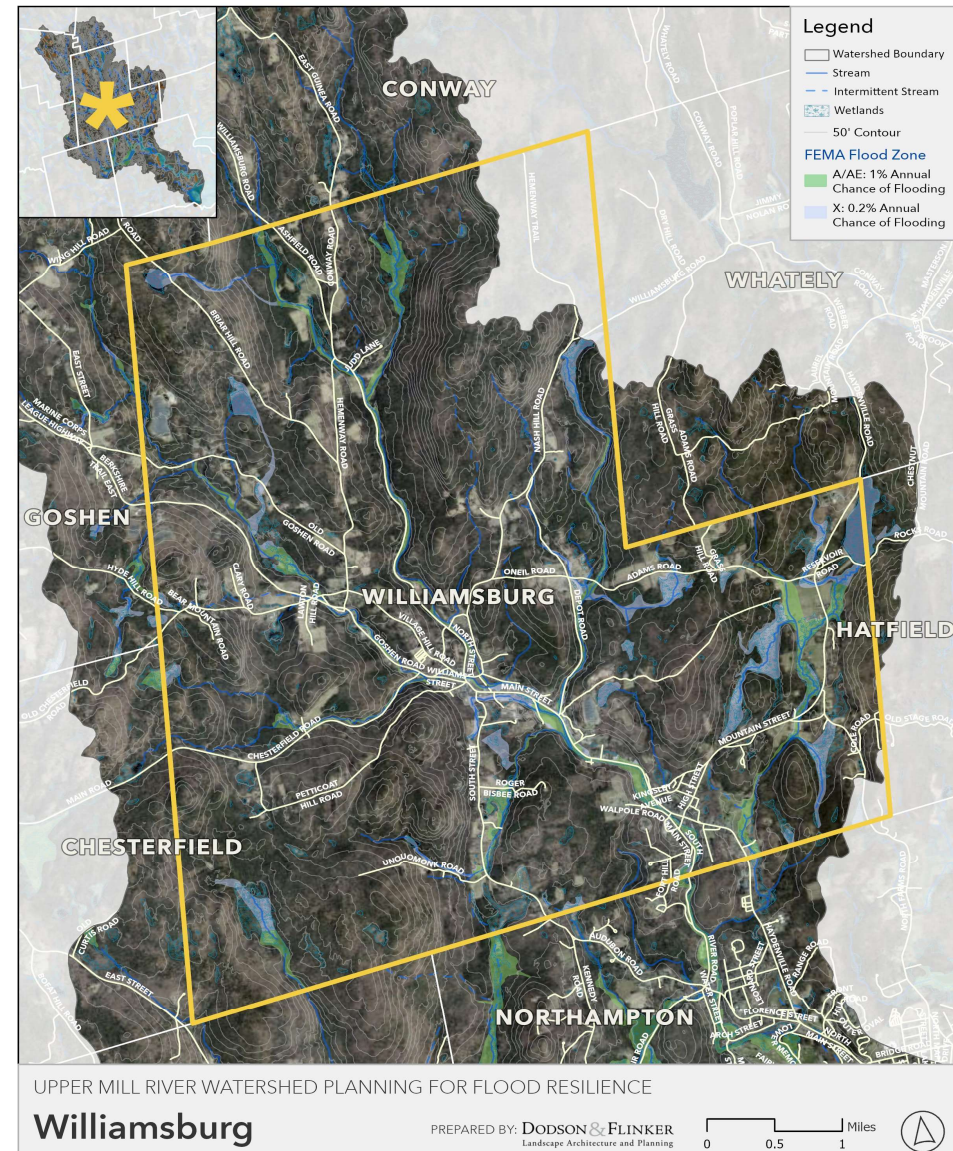


Mill River Watershed:

Mapping your Home for Stormwater Solutions

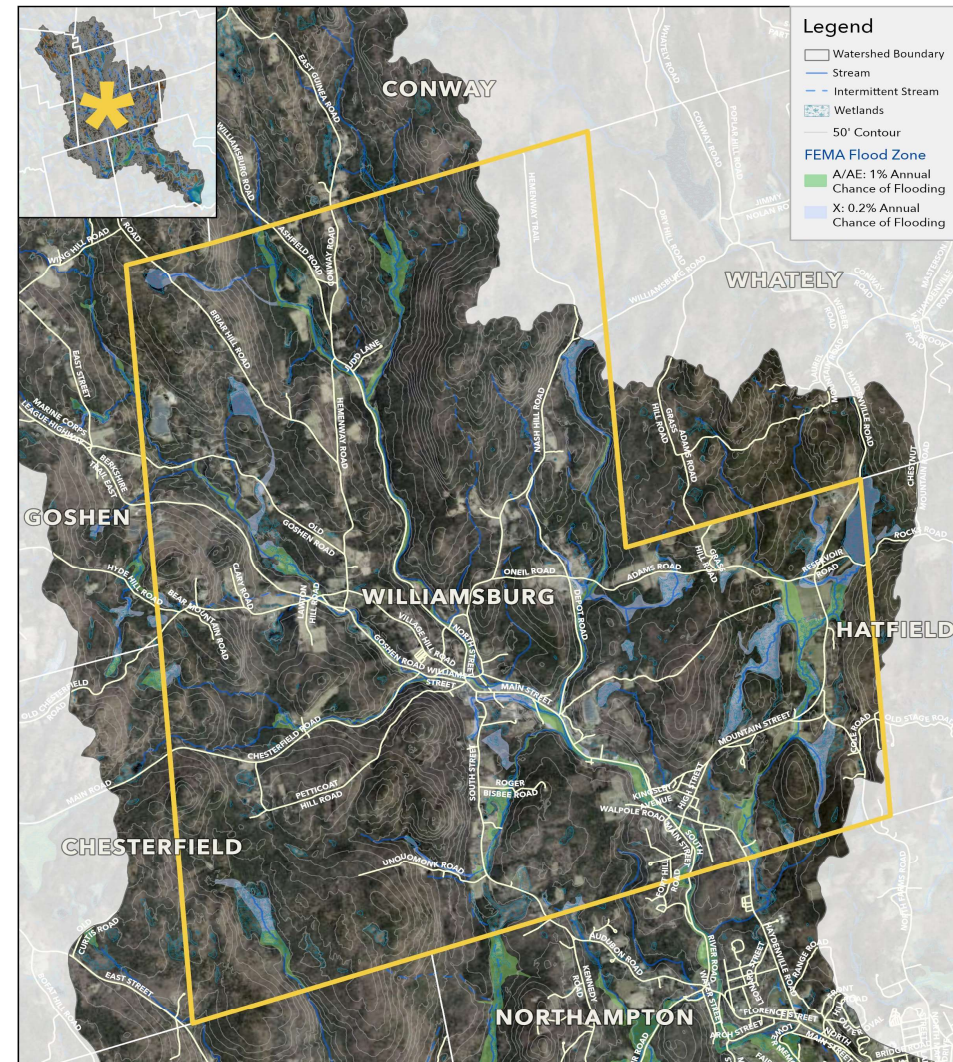


Mill River Watershed Planning for Flood Resilience

A two-year project made possible by an Action Grant from the
Massachusetts Municipal Vulnerability Preparedness Program to the
Town of Williamsburg



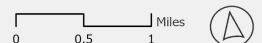
No Loose Braids



UPPER MILL RIVER WATERSHED PLANNING FOR FLOOD RESILIENCE

Williamsburg

PREPARED BY: DODSON & FLINKER
Landscape Architecture and Planning



PROJECT ELEMENTS

Holistic Watershed-Based Plan

- EPA 9-Element Watershed Plan
- Stormwater infrastructure mapping
- Upland watershed stewardship
- Collaborating across town boundaries with other stewards of the watershed

Technical Analysis

- Create up-to-date flood maps that show current and future flooding
- Assess climate vulnerabilities and flood mitigation opportunities in upland areas
- Identify sustainable housing opportunities

Engagement

- Town boards - Landowners - Indigenous Land Stewards - Dunphy School
- Greenway Design Charette & community visioning
- Resident involvement in flood solutions
- Backyard workshops to build climate resilience
- Interactive web-based mapping tool with watershed data

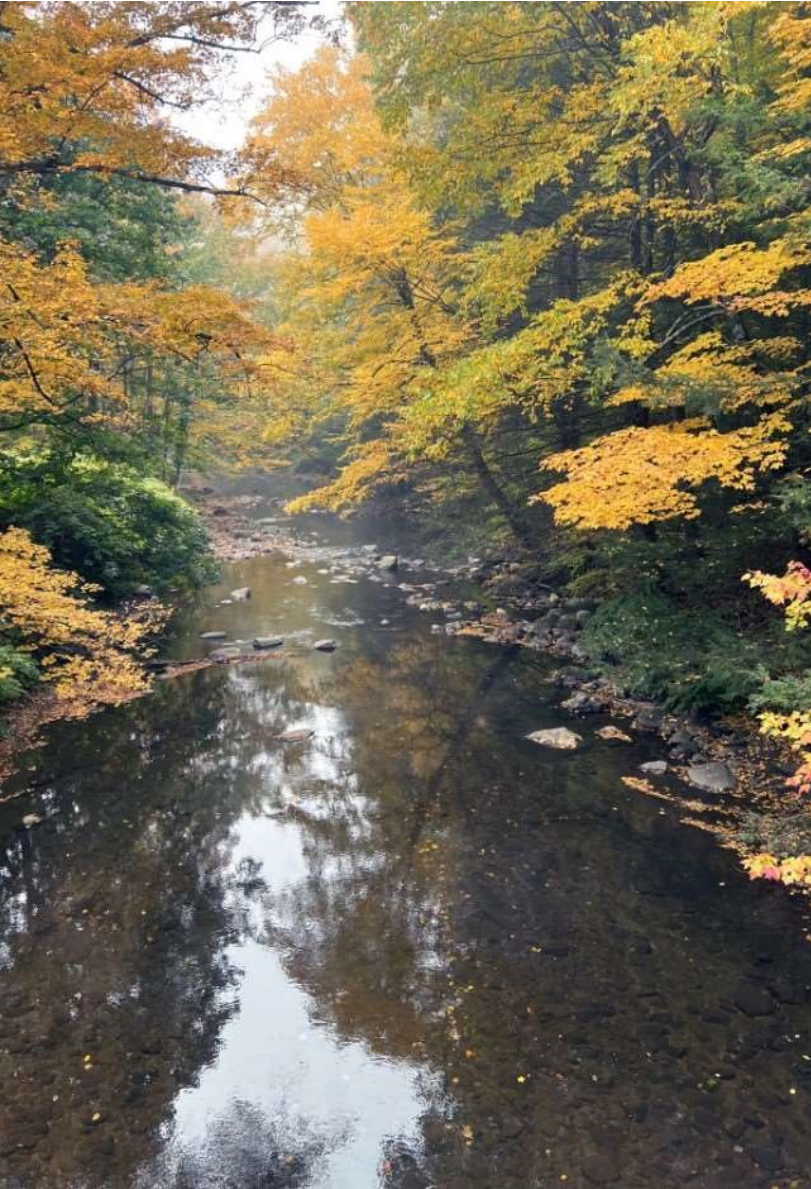
Resilience Building

- Community engagement in the project from start to finish
- Public participation in the design of the Mill River Greenway
- Landowner participation in climate-resilient land management strategies throughout the watershed

Regulatory Review

- Review town bylaws and regulations for ways to increase flood protection
- Recommend resiliency standards for bylaws and regulations





LOOKING AT WATER

Including flooding today and in the future

- New Flood Maps

- Regulations Review

- Areas for Improvement

Water quality

- Sources of Pollution

- Green Infrastructure



Source: Hilltown Land Trust

AND FORESTS

- Benefit of Forests for Flood mitigation
- Indigenous Land Practices with No Loose Braids
- Soil analysis of upland areas
- Balancing Climate resilient forest conservation with development needs

WHAT IS A WATERSHED?

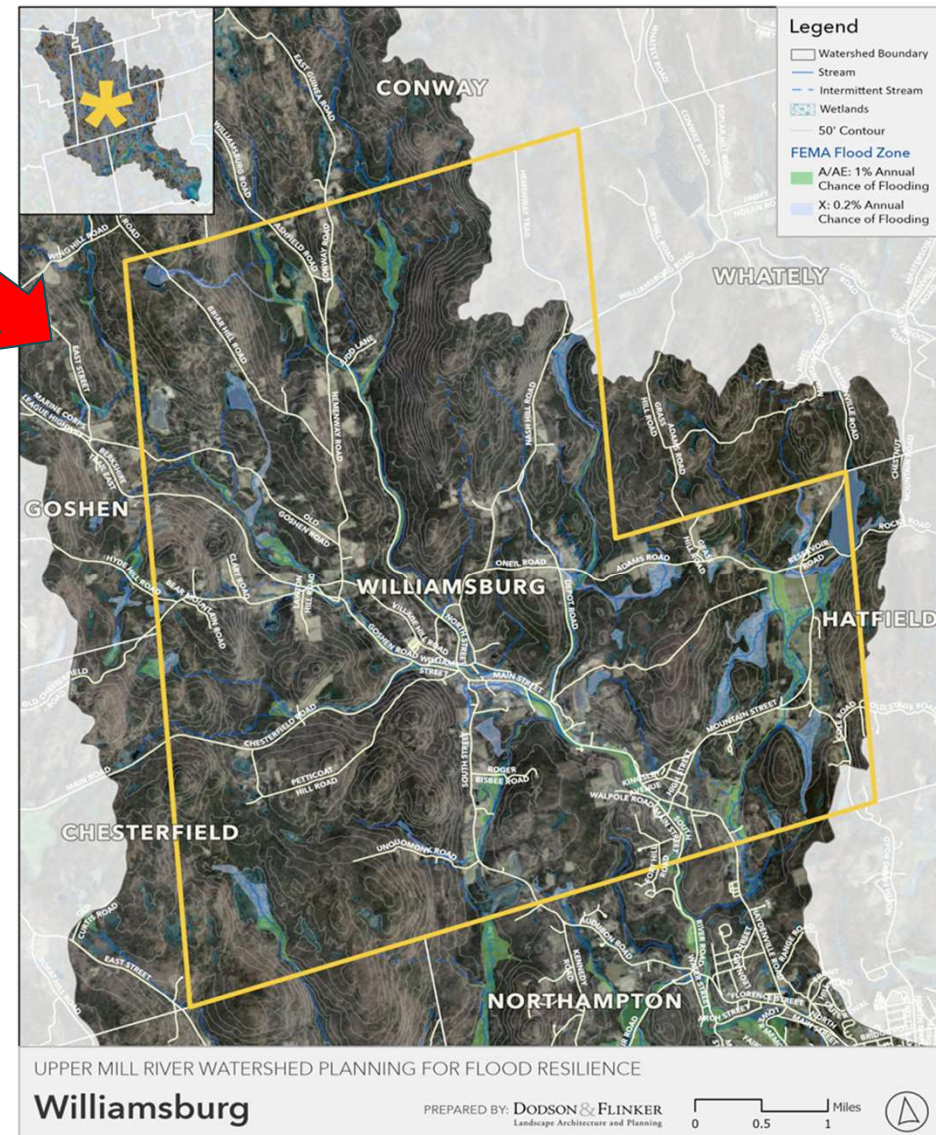


GO FROM THINKING
ABOUT JUST THIS

TO ALL OF
THIS



Source: New England Public Media



WHAT HAS HAPPENED

Massachusetts Observed Climate Changes

Temperature:  **2.9°F**
Since 1895
(Statewide)

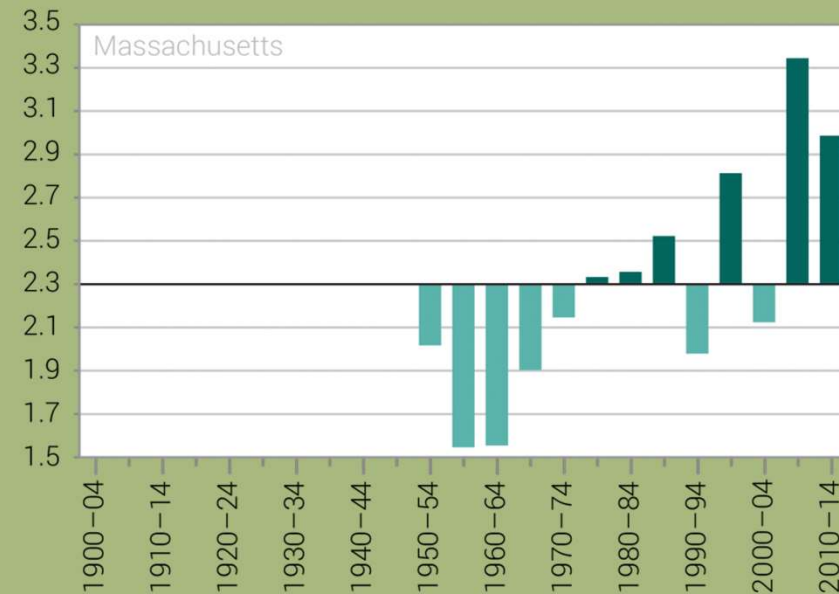
Growing Season:  **15 Days**
Since 1950

Sea Level Rise:  **11 inches**
Since 1922 (Boston)

Heavy Precipitation:  **55%**
Since 1958

Source: Climate Science Special Report, 2017; NOAA NCEI nClimDiv; NOAA Ocean Service

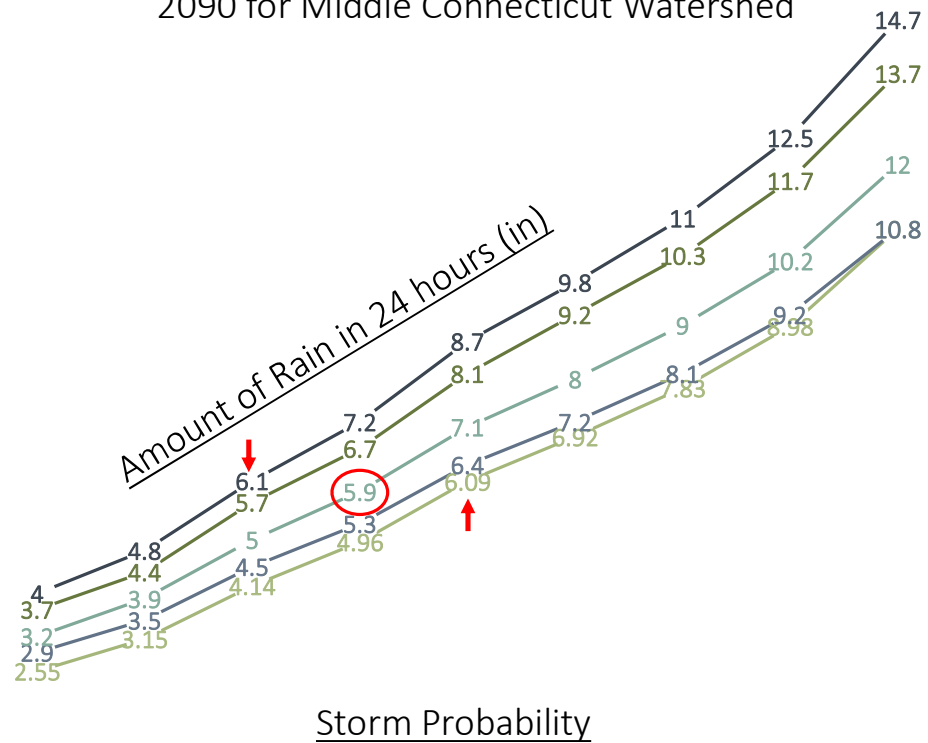
Increased # of precipitation events since 1970s



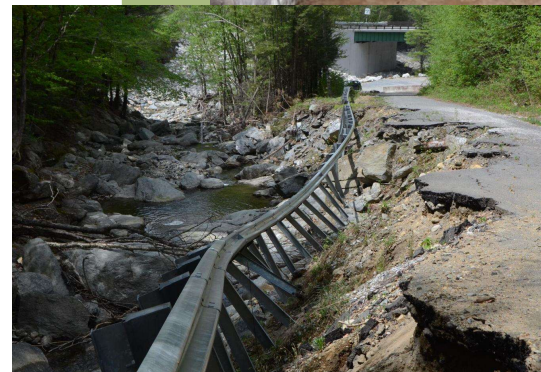
<https://statesummaries.ncics.org/ma>

MORE RAIN – MORE PROBLEMS

Predicted precipitation scenarios 2030 – 2090 for Middle Connecticut Watershed



Year
2090
2070
2050
2030
2023



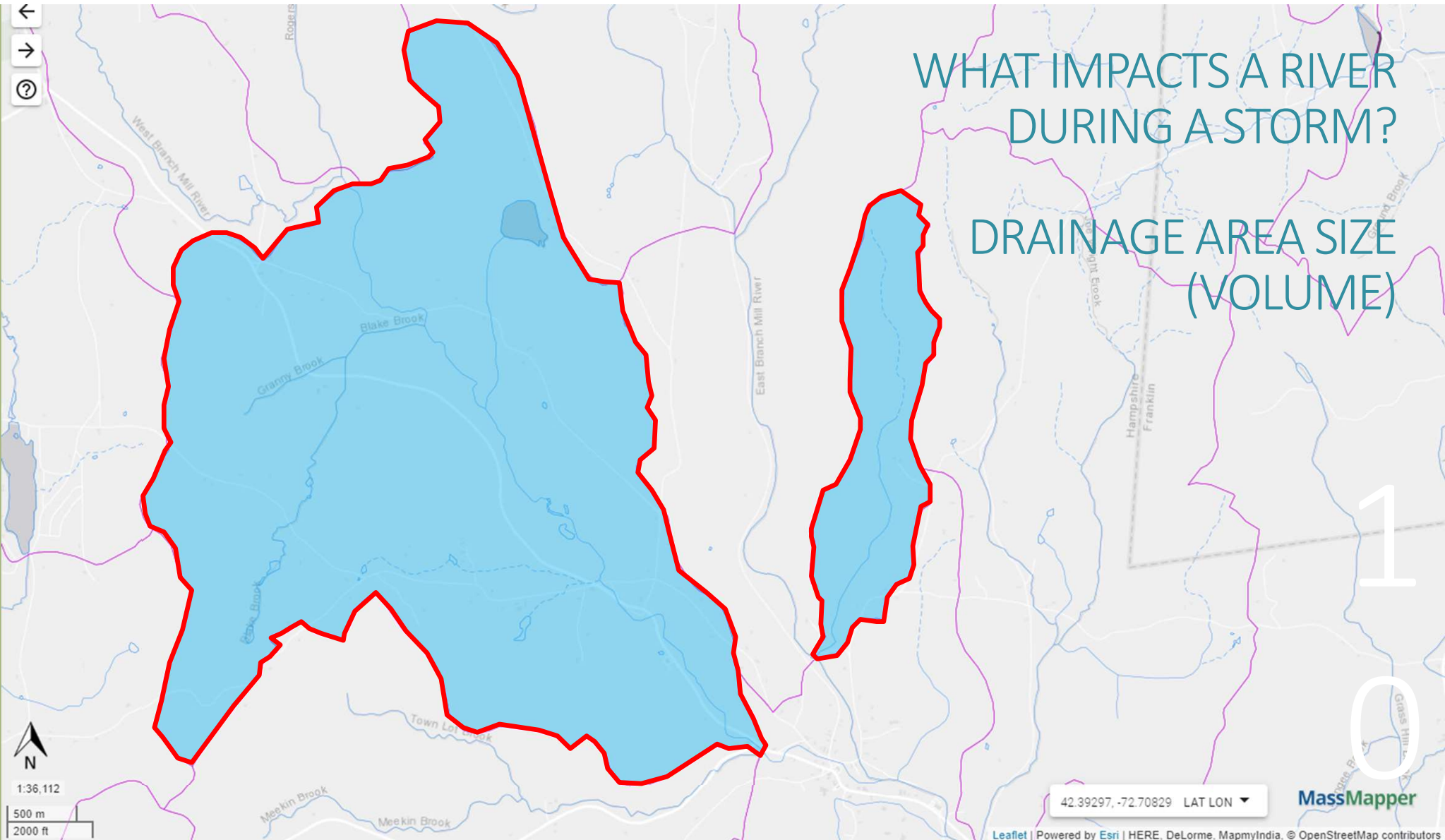
Data pulled from Massachusetts Climate Change Projections Dashboard and NOAA

WHAT IMPACTS A RIVER
DURING A STORM?

DRAINAGE AREA SIZE
(VOLUME)

1

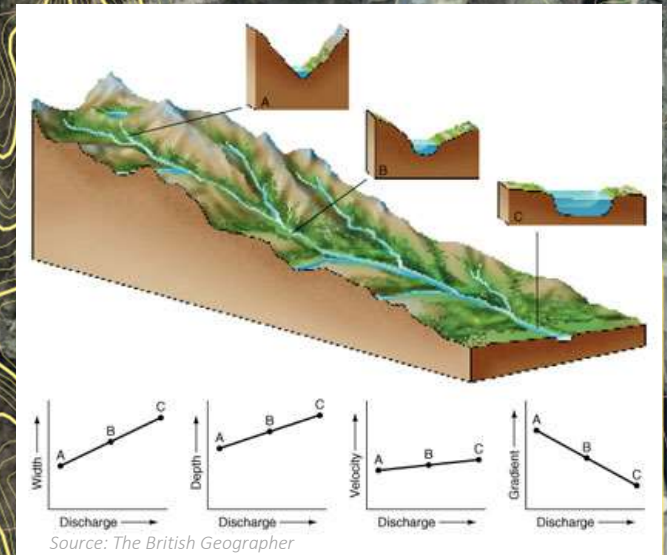
0





WHAT IMPACTS A RIVER DURING A STORM?

SLOPE



1:72,224
1 km
3000 ft

WESTHAMPTON

WILLIAMSBURG

NORTHAMPTON

WATFIELD

11

42.42916, -72.73499 LAT LON

MassMapper

Leaflet | MassGIS 2021 Aerial Imagery

WHAT IMPACTS A RIVER DURING A STORM?

FLOODPLAIN CONNECTION



Source: Wiki



Source: New England Public Media

WHAT IMPACTS A RIVER DURING A STORM?

FLOODPLAIN CONNECTION

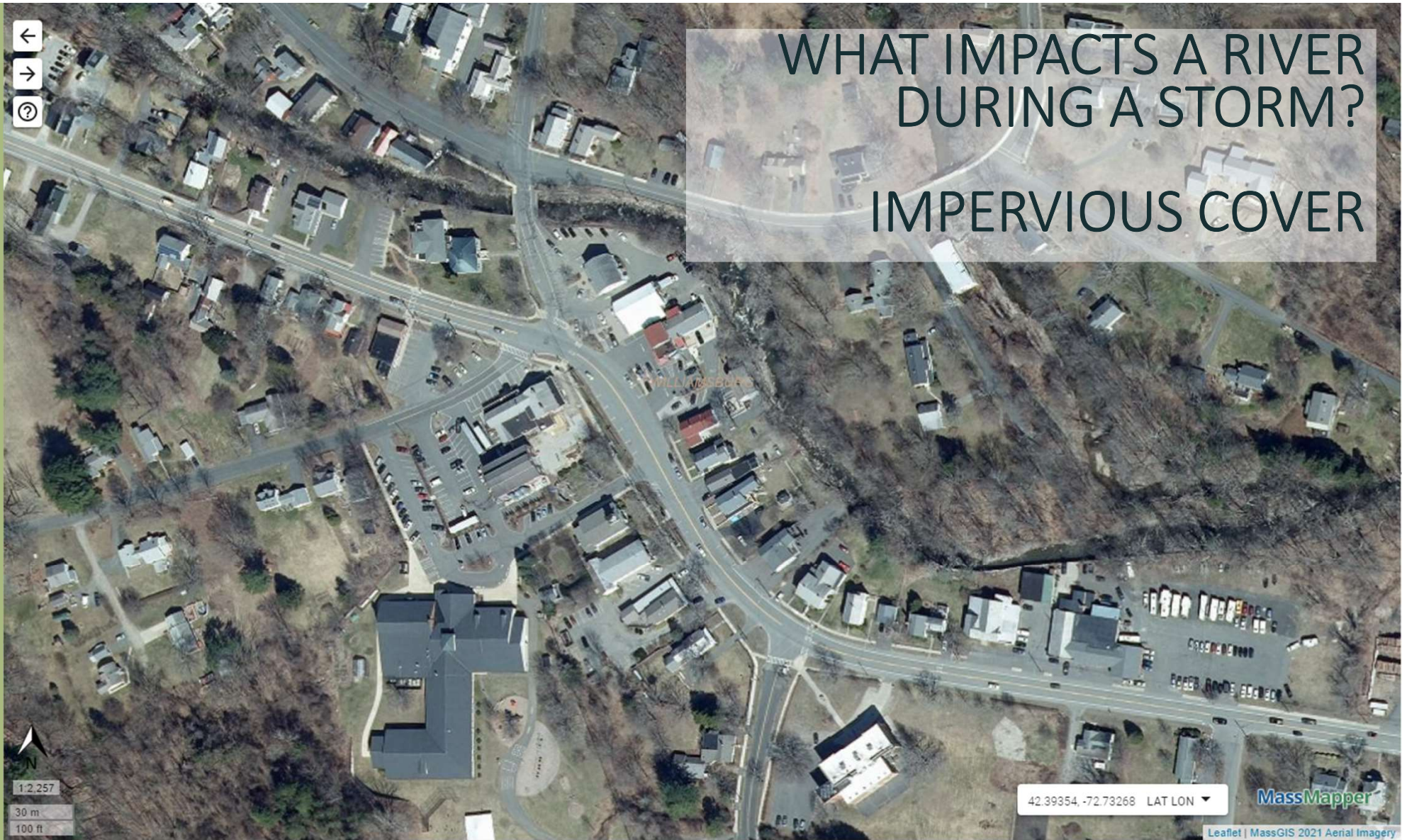


Source: WWLP 22 News



Source: USGS Mill River - Northampton

WHAT IMPACTS A RIVER DURING A STORM? IMPERVIOUS COVER

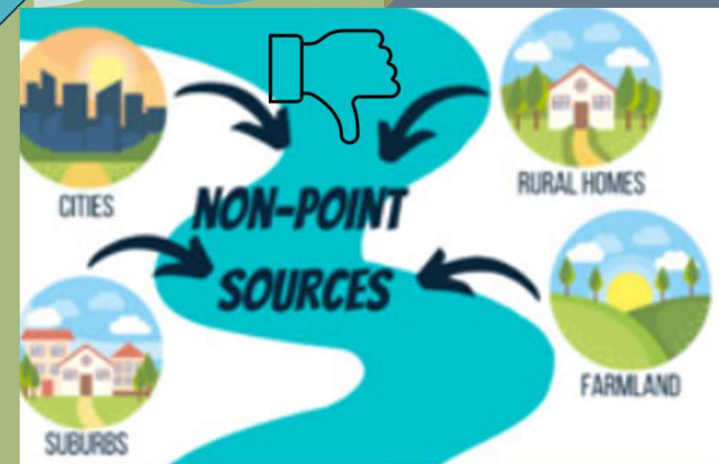
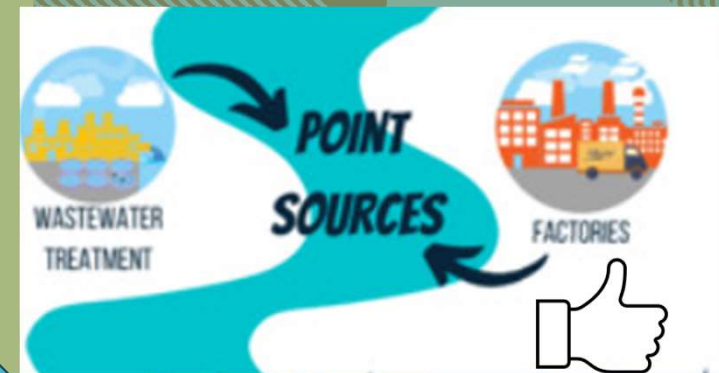


IMPERVIOUS COVER (AND OTHER STUFF) ON WATER QUALITY

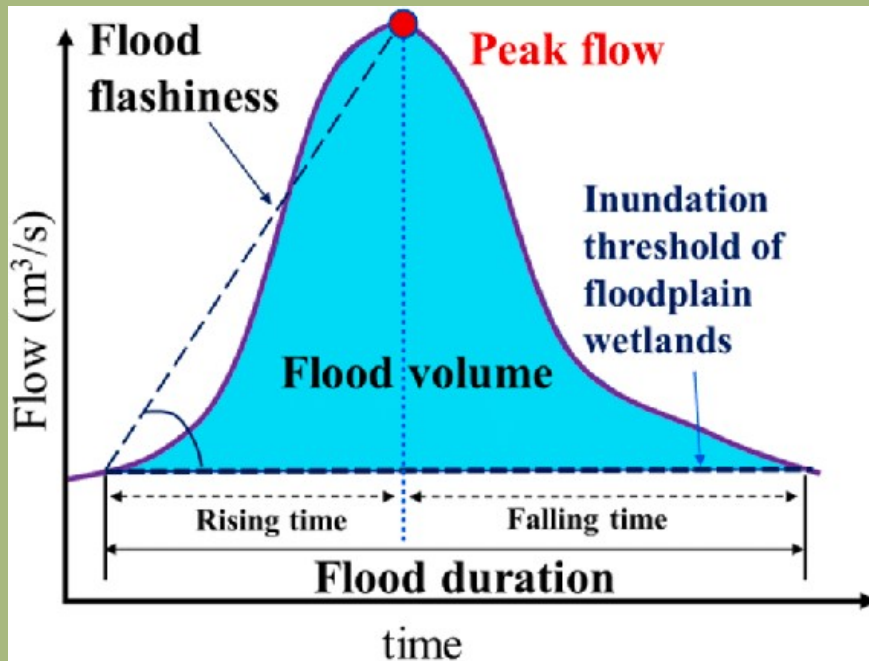


"The Congress, the Administration and the public all share a profound commitment to the rescue of our natural environment, and the preservation of the Earth as a place both habitable by and hospitable to man."

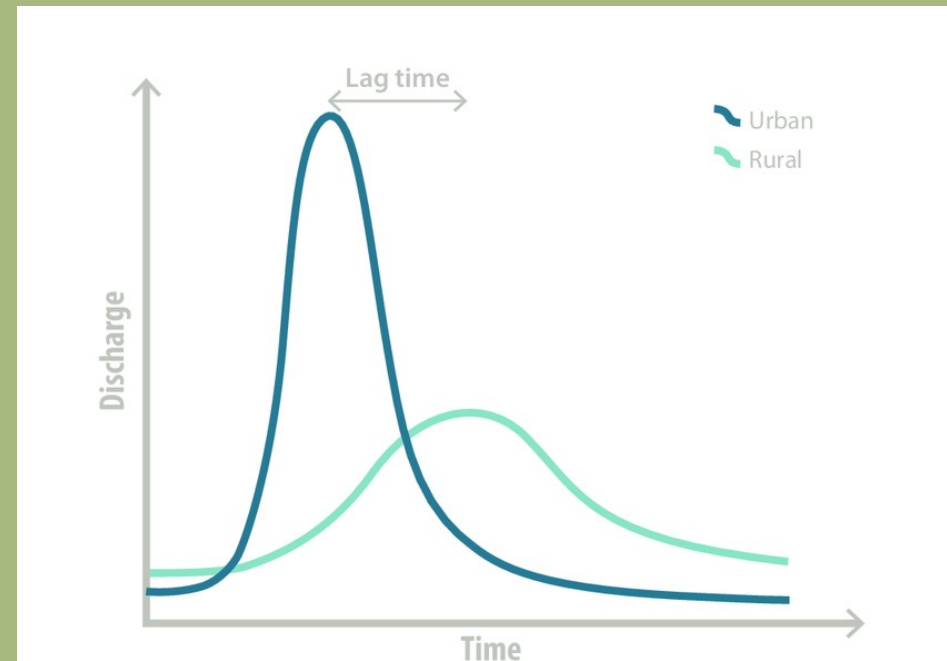
President Richard Nixon



IMPERVIOUS COVER & PEAK FLOW



Source: Liwen Chen



Source: Camille B. Lefrançois

USING NATURE-BASED SOLUTIONS ACROSS LANDSCAPES



FEMA

NBS projects can be larger in size in rural or less developed areas. These solutions reduce risk for communities by working at the source in coastal, mountain and rural lands nearby.

FIRE MANAGEMENT

SETBACK LEVEE

LAND CONSERVATION

TREE CANOPY

RAIN GARDENS

RAINWATER HARVESTING

PERMEABLE PAVEMENT

GREEN STREETS

GREEN ROOFS

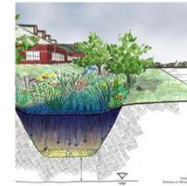
In more developed areas, small NBS and hybrid projects can add up over time. Many different types of NBS can work across a community to reduce risk at a larger scale.

Small BMPs for Homeowners



Pervious Pavement

These come in a number of forms include turf block pavers, permeable asphalt, and gravel blocks.



Rain Garden

Take a low point in your yard and make it official by filling it with plants and enhancing runoff drainage.



Rain Barrel

Collect rain off your roof to use on your gardens and grass during dry spells and drought.



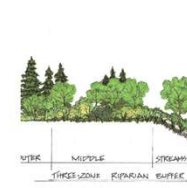
Downspout spreader

Redirect rainwater away from pavement and spread the flow across a wider area for better infiltration.



Vegetated Swale

Make your roadside ditch go to work by creating a vegetated swale - a linear rain garden that filters and infiltrates rain runoff.



Riparian Buffer

Do you have a stream or shoreline on your property? Plant it out with riparian plants, shrubs and trees. The wider, the better.



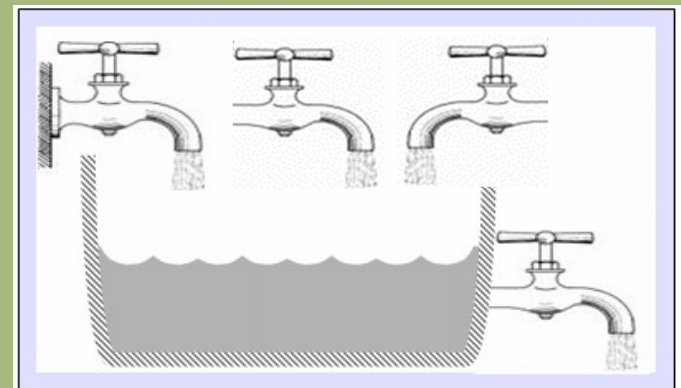
Infiltration Trench

If you need to filter a lot of stormwater, build an infiltration trench along your driveway filled with sand, gravel and rock.

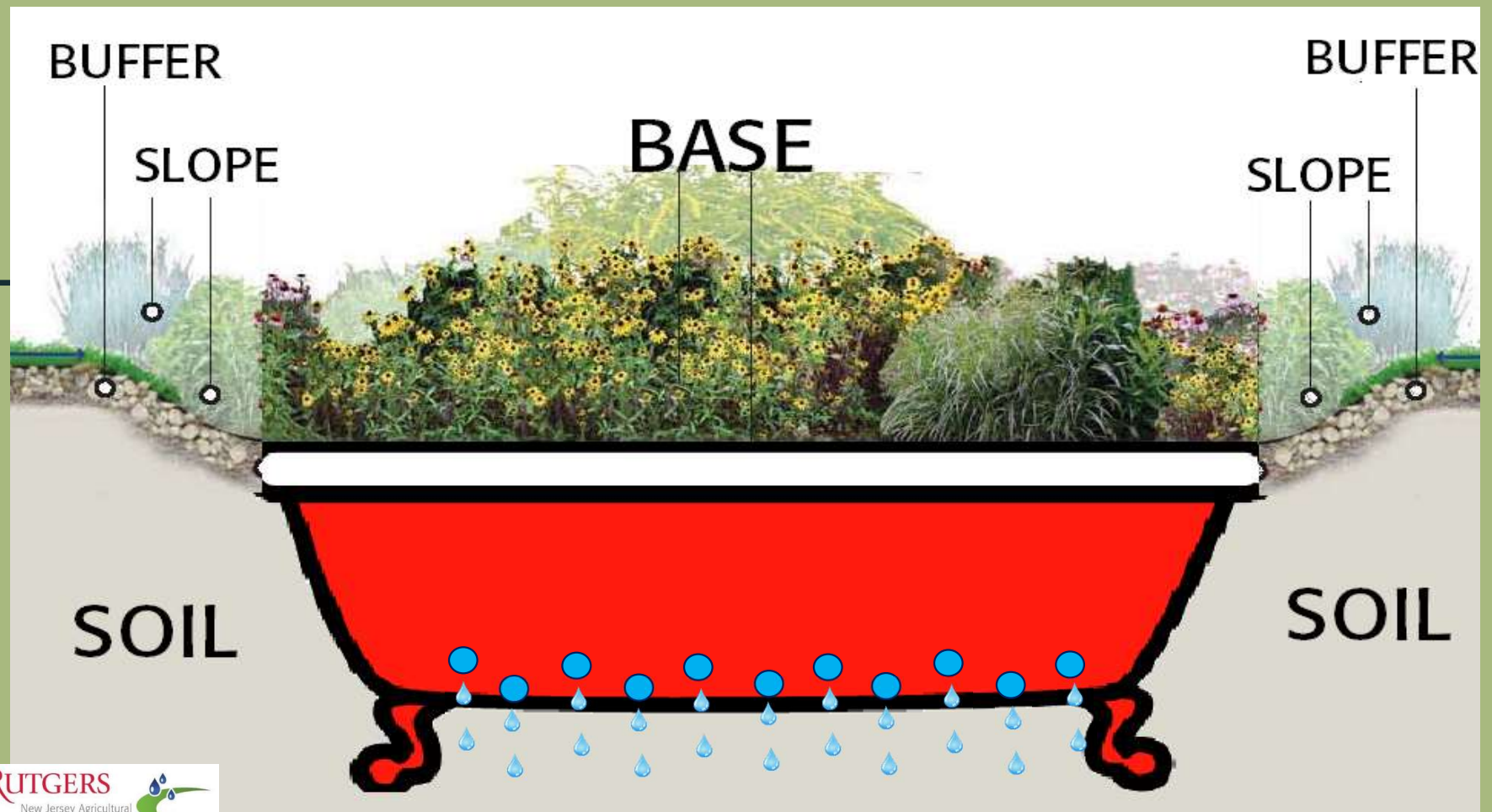


Downspout Planter Box

A simple planter box is an above-ground way to capture rain from your downspout.



INSTALL A RAIN GARDEN



HOW TO SITE YOUR STORMWATER SOLUTION: MAP YOUR PROPERTY



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Use Google Maps or Mass Mapper or Open Street Maps to pull up an aerial of your property – print it out



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm and record

Where the rain flows

Your downspouts

Where water pools

Property features



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm and record
Impervious Cover



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm, record rain flow
3. Pick a spot where:

- Disconnects impervious cover

- Water flows to it

- 10' from a building (usually)

- Uphill of pooling water

- Not too steep ($<10^\circ$ slope)

- Enough room for garden

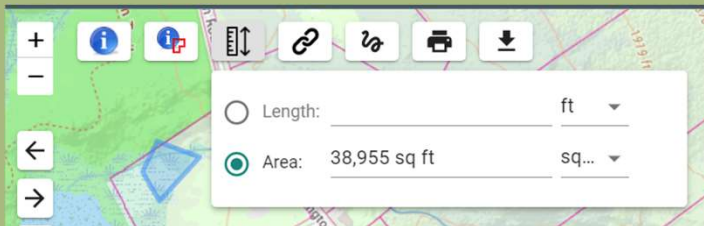
- $\geq 50'$ away from septics



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm, record rain flow
3. Pick a spot
4. Calculate drainage area of impervious cover

Tip: You can calculate square footage using Mass Mapper or My maps in google maps in



HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm, record rain flow
3. Pick a spot
4. Calculate drainage area
5. Size accordingly

Math!

Every sq.ft. of impervious cover you need ~0.33 sq.ft. of rain garden area.
 $= IC \times 0.33$

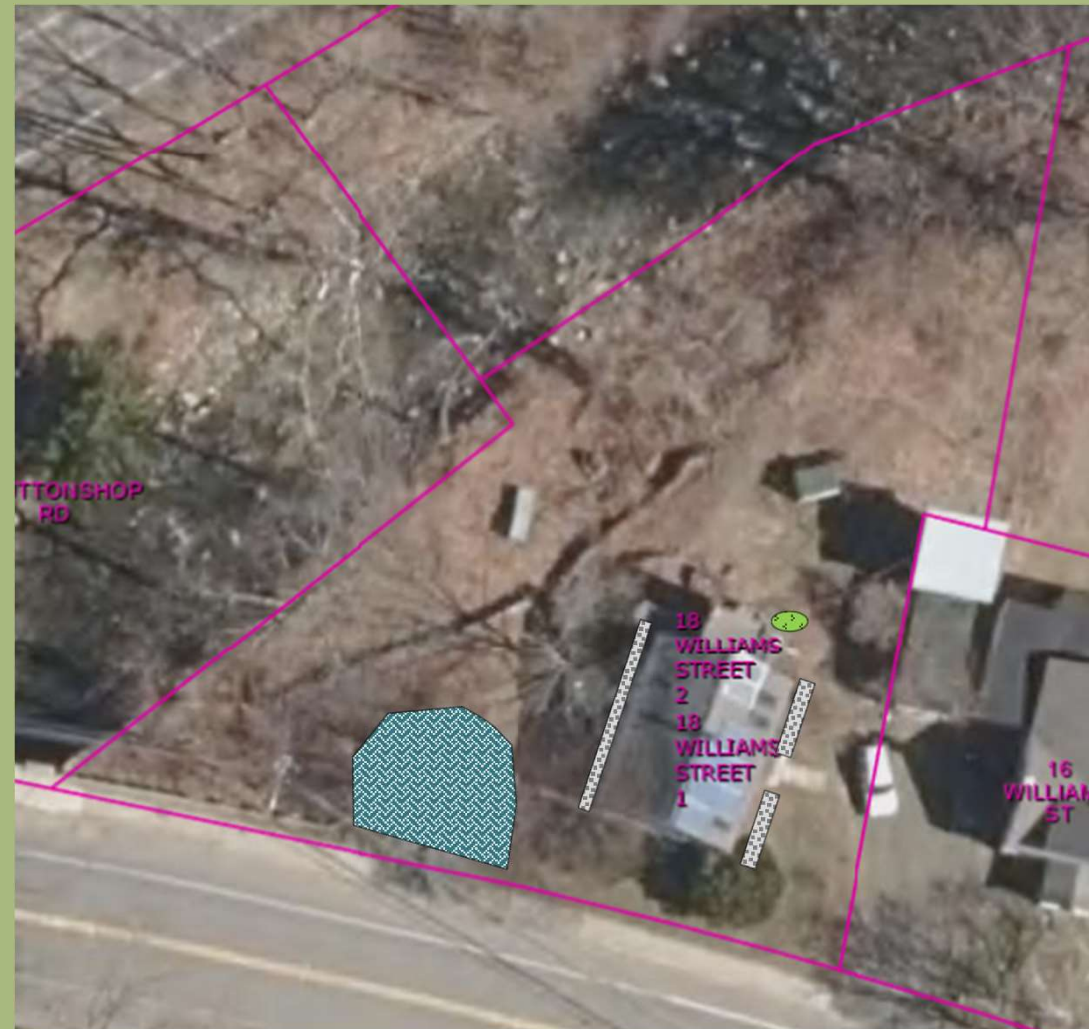


HOW TO SITE YOUR STORMWATER SOLUTION: MAPPING YOUR PROPERTY

1. Print your property map
2. Go out during a rainstorm, record rain flow
3. Pick a spot
4. Calculate drainage area
5. Size accordingly
6. Draw your rain garden

Pro Tip:

Natural shapes are good. Think kidney or teardrop. If you have a slope, elongate the shape perpendicular to the slope, wider than it is wide to capture more water

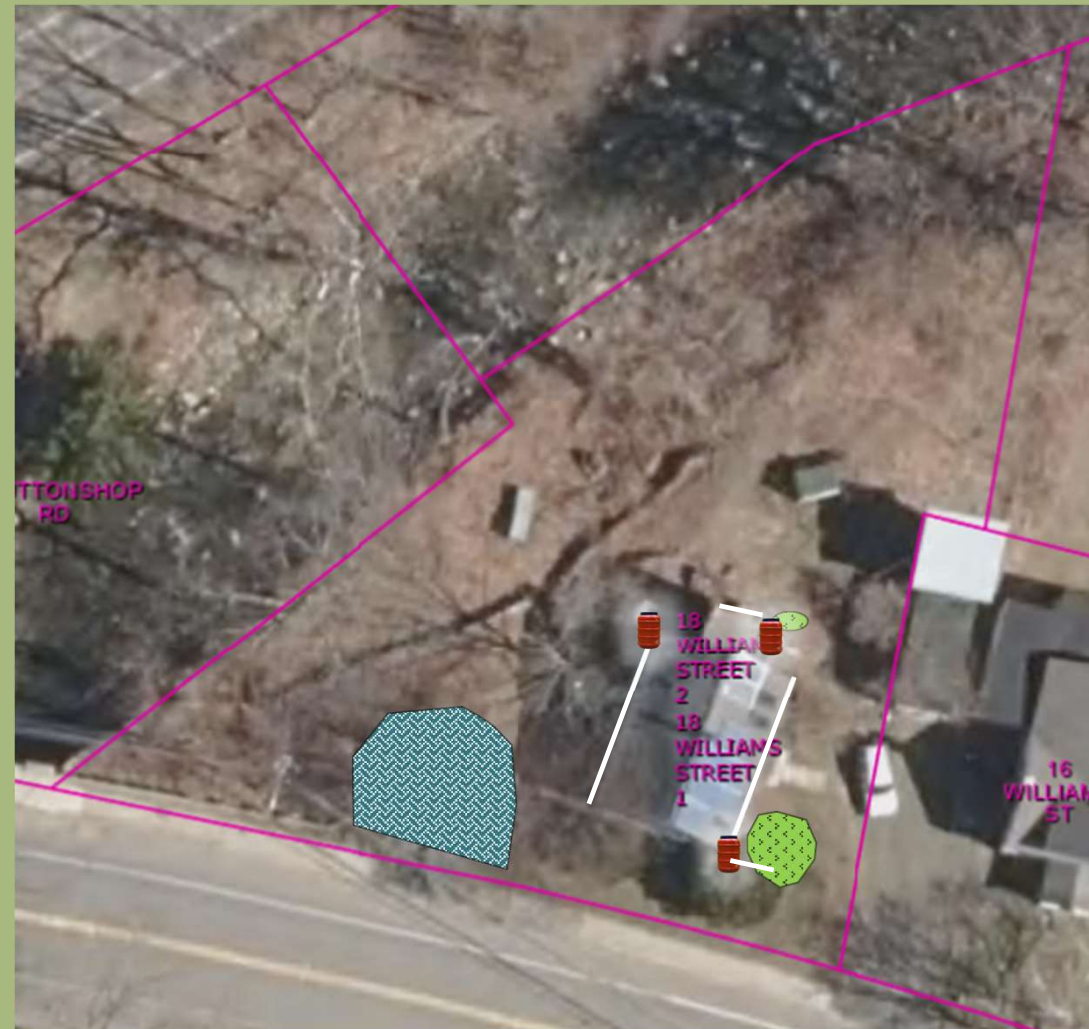


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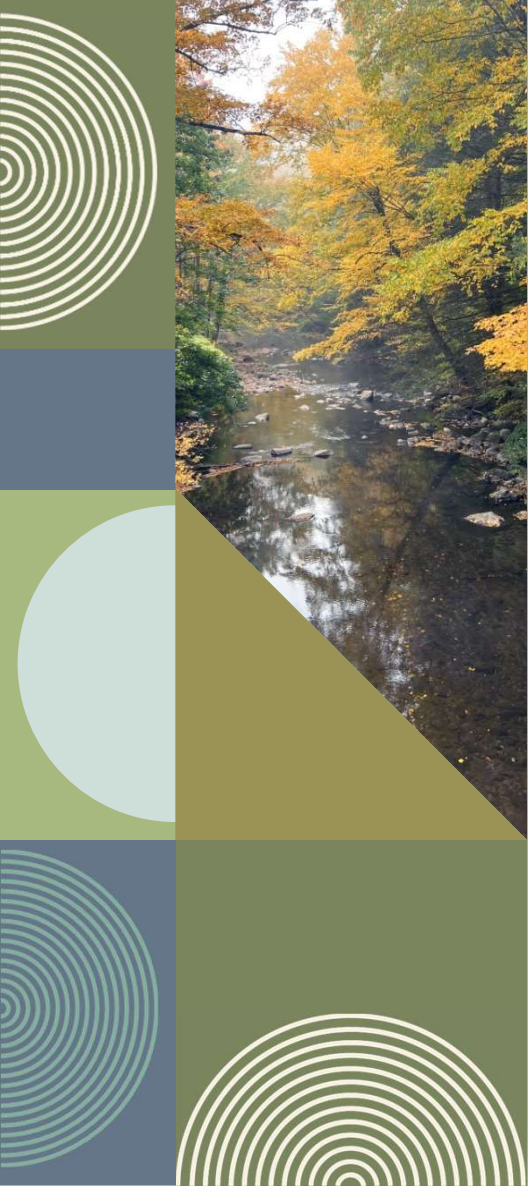
Pro Tip:

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TRY IT
YOURSELF!

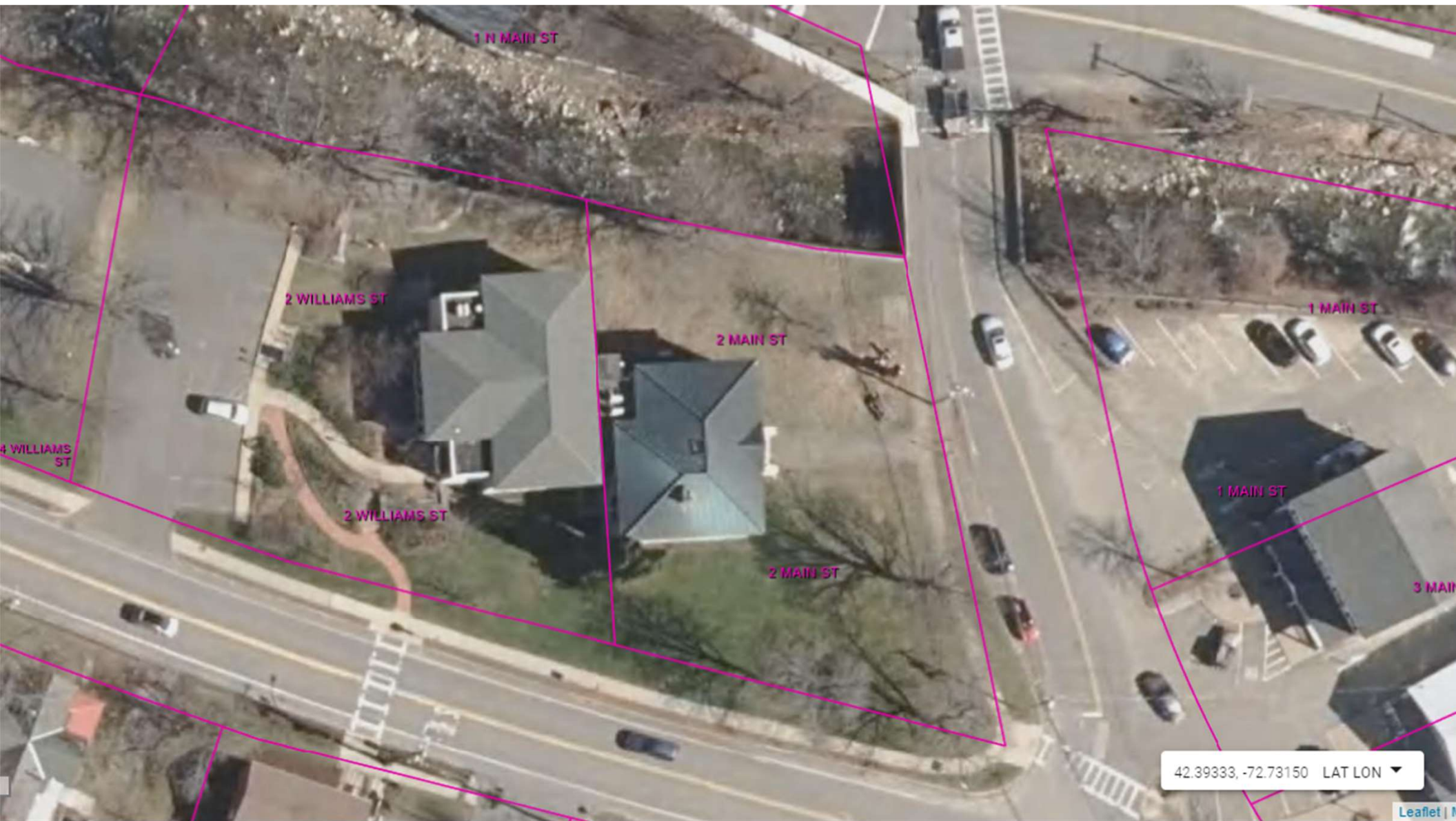




UPCOMING EVENTS IN THIS SERIES

- Sat, April 6: Soak up the Rain: It's All About the Soil
Patty Gambarini and Kyle Finnell
Pioneer Valley Planning Commission
- Sat, April 13: Harvesting Rainwater: Cisterns and Rain Barrels
Patty Gambarini and Kyle Finnell
Pioneer Valley Planning Commission
- Sat April 27: Soak Up the Rain: Rain Gardens and Bioswales
Rachel Lindsay, Regenerative Design Group
- Sat. May 4: Soak Up the Rain: Porous Paving
Rachel Loeffler, Berkshire Design Group

www.hilltownlandtrust.org/get-involved/events



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42.39333, -72.73150 LAT LON

Leaflet