



Air Pollution in Kew

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What is air pollution?

- WHO definition. Contamination of the environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere.

Ozone
(O₃)

Nitrogen oxides
(NO_x) including
nitrogen dioxide
(NO₂)

Particulates
(PM₁₀)
(PM_{2.5})

- All these air pollutants affect human health

Hydrocarbons
Arsenic
Lead
Polycyclics

Carbon
Monoxide
(CO)

Sulphur
dioxide
(SO₂)

Where do outdoor air pollutants come from?

Changes in road use have affected air pollution

- 10 x increase in road traffic 1949-2012
- Car traffic increased 10 x 1949-2000. Little increase since - BUT
- Diesel engines in new cars = 14% in 2000; 50% in 2014
- LGV (vans) traffic increased 20% since 2003 (?shopping delivery) - use diesel
- HGV traffic decreased 12% since 2004

In non-industrial areas

Road traffic

- Diesel engine exhaust emissions, eg PMs, NO_x, HC, SO₂
- Petrol engine exhaust emissions eg NO_x, CO, HC
- Petrol engine emissions greatly improved, not diesel
- Tyre and brake wear eg PMs

In industrial zones

- Power stations
- Factories

Air pollution in London on 21 January 2016.
Photograph: Gill Allen/REX/Shutterstock

Nitrogen dioxide NO₂

- Concentration in air easily measured by “diffusion tube” method
- Monthly or annual mean concentration used a general indicator of air quality

EU/UK Air Quality Standards

- ❖ EU/UK law: ANNUAL MEAN must not exceed 40 µg NO₂ /m³
- ❖ EU/UK law: SHORT EXPOSURES (1HOUR) must not exceed 200µg NO₂ /m³ 18 times per year

Pollution in Kew?

Annual Mean NO₂ µg/m³ levels for 2014?

Red = above legal limit of 40 µg/m³

*North side Kew Bridge/ Strand on the Green
59

Kew Rd/ Walpole Ave
56

Clean Air Reference - Holly Lodge Richmond Park
19 µg/m³



Mortlake Rd/ Kent Rd **57**

Mortlake Rd/ West Hall Rd **58**

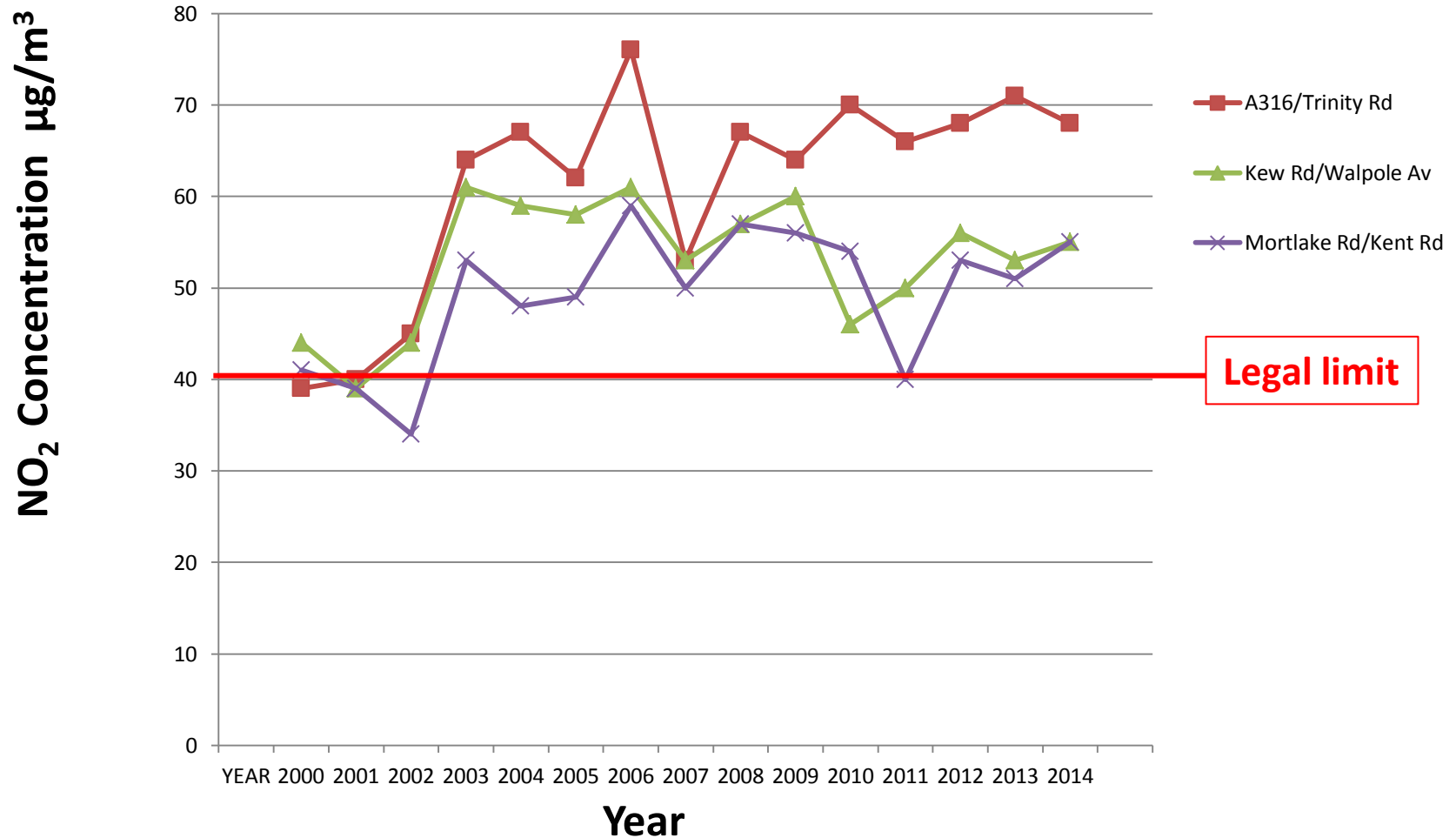
Mortlake Rd/ Cemetery Gates **56**

Chalkers Corner **64**

A316/Trinity Rd **68**

Data: LBRUT 2015, *Hounslow 2015

Has air pollution in Kew worsened in recent years?



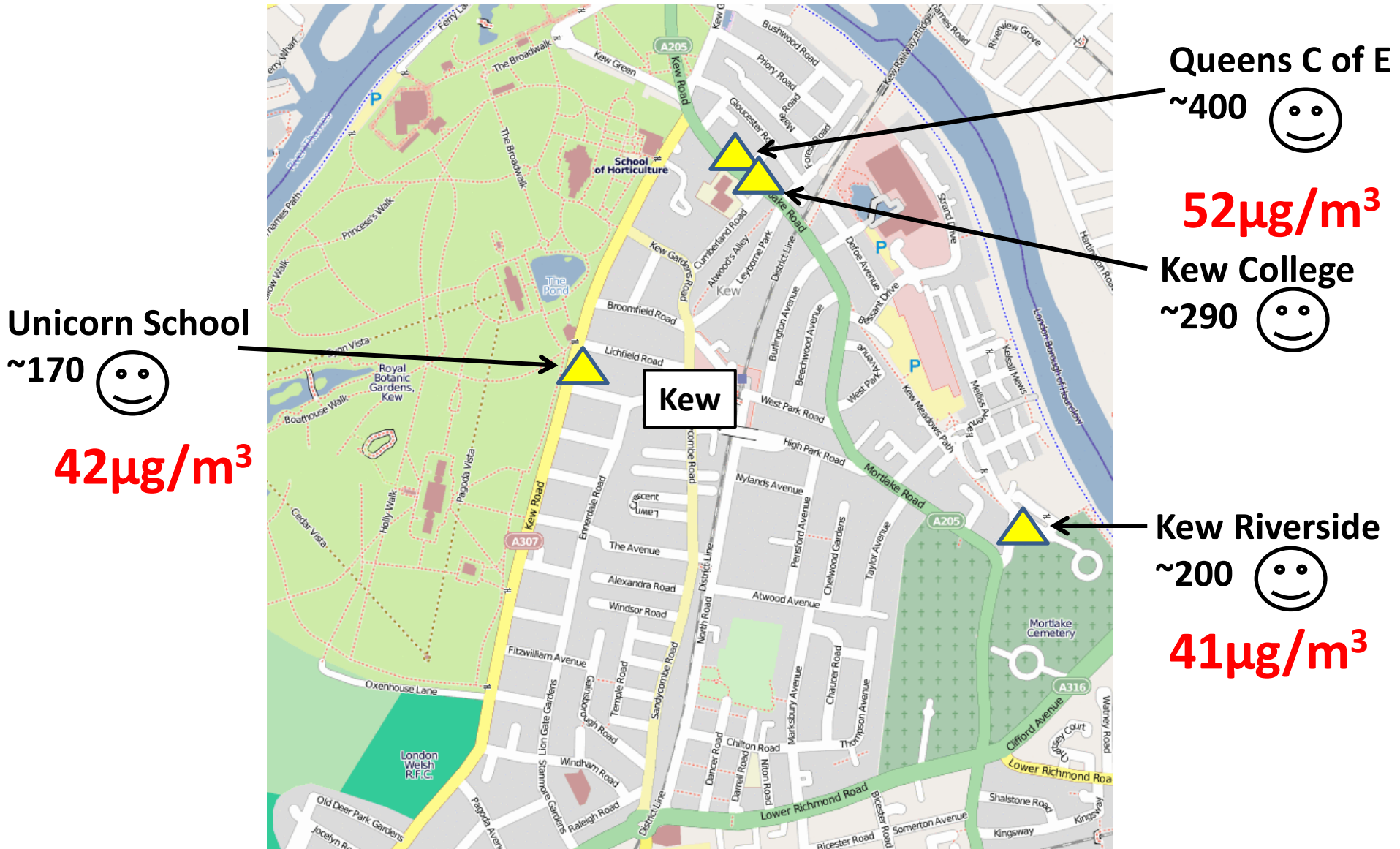
2000-2009 data from http://www.richmond.gov.uk/no2_annual_averages_91-11
2010-2014 data from LBRUT Air_Quality-Update 2015

How Does Traffic Air Pollution Affect Children's Health?

- Living within 500m of heavily polluted roads (NO₂, PMs) suppresses childhood lung growth
Chen Z et al. Journal Thoracic Disease, vol 7, 2015
- 19 separate studies of traffic air pollution showed
 - Increased exposure to NO₂ is associated with new-onset of asthma
 - Increased exposure to PMs is associated with new-onset of wheeze*Gasana J et al. Environmental Research, vol 117, 2012*
- Children living in polluted areas are 4 times more likely to have reduced lung function in adulthood
Royal College of Physicians report on Air Pollution, 2016

Are schoolchildren in Kew exposed to air pollution?

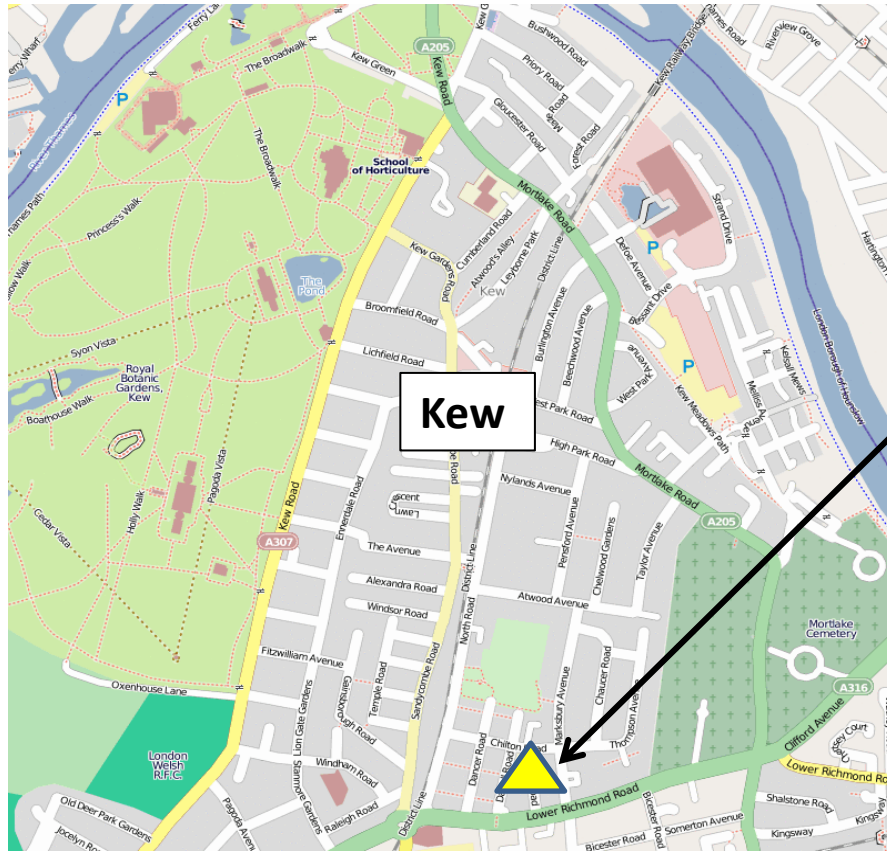
KRA measured kerbside NO₂ levels outside schools April-May 2015



Other local groups have measurements too!

What about air quality in the playground?

- KRA informed Kew schools about kerbside air pollution
- Four schools decided to set up student eco-projects measuring NO_2 in playground



Darell School has completed

- A316/Lower Mortlake Rd
55 $\mu\text{g}/\text{m}^3$
- Darell Playground off Niton Rd
31 $\mu\text{g}/\text{m}^3$

Good news – but many children walk to school along A316 and may be exposed to very high NO_2 during peak hour traffic!

In common with other Kew Schools many children also driven to school
 NO_2 - 2.5x higher in cars than on road!
- 3.0 x higher in drop off zone!

How Does Traffic Air Pollution Affect Adult Health?

- **ASTHMA: Increased incidence**
Asthmatics: 2h walk in polluted air: lung function down (6%), lung inflammation
Jacquemin et al. Environ Health Perspect, vol 123,2015
- **TYPE 2 DIABETES: Increased Incidence**
Wang et al. Eur J Endocrinol, vol 171, 2014
- **BRAIN: Reduced cognitive function in older adults**
Ailshire et al. Am J Epidemiol, vol 180, 2014
- **VASCULAR: Heart attacks and strokes increased after exposure**
Bhaskaran K et al. BMJ vol 343,2011
- **LUNG CANCER: Increased incidence. Diesel classed as a carcinogen**
International Agency for Research on Cancer. Press release no 221 2013

Summary

1. **Kew is surrounded by a ring of traffic-generated air pollution, far exceeding UK/EU limits**
2. **Over 1000 children attend primary schools adjacent to our main roads**
3. **The air pollutants are dangerous to both child and adult health**
4. **Mayor of London estimates 10,000 deaths a year in the Capital are due to this pollution**
5. **Some of these deaths will be in Kew. Each is likely to be about 12 years early.**

**If this number of deaths/year occurred due to a preventable “killer” virus -- there would be public outrage demanding immediate action by Government!
SO WHAT IS TO BE DONE?**