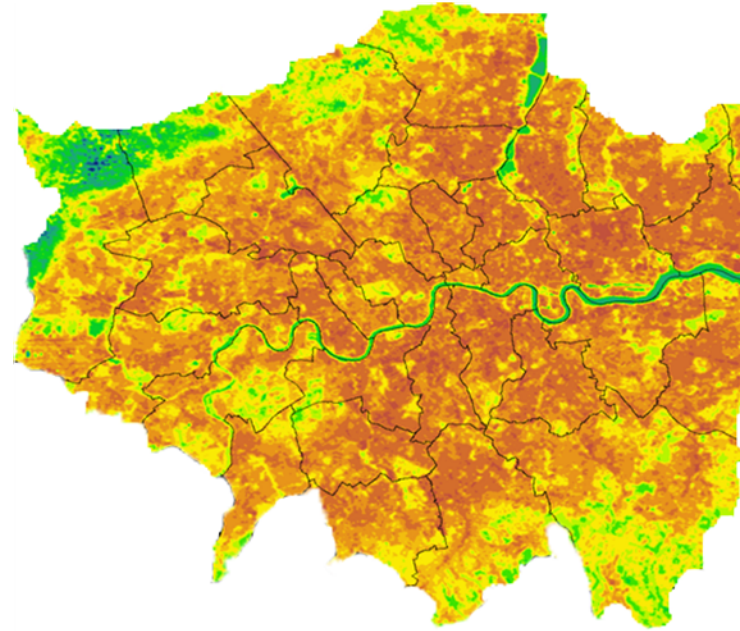# Urban Heat Risk Mapping and Visualisation in London

Polly Turton, Senior Consultant, Arup
ARCC Network Assembly
'Urban areas as systems: adapting for the future'
11 June 2014

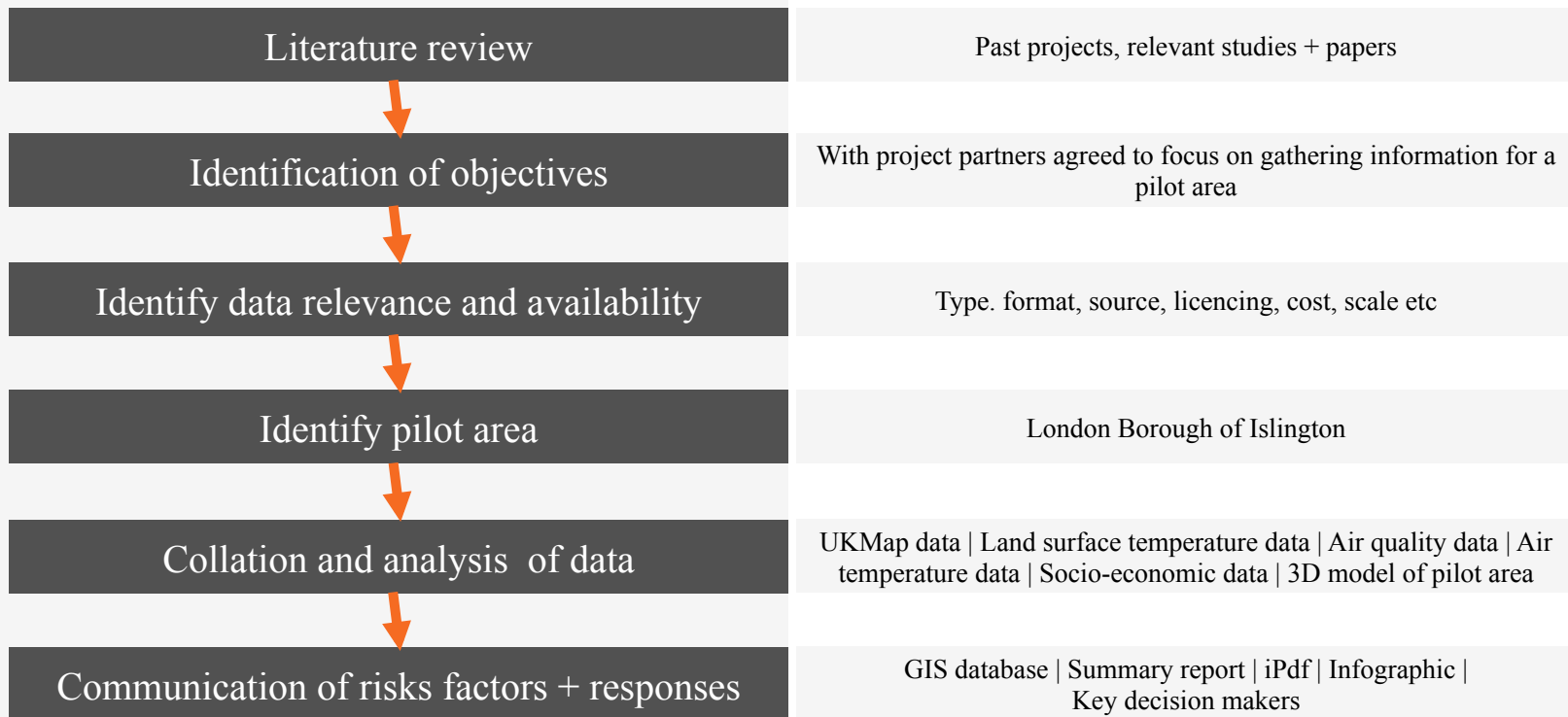ARUP

Today's discussion

1. What is urban heat risk and why is it increasing?

2. Methodology for the project

3. Project partners

4. Outputs from the project

5. Who is most vulnerable to urban heat risk?

6. Approaches to reduce urban heat risk

7. Recommendations and future work

8. Q + A

By 2030, 60% of the world's population will be living in urban areas. For some people living in these areas, hot weather can be a real threat.
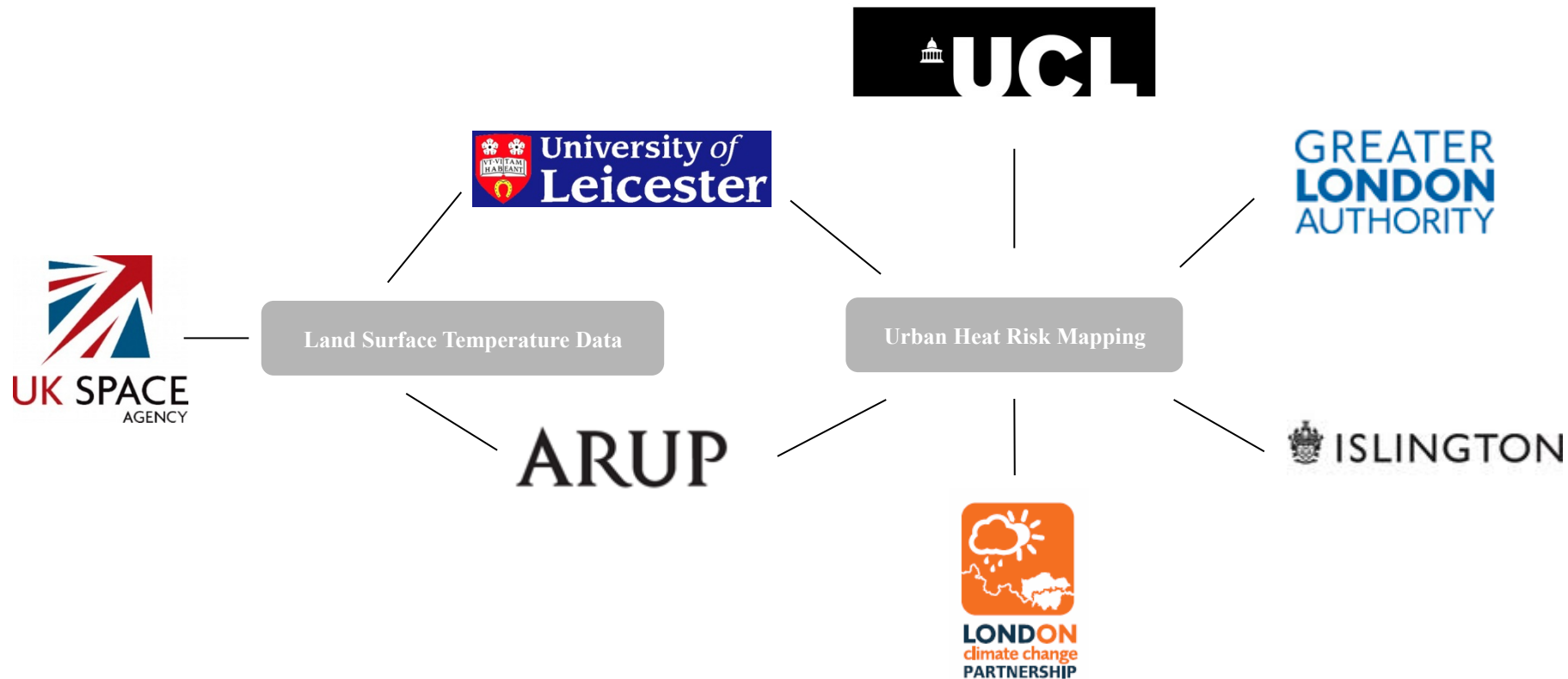
Urban heat risk

- What is it?

- Why is it increasing?

- Contributing factors to urban heat risk:

  - **Climate change**

  - **Urban heat island (UHI) effect**

  - **Demographic change - ageing population / under five year olds**

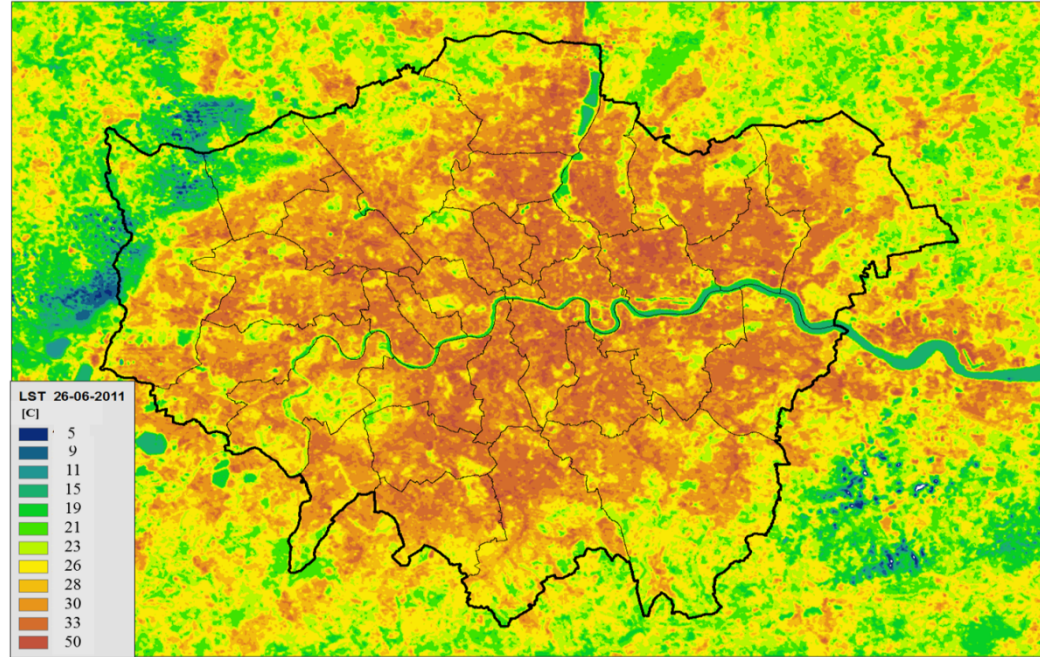 - **Urbanisation and densification**

Project methodology

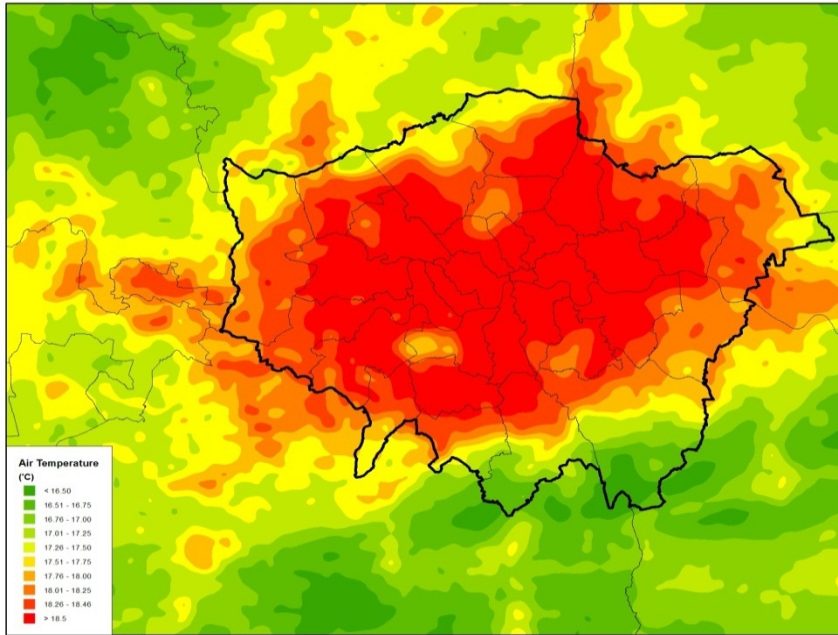|	
Literature review	Past projects, relevant studies + papers
Identification of objectives	With project partners agreed to focus on gathering information for a pilot area
Identify data relevance and availability	Type. format, source, licencing, cost, scale etc
Identify pilot area	London Borough of Islington
Collation and analysis of data	UKMap data | Land surface temperature data | Air quality data | Air temperature data | Socio-economic data | 3D model of pilot area
Communication of risks factors + responses	GIS database | Summary report | iPdf | Infographic | Key decision makers

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Project partners

Outputs: city scale

Comparison with the All London Green Grid

Outputs: borough scale
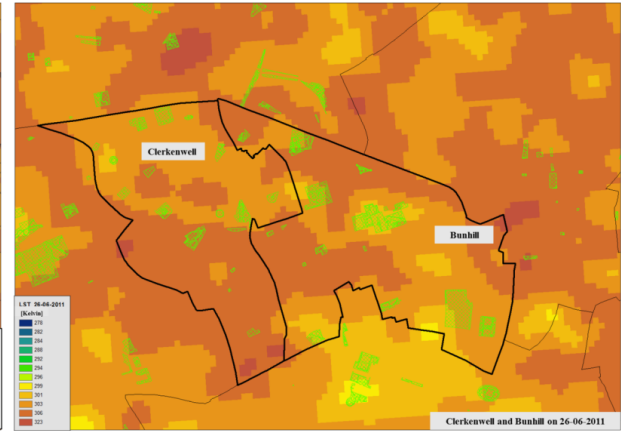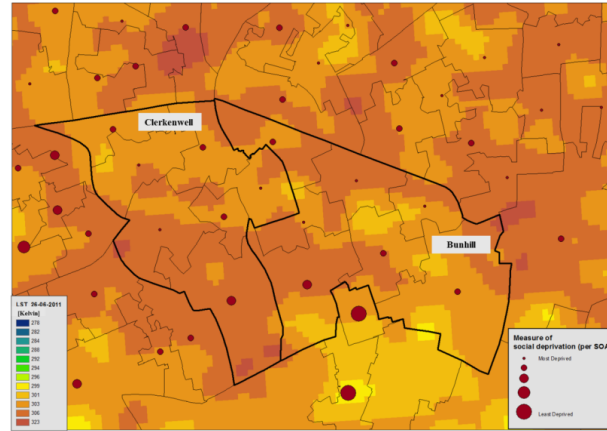
Outputs: neighbourhood scale
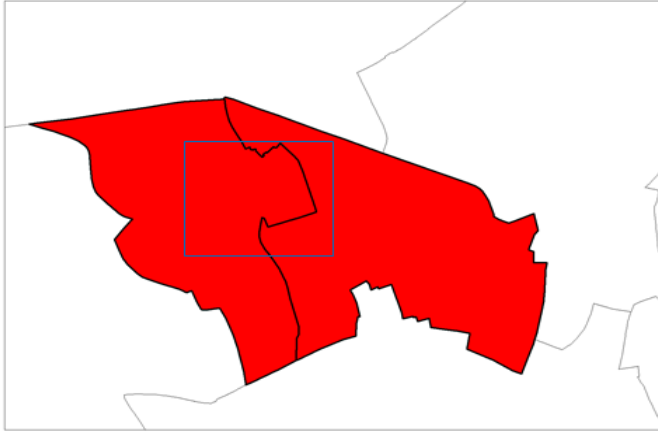
Who might be particularly vulnerable?

We have developed and collated data for a **triple risk index** for assessing urban heat risk:

- **Location**: e.g. proximity to Urban Heat Island and green space

- **Building characteristics**: e.g. age of construction, orientation, height

- **Characteristics of people**: e.g. age, health, socio-economic status

Who might be particularly vulnerable?

High risk
Ms X is 68 years old; she has limited mobility and suffers from a respiratory condition. Her days are spent mostly at home with occasional visitors. Her top floor flat is in a tower block with poorly insulated walls, south facing windows and balcony and no external shading. She lives within a UHI, close to a main road with no green or blue space in the area.
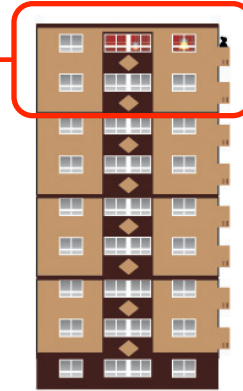
Who might be particularly vulnerable?

Medium risk

Mr and Mrs Y have two children, both under five years old. They live in a top floor flat of a converted terraced house which has poorly insulated walls and roof. Its dual aspect but with no garden, no external shading and west facing windows. The flat is close to a busy road junction, situated within a UHI with no green or blue space or mature trees in the local area.
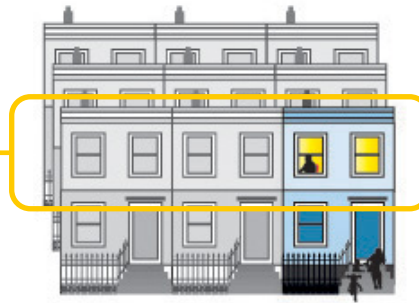
Who might be particularly vulnerable?

Low risk

Mr and Mrs Z are young couple with no children who spend most of the day away from home. They live in a mid-level floor flat with well insulated walls and roof on a quiet residential estate. The flat is outside the UHI, has west facing windows with a balcony and external shading, and is located close to blue space and mature trees.

Approaches to reduce the risk factors

Physical

- a change, intervention or improvement to the urban environment, or a particular neighbourhood or building.

Social

- Policies and practice relating to awareness raising, communication and behaviour change.

Strategic

- Longer term, larger investments of resources with less immediate results. Implemented before hot weather.

Operational

- Shorter term reactive efforts with more immediate results. Implemented during hot weather.

Spatial scales of approaches

City scale
- Many of the physical approaches
- Social approaches involve policy and guidance

Borough + neighbourhood scale
- Many strategic and physical approaches are versions of those at city scale
- Overlap with operational and social approaches

Building + block scale
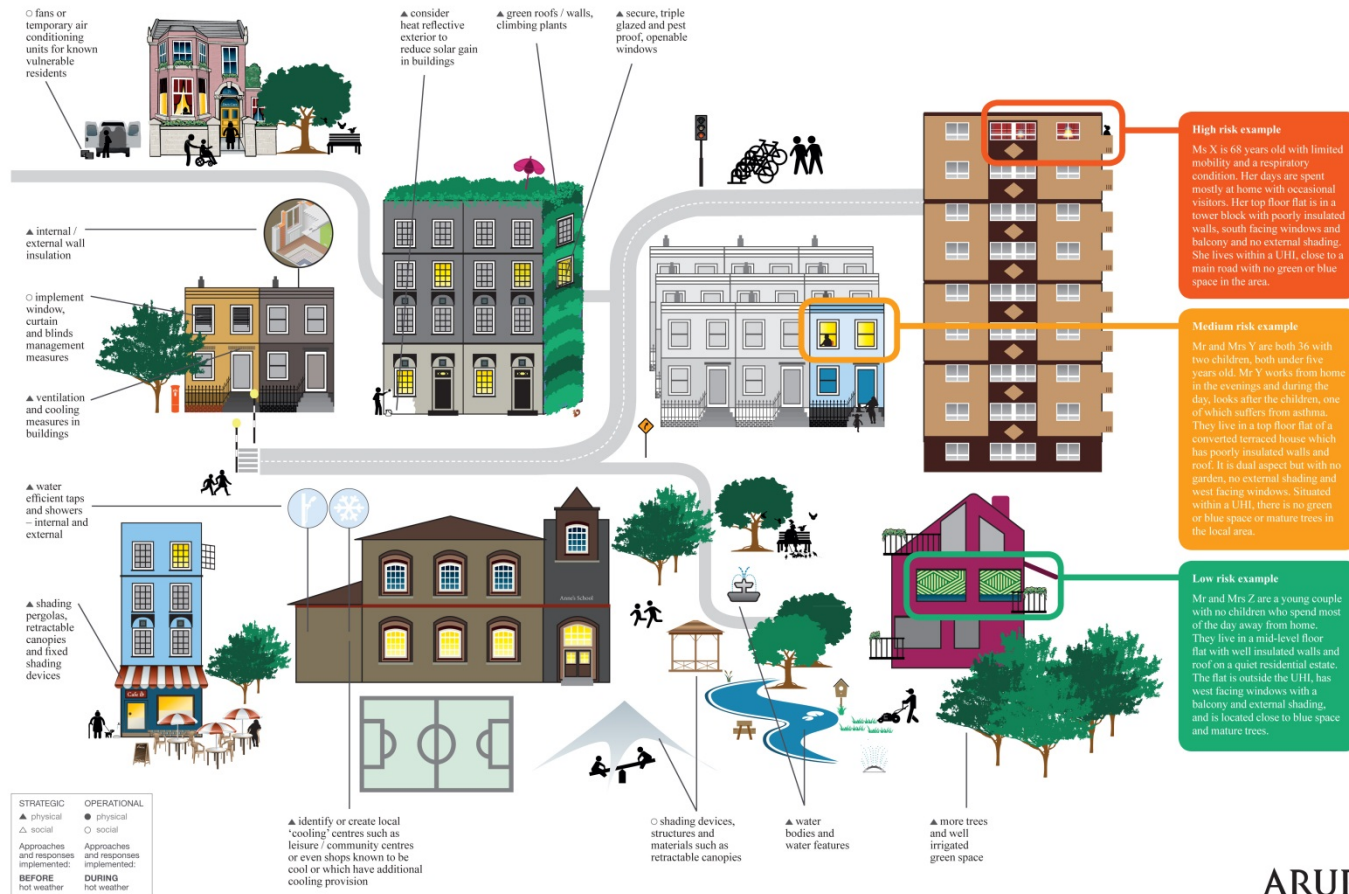- Most approaches strategic and physical – including upgrades and refurbishment to make improvements
- Some overlaps with operational approaches.

Community + individual scale
- Approaches linked to strategic and social approaches at borough and neighbourhood scale, and building or block scale.
- Focus on communication and awareness, and responses / actions during hot weather events.

Approaches to reduce urban heat risk

○ fans or temporary air conditioning units for known vulnerable residents

▲ consider heat reflective exterior to reduce solar gain in buildings

▲ green roofs / walls, climbing plants

▲ secure, triple glazed and pest proof, openable windows

▲ internal / external wall insulation

○ implement window, curtain and blinds management measures

▲ ventilation and cooling measures in buildings

▲ water efficient taps and showers – internal and external

▲ shading pergolas, retractable canopies and fixed shading devices

High risk example
Ms X is 68 years old with limited mobility and a respiratory condition. Her days are spent mostly at home with occasional visitors. Her top floor flat is in a tower block with poorly insulated walls, south facing windows and balcony and no external shading. She lives within a UHI, close to a main road with no green or blue space in the area.

Medium risk example
Mr and Mrs Y are both 36 with two children, both under five years old. Mr Y works from home in the evenings and during the day, looks after the children, one of which suffers from asthma. They live in a top floor flat of a converted terraced house which has poorly insulated walls and roof. It is dual aspect but with no garden, no external shading and west facing windows. Situated within a UHI, there is no green or blue space or mature trees in the local area.

Low risk example
Mr and Mrs Z are a young couple with no children who spend most of the day away from home. They live in a mid-level floor flat with well insulated walls and roof on a quiet residential estate. The flat is outside the UHI, has west facing windows with a balcony and external shading, and is located close to blue space and mature trees.

STRATEGIC   OPERATIONAL
▲ physical   ● physical
△ social   ○ social
Approaches and responses implemented: Approaches and responses implemented:
BEFORE hot weather   **DURING** hot weather

▲ identify or create local 'cooling' centres such as leisure / community centres or even shops known to be cool or which have additional cooling provision

○ shading devices, structures and materials such as retractable canopies

▲ water bodies and water features

▲ more trees and well irrigated green space

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Key messages: general

- **Urban heat risk is already an issue for London and is projected to increase.**

- **Areas** of London which are most at risk

- **Buildings** within London which are most at risk

- **People** within London who are most at risk

- **Strategic, operational, physical and operational approaches** to reducing urban heat risk **before and during** a hot weather event should **focus on these areas, these buildings and these people.**

Key messages: specific

- **Mayor of London**
  Ensure urban heat risk continues to be reflected within relevant plans, policies and strategy documents. Clarify and strengthen approaches to addressing urban heat risk.

- **Members of the public**
  Take note of 'Keep Cool' information, look out for old people, under 5s, pregnant women and people with respiratory or cardio-vascular conditions.

- **Public health professionals**
  Consider dealing with hot and cold weather events as part of a wider Seasonal Management Plan.

- **Housing professionals**
  Consider physical and social measures for reducing urban heat risk for buildings and people.

Key messages: specific

- **Planners and developers**

  Make the most of opportunities to incorporate urban heat risk reduction measures including urban greening.

- **Local politicians**

  Older people and parents with young children are voters. Demonstrating understanding of urban heat risk issues, and development of approaches to address them, is good for you and your constituents.

- **Insurers**

  Urban heat risk may have implications for buildings insurance and health insurance policies.

Future work

Creation of **web-based interactive urban heat risk database** for London and its Boroughs

- Contribution to National Health Service (NHS) SHAPE database http://shape.dh.gov.uk/
- Greenspace Information for Greater London (GiGL) http://www.gigl.org.uk/

Further development of an **Urban Heat Risk Index** for London and its Boroughs

- University College London (UCL) and Kings College London (KCL) work

Targeted **monitoring and measurement of relevant data** to feed in to the above

- London Climate Data Portal http://climatelondon.org.uk/publications/observing-london/
- London Datastore http://data.london.gov.uk/
- All London Green Grid (ALGG)
  http://www.london.gov.uk/priorities/environment/greening-london/improving-londons-parks-green-spaces/all-london-green-grid
- RE:LEAF i-Tree survey of Greater London
  https://www.london.gov.uk/priorities/environment/greening-london/re-leaf/why-we-want-more-trees/

Related projects + initiatives

Cities Alive

Rethinking green infrastructure

Cities Alive looks at how we can build nature into our urban systems at all scales through high quality landscape design, via new development or retrofitting through a green infrastructure design approach.

http://www.arup.com/Homepage_Cities_Alive.aspx

A framework, supported by The Rockefeller Foundation and developed by Arup's International Development team gives cities a tool to understand their resilience in order to shape urban planning, practice and investment.

http://publications.arup.com/Publications/C/City_Resilience_Framework.aspx

C40 CITIES
CLIMATE LEADERSHIP GROUP

A major new opportunities and baseline report which shows a clear trend of increasing climate action in cities.

http://www.arup.com/Projects/C40_Cities_Climate_Action_in_Megacities_report.aspx

Ambient Assisted Living
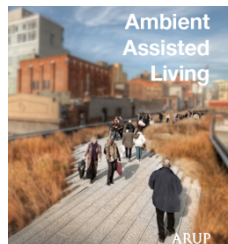
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A report highlighting the key challenges and opportunities for improving the wellbeing and quality of life of older people and those living with disabilities.

Information will be available shortly on www.arup.com