

Climate-Smart Cities

*Harnessing Big Data for Community Scale
Green Infrastructure Solutions*

Shaun O'Rourke

Green Infrastructure Director

shaun.orourke@tpl.org

@shaun_orourke

The logo for The Trust for Public Land, featuring a green square background with the text "THE TRUST FOR PUBLIC LAND" in white, stacked vertically.

THE
TRUST
FOR
PUBLIC
LAND

10X Increase in Heat-Related Deaths by 2057



Heat Hits Hardest for Low Income and Elderly

Climate-Smart Cities Framework



Cool: Boston “Greenovating” with Trees

Part III: Recommendations



7 Summary of Findings

This section provides an overview of the key findings from the different topic areas of the literature review. Figure 8 shows the key recommendations from the UHI mitigation literature. These recommendations should be considered first in the eleven most vulnerable census tracts found in this report.

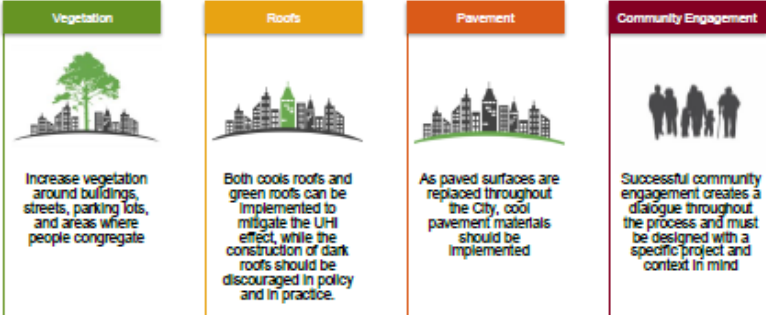


Figure 14: Key Recommendations (Source: E. Coutts, 2015)



Absorb: Boston Creating Edible “Green Sponges”



Protect: Boston Preparing for Sea Level Rise



CLIMATE
READY
BOSTON



Climate-Smart Cities Process

Climate-Smart Cities Partnerships – Our Integrated Approach



Science-Based

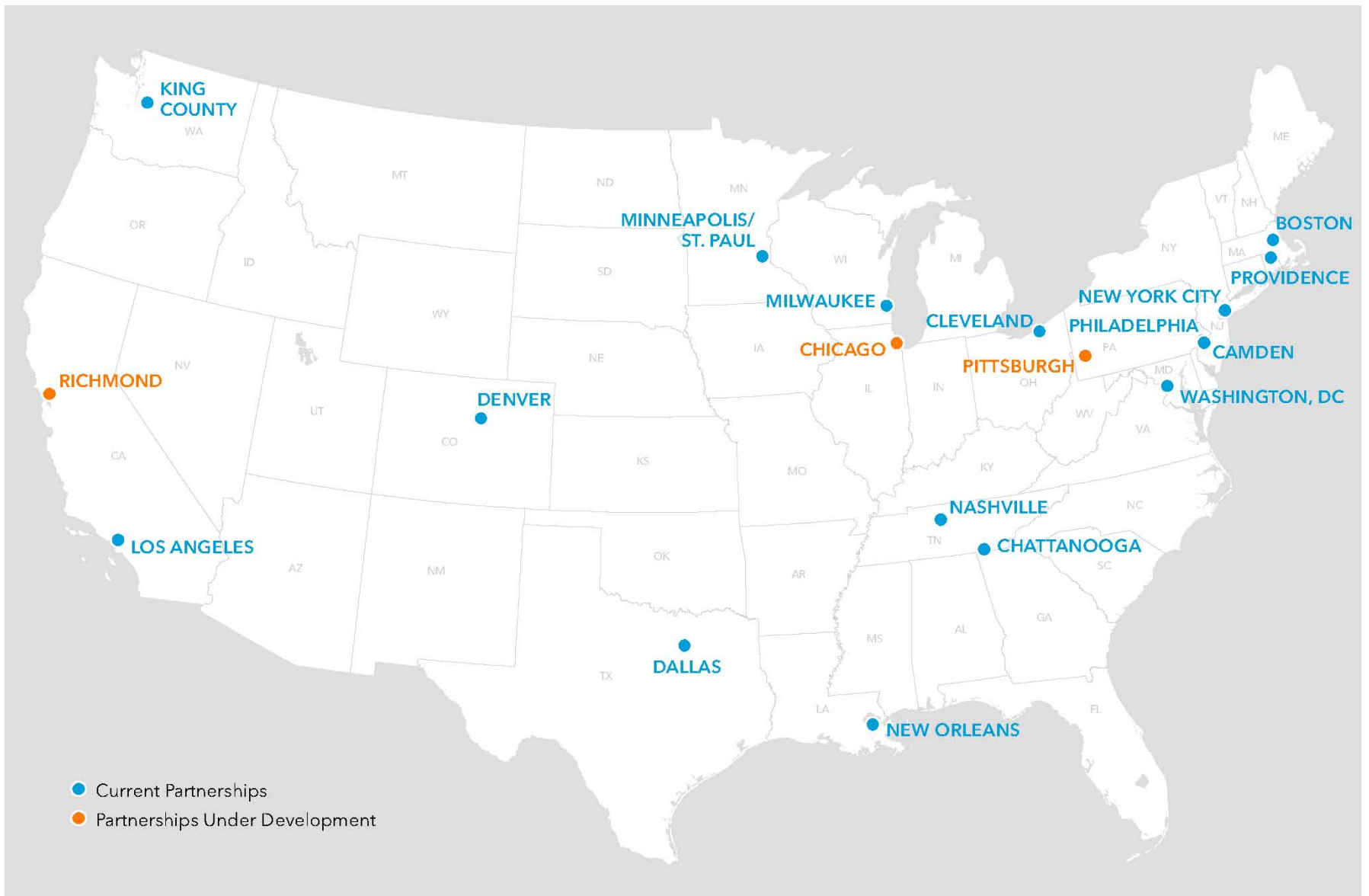
Academic
Partnerships and
Key Questions

Strategic

Integration of a
Process

Impact Based

Project Examples
and Monitoring



Climate-Smart Cities Partnerships

Climate-Smart Cities – Boston



Partnership Formation

The canopy cover in Boston is under 20% for most of the city. The map and table below highlight the eleven most vulnerable census tracts and their percent canopy cover.

Table 8. Most Vulnerable Census Tracts and Tree Canopy

ID	Neighborhood	FY15	% Canopy Cover
1	East Boston	17	0.6
2	Chatham	18	3.0
3	South End	17	3.5
4	South End	17	4.4
5	Roxbury	17	6.8
6	Roxbury	18	9.9
7	Roxbury	17	10.8
8	Roxbury	18	10.4
9	North End	17	10.5
10	North End	17	12.8
11	North End	17	16.0



Figure 13. Most Vulnerable Census Tracts and Tree Canopy

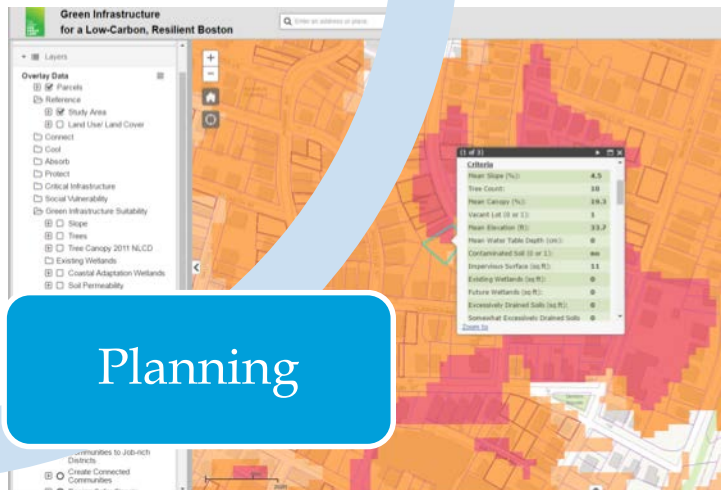
Implementation

Research

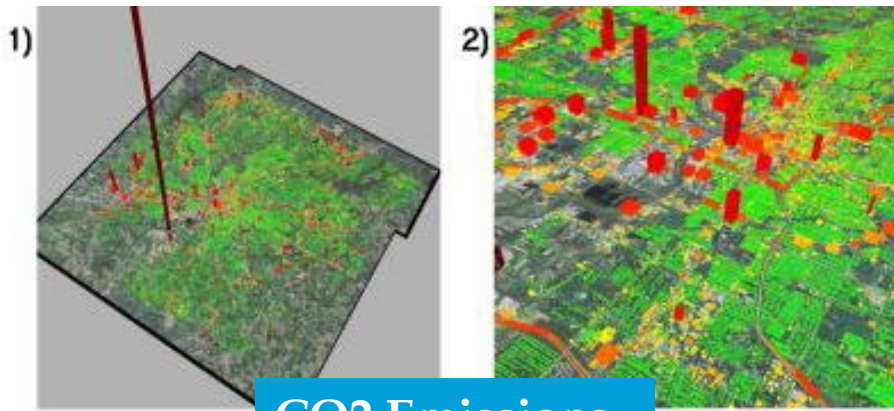


**YES ON 5
A BETTER
BOSTON**

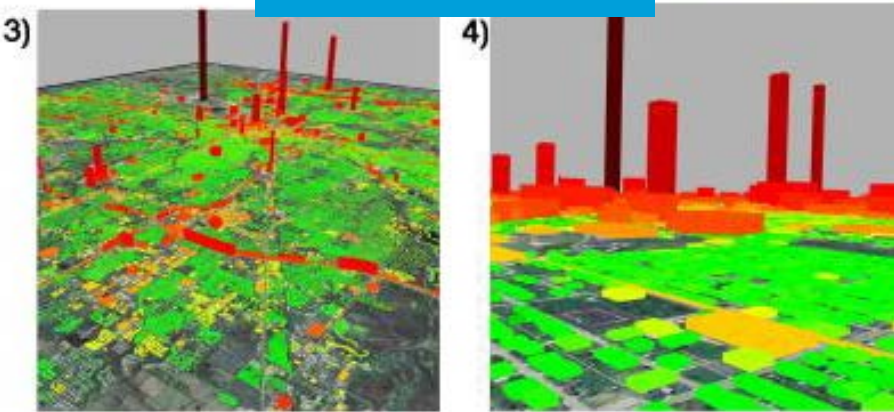
Funding



Planning



CO2 Emissions



Modeling Storm and Floodwater Dynamics



JPL
 Jet Propulsion Laboratory
 California Institute of Technology

HEALTHY CONNECTED CHATTAHOOGA
 URBAN HEAT ISLANDS

An Urban Heat Island (UHI) is an urban area that is significantly warmer than the surrounding landscape. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness, and water quality. This map highlights areas with elevated daytime land surface temperatures averaging at least 1.25 degrees Fahrenheit above the mean daily temperature during July and August of 2013.

Elevated land surface temperature (July-Aug. 2013)
 High
 Moderate to high
 Moderate
 Park
 Cemetery
 Hiking, biking, or multi-use path
 Chattahoochee boundary
 State boundary

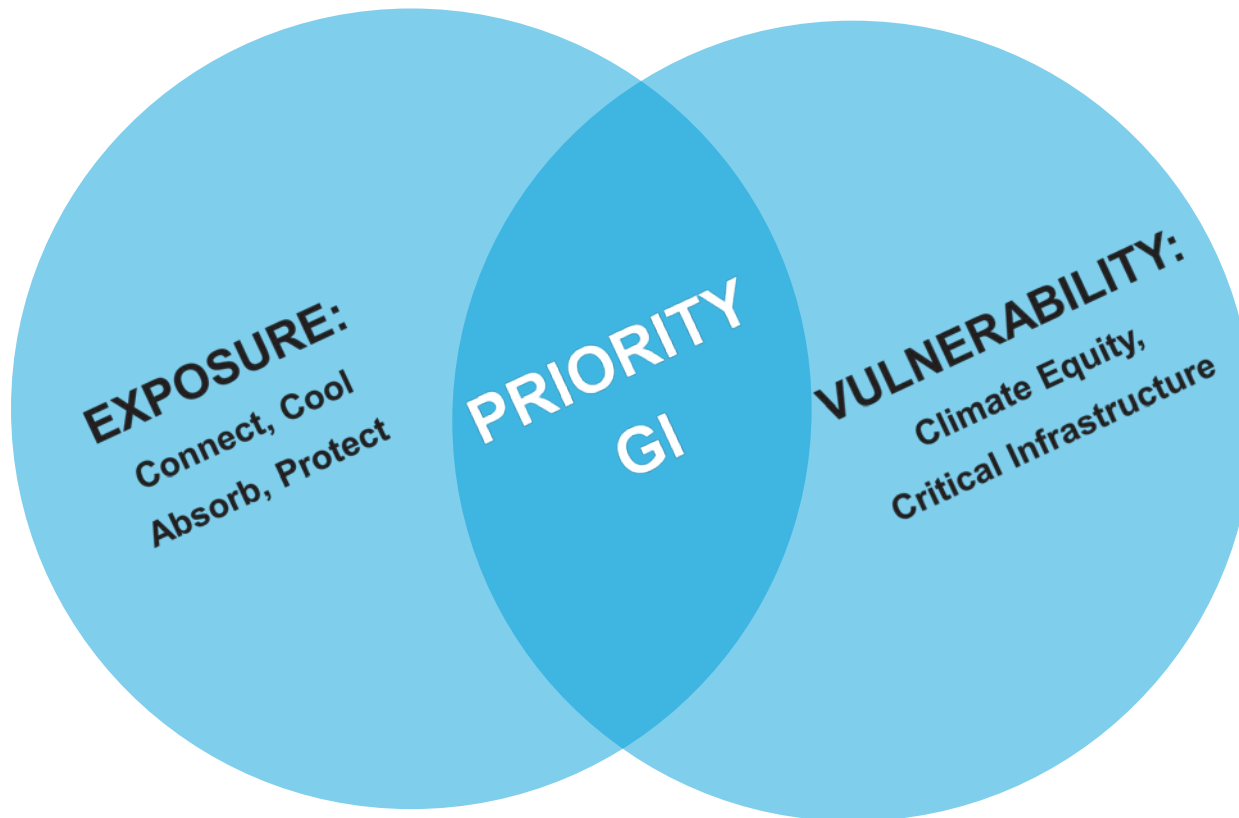
Heat Risk & Response

Applied Research = Data and Design Guidance

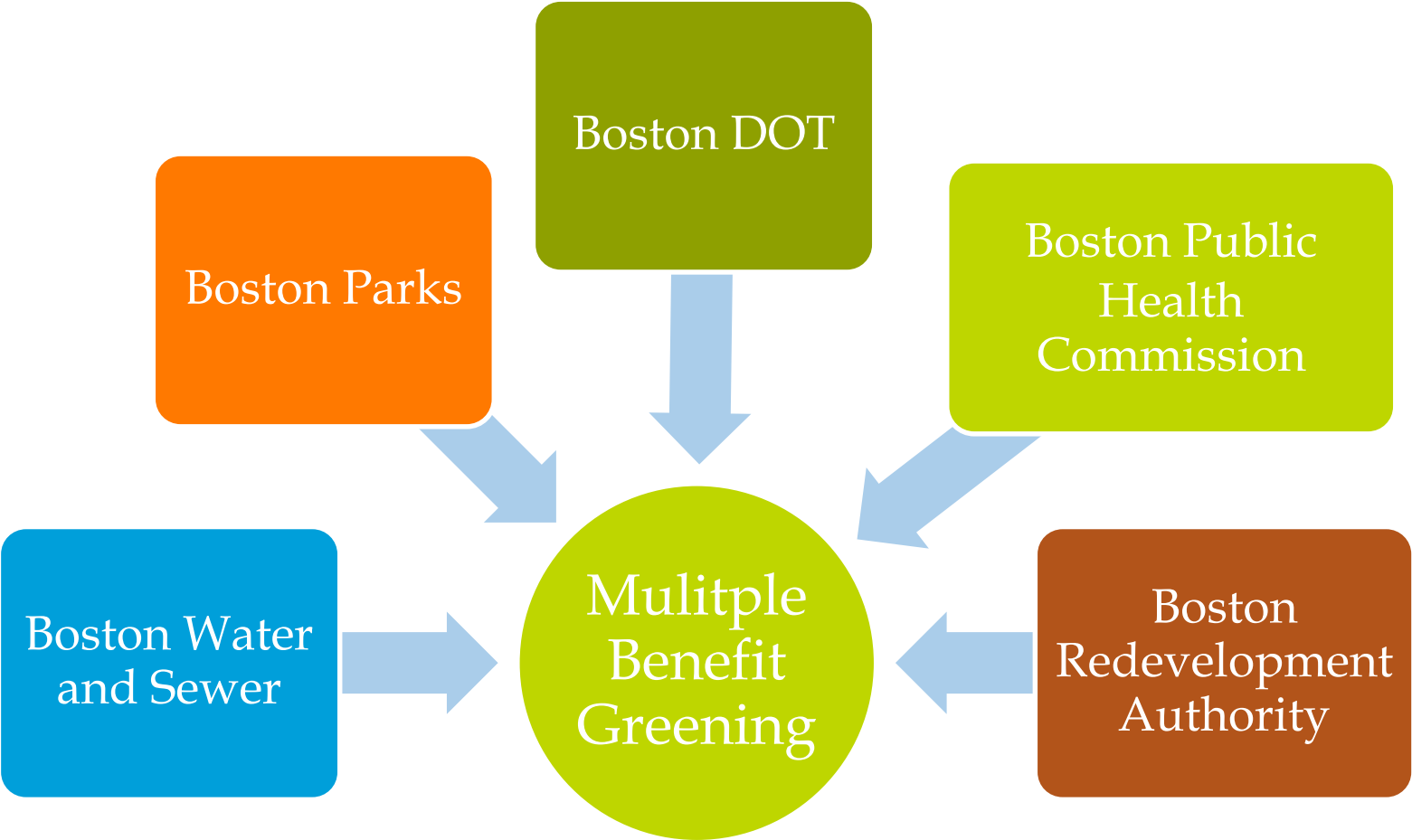


Climate-Smart Cities Decision Support

GOAL Identify priority areas for multi-benefit green infrastructure interventions with a focus on those people and places at the greatest risk to the effects of climate change.



Integrating across Silos for Climate-Smart Boston



Integrating across Sectors for Climate-Smart Boston



Climate-Smart Cities Decision Support Tool Guides Investment & Partnerships *for Impact*

Green Infrastructure for a Low-Carbon, Resilient Boston

Search: Enter an address or place

Help Logout

Overlay Data

- Parcels
- Reference
- Connect
- Cool
- Absorb
- Protect
- Critical Infrastructure
- Social Vulnerability
- Green Infrastructure Suitability

Analysis Results

- Turn off all Results
- Overall Stacked Priorities
- Cool
- Connect
- Absorb
- Protect
- Critical Infrastructure
- Social Vulnerability

Data Library

Prioritization Analysis

THE TRUST FOR PUBLIC LAND

Powered by esri

Connect Analysis Finds “Missing Links”



Green Infrastructure for a Low-Carbon, Resilient Boston

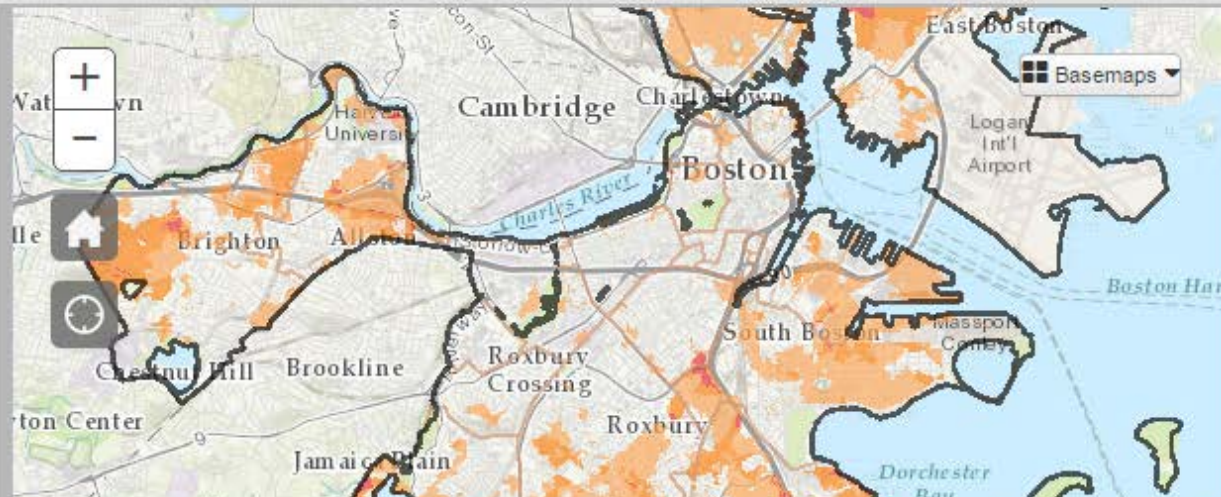
Enter an address or place

Help Logout

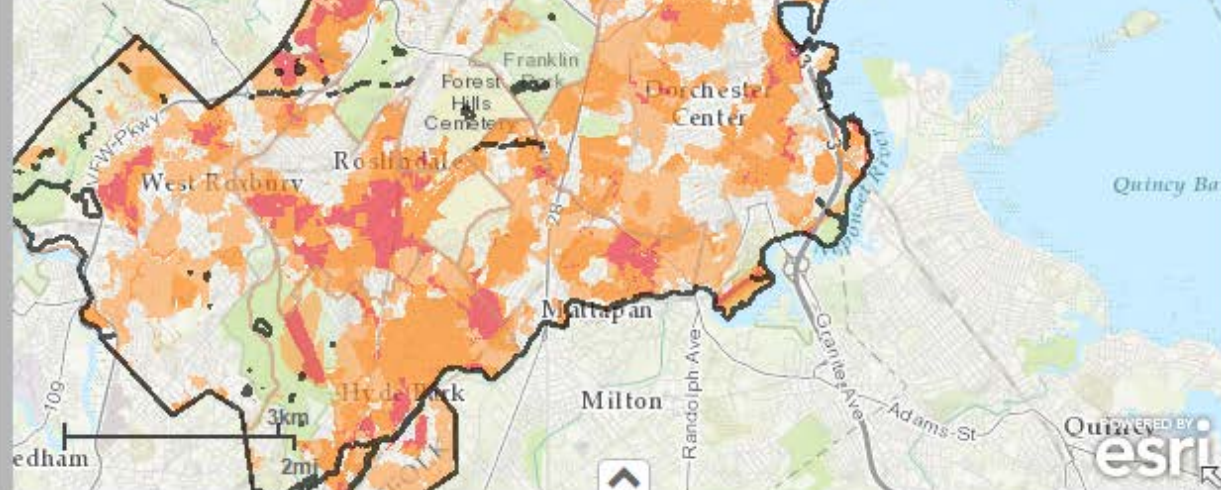
- Protect
- Critical Infrastructure
- Social Vulnerability
- Green Infrastructure Suitability

Analysis Results

- Turn off all Results
- Overall Stacked Priorities
- Cool
- Connect
 - Provide Many Travel Choices
 - Connect Low-income Communities to Job-rich Districts
 - Create Connected Communities
 - Design Safer Streets
 - Promote active and healthy lifestyles by providing access to green space
 - Pedestrian and Bike Safety
 - Connect Priority Areas
- Absorb
- Protect
- Critical Infrastructure



117,000 Bostonians have limited access



Cool Analysis Shows Urban Heat Island

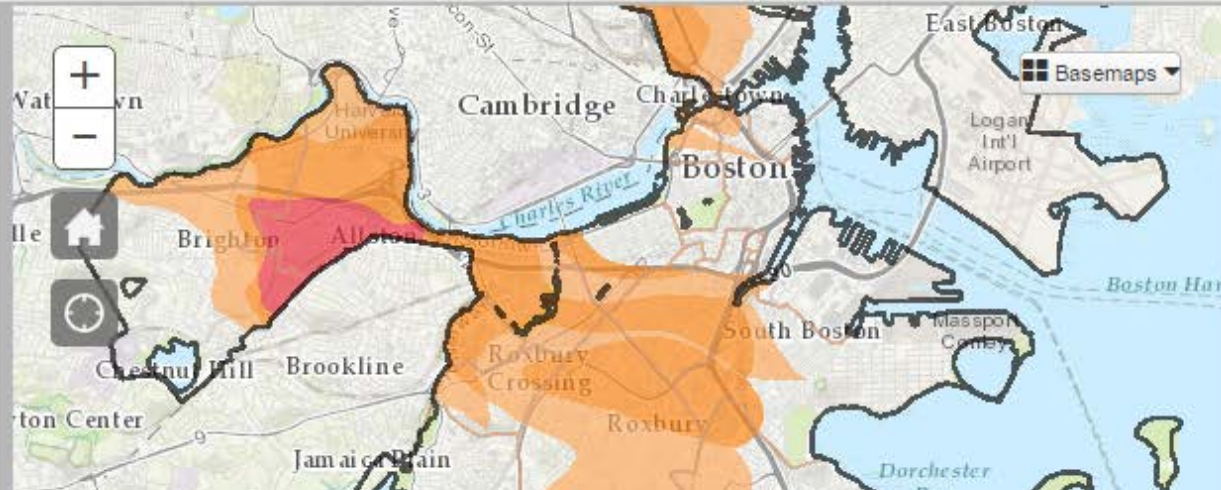


Green Infrastructure for a Low-Carbon, Resilient Boston

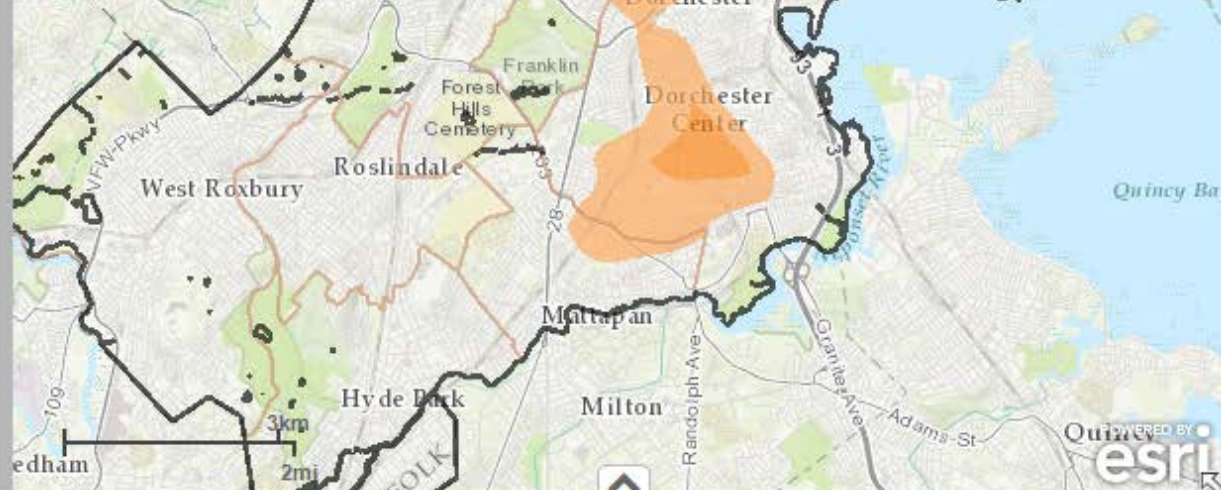
Q Enter an address or place

Help Logout

- Protect
 - Critical Infrastructure
 - Social Vulnerability
 - Green Infrastructure Suitability
- Analysis Results**
 - Turn off all Results
 - Overall Stacked Priorities
 - Cool
 - Land Surface Temperature Hot Spots - Day
 - Land Surface Temperature Hot Spots - Night
 - Cool Priorities
 - Connect
 - Absorb
 - Protect
 - Critical Infrastructure
 - Social Vulnerability



183,000 Bostonians live in a heat island



Absorb Analysis Guides Stormwater Management

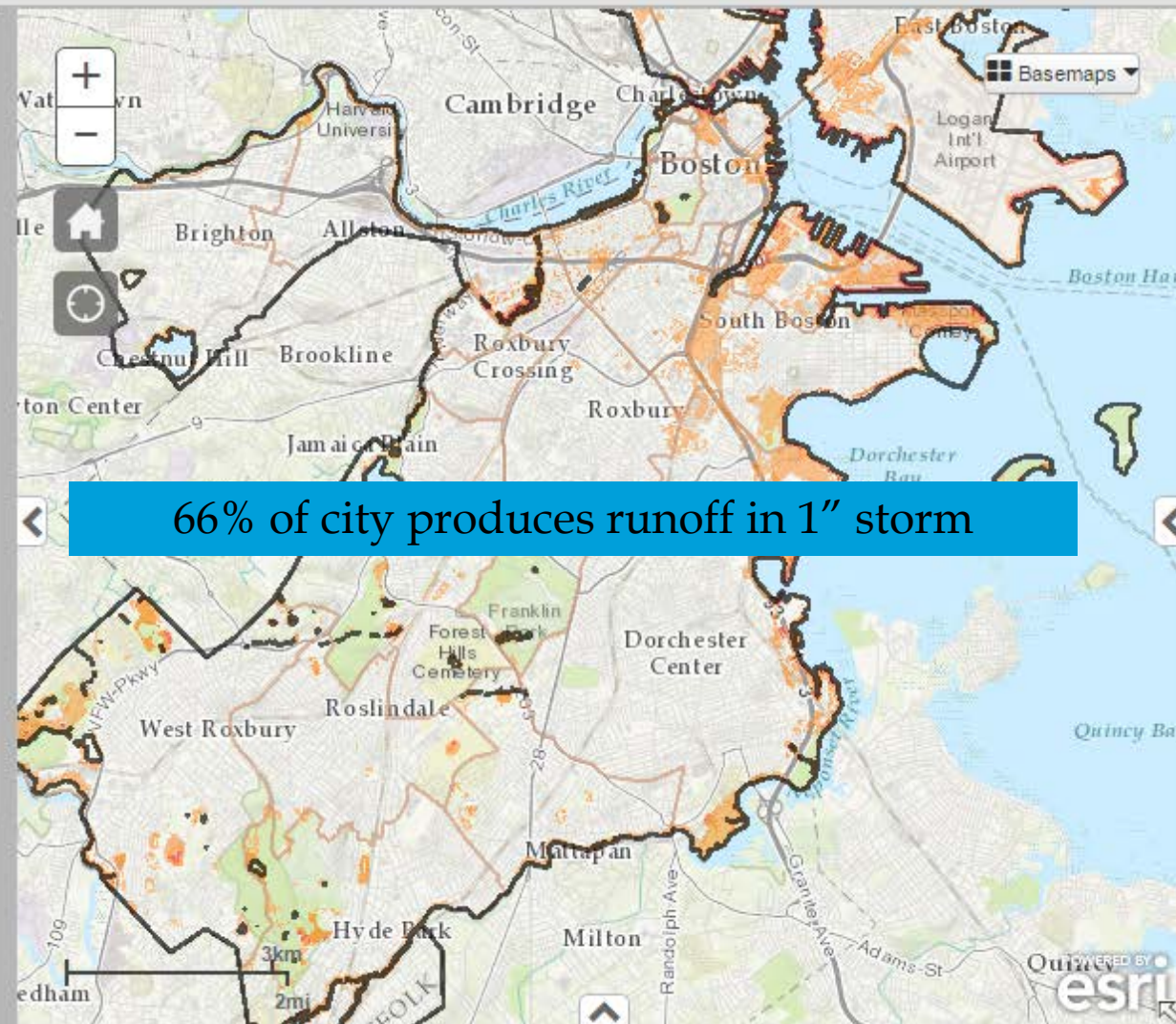


Green Infrastructure for a Low-Carbon, Resilient Boston

Enter an address or place

Help
Logout

- Protect
 - Critical Infrastructure
 - Social Vulnerability
 - Green Infrastructure Suitability
- Analysis Results
 - Turn off all Results
 - Overall Stacked Priorities
 - Cool
 - Connect
 - Absorb
 - Current Flood Zones
 - Estimated Runoff Potential
 - Increased Estimated Runoff Potential
 - Elevation Sinks
 - Wood Structures
 - Wetlands
 - Absorb Priorities
 - Protect
 - Critical Infrastructure
 - Social Vulnerability
- Scenario Weights



Protect Analysis Finds Flood Risk

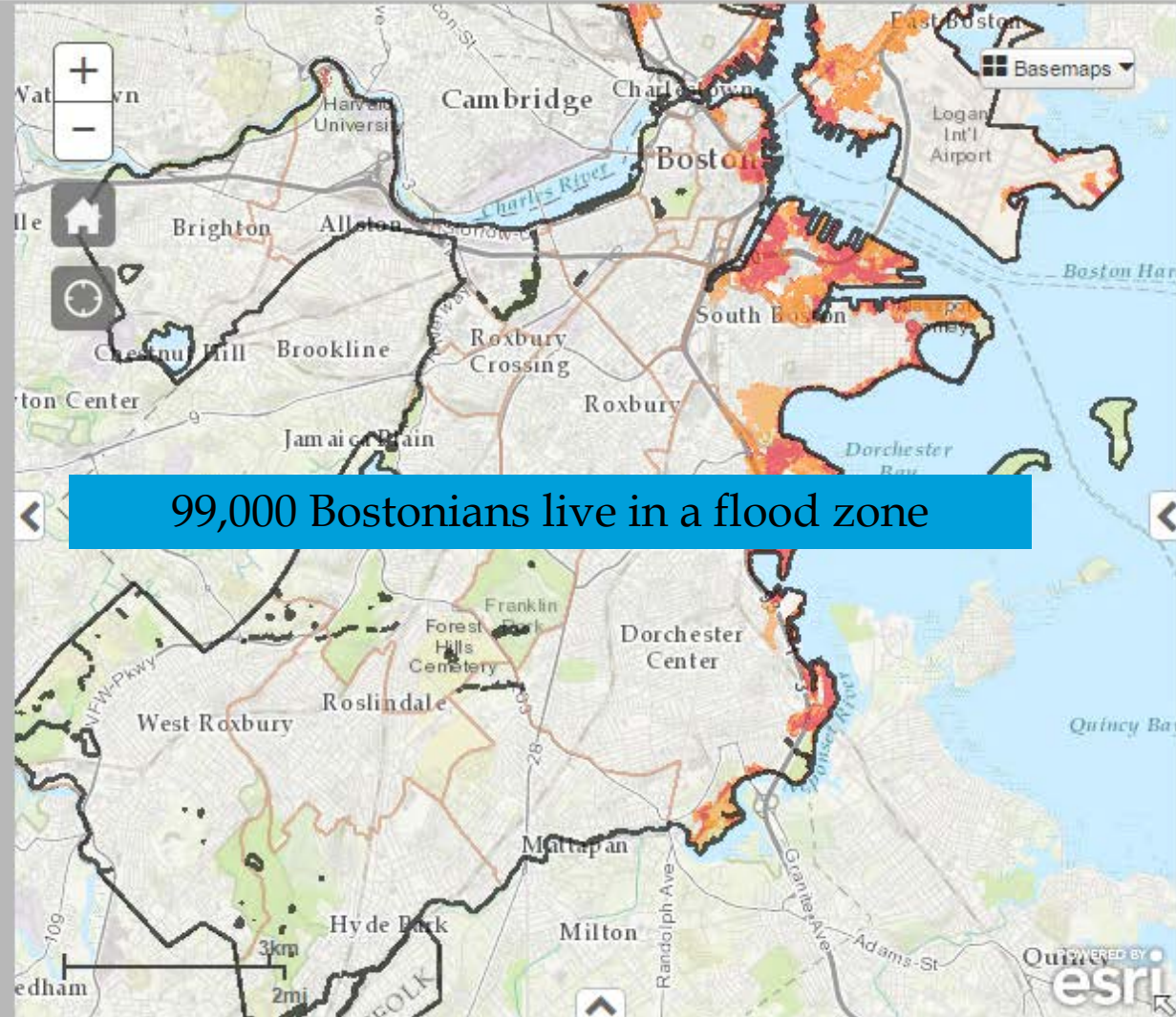


Green Infrastructure for a Low-Carbon, Resilient Boston

Enter an address or place

Help
Logout

- Social Vulnerability
- Green Infrastructure Suitability
- Analysis Results**
- Turn off all Results
- Overall Stacked Priorities
- Cool
- Connect
- Absorb
- Protect
 - 2013 Flood Zones
 - 2030 Flood Zones
 - 2070 Flood Zones
 - 2030 Coastal Inundation Areas 100yr flood
 - 2070 Coastal Inundation Areas 100yr flood
 - 2030 Coastal Inundation Areas 1000yr flood
 - 2070 Coastal Inundation Areas 1000yr flood
 - Protect Priorities
- Critical Infrastructure
- Social Vulnerability



“People Data” Help Us Advance Equity

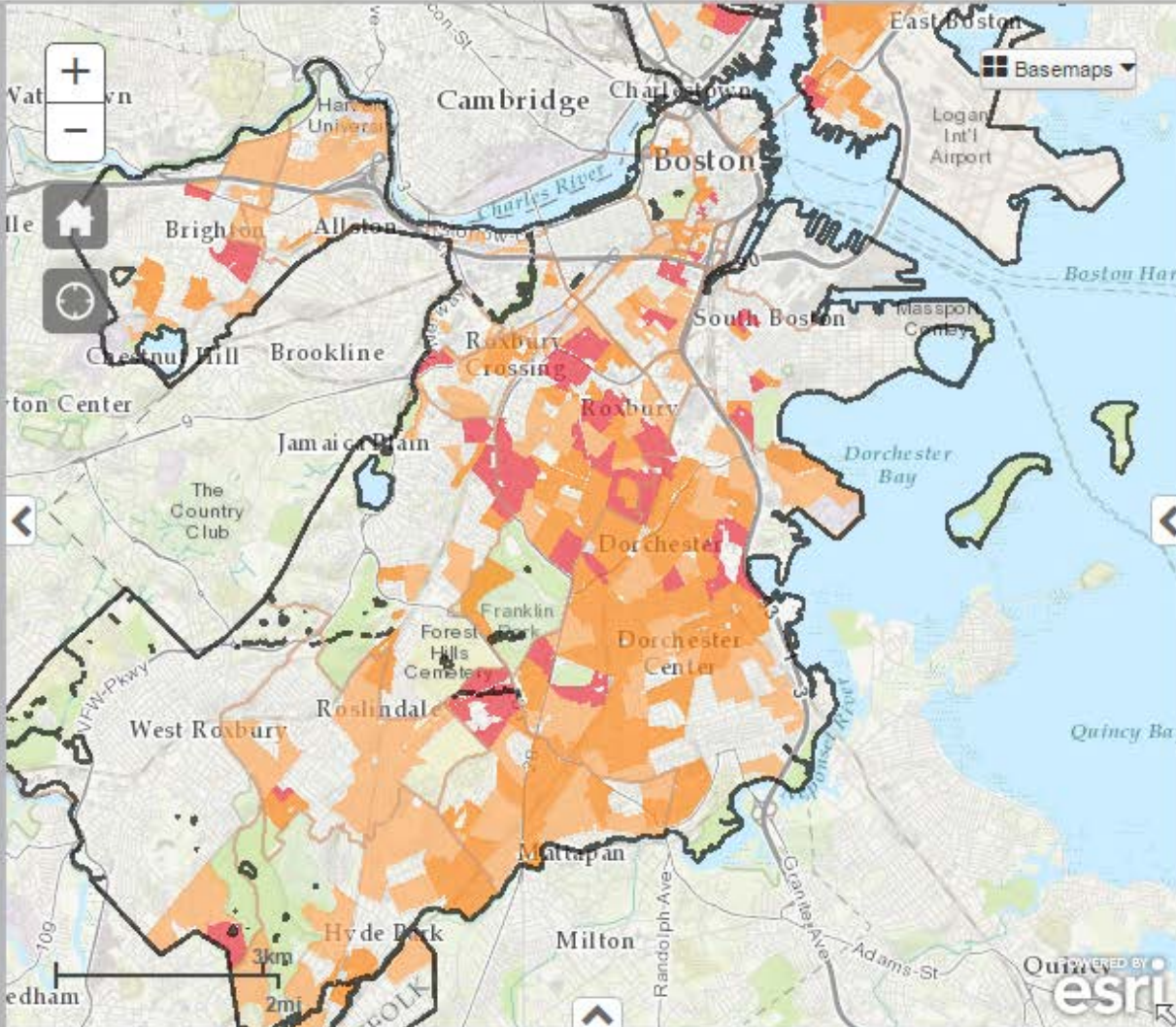


Green Infrastructure for a Low-Carbon, Resilient Boston

🔍 Enter an address or place

Help
Logout

- Social Vulnerability
- Green Infrastructure Suitability
- Analysis Results**
- Turn off all Results
- Overall Stacked Priorities
 - Cool
 - Connect
 - Absorb
 - Protect
 - Critical Infrastructure
 - Social Vulnerability
 - People of Color
 - Low Income Households
 - Linguistic Isolation
 - Less Than High School Degree
 - Population over 64
 - Population under 5
 - Social Vulnerability Priorities



☰ Scenario Weights

🖌 Draw



Most Important: Tool Helps Link Analysis to Action

Green Infrastructure for a Low-Carbon, Resilient Boston

[Help](#)
[Logout](#)

Group Parcel Selection

Query Data

Layer: Parcels

By Value By Location

Select A Field:

Estimated Runoff Potential

Logical Operator: Query Value:

= Yes

[Add Condition](#)

Query Conditions:

- ✗ Estimated Runoff Potential = 'Yes'
- AND
- ✗ Land Surface Temperature Hot Spots - Day = 'Yes'
- AND
- ✗ Low Income Households = 'Yes'
- AND
- ✗ Vacant Lot (0=No or 1=Yes) = 1

Use And or Or Between Conditions:

And Or

[Run Query](#)
[Clear Query](#)

Parcels Parcel Report Export

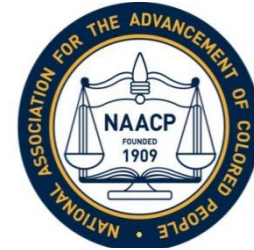
Parcel ID	Address	Cool Priorities	Connect Priority Areas	Absorb Priorities	Critical Infrastructure Priorities	S Vuln Prior
2205325000	LAKE ST	No	No	No	No	Yes
2204982000	CHISWICK TER	No	No	No	No	No
2202736020	VINELAND ST	Yes	No	No	No	Yes

1 - 100 of 2051 results

1
2
3
...
21
100



GREENLATINOS
LATINO ENVIRONMENTAL AND
CONSERVATION ADVOCATES



USDN | urban sustainability
directors network

PIONEERED BY THE
ROCKEFELLER FOUNDATION

100

RESILIENT

CITIES



**White House Climate Data Initiative
EPA GI Partnership
HUD NDRC Tech Advisors**

Climate-Smart Allies - Leadership through Partnership







Green Infrastructure
Schoolyards



Green Alleys



Connective Corridors/
Linear Parks



Community Agriculture



Water-Smart Parks

TPL Green Infrastructure Project Typologies

Climate-Smart Cities Partnership – Multi-Benefit GI for L.A.

CSC Partnership



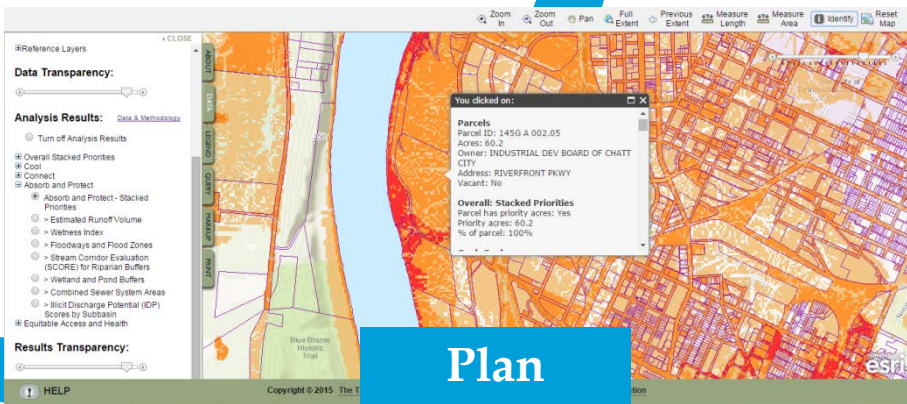
Fund



Research

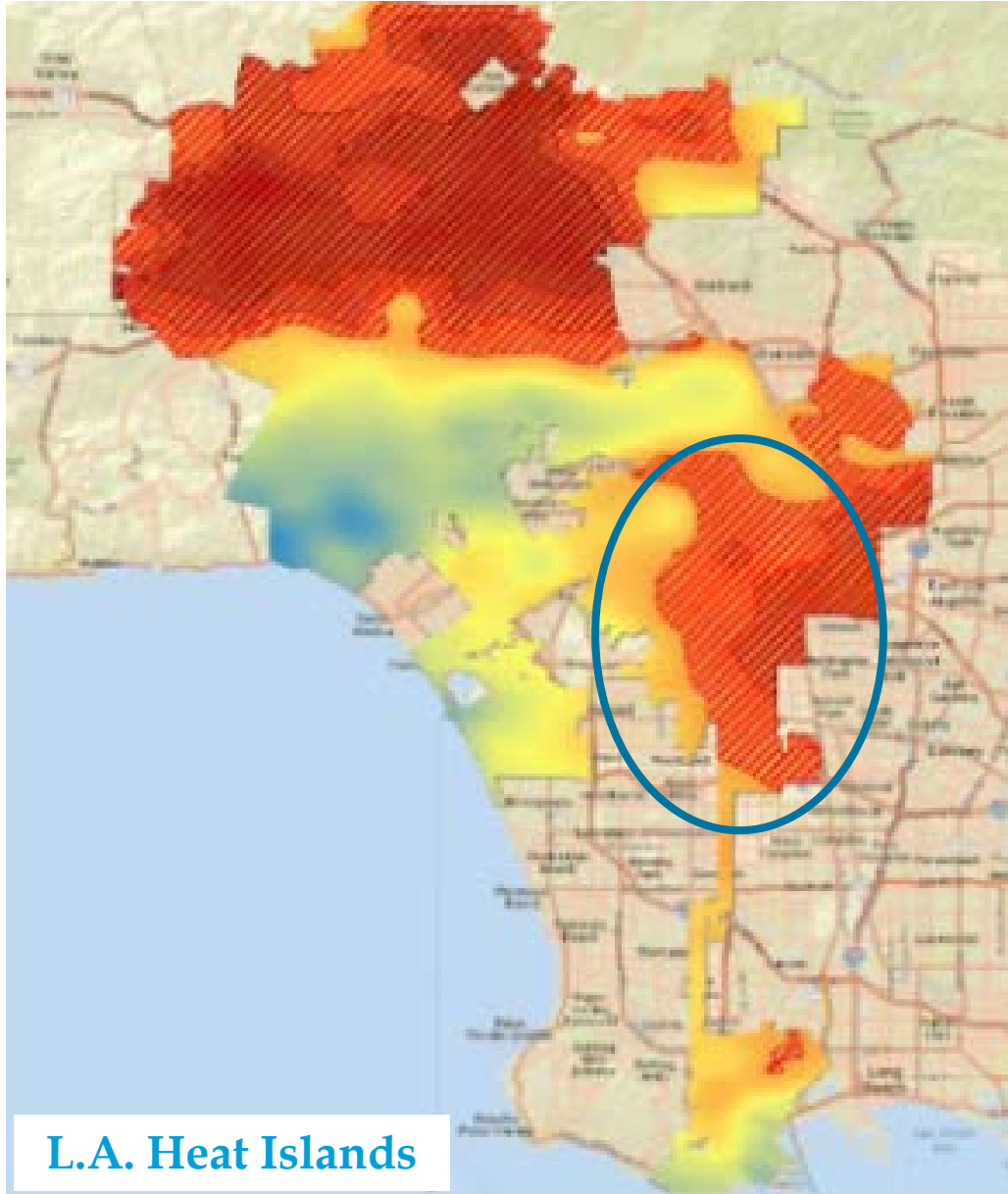


Create

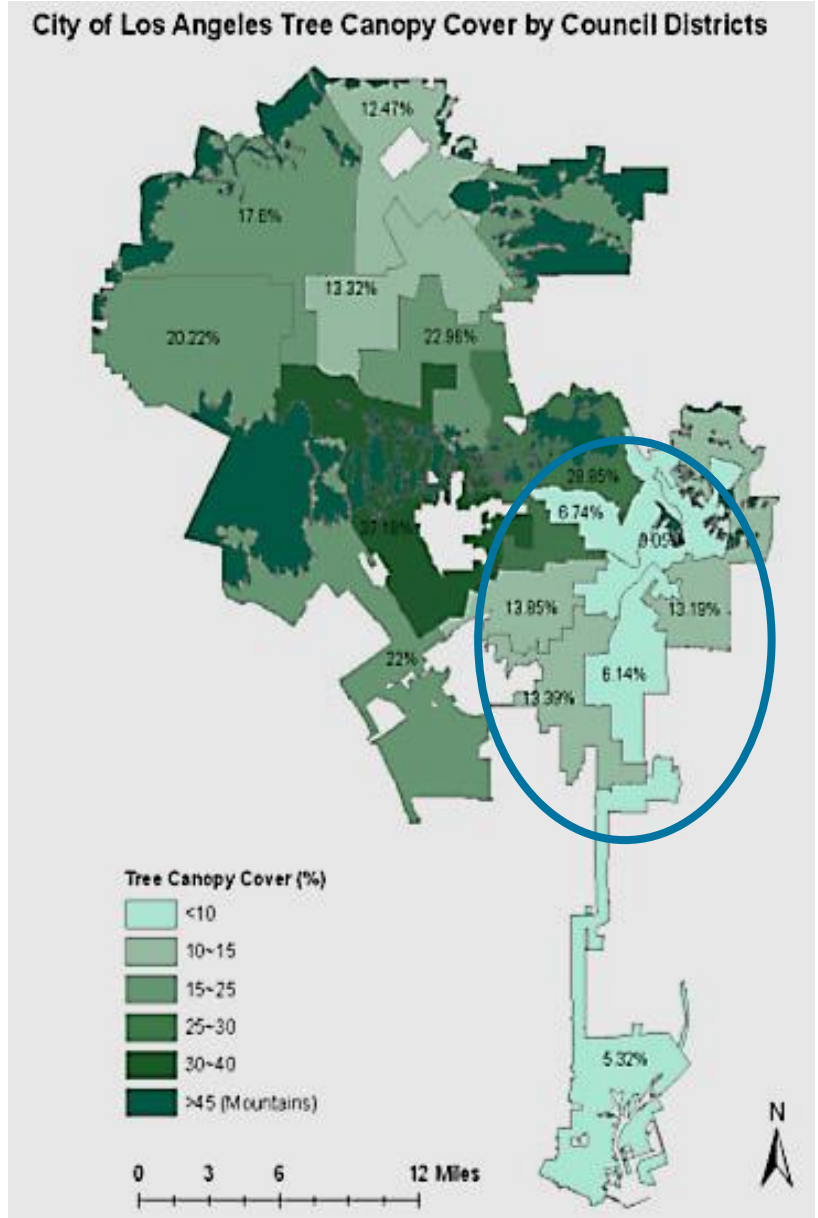


Plan

Science & Planning Link to Climate-Smart Implementation



L.A. Heat Islands



Green Alleys

Los Angeles, California



Implementation Begins with Community



NO DUMPING

No person shall deposit any non-combustible rubbish or any refuse of any kind whatsoever upon or in any street, sidewalk, parkway or upon any lot or private premises.
PENALTY: - \$1000 Fine or 6 months in jail, or both.
L.A. Municipal Code - Ord. No. 77,000 Sec. 66.25



¡POSADA!

¡Plática Sobre los Planes para Enverdecer Su Comunidad!

7 de diciembre
9 am - 12 de mediodía

- ¡Conozca a sus vecinos y festeje los días de fiesta!
- ¡Aprenda como puede impactar este proyecto!
- ¡Escuche y aprenda sobre los callejones verdes y los árboles!
- ¡Disfrute la comida deliciosa!

Para mayor información llame:
Loree Ballock at 323-223-0141 ext. 12
Mamee Durazo at 323-223-0141 ext. 19
THE TRUST FOR PUBLIC LAND
COMMUNITY LAND FOR PEOPLE

Dr. Maya Angelou High School Parent Center
300 E. 53rd Street, Los Angeles 90011



Images: The Trust for Public Land

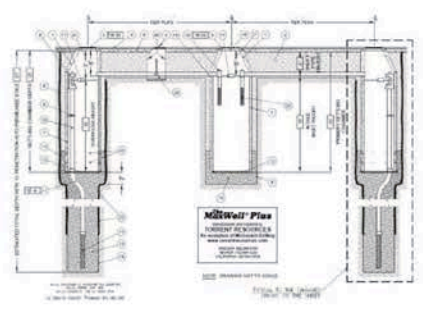
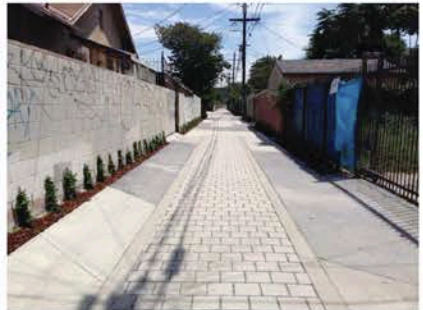
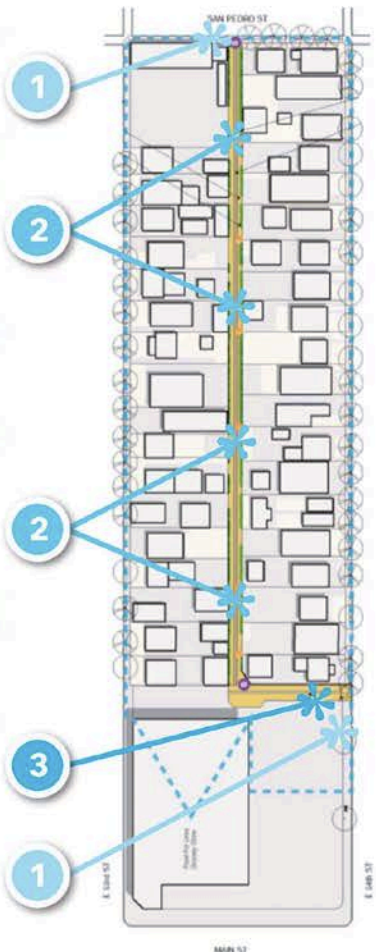


Science & Planning Link to Climate-Smart Implementation



Science & Planning Link to Climate-Smart Implementation

GREEN ALLEY STORMWATER MANAGEMENT



1. CATCH BASINS

Water is diverted from San Pedro Street and 54th Street and directed into the alley's stormwater treatment and capture system, allowing us to expand our tributary area beyond the alley's stormwater runoff. The water then enters the infiltration trench.

2. INFILTRATION TRENCH

Alley runoff enters the trench through permeable pavers and is cleaned as it passes through a gravel bed. An impermeable liner directs the treated water to the dry well.

3. DRY WELL

Water enters the shorter, center chamber (30' deep) where trash and oils are trapped. Clean water overflows into the two secondary chambers (60' deep) and recharges the aquifer.

Prepared for The Trust for Public Land
 by Philip Green, Rowling Miller, Nikki Niekant,
 Marybeth Eley and Lilly Shoop
 ICF International

Quantifying the Greenhouse Gas Benefits of Urban Parks



THE TRUST FOR PUBLIC LAND
 CONSERVING LAND FOR PEOPLE

THE AVALON GREEN ALLEY NETWORK DEMONSTRATION PROJECT

+ Lessons Learned from Previous Projects for Green Alley Development in Los Angeles & Beyond



Tributary Area

4.44 acres

Infiltration Rate

12 in/hr

Volume of Storage Provided

5,560 cf

~85%

impermeable surfaces and pavement in South LA

28%

of South LA residents live below the poverty line

expected to reduce up to

90%

bacterial loads for 20,000 people per square mile

Climate-Smart Implementation = Evaluate & Replicate

THE TRUST FOR PUBLIC LAND

Thank You

Shaun O'Rourke
Green Infrastructure Director
shaun.orourke@tpl.org