City of Ann Arbor
Primer for a Proposed
Floodplain Management Overlay Zoning District
2020

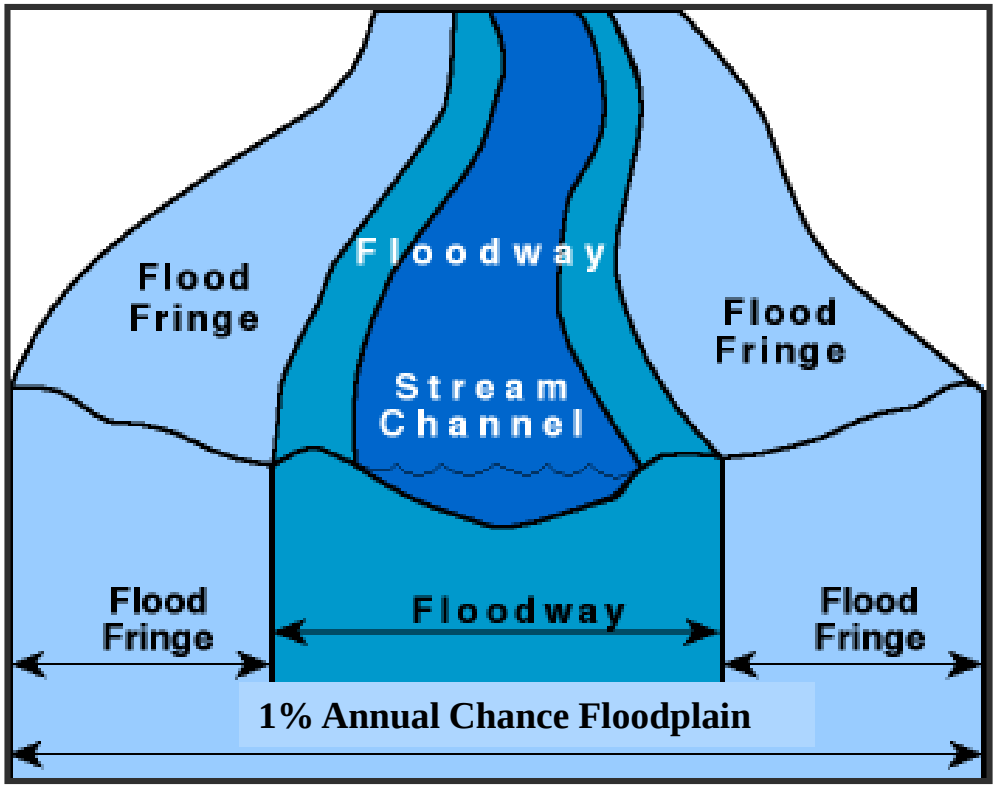
Jerry Hancock

Stormwater and Floodplain
Programs Coordinator

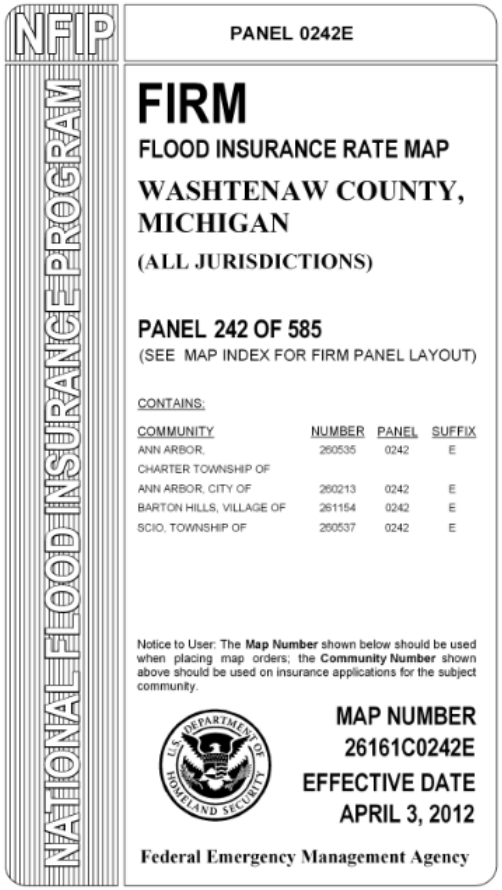
www.a2gov.org/floodplains

What is a Floodplain?

- Consists of a **floodway** and a **flood fringe**
- A 100-year floodplain has a 1% chance of flooding every year
- Doesn't mean once every hundred years
- **1% Annual Chance**



Flood Insurance Rate Map (FIRM)


NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0242E

FIRM

FLOOD INSURANCE RATE MAP

WASHTENAW COUNTY, MICHIGAN

(ALL JURISDICTIONS)

PANEL 242 OF 585

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANN ARBOR, CHARTER TOWNSHIP OF	260535	0242	E
ANN ARBOR, CITY OF	260213	0242	E
BARTON HILLS, VILLAGE OF	261154	0242	E
SCIO, TOWNSHIP OF	260537	0242	E

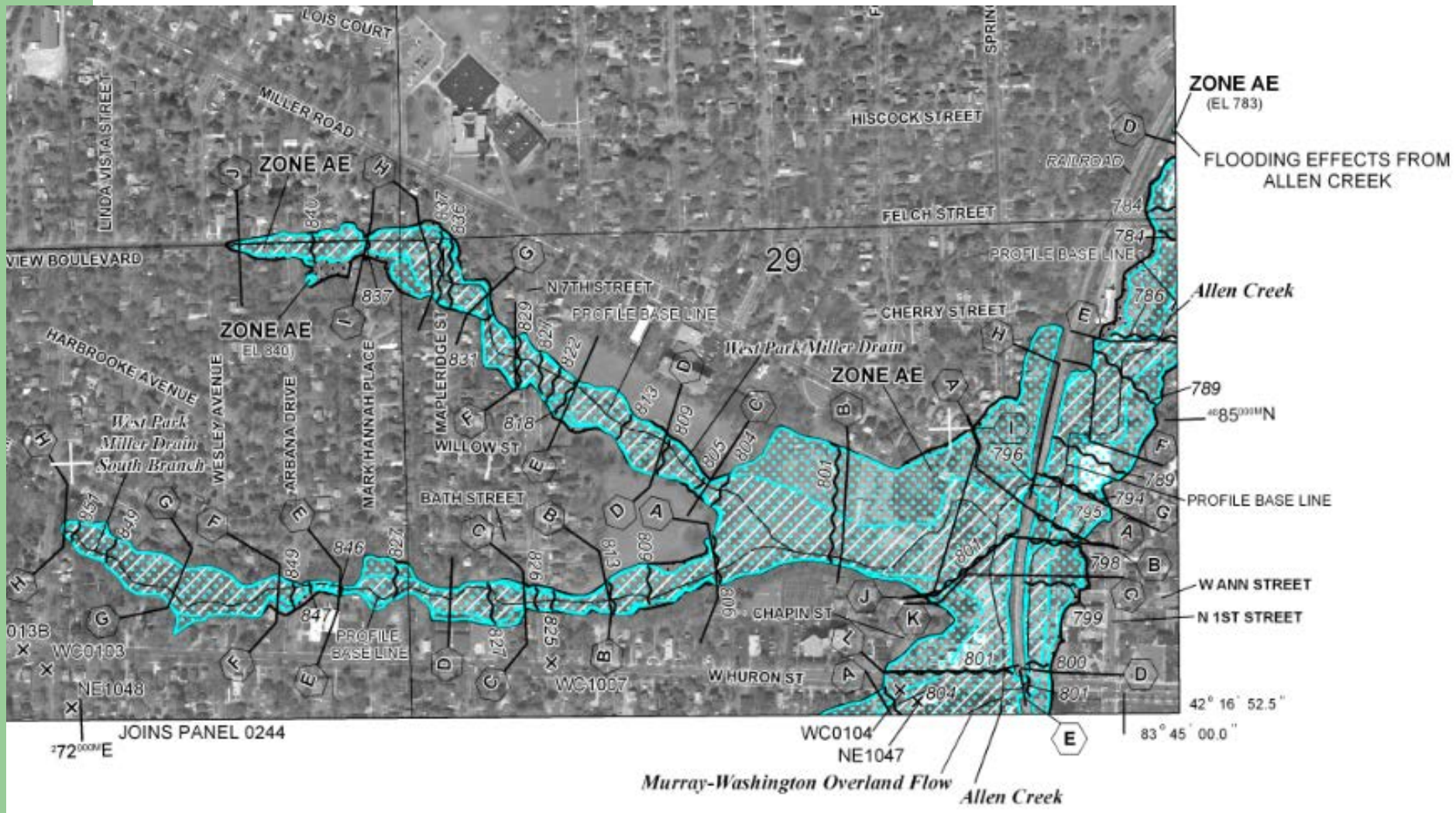
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
26161C0242E
EFFECTIVE DATE
APRIL 3, 2012

Federal Emergency Management Agency

- FEMA FIRMs
  - FIRMs show the flood hazard area and floodways
- FEMA Flood Insurance Study (FIS)
  - The FIS includes flood elevation and profiles

Flood Insurance Rate Map (FIRM)

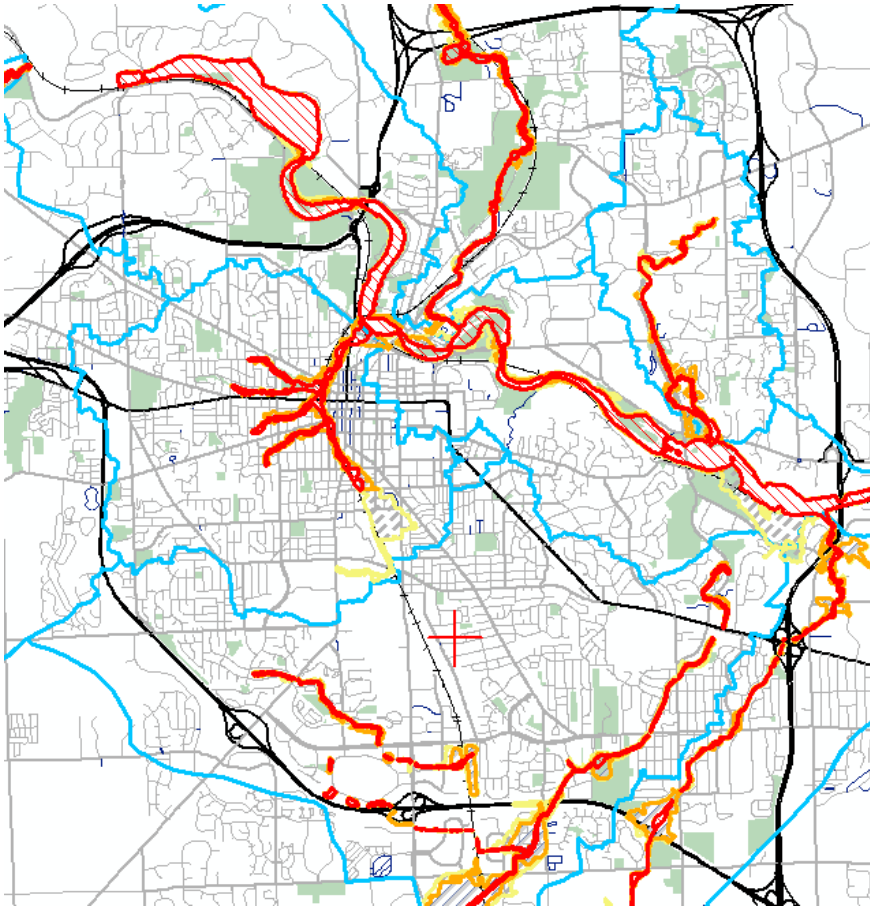


Floodplain quantities per FIRM dated April 3, 2012

Total Floodplain Area 2.79 sq miles or 10% of the City, 1035 Parcels with Floodplain Area

# of Structures by FEMA Flood Source Segment

FEMA Flood Source	# of Structures
Allen Creek	389
• Allen Creek Main Branch =	216
• Eberwhite Drain Overflow =	73
• Murray Washington Overland Flow =	73
• West Park Miller Drain Branch =	21
• West Park Miller Drain South Branch =	6
Malletts Creek	59
• Malletts Creek Main Branch =	43
• Northwest Branch Malletts Creek =	14
• West Branch Malletts Creek =	2
Swift Run Drain	29
Traver Creek	23
Huron River	23
Millers Creek	4
TOTAL	**527**

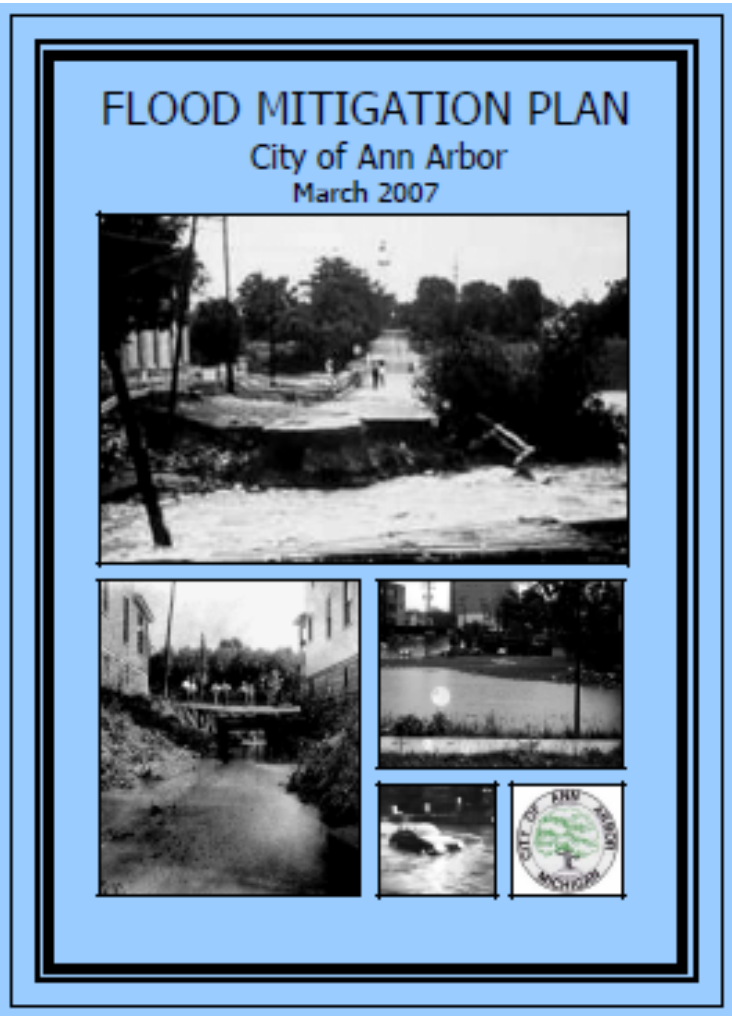


Origin / History
Flood Management Zoning Overly District

- Recommended by:
  - 2007 Flood Mitigation Plan
  - 2012 Hazard Mitigation Plan
  - 2017 Hazard Mitigation Plan Update
- May 1, 2007 City Planning Commission resolution directing staff to draft an ordinance and established a sub-committee to work with staff.
- Fall 2014 U of M Graduate Students received a Dow Foundation grant to work with the City on a draft ordinance and white paper to support the ordinance
- City Council has also directed staff to complete the draft and begin the review and approval process

Flood Mitigation Plan

- Approved by City Council in March 2007
- 56 individual project recommendations
- Project #14 specifically recommends a **Floodplain Overlay Zoning District**



Efforts since 2007

- 2005-2012 - FEMA Map Mod process
- 2008-2009 - Several ordinance drafts and meetings
- 2008-2018 - ZORO complicated staff availability
- 2008-2013 - 2 FEMA Mitigation Grant Projects:
  219 W Kingsley St. and 721 N Main St.
- 2009-2018 - Join the Community Rating System and improved to Class 6
- 2014 - UM Student Project
- 2015-Present - Hazard Mitigation Grant project:
  Allen Creek RR Berm Opening


ACRRBO
721 N. Main St
219 W. Kingsley St.
Fish Park
Charles St
Daniel St
Edward St
Wildt St
Depot St
E Summit St
Broadway St
N Main St
N Fourth Ave
N Fifth Ave
Access
Carey St
High St
Beakes St
Beakes Ct
Access
N Division St
Alley
Elizabeth St
Detroit St
N Ashley St
W Kingsley St
E Kingsley St
N First St
Alley
Alley
N Slate St
403
373
450
448
273

U of M Fall Term 2014

5 U of M Grad Students received a grant to work with the City to provide:

- A Draft Floodplain Management Overlay Zoning District Ordinance

- A White Paper on the reasons why it would be beneficial for the City to adopt the Draft Ordinance

Developing a Floodplain Management Overlay Ordinance for the City of Ann Arbor, MI

Dow Sustainability Fellowship Program

Matthew Weibel, Valerie Tran, Stephen Scheele, Caitlin Jacob, Joseph Halso

Dow Sustainability Fellows Symposium '14

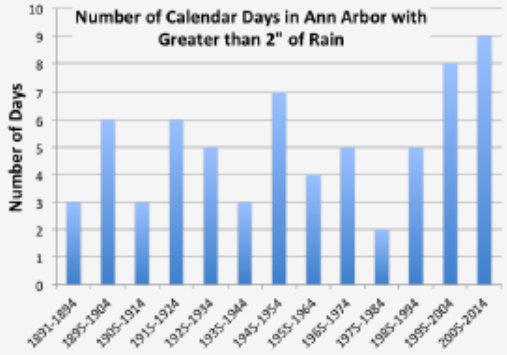
Developing a Floodplain Ordinance for the City of Ann Arbor

AUTHORS: Joseph Halso, Caitlin Jacob, Stephen Scheele, Valerie Tran, Matthew Weibel

M | planet blue

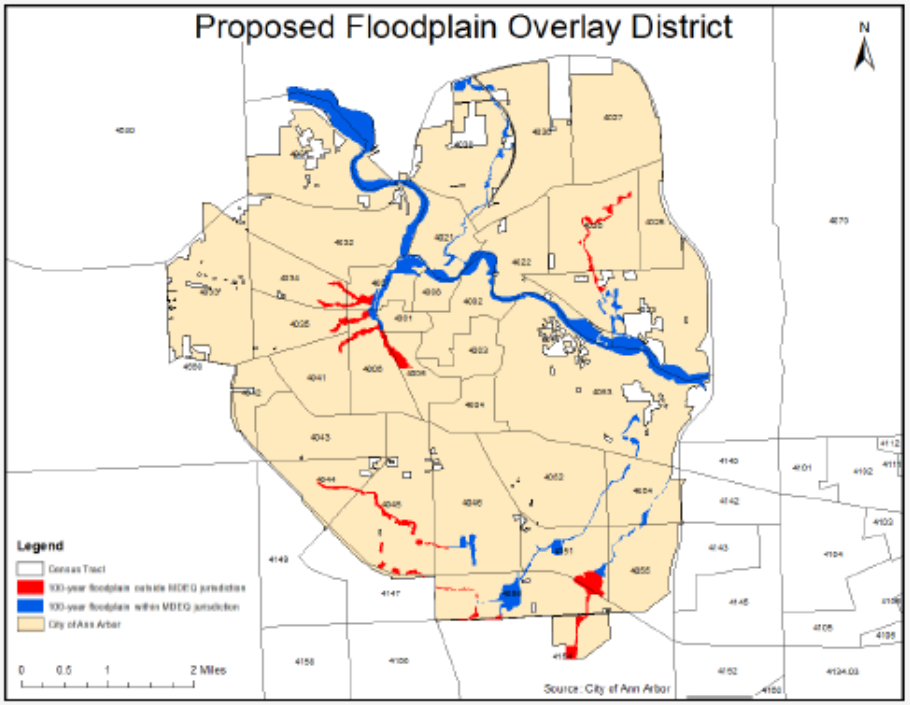
BACKGROUND

The last few years have seen growing incidence of flooding in Ann Arbor and other similar communities as a result of climate change. Increasingly, these communities are seeking out proactive ways to mitigate the causes of flooding and reduce damaging outcomes to people and property. This project seeks to address these challenges by working with the City of Ann Arbor to develop a floodplain overlay district as part of a broader floodplain management effort.

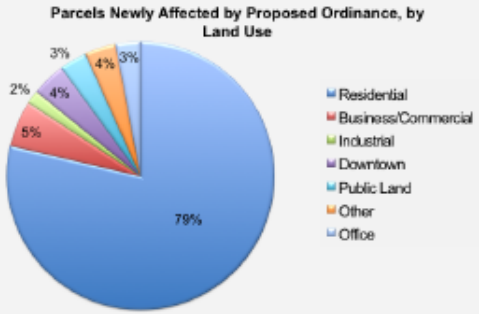


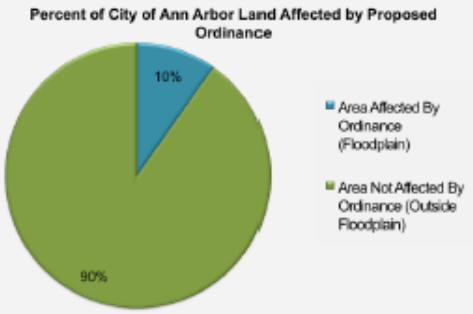
IMPACTS OF PROPOSED ORDINANCE

1. Creates a floodplain overlay district which is comprised of a floodway zone, flood fringe zone, and 50 foot buffer
2. Now regulates the area impacted by the 100-year flood (1% annual chance of flooding)
   - Extends land-use and development regulation beyond previously regulated areas under Michigan Department of Environmental Quality (MDEQ)
3. Increases Flood Protection Elevation to inundation level of 500-year flood (0.2% annual chance of flooding)
   - Supplements current National Flood Insurance Program standards



This map shows the proposed floodplain overlay district. The district contains the entire 100-year floodplain, including the area currently within MDEQ floodplain regulation.





We thank Jerry Hancock and Kevin McDonald with the City of Ann Arbor; Ashlee Grace with the Graham Sustainability Institute; and Professors Richard Norton and Larissa Larsen with the Taubman College of Urban and Regional Planning. Lastly, this project would not be possible without the generosity of The Dow Chemical Company.

Ann Arbor Floodplain Socioeconomic Factors

Full City		Floodplain
		Insurance Required
$54,128	Income	$40,253
3.5%	< High School Education	5%
7.5%	African American	9.06%

Slightly more vulnerable community at higher risk

Changing Weather Patterns

- **Temperature** – Increasing
  - Frost-free season longer
  - Less snow cover
  - More winter rain
- **Precipitation** – Increasing frequency and intensity of extreme storm events
- **Runoff** - more variable, decreasing during dry periods and increasing with more intense precipitation events

CLIMATE CENTER
UNIVERSITY OF MICHIGAN
A CENTER OF THE GRAHAM SUSTAINABILITY INSTITUTE

GRAHAM.UMICH.EDU/CLIMATE

City Fact Sheet: Ann Arbor, MI

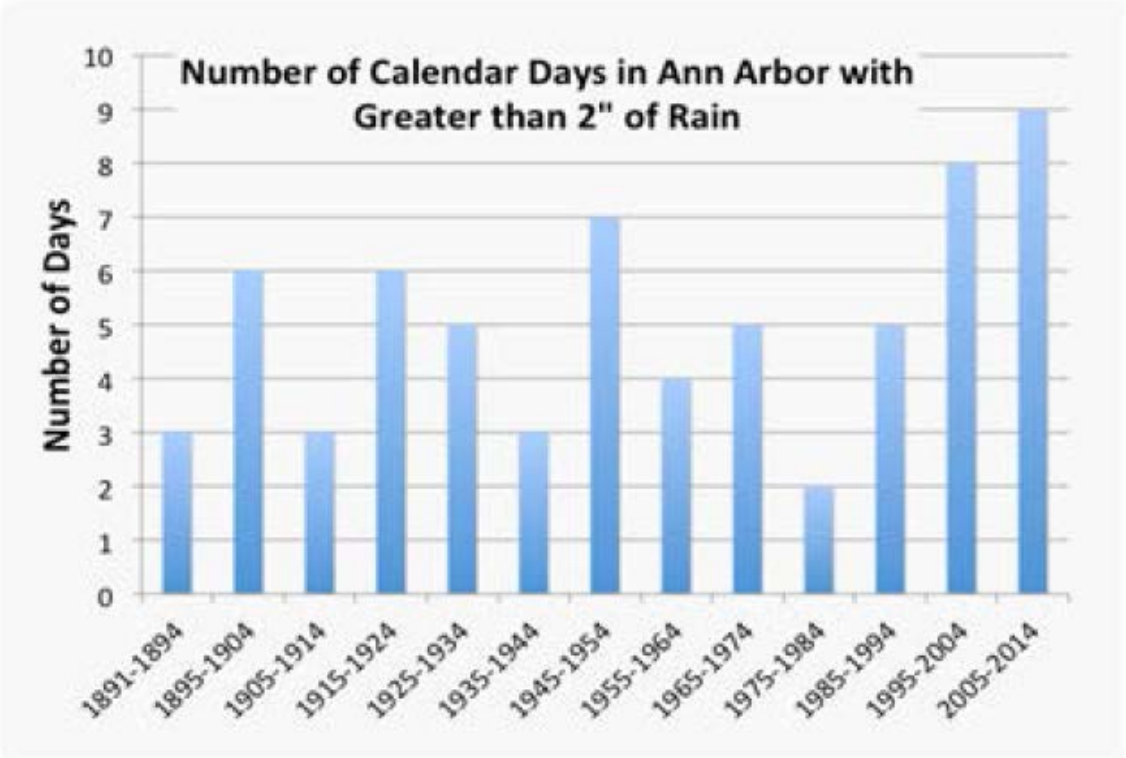
Geographic Location	S.E. Michigan Non-Coastal
Population	113,934
Government Structure	Council-Manager
Per Capita Income	$30,498 (USD)

The City of Ann Arbor has a long history as a progressive city with strong community engagement. Despite this, the city faces challenges keeping the community informed of emerging programs and ongoing efforts due to the city's many university students and other transient residents. Ann Arbor also faces the challenge that a significant percentage of property within the city limits falls under the public domain and is not subject to local taxes. Much of this public land also falls outside of the city's regulatory jurisdiction.

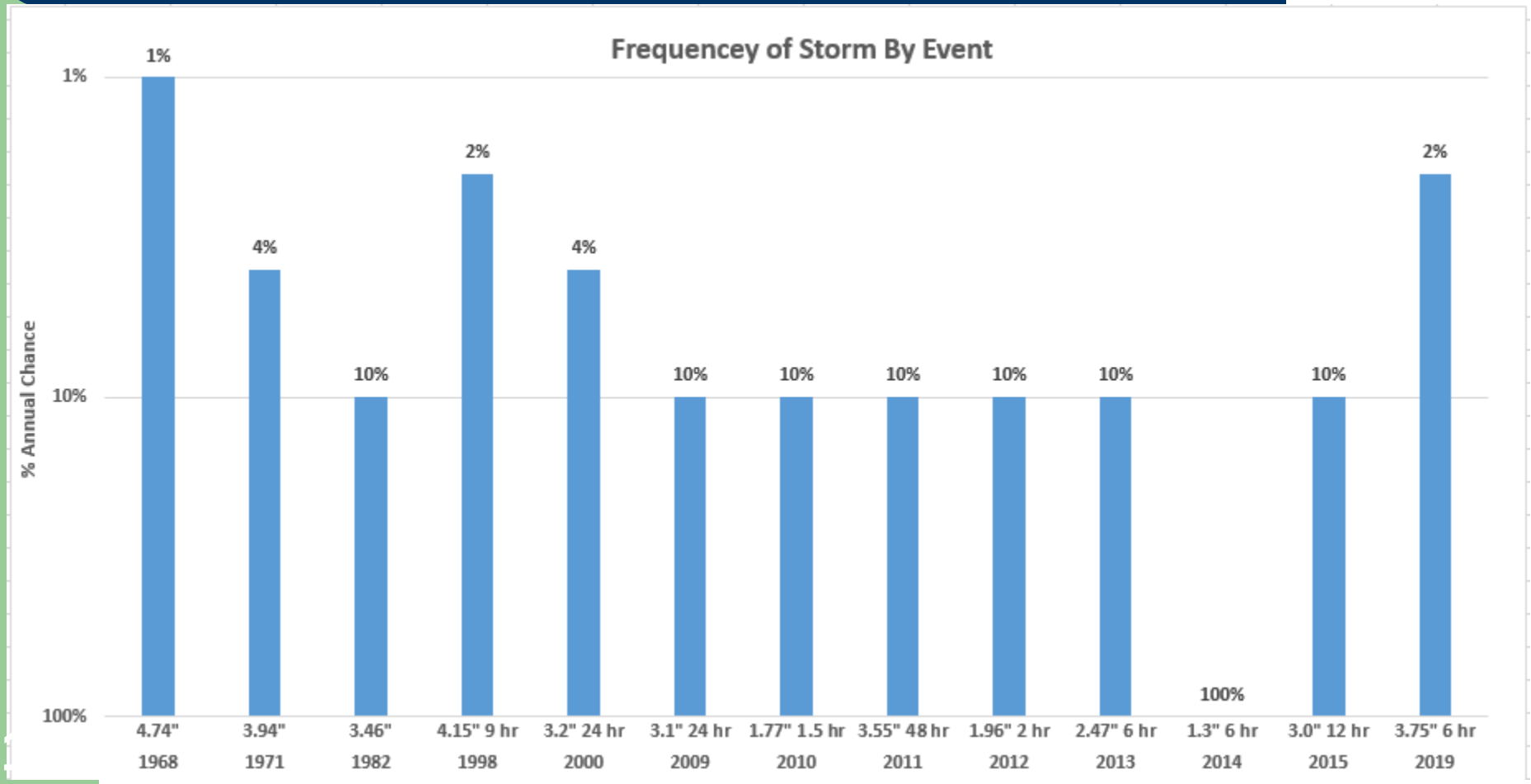
CLIMATE IMPACT

1°F	Increase in Annual Temperatures (from 1951-2012)
6.1	Fewer Days Below 32°F (from 1951-2012)
41.2%	Increase in Heaviest 1% of Precipitation Events (from 1951-2012)
44.8%	Increase in Annual Precipitation (from 1951-2012)

Changing Weather Patterns



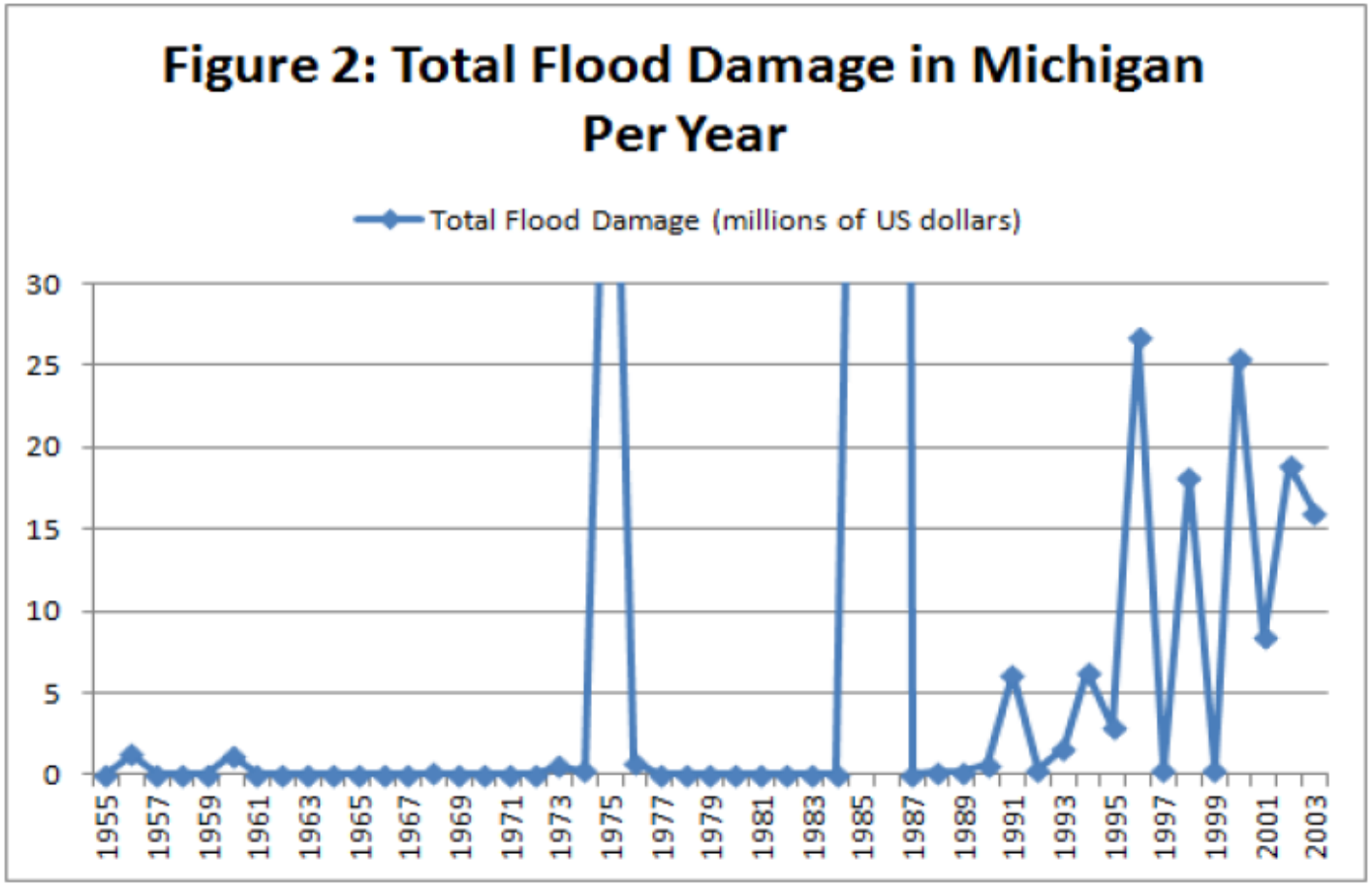
History of Flooding in Ann Arbor



NOAA Storm Frequencies for A2

- Current Flood Maps based on 1992 Bulletin 71
  – 24 Hour 1%-annual-chance = **4.36”**
- 2013 NOAA Atlas 14, Volume 8
  – 24 Hour 1%-annual-chance = **5.11”**
- **Difference = 0.75” or 17.2% increase**

Rising Economic Flood Damage



City Calibrated Stormwater Model Results

		Total	Allen	Malletts	Millers	Swift	Traver
FEMA Effective	Acres	717	126	241	50	199	101
	Buildings	500	390	55	4	29	22
	Parcels	923	486	229	25	123	60
Model Delineated	Acres	1143	203	379	62	297	202
	Buildings	739	520	129	6	61	23
	Parcels	1259	639	377	26	144	73
Difference	Acres	426	77	138	12	98	101
	Buildings	239	130	74	2	32	1
	Parcels	336	153	148	1	21	13

City Calibrated Stormwater Model Results

Future Scenario - If all single family homes had a rain garden, all private and U of M property were redeveloped to meet current local stormwater standards, and all streets were reconstructed to meet the green streets policy:

- Major water quality improvements
- Significant reduction of flooding for small events
- Most flooding eliminated up to the 10%-annual-chance
- However, there would still be a 1%-annual-chance floodplain similar to the current floodplain, particularly in Allen Creek, and only a slightly smaller floodplain in other watersheds.

National Flood Insurance Program

- NFIP is currently $20.5 Billion in debt (Oct. 8, 2018)

- The Biggert-Waters Flood Insurance Reform Act of 2012

  Moving from subsidized rates to actuary rates

- Homeowner Flood Insurance Affordability Act of 2014

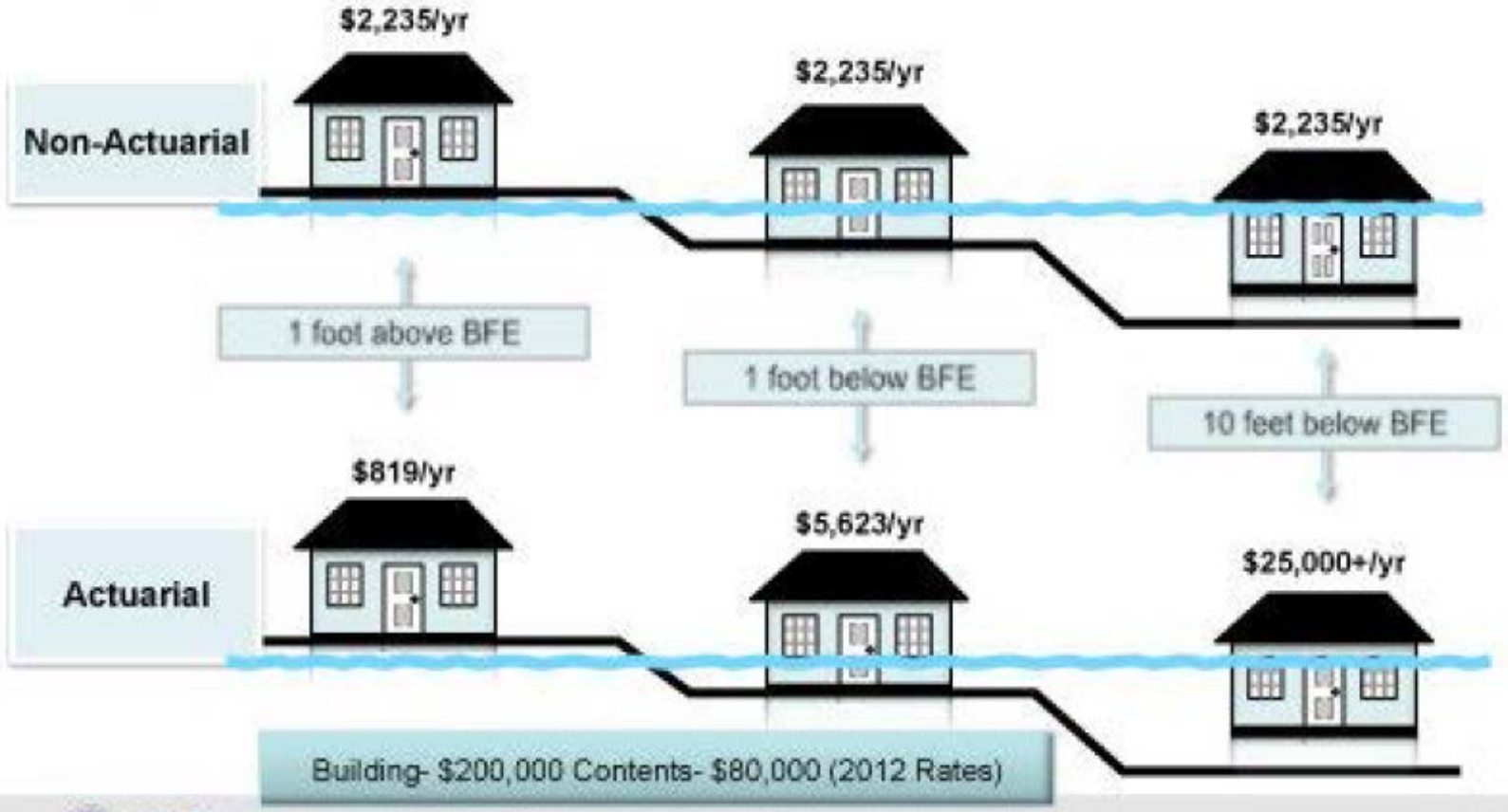
  Turned back to subsidized rates for SFR

  Approximate rate increases for Pre-FIRM structures

  - Primary Single Family Resident – 18% per year
  - All others – 25% per year until they reach actuary

NFIP Rating Examples:
The Impact of Loss of Subsidies

Rate comparisons



FEMA

Community Rating System

- The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

- As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

  1.Reduce flood damage to insurable property;

  2.Strengthen and support the insurance aspects of the NFIP, and

  3.Encourage a comprehensive approach to floodplain management.

The table below shows the credit points earned, classification awarded and premium reductions given for communities in the NFIP CRS.

CREDIT POINTS	CLASS	PREMIUM REDUCTION SFHA*	PREMIUM REDUCTION NON-SFHA**
4,500+	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

*Special Flood Hazard Area

**Preferred Risk Policies are available only in B, C and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. The CRS credit for AR and A99 Zones are based on non-Special Flood Hazard Areas (non-SFHAs) (B, C and X Zones). Credits are: classes 1-6, 10% and classes 7-9, 5%. Premium reductions are subject to change.

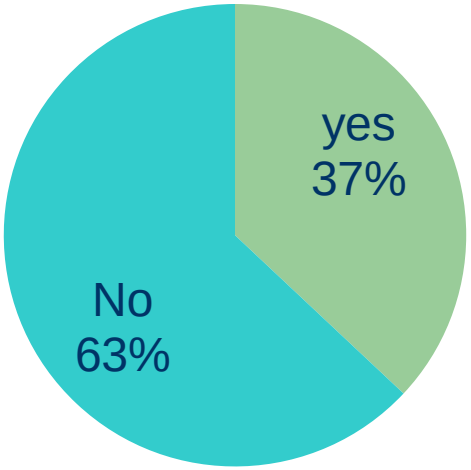
A2 - 2073

EGLE Floodplain Requirements

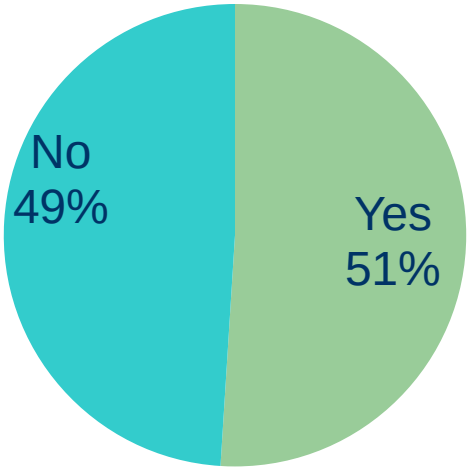
- Requires permitting for new fill or structures, and other floodplain modifications
- **Prohibits residential construction in the floodway**
- HOWEVER, the EGLE only has jurisdiction where the contributing drainage area is greater than 2 sq miles.

Areas of Non-EGLE Jurisdiction within the Ann Arbor Floodplains

EGLE Regulated Parcels



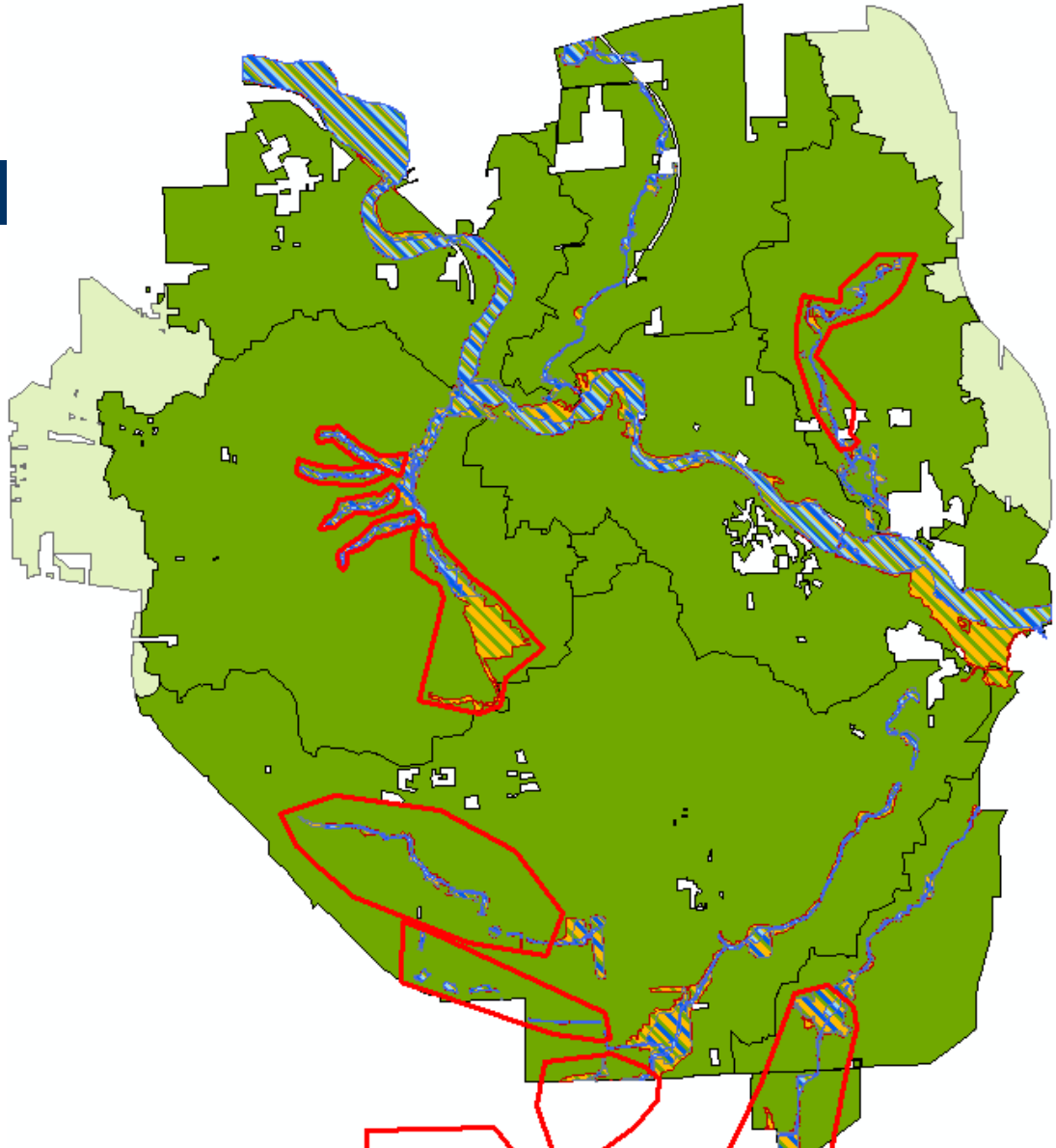
EGLE Regulated Buildings



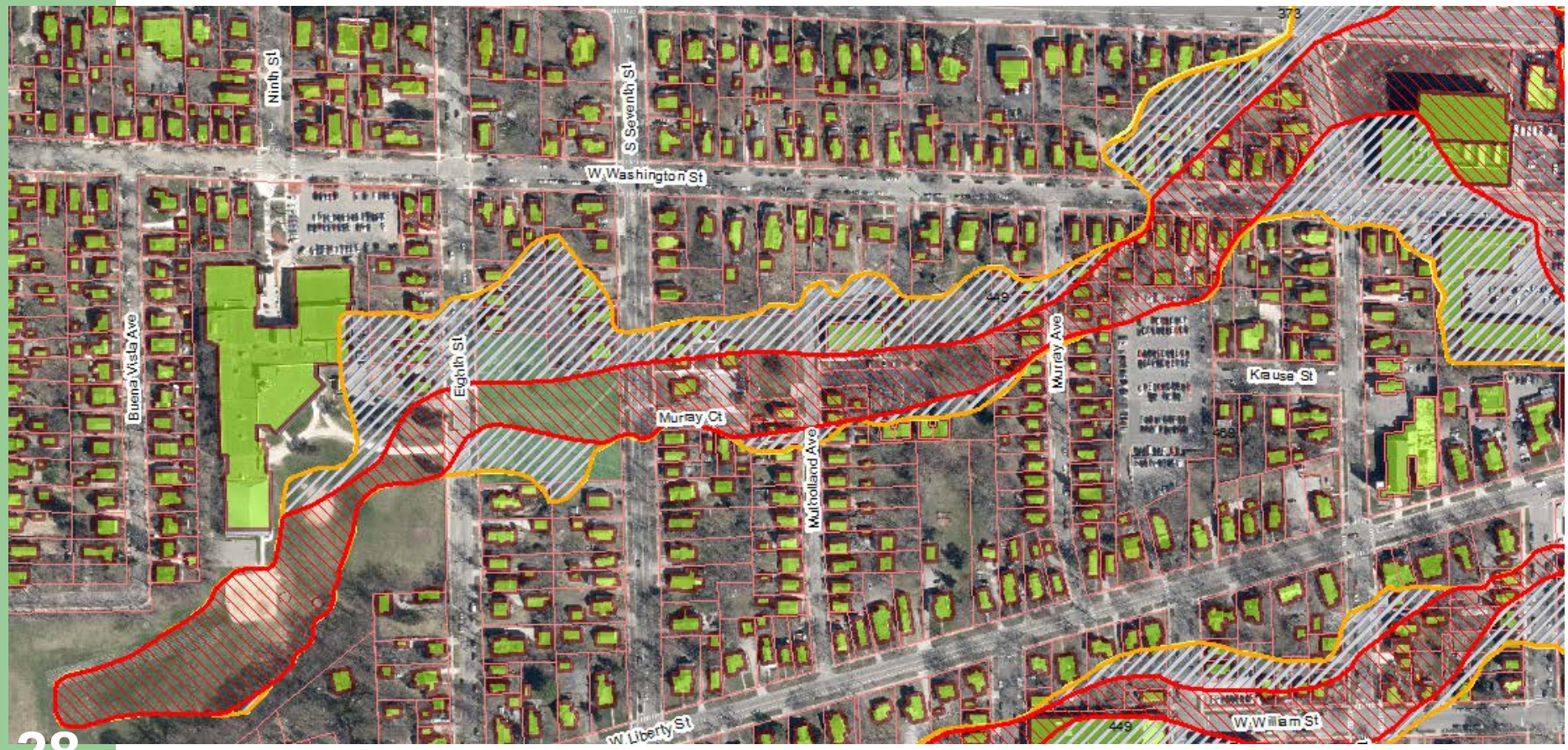
Areas of Non-EGLE Jurisdiction

Total Floodplain Area
- 2.79 sq miles
- 10% of the City
- 1035 Parcels
- 513 Buildings

Non- EGLE Regulated
650 Parcels or 63%
249 Buildings or 49%



Non-EGLE Jurisdiction
Old West Side Historic District
Murray Washington Drain
Eberwhite Drain



Reasons for Higher Standards

- Slightly more vulnerable community at higher risk
- Changing Weather Patterns causing more risk
- Rising Economic Flood Damage
- More structures in the future floodplain
- Rising Flood Insurance Rates
- Chance to Improve CRS Rating
- Apply EGLE floodway restrictions equally across the City

Current Basic Floodplain Regulations

- The State, County, and City all have floodplain development regulations. Most of these regulations are required for participation in the National Flood Insurance Program (NFIP) and are legally enforced under the Michigan Building Code.
- **General Criteria for floodplain development**
  - Michigan Department of Environment, Great Lakes, and Energy (EGLE), where they have jurisdiction. Flood flow may not be obstructed in a manner that causes a rise in flood elevations at the property line.
  - Washtenaw County Water Resources Commissioner within a County Drain easement
  - City Planning and Building Department.
  - State, County, and City all require no net loss of flood storage capacity. No fill without compensatory dredging (State has exceptions).

Current Basic Floodplain Regulations

- **Standards for development in the floodway**
  - The State prohibits residential uses in the floodway in areas under the jurisdiction of the EGLE.
  - For all development in the floodway, the developer must submit an hydrologic study certifying that the development will not raise the base flood elevation (BFE).
  - The lowest floor of any new non-residential structure must be elevated or floodproofed to an elevation 1 foot above the 1%-annual-chance flood elevation.

Current Basic Floodplain Regulations

- **Standards for new buildings in flood fringe**
  - The lowest floor of any new residential structure must be elevated 1 foot above the 1%-annual-chance flood elevation.
  - The lowest floor of any new non-residential structure must be elevated or flood-proofed to 1 foot above the 1%-annual-chance flood elevation.
- **Standards for substantially improved buildings**
  - All structures that are improved in the floodplain must meet standards for new buildings if the value of the improvements exceeds 50% of the market value of the structure.
  - Note: historic structures are exempt from the substantial improvement requirement, provided that the historic character of the structure is maintained.

Flood Mitigation Plan Recommended Higher Standards

- #17 – Additional Freeboard
- #19 – Cumulative Improvement Standard
- #21 – Addition Improvement Standard
- #22 – Flood Fringe Limits
- #23 – Equivalent Compensation
- #25 – Freestanding Structures and Obstructions
- #26 – Prohibit Floodway Development
- #43 – Higher Standards for New Critical Facilities

Draft Ordinance Applicability

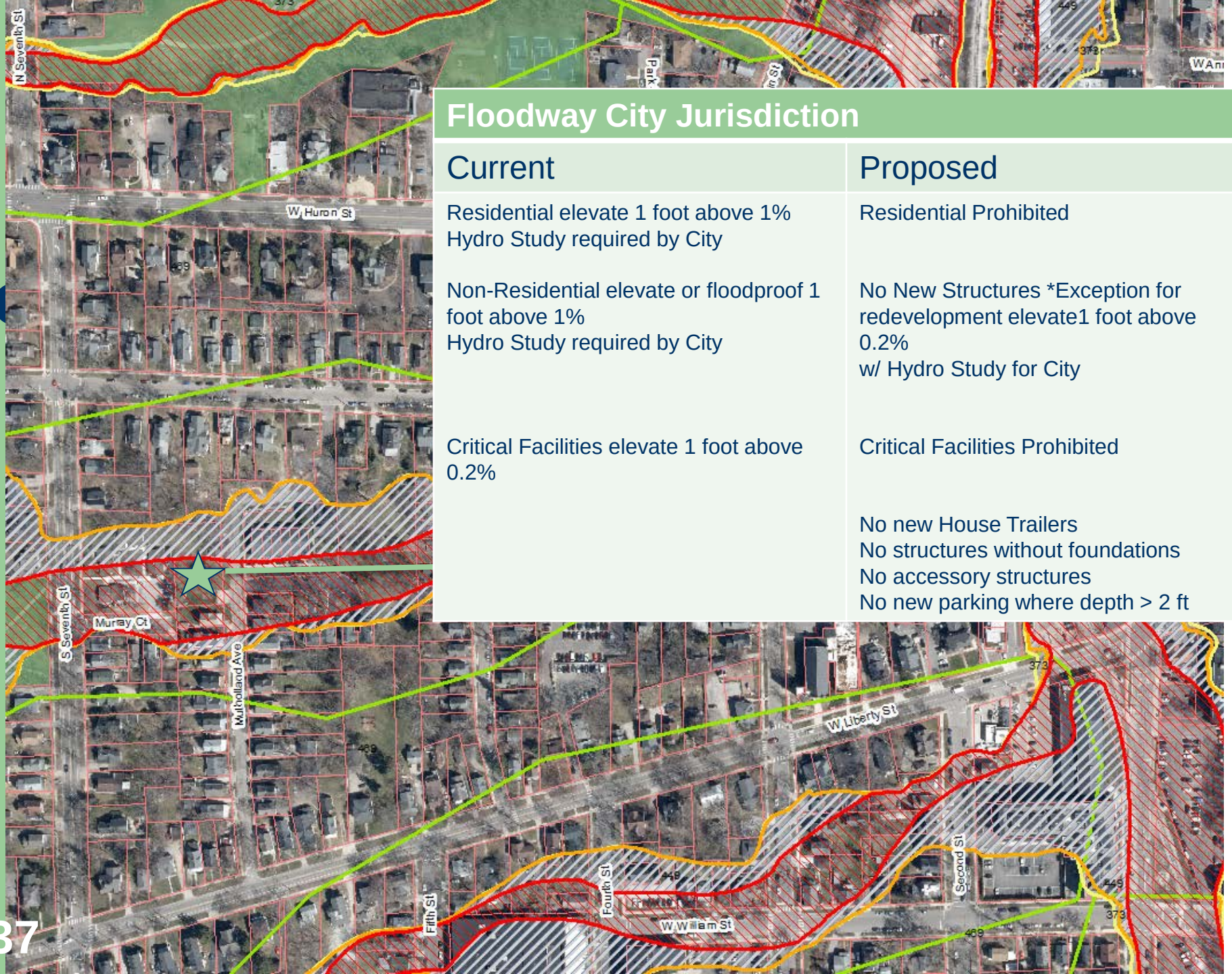
- Zoning Overlay District Ordinance
  - Applies to all property touching the floodplain plus a 50 foot buffer
- “Using This Ordinance” Section
  - Assist petitioners through the process
- Applies only to Building Permit and Site Plan Process
- No impact on maintaining existing structures
- Historic Structures exempt, unless expanding the footprint

Proposed Floodway Restrictions

- No new structures *Exemption section for redevelopment
- No additions
- No new residential uses
- No critical facilities
- No structures without foundations
- No accessory structures
- No new parking where depth greater than two feet

Floodway EGLE Jurisdiction

Current	Proposed
Residential Prohibited	Residential Prohibited
Non-Residential elevate or floodproof 1 foot above 1% Hydro Study required by EGLE	No New Structurtes *Exception for redevelopment elevate 1 foot above 0.2% w/ Hydro Study for EGLE
Critical Facilities elevate 1 foot above 0.2%	Critical Facilities Prohibited
	No new House Trailers No structures without foundations No accessory structures No new parking where depth > 2 ft



Floodway City Jurisdiction

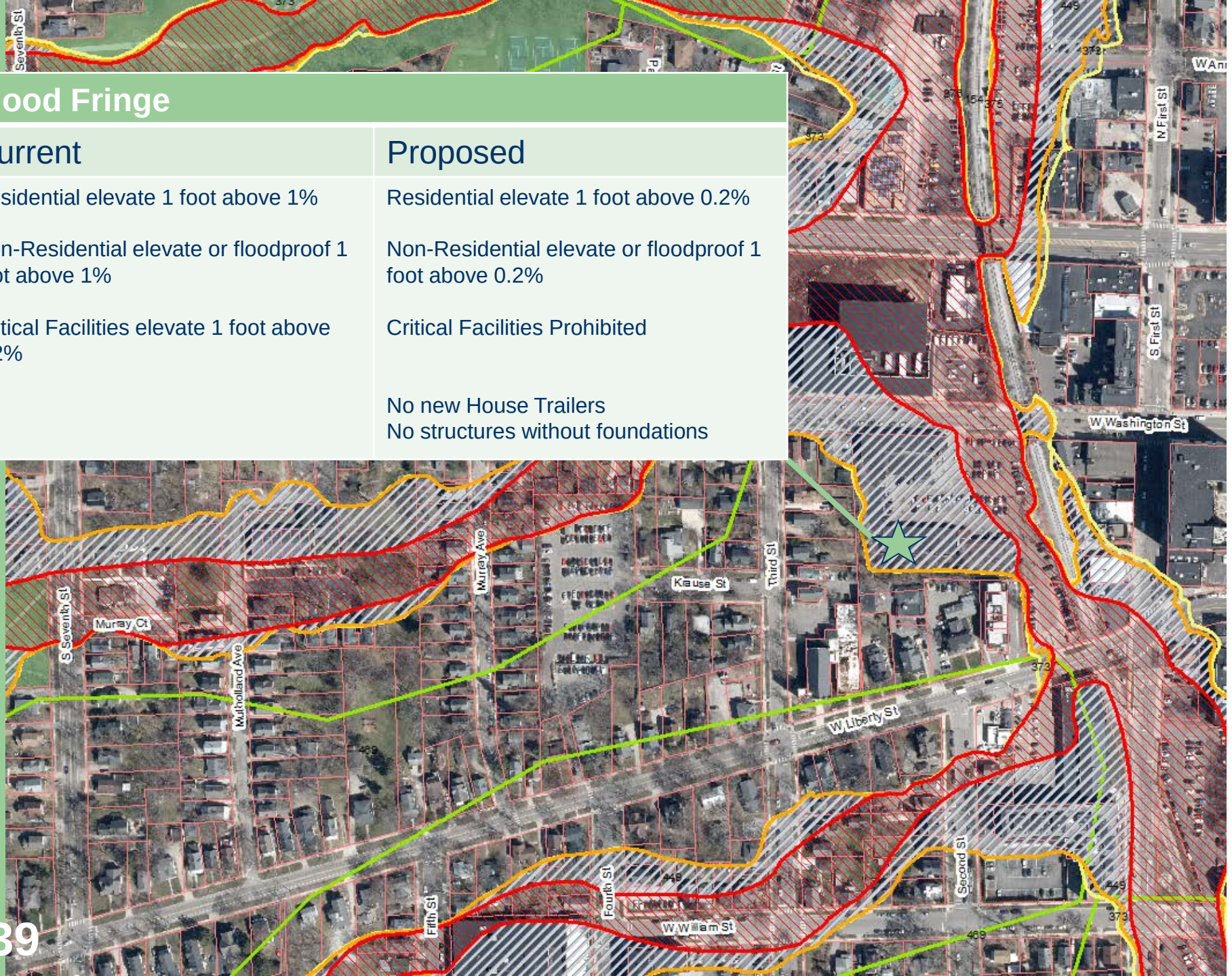
Current	Proposed
Residential elevate 1 foot above 1% Hydro Study required by City	Residential Prohibited
Non-Residential elevate or floodproof 1 foot above 1% Hydro Study required by City	No New Structures *Exception for redevelopment elevate1 foot above 0.2% w/ Hydro Study for City
Critical Facilities elevate 1 foot above 0.2%	Critical Facilities Prohibited
	No new House Trailers No structures without foundations No accessory structures No new parking where depth > 2 ft

Proposed Flood Fringe Restriction

- Very little change from current requirements.
- No Critical Facilities.
- No structures without foundations.
- Limit storage of hazardous materials.
- Elevate or floodproof to one foot above the 0.2%-annual-chance elevation

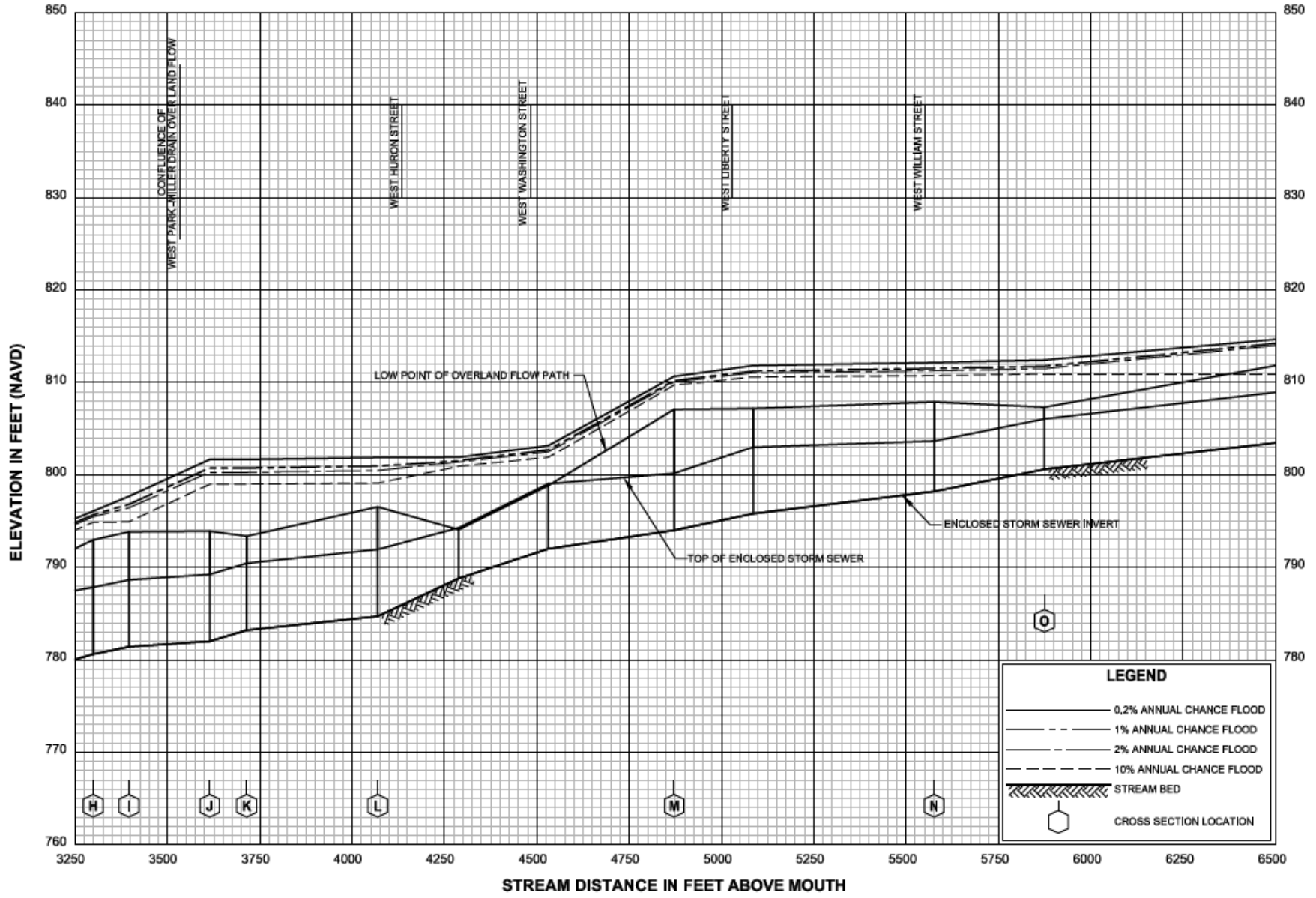
Flood Fringe

Current	Proposed
Residential elevate 1 foot above 1%	Residential elevate 1 foot above 0.2%
Non-Residential elevate or floodproof 1 foot above 1%	Non-Residential elevate or floodproof 1 foot above 0.2%
Critical Facilities elevate 1 foot above 0.2%	Critical Facilities Prohibited
	No new House Trailers No structures without foundations



Why above the 0.2%-annual-chance elevation

- Acknowledges Climate Change
  - 24 Hour 0.2%-annual-change = 6.74”
  - 1.63” or 31% greater than the 1%-annual-chance
  - 1%-annual-chance increased 17% over the past 30 years
  - So, in about 50 years we can expect the current 0.2% flood elevation to be the 1% elevation
- Consistent with 2015 Presidential Executive Order (now rescinded)
- Becoming common in costal communities
- Only adds about a foot in most areas



FLOOD PROFILES

ALLEN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHTENAW COUNTY, MI

ALL JURISDICTIONS

02P

Costs of Building Higher

Under the rules of the National Flood Insurance Program, buildings must be protected to the Base Flood Elevation (BFE). Therefore, the cost of freeboard is just the additional cost of building higher than the minimum NFIP standard.

A study conducted by ASFPM in February 2017 estimated the approximate cost of building higher for a 2,000-square foot house. The study assumed the house was constructed to NFIP standards and then estimated the additional cost of building higher than the BFE (see table below).

Foundation Type*	Cost per add'l foot
Concrete block piers	$890
Crawlspace with concrete block walls	$1,850
Crawlspace with poured concrete walls	$2,155
Stem wall with fill	$2,345
Fill only	$4,470

Using a house on fill with a stem wall (as illustrated on the cover), here are the average construction costs for building higher:

1 foot: $2,345
2 feet: $2,345 x 2 = $4,690
3 feet: $2,345 x 3 = $7,035

**Costs are lower for other foundations.*

Return on Investment

The owner of a building built higher will realize savings in two ways. The most important is when the area floods again and the building is not damaged. Also, the owner doesn't have to relocate, repair and rebuild.

Another form of savings is a reduced cost in flood insurance, which is required by most lenders. For example, using a 2,000-square foot home with a stem wall foundation with the floor 2 feet above the BFE (with fill underneath).

Additional cost of construction:	$4,690
Annual flood insurance premium built to the BFE:	$2,147
Annual flood insurance premium built 2 feet above the BFE:	$734
Annual flood premium savings:	$1,413
Number of years to pay off $4,690 via premium savings:	3.3 years
Added savings realized during a 30-year mortgage:	$37,300*

Another benefit of building is higher is potentially increase in value at the time of sale due to lower risk and lower insurance costs.

**Savings are greater for other foundations.*

The Costs & Benefits of Building Higher

Assn. of State Floodplain Managers

www.floods.org

ASFPM – February 2018

Other Proposed Regulations

- Define Market Value
  - City Assessor
- Cumulative Improvement Standard
  - 10 year period
- Equivalent Compensation
  - Hydrologically equivalent

Proposed Ordinance Benefits

- Improve safety and welfare
- Reduce loss of life and property
- Save money and resources necessary for emergency response
- Clearer permit process
- State regulations applied more consistently
- Lower flood insurance rates / Improve City of Ann Arbor CRS Rating

General Overview

	Current	Proposed
Floodway EGLE	Residential Prohibited Non-Residential elevate or floodproof 1 foot above 1% Hydro Study required by EGLE Critical Facilities elevate 1 foot above 0.2%	Residential Prohibited No New Structures *Exception for redevelopment elevate 1 foot above 0.2% w/ Hydro Study for EGLE Critical Facilities Prohibited No new House Trailers No structures without foundations No accessory structures No new parking where depth > 2 ft
Floodway City	Residential elevate 1 foot above 1% Hydro Study required by City Non-Residential elevate or floodproof 1 foot above 1% Hydro Study required by City Critical Facilities elevate 1 foot above 0.2%	Residential Prohibited No New Structures *Exception for redevelopment elevate 1 foot above 0.2% w/ Hydro Study for City Critical Facilities Prohibited No new House Trailers No structures without foundations No accessory structures No new parking where depth > 2 ft
Flood Fringe	Residential elevate 1 foot above 1% Non- Residential elevate or floodproof 1 foot above 1% Critical Facilities elevate 1 foot above 0.2%	Residential elevate 1 foot above 0.2% Non-Residential elevate or floodproof 1 foot above 0.2% Critical Facilities Prohibited No new House Trailers No structures without foundations

Questions

Jerry Hancock

Stormwater and Floodplain Programs Coordinator

www.a2gov.org/floodplains