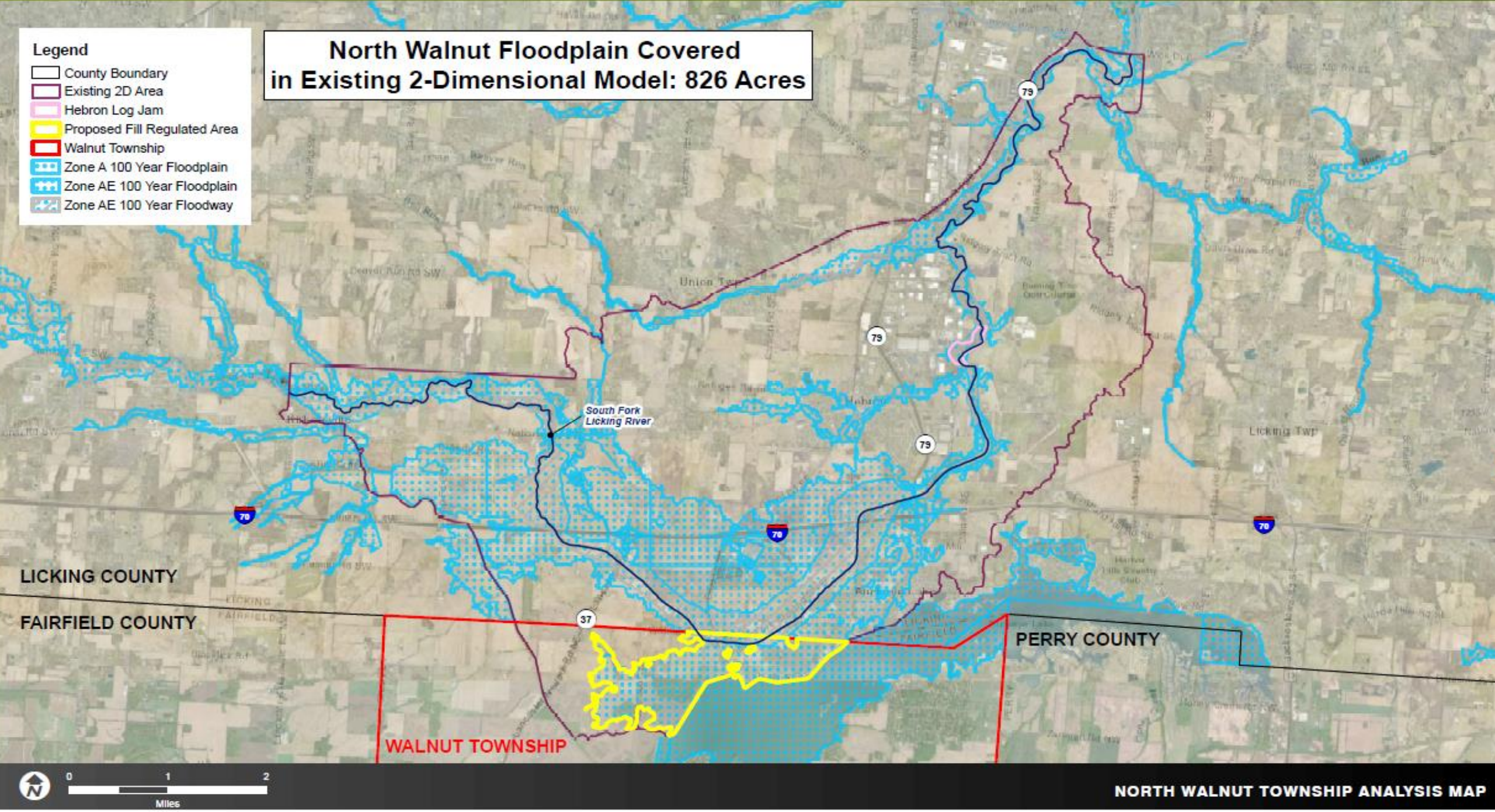
Advancing Sustainable Development for Resilient Watersheds

Presenters: Kari Mackenbach, CFM

ms consultants, inc.
engineers, architects, planners


Legend
County Boundary
Existing 2D Area
Hebron Log Jam
Proposed Fill Regulated Area
Walnut Township
Zone A 100 Year Floodplain
Zone AE 100 Year Floodplain
Zone AE 100 Year Floodway
North Walnut Floodplain Covered
in Existing 2-Dimensional Model: 826 Acres
South Fork
Licking River
LICKING COUNTY
FAIRFIELD COUNTY
PERRY COUNTY
WALNUT TOWNSHIP
Licking Twp
Union Twp
79
70
37
0
1
2
Miles
NORTH WALNUT TOWNSHIP ANALYSIS MAP


New South
Fork Channel
No Name
Creek
Old South
Fork Channel
Spillway
Channel
Lakeside
Study Area
SR 360
Study Area
Clark Dr
PetPlex Animal Hospital
Walnut Rd
Sally's Tax Shop
Middle Dr
Courtney Dr
Top Cat Concrete
Fairfield Dr NE
Eagle River Ranch
Hereinafter Cocktail Tavern
Lakeside Rd
Shepard Ave
Courier Trans
Sellers Point Spillway
Team Results Realty
Avalon Dr
3685 N Bank Rd
Sellers Dr
Sellers Point
171
79
360

Floodplain Defined

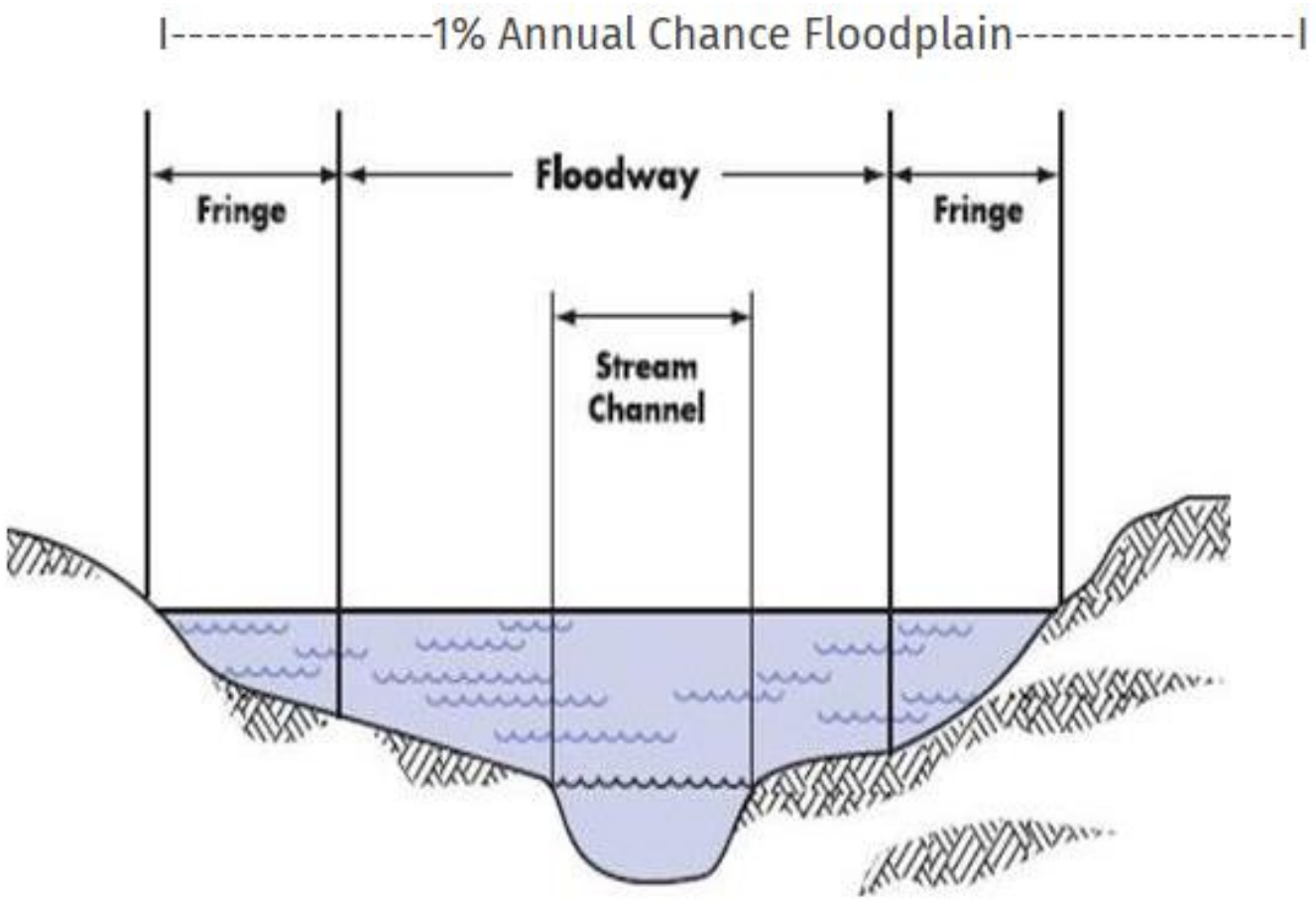
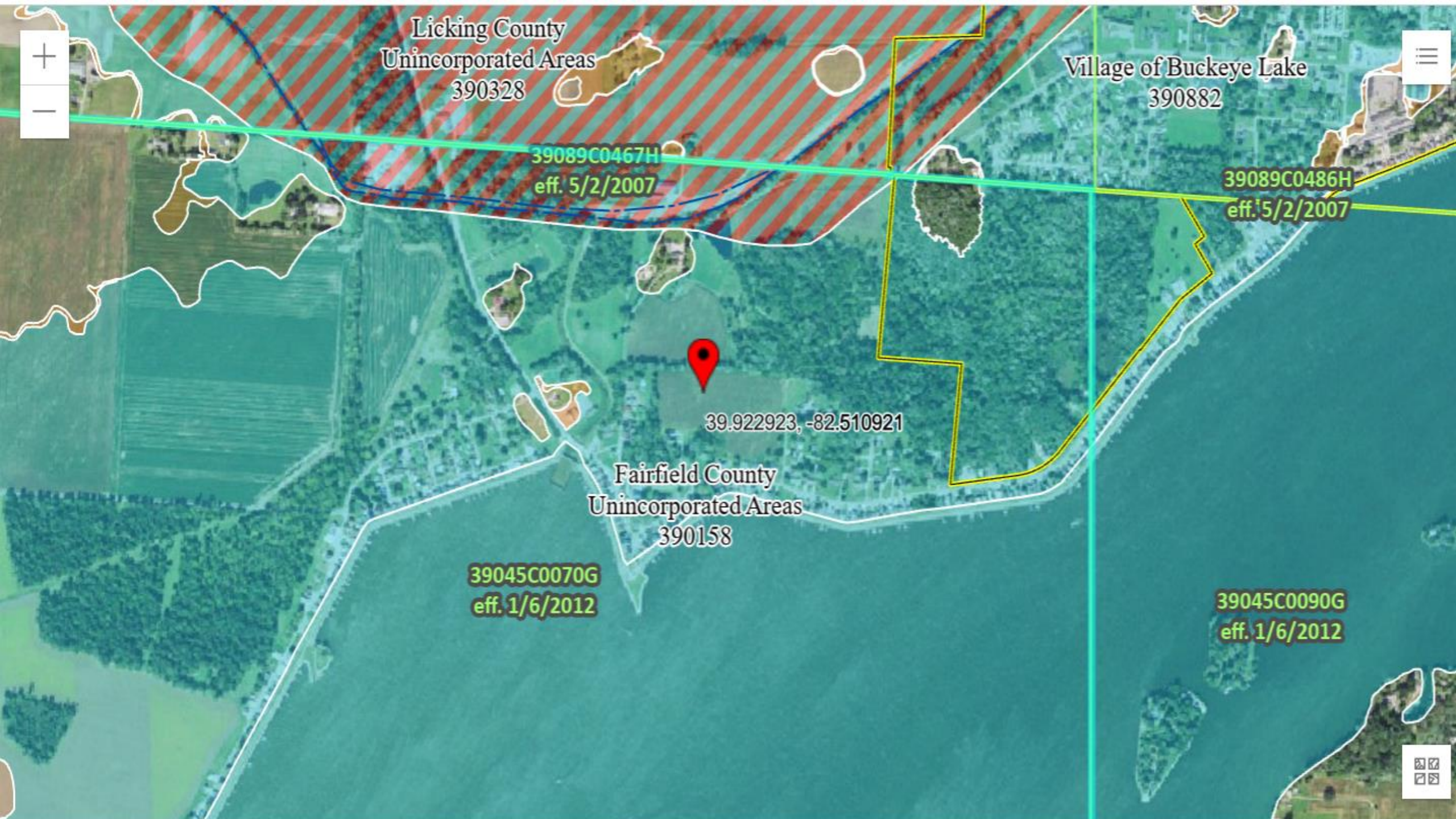


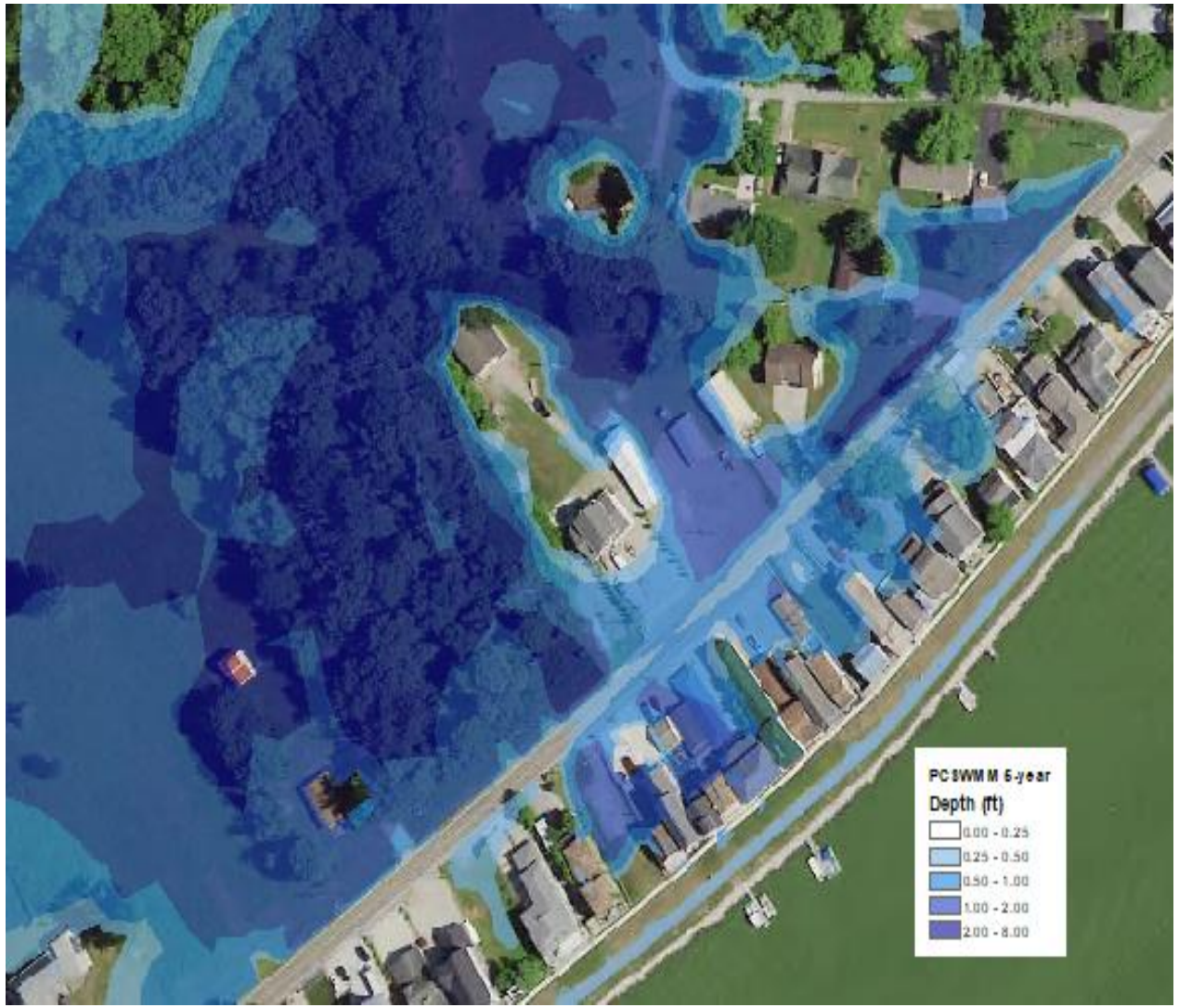
Photo: https://www.erieco.gov/2268/Floodplain-Information

Flat Floodplains Act Like Bathtubs


Licking County
Unincorporated Areas
390328
Village of Buckeye Lake
390882
39089C0467H
eff. 5/2/2007
39089C0486H
eff. 5/2/2007
39.922923, -82.510921
Fairfield County
Unincorporated Areas
390158
39045C0070G
eff. 1/6/2012
39045C0090G
eff. 1/6/2012

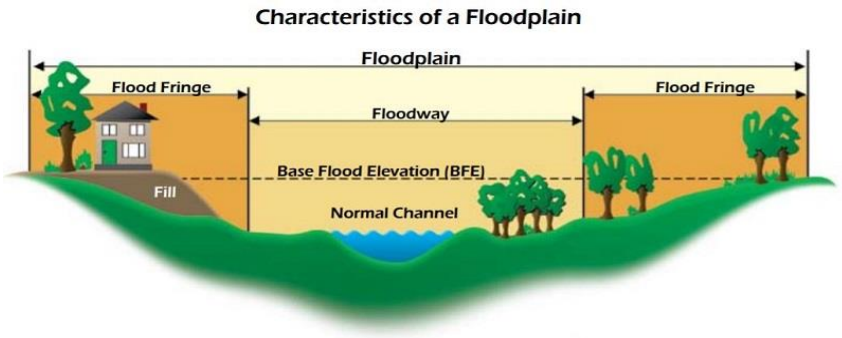

888
Zone AE
886
Village of
Buckeye Lake
390882
Fairfield County
Unincorporated Areas
390158
888
886
39045C0070G
eff. 1/6/2012
Zone AE
(EL 893)

5-YEAR MODEL RUN vs. JULY 14, 2017 PHOTOGRAPHS

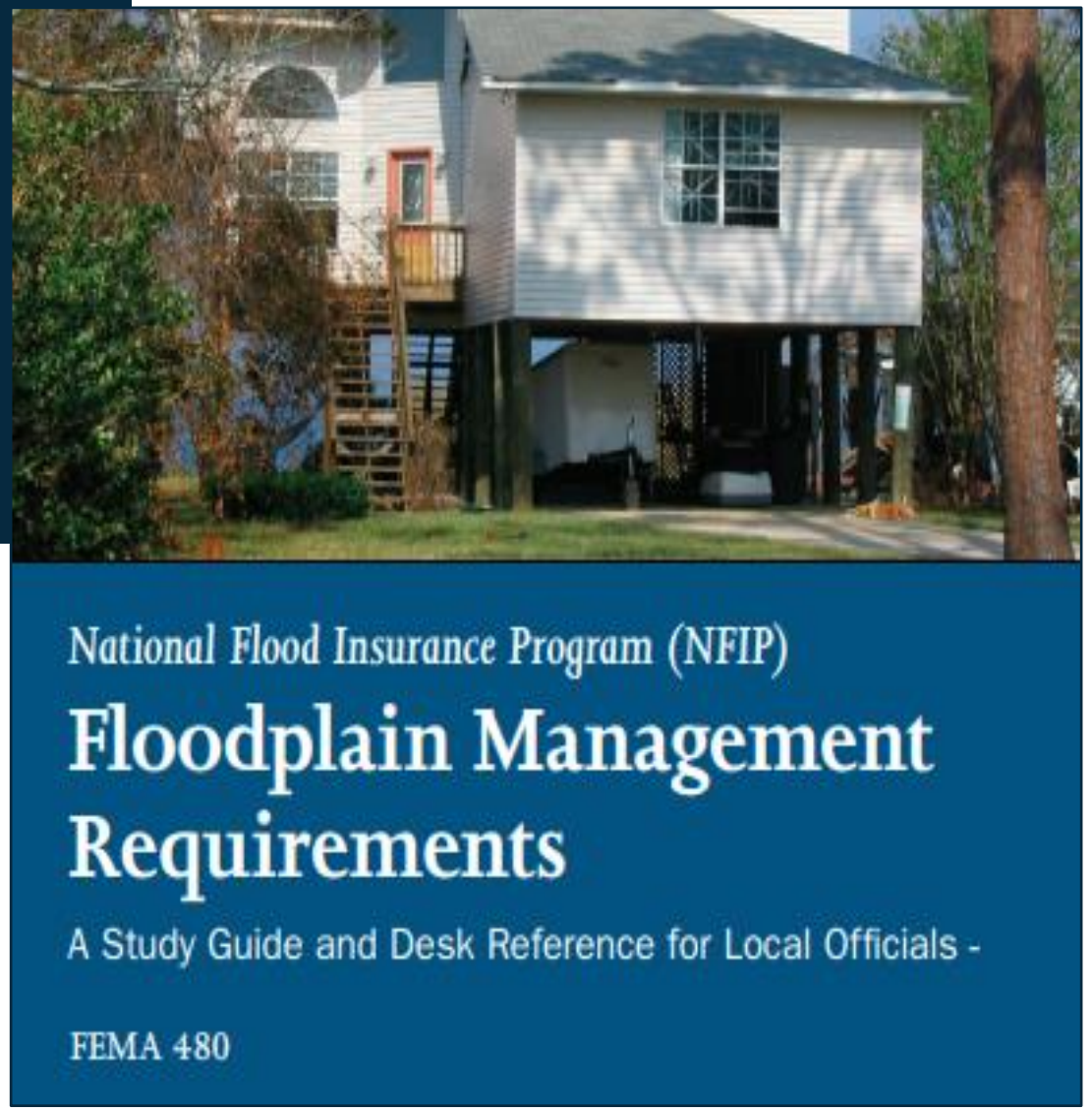


5-YEAR MODEL RUN vs. JULY 14, 2017 PHOTOGRAPHS

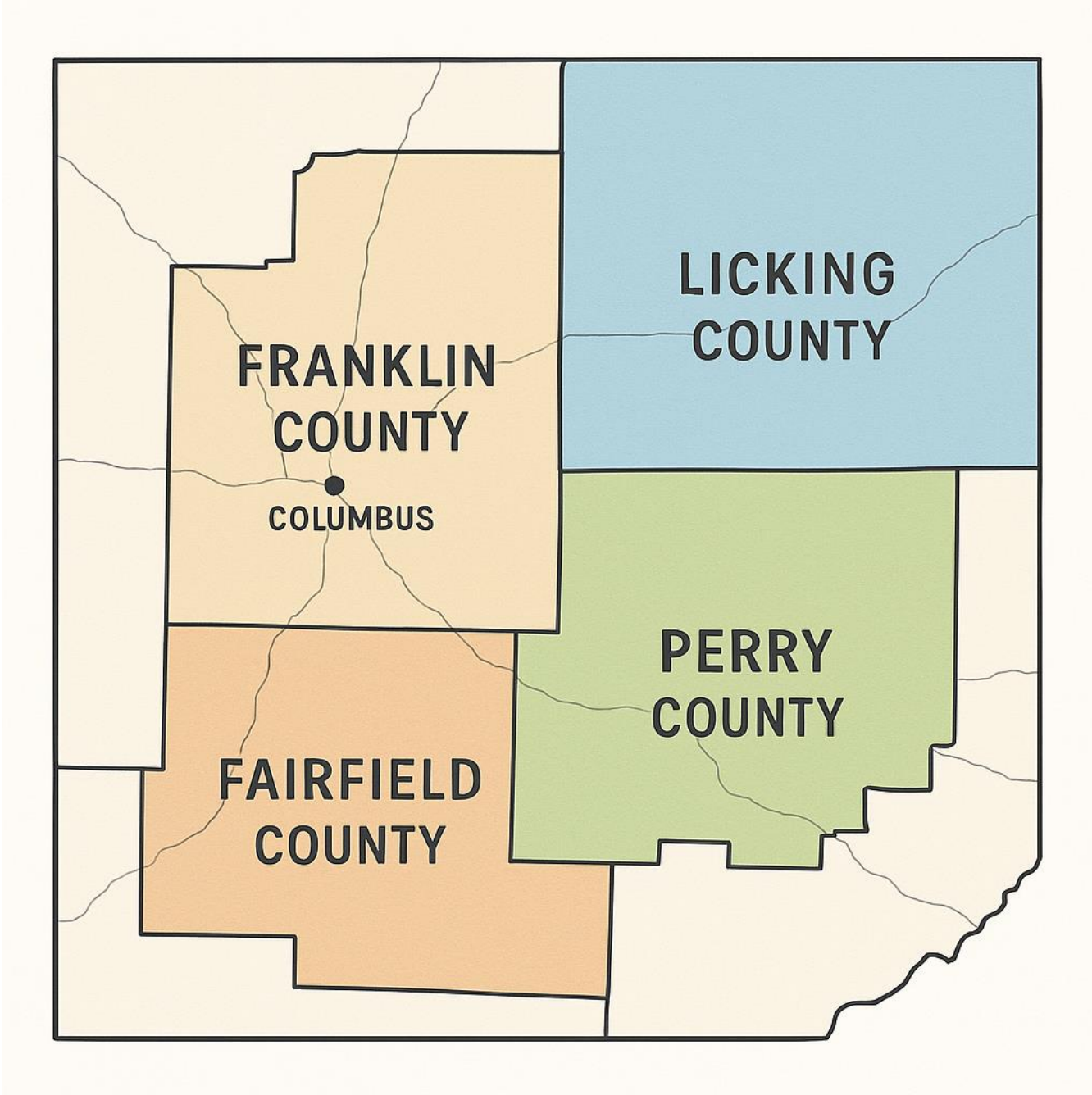
Minimum NFIP Standards vs. Higher Standards



The National Flood Insurance Program (NFIP) was adopted in 1968 through the passage of the National Flood Insurance Act. It was created to address the lack of affordable flood insurance, particularly from private insurers, and to shift the burden of flood losses from taxpayers to property owners.



Central Ohio Comparison of Flood Regulations

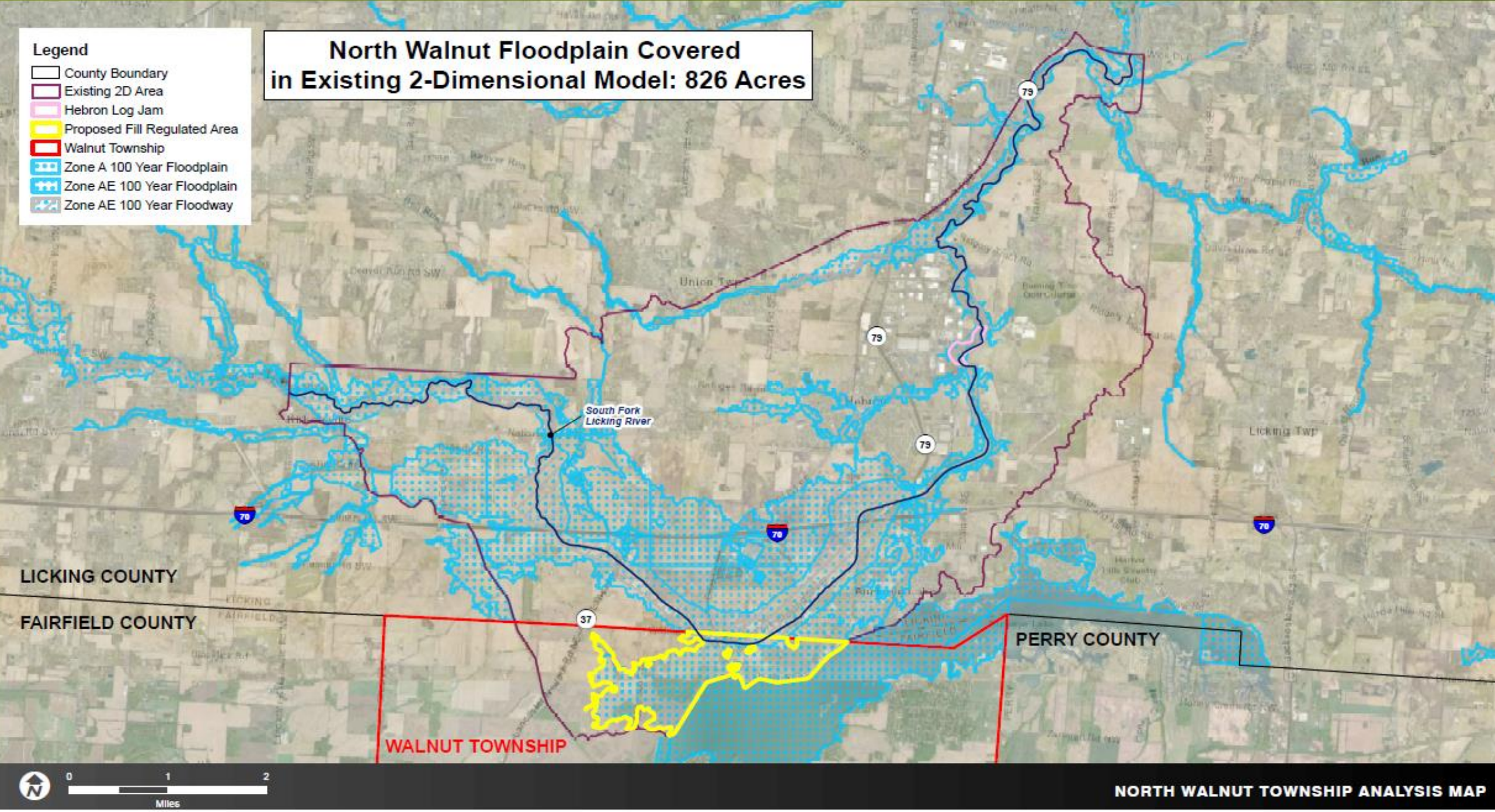


Photos: Columbus Dispatch and Residents

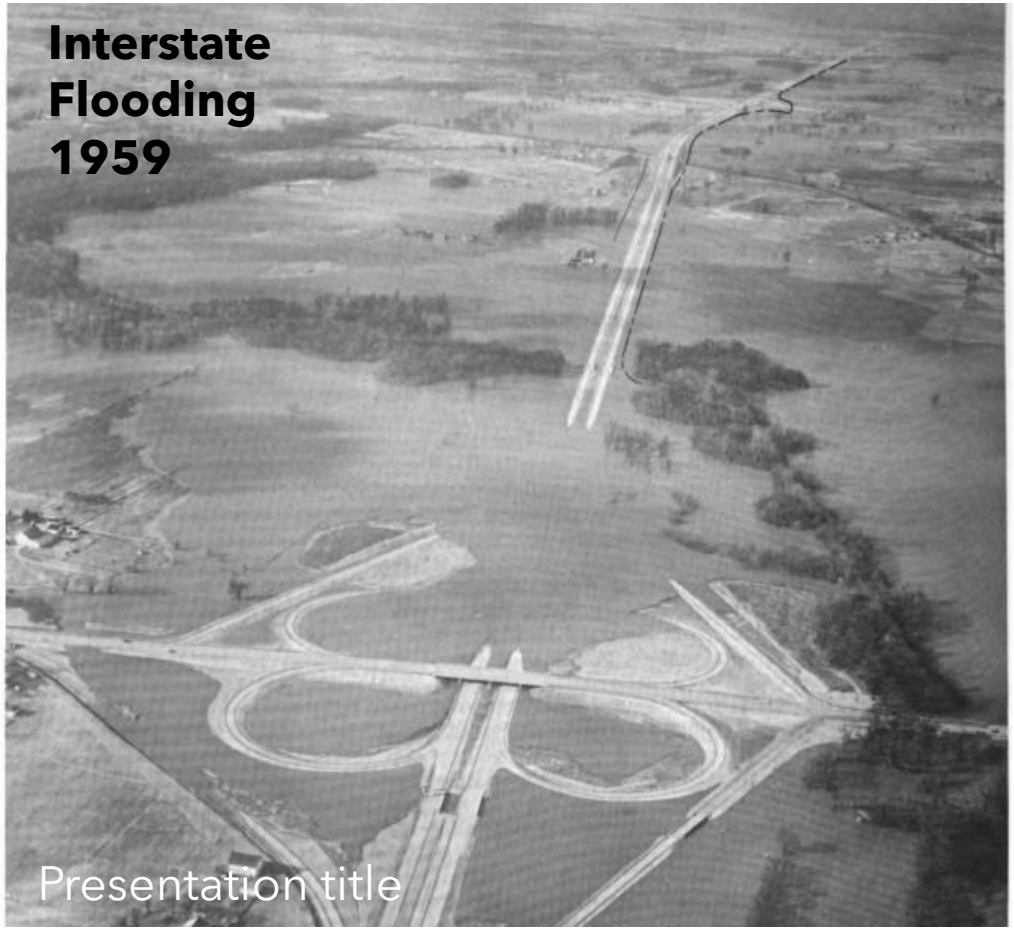
Central Ohio Floodplain Regulations Comparison

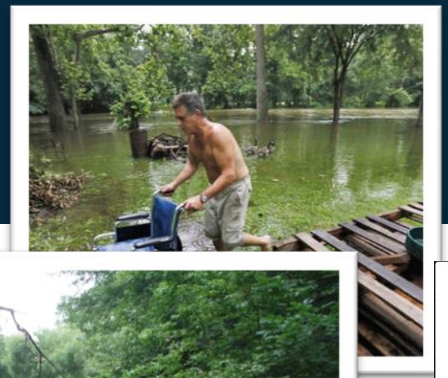
Category	Licking County (2024)	Fairfield County (2024)	Perry County (2021)	Franklin County (2007)
Effective Date	July 14, 2024	June 22, 2012	May 4, 2021	Sept 19, 2007
Mapping Basis	FEMA FIRM + Engineer Studies	FEMA FIRM + Engineer Studies	FEMA FIRM + Engineer Studies	FEMA FIRM + Engineer Studies
Permit Requirement	Required	Required	Required	Required
Stream Buffer Requirement	Required; 30 -100 ft. buffer	Not specified	Not specified	Not specified
Development Standards	BFE + 2 ft, Compensatory Storage, Streambank Buffer	BFE + 1 ft	BFE + 2 ft Per 1309.02S	BFE + 1 ft + Floodway Rise 0.5 Max
Freeboard Requirement	2 ft	1 ft	2 ft	1 ft
Compensatory Storage	Yes	No	No	No
Variance Procedures	Defined with hardship criteria	Defined with hardship criteria	Allow under conditions	Defined with hardship

*LICKING COUNTY Additional Standard-Development in Riverine Areas without Base Flood Elevations or Floodways Where base flood elevation and floodway boundaries cannot be determined" SECTION - 4.9.D WHICH THEY USE TO DETERMINE BASE FLOOD ELEVATIONS FOR STREAMS WITHOUT ONE, AND THEN APPLY THEIR STANDARDS FOR 4.9.B-DEVELOPMENT IN RIVERINE AREAS WITH BASEFLOOD ELEVATIONS, NOW THAT YOU HAVE ESTABLISHED AN ELEVATION.



History of Flooding in the South Fork





1,000 Year Plus Rainfalls in Ohio

Date	Location	Description
August 2023	Northeast Ohio (Akron, Cleveland)	Severe flooding in Summit, Cuyahoga, and Lorian Counties, with over 5 inches of rain in a few hours.
May 2019	Dayton and Miami Valley	Intense rainfall during the Memorial Day storms, leading to localized flooding, with rainfall totals reaching 1,000-year recurrence interval.
July 2017	Cincinnati Metro Area	Torrential downpours in Hamilton and surrounding counties, causing road closures and property damage. Nearly 1,000-year event.
June 2015	Northwest Ohio (Findlay)	Major rainstorm caused the Blanchard River to overflow, leading to flash flooding and damage, with recorded rainfall levels at 1,000-year recurrence intervals.

To Dredge or Not to Dredge…

The Geomorphic Effects of River Dredging

https://therivermanagementblog.wordpress.com/2013/03/18/the-geomorphic-effects-of-river-dredging/gement Blog

Understanding Dredging and Other River Management Options

https://www.uvm.edu/seagrant/news/understanding-dredging-and-other-river-management-options

Process for Advancing Standards for More Sustainable Development

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engineers, architects, planners

Benefits To Upgrading Standards

- Flood Risk Reduction
- Resiliency of the Natural System
- Faster recovery after flood events = improved economic recovery
- More sustainable development & community
- Potential for lower Flood Insurance Premium

Discussion of Sustainable Standards

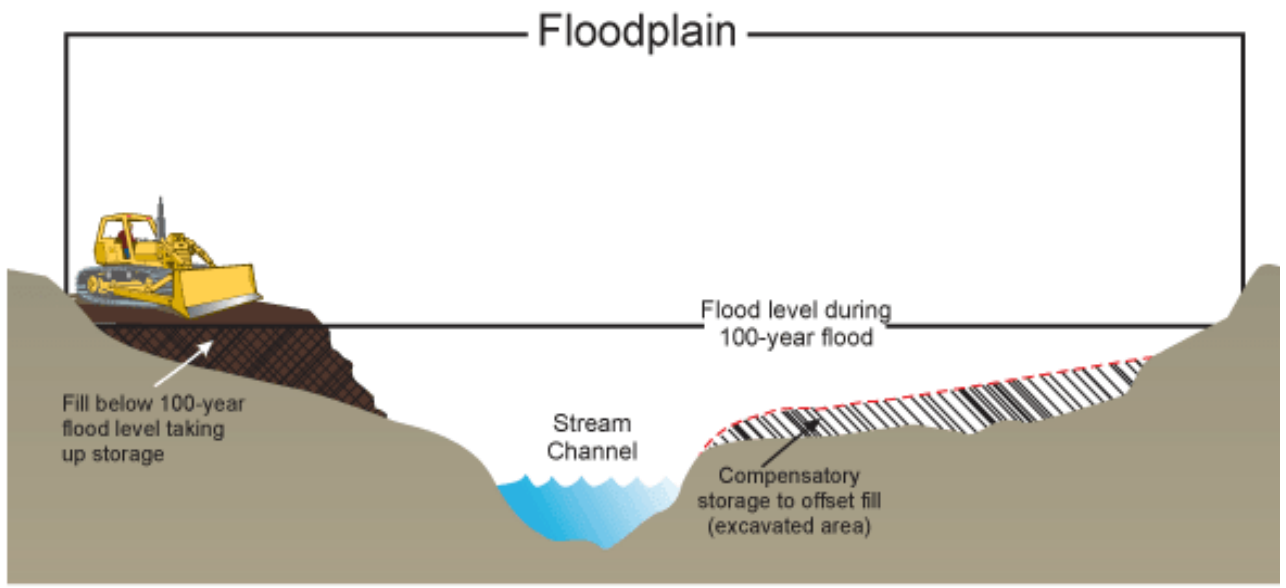
- **A Zone Freeboard**
- Access (ingress-egress)
- Coastal A Zones
- **Compensatory Storage**
- Critical Development
- Cumulative Substantial Damage/Substantial Improvement
- Floodway Rise
- Foundation Design
- Freeboard
- Future Conditions Mapping
- Materials Storage
- No Adverse Impact (NAI)
- Setbacks (Buffers)
- Stormwater Management
- Subdivision Regulations
- Use Restrictions
- **Fill**

A Zone Freeboard

- Where no detailed 100-year flood elevation data are available in approximate A Zones, elevation of a structure's lowest floor at least 2' above the highest adjacent natural grade (HAG) touching the structure to ensure some positive drainage *away* from the structure

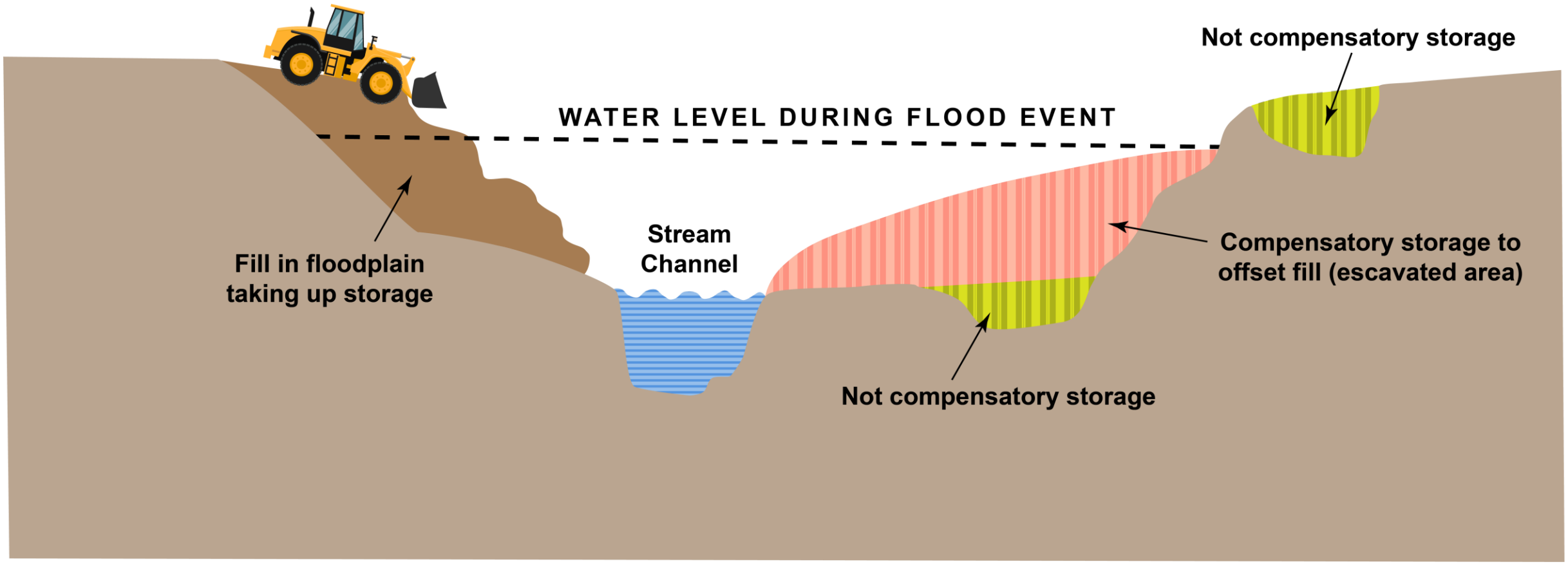
- May provide additional flood protection beyond using best available data or methods of estimating BFEs

Compensatory Storage



- Compensates for the loss of floodplain storage caused by filling or developing in the floodplain
- Requires the compensation for filling or other construction in the floodplain by removal of an equal amount of material from the floodplain near the proposed development
    - Sometimes referred to a "cut & fill"

Not Compensatory Storage

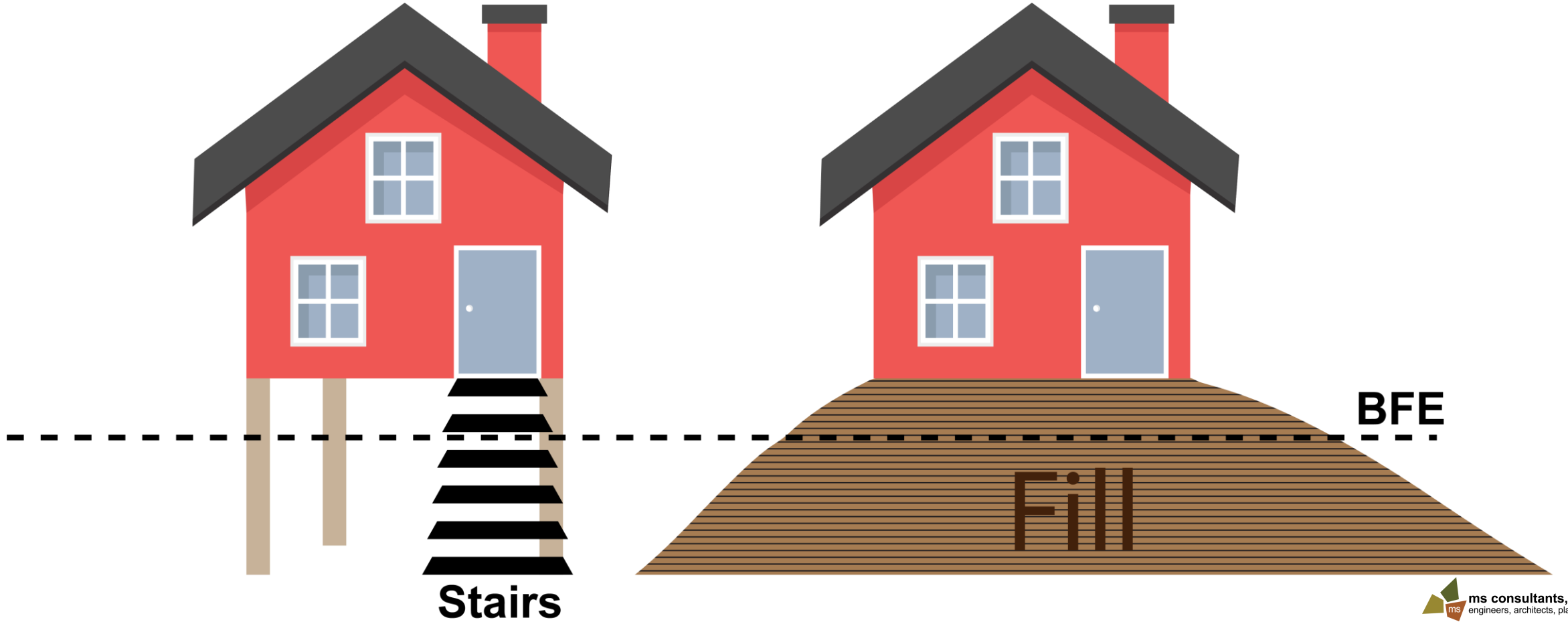


Fill

- Provide guidelines for the placement of fill in SFHAs
    - Minimum NFIP regulations are silent on fill

- NFIP Technical Bulletin 10 Reasonably Safe from Flooding Requirement for Building on Filled Land (March 2023) contains fill guidance

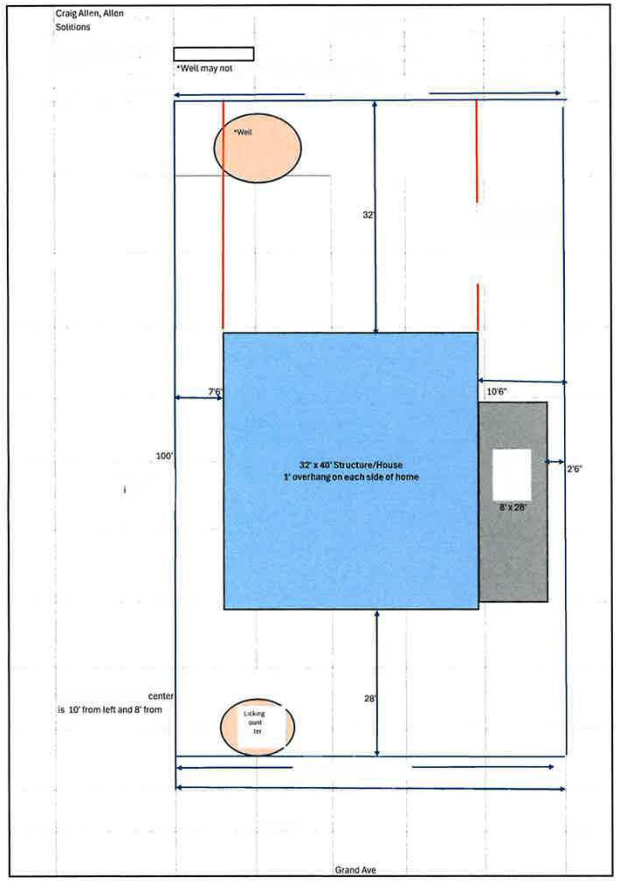
There is Another Way...

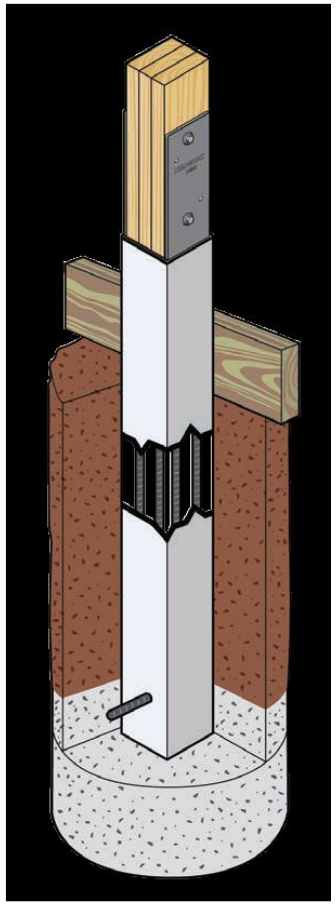


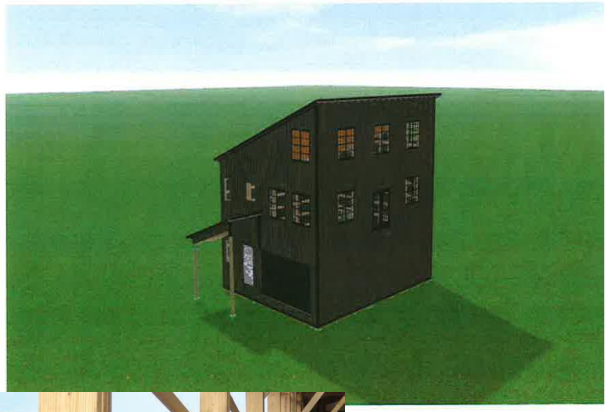
Wilmington, NC

Local Example of Elevated Home

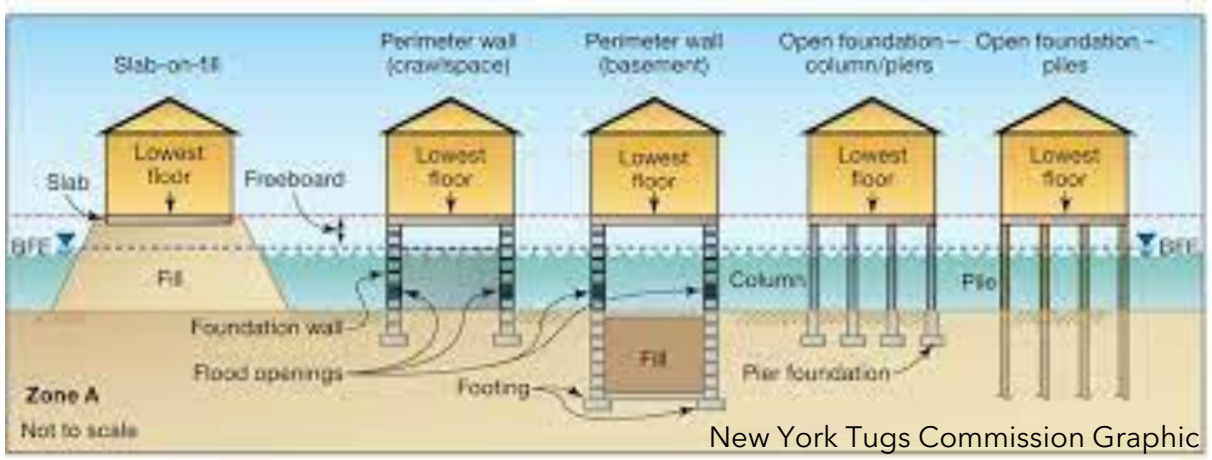
- Product is called Perma-Column
- New Build 2024
- Walnut Township
- Built within the 100-year floodplain







Building with Perma-Columns



New York Tugs Commission Graphic

Additional cost for construction in floodplain:

- Foundation System: $10,000 – $20,000
- Site Prep (minimal grading): $5,000 – $10,000
- Engineering (anchoring, uplift protection): $5,000 – $15,000
- Perma-columns: $197 - $362 for 5’ precast units

Pros:

- Lower cost for small to mid-sized homes.
- Keeps wood framing above flood level.
- Resistant to rot and water damage.

Cons:

- Less suitable for large or heavy structures.
- Require more complex engineering for code compliance

Please note: Costs are an estimate

Building on Engineered Fill

Additional cost for construction in floodplain:

- Site Preparation & Fill: $20,000 – $30,000
- Foundation (elevated slab): $20,000 – $50,000

Pros:

- Creates a level yard and driveway
- Compatible with slab-on-grade foundations

Cons:

- High cost for large elevation changes
- Requires large volumes of fill in high flood zones
- Risk of erosion or settlement over time if not properly engineered
- May increase flood insurance premiums if not properly elevated
- Doesn't solve ingress and egress issue when in the floodplain

Please note: Costs are an estimate

Wrap-Up & Questions

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engineers, architects, planners