



CLIMATE STEWARDSHIP INITIATIVE AND GREEN INFRASTRUCTURE

City of Hartford
Office of Sustainability



TODAY'S PRESENTATION

Climate Stewardship Initiative

- Climate Action Plan: What we do, and how
- Working Together: Our Team and Stakeholders

Background

- Climate Change
- Context in Hartford
- What is Green Infrastructure?

Our Approach

- Research
- Policy
- Community Action
- Next Steps





CLIMATE STEWARDSHIP INITIATIVE

Hartford Climate Action Plan
Adopted January 2018

VISION SUMMARY

We have developed an overall statement of our shared vision for each of the 6 action areas. This language will be repeated on the first page of each section for the 6 action areas.



ENERGY

Cleaner, cheaper, and more reliable energy that reduces the likelihood of power outages during storms, creates green jobs, reduces fossil fuel dependence, and cuts energy costs for all.



FOOD

Nutritious food that is locally grown or non-carbon-intensive, and is readily available across all neighborhoods, leading to improved health and greater resiliency for area families.



LANDSCAPE

Private and public landscapes filled with trees and meadows that together mitigate the effect of high heat days and flooding, provide ecosystem services, offer recreation, and clean our air.



TRANSPORTATION

A multi-modal, affordable transportation network with safe biking and walking options and fewer vehicle-related emissions, which improves air quality and cuts asthma rates.



WASTE

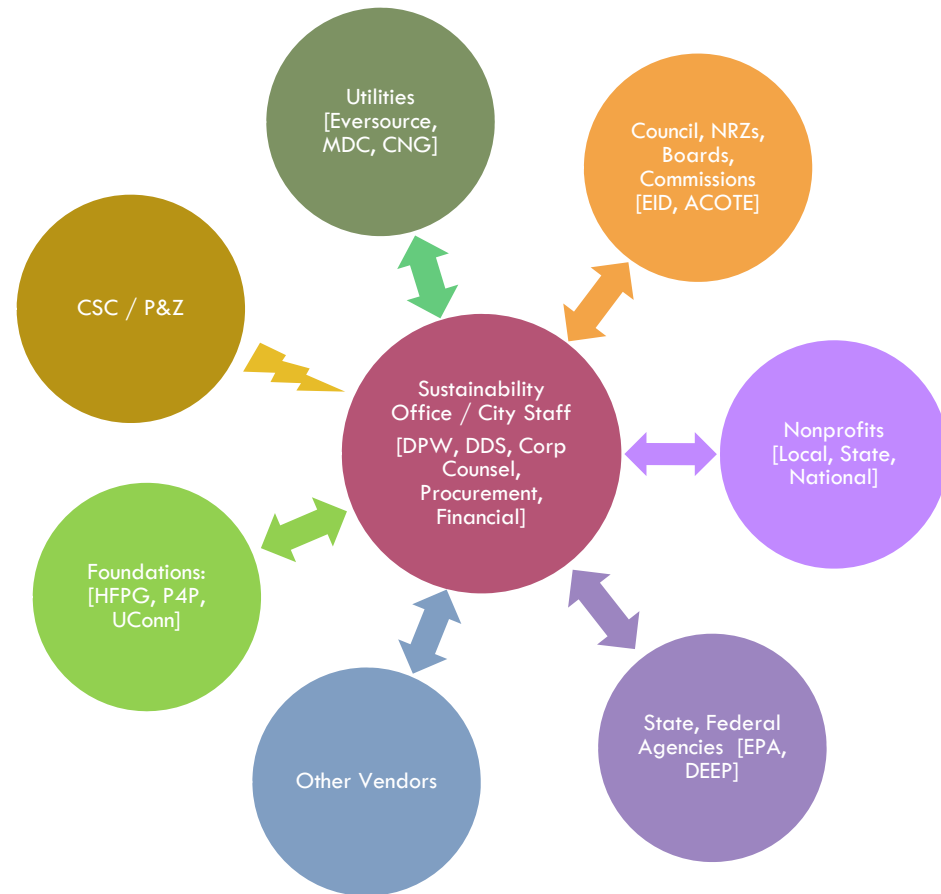
Eradication of the worst trash and blight, and public education that boosts diversion, recycling and reuse rates—which in turn cuts costs, related emissions, and environmental degradation.



WATER

More efficient use of potable water, better protection against floods and droughts, and waterways made cleaner through green infrastructure that reduces and cleans stormwater runoff.

Working Together





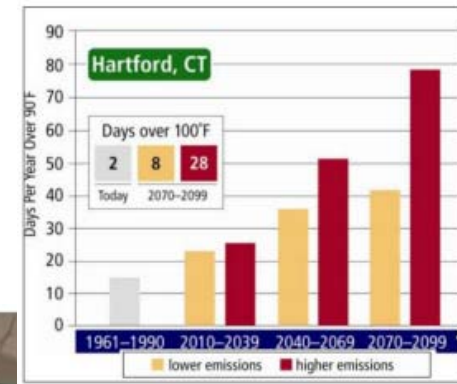
Bushnell Park from above

BACKGROUND

- Climate Change
- Context in Hartford
- What is Green Infrastructure?

IMPACTS OF CHANGING CLIMATE

In CT, “Flooding is likely to be worse during winter and spring, and droughts worse during summer and fall.” ~EPA, 2016



Above: The Hartford Fire Department at a cooling tent during a high-heat day. Chart from Frumhoff et al., Northeast Climate Impacts (2007).

IMPACTS OF CLIMATE ON TREES



Decayed Oak (Goodwin Park)



Oak failure due to drought (North End)



Tree structurally weakened from drought, failed by heavy snow/wind (Simpson St.)



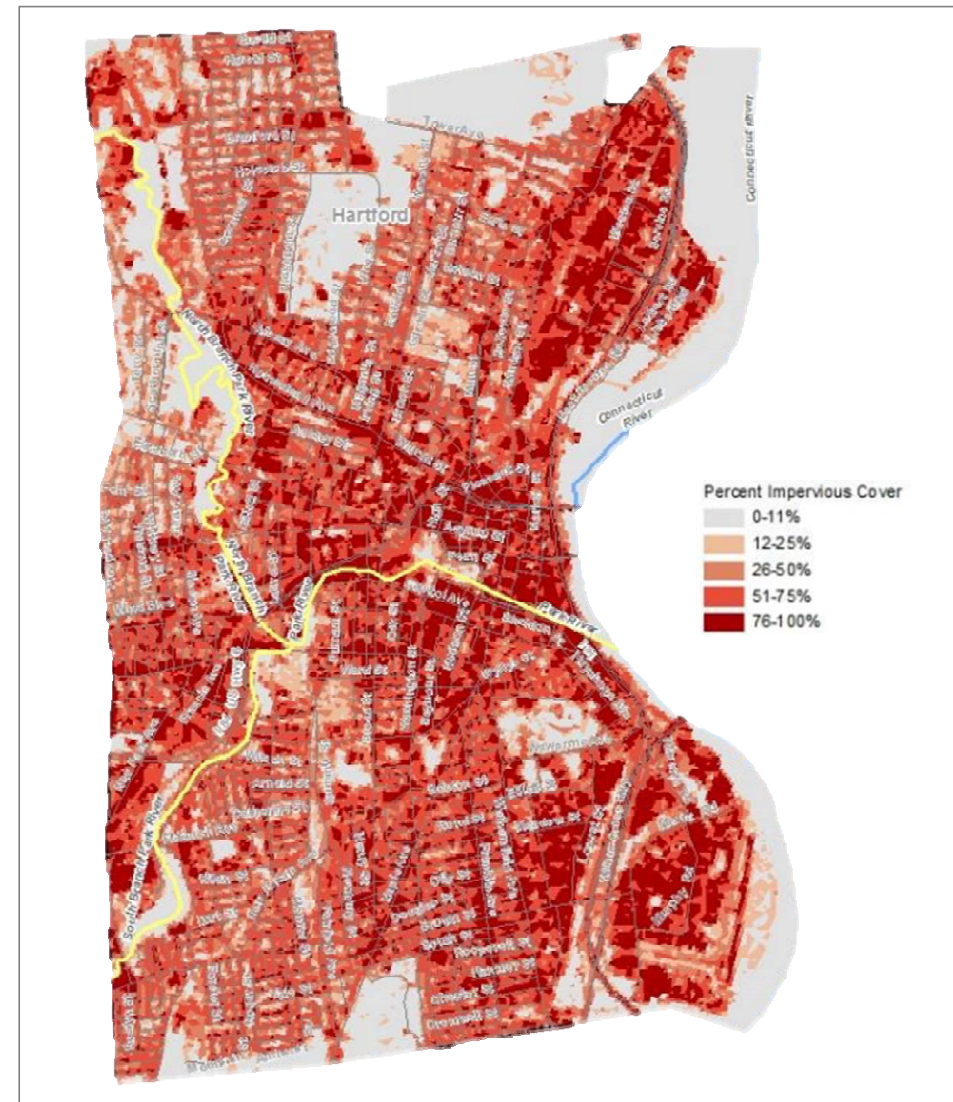
Norway Maple blown over by a recent nor'easter (Sterling St.)



Failing Sugar Maple (Old North Cemetery)

HARTFORD'S IMPERVIOUS COVER

- Degradation of water quality when IC $\geq 12\%$
- Impervious Cover over 12%: 80%
- Total Impervious Area Citywide: ~5,000 acres
- More Impervious Area \rightarrow More stormwater runoff *and* increased Urban Heat Island Effect

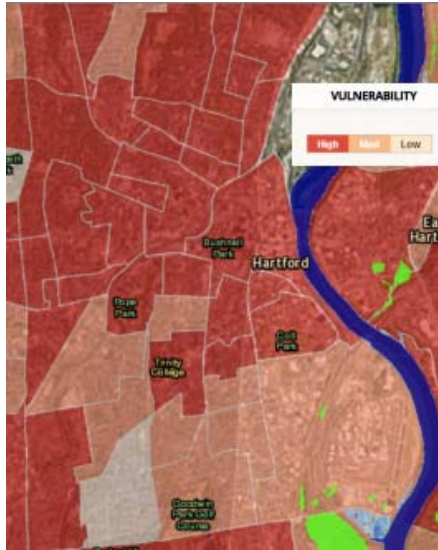


Sources: [CT DEEP](#); [UConn CLEAR](#); Hartford
Map from [CT DEEP](#)

NEGATIVE IMPACTS OF STORMWATER

- Increased frequency and risk of localized flooding
- 50 Combined Sewer Overflow (CSO) events every year
- CSO: stormwater/sewage discharge into local water bodies
- 76 Sewer Backups from Jan 2009 to July 2012
- 90% of the pollutant load is within the first inch of rain





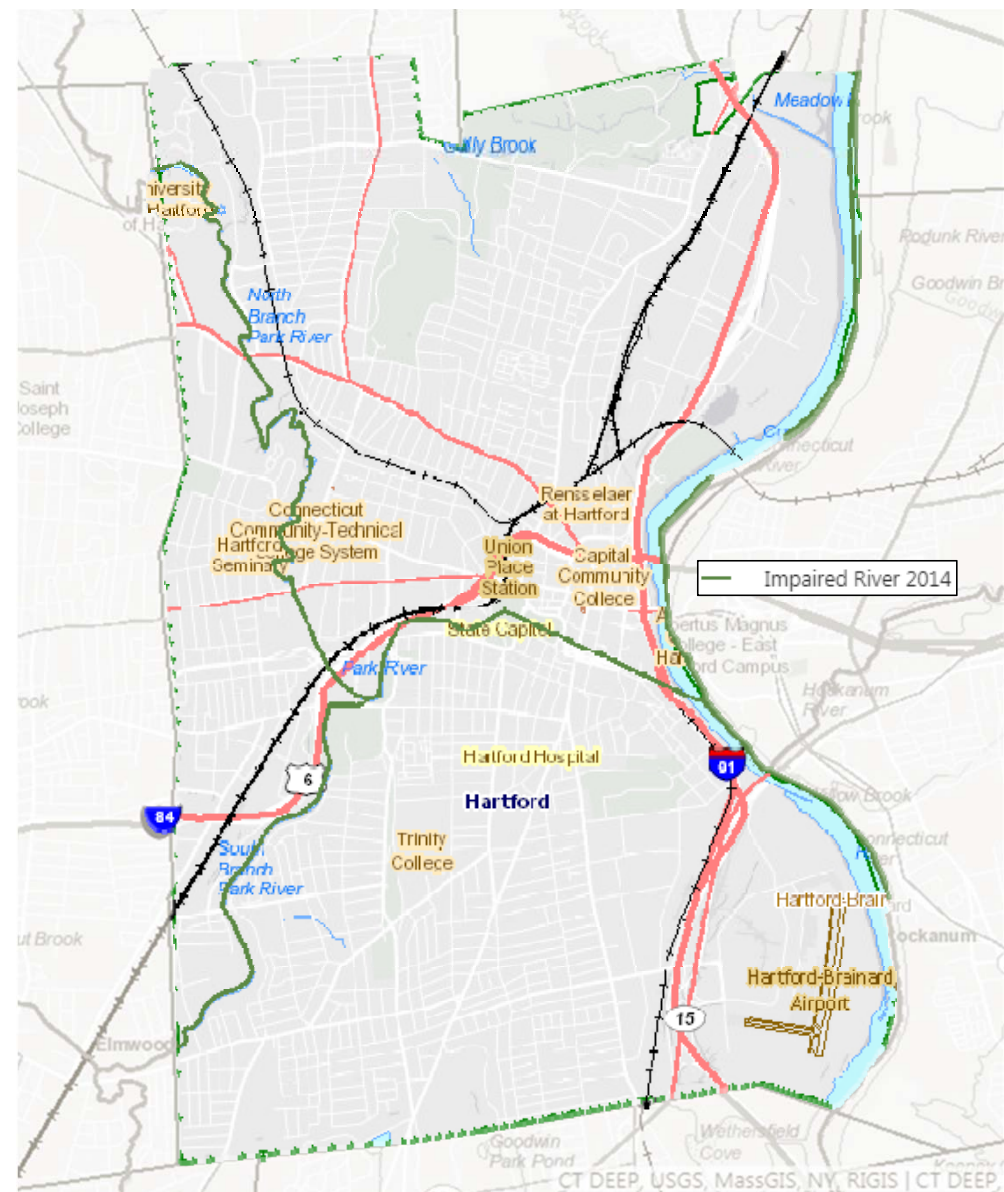
Map from the National Oceanic and Atmospheric Administration
"Sea Level Rise Viewer"

Historic River Surges @ Bulkeley Bridge



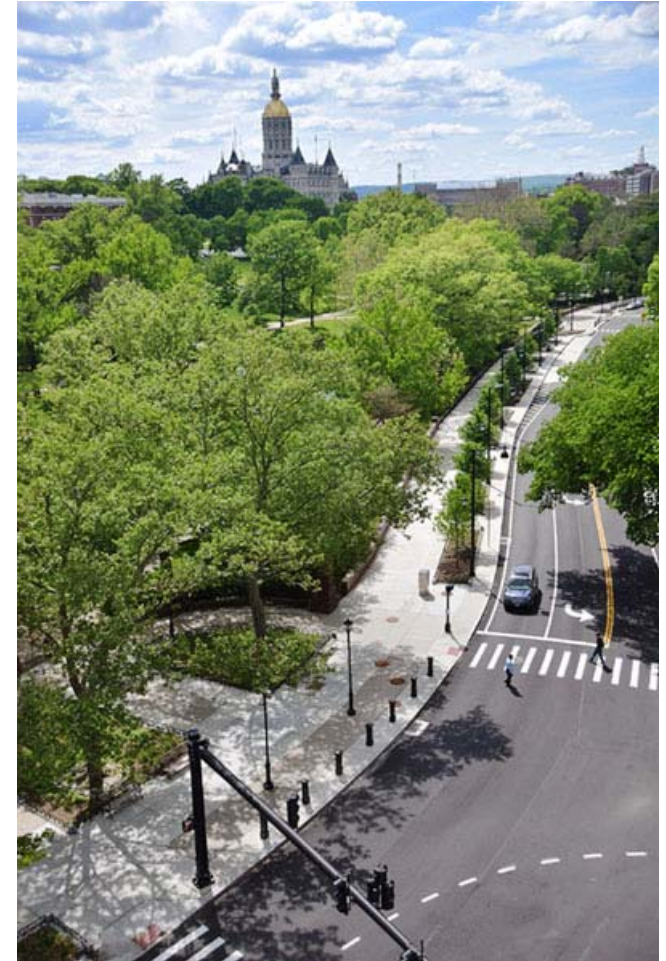
IMPAIRED WATER BODIES

- The following receiving waterbodies are on the state 303(d) list:
 - Connecticut River
 - Park River
 - North Branch Park River
 - South Branch Park River
- Other impaired water bodies:
 - Folly Brook
 - Kane Brook
 - Wethersfield Cove
- All are affected by CSOs/bacteria



SOLUTION: GREEN INFRASTRUCTURE

- “Green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits” – EPA
- **Benefits:**
 - Groundwater Recharge
 - Runoff Capture
 - Fewer sewer overflows
 - Less erosion
 - Reduced severity of flooding
 - Improved Water Quality
 - Improved Air Quality
 - Reduced Urban Heat Island Effect
 - Public Green Space



Bushnell Park North Promenade

TYPES OF LID/GI



Connecticut Science Center Green Roof



Bioswale at UConn Law



Urban Tree Canopy – Bushnell Park



Rain Garden at Keney Park



Permeable Pavement (asphalt) at the Capitol

URBAN TREE CANOPY, HARTFORD'S MOST VALUABLE GREEN INFRASTRUCTURE

Stormwater Runoff

PROBLEMS:

- ½ billion gallons of sewage-stormwater mix in local waters
- 50 Combined Sewer Overflows (CSO) a year (¼" of rain trigger)

Hartford's trees:

Intercept 590 million gallons of rain (\$4.7 million in runoff reduction services)

Urban Heat Island

PROBLEMS:

- Urban areas can be 22°F warmer than less paved areas
- Hartford's extended heat event deaths will increase from 27 to 40 deaths in 2055 (+48%)

Hartford's trees:

Provide shade and evapotranspiration (respectively cooling by 20-45°F and 2-9°F).

Air Quality

PROBLEMS:

- Highest Asthma Emergency Department Visit Rates in CT
- \$16.9 million in asthma hospital costs (2014)

Hartford's trees:

Capture pollutants such as particulate matter (a major asthma trigger). Annually, they removed 15,190 lbs of PM.

Sources: Clean Water Project, American Forests, NRDC, DEEP

GREEN INFRASTRUCTURE AND THE CLIMATE ACTION PLAN

- Hartford's Climate Stewardship Council approved a Climate Action Plan committed to climate resilience
- Green infrastructure is a way to mitigate landscape and water concerns



GOAL 1:

Reduce Discharge Into Sewers and Waterways

PUBLIC HEALTH

ECONOMIC DEVELOPMENT

SOCIAL EQUITY

To have a healthy city, we must have clean waterways. Unfortunately, Hartford has a combined sewer system, which collects and conveys sewage, industrial wastewater, and rainwater runoff in one pipe for treatment and discharge into the Connecticut River. During times of heavy rainfall, this system overflows and discharges untreated water into the River. The Park River alone sees 2,000 gallons of raw sewage annually.

To reduce pollution in our waterways, we must divert stormwater, so that we do not have overflow events. One excellent strategy is "green infrastructure," which is a natural approach to stormwater management that helps to filter and divert runoff before it enters the sewer system. Green infrastructure integrates vegetation and soils in architecture and landscaping. Examples of green infrastructure in the city include the

green roof at the Connecticut Science Center, bioswales along the Connecticut River and at the UConn Law School campus, and permeable asphalt around the State Capitol building.

The City already promotes green infrastructure, through a dedicated team in the Mayor's office, support from the EPA, and new zoning regulations. But more can be done.

A "Green and Complete Streets" workshop, sponsored by the EPA in 2017, convened stakeholders from local, state, and federal governments, nonprofits, and the MDC.

#	STRATEGY	TYPE	PURPOSE
a	Inventory Potential for Green Infrastructure to Capture Runoff	Inventory/Assess	Assess how much runoff can be captured citywide.
b	Develop Green Infrastructure Specifications	Policy/Code	Create guidelines for public and private parties to use to develop green infrastructure.
c	Evaluate and Pursue Stable, Innovative Funding for Green Infrastructure	Incentive	Promote green infrastructure financing.
d	Support Separation of Combined Sewer System	Partnership/Advocacy	Reduce the frequency of combined sewage overflow events.
e	Advocate for Green Infrastructure to be Incorporated into Long Term Control Plan	Partnership/Advocacy	Ensure green infrastructure is considered as a strategy by State in managing runoff close to source.



APPROACH

- Research
- Policy
- Community Action



RESEARCH

2017 CIRCA Green Infrastructure Workshop in New Haven

- Research
 - Topic memos/testimony
 - Tree characteristics and benefits
- Analysis
 - Mapping
 - Runoff calculator
 - Canopy cover
- Communications:
 - Design
 - Online platforms
 - Direct Outreach

COOL, GREEN, AND SOLAR ROOFS: FACT SHEET

WHAT ARE COOL/GREEN/SOLAR ROOFS?

Image courtesy of the U.S. Green Building Council

Cool Roof: A roof that reflects more sunlight and absorbs less heat than a standard roof. It requires a highly reflective material that is a type of paint, sheet covering, tile, or shingle.

Image courtesy of the U.S. Green Building Council

Green Roof: The area on roof that is open to the sky and is surfaced with soil and living plants in order to retain rainwater and absorb heat from sunlight.

Image courtesy of the U.S. Green Building Council

Solar Panels: are mechanical devices that convert sunlight into electricity. They can easily be mounted on flat roofs.

WHY CHOOSE THESE ROOFS?

COOL ROOF

- Energy Savings
- Reduced Peak Island Effect
- Short Payback Period
- Fewer Emissions

GREEN ROOF

- Energy Savings
- Longer Lifetime Use
- Improved Air and Water Quality
- Stormwater Management

SOLAR ROOF

- Energy Generation
- Reduced Emissions
- Increased Resiliency

OTHER EXAMPLES

Heartford's trying its best to become a more sustainable city. Check these <http://www.heartford.org/Climate> for our Climate Action Plan. Read below for some examples of other municipal programs:

• NYC Cool Roof Program

- Over 5.7 million of sq. foot rooftop since 2009
- 10-30% reduction of cooling costs

• Revolutionary Building Code in San Francisco

- San Francisco is the first U.S. city to require solar and living roofs on most new construction

APPLYING FOR A ZONING PERMIT?

You might be required to consider cool roofs, green roofs, solar panels – and explain your thought process in your application. An explanation is required for projects that:

- Have a parapet or flat roof
- Have a use other than a 1-, 2- or 3-story Dwelling
- Have a use other than a Retail or Service that takes less than 10,000 square feet

Your explanation may be simple, like a statement that you received price quotes from your roofing contractors.

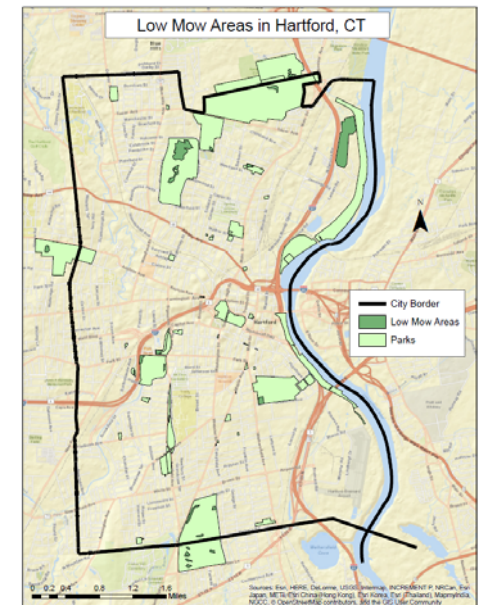
INTERESTED IN LEARNING MORE?

For useful links and other helpful tools on cool, green, and solar roofs, visit www.heartfordclimate.org/tools.

For more information about zoning requirements and permits:

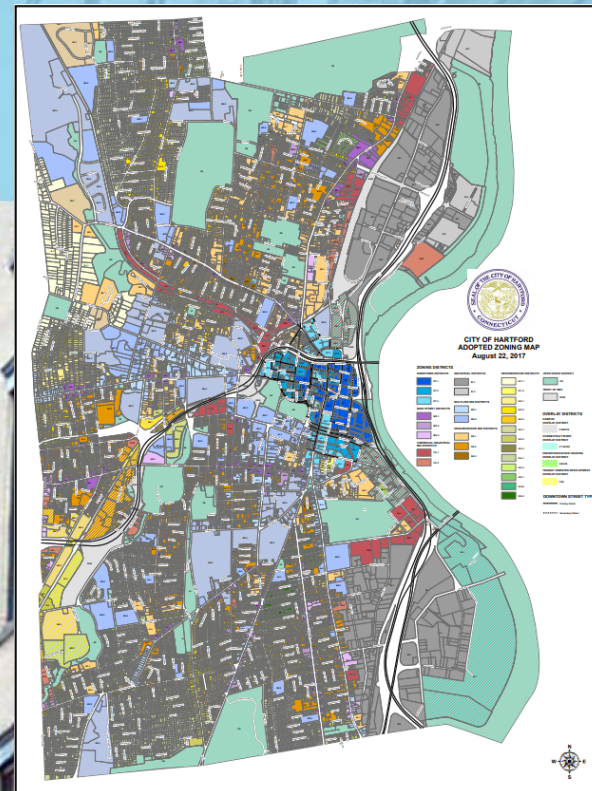
- Visit Heartford's Planning Department website at www.heartford.org/2009 or
- Contact: _____ by phone (508.666.4000) or by email (5086664000@heartford.gov)

Source: www.heartfordclimate.org, www.heartford.org/2009



ZONE HARTFORD

Zoning Regulations



SYSTEMATIC CHANGES

- Best Management Practices Guide
- Staff Stormwater Workshop
- Zoning Code
 - No Net Increase in Stormwater Runoff
 - Stormwater Fee-in-Lieu
 - Removal of Parking Minimums
 - Consideration for Green Roofs
- Preferred Tree Species List



COMMUNITY ACTION



KNOX and The Hartford volunteers plant 36 trees on Arbor Day 2018



Community Action Meeting on Landscape and Water

Photo from Keney Park Sustainability Project

RETAIN THE RAIN

STORMWATER MANAGEMENT PILOT

SPONSORED BY:



HOW WE GAIN FROM THE RAIN

Help
prevent
sewage
backups

Help
reduce
pollution
like motor oil
and heavy
metals

Water
your lawns
and gardens
at no cost

Recharge
the city's
groundwater
supplies

Help
prevent
sewage
overflows into
rivers

Did You Know?

1/4"

It can take as little as a 1/4 inch of rain to cause combined sewer overflows

50

Combined Sewer Overflows enter our waters every year

1/2

BILLION GALLONS
of sewage/stormwater mix is discharged into our rivers

OUR PROGRAM: SAVE WATER AND THE ENVIRONMENT!



Cap w/ clamp



Extension



Splash Block



Images: The Home Depot

COMMUNITY OUTREACH

Workshop

Neighborhood
Presentations

Community Action
Meeting



Workshop at Keney Park

FUTURE PLANS





Phoenix Plaza Green Roof

THANK YOU | QUESTIONS?