Dublin Airport Air Quality Monitoring
Q2 2018

HSSE Environment

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Dublin Airport Air Quality Monitoring Quarter 2 Report 2018

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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 10 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 H1 2018. 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 2016, Key Indicators of Ambient Air Quality was published in 2017 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 in H1 2018. 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.

The current location of the DAP air quality monitoring station adjacent to an increasingly active construction compound may have contributed to elevated readings of PM_{10}. 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 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 2.5km 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 10 external monitoring locations in the vicinity of the airport in H1 2018. 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:

- 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. Results are consistently below limit values (where limits exist).

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 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[1]	**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,	Passive Tubes	
A10	Oscar Papa Site, Portmarnock.	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 H1 2017, due to down times during calibration, approximately 95% of NO_2 data was captured, the capture of PM_{10} data was approximately 95%

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 for each location based on the monthly passive tube sampling. The Regulations mandate an annual mean limit value of 40 µg/m³ for NO_2. As can be seen from Figure 2, the annual mean values were below the limit value at all monitoring locations in H1 2018.

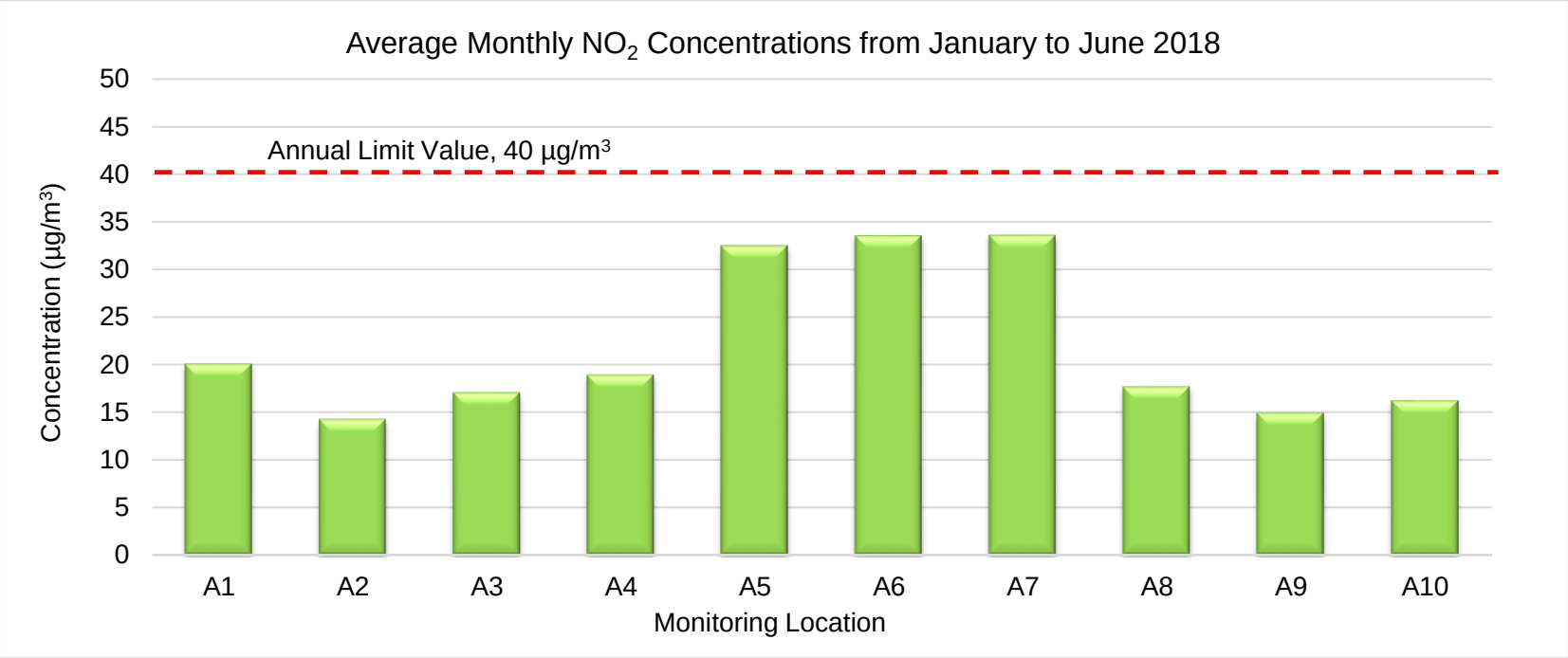

Figure 2 Average Monthly NO_2 Concentrations H1 2018

**A6 and A7 locations closest to motorway.*

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.

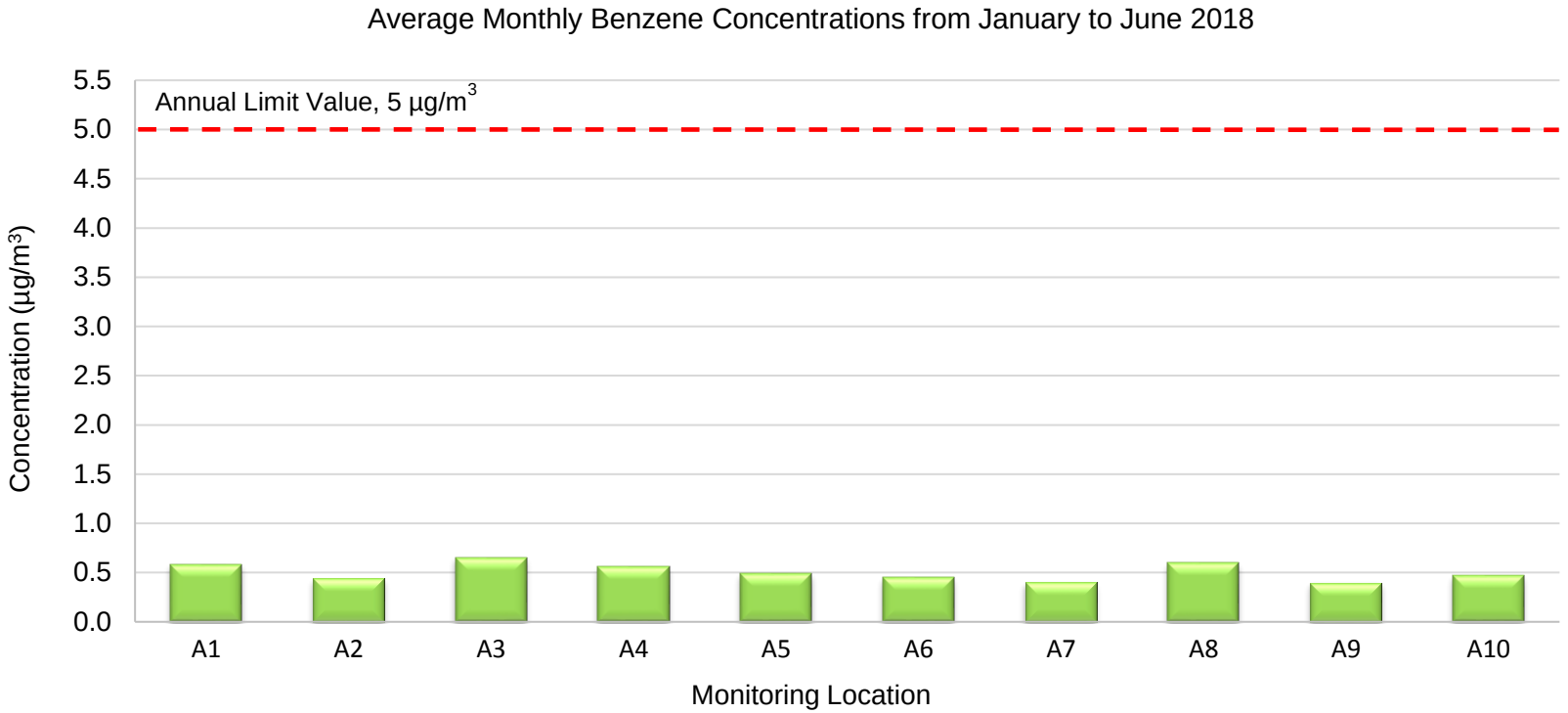

Figure 3 Average Monthly Benzene (C_6H_6) Concentrations H1 2018

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.

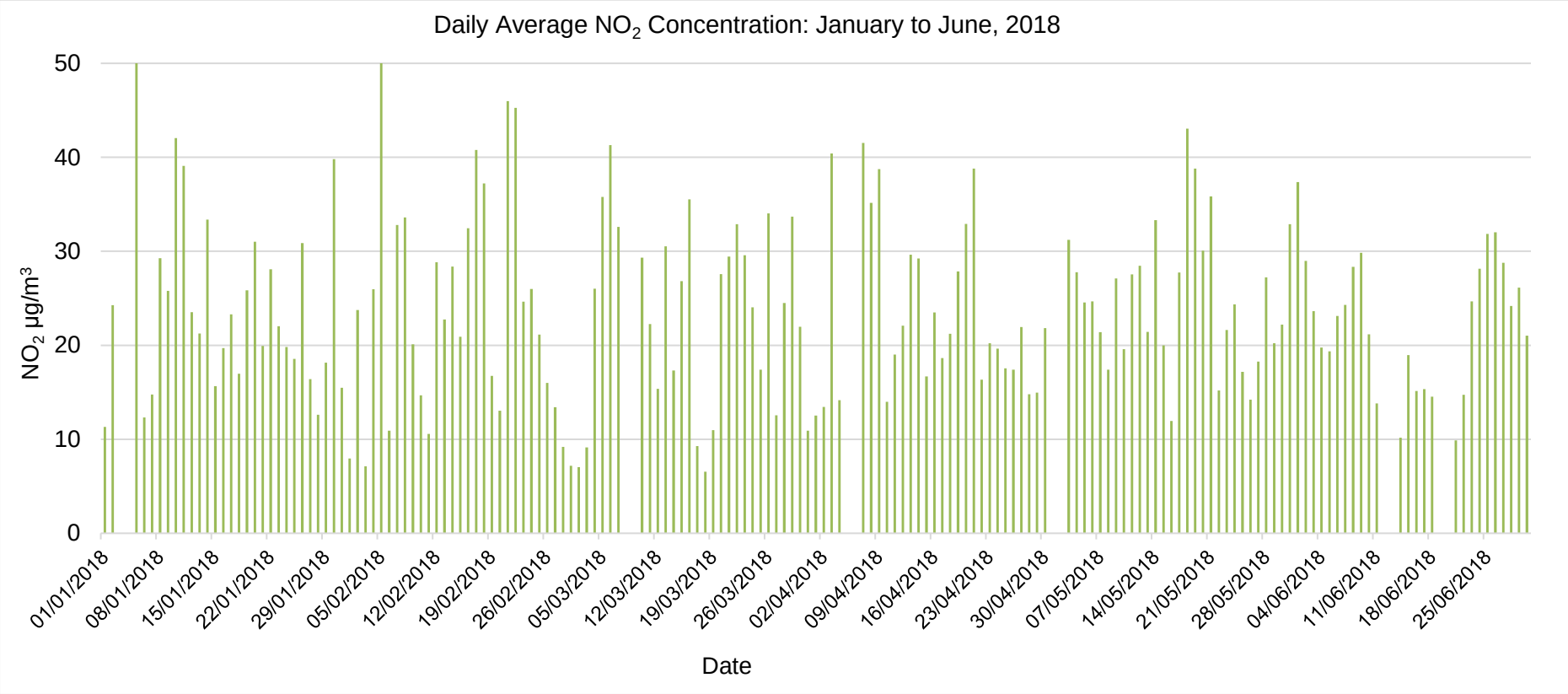

Figure **4** presents the daily average NO_2 concentrations measured during H1 2018. The equivalent daily average was calculated as 24 µg/m^3.

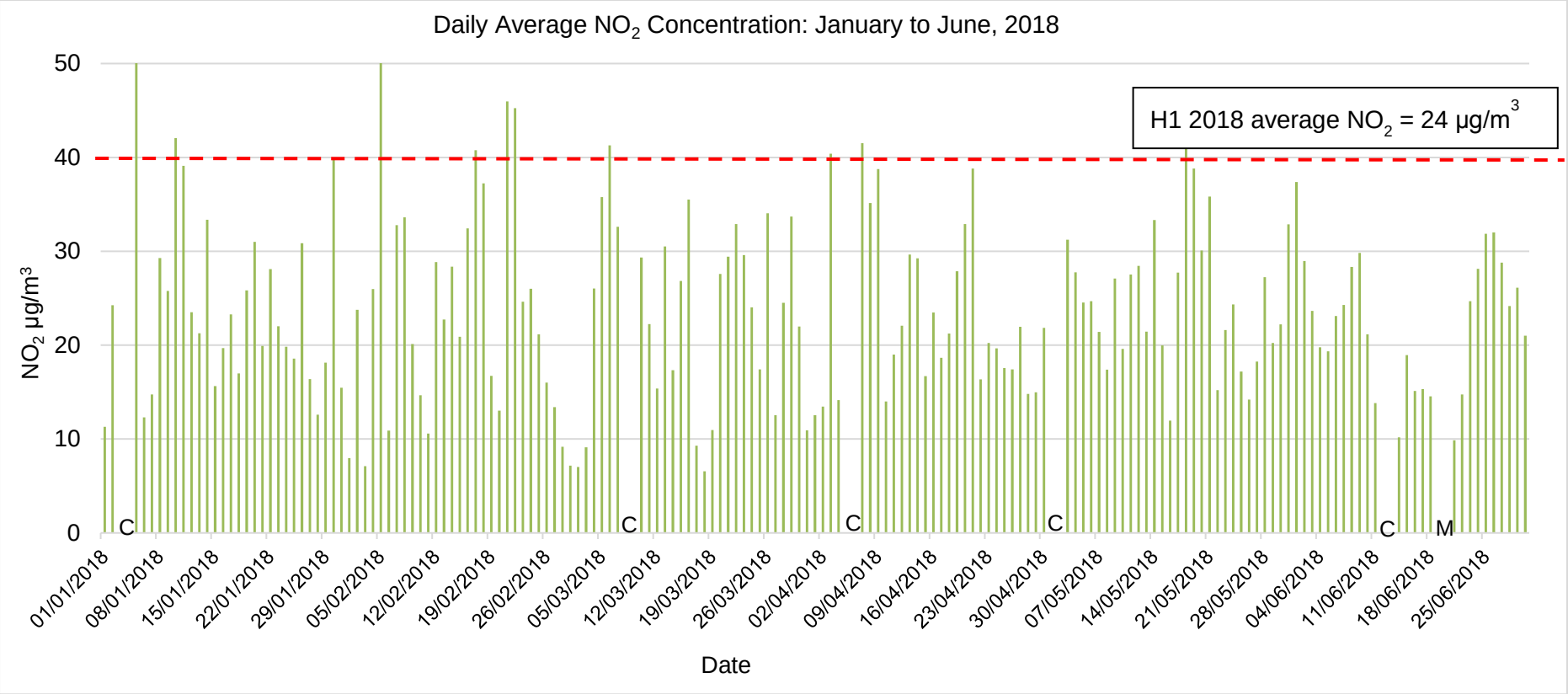

Figure 4 Daily Average NO_2 H1 2018

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

Daily average PM_{10} concentrations recorded at the automatic station in DAP in H1 2018 are presented in Figure 5. The average PM_{10} was calculated as 23 µg/m^3. 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

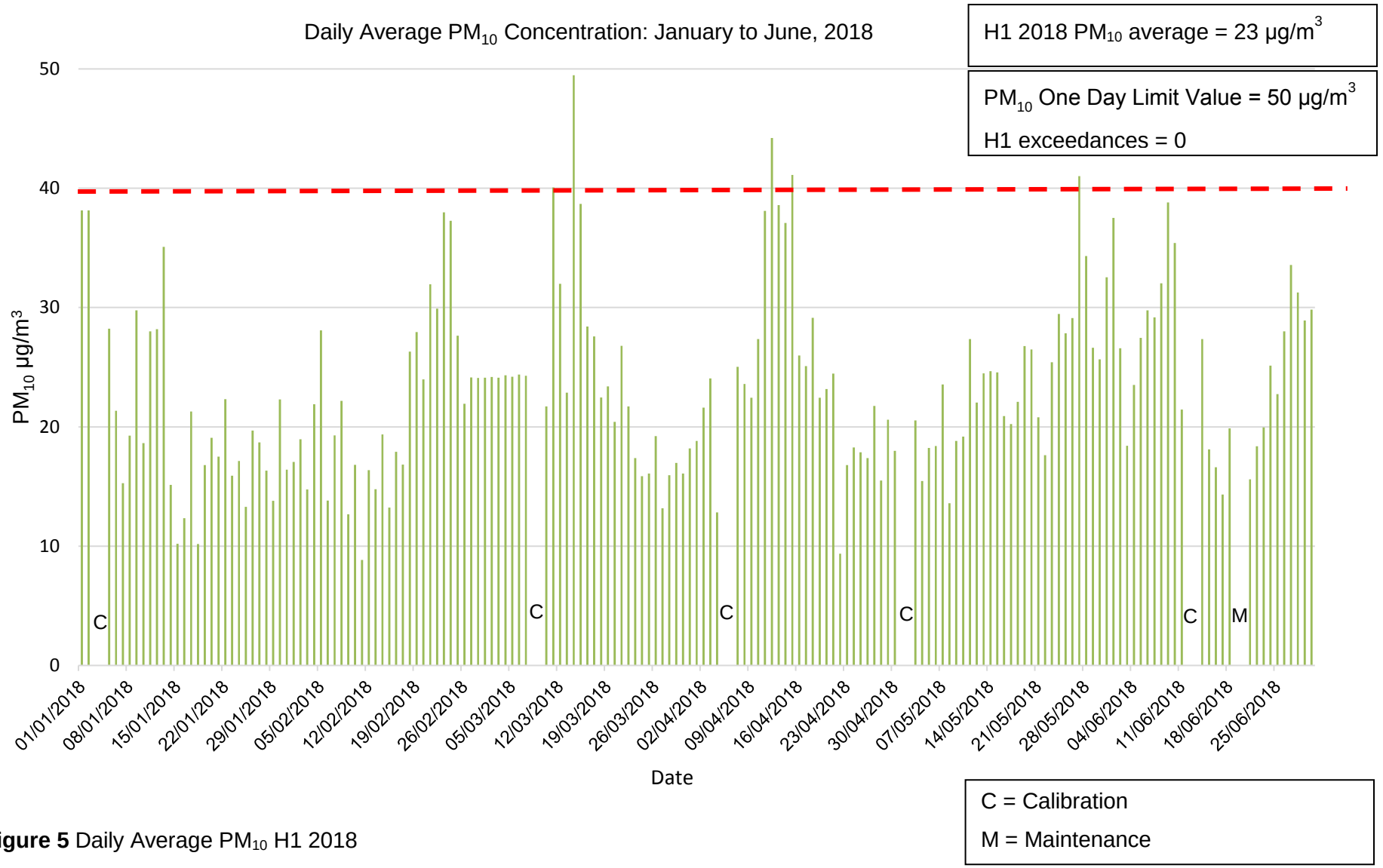

Figure 5 Daily Average PM_{10} H1 2018

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.

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_2 and PM_{10} concentrations using the online analyser indicate concentrations are well below the relevant annual limit value of 40µg/m³ and well within the allowed criteria of short term limit values.

Offsite Monitoring: The diffusion tube results for NO_2 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 concentrations which are close to the vehicular emission source. Concentrations further away from the roadways are much lower and similar to the concentrations recorded at the on-site station. All concentrations are below the annual average limit value for NO_2. Diffusion tube results for benzene indicate that concentrations at all locations are well below the annual average limit value.