Air Quality In Cambridge

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Air Quality in the UK today is affecting life expectancy

- **35,000 premature deaths in the UK each year due to outdoor air pollution**
- **106 deaths per year in Cambridge and South Cambridgeshire can be attributed to air quality**
- Air pollution linked to cancer, asthma, stroke and heart disease, diabetes, obesity and dementia
- The health problems resulting from exposure to air pollution have a high cost to people who suffer from illness and premature death, to our health services and to business. In the UK, these costs add up to more than £20 billion every year


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Diesel engines + Add to myFT

UK plans to ban sale of new petrol and diesel cars by 2040

Michael Gove prepares to follow lead set by France two weeks ago

The announcement will be seen as a milestone in the shift towards electric cars and the beginning of the end for the internal combustion engine © Bloomberg

The Objectives

Table 1.1 – UK Air Quality Objectives and Pollutants - LAQM

Pollutant	Objective	Averaging Period	Obligation
Nitrogen dioxide (NO_2)	200µg/m³ not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m³	Annual mean	All local authorities
Particulate Matter (PM_{10})	50µg/m³ not to be exceeded more than 35 times a year	24-hour mean	All local authorities
	50µg/m³ not to be exceeded more than 7 times a year	24-hour mean	Scotland only
	40µg/m³	Annual mean	All local authorities
	18µg/m³	Annual mean	Scotland only
Particulate Matter ($PM_{2.5}$)	Work towards reducing emissions/concentrations of fine particulate matter ($PM_{2.5}$)	Annual mean	England only (encouraged in Wales)
	10µg/m³	Annual mean	Scotland only
Sulphur dioxide (SO_2)	266µg/m³ not to be exceeded more than 35 times a year	15-minute mean	All local authorities
	350µg/m³ not to be exceeded more than 24 times a year	1-hour mean	All local authorities
	125µg/m³ not to be exceeded more than 3 times a year	24-hour mean	All local authorities
Benzene (C_6H_6)	16.25µg/m³	Running annual mean	All local authorities
	5µg/m³	Annual mean	England and Wales only
	3.25µg/m³	Running annual mean	Scotland and Northern Ireland only
1,3-Butadiene (C_4H_6)	2.25µg/m³	Running annual mean	All local authorities
Carbon Monoxide (CO)	10mg/m³	Maximum daily running 8-hour mean	England, Wales and Northern Ireland only
	10mg/m³	Running 8-hour mean	Scotland only
Lead (Pb)	0.25µg/m³	Annual mean	All local authorities

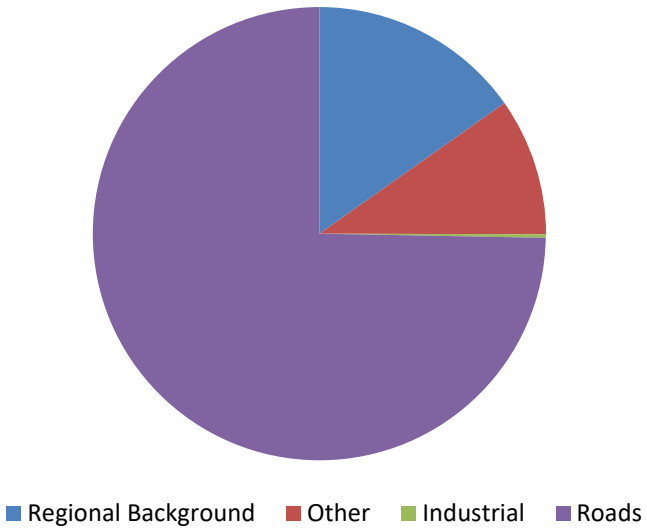
Pollutants – Nitrogen Dioxide (NO_2)

- Gas formed through emissions of Nitric oxide (NO) from combustion of fossil fuels, reacting with other gases in the atmosphere to form Nitrogen dioxide (NO_2).
- Exacerbates symptoms of those already suffering lung or heart conditions, causes inflammation of airways and increases susceptibility to respiratory infections and allergens.
- Main sources: road transport, energy generation, domestic and industrial combustion, other forms of transport i.e. diesel trains and shipping.
- Monitored across Cambridgeshire using continuous monitors and diffusion tubes
- Limit Values:
  - Annual Average 40 µg m^{-3}
  - Hourly average 200 µg m^{-3} (not to be exceeded more than 18 times per year)

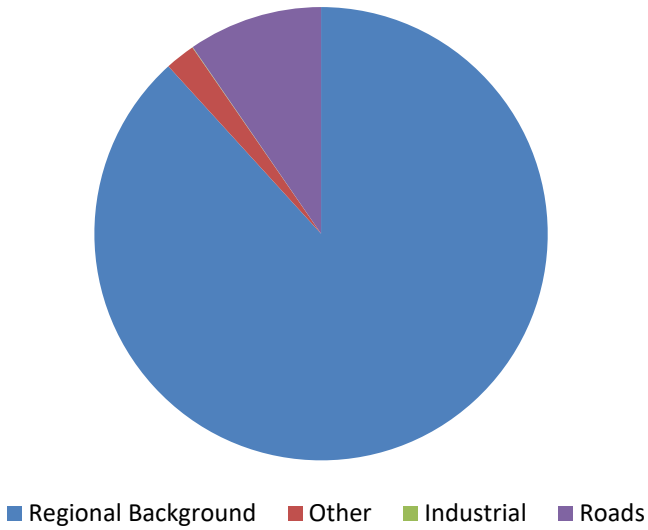
Pollutants – Particulate Matter

- PM_{10} – smaller than 10 microns in diameter
- $PM_{2.5}$ – smaller than 2.5 microns in diameter
  - Human hair is 50 microns in diameter, red blood cell is 6-10 microns (μ) in diameter
- Everything in the air which isn't a gas i.e. soil, sea salt spray, pollen, smoke from fires, dust from brakes and tyres and emissions from industry.
- Can travel into the lungs and then into the bloodstream where the particles can be transported and deposited into other organs such as the heart and brain. Particles provide a surface for transporting toxic materials or can themselves be toxic.
- Linked to diseases affecting heart and lungs and emerging evidence can have a role in low birth weights and dementia.
- Adversely affects the very young, the very old and pregnant women and their unborn children.
- Sources of particulates are: road transport, domestic wood and coal burning, industrial combustion, and the use of solvents and industrial processes.
- Limit Values:
  - PM_{10}
    - Annual Average 40 $\mu g\ m^{-3}$
    - 24 hour average 50 $\mu g\ m^{-3}$ (not to be exceeded more than 35 times a year)
  - $PM_{2.5}$
    - Annual Average 25 μgm^{-3}
    - Target of 15% reduction in annual average concentrations at urban background

Source of pollution (all) (2017)

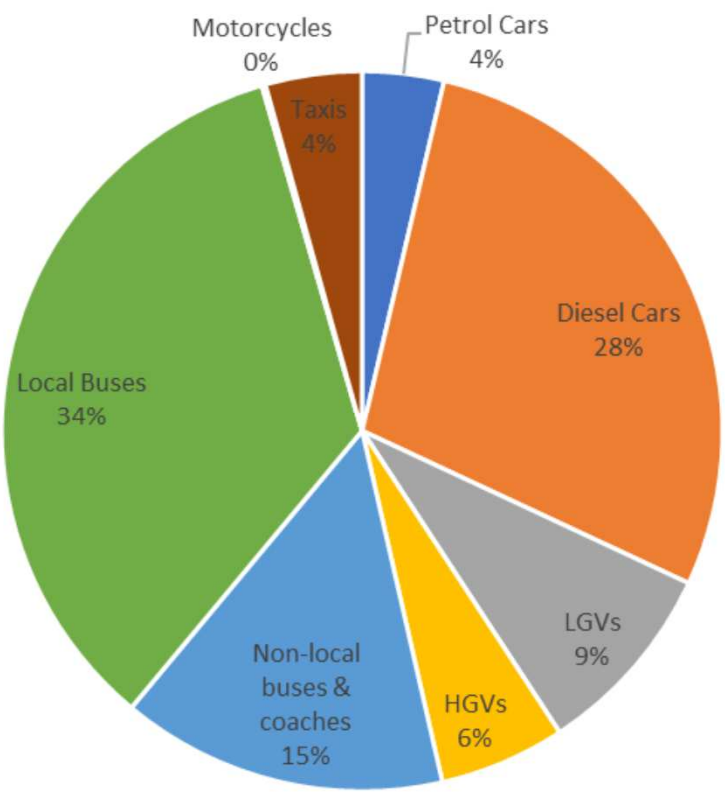


Nitrogen Oxide Sources

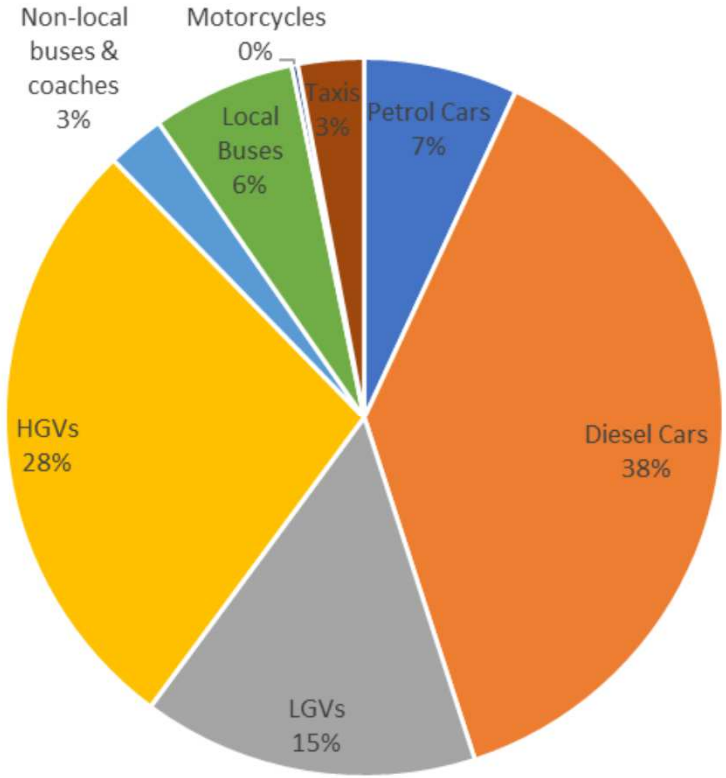


PM 10 Sources

Source Apportionment by Fleet (2017)

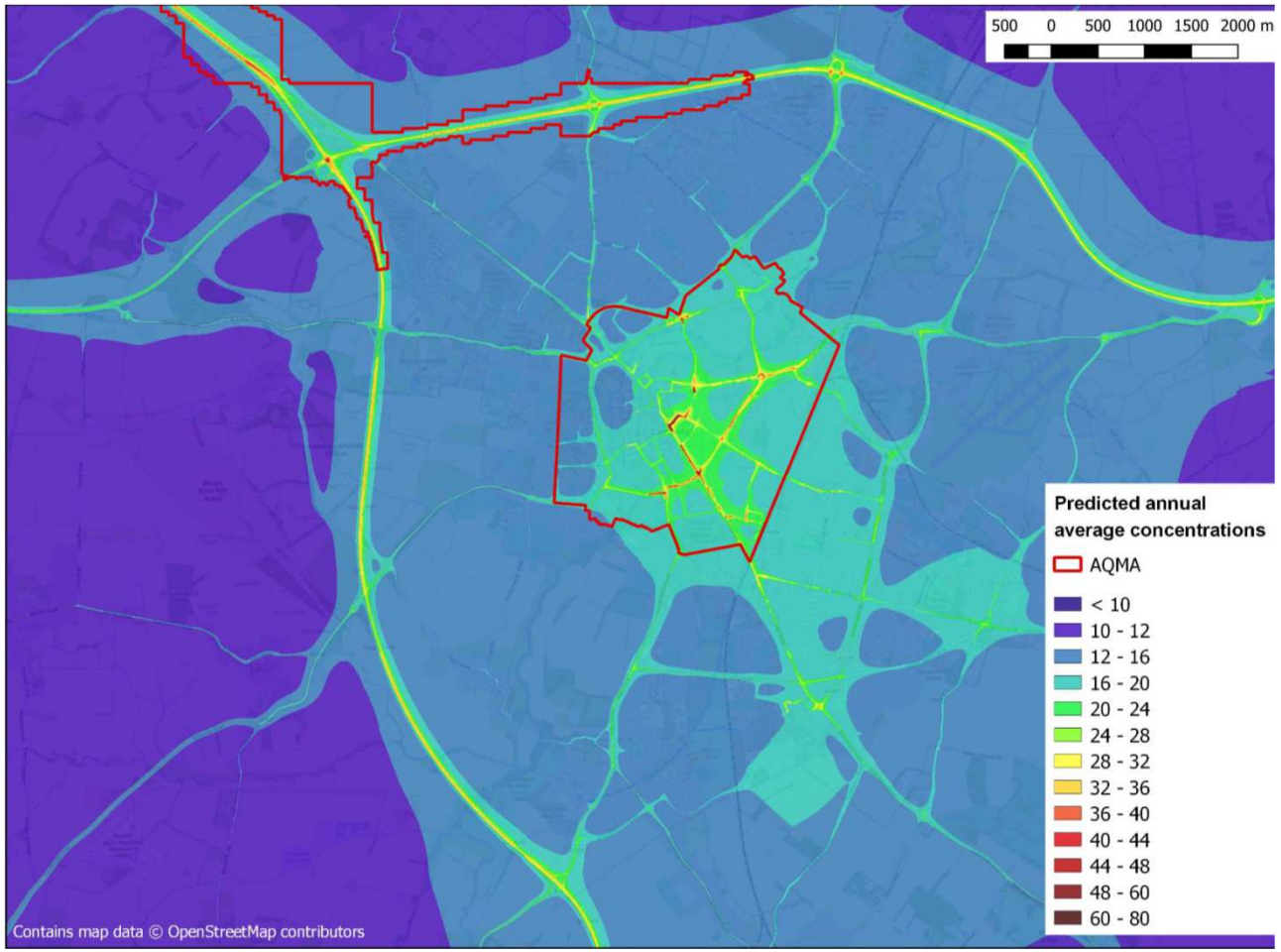


Inside Inner Ring Road

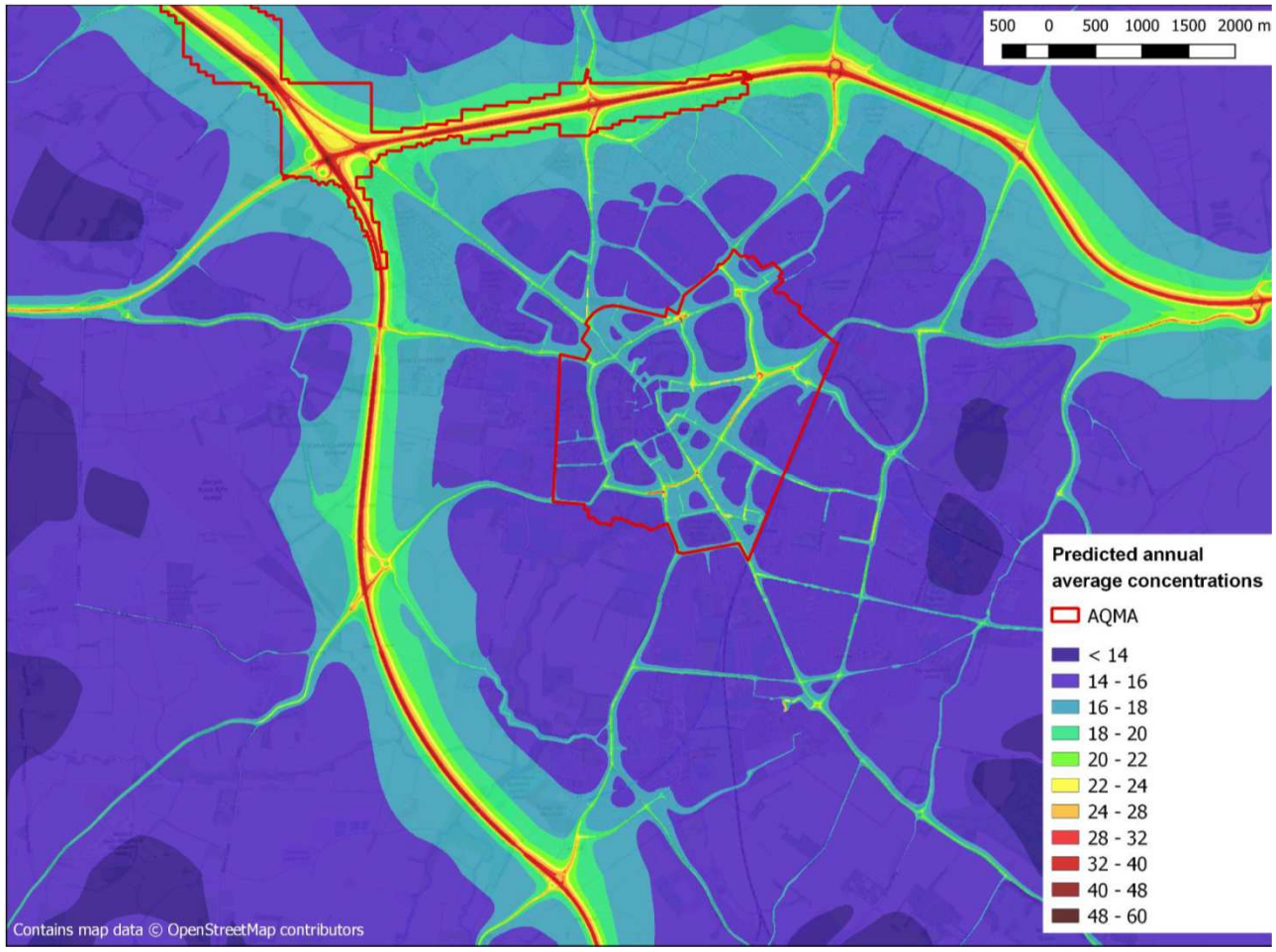


Outside Inner Ring Road

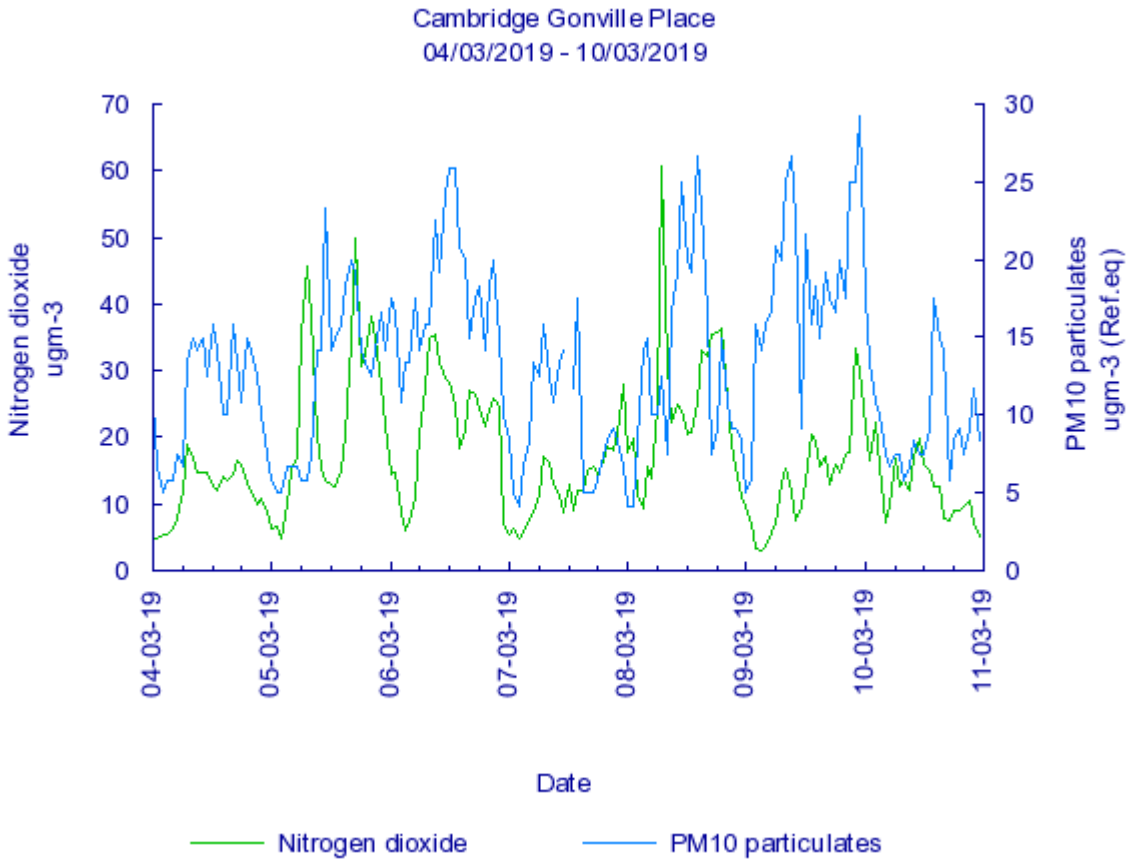
Current Air Quality – Nitrogen Dioxide



Current Air Quality - Particulates



Daily Variation – NO2 & PM10 (1 week)



Future Trends in Air Quality

- Areas of Concern:
  - Drummer Street Bus Station and Emmanuel Street
  - Station Square – CB1
  - Cambridge Biomedical Campus
- Monitoring in these “growth” areas shows trend of increasing concentrations in NO_2.