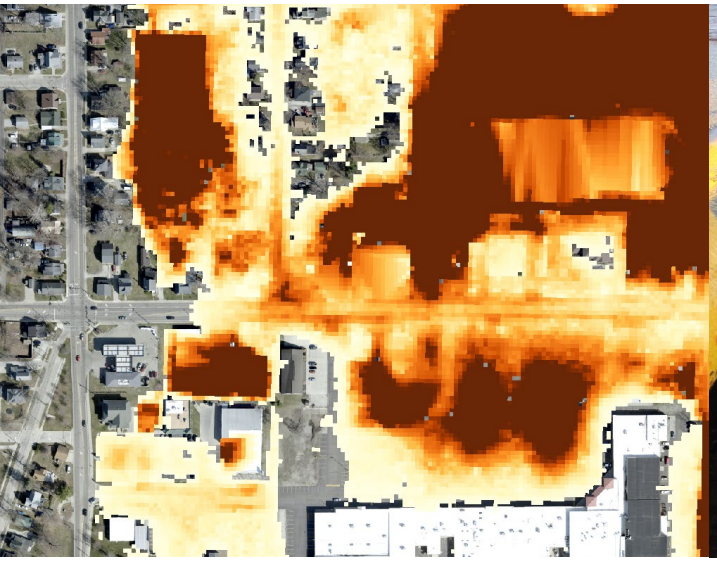
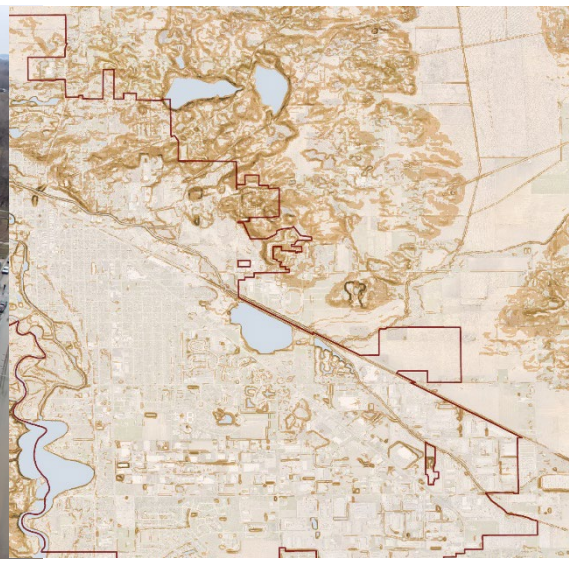
Flood Vulnerability in Goshen

City of Goshen Stormwater Department





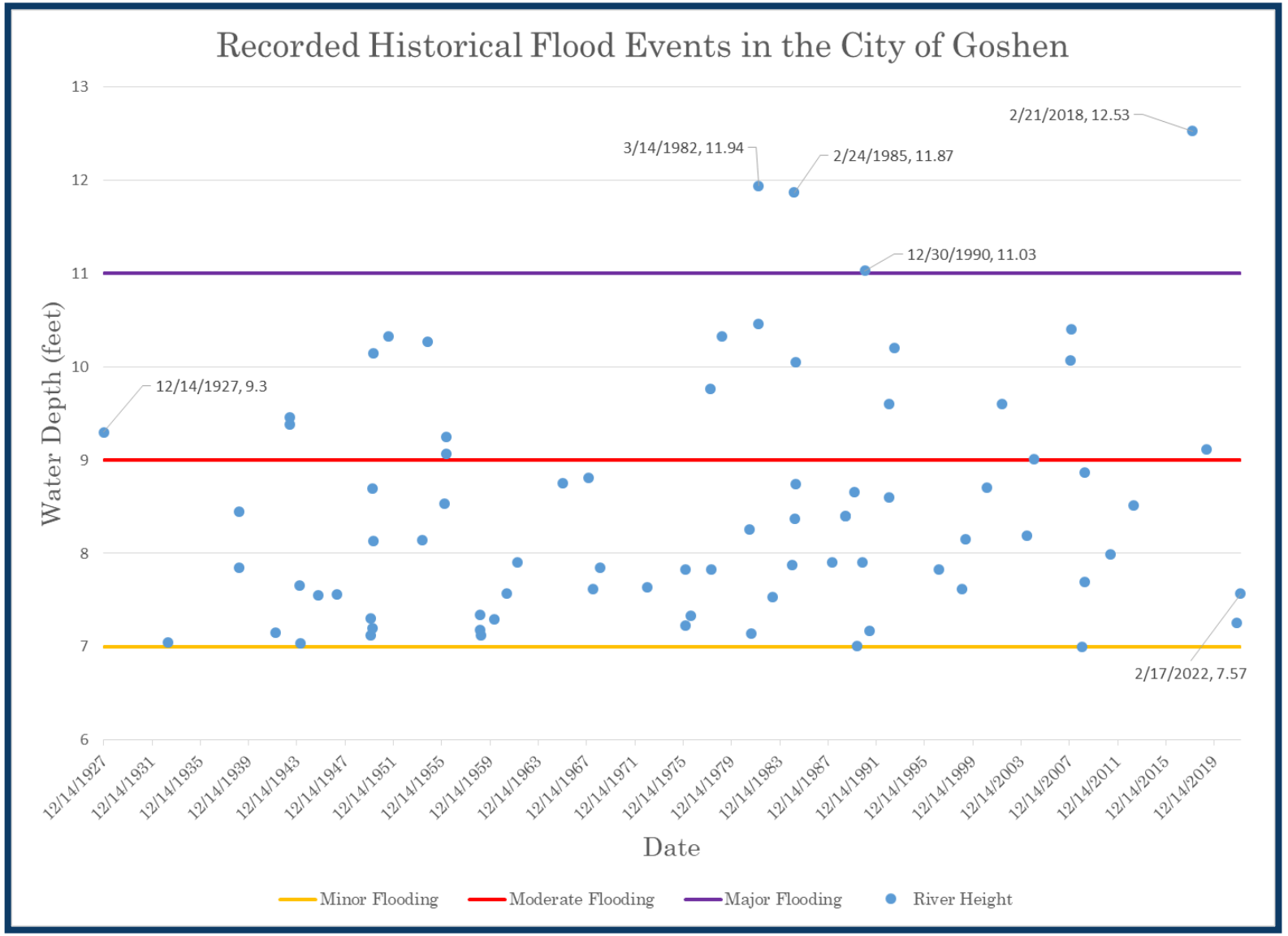


March 17, 2022 – Flood Resilience Plan Public Meeting

Flooding in Goshen

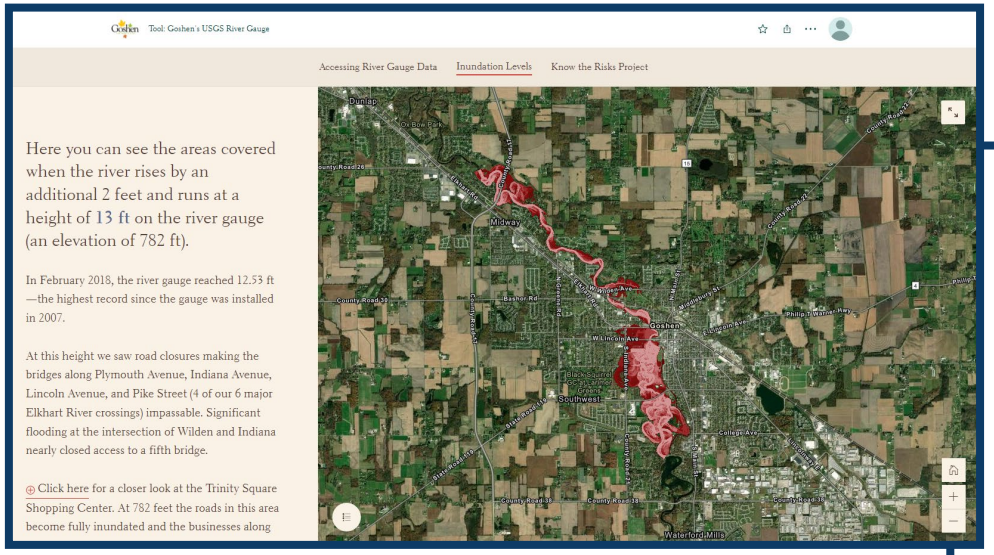
Goshen's Flood History

- **September 11, 1924** –USGS River Gauge installed near the N Indiana Ave. Bridge
- **December 14, 1927** –first recorded flood
- **February 17, 2022** – last recorded flood
- **Since 1982** – four major flood stage (11+ feet) events

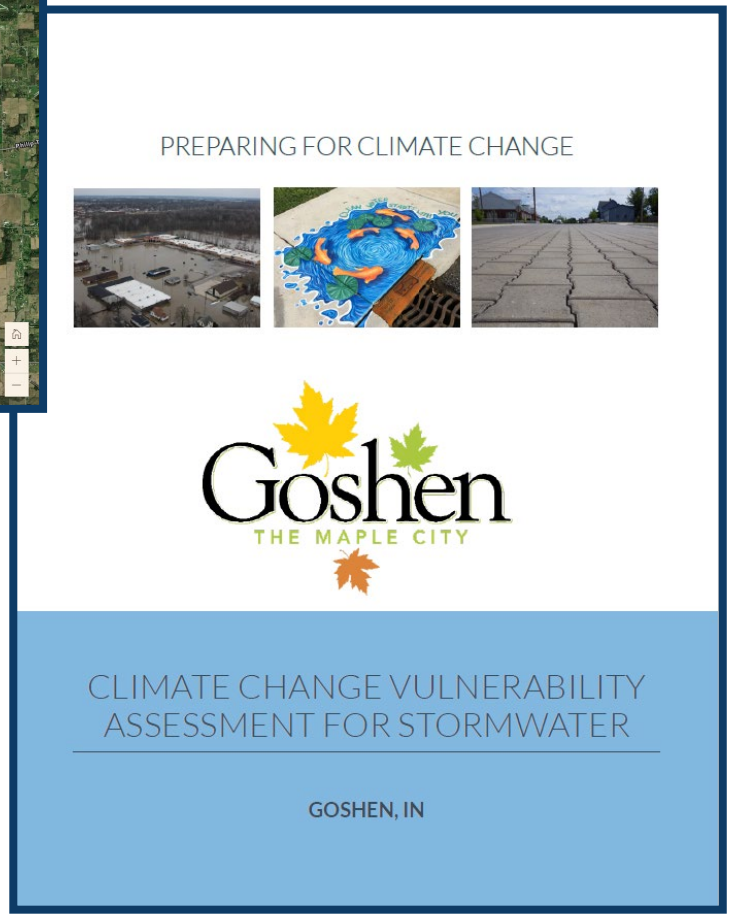


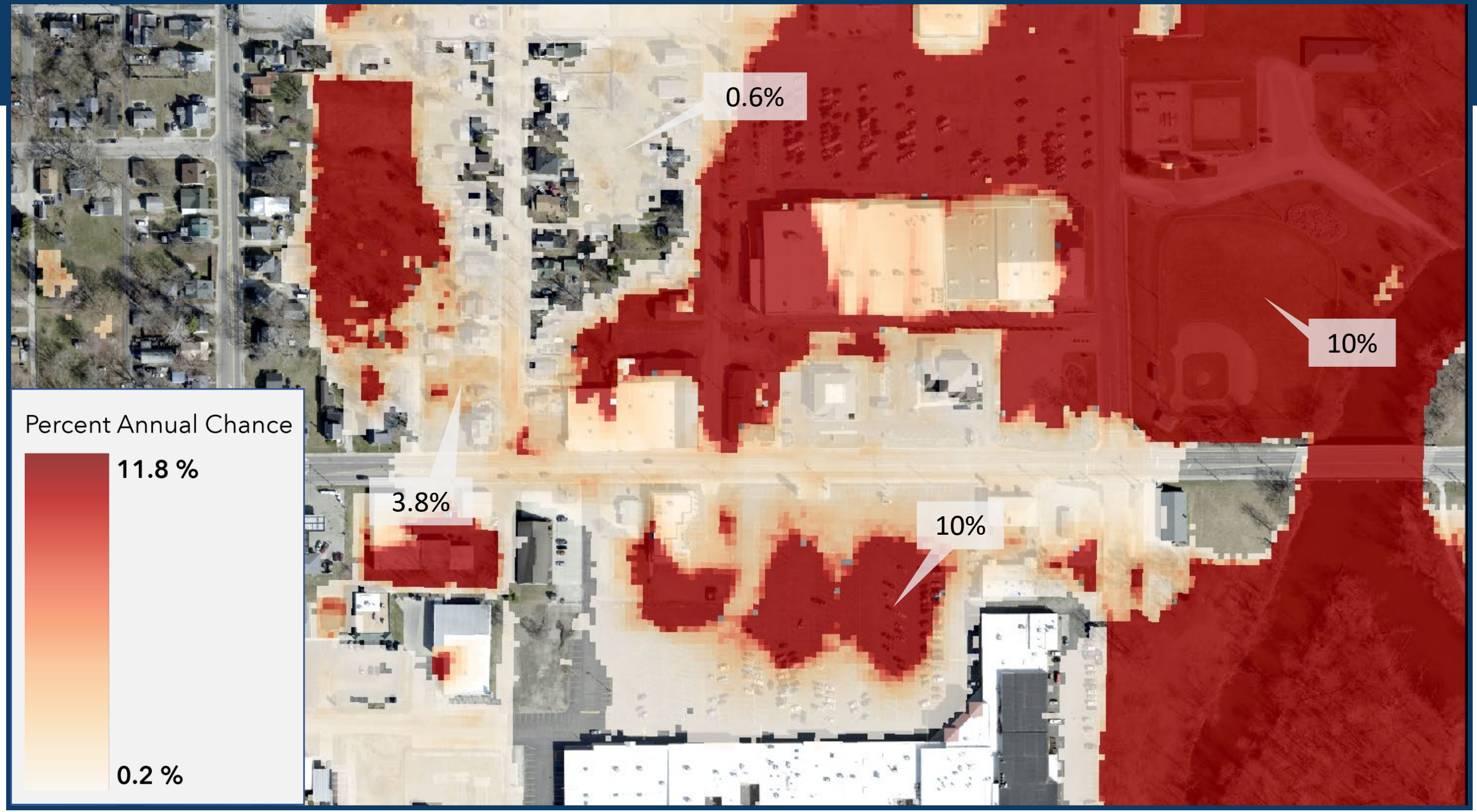
Assessing Vulnerability

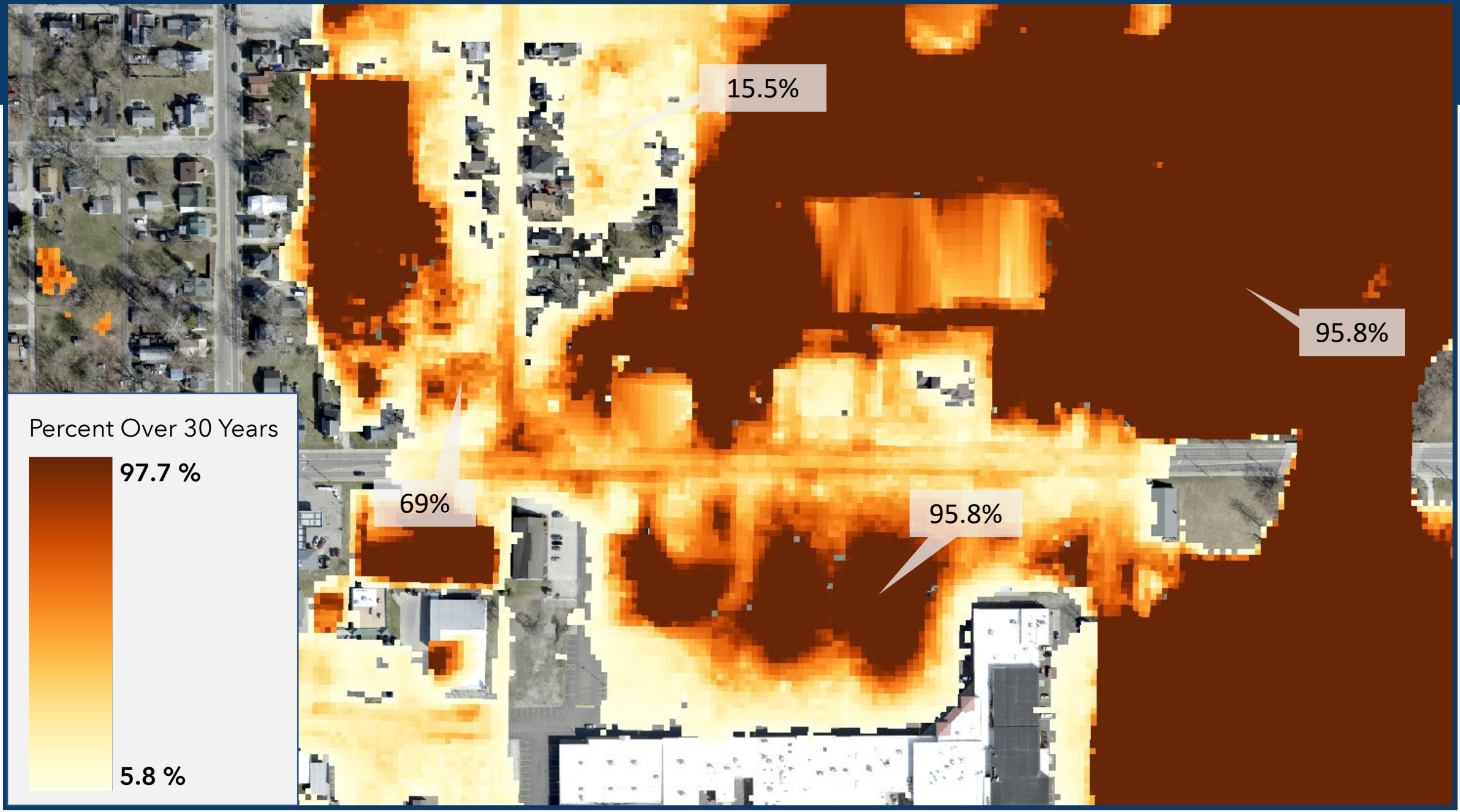
- Community Reporting
- Climate Change Vulnerability Assessment for Stormwater
- United States Geological Survey (USGS) Tools
- Federal Emergency Management Agency (FEMA) Risk Data



goshenindiana.org/flood-zone




0.6%
10%
3.8%
10%
Percent Annual Chance
11.8 %
0.2 %


15.5%
95.8%
69%
95.8%
Percent Over 30 Years
97.7 %
5.8 %


Goshen
THE MAPLE CITY

CHRISTOPHER B. BURKE ENGINEERING, LLC

Goshen
THE MAPLE CITY

CBB
BURKE

FLOOD RESILIENCE PLAN

Public Meeting
Thursday, March 17, 2022

Siavash Beik, PE, CFM, D.WRE
Sheila McKinley, AICP, CFM, LEED Green Associate

PLANNING PROCESS

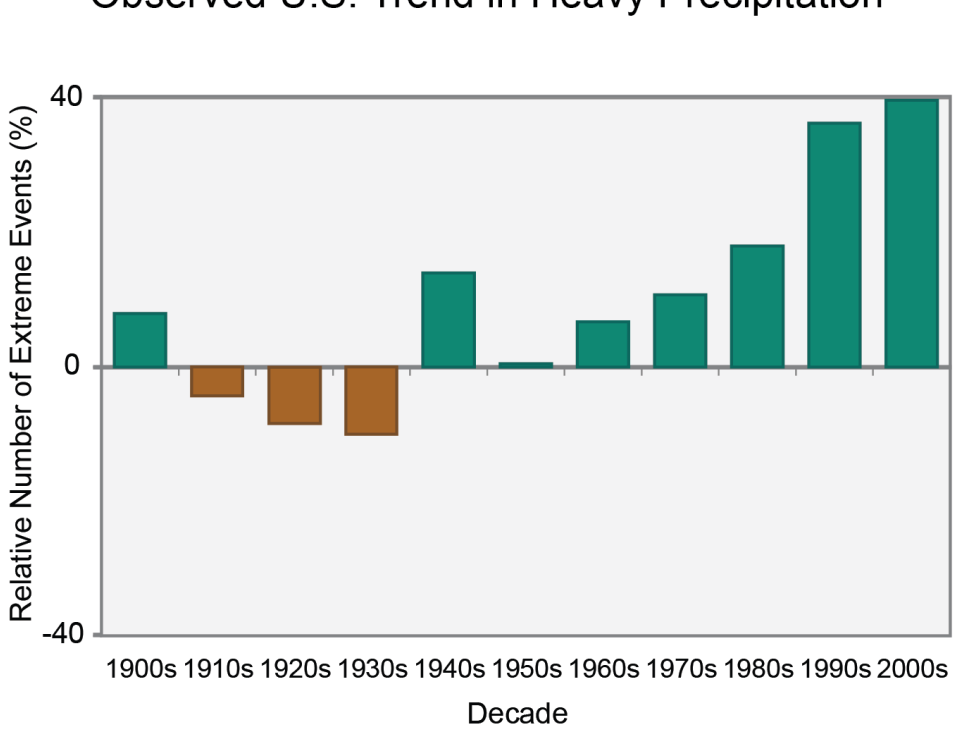
- 18-month planning process, led by a 12-member planning team
- Researched past flood events and impacts
- Evaluated existing policies, programs and projects
- Developed flood resilience planning areas and strategies
- Meetings with City Council, stakeholders and public
- *Next steps: final revisions, local adoption and implementation of flood resilience strategies*

FLOOD RESILIENCE PLAN PROJECT TEAM

Name	Responsibility
Aaron Satwatsky-Kingsley	Project Manager/Environmental Resilience Director
Jeremy Stutsman	Mayor
Rhonda Yoder	Planning & Zoning Administrator
Mark Brinson	Community Development Director
Dustin Sailor	Public Works Director
Jason Kauffman	Stormwater Coordinator
Mattie Lehman	Stormwater Specialist
Theresa Sailor	Environmental Educator
David Gibbs	Street Commissioner
Julia King	City Council
Matt Schrock	City Council
Jennifer Tobey (invited)	Elkhart County Emergency Management

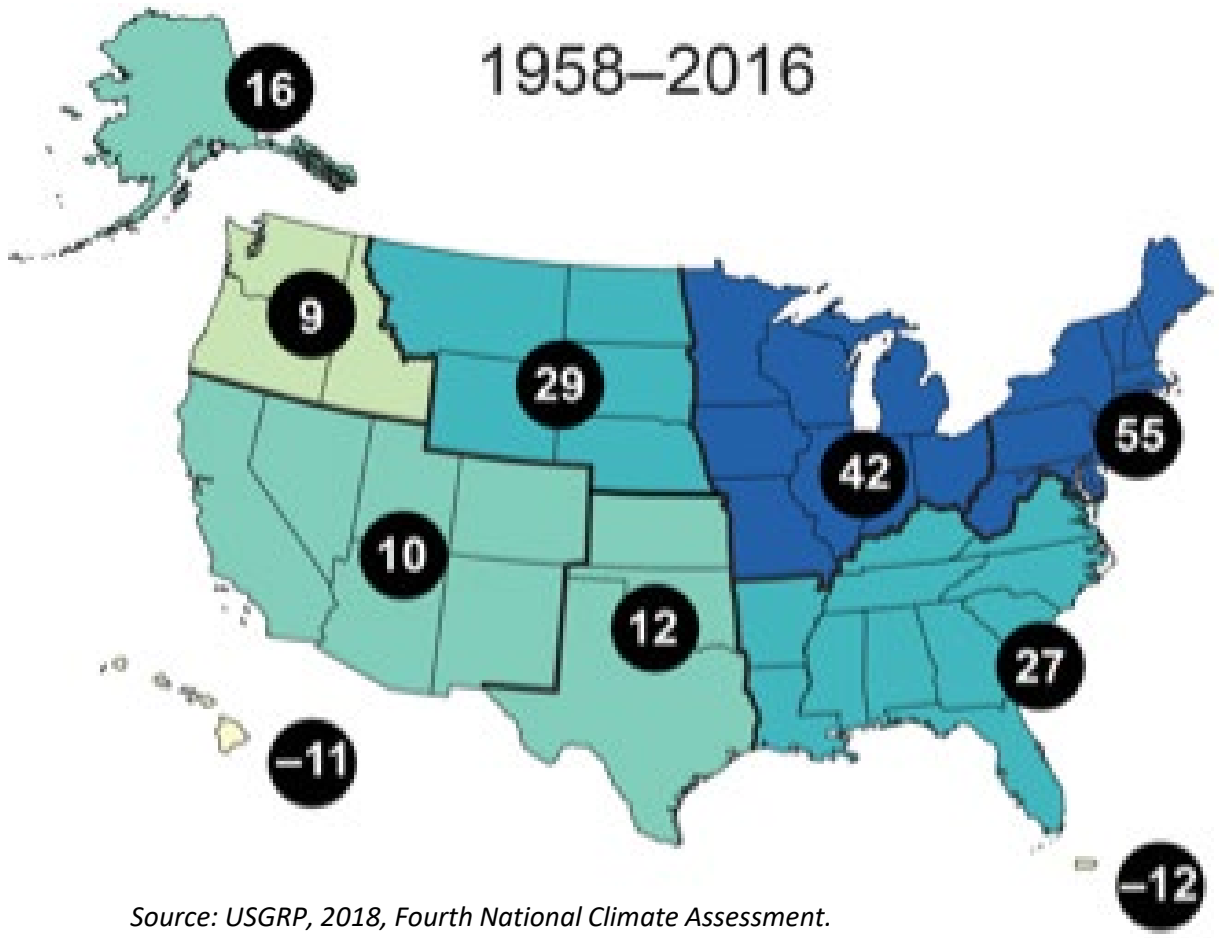
NATIONAL CLIMATE CHANGE ASSESSMENT

Observed Decadal Trend of Heavy Precipitation (2-day, 5-year RI) in Midwest (1901-2012 compared with 1901-1960)



Source: USGRP, 2014, Third National Climate Assessment (adapted from Kunkel et al. 2013)

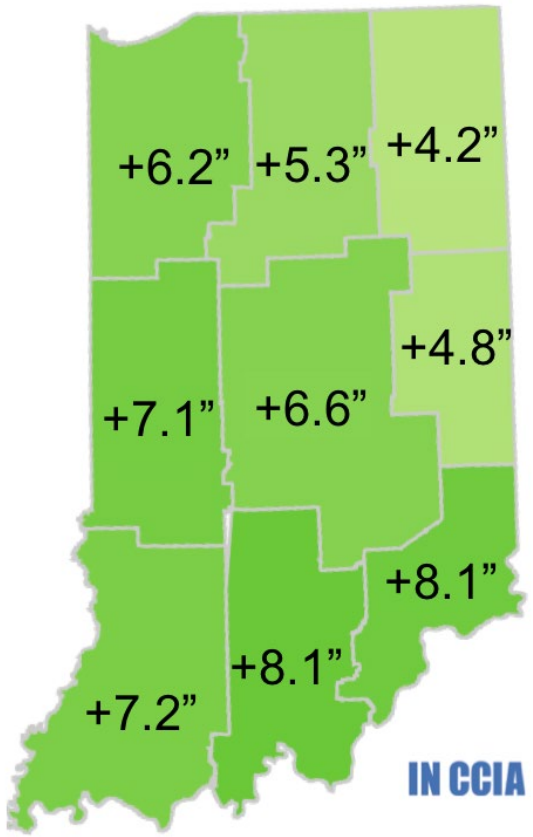
Observed % Change in Total Annual Precipitation Falling in the Heaviest 1% of Events (1958 – 2016)

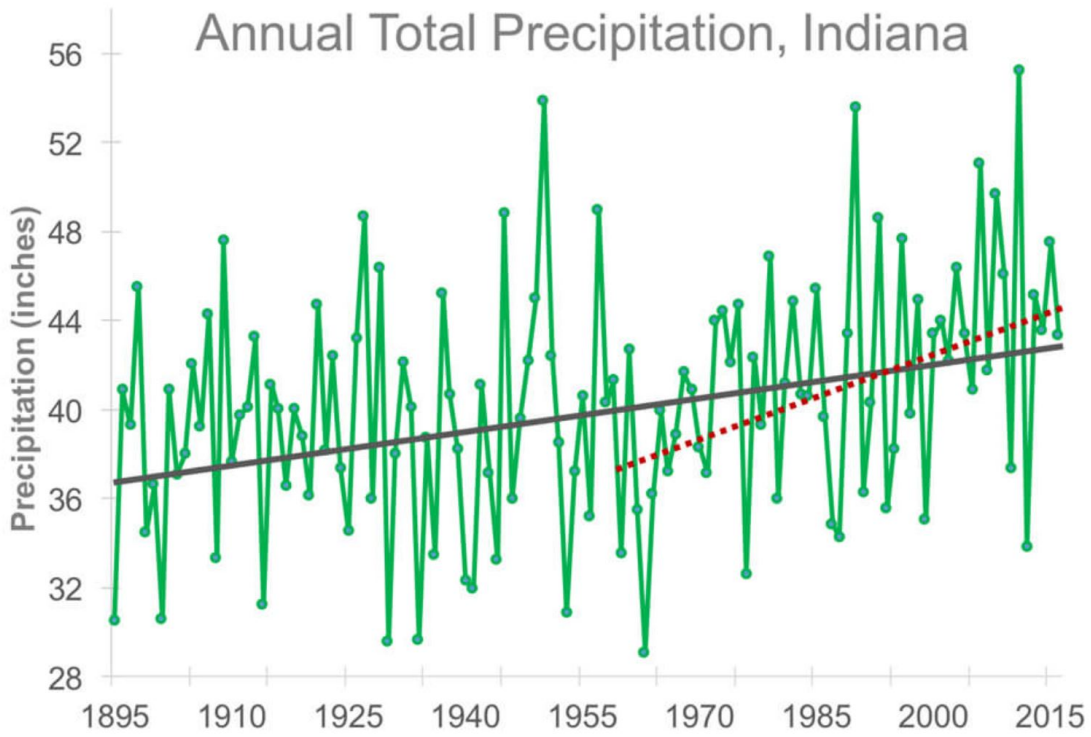


Source: USGRP, 2018, Fourth National Climate Assessment.

INDIANA CLIMATE CHANGE ASSESSMENT

Change In Annual Average Precipitation 1895-2019

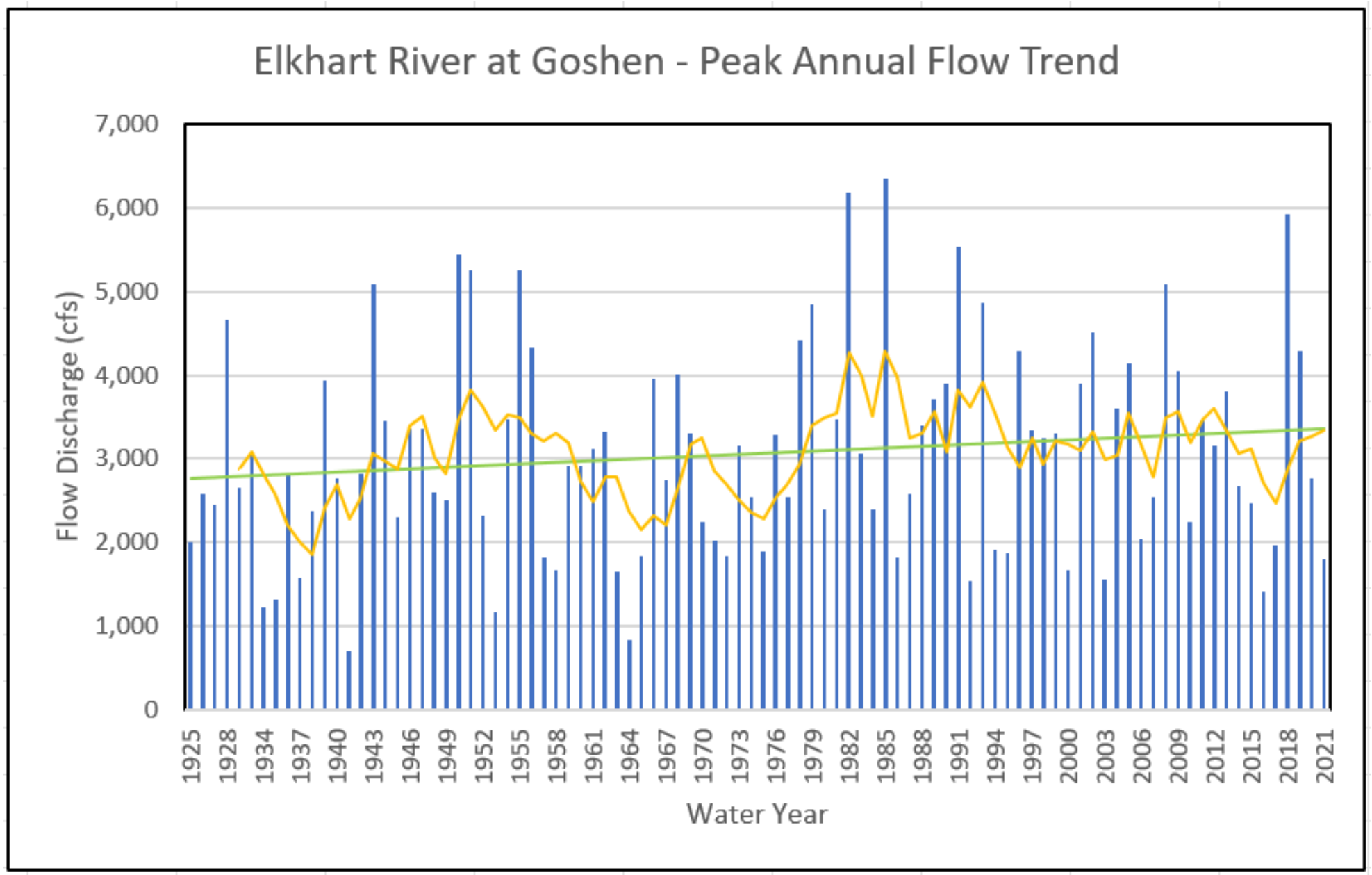




Indiana 2050…

1. **Total Annual Precipitation**: *expected to increase 6-8%*
2. **Seasonal Precipitation**: *expected to increase 25% in winter and 20% in spring*
3. ***Type of Precipitation:*** *rain is expected to replace snowfall*

Source: Indiana Climate Change Impacts Assessment. Purdue University (2019)

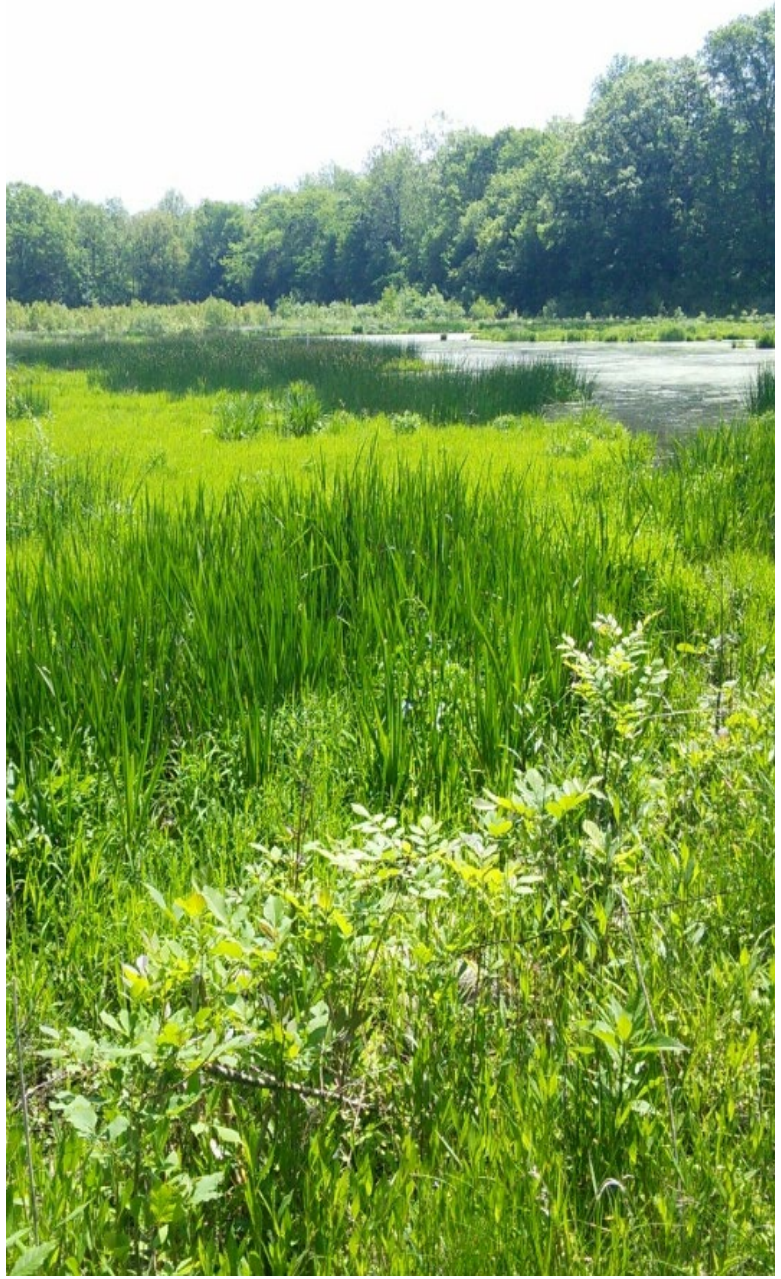

Elkhart River at Goshen - Peak Annual Flow Trend
Flow Discharge (cfs)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1925
1928
1934
1937
1940
1943
1946
1949
1952
1955
1958
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
2015
2018
2021
Water Year

MOVING FORWARD…

1. **Flooding Source Mitigation**: Secure major funding, allocate, and spend the ever-increasing necessary funds to try to reduce the flooding.
2. **Adaptation**: Adapt to these unavoidable climate change impacts by adopting and implementing appropriate flood resilience strategies.
3. **Do Nothing/Status Quo**: Suffer the consequences and brace for more devastation and economic uncertainty.

FLOOD RESILIENCE PLANNING

- Ability to prepare for, absorb, recover from and adapt to adverse flood events
- Define flood resilience areas and adopt smart growth strategies
- Support natural and beneficial floodplain function – leave room for the river

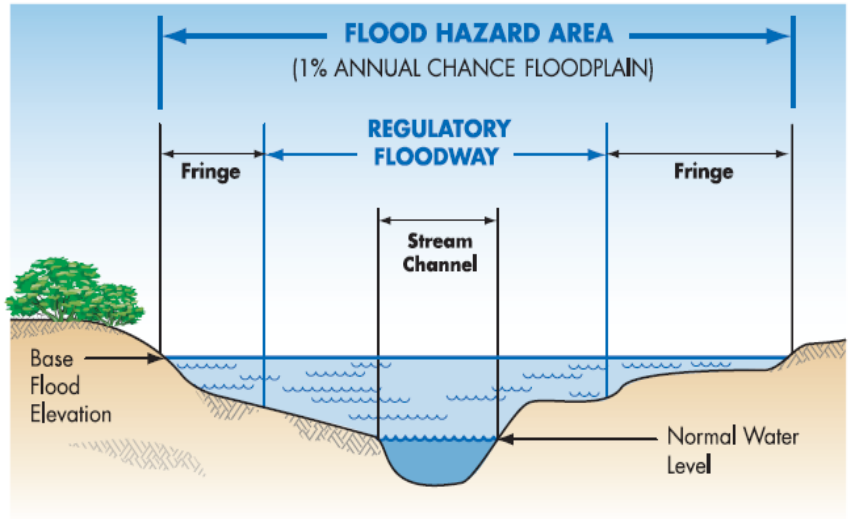


TWO-PRONGED APPROACH:

1. Use land-use planning policies to direct growth to areas less vulnerable to flooding
2. Identify and implement projects to protect those already vulnerable to flood risk

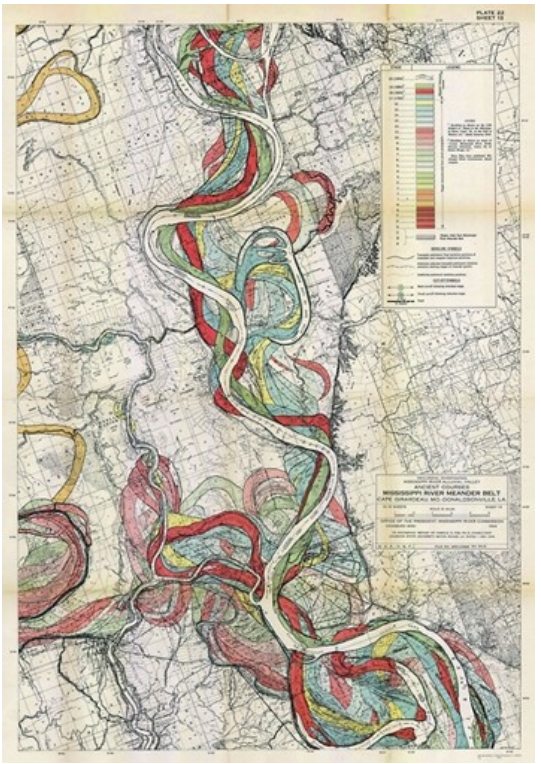
WATERSHEDS, FLOODPLAINS AND STREAMS

We all live in a watershed and land use impacts runoff



Flood Hazard Area
Special Flood Hazard Area
100-year Floodplain
1% Annual Chance Floodplain
Regulatory Floodplain

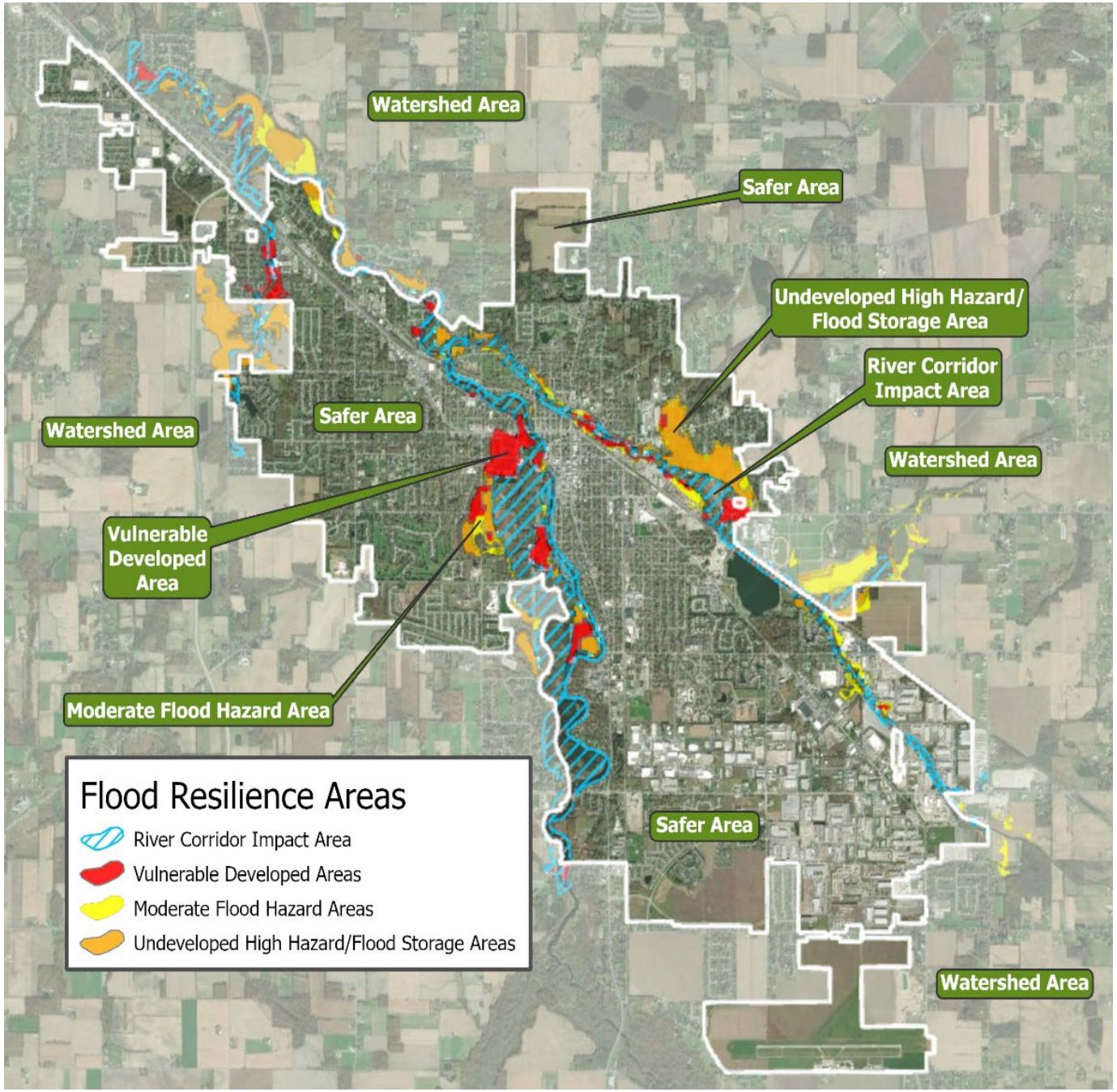
Streams move over time



FLOOD RESILIENCE PLANNING AREAS

Planning Area	Area Boundary
River Corridor	Floodway or FEH area, whichever is greater
Undeveloped High Flood Hazard/Flood Storage Area	Undeveloped land in the floodway fringe
Moderate Flood Hazard Area	0.2% or 500-year flood zone
Vulnerable Developed Area	Existing developed land in the SFHA
Safer Area	Outside SFHA, 0.2% and localized flooding areas
Watershed	Entire drainage area

FEH = Fluvial Erosion Hazard
SFHA = Special Flood Hazard Area

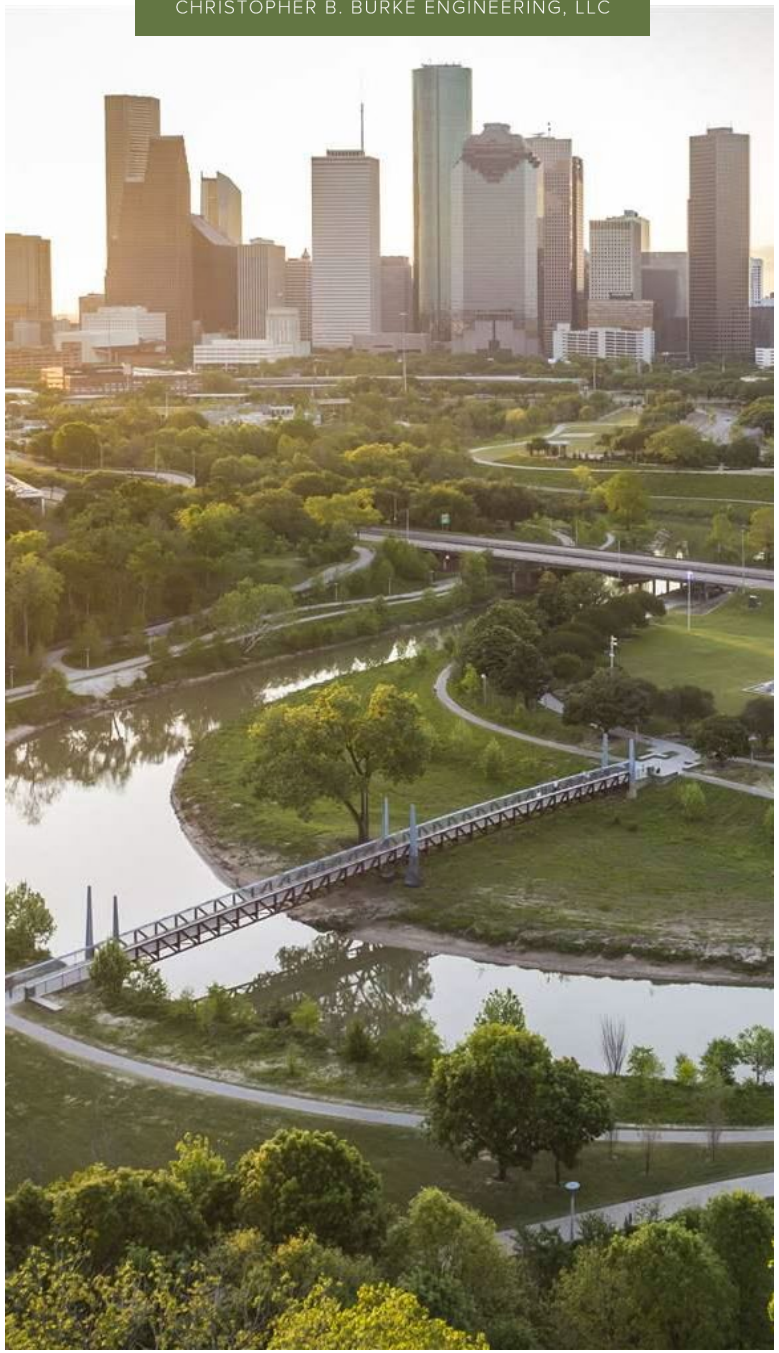


1. RIVER CORRIDOR IMPACT AREA

To conserve land and prohibit development

RECOMMENDED ACTION:

1. Adopt fluvial erosion hazard (FEH) regulations
2. Protect undeveloped land



2. UNDEVELOPED HIGH HAZARD /FLOOD STORAGE AREA

To conserve land and maintain the natural and beneficial function of the floodway fringe; discourage future development

RECOMMENDED ACTION:

1. Protect undeveloped land in the floodway fringe
2. Establish compensatory floodplain storage requirement

3. MODERATE FLOOD HAZARD AREA

To highlight areas subject to flood risk during extreme flood events, to avoid placement of critical facilities, and preserve these areas as additional flood storage

RECOMMENDED ACTION:

1. Discourage new development, especially critical facilities
2. Require higher standards for buildings

4. VULNERABLE DEVELOPED AREA

To protect people, buildings and facilities vulnerable to flooding and reduce future flood risk

RECOMMENDED ACTION:

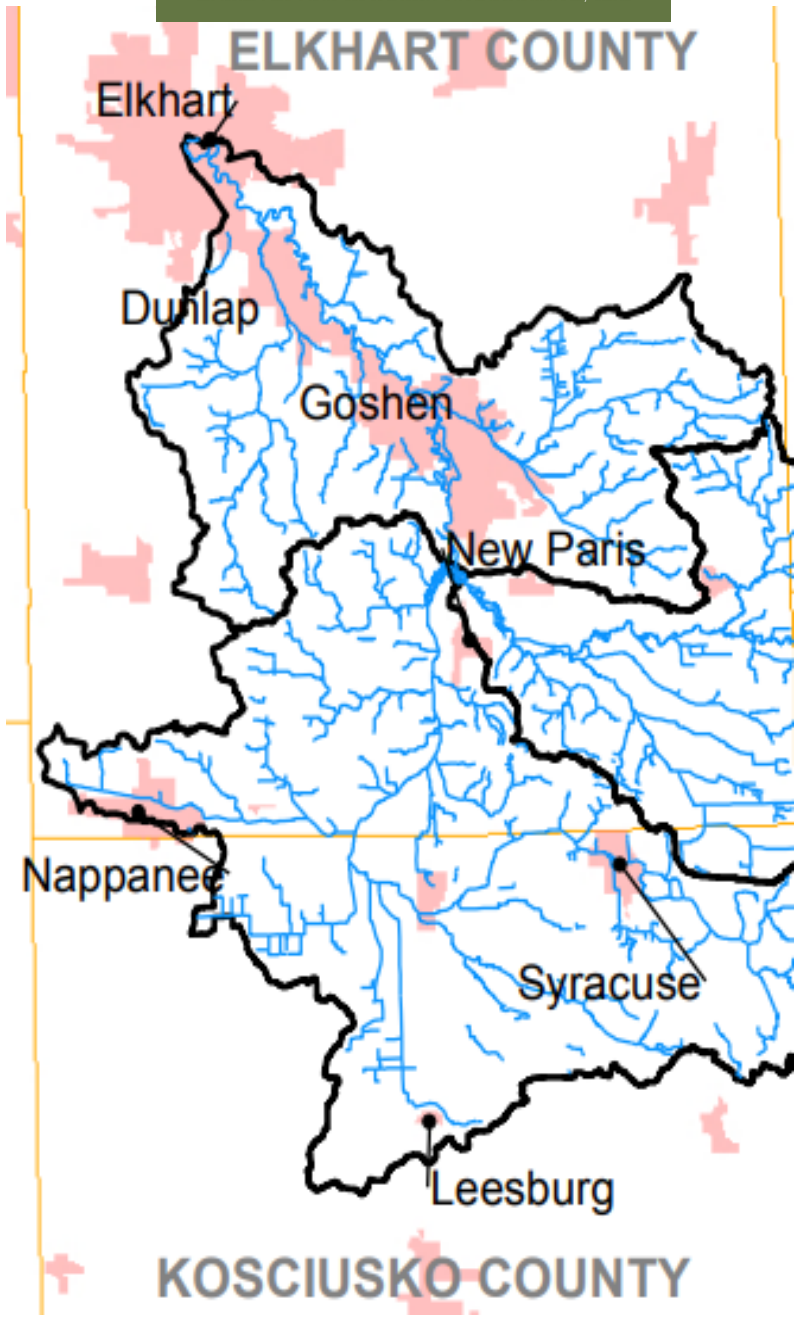
1. Prepare a Flood Response Plan
2. Prepare a citywide Stormwater Master Plan
3. Participate in the National Flood Insurance Program (NFIP) Community Rating System (CRS) program
4. Relocate and/or buyout structures inside the river corridor impact area
5. Retrofit, relocate and/or buyout structures outside the river corridor area
6. Bring nonconforming uses into compliance

5. SAFER AREA

To plan for and promote development in areas that are less vulnerable to future floods

RECOMMENDED ACTION:

- Guide growth and development to safer areas
- Promote conservation design and development
- Promote placement of critical facilities in safer areas



6. WATERSHED AREA

To promote coordination and partnerships and implement practices to slow, spread and infiltrate floodwater

RECOMMENDED ACTION:

- Support USGS stream gages
- Build partnerships within the watershed
- Support SWCD programs
- Reduce impact from tile and surface drains in the watershed

OVERALL STRATEGIES

To improve resiliency citywide. Emphasize importance of syncing plans, policies and regulations for consistency of resilience concepts and strategies.

RECOMMENDED ACTION:

1. Update Stormwater Ordinance and conduct training
2. Improve flood risk communication and education
3. Conduct regular audits of plans, programs and policies
4. Update City Code and Zoning Ordinance
5. Update the stormwater utility fee
6. Integrate resilience into the Comprehensive Plan
7. Include flood resilience in capital projects
8. Implement the Multi-hazard Mitigation Plan flood mitigation measures

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