UNIVERSITY OF BIRMINGHAM | WM-AIR

Air Quality Assessment at University Hospitals Birmingham NHS Foundation Trust – a WM-Air Case Study

PROGRAMME TEAM

Suzanne Bartington

Owain Simpson

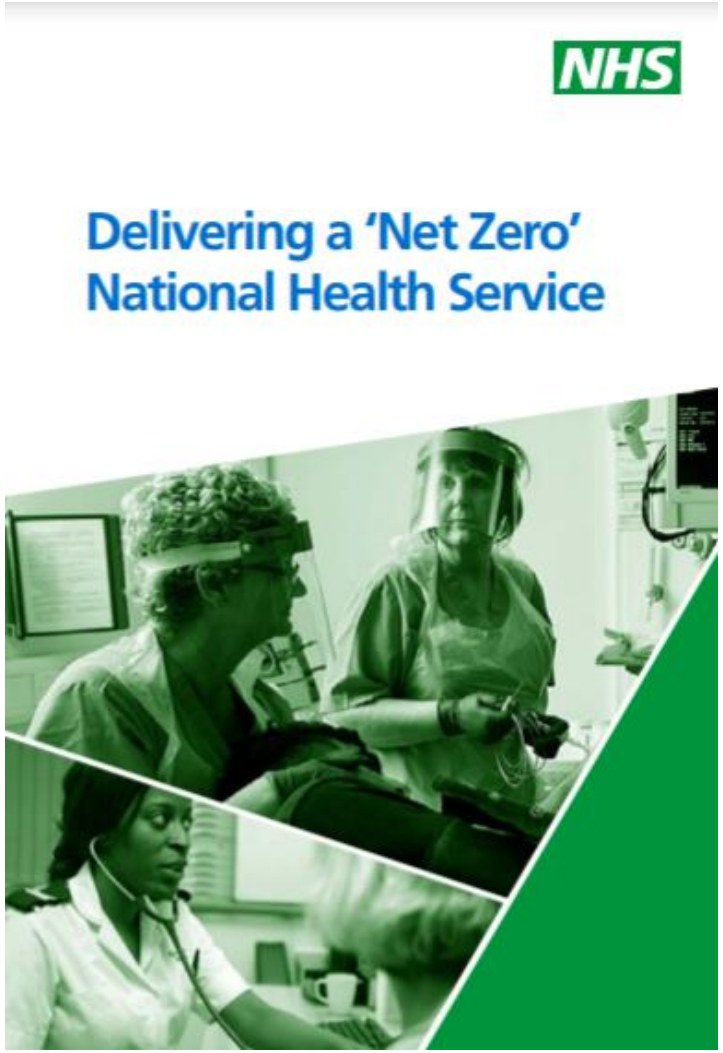
Cat Muller

Nicole Cowell

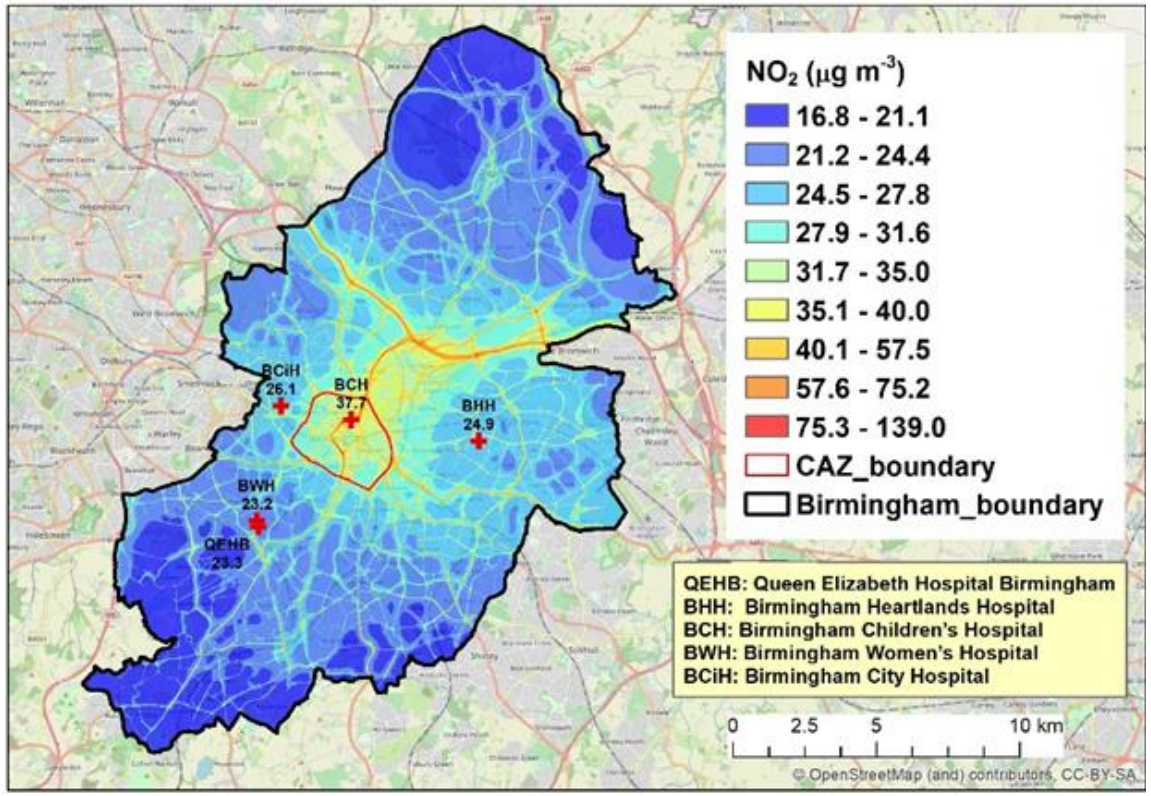
Daniel Rooney

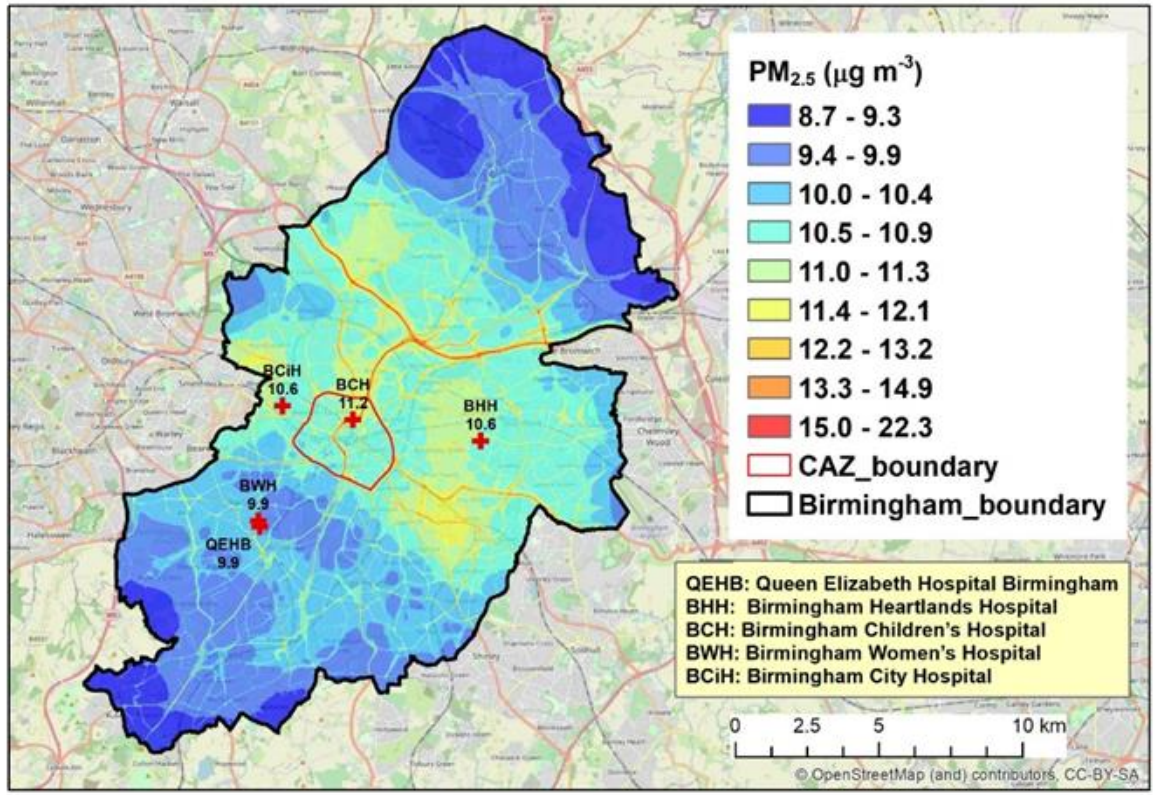
WM-AIR
CLEAN AIR SCIENCE FOR
THE WEST MIDLANDS

UHB NHSFT Case Study – Policy Context



Birmingham – NHS Acute Trust locations



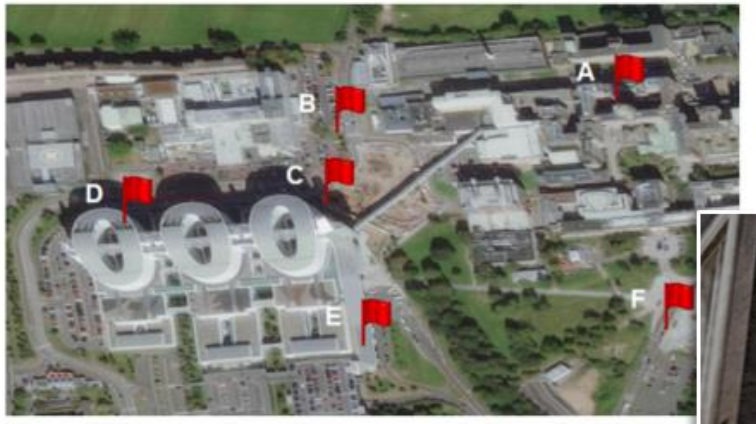


Air Quality Monitoring – Nitrogen Dioxide (NO_2)

- Pilot study at QEHB found high (>40 ug/m3) NO_2 concentrations (winter 2019)

- Triplicate NO_2 diffusion tubes deployed at QEHB and Heartlands Hospital sites

Queen Elizabeth Hospital

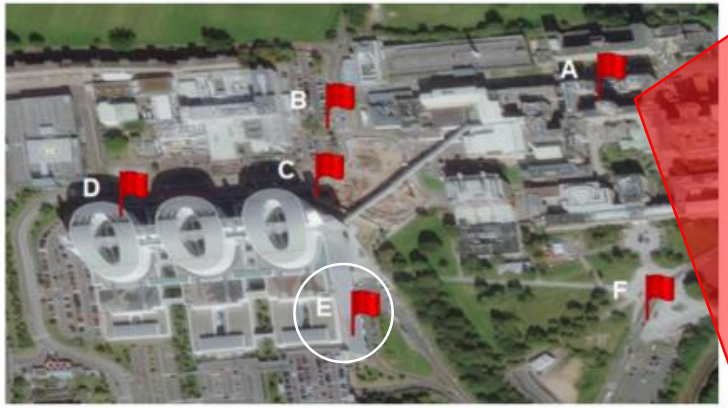


Heartlands Hospital

WM-Air NO_2 Monitoring at UHB Trust Sites

UNIVERSITY OF BIRMINGHAM | WM-AIR

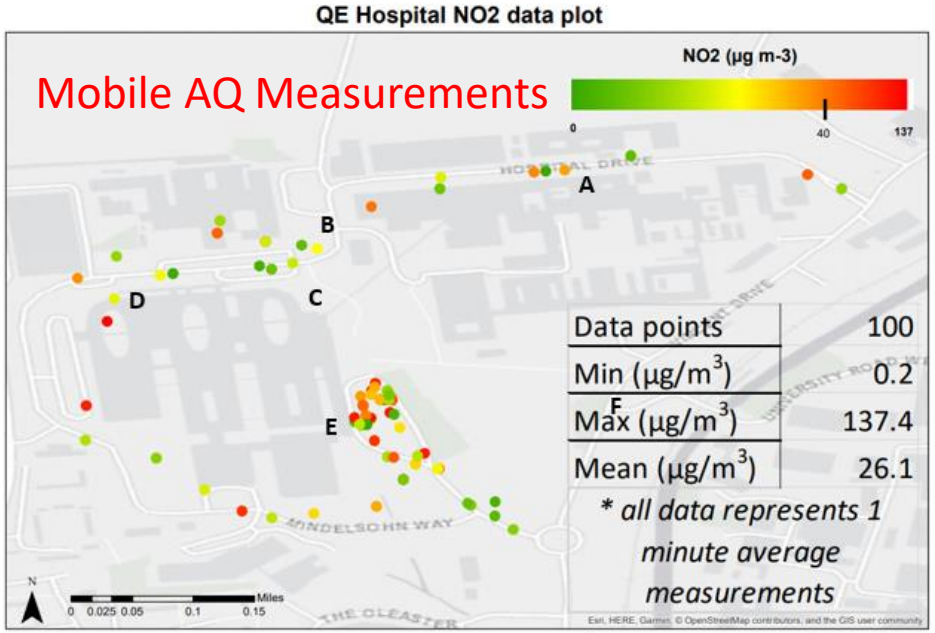
Queen Elizabeth Hospital



NO_2 Diffusion Tubes

Heartlands Hospital

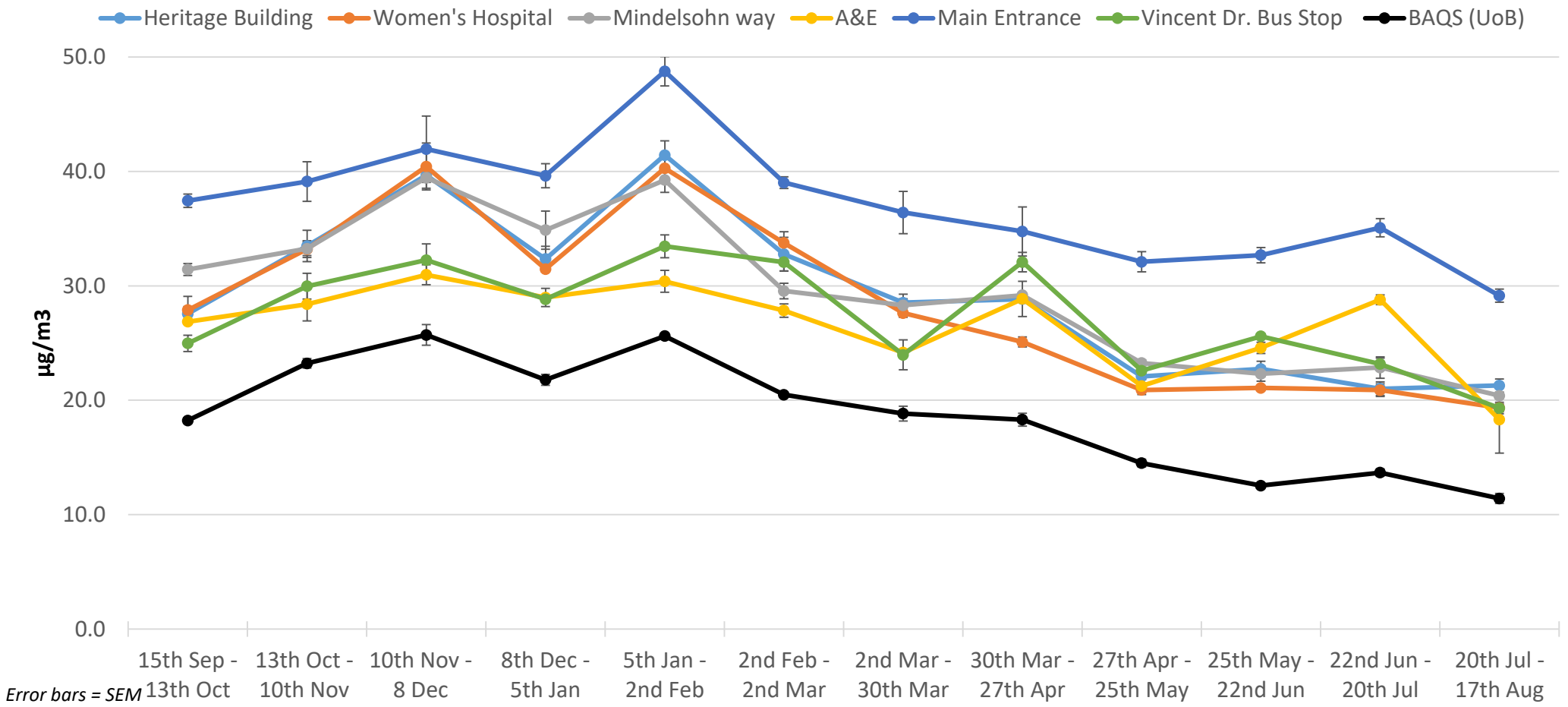
Mobile AQ Measurements



- NO_2 diffusion tube monitoring at QEHB and HH (Aug 2020 – Jan 2021); Mobile AQ measurements every fortnight at QEHB (2019-2020).
- High spatial variation in NO_2 concentrations recorded across the different sites
- NO_2 Hotspots:
  - **Main Entrance at QEHB:** average 39.5 µg m^{-3} - very busy location for hospital/private/public vehicles often idling when dropping off/collecting visitors;
  - **Gynaecology/near A&E at HH:** – average 40.5 µg m^{-3} - near the A&E entrance and close to ambulance and private vehicle drop-off areas.
- The interim NO_2 diffusion tube data suggests that they can be a reliable, low-cost, indicator to track month-on-month (4-week) changes in NO_2.

WM-AIR@CONTACTS.BHAM.AC.UK
@WMAIR_UOB
WM-AIR.ORG.UK

Queen Elizabeth Hospital – Annual NO_2 Trend

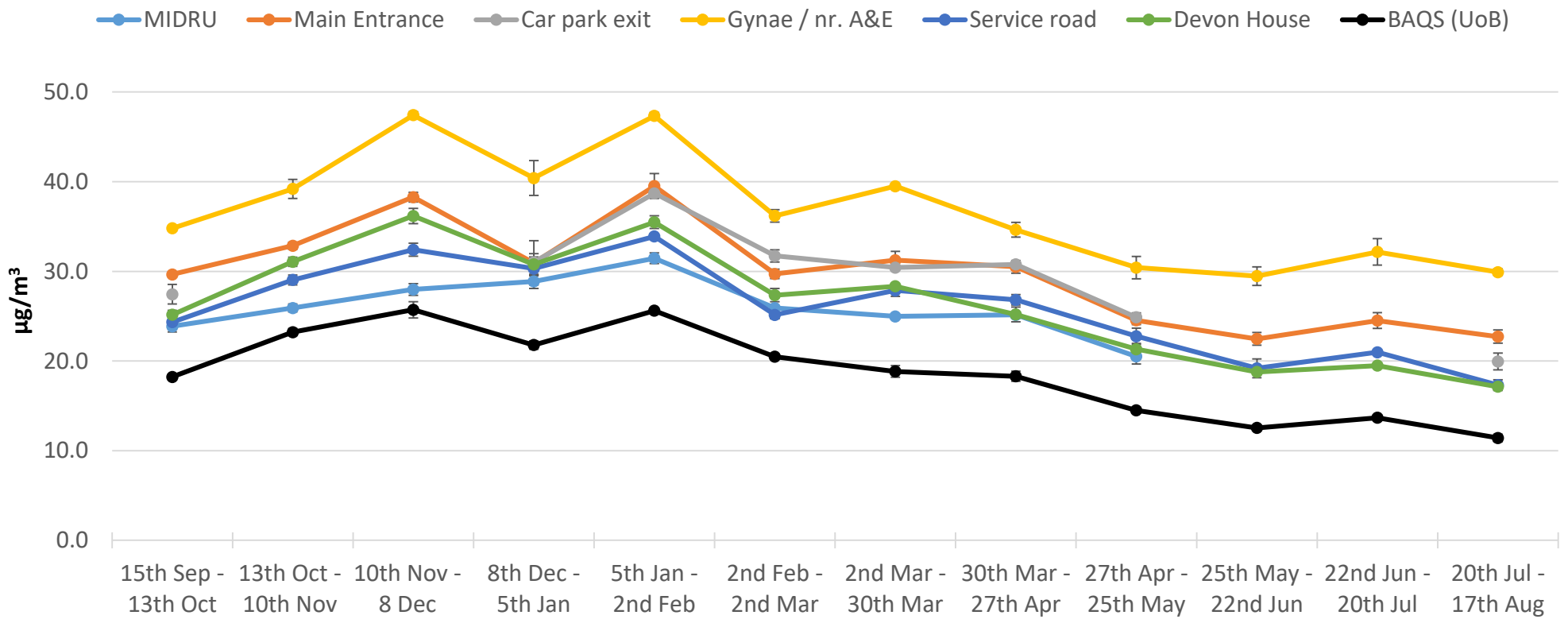


Error bars = SEM

*Main Entrance is statistically significantly **higher** than all other sites at P <0.01

*BAQS is statistically significantly **lower** than all other sites at P <0.01

Heartlands Hospital – Annual NO_2 Trend

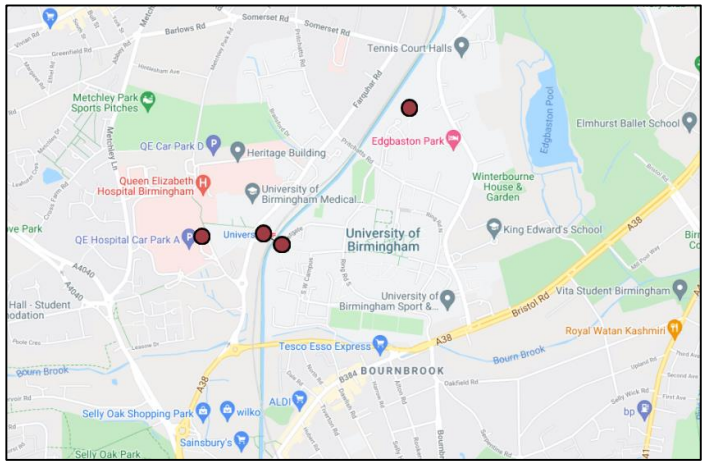


*Gynae/ nr. A&E is statistically significantly **higher** than all other sites at P <0.05

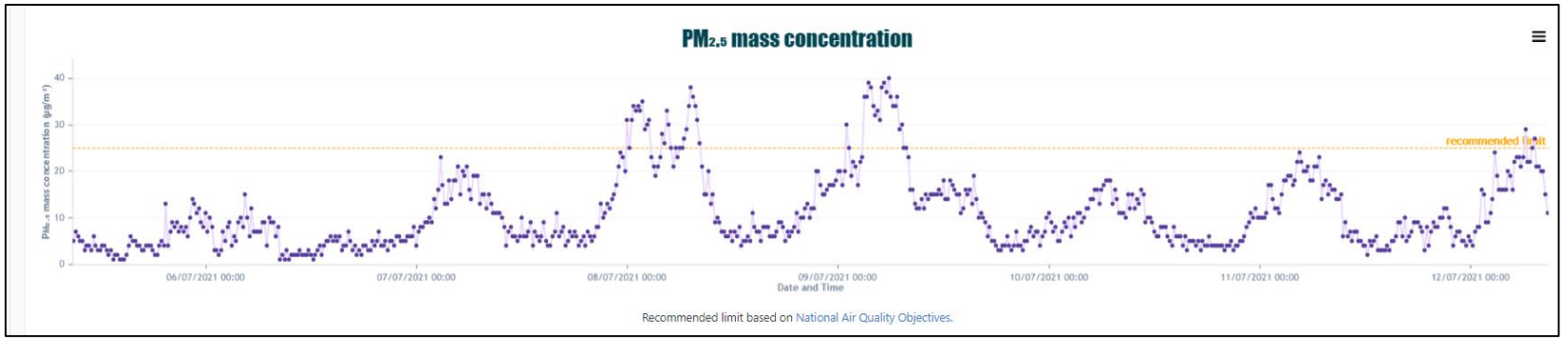
Error bars = SEM

WM-Air PM Monitoring at Acute Trust Sites

- Consistent evidence links Particulate Matter (PM) exposure with increased risk of adverse chronic and acute health outcomes (e.g., asthma, stroke Coronary Heart Disease, lung cancer)
- WM-Air (in collaboration with the Birmingham Urban Observatory) has deployed PM sensors at QEH (main entrance), University Station, Birmingham Children's Hospital and Birmingham Women's Hospital
- PM sensors may also be used to assess indoor air quality



PM sensor map (QEH & University Station)



Real-time PM2.5 concentrations at QRH Main Entrance (5-12 July 2021)

WM-AIR@CONTACTS.BHAM.AC.UK
@WMAIR_UOB
WM-AIR.ORG.UK

Identifying and Evaluating Air Quality Actions at the Queen Elizabeth Hospital, Birmingham (Owain Simpson)

Aim: To provide University Hospitals Birmingham NHSFT with a well-evidenced and prioritised set of clean air actions

- Reduce UHB NHSFT operational contributions to air pollution
- Protect patients, staff and local communities from air pollution exposure

Supervisors:

Dr Mark Elliot *(WMG)*, **Dr Suzanne Bartington** *(WMAir)* **and Phillippa Hentsch** *(UHB)*

WM-AIR@CONTACTS.BHAM.AC.UK
@WMAIR_UOB
WM-AIR.ORG.UK

Clean Air Hospital Framework Evaluation - Key Findings

- **Changing behaviours and organisational structures** should be the immediate focus

- **Significant barriers** to estate related changes are **cost and the third party provider.**

- Actions targeting **energy production and capital investment are likely to reduce carbon usage** with potential co-benefits for air quality.

- Resourced time is necessary for **implementing the actions recommended**, with **specialised roles in focus areas**

- The prioritised set of actions **should be reviewed on a regular basis**

WM-AIR@CONTACTS.BHAM.AC.UK
@WMAIR_UOB
WM-AIR.ORG.UK

WM-Air and UHB NHSFT – Next Steps

- Analysis of PM datasets (e.g., weather correction)
- Air quality modelling for specified scenarios
- Integration of air quality and site activity data
- Evaluation of Clean Air Hospital Framework actions
- Assessment of climate/clean air co-benefits
- Sharing of air quality monitoring protocols and best practice

WM-AIR@CONTACTS.BHAM.AC.UK
@WMAIR_UOB
WM-AIR.ORG.UK