Comhairle Cathrach & Contae Luimnigh

Limerick City & County Council

Air Quality Report for Limerick

March 2021

Introduction

Limerick City and County Council currently has air quality monitors operating at three locations in the metropolitan area of Limerick to provide live indicative air quality data to the public. These monitors are located in Mungret, Castletroy and O'Connell Street.

The monitors measure particulate matter and gases, including nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO) and ozone (O_3). Real time data from these monitors can be accessed at www.airqweb.com.

The monitors were removed on February 10th 2021 and were in the UK for servicing and calibration through March 2021. A replacement particulate matter monitor was installed in Mungret to allow for continued data collection. The following report is a presentation of the results of that monitoring.

Particulate matter

Particulate matter (PM) which is commonly used as an indicator of dust particles in air, including total suspended particulates, PM_{10}, $PM_{2.5}$ and PM_1.

PM_{10} is particulate matter 10 microns or less in diameter, $PM_{2.5}$ is particulate matter 2.5 microns or less in diameter and PM_1 is particulate matter 1 micron or less. $PM_{2.5}$ is generally described as fine particulates. As a comparison, the width of a human hair is around 100 microns so approximately 40 $PM_{2.5}$ will fit along its width.

The particulate matter indices that are of primary concern for human health are PM_{10}, $PM_{2.5}$ and PM_1. These are the sub-fraction of particles, which can penetrate into the alveoli (air sacs) in the lungs. Chronic exposure to particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as of lung cancer.

Nitrogen dioxide

Nitrogen dioxide (NO_2) is produced during combustion at high temperatures with the main sources in Ireland being vehicles and power stations. Short-term exposure to NO_2 is linked to adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in asthmatics. Long-term exposure is associated with increased risk of respiratory infections in children.

Sulphur dioxide

Sulphur dioxide (SO_2) is a gas, which is formed when sulphur-containing fuels (e.g. coal and oil) are burned in power stations, domestically and elsewhere. Impacts of high concentrations of SO_2 include temporary breathing difficulties for those that suffer from respiratory conditions such as asthma. Long-term exposure to SO_2 can aggravate existing cardiovascular disease and respiratory illness.

Carbon monoxide

Carbon monoxide (CO) is a colourless gas, formed from incomplete oxidation during combustion of fuel. Outdoor sources of CO are mainly from vehicles with concentrations generally highest in areas of traffic congestion. CO enters the bloodstream through the lungs and impairs the delivery of oxygen to the body's organs and tissues. The health impact of CO concentrations in ambient air is most serious for those suffering cardiovascular disease such as angina.

Ozone

Ozone (O_3) is formed as a secondary pollutant in the troposphere from the chemical reaction of NO_x (the two pollutants nitric oxide, NO, and nitrogen dioxide, NO_2), CO and volatile organic compounds (VOCs) in the presence of sunlight. Ozone can also be present in the troposphere due to downward flux from the ozone-rich stratosphere, where it occurs naturally and has a role in absorbing harmful UV radiation. Ground-level ozone is depleted through reactions with traffic-emitted pollutants and so levels of ozone are higher in rural areas than in urban areas.

Ozone irritates the eyes, nose, throat and lungs. It can destroy throat and lung tissue leading to a decrease in lung function and respiratory symptoms such as coughing, shortness of breath, aggravated asthma and other lung diseases.

Air Quality Standards

The CAFE (Clean Air for Europe) Directive sets air quality standards for member states in Europe and has been transposed into Irish legislation by the **Air Quality Standards Regulations.** The limit values for particulates are given below.

Pollutant	Objective	Averaging Period	Limit Value	Basis of Application of the Limit Value	Limit Value Attainment Date
PM_{10}	Protection of human health	24-hours	50 µg/m^3	Not to be exceeded more than 35 times in a calendar year	1 Jan 2005
	Protection of human health	Calendar year	40 µg/m^3	Annual mean	1 Jan 2005
$PM_{2.5}$	Protection of human health	Calendar year	25 µg/m^3	Annual mean	1 Jan 2005
	Protection of human health	Calendar year	20 µg/m^3	Annual mean	1 Jan 2020
NO_2	Protection of human health	1-hour	200 µg/m^3	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
	Protection of human health	Calendar year	40 µg/m^3	Not to be exceeded more than 18 times in a calendar year	1 Jan 2010
SO_2	Protection of human health	1-hour	150 µg/m^3	Not to be exceeded more than 24 times in a calendar year	1 Jan 2005
	Protection of human health	24-hours	125 µg/m^3	Not to be exceeded more than 3 times in a calendar year	1 Jan 2005
CO	Protection of human health	Maximum 8-hour mean*	10mg/m^3	60% of the hourly running 8-hour averages	1 Jan 2005

**The maximum daily 8-hour mean concentration is selected by examining eight-hour running averages, calculated from hourly data.*

The World Health Organisation (WHO) provides air quality guidelines as follows:

Pollutant	Averaging period	Guideline
PM10	Calendar year	20 µg/m3
	24-hours	50 µg/m3
PM2.5	Calendar year	10 µg/m3
	24-hours	25 µg/m3
NO2	Calendar year	40 µg/m3
	1-hour	200 µg/m3
SO2	24-hour	20 µg/m3
	10-minutes	500 µg/m3
Ozone	8-hour	100 µg/m3

Air Quality in March

The graphs on the following pages show the 24-hourly mean values of, PM_{10}, $PM_{2.5}$, PM_{1}, for the month of March at the Mungret site only.

The PM and gas monitors at Castletroy and O'Connell St and the gas monitor at Mungret were removed for calibration on February 10th. A replacement particulate matter monitor was installed in Mungret to allow for continuation of data collection for PM_{10}, $PM_{2.5}$, $PM_{1.}$

Further information on air quality and health can be found at http://www.epa.ie/air/quality/index/#d.en.51478.

The long-term mean values for particulate matter and gases (NO_2, SO_2, CO and ozone) since the monitors were installed are shown in the table below and compared with the annual mean limits and guidelines.

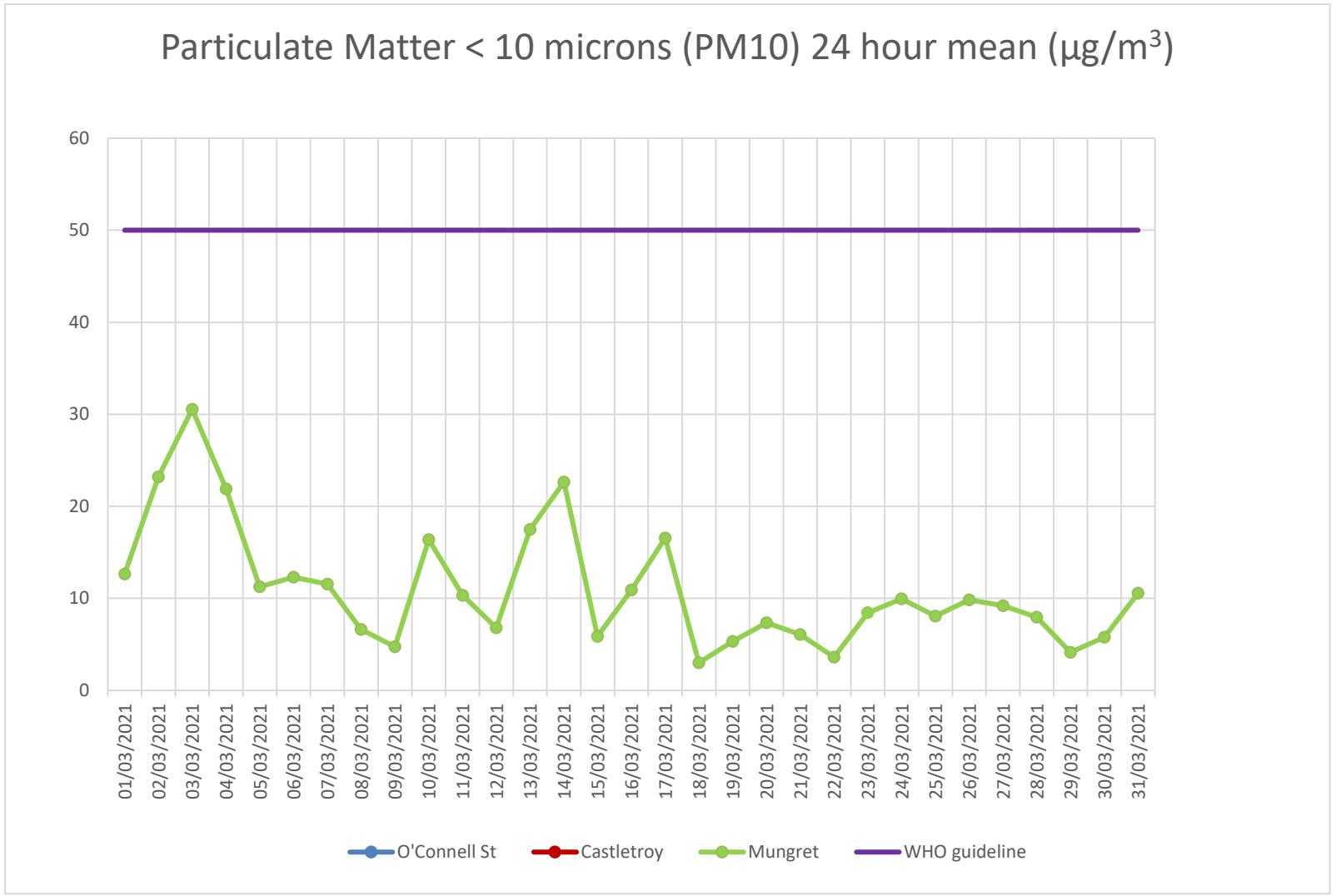
Parameter	Location	Measured long term mean ($\mu g/m^3$)	WHO annual mean guidelines ($\mu g/m^3$)	EU CAFÉ Directive annual mean limit ($\mu g/m^3$)
Total Particulates O Connell St August 18th 2020 – 10th Feb 2021 Castletroy March 4th 2020 – 10th Feb 2021 Mungret January 1st 2020 – 10th Feb 2021	O'Connell St	14µg/m³	None specified	None specified
	Castletroy	11µg/m³		
	Mungret	12µg/m³		
PM_{10} O Connell St August 18th 2020 – 10th Feb 2021 Castletroy March 4th 2020 – 10th Feb 2021 Mungret April 1st 2020 – 31st March 2021	O'Connell St	10µg/m³	20 µg/m³	40 µg/m³
	Castletroy	8 µg/m³		
	Mungret	9 µg/m³		
$PM_{2.5}$ O Connell St August 18th 2020 – 10th Feb 2021 Castletroy March 4th 2020 – 10th Feb 2021 Mungret April 1st 2020 – 31st March 2021	O'Connell St	8 µg/m³	10 µg/m³	20 µg/m³
	Castletroy	5 µg/m³		
	Mungret	6 µg/m³		
PM_1 O Connell St August 18th 2020 – 10th Feb 2021 Castletroy March 4th 2020 – 10th Feb 2021 Mungret April 1st 2020 – 31st March 2021	O'Connell St	4 µg/m³	None specified	None specified
	Castletroy	3 µg/m³		
	Mungret	3 µg/m³		
NO_2 March 4th 2020 -10th Feb 2021 Castletroy O Connell St Mungret	O'Connell St	23 µg/m³	40 µg/m³	40 µg/m³
	Castletroy	11 µg/m³		
	Mungret	10 µg/m³		
SO_2 March 4th 2020 -10th Feb 2021 Castletroy O Connell St Mungret	O'Connell St	10 µg/m³	40 µg/m³	None specified
	Castletroy	6 µg/m³		
	Mungret	6 µg/m³		
CO March 4th 2020 -10th Feb 2021 Castletroy O Connell St Mungret	O'Connell St	0.14 µg/m³	None specified	None specified
	Castletroy	0.10 µg/m³		
	Mungret	0.20 µg/m³		
Ozone March 4th 2020 -10th Feb 2021 Castletroy O Connell St Mungret	O'Connell St	44 µg/m³	None specified	None specified
	Castletroy	49 µg/m³		
	Mungret	50 µg/m³		

The maximum daily mean values for particulate matter, for March, are shown in the table below and compared with the WHO air quality guidelines where they exist.

Pollutant	**Total Particulates**	**PM_{10}**	**$PM_{2.5}$**	**PM_{1}**
Averaging period	**-**	**24-hours**	**24-hours**	**-**
Guideline	**None**	**50 µg/m³**	**25 µg/m³**	**None**
Maximum February '21 O'Connell Street	18 µg/m³ 03/02/21	14 µg/m³ 03/02/21	12 µg/m³ 03/02/21	06 µg/m³ 03/02/21
Maximum February '21 Castletroy	14 µg/m³ 03/02/21	11 µg/m³ 03/02/21	10 µg/m³ 03/02/21	06 µg/m³ 03/02/21
Maximum March '21 - Mungret	20 µg/m³ 09/02/21	30 µg/m³ 03/03/21	21 µg/m³ 03/03/21	16 µg/m³ 03/03/21

There were no exceedances of WHO guideline values for the month of March.

There were no recorded values for gases for March at the monitoring sites.


Particulate Matter < 10 microns (PM10) 24 hour mean (µg/m3)
60
50
40
30
20
10
0
01/03/2021
02/03/2021
03/03/2021
04/03/2021
05/03/2021
06/03/2021
07/03/2021
08/03/2021
09/03/2021
10/03/2021
11/03/2021
12/03/2021
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24/03/2021
25/03/2021
26/03/2021
27/03/2021
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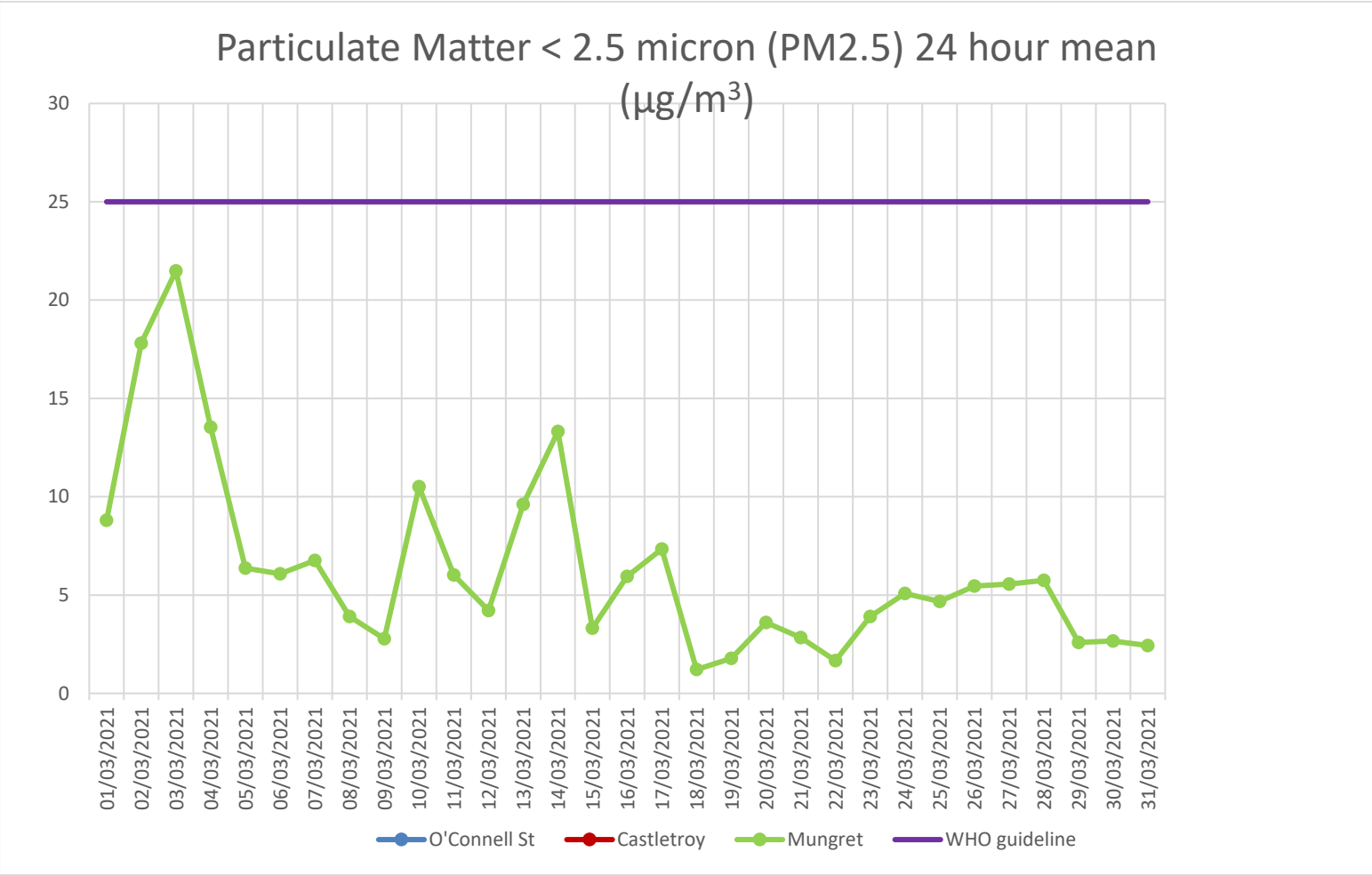
29/03/2021
30/03/2021
31/03/2021
O'Connell St
Castletroy
Mungret
WHO guideline


Particulate Matter < 2.5 micron (PM2.5) 24 hour mean (µg/m3)
30
25
20
15
10
5
0
01/03/2021
02/03/2021
03/03/2021
04/03/2021
05/03/2021
06/03/2021
07/03/2021
08/03/2021
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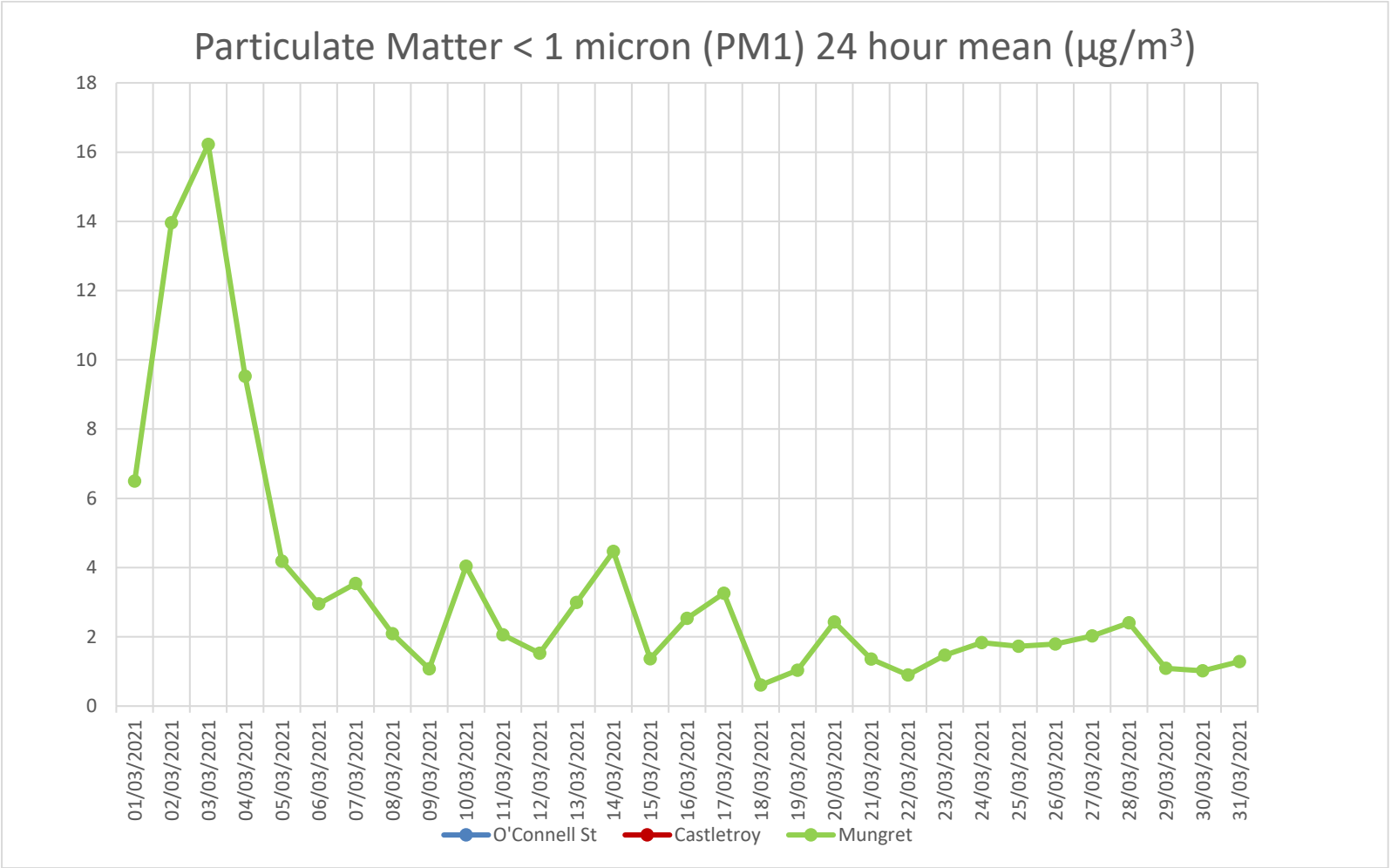
31/03/2021
O'Connell St
Castletroy
Mungret
WHO guideline


Particulate Matter < 1 micron (PM1) 24 hour mean (µg/m3)
18
16
14
12
10
8
6
4
2
0
01/03/2021
02/03/2021
03/03/2021
04/03/2021
05/03/2021
06/03/2021
07/03/2021
08/03/2021
09/03/2021
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31/03/2021
O'Connell St
Castletroy
Mungret