

A photograph of a stone arch bridge over a stream. The bridge is constructed from light-colored, irregularly shaped stones. The arch is prominent, and the water flows through it. The surrounding area is lush with green vegetation. The text is overlaid on the left side of the image.

Office of Strategic Planning and Projects
Connecticut Department of Transportation

CLIMATE CHANGE & EXTREME WEATHER PILOT PROJECT

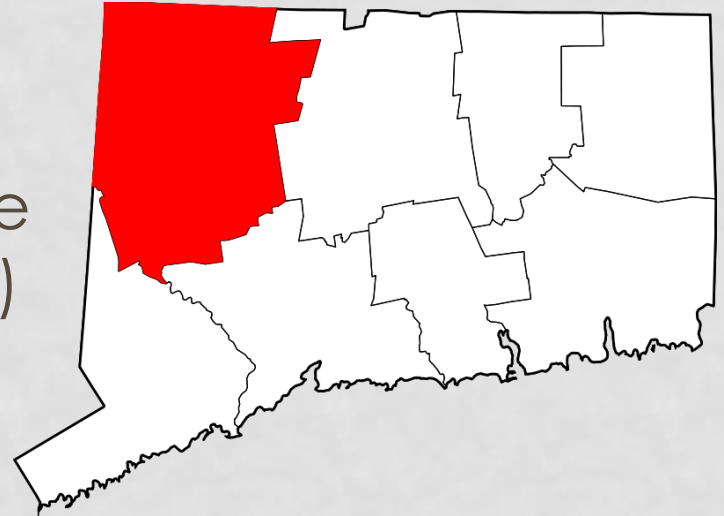
LITCHFIELD HILLS



Lake Waramaug, Warren/Kent/Washington

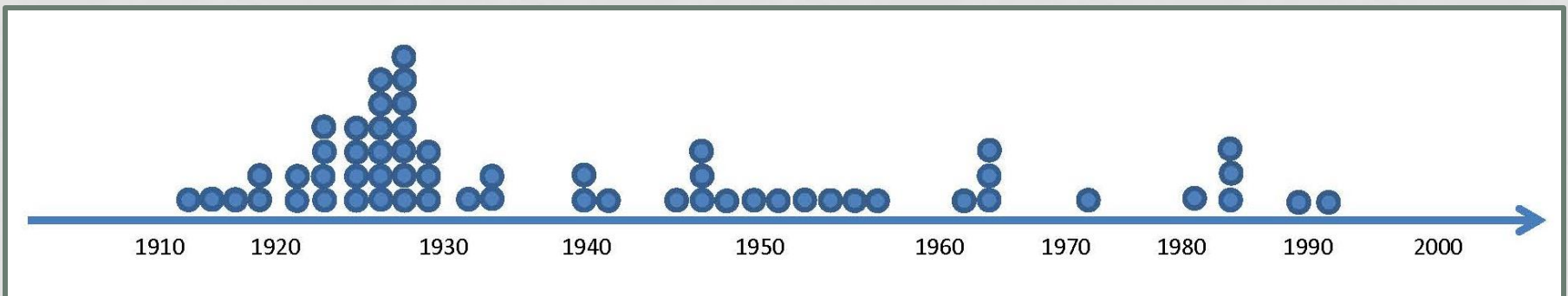
LITCHFIELD HILLS

- Northwest corner of Connecticut, historic, pastoral landscape at the foothills of the Berkshires (Appalachian range)
 - Population: 185,000
 - Land area: 920 sq. mi.
 - Density: 206 people/sq. mi.
 - Manhattan: 66,940 people/ sq. mi.
 - Economy: tourism, dairy farming, manufacturing
 - Older transportation infrastructure



STUDY STRUCTURES

- More than **135** structures were identified in the study area that met the review criteria
- Average structure age: **81** years
- **52** Structures underwent hydraulic evaluations
- **34** study structures *satisfy* hydraulic design criteria
 - ***13** of those vulnerable to scour due to velocity
- **18** study structures *do not satisfy* hydraulic design criteria
- **19** structures are critical



ASSESSMENTS

- Hydraulic Evaluations
 - Performance (Rating) curves for structures:
 - Headwater depth vs. peak discharge
 - Velocity vs. peak discharge
- Criticality/Vulnerability Assessments:
 - Criticality Matrix
 - Criticality ranking for structures

CRITICALITY MATRIX

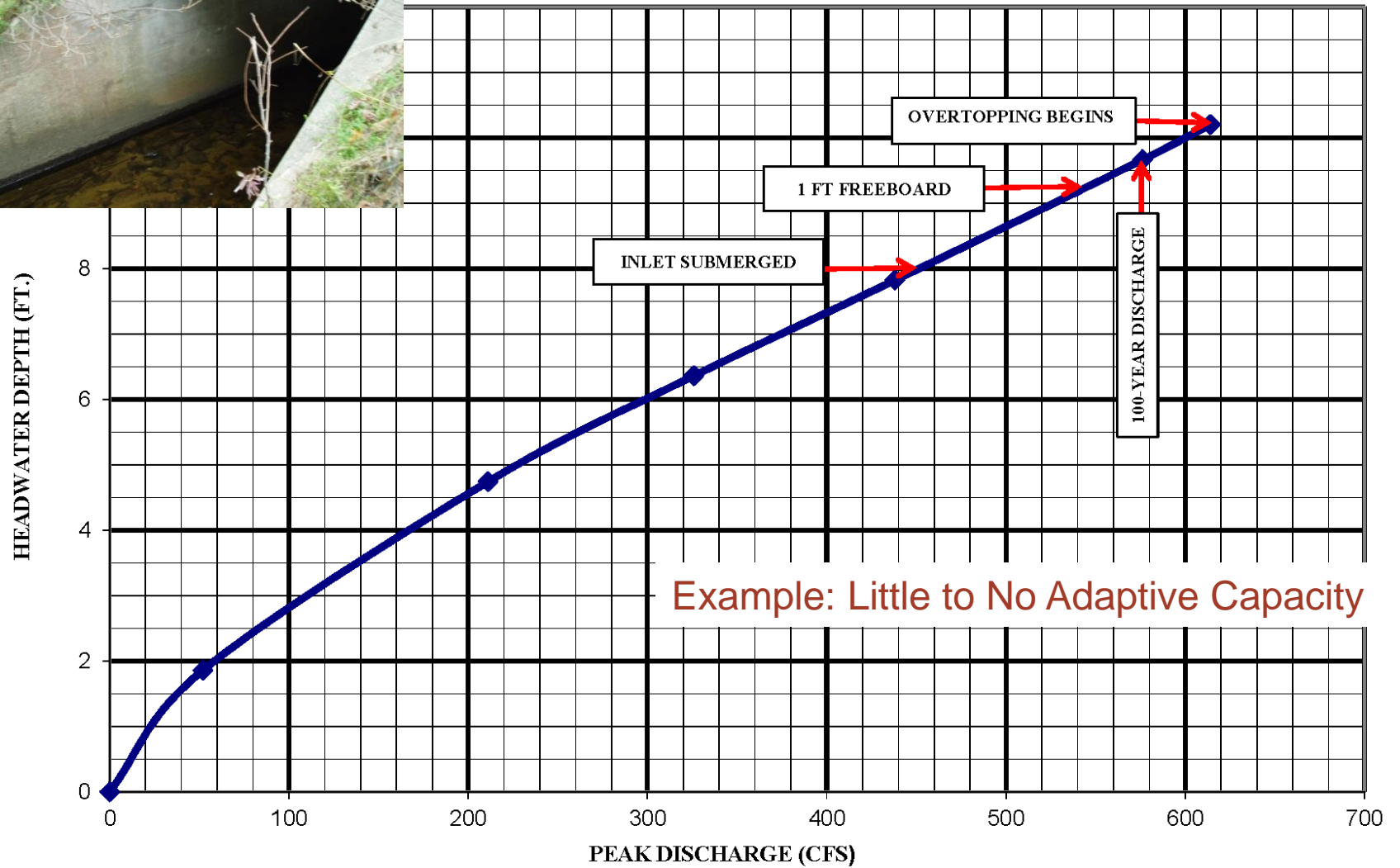
Structure: 06712
Location: Watertown

Year Built: 1966
Criticality Ranking: 4

		Very Low to Low			Moderate				Critical to Very Critical		
		1	2	3	4	5	6	7	8	9	10
Hydraulic	High adaptive capacity				Moderate adaptive capacity				Low adaptive capacity		
	No history of closure				History of periodic closures				Significant history of closure		
	Satisfies WSE criteria				Adjacent to scour critical structures				Scour critical		
Spatial	Outside FEMA flood zones				Within 500 year FEMA flood zone				Within 100 year FEMA flood zone		
	Low concentration of impervious surfaces				Moderate concentration of impermeable surfaces				High concentration of impermeable surfaces		
Social	Low ADT & V/C				Moderate ADT & V/C				High ADT & V/C		
	0-4 accidents				5 or more accidents				Emergency route		
	Non-NHS, non-emergency route				NHS route				Emergency services cluster		



STRUCTURE NO. 02315 HEADWATER DEPTH VS. PEAK DISCHARGE



Barkhamsted- Route 44

Legend

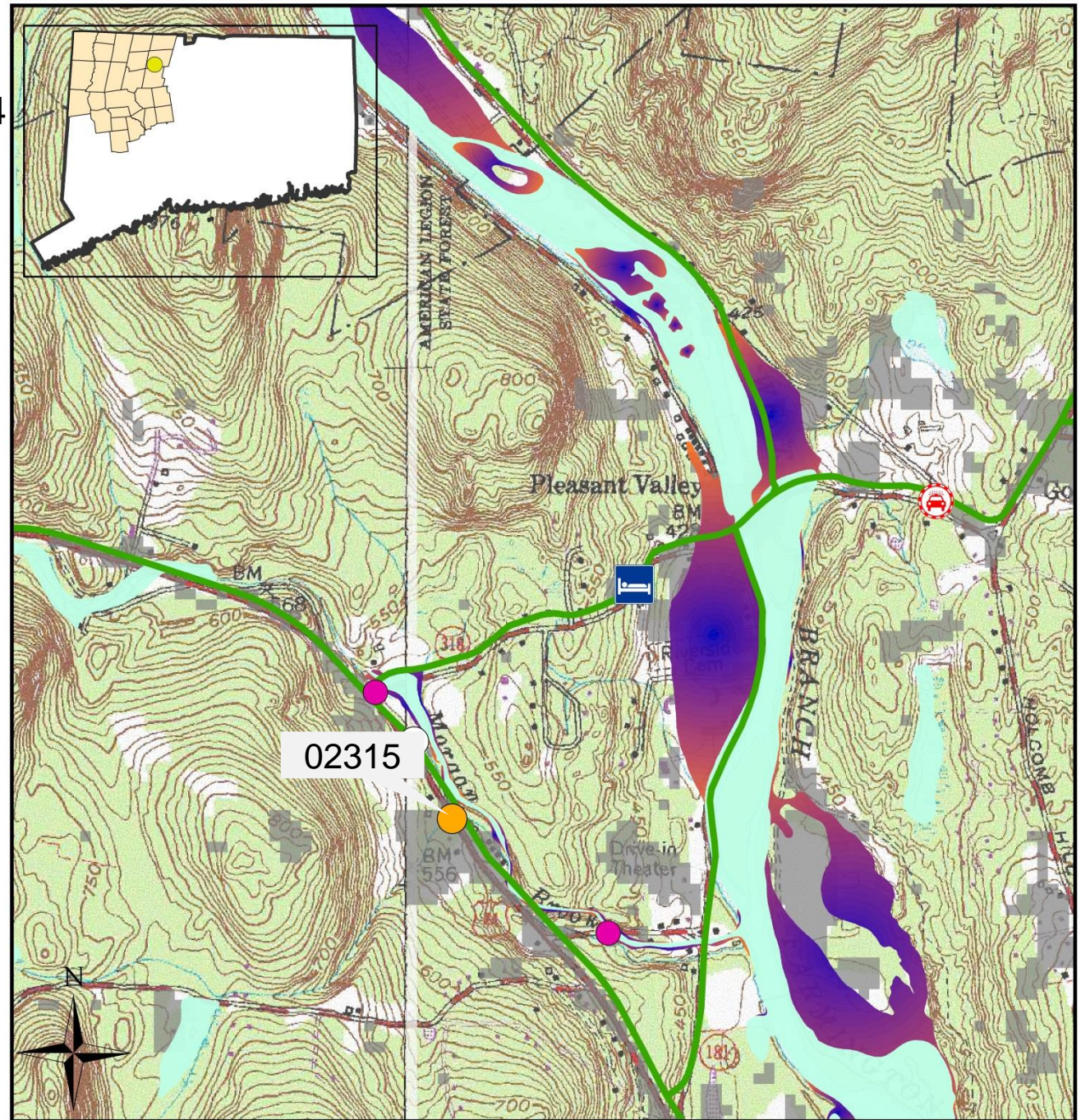
- Scour Critical Structures
- CTDOT Maintenance Facility
- POLICE Police
- Fire
- Emergency Shelters
- Public Works
- EMS

VC Ratios 2009

- 0.00 - 0.91
- 0.91 - 1.00
- 1.00 - 5.00

FEMA Flood Zones

- 100 Year Flood Zone
- 500 Year Flood Zone
- Floodway in Zone AE
- Other Flood Areas
- Impermeable Land Uses

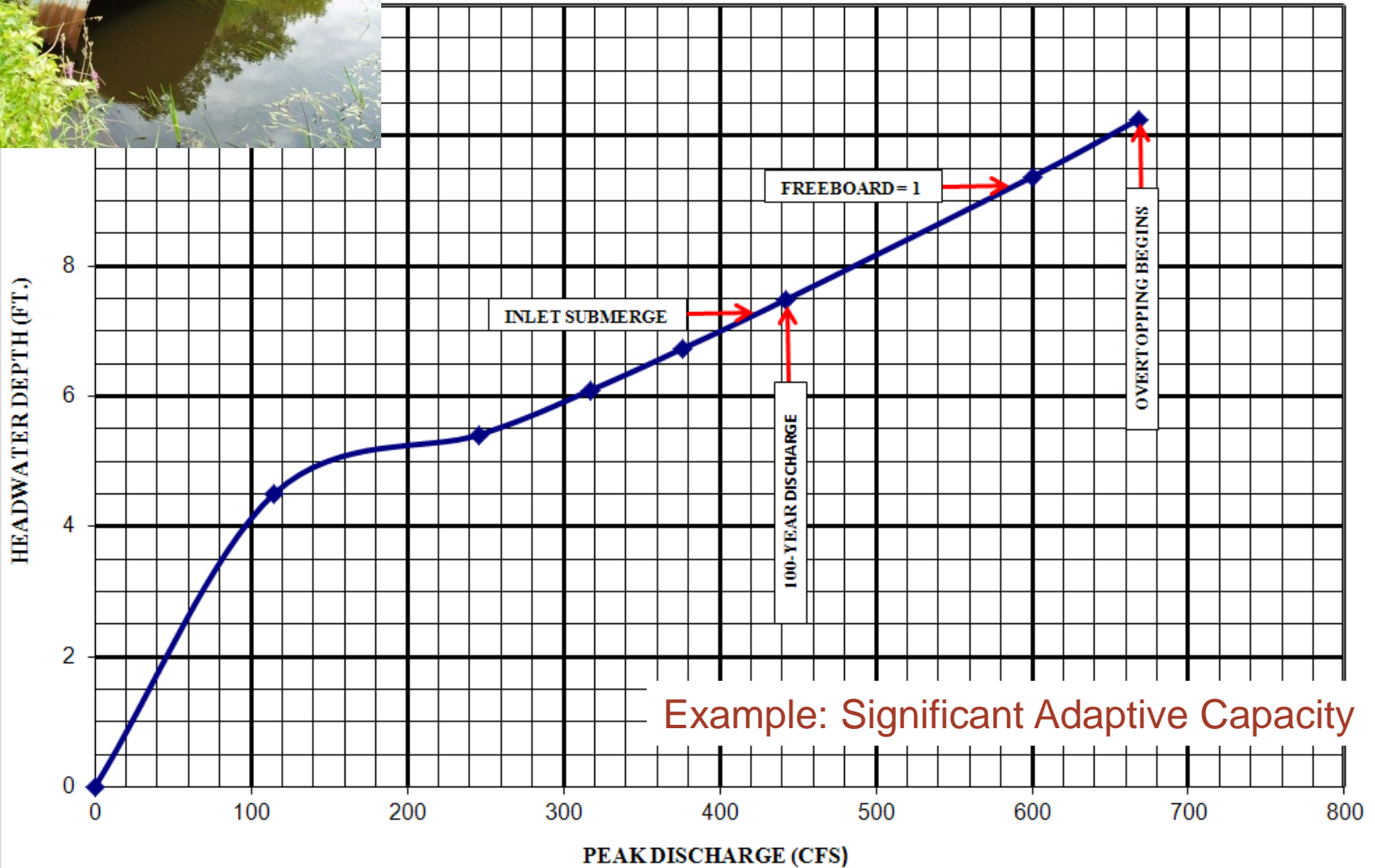


0.3 0.15 0 0.3
Miles

Criticality Score: 7








STRUCTURE NO. 05417
HEADWATER DEPTH VS. PEAK DISCHARGE



Morris- Route 109

Legend

Climate Structures

-  Climate Structures
-  Scour Critical Structures
-  CTDOT Maintenance Facility
-  Police
-  Fire
-  Emergency Shelters
-  Public Works
-  EMS

VC Ratios 2009

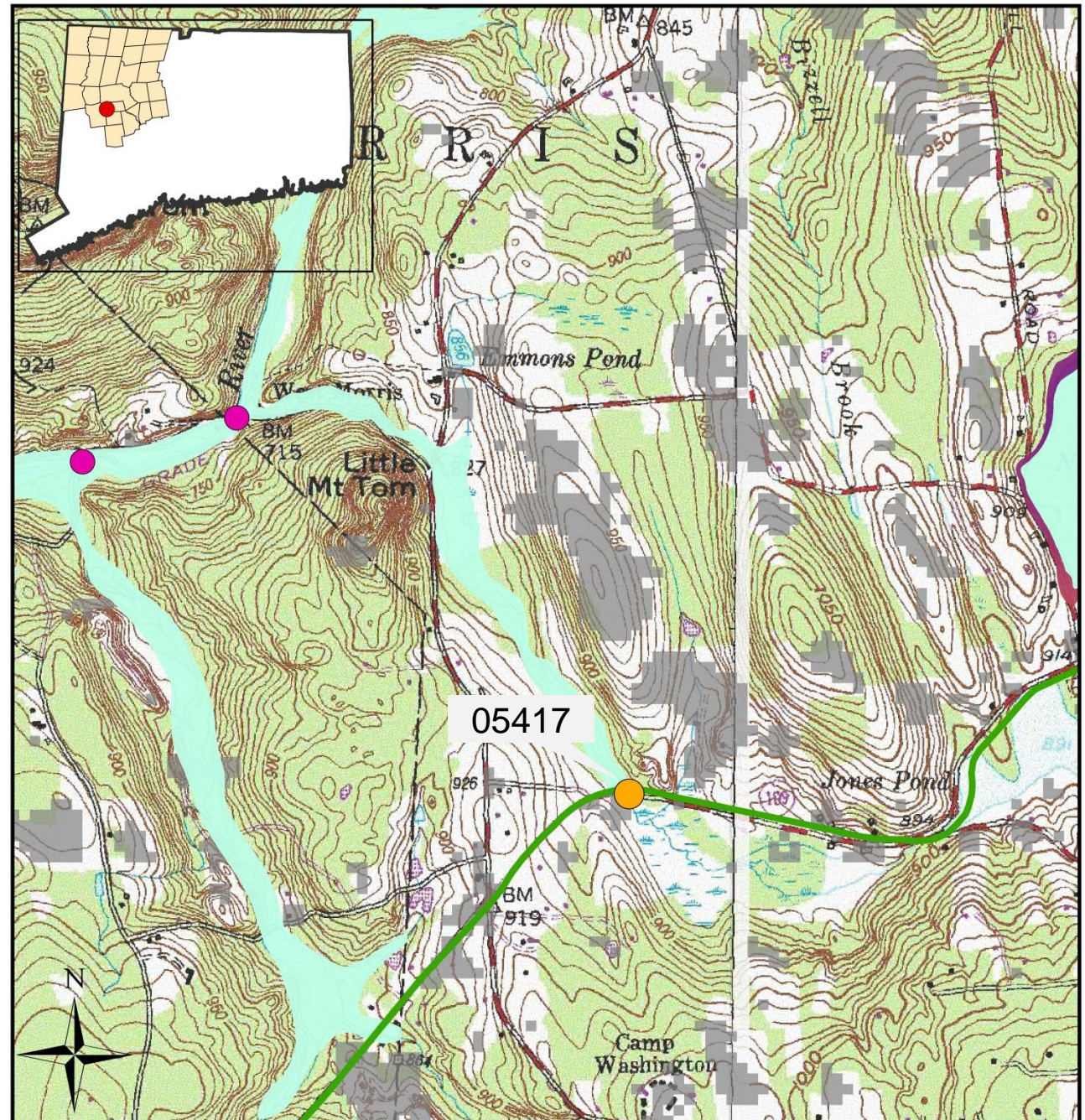
-  0.00 - 0.91
-  0.91 - 1.00
-  1.00 - 5.00

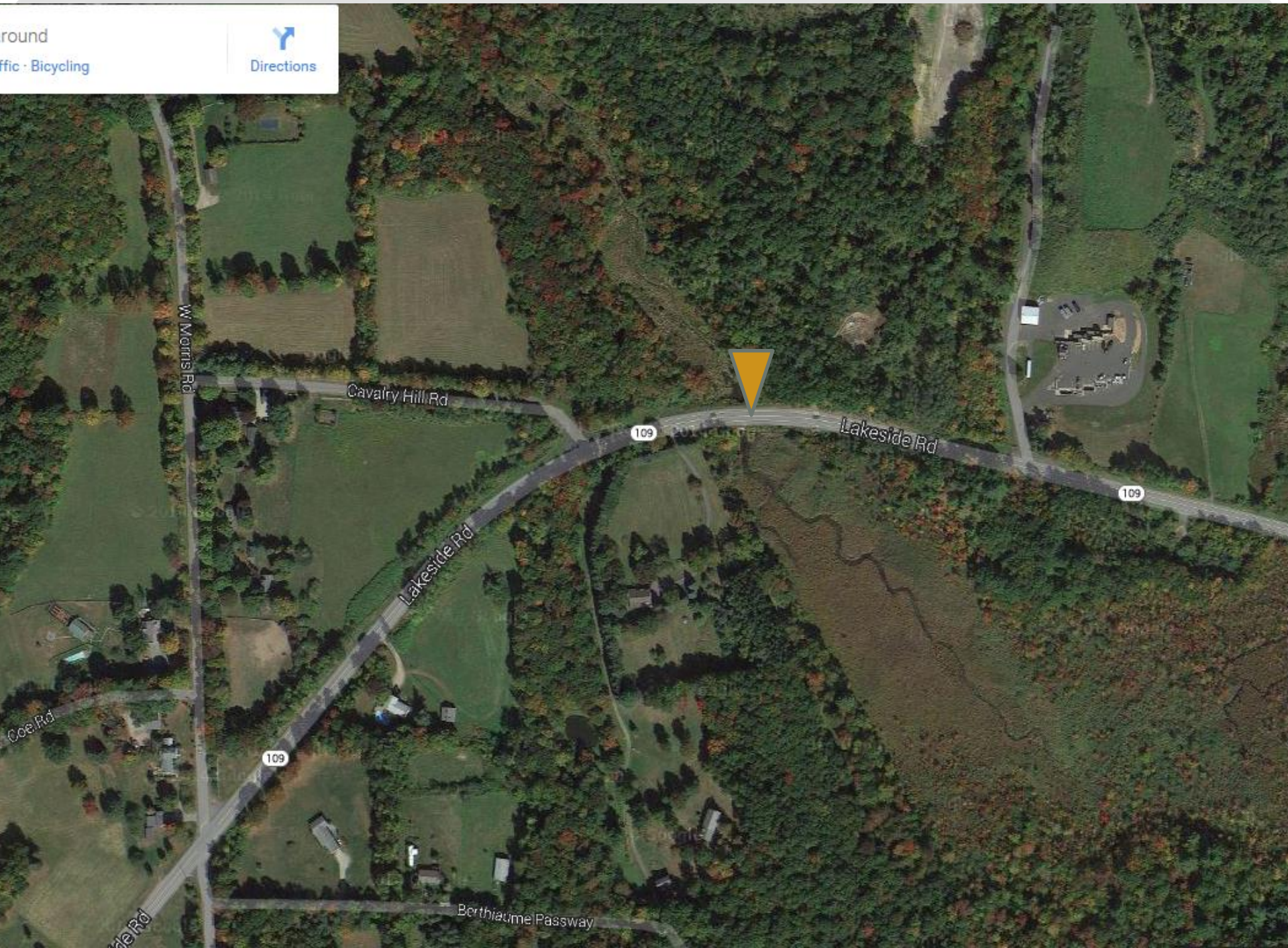
FEMA Flood Zones

-  100 Year Flood Zone
-  500 Year Flood Zone
-  Floodway in Zone AE
-  Other Flood Areas
-  Impermeable Land Uses

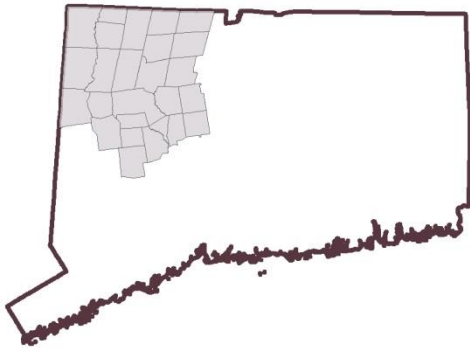


Criticality Score: 8





Litchfield Hills Study Structures Criticality Rankings



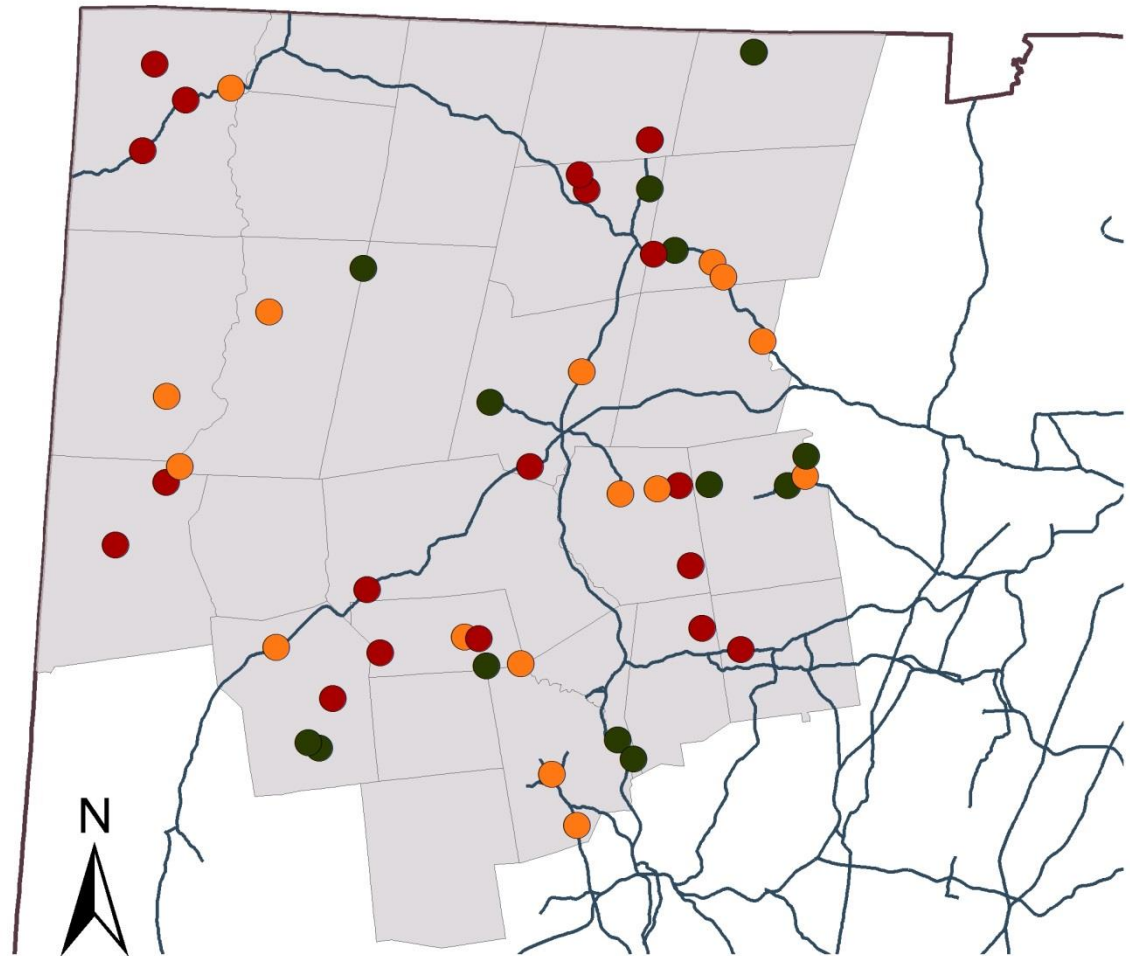
Legend

- Low Risk
- Moderate Risk
- High Risk

— National Highway System

■ Study Region

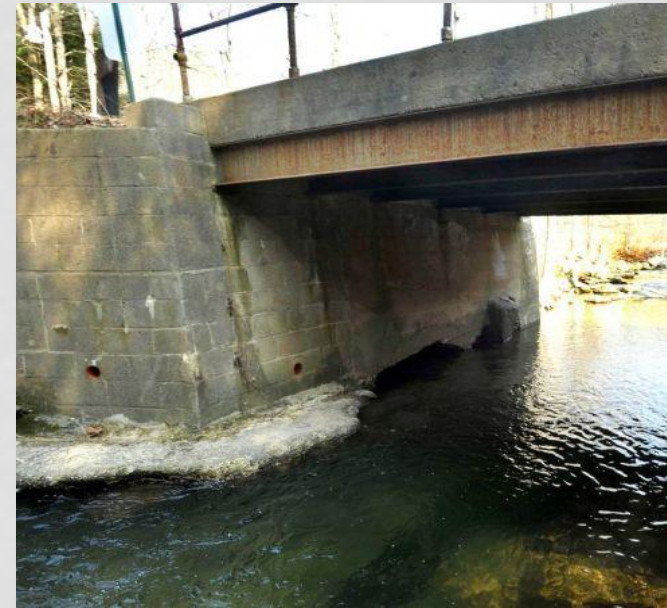
0 5 10 20 Miles



PROJECT FINDINGS

Factors related to Resiliency:

- Velocity-erosion-scour impact vulnerability and adaptive capacity
- Many structures near end of their service life may be more vulnerable
- Hydraulic design methods of older structures are unknown
- Precipitation Estimates
 - Precip.net vs. TP-40
 - NOAA Atlas 14 will be used when released
 - Precip.net estimates higher for less frequent storm events (500, 100, 50 year)



Example of bridge scour, New Milford

THANK YOU

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