

# Air Quality in Newcastle upon Tyne

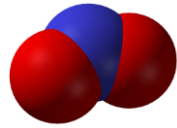
Dr Michael Deary

Associate Professor, Department of Geography and Environmental Sciences

Northumbria University

[michael.deary@northumbria.ac.uk](mailto:michael.deary@northumbria.ac.uk)

# Ambient air pollutants covered by legislation



Nitrogen dioxide (NO<sub>2</sub>)



Sulfur dioxide (SO<sub>2</sub>)



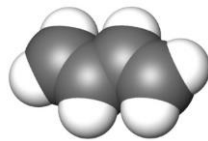
Ozone (O<sub>3</sub>)



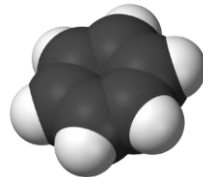
Carbon monoxide (CO)



Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)



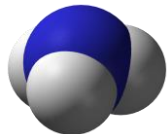
1,3-butadiene (C<sub>4</sub>H<sub>6</sub>)



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

**As, Pb, Cd, Ni, Hg**

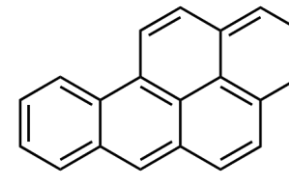
Metals (PTEs)



Ammonia

**VOCs**

Volatile organic compounds



Benzo[a]pyrene and other Polycyclic Aromatic Hydrocarbons

# Air quality monitoring



Real time (automatic monitoring - calibrated and DEFRA compliant)



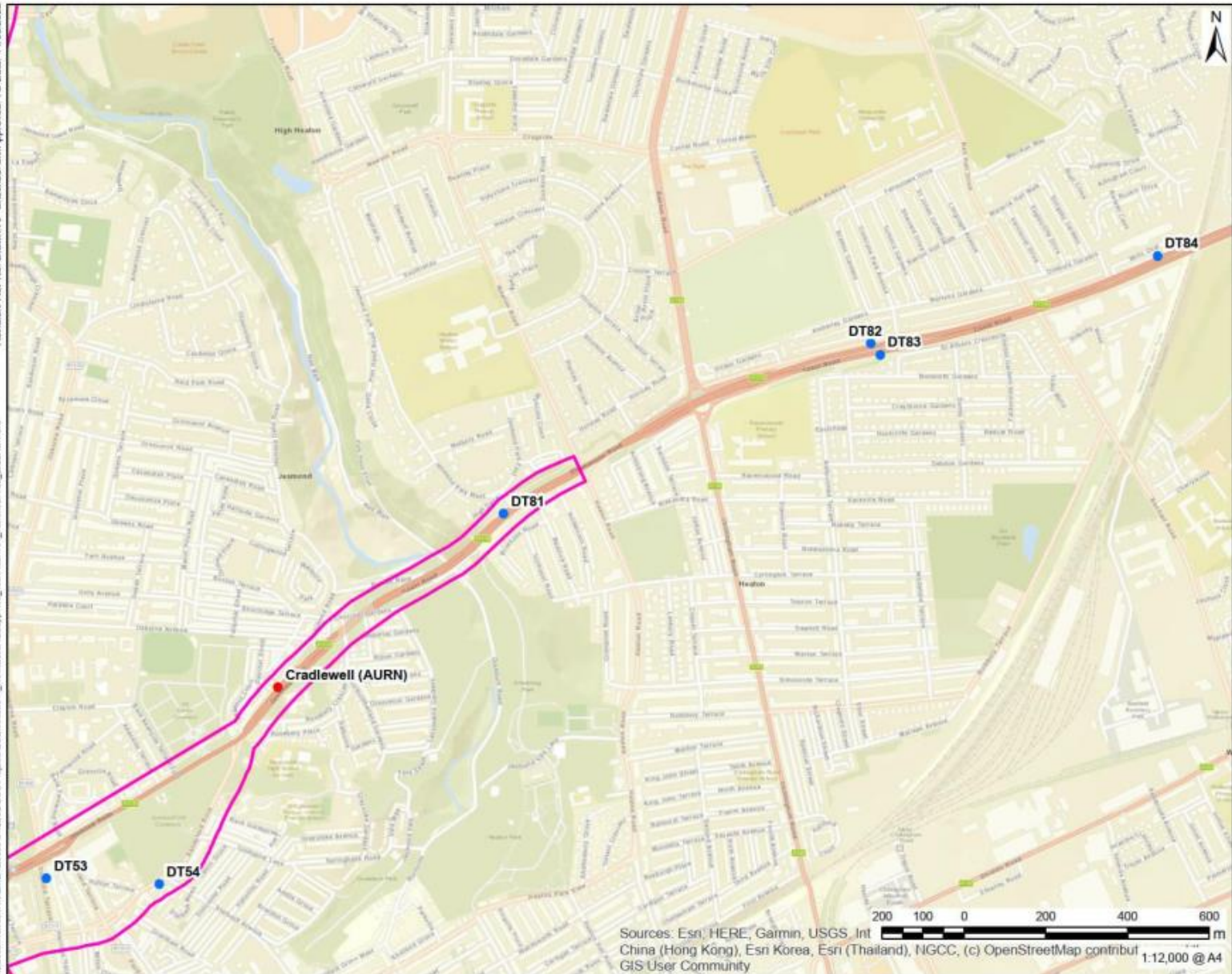
Real time (automatic monitoring - indicative)



Passive monitoring



Revision: Rev No. Drawn: AF Checked: CM Approved: TS Date: 14/09/2022  
I:\a\acomet\com\NEM\A\enw\UK\DS2\DCS\Projects\EGE\6068641\_Newcastle\GIS\app\480\_Technical\A41\_Technical\A41\_2023\ASR\016



**AECOM**

PROJECT  
ASR 22

CLIENT  
Newcastle City Council

CONSULTANT  
AECOM Limited  
2 City Walk  
Leeds, LS11 5AR  
www.aecom.com

LEGEND

- Automatic Monitors
- Diffusion Tubes
- AQMA Boundary

NOTES  
Contains Ordnance Survey Data © Crown Copyright and database right (2022)

ISSUE PURPOSE  
FINAL  
PROJECT NUMBER  
6068641  
SHEET TITLE  
East of Central Newcastle  
Monitoring Locations

SHEET NUMBER  
Figure D.2

Sources: Esri, HERE, Garmin, USGS, Int China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contrib GIS User Community  
1:12,000 @ A4



# Automatic Urban and Rural Network (AURN)

- Real time (automatic monitoring)  
(calibrated and DEFRA compliant)



# Static, roadside monitoring



Photos courtesy of Mike Terry, NCC



Browser address bar: <https://uk-air.defra.gov.uk>

Browser tabs: H Resit Fees..., Northumbria Unive..., Northumbria Unive..., NEBOSH: Log in to..., iRequest, Pages - My Northu..., Citrix Gateway, All of your Finance..., Student Enrolments..., Sign in to online su..., Resea...

**Air Information Resource**

Home | Air Pollution | Data | Monitoring Networks | Library | Science & Research | AQMAS | SCA

**An air pollution alert has been issued**  
[Read further details on the alert page](#)

### Air pollution forecast

**Latest forecast**

**Today :** The sunny conditions across much of the UK today mean that air pollution levels will start to build into the afternoon and evening. Widespread Moderate air pollution is expected to develop, perhaps very locally High in one or two spots.

**Tomorrow :** Widespread areas of Moderate air pollution are expected once again through the afternoon and evening, perhaps with isolated pockets of High pollution.

**Outlook :** Increasingly unsettled weather through this period, with some showers or thunderstorms developing, mean that air pollution levels will reduce somewhat. However, some areas of Moderate air pollution are still likely.

Issued at 15/06/2023 4am

Forecast provided by the **Met Office**

[Health advice](#)

[What is the Daily Air Quality Index?](#)

### Latest measured air quality

Today (15th June 2023)

1 2 3 4 5 6 7 8 9 10

Low Moderate High Very High

### Tools

Data collection & statistical tools....

- Pollution forecast
- Latest measurement summary
- Monitoring networks map
- Data tools

### National Statistics

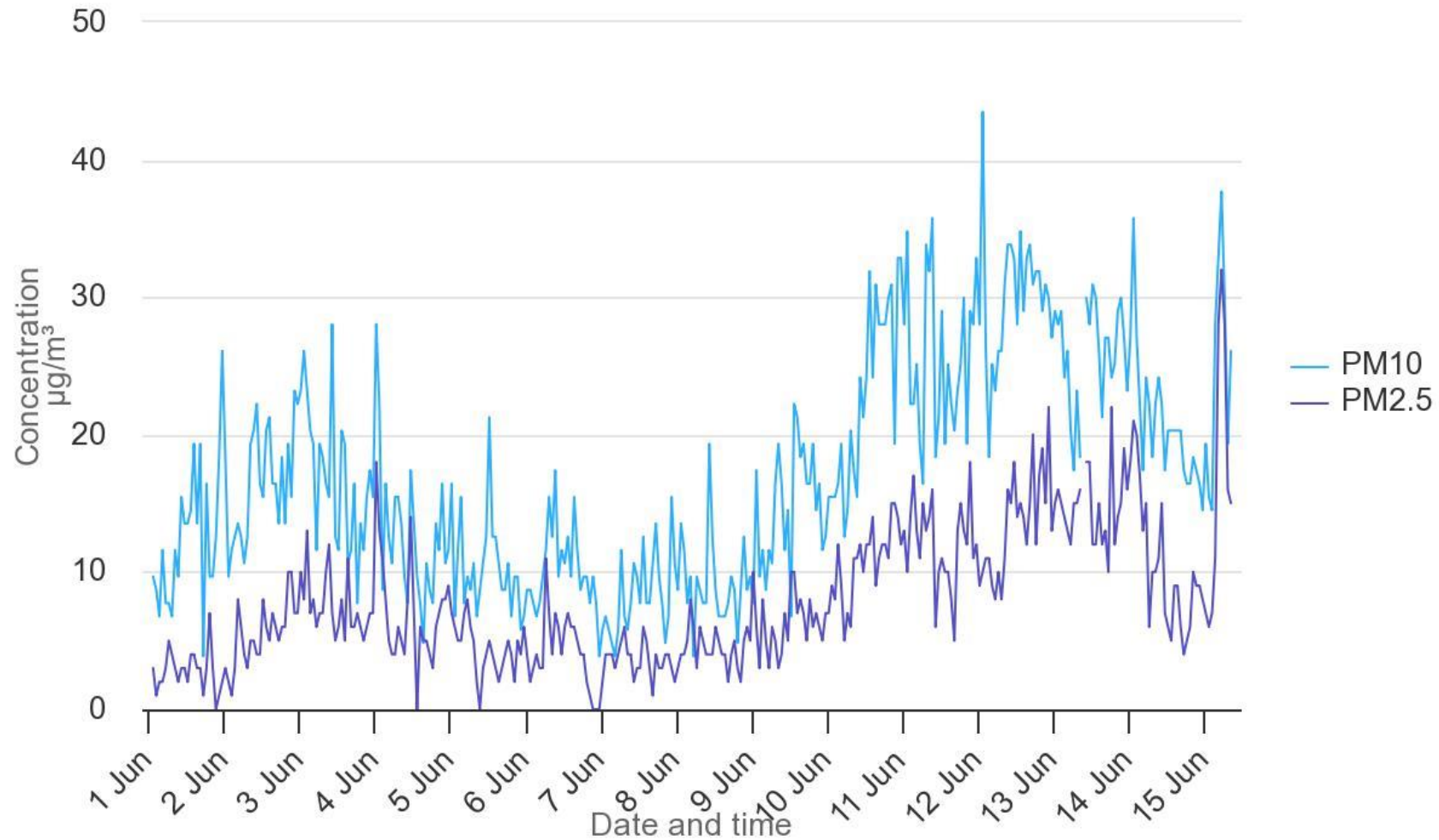
Air quality and emissions statistics

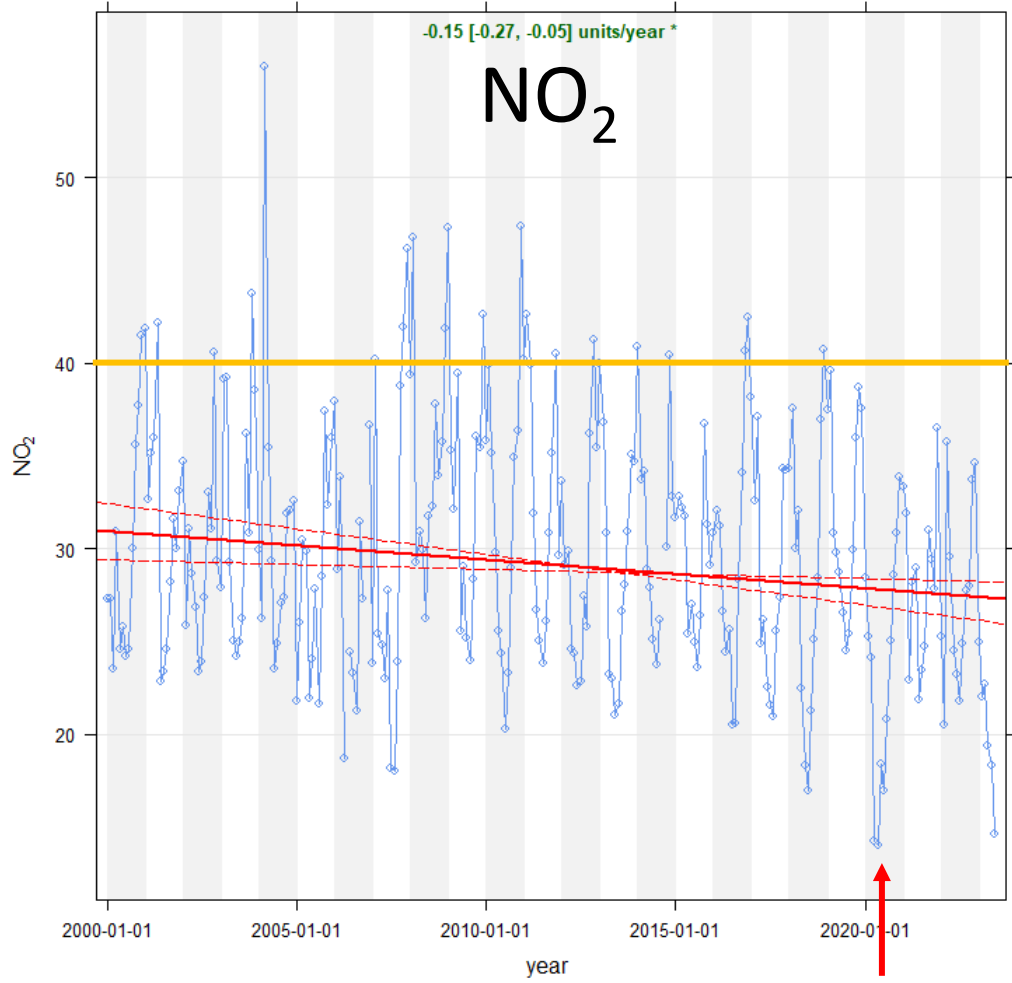
### Clean Air Strategy

Clean Air Strategy 2019

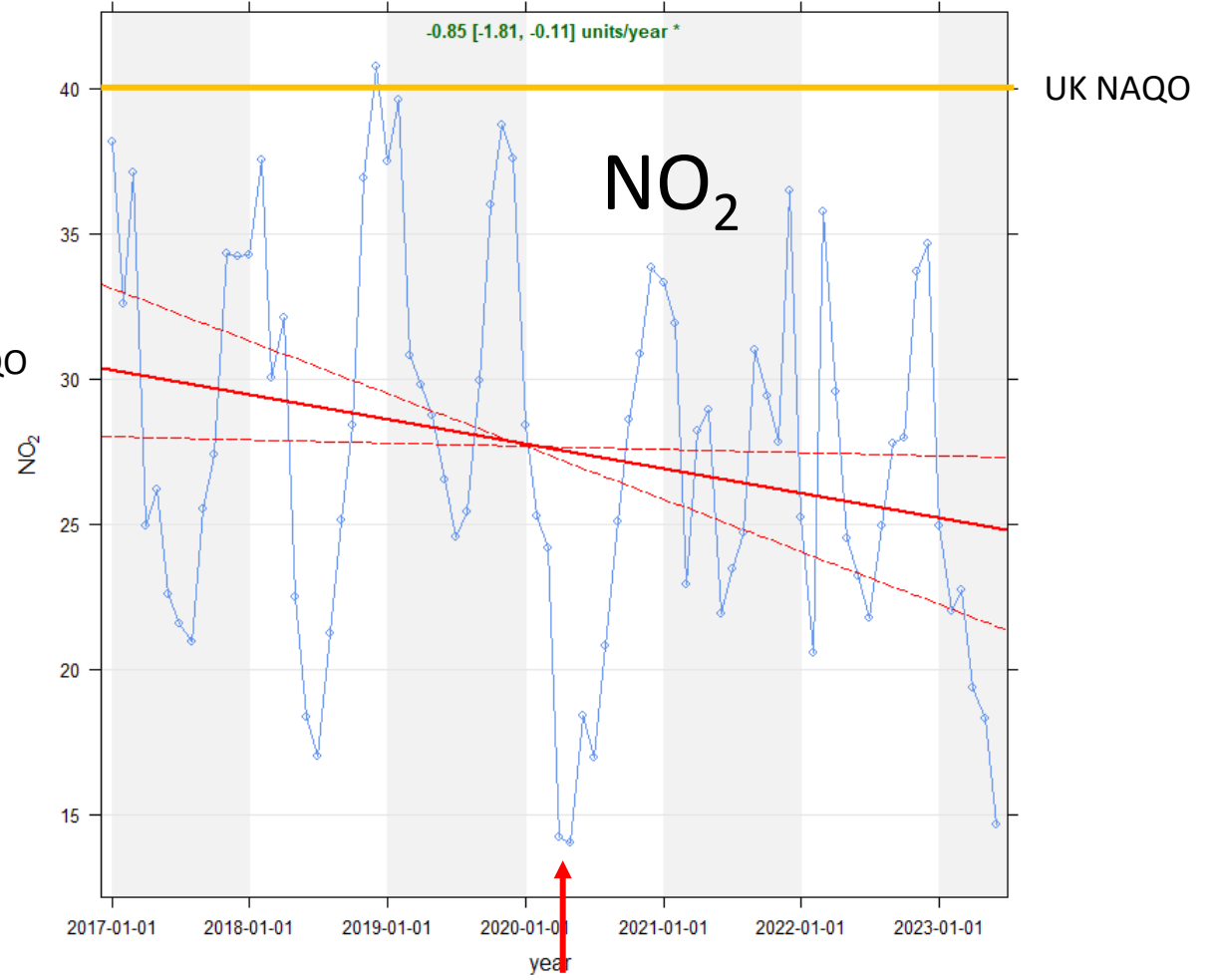
## Newcastle Centre

Measured data from 01/06/2023 to 15/06/2023

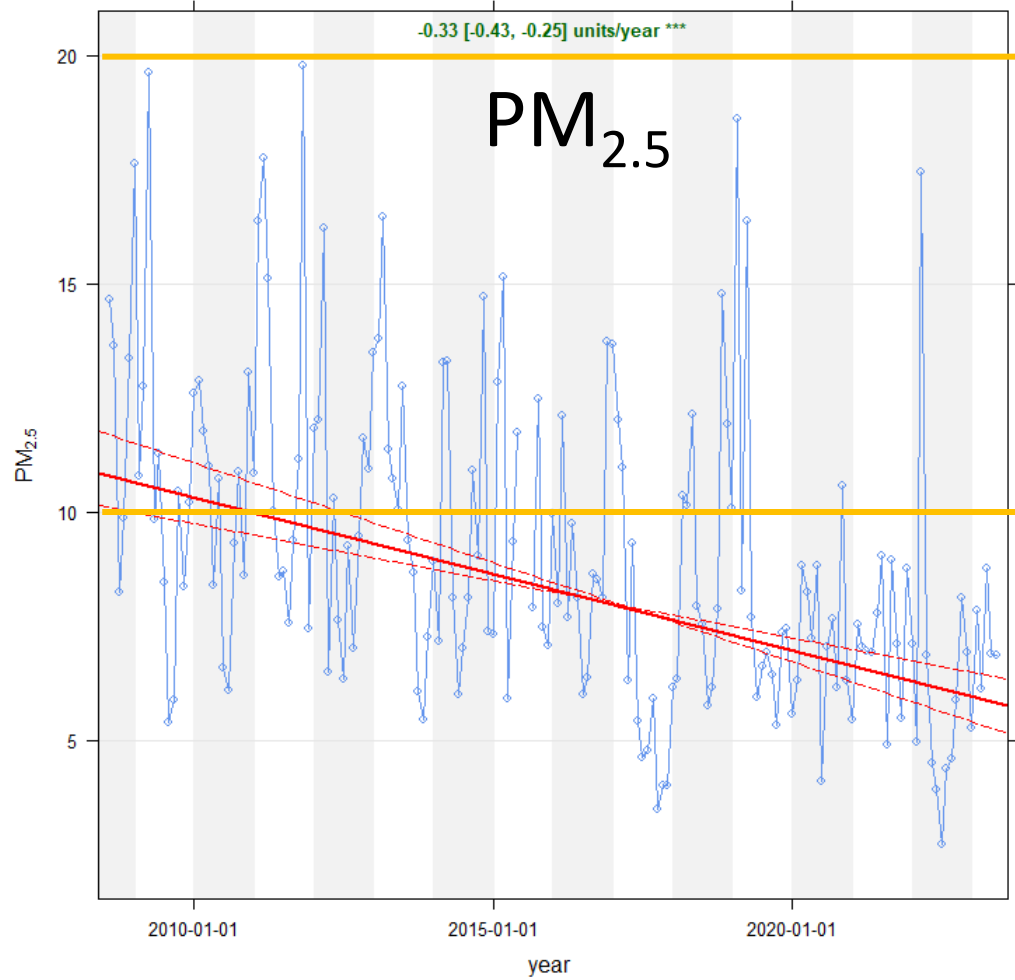




Lockdown

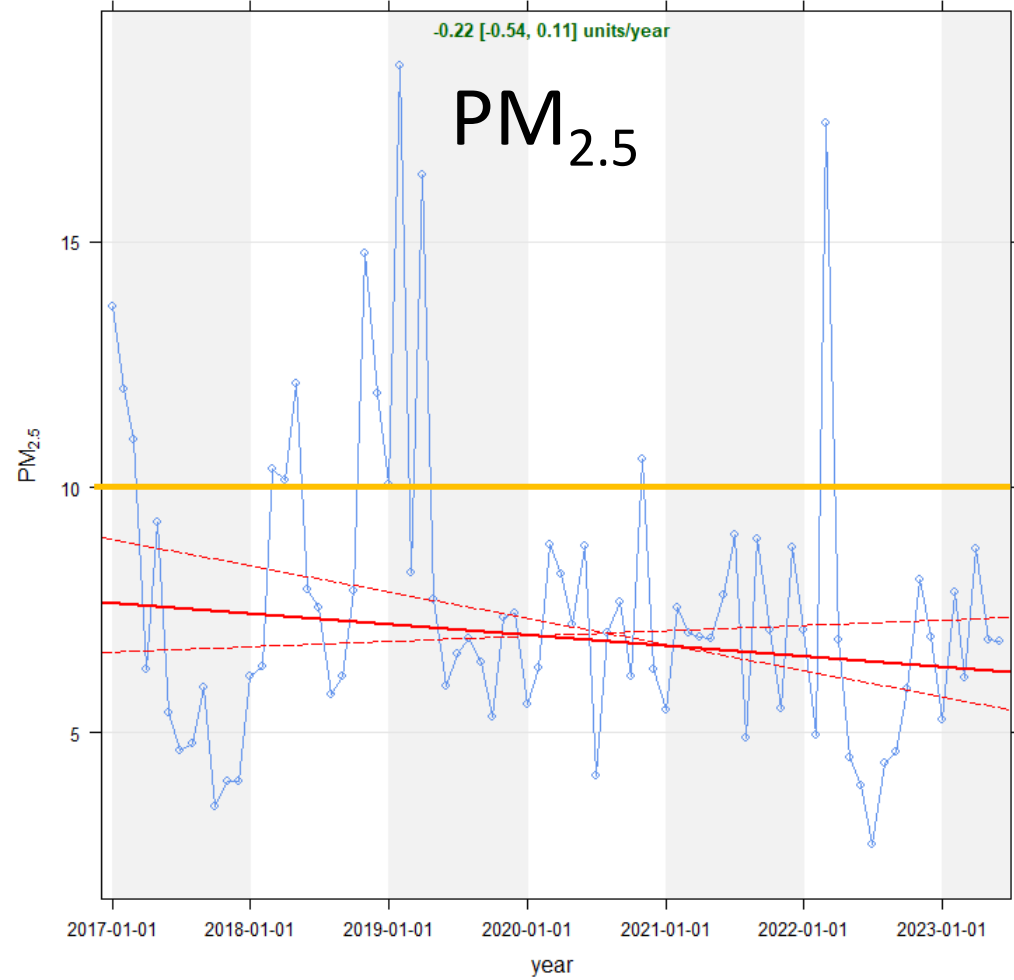


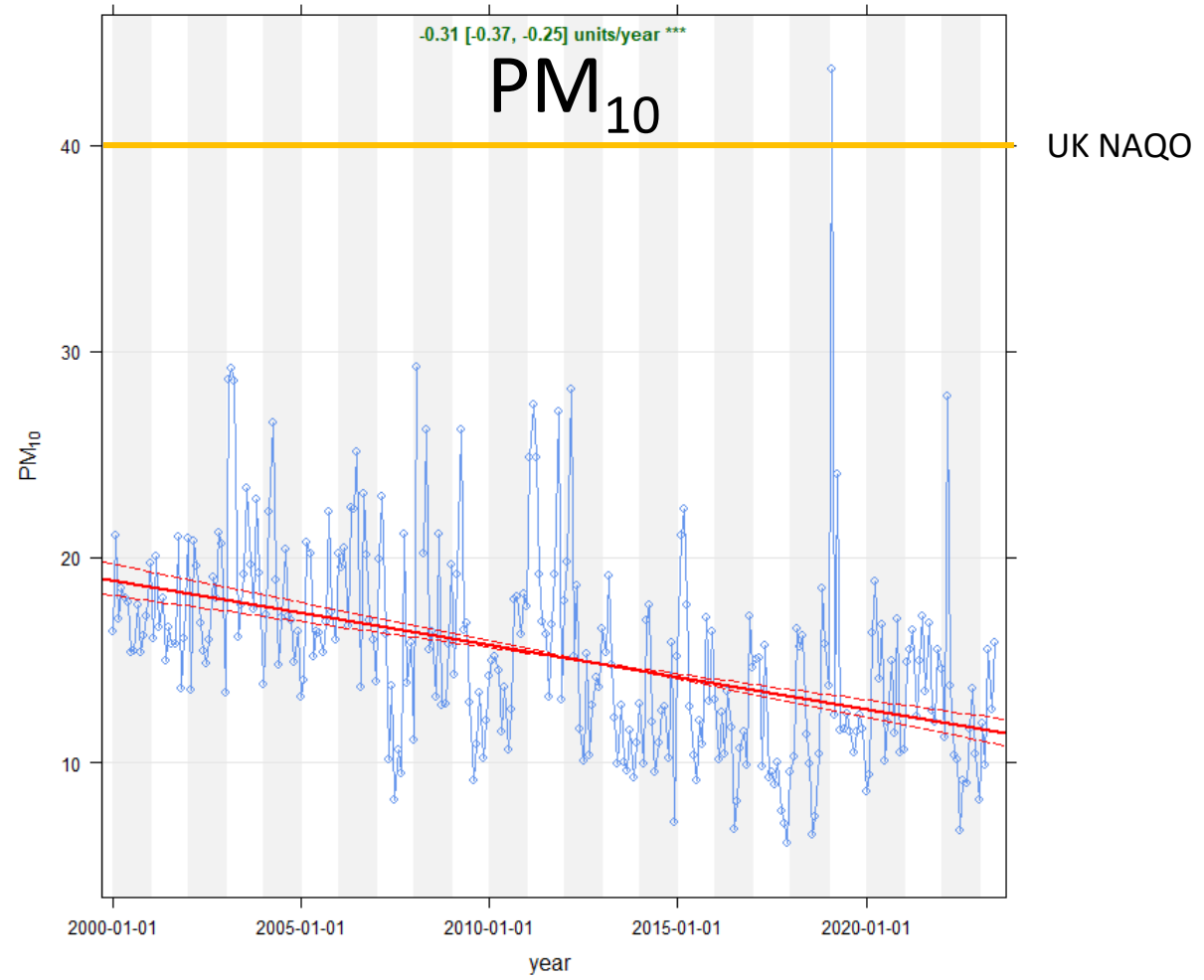
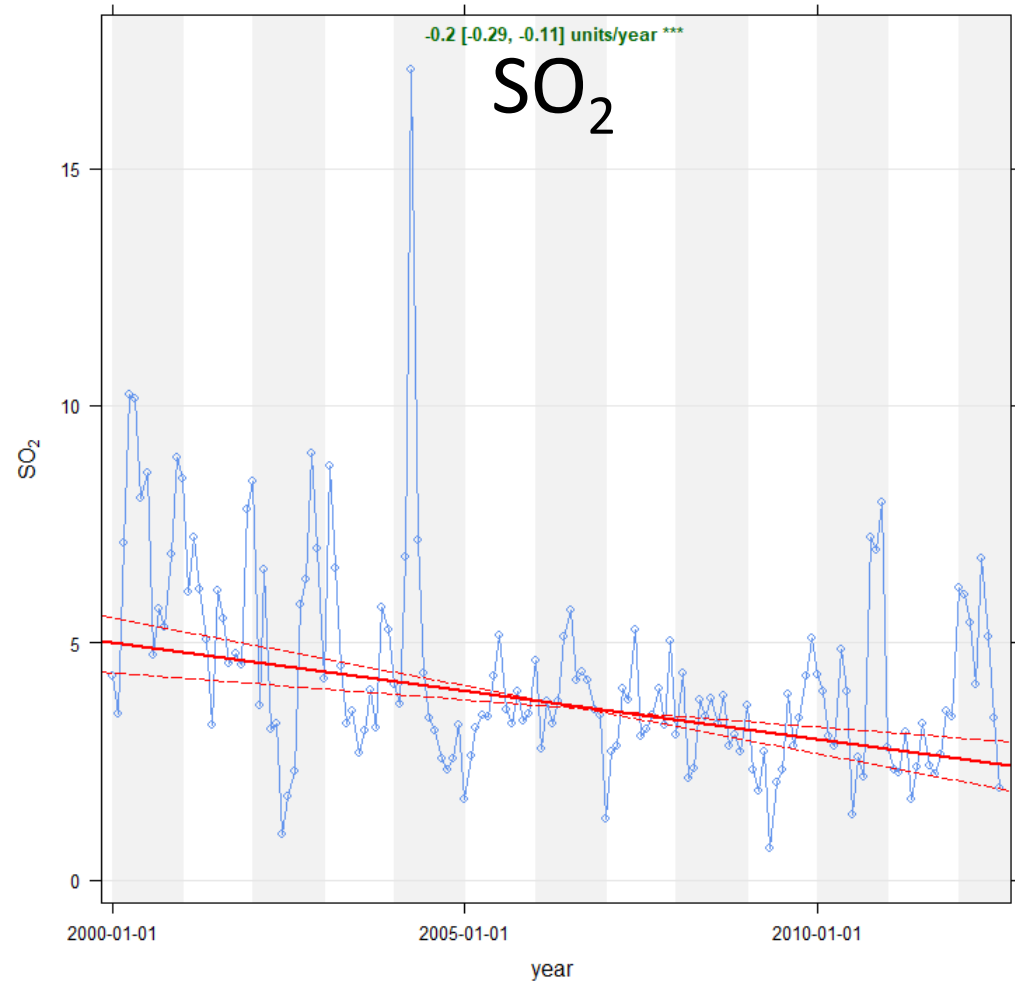
Lockdown



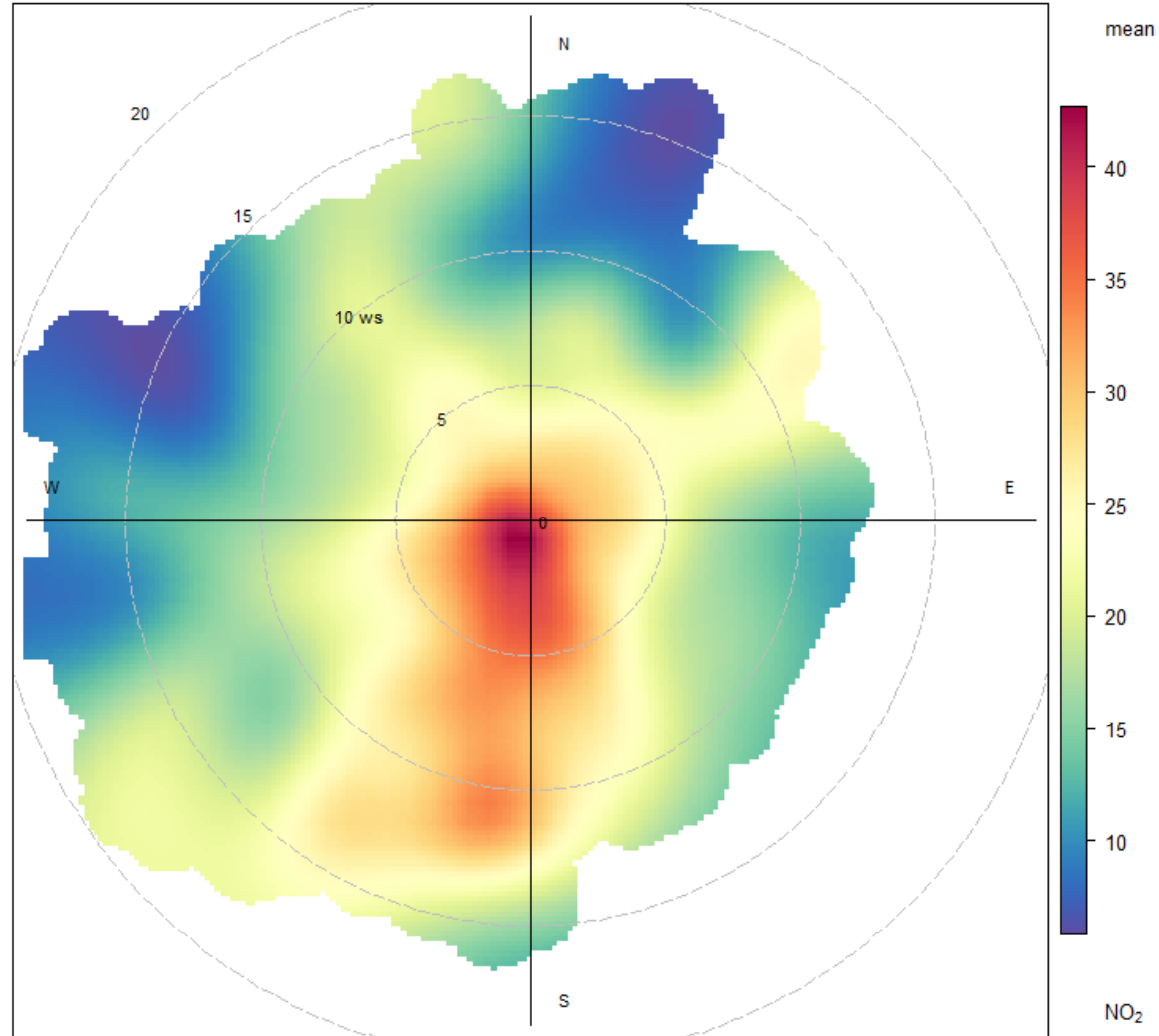
UK NAQO

UK PM<sub>2.5</sub>  
target for  
2040





### AURN: Newcastle City Centre NO<sub>2</sub>



## Real time **indicative** monitoring

- Real time (automatic monitoring)  
(indicative - not DEFRA compliant)
- Google '[Newcastle Urban Observatory](#)' for details of network and data.



Photos courtesy of Mike Terry, NCC

# Passive monitoring (diffusion tubes): 67 locations in 2021



Photos courtesy of Mike Terry, NCC





2022 Air Quality Annual Status Report  
(ASR)

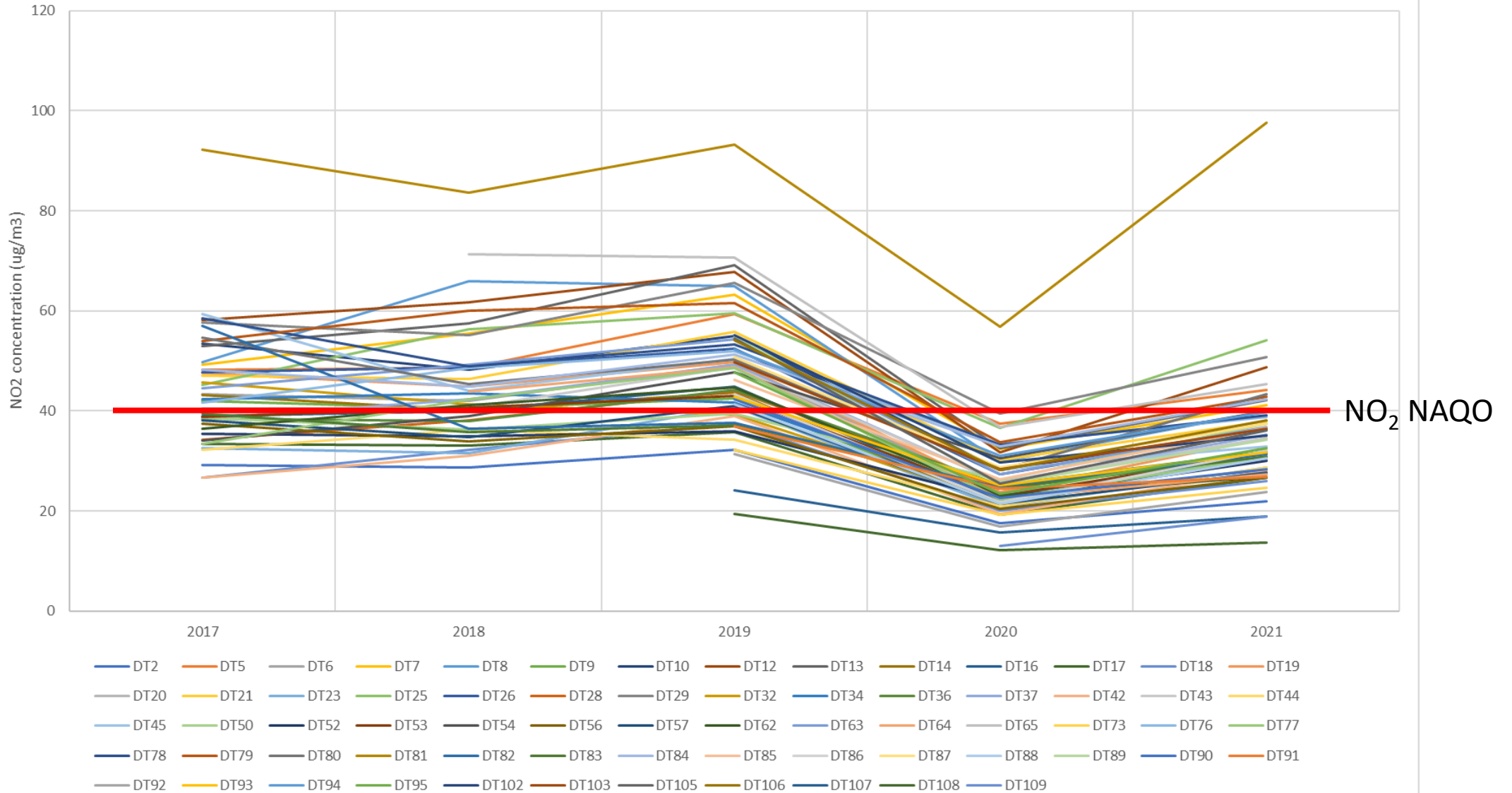
In fulfilment of Part IV of the Environment Act 1995  
Local Air Quality Management

Date: September, 2022

<https://www.newcastle.gov.uk/services/environment-and-waste/environmental-health-and-pollution/air-pollution/air-quality>



Diffusion tube measured NO<sub>2</sub> concentrations across Newcastle



Revision: Rev No. Drawn: AF Checked: CM Approved: TS Date: 14/09/2022  
I:\a\acomet\com\NEM\A\enw\UK\DS2\DCS\Projects\EGE\6068641\_Newcastle\GIS\app\480\_Technical\A41\_Technical\A41\_2023\ASR\016



**AECOM**  
PROJECT  
ASR 22

CLIENT  
Newcastle City Council

CONSULTANT  
AECOM Limited  
2 City Walk  
Leeds, LS11 5AR  
www.aecom.com

LEGEND  
 ● Automatic Monitors  
 ● Diffusion Tubes  
 □ AQMA Boundary

NOTES  
 Contains Ordnance Survey Data ©  
 Crown Copyright and database right  
 (2022)

ISSUE PURPOSE  
 FINAL  
 PROJECT NUMBER  
 6068641  
 SHEET TITLE  
 East of Central Newcastle  
 Monitoring Locations

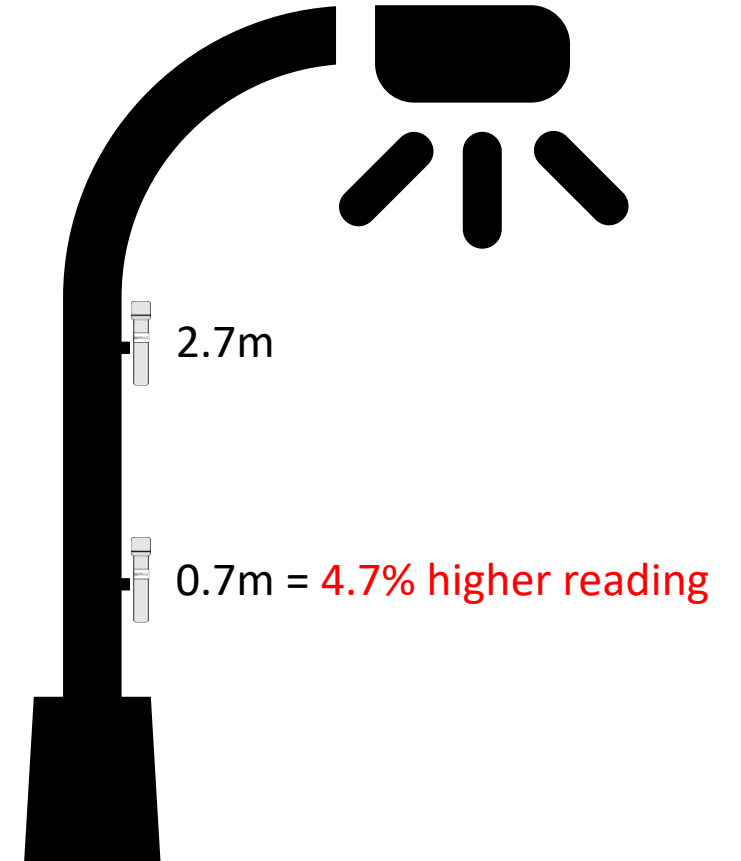
SHEET NUMBER  
 Figure D.2

Sources: Esri, HERE, Garmin, USGS, Int  
 China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contrib  
 GIS User Community  
 1:12,000 @ A4

## **12 Diffusion tube locations did not meet the annual mean objective in 2021 (a further 11 were within 10% of the objective)**

- DT5 (St. Mary's Place/John Dobson Street)
- DT7 (Blackett Street/Northumberland Street)
- DT12 (8 Mosley Street)
- DT13 (Neville Street/Westgate Road)
- DT20 (Newgate Street/Grainger Street)
- DT25 (Strawberry Place between St James Park and Nine Bar)
- DT29/DT30/DT31 (triplicate co-location site, Percy Street)
- DT65 (Blackett Street, Old Eldon Square)
- DT79 (Tyne Bridge)
- DT80 (A167 AQ Mesh)
- DT81 (Stephenson Road, entrance to Jesmond Park West)
- DT84 (A1058 Coast Road, Wills Building)

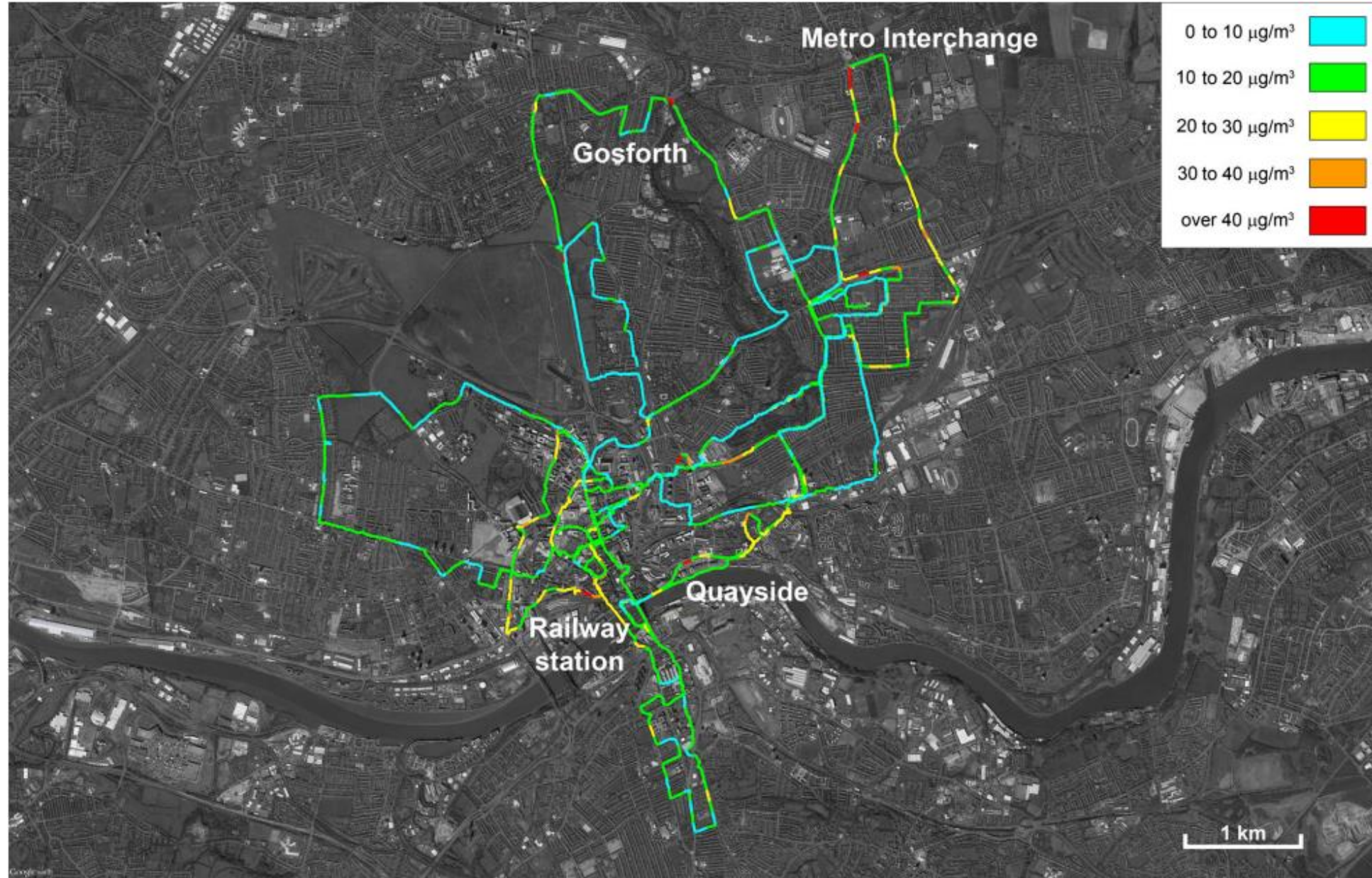
# But does diffusion tube height make a difference?



Rowell, A., Terry, M.E. and **Deary, M.E.**, 2021. Comparison of diffusion tube-measured nitrogen dioxide concentrations at child and adult breathing heights: who are we monitoring for?. *Air Quality, Atmosphere & Health*, 14, pp.27-36.



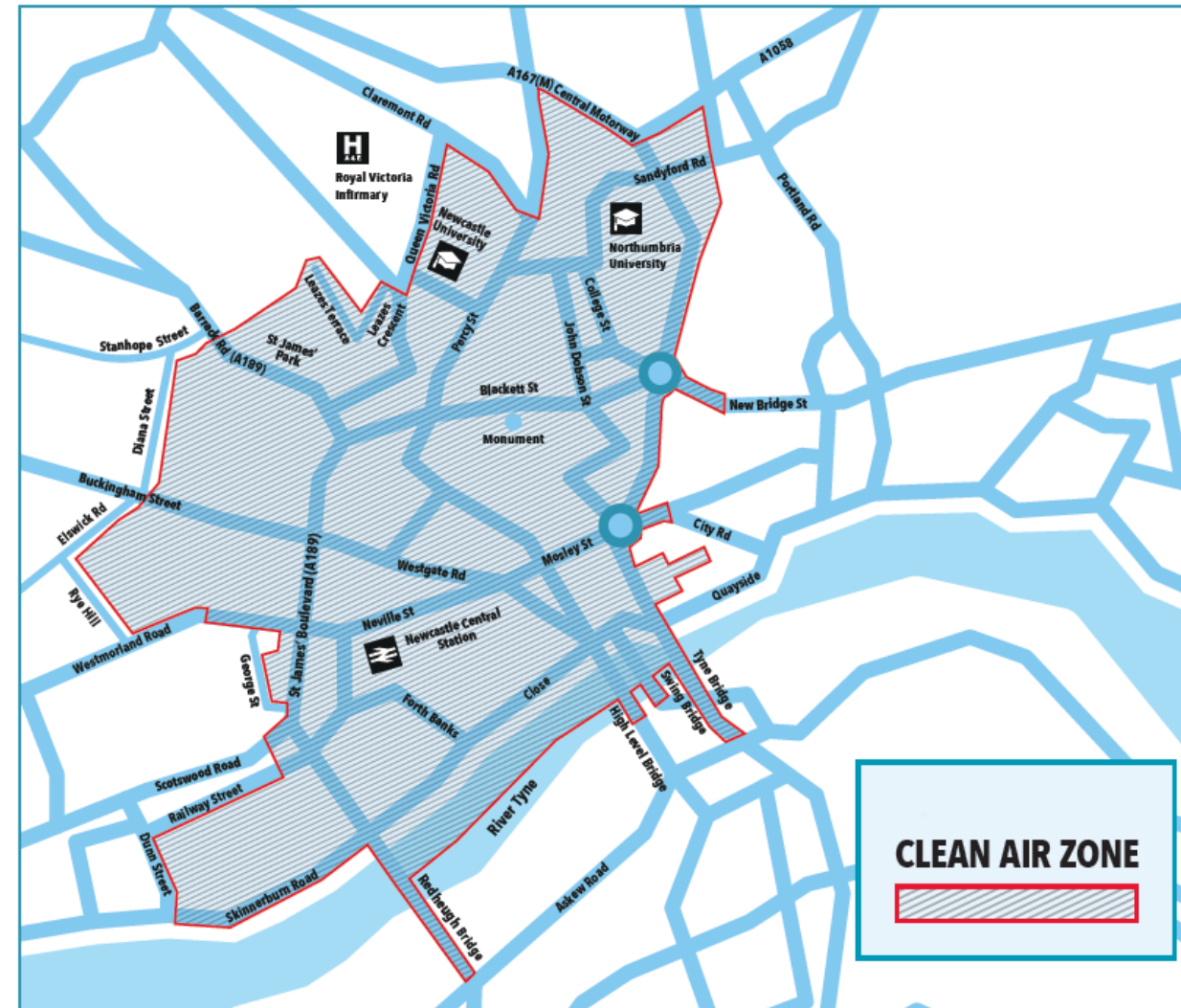
Deary, M.E., Bainbridge, S.J., Kerr, A., McAllister, A. and Shrimpton, T., 2016. Practicalities of mapping PM 10 and PM 2.5 concentrations on city-wide scales using a portable particulate monitor. *Air Quality, Atmosphere & Health*, 9, pp.923-930.





## Newcastle CAZ

- Clean Air Zone, covering Newcastle city centre and part of Gateshead, affecting all non-compliant buses, taxis, HGVs and vans (CAZ C)
- Charge levels: £50 for non-compliant HGVs and buses, £12.50 for taxis and LGVs (from June)



# Thank you for listening

[michael.deary@northumbria.ac.uk](mailto:michael.deary@northumbria.ac.uk)

The No



Northumbria  
University  
NEWCASTLE



Is  
ist



Northumbria  
University

ReNU



Renewable Energy  
Northeast Universities

NHS



The Newcastle upon Tyne Hospitals  
NHS Foundation Trust

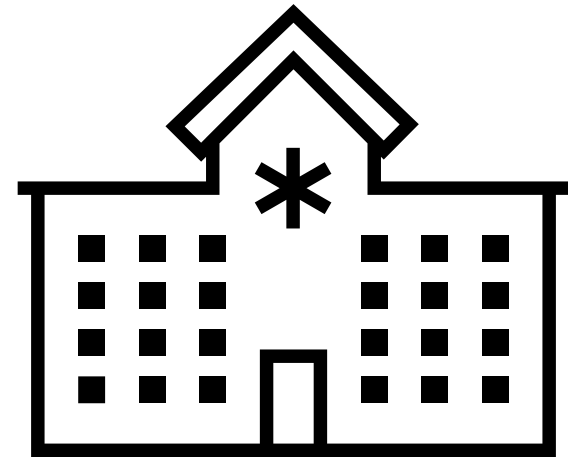
# Air Quality Data at the Royal Victoria Infirmary (RVI) Newcastle upon Tyne

**Clean Air Day Lunch Hour Meeting**

By

Tunde Okeowo

*babatunde.okeowo@northumbria.ac.uk*



## Data Source Introduction

The Clean Air Hospital Framework (CAHF) was developed by the Great Ormond Street Hospital and the Global Action Plan, an environmental charity in the UK to support achievement of clean air environment within the hospital and within the wider community.

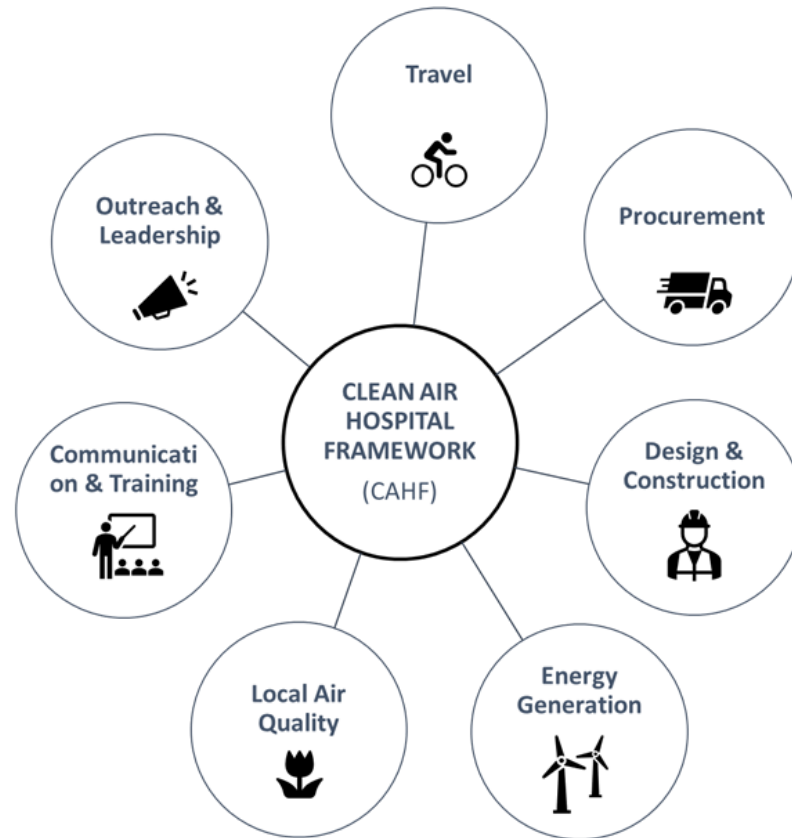


Figure 1 - The Clean Air Hospital Framework showing all 7 focus areas under the framework

# The Newcastle upon Tyne Hospitals THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

## Publicly available data

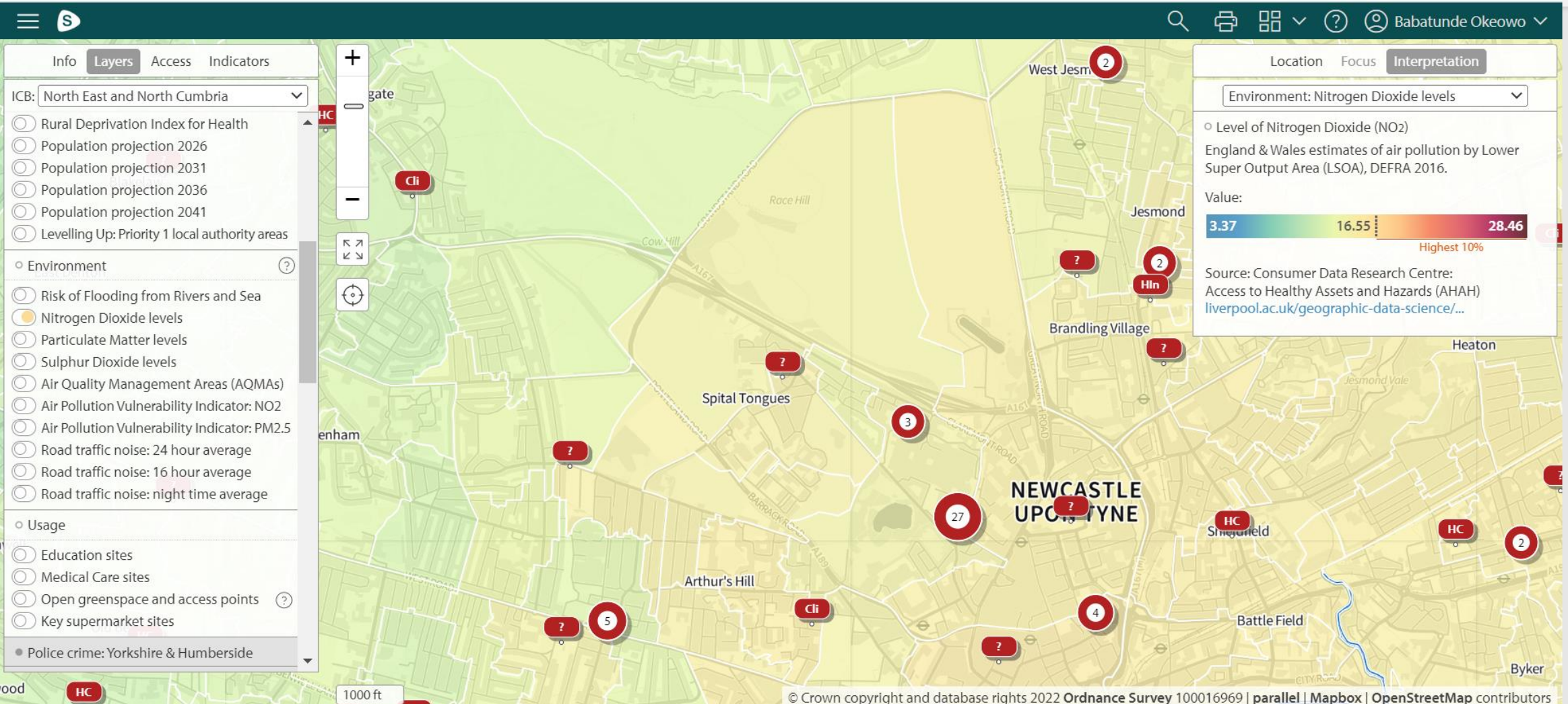


Figure 2 - NO<sub>2</sub> levels according to the ShapeAtlas Website

# The Newcastle upon Tyne Hospitals THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

## Publicly available data

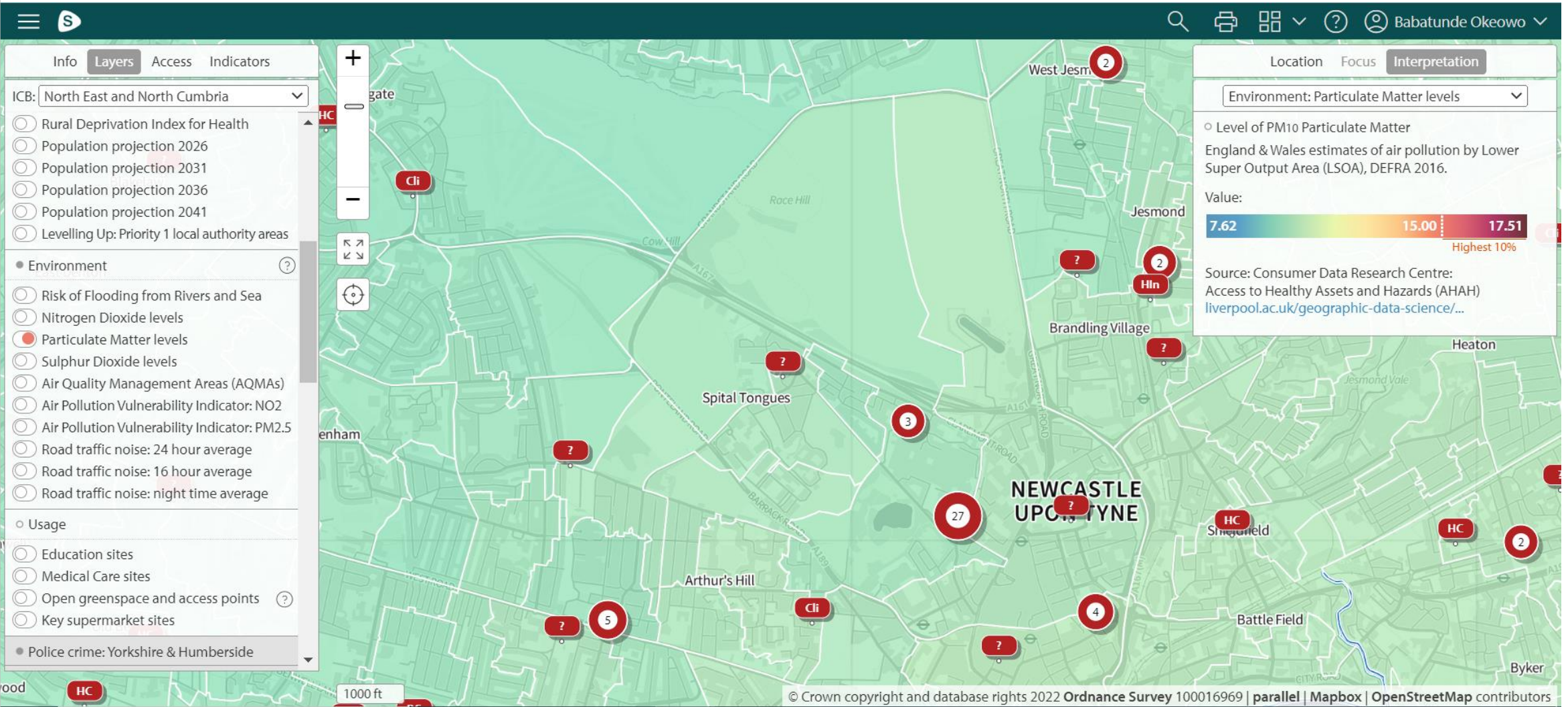


Figure 3 - PM10 levels according to the ShapeAtlas Website

# The Newcastle upon Tyne Hospitals THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

## RVI Specific Data on NO2, PM2.5, and PM10

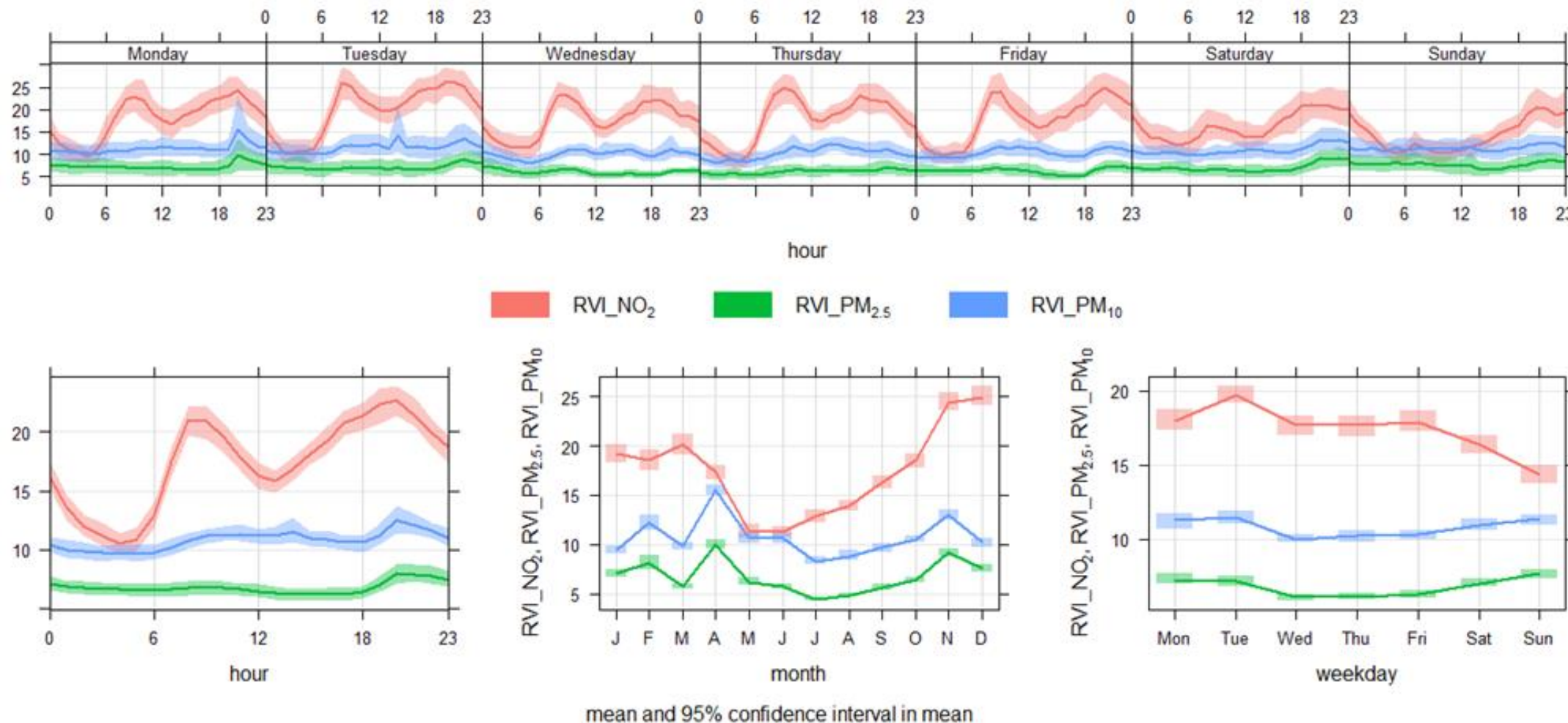


Figure 4 - Time variation plot of Project AQI (NO<sub>2</sub>, PM<sub>2.5</sub> and PM<sub>10</sub>) RVI

The Newcastle upon Tyne Hospitals  
THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED  
AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

RVI Specific Data

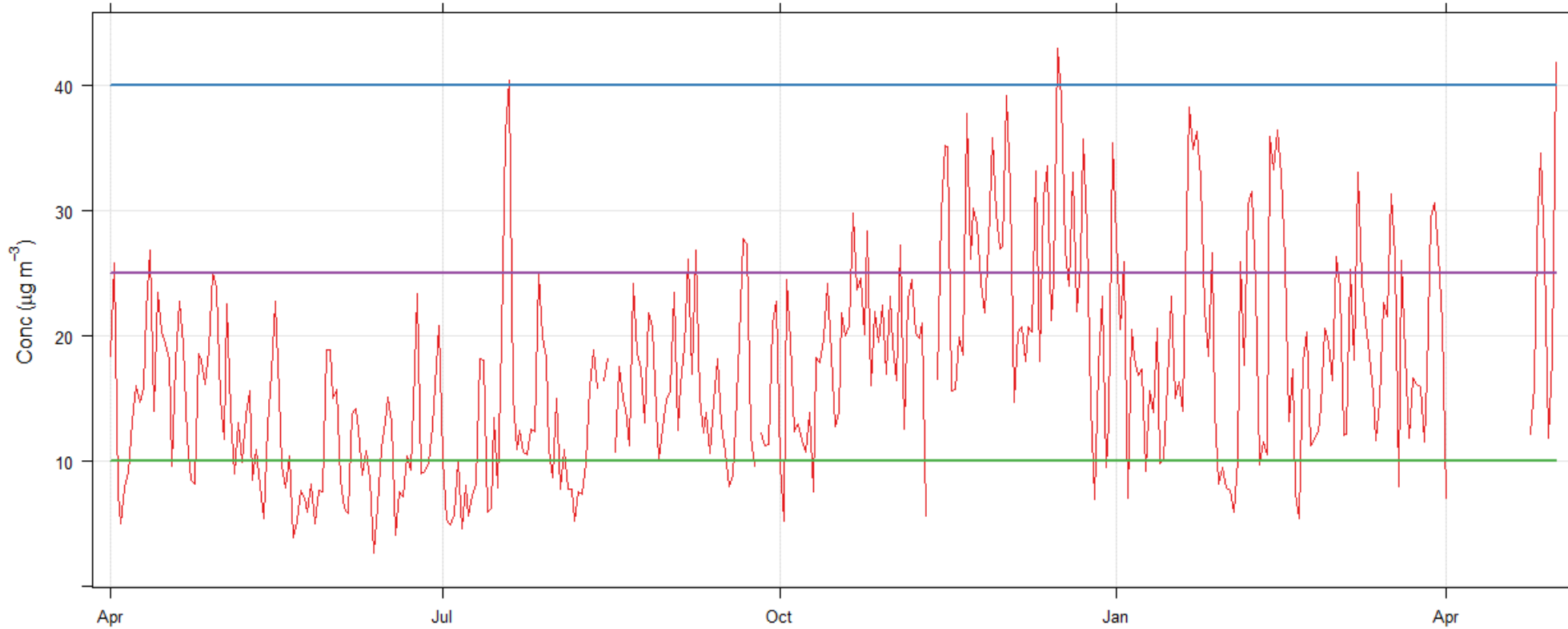
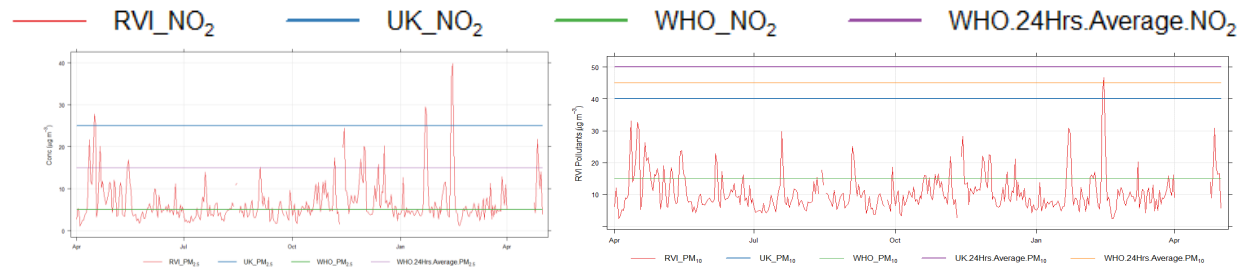


Figure 5 - Daily Average of NO<sub>2</sub> Concentration at RVI Monitoring Station Measured Against UK and WHO Guideline Concentrations.





The Newcastle upon Tyne Hospitals  
THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED  
AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

RVI Specific Data

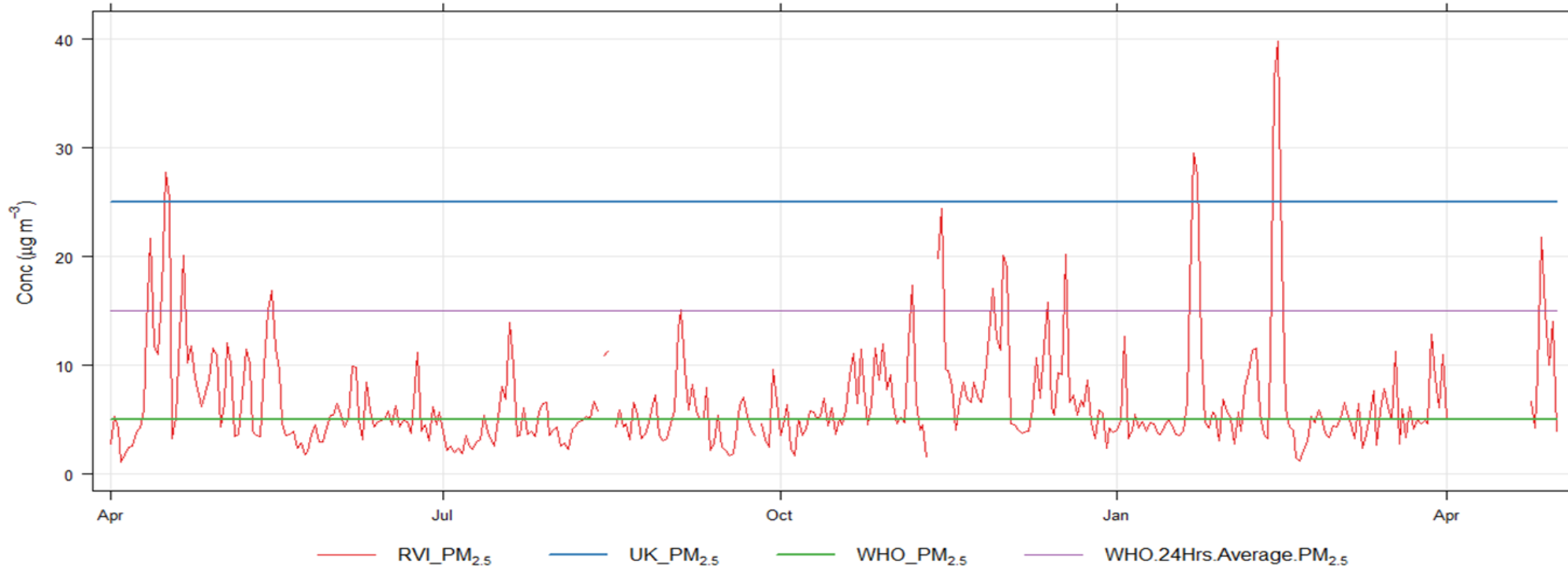
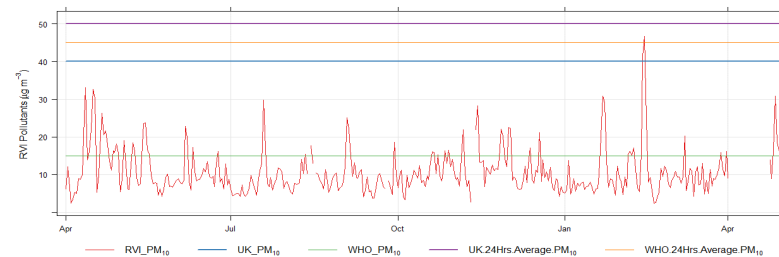
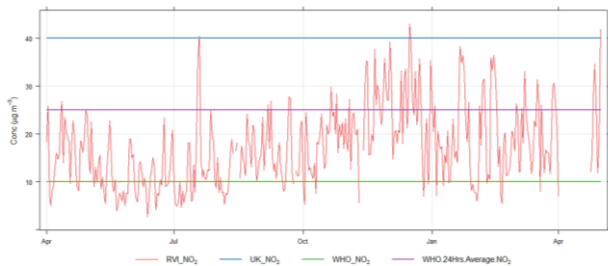


Figure 6 - Daily Average of PM<sub>2.5</sub> Concentration at RVI Monitoring Station Measured Against UK and WHO Guideline Concentrations



# The Newcastle upon Tyne Hospitals THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

## RVI Specific Data

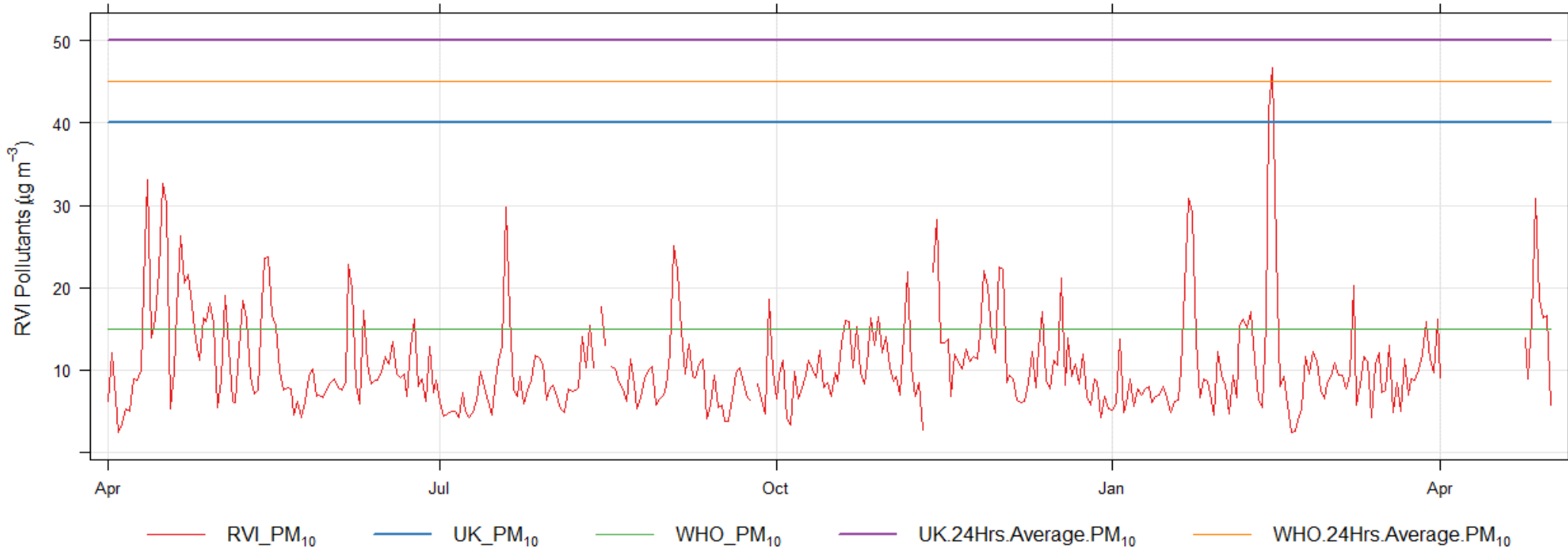
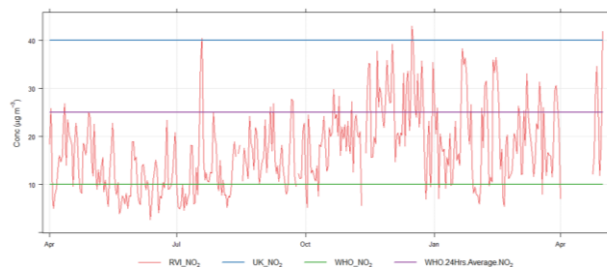
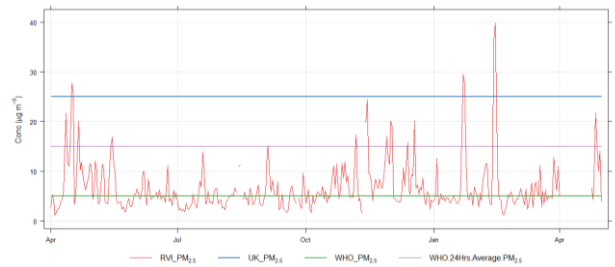


Figure 7 - Daily Average of PM10 Concentration at RVI Monitoring Station Measured Against UK and WHO Guideline Concentrations.



## Correlation Plots between RVI Data and Background

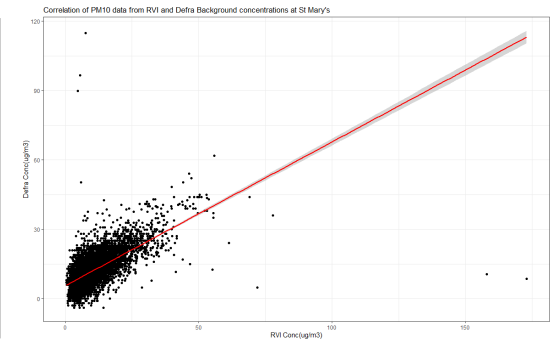
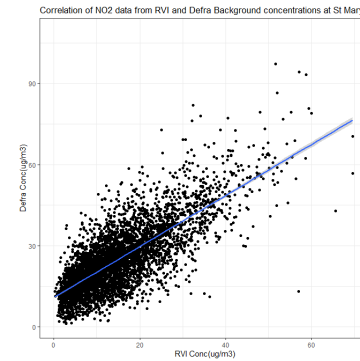
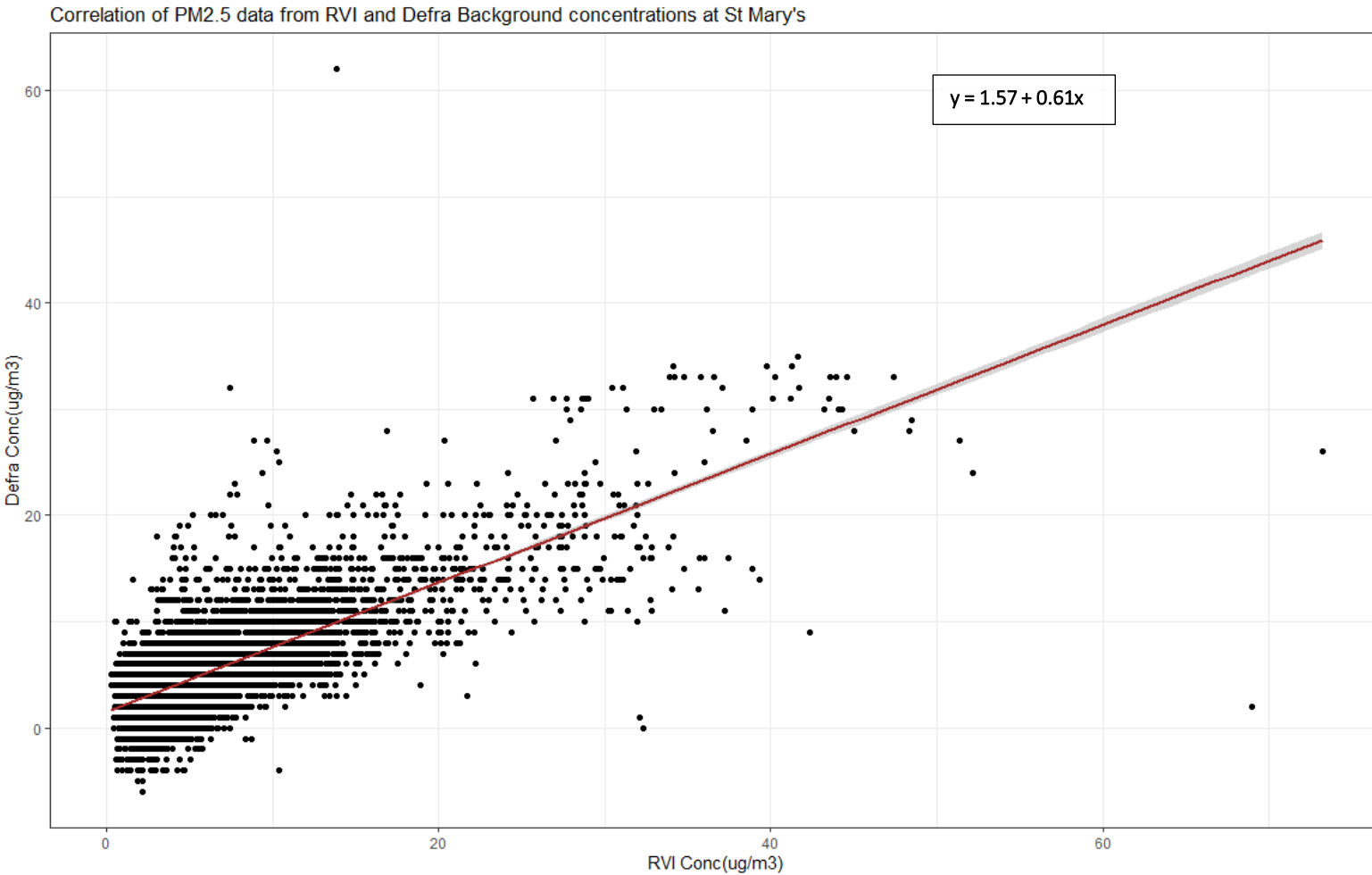


Figure 8 – Correlation plot for RVI and Background PM<sub>2.5</sub> Concentrations

# The Newcastle upon Tyne Hospitals THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

## Correlation Plots between RVI Data and Background

Correlation of NO<sub>2</sub> data from RVI and Defra Background concentrations at St Mary's

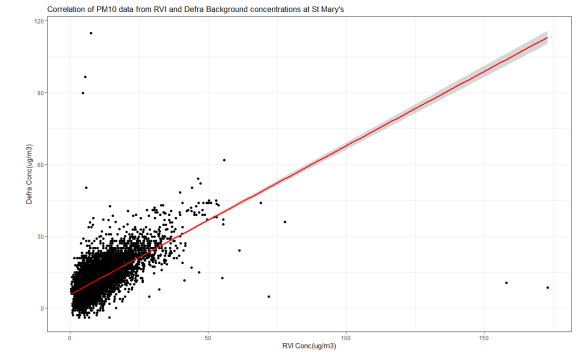
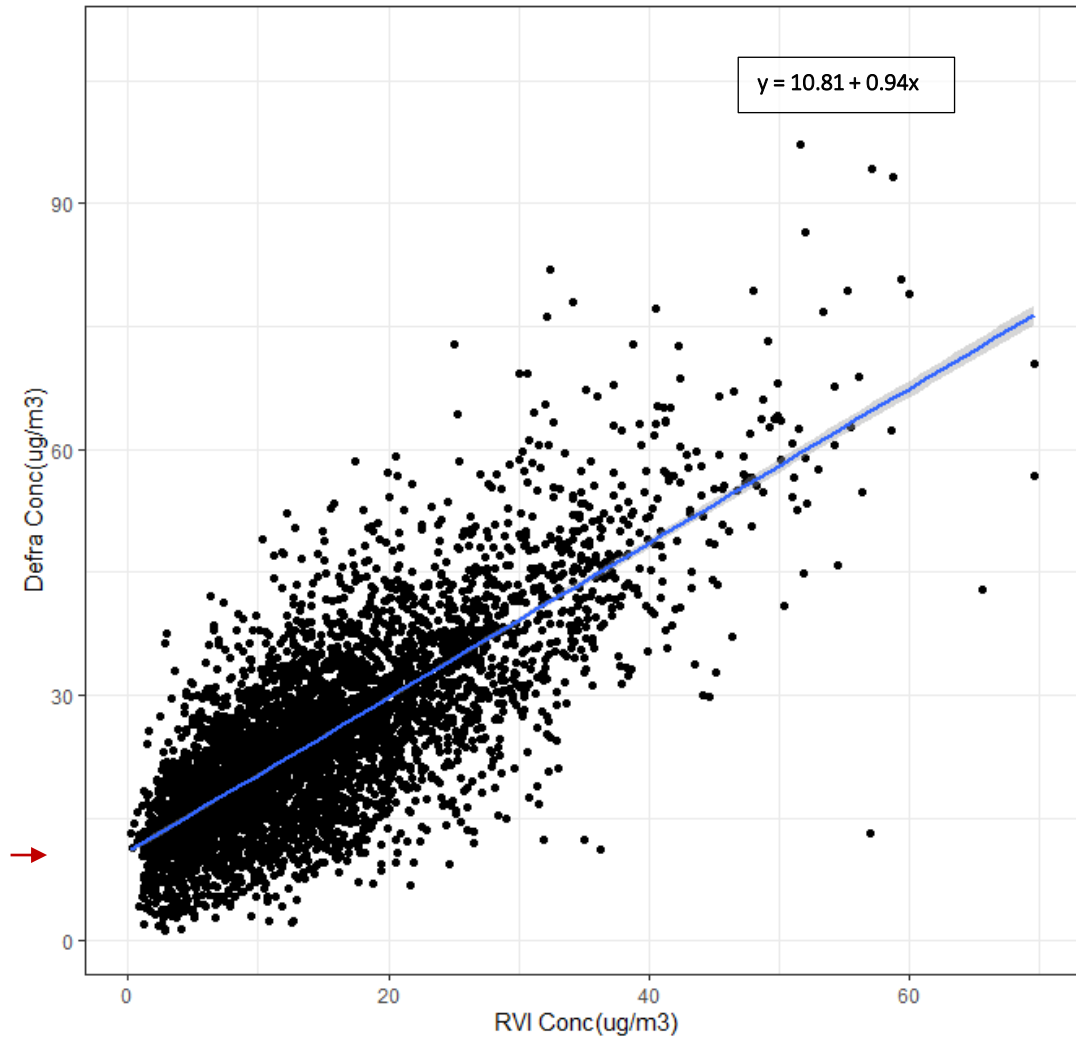
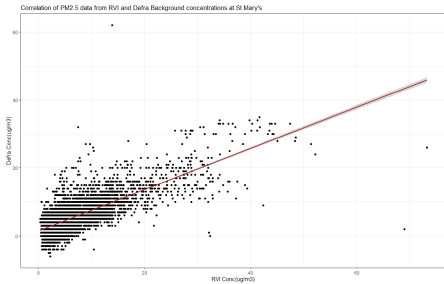
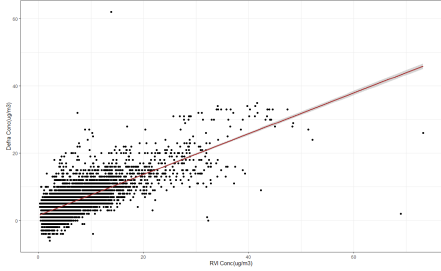


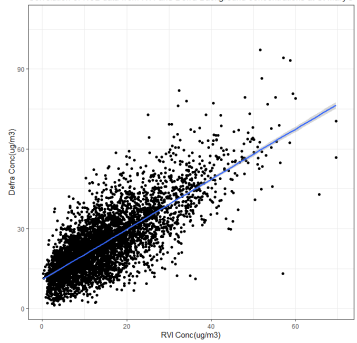
Figure 9 – Correlation plot for RVI and Background NO<sub>2</sub> Concentrations

## Correlation Plots between RVI Data and Background

Correlation of PM2.5 data from RVI and Defra Background concentrations at St Mary's



Correlation of NO2 data from RVI and Defra Background concentrations at St Mary's



Correlation of PM10 data from RVI and Defra Background concentrations at St Mary's

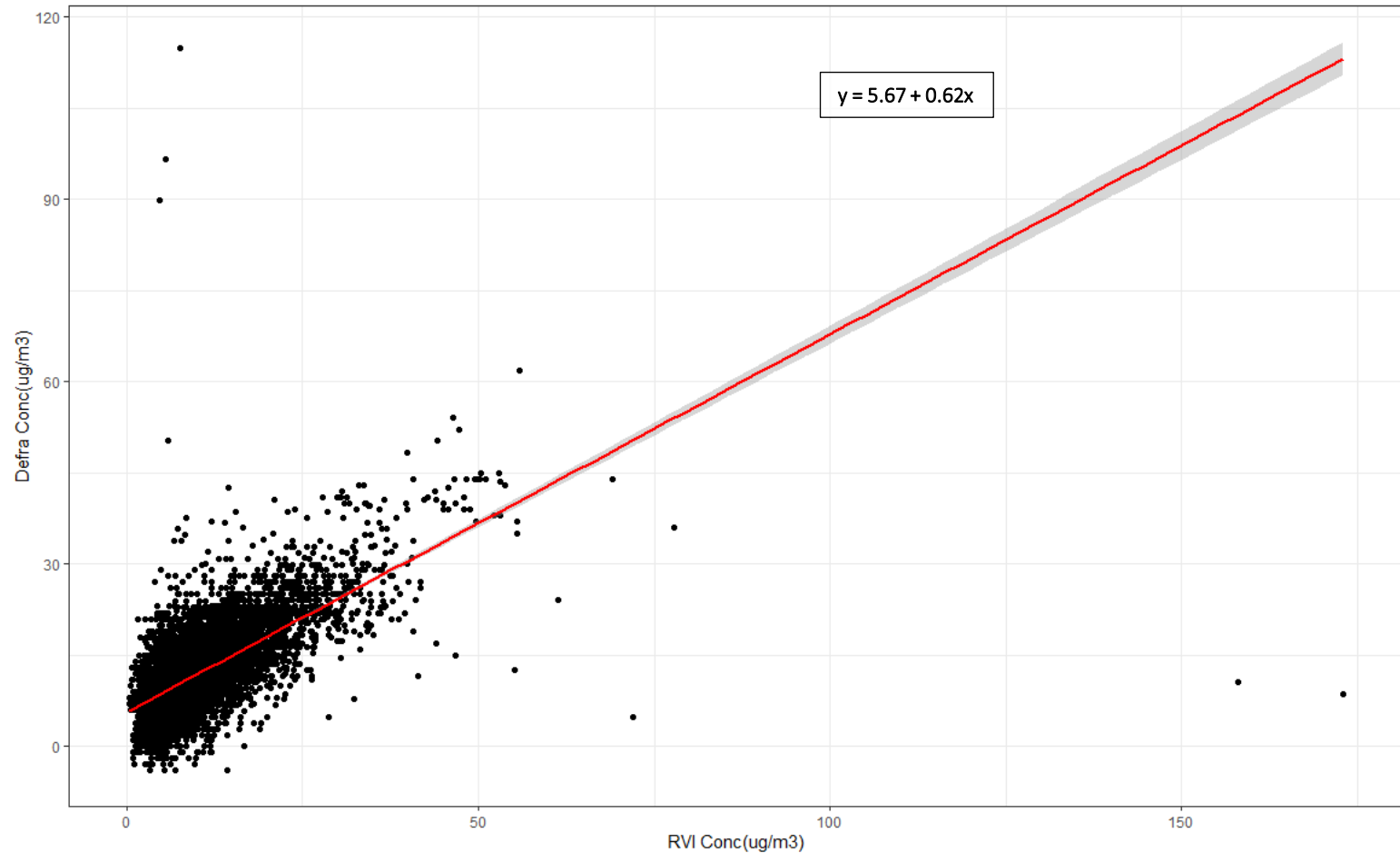


Figure 10 – Correlation plot for RVI and Background PM<sub>10</sub> Concentrations

The Newcastle upon Tyne Hospitals  
THE UK'S CAHF: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED  
AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE

Opportunity of what is possible

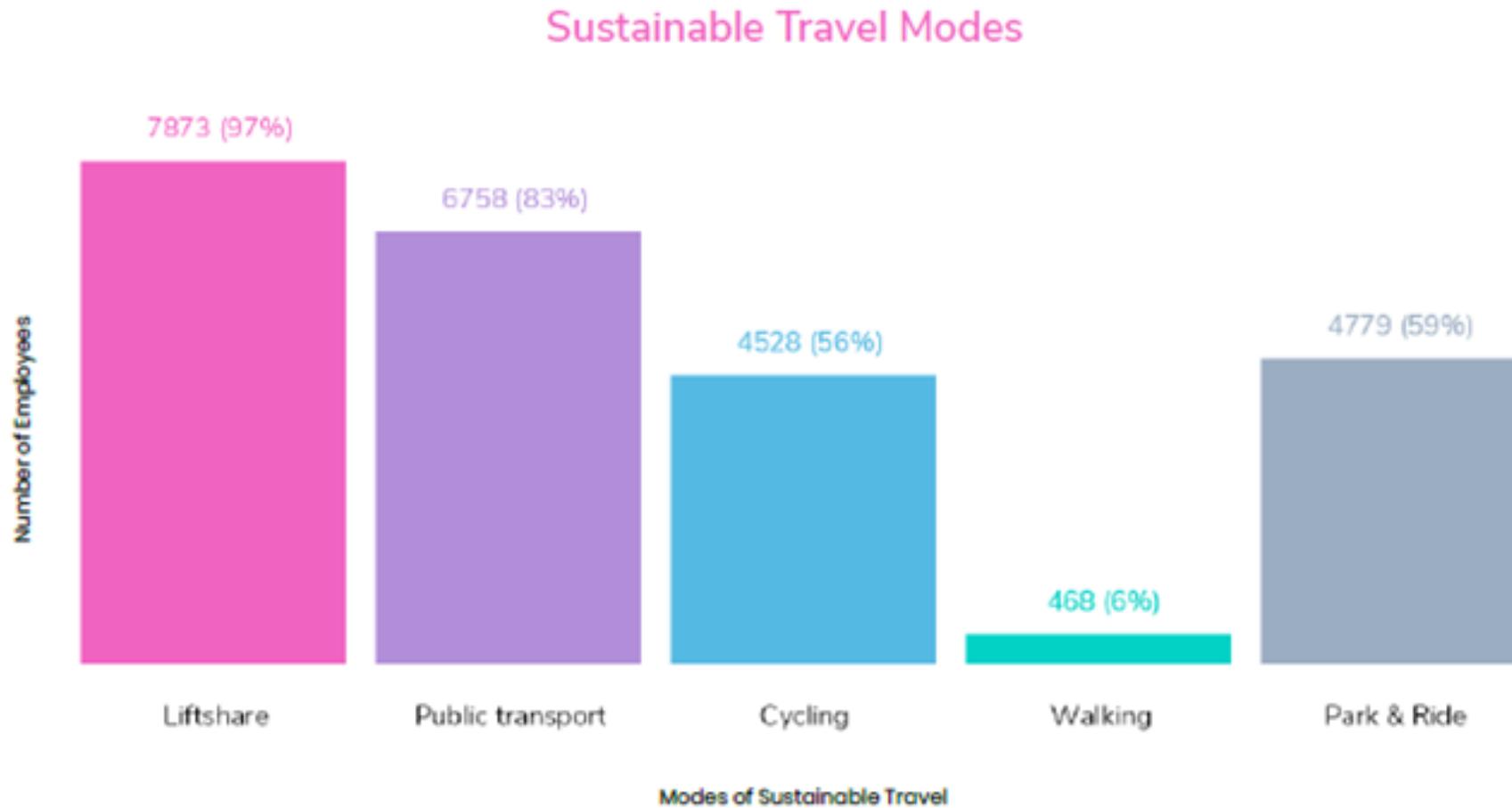


Figure 11 – Sustainable travel mode opportunity for RVI Staff

## Implications of these

Quick take aways from these data include

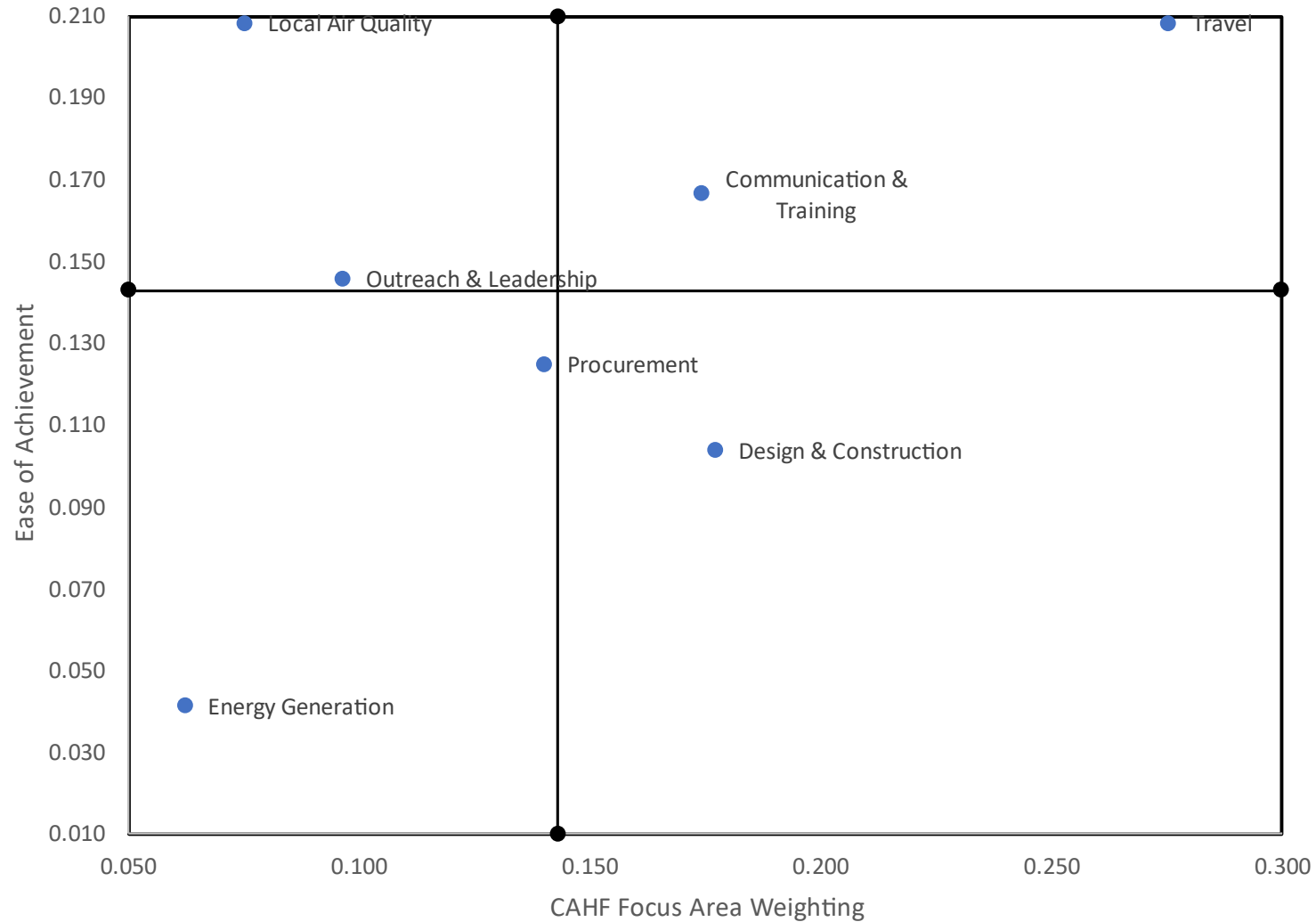
1. The RVI frequently experiences days with  $\text{NO}_2$  and  $\text{PM}_{2.5}$  concentrations in excess of the World Health Organisation's expected levels of daily exposure limit as seen in the time plot of data in figures 5, 6 , & 7.
2. Efforts towards air quality improvement at the hospital is a collaborative efforts between the hospital, the Newcastle Local Authority and the larger community as observed in figures 8-10 correlation plots
3. The over 2000 hospitals in areas with  $\text{PM}_{2.5}$  concentrations above WHO guidance level can improve their AQI and also have the potential of contributing to improved AQI within their local community.

**THANK YOU!**





The Newcastle upon Tyne Hospitals  
 THE UK'S CLEAN AIR HOSPITAL FRAMEWORK: THE ROLE OF HOSPITALS AS ANCHOR INSTITUTIONS IN ACHIEVING IMPROVED AIR QUALITY WITHIN THE COMMUNITIES THEY SERVE



**Quadrant Plot is used on this project as a strategy for CAHF focus Area Implementation prioritization**

1. The Policy area that should be given highest prioritization is positioned in the top right corner of the quadrant i.e Travel, Communication & Training
2. While the lowest prioritization should be CAHF focus areas located at the bottom left corner of the quadrant i.e Energy, Procurement

*Ease of Achievement vs CAHF Weighting Quadrant plot of CAHF Focus Areas*



**Clean Air Resources  
Newcastle Health  
Professionals  
Clean Air Day  
15/6/23**

**Dr Malcolm White  
malcolm.white@globalactionplan.org.uk**

201 Borough High Street, London, SE1 1JA, Telephone 0203 8177636

Charity registered in England and Wales No. 1026148, in Scotland No. SC041260, Registered company in England and Wales No. 2838296, VAT No. 625 994 009

# What is Clean Air Day?



- June 15<sup>th</sup>, 2023: the UK's biggest air pollution campaign
- Helps to drive a positive shift in public knowledge and action.
- Mobilises action to reduce air pollution – trigger moment to trial behaviours
- Increases public backing for air pollution measures

**#cleanairday**

**[cleanairday.org.uk](https://cleanairday.org.uk)**

# Air Pollution Resources for Healthcare Professionals

# Our Clean Air Champions!

## National Primary Care Project - 2022



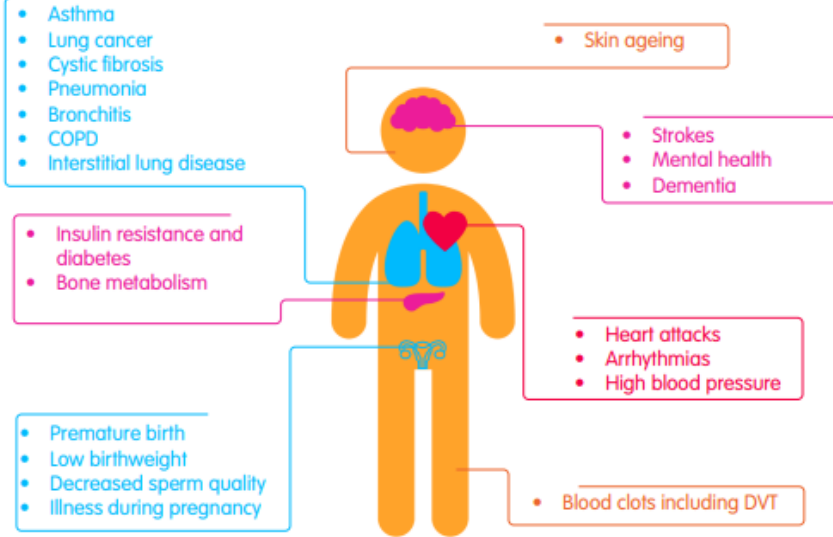
# Air Pollution Primary Care Protocol

## Key messages

Air pollution seriously impacts our health  
 There are things we can all do to reduce air pollution  
 There are things we can do to reduce our exposure to air pollution

## Inform patients how air pollution impacts the body

Air pollution can cause or worsen many health conditions. *It also significantly reduces respiratory and neurological development in children.*



**i** For in-depth learning on how air pollution impacts the body and the many positive steps we can all take to reduce our contributions and exposure, healthcare professionals can visit the [Action for Clean Air site](#).

You will find high-quality, free resources including teaching videos, lectures, slides leaflets and posters. Use these resources to teach your colleagues and spread the word!

## Provide air pollution information throughout the patient pathway



### Pre-consultation

- Practice website
- Practice phone systems
- Text messaging
- Practice social media pages
- Appointment reminders
- On prescription requests
- Waiting room posters/screens/notice boards
- Patient registration forms
- Invitation letter to routine/regular reviews

### Consultation

- Integrating air pollution advice into the conversation
- Incorporate achievable goals into the management plan
- Encourage positive steps as part of lifestyle advice
- Give an air pollution information leaflet
- Signposting to resources or websites



### Post-consultation

- Send the patient information via email or text
- Posters in pharmacies
- Training link workers
- Social prescription

**i** The **'Clean Air Hub'** is an information centre for patients and the general public. Healthcare professionals can direct their patients there to learn more about air pollution after the consultation.

## Words and phrases to use during a consultation

We'll need to run some tests to investigate your cough. Meanwhile, can we look at these actions to reduce your exposure to air pollution? It may be contributing to your symptoms.

During your pregnancy we'll want to make sure you and the growing baby are as healthy as possible. Can I point you in the direction of this website for advice on how to improve the air quality at home? Air pollution is known to be harmful to you and your baby.

Many things increase your risk of heart disease including smoking, blood pressure, diet and genetics, but one thing people don't often consider is air pollution. I'd like to suggest some things to reduce your risks.

Have you considered what the air pollution is like in your area? That could be contributing to your breathing problems. Please take this leaflet about how to reduce your exposure.



### TIPS

- Include positive steps that patients can do to help their condition and reduce exposure.
- Parents can be more open to changing habits and behaviours that benefit their children. Your consultations can inspire changes that improve air quality and protect their health.
- Having a bike or other fitness gear in your consultation room can prompt great conversations around exercise, sustainability and air pollution.

Unfortunately, many common things in the home produce air pollution, impacting our health. This includes cleaning products, fumes from cooking or woodburning stoves. Making what changes you can from this leaflet may help with your child's asthma symptoms.

Can I ask how you get the kids to school in the morning? It's really hard when we're all so busy, but one thing that is great for air quality where your kids spend so much time is reducing the number of cars nearby. Some families choose to park a bit further away and walk the last 15 minutes of the journey. I've heard of schools really improving the air quality by making some changes like this.

We're beginning to realise how important air quality and air pollution is for health. Here's some tips on how to reduce the risks for your health and your family's health.

Running and exercising is great for improving your health. Exercising in a green space, away from busy roads reduces your risks from air pollution.

# During Consultation



## History

Integrating into  
conversation



## Management plan

Specific, achievable goals



## Lifestyle advice

Work through a leaflet  
together  
If walking for exercise, try a  
green space



## Closing Statements

Signposting





SIGN UP



Home

CAPIT

Business

Health

Schools

Campaigns

News & Stories

## Training videos

Air pollution and health



Talking to patients about air pollution



Impacts of air pollution on patients



## Downloadable resources

We've made a set of downloadable resources for you that you can use with your colleagues and with your patients.

Leaflets



Posters



Reports and presentations



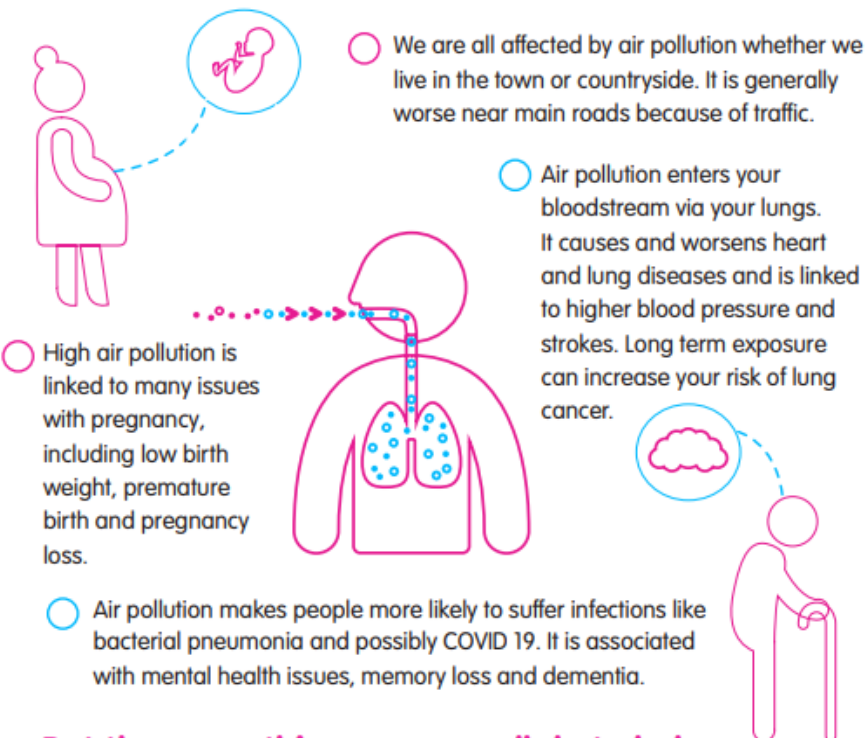
Clean Air graphics



# Air Pollution & Health

## How does air pollution damage my health?

- Air pollution is generally invisible but affects our health from before birth through to old age. It enters our lungs when we breathe and gets into our blood, leading to effects throughout the body. There is no safe level of air pollution and there are many causes, inside and outside the home.



### But there are things we can all do to help

Find health expert approved guidance with simple steps that you can take to tackle air pollution and protect your health at

[cleanairhub.org.uk](https://cleanairhub.org.uk)

## Simple steps can have a big impact on the air you and your family breathe

### Make travel choices for cleaner air



**Use people power** – Walk, scoot or cycle to work or school whenever you can.



**Discover the side streets** – Use quieter streets when you're walking or on a bike to avoid the higher levels of air pollution on main roads.



**Don't idle** – If you have to drive, turn off the engine when you are not moving and it is safe to do so. Consider switching to an electric vehicle. Air quality can be worse inside the vehicle than outside.

### Make cleaner air decisions in the home



**Use fragrance-free, milder cleaning products and avoid plug-in fragrances.**



**When decorating, choose safer paints and varnishes labelled 'low VOC' (volatile organic compounds).**



**Ask people not to smoke in your home.**



**Reduce home burning as much as possible** (e.g. log burners, coal fires or candles).



**Ventilate your home** - Open windows and use extractor fans when cooking or using cleaning products, but close windows near busy roads during rush hours.

# Air Pollution and Children

Air pollution can worsen asthma symptoms including coughing, wheezing and breathlessness. The actions below can help:

## 1. Discover the side streets



Use quieter roads and paths to keep away from heavy polluting traffic.

## 2. Leave the car behind



Encourage your whole family to walk, cycle and scoot more - air pollution can be higher inside a car than outside.

## 3. Turn the engine off



If you do need to use a car, ask the driver to turn the engine off when the car isn't moving.

## 4. Check the pollution forecast



Check air pollution levels in your local area at [uk-air.defra.gov.uk](http://uk-air.defra.gov.uk) - this site provides hourly measurements and forecasts. Remember that air pollution increases significantly near busy roads, especially during rush hour.

## 5. Keep the air clean inside too



Use fragrance free and low-chemical cleaning products. Stop air pollution collecting in your home by using extractor fans and opening windows away from busy roads.

You can learn more about air pollution and find some simple ways to tackle it and protect your health at [cleanairhub.org.uk](http://cleanairhub.org.uk)

## My air pollution plan:

Choose the actions that you and your family are going to do, when you can, to protect your health from air pollution:

Please tick all that apply

We will walk, cycle or scoot to school




We will use quieter routes to avoid roads with heavy traffic

We will turn the engine off when the car is stationary and it is safe

We will leave the car at home whenever we can




I will use my inhaler as recommended by my GP or asthma nurse

I will treat air pollution the same way I treat other asthma triggers

We will buy fragrance-free, milder cleaning products and avoid plug-in fragrances

When decorating, we will choose paints and varnishes labelled "low VOC"

We will ask people not to smoke in our home



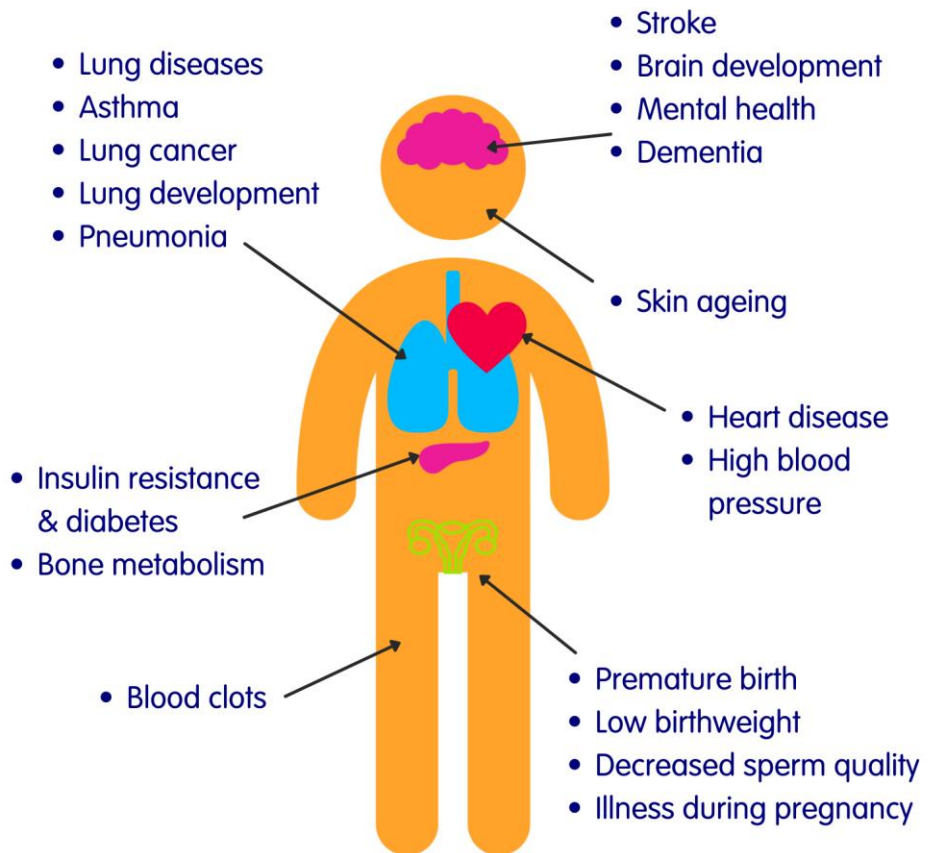

We will avoid home burning as much as possible (e.g. log burners, coal fires or candles)

We will turn on the extractor fan when cooking




We will open a window when cooking and cleaning

# How air pollution impacts the body



[cleanairhub.org.uk](https://cleanairhub.org.uk)



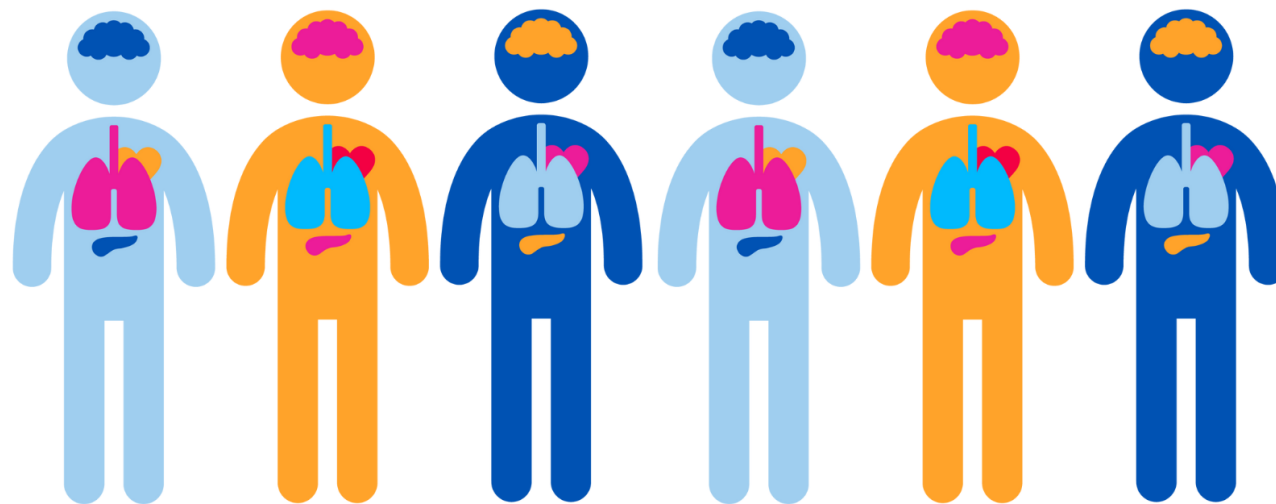
Department for Environment Food & Rural Affairs



Northumbria University  
NEWCASTLE



## Air pollution impacts us all



[cleanairhub.org.uk](https://cleanairhub.org.uk)

Department for Environment Food & Rural Affairs

# Topline Messages for Patients

Air Pollution seriously impacts your health

There are things we can do to reduce it

There are things we can do to reduce exposure

# Air Pollution Resources for Patients



# Clean Air Hub



We've collected everything you need to know about air pollution in one place

[www.cleanairhub.org.uk](http://www.cleanairhub.org.uk)



Get a free Air Quality report for your address

Enter postcode here

PROVIDING THE PUBLIC WITH THE  
MOST ACCURATE AIR POLLUTION DATA AVAILABLE

VERSION 3.0 - UPDATED APRIL 2022

Brought to you by the [Central Office of Public Interest](#)

[Terms of Service](#)



# How to be a Clean Air Champion: 1



Leaflets and materials  
available



Speak with your first  
patients



What words and  
phrases work for you?



Be creative!  
Make it personal



Develop your routine

# How to be a Clean Air Champion: 2



Introduce into your consultations



Share with practice colleagues



Speak at local education meeting(s)



Speak at a regional meeting!



Write to local and national representatives

# What can you do today?

- **ASK** your local councillor to support solutions that make it easier for you to breathe cleaner air (using our easy link and template [www.cleanairhub.org.uk/take-action](http://www.cleanairhub.org.uk/take-action))
- **SHARE** your support by: 1) sharing this councillor letter link to encourage your family, friends and community to also speak up, and 2) using #cleanairday to share why you want cleaner air for all.

Let's not miss this chance for change.

#cleanairday

