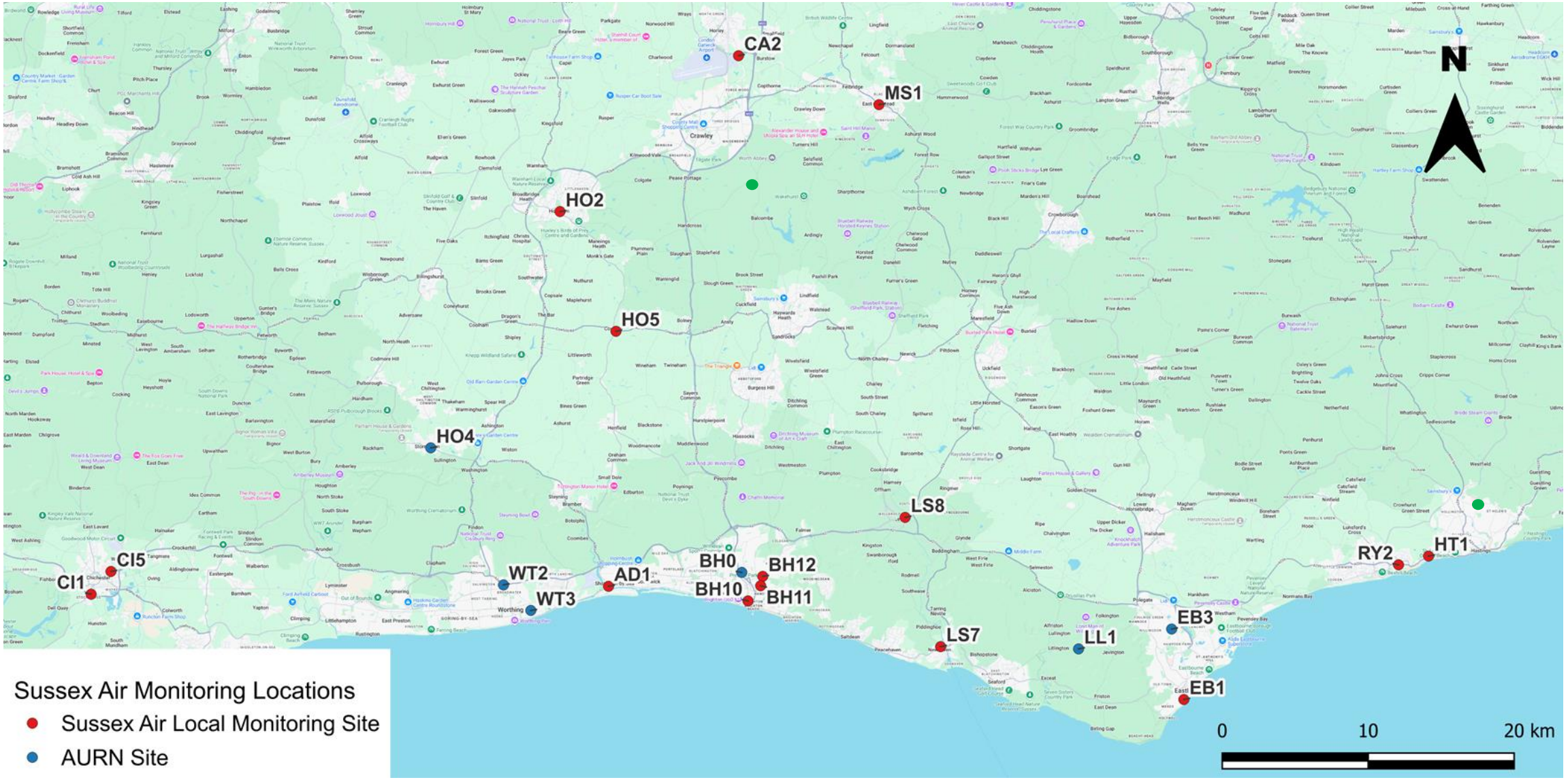
Sussex Air Quality Conference 2025

Air Quality Monitoring in Sussex

Dr Richard Maggs – Bureau Veritas UK

The Sussex Air Quality Network



The Sussex Air Quality Network : Data management

Data management system:

- 2.733 million data points per annum are collected, analysed and disseminated on to the Sussex-air website each year.
- Data is processed and sent onto www.sussex-air.net within 20mins of collection each hour.
- The network data management follows the principles of the national network.
- Annual review of all data is undertaken at year end.

Airviro:
collects data, checks are made daily. Issues and call-out logs record erroneous data or analyser/site issues (power) and ESU/ LSO activities

Stored data:
Airviro scales data (ppb) and stores data as ppb (scaled), calculates NO2 (NOx – NO in ppb) and PM data as µg/m-3 (raw)

Data transfers:
15min data is transferred to Sussex-air using ftp.

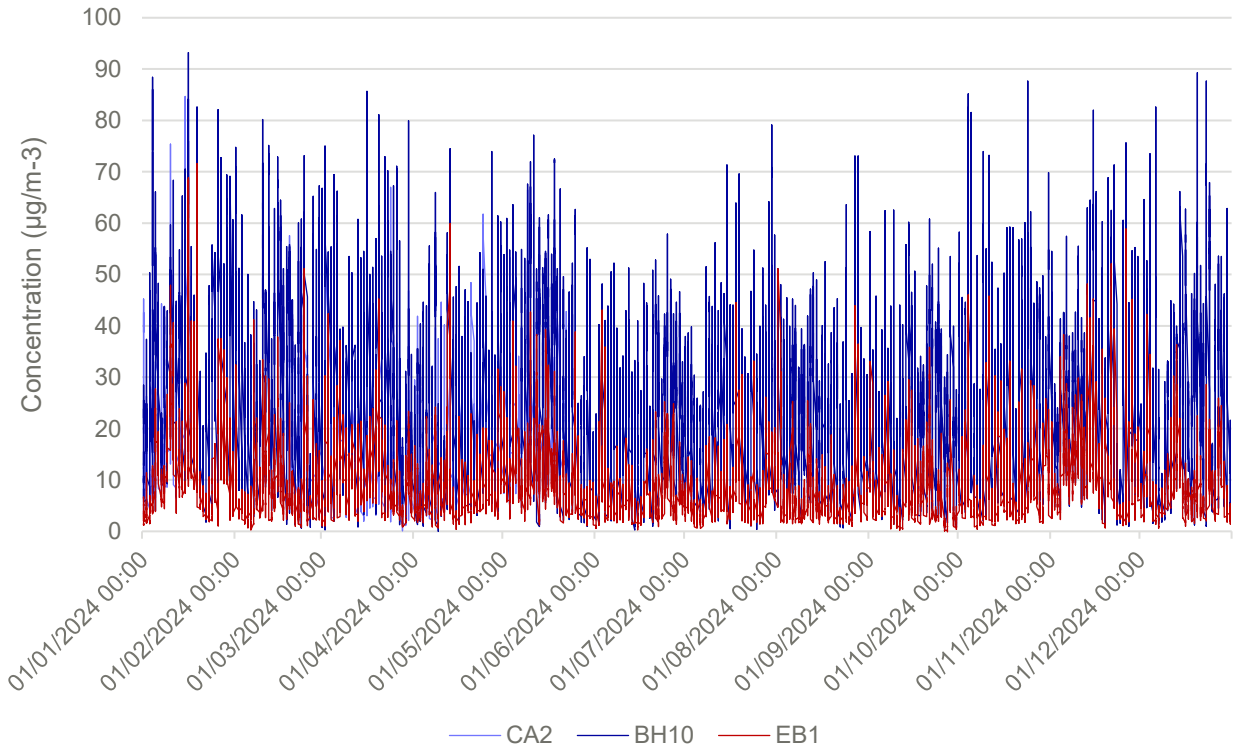
Sussex-air data checks
Data received is logged and id, receipt time and date, then identified by site name, date time, parameter, flag.

Sussex-air website
All data is then available and flagged as "p" provisional data until validation process is complete and flagged "v" for valid

The Sussex Air Quality Network: 2024 Headlines

2024 Compliance with UK Air Quality Objectives

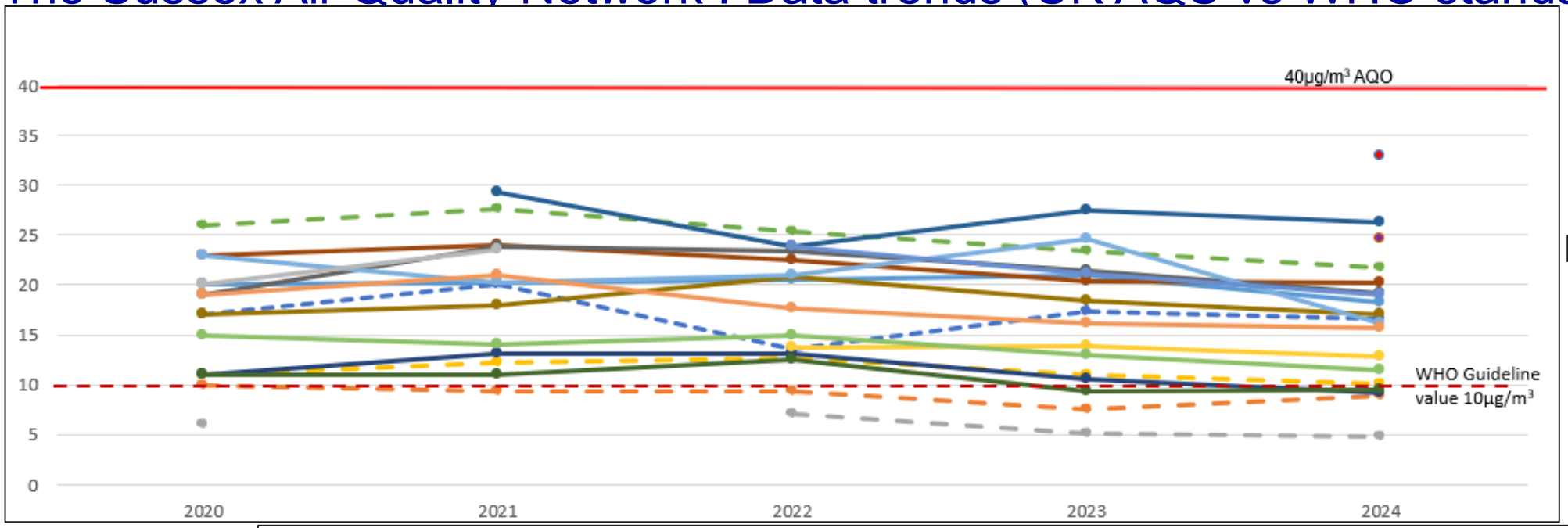
- No exceedances of long-term or short-term Air Quality Objectives for nitrogen dioxide (NO_2), particulate matter (PM_{10}), or sulphur dioxide (SO_2).
- All sites were below the annual mean targets for $PM_{2.5}$, meeting both the 2028 interim target (12 µg/m^3) and the 2040 final target (10 µg/m^3).



Air Quality Index and Health Implications

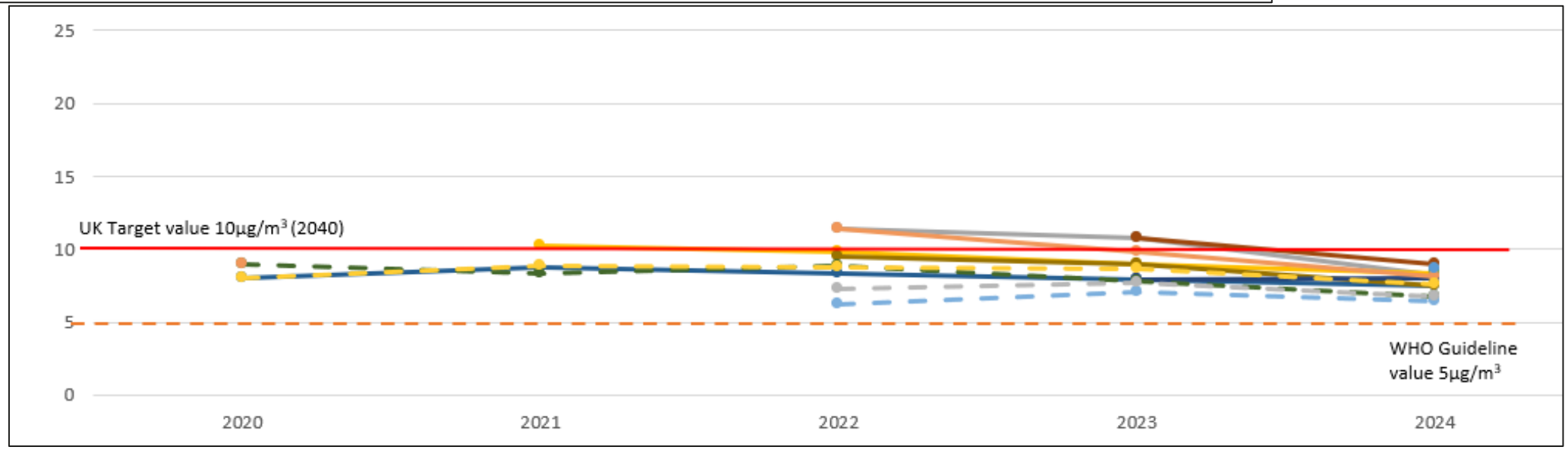
- 2024 was predominantly characterized by 'low' air pollution days.
- Only a few locations recorded 'moderate' pollution days. Ozone (O_3) was the dominant pollutant that caused up to 18 days ‘moderate’ air pollution during the year.

The Sussex Air Quality Network : Data trends (UK AQS vs WHO standards)

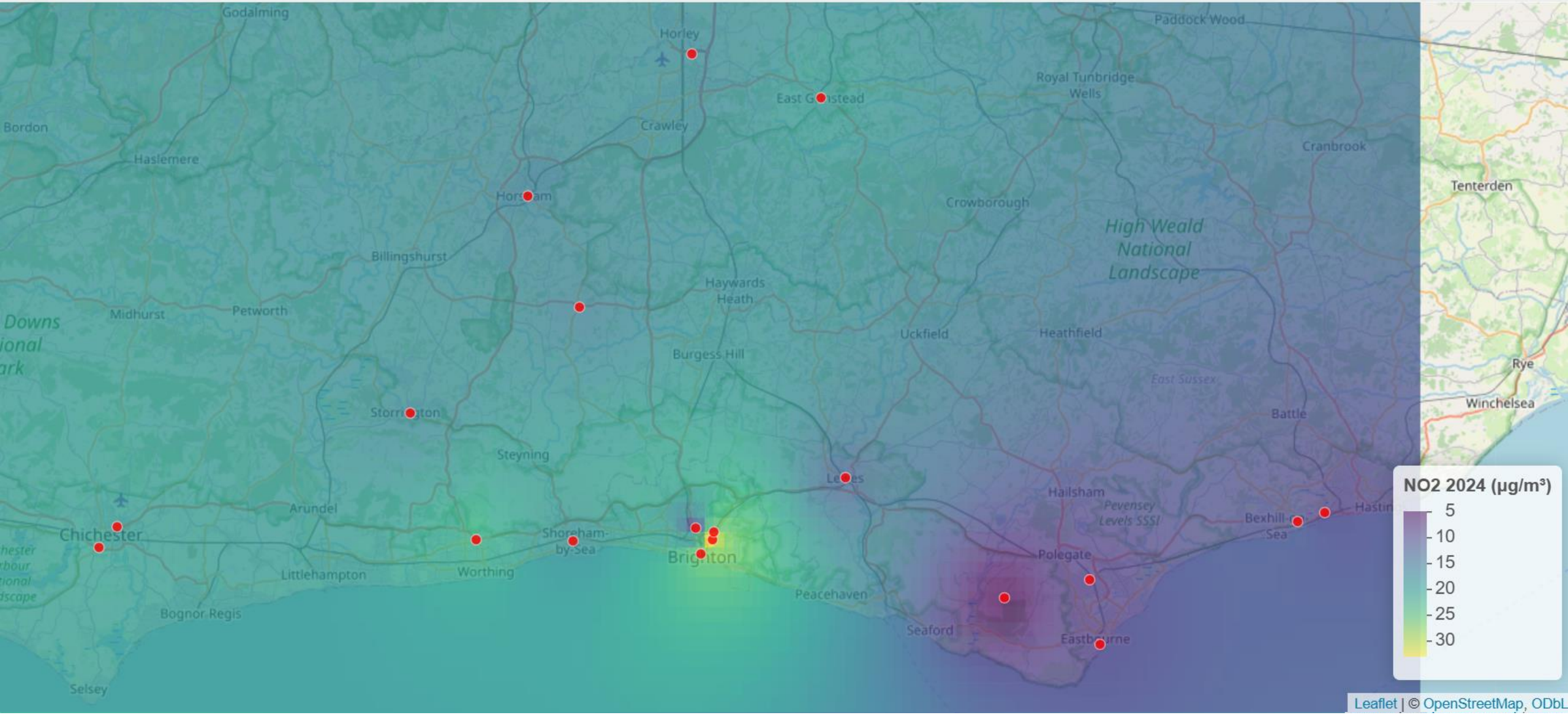


NO_2 trends

$PM_{2.5}$ trends



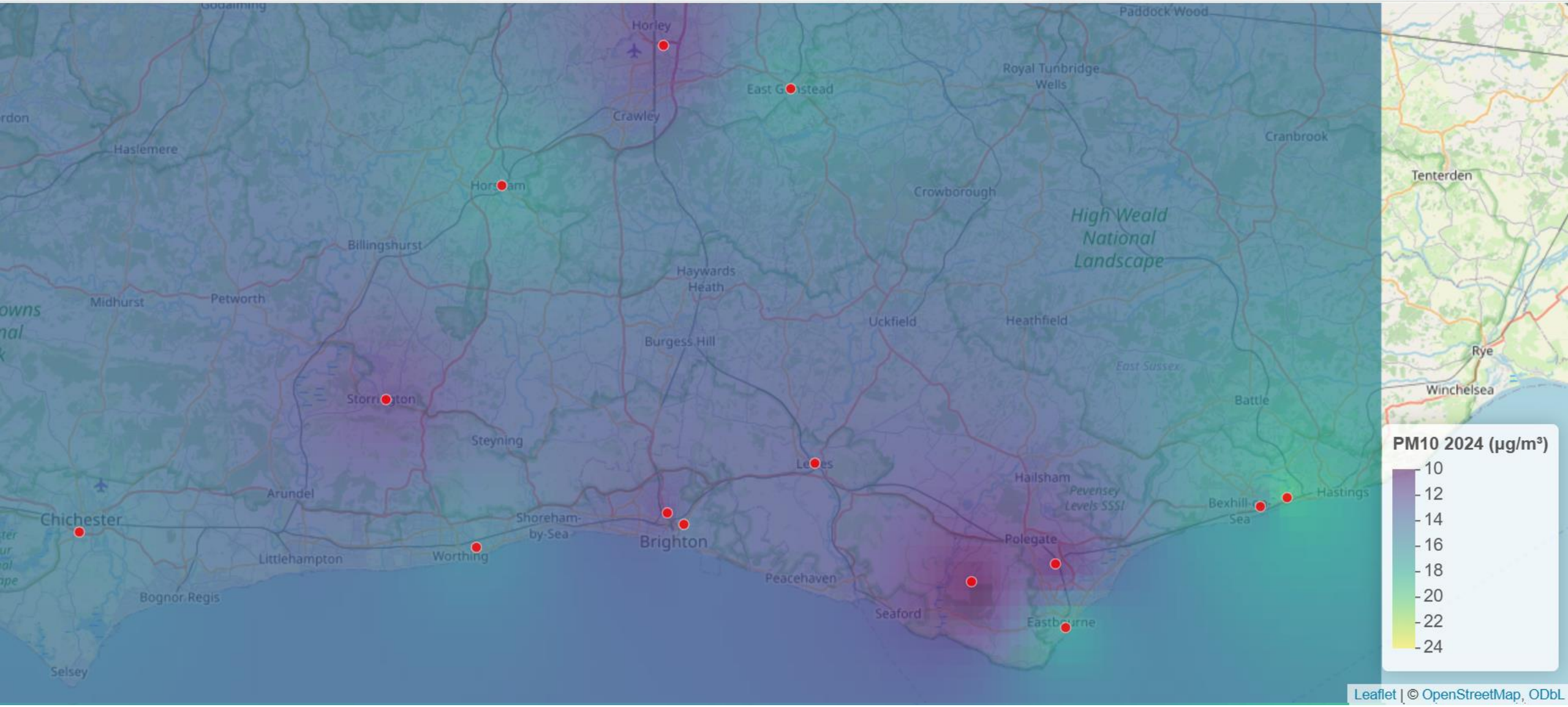
The Sussex Air Quality Network – NO_2 concentrations (2020- 2024)



NO_2 annual AQS = 40µg/m^3

WHO annual guideline value = 10µg/m^3

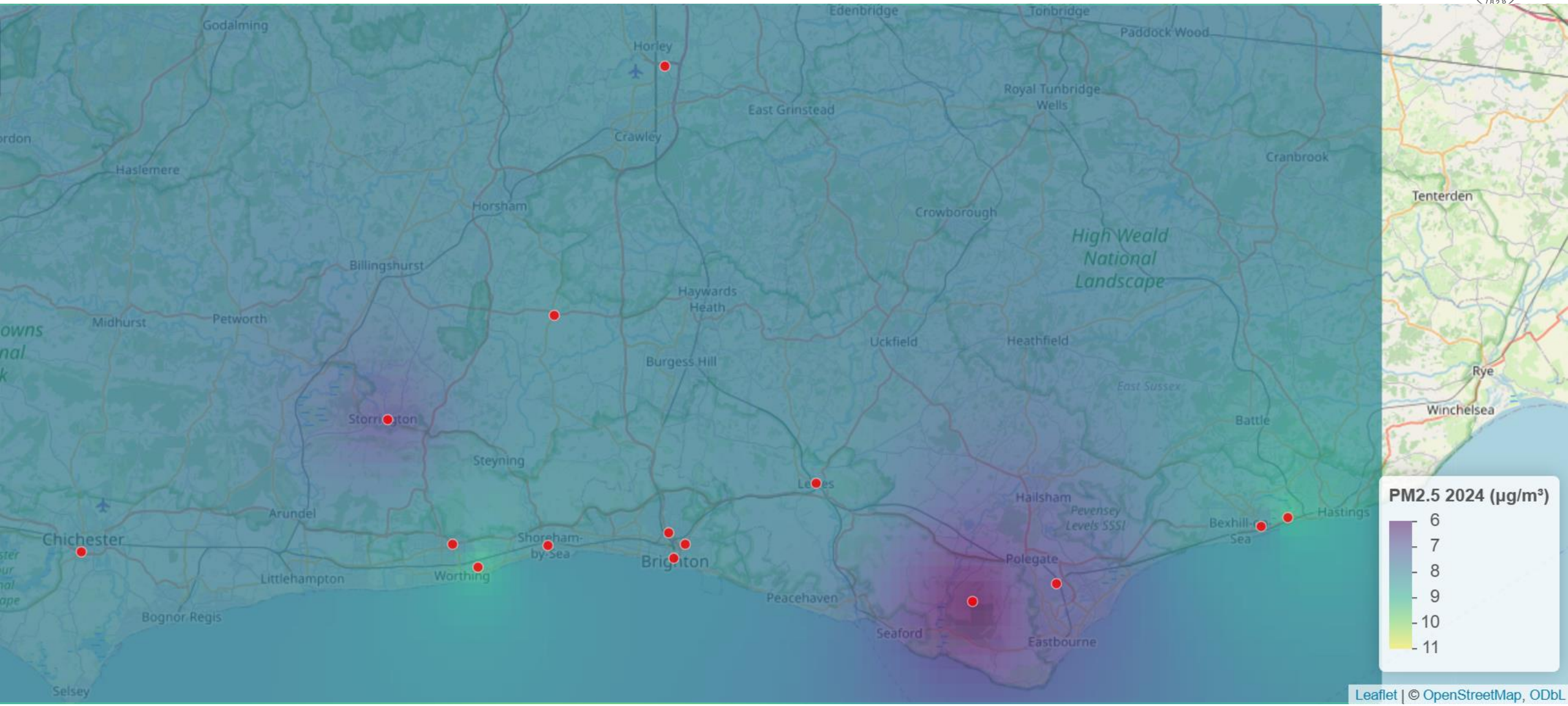
The Sussex Air Quality Network – PM_{10} concentrations (2020- 2024)



PM_{10} annual AQS = 40µg/m^3

WHO annual guideline value = 15µg/m^3

The Sussex Air Quality Network – $PM_{2.5}$ concentrations (2020- 2024)

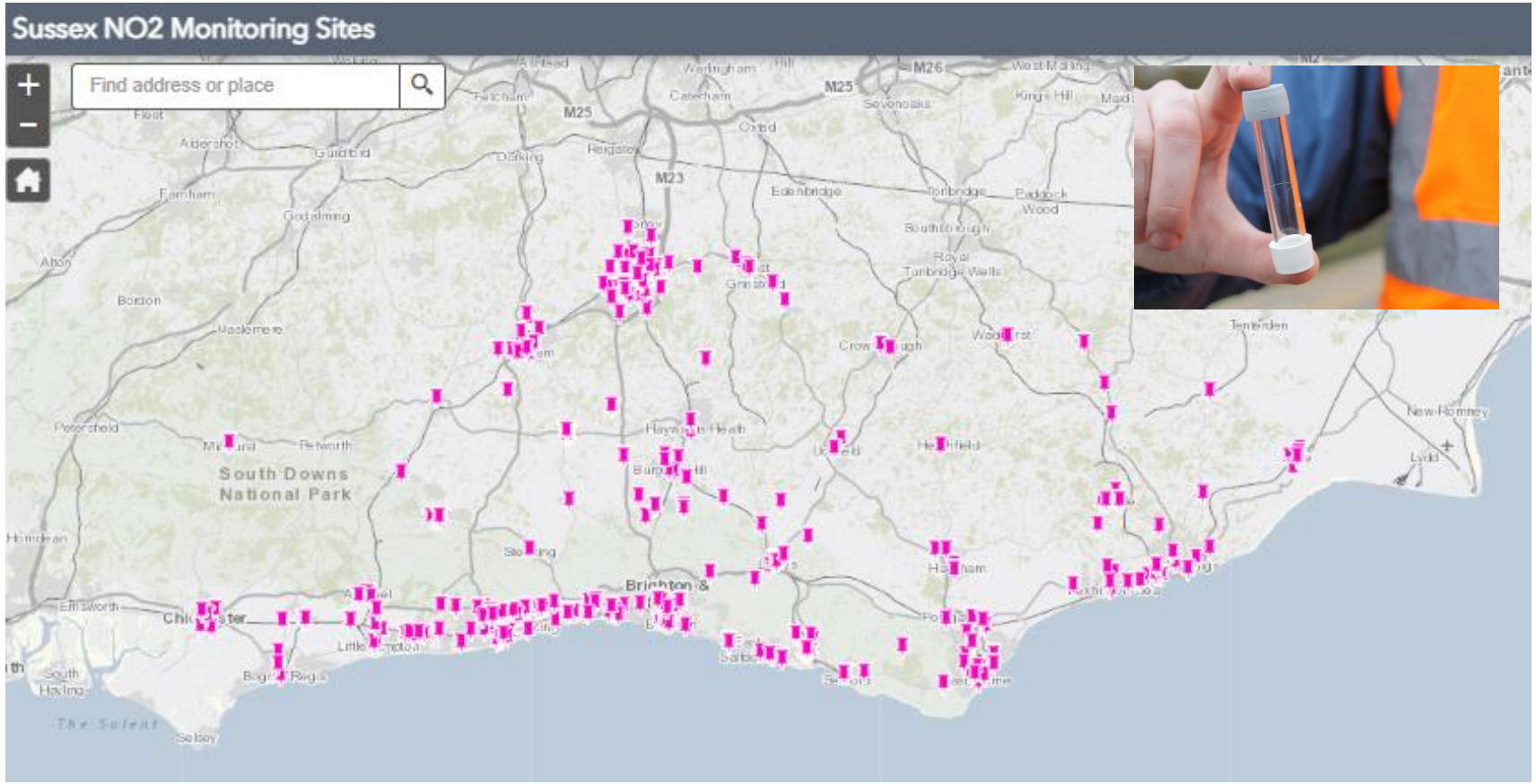


$PM_{2.5}$ Annual target value (2040) = 10µg/m^3 WHO annual guideline value = 5µg/m^3

The Sussex Air Quality Network: filling the gaps

Non-automatic monitoring across Sussex LA's

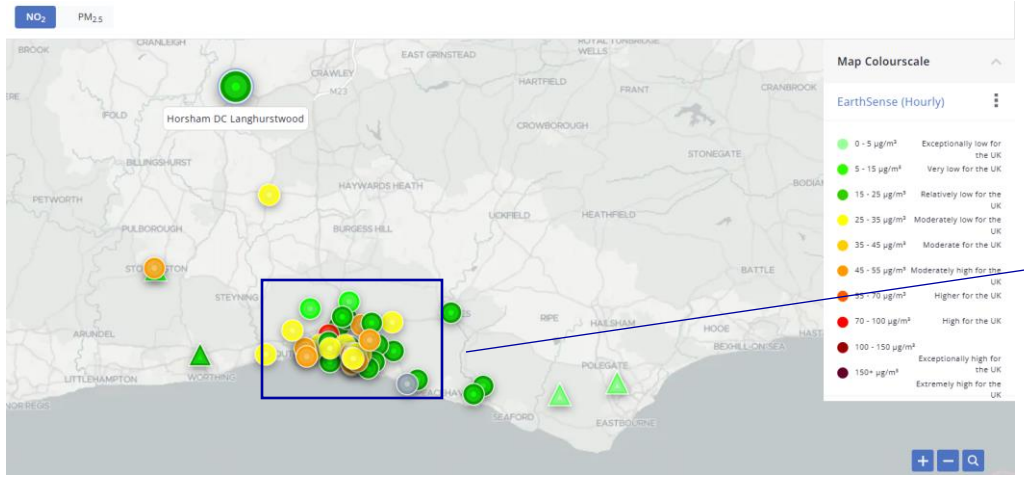
- Nitrogen dioxide (NO_2) diffusion tubes
- 448 locations across Sussex
- Manually installed and exchanged.
- Monthly and summary annual data results.
- Used in LAQM Annual Status Reports to identify locations of protentional exceedance.
- Used to monitor AQMAs and AQAP actions to improve air quality.
- Cheap and cost effective but limited to monthly results.

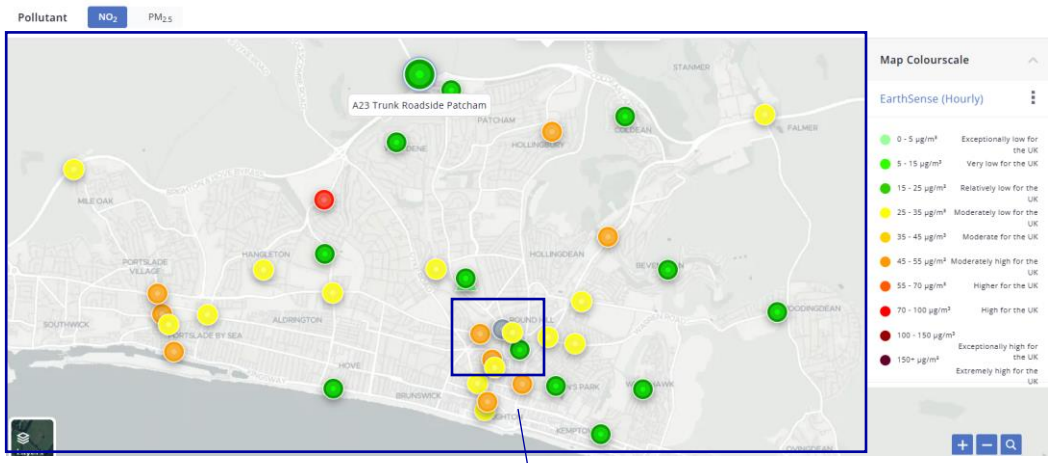


https://sussex-air.net/air-quality-near-me/no2-diffusion-tube-map/

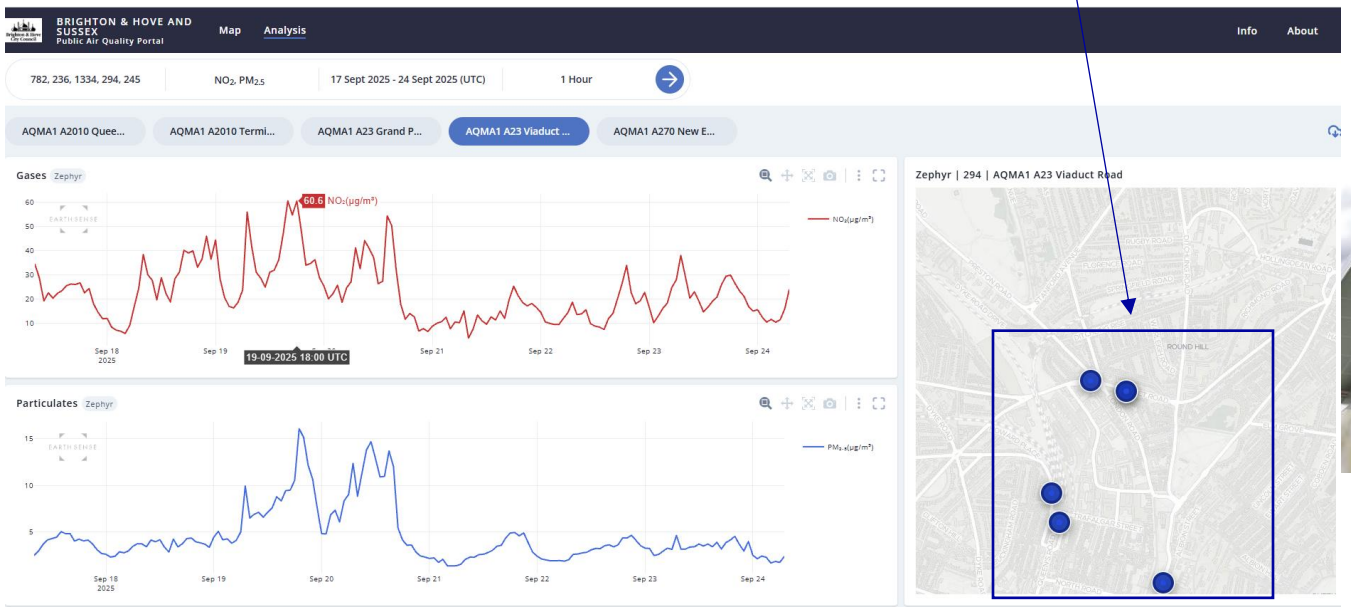
The Sussex Air Quality Network: filling the gaps

Sensor Systems across Sussex.





- 50 (indicative) sensors across Sussex, with 40 in Brighton & Hove
- Real-time sensors placed in a variety of locations to measure air quality in different environments
  - AQMAs, Industrial/ Construction, Schools, roadside, background, suburban
- Funded by Defra air quality grant and the council's Carbon Neutral Fund.



https://portal.earthsense.co.uk/BrightonHoveandSussexPublic/analysis

AI in Air Quality

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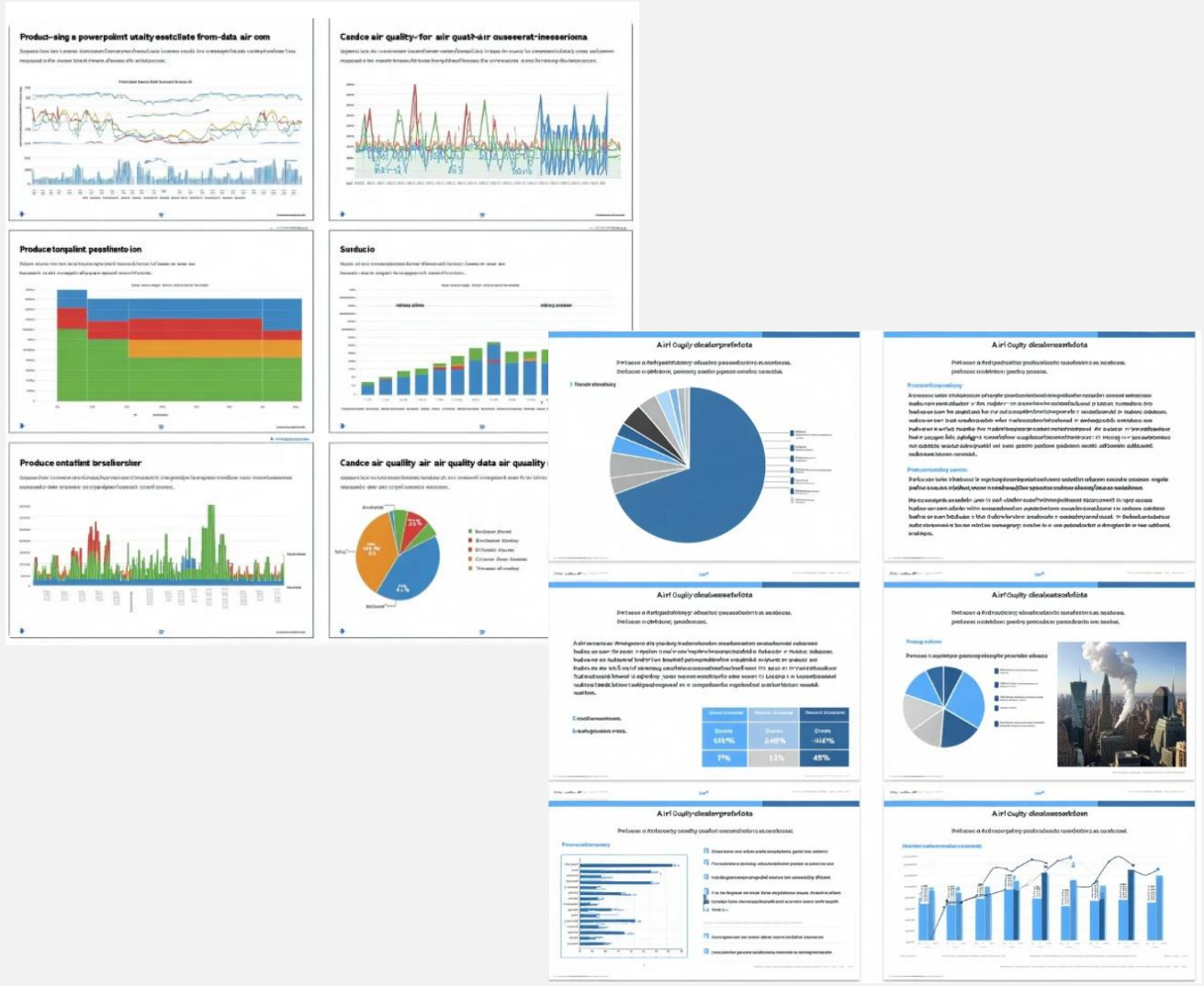
Produce a 5 page powerpoint presentation using air quality data from www.sussex-air.net



Data management:

- AI could be a powerful diagnostic tool for data management:
  - Fault detection and diagnosis
  - Data mining of large data sets (integrated national, local and hyper-local networks into one dataset)
  - Flags and alerts to instrument failures prior to exceeding formal diagnostic thresholds

Data analysis and visualisation:

- AI can produce various graphical version of data (maps, graphics, diagrams) for reporting and dissemination of information.
- Trend analysis

Simple queries can produce a variety of outputs, so these need to be very concise. The analysis of the information still needs to have expert understanding before releasing into the public domain.

Requires human input to ensure the information is clear and public facing.

Other features:

- Multi-lingual
- Generates presentations (like this)!

TOP 5 2024 “TAKE-AWAYS”

1. Network Performance and Data Quality

- Overall data capture was excellent, with most stations achieving over 90% data capture rates.
- Three new monitoring sites were added: Brighton - Lewes Road, Brighton - Hollingdean Road, and Horsham – Cowfold

2. Compliance with Air Quality Objectives

- No exceedances of long-term or short-term Air Quality Objectives for NO_2, PM_{10}, or SO_2.
- All sites were below the annual mean targets for $PM_{2.5}$, meeting both the 2028 interim target (12 µg/m^3) and the 2040 final target (10 µg/m^3).

3. Pollutant Trends and challenges

- Recent declines in air pollution starting to plateau. Ozone (O_3) remains a challenge.

4. WHO Guideline Value Comparisons

- Tighter WHO guideline values for PM_{10}, $PM_{2.5}$, and NO_2 are not met

5. Air Quality Index and Health Information

- 2024 was predominantly characterized by ‘Low' air pollution days.
- Only a few locations recorded ‘Moderate' pollution days.
- No ‘High' or ‘Very High' pollution days were recorded.
- The Sussex Air Quality Partnership maintained an air quality alert service to inform vulnerable populations.

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Bureau Veritas UK Ltd

Shaping a World of Trust