Air Quality Annual Status Report 2022

Update on year achievements and current levels

Major Achievements during reporting period

(July 2022 to June 2023)

July 2022 - Inauguration of Energy Super Hub

(42 new fast and ultra rapid charging points**)**

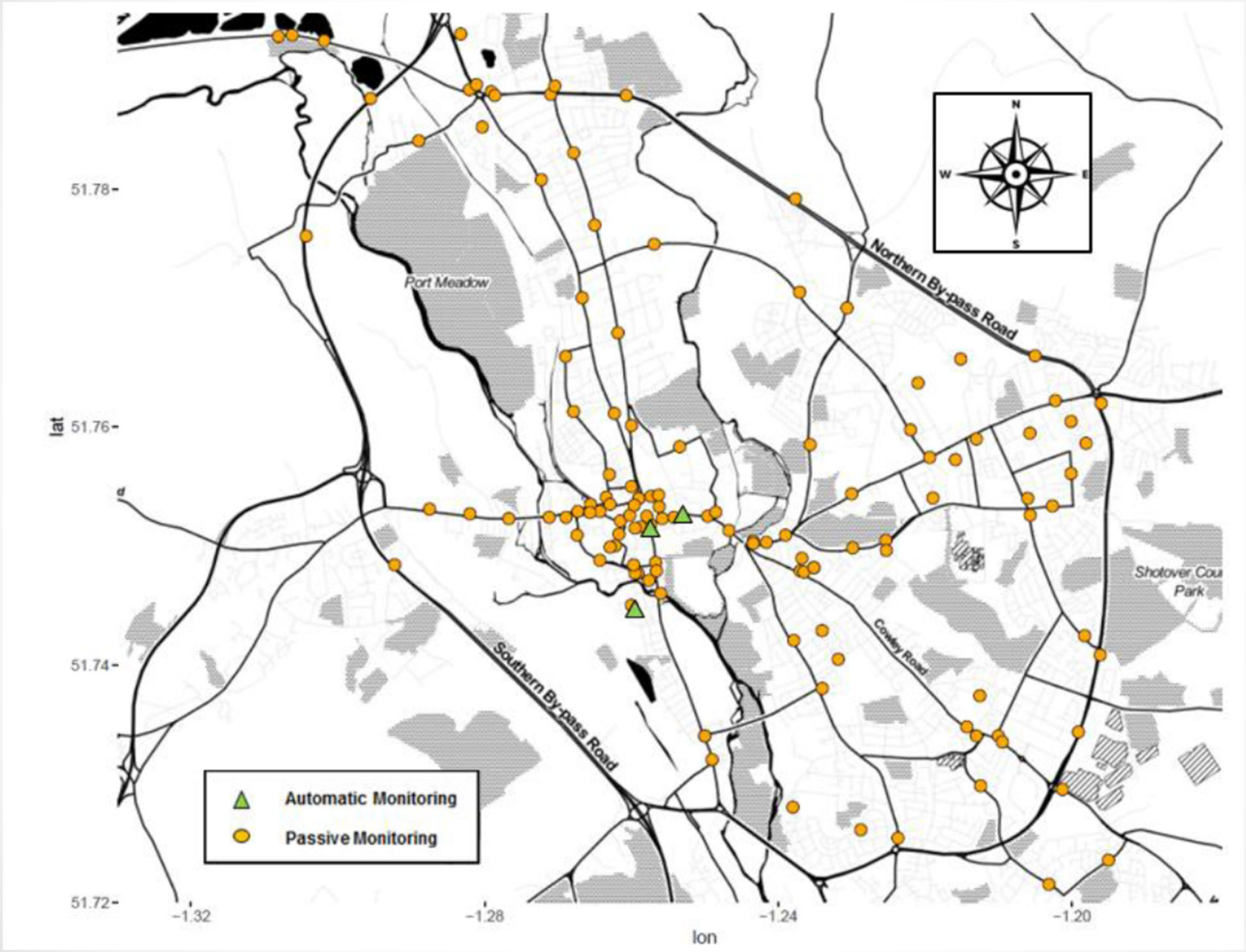
January 2023 - Deal signed to bring 159 electric buses to Oxford

(Project funded by ZEBRA scheme)**)**

March 2023 – 27% of OCCs fleet is fully electric

(commitment of having 25% of its fleet fully electric by the end of 2023 fully met)

Air Quality Monitoring Locations in 2022



- Measurements of NO_2 at **127** locations in the city

Nitrogen Dioxide

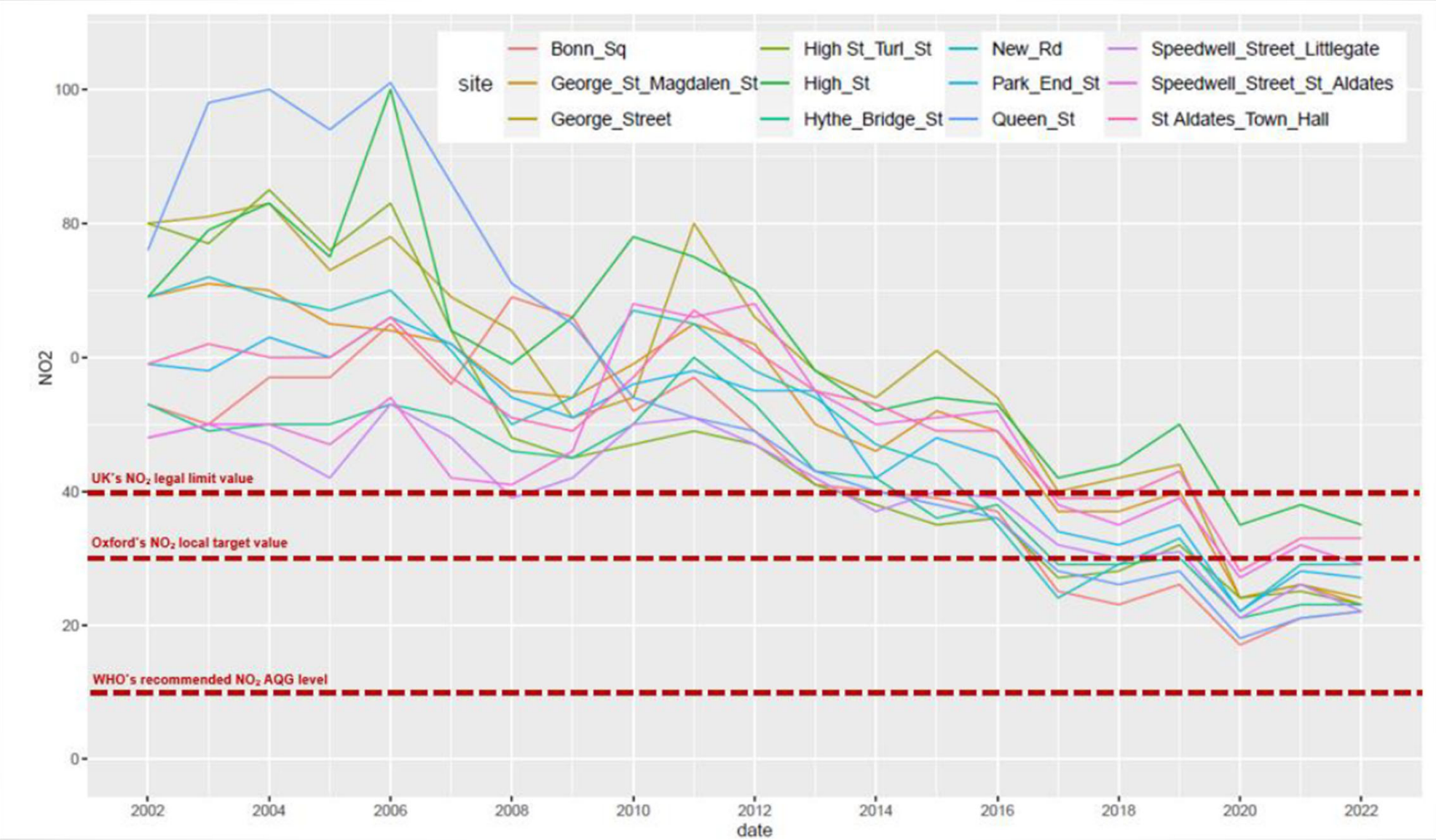
NO_2

Legal Target: Annual mean 40 ug/m3

Oxford's Local Target: Annual mean 30 ug/m3 (by 2025)

NO_2 – Air Quality Objectives: Annual Mean of 40 μgm^{-3}

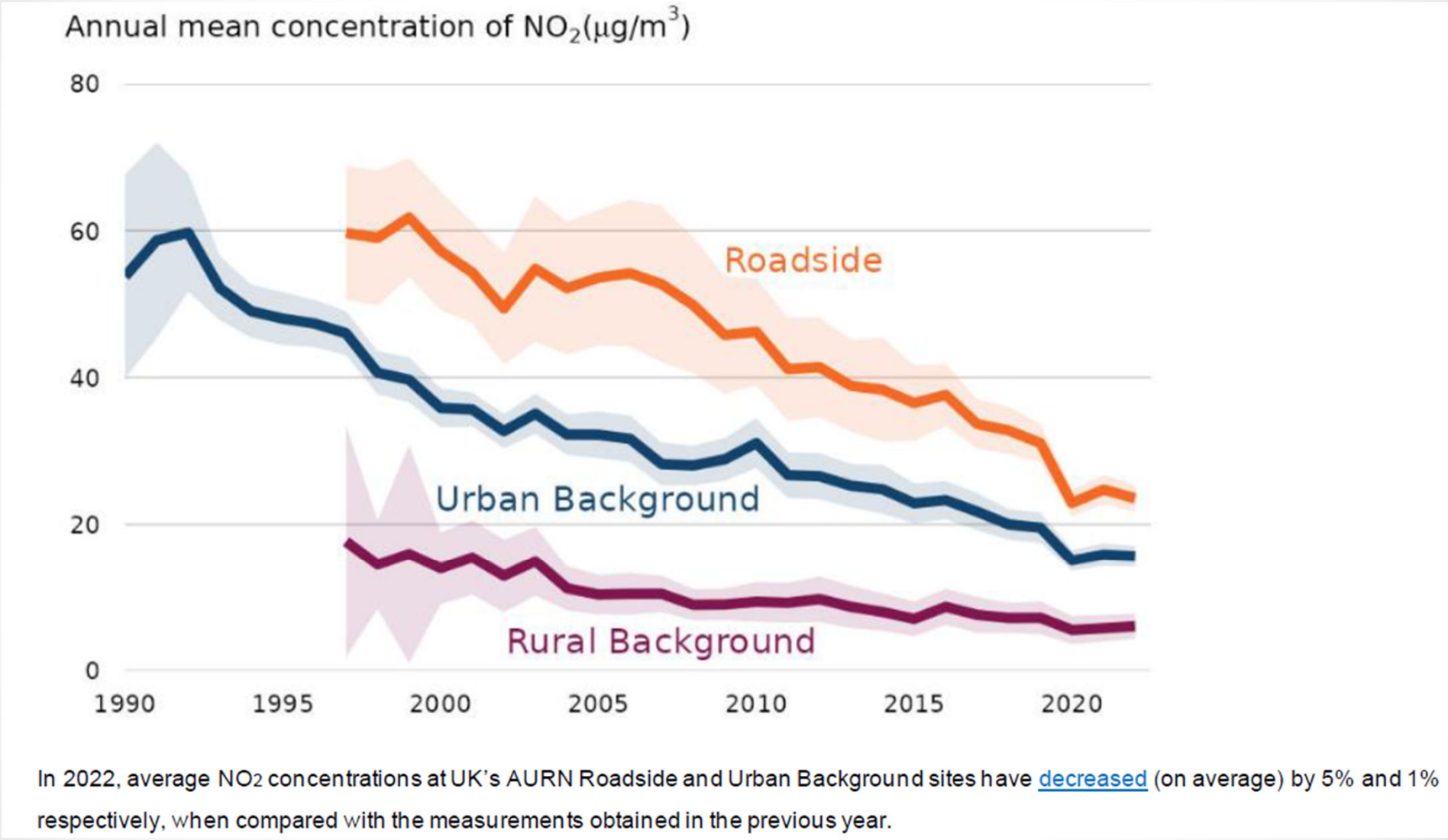
Long term trends of Annual Mean NO_2 at Oxford's historic diffusion tube sites, 2003-2022



Traffic levels and NO2 have decreased overall by 8% in Oxford when comparing with 2021

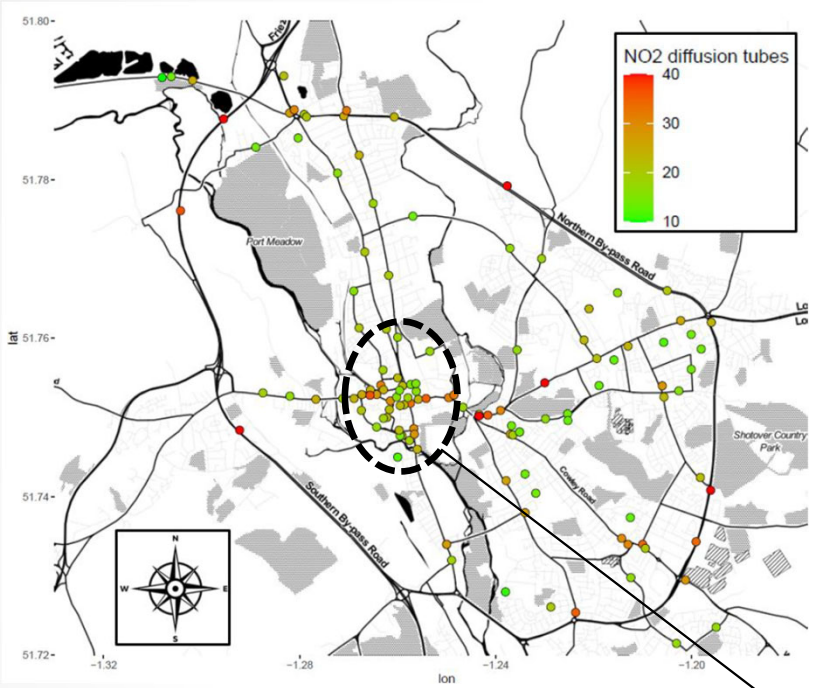
NO2 levels are still 24% below pre-pandemic times (2019)

NO2 – Annual Mean Concentrations in the UK (1990-2022)



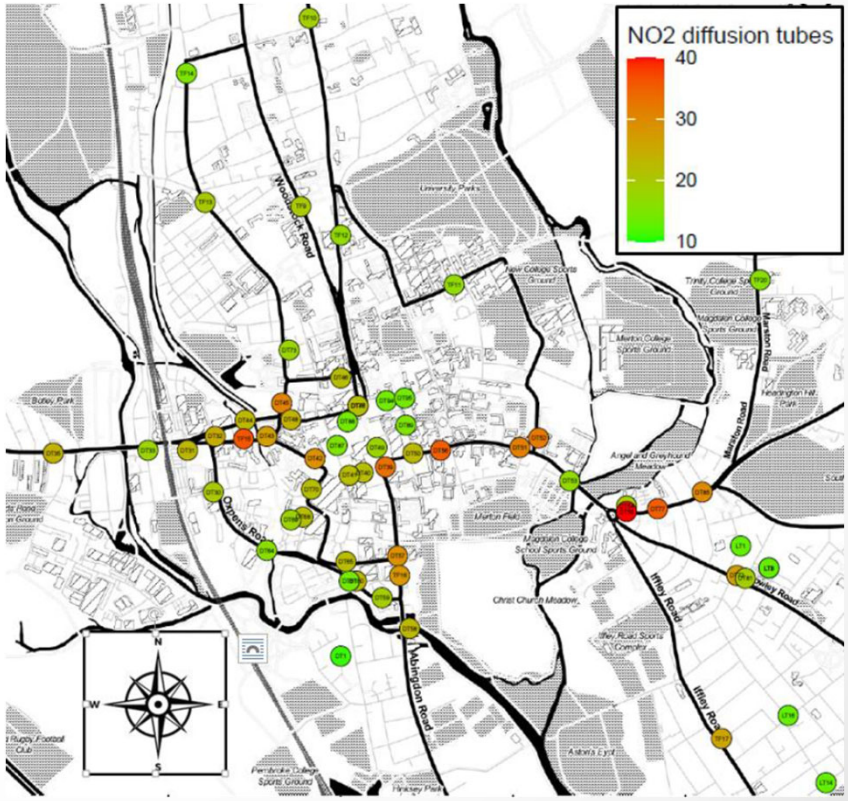
In 2022, average NO_2 concentrations at UK's AURN Roadside and Urban Background sites have decreased (on average) by 5% and 1% respectively, when compared with the measurements obtained in the previous year.

Diffusion tube results for Oxford in 2022



12 locations (out of the 127) are above local target for NO_2:

- Cutteslowe Round abound
- High Street (2x)
- St Clements (2x)
- Worcester St
- Oxford Road (cross with Newmans Road)
- St Aldates
- Long Wall St
- Hollow Way Rd
- Park End St
- Olivers Road (facing Eastern Bypass)



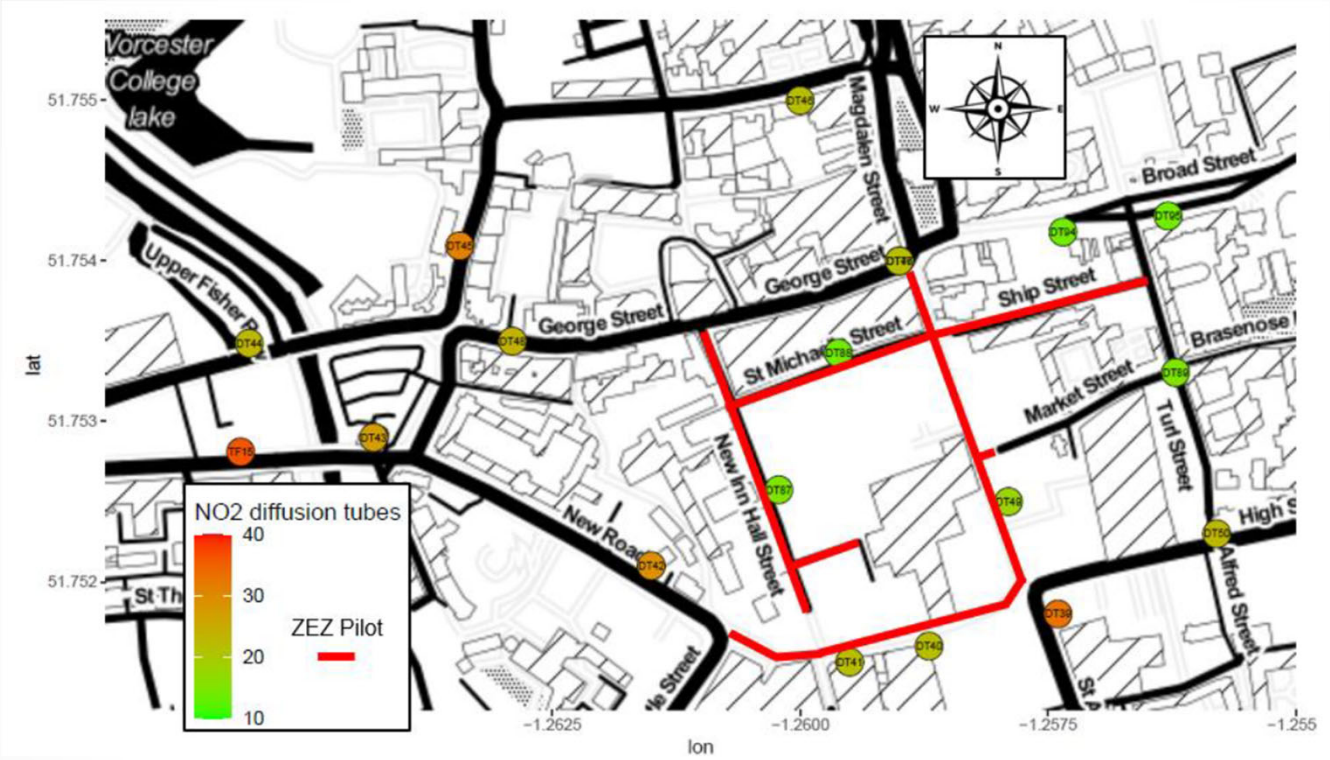
Exceedances to the UK limit value for NO_2 in Oxford in areas of relevant public exposure:

- St Clements – The Plain (43 ug/m3)

Other exceedances:

- Ring Road (2x) (42 and 43 ug/m3)
- Headington Hill (70 ug/m3)

ZEZ Pilot - Impacts



- Cornmarket St, St Michaels St and George St (Magdalen St side) , saw NO2 reductions of 3µg/m3, the equivalent to 14%, 18% and 12% reductions each;
- George St (Gloucester Green side) and New Inn Hall St saw improvements in NO2 levels measured at 2µg/m3 (8% and 12% reductions) each;
- NO2 levels at Queen St (DT40), Bonn Square (DT41) and New Road (DT42) were practically unchanged from 2021.

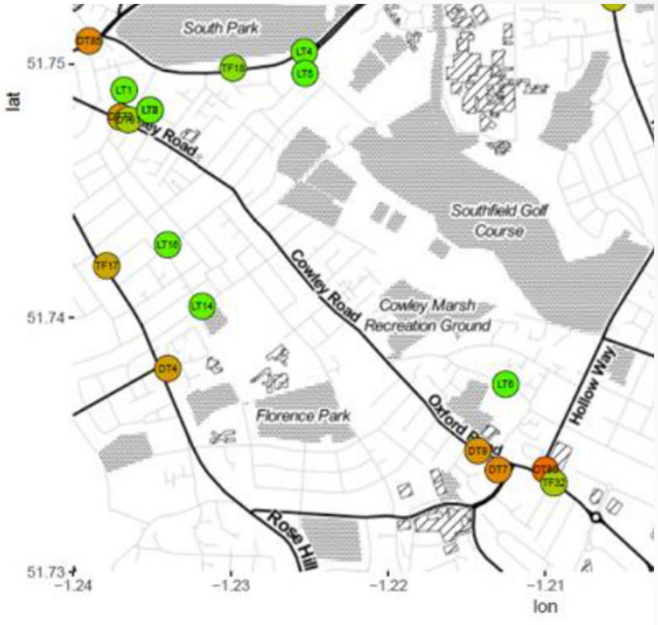
East Oxford LTNs - Impacts

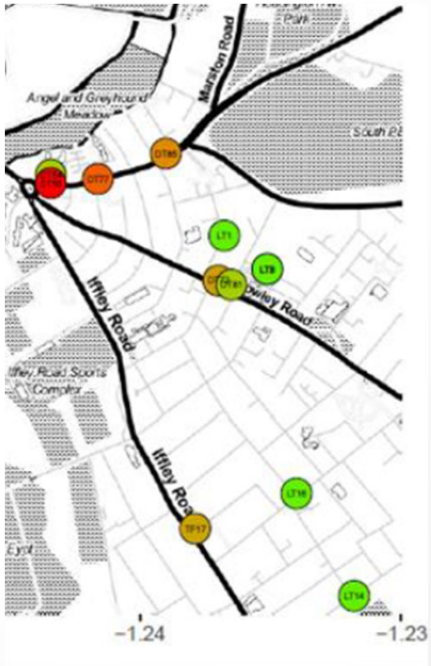
Inside LTNs

- **All the monitoring locations inside these LTNs showed a decrease in NO2**, with the greatest effects seen on Divinity Rd (6ug/m3 reduction or 33%) - 26 Prince Street (4 ug/m3 or 24%), St Marys neighbourhoods (Howard St. and Hurst St.) 3 ug/m3 19%;

On Boundary Roads

- **No perceptible negative traffic displacement impacts on Hollow Way Road and Oxford Road**, the three diffusion tubes in this area all consistently show practically no changes in the NO2 levels compared with 2021;
- **NO2 levels at Morrell Avenue reduced (by 3 µg/m3 or 19%)**, which seems to indicate that no significant LTN impacts have been seen on this boundary road as a result;
- **St Clements has seen consistent increases in the NO_2 levels measured** St Clements The plain saw an increase in NO2 of 4 µg/m3 equivalent to 10% and St Clements 2 saw an increase in NO2 of 5 µg/m3 equivalent to 17%. This seems to indicate that this street has seen impacts of LTNs, via traffic displacement;
- **Cowley Road (crossing with James Street) show the highest increase in NO2 levels measured (7 µg/m3 or 35%)** with an annual mean increasing from 20 to 27 µg/m3





Particulate Matter

PM_{10} and $PM_{2.5}$

Legal Target PM10: Annual mean 40 ug/m3

WHO Guidelines PM10: Annual mean 15 ug/m3

Legal Target PM2.5: Annual mean 10 ug/m3

WHO Guidelines PM2.5: Annual mean 5 ug/m3

PM_{10}

Clear downward trend since 2011 and slight increase in 2022 (up to 2ug/m3)

Oxford St Ebbes -12 ug/m3 annual mean
Oxford High Street – 16 ug/m3 annual mean

Full compliance with UK limit values + slightly above (by 1 ug/m3) WHO guidelines

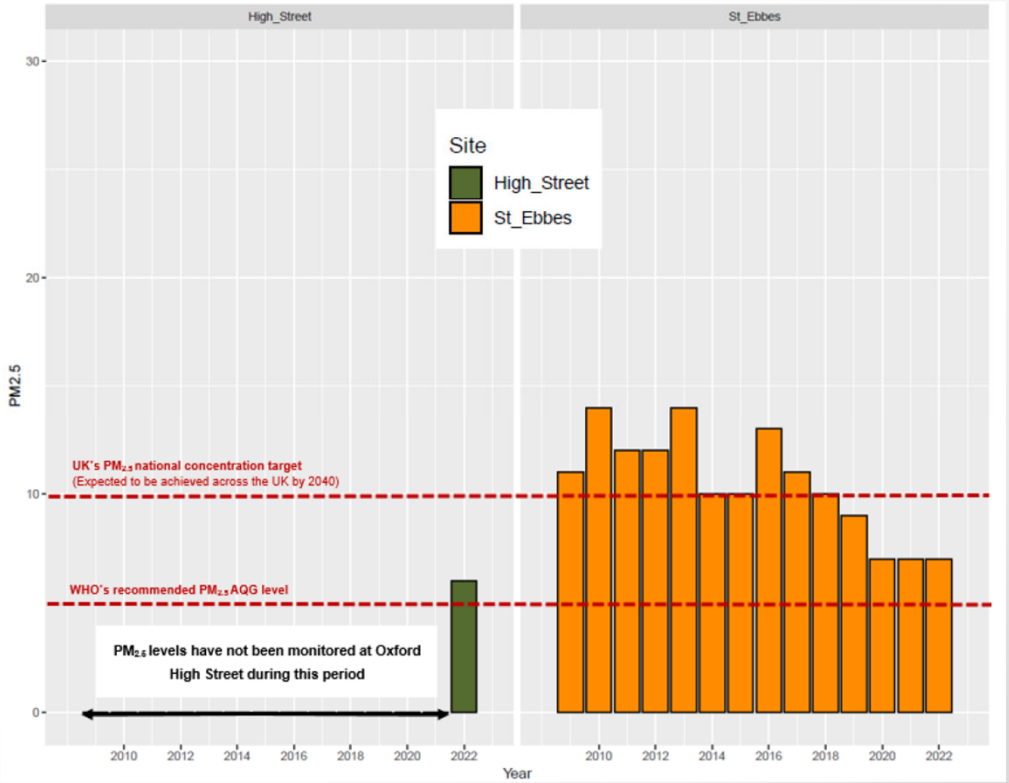
$PM_{2.5}$

Oxford St Ebbes -7 ug/m3 annual mean
Oxford High Street – 6 ug/m3 annual mean

Levels have plateaued at St Ebbes

Compliance with UK limit value

Slightly above (by 2 ug/m3) WHO guidelines



OX Air report – 9 recomendations

Low-cost sensor data should be used with caution for informative, educational and profile-raising applications because of the likely variability and uncertainty in raw sensor data - Oxford City Council is aware of the limitations of current low cost sensor technologies and therefore is only using these devices for educational purposes and citizen science – we do not officially report air quality data from these devices due to the limitations highlighted in this report.

Lobbyists and community groups should acknowledge the potential uncertainty in sensor data that that they commission compile and plan for handling of it - We try to inform community groups and members of the public of the high uncertainty levels of the raw data that comes out from these devices every time that the use of air quality sensor technologies is brought into discussion – a specific section of the new air quality website on air quality sensors is being developed so that members of the public have more direct access to information about these measurement techniques

The current state of the art in sensor low-cost sensor systems should only be used for LAQM applications with discretion and with traceable documentation attesting the handling uncertainty and / or absence of environmental effects in sensor signals e.g. use a model to correct for environmental interferences - The only air quality sensor projects that Oxford City Council i involved with relate with research grants being led by Oxford University to test these technologies. This guarantees that the results obtained are as accurate as they can ever be, as the air quality data is processed and adequately corrected by experts

Further research is needed to develop sophisticated correction models which can be used easily by all sensor users to handle the interfering effects of environmental parameters - This is a recommendation for the entire industry and for research institutions and Universities –Oxford City Council keeps engaging and with and participating in research projects with Birmingham and Oxford Universities on the testing of these technologies

Low-cost sensor performance should be regularly checked by co-locating with reference instrumentation at a heavily polluted environment such as a roadside / kerbside location e.g. before and after deployment (and at intervals in between, for long deployments) –This mandatory for every air quality sensor study that Oxford City Council is involved with

When purchasing new equipment it is recommended to arrange a returns / exchange policy with the vendor for sensors that can be demonstrated as having atypically behaviour(s) e.g. unsatisfactory signal noise, baseline offset for the intended application. Sensor vendors are encouraged (should) be open about interferences from environmental effects (temperature and relative humidity) and any testing that has been done in this regard for their products – These are recommendations for future users and vendors

To facilitate the benefits of active engagement on AQ policy and bi-directional flow of information on local AQ issues, a web-based resource for logging AQ issues on a web-map and creating open, traceable dialogue should be evaluated e.g. the OxAir Map of AQ Anecdotes – Useful recommendation and something to take on board for any future citizen science project involving residents and the use of air quality sensor technologies

Sensor users to keep a watching brief on new sensor developments from vendors on data processing, algorithms and models for the correction of environmental interference effects –This is a recommendation for current and future users

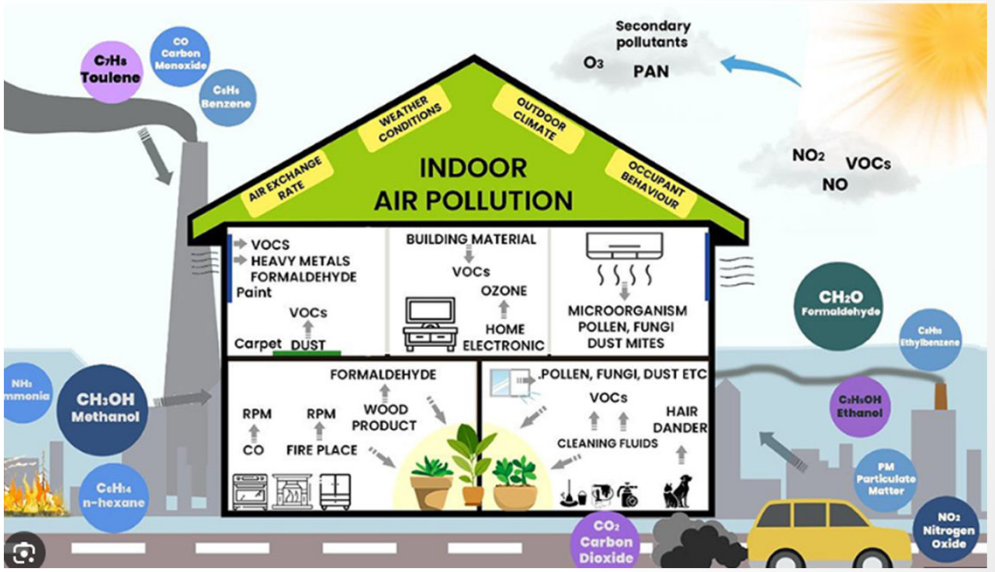
Indoor Air Pollution

- <u>Currently does not form part of the LAQM regime that local authorities have the statutory duty to follow</u>

- Our role as LA is therefore very much focused in providing advice to residents on means of reducing their exposure to poor indoor quality:

  - Do You Fuel Good? Wood burning campaign

  - Smoke Control Area Expansion



Questions