Urban Design & Green Infrastructure

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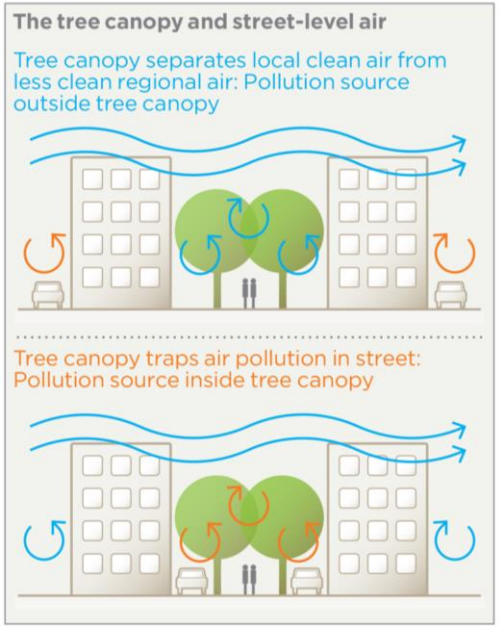
CLEAN AIR SCIENCE FOR
THE WEST MIDLANDS

UDGI: Urban Design & Green Infrastructure

- **Urban design affects air quality**
  - Where pollution is created
  - How it is dispersed or trapped
  - Where people are exposed
- **Green infrastructure**
  - Makes space for cleaner air
  - Can change atmospheric chemistry
  - Can act as a barrier (GI4RAQ)



> Need to integrate air pollution thinking into planning and design to **Reduce** emissions, **Extend** the distance between source and receptor and **Protect** people

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Air quality and the planning process

- NVivo used to analyse how the planning process is considered within local air quality strategies and how air quality is addressed in the planning process
  - Strategy developed for the West Midlands will be expanded to cover Greater London and Greater Manchester
- Disconnect between air quality policy and planning policy
- Identifying best practice
  - e.g. Coventry Air Quality Supplementary Planning Document (SPD)

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Design charter

- Design charter developed to set out how good urban design can improve air quality

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Acton, J. Ferranti, EJS. Levine, J.G., MacKenzie, AR. Grayson, N. 2021. Urban Design for Air Quality. A Design Charter produced by the WM-Air Project, University of Birmingham. Funding provided by NERC Innovation grant NE/S003487/1.

URBAN DESIGN FOR AIR QUALITY

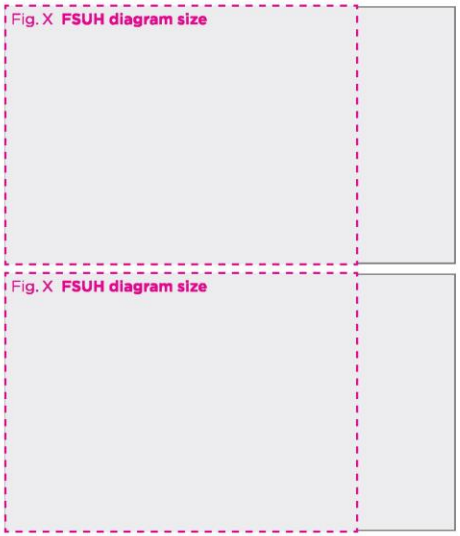
Urban design influences where air pollution is produced, how it disperses through streets and neighbourhoods, and where, when and how much communities are exposed. Good urban design improves air quality

Air quality mitigation strategies fit broadly into three categories:

1. Reduce
Reducing air pollution emissions is the most effective way to improve air quality. Road transport is one of the largest sources of air pollution in urban areas. Mitigation measures include facilitating active transport by creating walkways and cycleways, providing links to public transport, electric car charging points, and minimising car travel time on roads.

2. Extend
Increasing distance the distance between pollution source and human receptor gives time for air pollution to disperse, and can reduce exposure. This can be actual distance, or "effective" distance, when barriers can block pollution, or a heterogeneous surface can encourage the formation of eddies, thereby extending the pathway from source to receptor.

3. Protect
Older adults (>65), children (<12) and those with pre-existing health conditions are most vulnerable to air pollution. Extra care must be taken to separate people and pollution in places where these vulnerable groups gather and wait, such as in front of hospitals, schools or at bus stops.



Early air quality thinking

Air quality should be considered at the earliest stages of planning and design, before the position of infrastructure and buildings is decided. Consider:

i. What is the current air quality at the site?
If the site lies in an air quality management area (AQMA) or a clean air zone (CAZ) then planners and designers must consider how the site can improve existing air quality.

ii. How will the development change air quality within the development envelope and surrounding neighbourhood?
Reduce existing and new transport emissions by linking to public transport networks or mobility schemes (e.g. e-scooters), or creating/linking to cycleways or footpaths.
Reduce existing and future combustion emissions by avoiding installing residential log burners or solid fuel combustion sources, and preventing new industrial/commercial combustion in areas of with air quality concerns.
Extend Opening up the site to promote wind flow can help air pollution disperse (mix away). A mixed height surface can promote the formation of eddies to encourage mixing and dispersion.

iii. How are people on the development and surrounding neighbourhood exposed to air pollution?
Air pollution is generally highest at source. Seek to separate people, especially vulnerable groups from air pollution sources.
Extend Separate pavements and cycleways from road traffic pollution.
Extend Avoid locating bus stops near busy intersections or where vehicles idle. Set bus stops back from roadside.
Extend Set buildings back from roads (e.g. car park in front of building) to reduce the exposure of residents. Where facades are road side locate sensitive rooms (where people spend a lot of time) away from roadside.
Protect Avoid co-locating vulnerable groups with pollution sources, e.g. hospital bus stop next to idling cars. Locate school drop off/collection areas away from roadside to prevent people/parents waiting roadside in front of school.
Protect Avoid locating school playgrounds and park play areas close to traffic/combustion pollution.

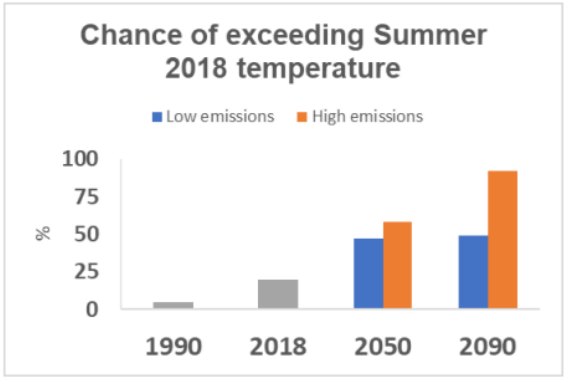
Green infrastructure

Green infrastructure in itself is not the solution to air pollution, rather a component of good urban design that can help to **Reduce** emissions (encourage active travel), **Extend** the distance between pollution sources and individuals (increase source receptor pathway physically and by effectively via promoting formation of eddies and dispersion) and **Protect** vulnerable people (e.g. green barriers).

Urban Heat & Air Quality

- Hotter temperatures and heatwaves will become more frequent
- Urban areas are warmer than rural areas (UHI)
  - UHI not exclusively negative impacts (e.g. reduced winter heating bills, reduced cold-related mortality)
  - UHI is complex: related to meteorology, season, time of day, and between neighbourhoods, and streets

> Overheating risk needs to be considered by planning and design



Met Office: UKCP18

Manor Farm Park: Birmingham

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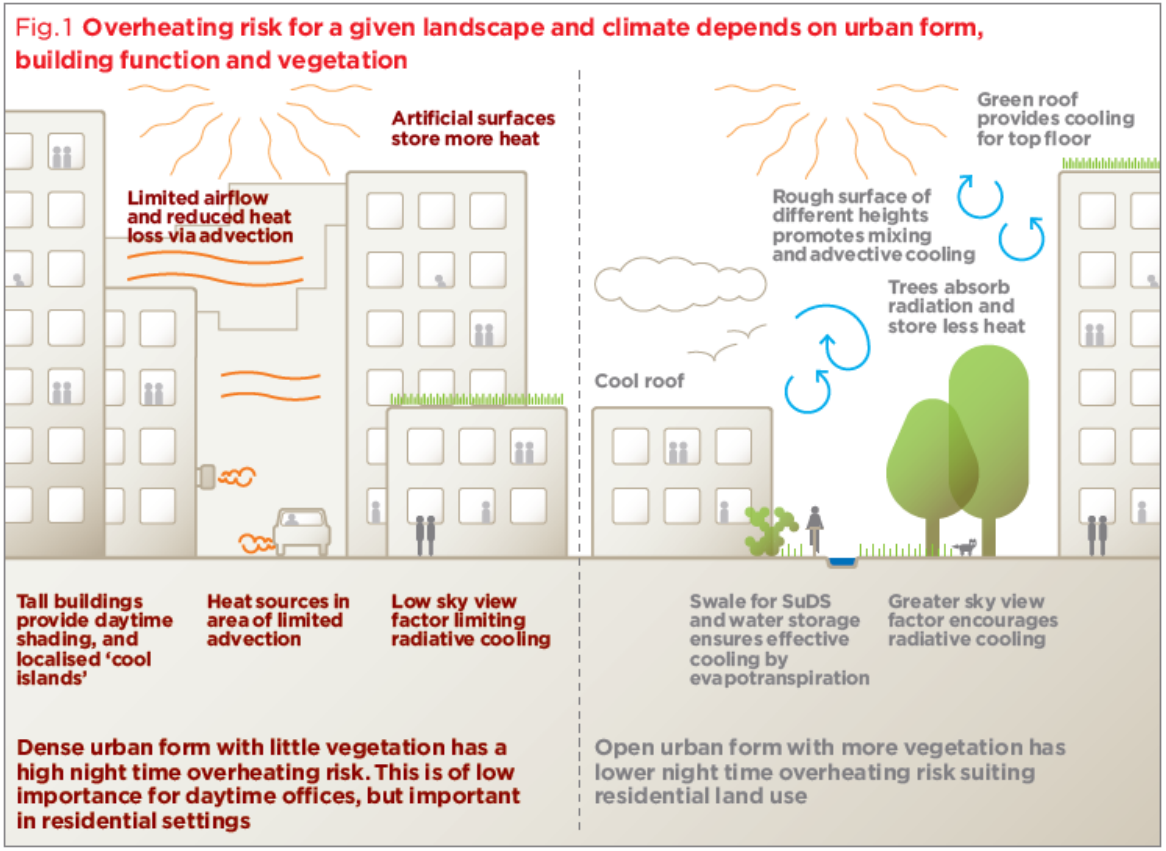
Urban Heat & Air Quality



- Urban Heat CPD including/or Climate walk (central Brum) available
- Download First Steps in Urban Heat: https://doi.org/10.25500/epapers.bham.00003452