East Providence
Tree Canopy Project Overview
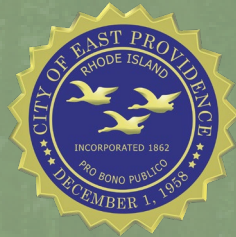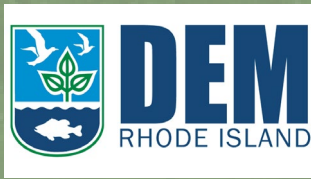
Matthew Lee
Green Infrastructure Center
October 2, 2023
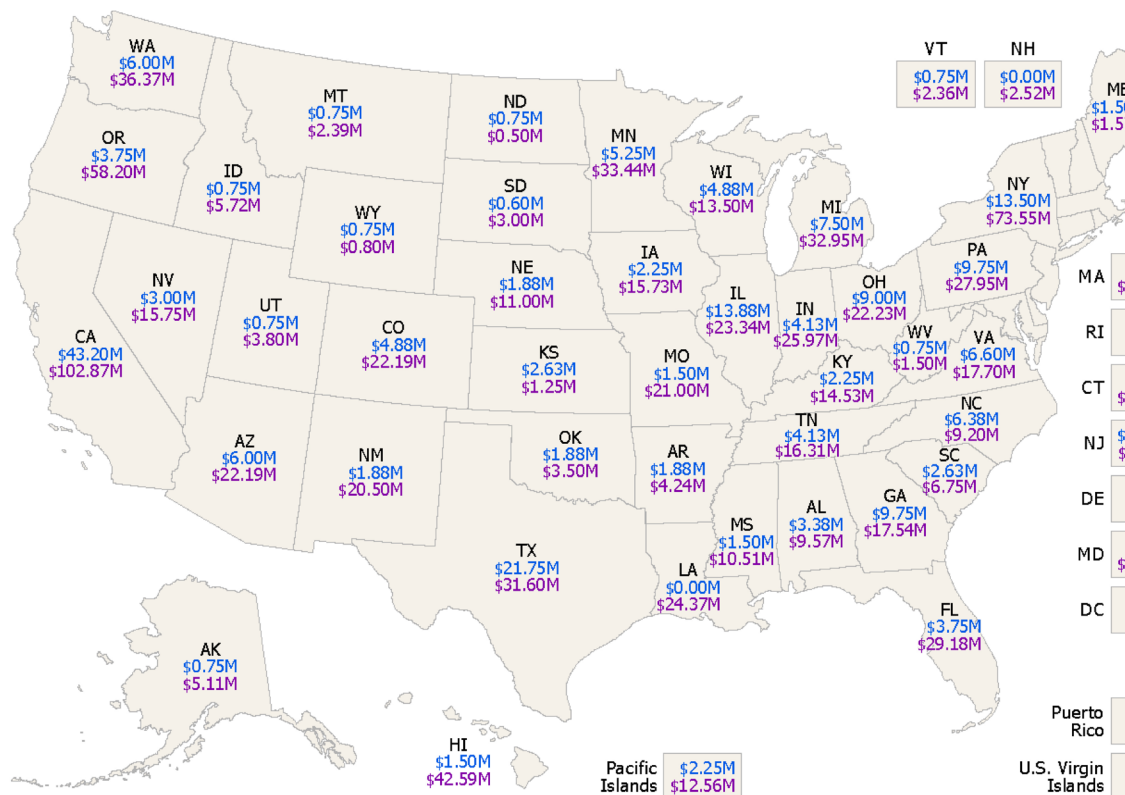
Urban and Community Forestry FY 202[3] IRA Grant Allocations in Millions of Dolla[rs]

URBAN AND COMMUNITY FORESTRY GRANTS

USDA is an equal opportunity provider, employer, and lender.

The USDA Forest Service's Urban and Community Forestry Program awarded more than $1 billion to fund projects that support urban communities through equitable access to trees and the benefits they provide. The funding was made possible by the Inflation Reduction Act.

FY 2023 IRA State Allocation - $250 Million Total
FY 2023 IRA Notice of Funding Opportunity Grants - $1.13 Billion Total

State	FY 2023 IRA State Allocation	FY 2023 IRA NOFO Grants
WA	$6.00M	$36.37M
OR	$3.75M	$58.20M
MT	$0.75M	$2.39M
ND	$0.75M	$0.50M
MN	$5.25M	$33.44M
ME	$1.50M	$1.57M
ID	$0.75M	$5.72M
SD	$0.60M	$3.00M
WI	$4.88M	$13.50M
MI	$7.50M	$32.95M
NY	$13.50M	$73.55M
WY	$0.75M	$0.80M
IA	$2.25M	$15.73M
PA	$9.75M	$27.95M
NV	$3.00M	$15.75M
UT	$0.75M	$3.80M
NE	$1.88M	$11.00M
IL	$13.88M	$23.34M
IN	$4.13M	$25.97M
OH	$9.00M	$22.23M
CA	$43.20M	$102.87M
CO	$4.88M	$22.19M
KS	$2.63M	$1.25M
MO	$1.50M	$21.00M
WV	$0.75M	$1.50M
VA	$6.60M	$17.70M
KY	$2.25M	$14.53M
AZ	$6.00M	$22.19M
NM	$1.88M	$20.50M
OK	$1.88M	$3.50M
AR	$1.88M	$4.24M
TN	$4.13M	$16.31M
NC	$6.38M	$9.20M
SC	$2.63M	$6.75M
MS	$1.50M	$10.51M
AL	$3.38M	$9.57M
GA	$9.75M	$17.54M
TX	$21.75M	$31.60M
LA	$0.00M	$24.37M
FL	$3.75M	$29.18M
AK	$0.75M	$5.11M
HI	$1.50M	$42.59M
Pacific Islands	$2.25M	$12.56M
VT	$0.75M	$2.36M
NH	$0.00M	$2.52M
MA	$1.88M	$22.81M
RI	$1.20M	$6.75M
CT	$2.63M	$15.44M

East Providence Tree Equity, Workforce, and Education Program (TEWEP)

Awarded: $750,000

City will implement over the next 5 years.

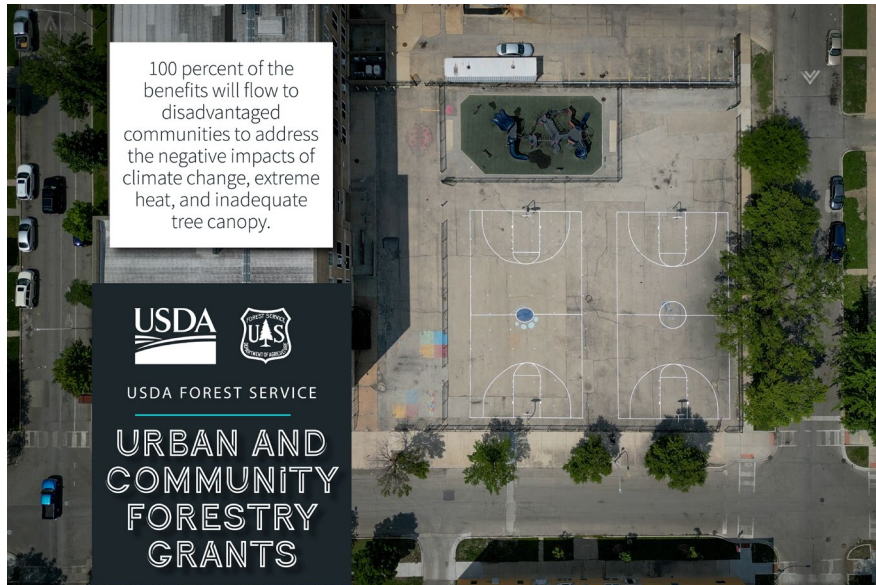# Canopy Mapping and Urban Forest Project

Tree Canopy data

Tree Canopy Analysis

Ecosystem Services

Tree Codes

Canopy Goal & Strategies

DETERMINING POTENTIAL CANOPY AREA (PCA)

GREEN INFRASTRUCTURE CENTER INC.

NAIP Leaf-On

Land Cover

Potential Planting Area (PPA)
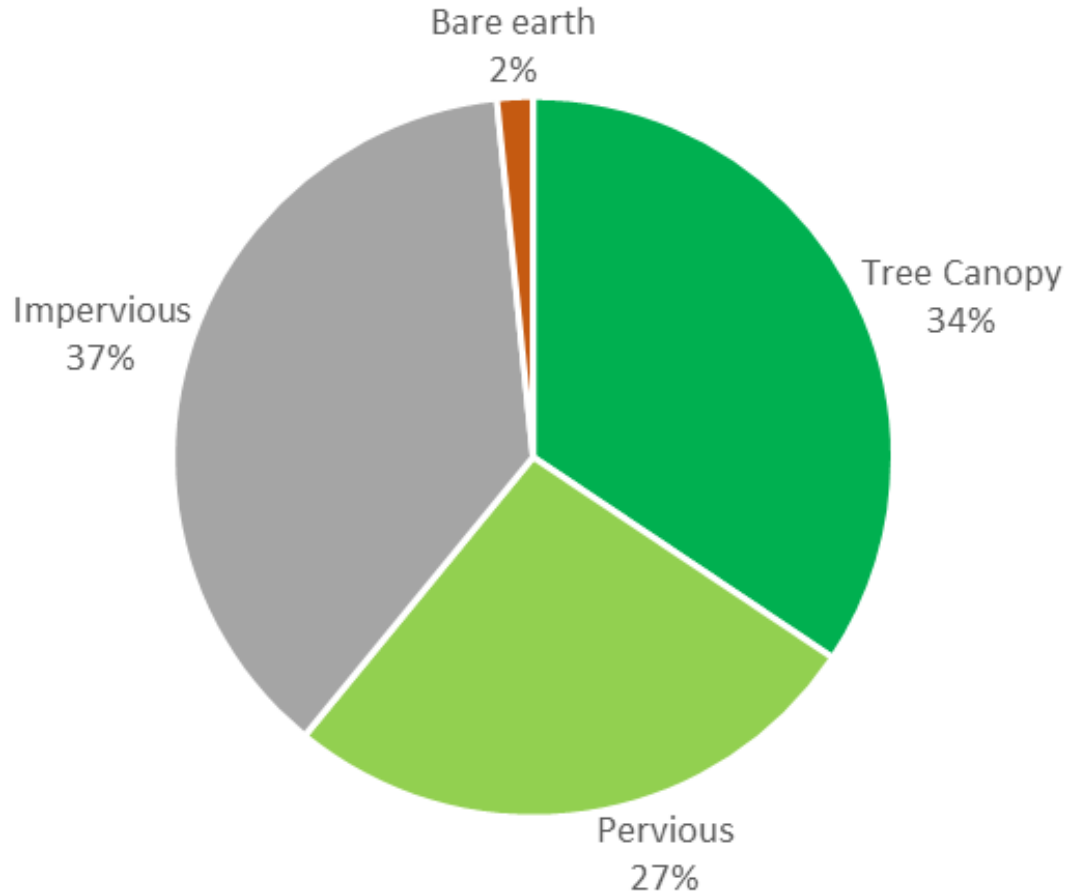
Potential Planting Spots (PPS)

Potential Canopy Area (PCA)

Potential Land Cover

East Providence Canopy

Citywide 34% (Final)

Potential Tree Canopy Citywide 41% (Final)

East Providence, Rhode Island
Potential Planting Areas (PPA)
Final

GREEN INFRASTRUCTURE CENTER INC.

East Providence
Potential Planting Areas (PPA)

Citywide 11.2% (Draft)
Citywide 5% (Final)

940 Acres (Draft)
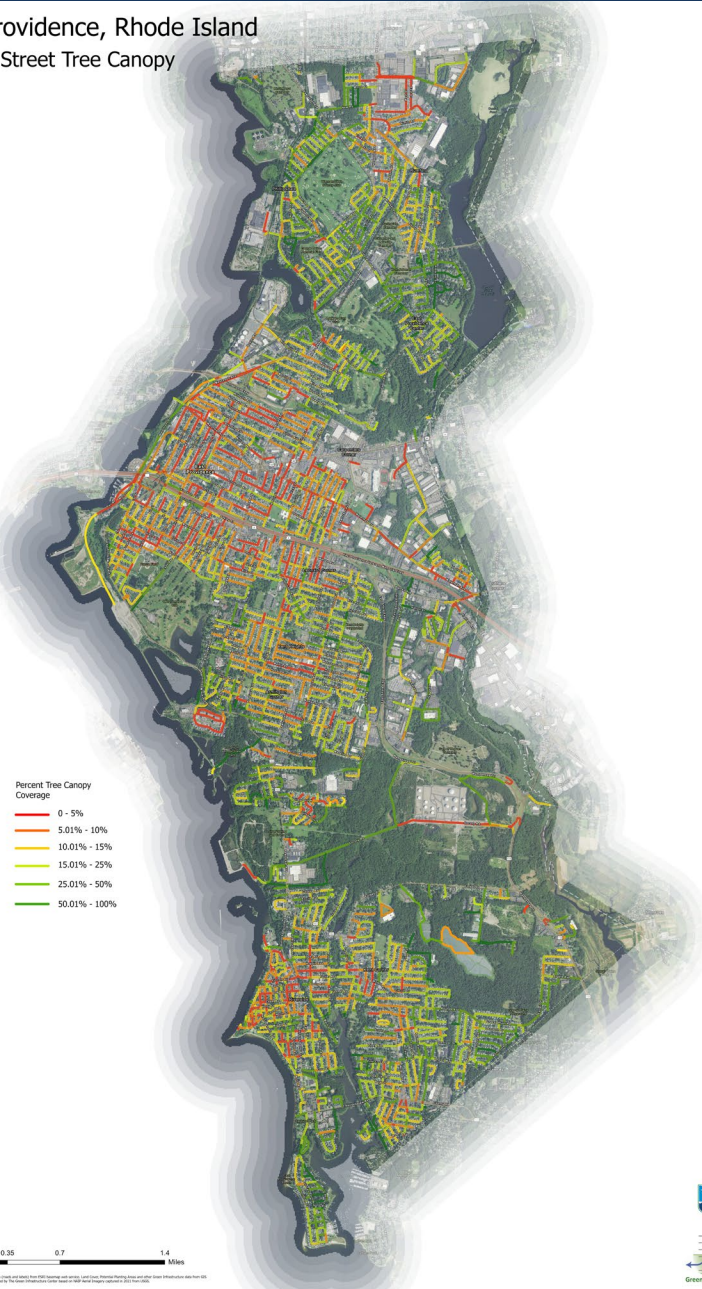## 411 Acres (Final)

If 100% of PPA was planted:

Total trees – 42,563
Small trees (20 ft diameter crowns) – 19,824
Large trees (40 ft diameter crowns) – 22,739

East Providence, Rhode Island
Percent Street Tree Canopy

Percent Tree Canopy
Coverage

0 - 5%
5.01% - 10%
10.01% - 15%
15.01% - 25%
25.01% - 50%
50.01% - 100%

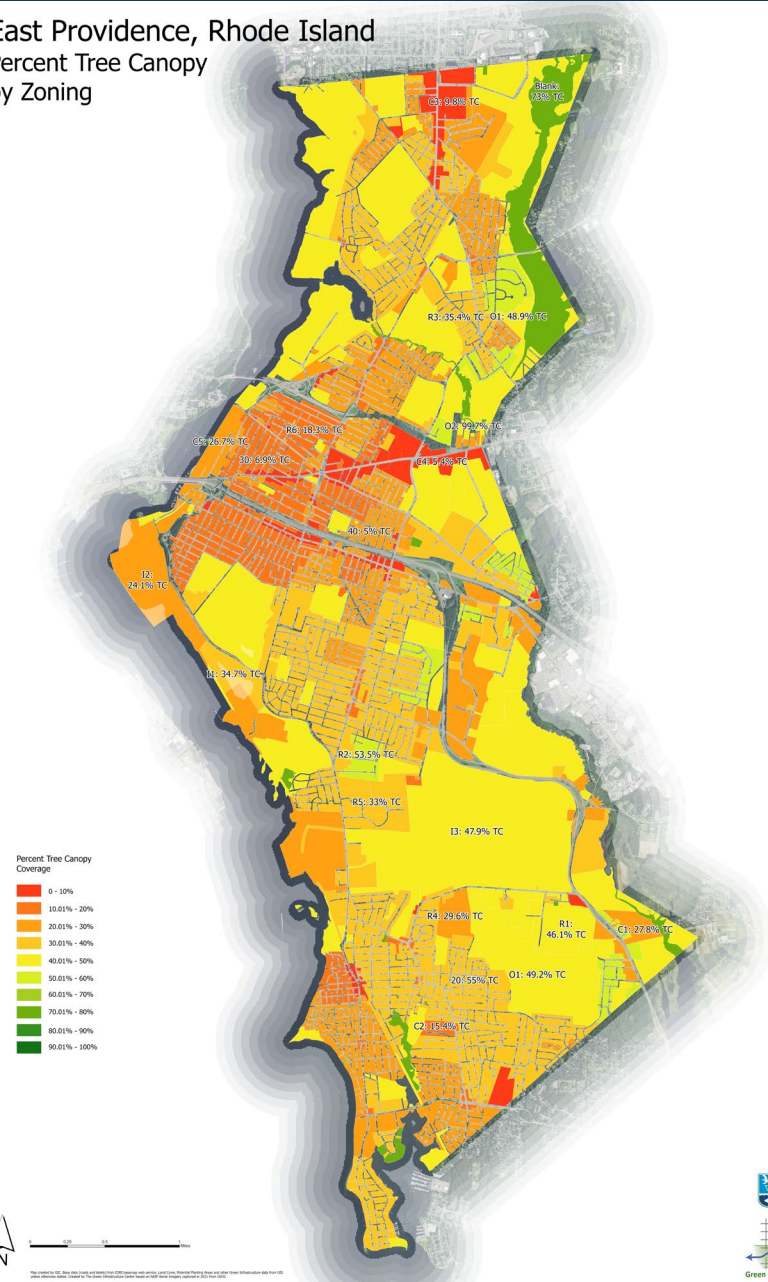There are **44** street segments with potential for greater than 20% tree canopy increase.

34 of those streets currently have less than 20% tree canopy.

GREEN INFRASTRUCTURE CENTER INC.

East Providence, Rhode Island
Percent Tree Canopy
by Zoning

Zoning	% TC
C1	28%
C2	15%
C3	10%
C4	5%
C5	27%

→ **35%**

Zoning	% TC
R1	46%
R2	53%
R3	35%
R4	30%
R5	33%
R6	18%

→ **24%**

East Providence, Rhode Island
Percent Tree Canopy
by Parcels

Percent Tree Canopy
Coverage

0%-10%
10.1%-20%
20.1%-30%
30.1%-40%
40.1%-50%
50.1%-60%
60.1%-70%
70.1%-80%
80.1%-90%
90.1%-100%
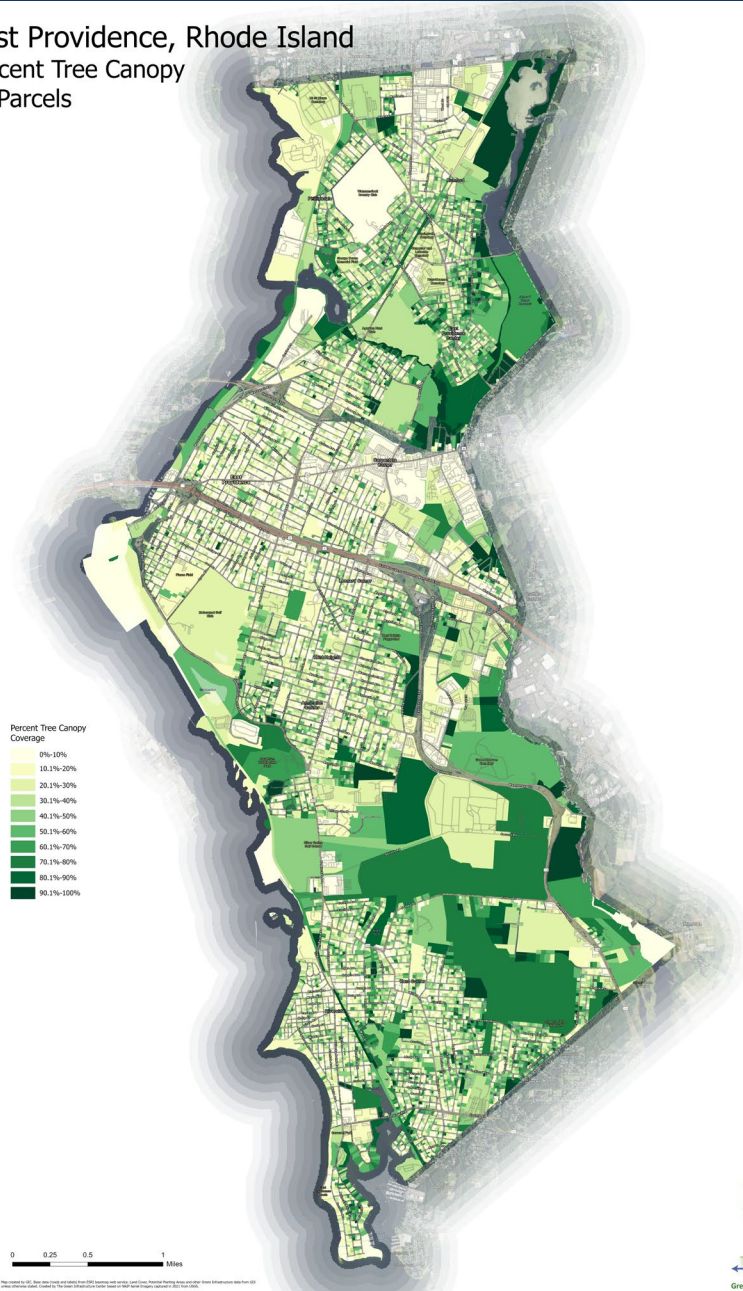
There are **10,861** parcels that could increase their canopy by **20%**.

Of those **10,861** parcels, **1,403** parcels have room for **5 or more trees**.

There are **264 parcels** with **less than 10%** tree canopy and have room for **7 or more trees.**

Air Quality Benefits (2021 data)

Pollutant (Abbrev.)	Benefit Description	Removal rate (lbs/acres/year)	Removal rate (lbs/year)
CO	Carbon monoxide removed annually	0.188	550
NO2	Nitrogen dioxide removed annually	1.99	5,825
O3	Ozone removed annually	19.916	58,294
PM10	Particulate matter greater than 2.5 microns and less than 10 microns removed annually	3.459	10,124
PM2.5	Particulate matter less than 2.5 microns removed annually	0.88	2,576
SO2	Sulfur dioxide removed annually	0.575	1,683

Source: Hirabayashi, 2014, "i-Tree Canopy Air Pollutant Removal and Monetary Value Model Descriptions"

DEM
RHODE ISLAND

Green Infrastructure Center

GREEN INFRASTRUCTURE CENTER INC.

Carbon Sequestration & Storage (2021 data)

Pollutant (Abbrev.)	Benefit Description	Removal rate (mT/acres/year)	Removal rate (mT/year)
C seq	Carbon sequestered annually in trees	4.35	12,732
C stor	Carbon stored in trees (**note: this benefit is not an annual rate**)	51.30	150,155

Source: Nowak, D. et al., 2013, "Carbon storage and sequestration by trees in urban and community areas of the United States"

East Providence, Rhode Island
Surface Temperature

July 17, 2023

95 degrees Fahrenheit

68 Degrees Fahrenheit
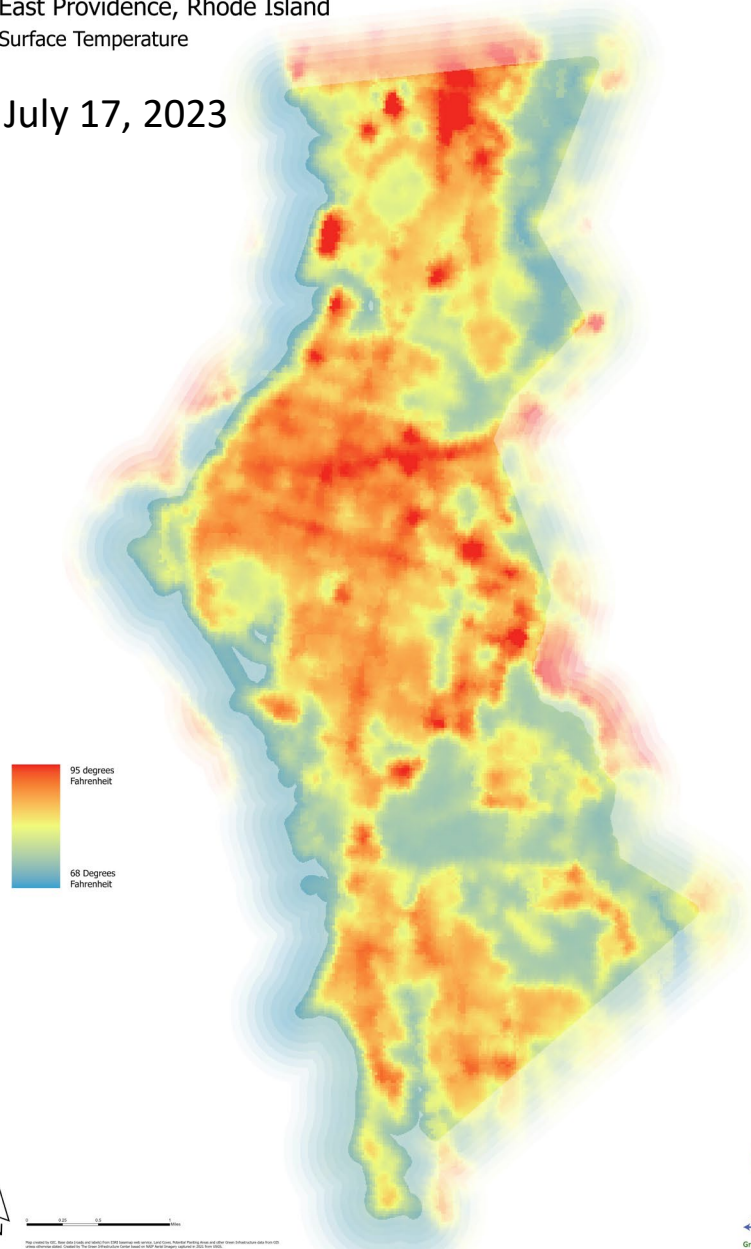
Surface Heat and Shade

Number of days above 100°F**

Where we are now	Where we are currently headed		If Bold Action is Taken
Historically 1971-2000 average	**Midcentury 2036-2065 average**	**Late Century 2070-2099 average**	**Extreme Heat Limited to**
0 days per year	**12** days per year	**29** days per year	**6** days per year

**Data are drawn from the July 2019 report, _Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days_

East Providence, Rhode Island
Potential Planting Areas Priority

High Priority Planting Areas
Medium Priority Planting Areas
Low Priority Planting Areas

Surface Heat and Low Income

The surface temperature data was combined with Census data to identify the hottest planting areas of the city that also have low income populations.

This can support the city planting these areas or partnering with the landowners to plant trees.
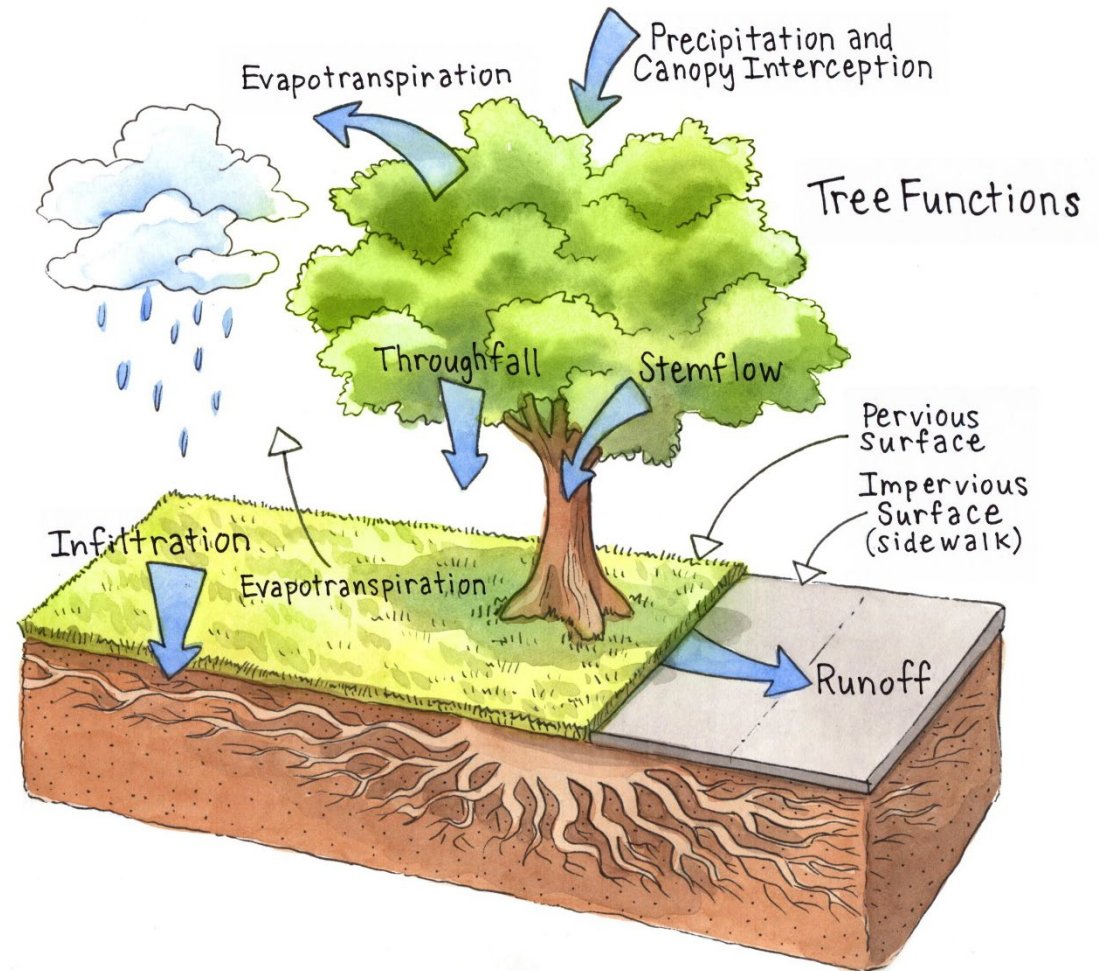
PPA:
High priority areas – 103 acres
Moderate priority areas – 215 acres
Low priority areas – 86 acres

Urban Tree Canopy

- 20% of annual rainfall or > retained in crown (Xiao et al., 2000)

- Delays runoff up to 3.7 hours

- ⬆ infiltration capacity of soils

Water Quality and Quantity

The City's current tree canopy captures as non-point source (NPS) surface runoff pollution:
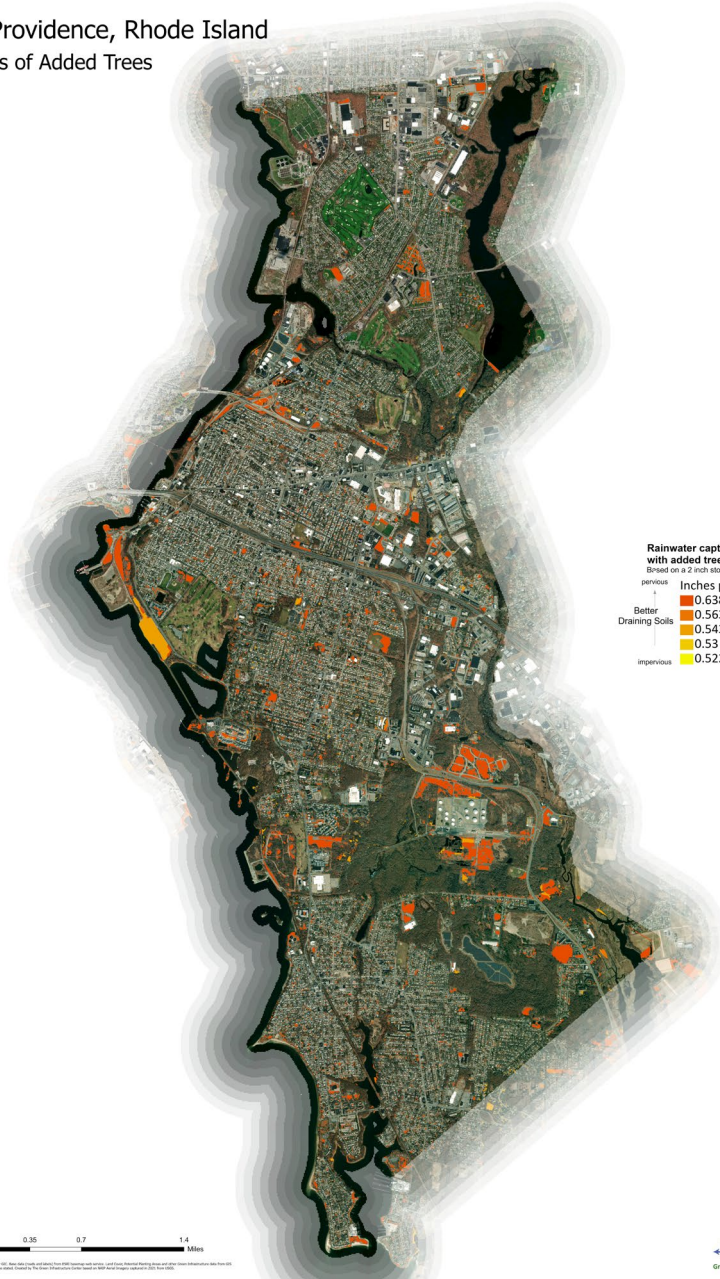
20,650 lbs/year of Nitrogen
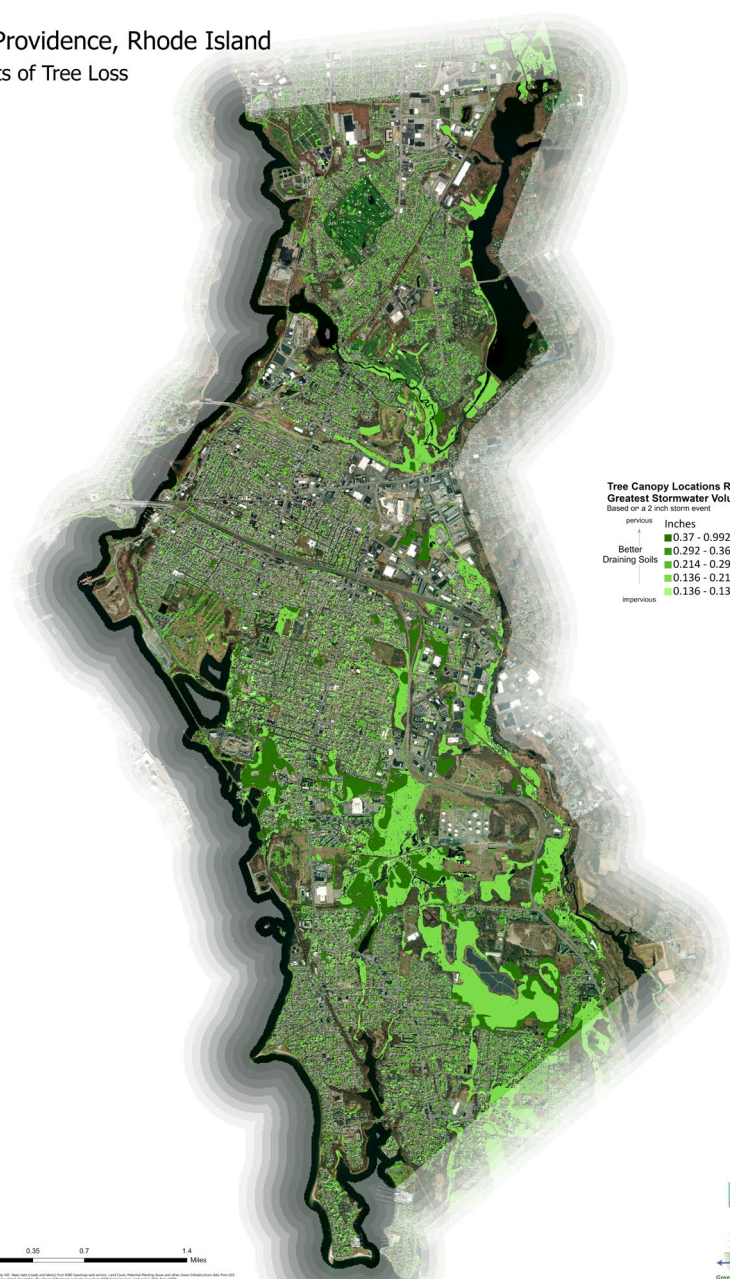
1,673 lbs/year of Phosphorus

1,257 tons/year of sediment

8.8 million gallons of stormwater runoff for every 1yr/24-hour rainfall event which equals 2.82 inches.

East Providence, Rhode Island
Benefits of Added Trees

Rainwater captured
with added tree canopy
Based on a 2 inch storm event

pervious   Inches per acre
                  0.638 - 1
Better   0.563 - 0.637
Draining Soils   0.543 - 0.562
                  0.53 - 0.542
impervious   0.522 - 0.529

East Providence, Rhode Island
Impacts of Tree Loss

Tree Canopy Locations Retaining
Greatest Stormwater Volumes
Based on a 2 inch storm event

pervious   Inches
                  0.37 - 0.992
Better   0.292 - 0.369
Draining Soils   0.214 - 0.291
                  0.136 - 0.213
impervious   0.136 - 0.135

Tools to use for Tree Canopy Planning

✓ Canopy Budget Calculator

✓ Trees and Stormwater Calculator

✓ Tree Codes and Ordinances Audit Tool

✓ GIS data for strategic planning and planting.

✓ A report and foundation for building tree canopy capacity.

Codes and Ordinances Audit Tool

Essential Elements (3 points) – this type policy or practice receives the most points because it has a greater impact on the health or management of the urban forest.

Desired Elements (2 points) – these are policies or practices we really like to see in place but are not as critically important as essential elements.

Extras (1 point) – these are extra ways a community can go above and beyond in managing their urban forest.

Example: Plans and Goals

Urban Forest Management Plan

Desired — Does this plan include a discussion of community values of trees (urban heat island effect mitigation, stormwater benefits, quality of life etc.)?

Essential — Does the municipality outline clear measurable goals along with concrete strategies?

Extra — If an Urban Tree Canopy Assessment was performed, are the results displayed and discussed in the UFMP?

Desired — Is urban forest analysis broken into smaller units (e.g. neighborhoods) and also by watersheds?

Extra — Does the UFMP show how it also meets goals in existing plans such as Open Space Plan, Park and Recreation Master Plan, Transportation Plan, Comprehensive Plan etc.?

Summary of Results

Score Breakdown by Urban Forestry and Stormwater Element Priority
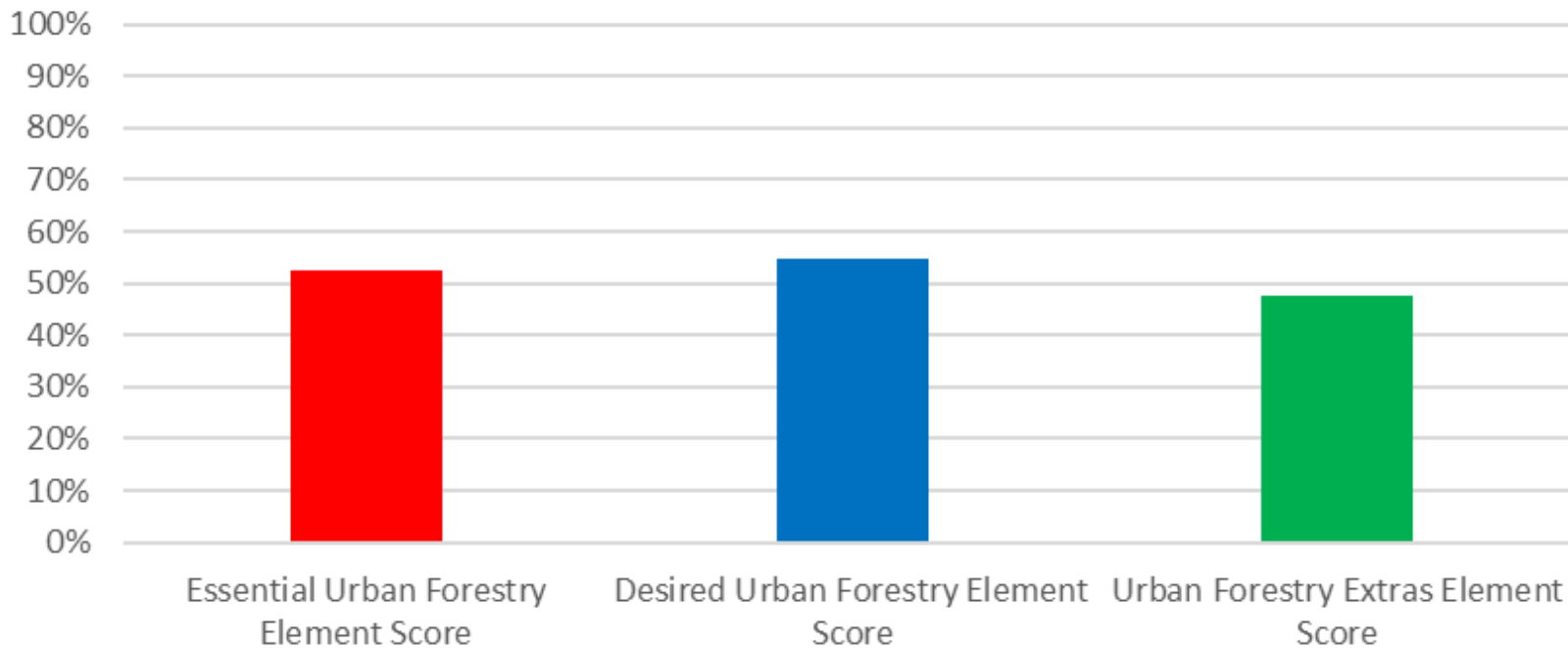
53%　　　55%　　　47%

Have a majority of the essential elements we want to see in the codes, policies and practices of the city.

The main focus with recommendations is to bring the essentials and desired up to a higher percentage which will result in a better managed more resilient urban forest.

Recommendations Summary:

1. Develop an Urban Forest Master/Management Plan.
2. Strengthen Tree Protection requirements to be more robust than currently under Section 14.
3. Establish a tree mitigation fund that is not limited to public property.
4. Expand tree protection measures to include private property. Create a private property tree removal permit process.
5. Designate root soil volume and soil surface area standards in development codes.
6. Create a contingency urban forest budget.
7. Incorporate trees into your next Hazard Mitigation Plan update.
8. Conduct a tree risk assessment in priority areas.
9. Include trees and stormwater data into the next Stormwater Master Plan.
10. Create a stormwater utility fee.
11. Adopt a Complete Green Street policy for the city.

East Providence Tree Canopy Goal

Maintain at least the current canopy level of 34% with the aim of increasing by 1-2% over the next 10 years.

This goal requires active tree planting and tree protection throughout the community.

Urban Forest Strategy Ideas:

1. Develop partnerships to plant more trees at low-canopied schools.
2. Revitalize street corridors with tree plantings.
3. Identify priority tree planting areas using data.
4. Develop an urban forest pest playbook to mitigate tree loss.
5. Retrofit impervious commercial properties with new trees.
6. Revise landscaping requirements for parking lots in Commercial and Office zones.
7. Require impervious surface reductions and tree plantings in floodplain redevelopments.
8. Require low impact development (LID) practices in new upland developments.
9. Identify strategic locations to plant more trees for stormwater mitigation.
10. Educate the public on the importance of trees to public health and the environment.
11. Build and train a youth workforce to help manage the urban forest.