Monitoring Air Quality for Health in Leicestershire

Leicestershire County Council

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Contacts

We would like to hear from you, please share your views with us.
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If you have any research suggestions, please email the HDRC team at hdrc@leics.gov.uk .
Please use the QR code to view our AQ Tableau dashboards.

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Background

Why we report on Air quality

Local authorities have a statutory responsibility to monitor air quality to ensure that it meets required standards for certain pollutants.

Particulate matter (PM2.5)

Particulate matter (PM) is everything in the air that is not a gas and therefore consists of a huge variety of chemical compounds and materials, some of which can be toxic. $PM_{2.5}$ is the most dangerous pollutant because it can penetrate the lung barrier and enter the blood system, causing cardiovascular and respiratory disease and cancers. The major sources of primary PM2.5 are combustion in the energy industries, road transport (both exhaust and non-exhaust emissions), off-road transport, residential sources and small-scale waste burning.

The UK Government has set two targets for fine particulate matter ($PM_{2.5}$) in England:

- An annual mean concentration target of 10 micrograms per cubic metre (µg m^3) to be met across England by 2040.
- A population exposure reduction target of 35% reduction in population exposure by 2040.

Source: Air quality: policies, proposals and concerns.

Nitrogen Dioxide (NO2)

Nitrogen dioxide (NO2) is a gas that is mainly produced during the combustion of fossil fuels, along with nitric oxide (NO). Short-term exposure to concentrations of NO2 can cause inflammation of the airways and increase susceptibility to respiratory infections and to allergens.

The Air Quality Standards Regulations 2010 require that the annual mean concentration of NO2 must not exceed 40 µg/m^3 and that there should be no more than 18 exceedances of the hourly mean limit value (concentrations above 200 µg/m^3) in a single year.

Limitations

The Council's monitoring mainly focuses on the selected indicators for PM2.5 and NO2. There are other air pollution measures not covered here that include PM10, NOx, CO, SO2, Ozone and Benzene.

PM2.5

- Although PM2.5 data is reported annually, data is approximately two years in arrears.
- PM2.5 travels long distances and can be influenced by neighbouring counties and other countries.
- PM2.5 can vary due to a range of factors such as weather conditions, as well as pollutant emissions.
- The indicator we use 'PM2.5 Air pollution fine particulate matter' (populated-weighted annual mean) includes exposure to local populations and sites are mostly located where most people in a region live (urban and suburban areas). The effects of PM2.5 pollution in rural areas may not be fully represented in the current national approach.

NO2

- NO2 monitoring sites tend to be located mainly in the western half of the county, in and around Leicester, and the larger settlements, motorways and the busiest A roads. The Eastern half of the county has very few monitoring sites and rates are not therefore fully captured.
- Specialist knowledge is required to assess if the current NO2 monitoring sites are in the most appropriate areas and if there are enough of them to give a true reading for the county.

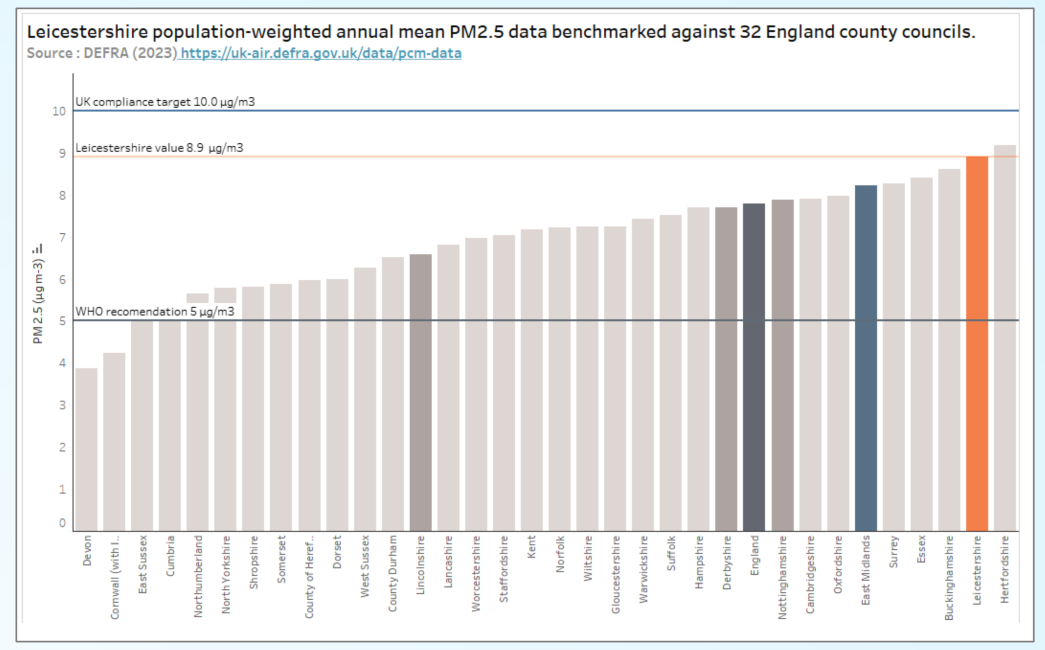
What we know about Air Quality

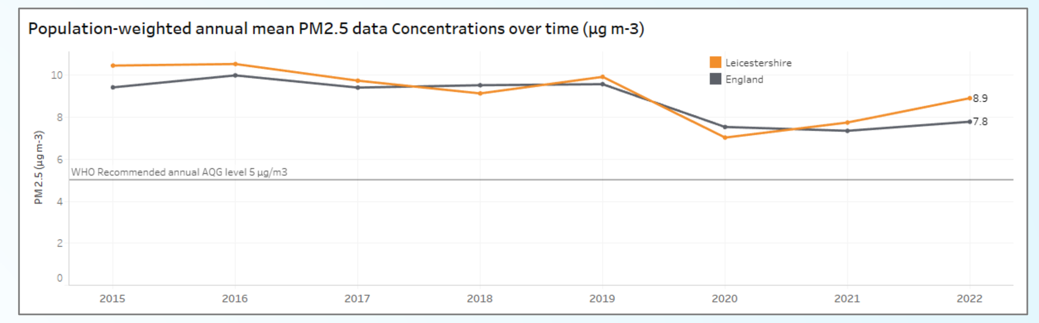
Particulate Matter PM2.5

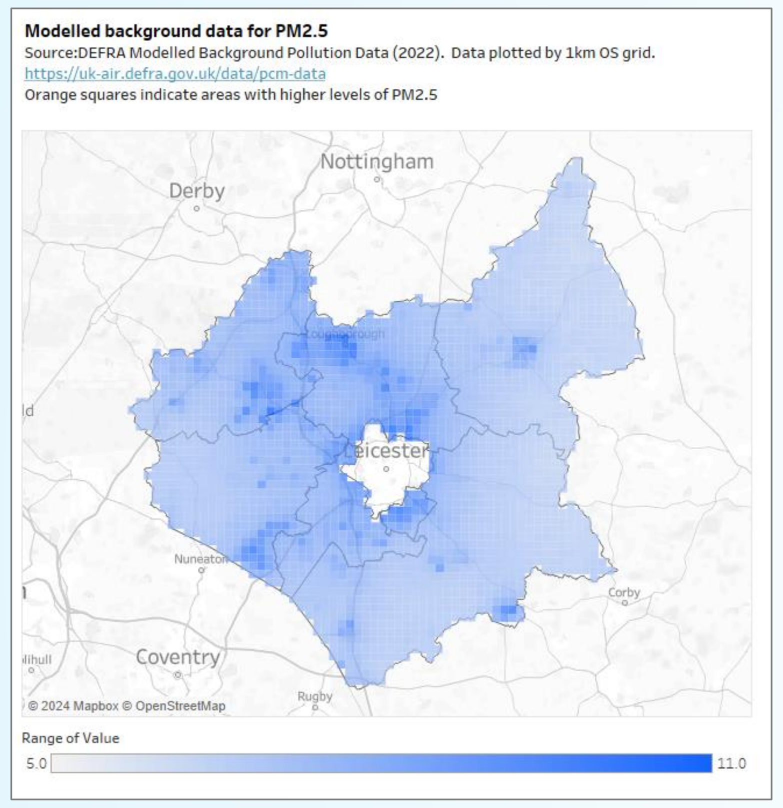
2022 Population Weighted Annual Mean PM2.5

The charts (right) shows the annual total concentration of human-made and non-human made fine particulate matter at an area level, adjusted to account for population exposure. Findings show:

- PM2.5 populated annual mean in Leicestershire is within the UK target (2040) of 10 micrograms/ cubic metre (µg m^3) and therefore compliant with UK law.
- PM2.5 populated annual mean in Leicestershire (8.9 µg m^3) is higher than (worse than) the England amount of 7.8 µg m^3 in 2022.
- Leicestershire's PM2.5 populated annual mean exceeds the World Health Organisations (WHO) recommendations of 5 µg m^3.
- Compared to other English County Councils, Leicestershire it is one of the worst performing areas (4th quartile in 2022) on PM2.5 populated annual mean.
- 2020 had the lowest concentrations with 2022 concentrations still lower than pre pandemic levels.







Modelled background PM2.5 data

Modelled background PM2.5 data in the map (left) shows that areas with the highest levels of PM2.5 in Leicestershire county are mostly urban areas including Loughborough, Coalville, Ellistown, Birstall, Syston, Wigston Magna, Hinckley and Market Harborough. The Western half of the county, where there is a higher proportion of towns and major county roads, tend to have higher PM2.5 background levels than the Eastern half of the county, which is much more rural with fewer towns and major roads.

Fraction of mortality attributable to particulate air pollution

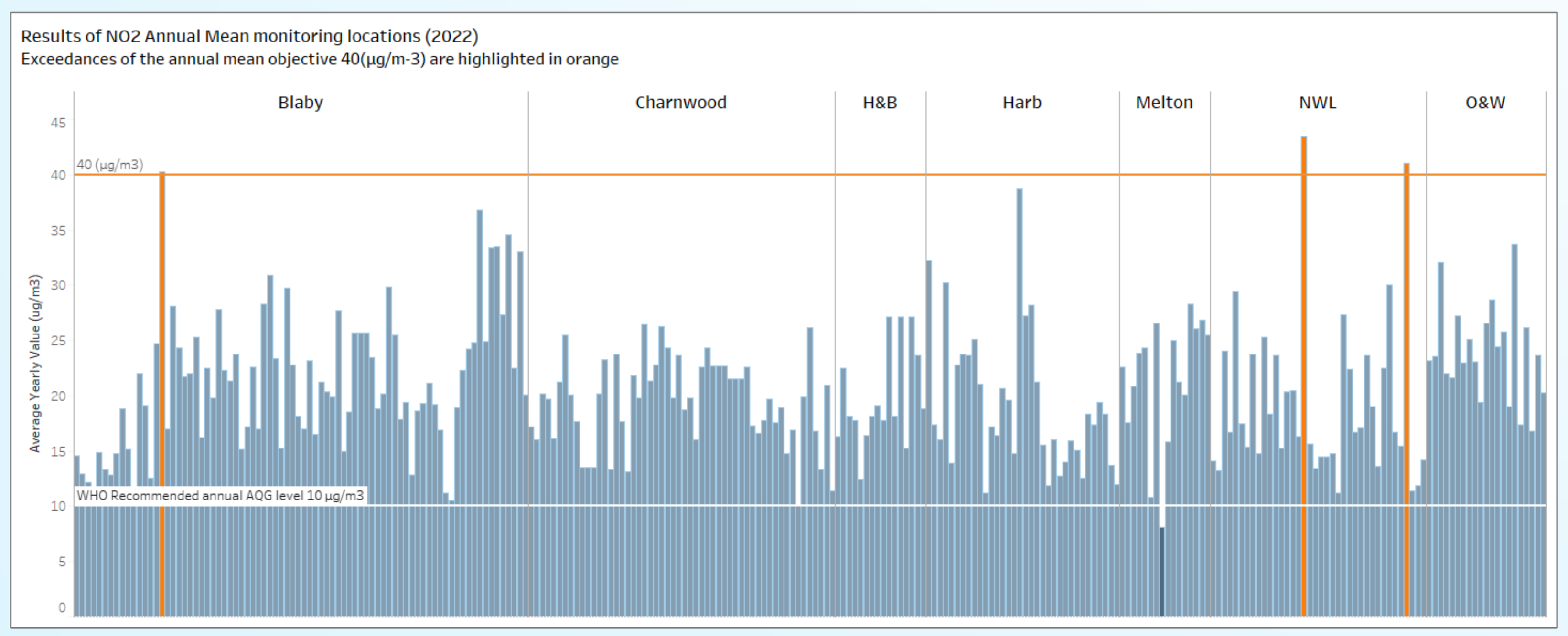
This is the mortality burden associated with long term exposure to particulate air pollution at current levels, expressed as the percentage of annual deaths from all causes in those aged 30 and older. We know from 'Fraction of mortality attributable to particulate air pollution' data covering 2022 that Leicestershire exceeds the England rate (6.6% and 5.8% respectively). Both Leicestershire and England's mortality percentage had a notable decrease in 2020.

Source: Department of Health & Social Care Fingertips Public Health Profiles

Nitrogen Dioxide NO2

Local Monitoring of NO2

Results of air quality monitoring by local authorities across Leicestershire for 2022 are shown below. There was an exceedance of the annual mean concentration of 40 µg/m^3 at three locations in 2022; one in Blaby District and two in North West Leicestershire. There were no exceedances above the hourly mean limit value. Source: Leicestershire District Council Annual Status Reports.



Modelled NO2 data 2022

NO2 modelled background data mapped at 1km square grids (above) shows the highest concentrations of NO2 are in and around Leicester, Loughborough, Castle Donington and Hinckley. Higher densities of NO2 appear to follow major routes such as the M1, M69, the M1 and M69 intersection and the A6 between Loughborough and Leicester.