Responding to Freak Storms

CONNECTICUT
Association of Flood Managers

CT Association of Flood Managers Conference
Wednesday October 24 ,2018

Joseph Michelangelo, P.E.
Director of Public Works
Town of Fairfield, CT

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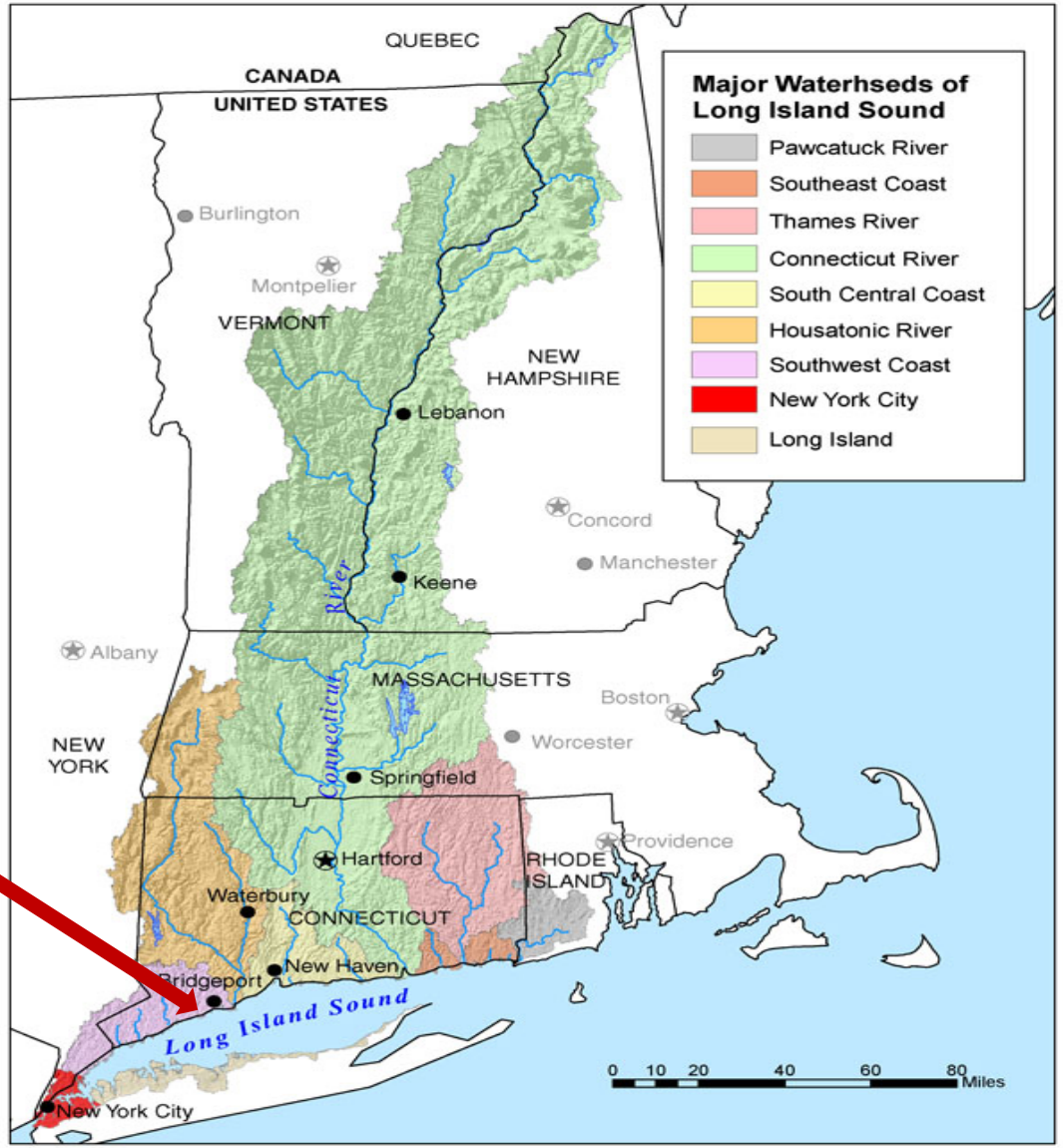
203 256-3010

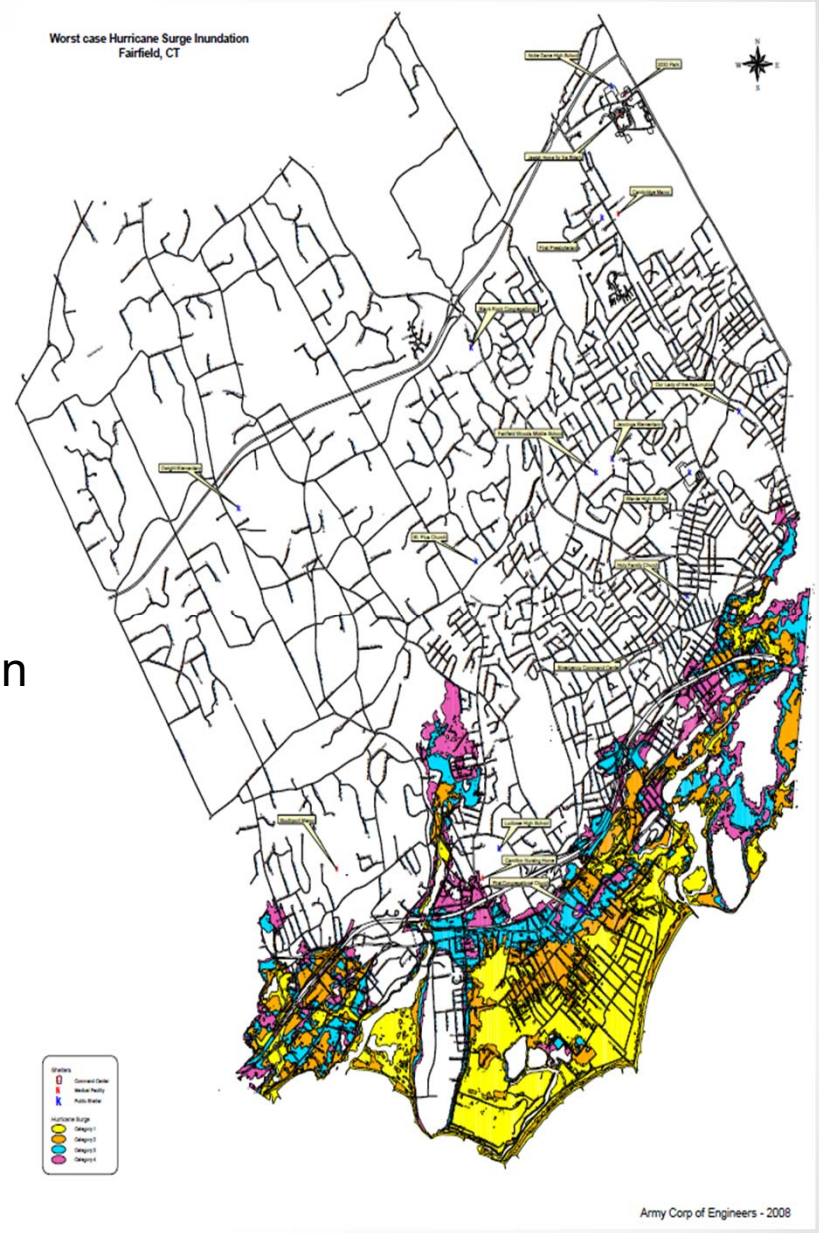
Town of Fairfield, CT

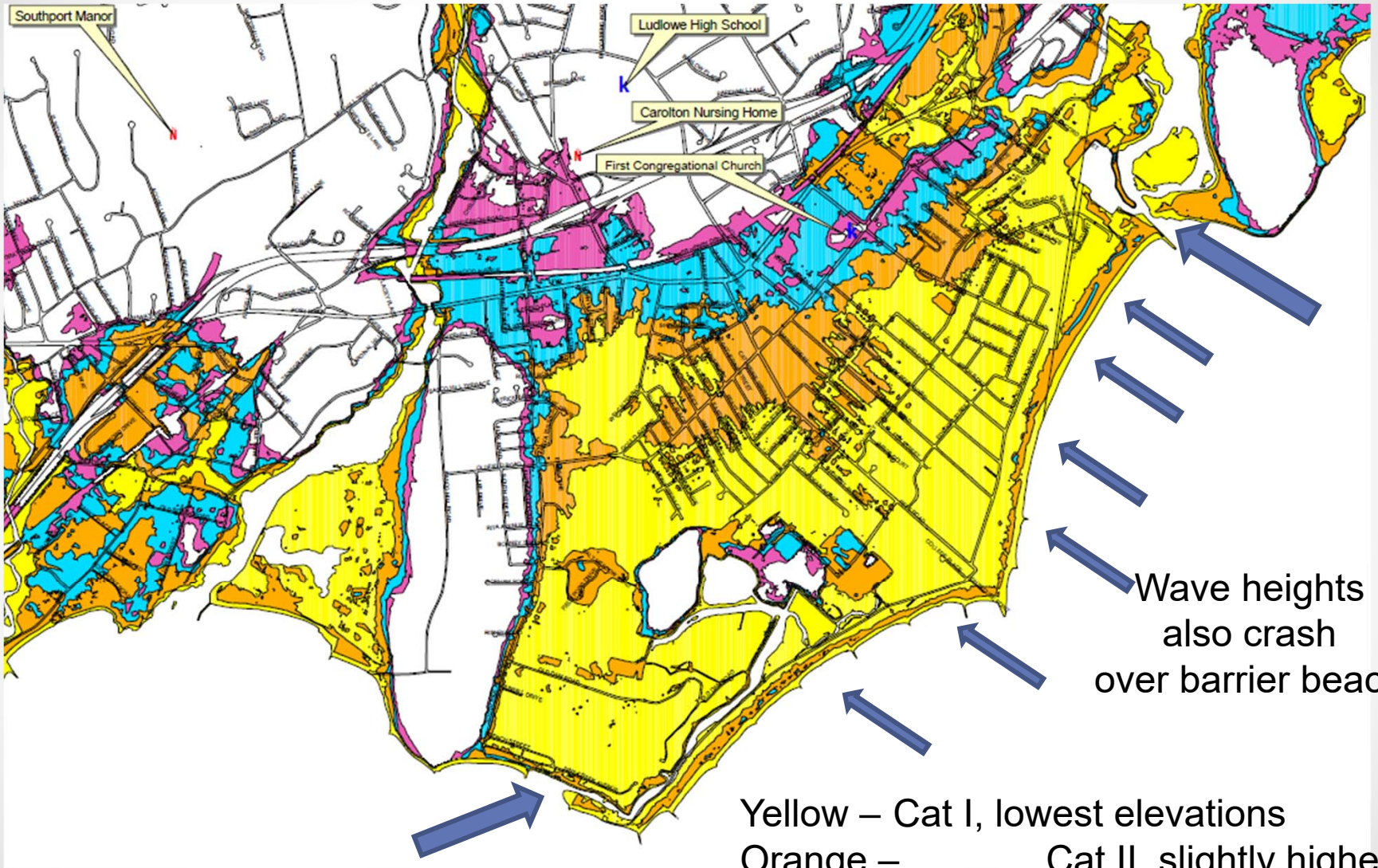


Fairfield, CT
STORM SANDY

- Community of 60,000
- Directly on Long Island Sound
- Approx. 10% of property & population in Hurricane/ Flood Zone

Response & recovery to Sandy has been major focus since 9/29/12





Fairfield Hurricane Inundation Map

Calm before the storm

COMPLEX DRAINAGE NETWORK: LOWER 1/4 OF TOWN TIDAL INFLUENCED

Flap Gates &

Self Regulating Tide Gates

All shapes and sizes

Some not as formal, need upgrades

Sometimes system can’t keep up especially during high tide cycle monthly occurrence +/-

We know the drill….

Storm Sandy

Hartford Courant Photo

Connecticut Post Photo

Storm Sandy


CIVIL AIR PATROL
N
Location: CT US - Object: CT COAST
Date: 31OCT12 TOT: 2122Z Lat=41.1355 Lon=-73.24417 Alt=991ft MSL

Problems are so complex, even a Senator can't figure it out….

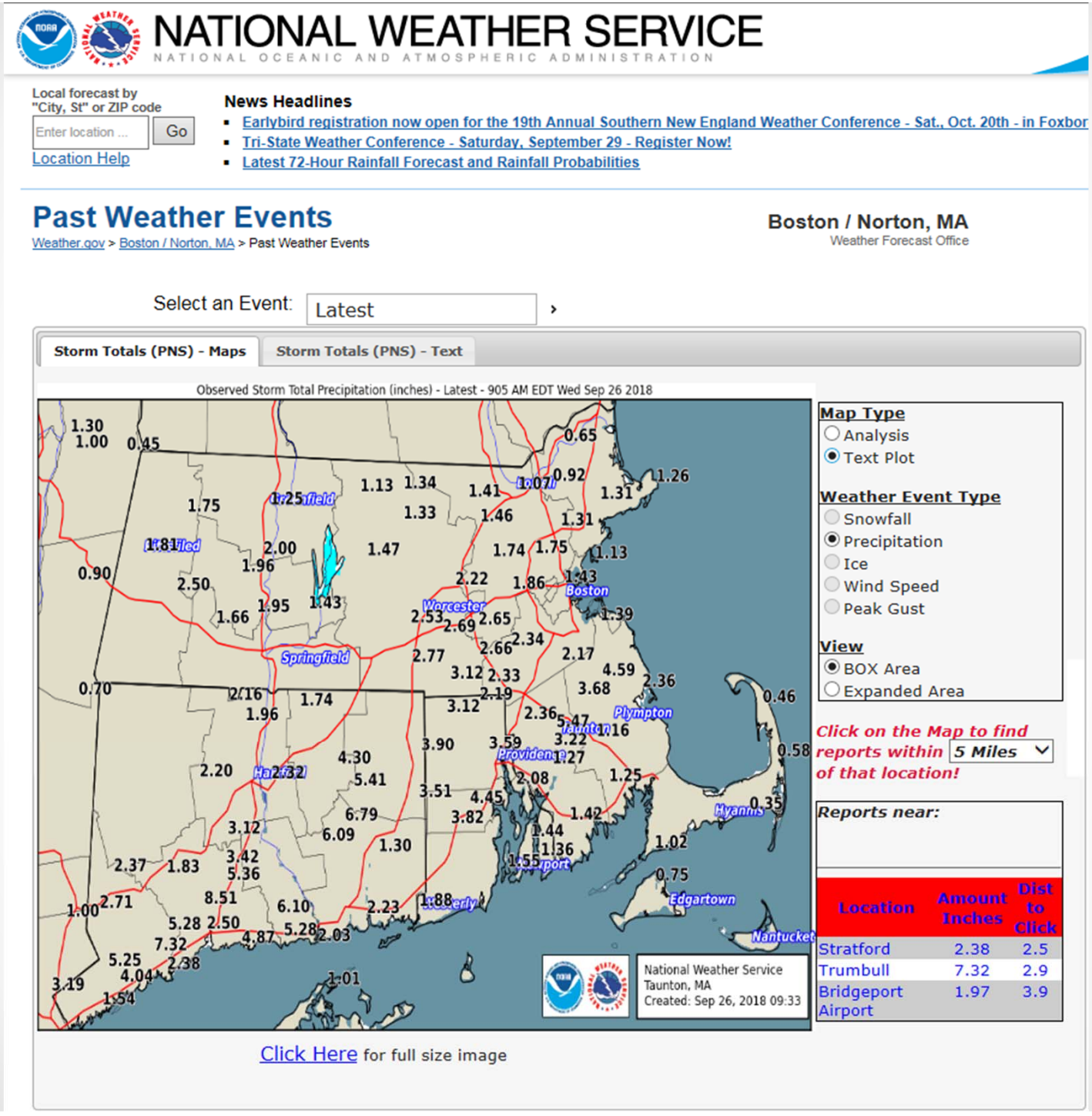
Federal & State Grants have been very helpful in advancing solutions:

- Making advancements and Improvements:
  Fortify dikes (hardening), enlarge & modify tide gates, create infiltration, evaluate pumping

Storm of 9/25/18 has caused us to refocus on non-coastal flooding issues

Rooster River Watershed

- Majority of upper reaches in other communities
- Highly Developed Suburban/Urban watershed
- Watercourses mostly on private properties, easement are limited
- Private land owners have “improved” properties, encroach on river corridor


NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Local forecast by "City, St" or ZIP code
Enter location ...
Go
Location Help
News Headlines
Earlybird registration now open for the 19th Annual Southern New England Weather Conference - Sat., Oct. 20th - in Foxbor
Tri-State Weather Conference - Saturday, September 29 - Register Now!
Latest 72-Hour Rainfall Forecast and Rainfall Probabilities
Past Weather Events
Weather.gov > Boston / Norton, MA > Past Weather Events
Boston / Norton, MA
Weather Forecast Office
Select an Event: Latest
Storm Totals (PNS) - Maps
Storm Totals (PNS) - Text
Observed Storm Total Precipitation (inches) - Latest - 905 AM EDT Wed Sep 26 2018
Springfield
Worcester
Boston
Plympton
Providence
Hyannis
Edgartown
Nantucket
National Weather Service
Taunton, MA
Created: Sep 26, 2018 09:33
Map Type
Analysis
Text Plot
Weather Event Type
Snowfall
Precipitation
Ice
Wind Speed
Peak Gust
View
BOX Area
Expanded Area
Click on the Map to find reports within 5 Miles of that location!
Reports near:
Location
Amount Inches
Dist to Click
Stratford 2.38 2.5
Trumbull 7.32 2.9
Bridgeport Airport 1.97 3.9
Click Here for full size image

NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Local forecast by "City, St" or ZIP code

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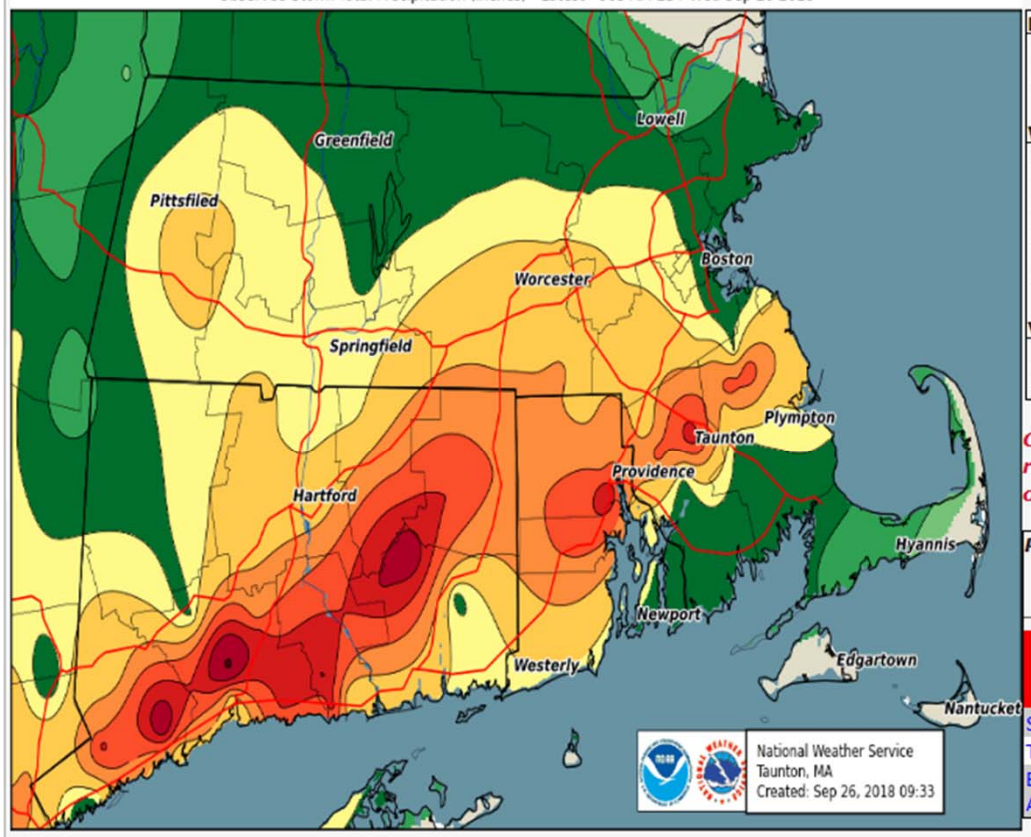
Weather Forecast Office

Select an Event: Latest ›

Storm Totals (PNS) - Maps | Storm Totals (PNS) - Text

Observed Storm Total Precipitation (inches) - Latest - 905 AM EDT Wed Sep 26 2018



Map Type
- (•) Analysis
- ( ) Text Plot

Weather Event Type
- ( ) Snowfall
- (•) Precipitation
- ( ) Ice
- ( ) Wind Speed
- ( ) Peak Gust

View
- (•) BOX Area
- ( ) Expanded Area

Click on the Map to find reports within 5 Miles *of that location!*

Reports near:

Location	Amount Inches	Dist to Click
Stratford	2.38	2.5
Trumbull	7.32	2.9
Bridgeport Airport	1.97	3.9

Click Here for full size image

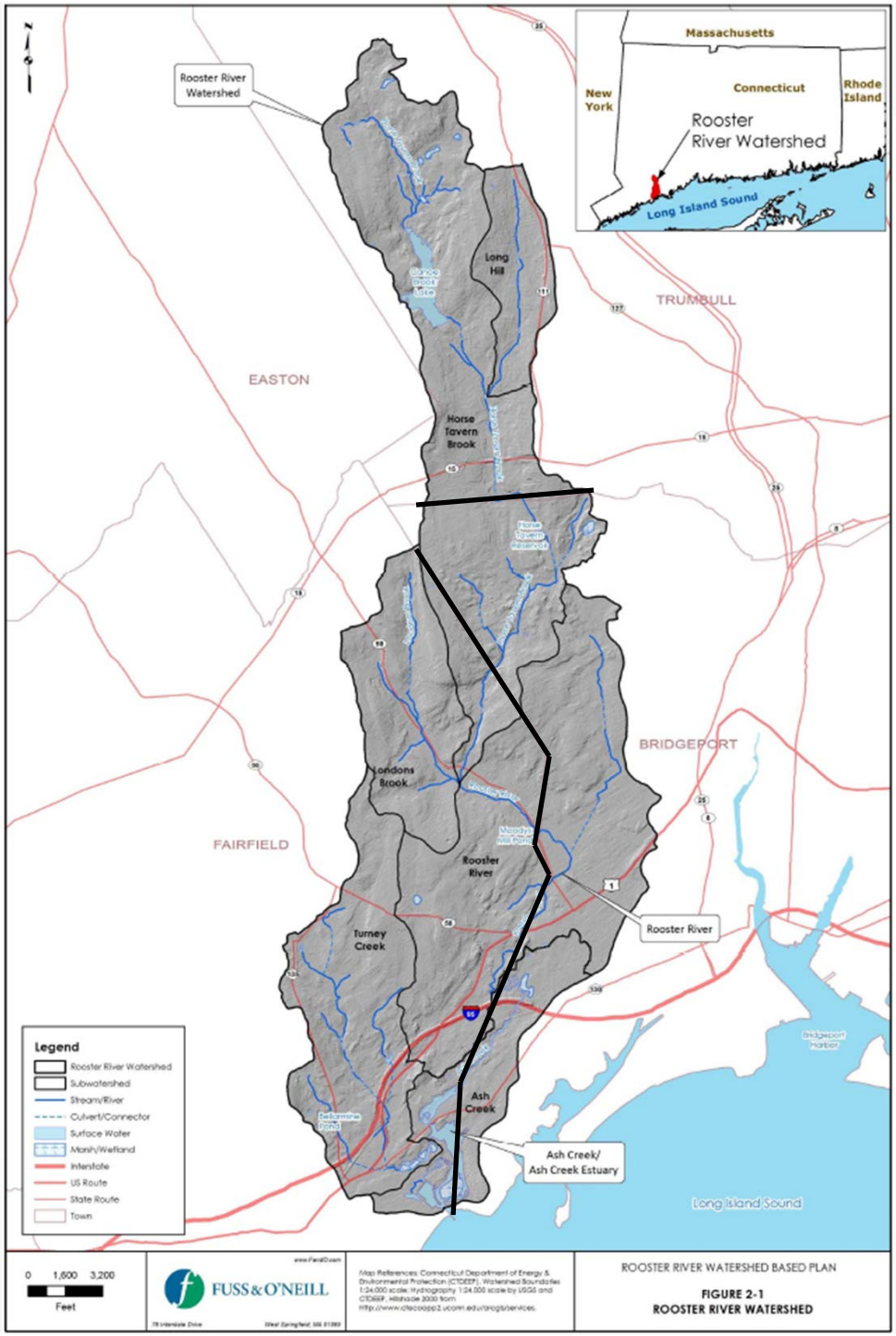

Rooster River Watershed
Massachusetts
New York
Connecticut
Rhode Island
Rooster River Watershed
Long Island Sound
Long Hill
TRUMBULL
EASTON
Horse Tavern Brook
BRIDGEPORT
Londons Brook
FAIRFIELD
Rooster River
Rooster River
Turney Creek
Ash Creek
Ash Creek/ Ash Creek Estuary
Bridgeport Harbor
Long Island Sound
Legend
Rooster River Watershed
Subwatershed
Stream/River
Culvert/Connector
Surface Water
Marsh/Wetland
Interstate
US Route
State Route
Town
0 1,600 3,200
Feet
FUSS & O'NEILL
ROOSTER RIVER WATERSHED BASED PLAN
FIGURE 2-1
ROOSTER RIVER WATERSHED

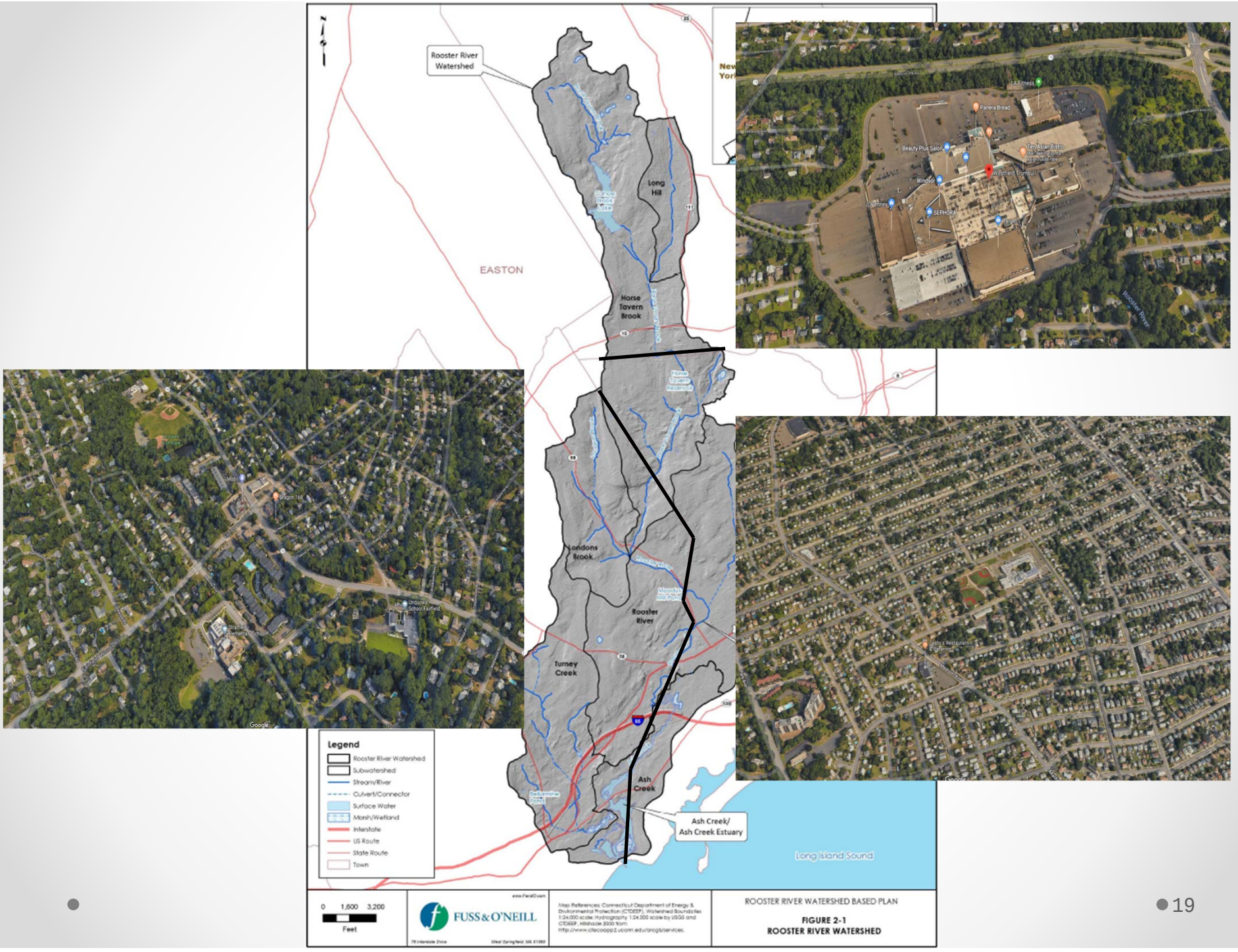
Table 2-2. Distribution of Municipalities in the Rooster River Watershed

Municipality	Total Acreage of Municipality	Acreage in Watershed	% of Municipality in Watershed	% of Watershed
Bridgeport	10,361	2,807	27.1%	28.8%
Easton	18,310	6	0.0%	0.1%
Fairfield	19,432	4,441	22.9%	45.6%
Trumbull	15,099	2,490	16.5%	25.6%
Watershed (Total)	**63,202**	**9,744**		**100.0%**

Table 2-3. Population Densities in the Rooster River Watershed

Municipality	Watershed Population	Watershed Population Density (Population / Square Mile)	Town Population	Town Population Density (Population / Square Mile)
Bridgeport	44,823	10,218	144,329	8,828
Fairfield	27,211	3,922	59,305	1,953
Trumbull	8,418	2,163	35,982	1,525
Watershed (Total)	**80,452**	**5,284**	**239,616**	**3,408**

Note: Easton has only 2 households within the watershed, and is therefore not included in the table.


Rooster River Watershed
EASTON
Long Hill
Horse Tavern Brook
Londons Brook
Rooster River
Turney Creek
Ash Creek
Ash Creek/ Ash Creek Estuary
Long Island Sound
Legend
Rooster River Watershed
Subwatershed
Stream/River
Culvert/Connector
Surface Water
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US Route
State Route
Town
0 1,600 3,200
Feet
FUSS & O'NEILL
ROOSTER RIVER WATERSHED BASED PLAN
FIGURE 2-1
ROOSTER RIVER WATERSHED

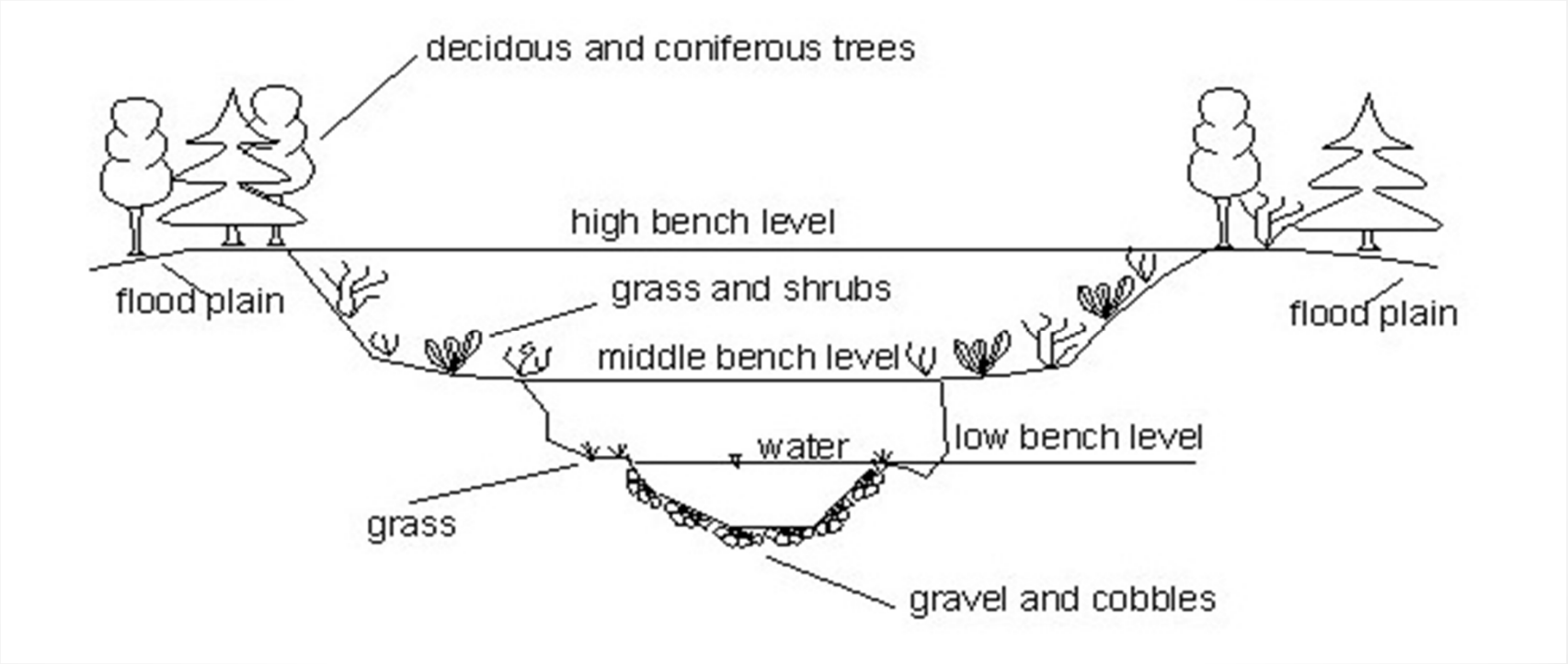
Because of nature of watershed development…

High density = Impervious surfaces, conveyance though piped systems

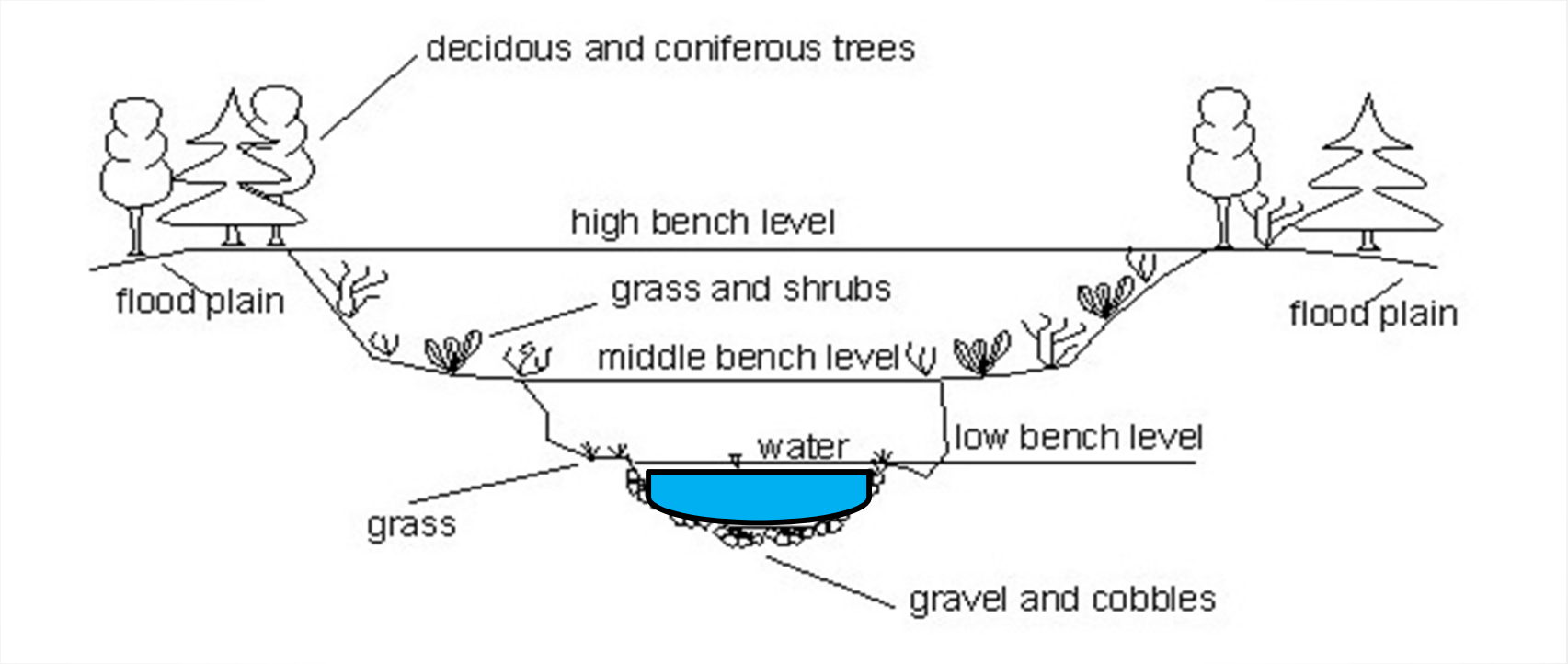
- Low Infiltration Rate
- Low Ground Water Recharge
- Low Base (Dry Weather) Flow

Conversely;

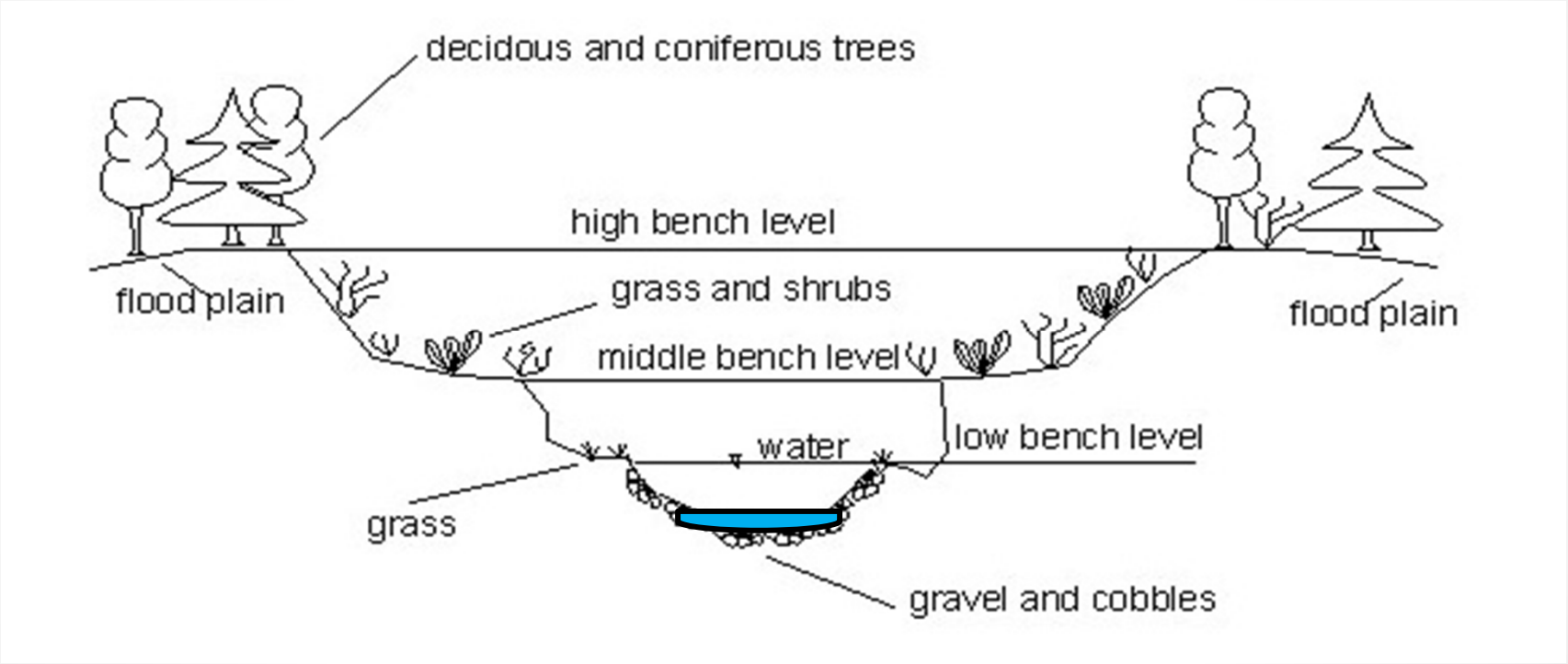
- High Peak Water Flow Volumes
- High Time of Concentration
  (water from the upper reaches of the watershed gets downstream quickly)
- High Stream Velocities



Typical Stream Cross-section
Radecki-Pawlik A. , Skalski T. 2008.

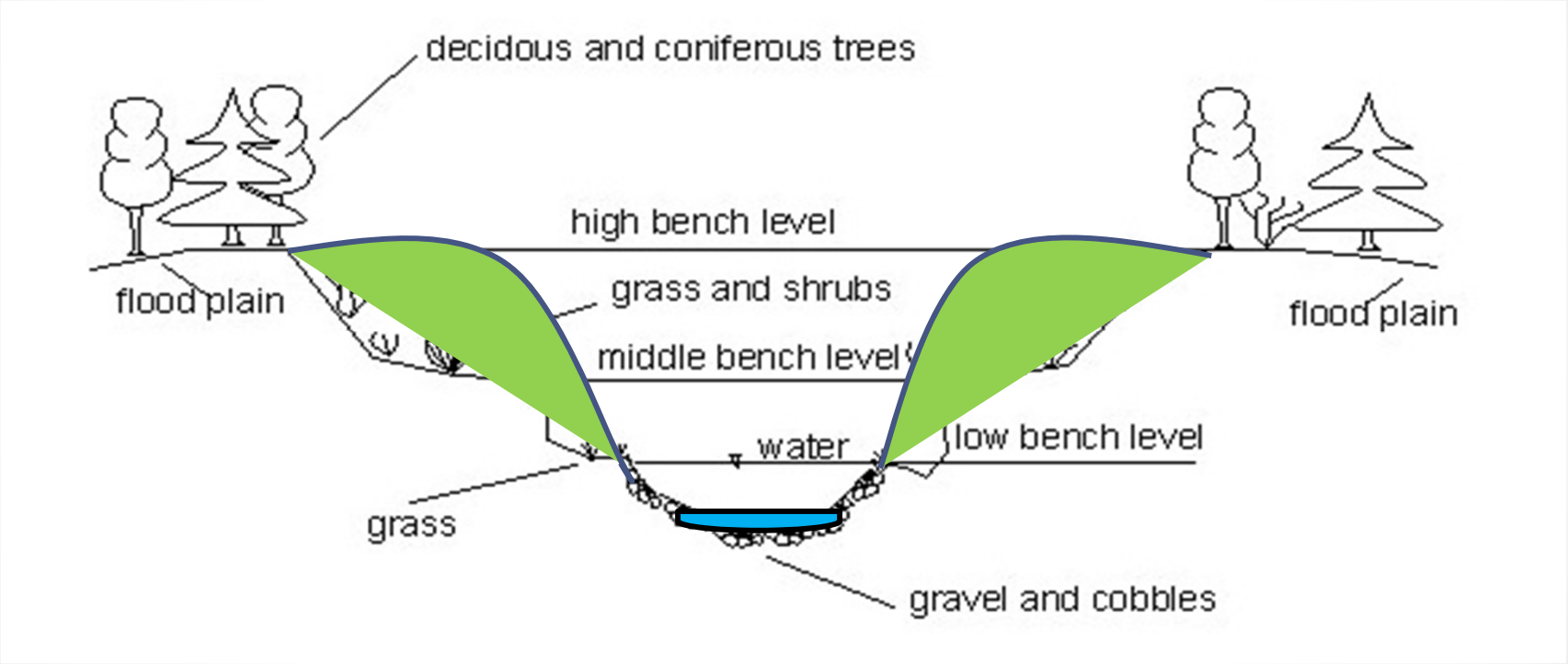


Dry Weather Base Flow is Substantial– Low Developed Watershed



Base flow Decreases – Increased Developed Watershed

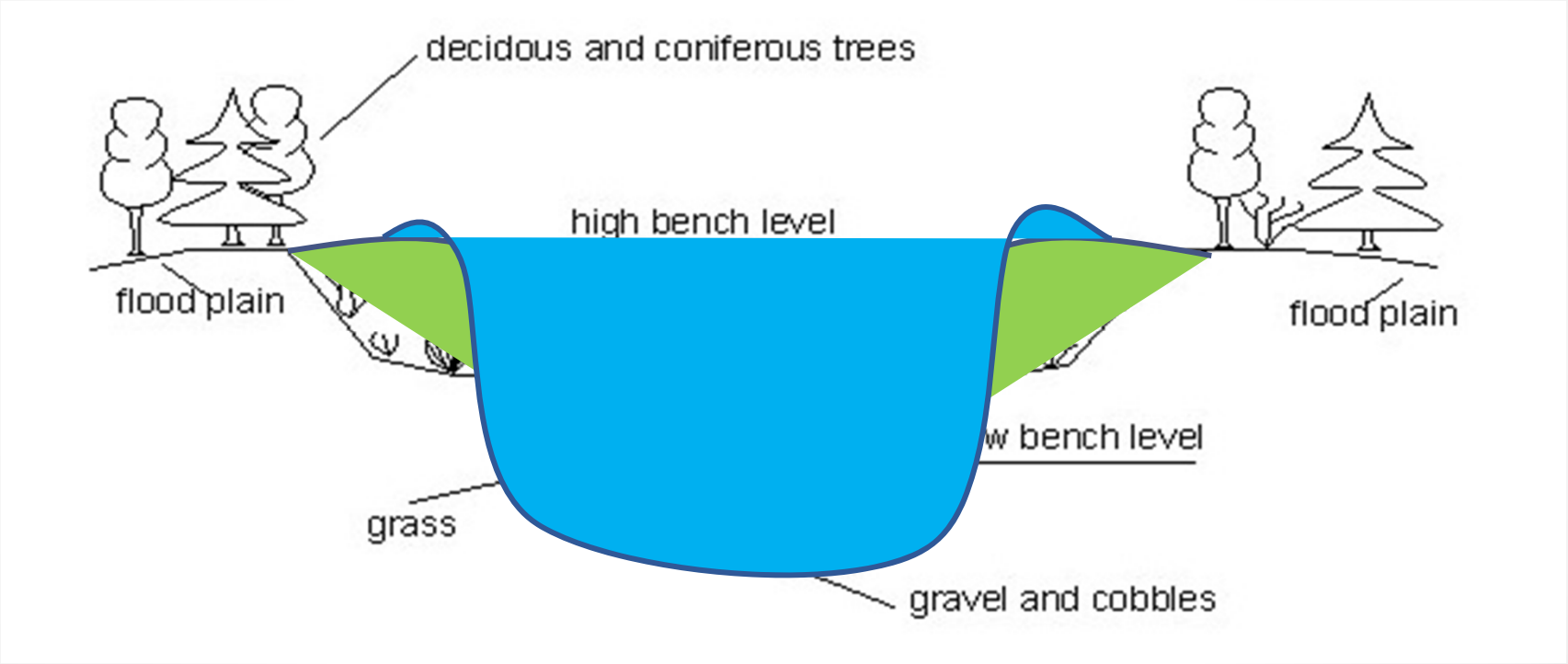
False sense of security, lack of awareness of potential issues



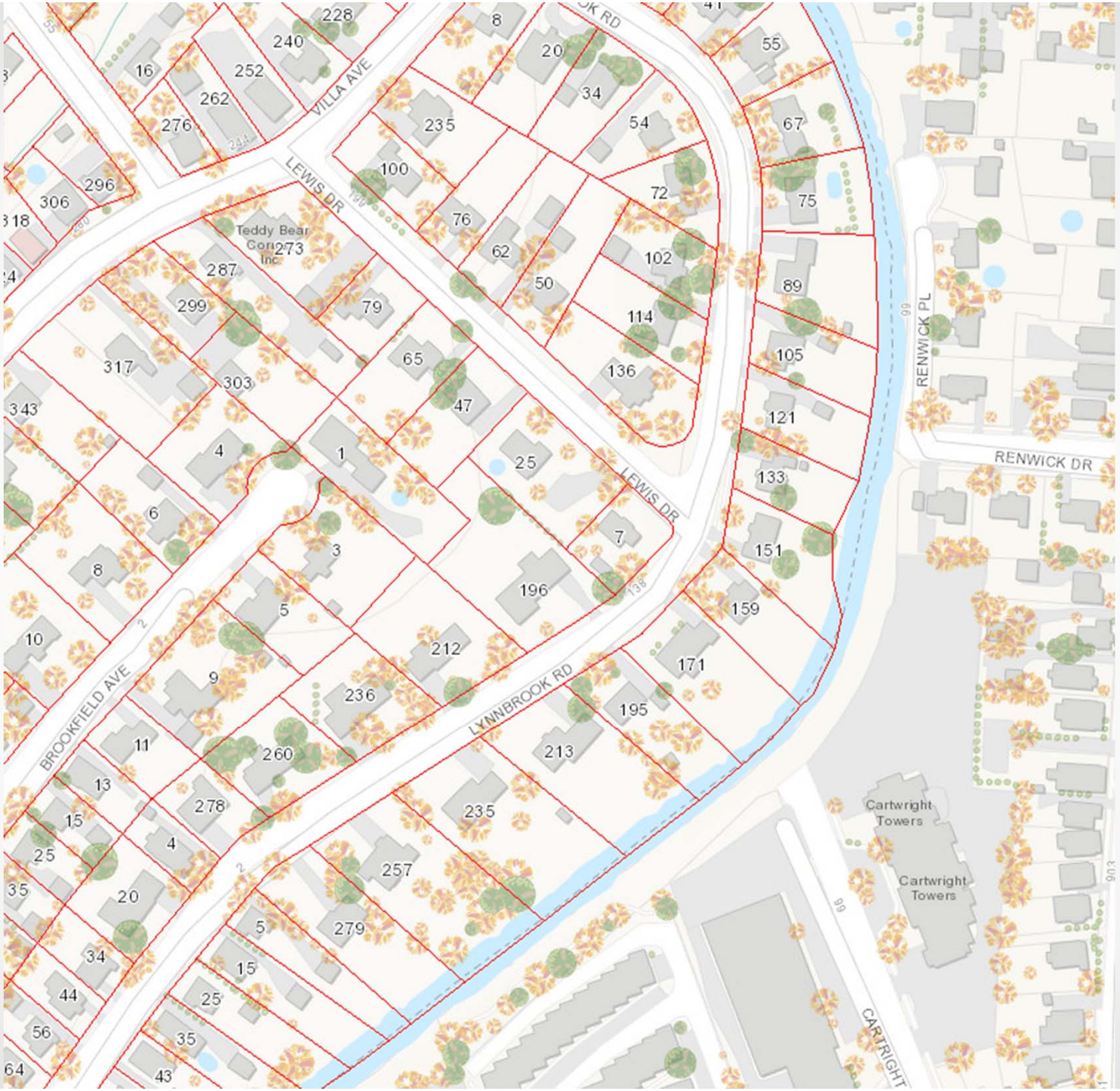
Encroachment on Stream Corridor by property owners

Limited stream cross-section and peak high flows = <u>overflows & flooding</u>

“V” channel cross section becomes degraded “U” = unstable bank, more erosion



Residents now want to “restore channel”, cycle continues.


VILLA AVE
LEWIS DR
LYNNBROOK RD
BROOKFIELD AVE
RENWICK PL
RENWICK DR
Teddy Bear Corp Inc
Cartwright Towers
Cartwright Towers
CARTWRIGHT
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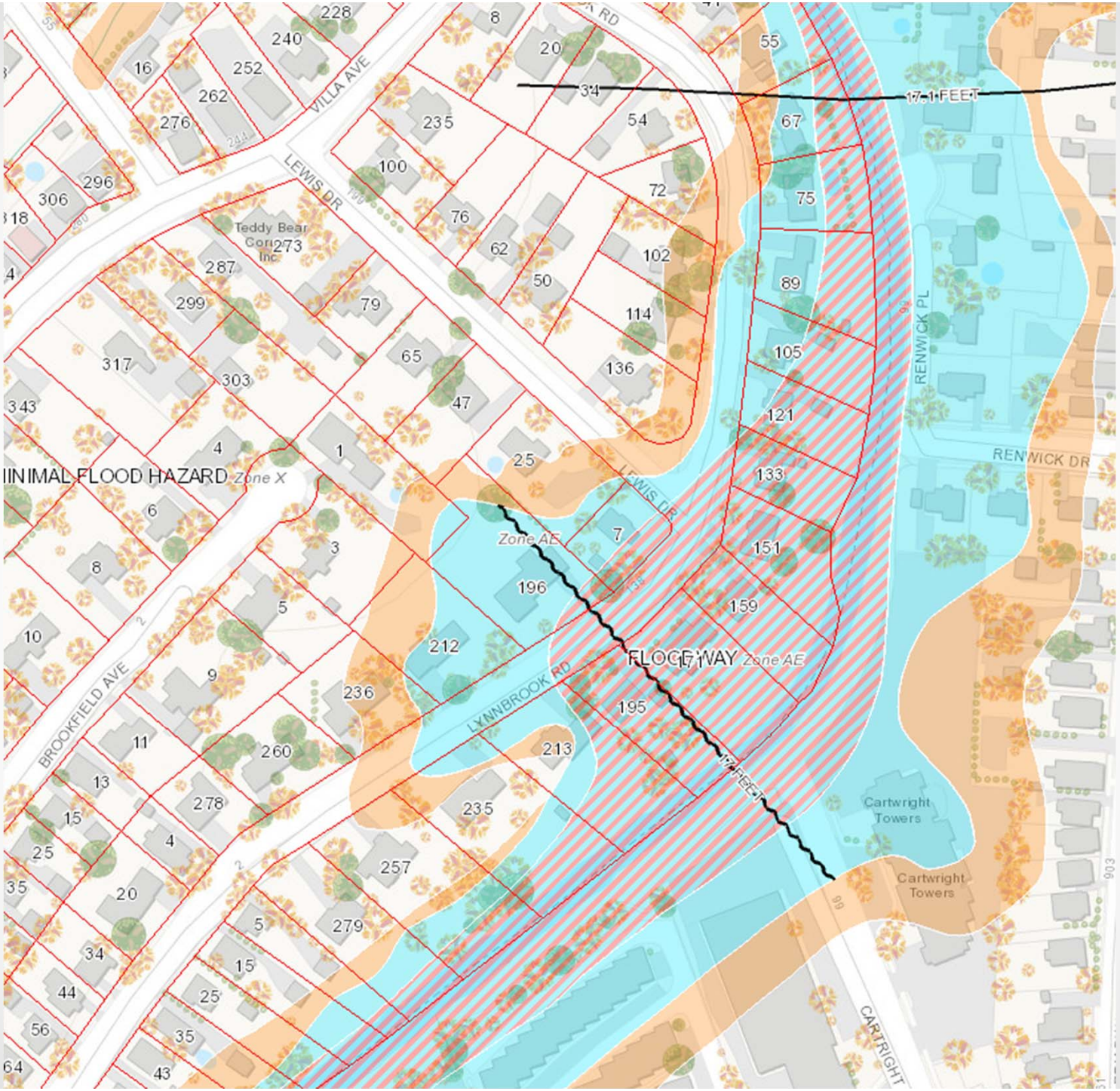
MINIMAL FLOOD HAZARD Zone X
Zone AE
FLOODWAY Zone AE
171 FEET
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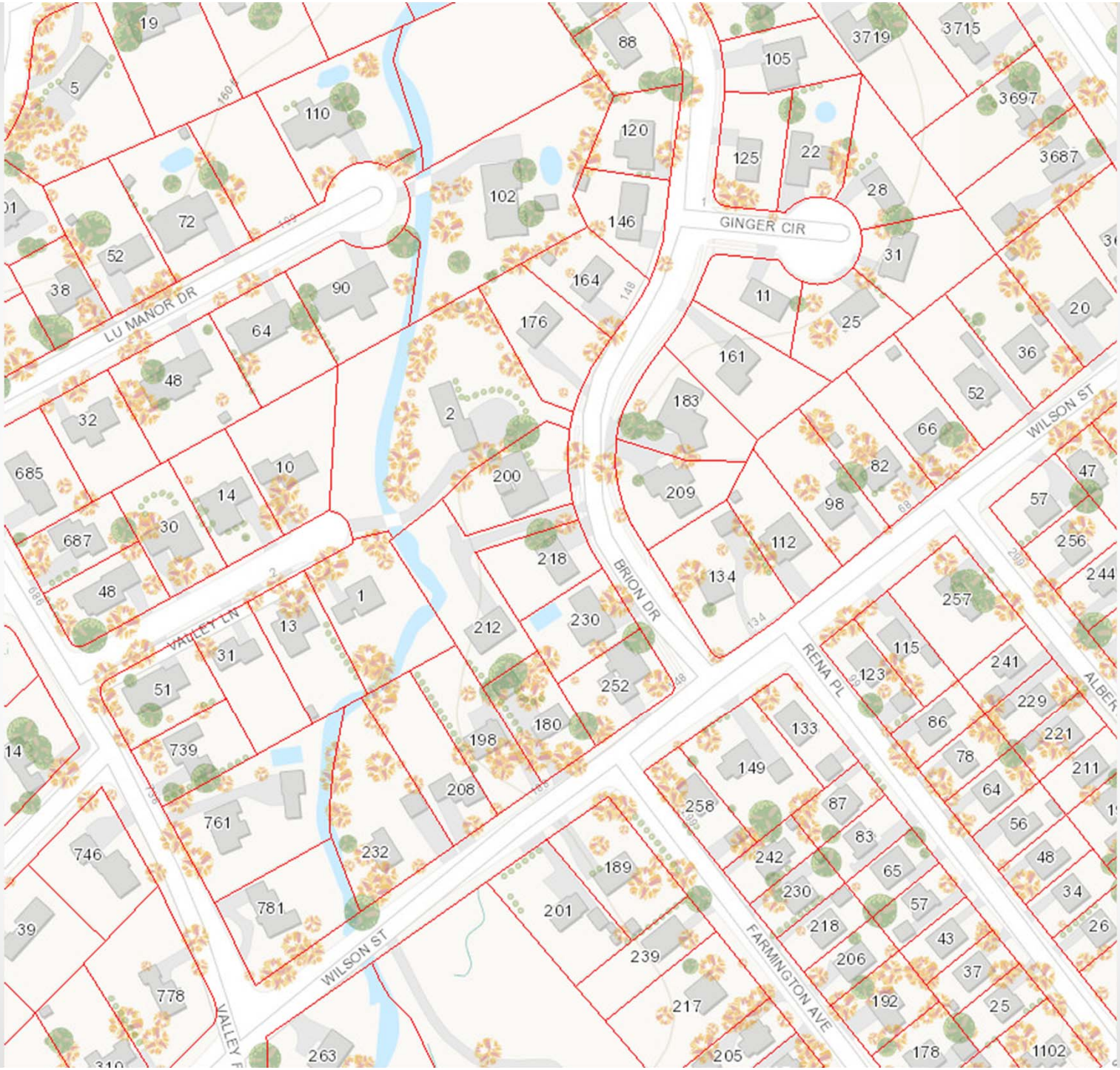
BROOKFIELD AVE
LYNNBROOK RD
RENWICK PL
RENWICK DR
Teddy Bear Corner Inc
Cartwright Towers
Cartwright Towers


GINGER CIR
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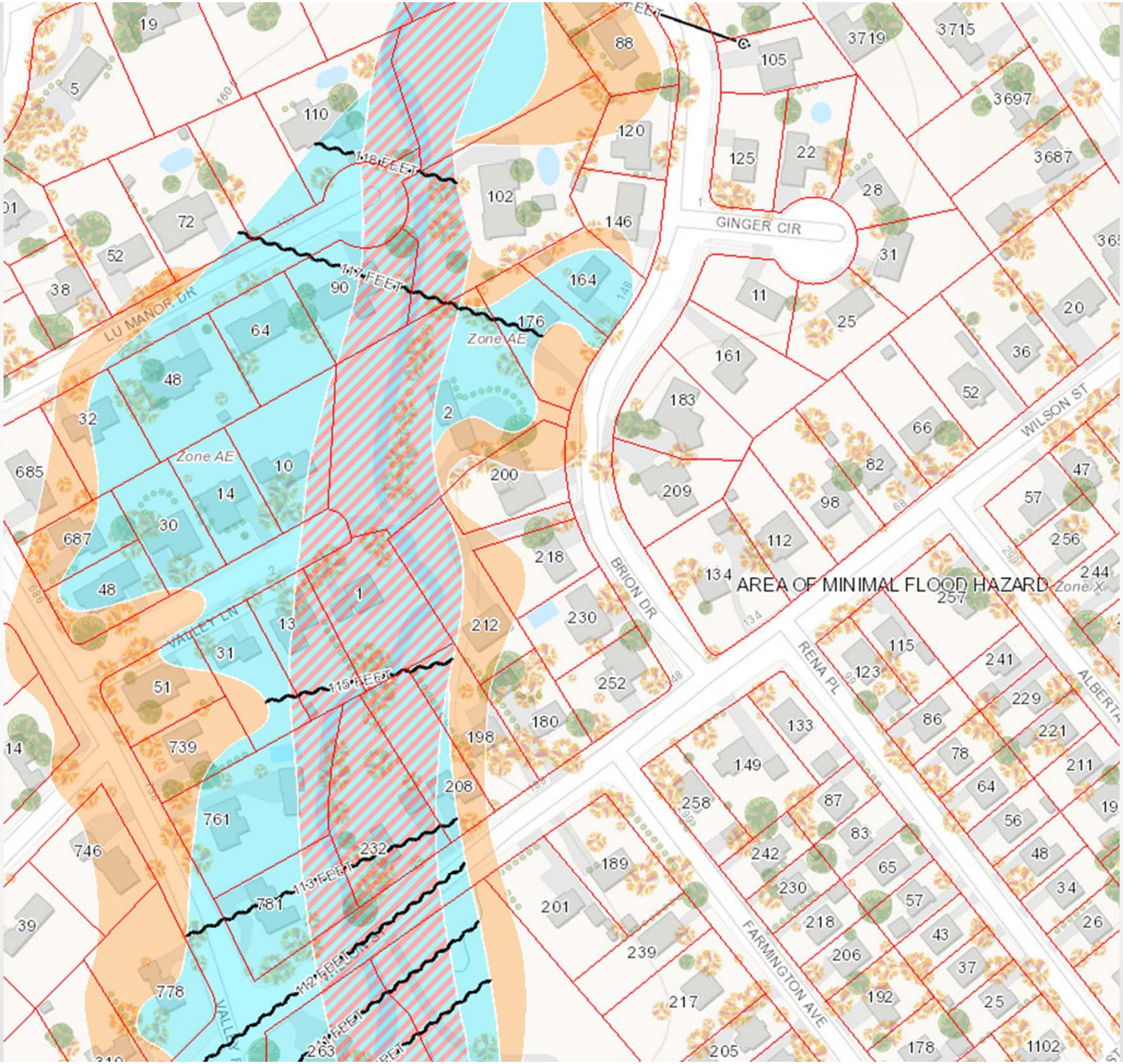
AREA OF MINIMAL FLOOD HAZARD
Zone X
Zone AE
Zone AE
GINGER CIR
LU MANOR DR
VALLEY LN
BRION DR
RENA PL
WILSON ST
FARMINGTON AVE
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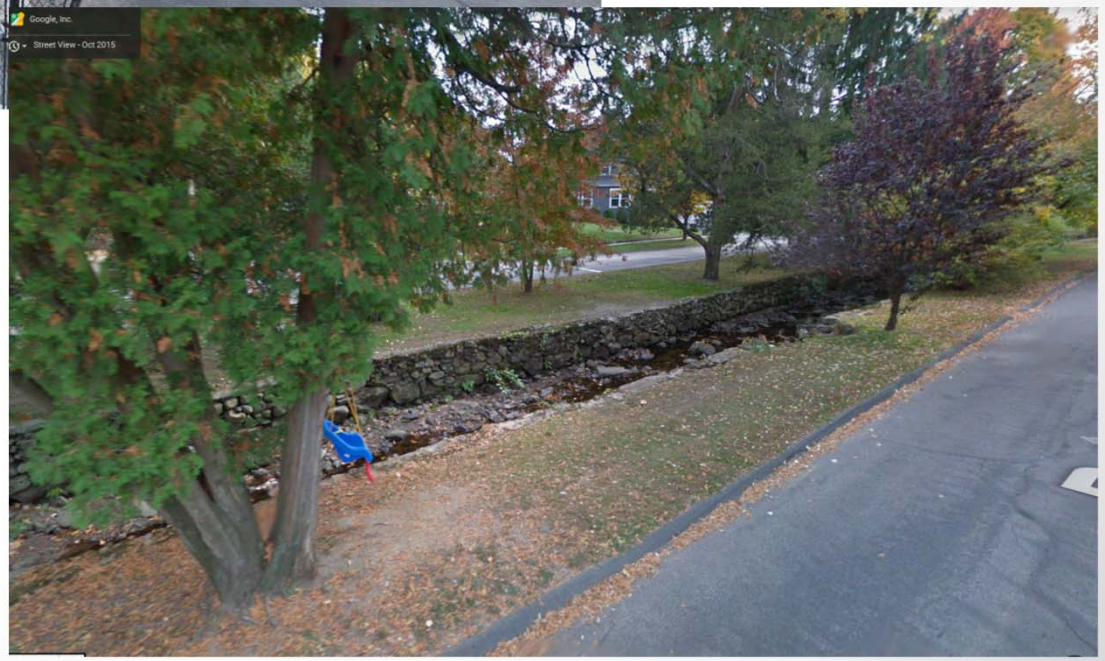


Brooklawn Parkway

Fairfield CT

What can we do about it:

General Ideas:

Sandy changed the way our shoreline residents viewed flooding;

Increased inland flooding may alter thinking

Educate - Use this event as evidence that old way of thinking is not working, change is necessary.

Take municipal responsibility of private steam matters, private issues are a public problem.

Can't totally engineer our way out of this – careful not to further increase velocities, Tc, create additional downstream issues.

What can we do about it:

More Specifically:

1. Establish and maintain proper riverine corridors

2. Create more efficient inlets & outlets at crossings, reduces “backwater”, erosion, etc.

3. Storage – look for opportunities for detention / retention

4. Infiltration – look for opportunities to recharge GW table + decrease peak runoffs (works in both dry & wet conditions).

Inlet side:

Forest litter washes downstream,

(Other litter in the mix too),

Blocks culvert opening,

Backwater creates flooding,

Overtopping the road creates issues.

Bronson Rd
Fairfield, CT

Downstream sides:

Culvert doesn't handle flow,

Flow overtops road,

Creates new channel,

Undermines road.

Hulls Farm Rd
Fairfield, CT

Informal headwalls subject to clogging,
Inefficient in conveying flows

PSU Technical Bulletin
6/20/18

Karl Jansen

Flared Ends

Funnel channel into opening

More efficient in conveying flows

Randy Rath,
Lake George Association Project Manager

Water doesn’t enter culvert;

Overflows road

Eastgate & Cheshire St, Cheshire CT

Create better inlets & channels

Eastgate & Cheshire St, Cheshire CT

Improved channels and inlets

Improved channels & inlets

Moved street outlet to down stream side

South Brooksvale & Abrams, Cheshire CT

Improved channels & inlets

South Brooksvale & Abrams, Cheshire CT

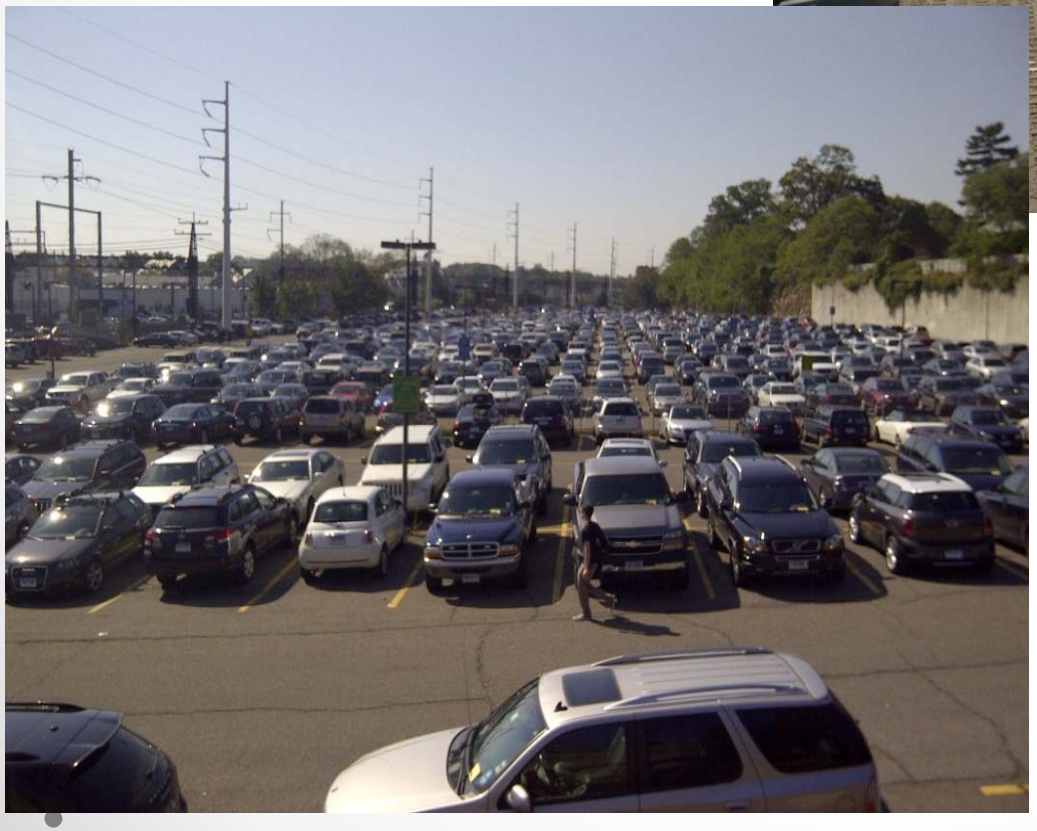
Final product
all dressed up

South Brooksvale & Abrams, Cheshire CT

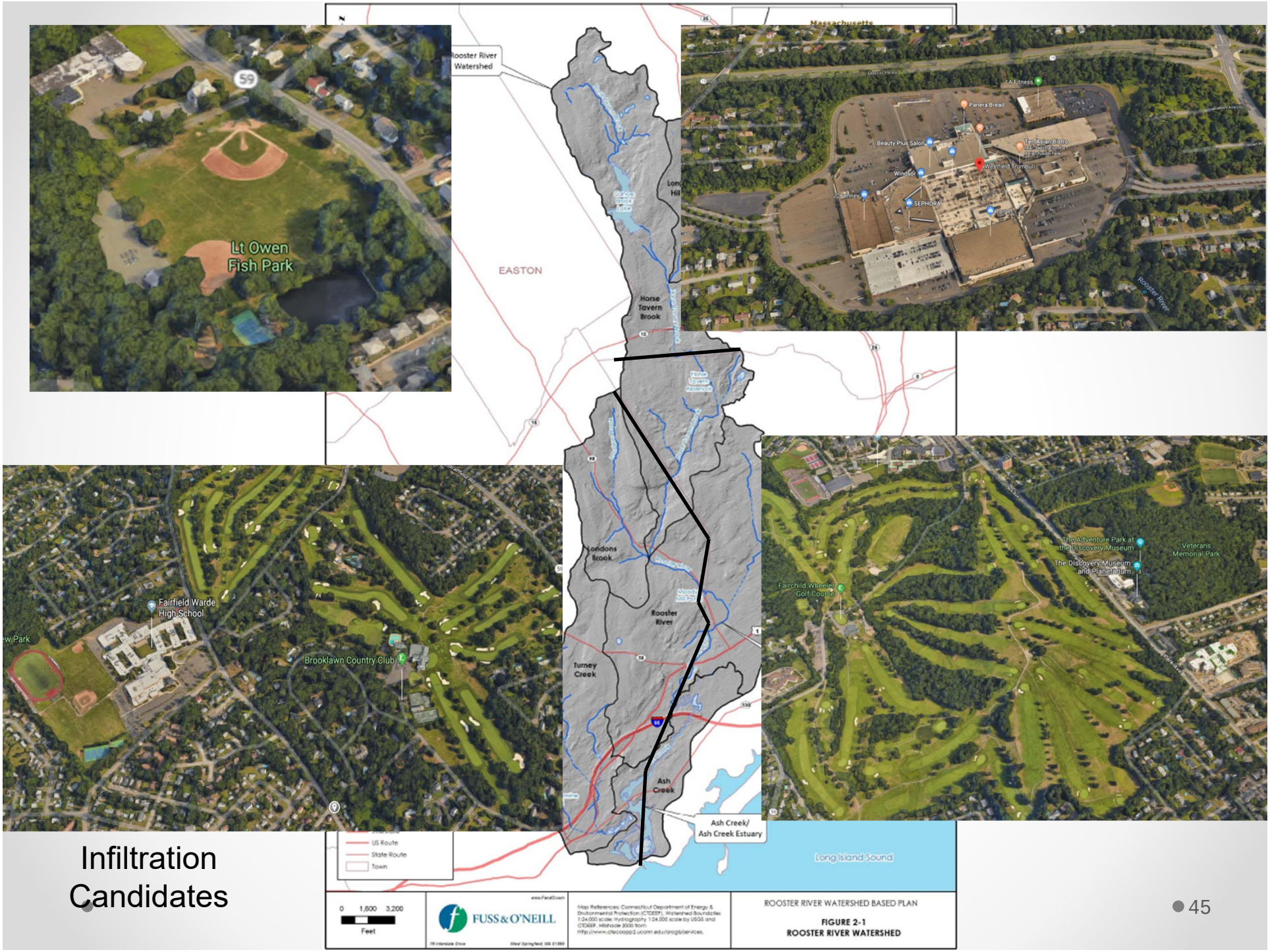
Infiltration:

Addresses stormwater quality & quantity

Penfield Beach



Future possibility at Train Station



Infiltration Candidates

Can we change things?

Every little bit helps,

Keep pushing in the right direction…

Responding to Freak Storms

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Association of Flood Managers

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Wednesday October 24 ,2018

THANK YOU

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