



Mapping heat. Protecting communities.

Urban Heat Index

Using urban heat maps to protect vulnerable communities

01

Welcome & introduction

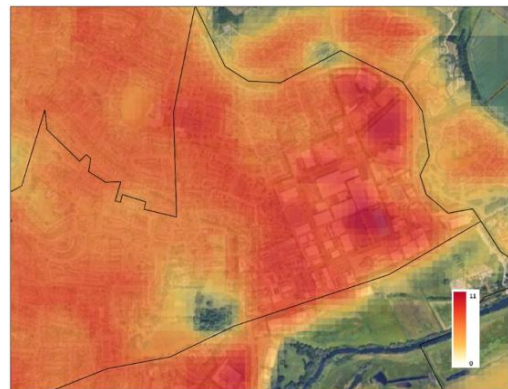
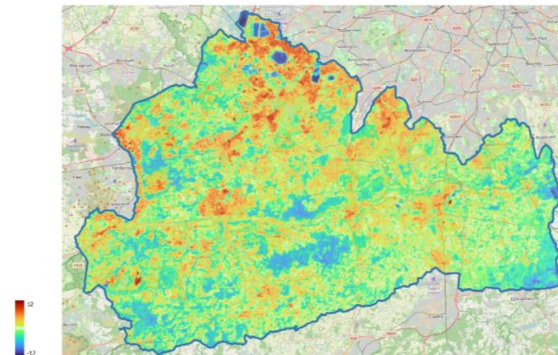


What are we covering

- How surface heat can be mapped at 30m resolution
- How we've piloted our heat maps with 8 local authorities – and what we've learned through this process
- How three of these authorities are planning to use the data: Surrey, Richmond, Bedford

About Urban Heat Index

- Small team with extensive experience in climate change adaptation and digital technology.
- We created the Urban Heat Index to provide local organisations with the precise evidence they need to build climate resilience.
- Our goal is to make high-resolution spatial data accessible.
- This data helps local authorities and public sector bodies protect vulnerable communities from extreme heat risks.



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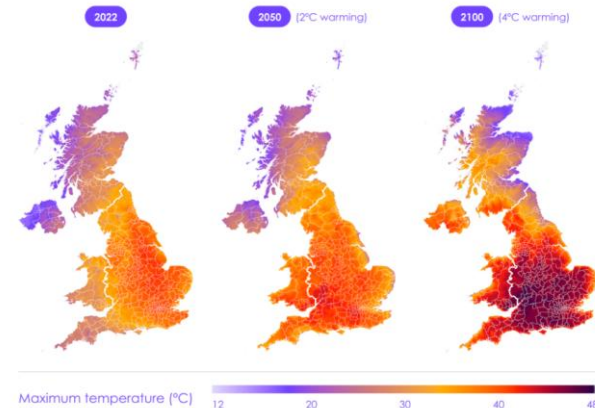
The importance of understanding heat risk

Figure 2. Extreme heat affects every part of life and society



Source: © HERA (2026, unpublished), reproduced with permission

Source: National Heat Risk Commission – A Heat Circuit Breaker for the UK



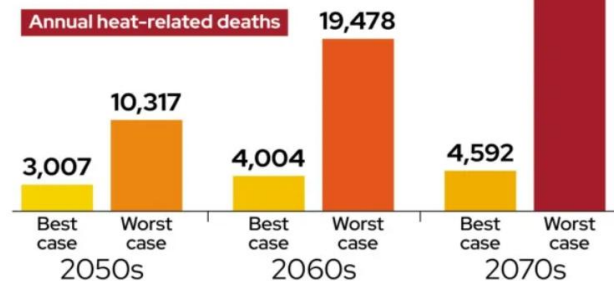
Source: Climate Change Committee – A Well Adapted UK

Heat-related deaths in England and Wales

Current baseline: 634 annual heat-related deaths

Most optimistic scenario is: 1.6°C of warming by end of the century, with strong measures taken to adapt to the heat

Least optimistic scenario is: 4.3°C of warming by end of the century, with minimal measures taken to adapt to the heat



Source: UCL, London School of Hygiene & Tropical Medicine

02

What is the heat data gap?

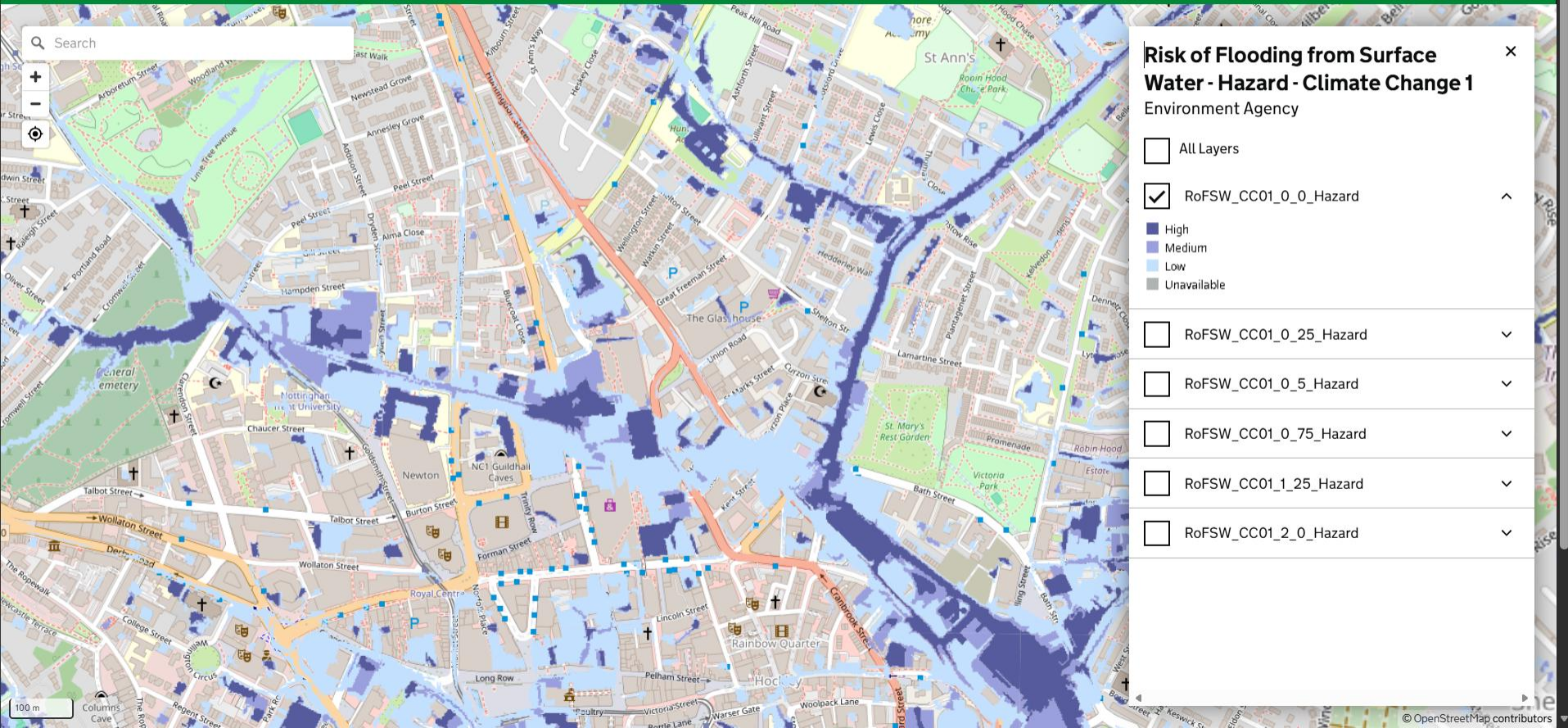


Urban Heat Index



Defra OGC preview

[Layers](#) [Download](#)



03

What data do we have for heat?



Urban Heat Index



MEASURING AIR TEMPERATURE



MEASURING SURFACE TEMPERATURE



HadUK-Grid

The HadUK-Grid dataset is a collection of gridded climate variables informed by land surface observations across the UK.

To create the long-running dataset, meteorological observations are interpolated onto a uniform grid to provide complete and consistent coverage across the UK.

The data sets cover the UK land area at 1km x 1km resolution as well as a range of other resolutions to allow for comparison with climate projections and area averages for countries, administrative regions and river basins.

The dataset spans the period from 1836 to present, but the start time is dependent on the climate variable and the temporal resolution. The grids are produced for daily, monthly, seasonal and annual timescales, as well as long term averages for a set of climatological reference periods.

Variables include air temperature (maximum, minimum and mean), precipitation, sunshine, mean sea level pressure, wind speed, relative humidity, vapour pressure, days of snow lying, and days of ground frost.



Local Authority Climate Service

Global

Observations

UK

Temperature

Projections

Precipitation

Sea Level

Welcome to the Met Office's climate service for Local Authorities in the UK.

This site provides tools and resources that have been specifically designed for Local Authorities to help you better understand climate change in your local area and support your adaptation journey.

This information may be useful for others, not just Local Authorities. It is free and available for all. This is a Beta service and will be developed further.



[Explore the Climate of your Local Authority.](#)



[How to Assess your Climate Risk](#)



[How to Take Action](#)



[FAQ and Version History.](#)

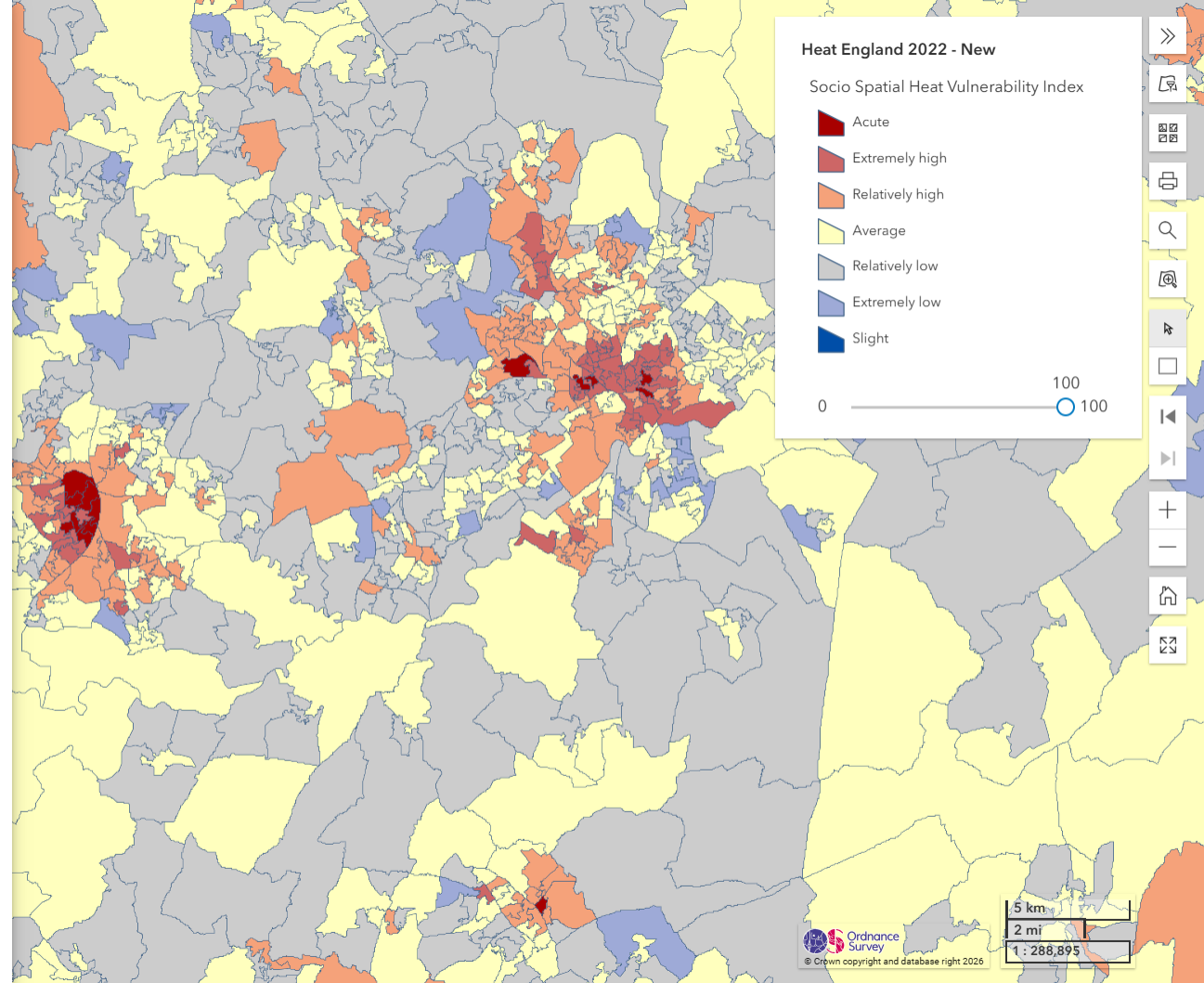
Search Layer

- Flood
- Heat
 - heat exposure (2018) - New
 - Heat disadvantage (2011)
 - Heat exposure (2011)
 - Heat socio-spatial vulnerability (2011)
- Flood England 2022 - New
- Flood Wales 2022 - New
- Heat England 2022 - New
 - Socio Spatial Heat Vulnerability Index**
 - Sensitivity
 - Inability to Prepare
 - Inability to Respond
 - Inability to Recover
 - Enhanced Exposure
 - Heat disadvantage (2022)
- Heat Wales 2022 - New

Heat England 2022 - New

Socio Spatial Heat Vulnerability Index

- Acute
- Extremely high
- Relatively high
- Average
- Relatively low
- Extremely low
- Slight



05

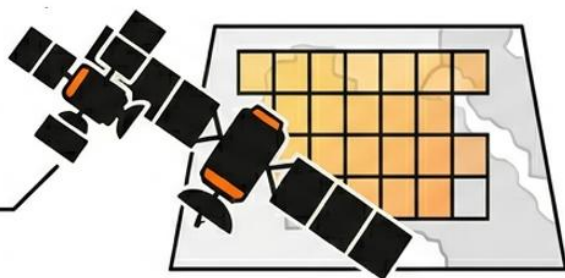
What satellite data is there?



Urban Heat Index

MODIS

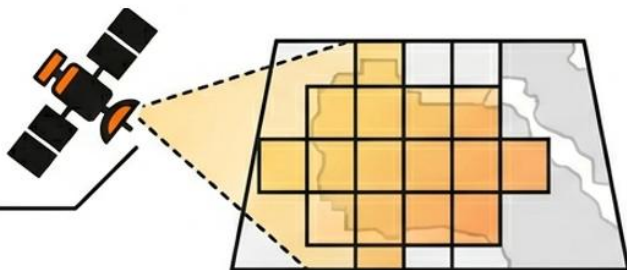
Low Detail Level
(Pixel Size: 1 kilometre square)



High Update Frequency
(Revisit Time: Up to 4 times a day)

SENTINEL-3

Low Detail Level
(Pixel Size: 1 kilometre square)



High Update Frequency
(Revisit Time: Once a day or more)

LANDSAT 8 AND 9

High Detail Level
(Pixel Size: 100 metres square)



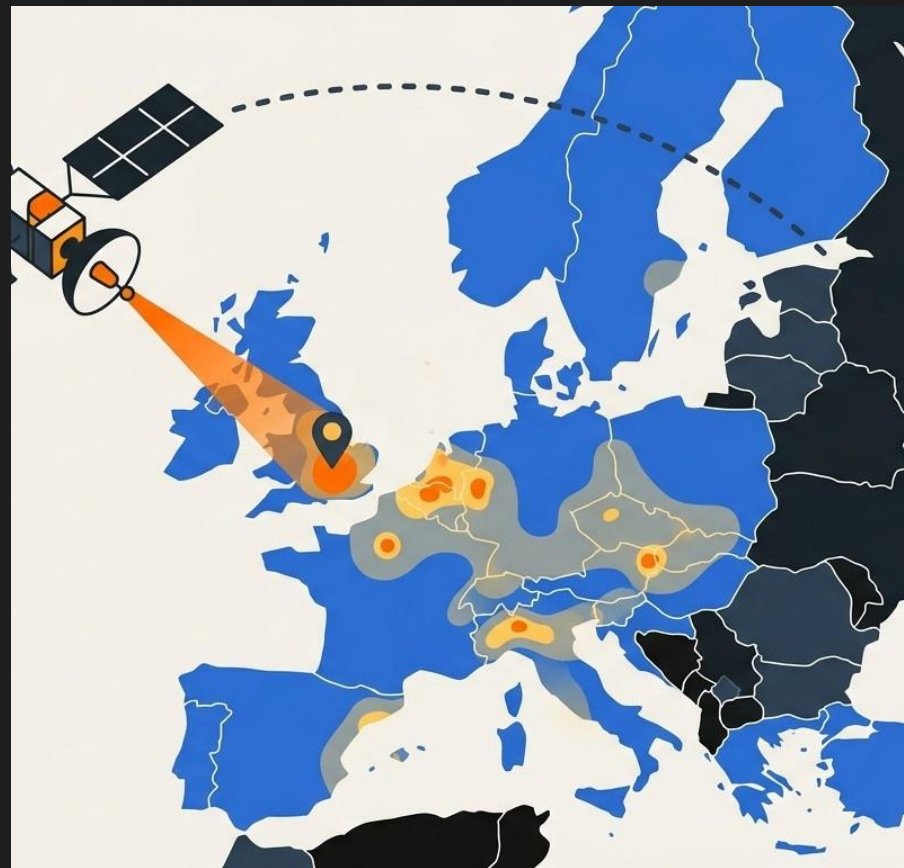
Low Update Frequency
(Revisit Time: Every 8 to 16 days)

Landsat access

Landsat is great resolution
(100m resampled to 30m)

Its currently free from USGS

You can get bi-weekly
thermal images



Landsat limitations

Infrequent images

Clouds

Surface temperature are more extreme

Cloud inpainting

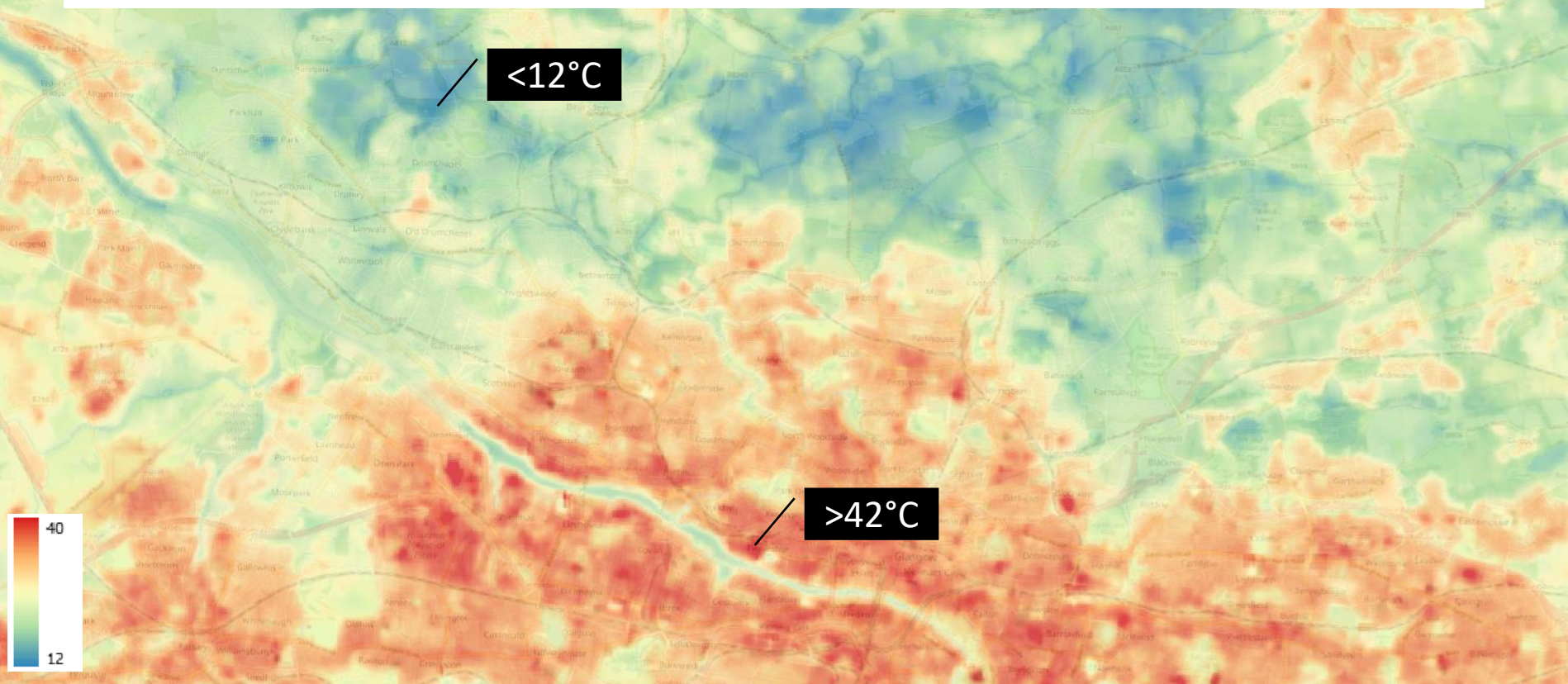
Create a relationship between the other spatial layers using machine learning

Create fake clouds

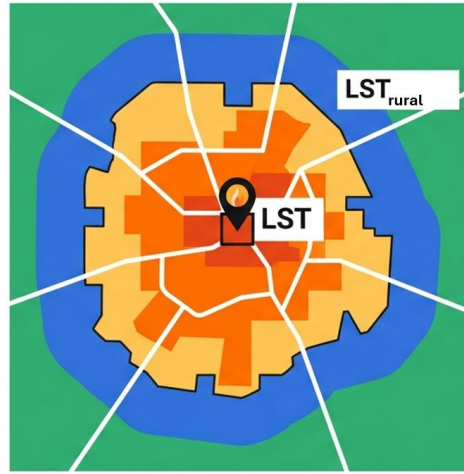
Run the model several times until it can fill in the missing fake clouds

Inpaint actual missing clouds

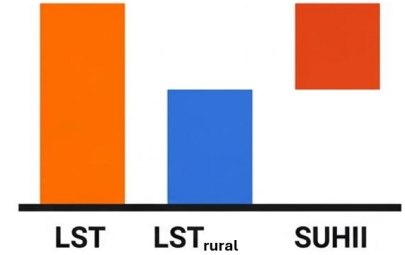
LST Temperature Range



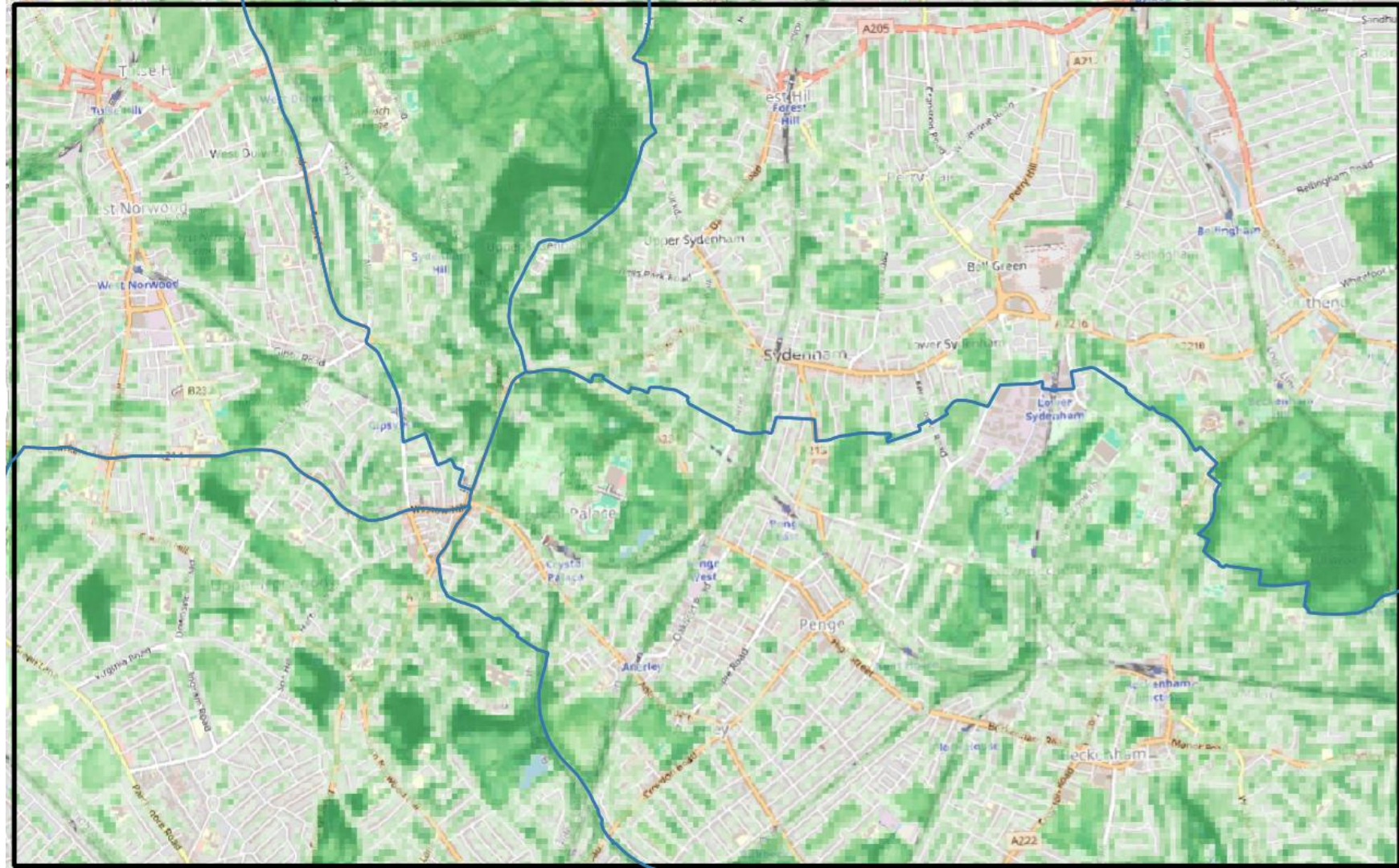
Surface Urban Heat Island Intensity

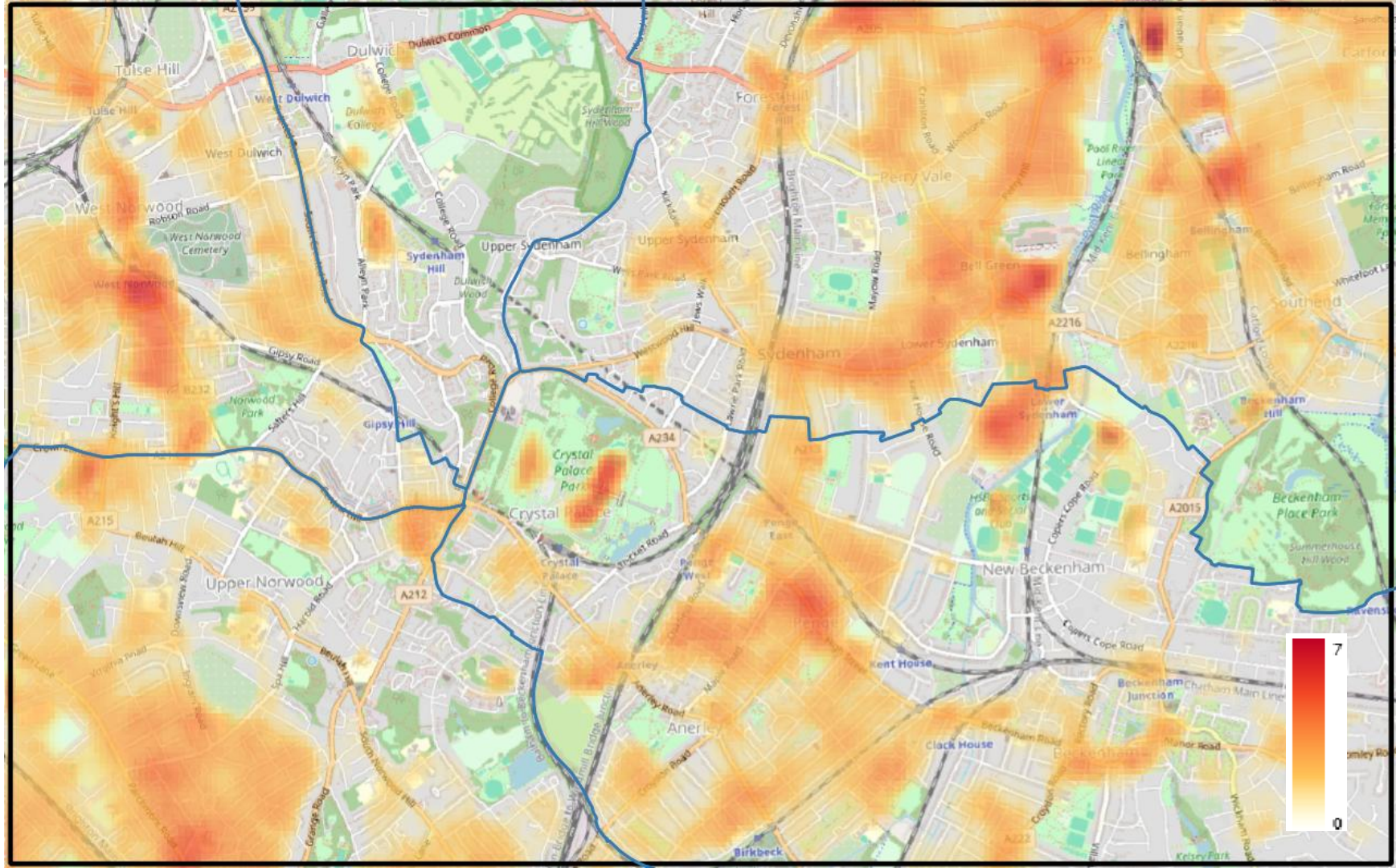


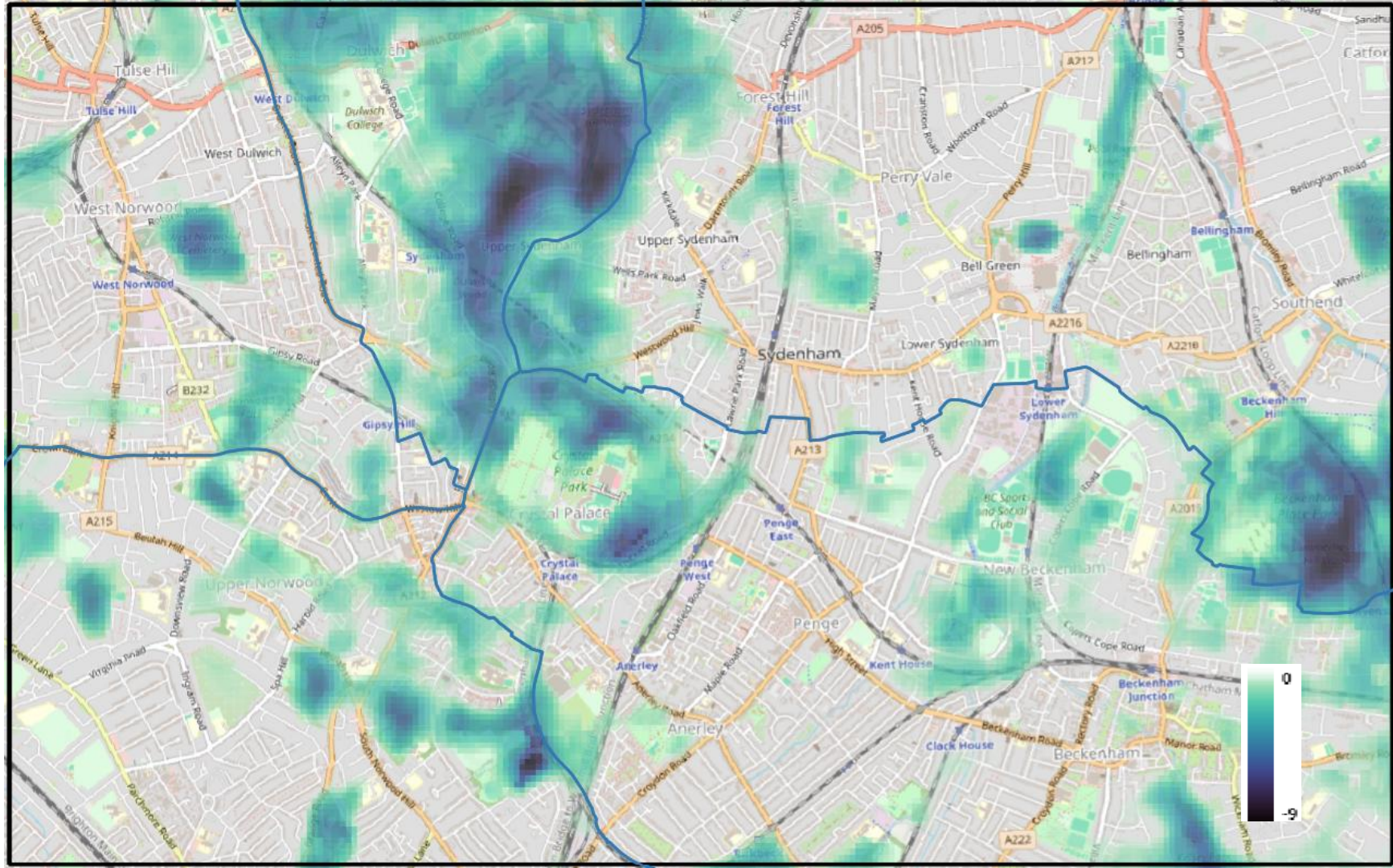
$$\text{SUHII} = \text{LST} - \text{LST}_{\text{rural}}$$



- **SUHII = Surface Urban Heat Island Intensity**
- **LST = Land surface temp of a pixel**
- **LST_{rural} = The mean temp of the selected non-urban buffer or vegetated baseline.**







To sum up

Key missing data layer is localised heat

Difference between Air Temp (modelled) and Surface Temp (recorded)

Existing data includes HadUK, LACS, various heat indices

Satellite (Landsat) is able to provide recorded local surface temp

But it has limitations

Delivered service for 7 LAs and 1 Combined Authority

Using 5 years rather than 3 years data set

LA level vs County level data

Interest from different departments: operational & strategic use

Cold data is also interesting

Fairly quick turn around (2-3 weeks)

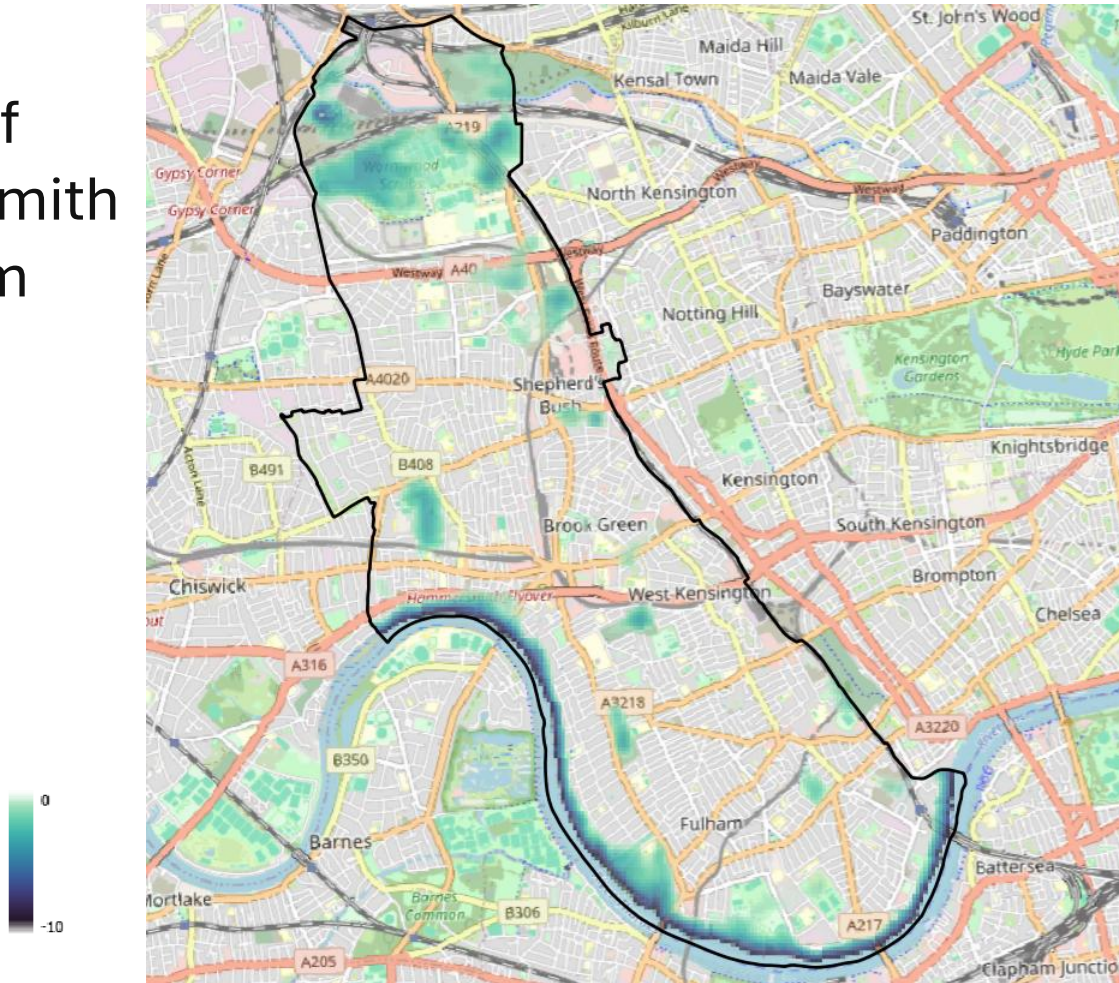
Under £5K for assessment for unitary/district (while data is free)

05

Some of our study areas



London Borough of Hammersmith and Fullam





Pilot: Surrey County Council





Urban Heat Index Trial



Sarah Birch (sarah.birch@surreycc.gov.uk) - Climate Resilience Lead
& Lauren Woulfe – Senior Strategy Officer – Climate Resilience
September 2026

Surrey Adaptation Strategic context

- The Surrey Climate Change Strategy (2020) identified the need to develop actions to increase Surrey's resilience to Climate Change. Even if we meet our set Net Zero Targets, Surrey will need to adapt to significant changes in our climate that are impacting already on our infrastructure, services, communities and ecosystems.
 - Climate Change Risk And Opportunities Assessment - JBA
 - We then developed a stand-alone Adaptation focussed strategy - [Surrey Climate Change Adaptation and Resilience Strategy – Surrey Adapt](#)
- Climate Change Impacts from severe weather, and our need to adapt to them are identified as a key **Corporate Risk** to Surrey County Council.
- **UK Government has directed ALL organisations to adapt to 2°C of change** and plan for 4°C of change for longer lived infrastructure. We are reporting to Central Government via the Adaptation Reporting Power mechanism.
 - **Spatial Climate Change Risk and Vulnerability Assessment – Storymap** ([How Surrey's Climate is Changing](#))

Surrey's Greener Future

Spatial understanding of climate risks:
1) Surrey- Risk and Vulnerability StoryMap

Storymap “How Surrey’s Climate is Changing”

Introduction Surrey's Climate Physical Infrastructure **Built Environment** Health, Wellbeing and Communities Natural Environment and Natural Assets Emerging Risks Methodology

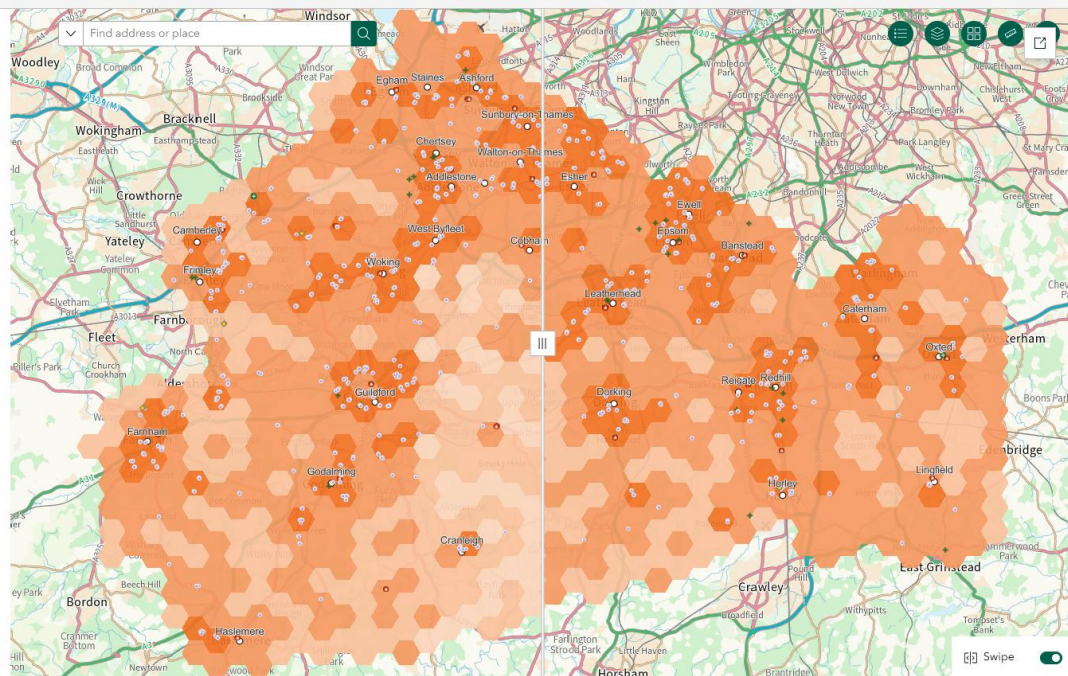
Extreme Heat Surface Water Flooding River Flooding

2050s Risk - 2°C Warming by 2100 Scenario

Move the slider left for 2050s 2°C warming scenario risk scores. Move the slider right for present day risk scores.

- Risk levels increase across much of Surrey, although the high risk areas remain concentrated around built up spaces.
- Towns such as Walton-on-Thames, Redhill, and Epsom show a clear rise in risk, with more buildings exposed to sustained heat conditions.
- The expansion of moderate-to-high risk zones suggests a growing need for adaptation in both urban and semi-urban settings.

The full legend for the map is available through

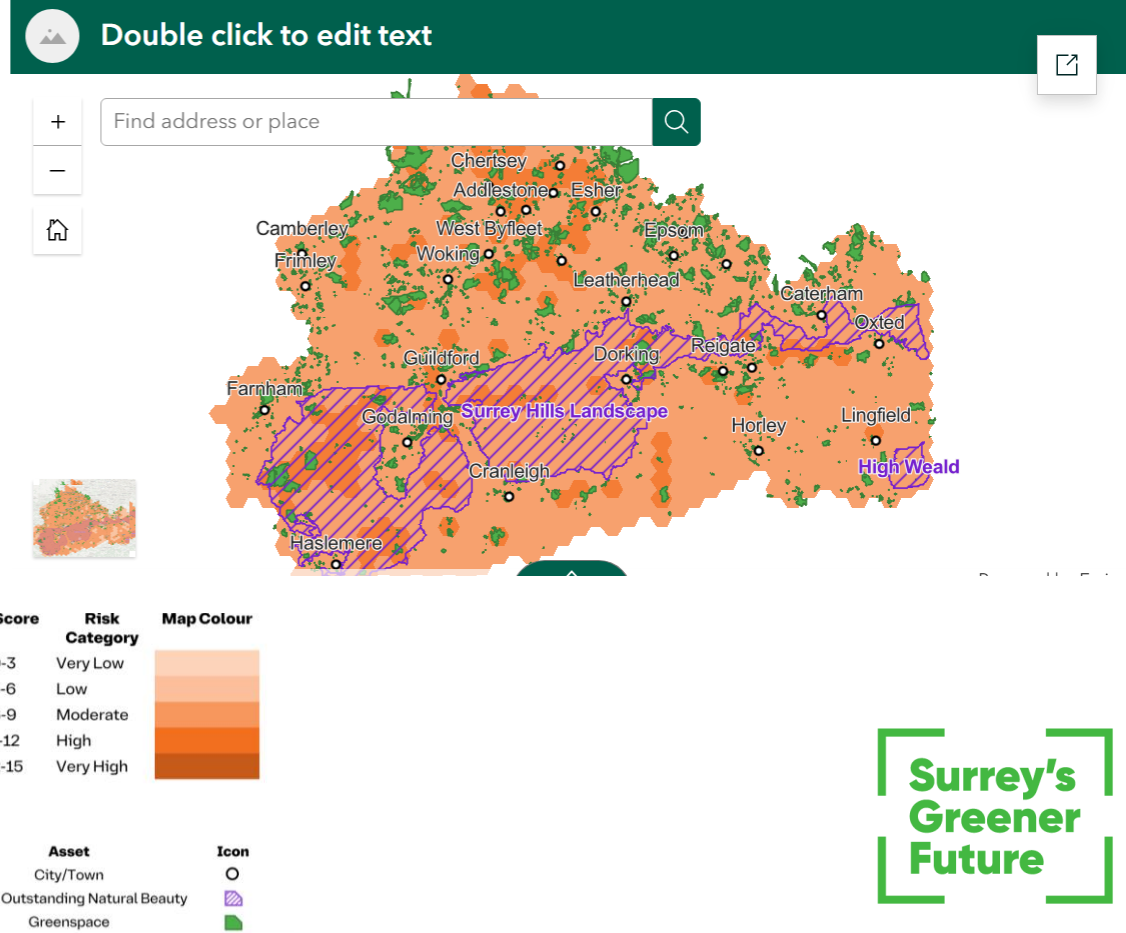


**Surrey's
Greener
Future**

2050s Risk - 4°C Warming by 2100 Scenario

Move the slider left for 2050s 4°C warming scenario risk scores. Move the slider right for present day risk scores.

- Risk becomes more widespread across Surrey with more areas falling into higher risk categories.
- Extreme heat becomes a persistent

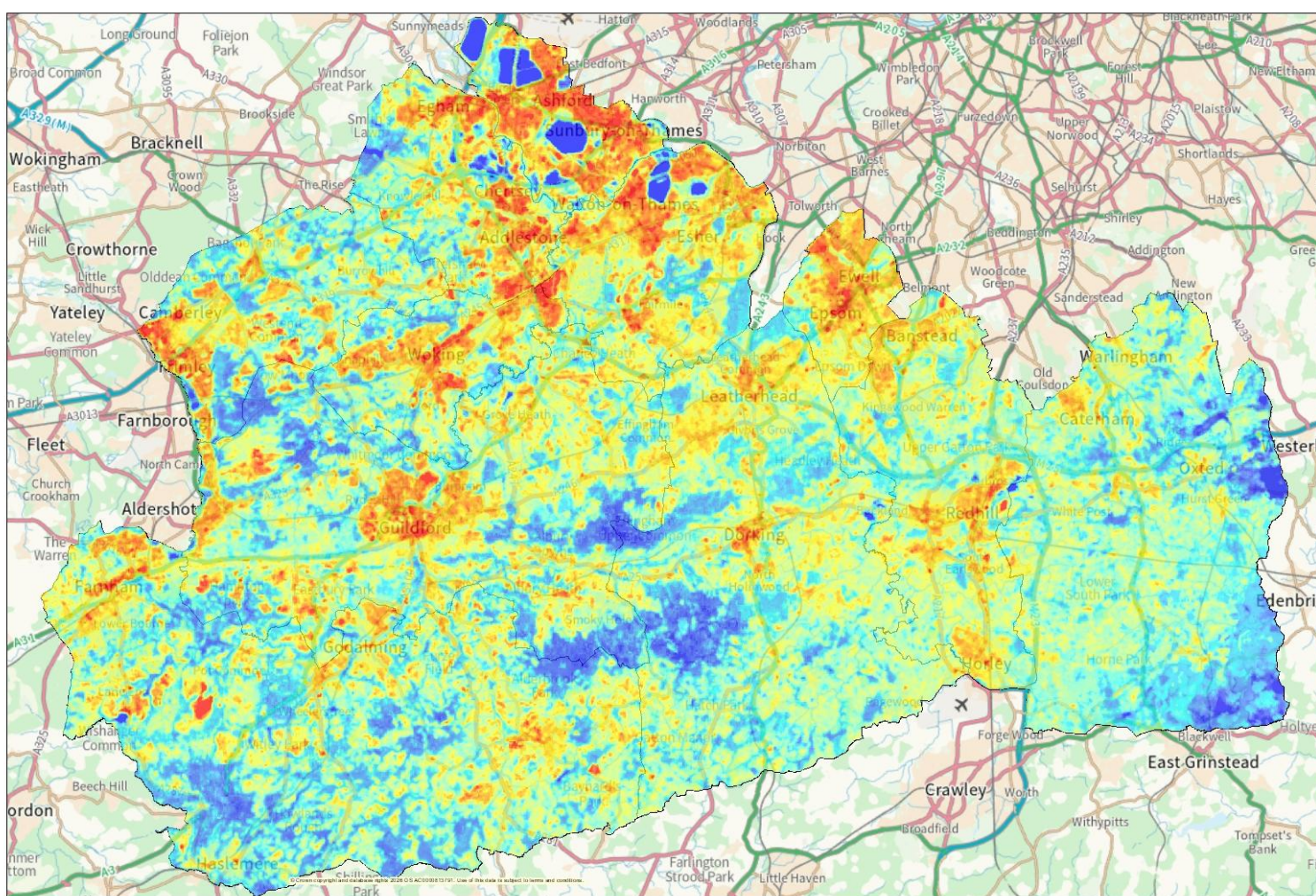


Surrey's Greener Future

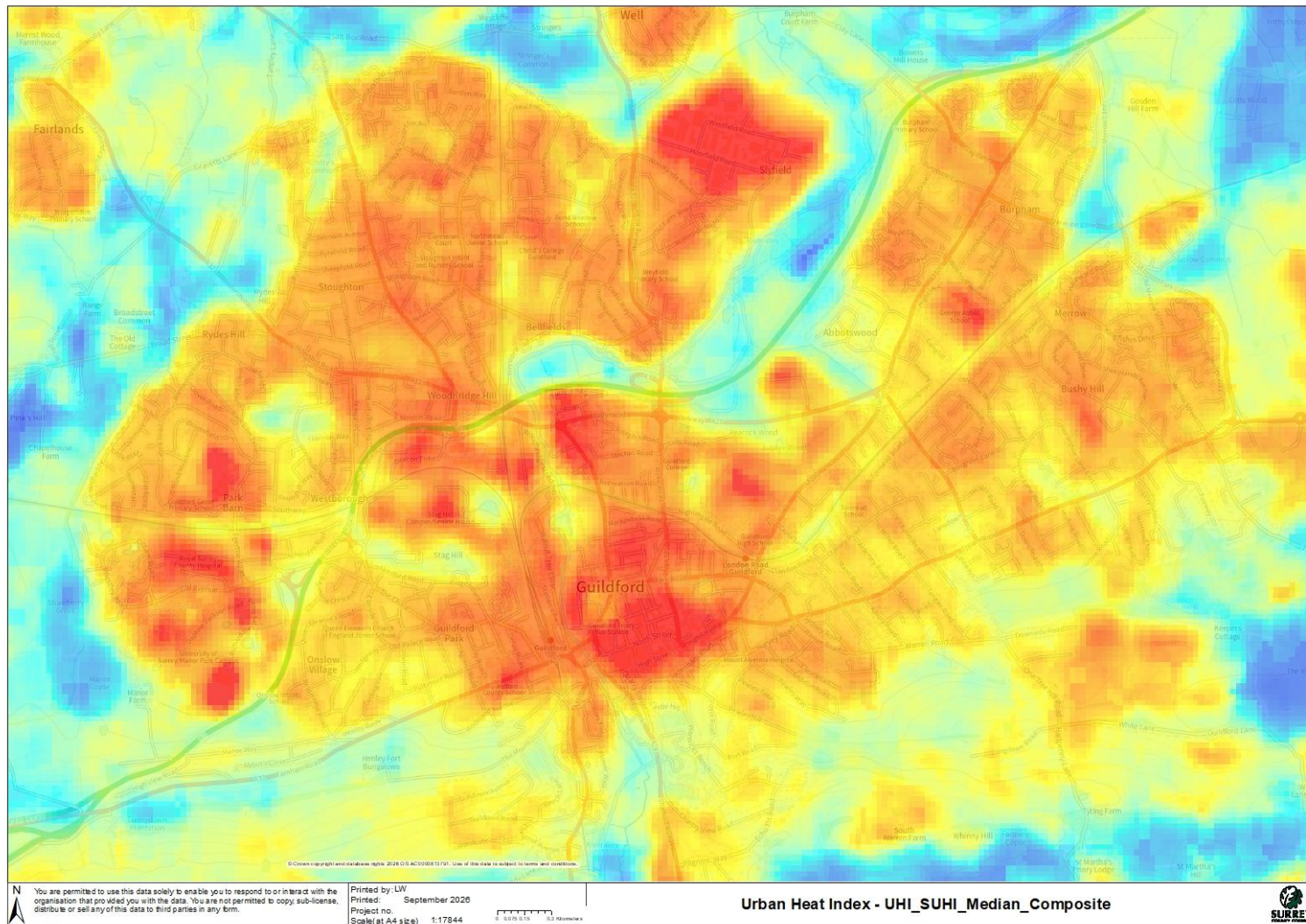
**Spatial understanding of climate risks:
1) Urban Heat Index**



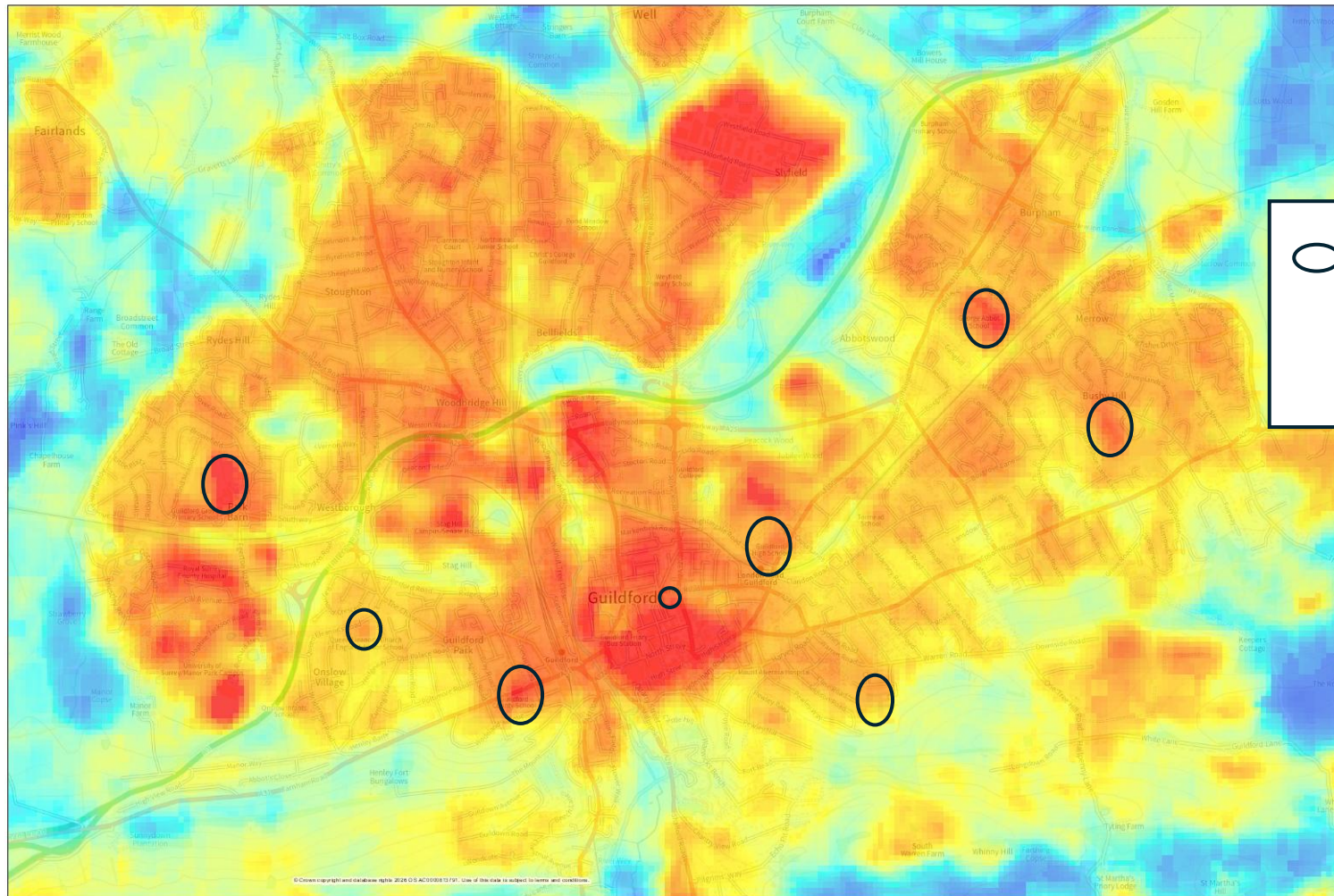
SURREY
COUNTY COUNCIL



**Surrey's
Greener
Future**

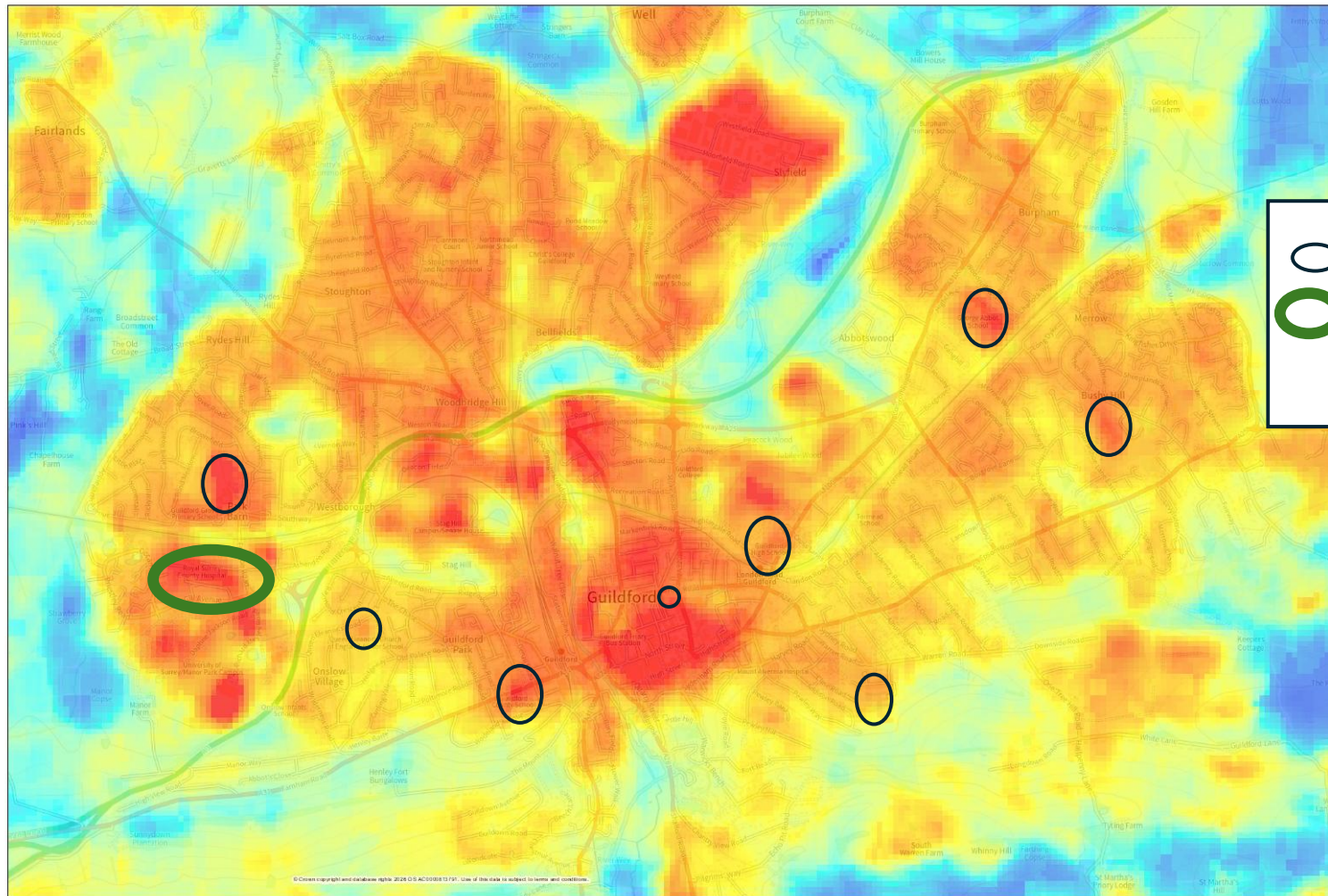


○ Schools



 Schools

 Royal Surrey Hospital




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Printed by: LW
 Printed: September 2026
 Project no:
 Scale (at A4 size): 1:17844


Urban Heat Index - UHI_SUHI_Median_Composite

What we have observed

- Some urban nodes worse than others – less trees, less natural amenities
- Some natural features are not performing at optimum e.g. urban rivers
- Schools appearing hotter generally
- Fallow fields appearing hot, and some natural areas e.g. Ash Ranges (fire scar/gradient/vegetation type etc)
- Larger buildings/institutions showing up hotter – Universities, Hospitals, Industrial estates etc.
- More dense housing estates/suburbs are hotter

What we are exploring

- Can the tool support us in decision making?
 - Where to prioritise funding (along with other climate risk data i.e. flood risk) e.g. Schools Grants
 - Does this support our understanding of wildfire risk?
 - Which care facilities might need to be prioritised (adults, and children's)
 - Which Health facilities (e.g. hospitals), and utilising this in our Environment JSNA and potential Heat Action Plan (with LARA toolkit)
 - Place Making – supportive evidence for enhanced greening – trees, SuDS, etc
- Ground truthing the data, discovering what it is actually telling us – e.g. schools we have MET climate projections data which also combines the building archetype.
- Need to combine this data with underlying vulnerability information i.e deprivation scores, available amenities, types of buildings, coping mechanisms and adaptations already in place etc.

Our Strategy: - [**Surrey Climate Change Adaptation and Resilience Strategy – Surrey Adapt**](#)

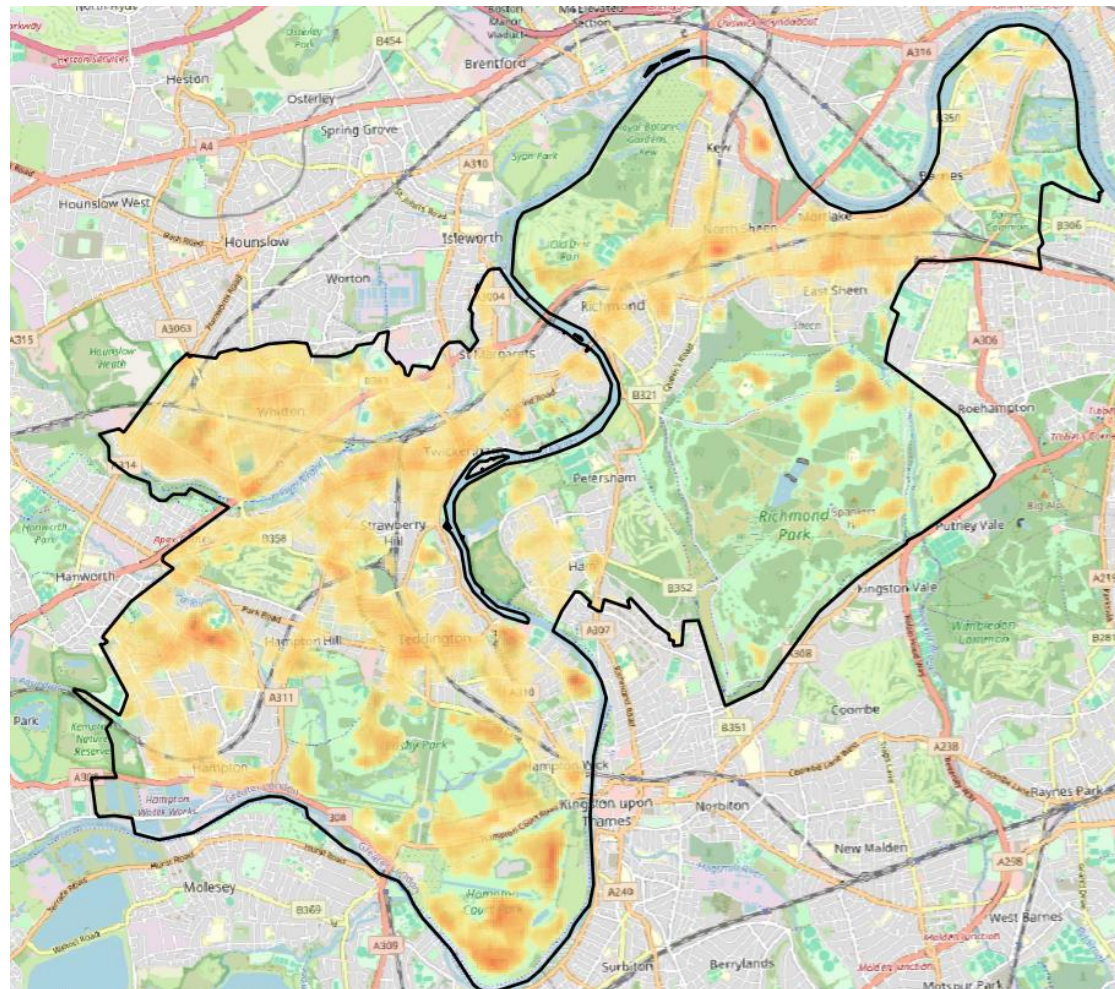
The Spatial Climate Change Risk and Vulnerability Assessment Storymap: [How Surrey's Climate is Changing](#)

Contact me, SCC Climate Change Adaptation lead: sarah.birch@surreycc.gov.uk

Pilot: London Borough of Richmond



London Borough of Richmond



Richmond upon Thames Climate & Air Pollution Risk Map

Location:

 OR Place Pin on Location for Find My Nearest

 Ruler

 [Link](#)

 **Print**

Legend

Climate Risk - Current

Climate: Risk - Current

Lower



Floor

+ Overheating: Risk - Current

☐

+ Flooding: Surface Water (ROFSW)
(Environment Agency, as at April 2026)

☐

⊕ Flooding: Rivers & Sea (ROFRS)
(Environment Agency, as at April 2026)

Overheating: Annual Count of Hot Summer Days - 2001-2020 median (Met Office, 2025)

☐

Overheating: Annual Count of Tropical Nights - 2001-2020 median (Met Office, 2025)

☐

+ Climate Risk - Future Climate Change

☐

+ Air Pollution Risk

☐

Exposure & Vulnerability

☐

+ Supporting Layers

☐

Base Layers

Climate Risk - Future Climate Change



Pilot: Bedford Borough Council

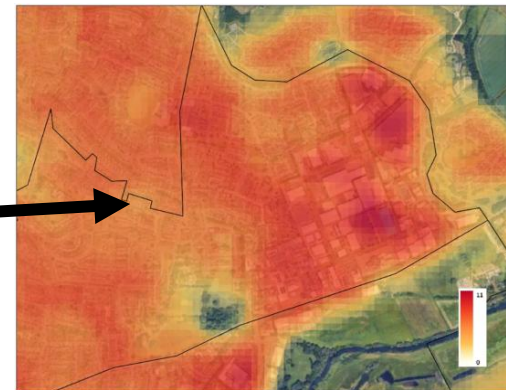
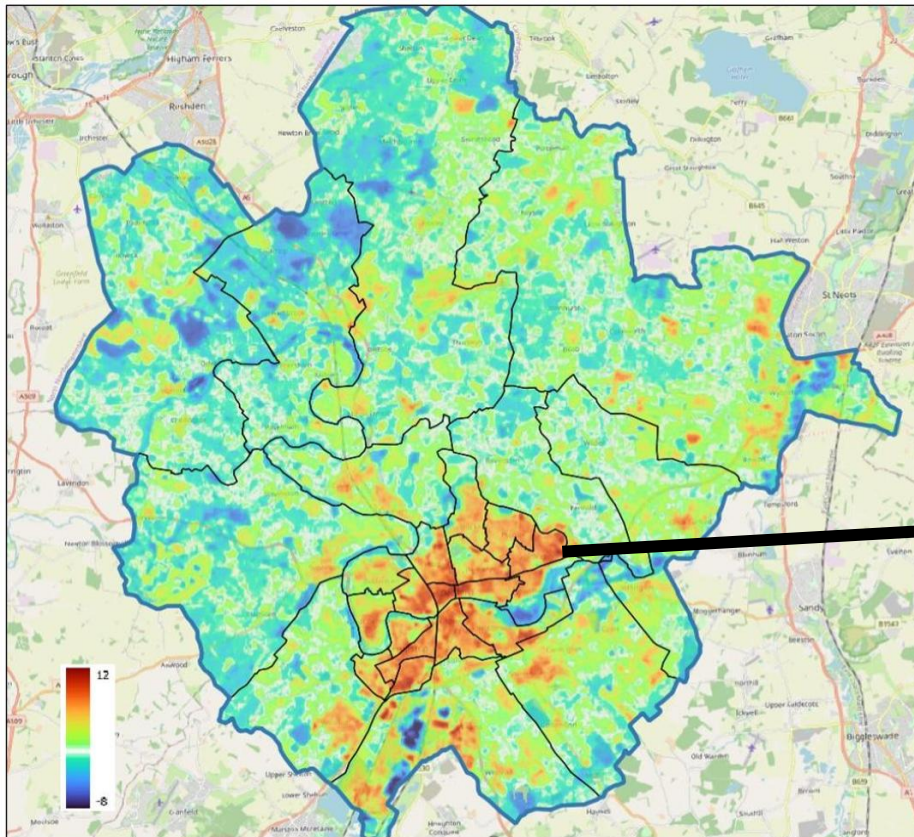


Urban Heat Index Mapping Journey

09/09/2026



BEDFORD
BOROUGH COUNCIL



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LEGEND

Project stages

Consultancy

Business Case

Challenges

Delivery

STARTING POINT

Need to identify urban heat index for Bedford Borough to identify priority areas of intervention via evidenced and climate just approach to this.

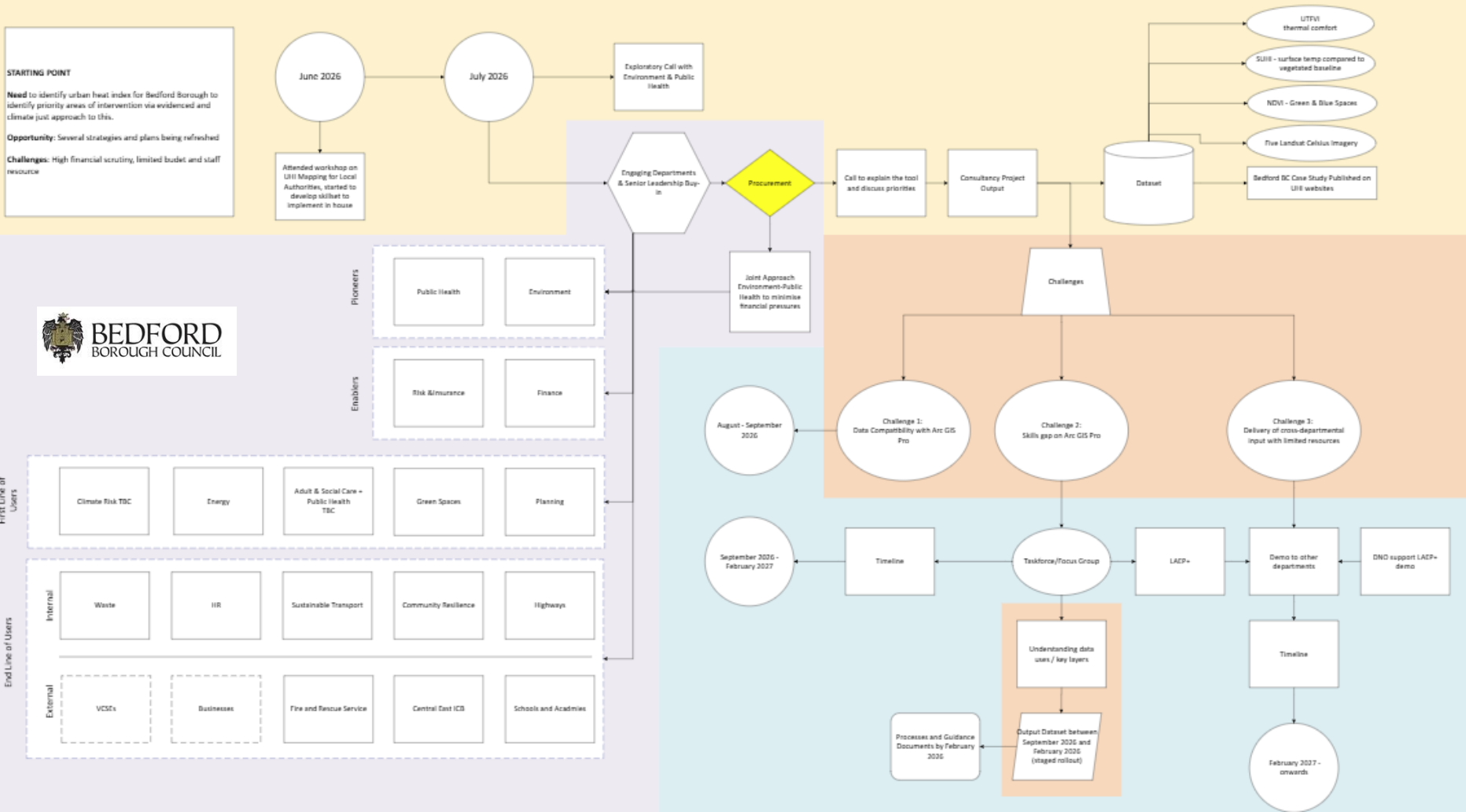
Opportunity: Several strategies and plans being refreshed

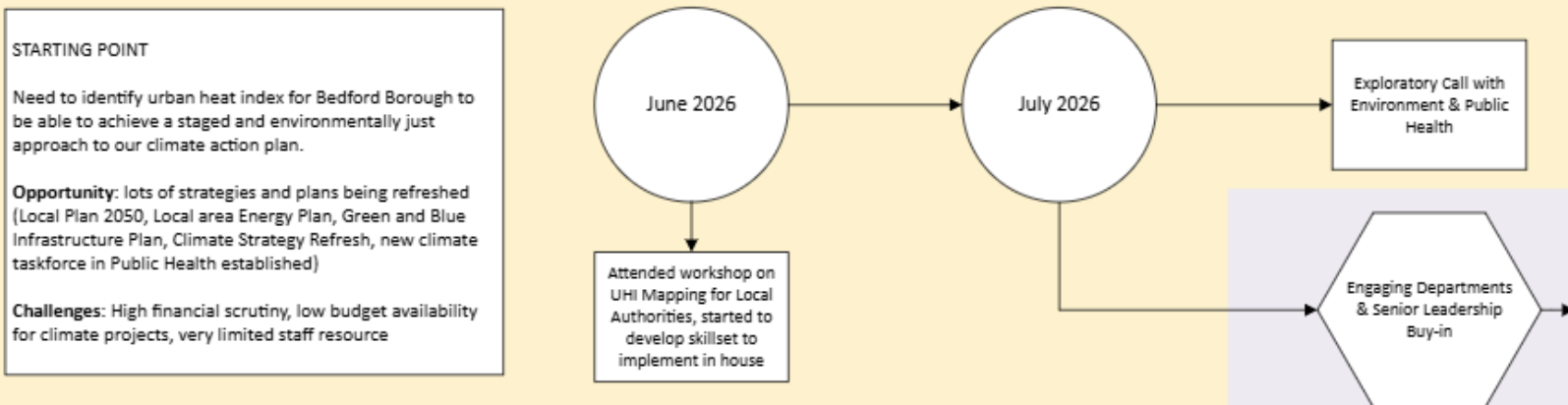
Challenges: High financial scrutiny, limited budget and staff resource

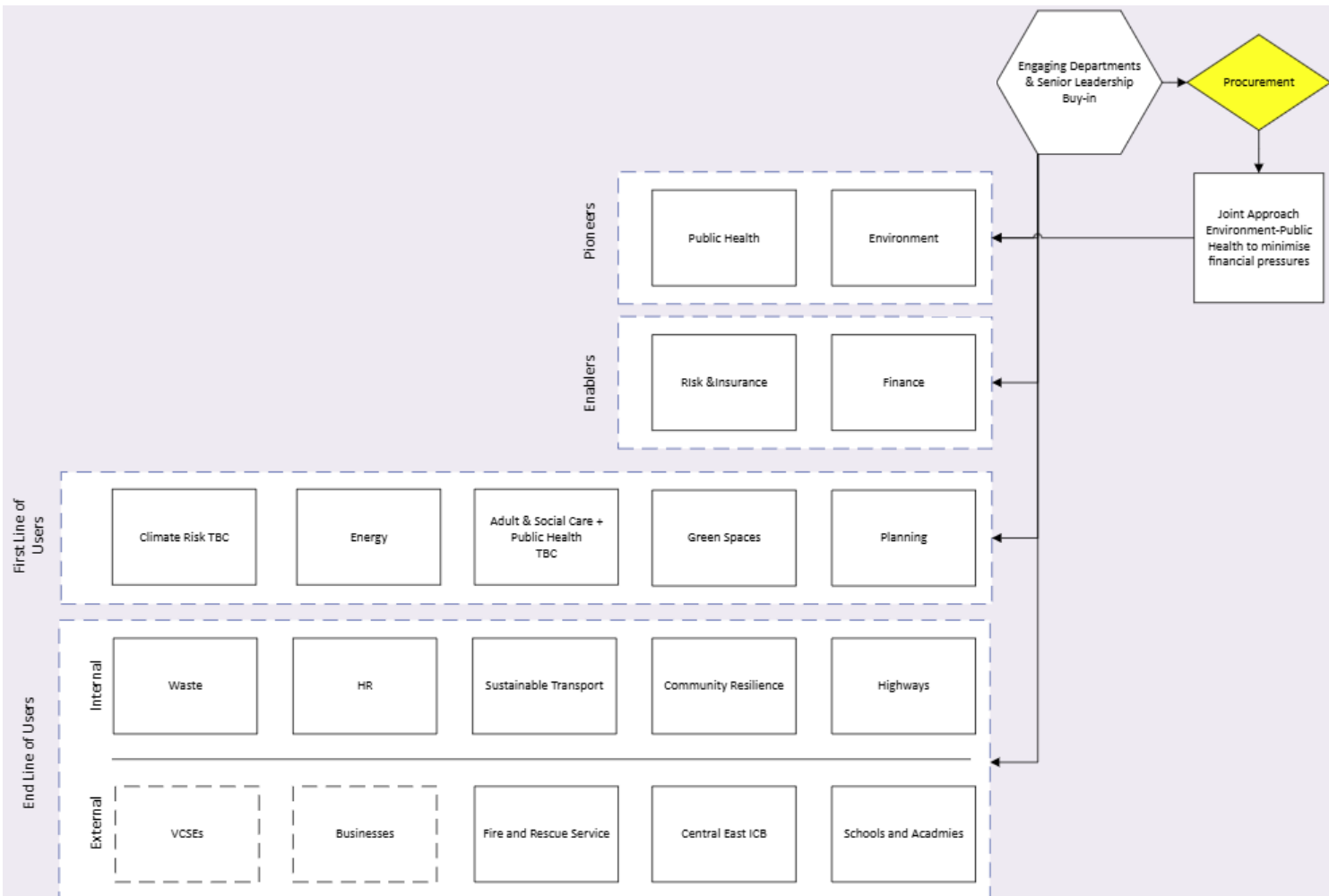


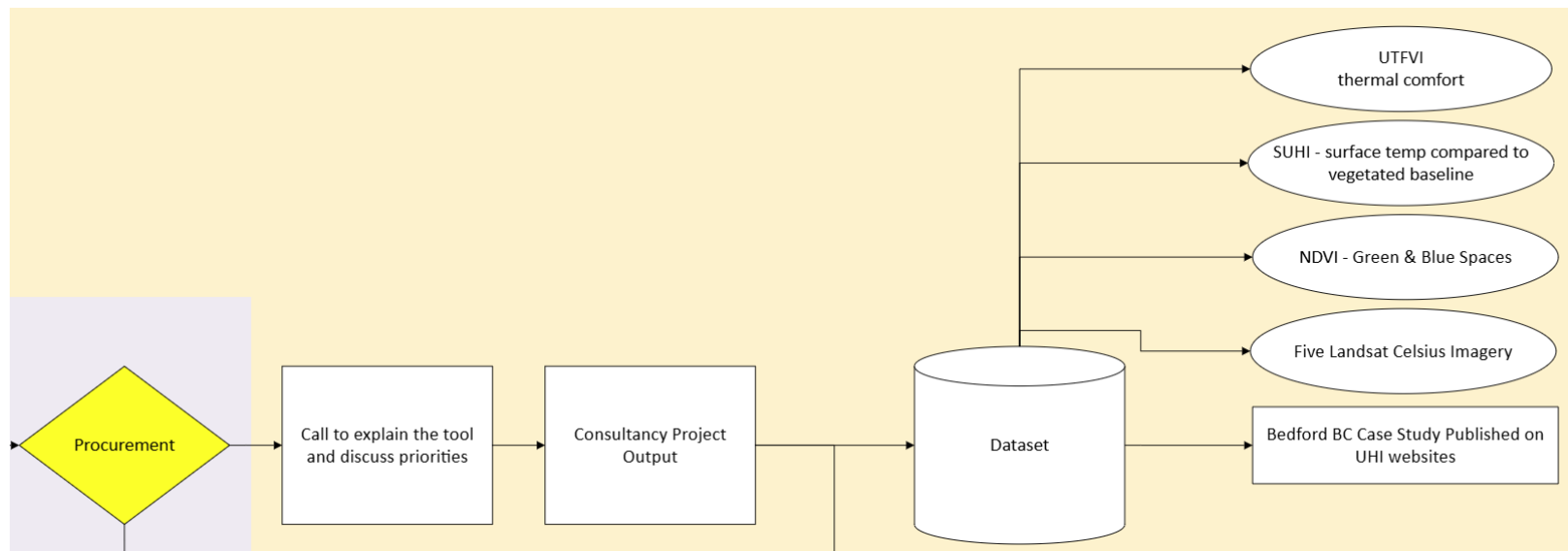
First Line of Users

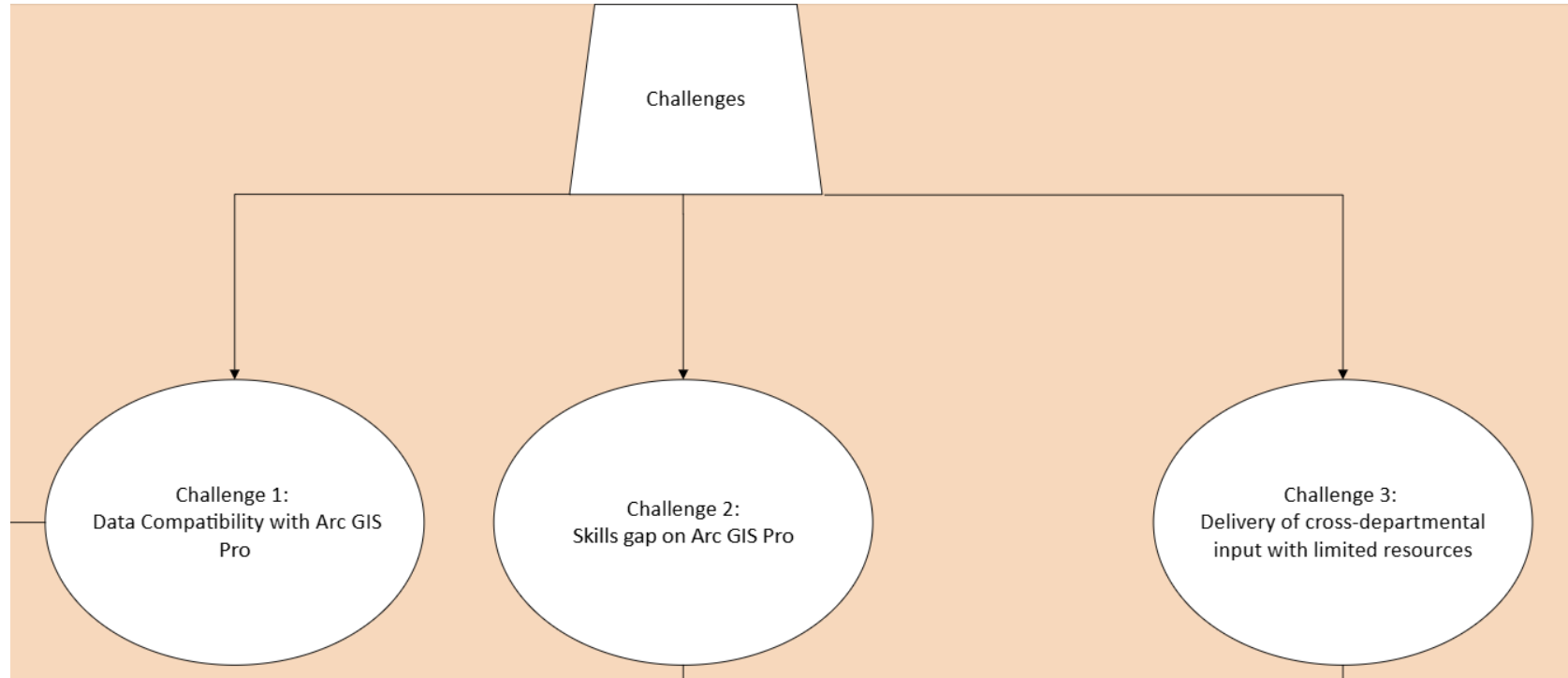
End Line of Users

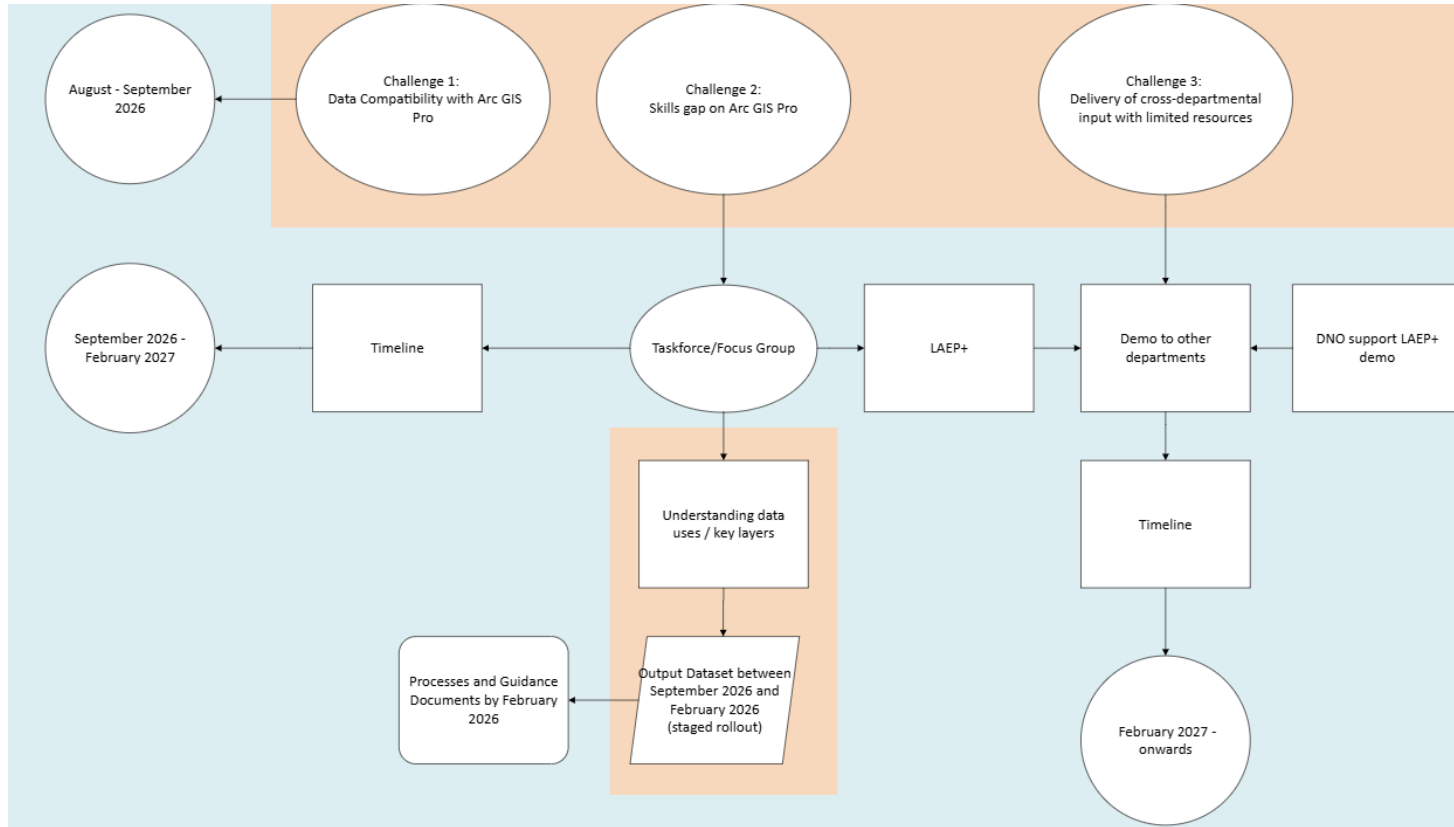












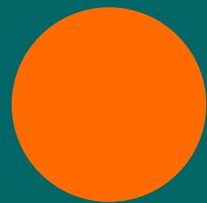
Challenges

Delivery

Questions?

Cristina.Vaduva@bedford.gov.uk

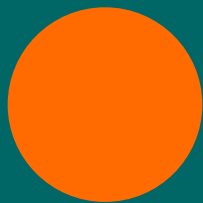
Rob.Couch@bedford.gov.uk



Q&A session



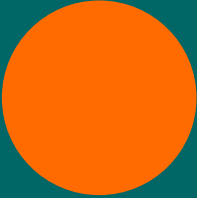
Urban Heat Index



Further information:

Urban Heat Index - Further information – Fill out form





Thank you for your time

Any queries: info@urbanheatindex.com

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