Air Quality Modelling for Cycle Enfield

21st January 2016

Introduction

- Cycle Enfield is proposing to introduce segregated cycle lanes along the A1010, A105 and A110

- Further measures:
  - Free cycle training for anyone living, working, or studying in Enfield
  - Installation of additional cycle parking
  - Introduction of a £10 bike loan scheme

- Together, these schemes are expected to increase the modal share by 5% by 2020

- Changing the road layout, traffic flows, speeds, and congestion will impact air quality

- CERC was commissioned to assess the air quality impacts

CERC

Health impacts of air quality

- Government advice on health impacts of air quality cover a range of pollutants

Pollutant	Health effects
Nitrogen Dioxide, Sulphur Dioxide, Ozone	These gases irritate the airways of the lungs, increasing the symptoms of those suffering from lung diseases
Particles (PM_{10} and $PM_{2.5}$)	Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of heart and lung diseases

- Both long-term and short-term exposure impact mortality

- London 2010 $PM_{2.5}$: 52630 life-years lost, 1990 hospital admissions

  NO_2: 88113 life-years lost, 740 hospital admissions

  – COMEAP factor 1.025 per 10µg/m³ exposure to long-term NO_2

CERC

Current situation

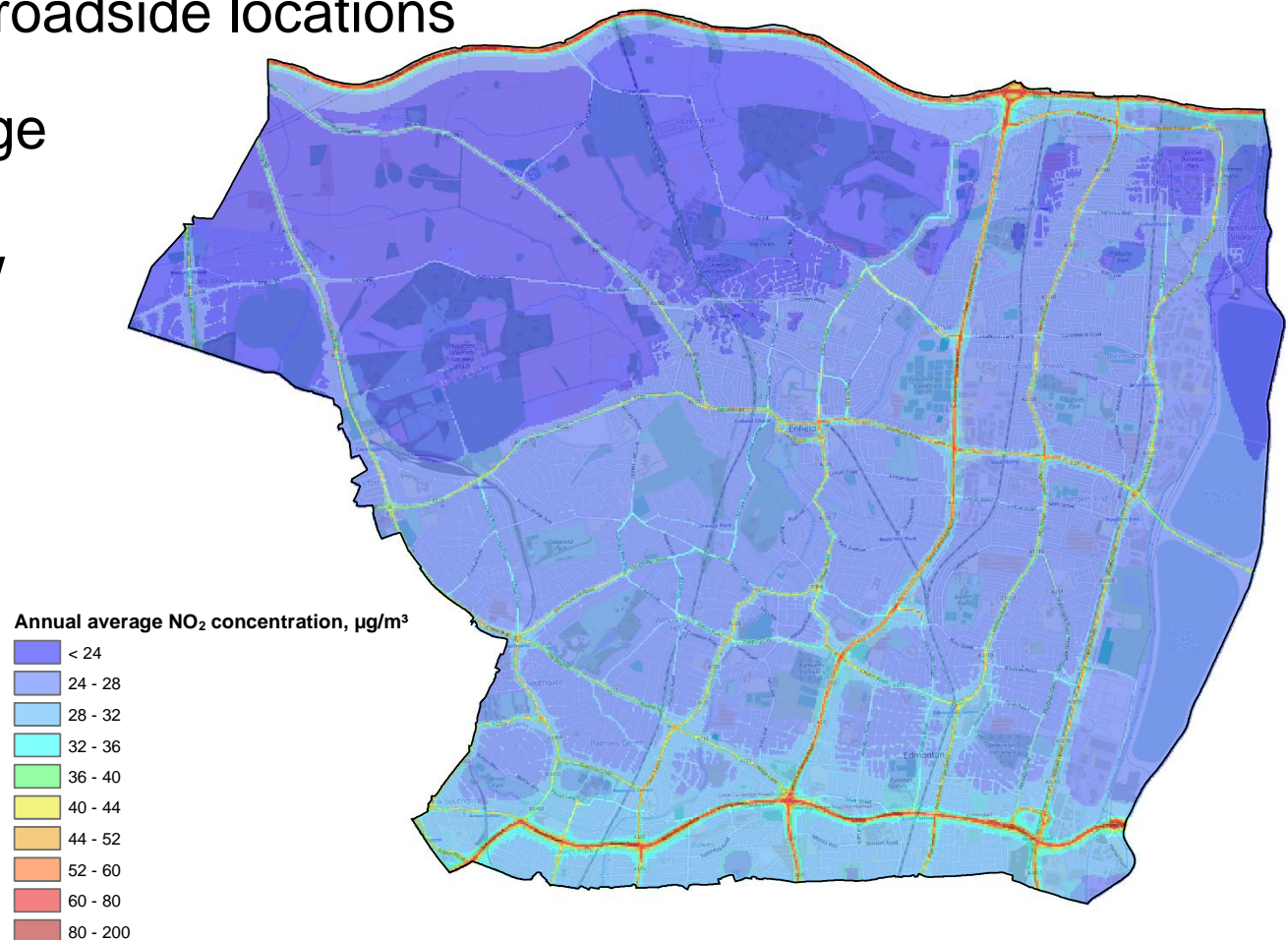- Local Authorities have a duty to review and assess air quality
- UK air quality objectives, based on EU limit values

	Value (µg/m^3)	Description of standard
NO$_2$	200	Hourly mean not to be exceeded more than 18 times a calendar year (modelled as 99.79th percentile)
	40	Annual average
PM$_{10}$	50	24-hour mean not to be exceeded more than 35 times a calendar year (modelled as 90.41st percentile)
	40	Annual average
PM$_{2.5}$	25	Annual average

- If a local authority finds any places where the objectives are not likely to be achieved, it must declare an Air Quality Management Area there

CERC

Current situation

- Whole of Enfield declared an Air Quality Management Area due to exceedences of the objectives for nitrogen dioxide and PM_{10} at busy roadside locations

- Annual average NO_2 maps for 2015 show predicted exceedences

Annual average NO_2 concentration, µg/m³

	< 24
	24 - 28
	28 - 32
	32 - 36
	36 - 40
	40 - 44
	44 - 52
	52 - 60
	60 - 80
	80 - 200

CERC

Air quality modelling

- Air quality modelling carried out to assess impact of Cycle Enfield scheme on air quality along the A105

- Uses ADMS-Urban software developed by CERC (www.cerc.co.uk)

  - Widely used for Local Authority air quality assessments and planning applications and for the *air*TEXT forecasting system

  - Uses traffic flow and speed data; emissions data for other sources; and meteorological data

- ADMS-Urban has been validated using various datasets

- Model input data and assumptions verified using locally measured air quality data
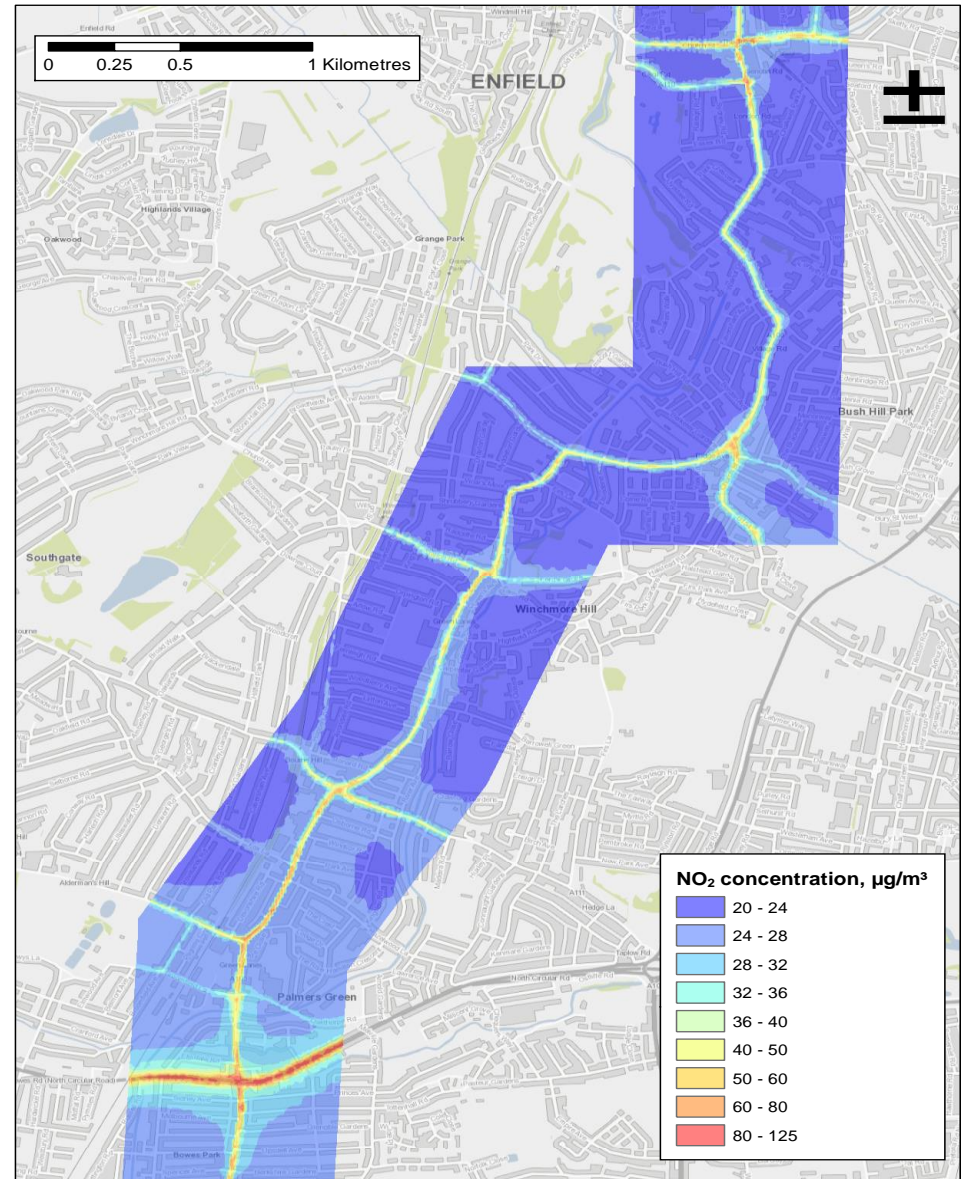
CERC

Enfield modelling

- Modelled scenarios:

  - Baseline (do-nothing)

  - Reduction in car flows resulting in reduction in total traffic flow of 2.5%, 5% and 10%

- Traffic data provided included:

  - local traffic counts

  - data on queue length and delay times at major junctions for each scenario

- Other sources:

  - Idling at bus stops

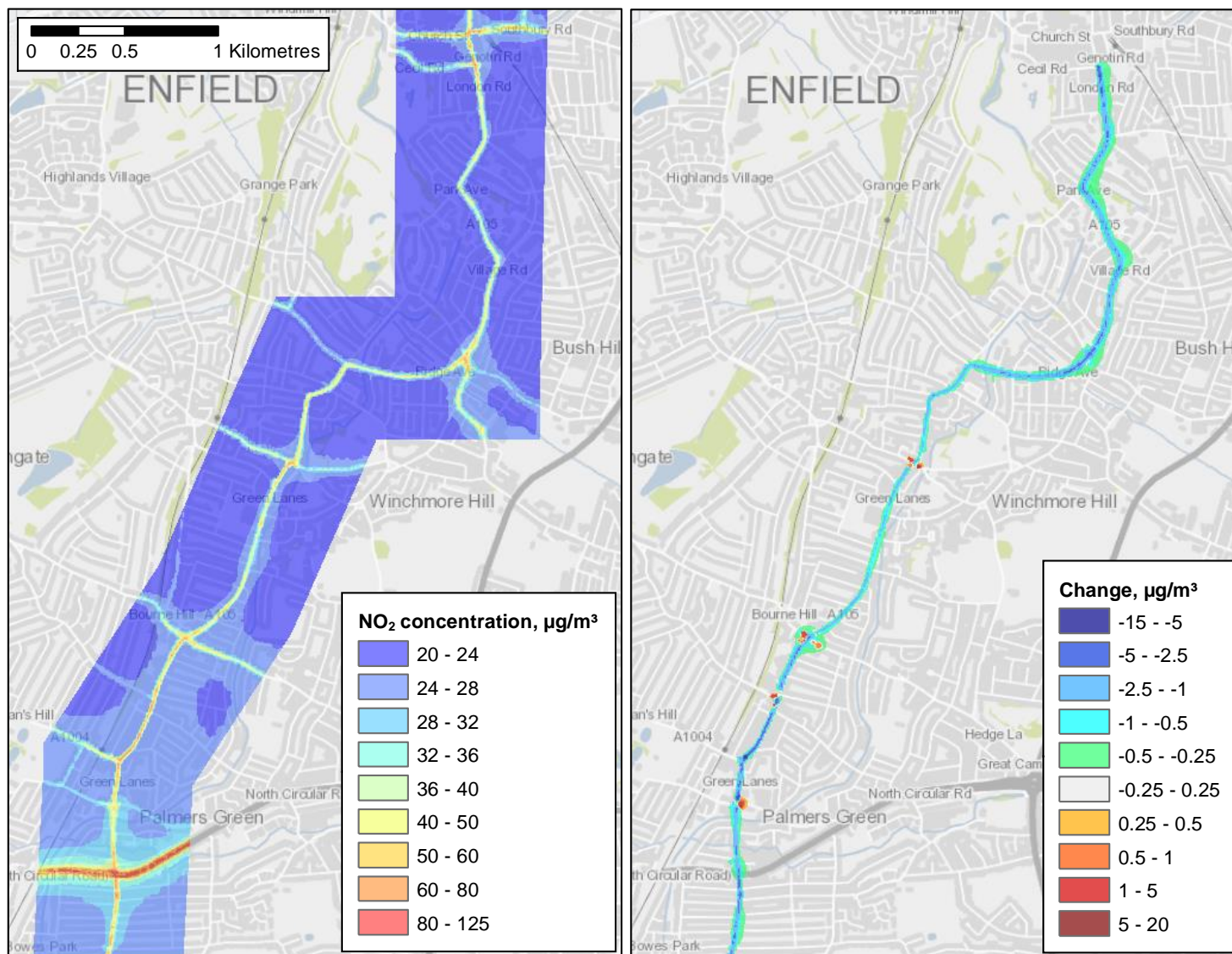 - Emissions from non-traffic sources from the London Atmospheric Emissions Inventory

CERC

Current situation

Annual average NO_2 concentrations

- Exceeds air quality standard of 40 µg/m³ along major roads

CERC

5% traffic reduction

NO₂ concentration, µg/m³
- 20 - 24
- 24 - 28
- 28 - 32
- 32 - 36
- 36 - 40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 125

Change, µg/m³
- -15 - -5
- -5 - -2.5
- -2.5 - -1
- -1 - -0.5
- -0.5 - -0.25
- -0.25 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 5
- 5 - 20

CERC

Air quality modelling for Cycle Enfield

10% traffic reduction

Air quality modelling for Cycle Enfield

Model results

- With 2.5% reduction in traffic:

  – Annual average NO_2 concentration predicted to decrease by 0.25 µg/m³ to 0.5 µg/m³ at roadside locations

- With 10% reduction in traffic:

  – Annual average NO_2 concentration predicted to decrease by up to 1.5 µg/m³ at roadside locations

- Some increases in concentrations at junctions where increased delays

- Smaller improvements in particulate concentrations

- Concentrations still predicted to exceed air quality standards, but will have beneficial impact on health of residents living along road

CERC