

NYC DEP's Approach to Flood Mitigation: The Local Flood Analysis (LFA) Process

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Agenda

- Introduction
- Scope of a Local Flood Analysis (LFA)
- Examples
- Lessons Learned

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- Introduction
 - Where did the LFA concept come from?
 - Why are LFAs needed?
 - Intentions and goals of an LFA
- Scope of an LFA
- Examples
- Lessons Learned

What is an LFA?

What is an LFA?

A **Local Flood Analysis**, or LFA, is a New York City funded program developed at the request of West of Hudson New York City Watershed communities following flooding caused by Tropical Storms Irene and Lee in 2011. The program funds a two-step process to:

- (1) conduct engineering analysis to determine the causes of flooding and evaluate mitigation options; and
- (2) undertake project design and implementation.

What is the end product of an LFA?

An engineering analysis of existing flooding conditions and feasible options to mitigate flooding moving forward, including sketches of the mitigation options, cost estimates, benefit-cost analyses, and funding sources available.

Why LFA?

- Catskills towns have been devastated by flooding, resulting in extensive damage
- Critical infrastructure, businesses, and homes remain vulnerable
- Located within the New York City public water supply watershed
- LFA funding provides a unique opportunity to assess the watershed under current conditions and plan for the future



Main Street in Phoenicia



Along the Beaver Kill in Mt Tremper

The LFA Process

- Uniform but customizable
- Collect input from property owners, municipal officials, and others
- Build upon FEMA flood modeling and county hazard mitigation plan
- Identify and evaluate potential flood mitigation measures that protect water quality
- Assess flood relief alternatives through hydraulic modeling
- Refine alternatives through vetting of cost, feasibility, and public support
- Develop an implementation plan



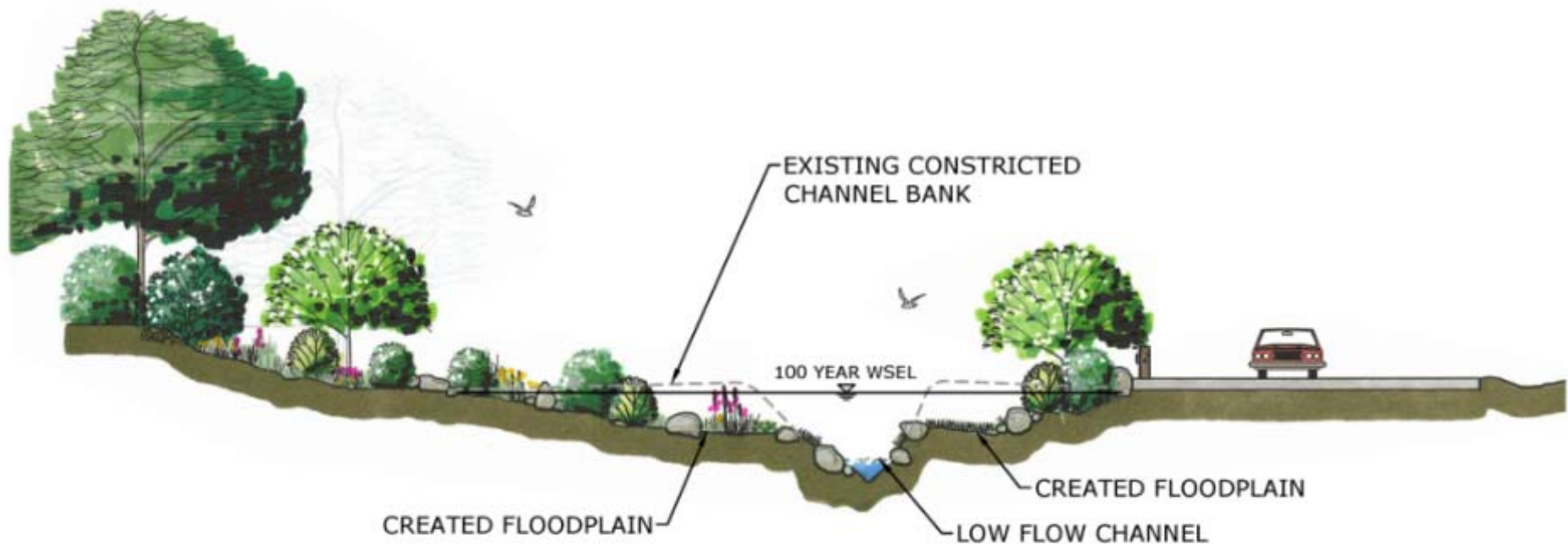
Lexington LFA Public Meeting



Walton LFA Public Meeting

Flood Mitigation Strategies

- Channel Alteration – Widening or realignment, creation of compound channel or bypass channel
- Floodplain – Reclamation, creation, enhancement
- Bridges – Removal or replacement



TYPICAL COMPOUND CHANNEL

Flood Mitigation Strategies

- Sediment Management
Sediment removal,
stabilization of sources
- Individual Structures
Floodproofing, elevation
of structures, voluntary
buy-outs, relocations



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- Scope of an LFA
 - Field assessment
 - Hydrology and Hydraulics
 - Flood Mitigation Alternatives
 - Benefit Cost Analysis
- Examples
- Lessons Learned

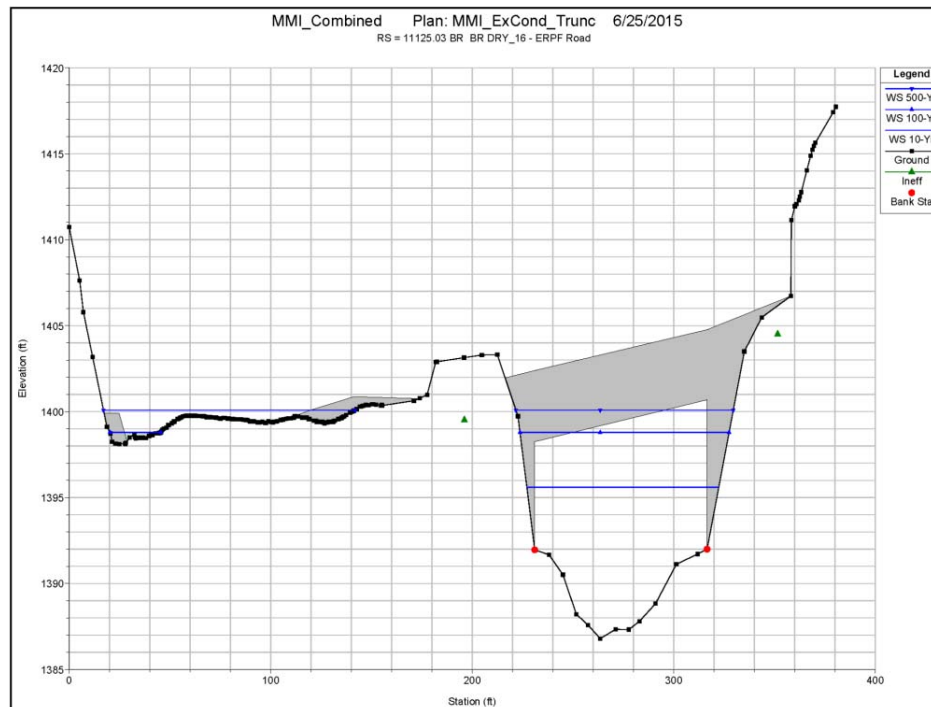
Field Assessment

- Visual assessment of river channel and floodplain
 - Bank and channel conditions
 - Low lying structures
- Visual assessment of structures within project area
 - Signs of past flooding
 - Basement type
 - Number of stories



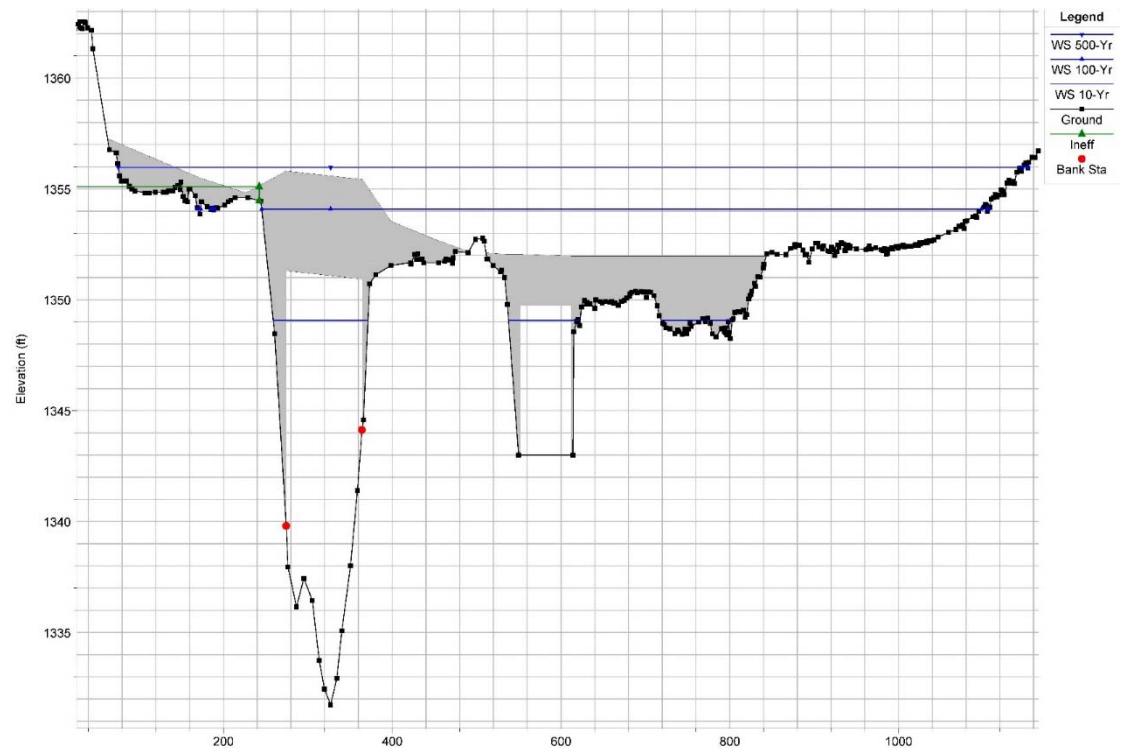
Hydrology and Hydraulics

- Use FEMA HEC-RAS modeling
 - Update model based on field assessment
 - Model flood mitigation alternatives



Flood Mitigation Alternatives

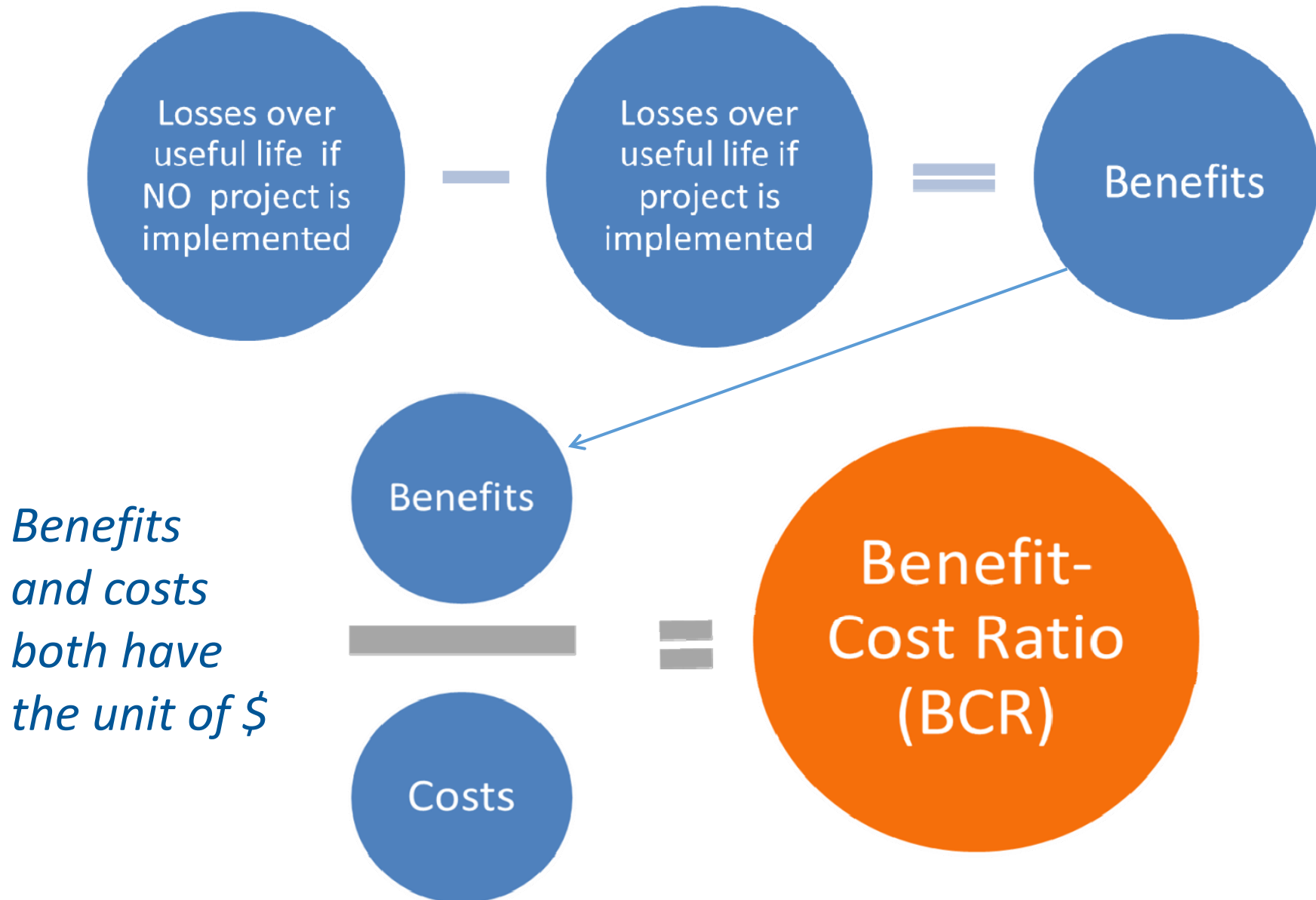
- Use HEC-RAS modeling to investigate alternatives:
 - Floodplain benches
 - Raising and/or widening bridges
 - Channel widening
 - Bypass channel
 - Dredging



Benefit Cost Analysis

- What is Benefit Cost Analysis (BCA)?
 - ✓ Process of determining the Benefit Cost Ratio (BCR)
 - ✓ A mitigation project cannot be funded by FEMA unless it has a BCR greater than 1.0
 - Benefits = Damages Avoided, units of \$
 - Benefits over the life span must exceed project cost
 - ✓ FEMA's BCA tool must be used

Benefit Cost Analysis (BCA)



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 - Fleischmanns
 - Walton
 - Arkville
- Lessons Learned

Fleischmanns – Specific Concerns

- Changes in FEMA mapping – expansion of homes and businesses in the SFHA
- Some property owners have not been required to have flood insurance, but may be required to have it
- Flood insurance premiums are increasing as actuarial rates are phased in
- Property owners can make changes to their structures and utilities to reduce insurance premiums

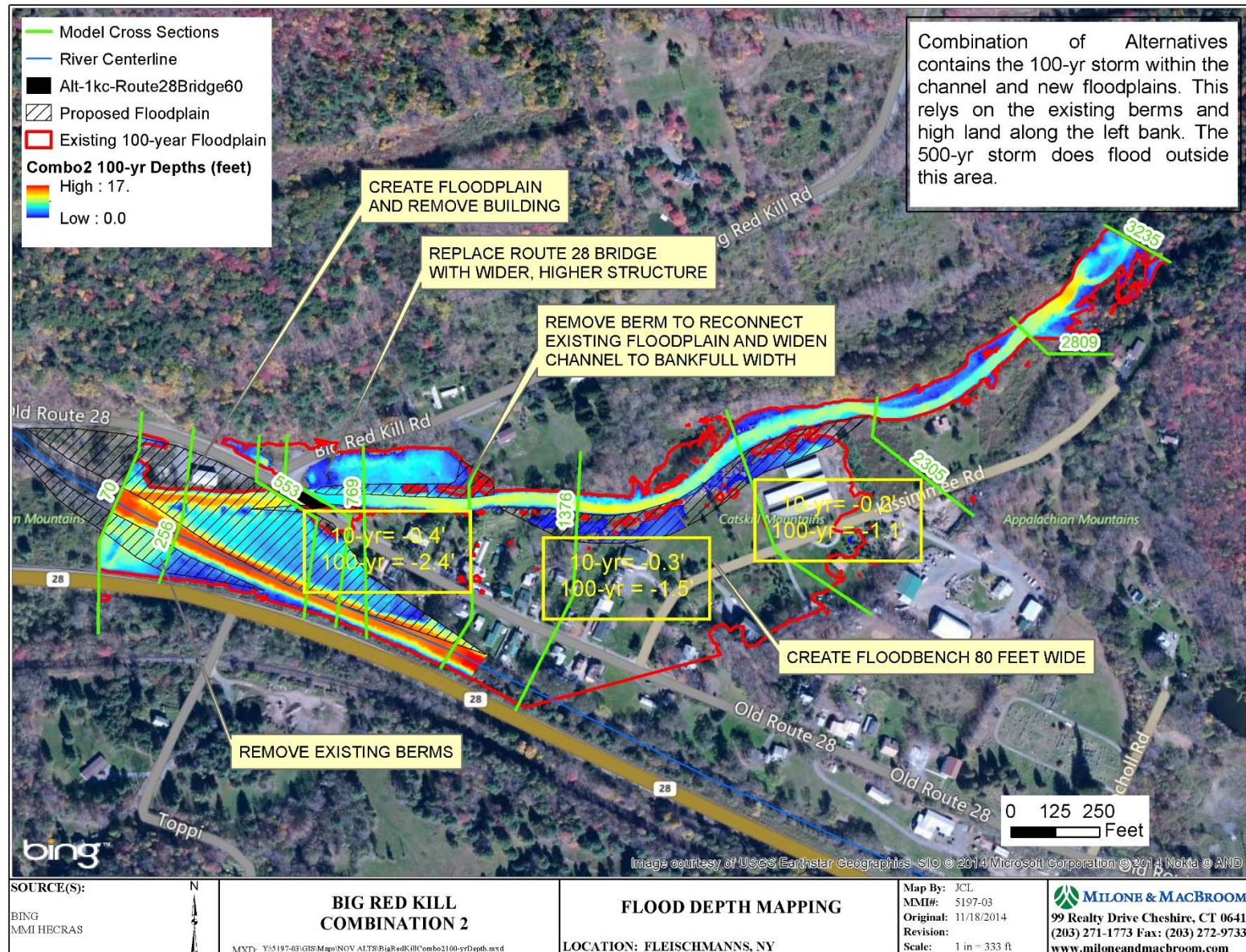


Fleischmanns – Specific Concerns

- Channelized sections of streams are located in the Village
- Berms, revetments, and walls are found along the streams in some locations
- Lack of connection to floodplain
- High flows are completely contained (unless overbank) and shear stresses are high, leading to erosion



Fleischmanns - LFA Examples



Fleischmanns - LFA Examples

	Alternative	Cost Estimates	Total Benefits*	BCR	BCR > 1?
10A	<ul style="list-style-type: none"> Creation of floodplain near park Removal of outbuildings 	\$268,000	\$218,000	0.8	No
Big Red Kill Combination 2	<ul style="list-style-type: none"> Includes 7A plus replacement of Route 28 Bridge Berm removal on right side of Big Red Kill and floodplain creation on left side of Big Red Kill 	\$2,134,000	\$3,286,000	1.5	Yes
8B Combination (8B+1C+1D+4A)	<ul style="list-style-type: none"> Includes 8B plus 4A and replacement of Main Street Bridge over Vly Creek Removal of buildings 	\$2,520,000	\$2,402,000	0.9	No
9A Combination (9A+1B+4B)	<ul style="list-style-type: none"> Includes 4B plus creation of floodplain along Vly Creek south of Wagner Avenue Replacement of Wagner Avenue Bridge Removal of buildings 	\$3,693,000	\$455,000	0.1	No

Walton – Specific Concerns



- Prevent floodwaters from diverting onto Delaware Street near Breakey Motors
- Reduce flooding at key businesses
- Reduce flood insurance premiums

Walton Alternatives

Short Term A

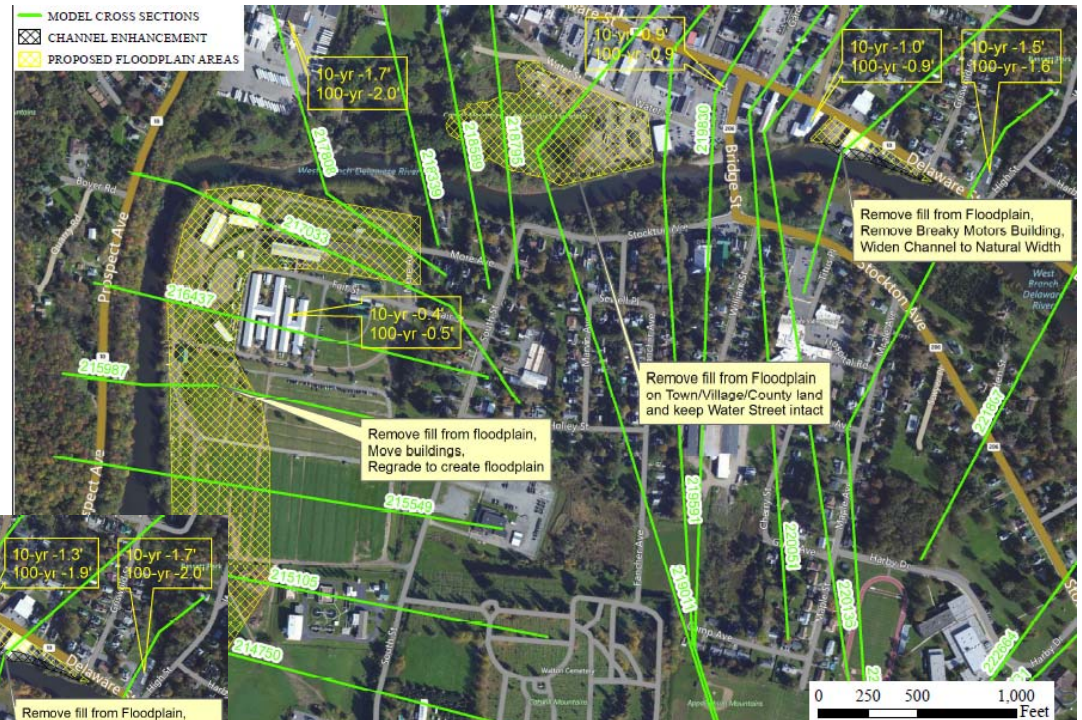


Long Term A

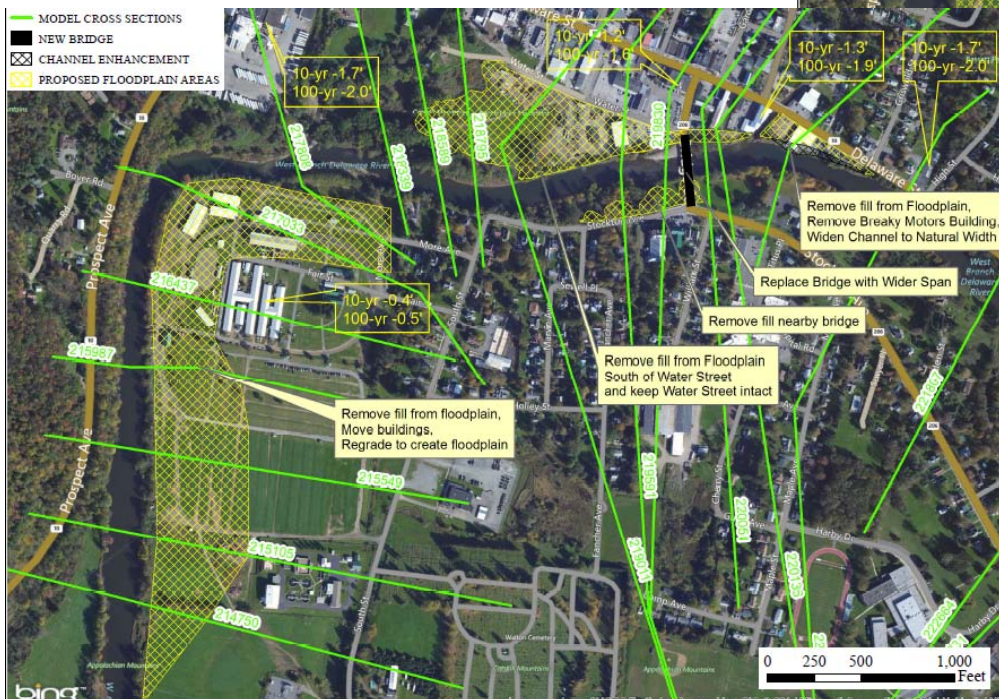


Walton Alternatives

Short Term C



Long Term C



Walton Alternatives

Alternative	Cost Estimates	Total Benefits	BCR > 1?
ST-A: Lower the floodplain south of Water Street Relocate Breaky Motors and restore site	\$3.0M	\$3.8M	Yes
ST-C: Lower the floodplain south of Water Street Relocate Breaky Motors and restore site Create/lower the fairgrounds floodplain	\$8.1M	\$495.1M	Yes
LT-A: Lower the floodplain south of Water Street Relocate Breaky Motors and restore site Extend the lowered floodplain through Dollar General Replace bridge with a 380' span and two piers Additional floodplain work related to bridge and connecting through to Water Street area	\$6.3M	\$5.3M	No
LT-C: Lower the floodplain south of Water Street Relocate Breaky Motors and restore site Extend the lowered floodplain through Dollar General Replace bridge with a 380' span and two piers Additional floodplain work related to bridge and connecting through to Water Street area Create/lower the fairgrounds floodplain	\$14.9M	\$496.8M	Yes

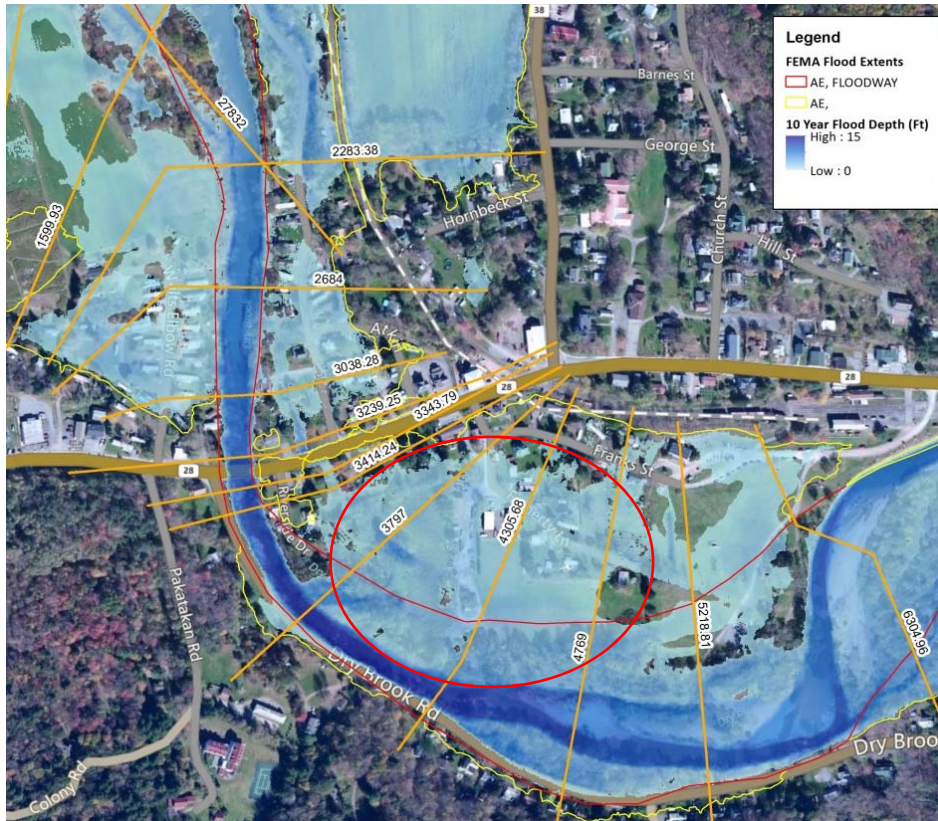
Arkville – Specific Concerns

- Bridges cause flooding or make it worse
- Sediment transport management
- Periodic gravel harvesting
- Mitigate bank erosion
- Automated early warning system

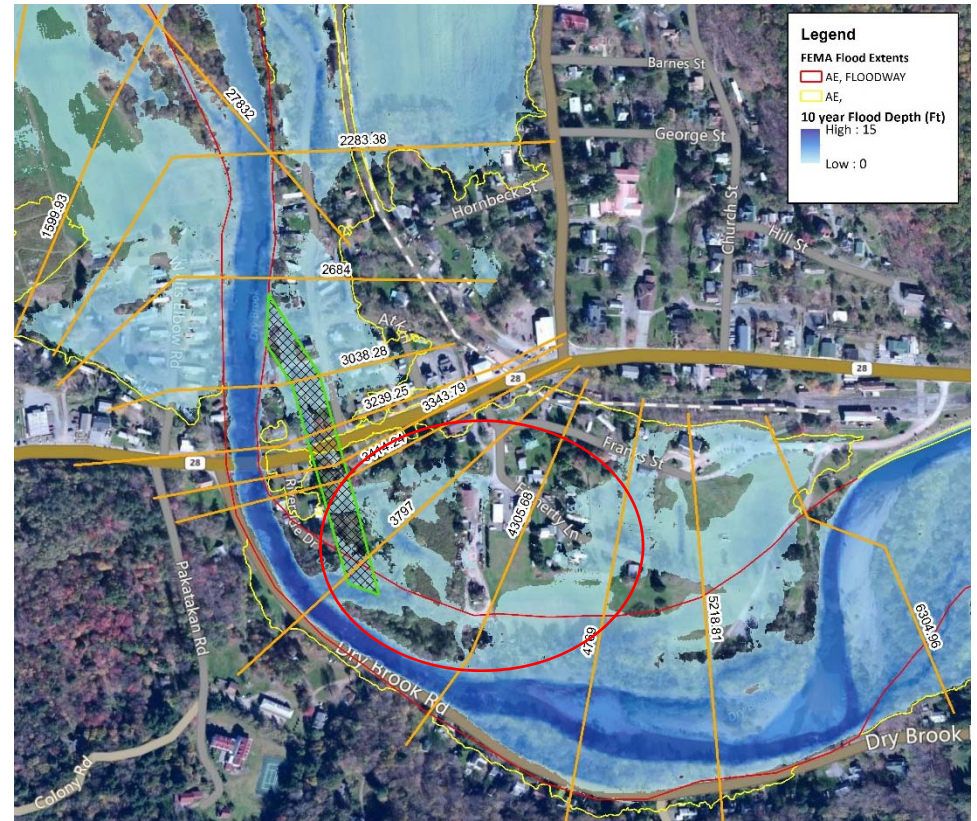


Arkville - Convert Culvert to Bypass Channel

Existing



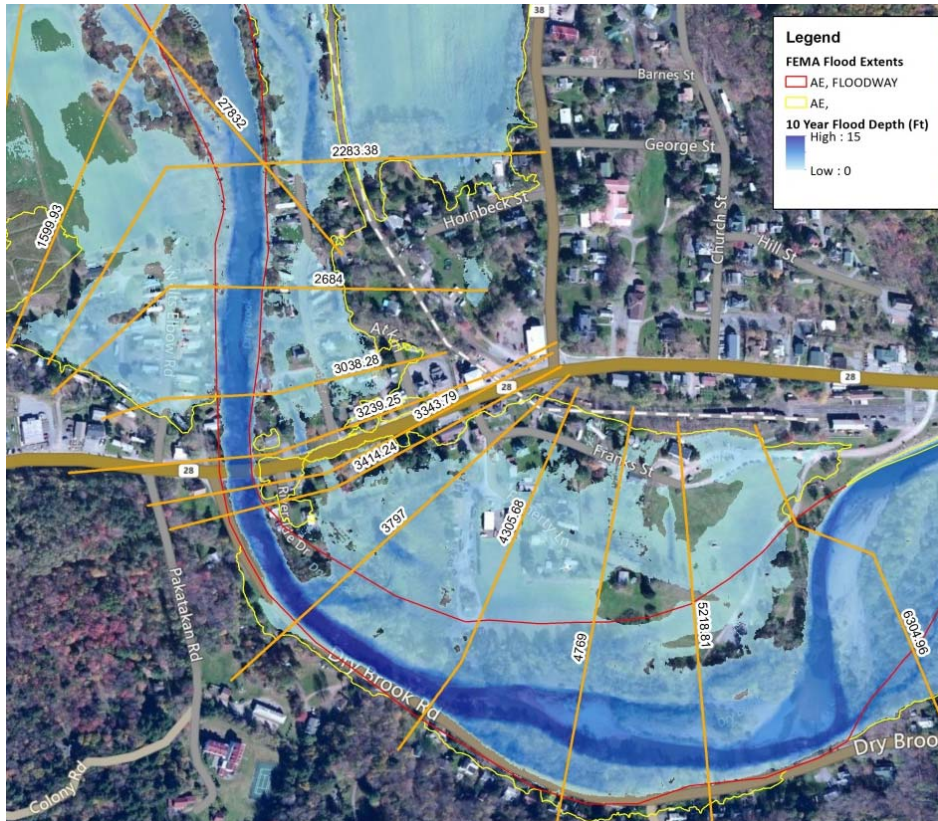
Proposed



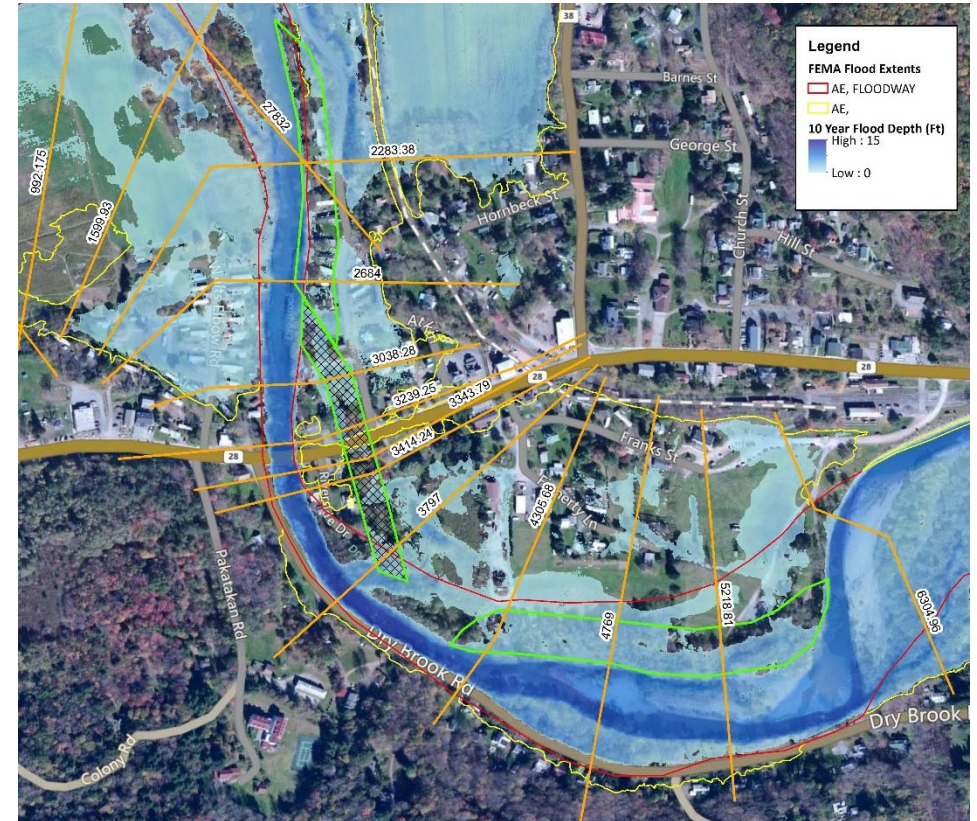
- Result: For the 10-Year flood, WSE decreases 1.4 ft to 2.9 ft in the circle
- Recommendation: ***Consider alone or in combination with other alternatives.***

Arkville Combination 1: Bypass Channel with Floodplains

Existing



Proposed



- Result: For the 10-Year flood, WSE decreases 1.4 to 2.4 feet

Arkville Alternatives

Alternative	Cost Estimates	Total Benefits	BCR > 1?
Floodplain Bench along Pavilion road	\$1,034,000	\$1,614,526	1.56
Convert Culvert to Bypass Channel under Route 28	\$2,533,000	\$265,109	0.10
Route 28 Bridge Replacement	\$8,941,000	\$2,153,405	0.24
Combination 1: Bypass Channel with Floodplains	\$3,615,000	\$1,375,582	0.38
Combination 2: Route 28 Bridge Replacement with Floodplains	\$10,023,000	\$3,199,614	0.32

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 - Involving a grass-roots flood committee
 - Benefits of a standardized process

Lessons Learned

- Involving a grass-roots committee to guide the study leads to better consensus
- A standardized but customizable process allows results from different communities to be compared
 - Streamlined funding
 - Better FEMA grant applications

Ideas for Connecticut

- Identify a funding mechanism that recognizes the water quality benefits of flood mitigation
 - 319/Impaired waters
 - Other DEEP programs
 - DPH Watershed protection
- Empower towns to work together to establish flood-related commissions
- Strengthen Flood and Erosion Control Boards and their funding sources

Questions, Comments, or Thoughts?

