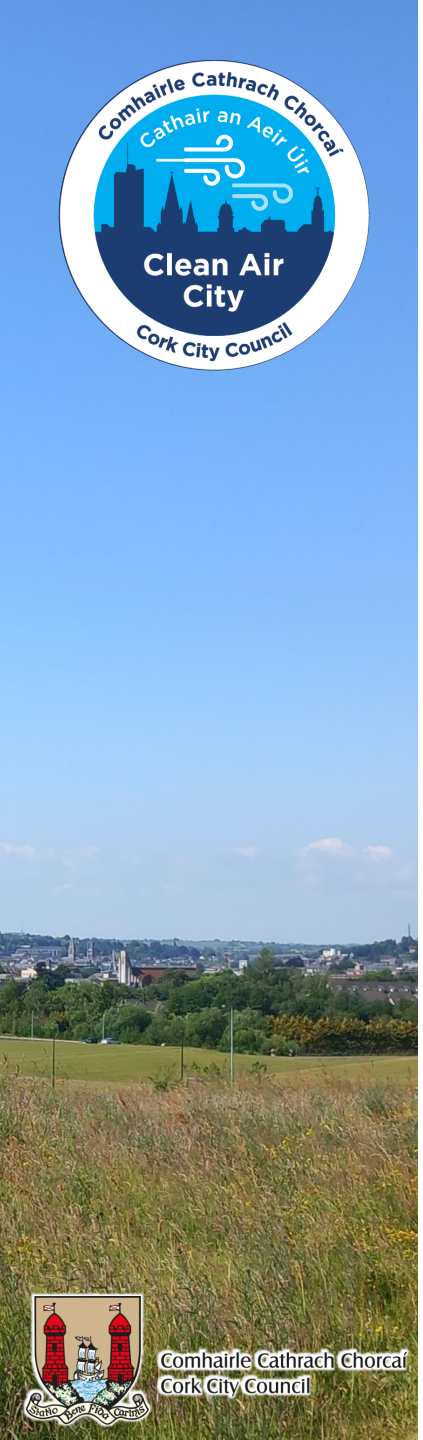
Air Quality in Cork City

Annual Report 2022

Cork City Council

Comhairle Cathrach Chorcaí
Cork City Council

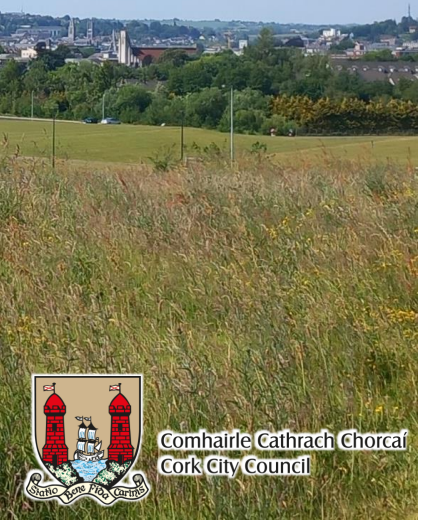


Document Control Sheet

Air Quality in Cork City

Annual Report 2022

Revision	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
0	First Draft	CF, AA, KR	KR	NM, DJ	July 2023
1	Final Version	CF, AA, KR	KR	NM, DJ	September 2023



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Acronyms and Key Terms

AQ = Air Quality

PM = Particulate Matter

$PM_{2.5}$ = Particulate Matter <2.5µm

PM_{10} = Particulate Matter <10µm

NO_2 = Nitrogen Dioxide

EPA = Environmental Protection Agency

EU = European Union

SEAI = Sustainable Energy Agency Ireland

WHO = World Health Organization

CAFE = Clean Air for Europe

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Summary

Air Quality in Cork City is generally good but is impacted by residential solid fuel burning and traffic.

Air Quality in Cork City is generally good but deteriorates during winter months and at heavy traffic points.

Emissions of fine particulate matter ($PM_{2.5}$) from burning solid fuels for home heating and from road traffic emissions (nitrogen dioxide, NO_2) are the main contributors to poor air quality.

Air monitoring carried out by the Environmental Protection Agency (EPA) and Cork City Council (CCC) in 2022 revealed that air pollution is within the current EU legal limits.

Live Air Quality monitoring for Cork City
https://corkairquality.ie/

Air Pollution and Health

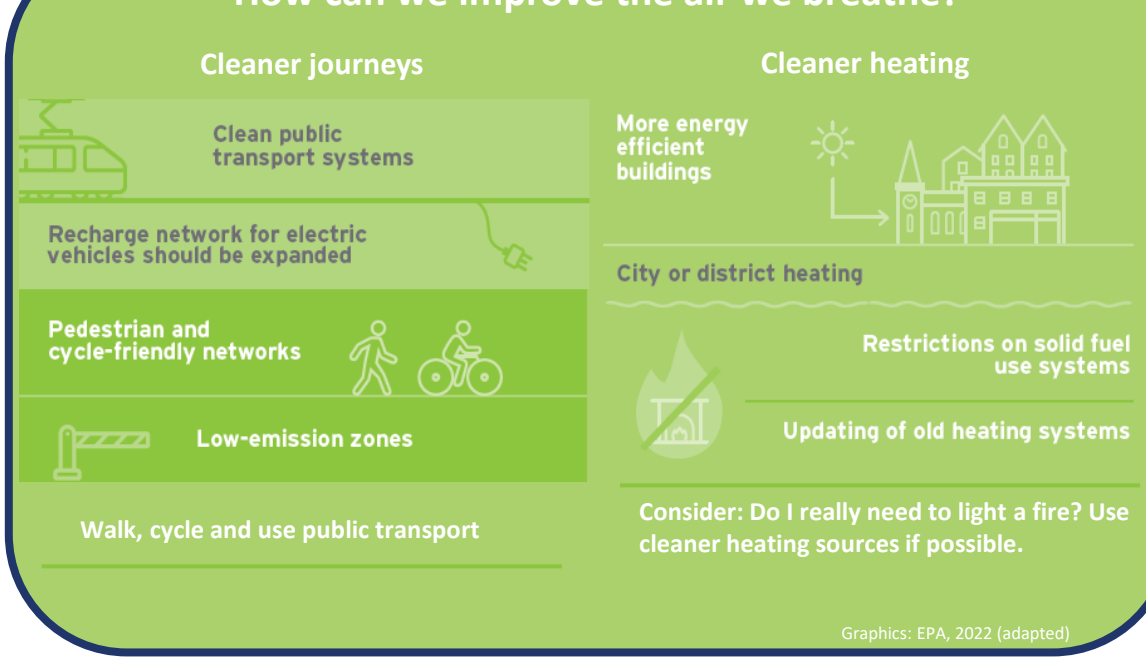
Air pollution is the single biggest environmental threat to human health, causing 1,300 premature deaths every year in Ireland (European Environment Agency, 2021).

In Cork City, this equates to 60 premature deaths every year, 116 for Cork County.

Health conditions related to air pollution include chronic and acute respiratory diseases, lung cancer, stroke and heart disease.

Meeting the new WHO Air Quality guidelines will be a major challenge for society. Ireland and Europe are aiming to move towards achieving the health based WHO Air Quality guidelines.

How can we improve the air we breathe?



Graphics: EPA, 2022 (adapted)

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Section 1 - Introduction - Key Air Pollutants

In Ireland, particulate matter (PM) from residential heating and Nitrogen dioxide (NO_2) from traffic are the two air pollutants most significant to our health.

Particulate Matter (PM)

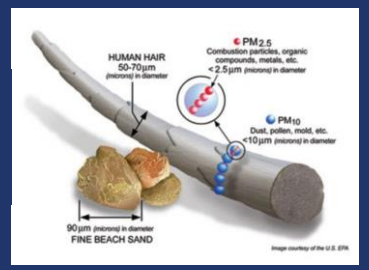
What is it? Particulate matter is a small solid or liquid particle. PM_{10} includes particles less than 10 µm in diameter, $PM_{2.5}$ includes particles less than 2.5 µm in diameter.

Where does it come from? The main source of fine particulate matter ($PM_{2.5}$) in Cork and Ireland is the burning of solid fuel for home heating (peat, coal, wood).

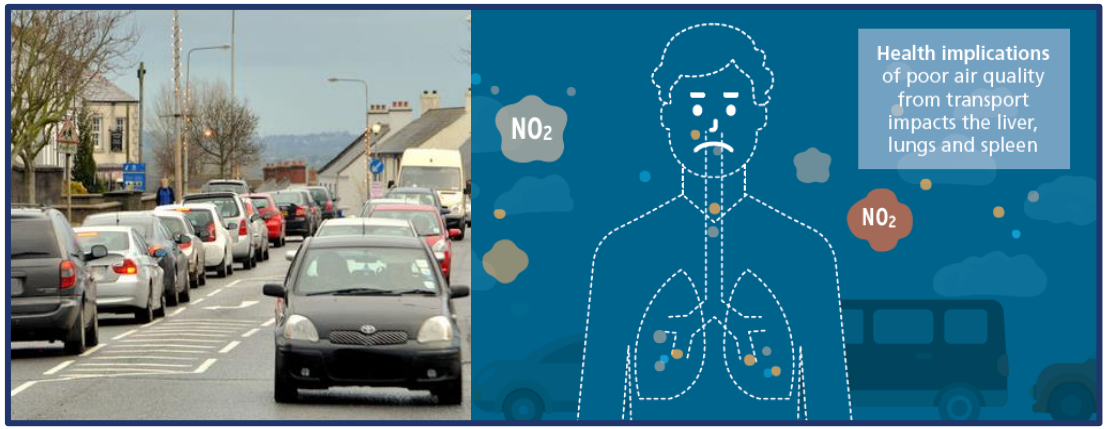
Why is it harmful? $PM_{2.5}$ is the air pollutant most harmful to our health. These particles are small enough to infiltrate deep into the lungs, causing respiratory damage, stroke and cardiovascular disease.

When does it cause the most harm? High $PM_{2.5}$ levels are of concern during winter as many houses in Cork city rely on solid fuels for home heating.

How big is particulate matter? Find out on the next page.



1µm = one micrometre = one millionth of a metre ($1x10^{-6}$m)



Graphics: EPA, 2022

Nitrogen Dioxide (NO_2)

What is it? Nitrogen Dioxide (NO_2) is an air pollutant in gaseous form.

Where does it come from? NO_2 is emitted by internal combustion engines, such as petrol and diesel cars.

Why is it harmful? NO_2 is damaging to our lungs and exacerbates conditions such as asthma and emphysema. It can also affect the liver and spleen.

When does it cause the most harm? High concentrations of NO_2 are associated with high volumes of traffic. Everyday exposure to NO_2 occurs if people are living, walking, cycling or driving in and near traffic.

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Particle Matter 2.5µm – Size Comparison

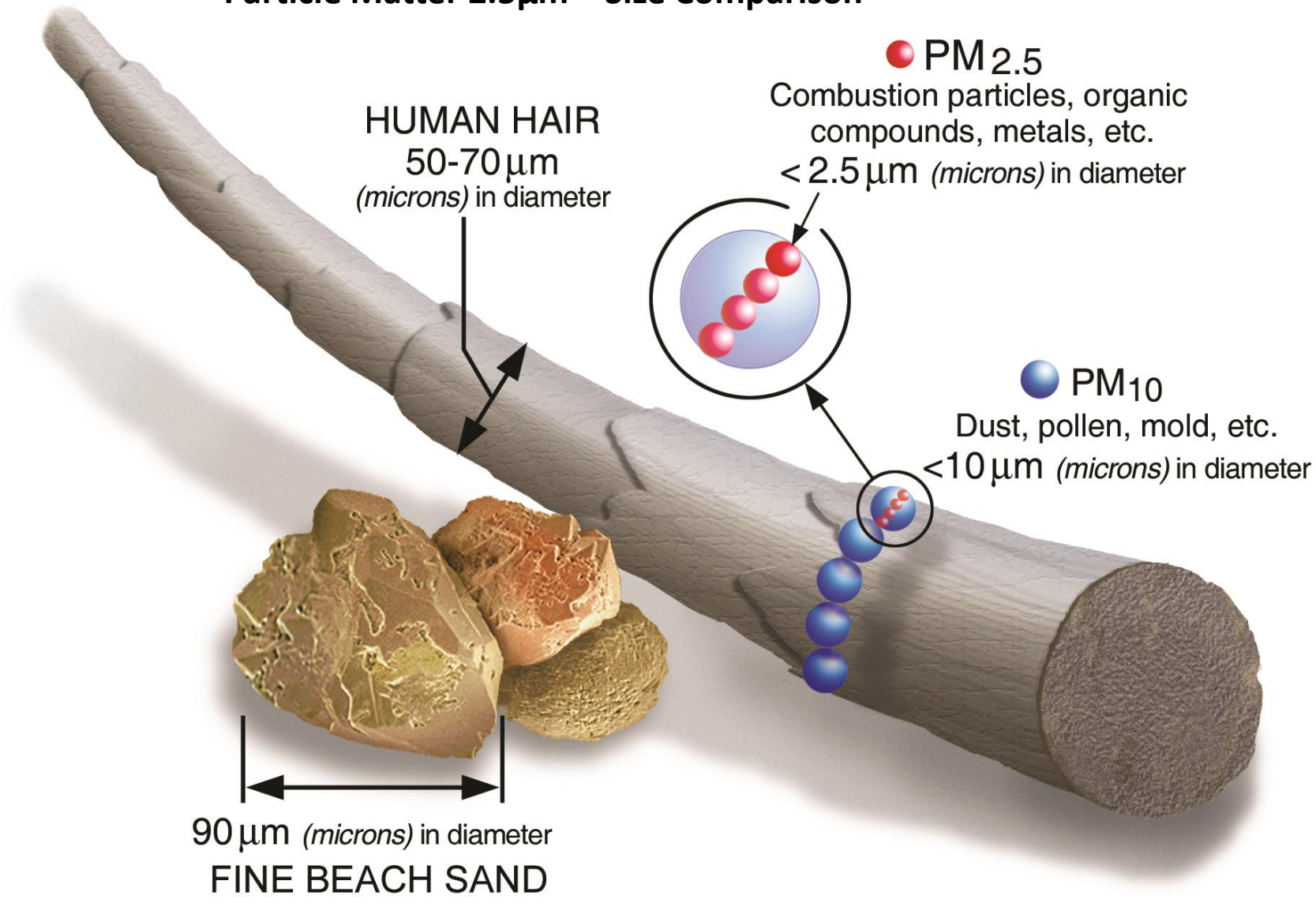

Image: US EPA

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Section 2 - Air Quality Monitoring in Cork City

Air Quality in Cork City is measured by the Environmental Protection Agency and by Cork City Council.

Environmental Protection Agency (EPA) Monitoring Network

The EPA air quality monitoring network is used for national and EU regulatory reporting purposes.

The network consists of reference-scale, high-end instrumentation, measuring a range of parameters (ozone, $PM_{2.5}$, PM_{10}, nitrogen oxides and sulphur dioxide).

EPA monitoring stations in Cork are located at the South Link Road, Heatherton Park, University College Cork (UCC), Munster Technological University (MTU) and the Lower Glanmire Road.

Access EPA Air Quality data for Ireland at www.airquality.ie

Cork City Council's Particulate Matter Air Quality Monitoring Network

In addition to the EPA monitoring network, Cork City Council developed Ireland's first citywide network of $PM_{2.5}$ sensors together with the Centre for Research into Atmospheric Chemistry at University College Cork.

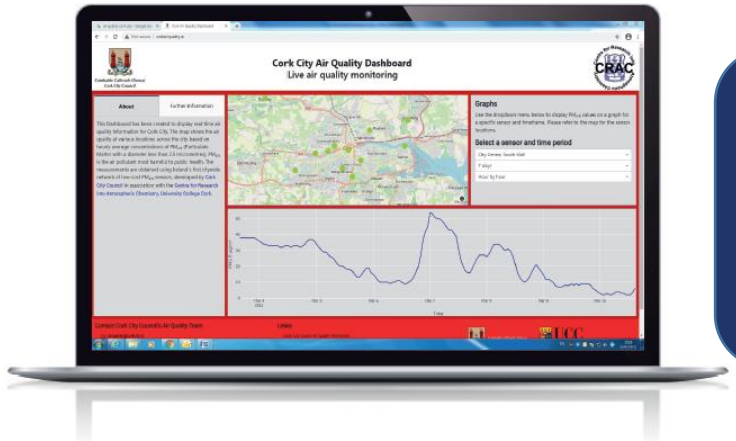
The $PM_{2.5}$ sensor network provides a cost-effective method for displaying real-time indicative information about air quality in different areas of the city.

Local, live data (averaged and updated every 15 minutes) is available at https://corkairquality.ie.

The air quality data provided on the network can assist citizens, including at-risk groups, to make informed decisions and manage their exposure to outdoor air pollution.

The $PM_{2.5}$ values displayed on the dashboard are indicative; however, they are highly correlated with EPA reference measurements. A colour coding scheme is utilised to describe the air quality in the area at a particular time.

A description of the colour coding is provided on the next page.



Check live air quality in your area at: https://corkairquality.ie

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Cork City Air Quality Dashboard

Live Air Quality Monitoring for Particulate Matter 2.5µm

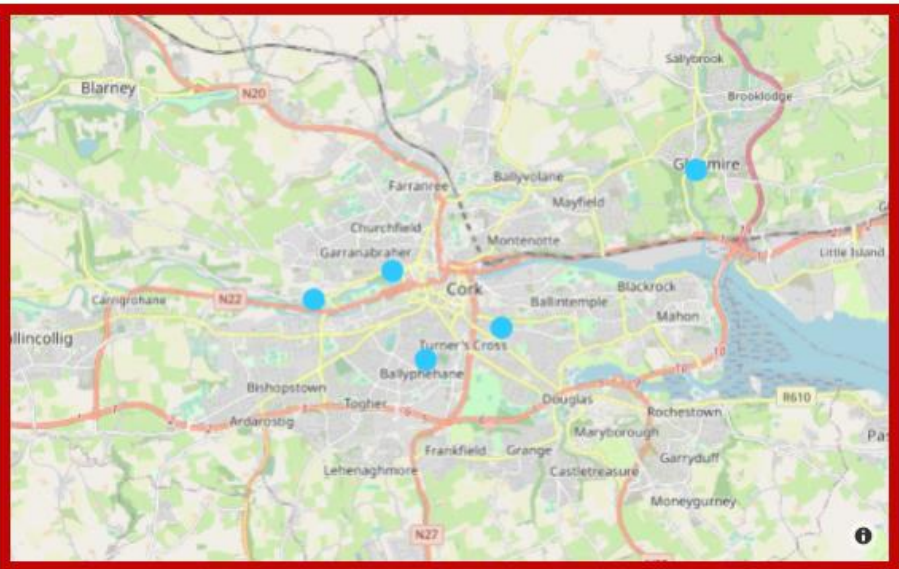
Colour Code Scheme - Cork City Air Quality Dashboard

Colour	Explanation*	$PM_{2.5}$ (µg/m³)	
		From	To
	Good	0	10
	Acceptable	11	35
	Moderate	36	53
	Poor	54	70
	Very Poor	71	+

Explanation*
These descriptions of air quality refer to pollution levels over a timescale limited to a few hours. For regulatory purposes, $PM_{2.5}$ concentrations are based on annual averages. The EU annual average limit for $PM_{2.5}$ is 20µg/m³. The WHO recommends a significantly lower annual average level of 5µg/m³

Feedback
We welcome your feedback and suggestions for improvements to this Air Quality Dashboard.
Email us: airquality@corkcity.ie

Note
The Cork City Air Quality Dashboard provides real-time air quality information based on a single parameter, $PM_{2.5}$. The hourly averaged

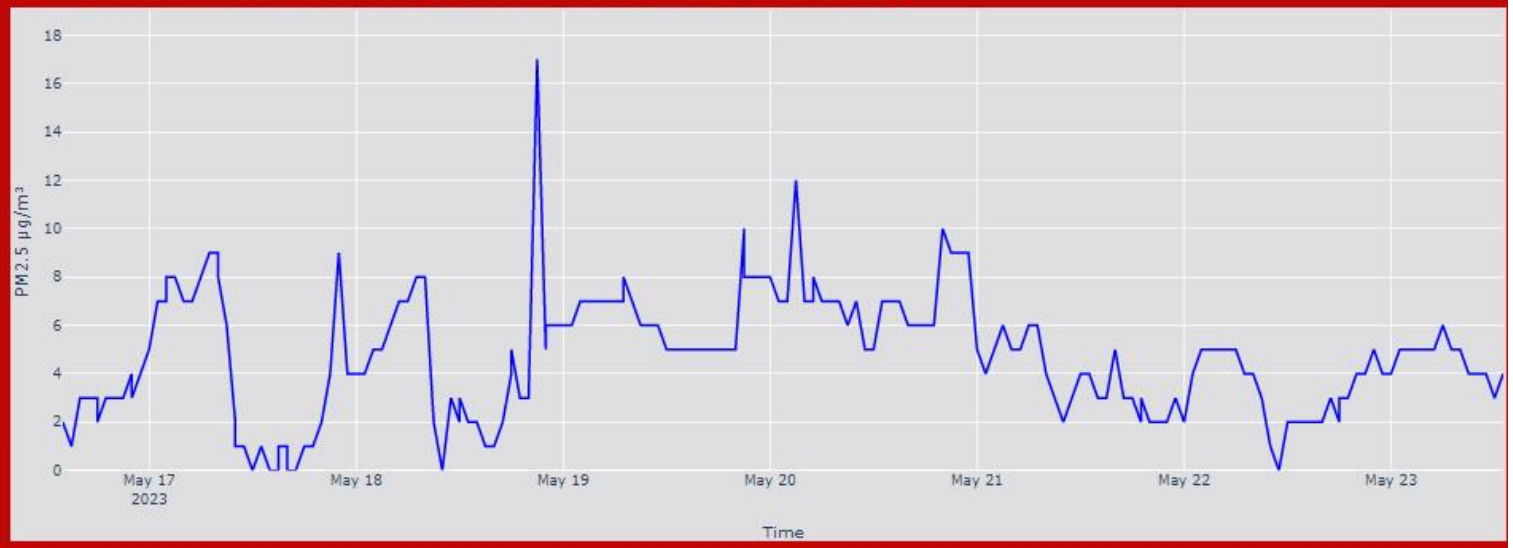


Graphs

Use the dropdown menu below to display $PM_{2.5}$ values on a graph for a specific sensor and timeframe. Please refer to the map for the sensor locations.

Select a sensor and time period

City Centre, Grattan Street
7 days
Hour by hour



Contact Cork City Council's Air Quality Team
airquality@corkcity.ie

Links
Cork City Council Air Quality Information
Centre for Research into Atmospheric Chemistry
University College Cork

Comhairle Cathrach Chorcaí
Cork City Council

UCC
University College Cork, Ireland

Comhairle Cathrach Chorcaí
Cork City Council

Section 3 - WHO and EU Air Quality Guidelines

Levels of NO_2 and PM_{10} were within EU legal limits in Ireland for 2022. They did however exceed the World Health Organization (WHO) Air Quality Guidelines for Health.

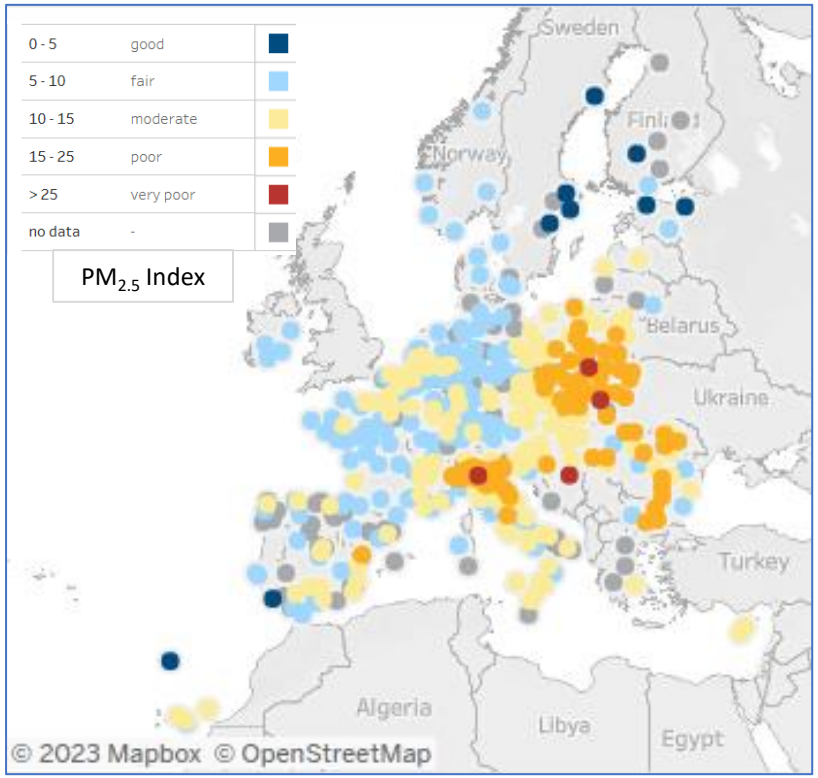
In order to protect our health, vegetation and ecosystems, the EU sets down air quality standards in Ireland and the other member states for a wide variety of pollutants.

As more research on the health effects of air pollution has emerged, the WHO has updated their air quality guidelines in 2021. The new targets are more stringent than previous WHO and EU levels. Accordingly, the EU limit values are currently under revision. Achieving the WHO Air Quality Guidelines is a major future challenge for Ireland and Europe.

The trigger levels for particulate matter ($PM_{2.5}$ and PM_{10}) and nitrogen dioxide (NO_2) as set by the EU and the WHO are laid out in the table below.

Table showing EU and WHO air quality guidelines.

Pollutant	Averaging Period	EU Regulatory Air Quality Limits (CAFE Directive)		WHO Health Based Air Quality Guidelines (2021)	
		Limit (µg/m³)	Allowable Exceedances	Limit (µg/m³)	Allowable Exceedances
$PM_{2.5}$	Annual	20	-	5	-
$PM_{2.5}$	24-hour	-	-	15	Not more than 3 – 4 days/year
PM_{10}	Annual	40	-	20	-
PM_{10}	24-hour	50	Not more than 35 days / year	50	Not more than 3 – 4 days/year
NO_2	Annual	40	-	10	-
NO_2	1-hour	200	Not more than 18 times / year	-	-
NO_2	24-hour	-	-	25	Not more than 3 – 4 days/year



How does air quality in Cork City compare to other European Cities?
https://www.eea.europa.eu/themes/air/urban-air-quality/european-city-air-quality-viewer

Section 4 - Monitoring of Air Quality Parameters

A range of air quality parameters is measured to assess air quality in Cork city. These include particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).

4.1 EPA Regulatory Monitoring of PM_{10} and NO_2

EU legal limits for NO_2 and PM_{10} were not exceeded in 2022.

Exceedances of EU air pollution guidelines as per the 'Clean Air for Europe' (CAFE) directive are reported to the European Union by the Environmental Protection Agency (EPA).

Table showing exceedances of PM_{10} and NO_2 at regulatory EPA monitoring stations.

	Number of Days with Exceedances in 2022		
Station Name	PM_{10} Days> 50 micrograms per metre cubed	NO_2 > 200 micrograms per metre cubed (1h average)	NO_2 > 40 micrograms per metre cubed (annual average)
UCC Distillery Fields	NA	0	0
Glanmire Road	NA	0	0
Heatherton Park	2	NA	NA
South Link Road	2	0	0
MTU Bishopstown	0	NA	NA
EU guidelines exceeded?	NO	NO	NO

A more detailed table can be viewed in Appendix A2.

This type of air quality monitoring for regulatory purposes is carried out by the EPA using reference-grade instruments.

For PM_{10} (Particulate Matter smaller than 10 micrometres), the annual mean limit is 40 micrograms per metre cubed. The daily mean limit is 50 micrograms per metre cubed, and it is deemed breached if more than 35 exceedances occur during the year. In Cork City, the daily average limit of 50 micrograms per metre cubed for PM_{10} was exceeded on 2 days in 2022 (16/12/2022 and 17/12/2022) but remained below the yearly limit of 35 exceedance days.

For NO_2, the annual limit is 40 micrograms per metre cubed (annual average) with an hourly limit of 200 micrograms per metre cubed. The limit is deemed breached if more than 18 exceedances of the one hour limit occur during the year. There were no exceedances of daily NO_2 limits in 2022.

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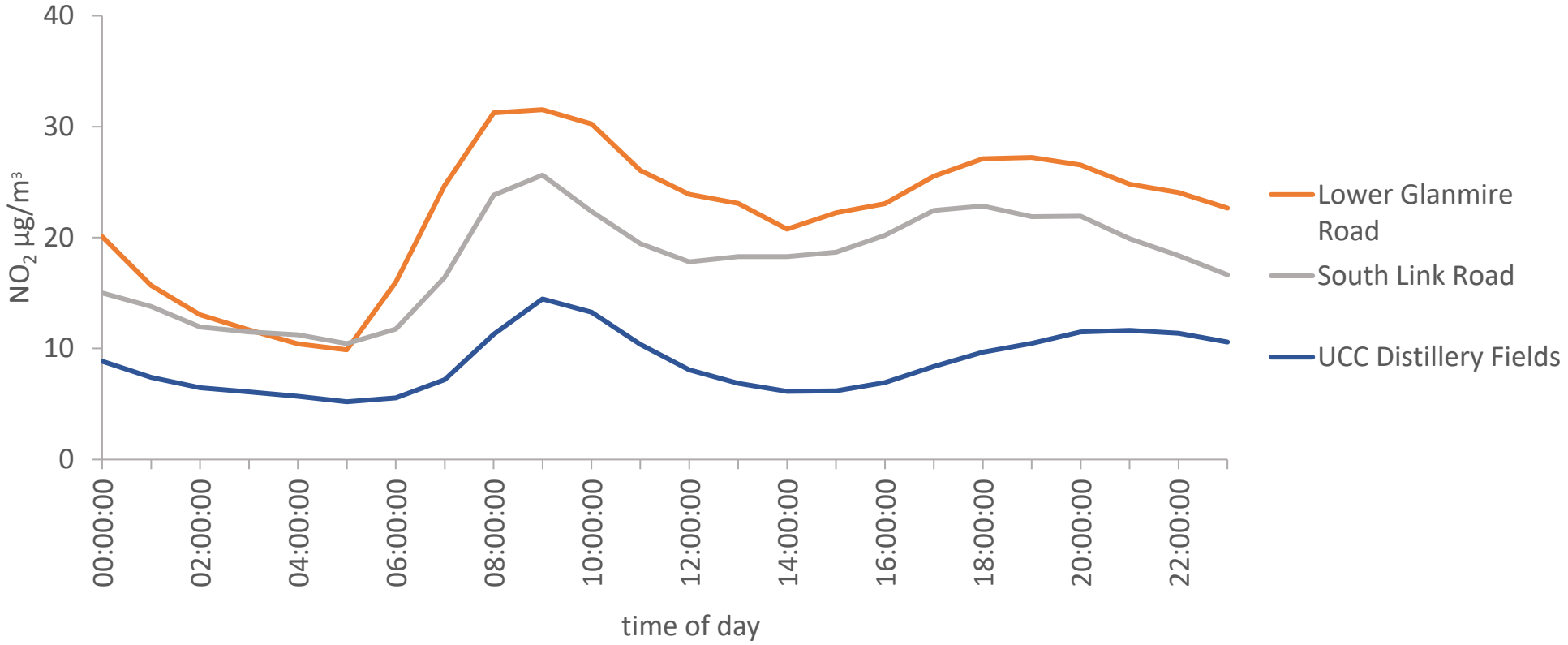
Diurnal Concentrations of NO_2 at EPA Regulatory Monitoring Stations in Cork City (2022 annual hourly average)



As can be noted from the graph above, NO_2 values tend to spike between the hours of 06:00 and 12:00 (morning commute). NO_2 levels rise again in the evening time between 14:00 and 20:00 (evening commute). The highest average NO_2 levels were recorded on the Lower Glanmire Road (average maximum of 32 µg/m³ at 09:00).
A continuation of policies and measures to encourage a shift away from fossil fuels burning vehicles will result in a reduction of NO_2 levels with associated air quality improvements.

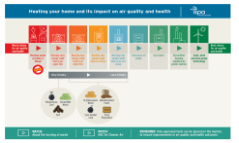
4.2 - Fine Particulate Matter ($PM_{2.5}$) - Cork City Air Quality Monitoring Network

Fine Particulate Matter ($PM_{2.5}$) levels were measured at 16 stations across Cork City Council's District-Scale Particulate Matter Air Quality Network in 2022. There were no exceedances of the EU trigger levels in 2022. However, $PM_{2.5}$ levels spiked during cold months when solid fuels are burned to heat homes.

Table: $PM_{2.5}$ levels as measured around Cork City. Data from 11 of the 16 stations are reported here, 5 stations were omitted due to incomplete data .

$PM_{2.5}$ ($\mu g/m^3$)						
Station	Seasonal averages				annual average	Exceed EU annual limit (20 $\mu g/m^3$)
	Spring Feb-Apr	Summer May-Jul	Autumn Aug-Oct	Winter Nov-Jan		
City Centre, Grattan Street	12	4	4	11	6	No
Fitzgerald's Park	6	1	2	4	3	No
Lifetime Lab	9	3	3	10	7	No
Mayfield	14	4	5	11	8	No
Blackpool	16	4	5	18	11	No
Ballyphehane	10	3	3	13	7	No
Ballinlough	13	3	4	16	9	No
Blackrock Castle	13	4	3	12	8	No
Blarney	10	3	4	13	6	No
Glanmire	13	4	4	15	9	No
Ballincollig	13	3	4	13	8	No

For more information on the Cork City District-Scale Particulate Matter Air Quality Network, and how to check air quality in your area please go to Section 2.

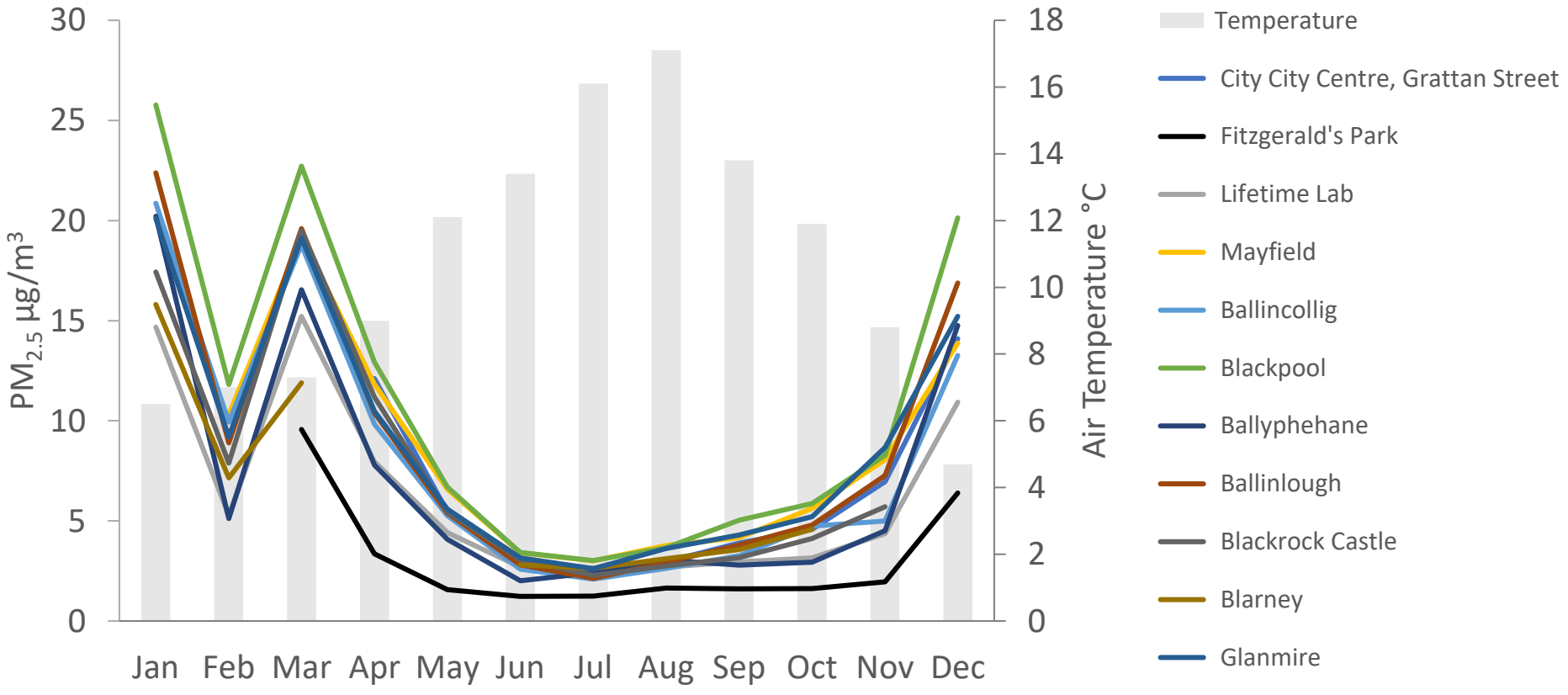


Find out how you can help improve air quality in Section 5.2.

Graph of Monthly Average $PM_{2.5}$ levels across Cork City Stations

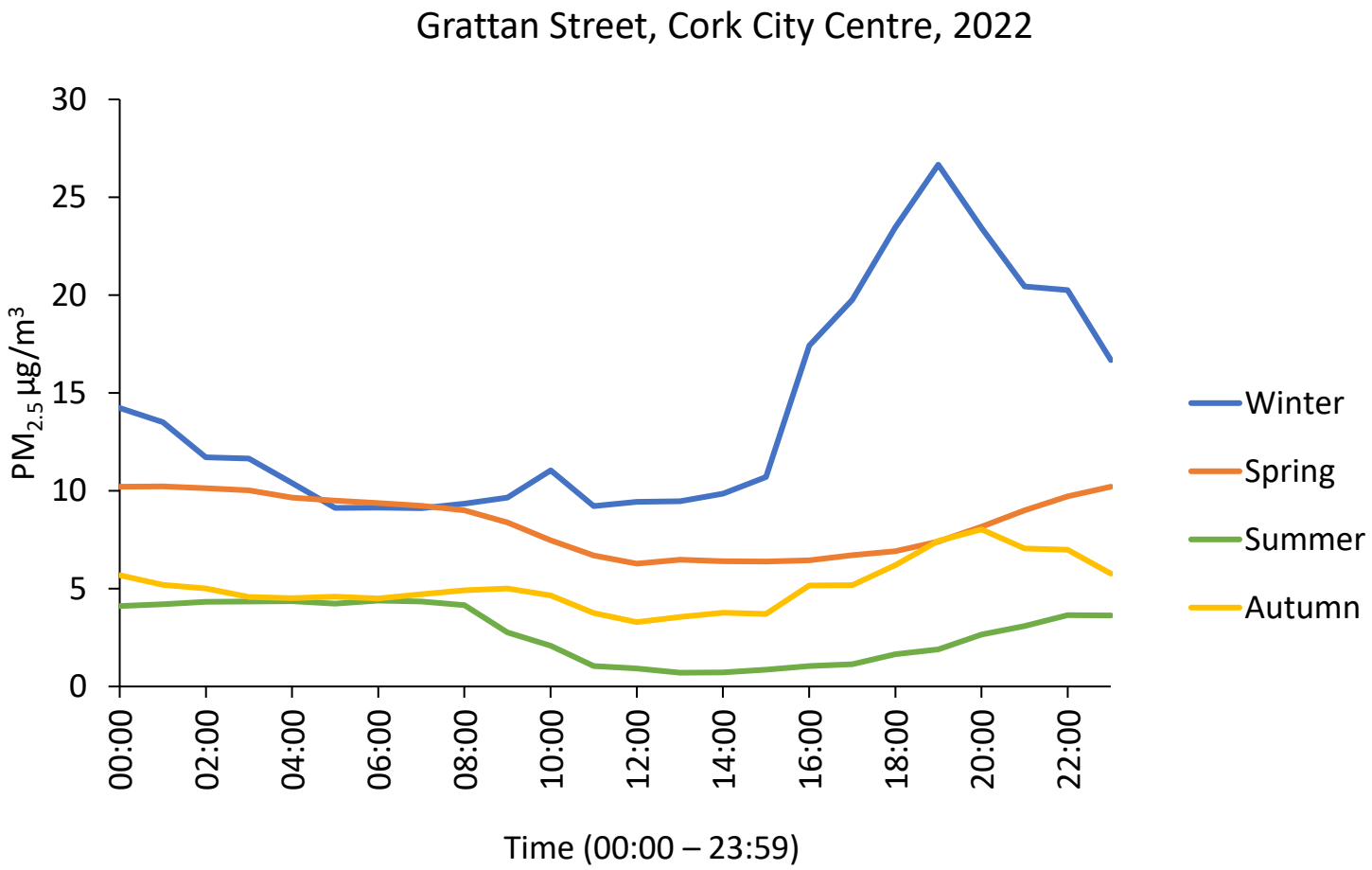
(Note: average monthly temperature is included for clarity)

Air quality in Cork City, like elsewhere in Ireland, is broadly acceptable, but can deteriorate quickly during winter evenings as households burn solid fuel (peat, wood, coal) for heating. Graphs of 11 monitoring stations are attached in the proceeding pages.



*Air Temperature from Met Eireann, Cork Airport monitoring station

Seasonal average $PM_{2.5}$ levels for monitoring locations across Cork City

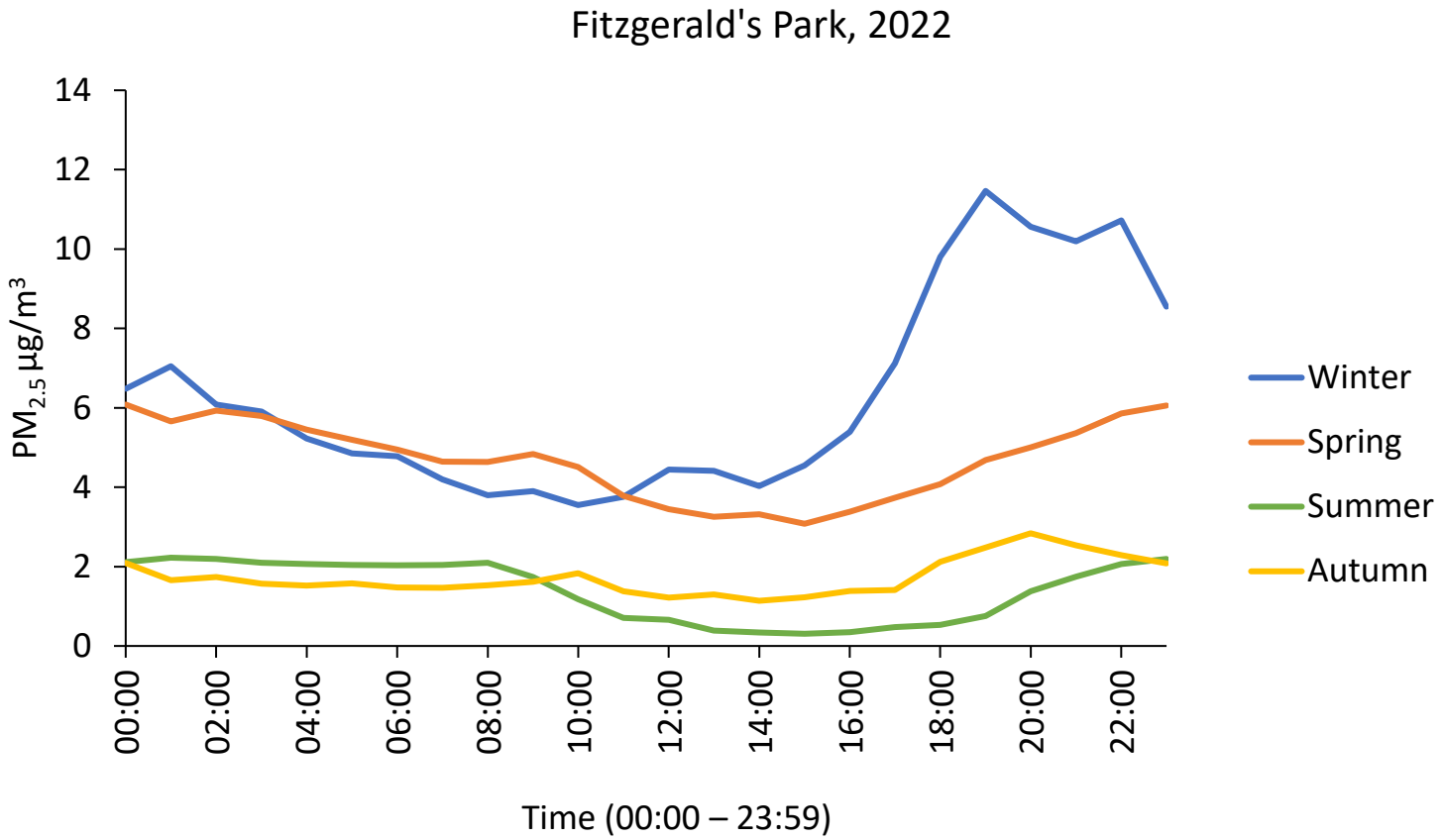


The Annual Average for 2022 at this station is 6 µg/m^3.

The seasonal averages are as follows:

- Winter: 11 µg/m^3
- Spring: 12 µg/m^3
- Summer: 4 µg/m^3
- Autumn: 4 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.7 - 26.7 µg/m^3.

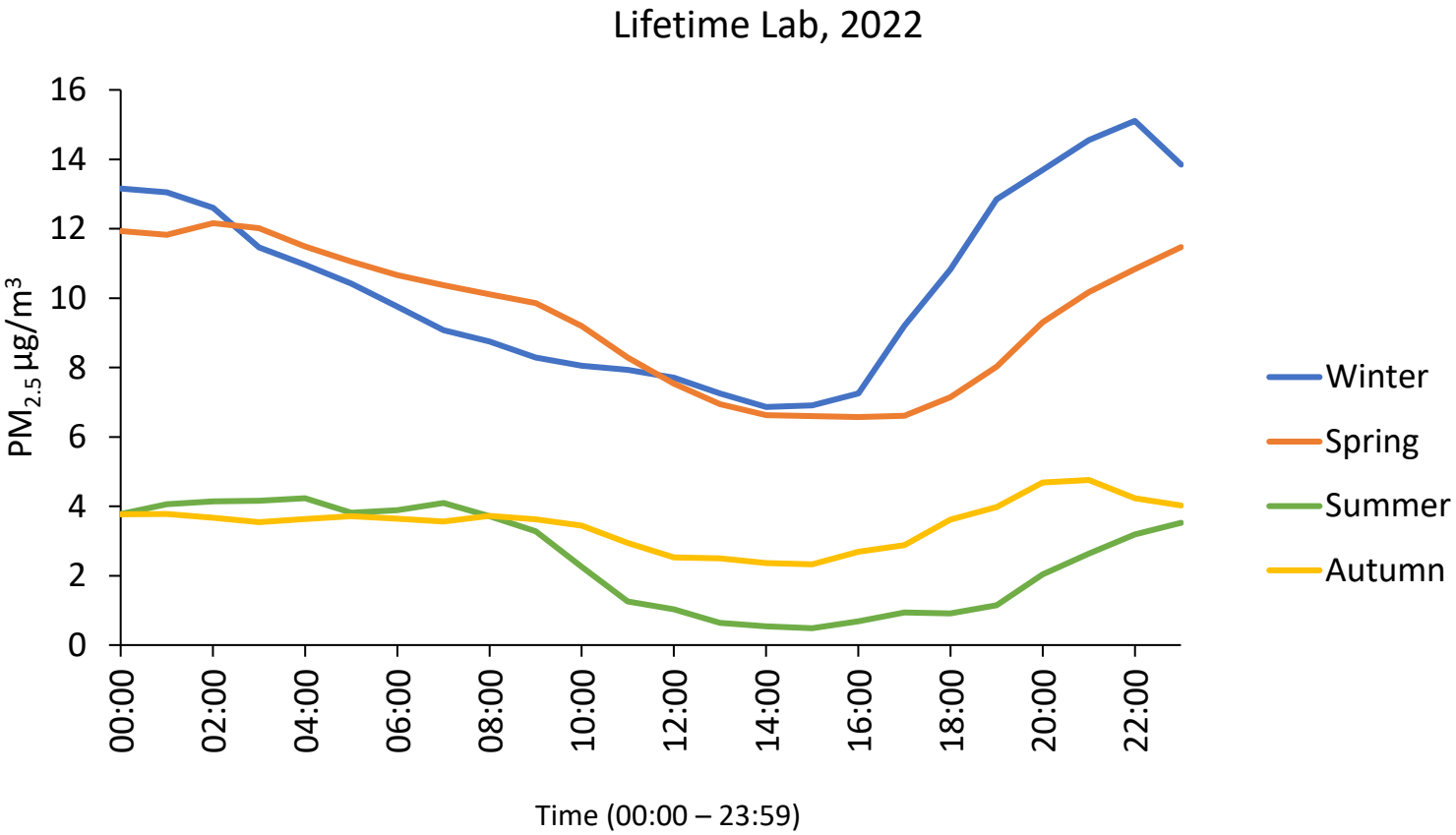


The Annual Average for 2022 at this station is 3 µg/m^3.

The seasonal averages are as follows:

- Winter: 4 µg/m^3
- Spring: 6 µg/m^3
- Summer: 1 µg/m^3
- Autumn: 2 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.3 – 11.5 µg/m^3.

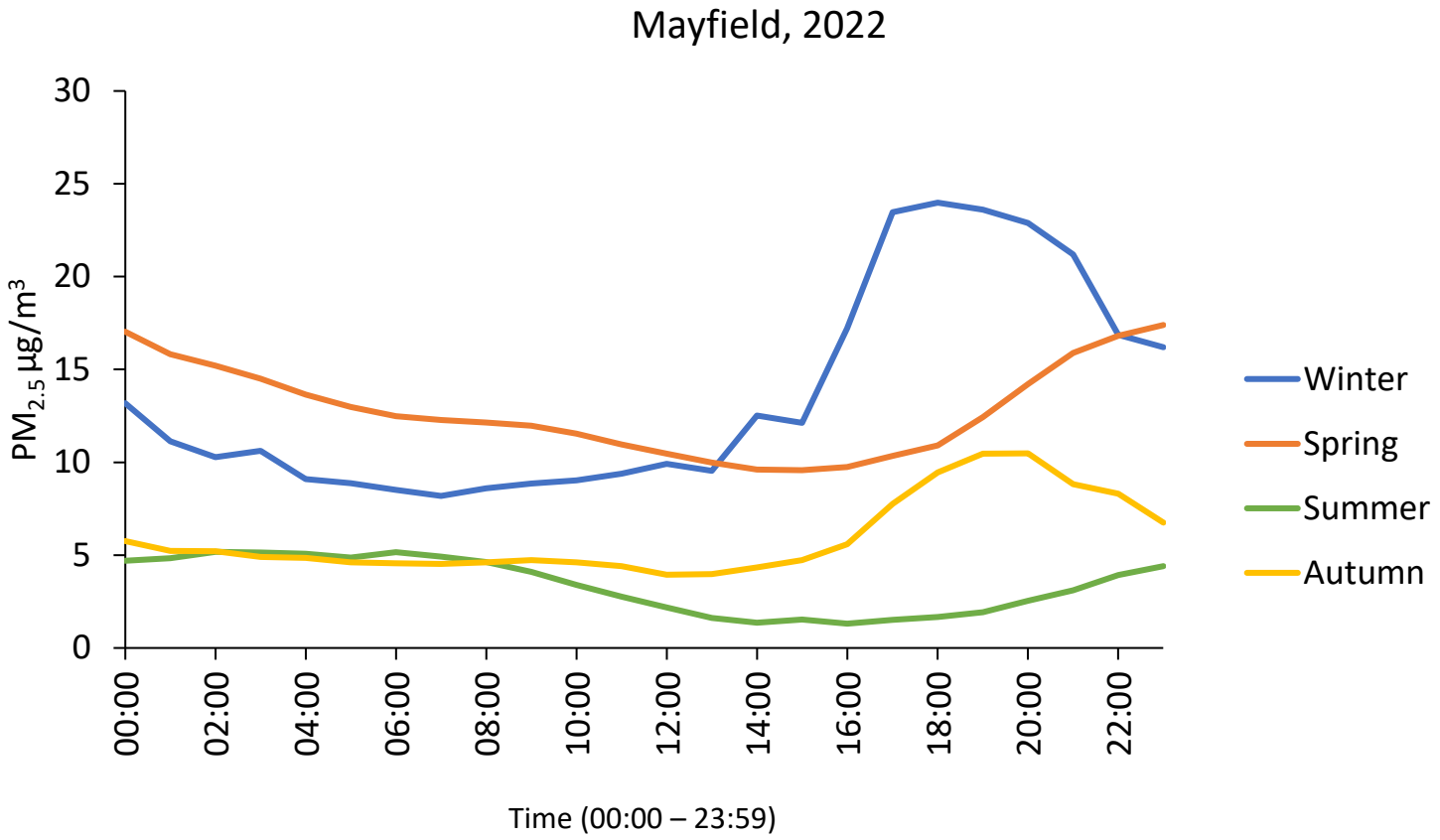


The Annual Average for 2022 at this station is 7 µg/m^3.

The seasonal averages are as follows:

- Winter: 10 µg/m^3
- Spring: 9 µg/m^3
- Summer: 3 µg/m^3
- Autumn: 3 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.5 – 15.1 µg/m^3.

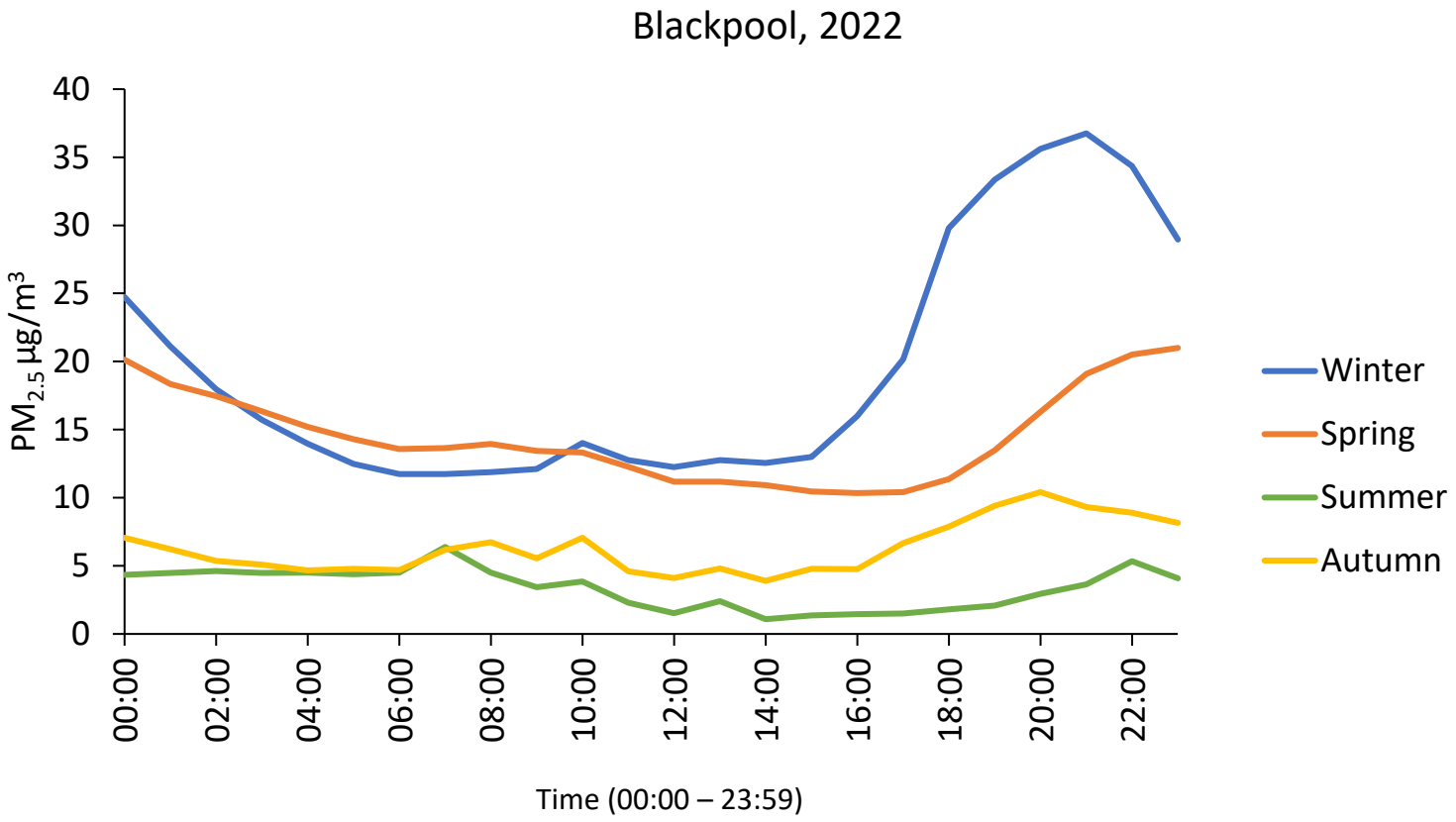


The Annual Average for 2022 at this station is 8 µg/m^3.

The seasonal averages are as follows:

- Winter: 11 µg/m^3
- Spring: 14 µg/m^3
- Summer: 4 µg/m^3
- Autumn: 5 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 1.3 – 24.0 µg/m^3.

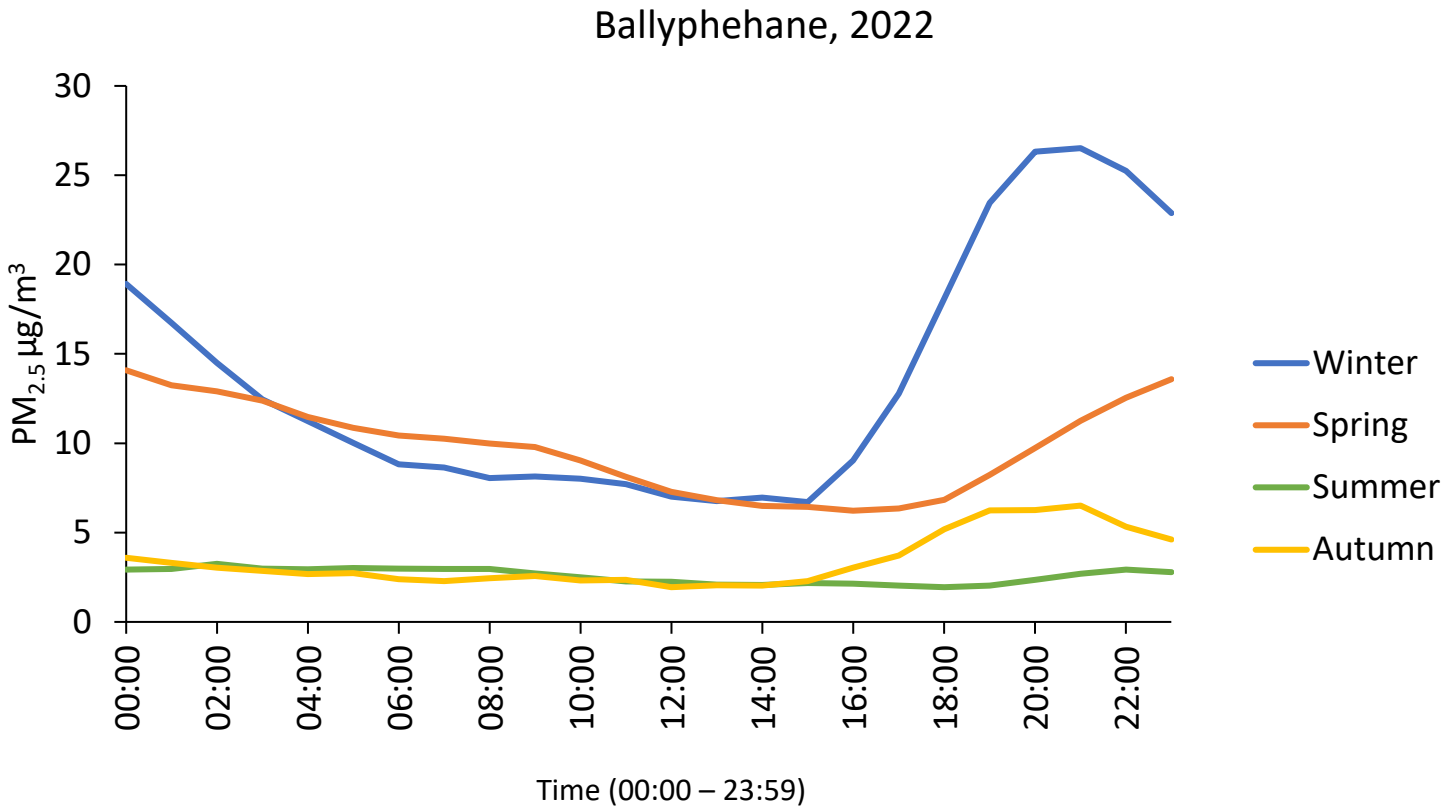


The Annual Average for 2022 at this station is 11 µg/m^3.

The seasonal averages are as follows:

- Winter: 18 µg/m^3
- Spring: 16 µg/m^3
- Summer: 4 µg/m^3
- Autumn: 5 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 1.1 – 36.8 µg/m^3.

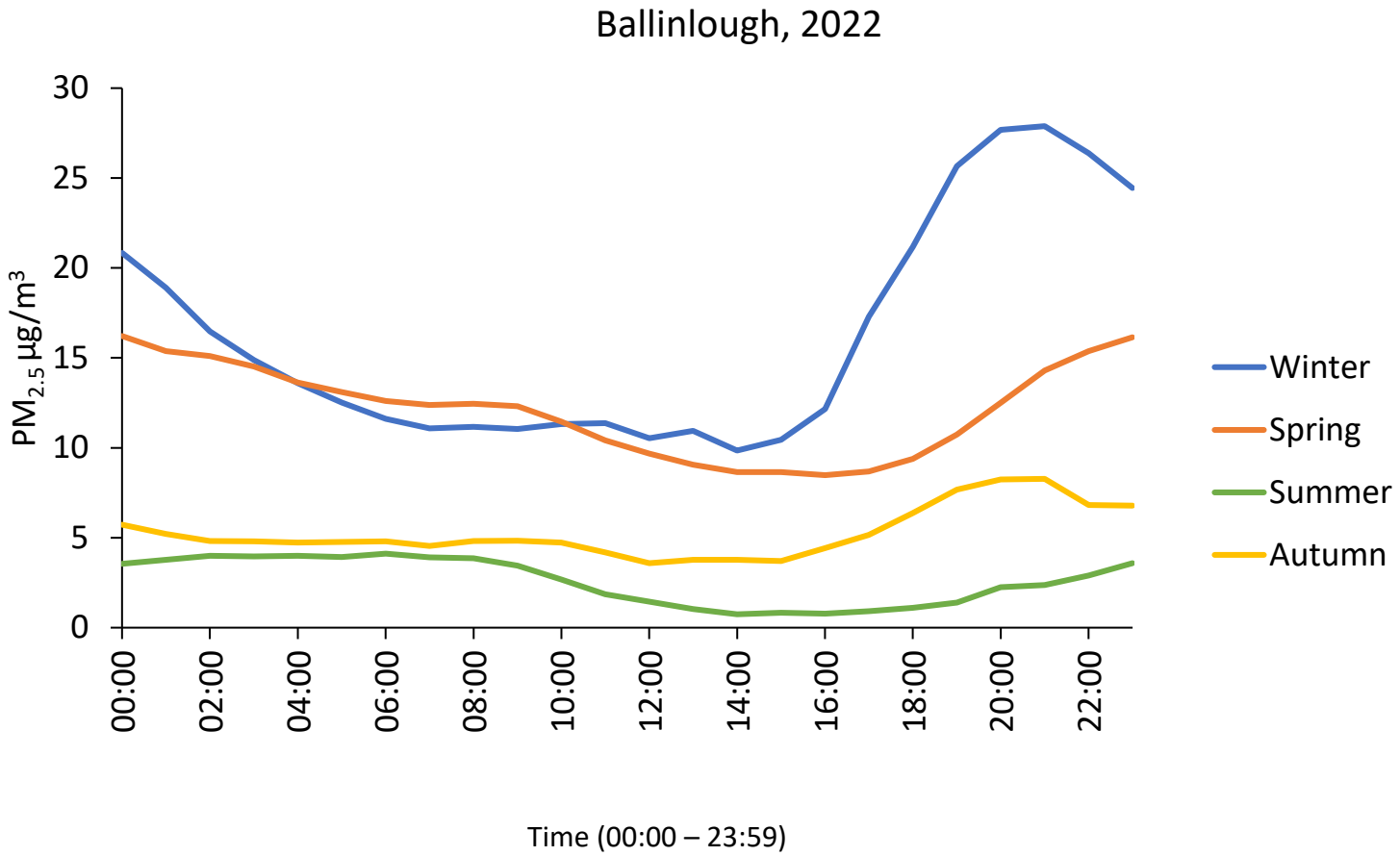


The Annual Average for 2022 at this station is 7 µg/m^3.

The seasonal averages are as follows:

- Winter: 13 µg/m^3
- Spring: 10 µg/m^3
- Summer: 3 µg/m^3
- Autumn: 3 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 1.9 – 26.5 µg/m^3.

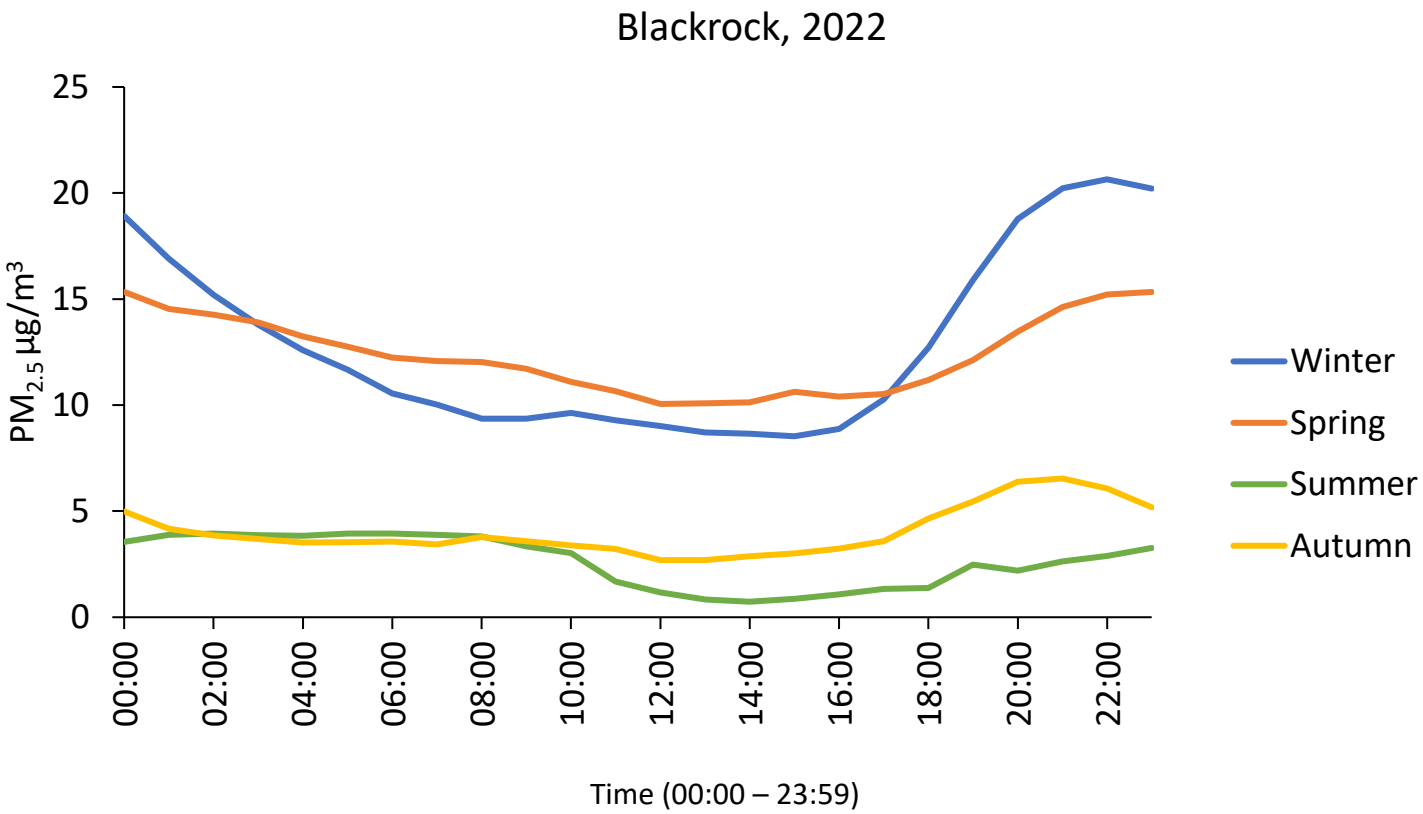


The Annual Average for 2022 at this station is 9 µg/m^3.

The seasonal averages are as follows:

- Winter: 16 µg/m^3
- Spring: 13 µg/m^3
- Summer: 3 µg/m^3
- Autumn: 4 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.7 – 27.9 µg/m^3.

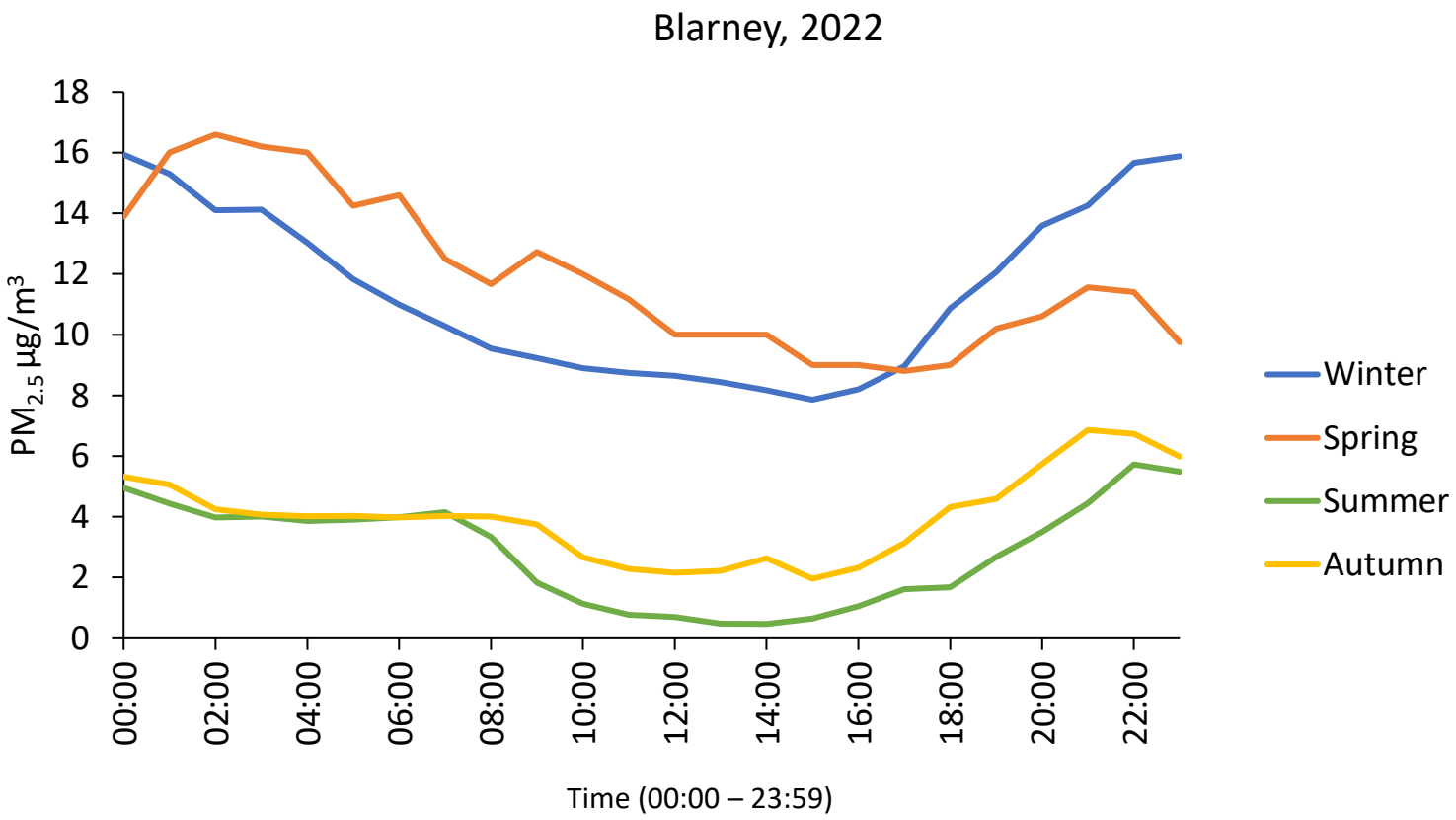


The Annual Average for 2022 at this station is 8 µg/m^3.

The seasonal averages are as follows:

- Winter: 12 µg/m^3
- Spring: 13 µg/m^3
- Summer: 4 µg/m^3
- Autumn: 3 µg/m^3

Seasonal hourly $PM_{2.5}$ at this station ranges from 0.7 – 20.7 µg/m^3.

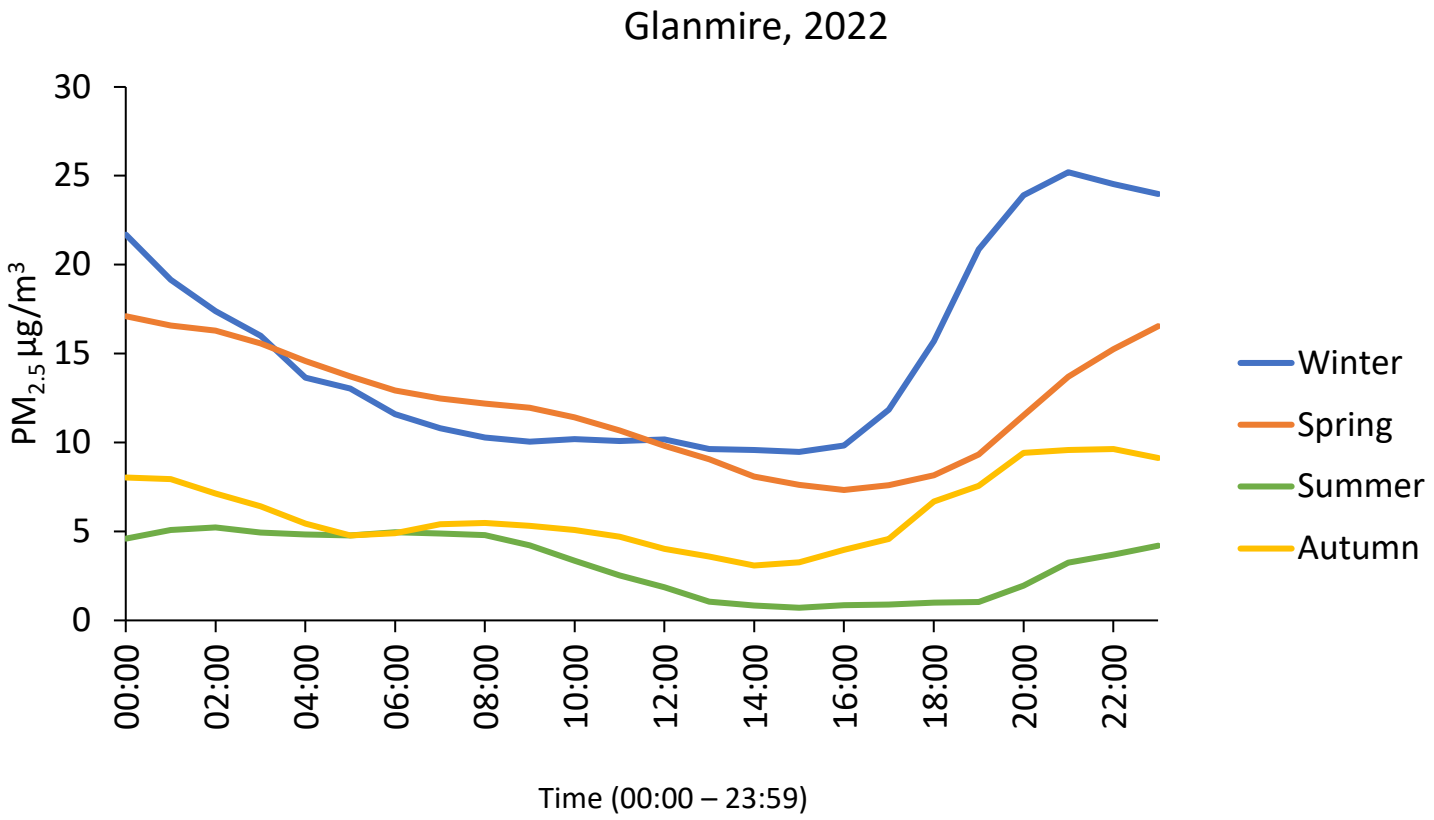


The Annual Average for 2022 at this station is 6 µg/m^3.

The seasonal averages are as follows:

- Winter: 13 µg/m^3
- Spring: 10 µg/m^3
- Summer: 3 µg/m^3
- Autumn: 4 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.5 – 15.9 µg/m^3.



The Annual Average for 2022 at this station is 9 µg/m^3.

The seasonal averages are as follows:

- Winter: 15 µg/m^3
- Spring: 13 µg/m^3
- Summer: 4 µg/m^3
- Autumn: 4 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.7 – 25.2 µg/m^3.

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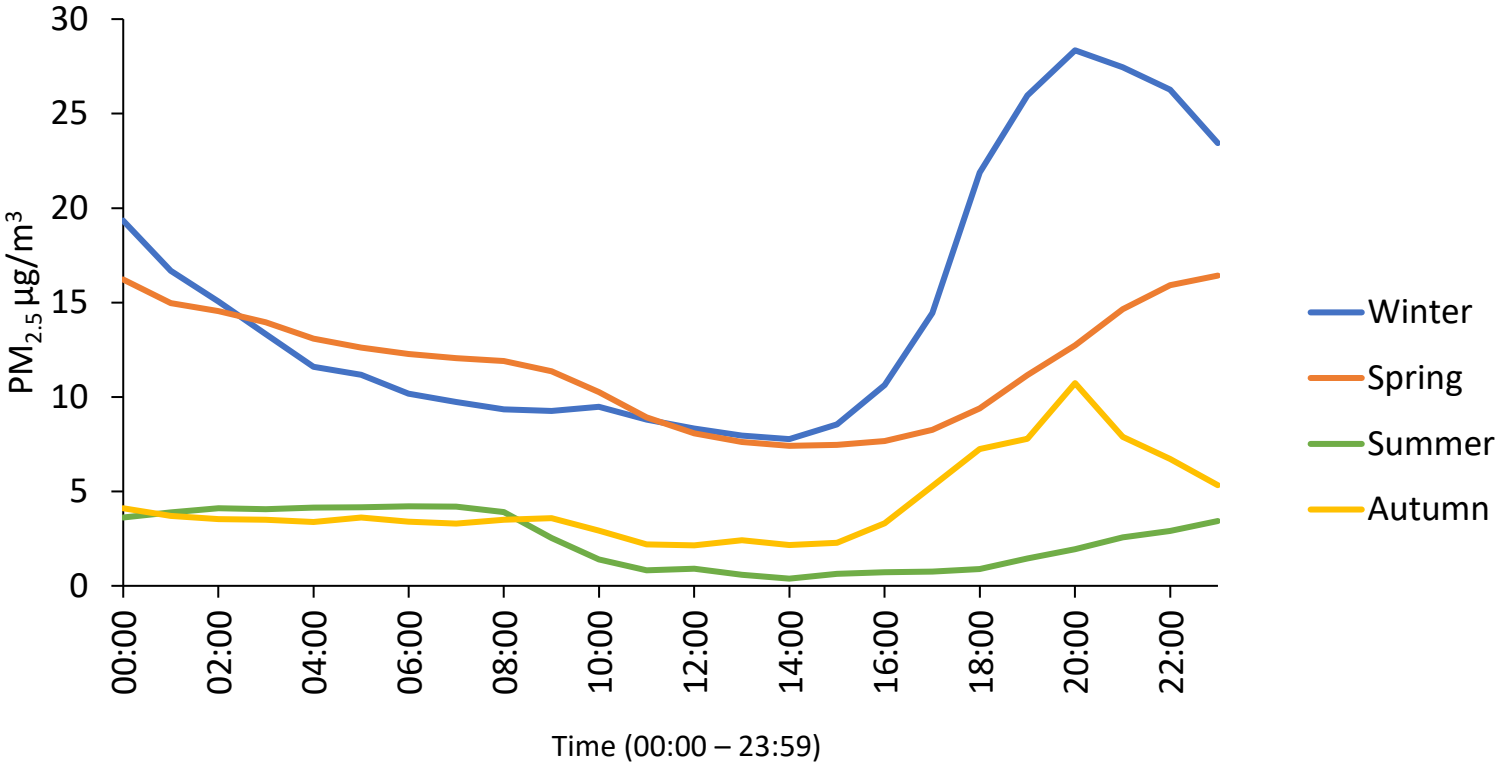
Cork City Council

Ballincollig, 2022



The Annual Average for 2022 at this station is 8 µg/m^3.

The seasonal averages are as follows:

- Winter: 13 µg/m^3
- Spring: 13 µg/m^3
- Summer: 3 µg/m^3
- Autumn: 4 µg/m^3

Seasonal hourly averaged $PM_{2.5}$ at this station ranges from 0.4 – 28.3 µg/m^3.

Summary of $PM_{2.5}$ data from Cork City's District-Scale Monitoring Network

Air quality in Cork City, like elsewhere in Ireland, is broadly acceptable, but can deteriorate quickly during winter evenings as households burn solid fuel (peat, wood, coal) for heating.

On winter evenings, $PM_{2.5}$ concentrations begin to rise at 15:00 due to solid fuel burning for residential heating purposes, peaking in the evening at 19:00. Particulate Matter levels start to flatten out and reduce after midnight.

$PM_{2.5}$ maximum levels on winter evenings at stations throughout the city ranged from 11 to 37 µg/m^3. The following maximum average hourly values were recorded:

- Grattan Street (27 µg/m^3 at 19:00)
- Fitzgerald's Park (11 µg/m^3 at 19:00)
- Lifetime Lab (15 µg/m^3 at 21:00)
- Mayfield (24 µg/m^3 at 18:00)
- Blackpool (37 µg/m^3 at 21:00)
- Ballyphehane (27 µg/m^3 at 21:00)
- Ballinlough (28 µg/m^3 at 21:00)
- Blackrock (21 µg/m^3 at 22:00)
- Blarney (16 µg/m^3 at 23:00)
- Glanmire (25 µg/m^3 at 21:00)
- Ballincollig (28 µg/m^3 at 20:00)

The data from these stations highlights the impact of solid fuel burning during cold snaps and outlines the need for progressing household insulation upgrades as well as continuing the move towards installation of cleaner home heating systems.

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4.3 Nitrogen Dioxide (NO_2) - Cork City NO_2 Air Quality Monitoring Network

Nitrogen Dioxide levels are mainly attributable to emissions from internal combustion engines, i.e. traffic emissions. NO_2 levels are measured at 5 stations in and around a designated Clean Air Zone in Cork City Centre. Traffic emissions are highest around busy roads, city quays and at traffic junctions.

NO_2 continuous monitoring (AirNodes sensors)

NO_2 levels are currently monitored within and around the Clean Air Zone.

NO_2 levels are highest during peak morning and evening traffic hours – between the hours of 7am – 10am and 5pm – 9pm.

Traffic emissions were highest near Patrick's Street, a busy main road in the city centre.

During colder and wetter months, NO_2 levels rise as people use their cars more.

See a map of monitoring locations in Appendix A1.

NO_2 diffusion tube study October 2022

Over 700 citizen scientists took part in a study to assess the NO_2 levels across Cork in October 2022. NO_2 data was collected as part of the "Clean Air Together" project run by the EPA and An Taisce with assistance from Cork City Council. NO_2 diffusion sampling tubes were installed outside houses for a period of 30 days to measure traffic emissions around Cork City and suburbs.

The results revealed that most locations had "very good" or "good" NO_2 levels. Lower NO_2 values were associated with reduced traffic volumes towards the outer edges of the city and suburbs.

NO_2 levels from traffic emissions were highest adjacent to main roads, city quays and at busy traffic junctions. These were particularly acute along the Lower Glanmire Road, Ballyhooly Road, Commons Road, Carrigrohane Road Junction, South Mall and South Link Road.

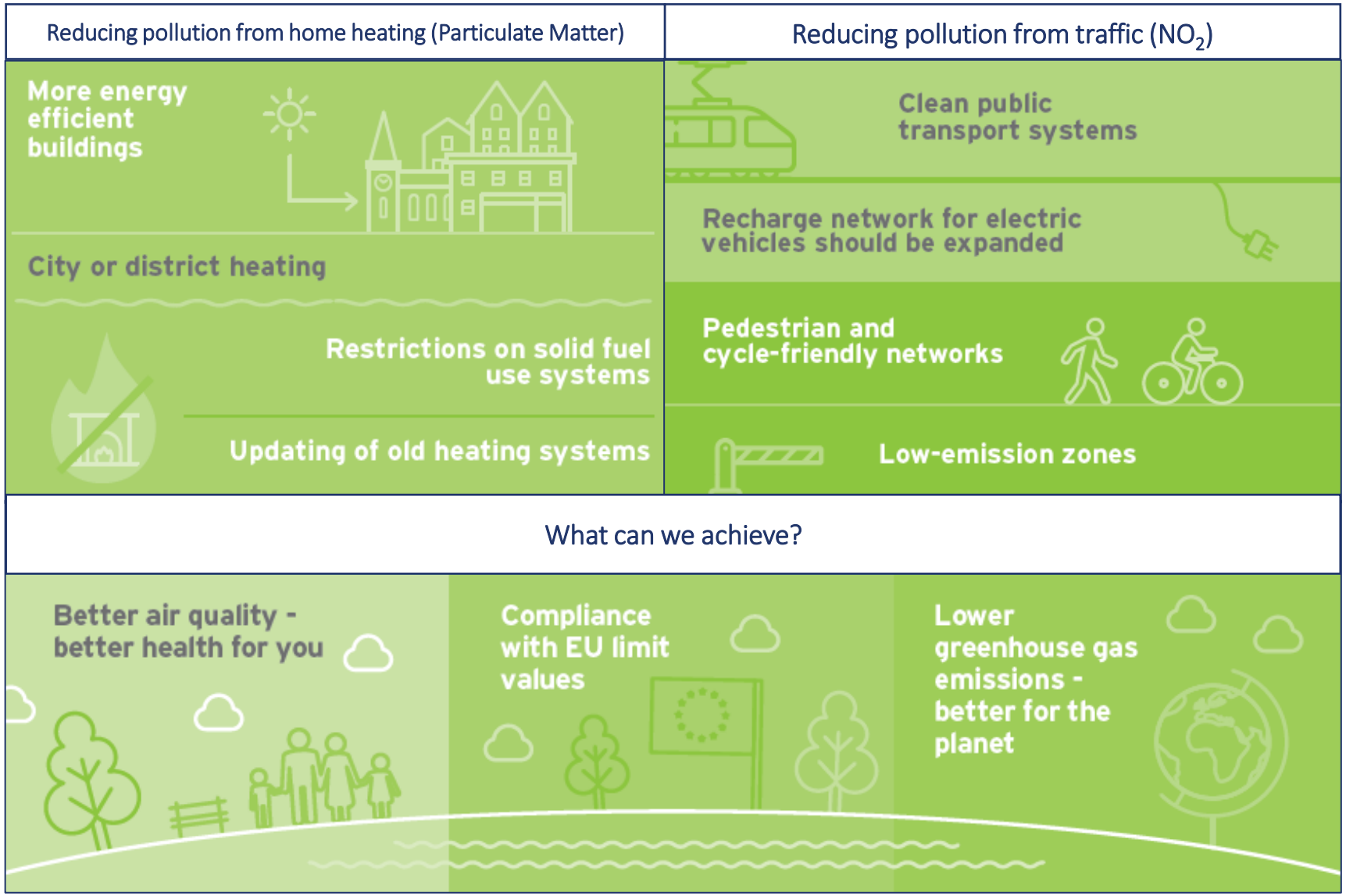
See Appendix A4 for more details of the study.

What can we do about traffic pollution? See infographics on the following pages.

Section 5 - Solutions and Alternatives for Cleaner Air

5.1 Improving Air Quality in Our City - What needs to be done?

Solutions and steps that society and government can take to improve the quality of the air we breathe.



Graphics: EPA website

5.2 Improving Air Quality in Your Neighbourhood - What Can Be Done?

Solutions and steps we can all take to improve the quality of the air we breathe.

Reducing pollution from home heating (PM)

Do you really need to light your open fire or stove?

Think 'ABC'!

A – Ask yourself: **"Do I really need to light a fire?"** Use other cleaner heating sources instead if possible.

B – Burn cleaner, more efficient, low-smoke fuels and make sure you use the right fuel for your appliance.

C – Clean and maintain your chimney and heating appliances at least once a year.

For **cleaner fuel choices**, consult the EPA guide on the next page.

Make your house more energy efficient and move to a clean form of home heating

Grants available from SEAI

Sustainable Energy Authority of Ireland (SEAI) operates a grant aided home energy & retrofitting scheme: https://www.seai.ie/grants/home-energy-grants/

Reducing pollution from cars (NO_2)

Think about each journey you make? Is there a cleaner alternative?

Walk or cycle it. You can save up to almost half the cost of a new bike and equipment through the Bike to Work scheme.

Bus or train it. Use public transport whenever possible.

Consider Carpooling. Talk to colleagues and neighbours if this is an option for you.

Work from home. If your workplace allows, consider working from home for part of your working week.

Go electric. If you can afford it, consider an electric or hybrid car for you next purchase.

Check out the Bike to Work Scheme: https://www.biketowork.ie/

Graphics: EPA website

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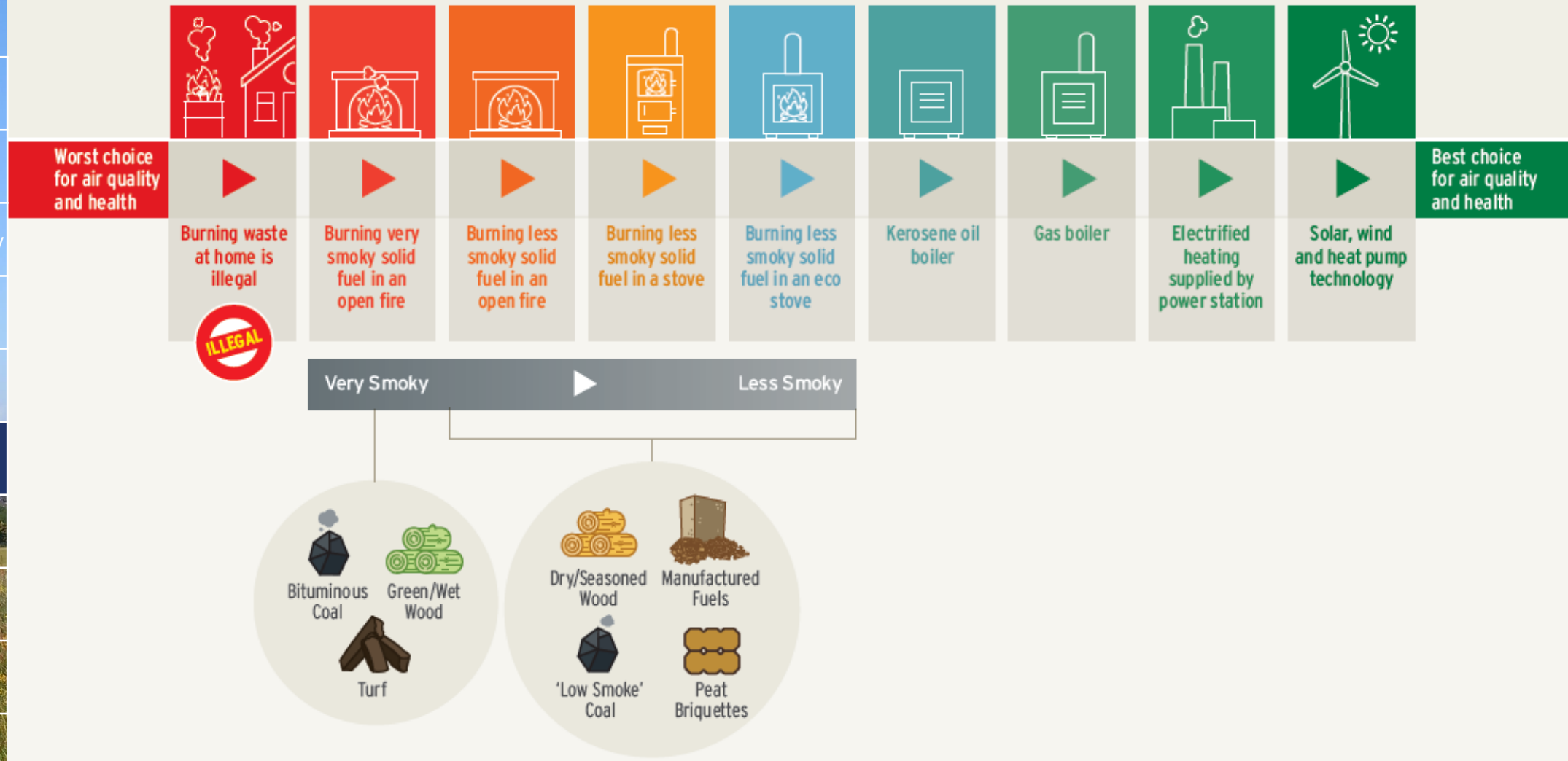
Heating your home and its impact on air quality and health



Graphics: EPA website

Section 6 - Air Quality Initiatives in 2022

The section below details the suite of air quality initiatives progressed in 2022 and outlines the progress in achieving the objectives and targets set out in Cork City Council's Air Quality Strategy (2021 – 2026).

6.1 Air Quality Projects Completed / Progressed in 2022

2022 was an exceptionally busy year for Cork City Council's air quality team. In addition to the works associated with the upkeep of the Particulate Matter monitoring network (sensor fixes, dashboard realignment), frequent stakeholder engagement (answering queries on air quality etc.), the following projects were launched and progressed.

Launch of Clean Air Zone and expanded NO_2 monitoring network in Cork City Centre

In April 2022, Cork City Council launched Ireland's first dedicated Clean Air Zone along Oliver Plunkett Street and its adjoining streets. The Clean Air Zone is an area where targeted action has been taken to improve air quality; specifically, through the reduction of traffic related air pollutants. As part of the initiative, five air quality monitors were installed in June 2022. The monitors measure nitrogen dioxide (NO_2) (emitted by petrol and diesel-burning vehicle engines), ozone and particulate matter.

The installation of these additional monitors throughout the area will form part of a study to demonstrate the air quality benefits in terms of health and wellbeing of Clean Air Zones; informing further discussions on the expansion and creation of future low emission areas across Cork City.

Clean Air Zone Launch, April 2022

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6.1 Air Quality Projects Completed / Progressed in 2022 (cont'd)

Participation in Cork Carnival of Science

On Saturday 11th and Sunday 12th June 2022, representatives from Cork City Council's Air Quality team took part in the annual Carnival of Science held at Fitzgerald's Park. The team were on hand to demonstrate real-time Air Quality readings from the city-wide monitoring network, provide details on Cork City's first Clean Air Zone and to give a glimpse at future developing projects.

Cork Carnival of Science, June 2022

Chambers Ireland Sustainable Environment Award 2022

Chambers Ireland Award

In November 2022, Cork City Council won the Chambers Ireland Sustainable Environment Award for their work on the Cork City Air Quality Strategy.
The strategy outlines the actions that Cork City Council will undertake between 2021 and 2026 to reduce the concentration of air pollutants in the city area; thereby positively impacting the health and quality of life of residents and visitors.

Clean Air Together

In October 2022, more than 700 citizen scientists took part in the Clean Air Together (Cork City) project. The successful study, which relied on the engagement of the citizens of Cork City; measured levels of the harmful air pollutant Nitrogen Dioxide (NO_2) across all areas of the city and suburbs. The results of the study were presented at a public event, hosted by Cork City Council on Wednesday February 22nd, 2023. The project was led by the Environmental Protection Agency (EPA) and An Taisce's Environmental Education Unit with the support of Cork City Council's Air Quality Team.

Clean Air Together Launch 2022

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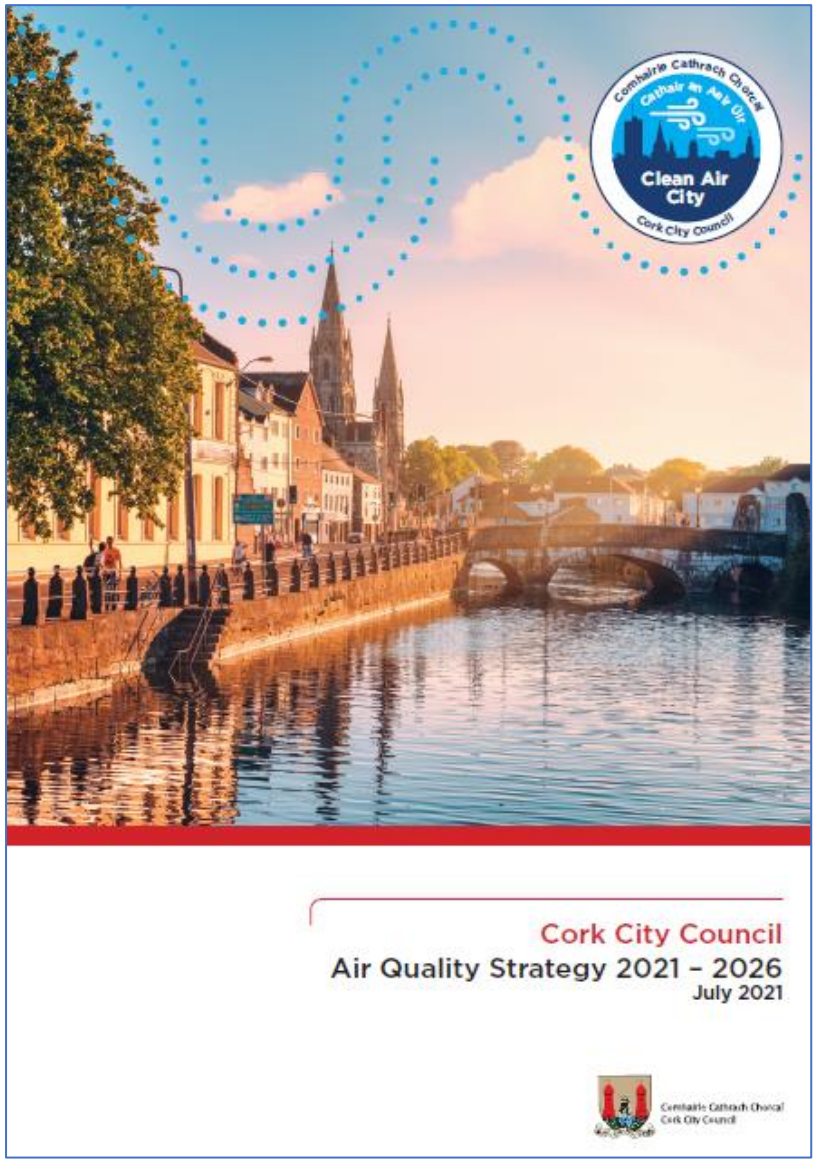
6.2 Progress Towards Achieving Objectives and Targets

(as set out in Cork City Council's Air Quality Strategy 2021 – 2026)



Cork City Council's Air Quality Strategy outlines 7 major themes under which air quality objectives will be progressed, namely:

1. Health and Wellbeing
2. Air Quality Monitoring
3. Travel
4. Electric Vehicles and Charging Infrastructure
5. Regulation and Enforcement
6. Green Infrastructure
7. Research and Innovation

In all, there are 27 objectives with associated targets set out in the document.

Cork City Council's full Air Quality Strategy is available at https://www.corkcity.ie/en/council-services/services/environment/air-quality/air-quality-strategy.html

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Progress Towards Achieving Objectives and Targets (cont'd)

Theme 1 – Health and Wellbeing contains 2 objectives with 6 targets. Progress has been made on conducting an Air Quality survey among citizens and updating the City Council website regarding access to air quality information.

Theme 2 - Air Quality Monitoring contains 2 objectives with 3 targets. Progress has been achieved in the delivery of a local air quality monitoring network and associated interactive web-based dashboard.

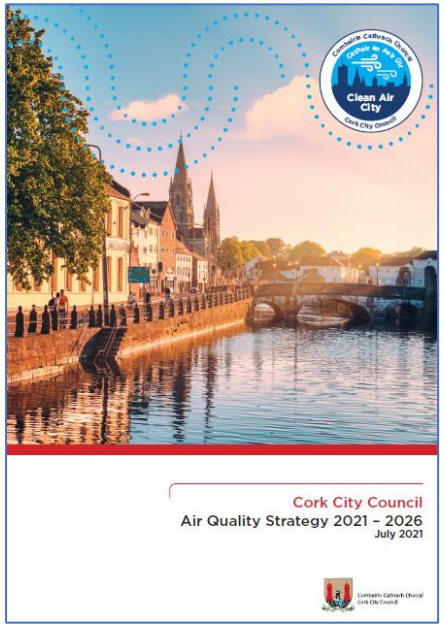
Theme 3 - Travel contains 7 objectives with 32 targets. Progress has been achieved with the delivery of an expanded network of cycleways and enhanced pedestrianisation across the city.

Theme 4 - Electric Vehicles and Charging Infrastructure contains 1 objective with 5 targets. Progress has been achieved with the delivery of an expanded electric vehicle (EV) charging network across the city. In addition to this, the Cork City Council's fleet contains 76 electric vehicles.

Theme 5 - Regulation and Enforcement contains 6 objectives with 6 targets. Progress has been achieved in the upgrade of a significant quantity of the City Council's housing stock to low or near-zero emission heating systems. There is continued progress with inspections and compliance investigations for the Solid Fuel Regulations and continued investigations of air pollution complaints.

Theme 6 - Green Infrastructure contains 3 objectives with 11 targets. Progress has been achieved under this theme with the delivery of a new park (Marina Park) as well as upgrades to numerous parks across the city (Holland Park, Murphy's Farm Park and Playground). Cork City Council has also hired a Tree Officer and two Biodiversity Officers to aid the delivery of green infrastructure across the expanded city area.

Theme 7 - Research and Innovation contains 6 objectives with 6 targets. Progress has been achieved via the roll out of a dedicated Clean Air Zone in April 2022, launch of a district scale air monitoring network across the city for $PM_{2.5}$ and the addition of 5 new NO_2 monitors in the city centre. There is also continued participation in air quality projects with external agencies such as UCC, Cork Healthy Cities and the EPA.



Appendix 5 details the status of all Objectives and Targets.

Section 7 – Air Quality Data and Useful Links

Cork City Air Quality Dashboard https://corkairquality.ie/	EPA Real Time Air Quality Data for Ireland https://airquality.ie/	EPA Air Quality Report 2021 https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2021.php	A synopsis of air quality issues in Ireland in infographic format https://www.epa.ie/environment-and-you/air/resources/airqualitygeneralinfograhpic.php	'ABC' – Home Heating Advice for Cleaner Air https://www.youtube.com/watch?v=bgH_rkH8YtI
Reducing air pollution from domestic solid fuel https://www.gov.ie/en/publication/e3da2-air-quality/?referrer=http://www.gov.ie/cleanair/	National Investment Framework for Transport in Ireland https://www.gov.ie/en/publication/cfae6-national-investment-framework-for-transport-in-ireland-nifti/	New Regulations on solid fuels https://www.epa.ie/our-services/licensing/air/solid-fuel-regulations/	Ireland's Climate Action Plan 2021 https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/	Cork City Climate Adaptation Strategy 2019-2024 https://www.corkcity.ie/en/council-services/services/environment/climate-change/climate-change.html
WHO – 10 ways to fight air pollution https://www.who.int/news-room/spotlight/how-air-pollution-is-destroying-our-health/10-ways-you-can-fight-air-pollution	WHO: How air pollution affects your body https://www.youtube.com/watch?v=t7MZE6ttPoA	EPA Research Paper: Residential Solid Fuel Use in Ireland and the Transition Away from Solid Fuels https://www.epa.ie/publications/research/air/Research_Report_407.pdf	EPA Research Paper: Eco-driving: Trends and Potential Impacts for Irish Heavy-duty Vehicles https://www.epa.ie/publications/research/air/Research_Report_398.pdf	Cork City Council's Air Quality Strategy https://www.corkcity.ie/en/council-services/services/environment/air-quality/air-quality-strategy.html

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APPENDICES

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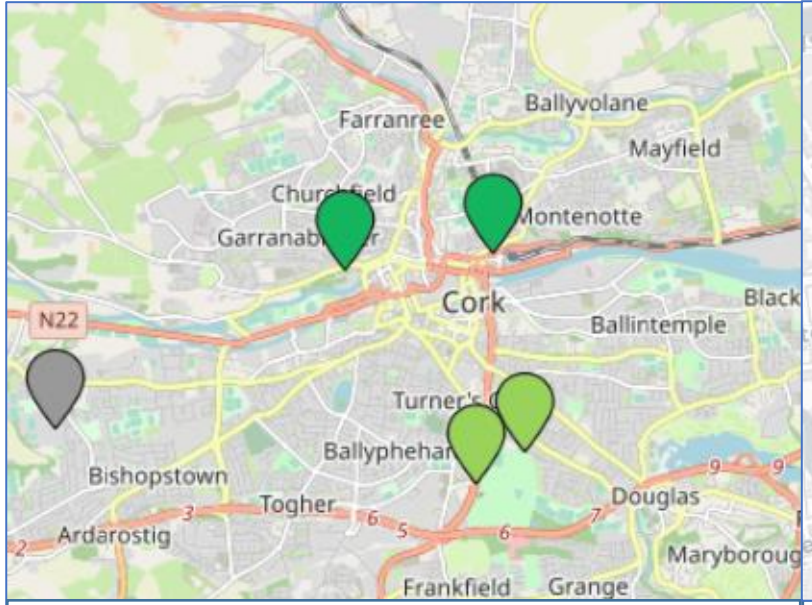
A1 – Locations of Air Quality Monitoring Stations

Links to access data:

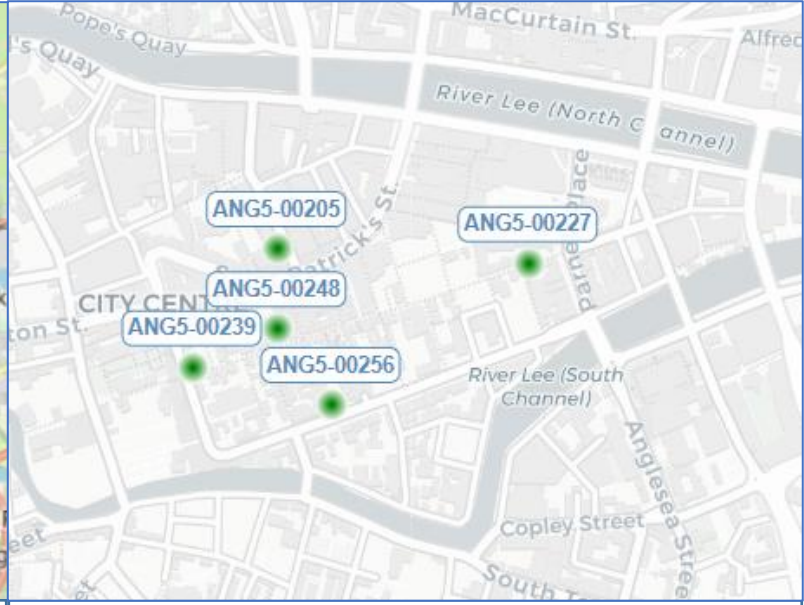
EPA Regulatory monitoring stations:
https://airquality.ie/

Cork City Particulate Matter monitoring stations:
https://corkairquality.ie/

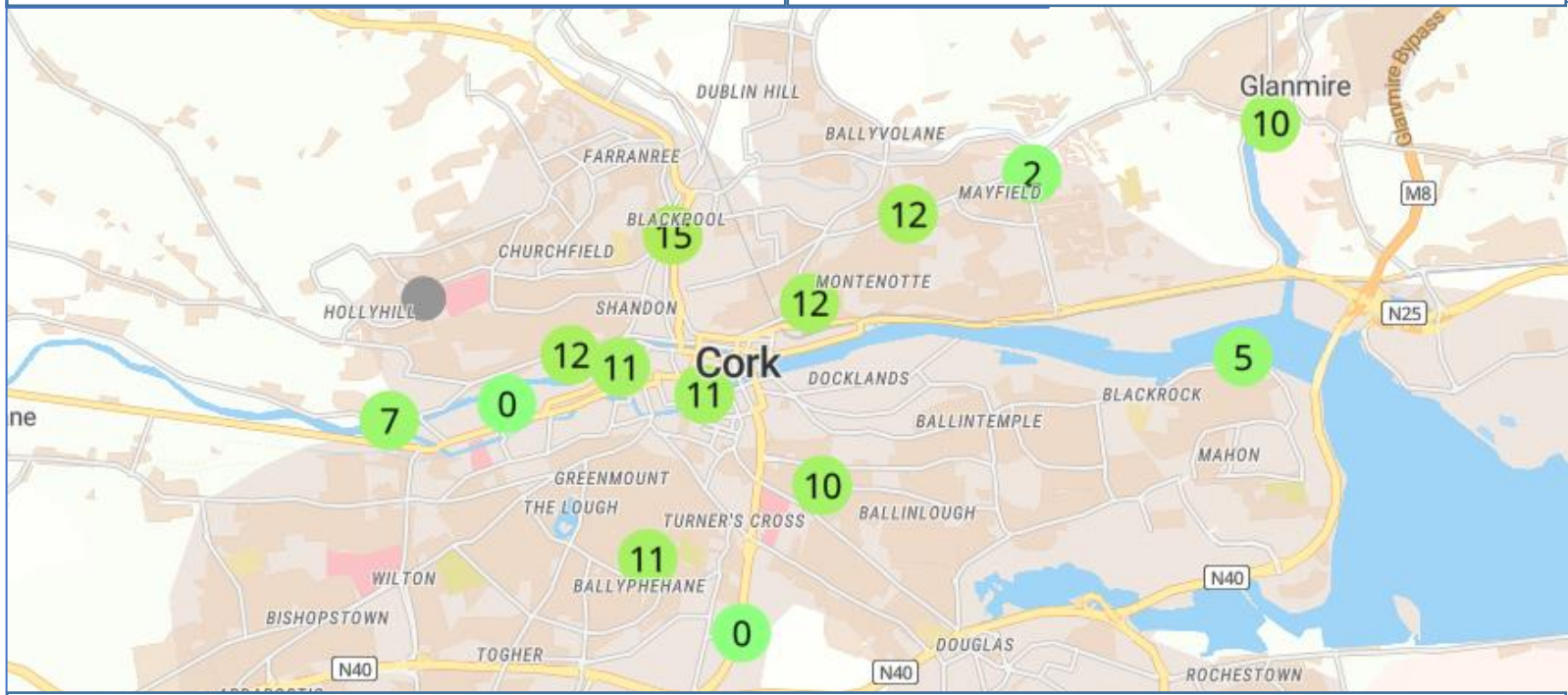
Clean Air Zone monitoring stations: In press



EPA Regulatory monitoring stations



Cork City Council NO_2 monitoring stations



Cork City Council $PM_{2.5}$ monitoring stations

A2 - EPA Monitoring: Summary Data Table for Cork City – $PM_{2.5}$, PM_{10} and NO_2

Monitoring Station		$PM_{2.5}$ ($\mu g/m^3$)		PM_{10} ($\mu g/m^3$)		NO_2 ($\mu g/m^3$)		
		24h	annual	24h	annual	1h	24h	annual
	EU Trigger Values in $\mu g/m^3$	**NA**	**20**	**50**	**40**	**200**	**NA**	**40**
Heatherton Park	Exceed EU Limits	No	No	No	No	-	-	-
Lower Glanmire Road	Exceed EU Limits	-	-	-	-	No	-	No
Southlink Road	Exceed EU Limits	-	-	No	No	No	-	No
UCC	Exceed EU Limits	-	No	-	-	No	-	No

Note: "-" implies parameter not measured at this station

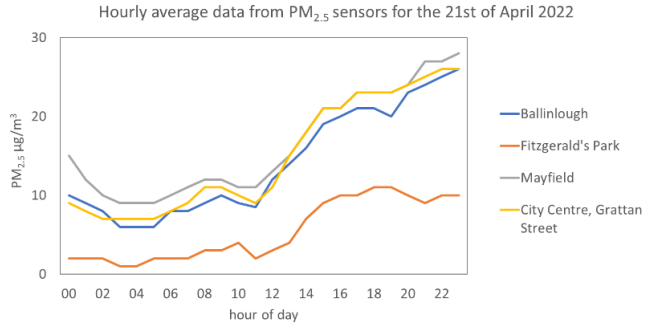
A3 - $PM_{2.5}$: Seasonal and daily trends

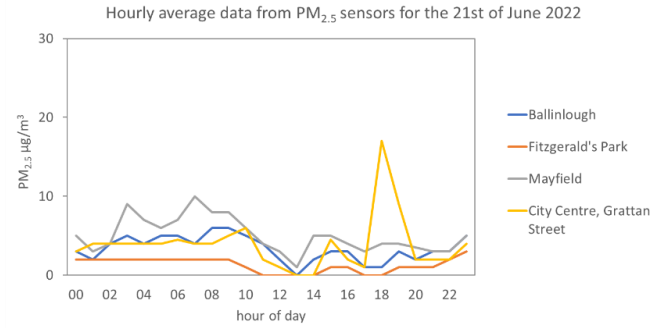
To demonstrate the differences in Air Quality in different parts of Cork city throughout the year, the graphs on the right show hourly values for the 21st of April, 21st June, 21st September and 21st December.

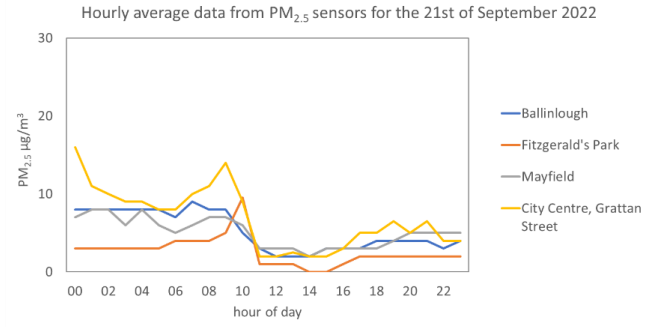
(note: April 2022 data applied due to sensor malfunction in March 2022)

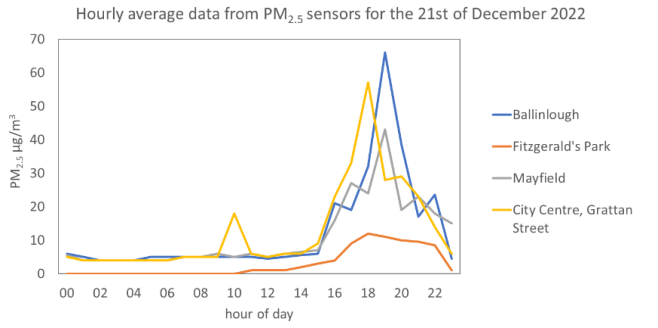
$PM_{2.5}$ levels are highest during the colder seasons. There is also a clear distinction between air quality in different locations. Air Quality in Fitzgerald's Park; which can be taken as a background location with cleaner air; is generally better than in residential areas such as Mayfield, Ballinlough, or the City Centre.

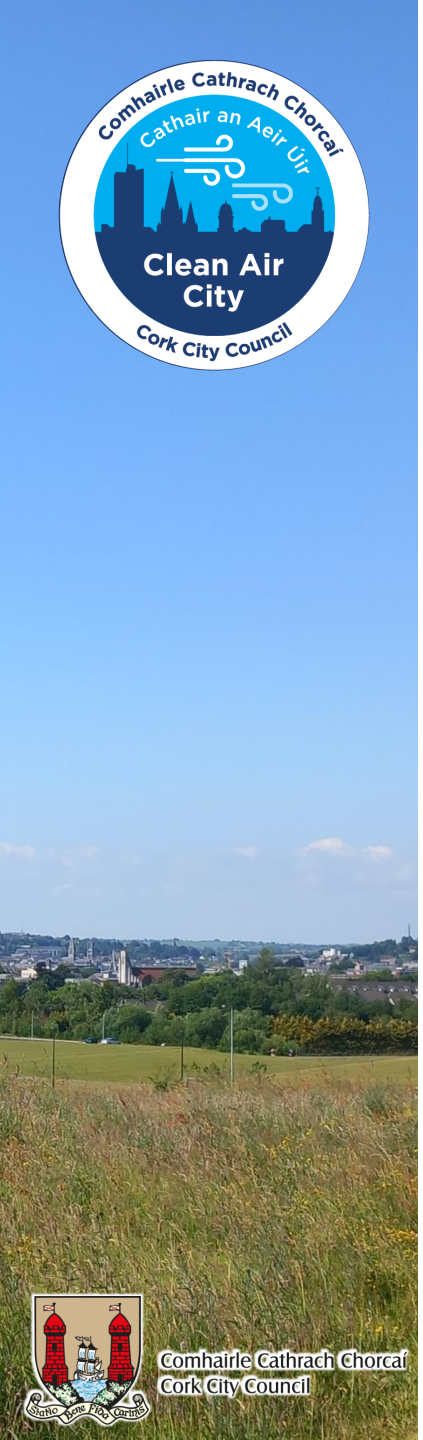
$PM_{2.5}$ ($\mu g/m^3$) Seasonal Averages 2022					
Station	Spring Feb-Apr	Summer May-Jul	Autumn Aug-Oct	Winter Nov-Jan	Annual Average
City Centre, Grattan Street	12	4	4	11	**6**
Fitzgerald's Park	6	1	2	4	**3**
Lifetime Lab	9	3	3	10	**7**
Mayfield	14	4	5	11	**8**
Blackpool	16	4	5	18	**11**
Ballyphehane	10	3	3	13	**7**
Ballinlough	13	3	4	16	**9**
Blackrock Castle	13	4	3	12	**8**
Blarney	10	3	4	13	**6**
Glanmire	13	4	4	15	**9**
Ballincollig	13	3	4	13	**8**



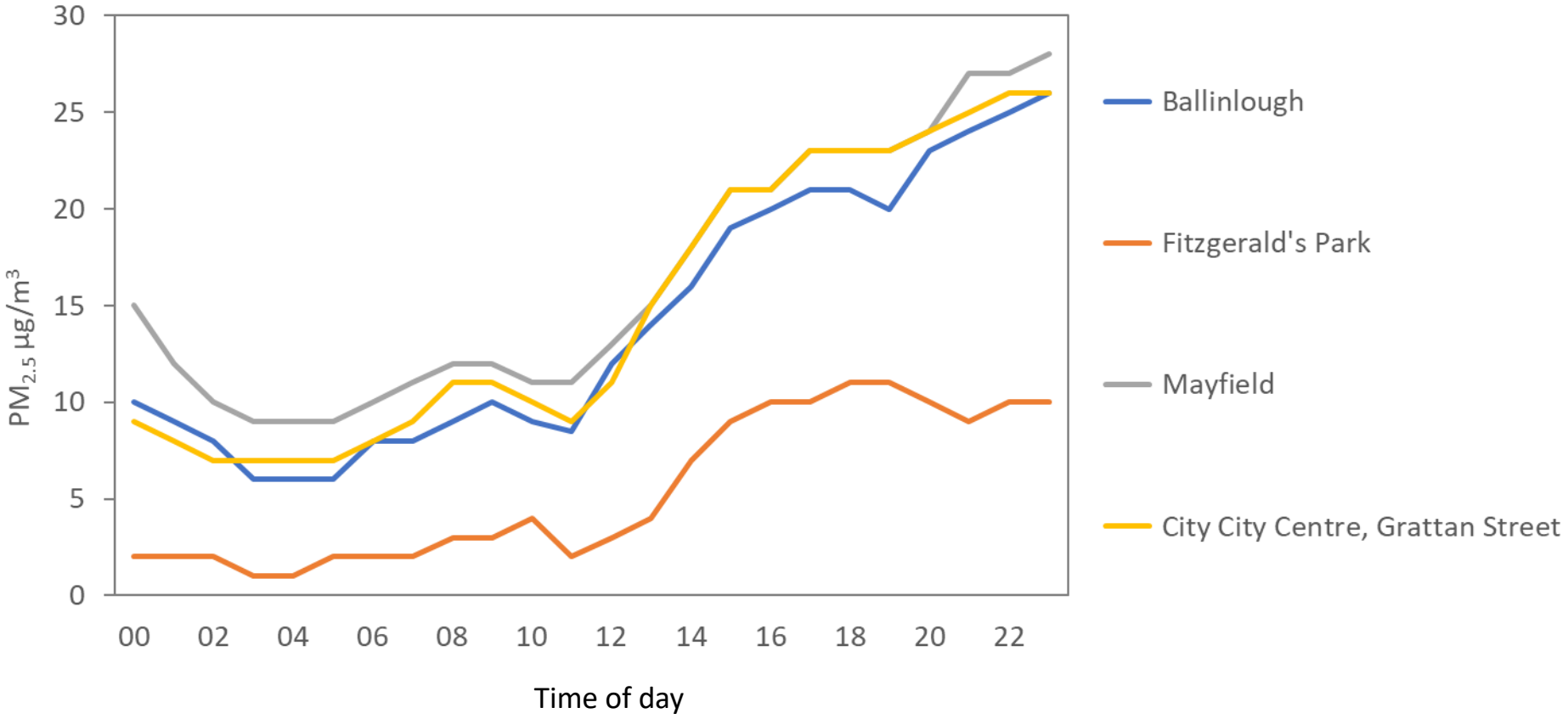




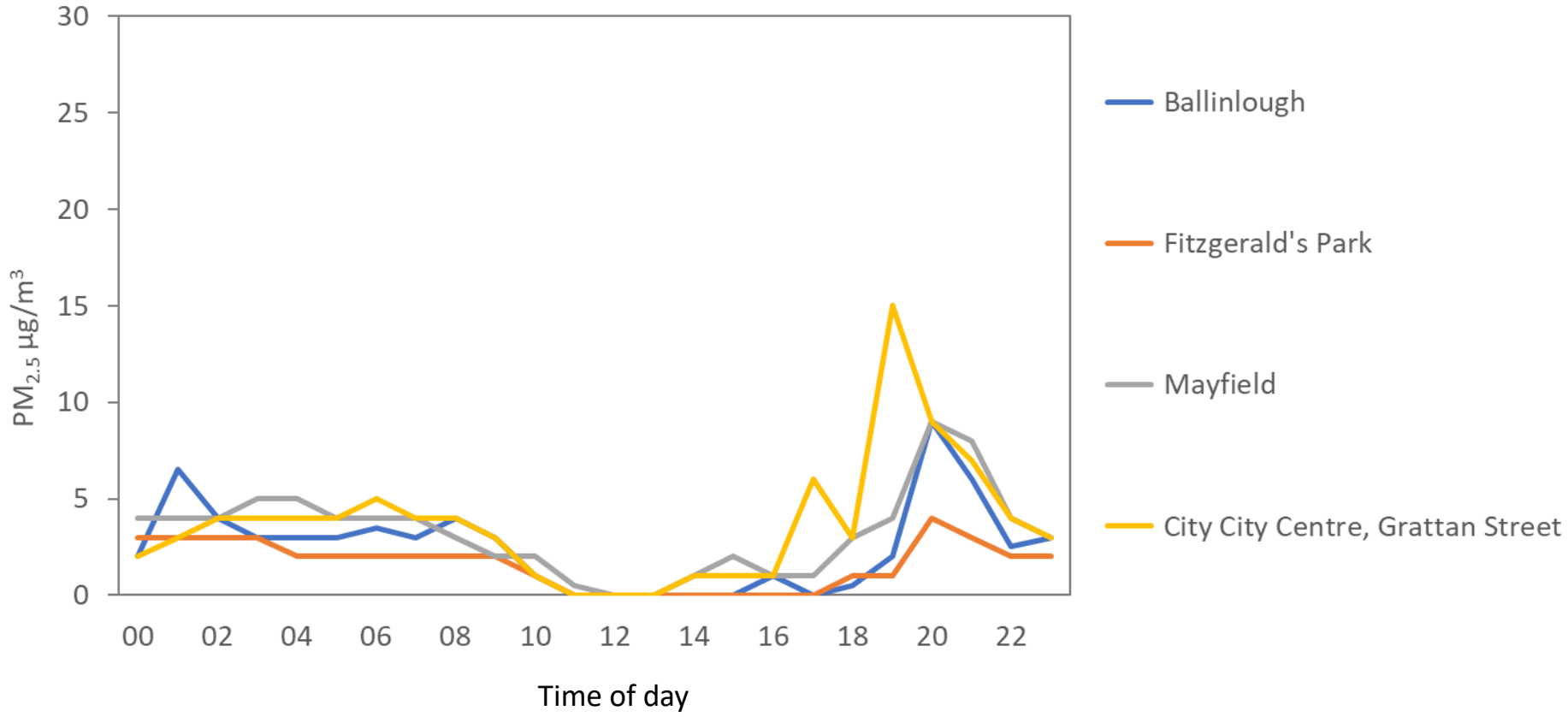




$PM_{2.5}$ at different locations across Cork City on April 21st 2022



$PM_{2.5}$ at different locations across Cork City on June 21st 2022



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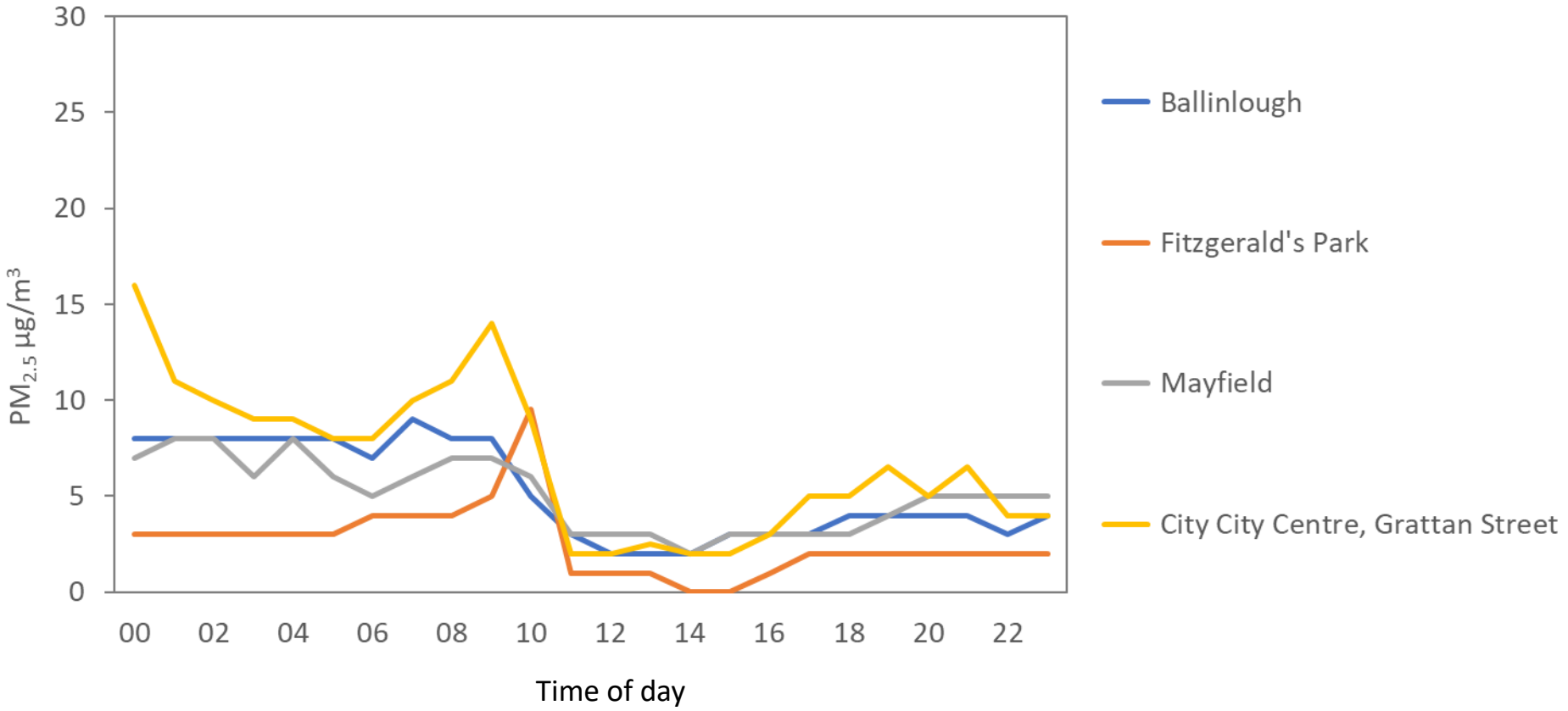
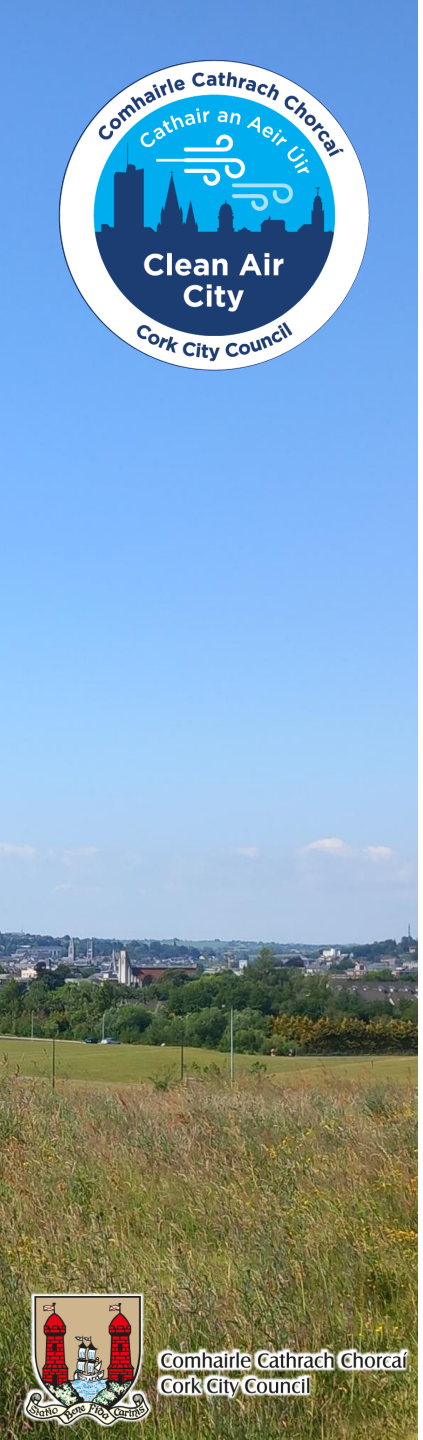
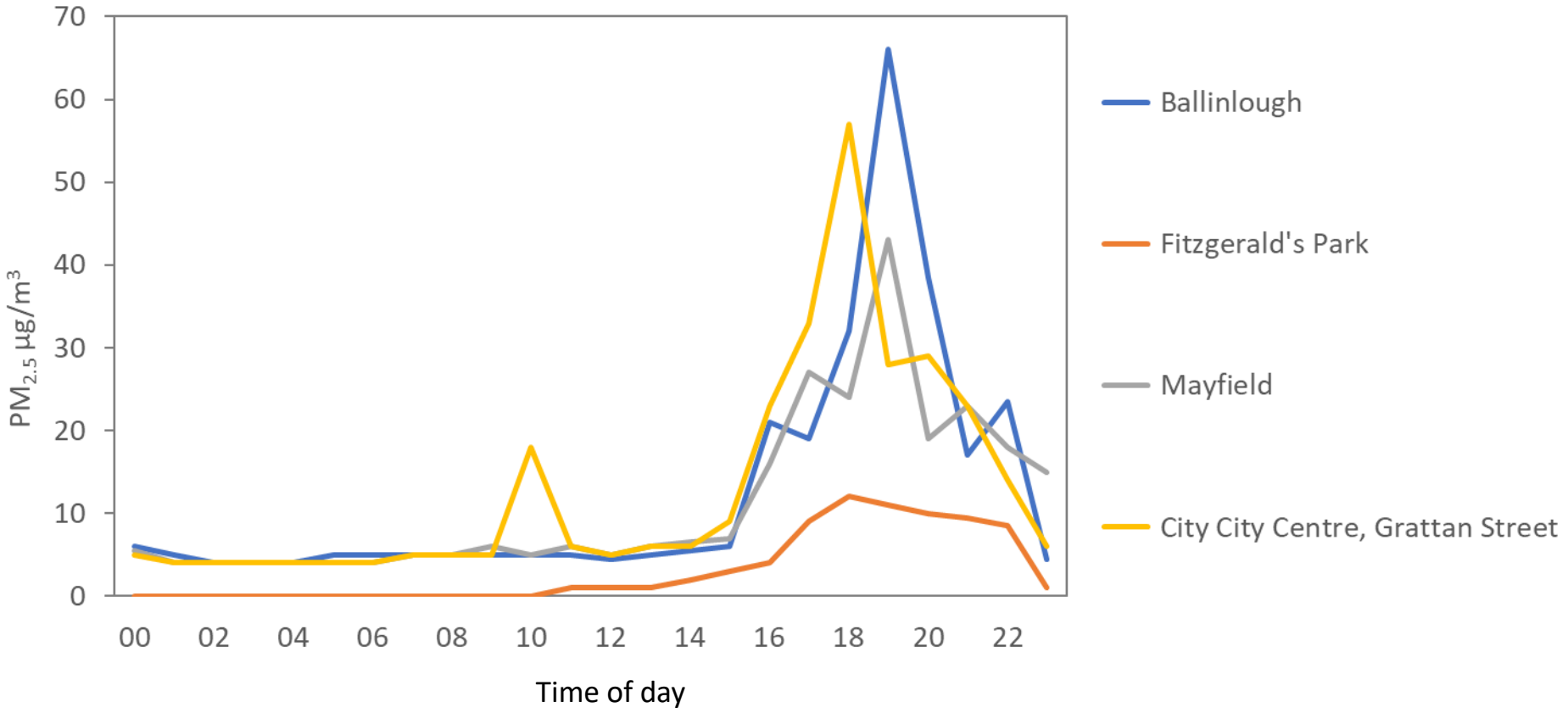
$PM_{2.5}$ at different locations across Cork City on September 21st 2022





$PM_{2.5}$ at different locations across Cork City on December 21st 2022



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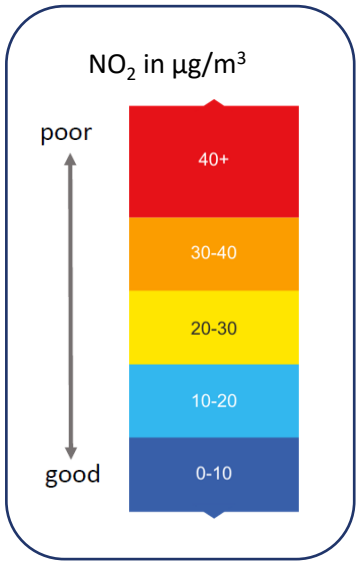
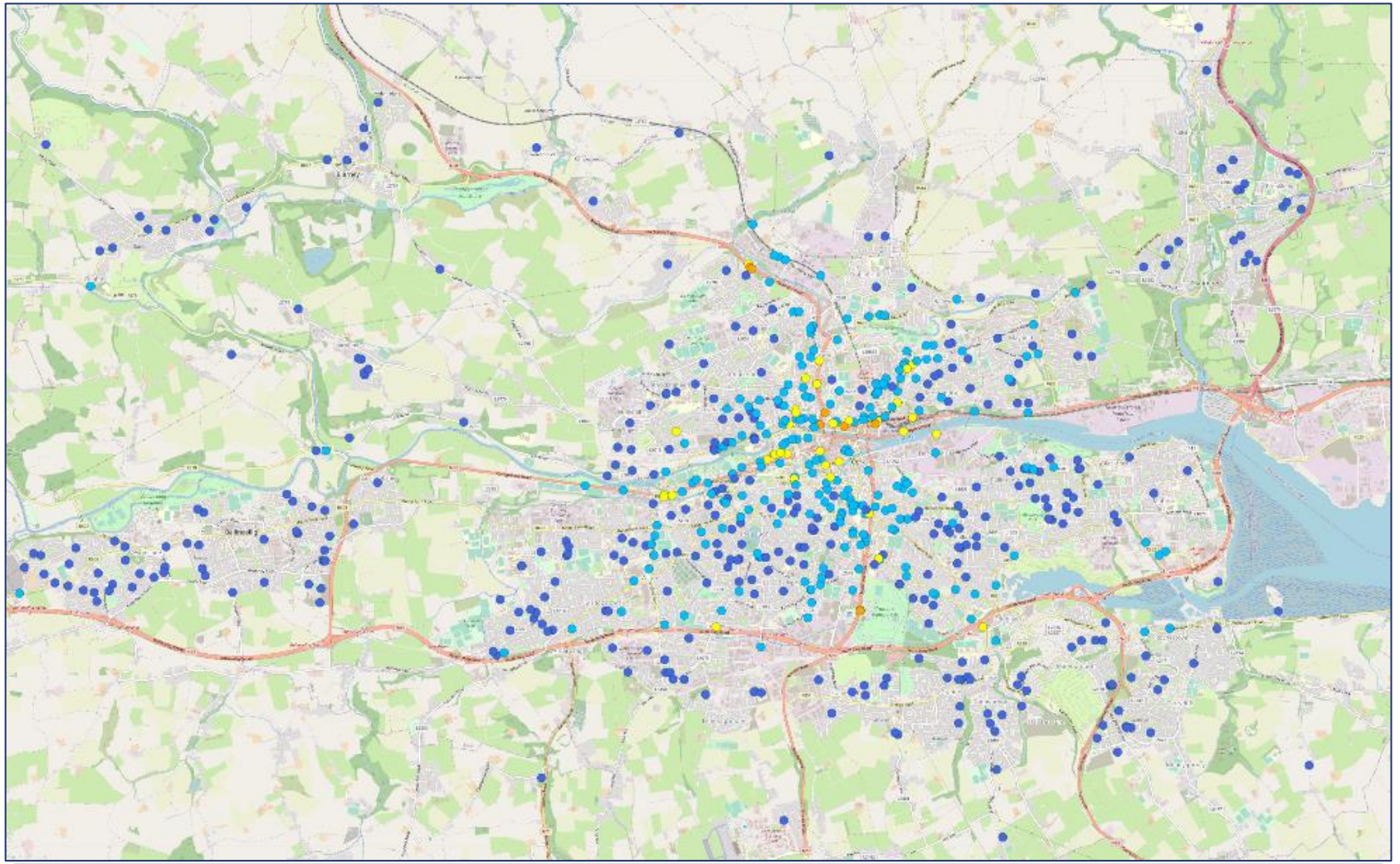
A4 – 'Clean Air Together' NO_2 diffusion tubes study October 2022

The Clean Air Together Project saw 700 citizen scientists measured Nitrogen Dioxide (NO_2) levels at different locations around Cork city continuously for over four weeks in October 2022. The project was led by the Environmental Protection Agency and An Taisce with the assistance from air quality scientists within Cork City Council. The map below shows the results for Cork City and Suburbs, ranging from low levels (dark blue, light blue) to medium (yellow) and higher (orange, red) levels of NO_2.

Results from the study revealed that over 90% of locations had low levels of NO_2.
The highest NO_2 levels were found along national primary roads, namely:

- Lower Glanmire Road
- MacCurtain Street (N8)
- Commons Road
- Leitrim Street
- Carroll's Quay (N20)
- South Link Road (N27)





Visit the Clean Air Together Project website https://www.cleanairtogether.ie/
to check NO_2 results in your neighbourhood.

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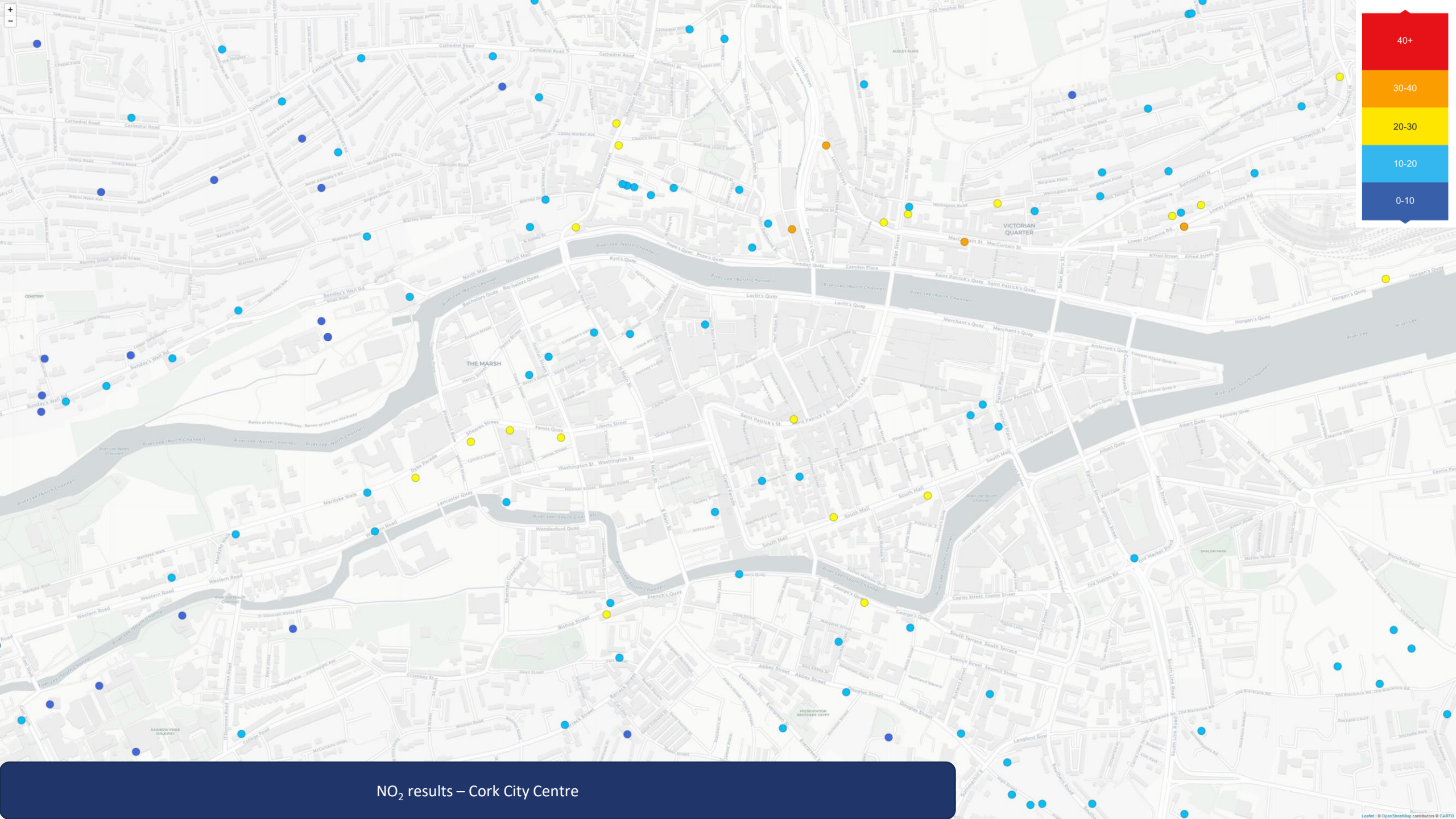
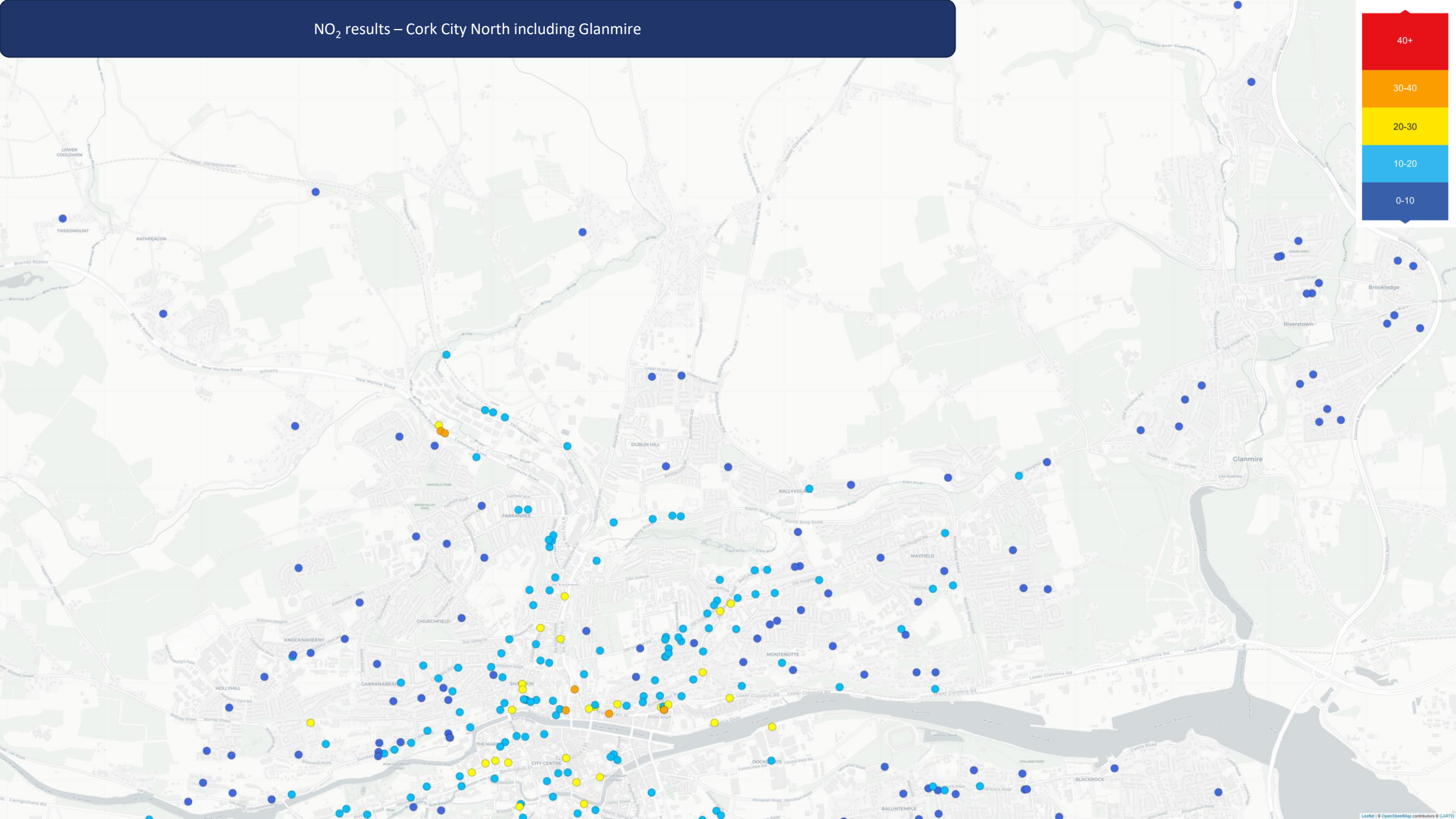
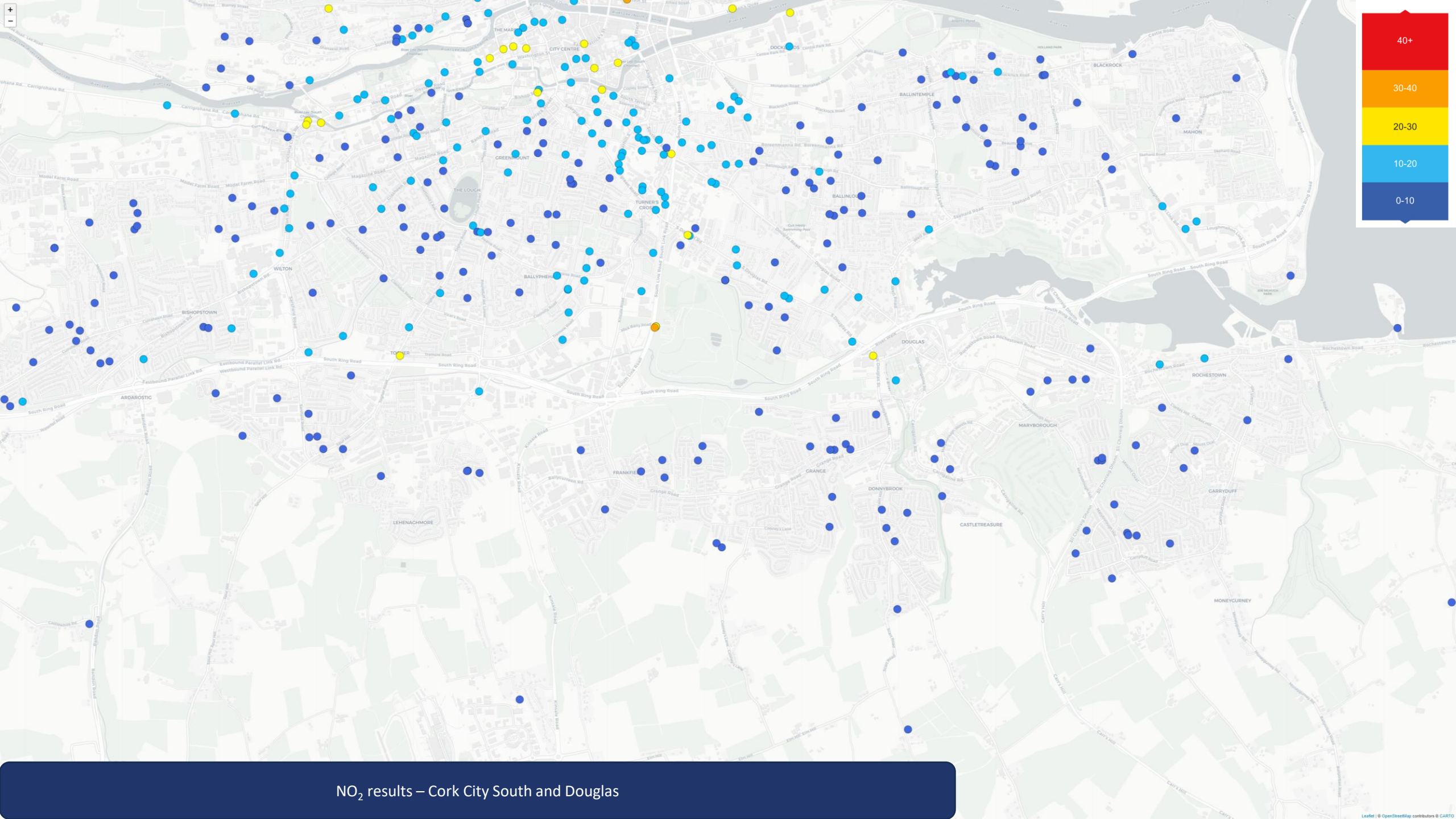


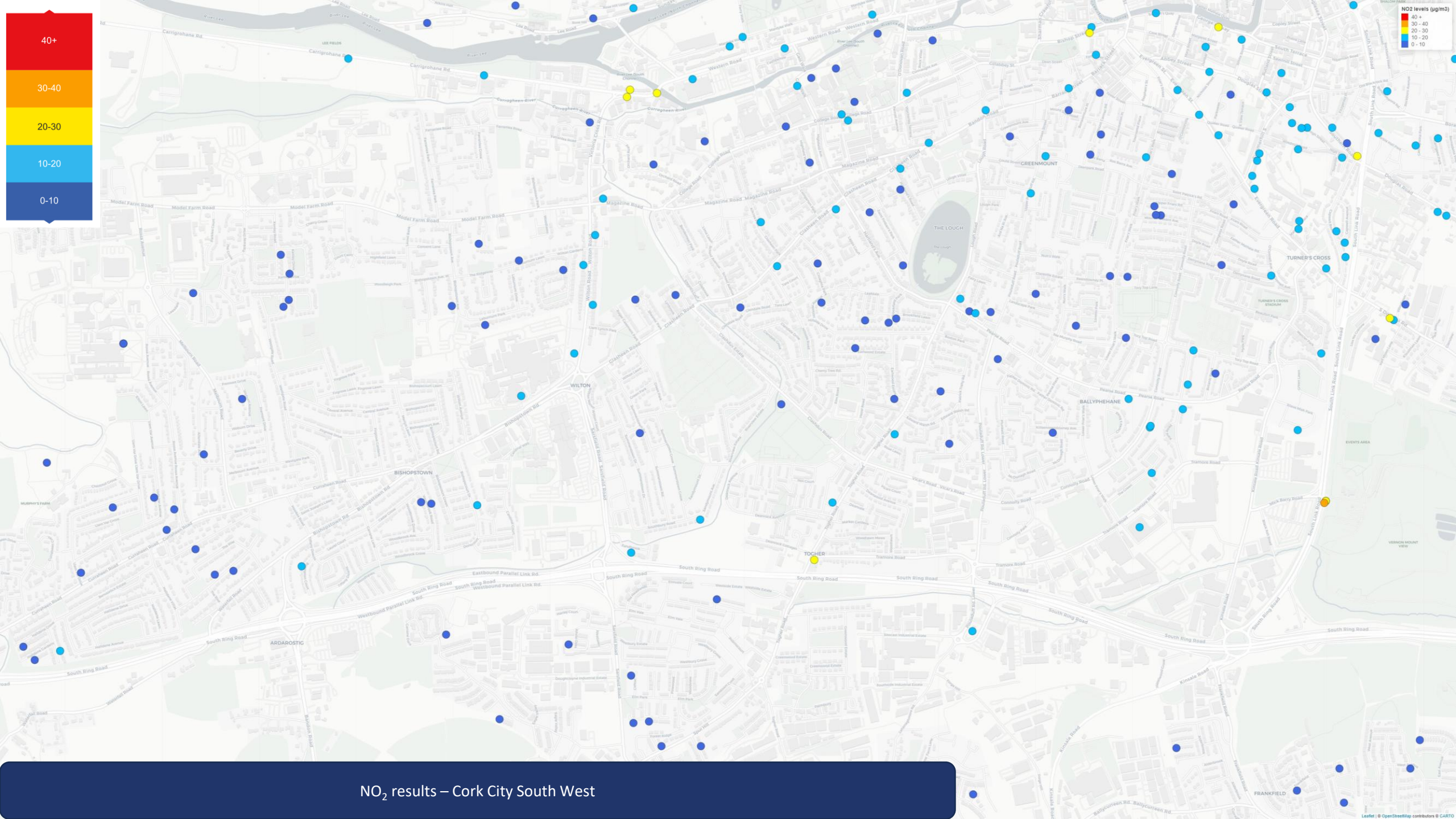
NO_2 results – Cork City Centre

NO_2 results – Cork City North including Glanmire

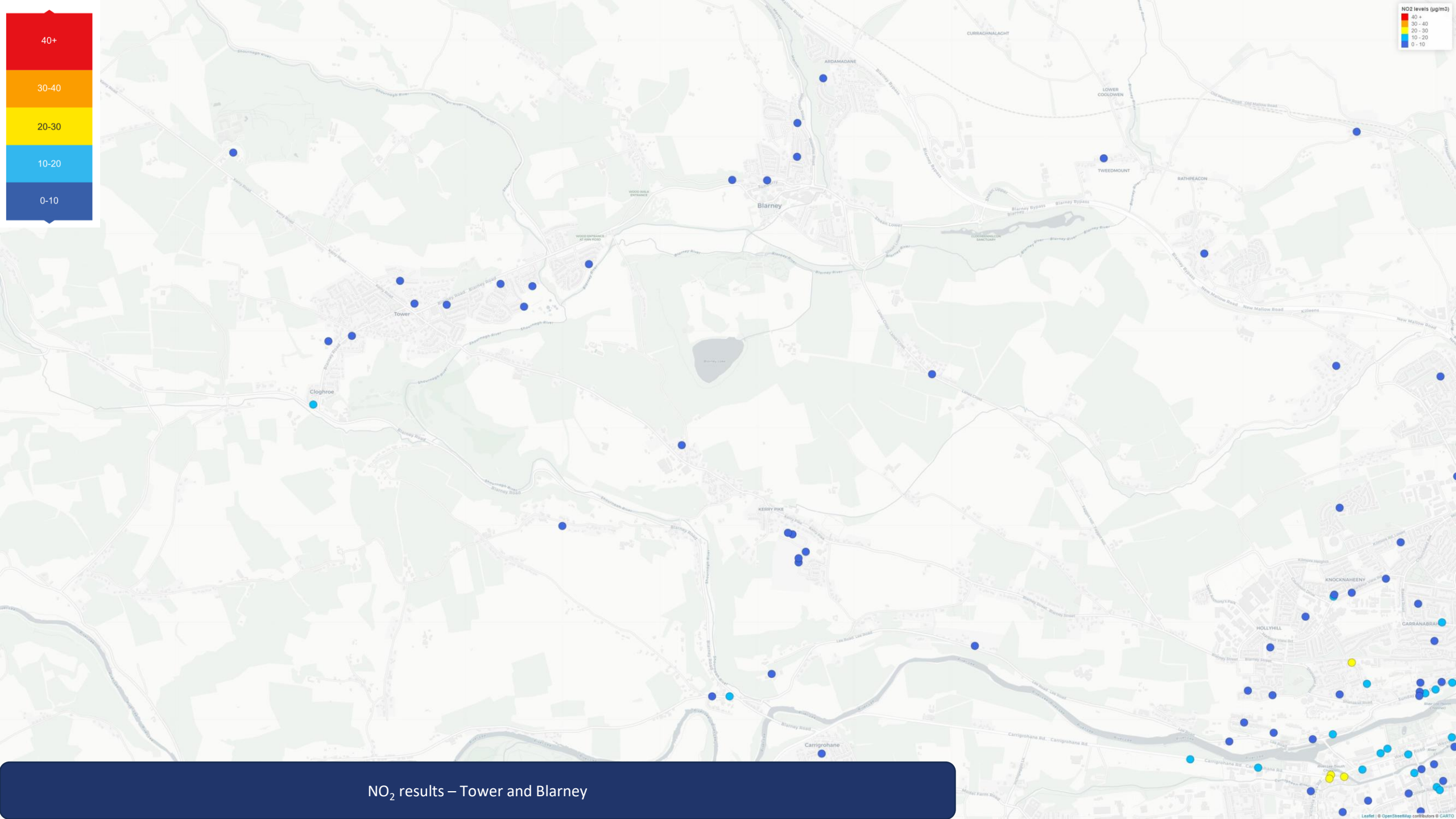




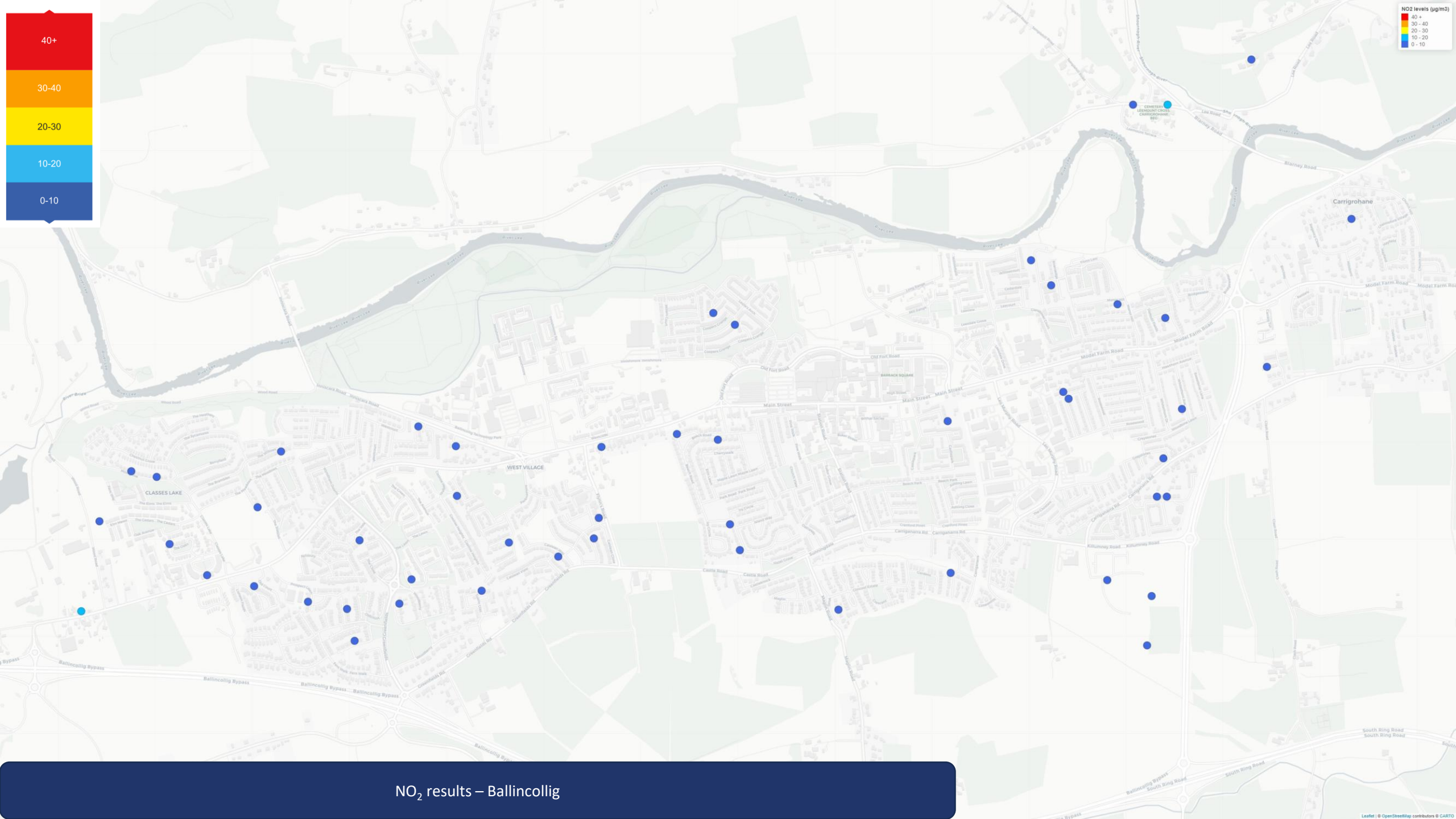
NO_2 results – Cork City South and Douglas



NO_2 results – Cork City South West



NO_2 results – Tower and Blarney



NO_2 results – Ballincollig

A5 Cork City Council's Air Quality Strategy – Status of Objectives and Targets

Theme 1: Health and Well-being

Objective 1.1	**Acquire feedback relating to the issue of air pollution in Cork City; including suggestions on how the Council and stakeholders could improve air quality across the city**		
No.	**Action**	**Timeframe**	**Status**
1.1a	Carry out a public Air Quality Assessment Survey and make results available to the public.	July 2020	Complete
Objective 1.2	**Develop awareness campaigns to inform the public of the dangers of air pollution and the steps that can be taken to reduce it. Incorporate data from Cork City Council funded studies to inform public at specific events**		
No.	**Action**	**Timeframe**	**Status**
1.2a	Utilise website, social media and e-mail to update public on new findings relating to air pollution.	Short - Medium	Ongoing
1.2b	Commission development of training courses, workshops and materials on air pollution.	Short - Medium	Ongoing
1.2c	Organise and establish training and workshops as part of planned City Council Science and Civic events and festivals (as appropriate).	Short - Medium	Ongoing
1.2d	Develop air quality information materials (brochures, educational packs, information boards) and make available to schools, colleges, social/sports clubs.	Short - Medium	Ongoing
1.2e	Liaise with other local authorities and government bodies to designate a local Clean Air Day. This may be integrated with Cork Cycle Week and other similar initiatives.	Short - Medium	Ongoing

Theme 2: Air Quality Monitoring

Objective 2.1	**Develop an accurate and efficient air quality monitoring infrastructure in Cork city**		
No.	**Action**	**Timeframe**	**Status**
2.1a	Install a local network of air quality monitors across the city.	2021 / 2022	Completed and ongoing
Objective 2.2	**Make air pollution updates available to the public**		
No.	**Action**	**Timeframe**	**Status**
2.2a	Create a localised web-based dashboard to deliver real-time air quality information.	2021	Completed and ongoing
2.2b	Produce an annual report for air quality in Cork City.	2022	Air quality brief published in April 2022. Full Air Quality Report for 2022 will be published in June 2023

Theme 3: Travel

Objective 3.1	**Enhance bus connectivity and frequency**		
No.	**Action**	**Timeframe**	**Status**
3.1a	Expand Park and Ride facilities across the city (Phase 1: Dunkettle).	Medium	Ongoing
3.1b	Prioritise bus network corridors: 1. East-West interim bus corridor following Light Rail corridor alignment; 2. Douglas Road and South Douglas Road Corridor; 3. N20 Mallow Road Corridor; 4. Summerhill North / Ballyhooly Road Corridor; 5. Hollyhill (Apple Campus) to City Centre; and 6. Dunkettle to City Centre.	Medium	Ongoing
3.1c	New bus lanes to be provided at Leitrim St, Cathedral Walk, Coburg St, Devonshire St, Bridge Street, St Patricks Bridge (MacCurtain Street Public Transport Improvement Scheme).	Short - Medium	Ongoing
3.1d	Produce an annual report for air quality in Cork City.	Medium	Air quality brief published in April 2022. Full Air Quality Report for 2022 will be published in June 2023
Objective 3.2	**Enhance Rail Infrastructure in Cork City**		
No.	**Action**	**Timeframe**	**Status**
3.2a	Undertake Review of Suburban Rail Network to determine level of upgrades and new stations required.	Medium to Long	Ongoing
3.2b	Include Watergrasshill and Mallow within Leap Card discount range to promote commuting trips by rail.	Medium	Ongoing

Objective 3.3	Develop Travel Plan information for the public to offer alternative modes of travel		
No.	**Action**	**Timeframe**	**Status**
3.3a	Work with public transport providers to offer public transport discounts.	Medium	Ongoing
3.3b	Work with Transport Mobility Forum (TMF) to publicise change of mode travel options.	Short and Medium	Ongoing
3.3c	Conduct regular Staff Travel to Work surveys.	Short and Medium	Ongoing
3.3d	Develop targets to increase the number of staff walking, cycling to work and choosing healthy commuting options.	Medium	Ongoing
3.3e	Cork City Council has developed a working from home policy for its staff. The reduction in air emissions associated with the working from home policy shall be reported annually.	Medium	Ongoing
3.3f	Work with NTA to introduce a mobility card which allows access to shared bikes, train, bus and shared car systems rather than separate cards for each form of travel.	Medium	Ongoing
3.3g	Develop commuting transition plan for walk - cycle, walk/cycle-train/bus etc. to make change of modes more accessible, effective and attractive.	Medium	Ongoing
Objective 3.4	**Reduce volume of traffic on City roads**		
No.	**Action**	**Timeframe**	**Status**
3.4a	Develop a phasing in of non-vehicular roads within city centre.	Medium	Ongoing
3.4b	Ensure central roads within city and Tivoli docklands are solely for sustainable and active travel as per Area Based Transport Assessments.	Medium	Ongoing
3.4c	Carry out an investigation on the feasibility of reducing traffic speed to 30kph in built up areas.	Short to medium	Ongoing

Objective 3.5	Reduce emissions from Freight and Heavy Goods Vehicles		
No.	**Action**	**Timeframe**	**Status**
3.5a	Progress "last mile delivery" feasibility studies and projects for the city centre.	Medium	Ongoing
3.5b	Investigate the feasibility of a permit system for HGVs.	Medium	Ongoing
3.5c	Pilot a cargo bicycle grant scheme to increase more sustainable inner city delivery methods.	Medium	Ongoing
Objective 3.6	**Expand the cycle network throughout the city and improve accessibility of Cycle lanes**		
No.	**Action**	**Timeframe**	**Status**
3.6a	Expand electric bike charging facility.	Medium	Ongoing
3.6b	Increase the amount of cycle parking in the city, including for larger cargo bikes.	Medium	Ongoing
3.6c	Improve cycle hire provision.	Medium	Ongoing
3.6d	Apply a minimum cycling level of service to all streets.	Medium	Ongoing
3.6e	Promote cycle to work scheme.	Medium	Ongoing
3.6f	Continue to support Mobility Management Initiatives and other initiatives which support greater use of walking, cycling and public transport including Bike Week, European Mobility Week and other related promotions. Use the 'Cork City Cycling Strategy' and the 'Cork Cycle Network Plan' to help deliver this action.	Ongoing	Ongoing
3.6g	Continue development of the primary and inter-city cycle network, including 'Lee to Sea Greenway' from Ballincollig to Crosshaven and the Bandon Railway Line Greenway.	Short and Medium	Ongoing
3.6h	Align implementation of the cycling network with the implementation of the Bus-Connects network.	Medium	Ongoing
3.6i	Continue to promote the use of cycling including the delivery of infrastructure and facilities as part of Planning assessments.	Short and Medium	Ongoing

Objective 3.7	Increase Pedestrianisation		
No.	**Action**	**Timeframe**	**Status**
3.7a	Align implementation of improvements to the walking and cycling network with the implementation of the BusConnects network.	Short and Medium	Ongoing
3.7b	Oversee ongoing maintenance and renewal of footpaths, urban realm improvements and walking network provisions (e.g. increased seating areas)	Short and Medium	Ongoing
3.7c	Report on the success of the increase in pedestrianised streets in the city as part of the 'Re-imagine Cork' programme	Short	Ongoing
3.7d	Develop a way-finding system to better inform public and encourage pedestrianisation	Short and Medium	Completed and Ongoing

Theme 4: Electric Vehicles and Charging Infrastructure

Objective 4.1	Develop an Electric Vehicle Strategy for Cork City		
No.	**Action**	**Timeframe**	
4.1a	Define objectives to increase transition to Electric Vehicles.	Medium	Ongoing
4.1b	Conduct a data survey which includes EV and non-EV drivers to determine priority locations and areas of highest EV charging requirements.	Medium	Ongoing
4.1c	Outline a strategy document for EV charging deployment: Public/private/Commercial/workplace and residential.	Medium	Ongoing
4.1d	Develop a road map for delivery.	Medium	Ongoing
4.1e	Assign a dedicated engineering team to the task.	Medium	Ongoing

Theme 5: Regulation and Enforcement

Objective 5.1	**Ensure that all buildings sites adhere to air quality standards**		
No.	**Action**	**Timeframe**	
5.1a	Insert conditions to Planning applications that focus on the need for consistent monitoring of air pollutants during the development phase.	Medium	Ongoing
Objective 5.2	**Ensure that all new Cork City Council buildings adhere to zero solid fuel systems**		
No.	**Action**	**Timeframe**	**Status**
5.2a	Construct buildings with low-emission heating systems. Work to retrofit existing buildings by converting heating systems and improving Building Energy Rating (BER).	Short to Medium	Ongoing
Objective 5.3	**Reduce carbon emissions for social housing stock by installing renewables and improving thermal insulation to NZEB (Near Zero Energy Building) standard**		
No.	**Action**	**Timeframe**	**Status**
5.3a	Work to improve energy efficiency of social and affordable housing stock to achieve minimum of B2 energy rating on existing social housing stock.	Long (2050)	Ongoing
Objective 5.4	**Ensure that solid fuel suppliers and public are aware of solid fuel regulations**		
No.	**Action**	**Timeframe**	**Status**
5.4a	Run advertisement campaigns in autumn and winter highlighting the importance of adhering to the Solid Fuel Regulations (Smoky Coal Ban) and the link to air quality.	Spring and Autumn	Completed and ongoing

Objective 5.5	Carry out inspections of fuel suppliers		
No.	**Action**	**Timeframe**	**Status**
5.5a	Carry out inspections in line with annual RMCEI Plan (regarding enforcement of the prohibition on the sale and supply of smoky coal).	Ongoing	Completed and ongoing
Objective 5.6	**Respond to complaints of air pollution**		
No.	**Action**	**Timeframe**	**Status**
5.6a	Investigate all air pollution complaints.	Ongoing	Completed and ongoing

Theme 6: Green and Blue Infrastructure

Objective 6.1	Enhance and expand the existing green and blue infrastructure within the city		
No.	**Action**	**Timeframe**	**Status**
6.1a	Finalize the Green and Blue Infrastructure Study and implement the objectives and actions from same.	2021	Completed
6.1b	Implement actions from Heritage and Biodiversity Plan (2021-2026).	2021 - 2026	Ongoing
6.1c	Commission Tree Planting Strategy for Cork city.	Short - Medium	Ongoing

Objective 6.2	Enhance flora and fauna biodiversity in Cork city		
No.	**Action**	**Timeframe**	**Status**
6.2a	Follow new initiatives as outlined in 2021-2026 Heritage and Biodiversity Strategy.	2021 - 2026	Ongoing
6.2b	Identify locations to create new habitats for native flora and fauna e.g. urban orchards.	Short-Medium	Ongoing
6.2c	Identify potential ecological corridors to improve connectivity between green areas.	Short-Medium	Ongoing
6.2d	Engage with local voluntary groups to enhance new planting and re-wilding initiatives to increase green footprint of the city	Short-Medium	Ongoing
6.2e	Engage with local voluntary groups to enhance new planting and re-wilding initiatives to increase green footprint of the city	Short-Medium	Ongoing
Objective 6.3	**Utilise nature based solutions (NBS) to improve air quality**		
No.	**Action**	**Timeframe**	**Status**
6.3a	Install City trees (Air Quality Moss Walls) in the city centre to improve ambient air quality	2021 - 2026	Completed and ongoing
6.3b	Install 10 new parklets around the city	Short-Medium	Completed and ongoing
6.3c	Assess outcomes from Green and Blue Infrastructure study for Cork city and apply Nature Based Solutions to enhance air quality	Short-Medium	Ongoing

Theme 7: Research and Innovation

Objective 7.1	**Assess levels of air pollution associated with traffic in Cork City**		
No.	**Action**	**Timeframe**	**Status**
7.1a	Carry out an assessment using air quality monitors to determine the level of air pollution caused by traffic at varying times of the day. These readings will be used to generate an air quality map of the city.	2022	Completed and ongoing
Objective 7.2	**Determine the benefits of introducing Low Emission Zones / Clean Air Zones in Cork city**		
No.	**Action**	**Timeframe**	**Status**
7.2a	Commission a study on the potential for introducing Low Emission Zones / Clean Air Zones for air quality enhancement in the city.	Short	Completed and ongoing
Objective 7.3	**Make available to the public real-time air quality information across Cork city**		
No.	**Action**	**Timeframe**	**Status**
7.3a	Develop a dashboard for displaying real-time air quality information at the district level across Cork City	2022	Completed and ongoing

Objective 7.4	**Determine the impact of green infrastructure on carbon levels in the city**		
No.	**Action**	**Timeframe**	**Status**
7.4a	Commission research on the potential carbon offsets provided by Parks and Green Spaces in the City and suburbs.	Short	Ongoing
Objective 7.5	**Commission a study to assess the potential for development of renewable energy in parks and green spaces**		
No.	**Action**	**Timeframe**	**Status**
7.5a	Use Tramore Valley Park as a pilot for assessing the potential for development of renewable energy in parks and green spaces.	Short	Completed and ongoing
Objective 7.6	**Assess the feasibility of adding low-cost NOx sensors to the existing Local Air Quality Monitoring Network**		
No.	**Action**	**Timeframe**	**Status**
7.6a	Commission a study to install NOx sensors across the city. Assess their accuracy through the use of reference sensors.	Short	Ongoing

Cork City Council's full Air Quality Strategy is available at
https://www.corkcity.ie/en/council-services/services/environment/air-quality/air-quality-strategy.html