

# Air Quality Monitoring at Dublin Airport: Q1-Q3 2015

HSSE Department



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## Glossary

### Abbreviation Definition

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 of particle size less than 10 microns in diameter.

C<sub>6</sub>H<sub>6</sub> Benzene

AQIH Air Quality Index for Health

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## Executive Summary

This report provides an overview of air quality at Dublin Airport and surrounding environs for the first three quarters of 2015, based on data obtained from the onsite monitoring station and diffusion tube monitoring in the surrounding areas. This includes the following parameters: nitrogen dioxide (NO<sub>2</sub>); particulate matter (PM<sub>10</sub>) and benzene (C<sub>6</sub>H<sub>6</sub>).

daa carries out extensive ambient air monitoring at Dublin Airport and the surrounding area. daa operate an air monitoring station on site at the airport and carry out diffusion tube monitoring in the surrounding areas. A list of these locations is presented in table 1.1 and Figure 1 enclosed within this report.

For comparison purposes the Ambient Air Quality Standards Regulations 2011 (SI 180 of 2011) are referenced. The Air Quality Standards Regulations do not require individual companies or operators to carry out air monitoring or compare the results with limit values specified in the Air Quality Standards Regulations. Monitoring for compliance with the Regulations is the responsibility of local authorities and is supervised by the competent authority under the Regulations, the EPA.

The results from each monitoring location are well below the ambient standards and are typical of urban and inter-urban areas. For national monitoring results carried out by the EPA and local authorities and information relating to air quality please visit [www.epa.ie](http://www.epa.ie). Up-to-date information including the Air Quality Index for Health is available at [www.airquality.epa.ie](http://www.airquality.epa.ie)

# 1. Introduction

## 1.1. Background

Dublin Airport is Ireland's busiest international airport, handling almost 22 million passengers in 2014. Dublin Airport covers a significant area of land in North Dublin, approximately two and a half thousand acres and is bounded on two sides by two of the busiest highways in the country – the M1 and the M50.

A list of the current ambient air quality sampling locations is given in Table 1. The spatial relationships of the sampling locations to the airport are indicated on a local area map in Figure 1.

## 1.2. Aims and Objectives

The aim is to monitor concentrations of air parameters around the airport. The results of the daa monitoring programme are compared with the limit values contained within the Regulations as a means of illustrating the general air quality at each location and not as a measure of compliance.

The parameters monitored were as follows:

- Nitrogen Dioxide ( $\text{NO}_2$ ) and Particulate Matter ( $\text{PM}_{10}$ ) using the automatic Dublin Airport Station
- Nitrogen Dioxide ( $\text{NO}_2$ ) and Benzene ( $\text{C}_6\text{H}_6$ ) using diffusion tubes at 9 locations

## 2. Monitoring Locations

A list of the ambient air quality sampling locations for 2015 is given in Table 1. The spatial relationships of the sampling locations to the airport are indicated on a local area map in Section 2.

<b>Table 1: Community ambient air monitoring locations</b>			
<b>Reference</b>	<b>Location</b>	<b>Measurement Method</b>	<b>Parameters Reported</b>
<b>On-site<sup>1</sup></b>	West of Castlemoate Road, Dublin Airport	Continuous analysers	Nitrogen dioxide (NO <sub>2</sub> ) Particulate Matter (PM <sub>10</sub> )
<b>A1</b>	Forrest Little Golf Club	Passive Tubes	Nitrogen dioxide (NO <sub>2</sub> ), Benzene (C <sub>6</sub> H <sub>6</sub> )
<b>A2</b>	Kilreesk Lane, St. Margaret's	Passive Tubes	
<b>A3<sup>2</sup></b>	Ridgewood Estate West, Swords	Passive Tubes	
<b>A4</b>	St. Margaret's School & Parish House	Passive Tubes	
<b>A5</b>	Fire Station, Huntstown, Dublin Airport	Passive Tubes	
<b>A6</b>	Southern Boundary Fence, Dublin Airport	Passive Tubes	
<b>A7</b>	Western Boundary Fence, Dublin Airport	Passive Tubes	
<b>A8</b>	St. Nicholas of Myra School, Malahide Road	Passive Tubes	
<b>A9</b>	Naomh Mearnóg GAA Club, Portmarnock	Passive Tubes	
<b>A10</b>	Oscar Papa Site, Portmarnock	Passive Tubes	

<sup>1</sup> Air Monitoring Station located in the vicinity of a construction compound.

<sup>2</sup> Ceased sampling due to unauthorised removal

## 2.1. Locations of Monitoring Sites

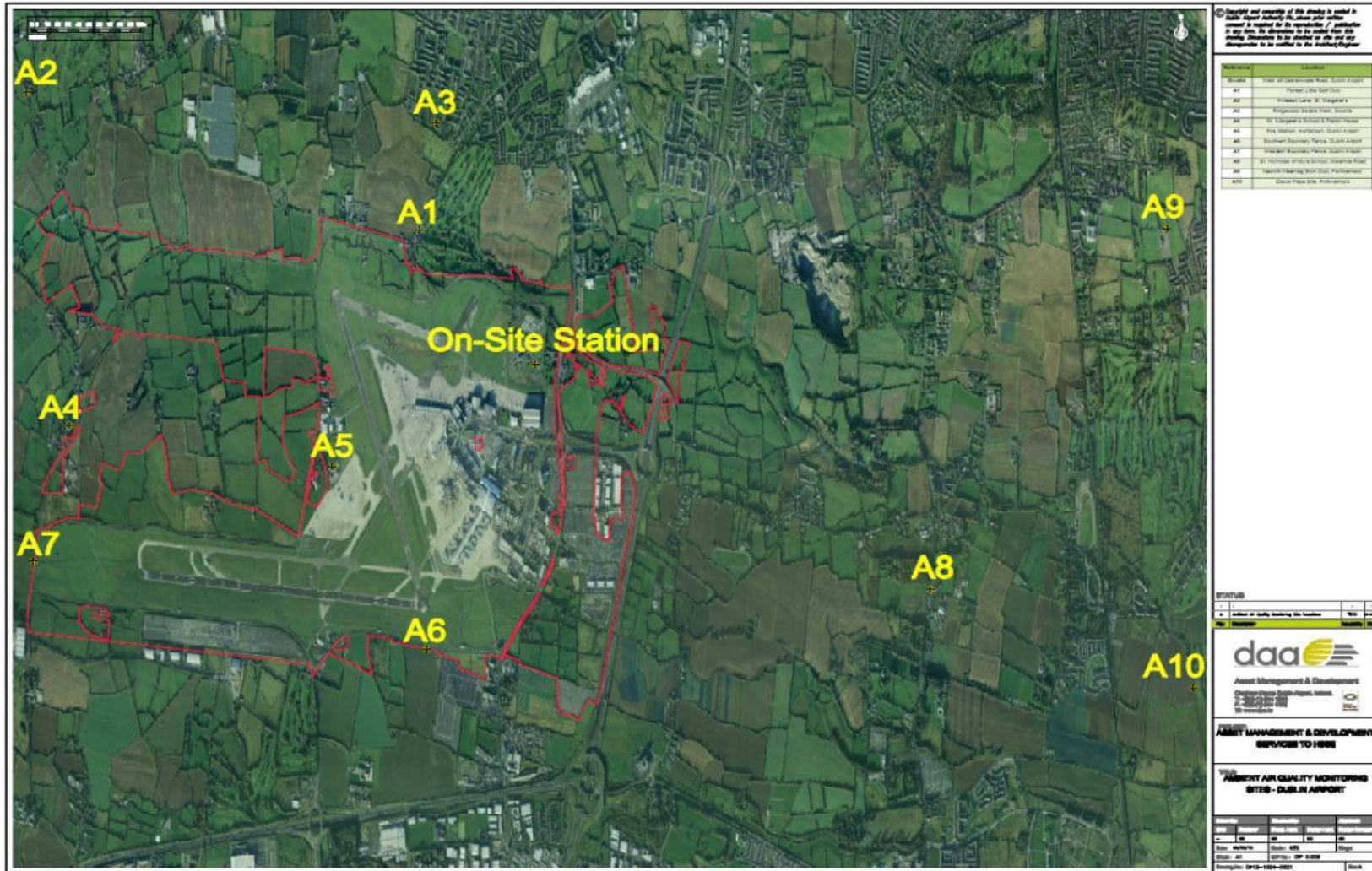


Figure 1: Map of Ambient Air Quality Monitoring Locations for Dublin Airport

## **3. Description of Parameters and Sampling Methodology**

### **3.1. Passive Sampling: Nitrogen Dioxide (NO<sub>2</sub>) & Benzene (C<sub>6</sub>H<sub>6</sub>)**

daa operates a network of passive diffusion tube samplers for nitrogen dioxide and benzene. The intent of this network is to establish the wider spatial pattern of NO<sub>2</sub> and C<sub>6</sub>H<sub>6</sub> concentrations in the area surrounding the Airport. The locations of the monitoring sites are shown in Figure 1 and are described in Table 1.1. The diffusion tubes are exposed for approximately 4-week intervals. The tubes are then analysed using UV Spectrophotometry at a UKAS accredited laboratory. The diffusion tubes record monthly mean concentrations, which have been averaged to give the mean. The results are expressed in µg/m<sup>3</sup>.

### **3.2. Onsite Sampling: Nitrogen Dioxide (NO<sub>2</sub>)**

Monitoring of NO<sub>2</sub> was carried out on a continuous basis at the airport monitoring location between January and early September 2015. Measurement of NO<sub>2</sub> was carried out, using a Horiba APNA-370 ambient NO<sub>x</sub> monitor which employs a cross-flow modulated chemiluminescence method.

Note: In early September 2015 the NO<sub>x</sub> monitor developed a fault at which point it stopped operating. The repair was completed on October 6<sup>th</sup>, meaning that the airport was unable to measure or record the NO<sub>2</sub> levels at the station during that period.

### **3.3. Onsite Sampling: Particulate Matter (PM<sub>10</sub>)**

Airborne particulate matter with an aerodynamic diameter equal to or less than 10µm was monitored using the onsite continuous analyser on a continuous basis at the airport monitoring location between January and September 2015. The Met One Instruments automatically measures and records airborne particulate concentration levels using the principle of beta ray attenuation. The sampler draws a measured volume of air through a chamber containing a pre-conditioned and pre-weighed filter according to USEPA protocol for PM<sub>10</sub> sampling. The results are expressed in µg/m<sup>3</sup>.



## 4. Community Monitoring Results

The diffusion tubes record monthly mean concentrations, which have been averaged to give the Q1-Q3 mean.

### 4.1 Average Monthly NO<sub>2</sub> Concentrations

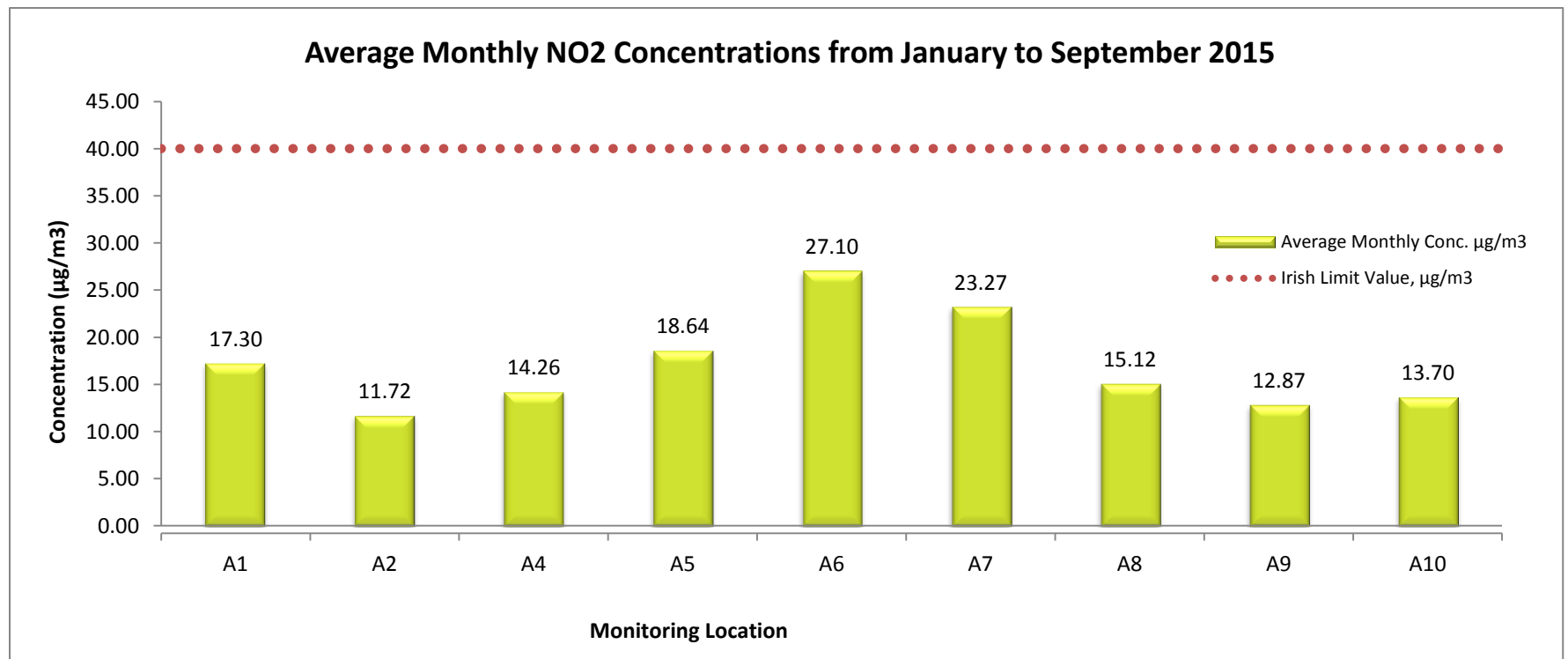


Figure 2: Average Monthly NO<sub>2</sub> Concentrations 2015 Q1-Q3

### 4.2 Average Monthly Benzene Concentrations

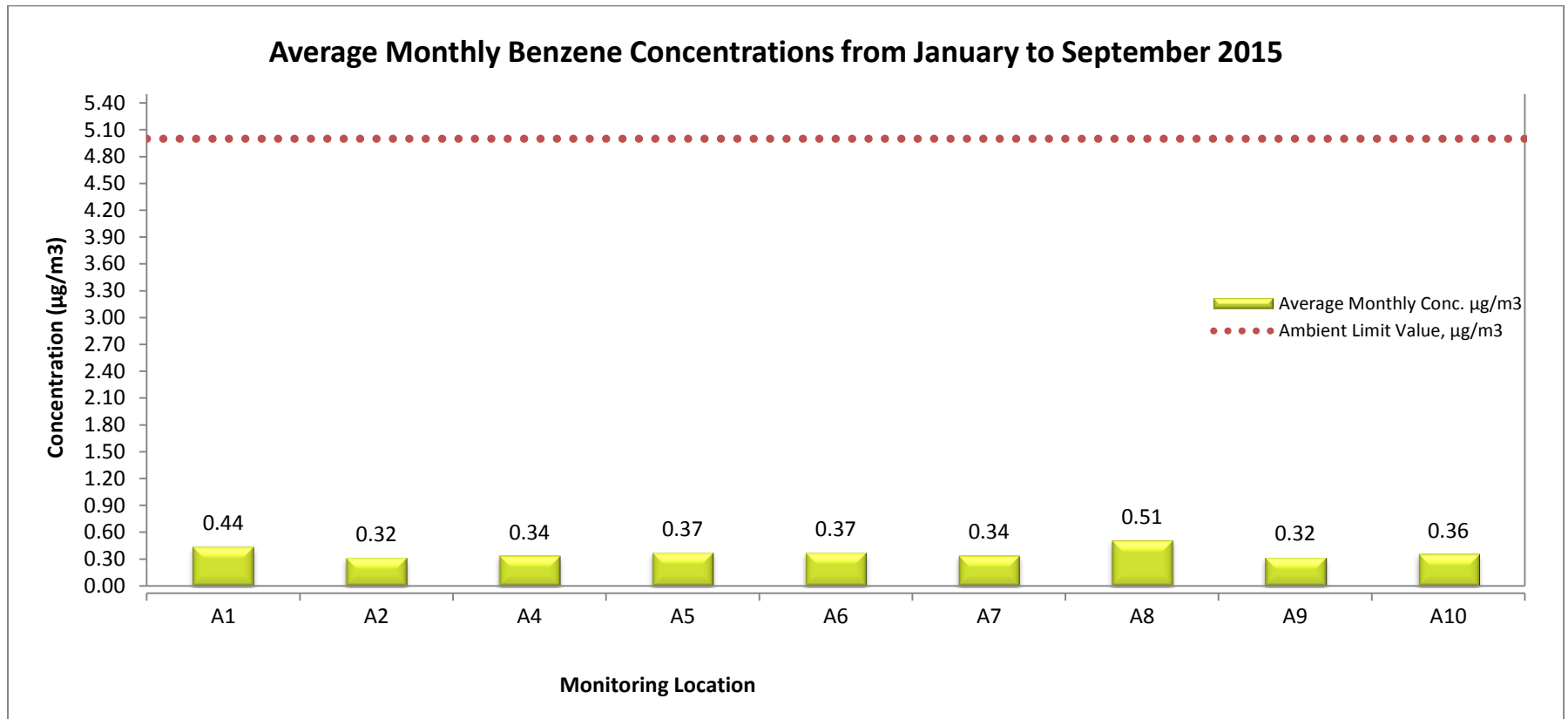


Figure 3: Average Monthly Benzene (C<sub>6</sub>H<sub>6</sub>) Concentrations 2015 Q1-Q3

## 5. On-site Airport Monitoring Station Results

### 5.1. Daily Average NO<sub>2</sub>

The 2015 Q1-Q3 average nitrogen dioxide concentration measured at the automatic station in Dublin Airport was 22.9 µg/m<sup>3</sup> (microgrammes per cubic metre).

**Table 2: Air Quality Limit and Target Values as set out by CAFÉ Directive and S.I. No. 180 of 2011**

Objective	Averaging Period	Limit or Threshold Value
NO <sub>2</sub> Limit Value	Calendar Year	40

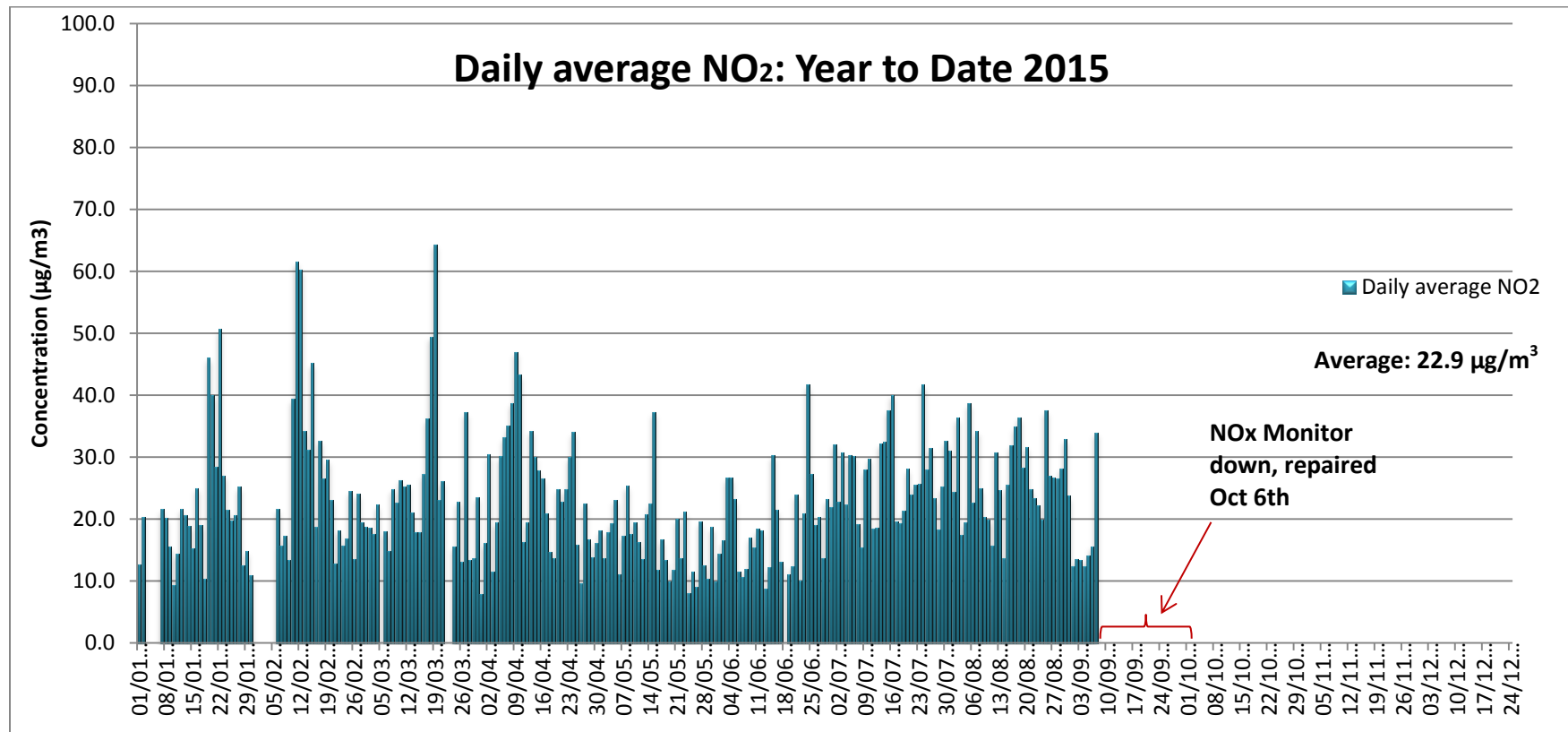


Figure 4: Daily Average NO<sub>2</sub> 2015

### 5.2. Daily average PM<sub>10</sub>

The 2015 Q1-Q3 average particulate matter concentration measured at the automatic station in Dublin Airport was 20.9 µg/m<sup>3</sup> (microgrammes per cubic metre). The 2015 Q1-Q3 daily value did not surpass the number of allowed exceedances as per the Ambient Air Quality Regulations.

**Table 3: Air Quality Limit and Target Values as set out by CAFÉ Directive and S.I. No. 180 of 2011**

Objective	Averaging Period	Limit or Threshold Value	No. of Allowed Exceedances	No. of Exceedances
PM <sub>10</sub> Limit Value	One day	50	Not to be exceeded on more than 35 days per year	3
PM <sub>10</sub> Limit Value	Calendar Year	40		0

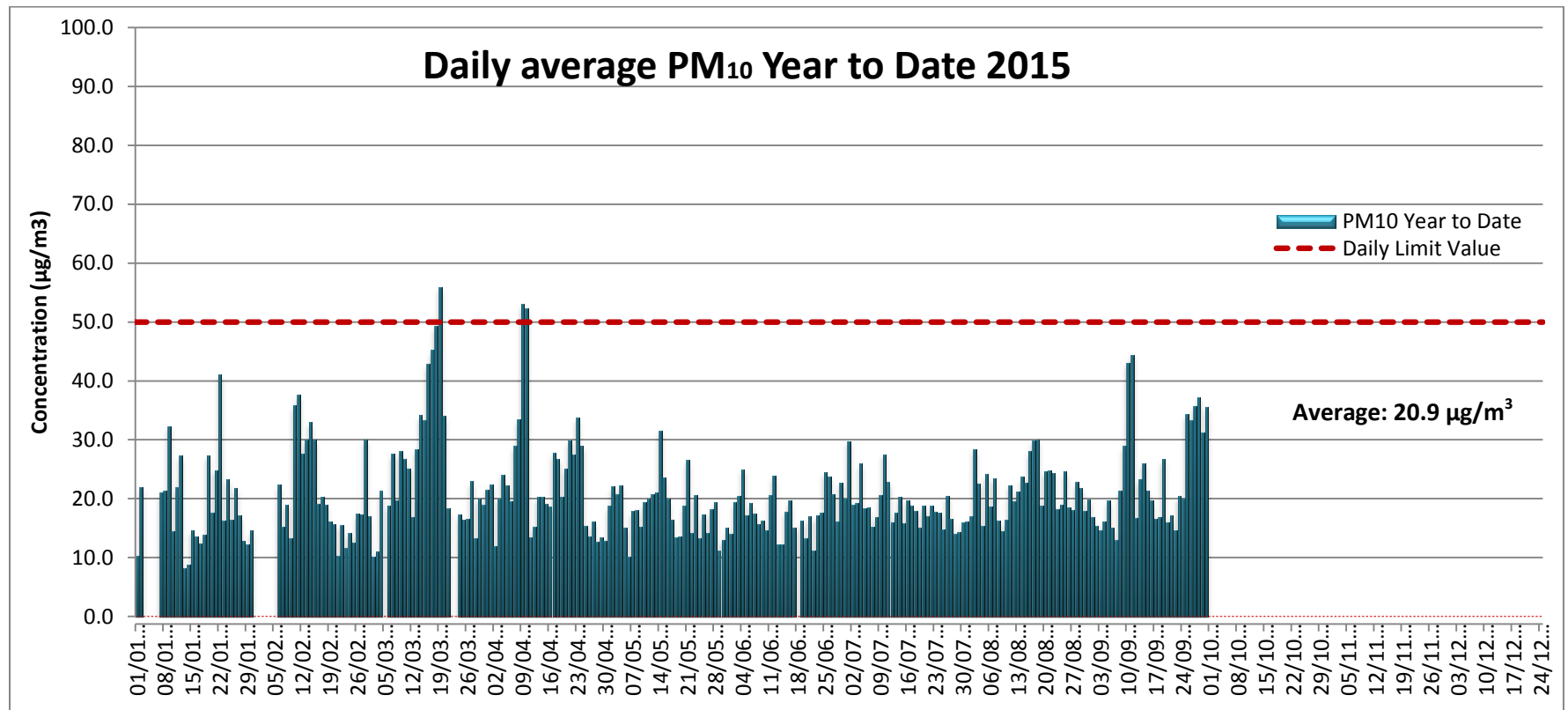


Figure 5: Daily Average PM<sub>10</sub> 2015

## 6. Results Summary

The results of the NO<sub>2</sub> and PM<sub>10</sub> concentrations using the online analyser indicate concentrations are below the relevant long-term (annual) limit value of 40µg/m<sup>3</sup> and within the allowed criteria of short term limit values.

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 are only a few metres from the road and therefore pick up on 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<sub>2</sub>.

In comparison with the relevant legislation, S.I. No. 180 of 2011 Air Quality Standards Regulations 2011, the levels of benzene detected at all locations are within the yearly average limit value of 5µg/m<sup>3</sup>.

The EPA is the designated Competent Authority in Ireland for the co-ordination of ambient air quality monitoring in accordance with EU Directive. The Environmental Protection Agency's Air Quality Index for Health (AQIH) is a number from one to 10 that tells you what the air quality currently is in your region and whether or not this might affect the health of you or your child. A reading of 10 means the air quality is very poor and a reading of one to three inclusive means that the air quality is good. The AQIH is calculated every hour. You can see the current readings on the [AQIH map](#). Reference: EPA (2014)