

## Air Detectives: Finding Out What We're Breathing in Dudley

Have you ever wondered what's floating around in the air you breathe?

It might look invisible—but there's a whole world of tiny things up there! Some of them are harmless, but others can make the air dirty and hard to breathe.

This briefing is a special guide made just for you—to help you become an Air Detective right here in Dudley. With the help of clever machines and science tools, we've been finding out what's in the air around Brockmoor Primary School. We'll show you where air pollution comes from, how it affects your body, and how we measure it with tools that sniff, count and even shine lights on dust!

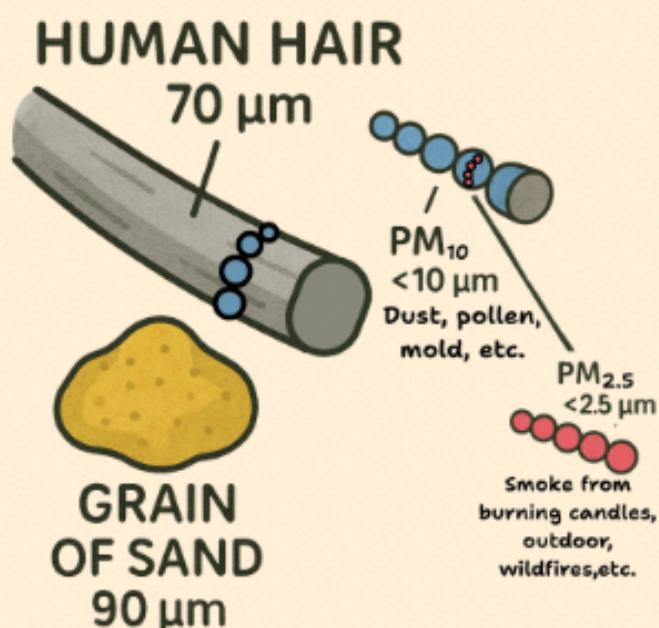
So get ready to explore your very own neighbourhood in a new way—and discover how the air around us tells a story worth paying attention to.

### What is Air Quality?

Air quality means how "clean" or "dirty" the air around us is. It's like the difference between breathing on the top of a mountain or standing behind a smoky bus! Dirty air contains pollutants –tiny bits of dust, smoke or gases. Some are big enough to be seen (PM<sub>10</sub>), like dirt, soot or smoke. Others are so tiny (PM<sub>2.5</sub>), you can only see them with a very powerful microscope.



Air quality sometimes good (left) and sometimes poor (right).



Size comparisons for PM particles.



## Where do Air Pollutants Come From?

Air pollutants come from many places. Cars, buses, and trucks release them when they burn fuel to move. Factories and power plants also send out smoke when they make electricity or products. At home, using gas stoves, burning candles, or using fireplaces can pollute the air too. Outdoor, wildfires, rubbish burning, dust or even pollen from plants can cloud air.



## Why Does Air Quality Matter?

Breathing clean air gives your body the best kind of fuel! it helps your lungs grow strong, keeps your heart healthy, and lets you run, play, and think clearly. But when the air is dirty, it can make your throat sore, your eyes watery, and cause asthma or coughing. Breathing dirty air for a long time can slowly harm your body.

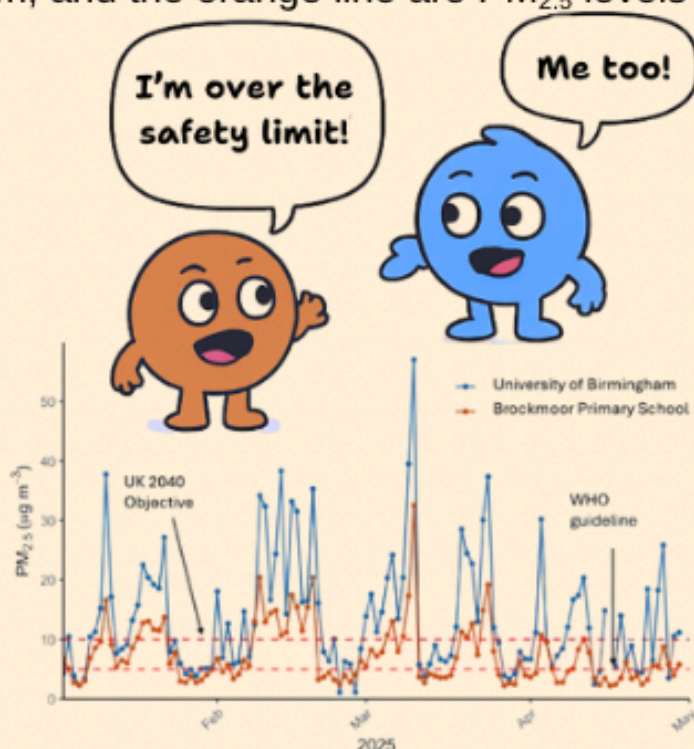


## What is the Air like around Brockmoor Primary School?

This chart is like a diary of the air from January to mid-May: the blue lines are PM<sub>2.5</sub> levels near the University of Birmingham, and the orange line are PM<sub>2.5</sub> levels at Brockmoor Primary School.

The two red dashed lines show the “safe” limits, 5 micrograms per cubic metre ( $\mu\text{g m}^{-3}$ ) is the World Health Organization's goal, and 10 micrograms per cubic metre ( $\mu\text{g m}^{-3}$ ) is the UK's 2040 target.

When the blue and orange lines go above these red lines (which happens quite a lot, especially in late February and March), it means the air had more dust than is healthy. This reminds us we still need cleaner air to breath easily.



Daily average PM<sub>2.5</sub> concentrations over 4-month period in University of Birmingham BAQS and Brockmoor Primary School.



## Air Quality Monitoring in Brockmoor

Have you noticed our air quality monitor trailer parked at Brockmoor Primary School?

This trailer is like a mini science lab—it measures tiny particles in the air and a substance called black carbon. Black carbon often comes from things like wood-burning stoves, used specially during winter time. By comparing this data with information from the Birmingham Air Quality Supersite (BAQS) near the university, scientists can learn how air pollution is different in each location.

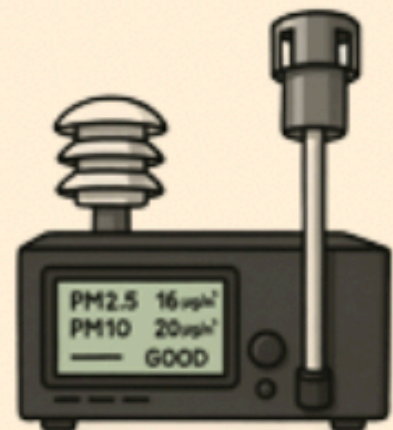
## Air Quality Monitoring Trailer



Aethalometer® AE33

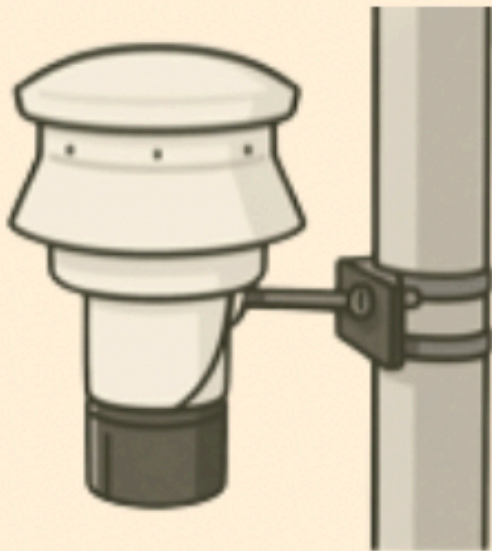
This tool works like a clever “super-nose” in a box! The Aethalometer AE33 pulls in air like a vacuum cleaner. It shines a light through the dust it collects, then checks how much of the light is blocked by tiny, sooty particles from things like car engines or wood fires. The faster the light fades, the more black carbon (kind of invisible smoke) is in the air. It's like counting how many sprinkles fall onto an ice-cream cone—just that instead of sprinkles is air pollution!

The Fidas 200 is like a super-smart “dust detective”. It gently pulls in air, then shines a tiny, invisible torch through it. Every bit of dust that zooms by makes the light bounce in a special way. This helps the Fidas count the specks one by one—and it can even tell if they're teeny like glitter or a bit bigger like sand. In just seconds, it tells us how much dust is floating around, even in your playground!



Fidas® 200

## Air Quality Sensor Network



Outdoor Air Quality Sensor

Look out for six small, white mushroom-shaped devices on lampposts—they look like little weather robots!

These outdoor sensors check the air every minute. They can sniff out:

- $\text{NO}_2$  – a smelly gas from traffic
- $\text{O}_3$  (Ozone) – a gas that appears on sunny days
- $\text{PM}_{2.5}$  – tiny particles small enough to float into your lungs

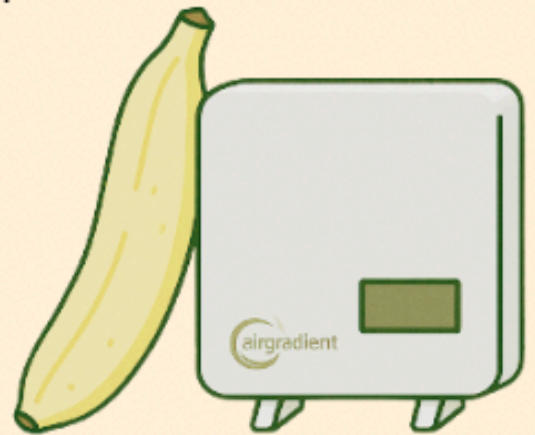
They also measure how warm or cold the air is outside. All this information is sent to scientists so we can understand if the air around us is clean - or if it needs to get cleaner.

We also placed air sensors inside some homes. These are small white boxes— about the height of a banana!

Like the outdoor ones, they measure:

- $\text{PM}_{2.5}$  – tiny dust-like particles
- $\text{CO}_2$  – the gas we breathe out
- Room temperature

Good air quality and a comfortable temperature can help keep your lungs healthy and your mind clear - especially when you are playing or doing homework indoors.



Indoor Air Quality Sensor

## What Can We Do Together?

Now that you've learned about air quality, you might be wondering: "What can I do to help?"

The good news is that even small actions can make a big difference. Walking or cycling instead of going by car, planting trees or flowers, turning off lights when you don't need them, or asking adults to check what they burn at home can all help make the air cleaner. You could even write a letter to your Member of Parliament to let them know that clean air matters to you.

You don't need to be a grown-up to make a difference — just someone who cares and has good ideas. What would you do to help the air where you live?

## Authors

This briefing note was prepared on behalf of the WM-Net Zero project by Yuqing Dai & Abril Herrera Chavez (University of Birmingham).