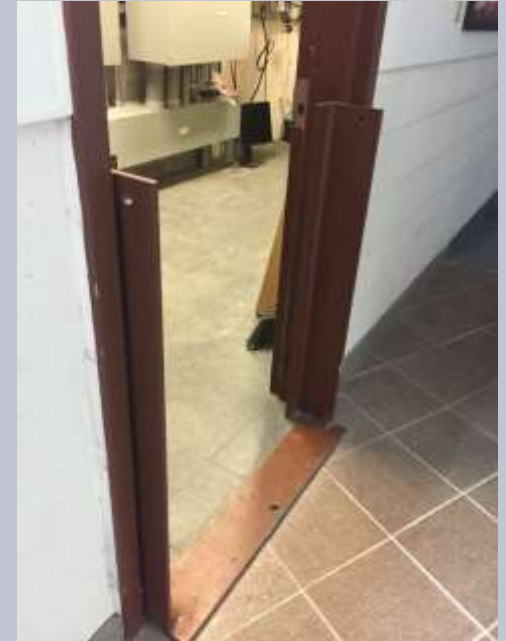


CRITICAL FACILITIES ASSESSMENT IN SOUTHEASTERN CONNECTICUT

STRATEGIES FOR FLOOD RESILIENCE



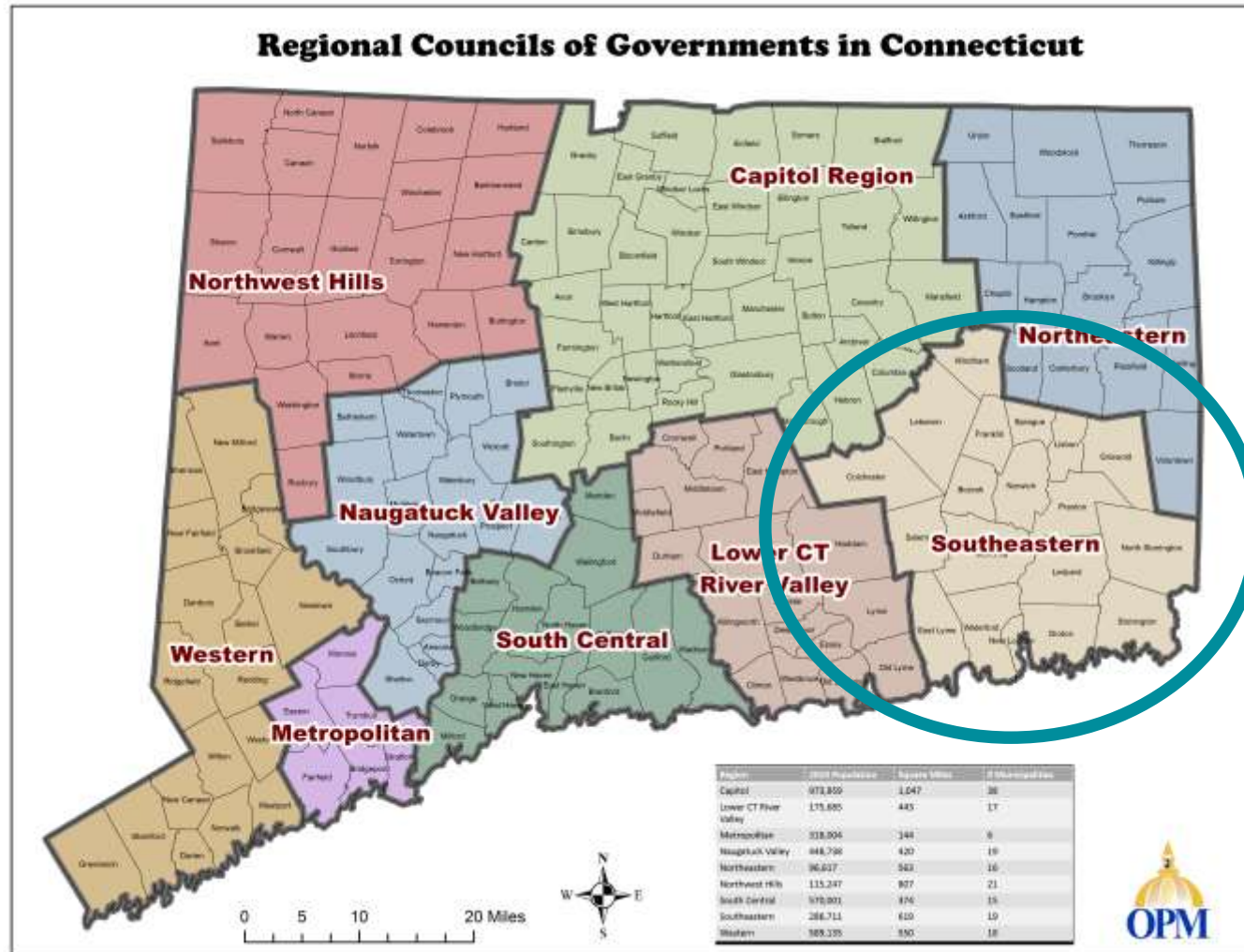
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AGENDA

- Project Background
- Critical Facilities Included
- Design Criteria
- Wind-Related Findings and Recommendations
- Snow-Related Findings and Recommendations
- Key Flood-Related Questions
- Flood-Related Findings and Recommendations for Each Facility
- Key Conclusions
- Repeatable Aspects

PROJECT BACKGROUND



PROJECT BACKGROUND

- Southeastern Connecticut Hazard Mitigation Plan (2012) recommended conducting an assessment of critical facility vulnerabilities and risks
- SCCOG received a grant from the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) for this assessment
- Project helped advance resilience of critical facilities
- Project demonstrated progress that could be recognized in the Southeastern Connecticut Hazard Mitigation Plan Update (2017)



CRITICAL FACILITIES INCLUDED

Which critical facilities were included?

Municipality	Facility	Address	FEMA Zone	Adjacent Zone
Stonington Borough	Fire House and EOC	100 Main St	AE	VE-14
	Borough Hall and Public Works	26 Church St	AE	500-yr
Stonington Town	Old Mystic Fire Department	21 North Stonington Rd	500-yr	AE
	Quiambaug Fire Department	50 Old Stonington Rd	AE	X
	Mystic Fire Department	34 Broadway	AE	X
Groton Town	Groton Long Point Police and Fire	5 Atlantic Ave	AE	X
	Groton Town Hall	45 Fort Hill Road	X	500-yr
Groton City	City of Groton Municipal Building	295 Meridian St	X	500-yr
	City of Groton Public Works	295 Meridian St	500-yr	X
New London	Fire Headquarters and EOC	289 Bank St	500-yr	AE/VE
Waterford	Quaker Hill Fire Company	17 Old Colchester Rd	500-yr	AE
Montville	Chesterfield Fire Company	1606 Hartford New London Tpke	X	AE
Norwich	Yantic Fire Company No. 1	151 Yantic Rd	AE	Floodway
	Occum Fire Department	44 Taftville Occum Rd	AE	500-yr
	Norwich Public Works	50 Clinton Ave	500-yr	AE
Preston	Preston Public Works	423 Route 2	X	A
Sprague	Sprague Town Hall	1 Main St	AE	Floodway
	Sprague Public Works	1 Main St	AE	Floodway

DESIGN CRITERIA...FOR A PLANNING STUDY

- Connecticut Building Code snow loads (30 psf) and assumption that heavy snow risks could increase with climate change
- Connecticut Building Code wind speeds (varies by town) and assumption that wind risks could increase with climate change
- Design wind speeds that exceed building codes for critical facilities
- FEMA BFE (1% annual chance) and 0.2% annual chance elevations
- For coastal properties, the mean high water (MHW) and sea level rise projections
- The State's requirement that critical facilities be constructed per the 0.2% annual chance flood elevation when State authorizations are needed or State funding is used
- Federal Flood Risk Management Standard (FFRMS) and local adopted versions such as NYC and NY & NJ Port Authority that are forward-looking relative to climate change

WIND-RELATED FINDING & RECOMMENDATIONS



New London Fire HQ



Norwich DPW Yard

- None of the buildings occupied by people appear to have deficient roofs relative to wind
- If a roof is planned for replacement, higher design wind speeds should be considered
- Many of the occupied buildings lack window protection
- Hurricane shutters are recommended where window damage could hinder the ability of the facility to function
- Small outbuildings, equipment, and vehicles parked outdoors at the three public works facilities are at risk for damage during strong winds and should be secured when storms are forecast

SNOW-RELATED FINDINGS & RECOMMENDATIONS



Preston DPW



Norwich DPW

- None of the buildings occupied by people appear to have deficient roofs relative to snow loads, although many are flat
- Procedures should be developed for removing snow from roofs
- If a roof is planned for replacement, higher design loads should be considered

KEY FLOOD-RELATED QUESTIONS

- Has the facility experienced a flood?
- Is the facility in the 1% annual chance flood zone (Special Flood Hazard Area) or the 0.2% annual chance flood zone?
- Is the facility's lowest floor below or above the base flood elevation?
- For coastal facilities, is the facility's lowest floor below or above the future high tide level (MHW + sea level rise)?
- Does the facility use pose logistical challenges? For example, fire station garage doors and emergency access cannot be blocked.
- Are there any situations where a flood wall is possible due to the risk profile?

FLOOD-RELATED FINDINGS & RECOMMENDATIONS

- Recommendations were divided into short-term and long-term
- In a limited number of cases, alternate options were provided if appropriate
- Options included:
 - Relocating facility
 - Elevating buildings
 - Wet or dry floodproofing
 - Elevating utilities
 - Elevating interior floors
 - Flood barriers at openings
 - Flood walls

FLOOD-RELATED FINDINGS & RECOMMENDATIONS

Acronym Key – All Sites:

BFE	0.2% WSE	LAG	FFE	NFE	Utility
Base Flood Elevation (1% annual chance WSE)	Flood elevation for the 500-year flood	Lowest Adjacent Grade	First floor elevation (not always the lowest occupied floor)	Next floor elevation (this may be the occupied floor, or what we call the “first floor”)	Elevation of lowest utility (sometimes the same as the FFE)

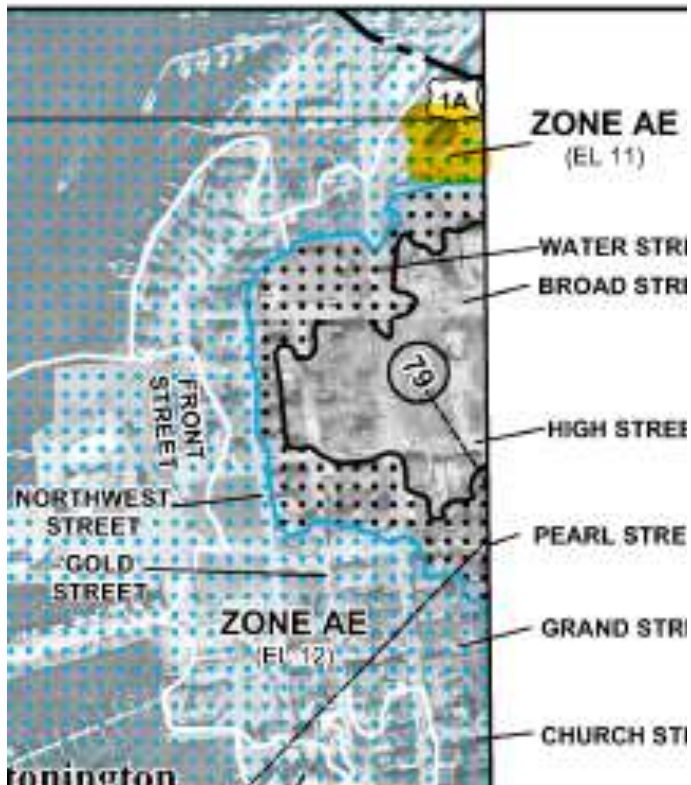
Acronym Key – Coastal Sites:

CJL	MHW
Coastal jurisdiction line	Mean high water

STONINGTON BOROUGH

Borough Fire Department

BFE	LAG	FFE	NFE	Utility
11	8.34	8.78	24.98	4.78



- Floodproofing already present
- Short-Term: No action needed
- Long-Term: Increase height of interior dry floodproofing

STONINGTON BOROUGH

Borough Hall

BFE	LAG	FFE	NFE	Utility
12	8.77	8.52	11.70	8.97

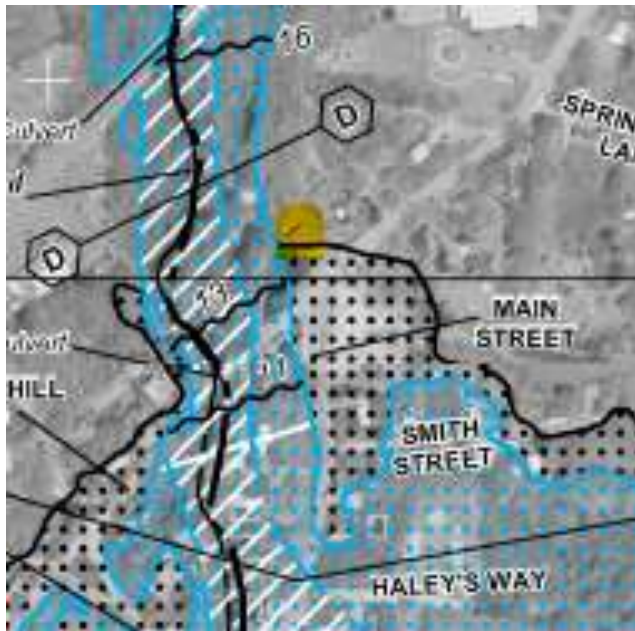


- Floodproofing not present
- Short-Term: Dry floodproof the utility room
- Long-Term: Wet floodproof the remaining lower areas such as the garage bays

TOWN OF STONINGTON

Old Mystic Fire Department

BFE	LAG	FFE	NFE	Utility
13	16.87	16.85	30.66	16.85



- Property at risk of riverine and coastal floods
- Floodproofing not present
- Short-Term: No action needed
- Long-Term: Wet and dry floodproofing or low berm or flood wall

TOWN OF STONINGTON

Quiambaug Fire Department

BFE	LAG	FFE	NFE	Utility
11	3.32	6.97	none	6.97

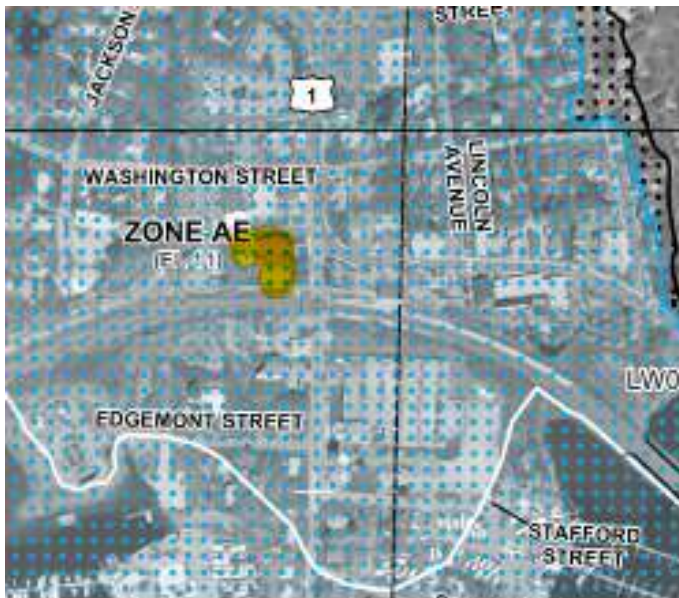


- Current MHW is 0.84'
- Coastal Jurisdiction Line is 2.0'
- Future daily high tide is 2'-5'
- Floodproofing not present
- Short-Term: Wet and dry floodproofing
- Long-Term: Relocate facility

TOWN OF STONINGTON

Mystic Fire Department

BFE	LAG	FFE	NFE	Utility
11	7.96	8.62	9.73	9.73

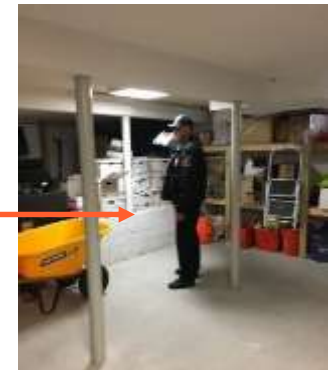


- Plans indicate construction to FFE-11; likely NVGD with prior FEMA map (pre-2010) so building is no longer above the BFE
- Floodproofing not present
- Short-Term: Dry floodproof the utility room
- Long-Term: Wet floodproof the remaining lower areas

TOWN OF GROTON

Groton Long Point Police & Fire

BFE	LAG	FFE	NFE	Utility
11	2.96	4.26	5.75	6.21

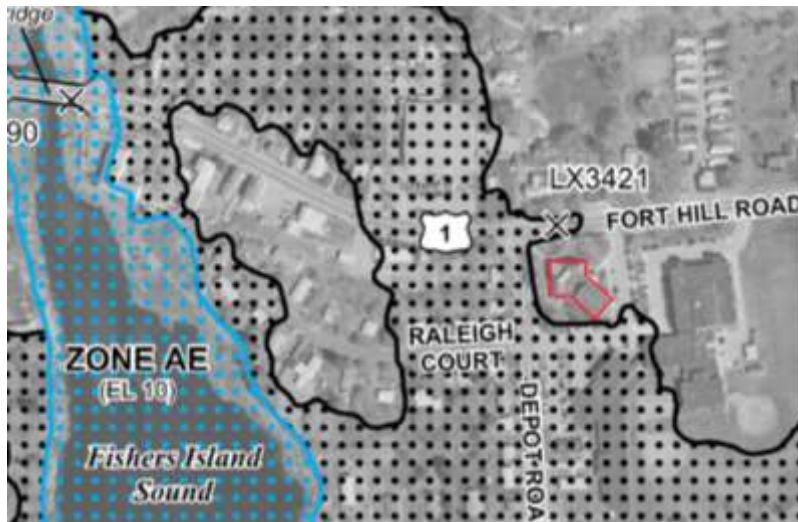


- Some floodproofing already present (utility room is elevated)
- Current MHW is 0.84'
- Coastal Jurisdiction Line is 2.0'
- Future daily high tide is 2'-5'
- Short-Term: Additional utility room dry floodproofing and expanded wet floodproofing
- Long-Term: Relocate facility

TOWN OF GROTON

Groton Town Hall

BFE	LAG	FFE	NFE	Utility
10	18.96	12.07	20.62	12.32



- Building has various floor elevations, window wells, and many openings
- Floodproofing not present
- Short-Term: No action needed
- Long-Term: Low berm or flood wall (due to the low flood risk, configuration of site, and complexities of the building)



CITY OF GROTON

Municipal Building

0.2% Elev.	LAG	FFE	NFE	Utility
52.80	49.54	49.62	61.38	49.92



- Building has various floor elevations and many openings
- 0.2% elevation estimated from FEMA Publication 265
- The grade between the building and the 0.2% risk zone exceeds 52.8', so there is no risk from Birch Plain Creek
- Drainage-related flooding has occurred
- Short-Term: Drainage improvements
- Long-Term: Upgrade drainage as needed to keep up with increasing precipitation intensities

CITY OF GROTON

Public Works

0.2% Elev.	LAG	FFE	NFE	Utility
52.80	--	--	--	--



- Building elevations not measured
- Floodproofing not present
- Short-Term: Wet and dry floodproofing
- Long-Term: Low berm or flood wall (due to the relatively low flood risk, configuration of site, and nature of the property use)



CITY OF NEW LONDON

New London Fire Headquarters

AE/VE	LAG	FFE	NFE	Utility
11/12	6.52	7.22	22.11	7.22



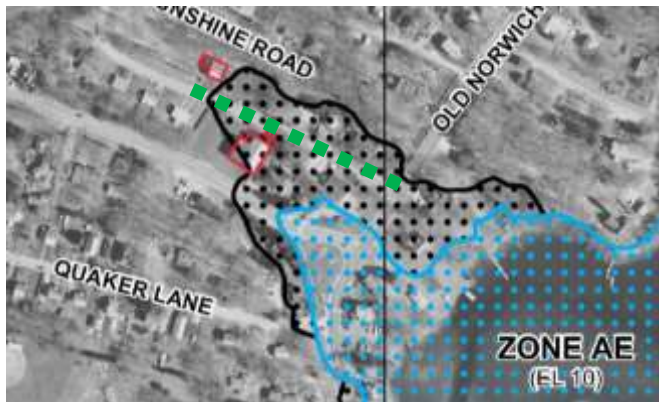
- Property is protected by a flood protection system at the Thames River and mapped in the 0.2% floodplain
- Floodproofing not present
- Short-Term: Stormwater improvements and backflow prevention; dry floodproof utility room
- Long-Term: Wet floodproof remaining first floor areas



TOWN OF WATERFORD

Quaker Hill Fire Company

BFE	LAG	FFE	NFE	Utility
10	11.96	11.06	14.44	19.25



Stream located beneath road in a long culvert

- Property at risk of riverine and coastal floods
- Tidal flood waters have reached the property, where water levels were approximately ten feet away from a building.
- The secondary garage has undergone flooding originating from the brook overtopping the culvert.
- Short-Term: Wet floodproofing
- Long-Term: Relocate facility (note that the expense of replacing the long culvert beneath the road would be significant)

TOWN OF MONTVILLE

Chesterfield Fire Company

BFE	LAG	FFE	NFE	Utility
131	132.56	134.17	149.80	134.15



- Building is not in SFHA, and FFE is above the 0.2% flood elevation of 132'
- Short-Term & Long -Term: No actions needed

CITY OF NORWICH

Norwich Public Works

BFE	0.2% WSE	LAG	FFE	NFE	Utility
96	101	98.3	98.8	none	99.9

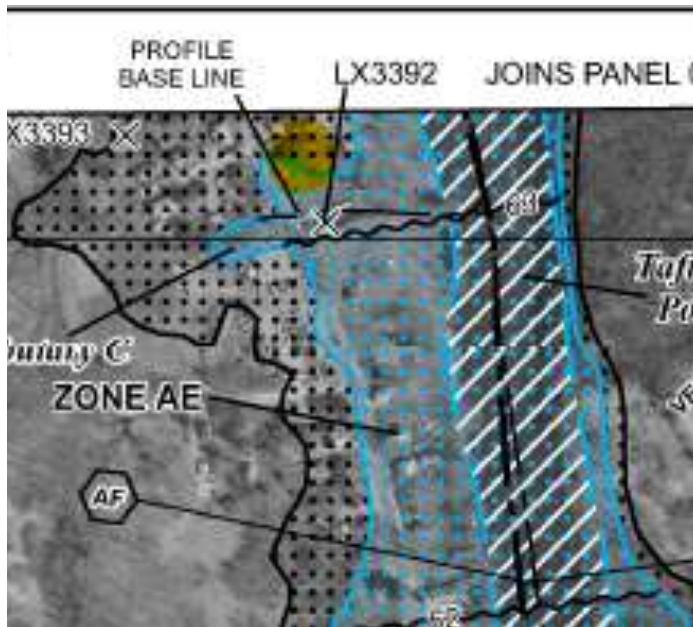


- Floodproofing not present
- Short-Term: Dry floodproof the utility room
- Long-Term: Wet floodproof all remaining lower areas

CITY OF NORWICH

Occum Fire Department

BFE	0.2% WSE	LAG	FFE	NFE	Utility
63.5	67.0	63.6	57.4	64.0	57.5

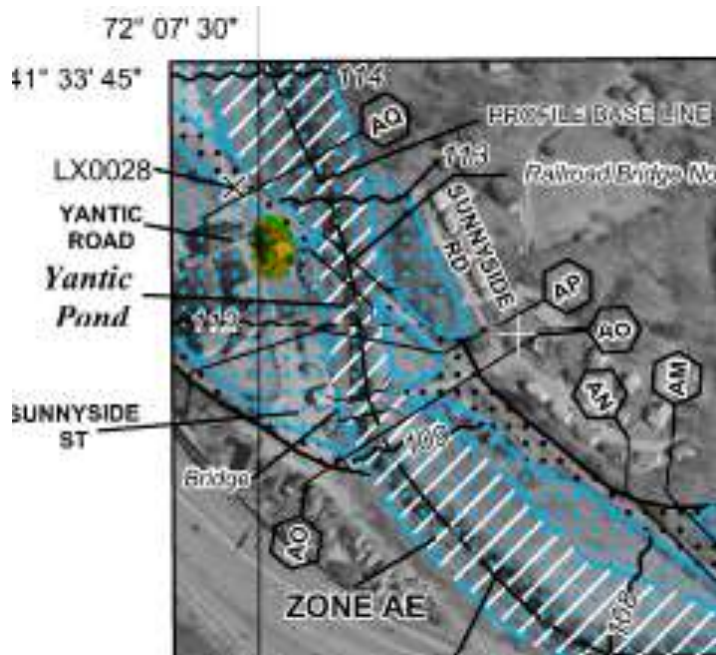


- Floodproofing not present
- Short-Term: Eliminate basement
- Long-Term: Relocate facility

CITY OF NORWICH

Yantic Fire Company No.1

BFE	0.2% WSE	LAG	FFE	NFE	Utility
112.5	120.0	110.77	101.80	111.57	102.40



- Floodproofing not present
- Short-Term: Eliminate basement
- Long-Term: Relocate facility

TOWN OF PRESTON

Preston Public Works

BFE	LAG	FFE	NFE	Utility
123.0	125.37	125.79	none	126.29



- BFE estimated from FEMA Publication 265
- Floodproofing not present
- Short-Term: No action needed
- Long-Term: Wet and dry floodproofing

TOWN OF SPRAGUE

Town Hall & Public Works

	BFE	LAG	FFE	NFE	Utility
Town Hall	84	81.79	82.05	~94	80.75
DPW	84	82.19	80.36	89.73	80.75



- Floodproofing not present
- Short-Term: Eliminate utility room basement
- Long-Term: Wet floodproof all remaining lower areas; or construct flood wall along rear of the property that extends to the north side without blocking access



KEY CONCLUSIONS

- The elevations of adjacent grade, first floor, second floor, and utilities are critical for characterizing the risks
- Every combination of flood risk and building configuration is unique; there is low potential for “one size fits all” solutions
- Beware of changing FEMA maps (think of Mystic Fire Company) and build higher when possible
- Make moderate flood mitigation improvements when possible, and make them adaptable
- Consider life span of the existing facility vs. replacement date

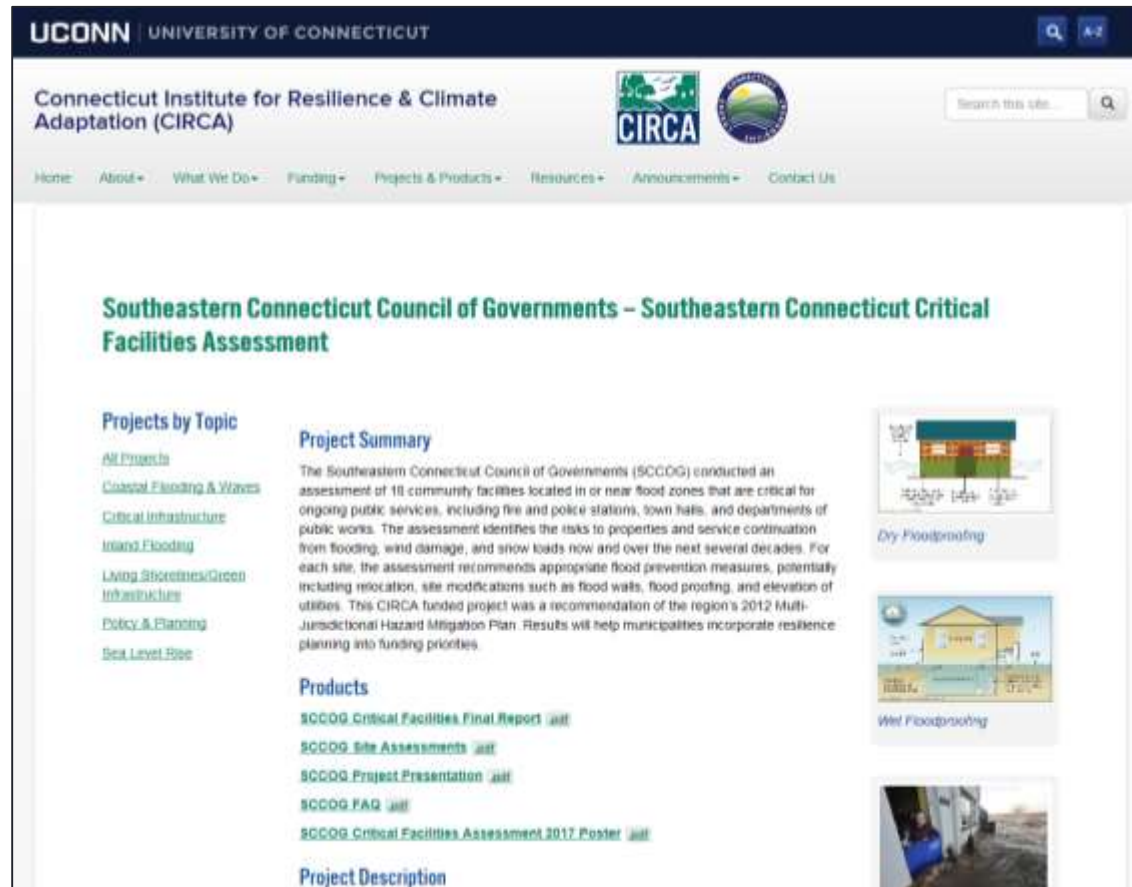
If implementing a recommendation from this study meets the Substantial Improvement / Substantial Damage threshold, then the building must be made NFIP-compliant

REPEATABLE ASPECTS

- Council of government (or county) assistance to small municipalities and fire districts that otherwise cannot conduct similar studies
- Progress with “regional” actions in a multi-jurisdiction hazard mitigation plan
- Screening-level analysis
- Separation into short-term and long-term recommendations
- Works in riverine and coastal settings
- State of Vermont is doing a similar study now

PROJECT WEB PAGE

- <https://circa.uconn.edu/southeastern-connecticut-council-of-governments-southeastern-connecticut-critical-facilities-assessment/>



QUESTIONS?

SANDY 2012

