Cambridge Urban Forest Master Plan

Task Force meeting #3

July 26, 2018

REED HILDERBRAND

PROGRESS UPDATE

INITIAL SPATIAL ANALYSIS

PROJECT GOALS

DISCUSSION AND QUESTIONS

PUBLIC COMMENTS

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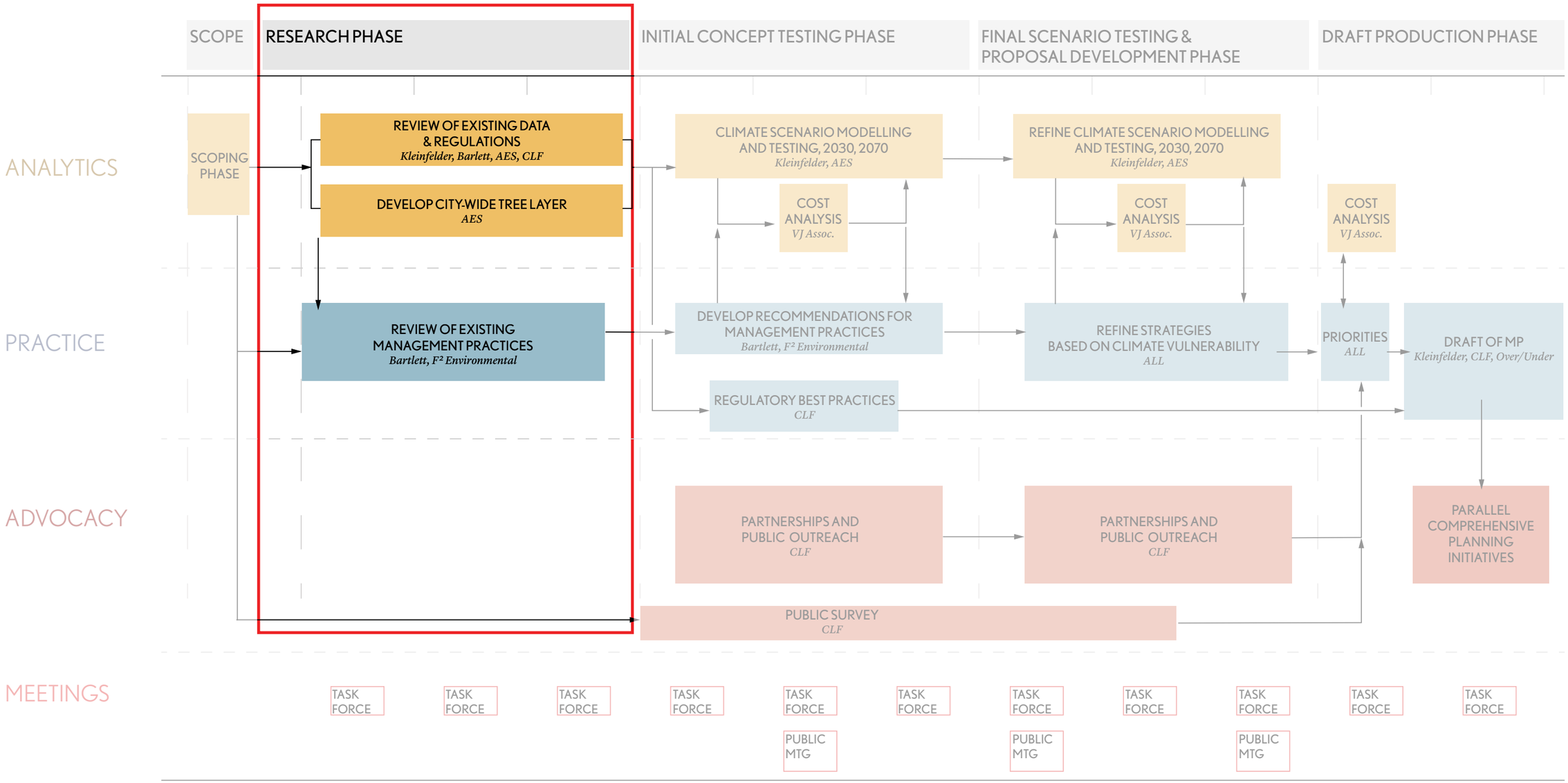
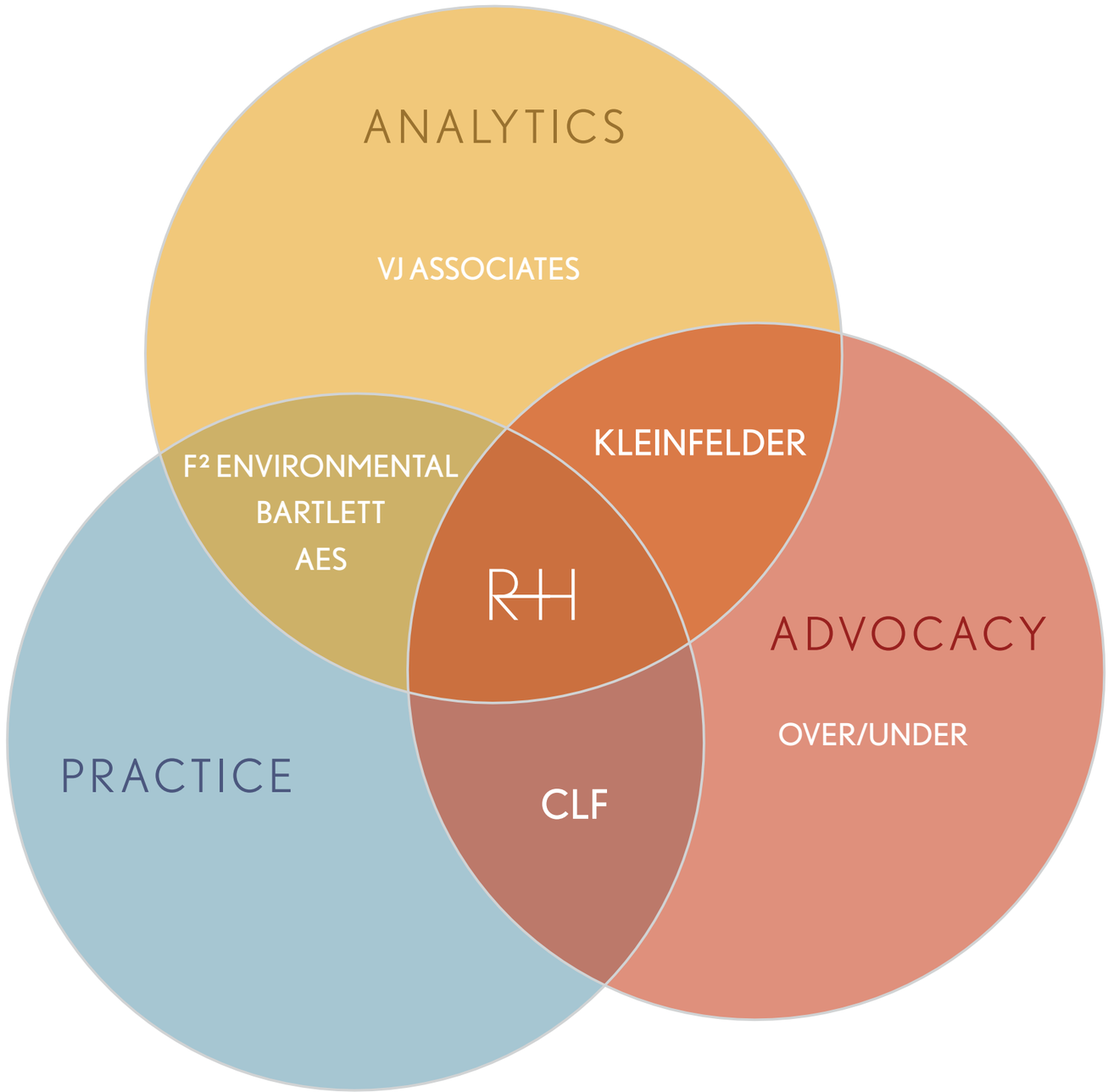
SCHEDULE


SCOPE
RESEARCH PHASE
INITIAL CONCEPT TESTING PHASE
FINAL SCENARIO TESTING & PROPOSAL DEVELOPMENT PHASE
DRAFT PRODUCTION PHASE
ANALYTICS
PRACTICE
ADVOCACY
MEETINGS
SCOPING PHASE
REVIEW OF EXISTING DATA & REGULATIONS
Kleinfelder, Barlett, AES, CLF
DEVELOP CITY-WIDE TREE LAYER
AES
REVIEW OF EXISTING MANAGEMENT PRACTICES
Bartlett, F² Environmental
CLIMATE SCENARIO MODELLING AND TESTING, 2030, 2070
Kleinfelder, AES
COST ANALYSIS
VJ Assoc.
DEVELOP RECOMMENDATIONS FOR MANAGEMENT PRACTICES
Bartlett, F² Environmental
REGULATORY BEST PRACTICES
CLF
PARTNERSHIPS AND PUBLIC OUTREACH
CLF
PUBLIC SURVEY
CLF
REFINE CLIMATE SCENARIO MODELLING AND TESTING, 2030, 2070
Kleinfelder, AES
COST ANALYSIS
VJ Assoc.
REFINE STRATEGIES BASED ON CLIMATE VULNERABILITY
ALL
PARTNERSHIPS AND PUBLIC OUTREACH
CLF
COST ANALYSIS
VJ Assoc.
PRIORITIES
ALL
DRAFT OF MP
Kleinfelder, CLF, Over/Under
PARALLEL COMPREHENSIVE PLANNING INITIATIVES
TASK FORCE
PUBLIC MTG

RESEARCH

Preliminary team summit — July 2018



RESEARCH

Preliminary team summit — July 2018

SURVEY OF CURRENT CANOPY

200 random 1 acre plots equal a 5% representative sample

The categories of assessment:

Genus
Species
DBH
Condition Class
Age Class
Native - Invasive to Massachusetts
Pests / Diseases
Location Information
Size of Planting Bed/Tree Pit
Material
Private / Public / Commercial

TREE HEALTH CONDITIONS

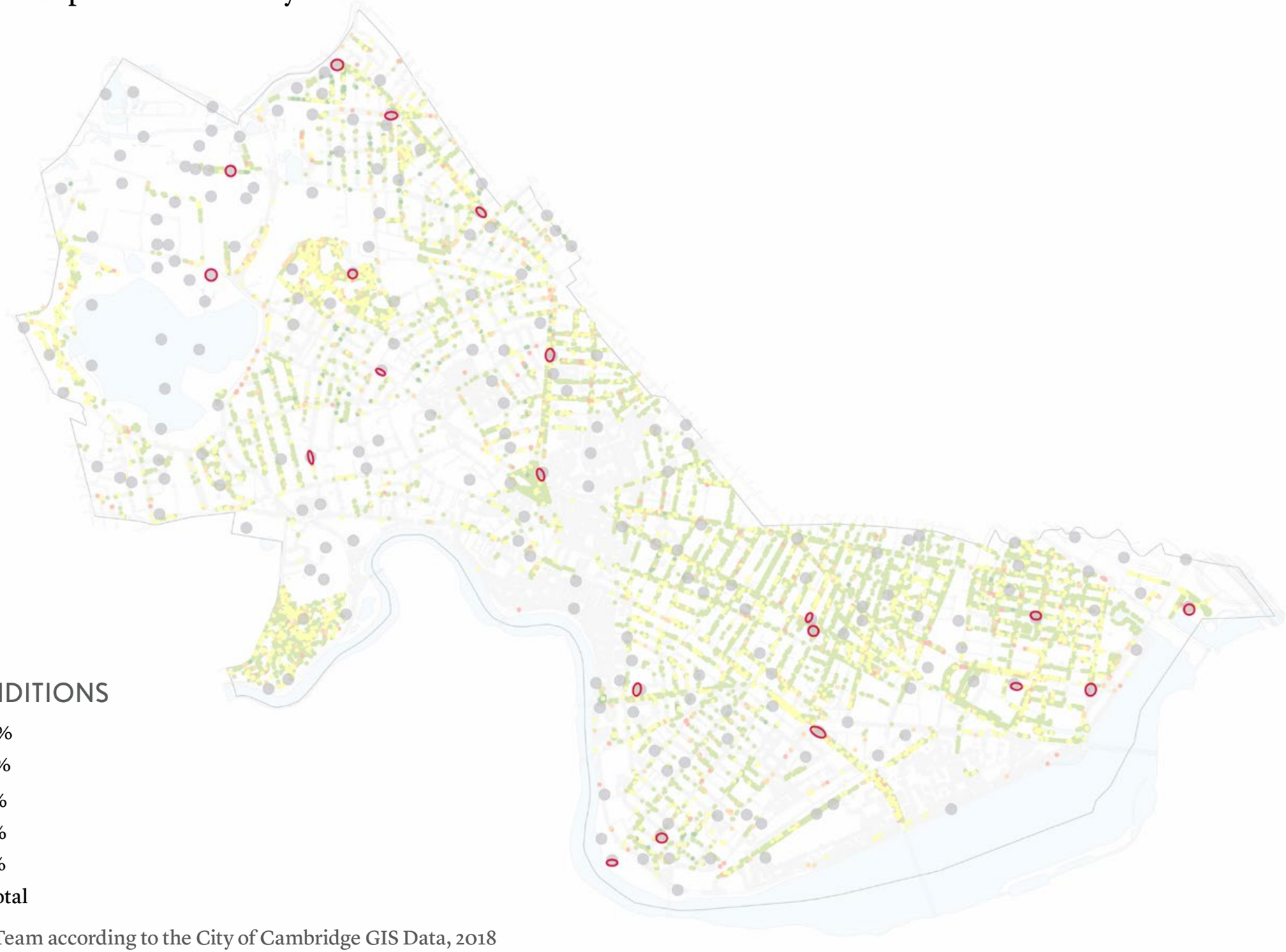
- Good 28.6%
- Fair 7.4%
- Poor 2.0%
- Dead 0.8%
- No Information 61.2%

31,800 tree data points total

Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

SOIL SURVEY

A representative sample to assess city soils



TREE HEALTH CONDITIONS

Good	28.6%
Fair	7.4%
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Dead	0.8%
No Information	61.2%

31,800 tree data points total

Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

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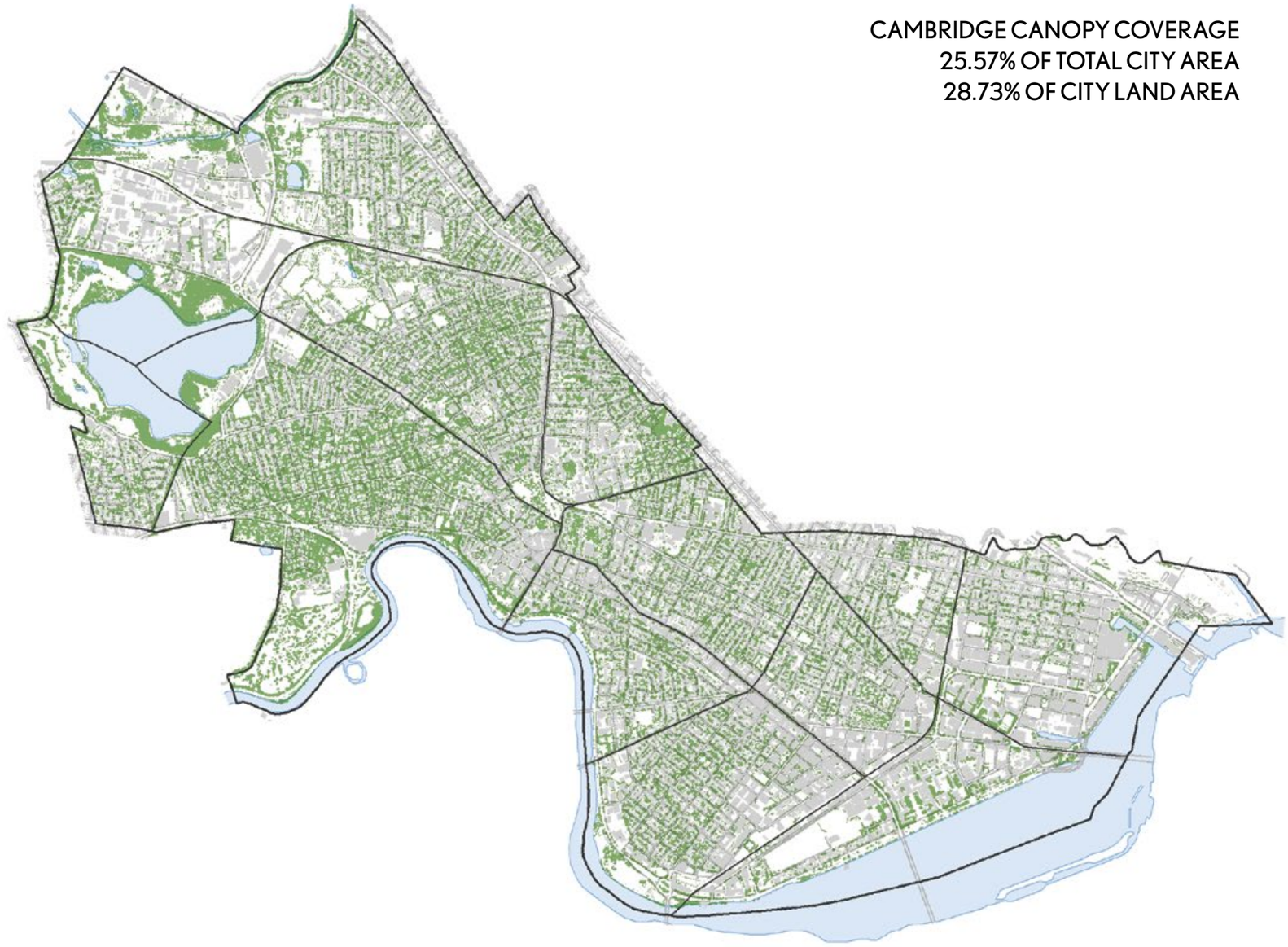
TREE CANOPY COVER

Preliminary spatial analysis

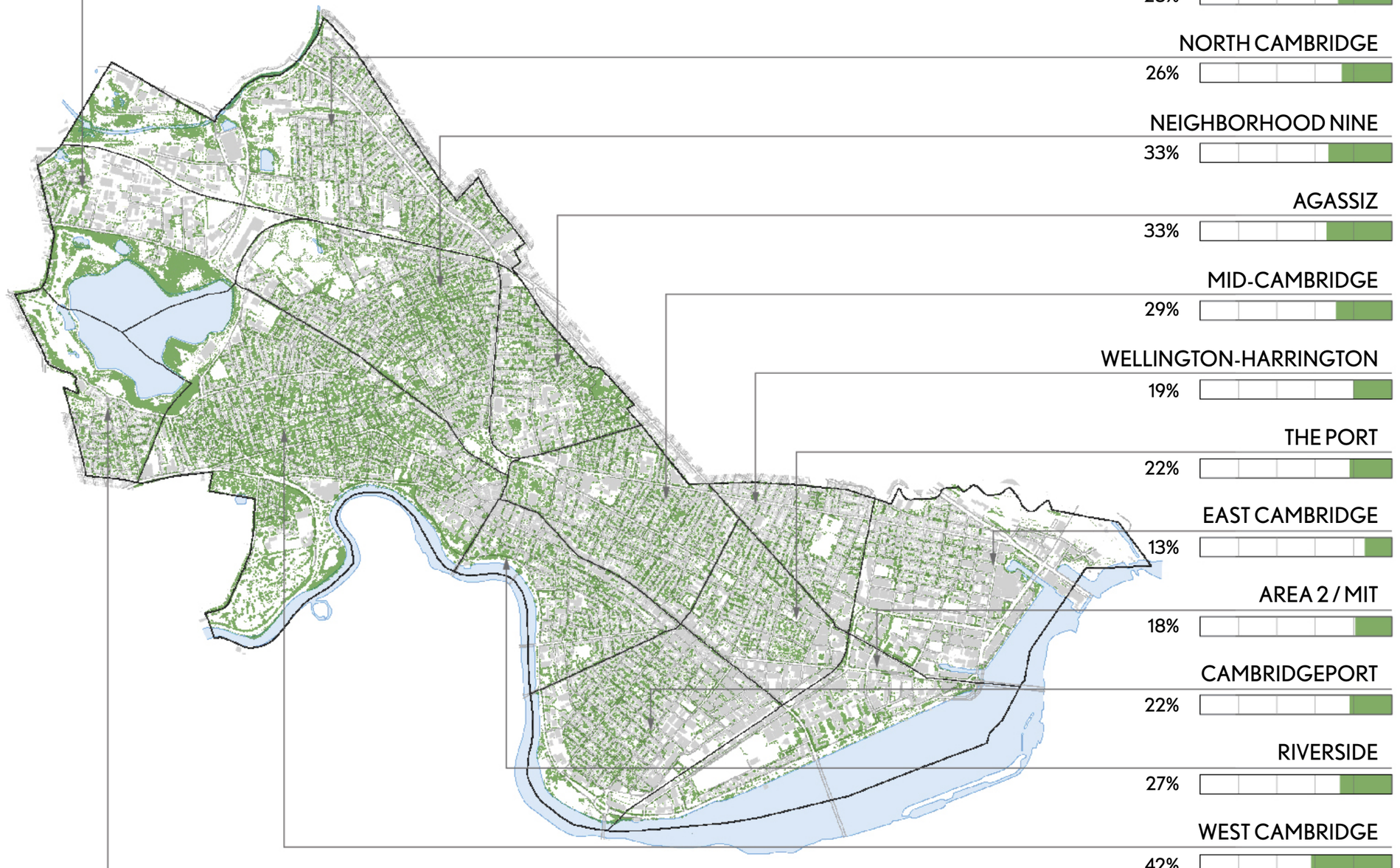


CAMBRIDGE CANOPY COVERAGE
25.57% OF TOTAL CITY AREA
28.73% OF CITY LAND AREA

Source: UVM 2014 Canopy Layer

TREE CANOPY COVER

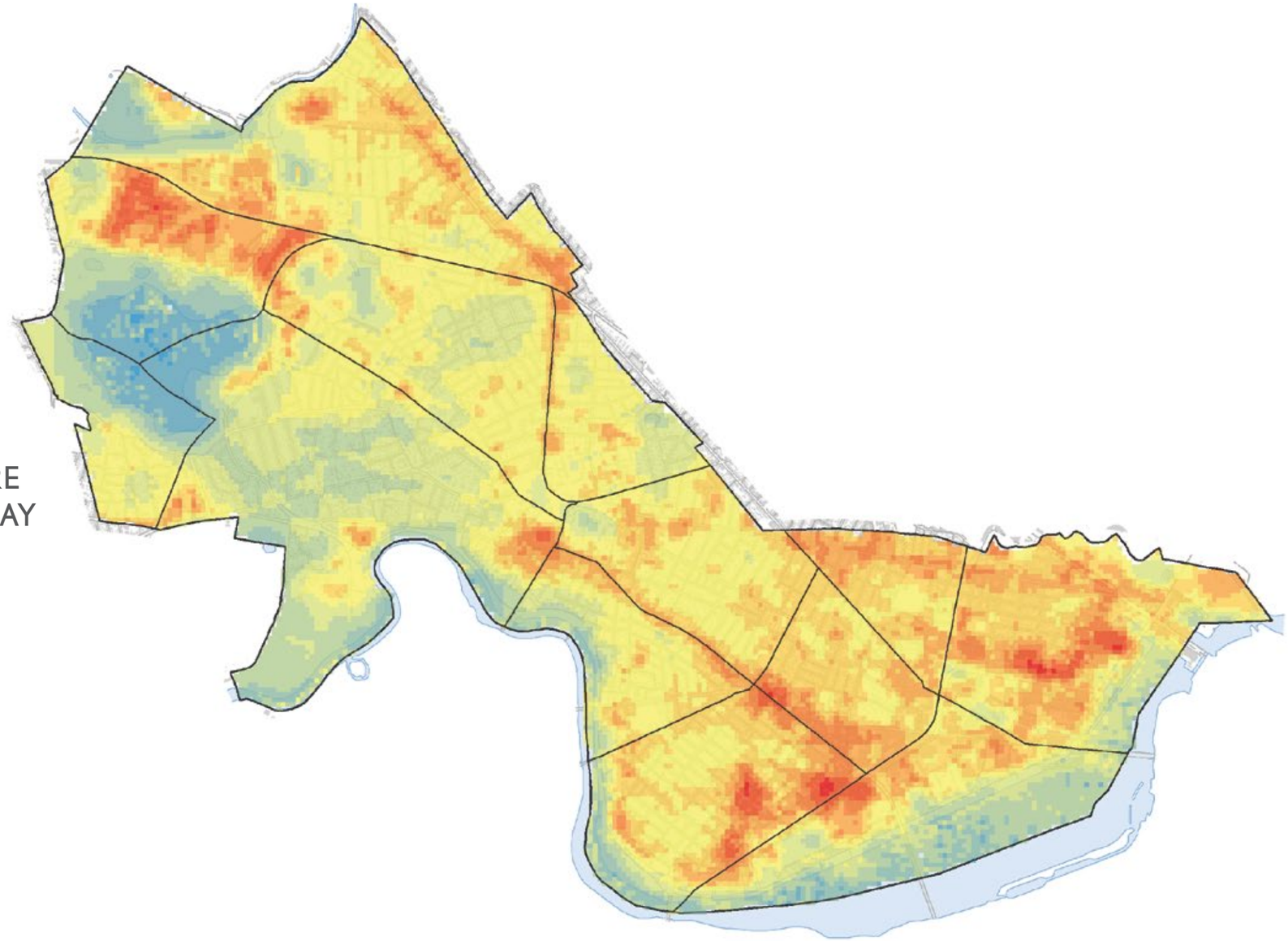
Preliminary spatial analysis



Source: UVM 2014 Canopy Layer

URBAN HEAT ISLAND

Predicted heat impacts 2070



ESTIMATED AMBIENT AIR TEMPERATURE OF A 100 °F DAY

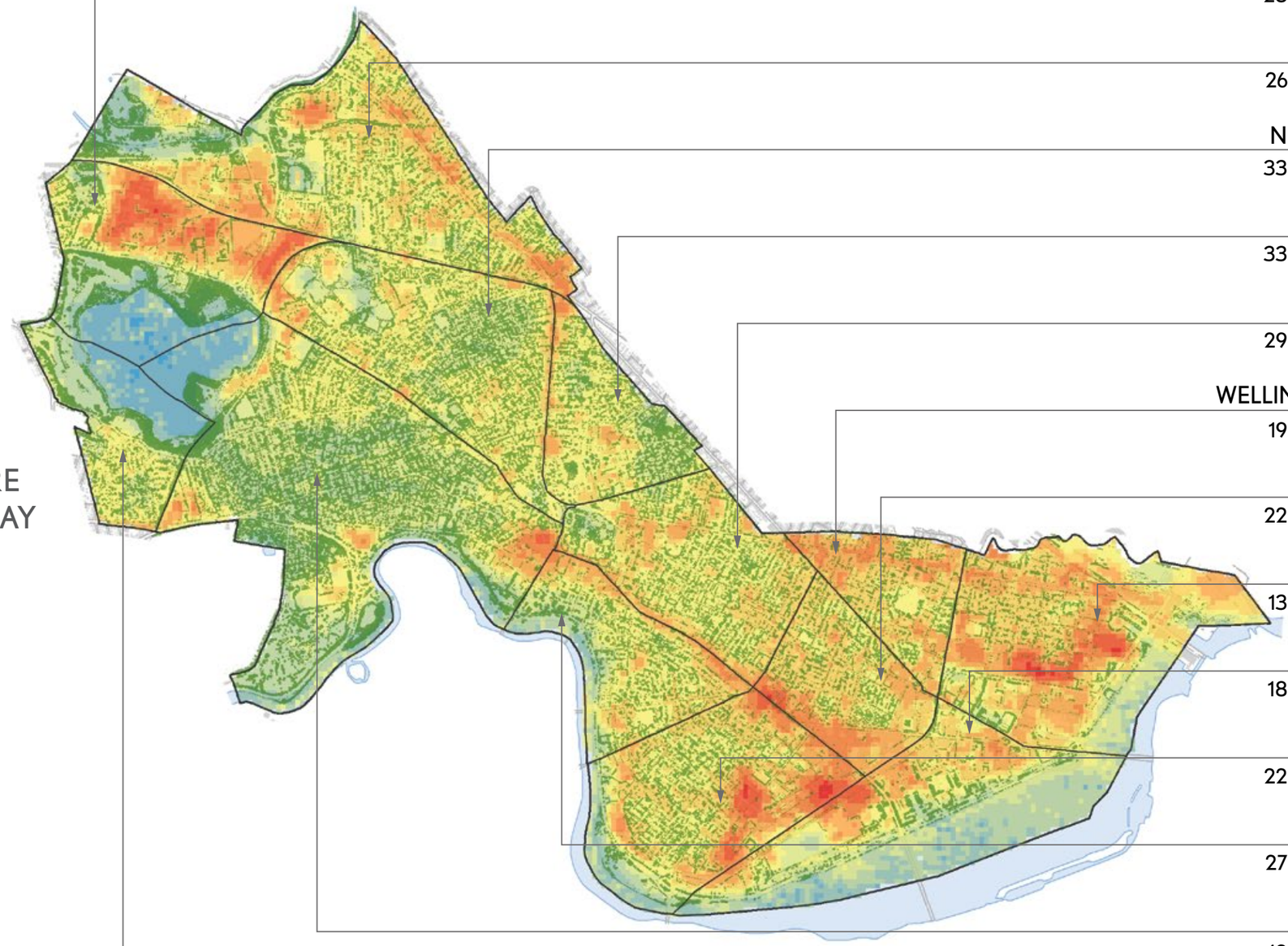
- 86.6 - 87.5
- 87.5 - 90
- 90 - 92.5
- 92.5 - 95
- 95 - 97.5
- 97.5 - 100
- 100 - 102.5
- 102.5 - 105
- 105 - 107.5
- 107.5 - 110
- 110 - 112.5

Source: CCVA

2070 Urban Heat Island

URBAN HEAT ISLAND AND CANOPY COVER

Predicted heat impacts 2070



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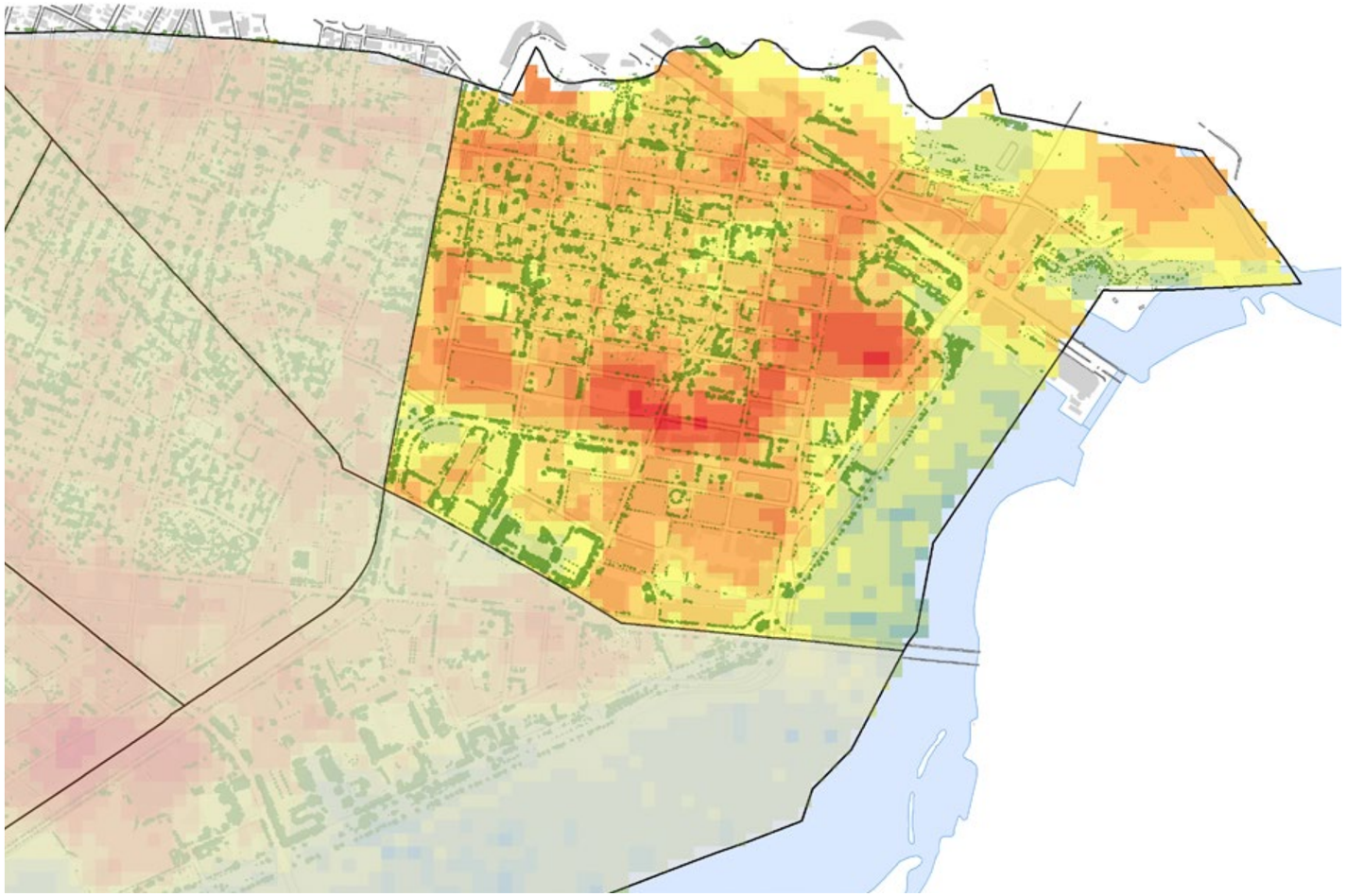
Source: CCVA
2070 Urban Heat Island

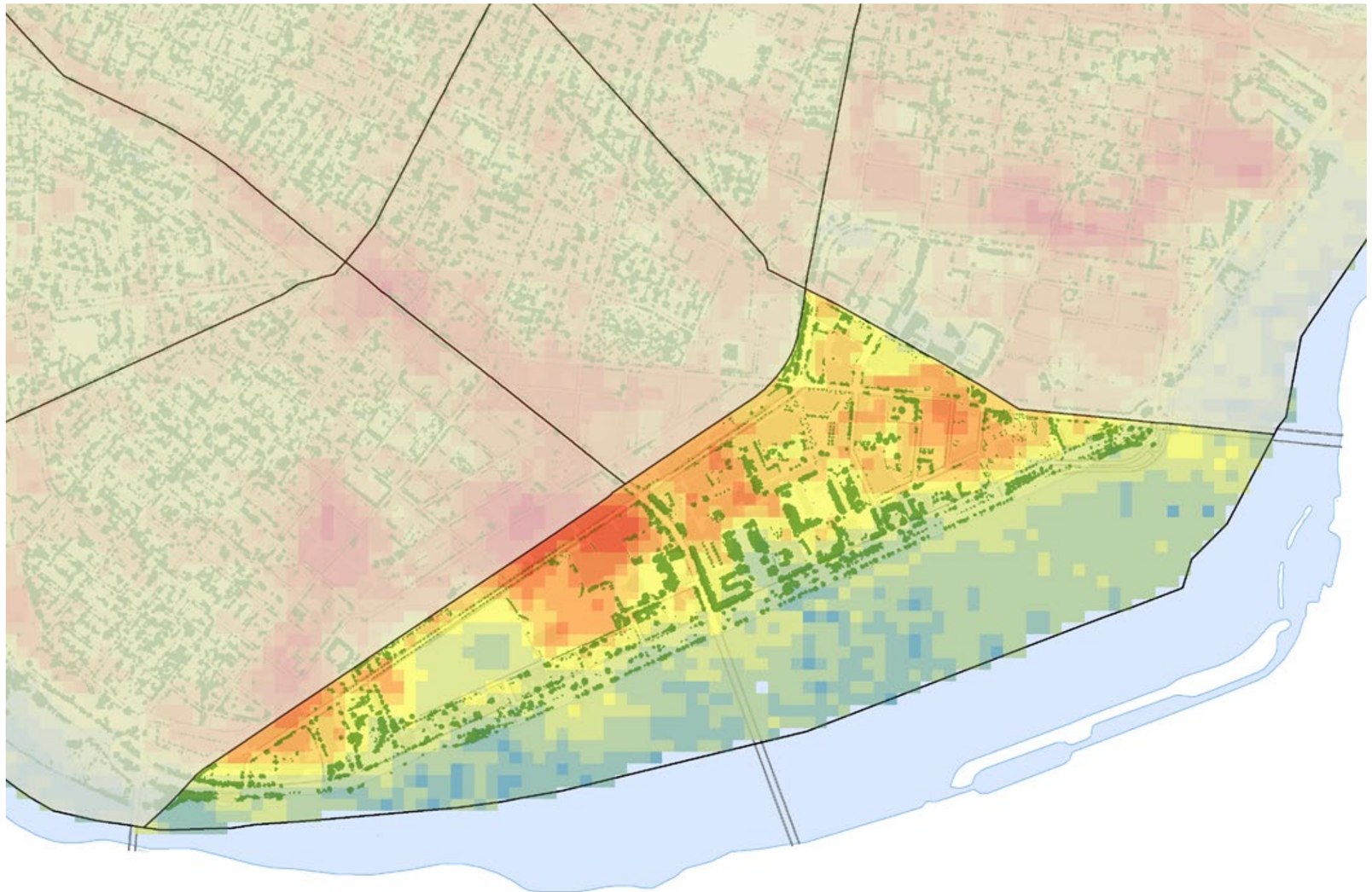
CANOPY COVER

East Cambridge — 13% Coverage



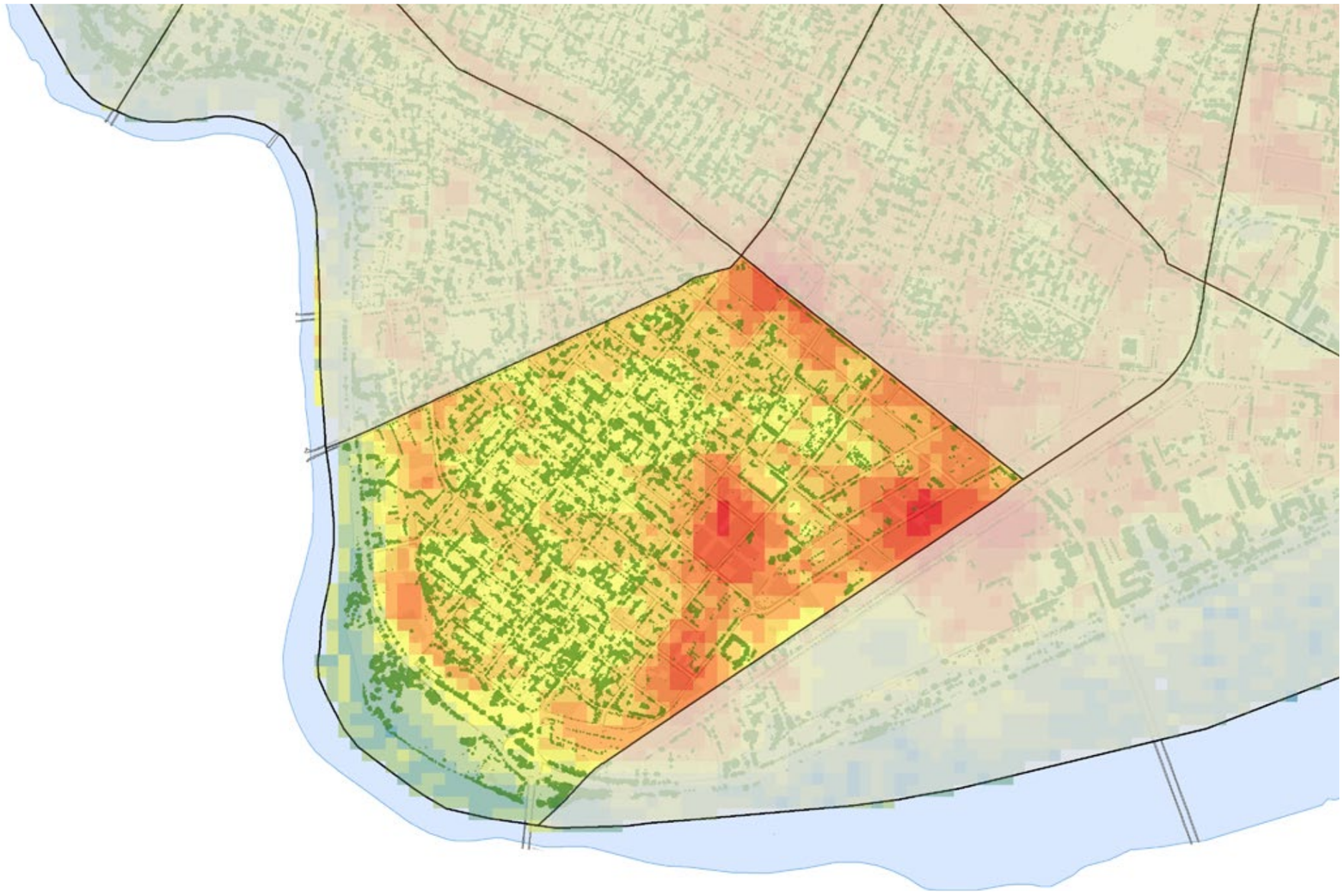
CANOPY COVER

Area 2 / MIT — 18% Coverage



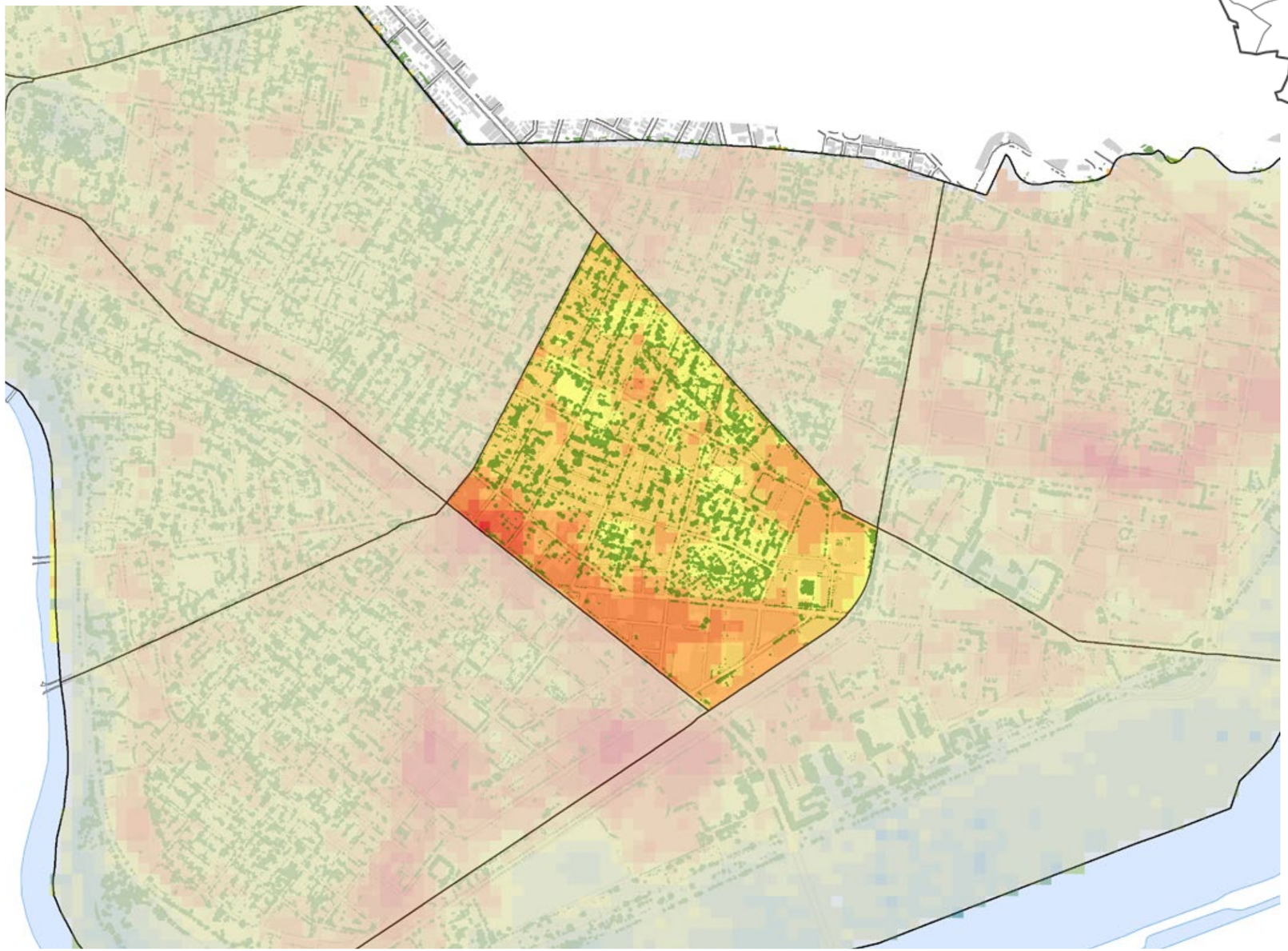
CANOPY COVER

Cambridgeport — 22% Coverage



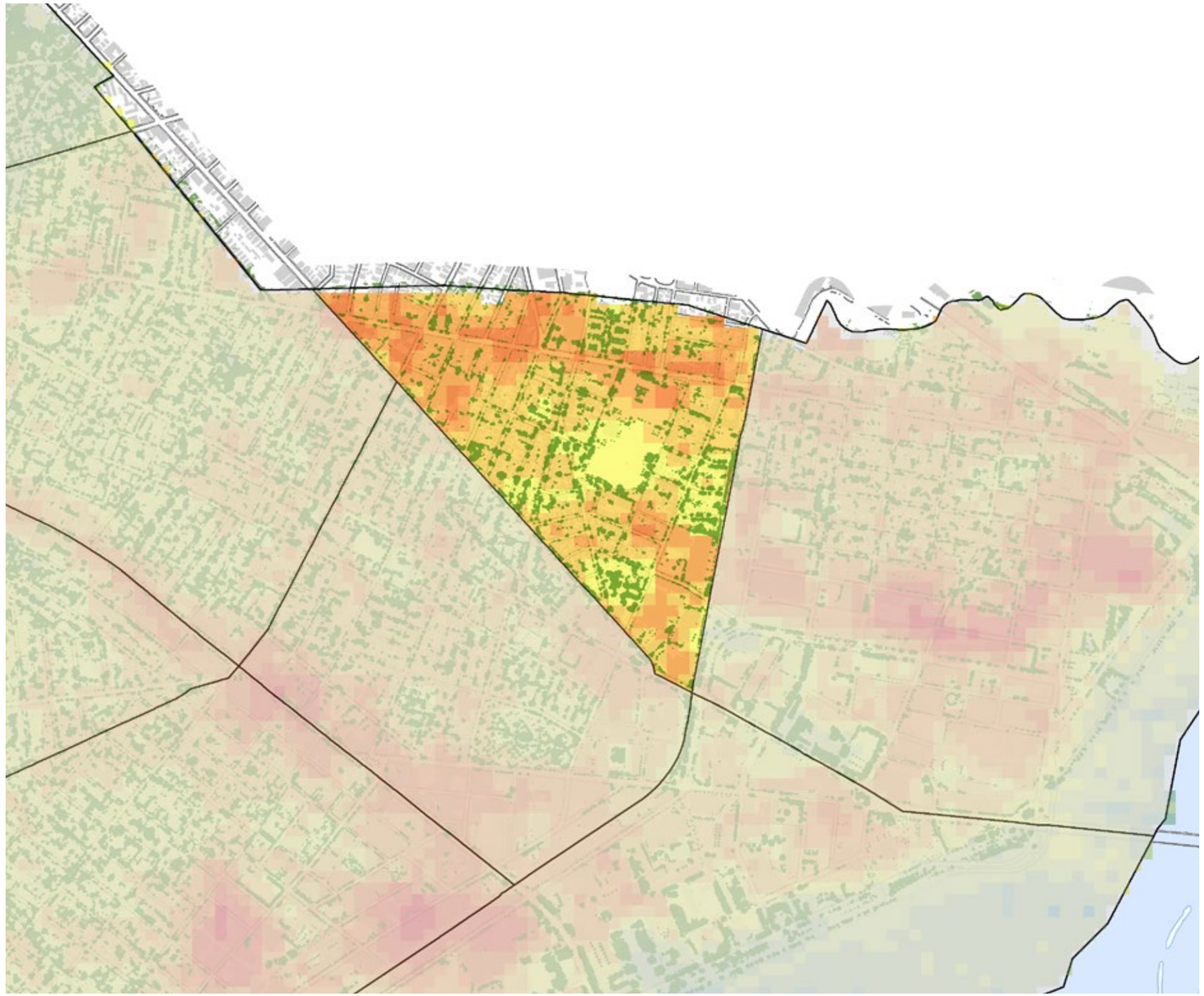
CANOPY COVER

The Port — 22% Coverage



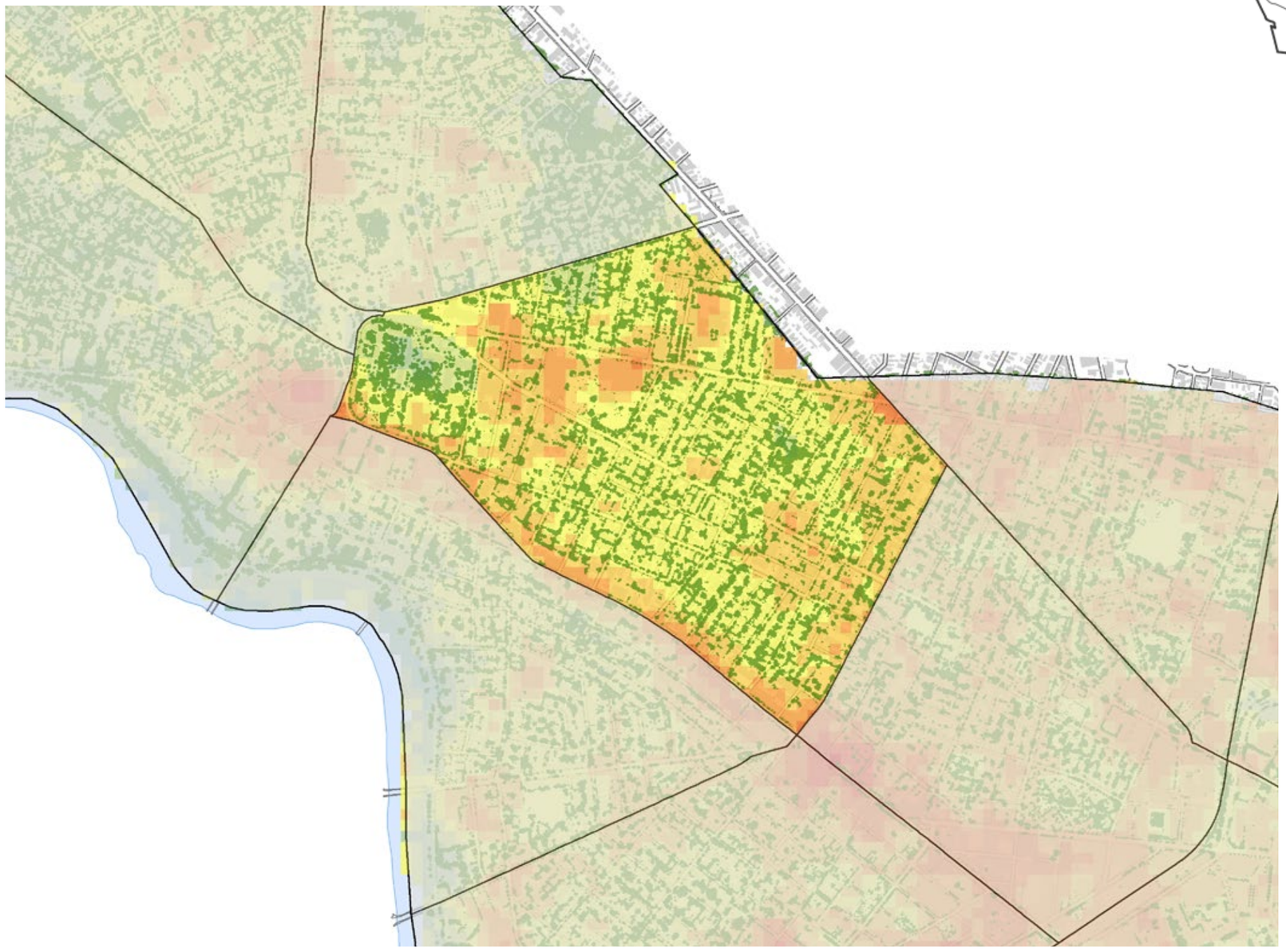
CANOPY COVER

Wellington-Harrington — 19% Coverage



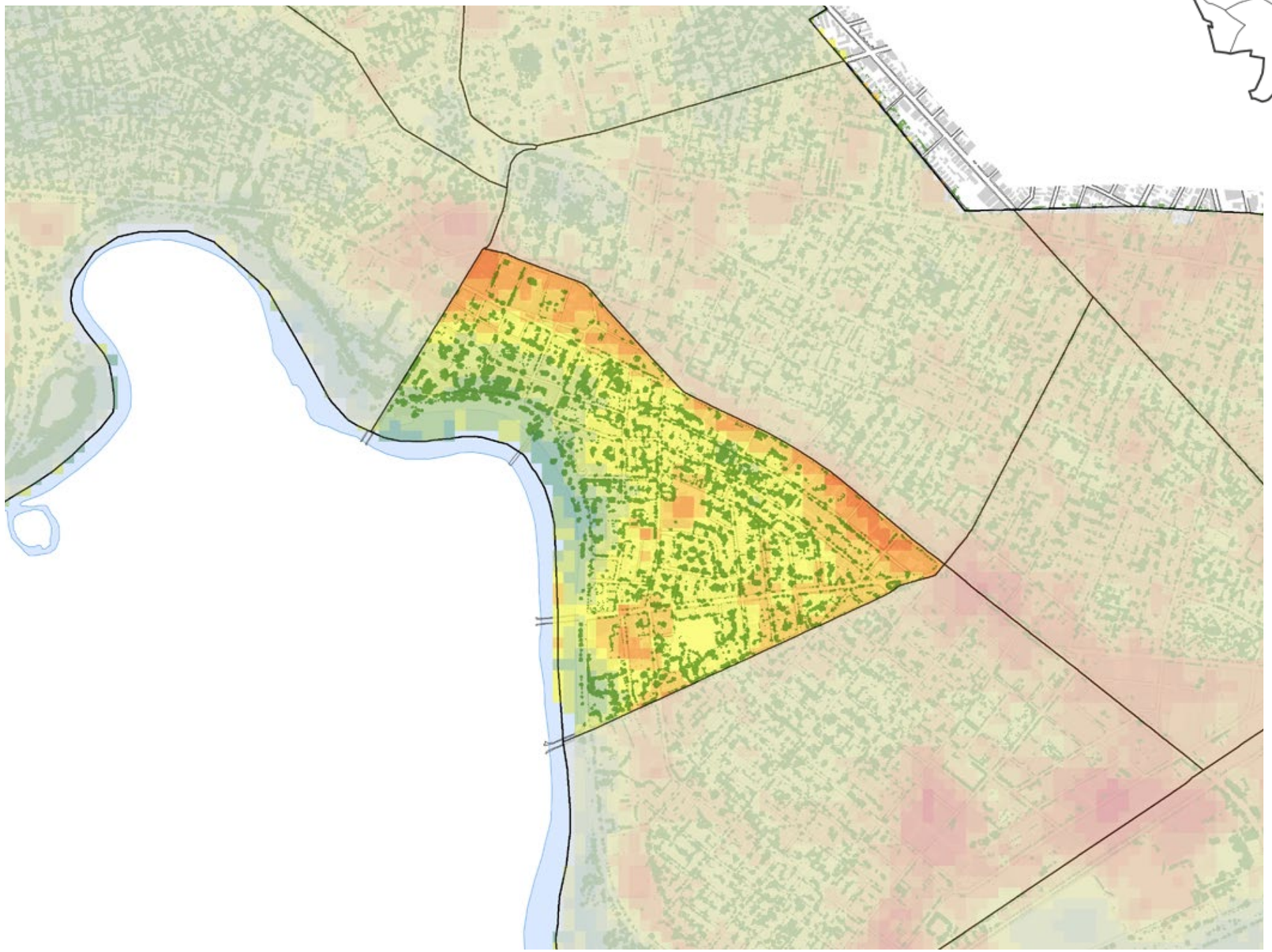
CANOPY COVER

Mid-Cambridge — 29% Coverage



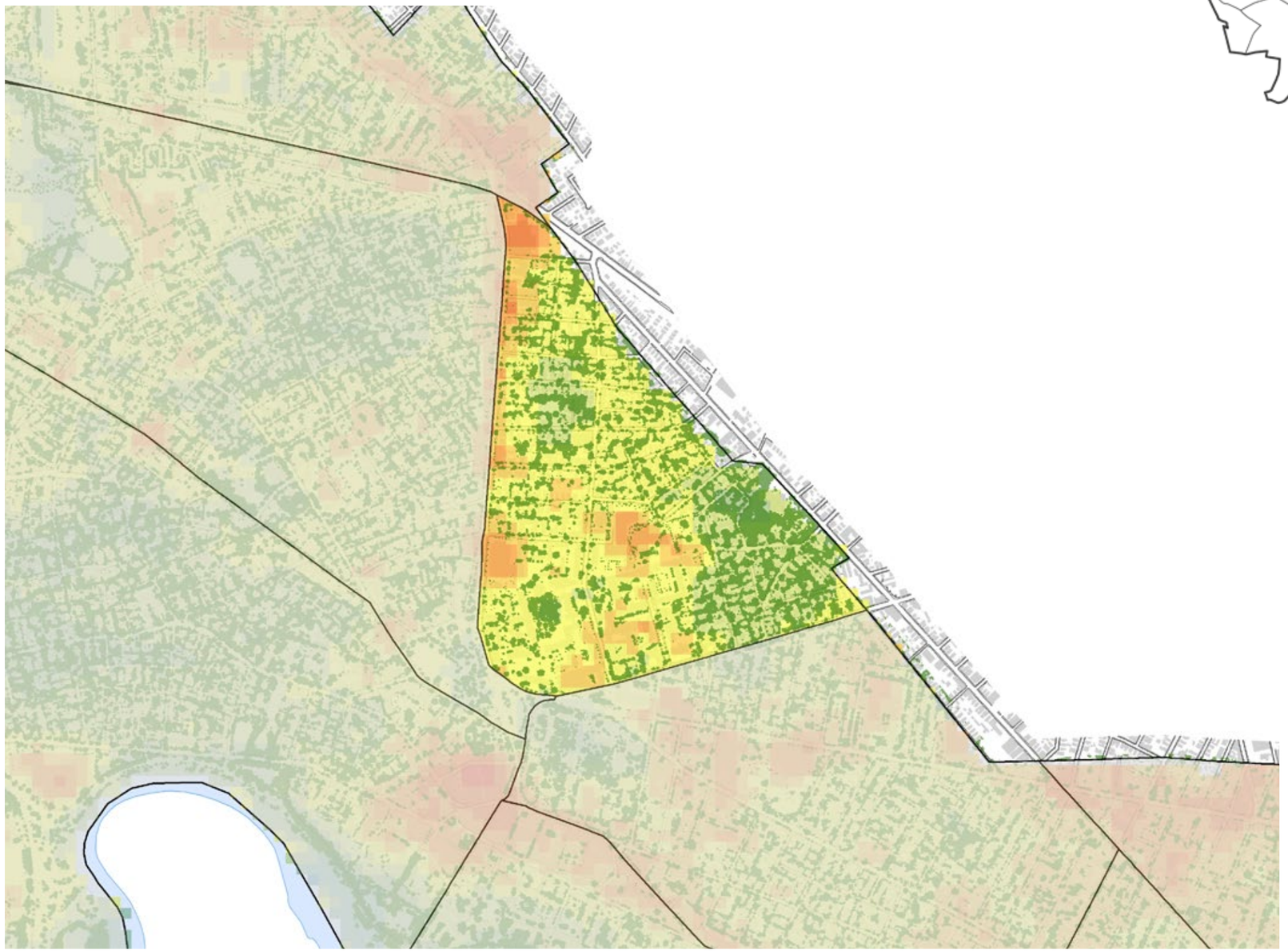
CANOPY COVER

Riverside — 27% Coverage



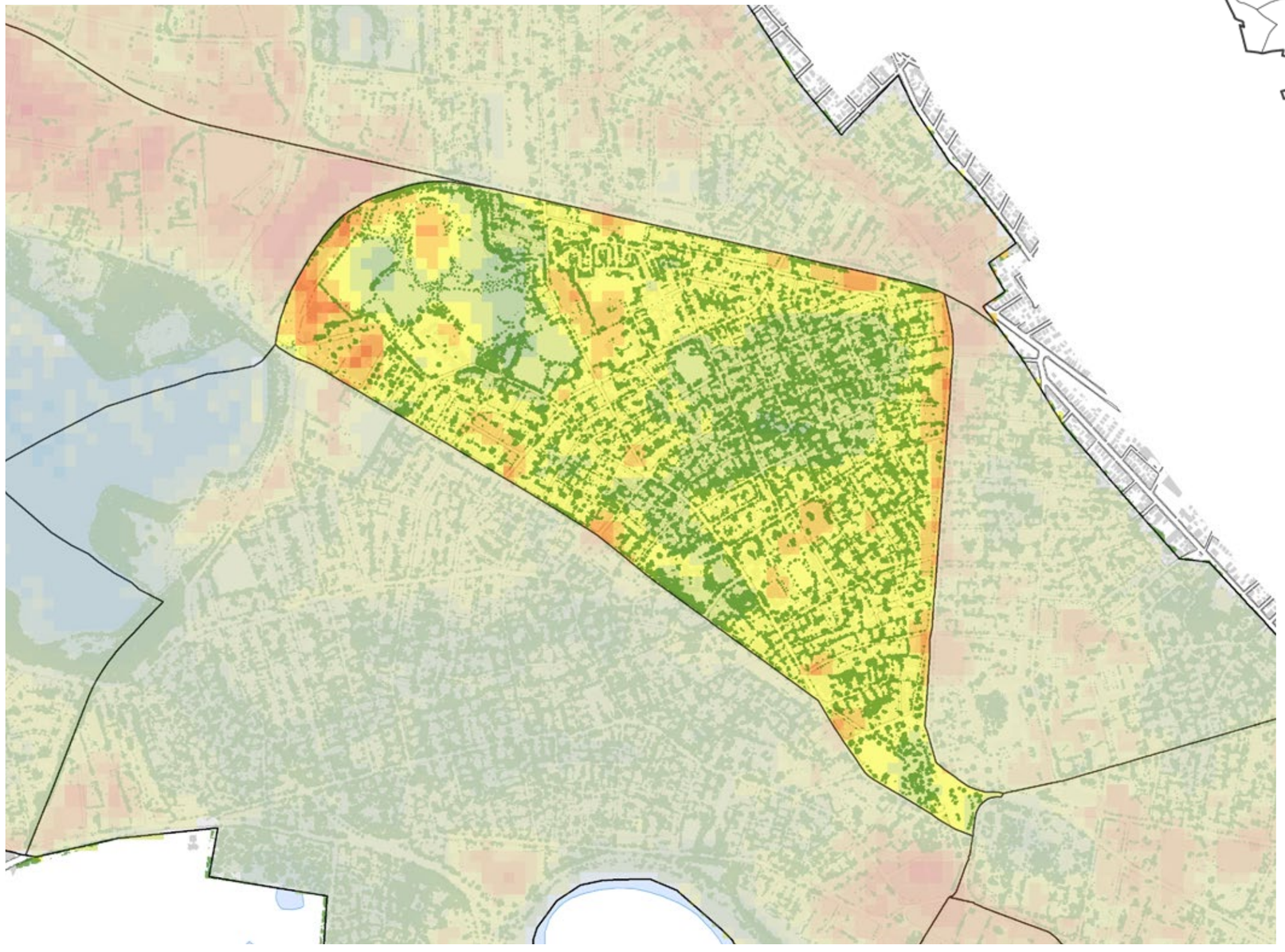
CANOPY COVER

Agassiz — 33% Coverage



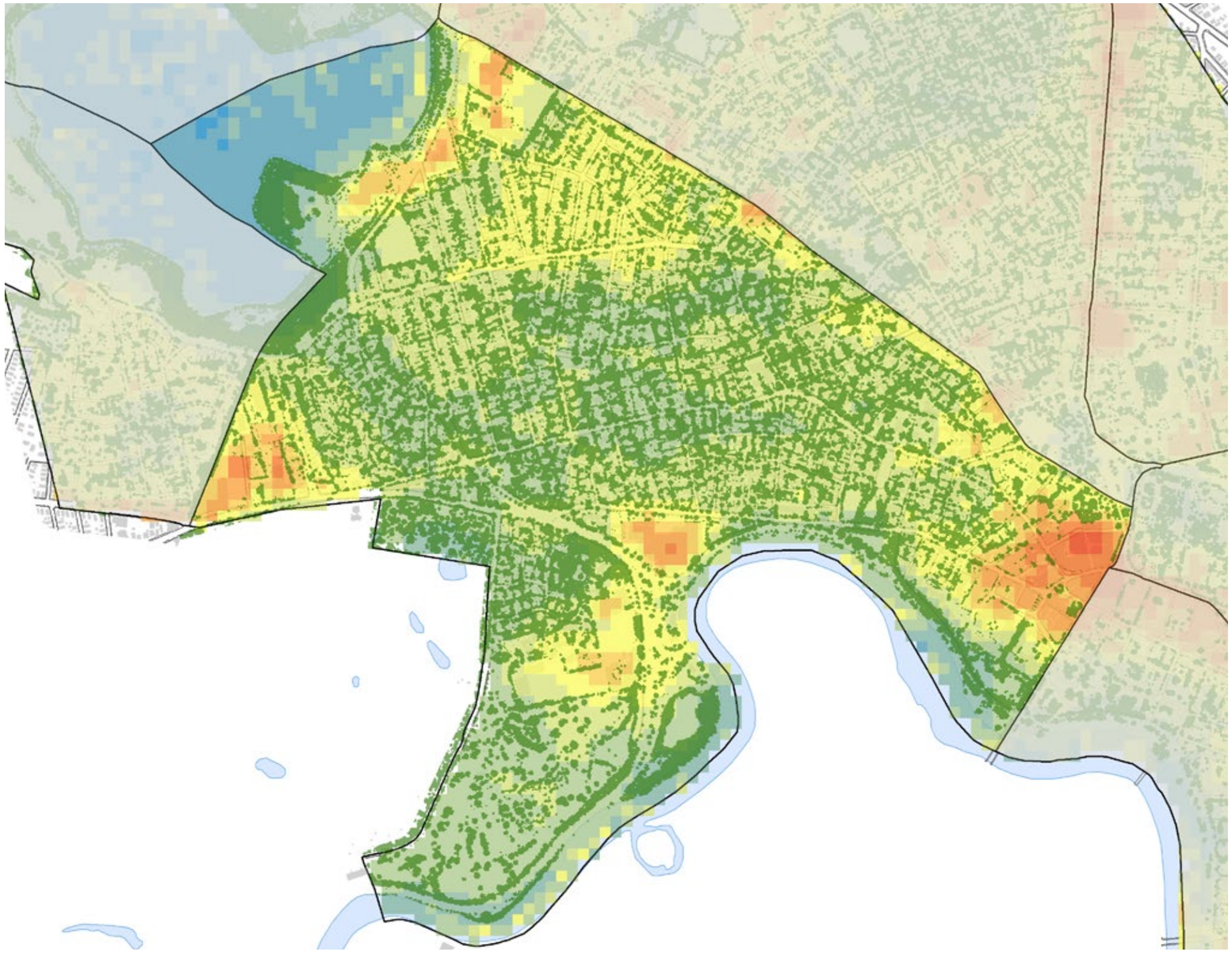
CANOPY COVER

Neighbrohood Nine — 33% Coverage



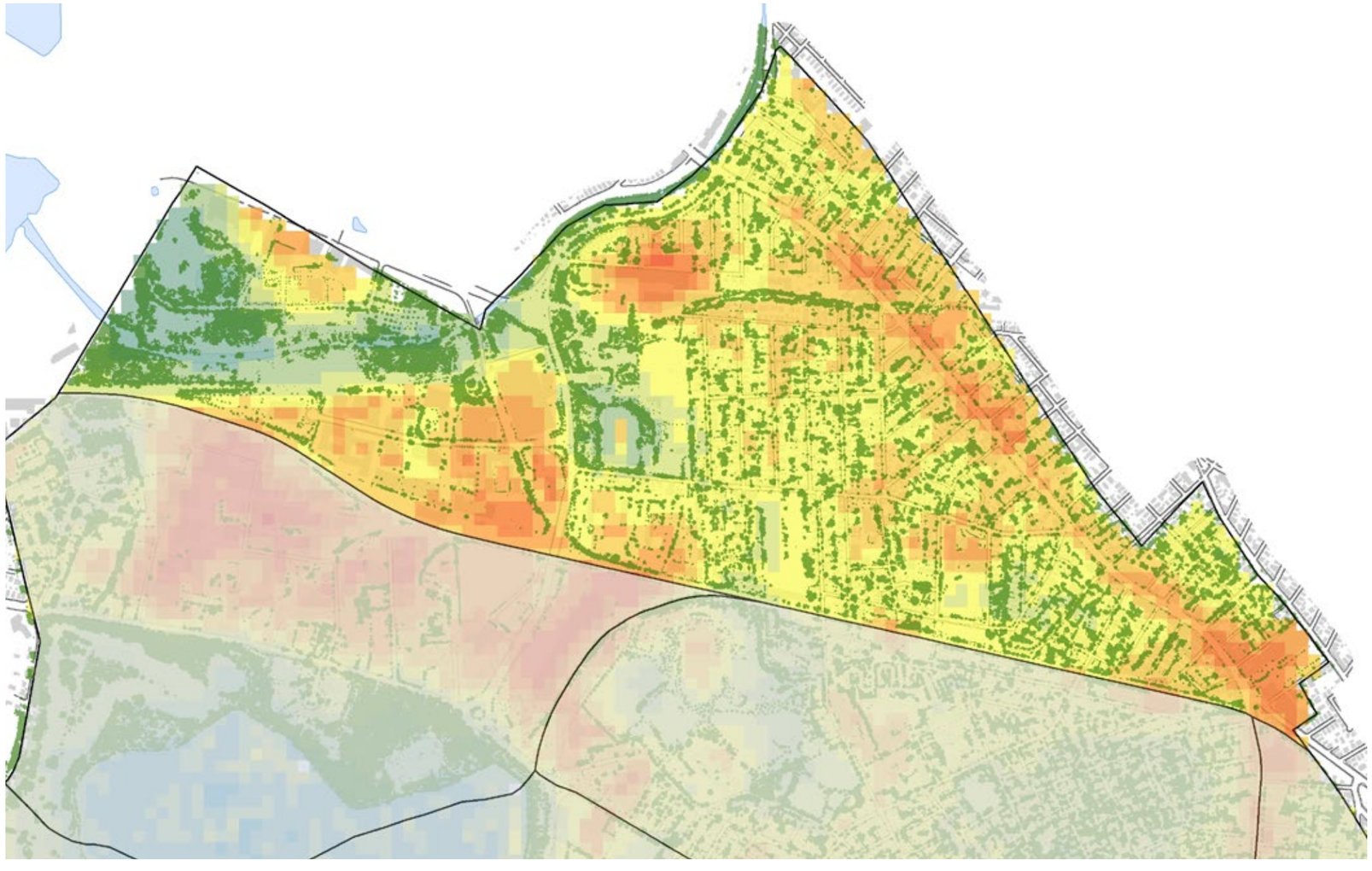
CANOPY COVER

West Cambridge — 42% Coverage



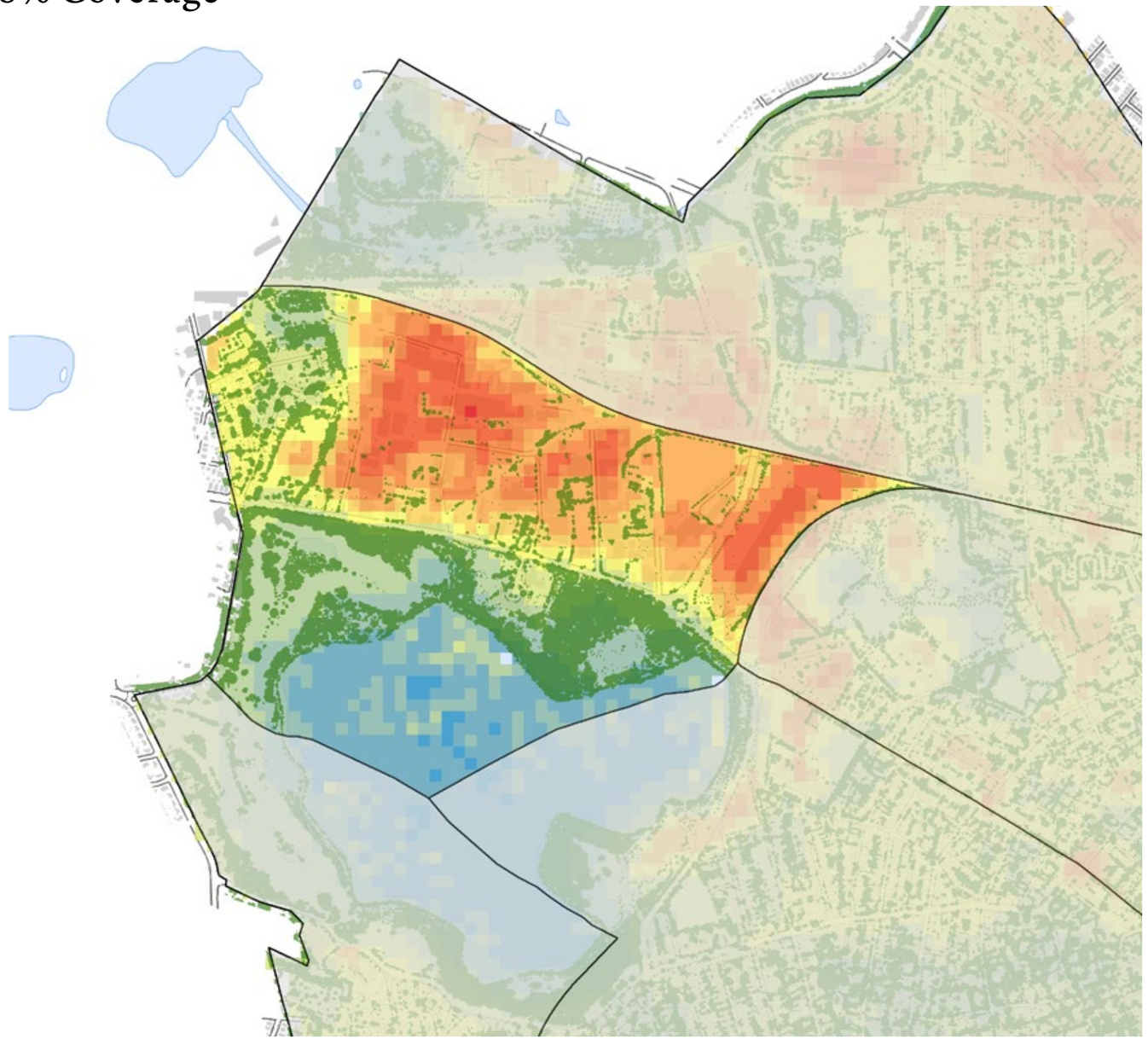
CANOPY COVER

North Cambridge — 26% Coverage



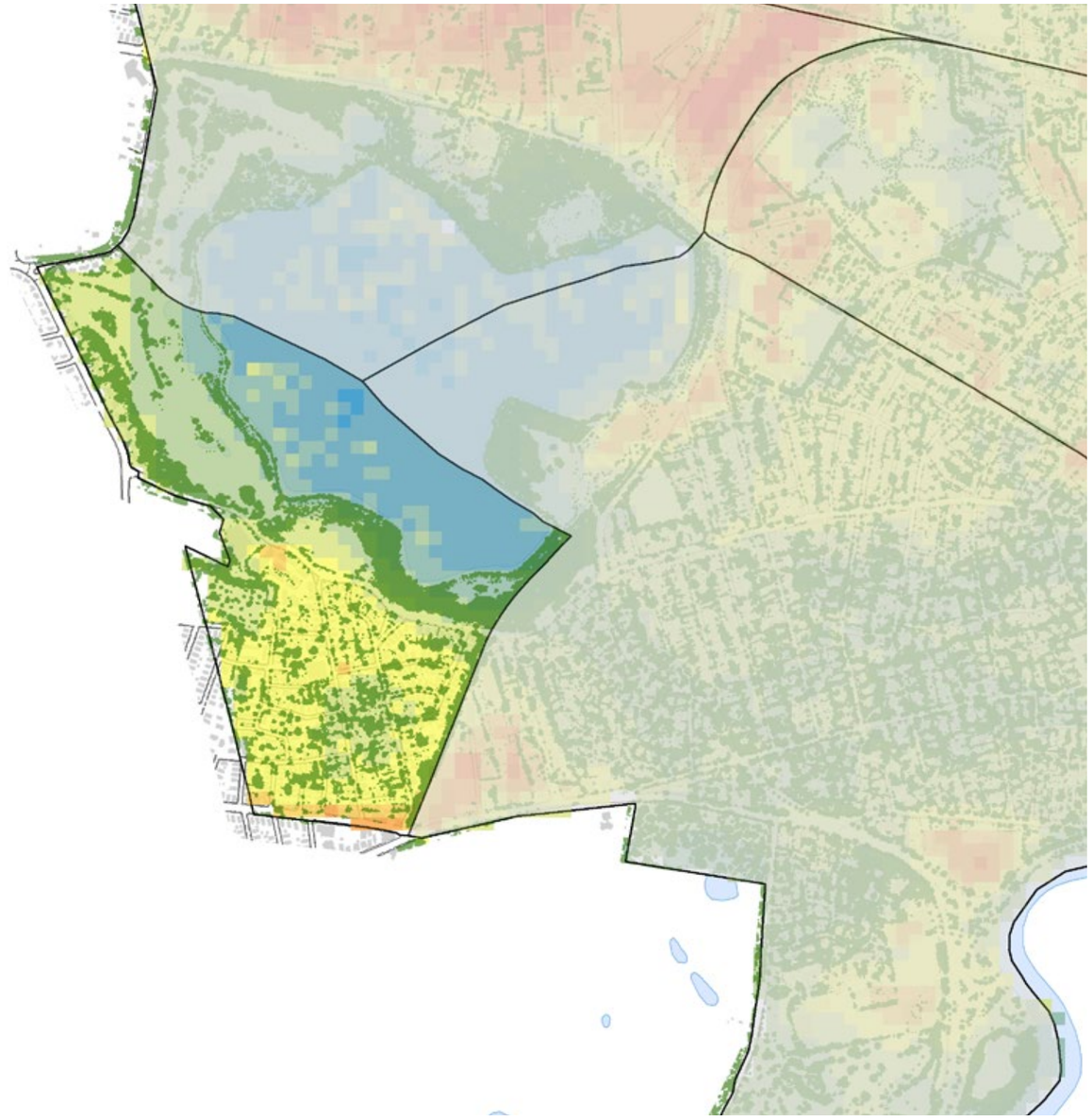
CANOPY COVER

Cambridge Highlands — 28% Coverage



CANOPY COVER

Strawberry Hill — 37% Coverage



LAND USE

Generalized land use

COMMERCIAL
- MIXED USE COMMERCIAL
- OFFICE
- OFFICE/R&D
- VACANT COMMERCIAL

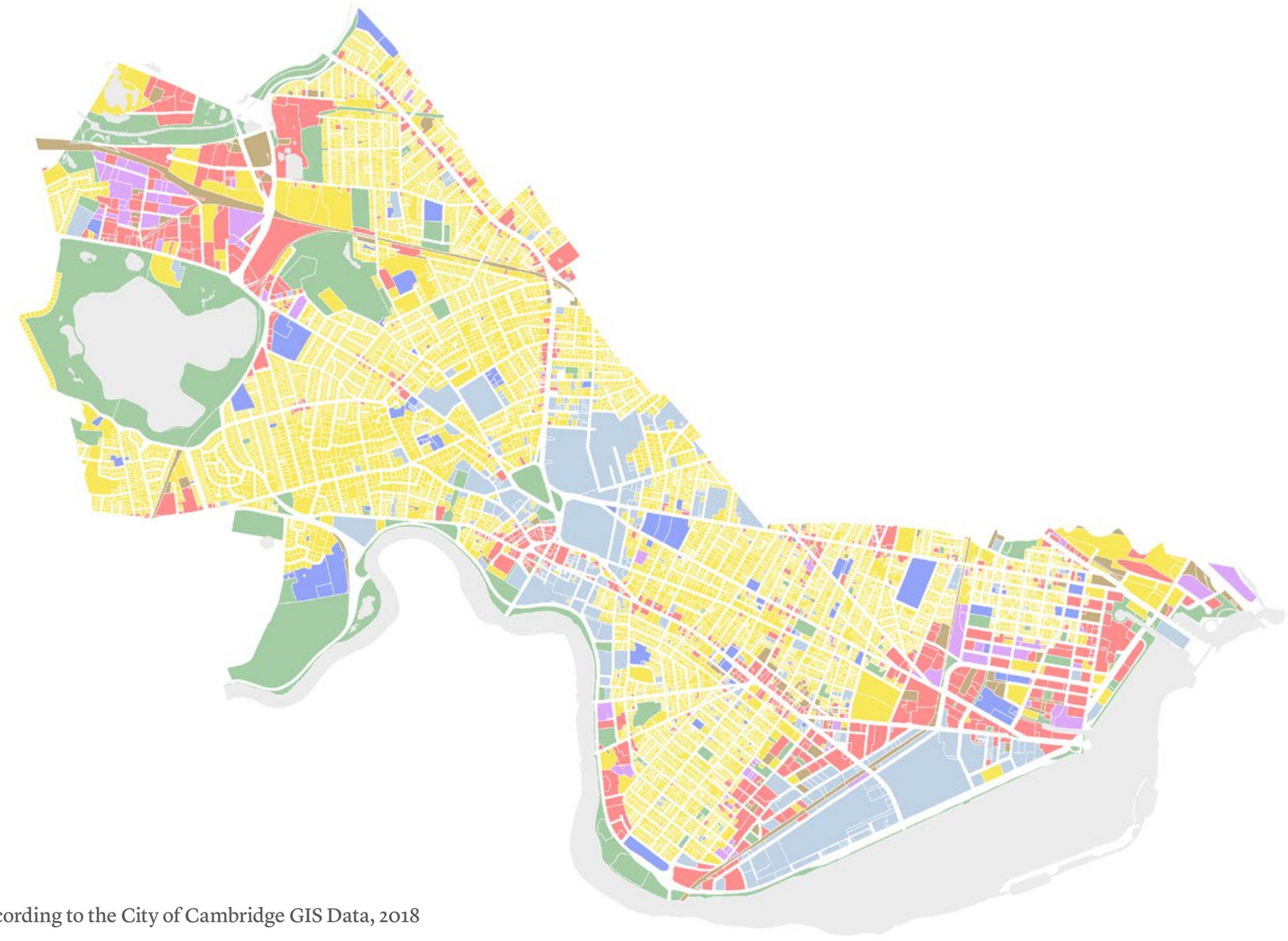
OPEN SPACE
- CEMETERY
- PRIVATELY-OWNED OPEN SPACE
- PUBLIC OPEN SPACE

INDUSTRIAL
- MIXED USE INDUSTRIAL
- UTILITY
- VACANT INDUSTRIAL

INSTITUTIONAL
- CHARITABLE/RELIGIOUS
- EDUCATION RESIDENTIAL
- HEALTH
- HIGHER EDUCATION
- MIXED-USE EDUCATION

PUBLIC
- EDUCATION
- GOVERNMENT OPERATIONS

RESIDENTIAL
- ASSISTED LIVING/BOARDING
- MIXED USE RESIDENTIAL
- VACANT RESIDENTIAL



Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

LAND USE

Generalized land use relationship to canopy cover

COMMERCIAL
- MIXED USE COMMERCIAL
- OFFICE
- OFFICE/R&D
- VACANT COMMERCIAL

OPEN SPACE
- CEMETERY
- PRIVATELY-OWNED OPEN SPACE
- PUBLIC OPEN SPACE

INDUSTRIAL
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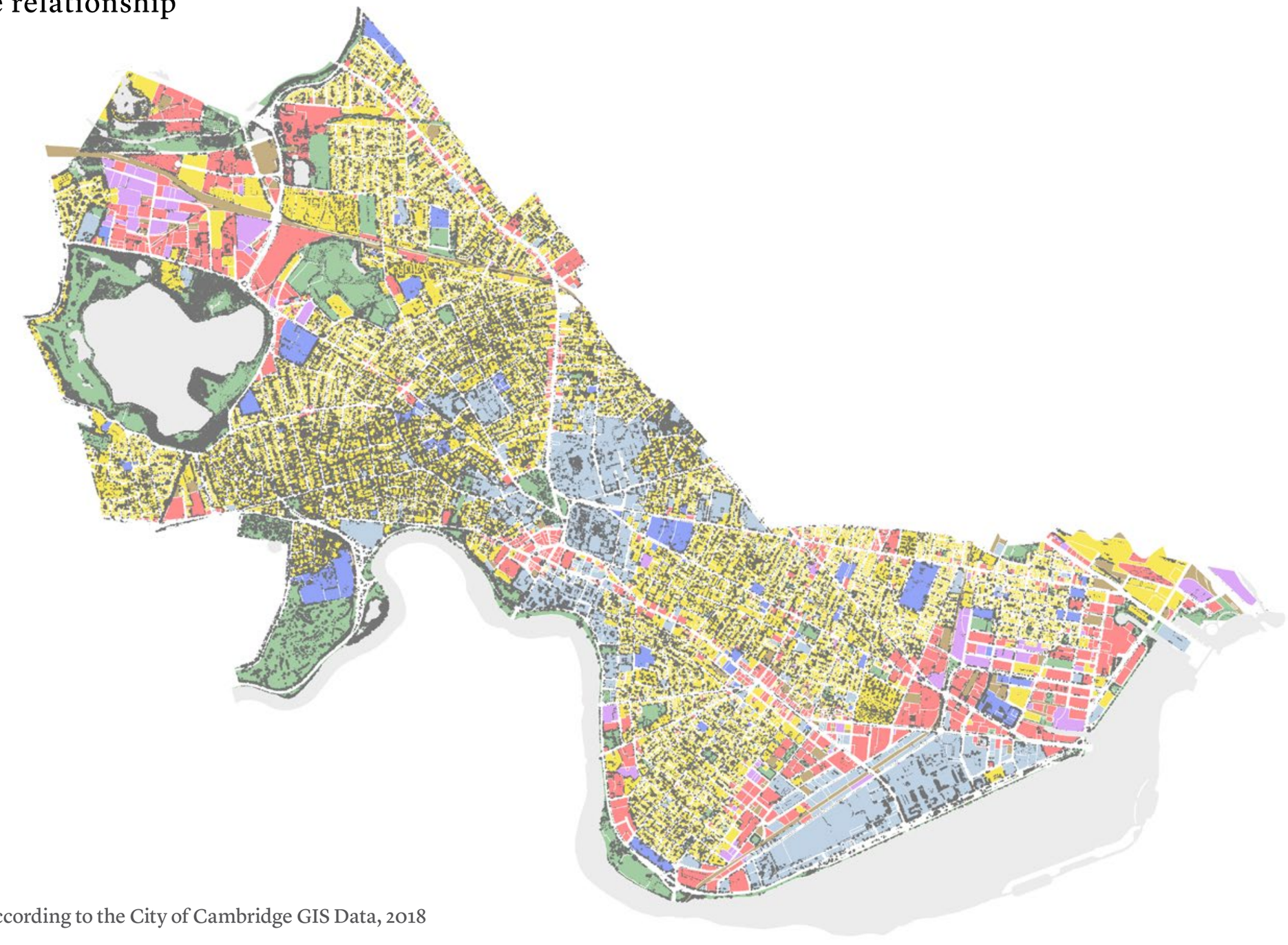
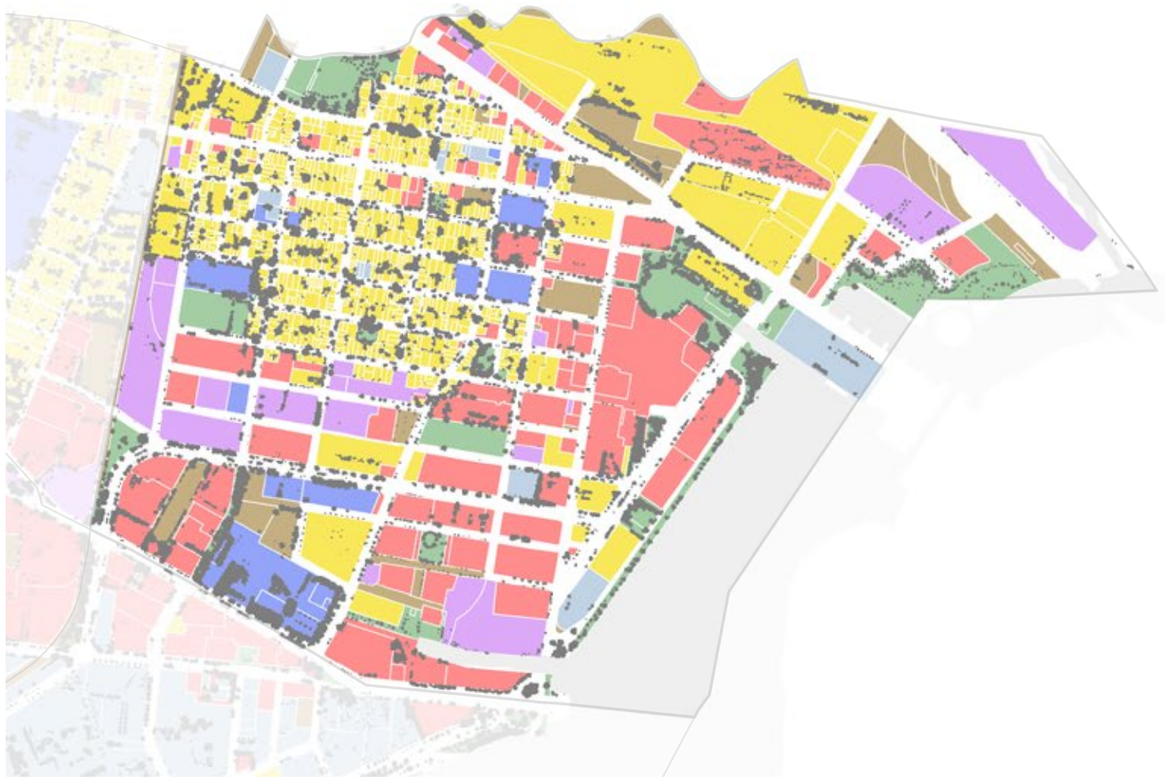


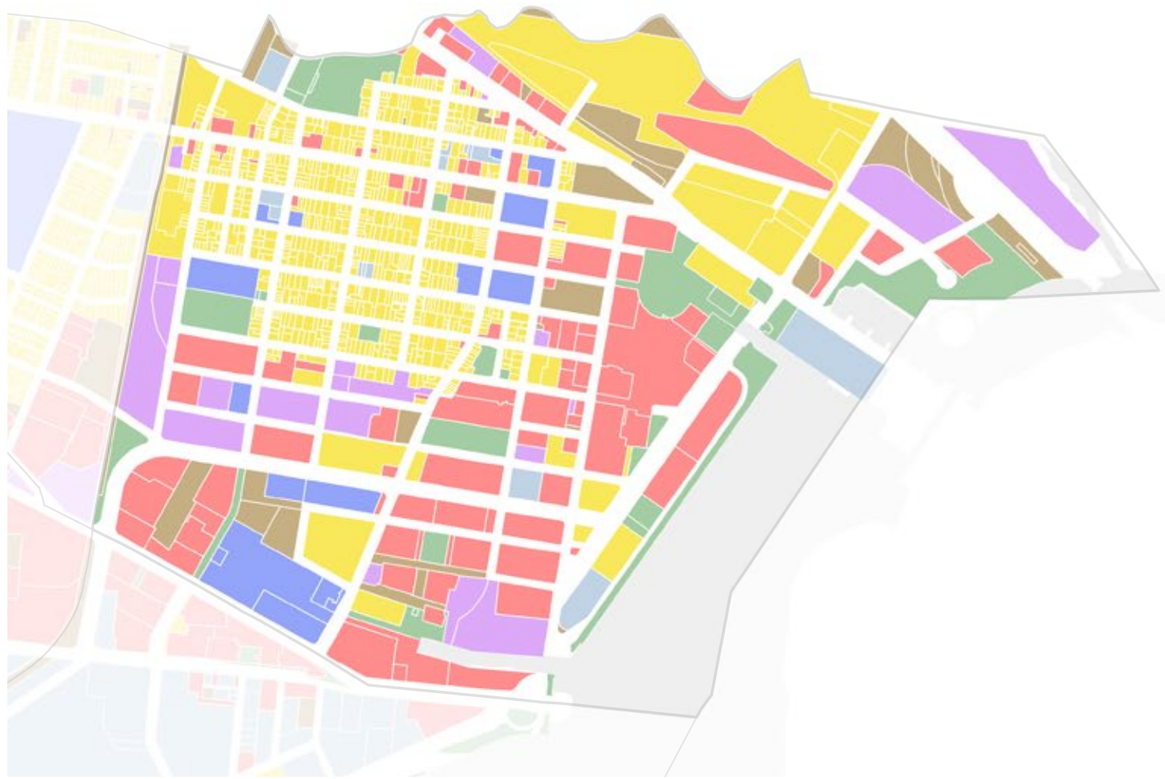
Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

LAND USE

Generalized relationship to canopy cover - East Cambridge

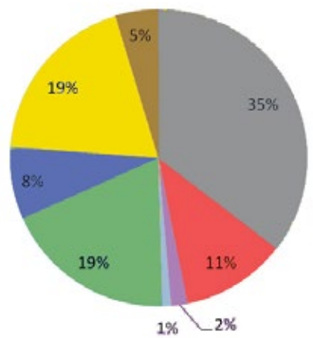
13% canopy cover





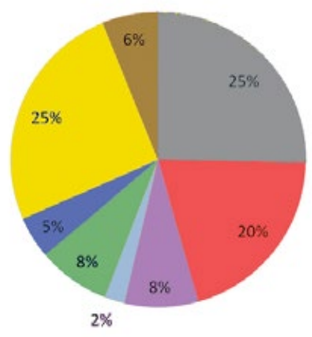
COMMERCIAL	11%
OPEN SPACE	19%
INDUSTRIAL	2%
INSTITUTIONAL	1%
PUBLIC	8%
RESIDENTIAL	19%
TRANSPORTATION	5%
R.O.W.	35%

CANOPY COVER BY LAND USE



COMMERCIAL	20%
OPEN SPACE	8%
INDUSTRIAL	28%
INSTITUTIONAL	2%
PUBLIC	5%
RESIDENTIAL	25%
TRANSPORTATION	6%
R.O.W.	25%

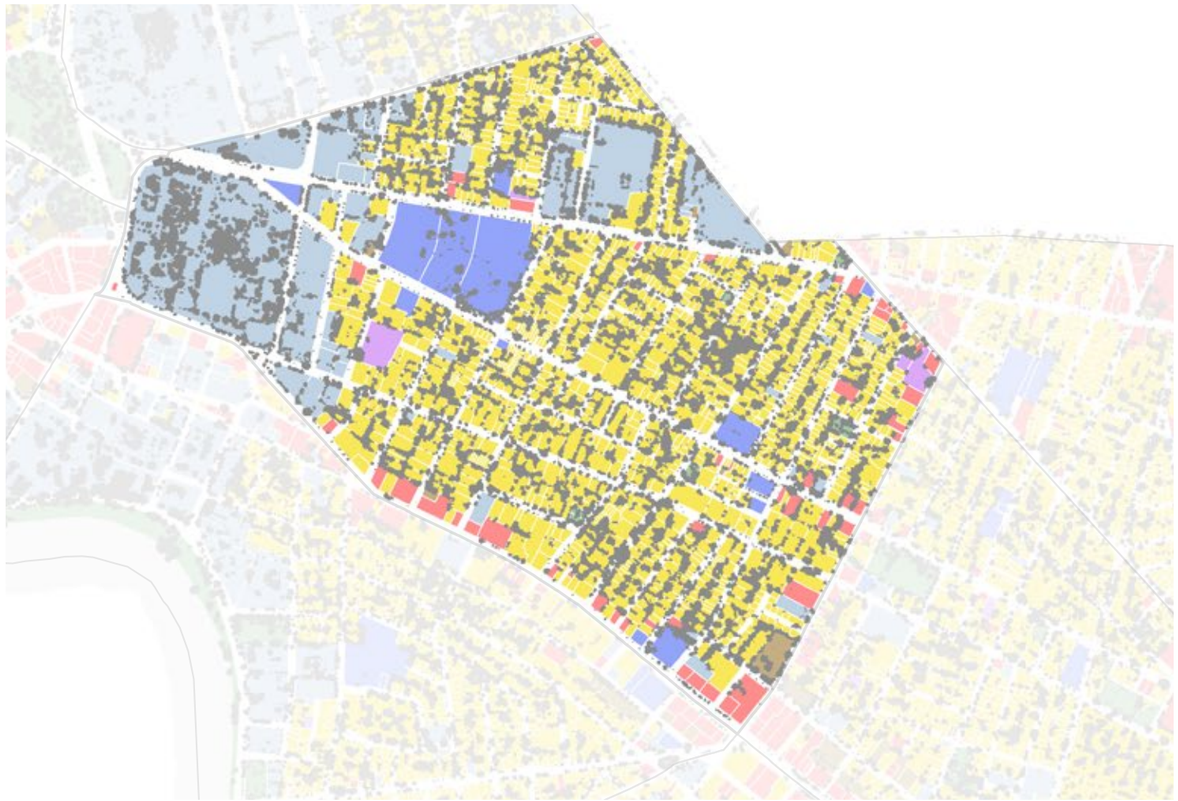
LAND USE AS % OF NEIGHBORHOOD LAND AREA

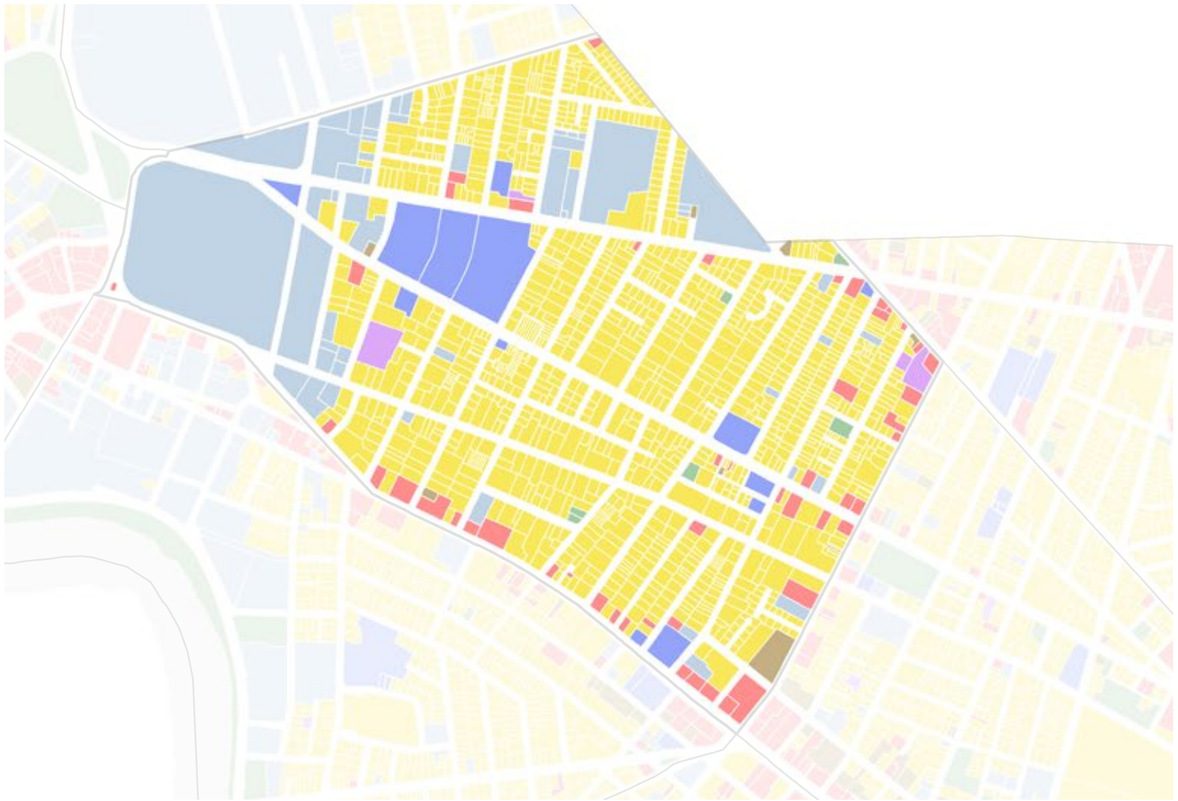


Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

LAND USE

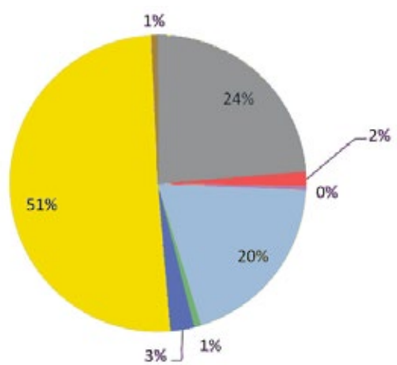
Generalized relationship to canopy cover - Mid Cambridge
29% canopy cover





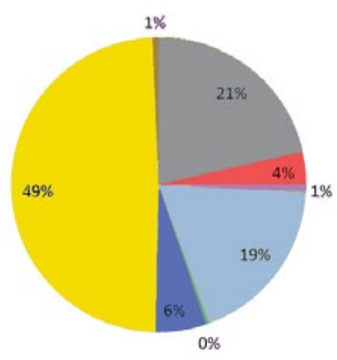
COMMERCIAL	2%
OPEN SPACE	1%
INDUSTRIAL	0%
INSTITUTIONAL	20%
PUBLIC	3%
RESIDENTIAL	51%
TRANSPORTATION	1%
R.O.W.	24%

CANOPY COVER BY LAND USE



COMMERCIAL	4%
OPEN SPACE	0%
INDUSTRIAL	1%
INSTITUTIONAL	19%
PUBLIC	6%
RESIDENTIAL	49%
TRANSPORTATION	1%
R.O.W.	21%

LAND USE AS % OF NEIGHBORHOOD LAND AREA

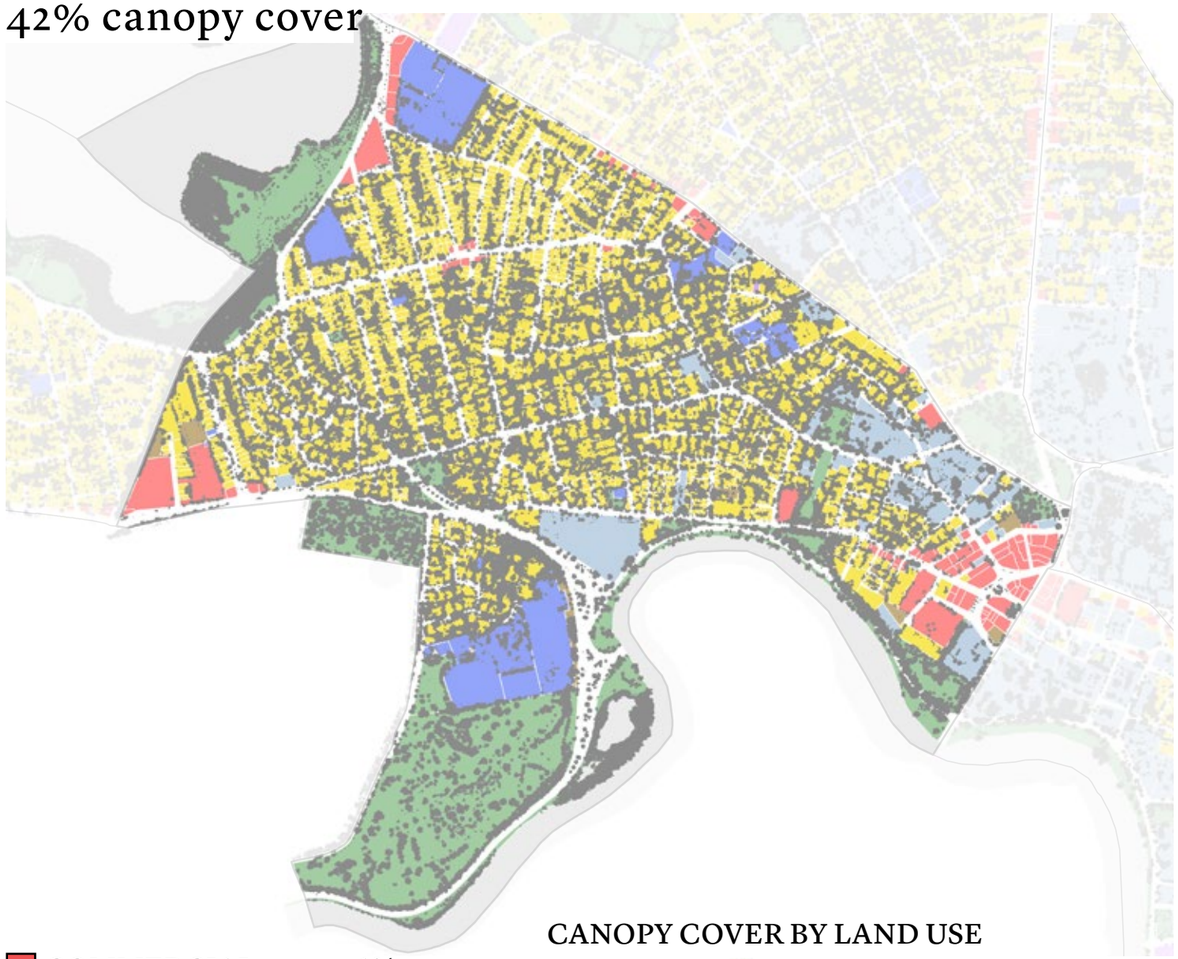


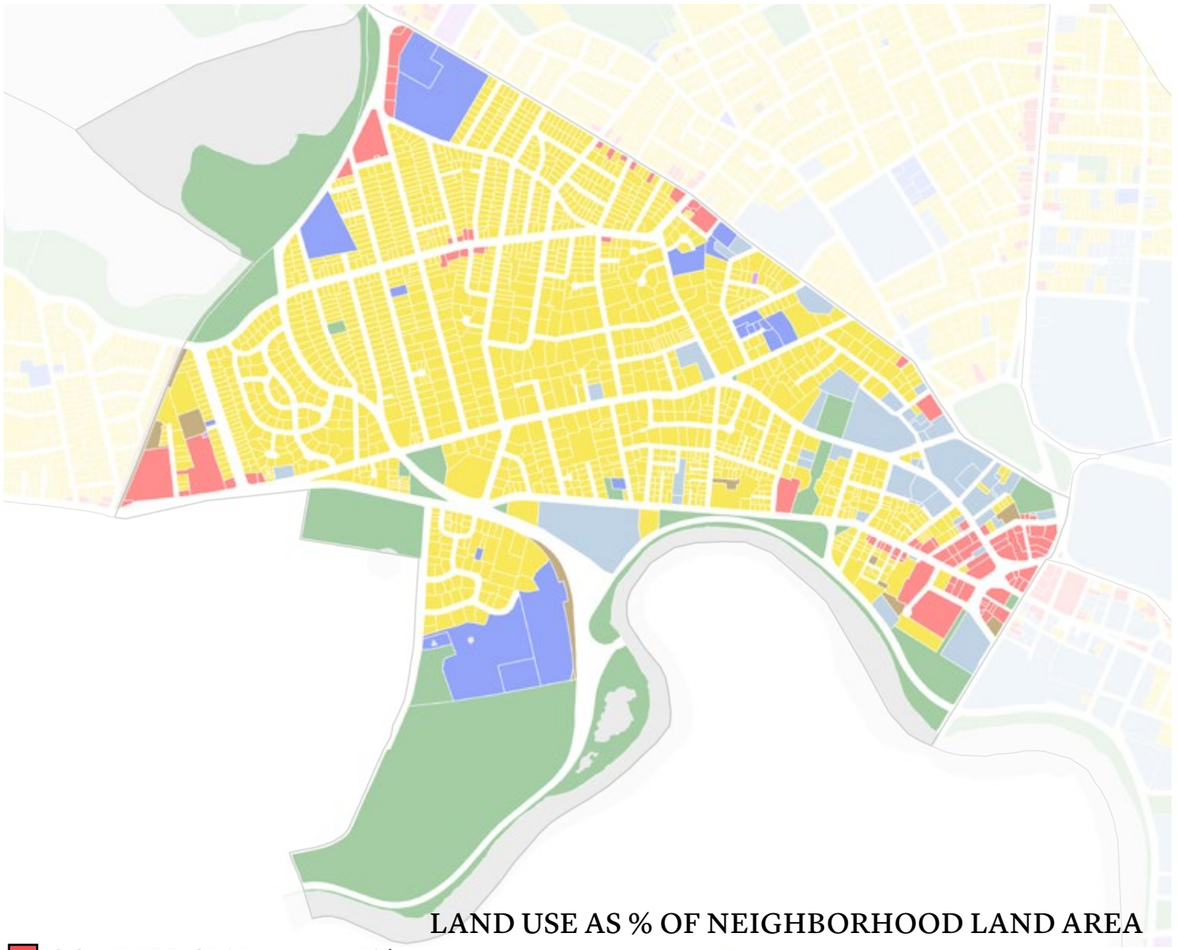
Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

LAND USE

Generalized relationship to canopy cover - West Cambridge

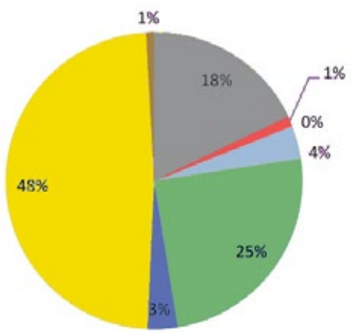
42% canopy cover





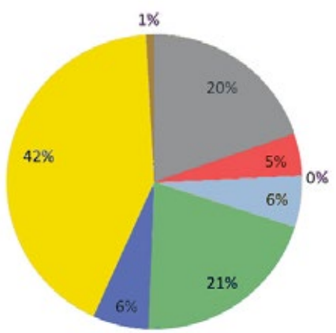
CANOPY COVER BY LAND USE

COMMERCIAL	1%
OPEN SPACE	25%
INDUSTRIAL	0%
INSTITUTIONAL	4%
PUBLIC	3%
RESIDENTIAL	48%
TRANSPORTATION	1%
R.O.W.	18%



LAND USE AS % OF NEIGHBORHOOD LAND AREA

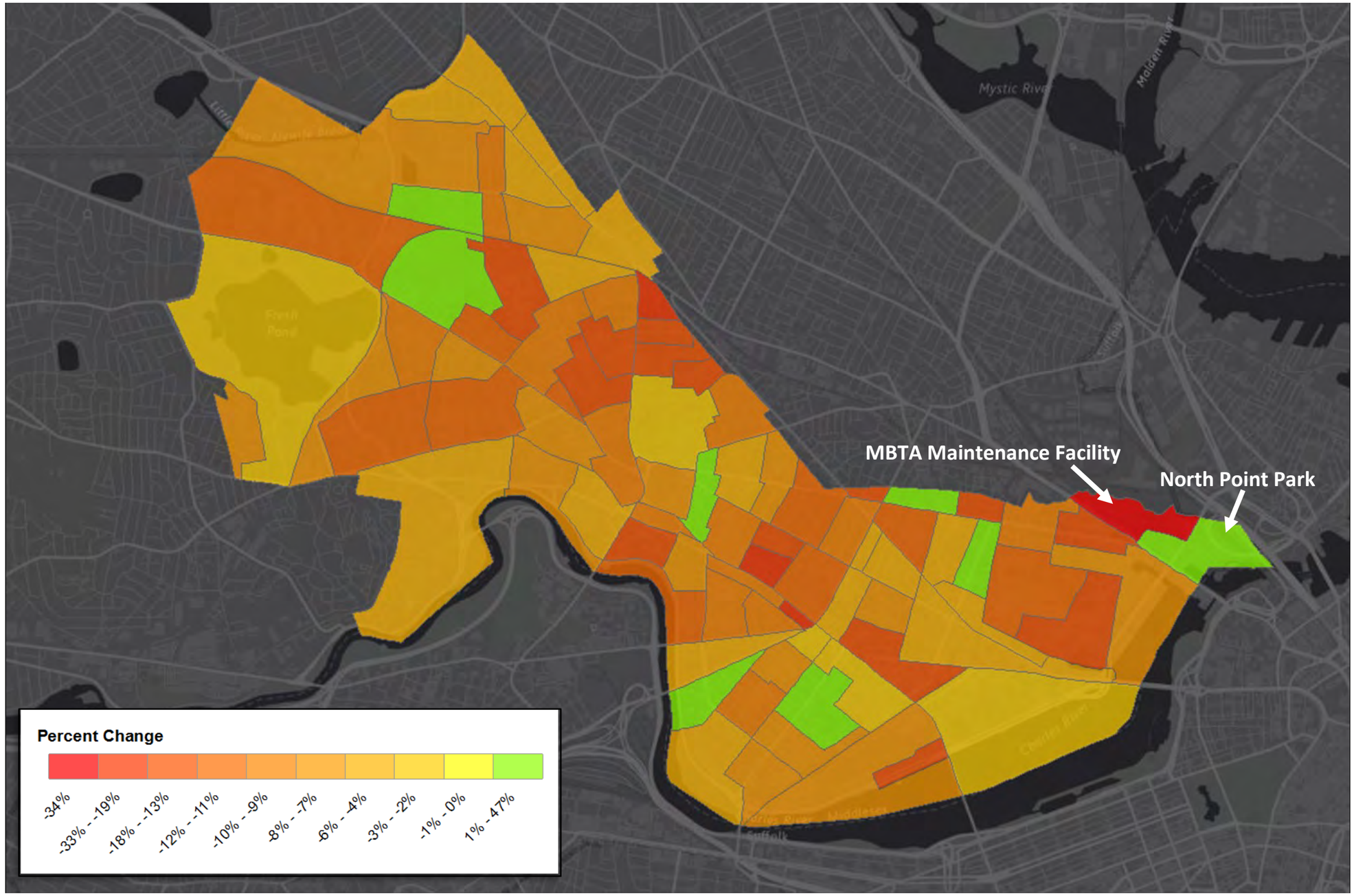
COMMERCIAL	5%
OPEN SPACE	21%
INDUSTRIAL	0%
INSTITUTIONAL	6%
PUBLIC	6%
RESIDENTIAL	42%
TRANSPORTATION	1%
R.O.W.	20%



Source: Prepared by RH Team according to the City of Cambridge GIS Data, 2018

TREE CANOPY COVER

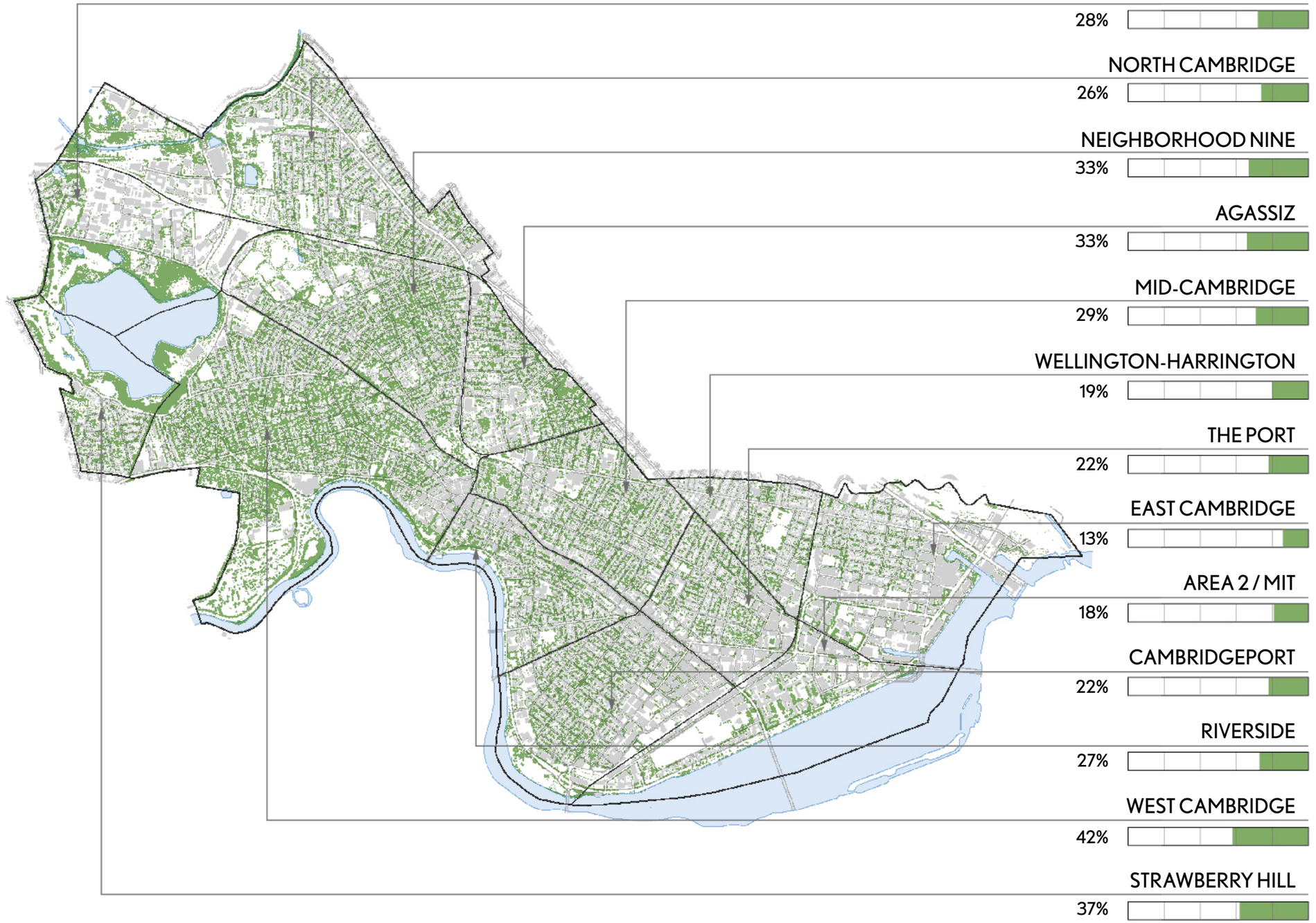
Relative change per census block between 2009 and 2014



Source: 2014 UVM Study

URBAN HEAT ISLAND AND CANOPY COVER

Predicted heat impacts 2070



PROGRESS UPDATE

INITIAL SPATIAL ANALYSIS

PROJECT GOALS

DISCUSSION AND QUESTIONS

PUBLIC COMMENTS

What is the vision?

How do we set measurable goals?

To maintain, plan, build, and sustain a healthy, connective urban forest at a time when the urban forest is more important than ever before.

PROJECT GOALS

What is the most effective metric of success?

Million TREES Miami

million treesLA

million trees NYC

A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT

PROJECT GOALS

Canopy cover goals for northeastern cities

CITY	% COVER FOR THE YEAR CITY'S CANOPY GOAL SET	RECENT CANOPY COVER MEASUREMENT	TARGET
CAMBRIDGE	N/A	29%	?
BOSTON	29% (2006)	27% (2017)	49% (2016)
BALTIMORE	20% (2007)	28.5% (2013)	40% (2036)
HARTFORD	25% (2013)	-	35% (ONGOING)
NEW YORK CITY	24% (2006)	20.9% (2013)	36% (2036)
PHILADELPHIA	20% (2011)	20.8% (2013)	30% (2025)

Source: D.J. Nowak et al., Environmental Pollution 178 (2013), 229-236

Leff, Michael, The Sustainable Urban Forest Guide (2016). Davey Institute.

PROJECT GOALS

Relevant goals from draft of Envision Cambridge

CLIMATE & ENVIRONMENT

- Protect lives and livelihoods of Cambridge community members, particularly those who are at greater risk of climate change and environmental impacts.
- Maintain sustainable water resources by taking action to reduce water usage, manage stormwater runoff, and improve the quality of surface water and groundwater.

URBAN FORM

- Create a connected network of high-quality open spaces that link all residents to local and regional natural assets, that are inclusive of all people.

COMMUNITY WELLBEING

- Ensure access to resources that support health and well-being.

HOUSING

- Support high-quality housing that is healthy, climate-resilient, and energy-efficient without increasing costs for low and moderate income indicidual and families.

ECONOMY

- Support efforts to erase racial and gender disparities in economic opportunity.

MOBILITY

- Ensure that the city transportation system supports shared community spaces and enhances neighborhood streets.
- Create an easy-to-understand, integrated, continuous, and comfortable transportation network

PROJECT GOALS

Relevant strategies from Draft CCPR Alewife

RESILIENT URBAN FOREST

- Reduce the urban heat island effect by increasing the urban forest canopy, developing a comprehensive urban forest management plan, and continuing urban forest maintenance efforts.

ENHANCED OUTDOOR THERMAL COMFORT

- Develop “cool corridors” aligned with bike and pedestrian routes and MBTA bus stops to enhance outdoor thermal comfot for transit users.

REDUCE IMPERVIOUS AREA

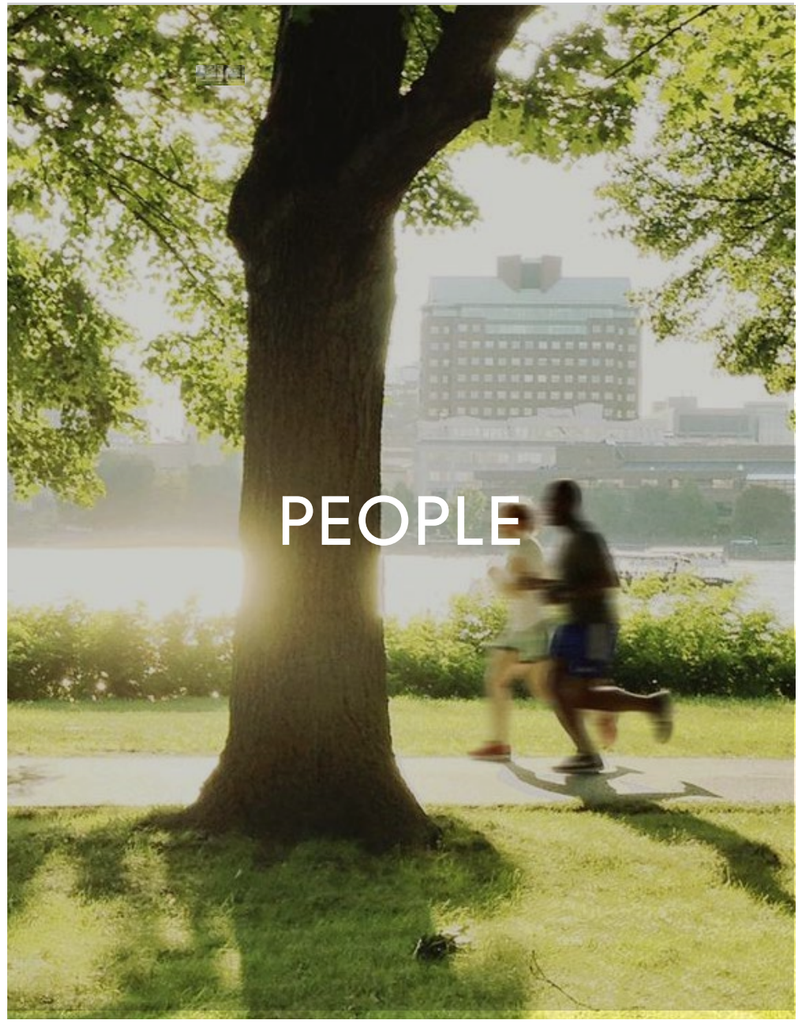
- Reduce impervious area of upstream parcels to limit flooding at downstream parcels. Evaluate the implementation of a combination of grey and green infrastructure in parcels upstreamof flood-prone areas to reduce runoff from impervious areas.

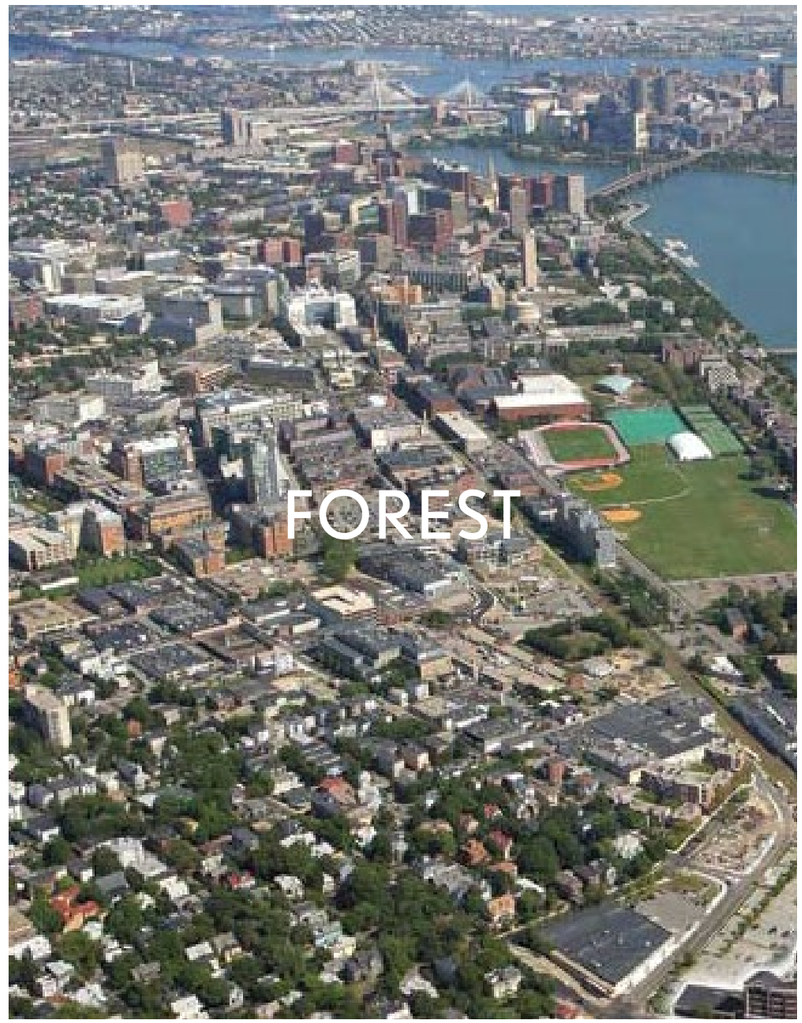
GREEN INFRASTRUCTURE OPPORTUNITIES

- Implement Green Infrastructure to improve water quality and reduce flooding impacts from smaller rainfall events and mitigate urban heat islands.

PROJECT GOALS

A layered approach to success





PROJECT GOALS
DRAFT Decision support framework

Vision	Goals		Evaluative Criteria	Baseline	2030 Target	2070 Target
To build, maintain, and sustain a healthy, connective urban forest at a time when the urban forest is more important than ever before.	PEOPLE: A forest that contributes to residents' well-being	Reduce urban heat island effects	Degrees above city avg			
		Enhance citywide stormwater management	Runoff volume			
		Increase equity in distribution of canopy cover	Canopy cover by vulnerable population			
		Improve air quality	Air pollutants			
		Create aesthetically pleasing streetscapes	Property value			
		Enhance pedestrian outdoor thermal comfort	Sidewalk temperatures re: city avg			
		Increase carbon sequestration	Carbon sequestration			
	TREES: A healthy forest whose trees live longer and thrive during predicted changing climate conditions	Improve soils health	Soil metric			
		Improve tree health	% trees in good health			
		Improve street tree lifespan	Avg life of street tree			
	FOREST: A forest that supports a resilient, connected ecosystem	Enhance habitat	Canopy connectivity			
		Diversify forest composition	Shannon Index			
		Plan for disaster response (noreaster, drought)	Increased disaster resiliency			

PROGRESS UPDATE

INITIAL SPATIAL ANALYSIS

PROJECT GOALS

DISCUSSION AND QUESTIONS

PUBLIC COMMENTS

PROGRESS UPDATE

INITIAL SPATIAL ANALYSIS

PROJECT GOALS

DISCUSSION AND QUESTIONS

PUBLIC COMMENTS

TASK FORCE MEETING SCHEDULE

JUNE 12	Introduction
JUNE 28	RESEARCH: Regulation and Management
JULY 26	RESEARCH: Goal Setting
AUGUST 30	RESEARCH: Analysis and Findings
SEPTEMBER 27	TESTING: Baseline Change Model
OCTOBER 25	TESTING: Impact Analysis
NOVEMBER 29	TESTING: Impact Analysis (2)
DECEMBER 20	PROPOSAL DEVELOPMENT
JANUARY 31	PROPOSAL DEVELOPMENT
FEBRUARY 28	DRAFT DOCUMENTATION
MARCH 28	DRAFT DOCUMENTATION
APRIL 25	DRAFT DOCUMENTATION

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