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Dublin Airport Air Quality Monitoring  
Q3 2017

HSSE Environment

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October 2017



**Dublin Airport Air Quality Monitoring Report  
Quarter 3 2017**



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**Glossary**

<b>Abbreviation</b>	<b>Definition</b>
EPA	Environmental Protection Agency
NO	Nitrogen Oxide
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Oxides of Nitrogen
PM <sub>10</sub>	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**

<b>Issue No:</b>	<b>Prepared by:</b>	<b>Reviewed by:</b>	<b>Date:</b>
V1	HSSE – Project Officer	HSSE – Environmental Manager	03/11/2017

## **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 as well as at 10 separate locations outside the airport boundary using passive diffusion tube sampling. Air monitoring locations are listed in Table 1 and presented as Figure 1 of this report. This report provides an overview of the results of air quality monitoring during Q1, Q2, and Q3 of 2017.

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. It should be noted that there is no requirement under the Regulations for individual companies or operators to carry out air monitoring. 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 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 2015, Key Indicators of Ambient Air Quality was published in 2016 and is available on the EPA website.

Data collected from each monitoring location presented in this report was well within the limit values mandated in the Regulations over the reported for 2017. Similarly, data collected since implementation of the air quality monitoring programme has been found to be well within the limit values mandated in the Regulations.

daa is in the process of engaging with the EPA regarding the location of the continuous air quality monitoring station.

## **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, Swords Village is located 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 1 km east 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 10 external monitoring locations in the vicinity of the airport over the period Q1, Q2, and Q3 of 2017. 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. This report compares the data collected during the daa monitoring programme with limit values contained in The Ambient Air Quality Standards Regulations 2011 (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<sub>2</sub>)
- Oxides of nitrogen NO<sub>x</sub> (NO and NO<sub>2</sub>)
- Carbon monoxide (CO)
- Ozone (O<sub>3</sub>)
- Particulate Matter (PM<sub>10</sub>)

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

- Benzene
- Ethylbenzene
- m- and p-Xylene
- o-Xylene
- Toluene
- Ozone

All monitoring results are reviewed by daa on a continuous basis. Results have been consistently below limit values (where limits exist).

The EPA notes in its latest report that vehicle emissions are the main source of NO<sub>x</sub>, CO and benzene compounds, with fuel burning (industrial and domestic) the primary source of SO<sub>2</sub> emissions, while both contribute to PM<sub>10</sub> levels. To date and in line with air quality reporting at many airports, daa has focussed reporting on the most important parameters:

- Nitrogen Dioxide (NO<sub>2</sub>) and Particulate Matter (PM<sub>10</sub>) at the DAP automatic station; and
- Nitrogen Dioxide (NO<sub>2</sub>) and Benzene using diffusion tubes at 10 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 <sup>1</sup>	NO <sub>2</sub> PM <sub>10</sub>
A1	Forrest Little Golf Club.	Passive Tubes	NO <sub>2</sub> Benzene
A2	Kilreesk Lane, St. Margaret's.	Passive Tubes	
A3	Ridgewood Estate West, Swords.	Passive Tubes	
A4	St. Margaret's School and Parish House.	Passive Tubes	
A5	Fire Station, Huntstown, Dublin Airport.	Passive Tubes	
A6	Southern Boundary Fence, Dublin Airport	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	

Table 1 Community Ambient Air Quality Monitoring Locations

### Note

1. A review of the Air Quality Monitoring Station location will be undertaken in 2017.



Figure 1 Air Quality Monitoring Locations



### **3.0 Parameters and Sampling Methodology**

#### **3.1 Offsite Passive Sampling:**

##### **3.1.1 Nitrogen Dioxide (NO<sub>2</sub>) and Benzene (C<sub>6</sub>H<sub>6</sub>)**

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 a year to date mean, presented in Figure . The tubes are analysed using UV Spectrophotometry at a UKAS (United Kingdom Accreditation Service) accredited laboratory. Results are expressed in µg/m<sup>3</sup> (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. Additionally, 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 as and when required. The monthly calibration process takes approximately 24 hours, data collection resumes after this 24-hour period. In Q1, Q2 and Q3 2017, due to down times during calibration, approximately 95% of NO<sub>2</sub> data was captured, the capture of PM<sub>10</sub> data was approximately 88%.

##### **3.2.2 Nitrogen Dioxide (NO<sub>2</sub>)**

Onsite monitoring of NO<sub>2</sub> is carried out on a continuous basis at the stationary airport monitoring station. Measurement of NO<sub>2</sub> is carried out using a Horiba APNA-370 ambient NO<sub>x</sub> monitor which employs a cross-flow modulated chemiluminescence method.

##### **3.2.3 Particulate Matter (PM<sub>10</sub>)**

PM<sub>10</sub> is defined as airborne particulate matter with an aerodynamic diameter equal to or less than 10µm. PM<sub>10</sub> is monitored on a continuous basis at the airport monitoring station. This PM<sub>10</sub> instrument automatically measures and records

airborne particulate concentration levels using the principle of beta ray attenuation. The sampler monitors the PM<sub>10</sub> 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<sub>10</sub> sampling. The results are expressed in µg/m<sup>3</sup>.

#### 4.0 Monitoring Results

#### 4.1 Offsite NO<sub>2</sub> Monitoring Results

Figure 2 presents the year to date (Jan – September inclusive) mean NO<sub>2</sub> concentration for each location based on the monthly passive tube sampling. The Regulations mandate an annual mean limit value of 40 µg/m<sup>3</sup> for NO<sub>2</sub>. Figure 2 shows Average Monthly NO<sub>2</sub> Concentrations Q1, Q2, Q3 2017. As can be seen from **Figure 2**, the year to date mean values were below the annual limit value at all monitoring locations over the period Q1, Q2, Q3 2017.

*\*A6 and A7 locations closest to motorway.*

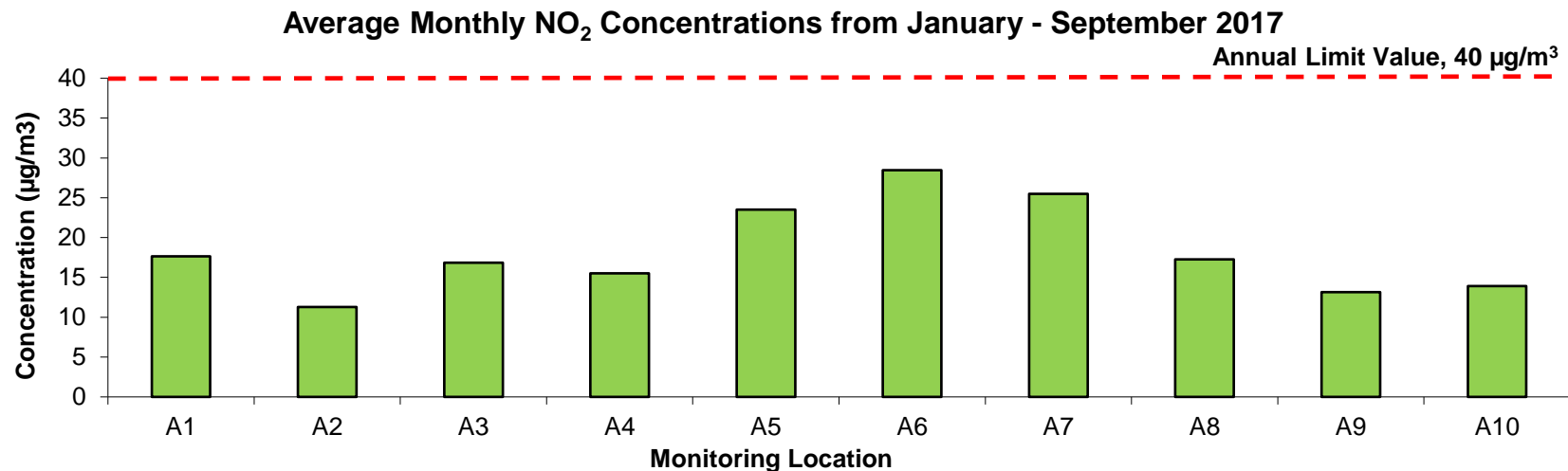


Figure 2: Average NO<sub>2</sub> Concentrations: January - September 2017

### 4.2 Offsite Benzene Monitoring Results

Figure 3 presents the year to date mean (Jan – September inclusive) Benzene concentration for each location based on the monthly passive tube sampling. The Regulations mandate an annual mean limit value of 5 µg/m<sup>3</sup> for Benzene. As can be seen from Figure 3, the year to date mean values were below the annual limit value of 5 µg/m<sup>3</sup> and less than 1 µg/m<sup>3</sup> at all monitoring locations.

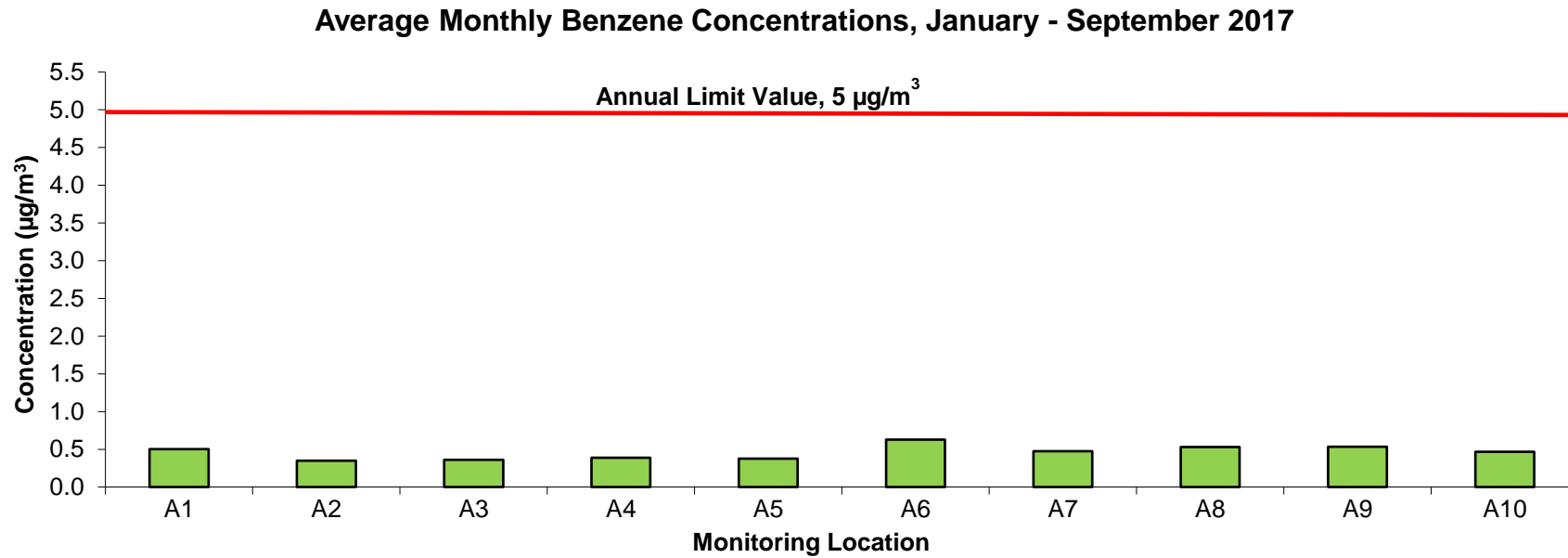


Figure 3: Average Monthly Benzene (C<sub>6</sub>H<sub>6</sub>) Concentrations Q1, Q2, Q3 2017

### 5.0 On-site Airport Monitoring Station Results

#### 5.1 On-site Airport Monitoring Station Results: Daily Average NO<sub>2</sub>

NO<sub>2</sub> concentrations are measured at the automatic station at DAP. Figure 4 presents the daily average NO<sub>2</sub> concentrations measured during the period Q1, Q2 and Q3 of 2017. The equivalent average for the period is 19.55 µg/m<sup>3</sup>.

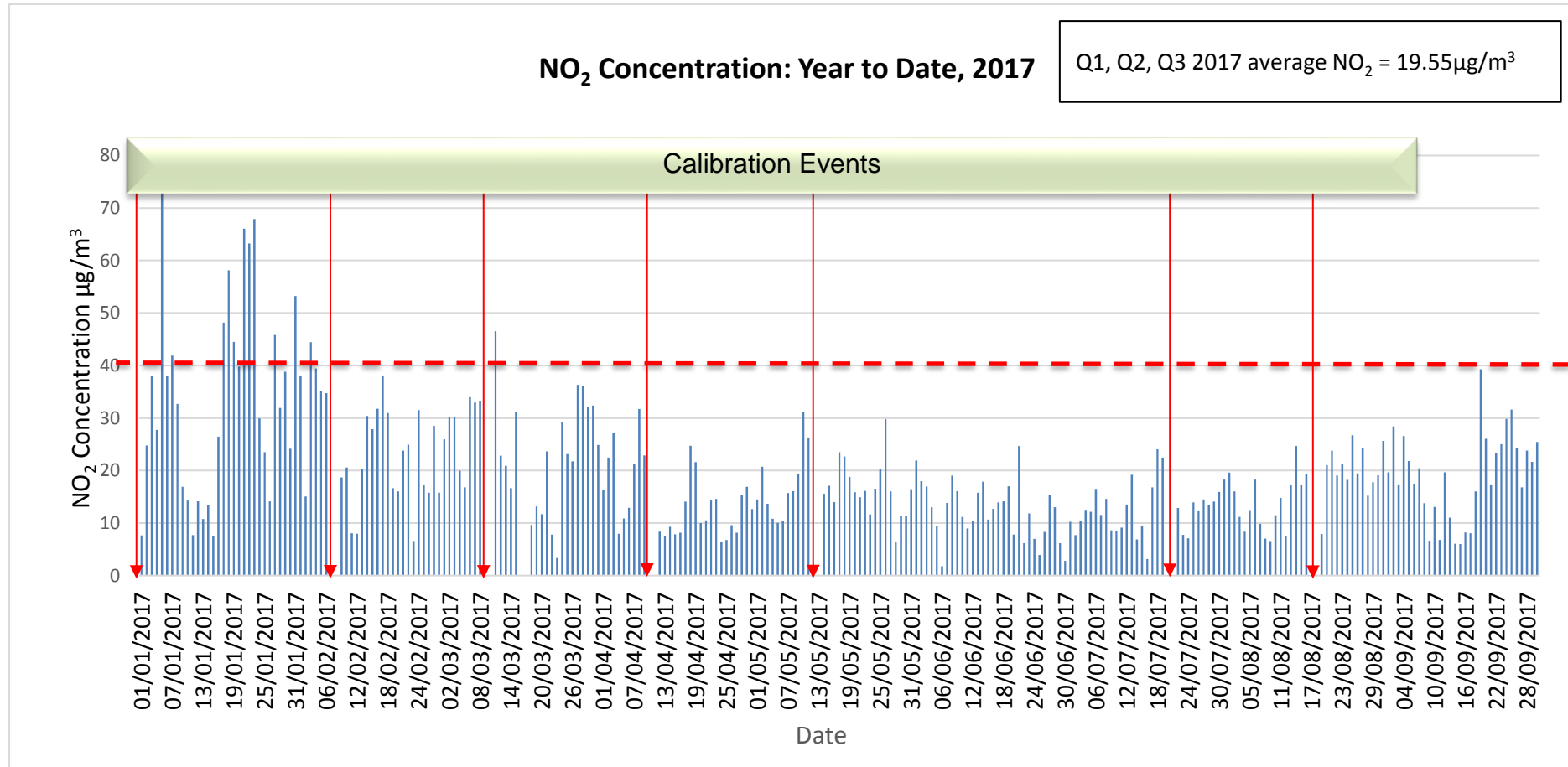


Figure 4: NO<sub>2</sub> Concentrations Year to Date

## 5.2 On-site Airport Monitoring Station Results: PM<sub>10</sub>

Daily average PM<sub>10</sub> concentrations recorded at the automatic station in DAP in Q1, Q2 and Q3 2017 are presented in **Error! Reference source not found.**. The mean PM<sub>10</sub> was calculated as 21.88 µg/m<sup>3</sup>. The Regulations set a 24 hour PM<sub>10</sub> limit value of 50 µg/m<sup>3</sup>, and an annual mean limit value of 40 µg/m<sup>3</sup> as shown in Table 3.

Objective	Averaging Period	Limit or Threshold Value (µg/m <sup>3</sup> )	No. of Allowed Exceedances	No. of Exceedances (Year to date)
PM <sub>10</sub> Limit Value	24 hour	50	Not to be exceeded on more than 35 days per year	4
PM <sub>10</sub> Limit Value	Calendar Year	40	NA	NA

**Table 2: PM<sub>10</sub> Limit Values**

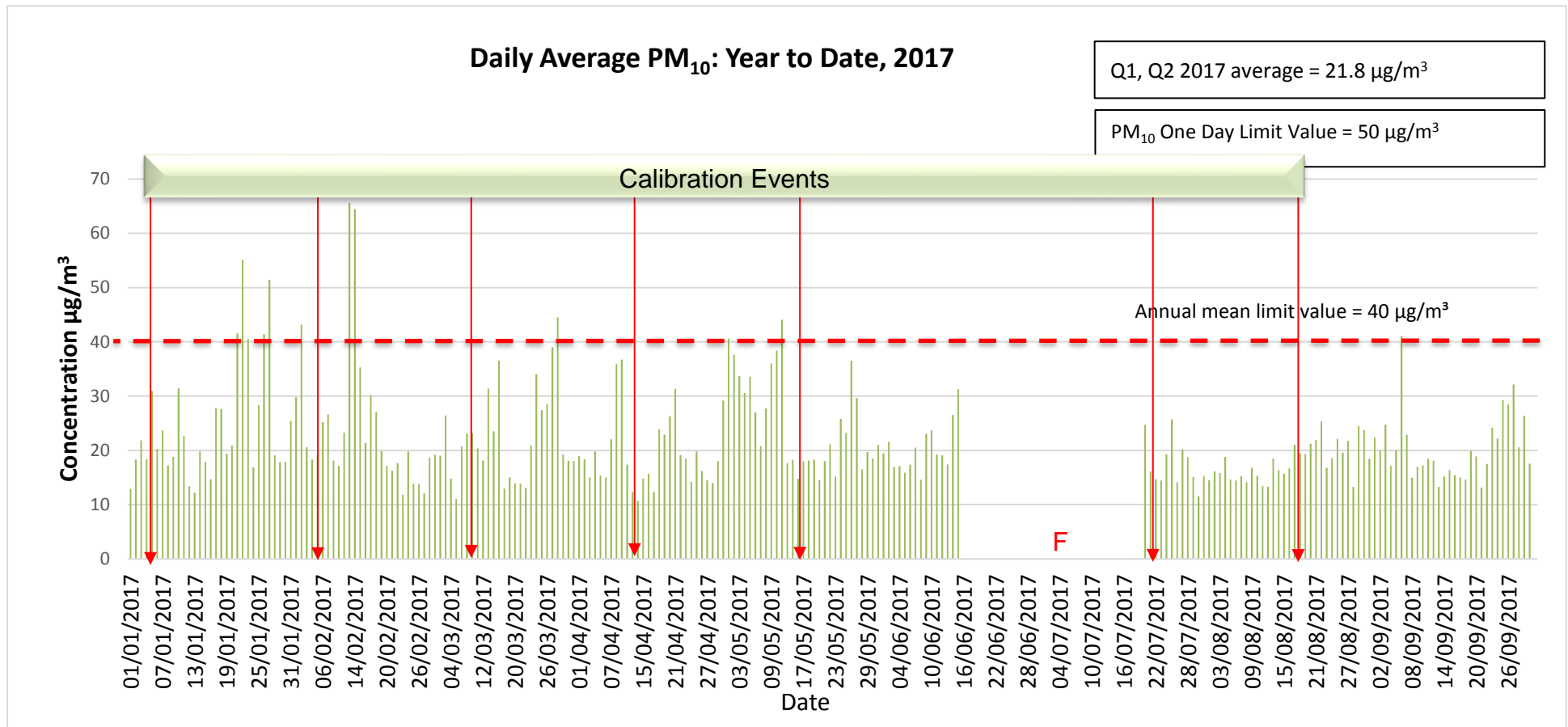


Figure 5: PM<sub>10</sub> Concentrations Year to Date

F – Air monitoring Station Fault

### **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 0 of this report, diffusion tubes results for benzene indicate that the average concentrations are well below the national limit value at all locations. It is also worth noting that results for benzene are lowest during the summer months when aircraft activity is highest, which suggests that aviation is not the primary source of this activity.

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 NO<sub>2</sub> and PM<sub>10</sub> concentrations using the online analyser indicate concentrations are well below the relevant annual limit value of 40µg/m<sup>3</sup> and well within the allowed range for short term limit values.

Offsite Monitoring: The diffusion tube results for NO<sub>2</sub> indicate that the highest concentrations are recorded adjacent to the main roads around the airport. The monitoring locations A6 and A7 are only a few metres from the road and are therefore influenced by roadside vehicle emissions. Readings further away from the roadways are much lower and similar to the levels recorded at the on-site station. All concentrations are below the annual average limit value for NO<sub>2</sub>. Diffusion tube results for benzene indicate that concentrations at all locations are well below the annual average limit value.