City of Goshen

Flood Resilience Plan

JULY 2022

Prepared for:

City of Goshen
Department of Environmental Resilience
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EXHIBITS

APPENDICES

EXECUTIVE SUMMARY

Many communities in Indiana and across the United States have experienced damages from flooding. Despite the use of expensive, engineered solutions to reduce flooding risk such as elevating buildings and constructing levees, flood damage losses continue to increase. Moreover, climate change projections suggest that floods will intensify in most regions of the United States, especially in the Midwest and Northeast. These trends are creating a sense of urgency among communities to look for better ways to deal with flooding and build flood resilience, particularly in states like Indiana that are expected to experience increased flooding in the future. Flood resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse flood events.

This flood resilience plan identifies smart growth strategies to improve flood resilience in the City of Goshen. The approach is two-pronged. The first uses land-use planning policies to direct growth, economic development, and capital improvement projects to areas that are less vulnerable to flooding. This will help to prevent the problem from spreading and getting worse. The second is to implement projects to protect the people and critical assets that already exist in the vulnerable flood risk areas. This planning effort may challenge local leaders, decision-makers, and stakeholders to think differently about how to grow and develop while at the same time become resilient to the floods that have previously devastated the City of Goshen. This approach recognizes that the city may not be able to mitigate the increasing extreme rainfall events we have been experiencing from climate change and which are forecasted to further intensify into the foreseeable future. The plan does, however, emphasize strategies to adapt to the unavoidable climate change impacts through adoption and implementation of appropriate flood resilience strategies. This will result in the most immediately achievable and sustainable positive outcome for the city.

The flood resilience strategies are grouped by overall, citywide strategies and into six different planning area defined by the geographic regions of a river valley. Overall, citywide strategies include updating and synchronizing plans, policies and regulations. These consist of enhancements to the comprehensive plan, zoning ordinance, city code, and stormwater ordinance. Improving risk communication, education and outreach is discussed, as well as, evaluating the effectiveness of the stormwater utility to fund capital projects.

The six flood resilience areas consist of 1) the river corridor impact area which is the floodway and/or fluvial erosion hazard area, whichever is larger; 2) the undeveloped high hazard/flood storage area defined as the undeveloped land in the floodway fringe; 3) the moderate flood hazard area which incorporates the 0.2% annual exceedance probability or 500-year flood zone; 4) the vulnerable developed area comprised of existing developed land in the special flood hazard area; 5) the safer area outside the floodplain all together and within the city's planning jurisdiction; and 6) the watershed or entire drainage area.

The flood resilience strategies identified for the six flood resilience planning areas include protecting open, undeveloped land in the river corridor and floodway fringe and, where development is unavoidable in the floodway fringe, require compensatory flood storage. Strategies for vulnerable developed areas include preparing a flood response plan and stormwater master plan. As well as relocating and/or buying out structures, floodproofing and bringing nonconforming uses into compliance. This plan guides growth and development, and critical facilities, to safer areas, outside known flood hazard areas and encourages cooperation and partnerships throughout the watershed to slow, spread and infiltrate floodwater.

GLOSSARY OF KEY TERMS

Flood Insurance Rate Map (FIRM) – the map produced for a community participating in the National Flood Insurance Program that has been officially adopted by that community. The flood zones and Base Flood Elevations (BFEs) shown on the FIRM are used to determine flood insurance rates and requirements. Communities also use the FIRM to manage development and make floodplain management decisions. The adopted map is called the Effective FIRM or regulatory flood map. A Preliminary FIRM includes new or revised flood data and is for review and guidance only.

Floodway – the channel of a river or stream and those portions of the floodplains adjoining the channel which are reasonably required to efficiently carry and discharge the peak flood flow of the regulatory flood of any river or stream.

Floodway Fringe – the portion of the regulatory floodplain lying outside the floodway.

Indiana Best Available Floodplain Mapping – DNR has determined base flood elevations and floodplain boundaries for previously unstudied Approximate Zone A streams. This information is used statewide to supplement community adopted FIRMs.

Fluvial Erosion Hazard (FEH) Area - the area of the stream and land adjacent to the stream where stream processes may occur that enable the stream to re-establish and maintain a stable slope and dimensions over time. FEH area boundaries attempt to capture lands most vulnerable to fluvial erosion in the near term and indicate the type, magnitude, and frequency of fluvial adjustments anticipated during flood events.

National Flood Insurance Program (NFIP) – FEMA program that provides flood insurance to property owners. The NFIP works with communities to adopt and enforce floodplain management regulations that help mitigation flooding effect.

Special Flood Hazard Area (SFHA) – the land defined on the flood insurance rate map subject to inundation by the one percent annual chance or regulatory flood (also known as the 100-year flood). These areas are shown on the maps as Zone AE, AH, AO, A.

1% Annual Exceedance Probability (AEP) – the flood that has a one percent chance of being equaled or exceeded in any given year. Any flood zone that begins with the letter A is subject to the one percent annual chance flood. Also referred to as the 100-year flood.

0.2% Annual Exceedance Probability (AEP) – the flood that has a 0.2 percent chance of being equaled or exceeded in a given year. The area shown on the FIRM that is outside the SFHA and labeled Zone X (unshaded). Also referred to as the 500-year flood.

CHAPTER 1: INTRODUCTION AND BACKGROUND

Many communities in Indiana and across the United States have experienced damages from flooding. Despite the use of expensive, engineered solutions to reduce flooding risk such as elevating buildings and constructing levees, flood damage losses continue to increase. Moreover, climate change projections suggest that floods will intensify, especially in the Midwest and Northeast. According to a 2018 National Climate Assessment report, the Midwest has experienced a greater increase in extreme precipitation over the past few decades than most other regions in the United States; between 1958 and 2016, the Midwest saw a 42% percent increase in the amount of precipitation from very heavy events (**Figure 1-1**).

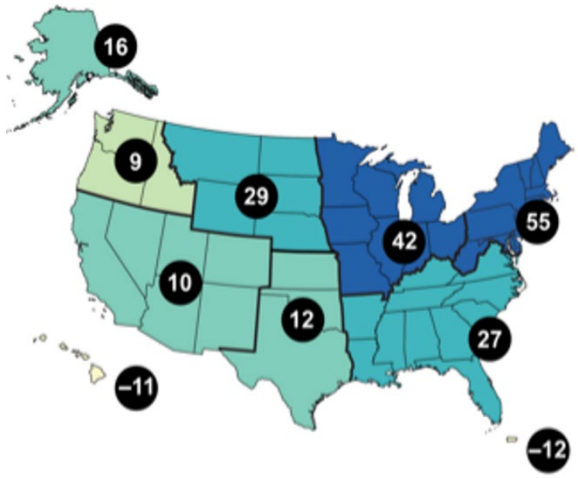

Figure 1-1: Observed Change in Heavy Precipitation 1958 - 2016

A recent study from the Indiana Climate Change Impact Assessment (INCCIA) reported an increase in annual precipitation of 4.8 inches in north central Indiana from 1895 to 2016 (**Figure 1-2**). Over the next 30 years, the pace of this increase is predicted to quicken; annual precipitation is expected to increase an additional 6-8%. It is also predicted that Indiana will experience a 25% increase in winter precipitation and 20% increase in the spring, and a 5% decrease in the summer and fall precipitation. Additional precipitation in the winter and spring, when the ground is frozen and trees are dormant, will increase runoff and the risk of flooding.

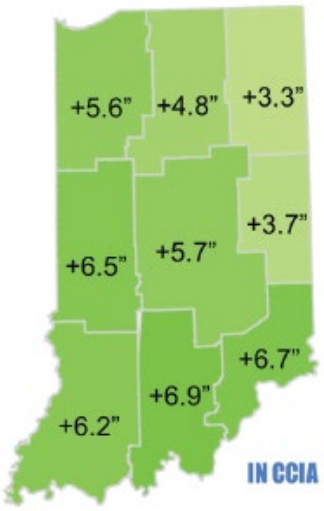

Figure 1-2: Change in Annual Average Precipitation 1895 - 2016

The most extreme rainfall events, defined by the top 1% daily total rainfall occurrences on record, are occurring more frequently and trending to continue in doing so. The INCCIA estimates that a one-to two-day increase in the average number of days per year with extreme precipitation is likely. Regional observations have also indicated more intense storms, and an increase in the amount of rain falling during these extreme events.

These trends are creating a sense of urgency among communities to look for better ways to deal with flooding and build flood resilience, particularly in states like Indiana that are expected to experience increased flooding in the future. As used in this report, flood resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse flood events.

In 2014, the U.S. Environmental Protection Agency (EPA) Office of Sustainable Communities, in partnership with the Federal Emergency Management Agency (FEMA), published a report entitled: "Planning for Recovery and Long-Term Resilience in Vermont". This report, which includes smart growth approaches for disaster-resilient communities, describes a process through which communities could achieve flood resiliency through auditing, updating, integrating, and revising their plans, policies, and regulations as well as adopting and implementing specific land use policies. The concept and methodologies used in that report, including a flood resilience checklist, was subsequently utilized and further modified and refined by Christopher B. Burke Engineering, LLC (Burke) for use in Indiana.

The purpose of this plan is to explore smart growth strategies to improve flood resilience. The approach is two-pronged. The first uses land-use planning policies to direct growth, economic development, and capital improvement projects to safer areas that are less vulnerable to flooding. This will help to prevent the problem from spreading and getting worse. The second is to implement projects to protect the people and critical assets that already exist in the vulnerable flood risk areas. This planning effort may challenge local leaders, decision-makers, and stakeholders to think differently about how to grow and develop while at the same time become resilient to the floods that have previously devastated the City of Goshen and other communities in Indiana.

The two-pronged approach noted above recognizes that we, as a nation or globally, may not be able to mitigate the increasing extreme rainfall events we have been experiencing because of climate change and which are forecasted to further intensify into the foreseeable future. That realization would force the communities to select one of the following three paths:

1. **Flooding Source Mitigation**: Secure major funding, allocate, and spend the ever-increasing necessary funds to try to reduce the flooding through major structural projects such as flow diversion, flood control facilities, or levees (if even effective or feasible without adverse impacts to others downstream or upstream).

2. **Adaptation**: Adapt to these unavoidable climate change impacts by adopting and implementing appropriate flood resilience strategies (which may include small scale structural measures to protect assets and buildings).

3. **Do Nothing/Status Quo**: Suffer the consequences of ignoring the previous two options and brace for more devastation and economic uncertainty.

Focusing on adaptation, path number two, which promises to result in the most immediately achievable and sustainable positive outcome for the city, this flood resilience plan provides background on the city, a summary of past flood studies, an overview of this planning process, a set of overall and geographically specific resilience strategies, and recommended flood resilience implementation measures for the City of Goshen.

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CHAPTER 2: ABOUT THE CITY OF GOSHEN

The City of Goshen is in north central Indiana and serves as the county seat of Elkhart County. This 18 square mile city is home to 34,517 people. The city is located southeast of the City of South Bend and the City of Elkhart near the Indiana-Michigan state line. The city appropriately promotes itself with the tagline an "uncommonly great" place to live, study, work or visit. It is home to Goshen College, a private university known for leadership in intercultural and international education, sustainability and social justice.

Maintaining a healthy population of residents and businesses is important to the social and economic stability of any community, and Goshen is no exception. This challenge is even greater for Goshen with approximately 10% of the city is in a flood risk area. As shown in **Figure 2-1**, Elkhart River enters the city from the south and meanders through the city before merging with Rock Run Creek on the east side. The geometry of these watercourses, along with low-lying elevations, encroachment from neighboring land uses, stretched with limited riparian cover, and eroding streambanks all contribute to the flooding problems present in the city. To compound the problem, the City of Goshen is located downstream of a large watershed.

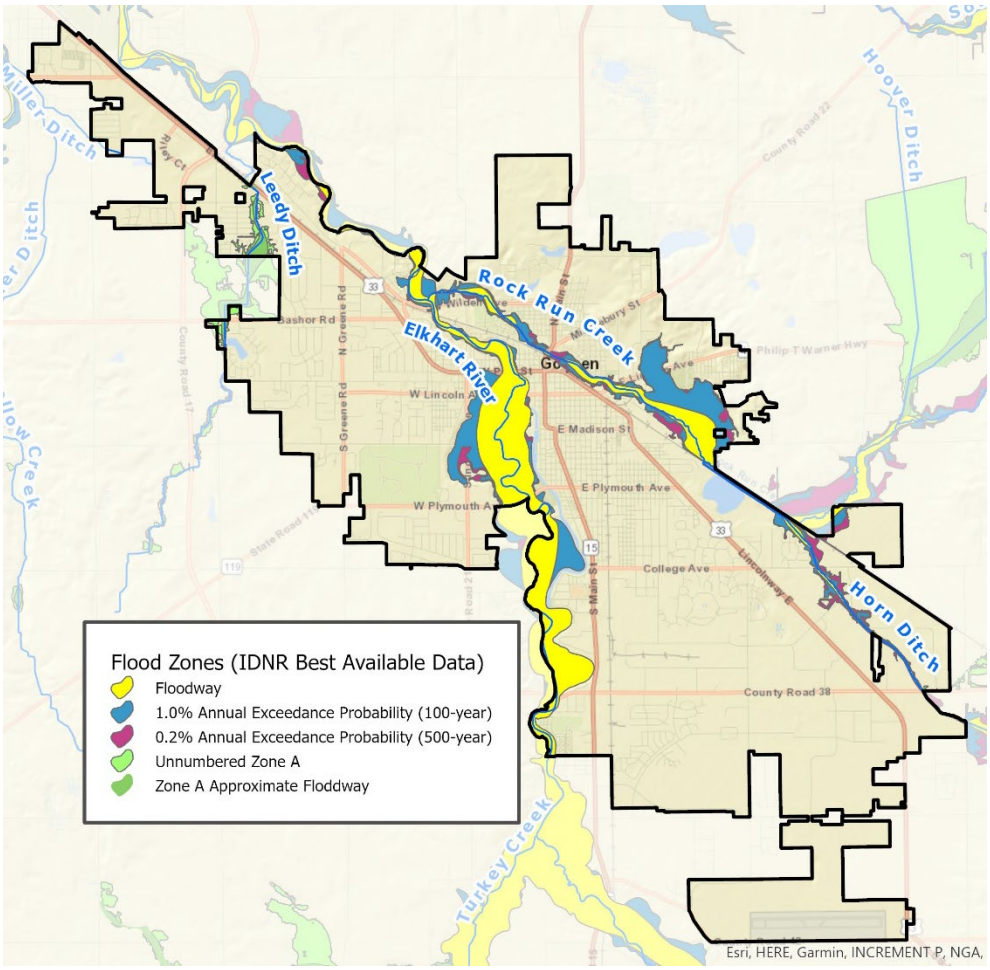


Figure 2-1: City of Goshen and Flood Risk Areas

CHAPTER 3: SUMMARY OF FLOODING AND FLOOD STUDIES

The impetus for the preparation of this plan was the widespread flood-related damage that Goshen and the surrounding areas sustained in February 2018, resulting from approximately ten inches of snow accumulation in early February followed by unusually warm weather and a record-breaking five inches of rainfall a few weeks later. According to the National Weather Service (NWS), the local geology was primed for a big flood. Ten inches of snow equates to about 1 to 1.5 inches of melted water causing the ground to become saturated and local river levels to rise. The five inches of rainfall was the heaviest recorded in a three-day period for any one month since the early 1900s. Compound this with the time of year in February when vegetation is dormant and less effective at absorbing or reducing runoff.

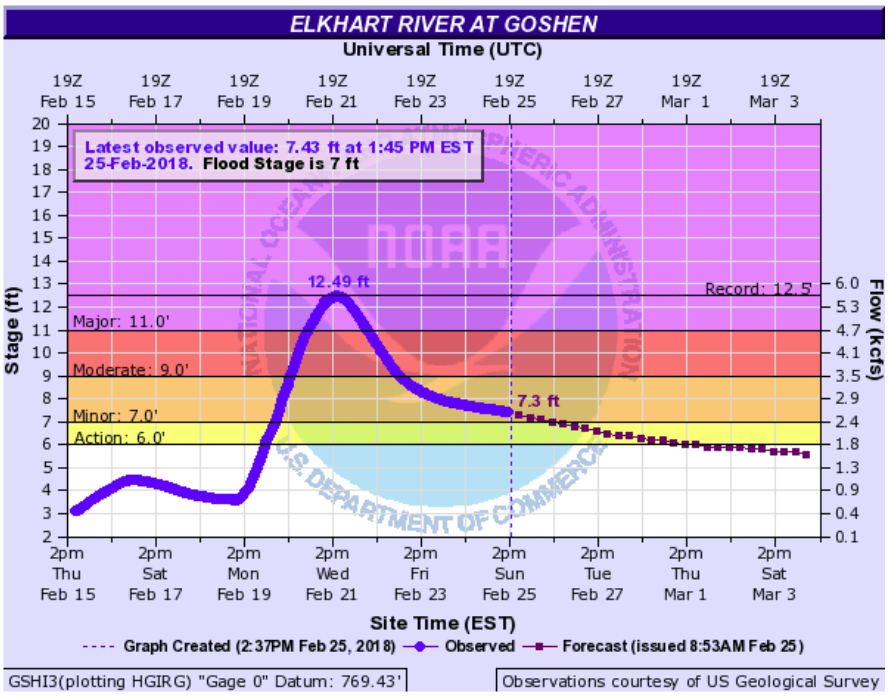


Figure 3-1: Stream Gage Reading during the February 2018 Flood in Goshen

The NWS Advance Hydrologic Prediction Service (AHPS) co-located at the Elkhart River at Goshen United States Geological Survey (USGS) stream gage indicated that on February 21, 2018, the Elkhart River (at Goshen) crested at 12.49 feet, as shown on **Figure 3-1**. Later the NWS confirmed the crest was 12.53 feet which set a new flood record for this gage. Figure 3-1 shows how the flood event escalated quickly in about 48 hours from below action stage to a major flood stage. Historic crest data for this gage date back to the 1930s. Since that time, there have only been three other major stage floods recorded and all within the last 40 years. These include:

- 11.94 feet on 3/14/1982
- 11.87 feet on 2/24/1985
- 11.03 feet on 12/30/1990

While the flood of February 2018 was not the first flood to impact Goshen, the extent and severity of flooding was widespread and unprecedented. As shown in **Figure 3-2** and **Figure 3-3**, numerous buildings were damaged, streets overtopped, neighborhoods evacuated and businesses forced to close. The mayor declared a state of emergency and the county commissioners recognized the situation was beyond local response capabilities and issued a disaster declaration for Elkhart County, the City of Goshen and the City of Elkhart. Travel advisories were issued to limit traffic on flooded roads. The February 2018 flood became a catalyst for the City of Goshen to think differently about flood preparedness and mitigation. In a statement from the mayor, he expressed the need for the city to find ways to be more adaptable to flooding in the future.

A large concern is that the flooding could get worse. The greatest impact may be from the increase in heavy rainfall. As noted earlier, the 2018 National Climate Assessment shows that in the Midwest areas, the heaviest 1% of all daily rainfalls has increased by 42% from 1958 to 2016, and that trend is predicted to continue. The effects of an increase in heavy rainfall can also be seen in interior drainage issues and urban flooding. Large areas of impervious cover increase stormwater runoff volume and velocity to infrastructure that was not designed for these more intense and frequent storms. Also impacted are the areas upstream in the watershed. Changing farm practices and the continued draining of depressional areas. These modifications contribute to increased stream flow and flooding. While elimination of flooding may not be a near term possibility, there are ways, including non-structural alternatives, to at least prevent it from becoming worse and increase the City of Goshen's resiliency to flooding. The following summarizes recent studies and reports that relate to stormwater and flooding.

Figure 3-2: Flooding on Lincoln Avenue and Linway Plaza

Figure 3-3: Flooding at Creekside Estates Mobile Home Park

3.1 STORMWATER DRAINAGE STUDIES AND PROJECTS

Stormwater drainage studies and projects are completed to protect life and property against flooding and to meet regulatory requirements. These studies are often in response to a flooding or stormwater drainage problem. The following are recently completed studies in the City of Goshen.

- **Century Drive Drainage System Capacity Study (2005)** – this study evaluated the capacity of the existing stormwater infrastructure to accommodate nearby development runoff.
- **Goshen Industrial Park Stormwater Study (2006)** – this study evaluated past flooding and provides recommendations to improve onsite stormwater storage potential.
- **Crescent Street Stormwater Study (2008)** – this study provided proper sizing for reconstruction of this street and future stormwater improvements on Seventh Street.
- **Wilson Avenue Drainage Study (2009)** – this study evaluated the size of pipes needed to properly drain Wilson Avenue between Plymouth Avenue/SR 119 and Lafayette Street and between Mill Race Canal and Main Street/SR 15.
- **Chicago Avenue and Indiana Avenue Drainage Study (2011)** – this study evaluated the outfall pipe size at this intersection south to Wilkinson and west to Riverside Boulevard.
- **West Goshen Stormwater Study (1981, 2011)** – this study evaluated drainage problems in this area and recommended improvements. The study was updated and is being used as a guide for future drainage improvement projects.
- **Former Western Rubber "Genesis" Drainage Study (2014)** – this study evaluated options for offsite stormwater management for the property at Tenth Street and Plymouth Avenue to maximize the site redevelopment potential.
- **Horn Ditch Reconstruction (2016)** – this project converted 1.81 miles of Horn Ditch to a two-stage ditch and removed approximately 50 acres from the floodplain to allow for development.
- **Goshen Dam Pond Report (2019)** – this report evaluated options to increase flood storage/flood control of the Goshen Dam Pond and concluded that without completely rebuilding the dam, additional flood storage is not possible.
- **Crossing Subdivision Stormwater Improvements (2020)** – this project includes the design and construction of a series of interconnected detention basins to alleviate flooding and allow the Crossing subdivision and a future subdivision to the south to be built out.
- **Lippert/Dierdorff TIF Stormwater Master Plan (2021)** – this plan identified solutions to address flooding and allow for new industrial development in the southeast TIF district.

3.2 FLOOD RISK REVIEW / RISKMAP STUDY

In early 2020, FEMA completed a Flood Risk Review study of select streams in the St Joseph River Watershed in Indiana and Michigan through the RiskMAP program. The draft results show several differences in the limits of the floodway and floodplain between this new study and the effective FIRM. The RiskMAP team met with the City of Goshen in August 2020 to review and comment on the draft results of the completed analyses. These results will eventually be used to revise and update the FIRM following the city's thorough review, approval and adoption process.

Since the RiskMAP study is under review and will most likely be refined, these areas were not used to determine the flood resilience areas in this plan. However, once approved, the RiskMAP areas may be used to amend, refine, or revise flood resilience areas in the future. Land use decisions in the city should consider the potential for flood risk based on updated data and flood modeling.

3.3 ST. JOSEPH WATERSHED FLOOD RISK REPORT

In March 2021, FEMA's RiskMAP program published a Flood Risk Report for the St Joseph Watershed. This report provides non-regulatory flood risk information to assist local floodplain managers, planners and emergency managers to better understand their flood risk, take steps to mitigate those risks and communicate those risks to their citizens and local businesses. This report includes a summary of flood risk data for each of the communities in the St Joseph Watershed. **Table 3-1** below shows the estimated potential losses for flood event scenarios for the City of Goshen using FEMA's HAZUS risk modeling software. Without mitigation and adaptive measures in place, substantial losses to structure, content and business operations can be expected during a large flood event however, this data shows potential for large losses during a smaller 10-year flood event which are more common and more likely to occur.

Table 3-1: Estimated Potential Losses for the City of Goshen

Building Type (Percent)	Estimated Dollar Losses by Flood Event			
	10% (10-yr)	2% (50-yr)	1% (100-yr)	0.2% (500-yr)
Residential (52%)	$2.9M	$1.0M	$4.0M	$6.4M
Commercial (28%)	$4.6M	$1.0M	$8.9M	$12.6M
Other (20%)	$2.2M	$400K	$4.7M	$6.6M
Total Building	$9.7M	$2.4M	$17.6M	$25.5M
Business Disruption	$55.3M	$64.8M	$82.7M	$104.1M
TOTAL LOSSES	$65.0M	$67.2M	$100.3M	$129.6M

3.4 CLIMATE ACTION PLAN

The goal of the City of Goshen Climate Action Plan for Local Government Operations is to reduce greenhouse gas emissions and achieve net zero emissions from municipal operations by 2035. Climate change directly influences flooding. A warmer climate allows the atmosphere to hold more moisture and when this warm moist air rapidly cools, the result is heavy and sometimes record-breaking rainfall. The Climate Action Plan, adopted by City Council in July 2021, identifies nine major emission reduction strategies. The following strategies directly relate to stormwater and flooding:

S4: Sustainable Infrastructure – need for higher standards to accommodate more intense and heavier rainfall; need to incorporate nature-based solutions such as green infrastructure

S6: Sustainable Land Use – need to preserve, enhance and acquire land in the floodplain and maintain its natural and beneficial function for flood storage

S7: Tree Canopy – need to increase the urban tree canopy to 45% by 2045, trees naturally reduce stormwater runoff by intercepting, capturing and storing rainfall

3.5 VULNERABILITY ASSESSMENT FOR STORMWATER

The City of Goshen is in the process of finalizing a Climate and Socio-Economic Vulnerability Assessment for Stormwater with assistance from the Great Lakes Integrated Sciences and Assessments (GLISA). This study assesses the vulnerability of 18 system components throughout Goshen, shown in **Figure 3-4**, by evaluating their sensitivity to climate change and their adaptive capacities. Several landscape and demographic factors were considered to inform evaluations of sensitivity and adaptive and many of these factors were mapped to understand geographic vulnerabilities in the city. For example, flood damage data from the February 2018 was analyzed for density of damaged structure (**Figure 3-5**).

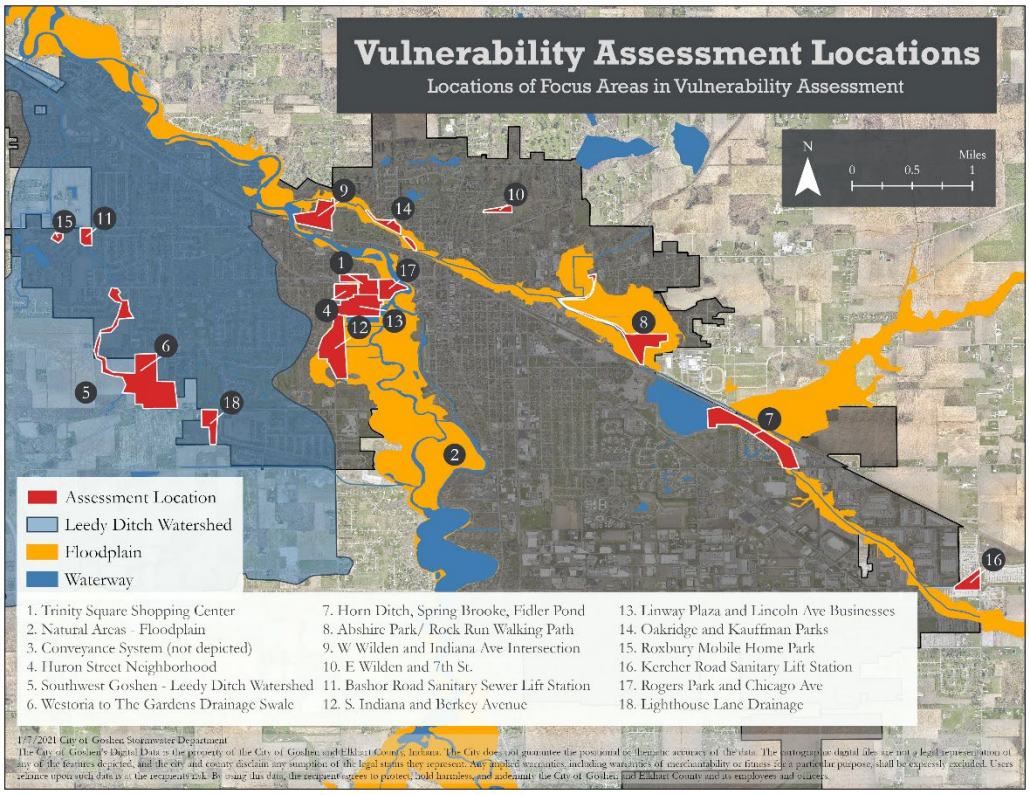


Figure 3-4: Location of Vulnerable System Components

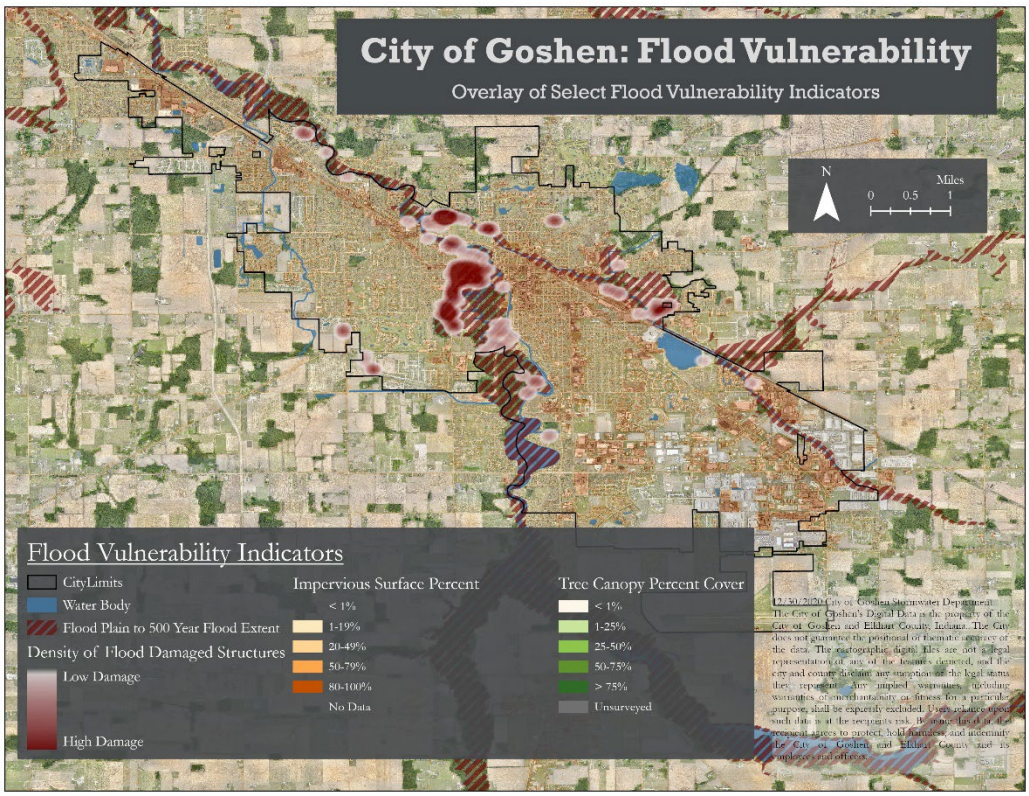


Figure 3-5: Flood Vulnerability Indicators

3.6 FLOOD FACTOR ANALYSIS

Flood Factor is an interactive online mapping and comprehensive risk assessment tool that assigns a flood risk score from 1 to 10 to individual properties. Those properties with a higher score are more likely to experience flooding over a 30-year period. While this tool does not account for flood protection measures such as sump pumps, sealed or elevated homes, it does provide a resource to discuss flood risk and associated flood damage with the public. In the City of Goshen, the flood factor tool identified approximately 1,400 properties that are at risk to flooding and that this number is expected to increase based on climate change predictions. **Figure 3-6** shows the distribution of properties at risk to flooding and severity of flooding expected. This tool is a product of First Street Foundation, a non-profit research and technology group.

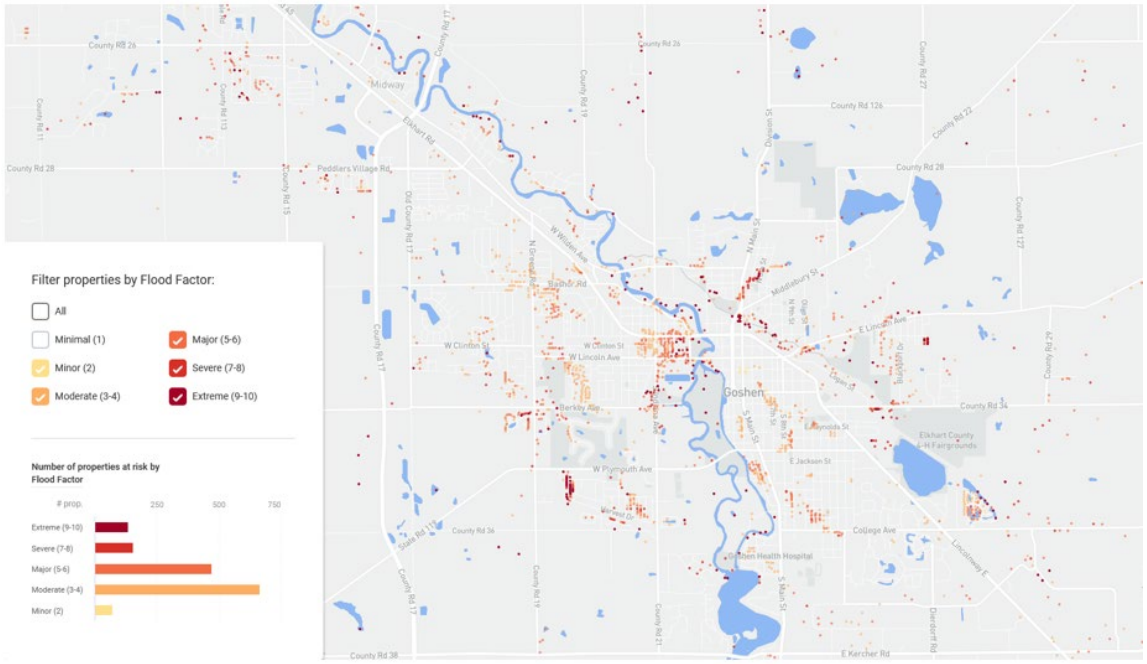


Figure 3-6: Properties at Risk to Flooding

3.7 NORTH BRANCH ELKHART RIVER FLOOD RISK MANAGEMENT PLAN

The St Joseph River Basin Commission (SJRBC) completed the North Branch Elkhart River Corridor Flood Risk Management Plan in 2020 to investigate the overall stream function and flooding on the mainstem of the North Branch Elkhart River in Noble and LaGrange Counties, upstream of the City of Goshen. As it related to flood control, the study concluded that there are no feasible alternatives to eliminate or significantly reduce flood peaks or volumes being experienced within the North Branch Elkhart River floodplains. Communities in this watershed should accept flooding will continue to occur and adopt strategies to prevent flooding from getting worse and to minimize flood damages through community-wide and geographic area specific flood resilience strategies.

CHAPTER 4: OVERVIEW OF THE PLANNING PROCESS

The following sections provide an overview of the major planning steps in the development of the City of Goshen Flood Resilience Plan. These include reviewing and consolidating available flood-related data; project team meetings and decision-making; and defining flood resilience planning areas for the City of Goshen. The strategies associated with the flood resilience planning areas are discussed in **Chapter 6**.

4.1 REVIEW AND CONSOLIDATION OF FLOOD-RELATED DATA

Burke reviewed available flood data, studies, and maps as well as planning documents, development codes, and stormwater and flood hazard ordinances to identify opportunities to incorporate/enhance flood resilient strategies into the city's policies, programs, and projects. The following lists the materials that were reviewed:

- City of Goshen Comprehensive Plan (2016)
- City of Goshen Zoning Ordinance (1984)
    - Article IV Section 4270: Flood Control District (Overlay) Regulations (2020)
    - Article V Section 5000: Landscape Regulations for Development
    - Article V Section 5110 Parking Requirements
- City of Goshen Subdivision Control Ordinance (1960)
    - Article V Section 512: Drainage Plan
- City of Goshen City Code (2016)
    - Title 6 Article 6: Stormwater Management
    - Title 6 Article 8: Trees
- City of Goshen Redevelopment Five-Year Capital Plan (2020-2024)
- City of Goshen Comprehensive Five-Year Park System Master Plan (2019)
- City of Goshen Tree Canopy Policy (2020)
- City of Goshen Climate Action Plan (2021)
- City of Goshen Climate and Socio-Economic Vulnerability Assessment for Stormwater (2021)
- Elkhart County Multi-Hazard Mitigation Plan (2016)
- Elkhart River Watershed Management Plan (2008)
- Effective FIRM (2011) and FIS (2011)
- Flood Risk Review St Joseph River Watershed RiskMAP Update (2020)
- Flood Risk Report St Joseph Watershed (2021)
- Goshen Dam Pond Report of Findings (2019)
- West Goshen Drainage Study (2012)

4.2 GUIDANCE FROM THE PROJECT TEAM

A project team of city staff from multiple departments and elected officials was assembled to guide the development of the Flood Resilience Plan. **Table 4-1** lists the project team members.

In December 2020, Burke met with the project team to introduce the project and discuss past flood events and actions needed for the City of Goshen become a flood resilient community. At this initial meeting, Burke lead the project team through a customized flood resilience checklist. The checklist includes strategies that assess how well the City of Goshen is positioned to avoid or reduce flood damage and recover from floods. Through a series of yes or no questions, the checklist evaluates the strengths and weaknesses of current policies and regulatory tools and non-regulatory programs as they relate to flood mitigation and adaptation. As intended, much discussion was generated by each of the questions including

where city policies, programs and projects could be added or enhanced as well as development trends and potential areas of expansion in the city. **Appendix 1** includes the completed checklist.

Table 4-1: Project Team List and Affiliation

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

The project team met again in February 2021 to review flood impact areas from the 2018 flood, land use designations and Flood Insurance Rate Maps (FIRM). Using the ArcGIS Online platform, Burke shared suggested boundaries for flood resilience planning areas. More information on the flood resilience planning areas is in Section 4.3 below.

Burke reached out to individual city staff from planning, redevelopment, engineering, stormwater and environmental resilience to better understand existing policies, programs and projects and discuss the types of flood resilience strategies that would work best for the City of Goshen. In May 2021, the full project team reconvened to review and prioritize recommended flood resilience strategies as well as discuss the method, resources, and timeline for implementation of these strategies. The project team met in August 2021 to discuss the implementation checklist and review the draft Flood Resilience Plan. Meetings were held with the stakeholders and the public in March 2022. Following revisions, the draft plan was presented to City Council in July 2022. Appendix 1 also includes summaries and worksheets from the project team meetings, presentations to the stakeholders and the public and comments received.

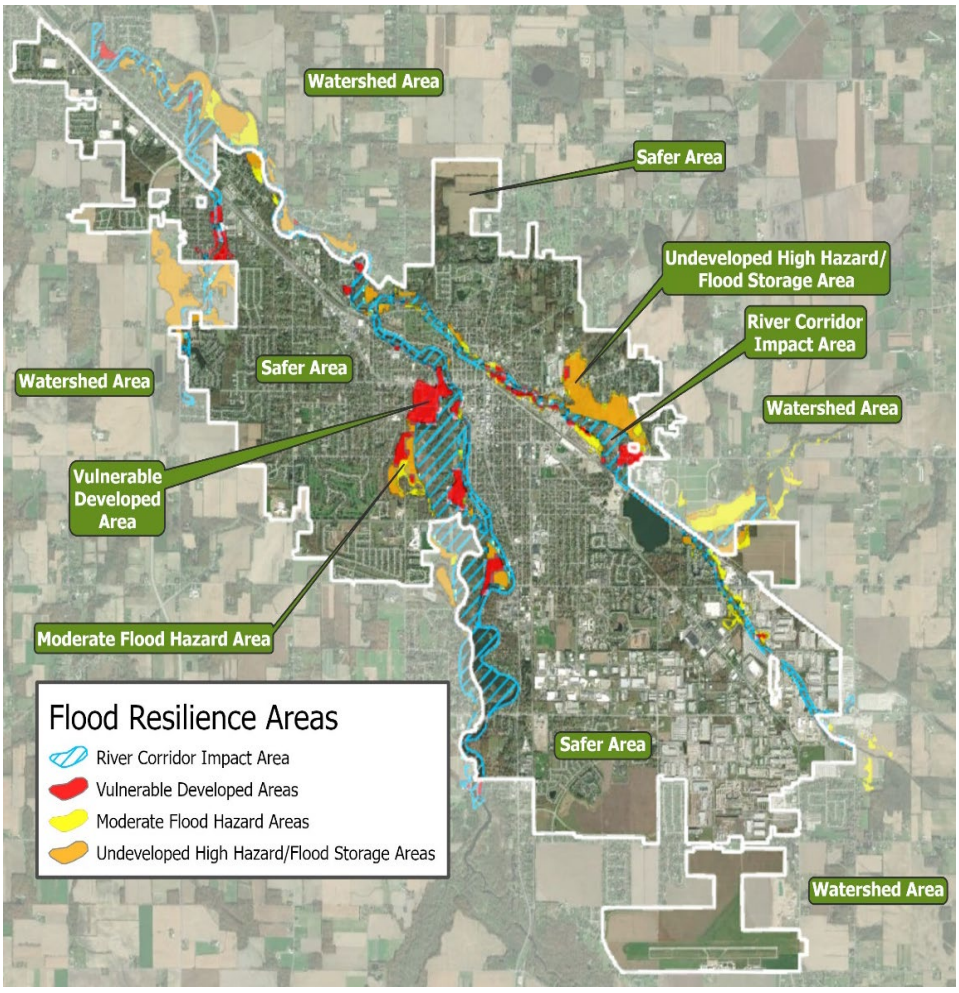
4.3 DEFINE FLOOD RESILIENCE PLANNING AREAS

As discussed in Chapter 1, EPA Office of Sustainable Communities, in partnership with FEMA, published a report in 2014 entitled: "Planning for Recovery and Long-Term Resilience in Vermont". This report defined four flood resilience planning areas based on the different geographic regions within a river valley. To better suit Indiana communities, Burke further refined these into six flood resilience planning areas. These include the river corridor impact area, undeveloped high hazard/flood storage area, moderate flood hazard area, vulnerable developed area, safer area and watershed. **Table 4-2** lists each flood resilience planning area, the geographic boundary used to define it and the purpose of the strategies for each area.

In the City of Goshen, the flood resilience areas were defined using the Effective FIRM and the Indiana Department of Natural Resources (IDNR) best available floodplain mapping. **Figure 4-1** is a graphical representation of these areas in the City of Goshen and **Exhibit 1** provides a larger, more detailed image.

Table 4-2: Flood Resilience Planning Areas

Planning Area	Geographic Boundary	Purpose of Strategies
River Corridor Impact Area	Floodway or fluvial erosion hazard area, whichever is greater	To conserve land and prohibit development
Undeveloped High Hazard/Flood Storage Area	Undeveloped land in the floodway fringe	To conserve land and maintain the natural and beneficial function of the floodway fringe and discourage future development
Moderate Flood Hazard Area	0.2% AEP or 500-year flood zone	To highlight areas that are subject to flooding during extreme events and to discourage placement of critical facilities in these areas, which are considered to be the near future high hazard (1% AEP) areas due to ongoing climate change
Vulnerable Developed Area	Existing developed land in the SFHA (floodway and floodway fringe)	To protect people, buildings and facilities vulnerable to flooding and reduce future flood risk
Safer Areas	Outside the SFHA, 0.2%AEP floodplain and localized flooding areas; within the planning jurisdiction	To plan for and promote development in areas that are less vulnerable to future floods
Watershed	Entire drainage area	To promote coordination and partnerships and implement practices to slow, spread, and infiltrate floodwater



Note: a large, detailed map (Exhibit 1) is available at the end of the report

Figure 4-1: Flood Resilience Planning Areas

4.4 DEVELOP FLOOD RESILIENCE STRATEGIES

The approach to develop flood resilience strategies is two-pronged. The first uses land-use planning policies to direct growth, economic development and capital improvement projects to safer areas that are less vulnerable to flooding. This will help to prevent the problem from spreading and getting worse. The second is to identify projects to protect people and critical assets that already exist in the vulnerable flood risk areas. **Chapter 5** includes a discussion on overall citywide strategies and **Chapter 6** discusses each flood resilience planning area in more detail and lists recommended strategies to achieve flood resilience.

CHAPTER 5: OVERALL STRATEGIES FOR FLOOD RESILIENCE

Overall strategies are meant to improve resiliency citywide. They emphasize the importance of syncing plans, policies, and regulations for consistency of resiliency concepts and strategies. The following includes a discussion on each of the overall strategies reviewed and prioritized by the project team.

5.1 UPDATE STORMWATER ORDINANCE AND CONDUCT TRAINING

Under state and federal regulations, the city is required to establish a regulatory mechanism for managing stormwater quality and quantity. Currently the City of Goshen relies on the 2015 Indiana Stormwater Drainage Manual and the 2007 Indiana Stormwater Quality Manual to meet this requirement. These are both good resources however, they are not tailored to the city's specific needs, nor do they include higher standards to address climate change or incorporate recent regulation updates. Purdue Research Foundation through the Local Technical Assistance Program (LTAP) has recently completed a comprehensive Model Stormwater Ordinance and Technical Standards with the intent for Indiana communities to customize and adopt locally. As it relates to flood resilience, this document includes requirements for fluvial erosion hazard (FEH) areas, channel protection volume, compensatory flood storage and promotes low impact development/green infrastructure as an alternative to conventional development.

Recommended flood resilience strategy

- Customize and adopt the LTAP Model Stormwater Ordinance and Technical Standards and include requirements for fluvial erosion hazard (FEH) areas, channel protection volume, compensatory flood storage, low impact development/green infrastructure and climate change.

Green infrastructure has been of particular interest to the city as a stormwater management practice. There are several projects where it has been implemented and, in some cases, it is performing well. An example is the permeable paver system installed on Jefferson Street (**Figure 5-1**). Of concern among city staff is the lack of knowledge as it relates to design, construction and long-term maintenance of these practices. The detailed best management practice (BMP) fact sheets referenced in the LTAP Model Stormwater Ordinance and Technical Standards, provides guidance on the design, review, construction, inspection, and long-term maintenance of green infrastructure practices. Customizing the LTAP Model Stormwater Ordinance and Technical Standards to promote green infrastructure should result in more of these facilities being implemented on public and private property. For the city to maintain the public green infrastructure installations, inspection and maintenance staff will need to be trained.

Figure 5-1: Installation of Permeable Paver System in Goshen

Recommended flood resilience strategy

- Train city stormwater inspection and maintenance staff about green infrastructure practices to improve function, performance and appearance.

5.2 IMPROVE FLOOD RISK COMMUNICATION AND EDUCATION

Communicating flood risk is central to achieving flood resilience. If done correctly, communication strengthens people's risk awareness and motivates them to take measures to protect themselves and their property. The typical method of communicating flooding and flood risk uses data, confusing terminology and static maps which does not always achieve the desired result. People need to perceive the risk to act. The City of Goshen is very good at sharing flood information on the city webpage including the link to the stream gage, listing areas that are expected to flood and where to pick up sandbags to protect personal property. The city is working on a series of online story maps that give guidance and provide interactive maps that cover themes like stream river gages, historic flooding, floodplain maps and information on the percentage chance of flooding over the lifetime of a 30-year mortgage.

The city should expand on these efforts and develop a flood risk education and outreach program to help people understand their risk and take the appropriate action. This effort should target all groups including elected officials, local leaders, business owners and residents. The Association of State Floodplain Managers (ASFPM), FEMA, USGS and others have good resources and tools to improve flood risk communication and methods for education and outreach. **Appendix 3** includes a list of resources to help the city get started.

Recommended flood resilience strategy

- Expand current flood communication efforts and develop a flood risk education and outreach program to improve people's risk awareness and motivate them to take measures to protect themselves and their property.

5.3 CONDUCT REGULAR AUDITS OF PLANS, PROGRAMS AND POLICIES

Critical to the successful implementation of this plan and flood resilience in the City of Goshen is to update, integrate, and revise the plans, programs and policies to include the overall resilience strategies in this chapter and the strategies for each of the flood resilience planning areas discussed in Chapter 6. **Appendix 2** includes a blank copy of the flood resilience checklist that was used early in this planning process to assess the strengths and weaknesses of current plans, programs, and policies related to flooding. This checklist should be revisited annually.

Recommended flood resilience strategy

- Complete the flood resilience checklist at least annually to track progress made and continue to do so until all questions are marked "yes."

5.4 UPDATE THE CITY CODE AND ZONING ORDINANCE

Preventative measures integrated into the City Code and Zoning Ordinance can reduce future vulnerability to flooding, especially in areas where development has not yet occurred. For flood resiliency, there are two areas where enhancements or new requirements are recommended. These include trees and landscape standards and flood hazard regulations.

In 2019 the city adopted a goal to have 45% urban tree canopy cover by 2045 or 45 by '45. Achieving this goal will double the current tree canopy. **Figure 5-2** shows one of the tree-lined city streets in Goshen. As

this relates to flood resilience, trees naturally reduce stormwater runoff by intercepting, capturing and storing rainfall. Title 6 Article 8 of the City Code covers tree planting, maintenance and removal of street trees. The recommended tree list includes trees tolerant the urban environment however not all are native to Indiana. Native species are adapted to local growing conditions and will require less maintenance.

The city has a cost-share program to assist property owners, excluding developers, to plant new street trees. When street trees need to be removed for widening or construction, the city will compensate the property owner or replace the tree (1:1).

Figure 5-2: Tree-lined Street in Goshen

Article V Section 5000 of the Zoning Ordinance includes landscape regulations for development. Robust landscaping standards are in place for streetside, bufferyards, foundation (optional) and off-street parking. Naturalized landscaping is permitted providing it is maintained and free of noxious weeds. The city offers a credit for preserving existing trees and vegetation. This policy requires a preservation landscape plan and the area to be designated as a Tree Save Area. Should the trees or vegetation preserved become damaged or die within three years, replacement landscape is required that equals or exceeds the requirements of the landscape regulations. Currently there is not a policy to replace mature trees or stands of trees that are removed for private or public development. The city should consider expanding the tree preservation language to mitigate for lost tree canopy and promote species diversity. The following recommendations should help bolster the city's tree canopy goal and promote native species and green infrastructure practices.

Recommended flood resilience strategies

- Expand the tree preservation language in the Zoning Ordinance to include replacement of trees lost to development. Consider a tree mitigation ratio of 5:1 based on tree size and require a variety of native species to reduce the risk of mass tree casualties from future pest damage.
- Promote the use of native plants in the Zoning Ordinance by requiring a higher percentage to meet the landscape standards and update the recommended tree list in the City Code to include more native species and cultivars.
- Allow vegetated green infrastructure practices, including parking areas, to count toward landscape requirements in the Zoning Ordinance.

The Flood Control District (Overlay) regulations are included in Article IV Section 4270 of the Zoning Ordinance. These regulations were updated in 2020 and follow the model flood hazard ordinance language recommended by IDNR. The regulations state that no structure shall be located, extended, converted or structurally altered and no land or stream shall be altered in the SFHA without full compliance of these regulations.

Critical facilities are structures that are vital to the community's ability to provide essential services and protect life and property, are critical to the community's response and recovery activities, and/or are the facilities the loss of which would have a severe or catastrophic impact. These typically include fire stations,

police stations, schools, and hospitals for example. Current floodplain regulations in the City of Goshen allow critical facilities to be constructed in the SFHA, if no feasible alternative site is available. However, due to the importance of these facilities to the operation and function of the city before, during, and after a hazard event, under no circumstances should they be in the SFHA or the 0.2% AEP (500-year) flood limits. If placement of new critical facilities in the flood hazard area is unavoidable, the facility, including access, should be protected to at least one foot above the 0.2% AEP flood elevation. These requirements are consistent with the intent of Executive Order 11988, Floodplain Management as well as federal agencies requirements for funding and/or permitting for critical facilities. However, facilities such as water and wastewater treatment plants that are typically located within the floodplain due to their function should be excluded.

In the floodway, construction of non-substantial additions/improvements to residences are allowed without a permit from IDNR. Also, the current city codes allow non-residential structures to be placed within the regulatory floodway with a permit from IDNR (which only considers the 1% AEP or 100-year flood). To minimize cumulative impacts of the loss of flood conveyance on various flood frequencies, minimize the potential increase in erosion, and preserve the natural and beneficial functions of the stream corridor, all new development, residential or commercial, should be prohibited and if not possible, discouraged in the floodway. To the extent possible redevelopment in the floodway should also be discouraged. Note that rebuilding of structures destroyed by fire or other means are not considered redevelopment and are subject to provisions in the Flood Control District regulations.

The regulatory floodplain limits area based the 2011 FIRM and in the absence of published FEMA maps, the city refers to IDNR's best available floodplain mapping. In August 2020, the city met with FEMA's RiskMAP team to review draft results of updated floodplain analyses. These results will eventually be used to revise and update the FIRM following the city's thorough review, approval and adoption process.

The flood resilience planning areas defined in this plan will need to be added to the Flood Control District regulations. These are included below and in more detail in Chapter 6.

Recommended flood resilience strategies

- Amend the Flood Control District regulations to require new critical facilities to be located outside of known flood hazard areas only, including the 0.2% AEP. If placement of new critical facilities in flood hazard area is unavoidable, the facility, including access, should be protected to at least one foot above the 0.2% AEP flood elevation.
- Amend the Flood Control District regulations to prohibit and if not possible, discourage new development or redevelopment within the floodway and undeveloped high flood hazard storage areas in the floodway fringe.
- Update flood resilience planning areas based on updated FIRM information.

5.5 UPDATE THE STORMWATER UTILITY FEE

A stormwater utility is a proven method of providing a reliable funding source for managing stormwater programs. It can generate funds for a variety of stormwater needs including capital improvement projects, regulatory compliance, drainage plans and studies, operation and maintenance of infrastructure, equipment, vehicles and staff training. In 2005 the City of Goshen, in partnership with Elkhart County, City of Elkhart and City of Bristol, established a stormwater utility fee. The rate structure is set up to collect a flat fee of $1.25 per month for residential properties and a variable rate for nonresidential properties based on actual impervious cover. There are about 95 stormwater utilities in Indiana with an average single family residential fee of $5.74 per month. The average fee for the 12 stormwater utilities in the northeast portion of the state, where the City of Goshen is located, is $5.29. This is over four times the city's stormwater

utility fee. While the funds collected currently cover some of the city's stormwater program costs, it does not generate enough revenue to tackle larger, much needed capital projects to mitigate flooding. The city should first work with the county to study and increase the stormwater utility fee or pursue this work on their own.

Recommended flood resilience strategy

- Work with the County to study and update the stormwater utility rate collectively, otherwise complete an independent Stormwater Utility Rate Study that includes stormwater program costs and a fair and equitable rate structure; update the stormwater utility fee accordingly within the City of Goshen.

5.6 INTEGRATE FLOOD RESILIENCE INTO THE COMPREHENSIVE PLAN

The comprehensive plan represents the community's vision for growth and development and as such can play an important role in flood resilience. The City of Goshen's Comprehensive Plan was updated in 2016 with a strong natural environment chapter. Throughout this chapter there are several references to maintaining the natural and beneficial function of the floodplain, preserving the ecological integrity of riparian corridors, promoting of native plants and landscaping, directing growth toward existing development and away from undeveloped open space including floodplains, work with landowners along the river to promote low impact uses, purchase land or development rights along the river and partner with county/regional organizations and landowners to reduce runoff upstream in the watershed. The vision, goals and objectives in the city's Comprehensive Plan align with the strategies in this Flood Resilience Plan.

Recommended flood resilience strategies

- Add a discussion on flooding, climate change, and flood resilience planning areas to the Comprehensive Plan.
- Cross-reference the Flood Resilience Plan, Redevelopment Capital Plan and Elkhart County MHMP for strategies and mitigation measures related to flooding, growth and development priorities.

5.7 INCLUDE FLOOD RESILIENCE IN CAPITAL PROJECTS

The City of Goshen established the Goshen Redevelopment Commission and the Department of Redevelopment to act as a catalyst for new development in targeted areas. This is done through techniques including real estate acquisition, site preparation, environmental remediation and providing public infrastructure to the site. Financing resources generally used are Tax Incremental Financing (TIF) and Redevelopment General Obligation Bonds. The city maintains a five-year capital plan for redevelopment projects. In the current plan, there are several properties in the SFHA. Reuse of these properties should reflect the strategies in this Flood Resilience

Figure 5-3: Illustration of Mill Race Pavilion and Floodplain Open Space

Plan. Based on studies conducted by the National Institute of Building Sciences' Multihazard Mitigation Council, on average, every $1 spent on mitigation (including preservation of floodplain land and floodplain development restrictions) results in a $6 return of avoided future losses, a 6:1 benefit-cost ratio.

Figure 5-3 is an illustration of the Mill Race Pavilion and surrounding open space for flood storage in the Elkhart River floodplain. There has been some early discussion among city staff about the need to prepare a Future Growth Plan for the City of Goshen. This plan should incorporate the flood resilience planning areas as should the proposed Stormwater Master Plan discussed in 6.4.2.

Recommended flood resilience strategies

- Focus redevelopment efforts (site preparation, remediation and public infrastructure) in locations that are designated as safe growth areas outside the 0.2% AEP floodplain and local flooding areas.
- Continue to acquire available land in the SFHA for flood storage and compatible open space uses; build on the city-owned parkland along the Elkhart River and create a Central Park like amenity for the city and region.
- Consider climate change and flood impacts in capital projects; promote low impact development/green infrastructure to manage stormwater.
- Incorporate the flood resilience planning areas into the proposed Future Growth Plan.
- Cross-reference the Flood Resilience Plan, Comprehensive Plan and Elkhart County MHMP for strategies and mitigation measures related to flooding, growth and development priorities.

5.8 IMPLEMENT THE MHMP FLOOD MITIGATION MEASURES

FEMA requires communities to prepare Multi-Hazard Mitigation Plans (MHMP) to reduce or eliminate risk from natural hazards. A community must have a MHMP to receive hazard mitigation and disaster recovery funding from FEMA. Elkhart County Emergency Management Agency (EMA) prepared a multi-jurisdictional MHMP in 2016 that includes the City of Goshen. This plan provides several mitigation strategies to prevent or reduce the potential damages caused by flooding. Additionally, the MHMP suggested a timeline of implementation for each strategy. The following lists the mitigation measures in the MHMP that support flood resilience in the City of Goshen and where they are discussed in the Flood Resilience Plan.

Recommended flood resilience strategies

- Minimize impacts of flooding by retaining stormwater onsite using low impact development/green infrastructure practices (see 5.1).
- Maintain channels and regulated drains to prevent localized flooding (see 6.1.3, 6.2.3 and 6.6.4).
- Educate the population of known flood hazard areas (see 5.2).
- Prohibit development of new critical facilities in known flood hazard areas; protect existing critical facilities (see 5.4 and 6.3.1).
- Relocate, buyout or floodproof (nonresidential) existing structures that are subject to repetitive flooding (see 6.4.4 and 6.4.5).
- Maintain a database of accurate and community specific information following each hazard event including extent, magnitude, cost, response and recovery efforts (partner with EMA).
- Establish procedures to alert and evacuate the population in known hazard areas (see 6.4.1).
- Incorporate hazard information, risk assessment and hazard mitigation practices into plans and policies to better guide future growth and development (see 5.3).
- Reduce flood insurance premiums through participation in the NFIP Community Rating System (see 6.4.3).

- Support FEMA flood depth mapping (RiskMAP) to better understand the flood risk potential (see 5.4).
- Encourage restoration of the natural stream corridor in new and redevelopment projects (see 6.6.2).
- Cross-reference the Flood Resilience Plan, Comprehensive Plan and Redevelopment Capital Plan for strategies and mitigation measures related to flooding, growth and development priorities (see 5.6 and 5.7).
- Participate in the MHMP five-year update; multi-departments needed (partner with EMA).

CHAPTER 6: STRATEGIES FOR FLOOD RESILIENCE PLANNING AREAS

As introduced in Section 4.3, six flood resilience planning areas were identified for the City of Goshen. These are based on the different geographic regions of the river valley. These include the river corridor impact area, undeveloped high hazard/flood storage area, moderate flood hazard area, vulnerable developed areas, safer area and the watershed. The strategies most effective at enhancing flood resilience will differ depending on the flood resilience planning area while at the same time offer multiple and interrelated benefits. For example, directing development out of the floodplain and into safer areas not only keeps people and property safe, but it also maintains the ability of floodplains to hold and slow down floodwater before it reaches development downstream. Based on the review of available flood data and studies as well as input from project team, the following are the recommended strategies to improve flood resilience in the City of Goshen.

6.1 RIVER CORRIDOR IMPACT AREA

The river corridor impact area is defined by the floodway or FEH area boundary, whichever is greater (**Figure 6-1** and enlarged in Exhibit 1). The floodway encompasses the channel of a river or stream and those portions of the floodplains adjoining the channel which are reasonably required to efficiently carry and discharge the peak flood flow of the regulatory flood of any river or stream. During a flood, the velocity and volume of water in the floodway is great and can be destructive to obstacles in its path.

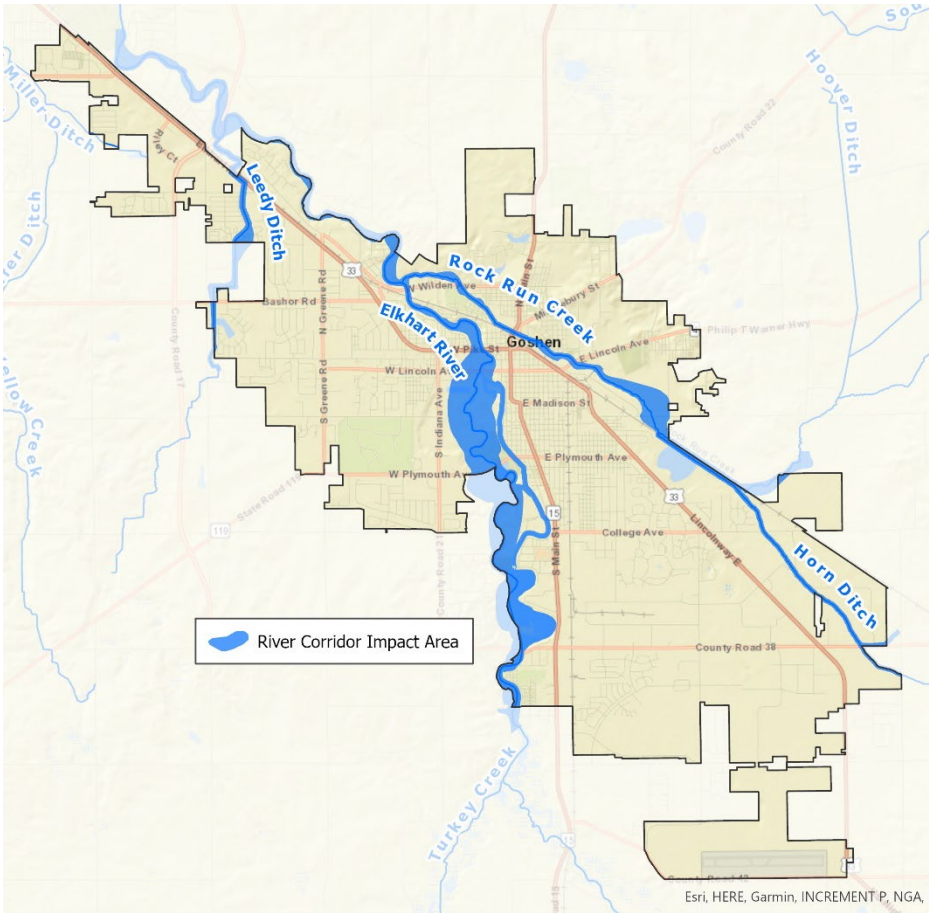


Figure 6-1: River Corridor Impact Area

In addition to carrying floodwater, the land adjacent to the channel is needed for the river to adjust laterally over time and maintain its natural stable form and become less prone to severe flooding. In many cases, flood damage is not only the result of inundation, but erosion as well. Development and infrastructure that encroach in this area may be adversely affected by the natural stream processes and exacerbate flooding and erosion potentials in other areas. Conserving land and prohibiting development in this particularly vulnerable area is imperative to improving flood resilience in the City of Goshen. The following strategies detail how to successfully achieve this.

6.1.1 Adopt Fluvial Erosion Hazard (FEH) Regulations

Floodplain regulations regulate land use in floodplains and are primarily in place to protect insured structures from flood-related losses. They do not necessarily address erosion or the negative impact development can have on other property owners or the natural and beneficial functions of the floodplain.

Because of this area's susceptibility and vulnerability to flooding and erosion, development should be prohibited and if not possible, discouraged. This includes structures, infrastructures and utilities, as well as any land disturbance activities including parking areas, land clearing, excavation, and grading.

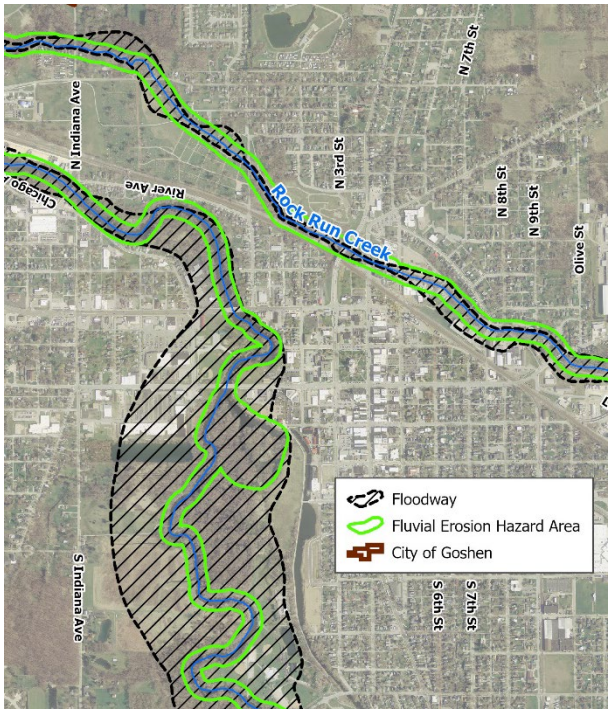


Figure 6-2: Floodway and Fluvial Erosion Hazard Areas

In Indiana, FEH boundaries have been determined as part of a 2014 initiative by Indiana Silver Jackets, through funding obtained from the Indiana Office of Community and Rural Affairs (OCRA), and available on the IDNR Division of Water website. As shown in **Figure 6-2**, the floodway and FEH do not always occupy the same space. For this reason, the city should adopt FEH regulations in addition to enforcing the existing floodway requirements in the Flood Control District.

Recommended flood resilience strategy

- Adopt standalone fluvial erosion hazard regulations to prohibit and if not possible, discourage new development and redevelopment in this area or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standards recommendation.

6.1.2 Protect Undeveloped Land in the River Corridor Impact Area

For this area to function and provide critical conveyance for floodwater and stream movement, it should remain undeveloped. This includes encroachment from structures, infrastructures, and utilities, as well as any land disturbance activities including parking areas, land clearing, excavation, and grading that should be avoided.

The City of Goshen has done a great job acquiring land in the floodplain and using it as parkland. In the river corridor district, 31% of the land is owned by the city; 82%, of which, is designated as parks. Along the Elkhart River, the amount of city-owned parkland is even greater. As shown in **Figure 6-3**, much of the land in the river corridor impact area between Lincoln Highway (US 33) and Goshen Dam Pond is a city-owned park. This large green, Central Park like swath, includes Rogers Park, Linway Lake, Mullett Park, Shanklin Park, Millrace Park, Larry L. Beachy Forest and Shoup-Parsons Woods. On the city's eastside, the city owns Oakridge Park, Mill Street Park and Abshire Park adjacent to Rock Run Creek

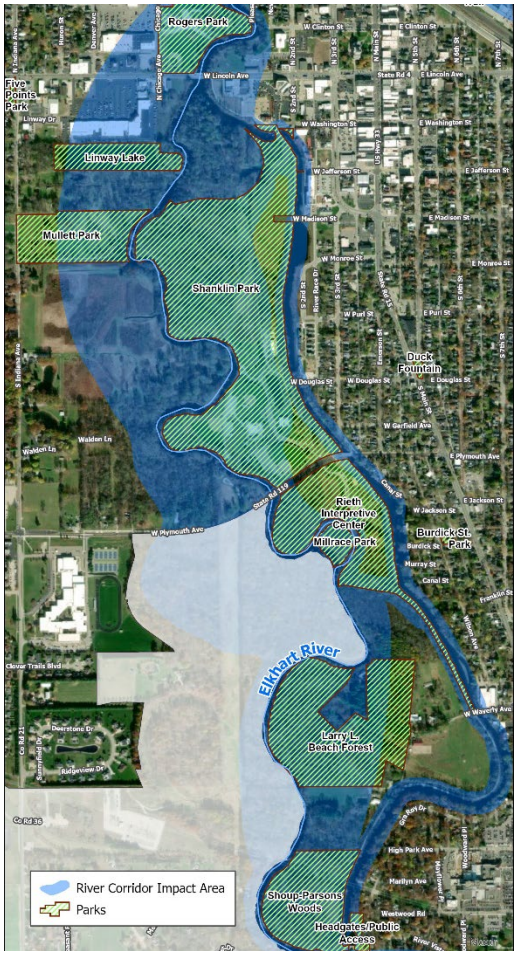


Figure 6-3: Parks in the River Corridor Impact Area

As land and funding become available, the city should continue to acquire properties within the river corridor impact areas to allow for critical conveyance for floodwater and stream movement.

Another method to preserve the river corridor impact area, is for the city to identify landowners of undeveloped land and partner them with local land trusts, United States Department of Agriculture (USDA), IDNR, and the Elkhart County Soil and Water Conservation District (SWCD) organizations that can purchase, accept land donations, or hold conservation easements. Many of these programs have incentives to help with implementation such as cost-share funding, purchase agreements, and property tax reductions. Depending on the program, funds may be available to restore or enhance natural features on the site like wetlands, forest, or prairie as well as provide long-term maintenance of the protected property. **Appendix 4** contains a list of land trusts, agencies, and cost-share programs in Indiana. This list should be updated as other organizations and programs become available.

Recommended flood resilience strategies

- Prohibit and if not possible, discourage new development in the river corridor impact area.
- Continue to acquire undeveloped land from willing landowners in the river corridor impact area as land becomes available and funding allows.
- Identify willing landowners of undeveloped land in the river corridor impact area and partner them with entities willing to purchase, accept donations or hold conservation easements.

6.2 UNDEVELOPED HIGH FLOOD HAZARD/FLOOD STORAGE AREA

Undeveloped High Flood Hazard/Flood Storage Area includes the undeveloped land in the floodway fringe (**Figure 6-4** and enlarged in Exhibit 1). The intent of the strategies for this flood resilience planning area is to conserve land and maintain the natural and beneficial function of the floodway fringe.

While the floodway is critical for flood conveyance, the floodway fringe is critical for flood storage. Flooding in this area is an essential part of the river's hydrologic and hydraulic processes, geomorphic processes, and biologic processes that shape and maintain this natural system. Encroachment in the floodway fringe upsets this delicate balance and disturbs the functions and overall health of the river's ecosystem. The short-term economic gain from developing in the floodplain is unsustainable and ultimately shifts the adverse environmental impacts to future generations.

Like the river corridor, conserving land and prohibiting development in this particularly vulnerable area is imperative to improving flood resiliency in the City of Goshen. The following strategies detail how to successfully achieve this.

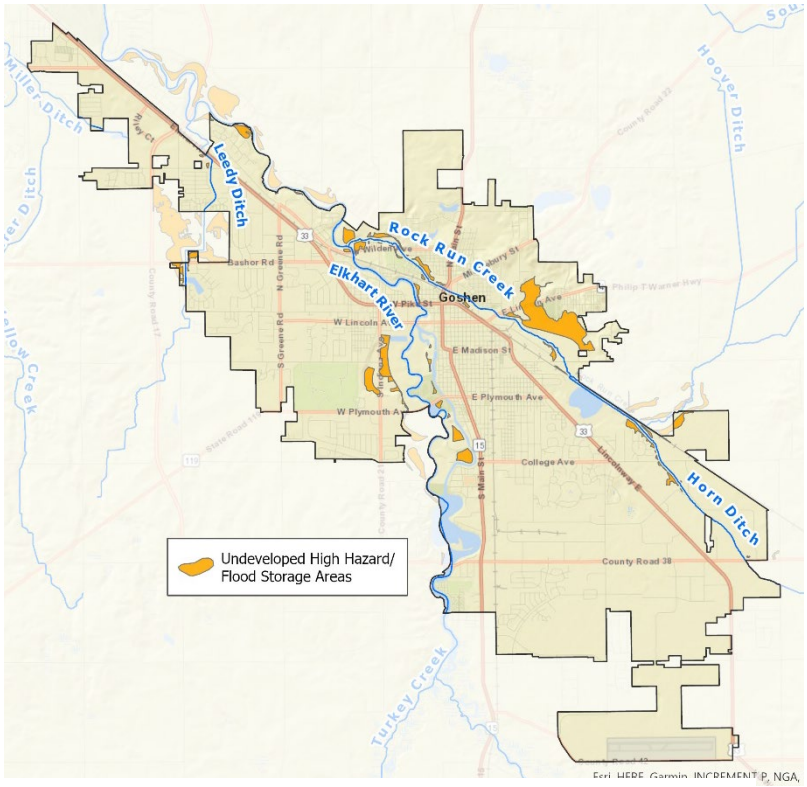


Figure 6-4: Undeveloped Land in the Floodway Fringe

6.2.1 Protect Undeveloped Land in the Floodway Fringe

For the floodway fringe to function and provide critical storage for floodwater, it must remain undeveloped. The same approach used in 6.1.2 to protect undeveloped land in the river corridor impact area can be used to protect undeveloped land in the floodway fringe. The city should continue to purchase land in the floodway fringe as land and funding is available. Where city ownership is not feasible, the city should partner willing landowners with local land trusts, USDA, IDNR, and SWCD organizations that are willing to outright purchase, accept land donations, or hold conservation easements.

Recommended flood resilience strategies

- Prohibit and if not possible, discourage new development in the undeveloped high flood hazard storage areas in the floodway fringe.
- Continue to acquire undeveloped land from willing landowners in the undeveloped high hazard/flood storage area as land becomes available and funding allows.
- Identify willing landowners of undeveloped land and partner them with entities willing to purchase, accept donations or hold conservation easements.

6.2.2 Establish Compensatory Floodplain Storage Requirements

It is necessary to preserve the natural storage within the floodplain because loss of floodplain storage on one property could lead to increases in flood depths and frequency of flooding and negatively impact other properties along the stream or within the watershed. Floodplain storage is lost when a portion of the floodplain is filled, occupied by a structure, or when there is a change in the channel hydraulics that reduces the existing available floodplain storage volumes. In some circumstances when placement of fill within the floodway fringe is considered unavoidable, compensatory floodplain storage can be an effective regulatory tool to compensate for loss of flood storage(but not necessarily the loss of other beneficial functions of a floodplain) due to fill, structure, or other materials above grade in the regulatory floodplain that temporarily or permanently displaces floodplain storage volume. **Figure 6-5** provides an illustration of how compensatory storage works.

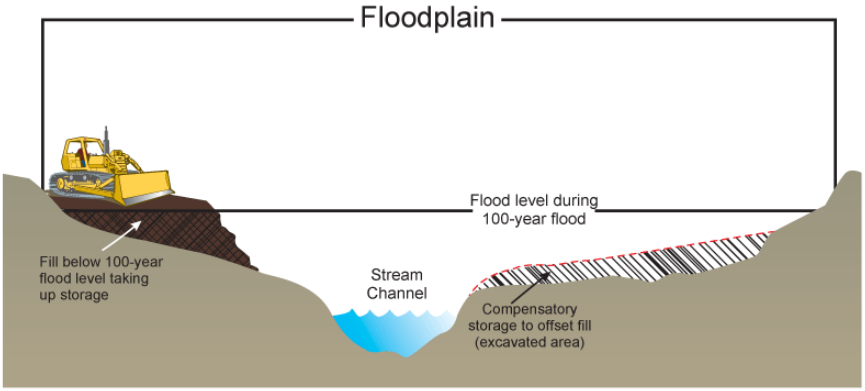


Figure 6-5: Illustration of Compensatory Storage

The City of Goshen does not currently have a compensatory flood storage requirement. In the rare circumstance where the placement of fill in the floodway fringe is unavoidable, and a variance has been granted, the city should require a minimum 3:1 compensation of the floodplain storage that is lost.

Recommended flood resilience strategy

- Adopt a standalone minimum 3:1 compensatory flood storage requirement or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standard recommendation (see 5.1.1).

6.3 MODERATE FLOOD HAZARD AREA

The Moderate Flood Hazard Area encompasses the land in the 0.2% AEP flood zone **(Figure 6-6**). The intent of this flood resilience planning area is to highlight areas subject to flood risk during extreme flood events, to avoid placement of critical facilities and, to the extent possible, preserve these areas as additional flood storage areas that will likely be needed as the impacts of the ongoing changes in climate makes

inundation of these areas in the future like how the 1% AEP floodplain is inundated in today's climate. The following strategies detail how to successfully achieve this.

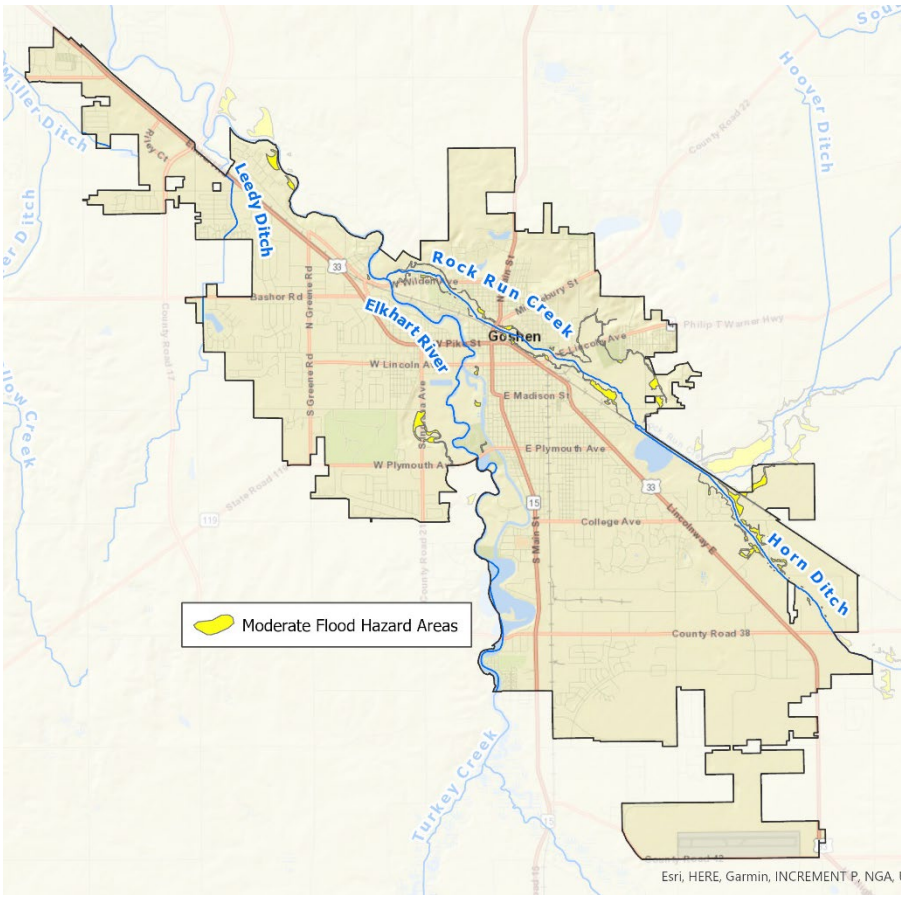


Figure 6-6: Moderate Flood Hazard Area

6.3.1 Discourage New Development, Especially Critical Facilities

Since it is likely that the moderate flood hazard area will flood during extreme events, development should be discouraged, especially critical facilities. The City of Goshen's Flood Control District regulations states that the construction of new critical facilities shall be, to the extent possible, located outside the limits of the SFHA. Critical facilities are permissible in the SFHA if no other feasible alternative site is available however, access routes must be elevated to or above the flood protection grade to the extent possible. This language should be updated to include the 0.2% AEP flood zone or be protected to one foot above 0.2% AEP. Critical facilities such as police, fire, medical facilities, and schools should not be in areas vulnerable to flooding. Facilities for drinking water and wastewater treatment plants that are typically located within the floodplain due to their function may be excluded from such requirements.

Recommended flood resilience strategies

- Discourage new development and preserve the 0.2% AEP flood zone for additional flood storage for extreme flood events.
- If placement of new critical facilities in flood hazard area is unavoidable, the facility, including access, should be protected to at least one foot above the 0.2% AEP flood elevation.

6.3.2 Require Higher Standards for Buildings

Development in the floodplain is regulated to protect people and property and reduce vulnerability to future flood risk. Currently buildings in the 0.2% AEP flood zone are not required to meet the same requirements as those in the SFHA. The moderate flood hazard area is a known flood risk area and as such new development and redevelopment in this area should be to a higher standard than currently regulated. The following are recommended to improve flood resilience in this area.

Recommended flood resilience strategies

- Require new development and redevelopment in the 0.2% AEP flood to have a flood protection grade equal to or greater than that required in SFHA (a minimum of two feet above the 1% AEP).

6.4 VULNERABLE DEVELOPED AREA

Vulnerable developed areas are, as name suggests, existing developed areas within high flood or erosion hazard areas, i.e., within the river corridor impact area and floodway fringe (**Figure 6-7** and enlarged in

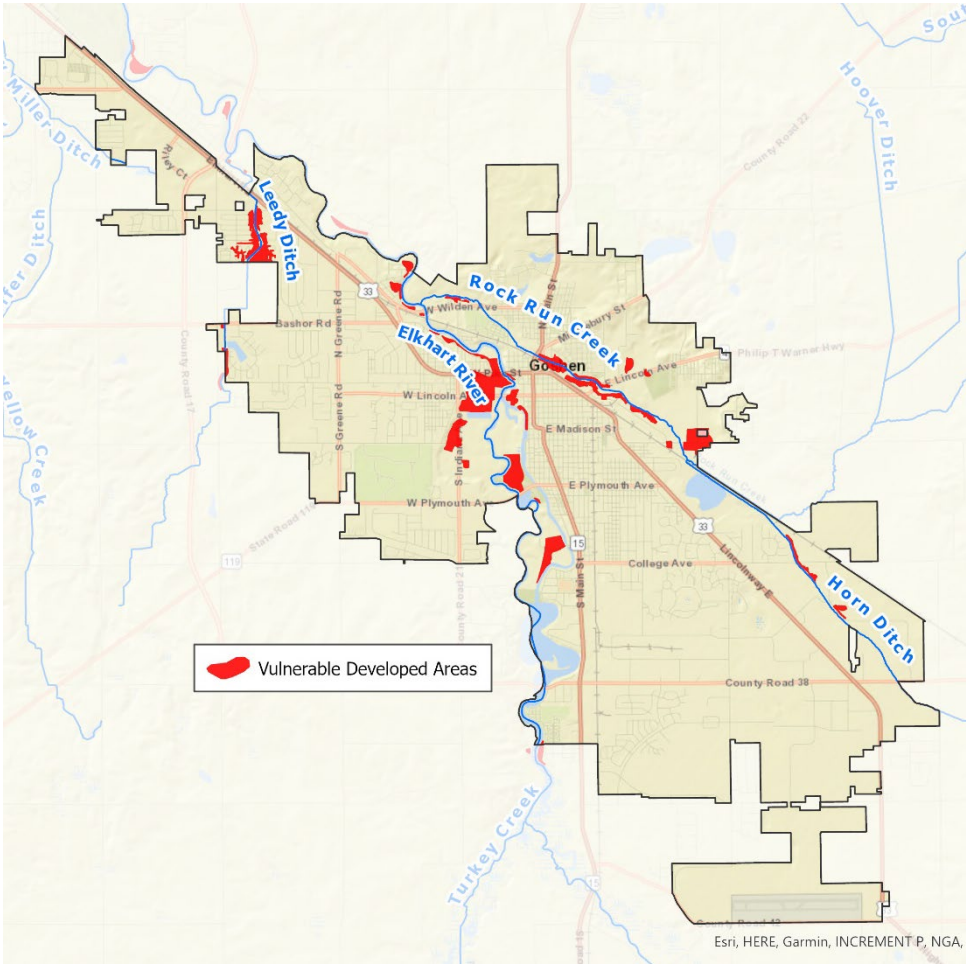


Figure 6-7: Vulnerable Development Area

Exhibit 1). The intent of this flood resilience planning area is to protect people, buildings, and facilities in vulnerable areas and reduce future flood risk.

While ideally removing these structures through a buyout program provides the best protection from future flood-related or erosion-related losses, it is unlikely that such a strategy can cover the entire affected area because of the number of structures in the high flood hazard areas. In the City of Goshen there are 558 structures in the high flood hazard areas. **Table 6-1** shows a breakdown of the structures for the Elkhart River, Rock Run Creek, Horn Ditch and Leedy Ditch. These areas make up older, established neighborhoods, commercial and industrial developments. As evident following the 2018 flood, there is a willingness and strong desire to repair and/or rebuild structures damaged by major floods.

A report on the value of mitigation by the National Institute of Building Sciences, reviewed over 20 years of federally funded mitigation grants, not only from FEMA, but also from the US Economic Development Administration (EDA) and the US Department of Housing and Urban Development (HUD). From this broadened review, it has been determined that for every $1 spent on mitigation, $6 are saved on disaster and recovery costs. Further, by designing and constructing buildings which exceed select items in the 2015 International Code, an additional $4 can be saved for every $1 invested in those changes. Given these findings, every effort should be taken to mitigate the flooding impacts in the vulnerable developed area.

Table 6-1: Structures in the SFHA

WATERWAY	STRUCTURES IN RIVER CORRIDOR IMPACT AREA		STRUCTURES OUTSIDE RIVER CORRIDOR (in floodway fringe)	
	Primary	Accessory	Primary	Accessory
Elkhart River	176	64	111	42
Rock Run Creek	71	18	31	10
Horn Ditch	5	4	3	0
Leedy Ditch	111	85	50	26
TOTAL	**363**	**171**	**195**	**78**

Note: Structure count does not include those removed through Letter of Map Change

Below are strategies to safeguard development and redevelopment in areas that are susceptible to flooding. Although in many cases the risk to flooding cannot be eliminated entirely, these strategies will help reduce the potential damage from future flooding events.

6.4.1 Prepare a Flood Response Plan

With every major flood, there comes an overwhelming level of activity and a need for quick information and response. A Flood Response Plan documents the flood response process, informs those involved in the chain of command, lists specific responsibilities and task assignments, and provides a schedule of activities tied to stages of the flood fight, including flood safe routes for evacuation (**Figure 6-8**). A good plan helps prevent duplication of effort and wasted resources and helps avoid gaps in response and recovery. The City of Goshen currently posts flood information on the city webpage. This includes the link to the stream gage, areas expected to be impacted and where sandbags are available. While general flood fighting procedures may have been established following the latest flood, the process needs to be formalized. The city should prepare a formal Flood Response Plan to document 1) event forecast, detection and classification, 2) event-based warning and notification, 3) recommended response actions and 4) event termination and follow-up.

Recommended flood resilience strategy

- Prepare a Flood Response Plan that documents flood detection, warning, response and follow-up protocols.

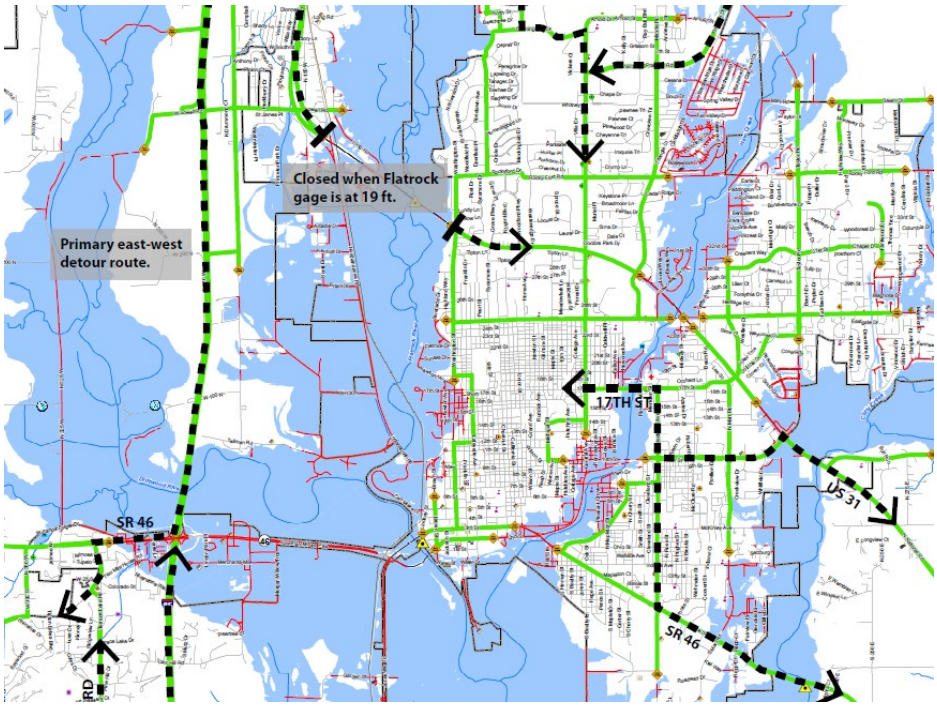


Figure 6-8: Example of Flood Safe Routes from a Flood Response Plan

6.4.2 Prepare a Citywide Stormwater Master Plan

The purpose of a Stormwater Master Plan is to is to provide an overall understanding of the drainage, flooding, and water quality conditions citywide. This type of plan provides recommended solutions that will solve or reduce existing water quality/quantity problems; prevent an increase in water quality/quantity problems as growth occurs; and preserve the natural and beneficial function of the floodplain. The City of Goshen does not currently have a comprehensive citywide Stormwater Master Plan but rather completes individual drainage studies and projects in response to specific flooding or drainage problems. The most recent list is included in Section 3.1 of this plan. The draft Stormwater Vulnerability Assessment (Section 3.4) identified 18 areas impacted by the 2018 flood. These include the Trinity Square Shopping Center, Linway Plaza and Lincoln Avenue businesses, Huron Street neighborhood, Roxbury Mobile Home Park as well as multiple road and intersections and sanitary sewer lift stations. Depending on the level of analysis and recommendations from the GLISA study discussed in Section 3.5, this potentially could function as a Stormwater Master Plan or at very least provide the foundation for a more detailed planning effort.

Recommended flood resilience strategy

- Prepare a comprehensive citywide Stormwater Master Plan to understand drainage, flooding and water quality conditions citywide.

6.4.3 Participate in the NFIP Community Rating System

The Community Rating System (CRS) is a voluntary program that provides reduced flood insurance premiums for policy holders in communities that go above and beyond the NFIP standards. Communities must apply to participate in the CRS and commit to implement and certify activities that contribute to reduced flood risk and improve flood resiliency. Examples of eligible activities include preserving open space in the floodplain, enforcing higher standards, developing mitigation plans, maintaining drainage systems, and monitoring flood conditions and issuing warnings. Although eligible, due to minimum statewide higher standards, the City of Goshen does not currently participate in the CRS program. However, after the implementation of recommendations contained in this plan, the city will be in a great position to bring about significant discounts on flood insurance premiums paid by property owners. In Indiana, 32 communities participate in the CRS program.

Recommended flood resilience strategy

- Upon implementation of flood resilience strategies, participate in the NFIP Community Rating System (CRS) program to reduce flood risk, improve flood resiliency and reduce the flood insurance premiums for all flood insurance policy holders within the city.

6.4.4 Relocate and/or Buyout Structures Inside the River Corridor Impact Area

Relocation and buyouts (or voluntary acquisitions) removes individual flood prone structures from harm's way by physically moving the structure or demolishing and rebuilding in a safer location. Not only does this greatly reduce the flood risk to the building and its contents but the land becomes designated as open space in perpetuity which provides more area for storage or conveyance of floodwater. FEMA provides 75% of the funding for voluntary acquisition projects through the Building Resilient Infrastructure and Communities (BRIC) grant program. These grants are highly competitive and the process from application to site restoration can take several years. The city should prepare a Voluntary Acquisition Plan that includes property details, the location within the floodway or river corridor impact area, depth of flooding and repetitive loss, for example. As shown in Table 6-1 above, 65% or 363 of the structures in the City of Goshen SFHA are in the river corridor impact area. Removal of structures in the river corridor impact area should be prioritized followed by those outside of the river corridor impact area but inside the SFHA (see 6.4.5).

Recommended flood resilience strategies

- Prepare a Voluntary Acquisition Plan to prioritize structures for relocation and/or buyout in the vulnerable developed area.
- Acquire and demolish structures in the river corridor impact area as properties become available and funding allows.

6.4.5 Retrofit, Relocate and/or Buyout Structures Outside the River Corridor Impact Area

Floodproofing is an option for nonresidential structures with less than three feet of flood depth. Floodproofing methods include elevating the building and/or utilities, building perimeter flood protection measures, dry floodproofing (sealing a building to prevent floodwater from entering) or wet floodproofing (letting water enter the structure but protecting/elevating/removing everything that could be damaged by floodwater). Each method is better suited to different building construction and site conditions. Floodproofing costs vary depending on the site considerations and the method selected. Nonresidential structures in the SFHA (outside the River Corridor Impact Area) are potential

candidates for floodproofing. Some funding may be available from FEMA through the BRIC grant program, disaster declarations, and/or increased cost of compliance programs to assist with floodproofing efforts. The city should establish a Floodproofing Assistance Program that prioritizes structures for floodproofing based on flood depth and frequency of flooding, identifies landowners and floodproofing options, and assists with securing available funding.

Priority for relocation and/or buyouts should be first in the river corridor impact area and then in the remaining SFHA. Structures should be prioritized in the Vulnerability Acquisition Plan based on depth of flooding and repetitive loss like those in the river corridor impact area.

Recommended flood resilience strategy

- Create a Floodproofing Assistance Program to prioritize nonresidential structures for floodproofing, establish partnerships with willing landowners and secure available funding.
- Acquire and demolish structures outside the river corridor impact area and inside the SFHA as properties become available and funding allows (based on Voluntary Acquisition Plan developed in 6.4.4).

6.4.6 Bring Nonconforming Uses into Compliance

Nonconforming uses are defined as uses and structures that may have met the development regulations at the time they were permitted or constructed but because of changes to the regulations, these uses are no longer in compliance. Even though the City of Goshen is in good standing with the NFIP and regulates development in the floodplain, there are older structures that do not meet the most recent flood regulations.

Figure 6-9: Example of Compliance with Flood Ordinance Requirements

Normally, a nonconforming use will be brought into compliance during a major repair as the result of substantial damage from a flood, wind, fire, or similar. A major renovation will also trigger compliance with the current regulations. However, minor repairs or renovations will not. If uses and structures are going to remain in the SFHA they should follow the most recent flood regulations to reduce future losses and damages.

The City of Goshen should implement a Flood Compliance Program to encourage owners of all nonconforming uses to voluntarily come into compliance, or even partial compliance, with the most recent flood regulations. This can be achieved by using flood-resistant materials, installing vents, or elevating HVAC equipment (**Figure 6-9**). The city will need to identify incentives such as cost-share programs or waived permit fees to improve participation in the program.

Recommended flood resilience strategy

- Implement a Flood Compliance Program to encourage owners of nonconforming uses to voluntarily meet flood regulations.

6.5 SAFER AREAS

Safer areas are located outside the SFHA and moderate flood hazard areas and not subject to localized flooding in low lying areas, but within the planning jurisdiction (**Figure 6-10** and enlarged on Exhibit 1). The intent of this flood resilience planning area is to plan for and promote growth and development in areas that are less vulnerable to future floods. The following strategies can be taken to foster growth in these areas.

6.5.1 Guide Growth and Development to Safer Areas

At the core of the comprehensive plan is the land use section which provides a general pattern for the location, distribution, and character of the future land uses in the city. The land use section reflects the city's vision of its future self and becomes the foundation for zoning designations. The land use section of the City of Goshen Comprehensive Plan (L-4) encourages development that is sensitive to the natural environment. Specifically, this includes directing growth toward existing development and away from undeveloped open space including floodplains. To achieve this, the city should target future capital improvements, extend utilities, and infrastructure in locations that are designated as safer areas by formally coordinating local capital improvement plans with the city's Comprehensive Plan. By prioritizing capital improvements in safer areas, Goshen can provide incentives for development to locate there. This may include TIF districts, flexible zoning practices, or permit waivers as examples.

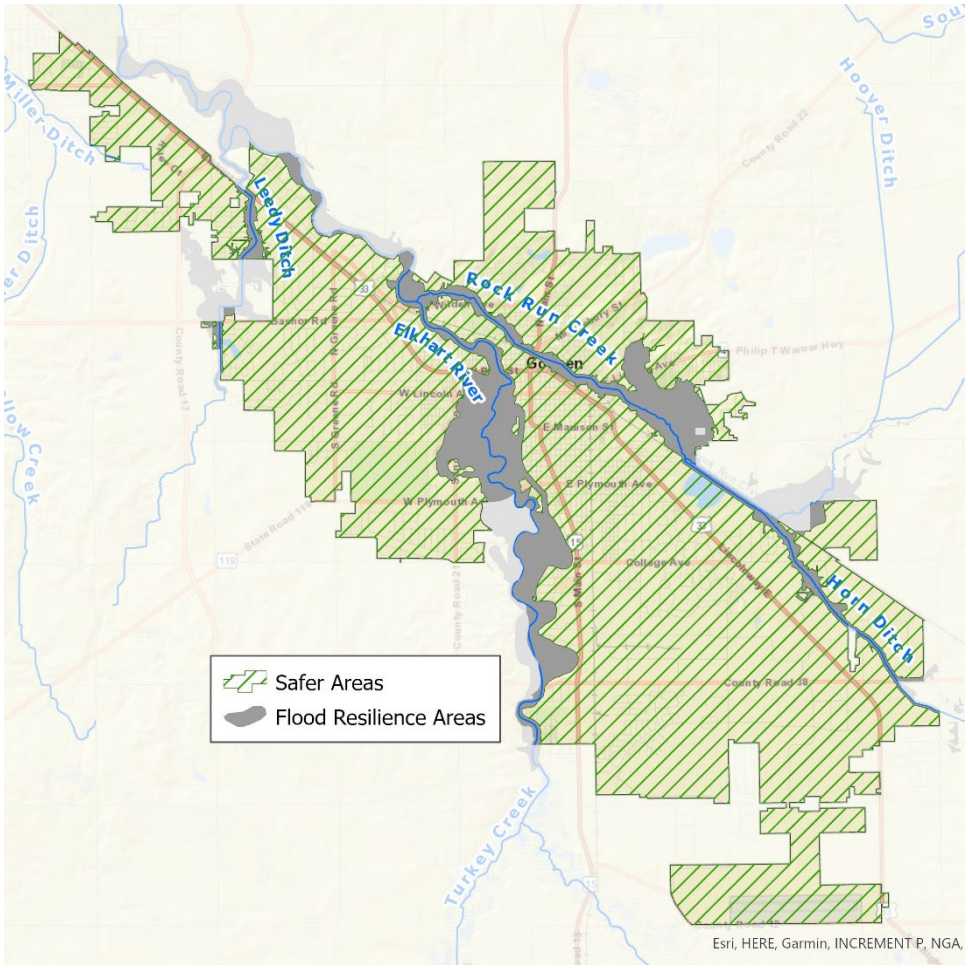


Figure 6-10: Safer Areas for Growth and Development

Recommended flood resilience strategy

- Guide growth and development including utilities and infrastructure to safer areas outside the SFHA, 0.2% AEP flood zone and localized flooding areas.

6.5.2 Promote Conservation Design and Development

Conservation design is a land development practice that allows for growth and development while protecting sensitive ecological resources, prime agricultural lands, scenic landscapes, as well as historic and cultural resources. **Figure 6-11** illustrates this practice and compares a traditional residential development to a conservation residential development approach. Conservation design is an effective tool to preserve the natural and beneficial function of the floodplains, wooded areas, and wetlands for stormwater and floodplain management. The open space is typically held and managed as a conservation easement by a land trust or similar organization. While less common, the same approach can apply to commercial and industrial land use categories as well. Economically, conservation design allows developers to distinguish themselves in a competitive market. Houses in conservation design neighborhoods tend to appreciate faster than their traditional counterparts.

The land use section of the City of Goshen Comprehensive Plan (L-4) states that the impact of new development on the natural environment should be minimized and this can be achieved by identifying natural features and promote their inclusion in the design process. The city's zoning ordinance allows this through the Planned Unit Development (PUD) process (Article IV Section 4250).

Recommended flood resilience strategy

- Promote development that is sensitive to the natural environment through conservation design and development.

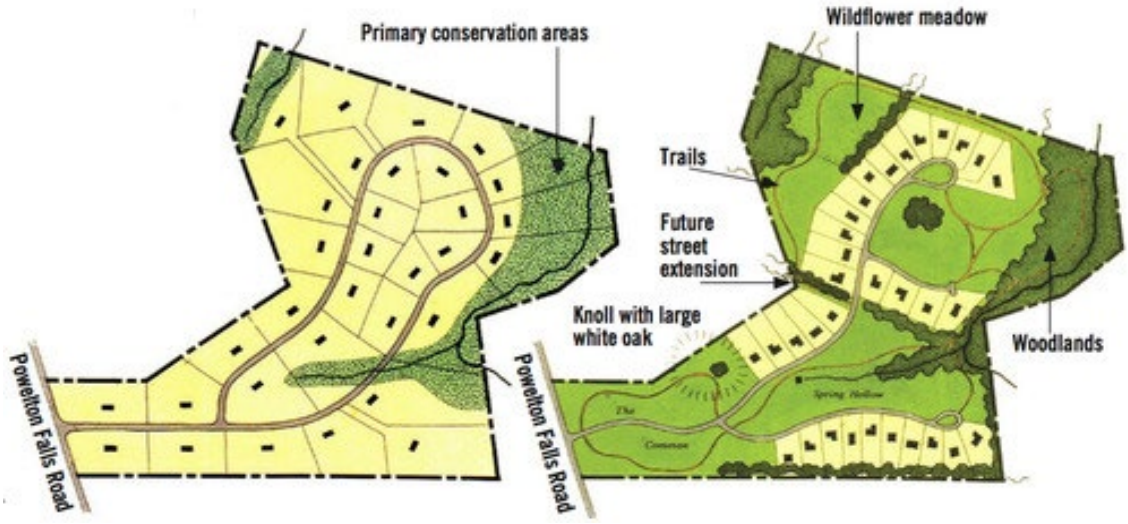


Figure 6-11: Illustration Comparing traditional and Conservation Design Approach

6.5.3 Promote Placement of Critical Facilities in Safer Areas

As discussed in 5.1.4, new critical facilities should only be permitted in safer areas outside of known flood hazard areas.

Recommended flood resilience strategy

- Require new critical facilities to be constructed exclusively in safer areas outside the SFHA and 0.2% AEP flood zone.

6.6 WATERSHED

The watershed flood resilience planning area is outside the SFHA and includes the entire drainage area (**Figure 6-12**). The intent of this planning area is to promote coordination and partnerships in the watershed and implement practices to slow, spread, and infiltrate floodwater. Stream gages upstream in the watershed can provide early warning to downstream communities. The following lists the watershed planning area strategies.

6.6.1 Support USGS Stream Gages

USGS maintains a network of gages nationwide to provide local, real-time streamflow information for emergency managers, local official, and the public. USGS gages are supported through matching local funds. There is a stream gage on the Elkhart River in Goshen. Flood forecast information for this gage is provided during times of high water only. This gage is in the center of the city near River Avenue and as such is unable to provide much flood warning. The next gage upstream is in Noble County on the North Branch Elkhart River at Cosperville. This gage is too far away to provide reliable flood forecast information for the City of Goshen. An additional gage upstream on the Elkhart River would help with flood detection and early warning. The addition of probabilistic and daily forecast information to the gage in Goshen would be beneficial as well.

Recommended flood resilience strategies

- Partner with the USGS to add a new gage upstream of Goshen to improve flood detection and provide early warning through the NWS.
- Partner with the NWS to expand the capabilities of the Elkhart River at Goshen gage to provide daily forecast information.

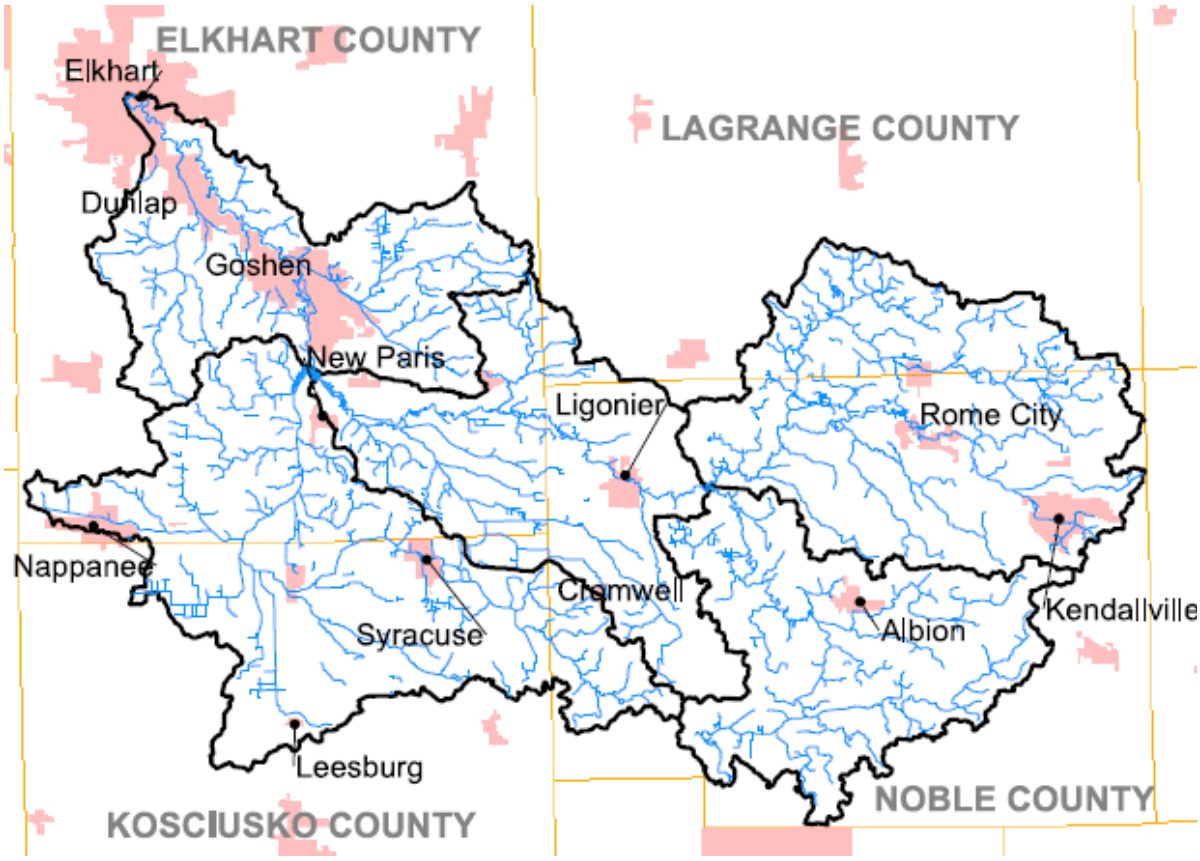


Figure 6-12: Elkhart River Watershed

6.6.2 Build Partnerships within the Watershed

The Elkhart River Restoration Association (ERRA) is a locally led organization that received an EPA 319 grant through IDEM to develop a watershed management plan for the Elkhart River Watershed. This plan focused on excessive sediment loading (especially as it relates to the Goshen Dam Pond), problematic *E.coli* levels, nutrient loading, rapid land use change and loss of wildlife habitat. This study identified agricultural and urban BMPs to address these concerns. The City of Goshen is downstream of a large area of row crops and pasture. Implementation of agricultural BMPs will help slow, spread and infiltrate floodwater before it reaches the city. Implementation of the urban BMPs in the city will capture, treat and store stormwater and reduce localized flooding.

The St Joseph River Basin Commission (SJRBC) includes the Elkhart River Watershed and several others to the east, west and north into Michigan. The SJRBC was established by the Indiana General Assembly to improve water quality, encourage conservation and increase coordinated management of the water and related land resources with the St Joseph River Basin. The SJRBC develops plans and tools to improve water quality and mitigate flooding as well as hosts an annual symposium for entities in the basin to network and collaborate on watershed efforts.

The City of Goshen should partner with the SJRBC and other jurisdictions in the watershed to encourage establishment of a natural resource overlay zone in the watershed. The overlay zone will be managed by each participating jurisdiction. This overlay should encompass open water, floodplains, riparian corridors, wetlands, woodlots, and urban tree canopy. These natural areas have a tremendous

ability to capture, store, and treat floodwater. Protecting and enhancing these areas throughout the watershed will go a long way toward the city's flood resiliency. The implementation of a natural resource overlay zone does not have to restrict agricultural practices or plans for development if it supports the natural and beneficial function of natural resources.

On the watershed scale, No-Adverse-Impact (NAI) is an effective floodplain management approach that ensures the action of any community or property owner, public or private, does not adversely impact the property and rights of others. The City of Goshen should work with the SJRBC to promote the adoption of comprehensive NAI ordinance and standards by all counties and communities in the watershed.

Recommended flood resilience strategies

- Participate in the Elkhart River Restoration Association and the St Joseph River Basin Commission planning activities and studies that help slow, spread and infiltrate floodwater upstream in the watershed.
- Partner with the St Joseph River Basin Commission to define a natural resource overlay zone and support local adoption throughout the basin.
- Work with St Joseph River Basin Commission to promote adoption of comprehensive No-Adverse-Impact development ordinance and standards, as reflected in the LTAP Model Stormwater Ordinance and Technical Standards, by all counties and communities within the watershed.

6.6.3 Support SWCD Programs

The Elkhart County Soil and Water Conservation District (SWCD) established the Stormwater Alliance Management Program (SWAMP) to provide financial assistance to landowners for implementing conservation practices that reduce non-point source pollution and sediment loading into waterways. Practices funded through this program must be functional for five years and include cover crops, filter strips, grade stabilization structures, and grassed waterways. These practices add organic matter and improve overall soil health and productivity. Cover crops for example, increase storage of water within soil layers, which helps to reduce the frequency of the stream flows that determine the channel size, thereby reducing increases in streambank erosion and sedimentation (**Figure 6-13**).

Figure 6-13: Cover Crops Increase Water Storage in Soil

Recommended flood resilience strategy

- Support (non-monetary) SWCD programs upstream in the watershed to improve flood resiliency in the City of Goshen.

6.6.4 Reduce Impact from Tile and Surface Drains in the Watershed

Tile and surface drains from agricultural practices drain fields quickly and contribute to flooding downstream. The City of Goshen should work with the Elkhart County Surveyor's Office to explore ways, like two-stage ditch reconstruction or regional flood control facilities, to compensate the impact of additional drainage tiles and surface drains as they are considered and allowed within the watershed.

Recommended flood resilience strategy

- Partner with the County Surveyor to investigate methods to store floodwater in the watershed, in flood control facilities, two-stage ditches or similar, to reduce flooding downstream.

CHAPTER 7: IMPLEMENTATION CHECKLIST

Preparation and adoption of this Flood Resilience Plan is a necessary first step for the City of Goshen to reduce its vulnerability to future flooding events. However, the plan by itself is not going to bring flood resiliency to the city unless its recommendations are implemented in a sustained and methodical manner. The following checklists provides a summary of the flood resilience strategies identified in this plan. These are grouped by the mechanism necessary for their successful implementation. The numbers following each strategy refer to the section of the report where the recommendation is discussed in greater detail. **Appendix 5** includes a table that lists each flood resilience strategy, interim steps for implementation, the department or entity that should lead implementation and timeline. Successful implementation for the recommended strategies will depend on available funding and staff resources.

7.1 COMPREHENSIVE PLAN

- ☐ Add a discussion on flooding, climate change, and flood resilience planning areas to the Comprehensive Plan. (5.6)

7.2 ORDINANCES AND CODES

Stormwater Ordinance

- ☐ Customize and adopt the LTAP Model Stormwater Ordinance and Technical Standards and include requirements for fluvial erosion hazard areas, channel protection volume, compensatory flood storage, low impact development/green infrastructure and climate change. (5.1)
- ☐ Adopt standalone fluvial erosion hazard regulations to prohibit and if not possible, discourage new development and redevelopment in this area or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standards recommendation. (6.1.1)
- ☐ Adopt a standalone minimum 3:1 compensatory flood storage requirement or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standard recommendation. (6.2.2)

City Code and Zoning Ordinance – Landscape Standards

- ☐ Expand the tree preservation language in the Zoning Ordinance to include replacement of trees lost to development. Consider a tree mitigation ratio of 5:1 based on tree size and require a variety of native species to reduce the risk of mass tree casualties from future pest damage. (5.4)
- ☐ Promote the use of native plants in the Zoning Ordinance by requiring a high percentage to meet the landscape standards and update the recommended tree list in the City Code to include more native species and cultivars. (5.4)
- ☐ Allow vegetated green infrastructure practices, including parking areas, to count toward landscape requirements in the Zoning Ordinance. (5.4)

Zoning Ordinance – Flood Control District

- ☐ Update flood resilience planning areas based on updated FIRM information. (5.4)

- ☐ Amend the Flood Control District regulations to require new critical facilities to be located outside of known flood hazard areas, including the 0.2% AEP flood zone. If placement of new critical facilities in flood hazard area is unavoidable, the facility, including access, should be protected to at least one foot above the 0.2% AEP flood elevation. (5.4, 6.3.1 and 6.5.3)
- ☐ Amend the Flood Control District regulations to prohibit and if not possible, discourage new development and redevelopment in the floodway and undeveloped high flood hazard storage areas in the floodway fringe. (5.4, 6.1.2 and 6.2.1)
- ☐ Discourage new development and preserve the 0.2% AEP flood zone for additional flood storage for extreme flood events. (6.3.1)
- ☐ Require new development and redevelopment in the 0.2% AEP flood to have a flood protection grade equal to or greater than that required in SFHA (a minimum of two feet above the 1% AEP). (6.3.2)
- ☐ Guide growth and development including utilities and infrastructure to safer areas outside the SFHA, 0.2% AEP flood zone and localized flooding areas. (6.5.1)

Zoning Ordinance – Land Use

- ☐ Promote development that is sensitive to the natural environment through conservation design and development. (6.5.2)

7.3 CAPITAL PROJECTS

Redevelopment

- ☐ Focus redevelopment efforts (site preparation, remediation and public infrastructure) in locations that are designated as safe growth areas outside the 0.2% AEP floodplain and local flooding areas. (5.7)
- ☐ Consider climate change and flood impacts in capital projects; promote low impact development/green infrastructure to manage stormwater. (5.7)

Land Acquisition

- ☐ Continue to acquire available land in the SFHA for flood storage and compatible open space uses; build on the city-owned parkland along the Elkhart River and create a Central Park like amenity for the city and region. (5.7, 6.1.2 and 6.2.1)
- ☐ Acquire and demolish structures in the river corridor impact area first then acquire and demolish structures outside the river corridor impact area and inside the SFHA as properties become available and funding allows. (6.4.4 and 6.4.5)

7.4 COMMUNICATION, EDUCATION AND TRAINING

- ☐ Train city stormwater inspection and maintenance staff about green infrastructure practices to improve function, performance and appearance. (5.1)

- [ ] Expand current flood communication efforts and develop a flood risk education and outreach program to improve people's risk awareness and motivate them to take measures to protect themselves and their property. (5.2)

7.5 SUPPORTING EFFORTS AND PARTNERSHIPS

- [ ] Complete the flood resilience checklist at least annually to track progress made and continue to do so until all questions are marked "yes". (5.3)
- [ ] Cross-reference the Flood Resilience Plan, Comprehensive Plan, Redevelopment Capital Plan and Elkhart County MHMP for strategies and mitigation measures related to flooding, growth and development priorities. (5.6, 5.7 and 5.8)
- [ ] Ensure the City of Goshen is represented in the MHMP five-year update. (5.8)

Plans, Programs and Studies

- [ ] Work with the County to study and update the stormwater utility rate collectively, otherwise complete an independent Stormwater Utility Rate Study that includes stormwater program costs and a fair and equitable rate structure; update the stormwater utility accordingly within the City of Goshen. (5.5)
- [ ] Incorporate the flood resilience planning areas into the proposed Future Growth Plan. (5.7)
- [ ] Identify willing landowners of undeveloped land and partner them with entities willing to purchase, accept donations or hold conservation easements. (6.1.2 and 6.2.1)
- [ ] Prepare a Flood Response Plan that documents flood detection, warning, response and follow-up protocols. (6.4.1)
- [ ] Prepare a comprehensive citywide Stormwater Master Plan to understand and resolve drainage, flooding and water quality conditions citywide. (6.4.2)
- [ ] Upon implementation of flood resilience strategies, participate in the NFIP Community Rating System (CRS) program to reduce flood risk and improve flood resiliency and reduce flood insurance premiums for all flood insurance policy holders within the city. (6.4.3)
- [ ] Prepare a Voluntary Acquisition Plan to prioritize structures for relocation and/or buyout in the vulnerable developed area. (6.4.4 and 6.4.5)
- [ ] Create a Floodproofing Assistance Program to prioritize nonresidential structures for floodproofing, establish partnerships with willing landowners and secure available funding. (6.4.5)
- [ ] Implement a Flood Compliance Program to encourage owners of nonconforming uses to voluntarily meet flood regulations. (6.4.6)

County Partnerships

- [ ] Support (non-monetary) SWCD programs upstream in the watershed to improve flood resiliency in the City of Goshen. (6.6.3)
- [ ] Partner with the County Surveyor to investigate methods to store flood water in the watershed, in flood control facilities, two-stage ditches or similar, to reduce flooding downstream. (6.6.4)

Watershed Partnerships

- ☐ Partner with the USGS to add a new gage upstream of Goshen to improve flood detection and provide early warning through the NWS. (6.6.1)
- ☐ Partner with the NWS to expand the capabilities of the Elkhart River at Goshen gage to provide daily forecast information. (6.6.1)
- ☐ Participate in the Elkhart River Restoration Association and the St Joseph River Basin Commission planning activities and studies that help slow, spread and infiltrate flood water upstream in the watershed. (6.6.2)
- ☐ Partner with the St Joseph River Basin Commission to define a natural resource overlay zone and support local adoption throughout the basin. (6.6.2)
- ☐ Work with the St Joseph River Basin Commission to promote adoption of comprehensive No-Adverse-Impact development ordinance and standards, as reflected in the LTAP Model Stormwater Ordinance and Technical Standards, by all counties and communities within the watershed. (6.6.2)

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EXHIBIT

Planning Area	Geographic Boundary[1]	Purpose of Strategies
River Corridor Impact Area	Floodway or fluvial erosion hazard area, whichever is greater	To conserve land and prohibit development
Vulnerable Developed Area	Existing developed land in the SFHA (floodway and floodway fringe)[1]	To protect people, buildings and facilities vulnerable to flooding and reduce future flood risk
Undeveloped High Hazard/Flood Storage Area	Undeveloped land in the floodway fringe	To conserve land and maintain the natural and beneficial function of the floodway fringe and discourage future development
Moderate Flood Hazard Area	0.2% Annual Exceedance Probability or 500-year flood zone	To identify areas that are subject to flooding during extreme events and to discourage placement of critical facilities
Safer Areas	Outside the SFHA but within the planning jurisdiction	To plan for and promote development in areas that are less vulnerable to future floods
Watershed	Entire drainage area	To promote coordination and partnerships and implement practices to slow, spread, and infiltrate flood water

[1] The geographic boundary is based on the most reliable, best available flood data which may not align with the area defined in the regulatory floodplain. The City of Goshen currently has preliminary maps under FEMA review; these preliminary delineations were used whenever possible.

Sources of Data
1. GIS Layers provided by City of Goshen, 2020-2021
2. US Bureau of the Census TIGER Files, 2019
3. National Hydrography Dataset, 2020
4. State of Indiana Orthophotography Project, 2016
5. Best Available Floodplain Data, Indiana Department of Natural Resources, 11-24-2020

- River Corridor Impact Area
- Vulnerable Developed Areas
- Undeveloped High Hazard/Flood Storage Areas
- Moderate Flood Hazard Areas
- Effective Floodway (Preliminary)
- Fluvial Erosion Hazard Area
- City of Goshen

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Christopher B. Burke Engineering LLC
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115 West Washington Street
Indianapolis, Indiana 46204
(t) 317.266.8000 www.cbbel-in.com

PROJECT: Flood Resilience Plan, City of Goshen, Indiana
PROJECT NO.: 20-0137
APPROX SCALE: as shown
DATE: 07/2021
TITLE: Flood Resilience Planning Areas
EXHIBIT: 1

R:\2020\20-0137.00000\GIS\Exhibits\APRX\DNR Best Available\Ex1_ResilienceAreas_LargeMap_dnr.aprx

APPENDIX 1: PROJECT TEAM MEETING SUMMARIES, WORKSHEETS, PRESENTATIONS AND PUBLIC COMMENTS

City of Goshen Flood Resilience Plan

Project Team Meeting (Zoom)

1 pm Thursday, December 17, 2020

SUMMARY

City of Goshen:
Mark Brinson, Community Development Director
Jason Kauffman, Stormwater Coordinator
Mattie Lehman, Stormwater Specialist
Aaron Sawatsky-Kingsley, Environmental Resilience Director
Dustin Sailor, Public Works Director
Theresa Sailor, Environmental Educator
Jeremy Stutsman, Mayor
Rhonda Yoder, Planning and Zoning Administrator

Christopher B. Burke Engineering:
Siavash Beik
Sheila McKinley
Matt Rummel

1. **Purpose, Scope, and Schedule for the Flood Resilience Plan**
   Burke staff opened the meeting with an overview on climate change in Indiana, the observed increased intensity and frequency of large rain events and damages that result from extreme flood events. And explained that that the purpose of this planning effort is to identify and implement smart growth strategies for flood resilience in the City of Goshen. The project scope, anticipated schedule and list of project team members were reviewed. Following some discussion, the project team agreed to add representatives from City Council, the Street Commissioner and the Elkhart County EMA.

2. **Discuss Past Flood Events and Areas Impacted**
   Burke staff initiated a discussion about past flood events, areas that flood, and road overtopping. City staff shared GIS maps that showed flood depth data collected from the 2018 flood, news articles and other resources available that could be used in this planning effort.

3. **Complete the Flood Resilience Checklist**
   Burke staff provided some background on the Community Flood Resilience Checklist and that it has been customized based on an initial review of Goshen policies and regulatory tools. The project team talked through the strategies in the checklist and identified those that are already in place, those in place but could use some enhancements and missing strategies (attached). This checklist will form the basis of the recommendations in the Flood Resilience Plan.

4. **Next Steps in the Planning Process**

   Burke staff shared that the next steps in the planning process will be to map flood resilience planning areas in GIS and follow-up on checklist strategies with individual protect team members to begin to draft recommended strategies. The next project team meeting will be sometime in February to review the flood resilience planning areas.

City of Goshen Flood Resilience Plan

COMMUNITY FLOOD RESILIENCE CHECKLIST

Completed December 17, 2020

The Community Flood Resilience Checklist identifies opportunities to improve resilience to future floods through policy and regulatory tools and non-regulatory programs. The checklist includes strategies that assess how well a community is positioned to avoid or reduce flood damage and recover from floods.

The strategies are organized into the following categories: improve overall resilience; conserve land and discourage development in river corridors and undeveloped floodplain; protect people, businesses and existing facilities in the floodplain; direct future growth away from vulnerable flood areas and coordinate stormwater management practices throughout the watershed.

Christopher B. Burke Engineering has adapted this checklist from the USEPA Smart Growth program and customized it for the City of Goshen. The city should revisit this checklist annually to track progress made and continue to do so until all questions are marked "yes".

A. OVERALL STRATEGIES TO ENHANCE RESILIENCE			**Notes**
1. Is the Comprehensive Plan current (within 10 years) and adopted by the city?	☒ Yes	☐ No	"Community Plan & Community Vision 2025" adopted 2016
a. Does the Comprehensive Plan include a goal to preserve the natural and beneficial function of floodplains?	☒ Yes	☐ No	NE-1 preserve/protect lists floodplains L-4 minimize impact development on natural environment/hydric soils
b. Does the Comprehensive Plan include a goal to preserve and enhance urban tree cover for stormwater management?	☒ Yes	☐ No	NE-4 urban forestry program benefit stormwater runoff
c. Does the Comprehensive Plan include a goal to provide connectivity of people to the waterways (trails, parks, public access points)?	☒ Yes	☐ No	NE-2 develop Elkhart River as asset Millrace Canal Trail; Pumpkinvine Nature Trail near Rock Run Creek
d. Does the Comprehensive Plan cross-reference the Elkhart County Multi-Hazard Mitigation Plan?	☐ Yes	☒ No	
e. Did emergency managers, public works and floodplain administrator participate in the development of the Comprehensive Plan?	☒ Yes	☐ No	City Public Safety (ROOM FOR ENHANCEMENT)

2. Is the County Multi-Hazard Mitigation Plan current (within 5 years), approved by FEMA and adopted by the city?	☒ Yes	☐ No	Approved and adopted 2016
a. Did the city planner participate in the development of the Multi-Hazard Mitigation Plan?	☒ Yes	☐ No	Listed, participation limited (ROOM FOR ENHANCEMENT)
b. Were stakeholders affected by floods involved in the development of the Multi-Hazard Mitigation Plan?	☒ Yes	☐ No	Public invited, low participation (countywide planning effort)
c. Does the Multi-Hazard Mitigation Plan include mitigation practices to preserve the natural and beneficial function of floodplains?	☒ Yes	☐ No	Land Use Planning & Zoning – overlay zones; low impact development; safe growth audit; incorporate into Comp Plan
3. Is the Flood Control District based on the IDNR State Model Flood Hazard Ordinance?	☒ Yes	☐ No	Zoning Ordinance Art IV Zoning Districts FCD Flood Control District (Overlay) Adopted 2020
a. Does the Flood Control District include a requirement for compensatory flood storage?	☐ Yes	☒ No	
b. Does the Flood Control District require critical facilities to be located outside the floodplain as well as access/egress?	☒ Yes	☐ No	"to extent possible" (ROOM FOR ENHANCEMENT)
c. Does the city require building expansion and new accessory structures in the floodplain to meet additional requirements?	☒ Yes	☐ No	Flood District covers new construction and substantial improvements (ROOM FOR ENHANCEMENT)
d. Does the city participate in the National Flood Insurance Program (NFIP)?	☒ Yes	☐ No	
e. Does the city participate in the Community Rating System (CRS) program?	☐ Yes	☒ No	
4. Does the Stormwater Management Code promote low impact development/green infrastructure?	☐ Yes	☒ No	
a. Does the Stormwater Management Code include requirements to reduce and treat runoff from impervious areas?	☒ Yes	☐ No	MS4 requirements only (ROOM FOR ENHANCEMENT)

b. Does the Stormwater Management Code include a requirement for channel protection volume?	☐ Yes	☒ No	
c. Does the Stormwater Management Code include a requirement for compensatory storage?	☐ Yes	☒ No	
d. If not in the Comprehensive Plan, does the Stormwater Management Code include a requirement for fluvial erosion hazard (FEH) areas?	☐ Yes	☒ No	
5. Does the Zoning/Subdivision Control Ordinances promote low impact development and green infrastructure?	☐ Yes	☒ No	
e. Does the Ordinance include maximums for impervious cover?	☒ Yes	☐ No	Minimums for street width, parking (ROOM FOR ENHANCEMENT)
f. Does the Ordinance promote native plants to meet landscape standards?	☐ Yes	☒ No	Conflict with weed ordinance Comp Plan NE-1 encourages native plants
g. Does the Ordinance include tree replacement and/or tree mitigation standards?	☐ Yes	☒ No	
6. Is the Capital Plan recent (within 5 years) and been approved and adopted by the city? (Utilities/Redevelopment)	☒ Yes	☐ No	Not unified CIP, Utilities and Redevelopment most applicable (ROOM FOR ENHANCEMENT)
a. Does the Capital Plan cross-reference the Comprehensive Plan and Multi-Hazard Mitigation Plan?	☐ Yes	☒ No	
b. Does the Capital Plan include flood mitigation projects with low impact development/green infrastructure solutions?	☐ Yes	☒ No	Not as a priority, acquisition along river for redevelopment
7. Does the city consider possible flood impacts from climate change in their plans, policies and projects?	☐ Yes	☒ No	Climate Action Plan (in progress)
8. Does the city have a stormwater utility to fund stormwater projects and programs long-term?	☒ Yes	☐ No	$1.50 ERU in partnership w County, Elkhart and Bristol – plans to establish own utility to generate more funds (ROOM FOR ENHANCEMENT)

a. Does the funding mechanism include an incentive to promote low impact development/green infrastructure?	☐ Yes	☒ No	Residential rain barrel cost-share program only
9. Does the city conduct an annual review/audit of plans, programs, and policies to ensure consistency?	☐ Yes	☒ No	

B. CONSERVE LAND & DISCOURAGE DEVELOMENT IN THE RIVER CORRIDOR & UNDEVELOPED HIGH FLOOD HAZARD/FLOOD STORAGE AREAS			**Notes**
1. Does the Comprehensive Plan include a goal to prohibit development in stream meander zones or fluvial erosion hazard (FEH) areas?	☒ Yes	☐ No	NE-2 directs growth from farmland, wetlands and forest (add floodplain) Flood District includes erosion hazard (ROOM FOR ENHANCEMENT)
1. Does the Zoning Ordinance include a river corridor overlay district that prohibits development and land disturbances?	☐ Yes	☒ No	
2. Does the Zoning/Subdivision Control Ordinance allow for cluster development, density bonuses as incentives to protect/conserve floodplains?	☐ Yes	☒ No	
3. Does the city use incentives or non-regulatory strategies to maintain undeveloped land in the floodplain?	☐ Yes	☒ No	
a. Does the city encourage floodplain landowners to restore infiltration properties of the soil?	☐ Yes	☒ No	
b. Does the city encourage floodplain landowners to maintain/enhance native vegetation in river corridors, floodplains and wetlands?	☐ Yes	☒ No	Education through MS4 program (rain gardens)
c. Does the city encourage floodplain landowners to partner with land trusts or SWCD to hold the land in a conservation easement through a cost-share, donation or purchase agreement?	☐ Yes	☒ No	Limited land in floodplain for conservation easement

C. PROTECT PEOPLE & EXISTING BUILDINGS IN FLOODPRONE AREAS			**Notes**
1. Does the Comprehensive Plan and Multi-Hazard Mitigation Plan identify developed areas that have been or are likely to flood?	☒ Yes	☒ No	Comp Plan – no, MHMP – yes

a. Does the Multi-Hazard Mitigation Plan identify critical facilities and infrastructure in the floodplain?	☒ Yes	☐ No	Identified 3 FW & 2 1% City unfamiliar with MHMP (ROOM FOR ENHANCEMENT)
b. Does the Multi-Hazard Mitigation Plan include mitigation practices to acquire or floodproof at-risk structures?	☒ Yes	☐ No	Identified 300 structures in SFHA City unfamiliar with MHMP (ROOM FOR ENHANCEMENT)
c. Is the city willing to cost share with property owners on voluntary acquisition, relocation and/or floodproofing projects?	☒ Yes	☐ No	More information needed (ROOM FOR ENHANCEMENT)
d. Does the city use incentives or cost-share programs to protect existing critical facilities in the floodplain including access/egress?	☐ Yes	☒ No	
2. Does land development codes and building codes promote safer building and rebuilding in floodprone areas?	☐ Yes	☒ No	
a. Does the city follow the International Building Code to promote flood-resistant design and construction?	☒ Yes	☐ No	
b. Does the city use incentives or cost-share programs to bring non-conforming use and structures into compliance?	☐ Yes	☒ No	
c. Does the city require redevelopment projects in the floodplain to provide additional flood storage/meet higher stormwater standards?	☐ Yes	☒ No	
3. Is the city able to impose a building moratorium on all new development following a disaster?	☐ Yes	☒ No	Legal question. Not necessary since delayed naturally by volume

D. PLAN FOR AND ENCOURAGE NEW DEVELOPMENT OUTSIDE OF THE FLOODPLAIN			**Notes**
1. Does the Comprehensive Plan guide future growth and development to areas outside the floodplain?	☒ Yes	☐ No	Not exclusively (ROOM FOR ENHANCEMENT)
2. Does the city use incentives such as TIF districts, density bonuses, stormwater utility credits to steer new development to safer areas outside the floodplain?	☐ Yes	☒ No	

3. Does the Capital Plan support development and expansion of infrastructure outside of the floodplain?	☒ Yes	☐ No	Limited by default (ROOM FOR ENHANCEMENT)

E. IMPLEMENT STORMWATER MANAGEMENT THROUGHOUT THE WATERSHED			Notes
1. Does the city participate in watershed-based planning activities to manage stormwater?	☒ Yes	☐ No	Elkhart River Restoration Association St Joe River Basin Commission
2. Does the city participate in a multi-jurisdictional/regional effort to link and protect wooded areas, floodplains and wetlands?	☐ Yes	☒ No	
3. Does the city coordinate planning, policy, and/or projects with other communities in the watershed?	☐ Yes	☒ No	Limited beyond stormwater

City of Goshen Flood Resilience Plan

Project Team Meeting (Zoom)

2 pm Tuesday, February 23, 2021

SUMMARY

City of Goshen:
Mark Brinson, Community Development Director
Jason Kauffman, Stormwater Coordinator
Mattie Lehman, Stormwater Specialist
Julia King, City Council Member
Aaron Sawatsky-Kingsley, Environmental Resilience Director
Dustin Sailor, Public Works Director
Theresa Sailor, Environmental Educator
Mark Schrock, City Council Member
Jeremy Stutsman, Mayor
Rhonda Yoder, Planning and Zoning Administrator

Christopher B. Burke Engineering:
Siavash Beik
Sheila McKinley
Matt Rummel

1. **Introduction and Recap of Project Purpose and Work to Date**
   Burke staff discuss the project purpose, planning approach and an overview of what work had been completed so far in the planning process.

2. **Discuss Purpose and Intent of Flood Resilience Planning Areas**
   Burke staff shared a table (below) to introduce the different flood resilience planning areas, discussed how the area is defined and the purpose of each area. Strategies for flood resilience will be identified for each of these planning areas.

Planning Area	Area Defined	Purpose
River Corridor Impact Areas	Regulatory floodway or Fluvial Erosion Hazard (FEH) area, whichever is greater	To conserve land and prohibit development

Vulnerable Developed Areas	Existing developed land in the Special Flood Hazard Area (SFHA) including the floodway and floodway fringe	To protect people, buildings, and facilities in the vulnerable areas and reduce future flood risk
Undeveloped High Hazard/Flood Storage Areas	Undeveloped land in the floodway fringe	To conserve land and maintain the natural and beneficial function of the floodway fringe, and discourage future development in these areas
Moderate Flood Hazard Areas	0.2% Annual Exceedance Probability flood zone or 500-year floodplain	To identify areas that are subject to flooding during an extreme event and to discourage placement of critical facilities in these areas
Safer Areas	Outside the SFHA, but within the planning jurisdiction	To plan for and promote development in areas that are less vulnerable to future floods
Watershed	Entire drainage area	To promote coordination and partnerships and implement practices to slow, spread and infiltrate flood water

3. **Review Mapped Areas, 2018 Flood Data and Land Use Designations**
   Burke staff shared an ArcGIS Online map that showed the flood resilience planning areas for the City of Goshen based on current floodplain mapping. The project team reviewed each area and stream segment and discussed areas that flood, studies and projects as well as implications of higher standards for development. Additional data was shared and will be incorporated into updated flood resilience maps.

4. **Closing Comments and Next Steps in the Planning Process**
   Burke staff offered to update the ArcGIS Online maps with the comments from the meeting and the additional data provided by the city. The updated map will be routed for the project team to review and comment. Before the next project team meeting, Burke staff will be reaching out to individual project team members to discuss details of local plans and regulations. This will help craft the most appropriate flood resilience strategies.

City of Goshen Flood Resilience Plan

Project Team Meeting (Zoom)

9 am Thursday, May 27, 2021

SUMMARY

City of Goshen:
Mark Brinson, Community Development Director
Jason Kauffman, Stormwater Coordinator
Mattie Lehman, Stormwater Specialist
Julia King, City Council Member
Aaron Sawatsky-Kingsley, Environmental Resilience Director
Dustin Sailor, Public Works Director
Theresa Sailor, Environmental Educator
Mark Schrock, City Council Member
Jeremy Stutsman, Mayor
Rhonda Yoder, Planning and Zoning Administrator

Christopher B. Burke Engineering:
Siavash Beik
Sheila McKinley

1. **Welcome and Recap of Project Purpose and Work to Date**
   Burke staff discuss the project purpose, planning approach and an overview of what work had been completed so far in the planning process.

2. **Review and Prioritize Flood Resilience Strategies/Discuss Method, Resources and Timeline for Implementation**
   Burke staff introduced the recommended flood resilience strategies to the project team. Following some discussion, revisions and clarification, the team prioritized the strategies in order of importance within the individual flood resilience planning areas and then identified which were the highest priority overall. The method of how the strategy would get implemented, resources needed and timeline were discussed as well. The meeting ran long and the project team was assigned homework to finish the worksheet. The completed worksheet is attached.

3. **Next Steps: Review Draft Plan**
   Burke staff shared that the next step is to review the draft plan which should be distributed in July.

GOSHEN FLOOD RESILIENCE PLAN – PROPOSED STRATEGIES WORKSHEET

Project Team Meeting – May 27, 2021

AREA	PROPOSED STRATEGIES	PRIORITY		IMPLEMENTATION: METHOD, RESOURCES & TIMELINE
		WITHIN AREA	**OVERALL** (H=High)	
OVERALL/ CITYWIDE	**1. Update Comprehensive Plan** - *Add discussion flood risk and climate change* - *Introduce/define flood resilience planning areas* - *Promote growth/development in safer areas* - *Add Urban Tree Canopy Goal*	4		M: update to CP R: draft language, maps T: 2025; possible to amend sooner
	2. Update Zoning and Subdivision Development Ordinances; City Code Trees: - *Promote/incentivize planting/preserving natives* - *Add tree replacement/mitigation standards/ratios* Flood Hazard: - *Add/define flood resilience overlay zones* - *Prohibit development in floodway and discourage in floodway fringe* Stream Buffer - *Add streamside forest/buffer strips requirement; size proportional to waterway;*	2		M: amend codes R: draft language T: following CP update; possible to amend sooner
	3. Update Stormwater Ordinance & Technical Standards - *Customize/adopt LTAP Model SW O&TS include compensatory storage, FEH, LID/GI*	1	H	M: model SW O&TS R: customize T: 2022
	4. Update Redevelopment Capital Improvement Plan - *Promote growth/development in safer areas* - *Use LID/GI redevelopment projects* - *Land Use Plan/Future Growth Plan (RFP Summer 2021)*	4		M: new Land Use Plan/Future Growth Plan R: maps, projections, guidance? T: 2022
	5. Conduct policy audits and update plans for consistency - *Revisit Flood Resilience Checklist annually* - *Consider flood and climate change impacts*	1		M: meeting R: Flood Resilience Plan Project Team T: annually (min)
	6. Flood Risk Communication, Education & Outreach - *Educate all groups about flooding, flood risk* - *Expand existing educational programs* - *Need for GI design, construction, maintenance training (city)* - *Create future flood map/articulate frequency of storms (visual)*	1		M: expand efforts R: Maple City Now/webpage T: ongoing
	7. Stormwater Utility Fee/In-lieu Fee Program - *Adjust fee in city limits to cover projects; maintain billing through county; if not, stand alone* - *Create in-lieu stormwater fee program where space is limited; regional ponds with onsite BMPs for water quality*	3		M: work w county R: rate study; billing T: 2022?
RIVER CORRIDOR	**1. Adopt a River Corridor Overlay Zone** - *Prohibit (discourage) future land disturbance/development* - *Distinguish FW & FEH; alternatives to adopting River Corridor*	1	H	M: update zoning R: map, language T: 2022?
	2. Protect Undeveloped Land - *Acquisition or partner landowners with organizations like land trusts* - *Create a "Central Park" along Elkhart River*	1	H	M: acquisition/easement R: list of options and contact information T: 2030? 2050?
	3. Reconstruct City-maintained Open/Tile Drains - *Provide flood storage/water quality improvement with 2-stage ditch/ greenway/ recreation corridor (Carter Road Ditch, ~~Pumpkinvine Ditch, Sommers Ditch~~, Stutsman Ditch, Wellington Ditch, ~~West Goshen Ditch~~)*	2		M: CP/CIP R: city ownership only T: as opportunity
UNDEVELOPED HIGH FLOOD HAZARD/ FLOOD STORAGE AREA	**1. Protect Undeveloped Land** - *Acquisition/partner landowners with organizations willing to purchase, accept donations, easements* - *Expand "Central Park" concept along Elkhart River*	1		M: acquisition/easement R: list of options and contact information T: 2030? 2050?
	2. Establish Compensatory Storage Requirements - *Minimum 3:1 compensation when fill in the floodway fringe is unavoidable*	1		M: model SW O&TS R: customize T: 2022
	3. Prohibit New Critical Facilities - *Strengthen current language "to extent possible"*	1		M: update zoning R: draft language T: 2022?
MODERATE FLOOD HAZARD AREA	**1. Discourage New Development** - *Prepare for 500-year floodplain to become the new 100-year floodplain*	1		M: update zoning R: draft language T: 2022?
	2. Require Higher Standards for Buildings - *Require buildings to have a FPG equal or greater to that required in SFHA* - *Require critical facilities to have a FPG above the 0.2% chance flood elevation*	1		M: update zoning R: draft language T: 2022?

VULNERABLE DEVELOPED AREA	**1. Voluntary Acquisition of Structures INSIDE River Corridor** - *155 structures (earlier mapping)* - *Prioritize based on potential public use, connectivity, location* - *Depending on interest, may require dedicated staff*	2		M: prepare a Voluntary Acquisition Plan R: property details, depth flooding, prioritization, etc. T: 2023 plan; 2026 start?
	2. Voluntary Acquisition of Structures OUTSIDE River Corridor - *272 structures (earlier mapping)* - *Prioritize based on severity of flood risk* - *Depending on interest, may require dedicated staff*	4		M: prepare a Voluntary Acquisition Plan R: property details, depth flooding, prioritization, etc. T: 2023 plan; 2030 start?
	3. Floodproof Structures Outside River Corridor - *Nonresidential only; incentive or cost-share program* - *Prioritize based on severity of flood risk* - *Depending on interest, may require dedicated staff*	3		M: establish Floodproofing Assistance Program R: FEMA floodproofing techniques/requirements, prioritize, outreach to businesses T: 2023 prog; 2026 start?
	4. Bring Nonconforming Uses into Compliance - *Outside requirements for substantial improvement* - *Older structures not compliant with current flood regulations; provide incentives, cost-share, waived permit fees* - *Depending on interest, may require dedicated staff*	4		M: establish Compliance Program; identify incentive R: education and outreach T: 2023 prog; 2026 start?
	5. Participate in the NFIP Community Rating System - *Program lowers flood insurance premiums for communities that have higher flood standards; 32 communities in Indiana participate*	2		M: populate checklist online, meet with CRS rep R: existing flood policies, outreach efforts, etc. T: 2022 start; annual recert
	6. Prepare a Flood Response Plan - *Improves flood response efforts; schedule of activities tied to flood levels, prevents duplication and avoids gaps in response*	1	H	M: prepare plan R: actions for flood fight T: 2023?
	7. Prepare a Citywide Stormwater Master Plan - *Prioritize, study and identify solutions for flood impact areas (GLISA Vulnerability Assessment – 18 areas 2018 flood) including Trinity Square Shopping Center, Linway Plaza/Lincoln Avenue Business, Huron Street Neighborhood, Roxy Mobile Home Park, road/intersection flooding, sanitary sewer lift stations and more*	1		M: Prepare plan R: detail study problem areas, prioritized solutions and costs, stormwater asset condition assessment T: following GLISA work?
SAFER AREA	**1. Guide Growth and Development to Safer Areas** - *Promote smart growth principles/mixed use developments, conservation design* - *Prioritize capital projects in safer areas* - *Incentivize with TIF districts, flexible zoning practices, permit waivers* - *Future Growth Plan*	1		M: new Land Use Plan/Future Growth Plan R: maps, projections, guidance? T: 2022
	2. Allow Critical Facilities			M: update zoning R: draft language T: 2022?
WATERSHED	**1. Watershed Partnerships** - *Increase participation in Elkhart River Restoration Association and St Joseph River Basin Commission and watershed planning activities/studies* - *Engage in multi-jurisdictional/regional efforts to link and protect wooded areas, floodplains and wetlands* - *Support uniform no-adverse impact (NAI) stormwater standards* - *Support sustainable design and maintenance practices for waterbodies*	1		M: city participation R: initiate ideas and support implementation T: ongoing
	2. Upstream Flood Storage - *Investigate options for flood storage upstream using dry detention or regional pond (economic development benefit)* - *Controlled structures on select tributaries with dedicated flood easements on private land undeveloped land, when needed for flood storage, flood loss expenses paid to landowner by city*	2		M: study flood storage needs (component of Stormwater Master Plan?) R: volume/area needed; identify land and funding T: standalone or following GLISA work?
	3. Support SWCD Programs - *Stormwater Alliance Management Program (SWAMP) cost-share* - *Soil health and tillage practices* - *Education, trainings, workshops, equipment rental*	2		M: city participation R: initiate ideas and support implementation T: ongoing
	4. Enhanced and Additional USGS Stream Gages - *Add forecast capabilities to Elkhart River at Goshen gage* - *Add new gage upstream for advanced flood warning and notification (upstream gage is North Branch Elkhart at Cosperville)*	1		M: USGS gages R: explore options and resources needed with USGS T: tie to Flood Response Plan 2023?

Goshen Common Council
9:00 a.m. January 14, 2022 Special Meeting
Schrock Pavilion, Shanklin Park, 411 West Plymouth Avenue, Goshen, Indiana

Call to Order by Mayor Jeremy Stutsman

Roll: **Megan Eichorn (District 4)** **Julia King (At-Large)** **Doug Nisley (District 2)** **Gilberto Pérez, Jr. (District 5)** **Donald Riegsecker (District 1)** **Matt Schrock (District 3)** **Council President Brett Weddell (At-Large)** **Youth Advisor Adrian Mora (Non-voting)**

1. **Welcome and Opening Comments – Mayor Stutsman**

2. **Review of past floods and climate change**

3. **Overview of flood resilience planning areas and strategies**

4. **Detailed discussion of short-term implementation strategies**

5. **Open discussion and next steps**

Adjournment

Assessing Flood Vulnerability in Goshen

January 14, 2022

City of Goshen Stormwater Department

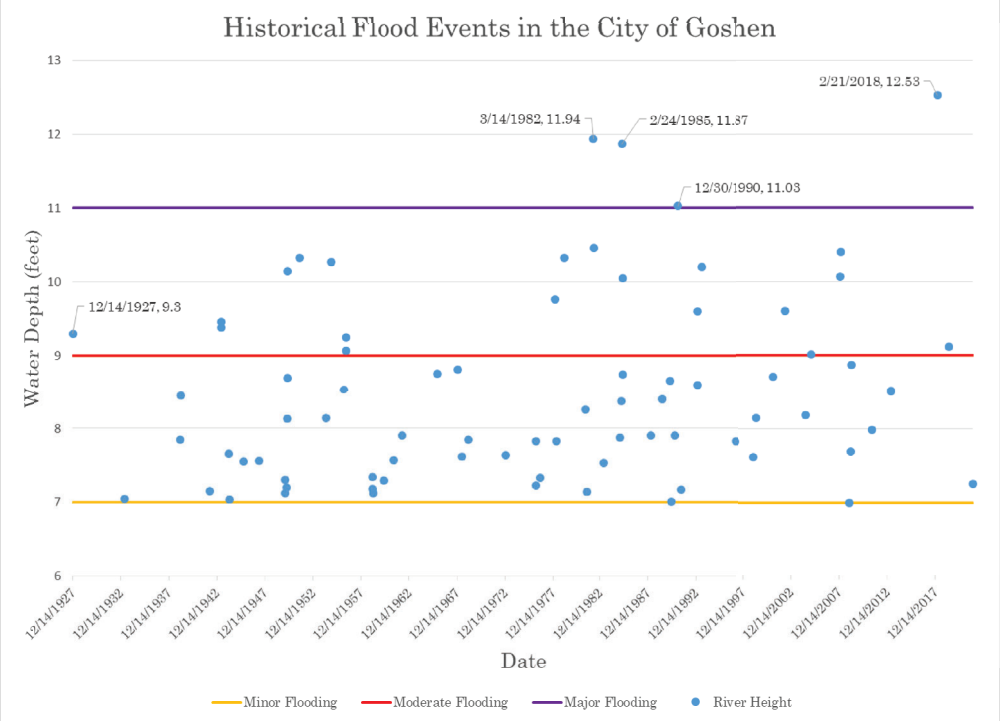
Shanklin and Mullet Parks (left) and Creekside Manner (right)

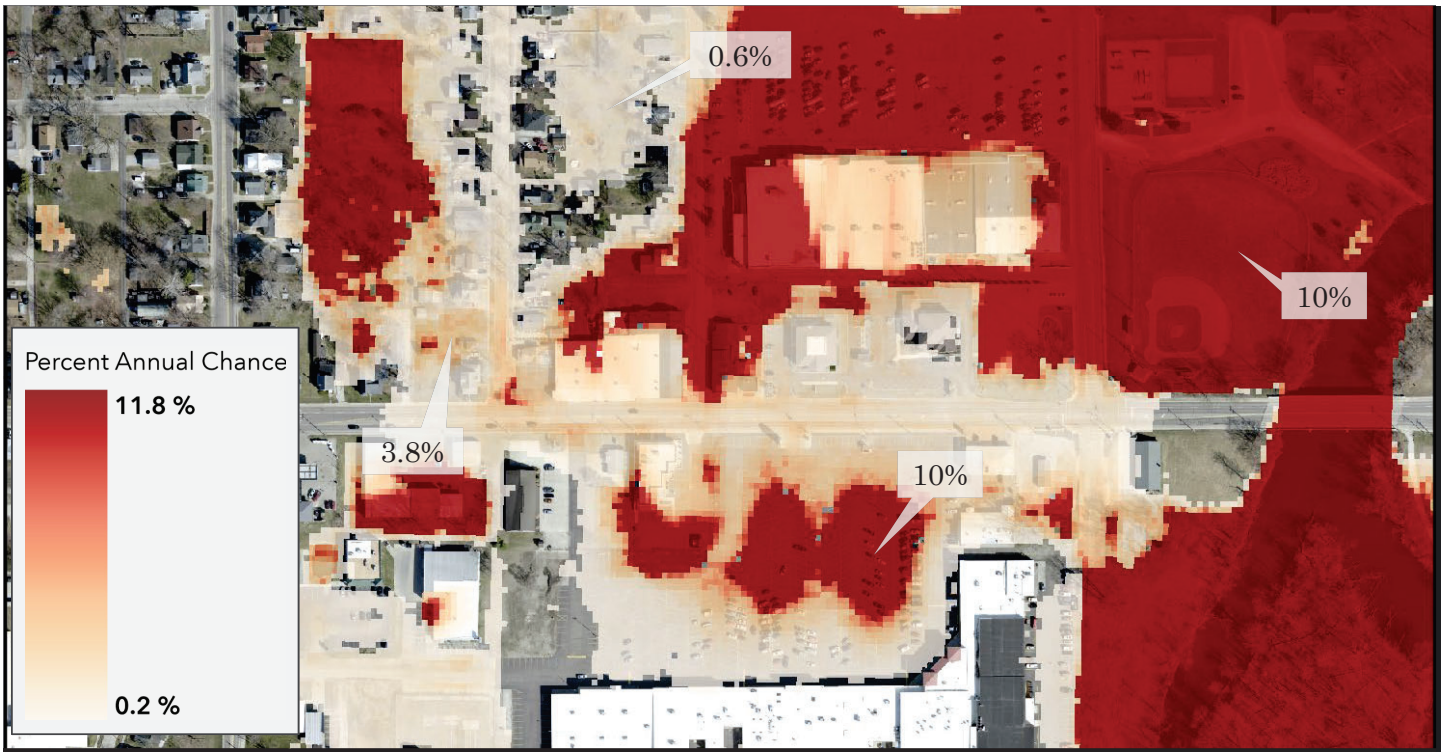
February 21, 2018 – Trinity Square and Linway Plaza

1892 – View of Lincoln Ave. bridge from County Courthouse

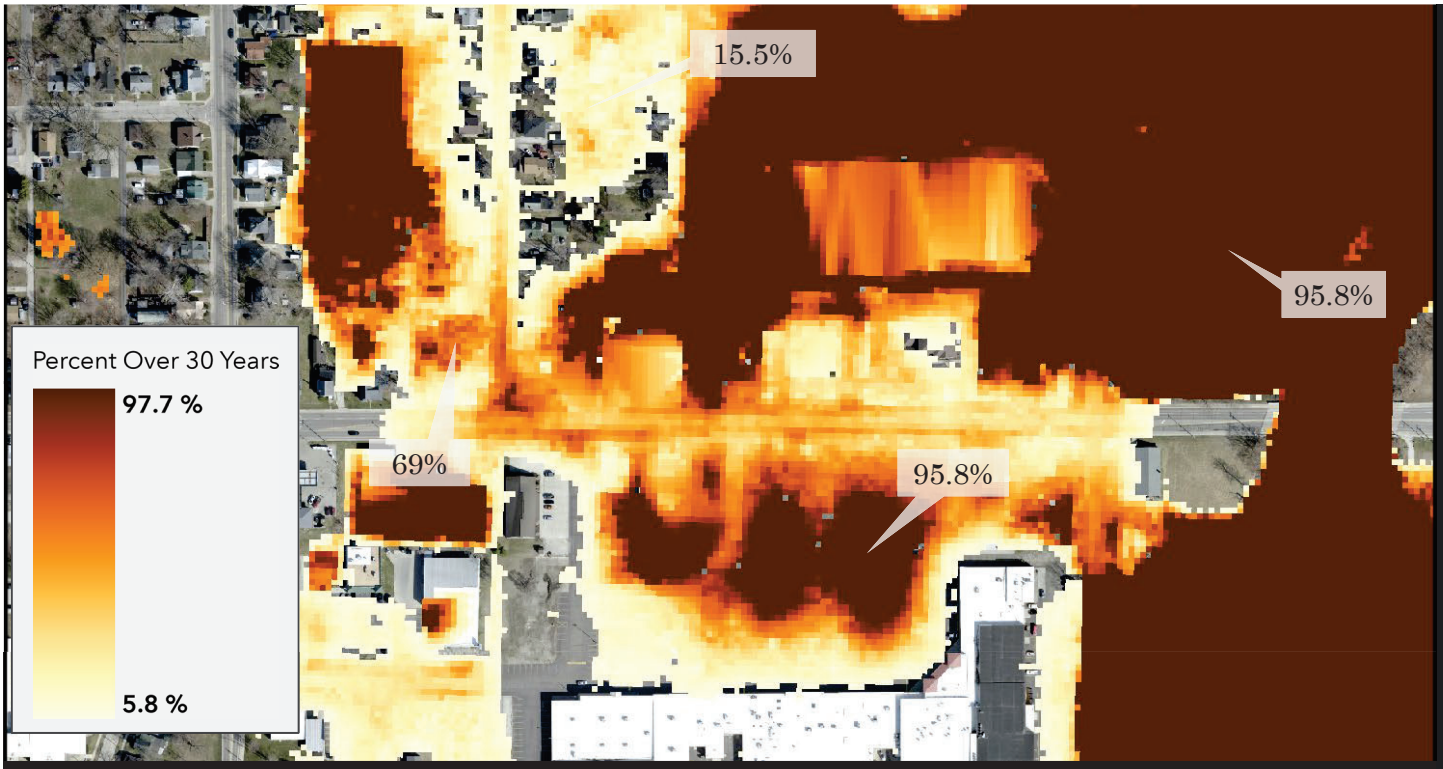
Major Historical Flooding Events

- USGS River Gauge has been located near N Indiana Avenue Bridge over the Elkhart River since September 11, 1924.
- First recorded flood occurred on December 14, 1927.
- Four major flood events (11+ feet) have occurred since 1982.





Percent Annual Chance of Flooding



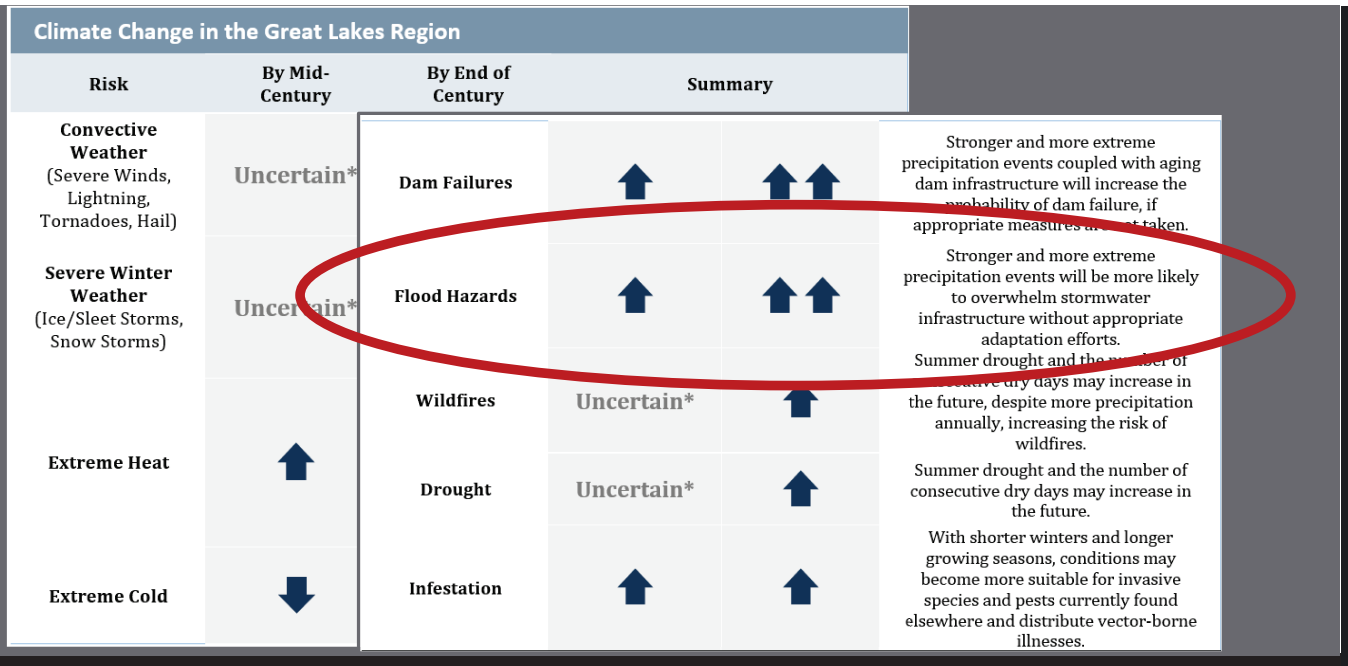
Percent 30-year Chance of Flooding

Flooding, Stormwater, and a Changing Regional Climate

Partnering with the Great Lakes Integrated Sciences and Assessments (GLISA) for a Climate Change Vulnerability Assessment for Stormwater

Assessment at a Glance

- Regional Climate Predictions
- Social Vulnerability Indicators
- Landscape Features
- Assessment Locations
- Final Matrix



Climate Change in the Great Lakes Region

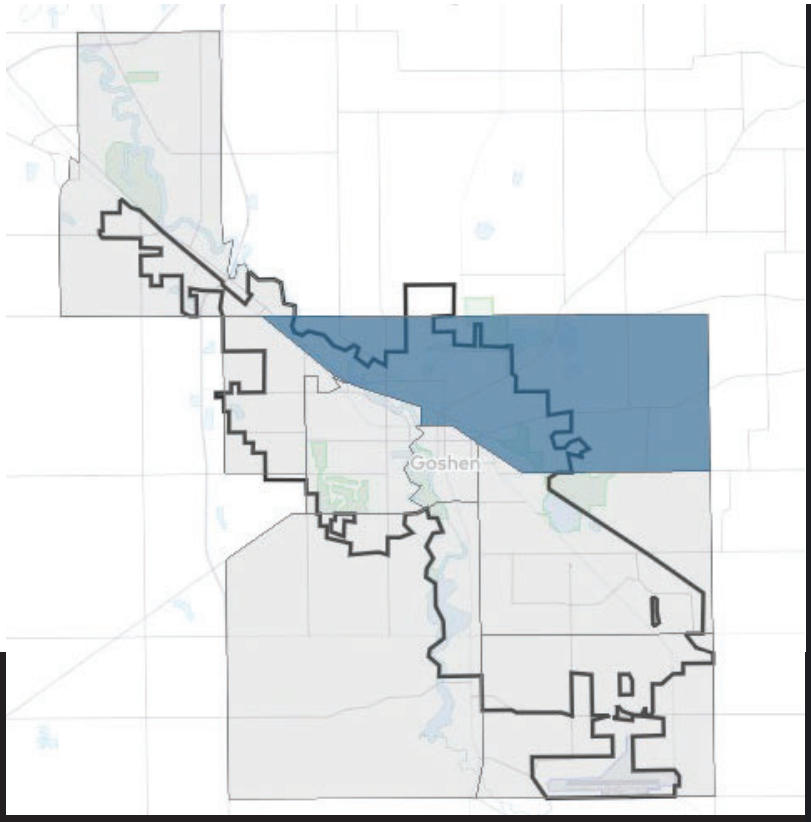
Risk	By Mid-Century	By End of Century		Summary
Convective Weather (Severe Winds, Lightning, Tornadoes, Hail)	Uncertain*	**Dam Failures**	↑	↑↑	Stronger and more extreme precipitation events coupled with aging dam infrastructure will increase the probability of dam failure, if appropriate measures are not taken.
Severe Winter Weather (Ice/Sleet Storms, Snow Storms)	Uncertain*	**Flood Hazards**	↑	↑↑	Stronger and more extreme precipitation events will be more likely to overwhelm stormwater infrastructure without appropriate adaptation efforts.
Extreme Heat	↑	**Wildfires**	Uncertain*	↑	Summer drought and the number of consecutive dry days may increase in the future, despite more precipitation annually, increasing the risk of wildfires.
		Drought	Uncertain*	↑	Summer drought and the number of consecutive dry days may increase in the future.
Extreme Cold	↓	**Infestation**	↑	↑	With shorter winters and longer growing seasons, conditions may become more suitable for invasive species and pests currently found elsewhere and distribute vector-borne illnesses.

Climate Change in Great Lakes and Goshen

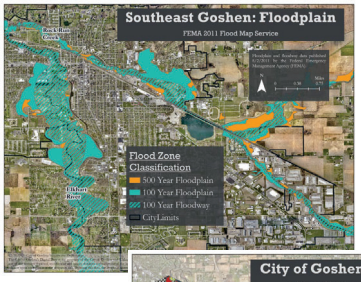
Section assembled from a variety of sources by the Great Lakes Integrated Sciences and Assessments (GLISA)—a NOAA supported collaboration between University of Michigan and Michigan State University.

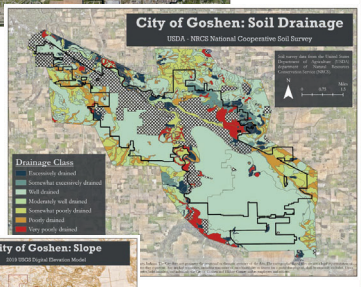
- 92nd vulnerability percentile in State

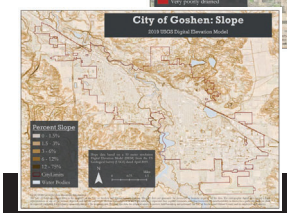
- Factors Impacting
  - Poverty
  - Limited English proficiency
  - Persons of Color or Hispanic
  - Persons without health insurance
  - Persons without a car
  - Persons with disabilities
  - Percent rental and mobile homes,
  - Persons without a high school diploma

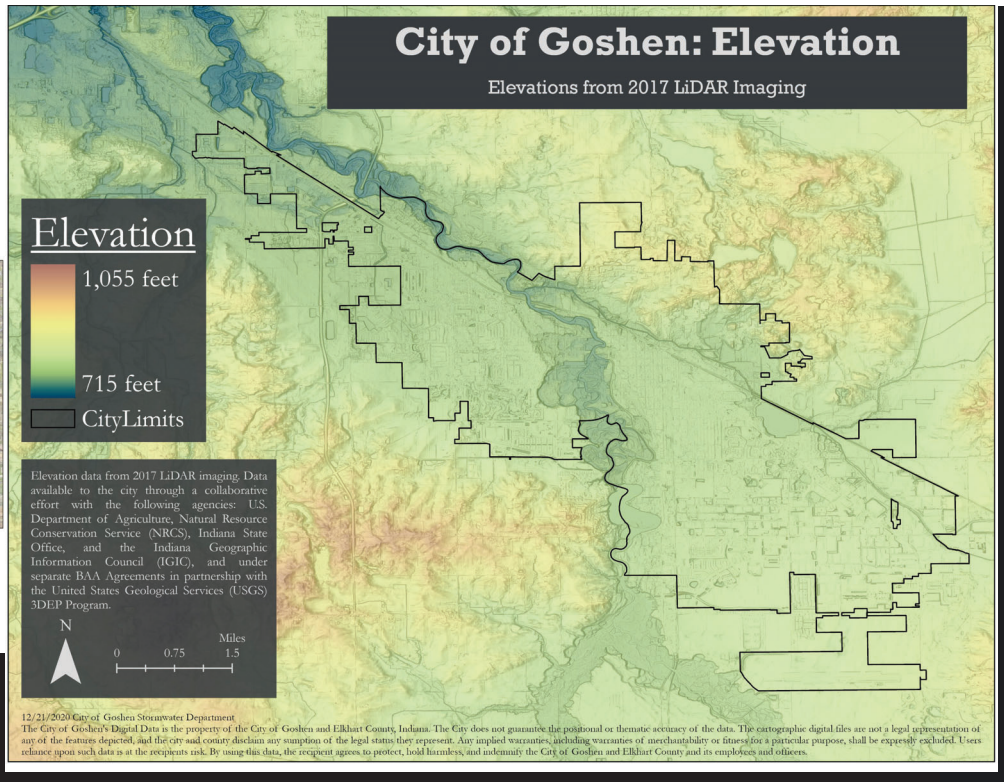


Demographic Trends

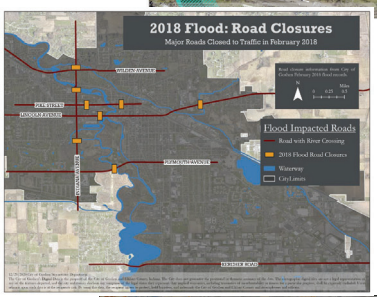


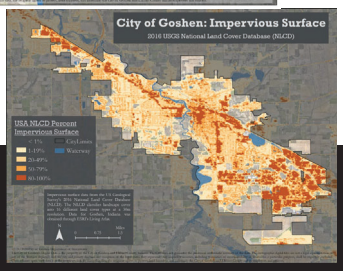


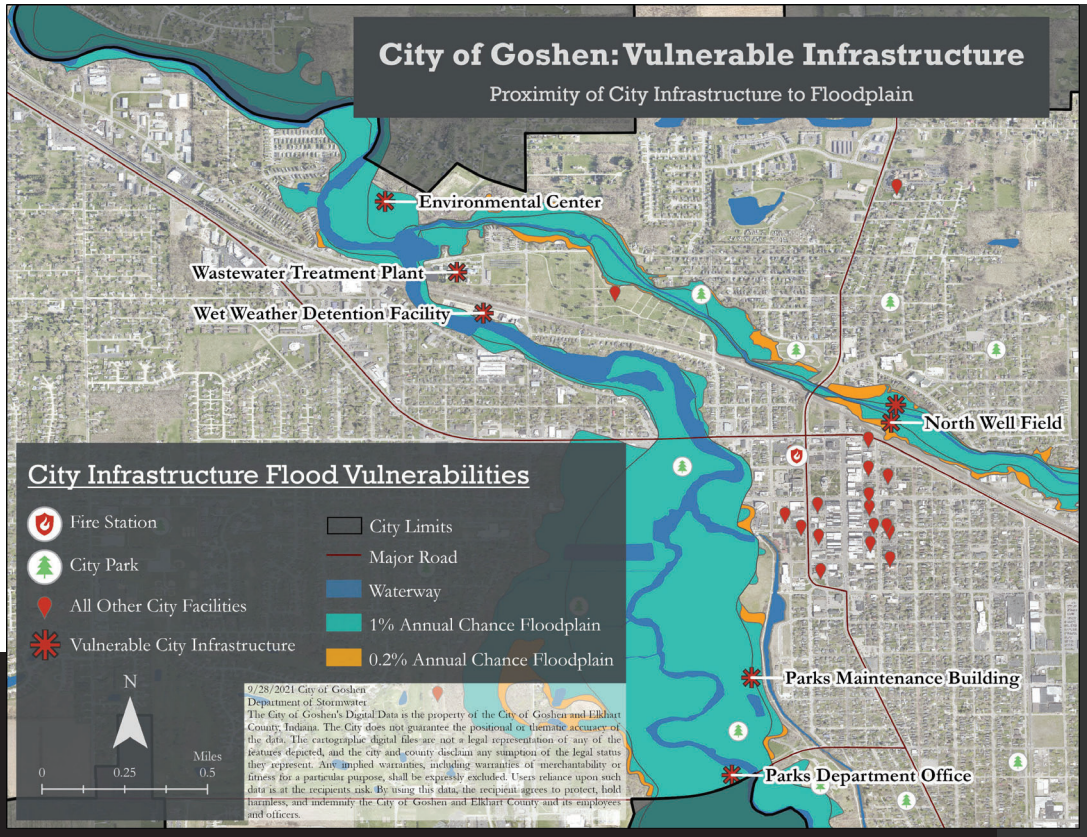


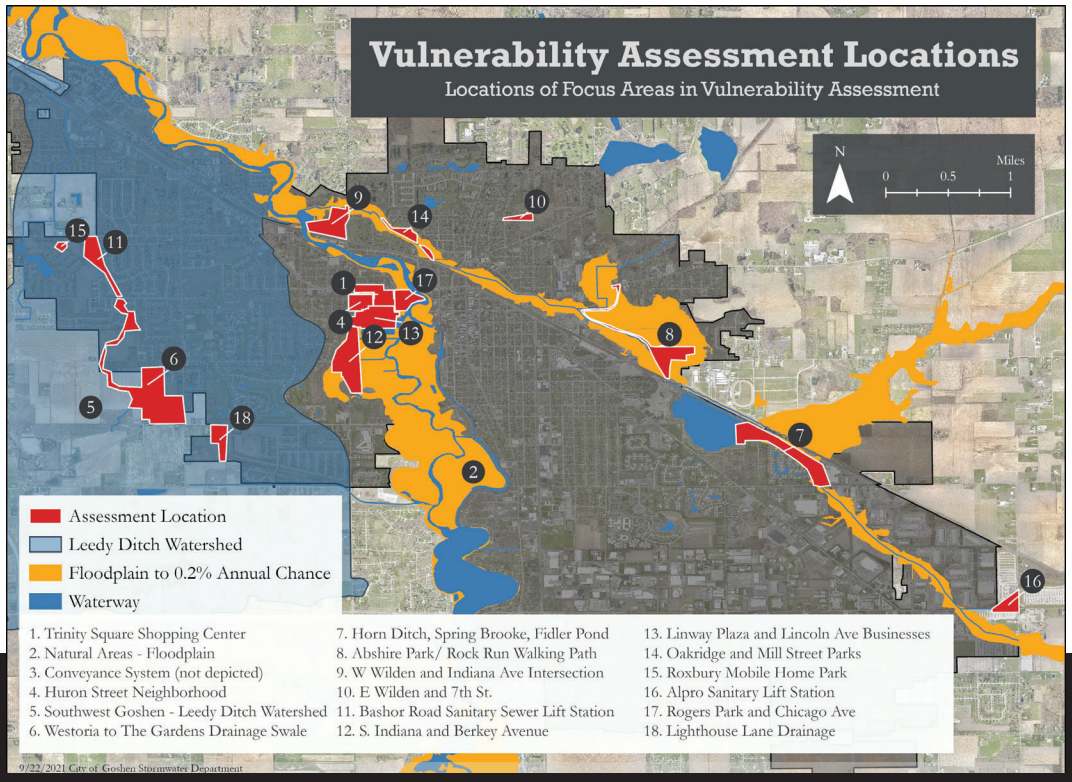


Landscape Features

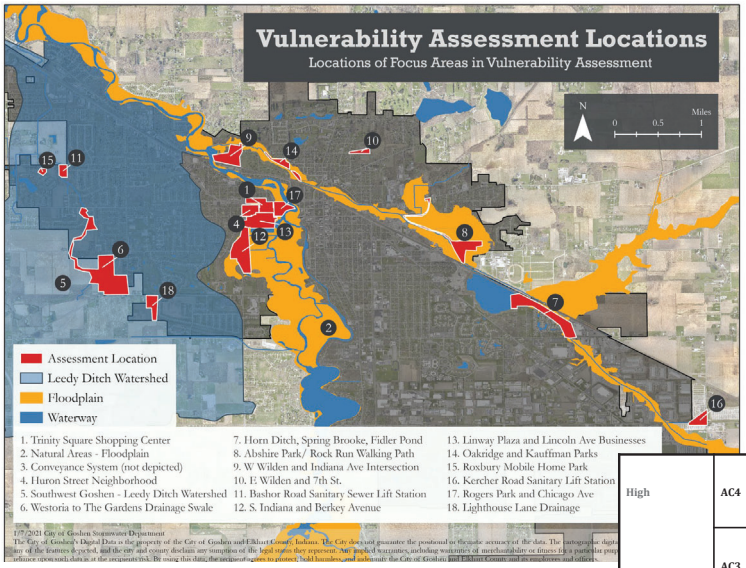








Assessment Locations



Sensitivity

Adaptive Capacity

Adaptive Capacity		Sensitivity: Low	S1	S2	S3	High: S4
High	AC4		15			
	AC3		2	8, 14, 16	6, 10, 11, 18	
	AC2				3, 5, 7, 12	9, 17
	AC1				4	
Low	AC0					1, 13

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Goshen
THE MAPLE CITY

CBB
BURKE

FLOOD RESILIENCE PLAN

City of Goshen Common Council Work Session
Friday, January 14, 2022

1

CHRISTOPHER B. BURKE ENGINEERING, LLC

AGENDA

1. Welcome and opening comments
2. Review of past floods and climate change
3. Overview of flood resilience planning areas and strategies
4. Detailed discussion of short-term implementation strategies
5. Open discussion and next steps

2

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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

3

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REVIEW OF PAST FLOODS AND VULNERABILITY ASSESSMENT STUDY

4

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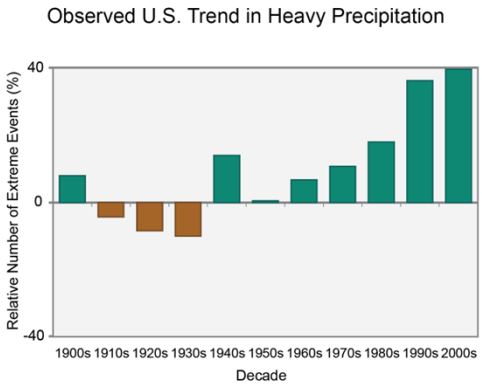
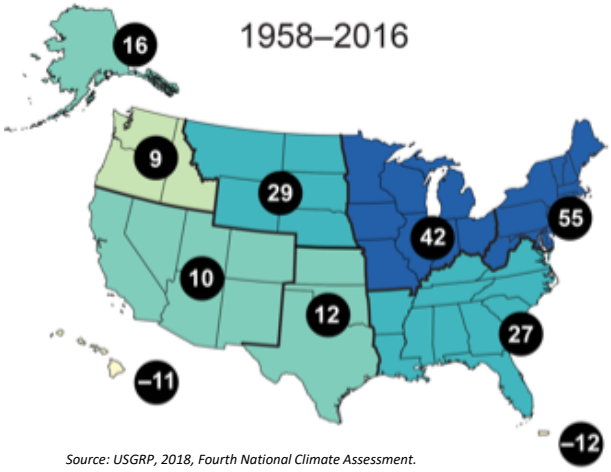
NATIONAL CLIMATE CHANGE ASSESSMENT

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.

5

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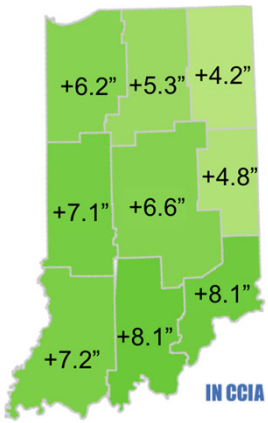
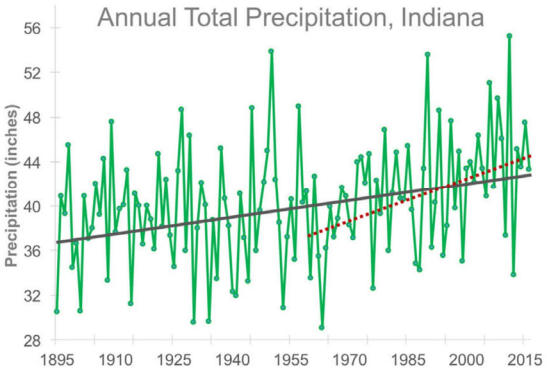
INDIANA CLIMATE CHANGE ASSESSMENT

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. **Storm Intensity & Extreme Events**: *expected to increase 42%*

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

6

MOVING FORWARD…

1. **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.

7

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

8

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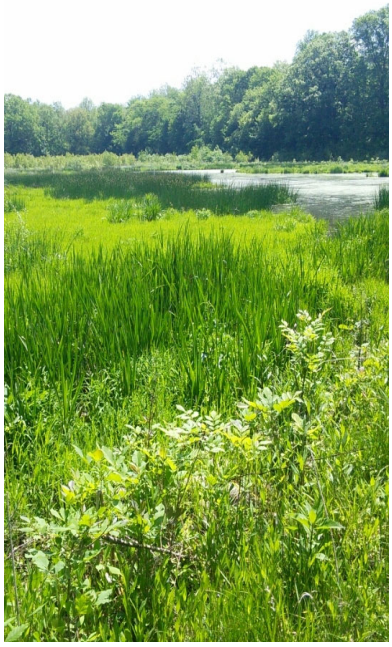

TWO-PRONGED APPROACH:

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

9

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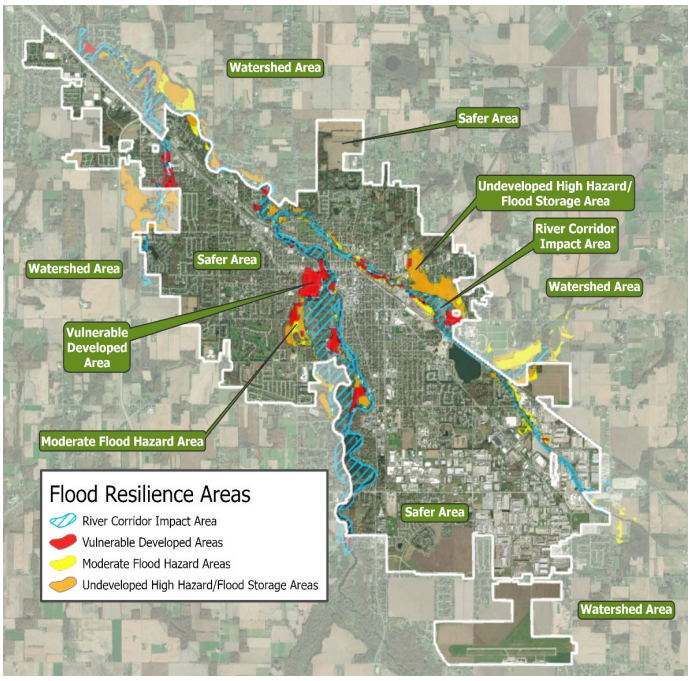
FLOOD RESILIENCE PLANNING AREAS

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



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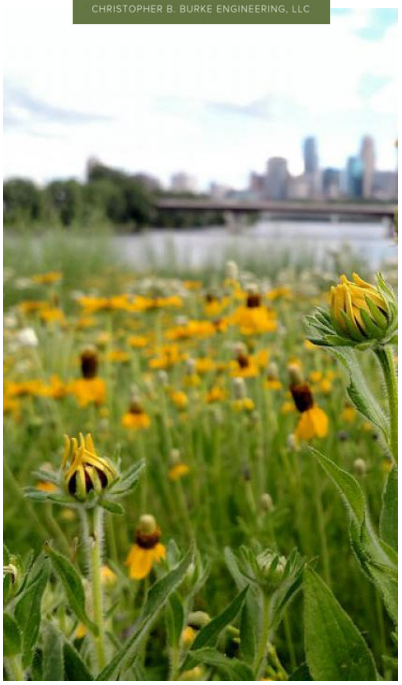

1. RIVER CORRIDOR IMPACT AREA

To conserve land and prohibit development

RECOMMENDED ACTION:

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

11

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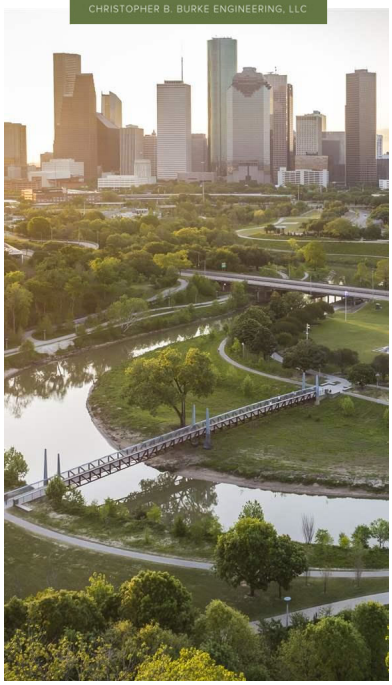

2. UNDEVELOPED HIGH HAZARD /FLOOD STORAGE AREA

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**

12

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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

13

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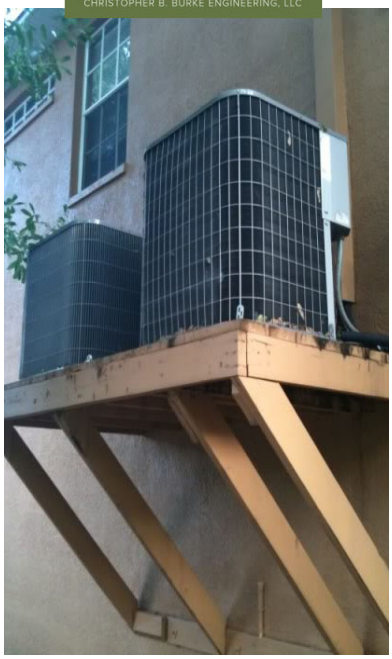

4. VULNERABLE DEVELOPED AREA

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

14

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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

15

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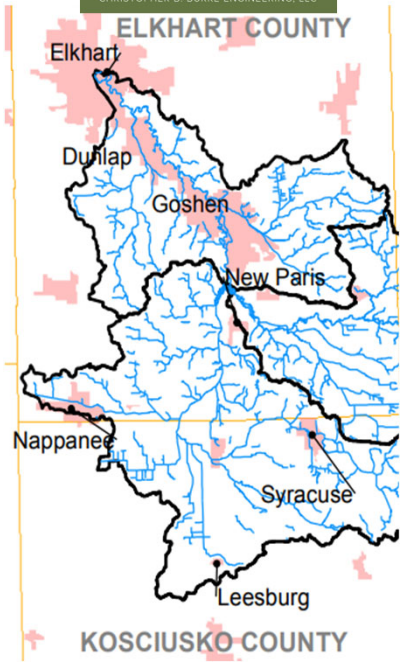

6. WATERSHED AREA

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

16

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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

17

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DETAILED DISCUSSION OF SHORT-TERM IMPLEMENTATION STRATEGIES

18

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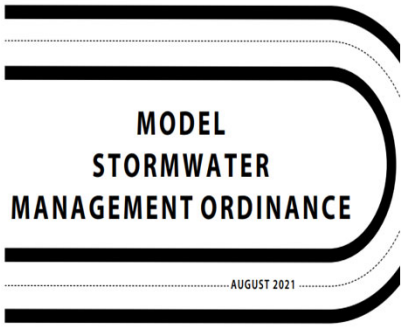

STORMWATER ORDINANCE

1. Update Stormwater Ordinance and Technical Standards
2. Adopt fluvial erosion hazard (FEH) regulations
3. Adopt compensatory flood storage requirements

19

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Fluvial Erosion Hazard (FEH) Area

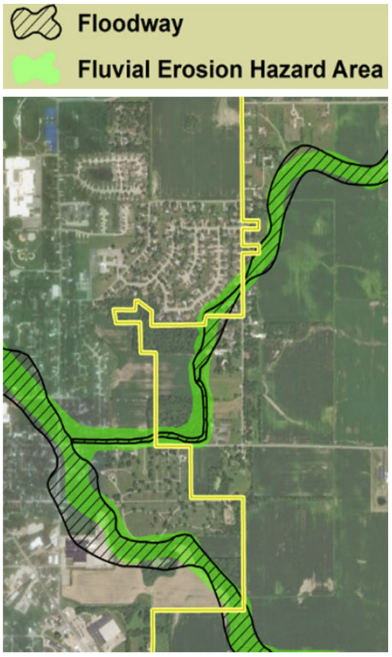
(A) New primary building are not allowed to be constructed in FEHAs

(B) Improvements to existing structures, and any associated fill as needed to comply with elevation requirements in the SFHA shall not decrease the distance between the existing structures and the top of bank and must comply with all compensatory flood storage requirements

(C) Development shall not increase the potential for fluvial erosion damage on the property or on neighboring properties

(D) Development shall not increase the potential of materials being swept onto other lands or into stream and causing damage to other properties from fluvial erosion

(E) Development shall not cause an undue burden on public services and facilities including roads, bridges, culverts and emergency service providers during and after fluvial erosion events



Morgan County, IN Flood Hazard Areas, Section 151.07 Fluvial Erosion Areas

20

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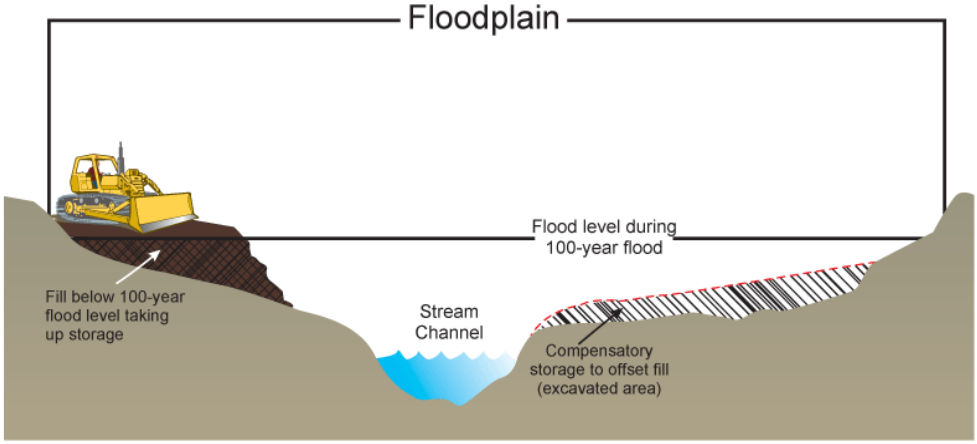
Compensatory Flood Storage

Whenever any portion of the SFHA is authorized for use, the volume of space which will be occupied by the authorized fill or structure below the BFE shall be compensated for and balanced by an equivalent volume of excavation taken below the BFE. The excavation volume shall be at least equal to the volume of storage lost (replacement ratio of 1 to 1) due to the fill or structure.

Noble County, IN Ordinance for Flood Hazard Areas, Article 5: Provisions for Flood Hazard Reduction



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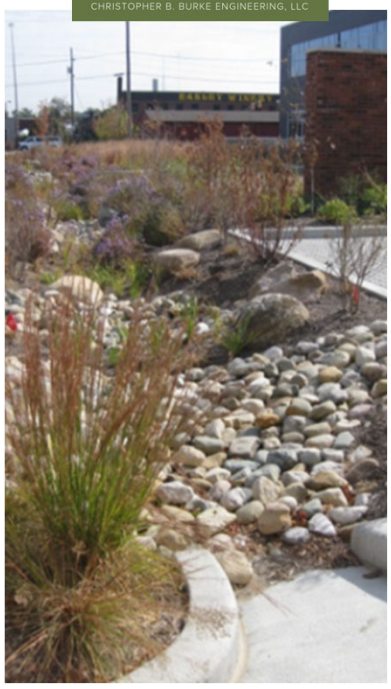

LANDSCAPE STANDARDS

1. Adopt tree mitigation and tree replacement requirements
2. Promote use of native plants
3. Allow vegetated stormwater practices to count toward landscape requirements

22

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Tree Replacement or Contribution to Tree Fund

1. Tree replacement ratios:

a. 1 to 1 tree replacement to removal for trees that are at least 5 inches DBH, but less than 16 inches DBH;

b. 2 to 1 tree replacement to removal for trees that are at least 16 inches DBH, but less than 24 inches DBH;

b. 3 to 1 tree replacement to removal for trees that are at least 24 inches DBH, but less than 30 inches DBH;

c. 4 to 1 tree replacement to removal for trees that are at least 30 inches DBH.

2. [specifies location, minimum caliper and/or height, native species]

3. In lieu of replacement, applicant shall pay $200 per replacement tree to Tree Fund; maximum payment is $10,000 per project

Porter County, IN Unified Development Ordinance Chapter 5 Tree Preservation Standards

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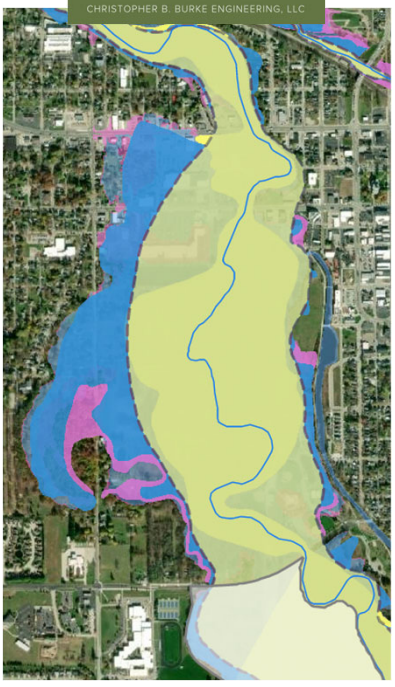

FLOOD CONTROL DISTRICT

1. Update flood resilience planning areas based on updated FIRM information

24

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REDEVELOPMENT

1. Promote growth and development in safer areas
2. Consider climate change and flood impacts in capital projects; promote low impact development and green infrastructure

25

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COMMUNICATION, EDUCATION & TRAINING

1. Train city stormwater inspection staff about green infrastructure practices
2. Develop a flood risk education and outreach program

26

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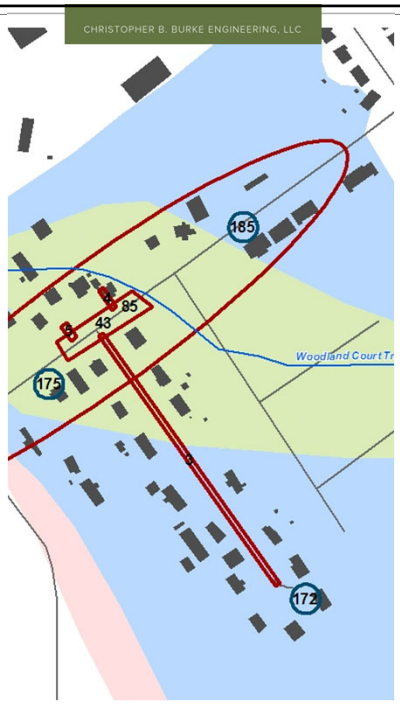

PLANS, PROGRAMS & STUDIES

1. Update the stormwater utility fee
2. Incorporate flood resilience planning areas into the proposed Future Growth Plan
3. Prepare a Flood Response Plan
4. Prepare a Stormwater Master Plan

27

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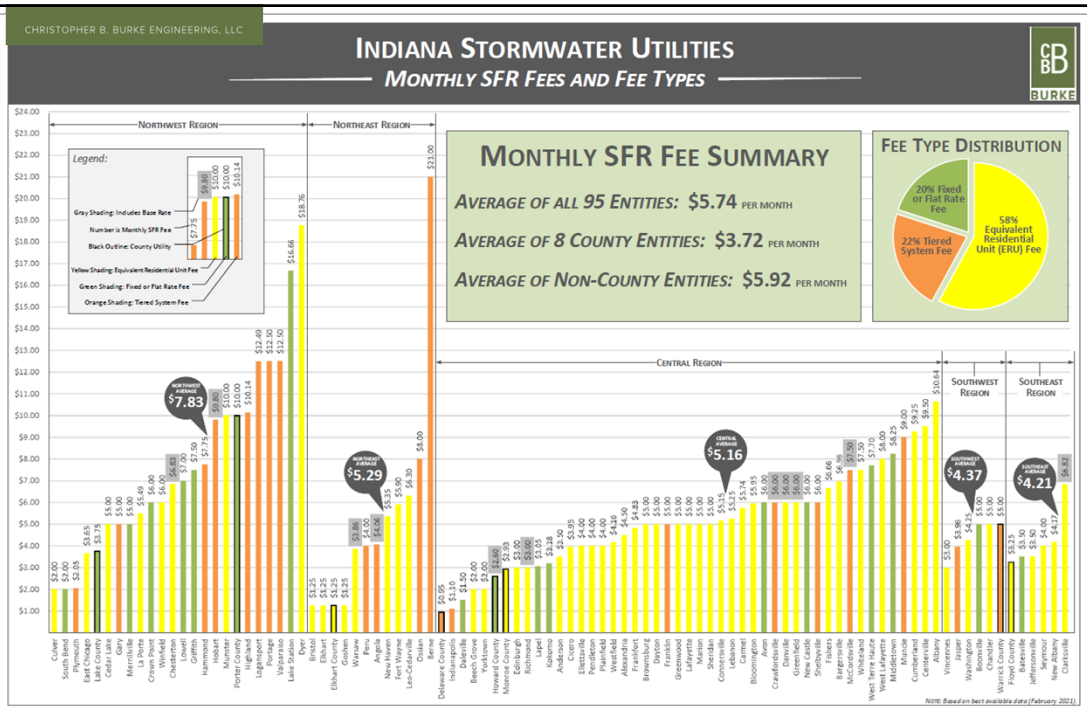

28

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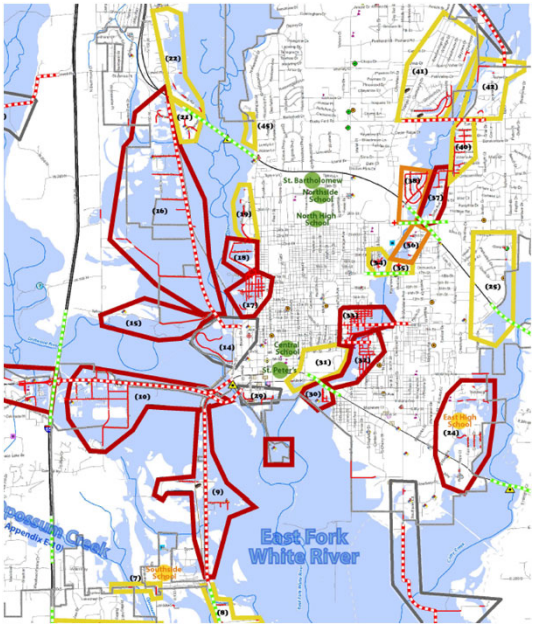
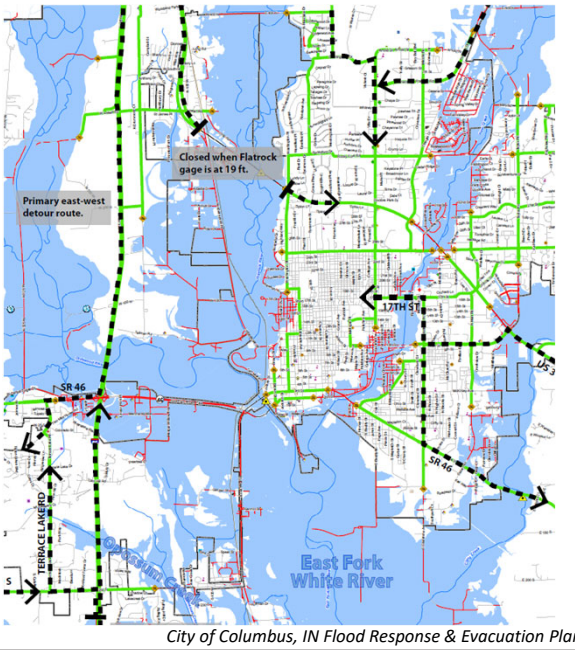
Flood Response Plan





City of Columbus, IN Flood Response & Evacuation Plan

29

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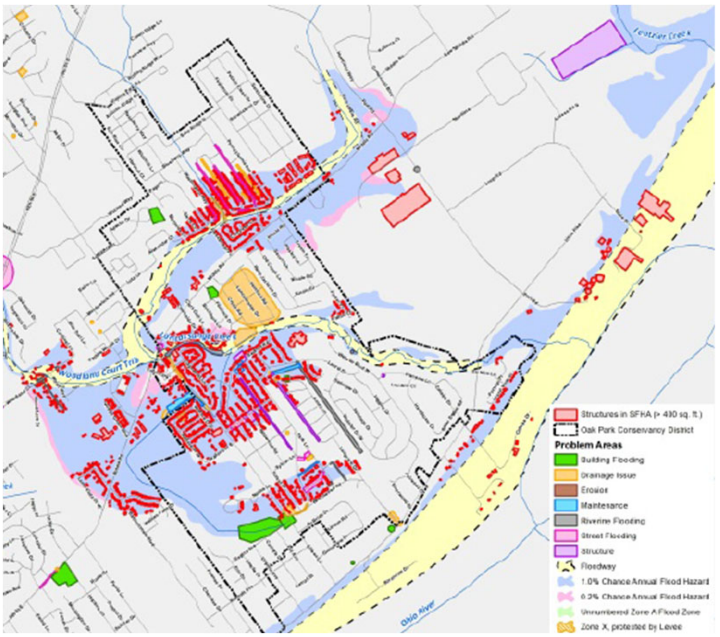
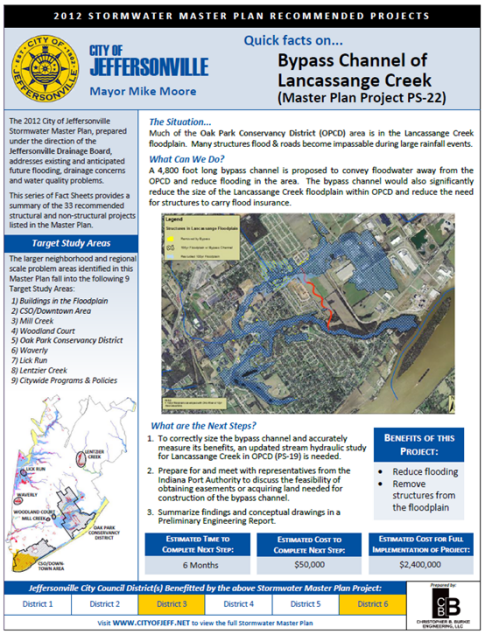
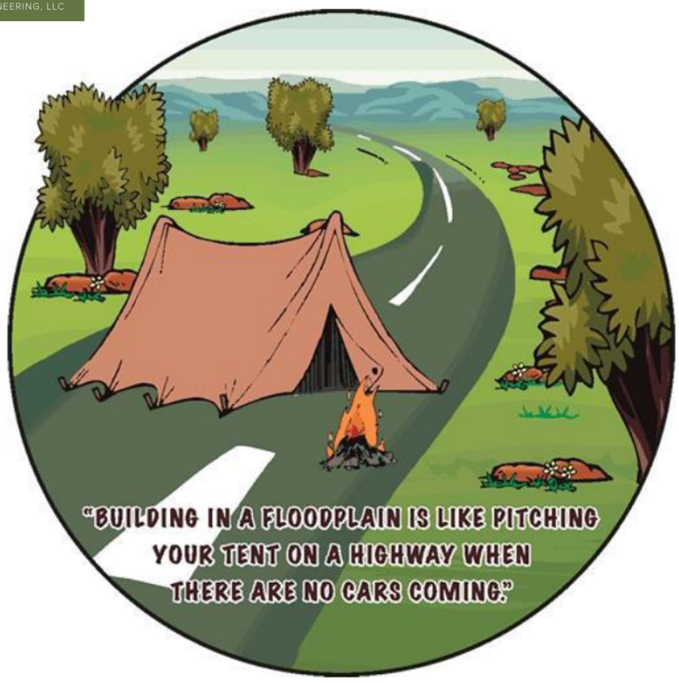
Stormwater Master Plan





City of Jeffersonville, IN Stormwater Master Plan

30



31

Flood Resilience Plan ArcGIS Online Map

https://cbbel-in.maps.arcgis.com/apps/webappviewer/index.html?id=1544826de5ee48d8923bc79c26c6a250

32

Flood Resilience Plan Meetings

March 17, 2022

Goshen Theater, 216 S. Main St

Business Owner's Meeting, 3:00 pm

3:00	Welcome and Introduction – Mayor(?) / Aaron
3:05	History of flooding in Goshen – Jason and Mattie
3:15	Goshen Flood Resilience Plan Overview and Highlights – Siavash and Sheila
3:30	Open question and answer / discussion in the auditorium
4-4:15	Wrap-up, invite to attend public meeting at 6:00

Public Meeting, 6:00 pm

MC – Aaron Sawatsky-Kingsley

Presenters: Jason Kauffman and Mattie Lehman (Goshen Stormwater Department); Siavash Biek and Sheila McKinley (Christopher Burke Engineering). Hand held microphone provided.

6:00	Welcome – Mayor(?)
6:05	Introduction – Aaron
6:10	Flood History and Vulnerability – Jason and Mattie
6:20	Goshen Flood Resilience Plan Overview and Highlights – Siavash and Sheila
6:40	Open question and answer / discussion in the auditorium
	Mic and mic-stand will be provided on the floor for audience.
7-7:15 approx.	As Q&A wraps up, Aaron will direct audience to Break-Out Topic sites for further discussion with staff. Two Break-Out sites will be in the back of the auditorium, and 4 will be throughout the lobby. Sites will be supplied with table and chairs.

Break-Out Topics and staff:

Climate Impacts and Flooding (southside of lobby) – Austin Pearson, Purdue Extension specialist. He would like to use one of the flat screens, and needs us to supply the HDMI cable. Kathleen Jones will help record comments and questions.

Goshen and the Wider Watershed (southwest side of lobby) – Matt Meersman, St. Joseph River Basin Commission. St. Joseph Watershed map from Stormwater. Phil Metzler will help record comments and questions.

Emergency Response (eastside of lobby) – Bruce Nethercutt, GFD. He will bring the drone. We will bring flatscreen from city courts. Theresa Sailor will help record comments and questions.

Flood Vulnerability (northside of lobby) – Jason Kauffman and Mattie Lehman. Will use a flat screen (bring HDMI cable). James Loewen will help record comments and questions.

Safe Development and the Floodplain (northwest corner of auditorium)– Dustin Sailor, Rhonda Yoder, and Siavash. Glenn Gilbert will help record questions and comments.

Green Infrastructure and Flooding (southwest corner of auditorium)– Aaron and Sheila (from Christopher Burke). Aaron will help record questions and comments.

8:00 approx. Wrap up and good night.

Stormwater Dept. is printing the following maps for the Break-Out Topics:

"Elevation Map" – Safe Development and the Floodplain, Goshen and the Wider Watershed

"Floodplain Southeast and Northwest" - Safe Development and the Floodplain

"Trinity Square Shopping Center" – Flood Vulnerability

"Landcover" – Green Infrastructure and Flooding

"Emergency Services" – Emergency Response

"Flood Vulnerability" – Flood Vulnerability

"Comparison: Flood Plain Development" – available

"Tree Canopy" – Green Infrastructure and Flooding

"Comparison: Percent Impervious" – Climate Impacts and Flooding

Flood Vulnerability in Goshen

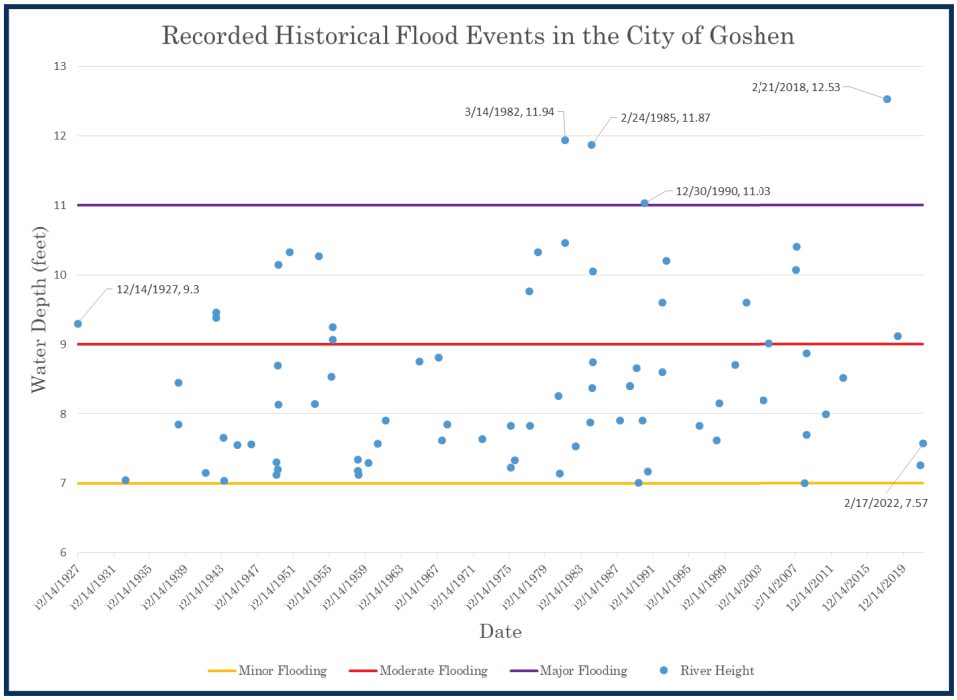
City of Goshen Stormwater Department

March 17, 2022 – Flood Resilience Plan Public Meeting

Flooding in Goshen

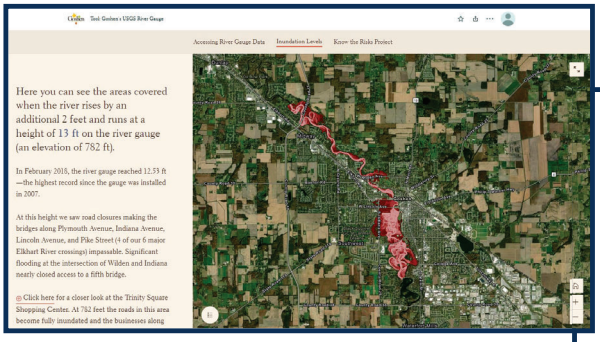
Goshen's Flood History

- **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

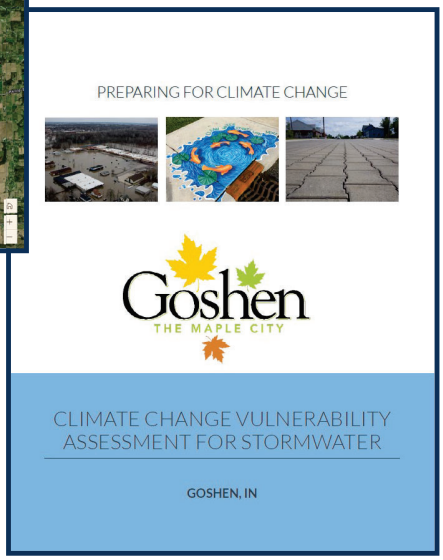


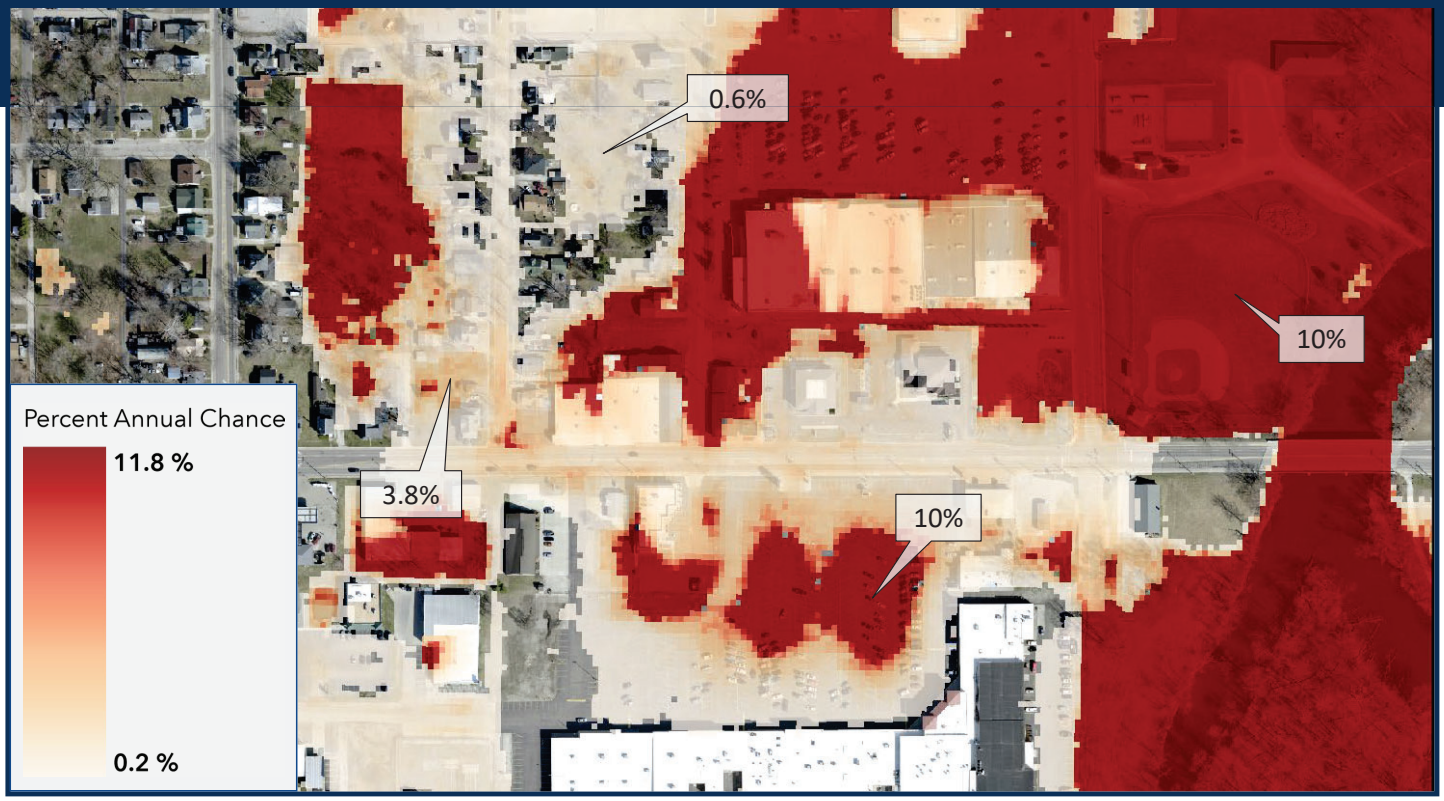
Assessing Vulnerability

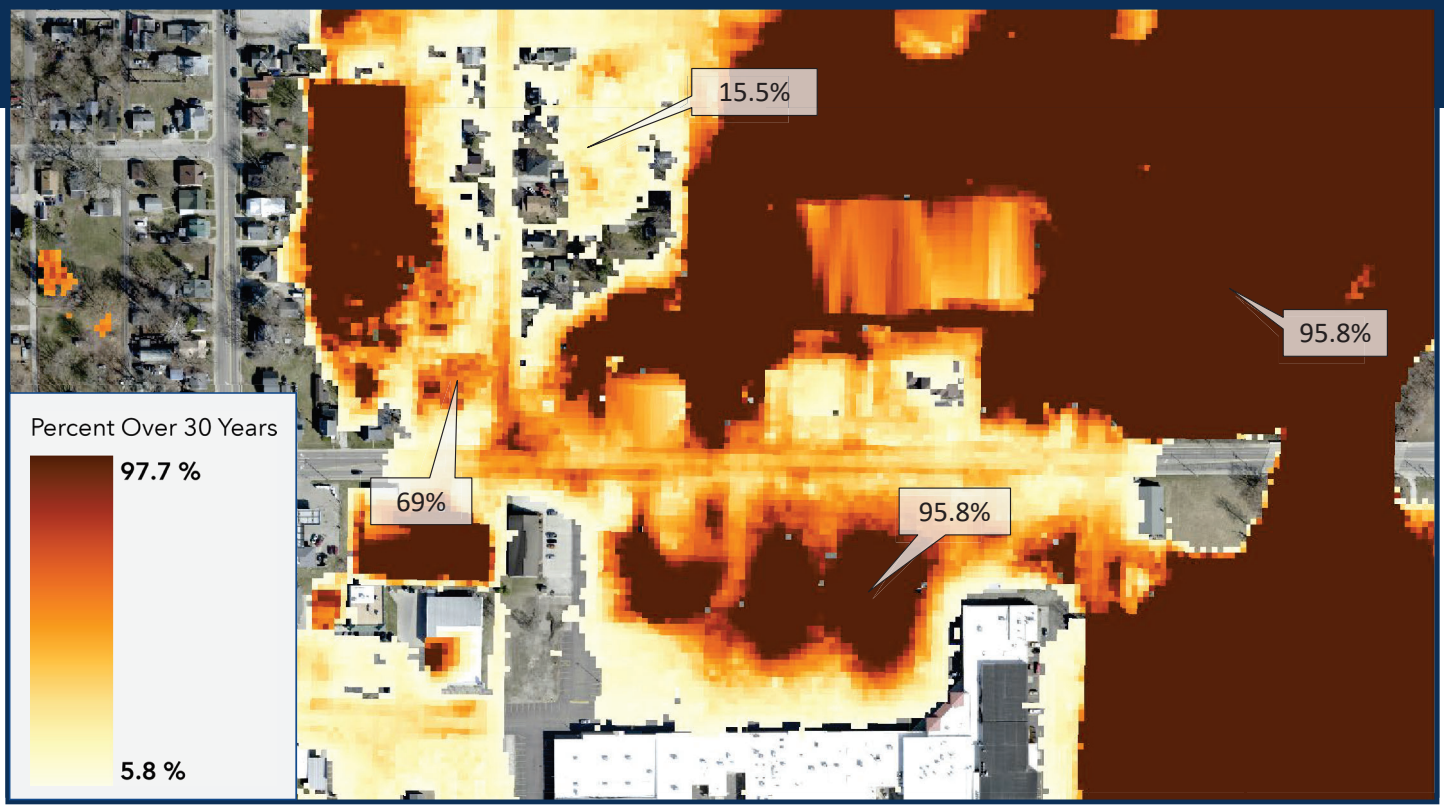
- **Community Reporting**
- **Climate Change Vulnerability Assessment for Stormwater**
- **United States Geological Survey (USGS) Tools**
- **Federal Emergency Management Agency (FEMA) Risk Data**



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 %

CHRISTOPHER B. BURKE ENGINEERING, LLC

Goshen
THE MAPLE CITY

CBB
BURKE

FLOOD RESILIENCE PLAN

Stakeholder Meeting
Thursday, March 17, 2022

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

1

CHRISTOPHER B. BURKE ENGINEERING, LLC

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*

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CHRISTOPHER B. BURKE ENGINEERING, LLC

FLOOD RESILIENCE PLAN PROJECT TEAM

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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

3

CHRISTOPHER B. BURKE ENGINEERING, LLC

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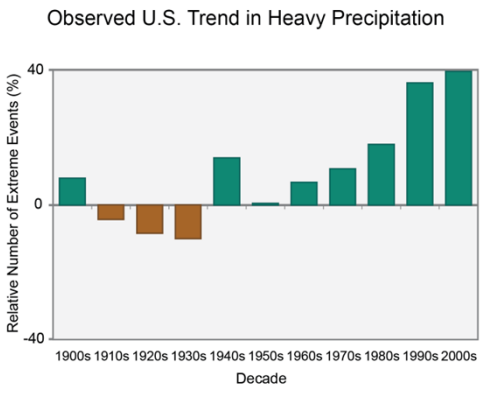

Source: USGRP, 2014, Third National Climate Assessment (adapted from Kunkel et al. 2013)

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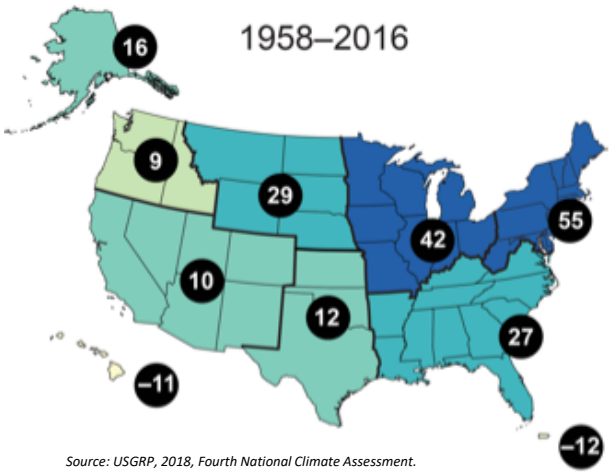


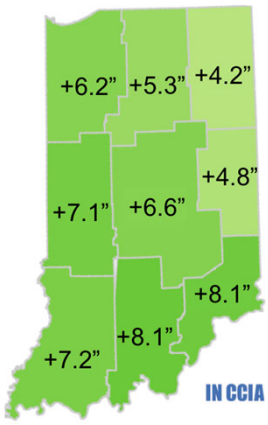
Source: USGRP, 2018, Fourth National Climate Assessment.

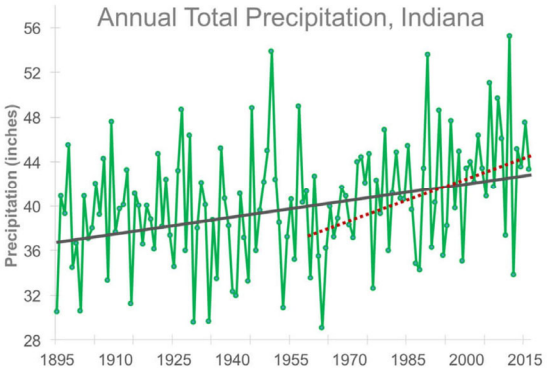
4

CHRISTOPHER B. BURKE ENGINEERING, LLC

INDIANA CLIMATE CHANGE ASSESSMENT

Change In Annual Average Precipitation 1895-2019





Indiana 2050…

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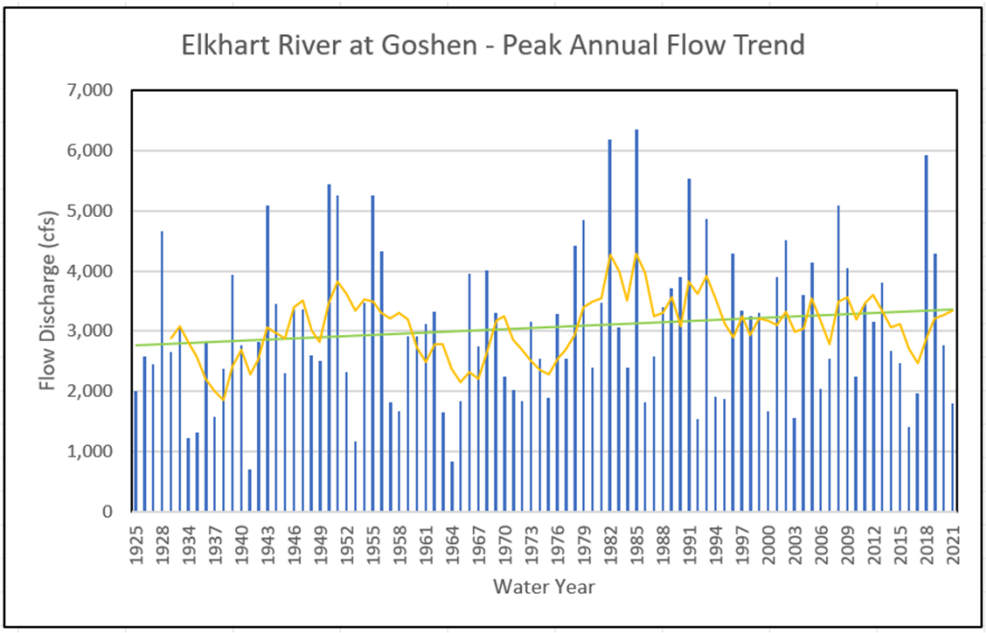
Source: Indiana Climate Change Impacts Assessment. Purdue University (2019)

5

CHRISTOPHER B. BURKE ENGINEERING, LLC



6

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MOVING FORWARD…

1. **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.

7

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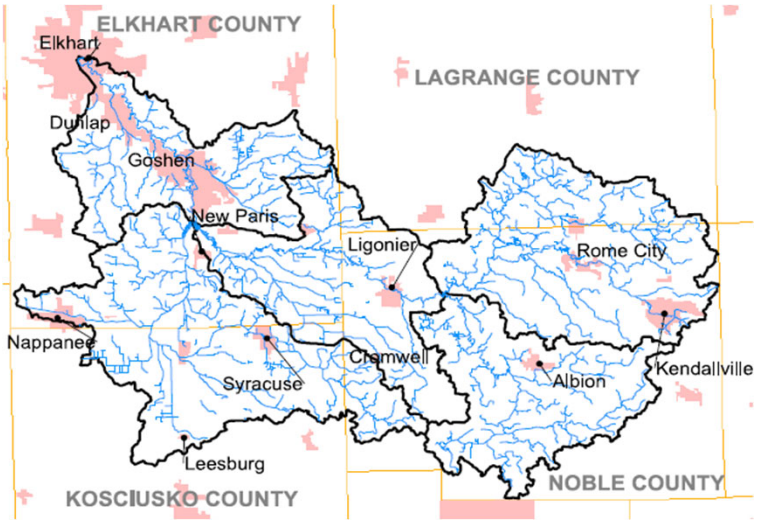
FLOODING SOURCE MITIGATION OPTIONS

- Additional flood storage in existing Goshen Pond
- Large flood storage upstream in watershed
- Flood protection levees
- Channel improvements
- Flow diversion/bypass



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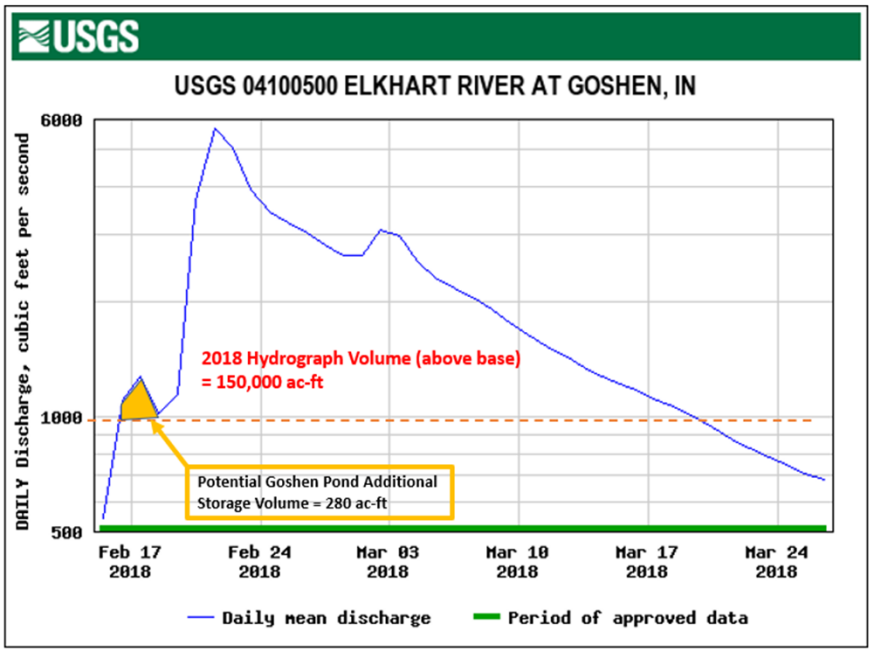

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ADAPTATION THROUGH FLOOD RESILIENCE

- 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

10

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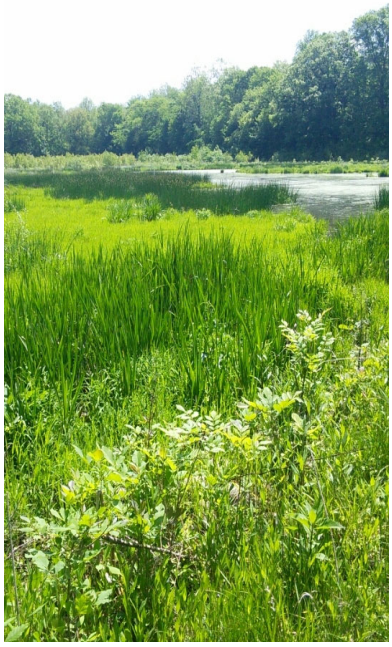


TWO-PRONGED APPROACH:

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

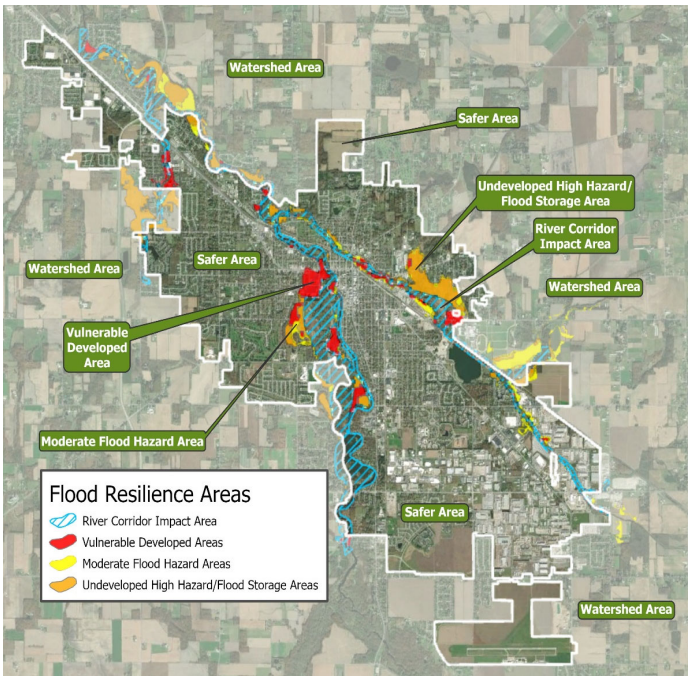
11

CHRISTOPHER B. BURKE ENGINEERING, LLC

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

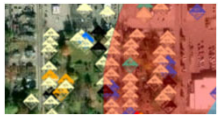
FEH = Fluvial Erosion Hazard
SFHA = Special Flood Hazard Area



12

CHRISTOPHER B. BURKE ENGINEERING, LLC

Adopt Resilience Strategies to Keep Things from Deteriorating

Flood Resilience Planning Areas	Area Boundaries	Intent of Area Strategies	Strategies
River Corridor Impact Area 	Floodway or fluvial erosion hazard area, whichever is greater	To conserve land and prohibit development	• Adopt fluvial erosion hazard (FEH) regulations • Perpetuate protection of undeveloped land within River Corridor through partnering with land trusts
Undeveloped High Flood Hazard/Flood Storage Area 	Undeveloped land in the floodway fringe	To conserve land and maintain the natural and beneficial function of the floodway fringe	• Preserve floodplain storage and beneficial floodplain functions through prohibiting or strongly discouraging new development in this area • Establish floodplain compensation when flood storage loss cannot be avoided • Perpetuate protection of undeveloped land within SFHA through partnering with land trusts
Moderate Flood Hazard Area 	Area within 0.2% annual chance floodplain and localized flooding areas (likely future SFHA due to climate change)	To identify areas that are subject to flooding during an extreme event and to discourage future development in these areas	• Discourage new development in this area • Require buildings to have a freeboard equal or greater to that required in SFHA • Require flood protection grade of critical facilities in this area to be above the 0.2% chance flood elevation

13

CHRISTOPHER B. BURKE ENGINEERING, LLC

Adopt Resilience Strategies to Keep Things from Deteriorating

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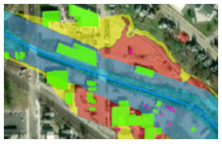
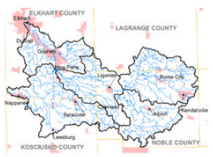
Vulnerable Developed Area 	Existing developed land in the River Corridor or floodway fringe	To protect people, buildings, and facilities in vulnerable areas and reduce future flood risk	• Prepare a Flood Response Plan • Prepare a citywide Stormwater Master Plan • Encouragе Flood Insurance and participate in CRS • Protect existing critical facilities • Retrofit, relocate and/or buyout of structures • Bring nonconforming uses into compliance
Safer Area 	Outside the 0.2% annual chance floodplain area but within planning jurisdiction	To plan for and promote development in areas that are less vulnerable to future floods	• Steer public policy and investment into safer areas • Promote conservation design and development • Promote placement of critical facilities in safer areas
Watershed 	Entire drainage area	To promote coordination and partnerships and implement practices to slow, spread, and infiltrate flood water	• Partner in watershed-wide partnerships (Basin Commissions, Joint Drainage Boards, etc.) • Encourage uniform No-Adverse-Impact stormwater standards • Support USGS stream gages • Promote use of cover crops and soil health practices • Reduce impact from surface draining and regulated drain improvements in the watershed

14

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Siavash Beik, PE, CFM, D.WRE
Vice-President, Principal Engineer
sbeik@cbbel-in.com

Sheila McKinley, AICP, CFM, LEED Green Associate
Director, Planning
smckinley@cbbel-in.com

Christopher B. Burke Engineering, LLC
www.cbbel-in.com
317-266-8000

15

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

1

CHRISTOPHER B. BURKE ENGINEERING, LLC

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CHRISTOPHER B. BURKE ENGINEERING, LLC

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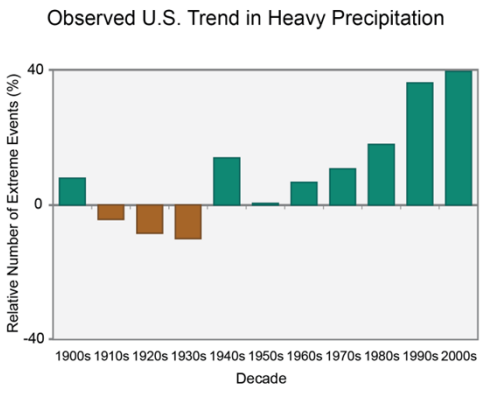

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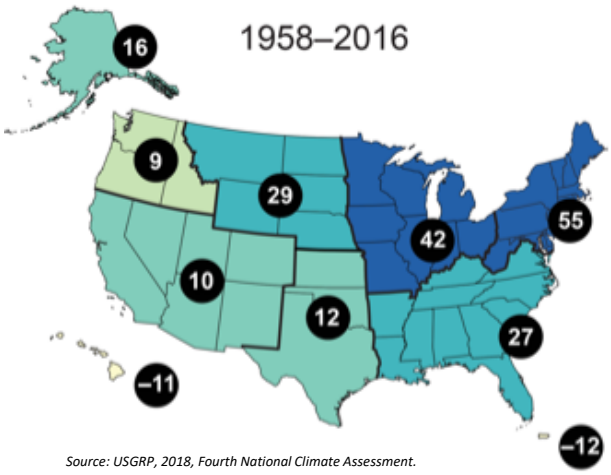

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4

CHRISTOPHER B. BURKE ENGINEERING, LLC

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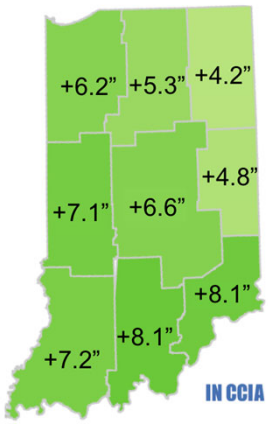

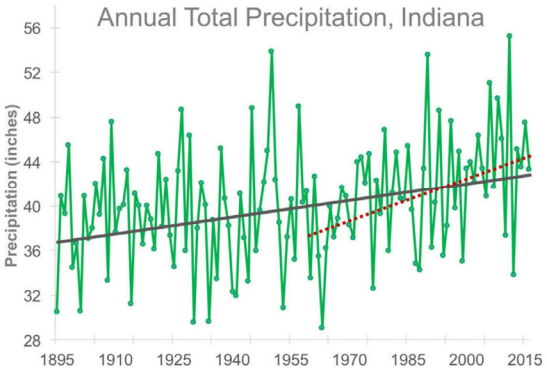

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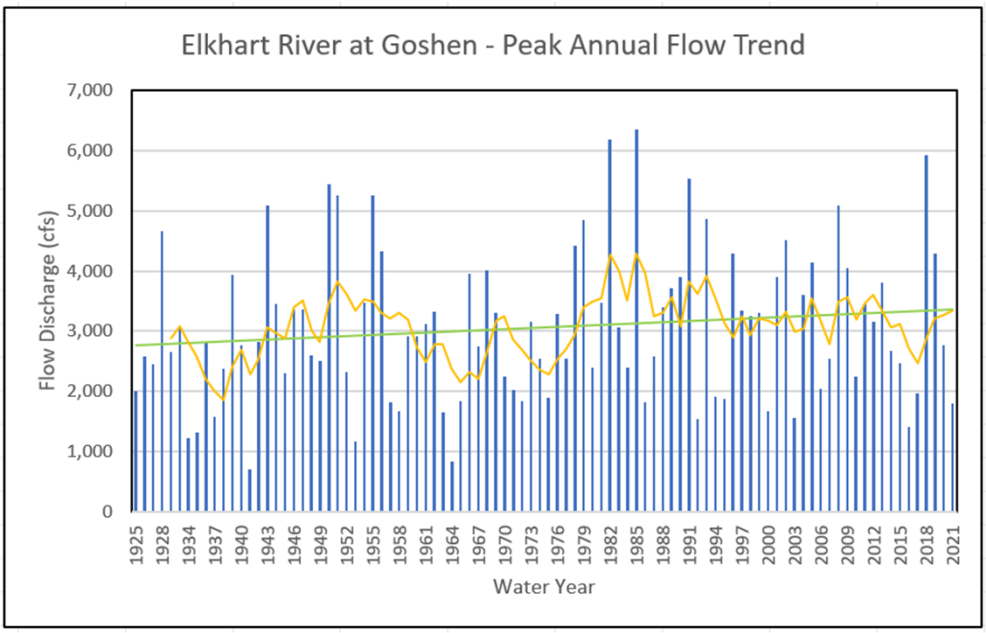

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CHRISTOPHER B. BURKE ENGINEERING, LLC

MOVING FORWARD…

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CHRISTOPHER B. BURKE ENGINEERING, LLC

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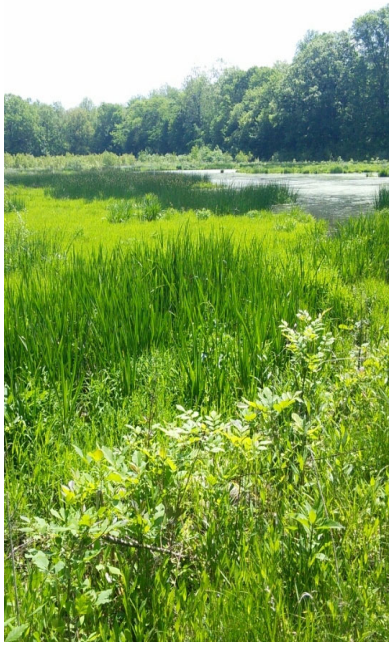
CHRISTOPHER B. BURKE ENGINEERING, LLC



TWO-PRONGED APPROACH:

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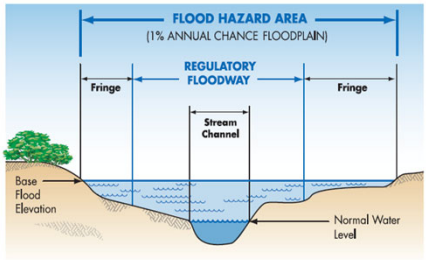
9

CHRISTOPHER B. BURKE ENGINEERING, LLC

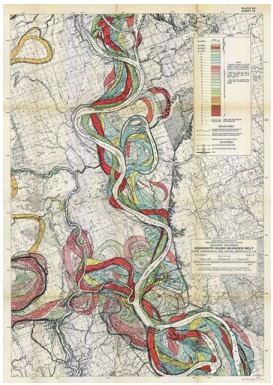
WATERSHEDS, FLOODPLAINS AND STREAMS

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



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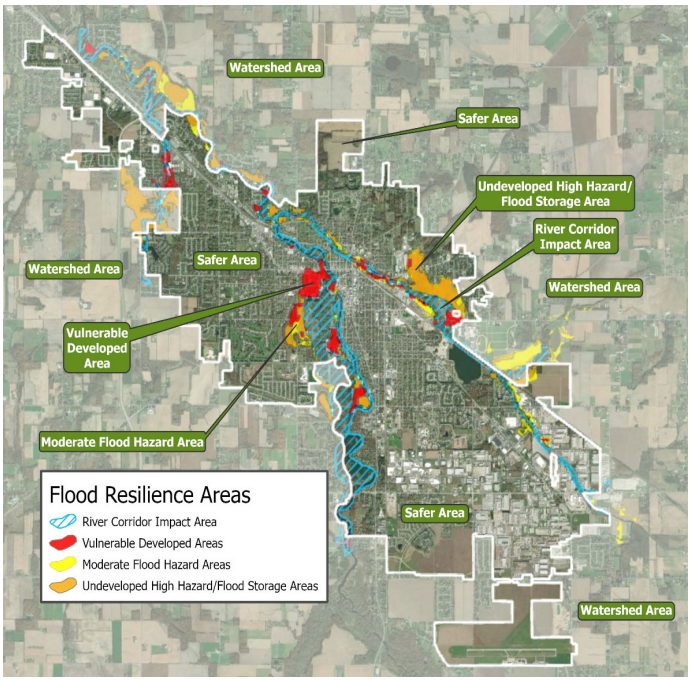

11

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1. RIVER CORRIDOR IMPACT AREA

To conserve land and prohibit development

RECOMMENDED ACTION:

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

12

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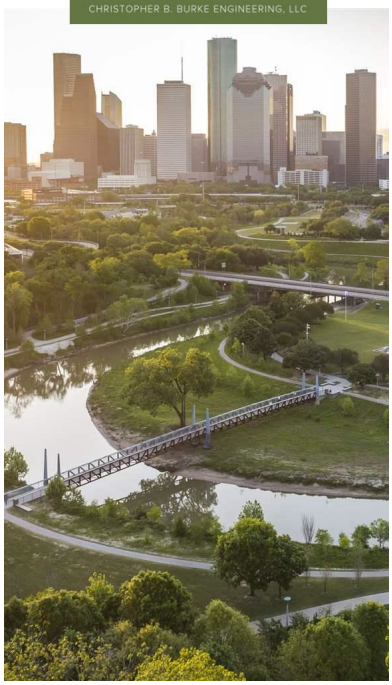

2. UNDEVELOPED HIGH HAZARD /FLOOD STORAGE AREA

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

13

CHRISTOPHER B. BURKE ENGINEERING, LLC

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

14

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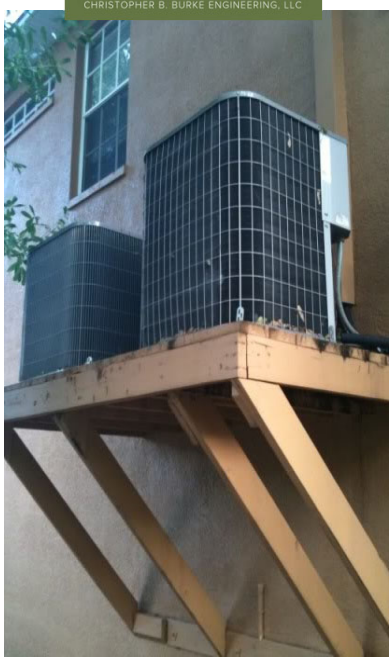

4. VULNERABLE DEVELOPED AREA

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

15

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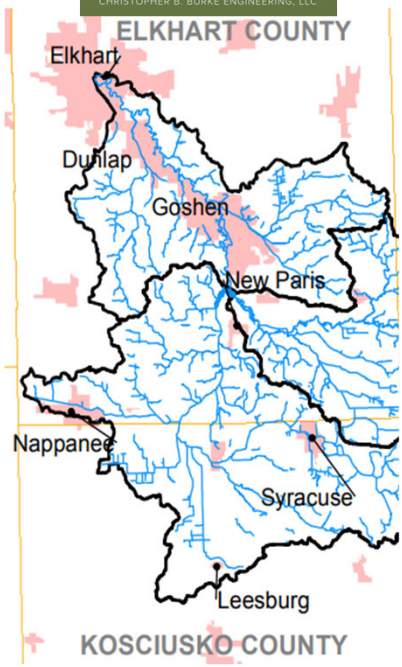
5. SAFER AREA

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

16



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

17

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

18

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19

March 17, 2022

Flood Resilience Plan Businesses/Property Owner Meeting

Q: Are there any places upstream that could be used to detain water before it reaches Goshen?

A: Siavash explained how the potential for storage is minimal due to high groundwater. Referenced the N. Branch of Elkhart River study.

Q: Can the river be cleaned of treefalls and dredged to get the water to flow downstream faster?

A: For large watersheds, like the Elkhart River, these efforts and engineering efforts (eg., dams, levees, detention basins) will not work or change the picture (existing conditions) very much. Only works in smaller watersheds.

- ~ 600 square miles of land is flowing to the Goshen area. Add to that how development has occurred there is more water coming to the waterways. What we need to look at is how to protect developed areas and how to slow water down in a cost effective and positive way.

Q: What is the State doing and should ~~we~~ there be a larger conversation.

- Mayor Stutesman talked about State legislation, which ~~through~~ deregulated wetland protection and how many municipalities spoke against this.

Q: Potential for buyback programs.

Q: a Question on the CR 36 diversion ~~ditch~~ ditch and the detention basin.

A: Dustin responded and explained how it has helped but there are still steps to be taken.

Public Meeting on Draft Flood Resilience Plan

Q: James Lowen - Suggestion - make the maps useable so the user can distinguish along the edges of the flooding.
↳ Are there any disagreements or pushback on the plan

A: The Mayor talked about the pushback against stormwater regulations and explained the reason why Goshen ~~do~~ implements the regulations.
- Another issue is the costs to complete some of ~~these areas~~ the pieces of the plan.
- Areas not being allowed to develop will be another issue.
- How to work w/ communities upstream from us to manage water runoff together.

Q: Glenn Null - Question on buyback on properties - why should taxpayers pay for properties developed in floodplains?

A: The Mayor explained how the buyback programs are new to us and something we will continue to look into to understand.

Q: Jesse Stoltzfus - ~~Do~~ Is there a longterm economic impact understanding due to loss of property values and tax base?

A: No study done here, but based on other areas they have seen is that property values will go down much lower if nothing is done. Showing that a community is resilient and planned for flooding will experience less property value loss and tax impacts.

Q: The person noticed a higher percentage of flooding downtown and is that due to surface runoff or river flooding?

A - Both due to localized flooding issues and rising river waters.

Q: Rogers Park seems to be a natural area for holding water. Does the plan provide for this?

A: To simplify the plan protecting the natural floodplains is important and Rogers Park is in the floodplain. It is important to allow the areas along the waterways to remain natural and act as a floodplain.

Q: What ideas are there for areas where development is removed and returned to a more natural area.

A: Any landuse that removes impervious surfaces that either allows the water to soak into the soil or just to sit there is good.

Q: Ron Hoke - Talked about the 1892 Flood and how the people of Goshen were smart to not develop that area.
- The Historic Society estimates the river crested at 15-16 feet.
- The implementation of this Plan is vital to ensure that.

Q: Is the current status of the Goshen Dam Pond available for additional water storage?

A: Siavash explained how even if the Dam Pond was used for storage it would have a minimal impact on the severity of a flood. This is due to the watershed flowing into the Dam Pond.

Flood Resilience Plan

Public Meeting

March 17, 2020, 6:00-8:00 pm

Questions and comments from breakout sessions

From Glenn Gilbert, recording at “Safe Development Away from the Floodplain” hosted by Dustin Sailor and Rhonda Yoder

From my section, the only thing I would note is there was a request (from Ron Hoke) to print maps at 15 foot floods and perhaps at 16ft.

A question was asked about the remediation work being done at Rock Run Creek and a question about using the dam pond for retention. Both questions were answered.

From Kathleen Jones, recording at “Climate Impacts and Flooding” hosted by Austin Pearson

Q: If climate change comes along and we have more rain than snow, it seems like the worst flooding comes from snowpack combined with rain. If we don’t get that snowpack, does it help the flooding probability at all?

A: When you’re looking at snowmelt, one inch of liquid water in ten inches of snow, but frozen ground is the biggest factor.

Q: Will we get as much frozen ground in the future? Could fewer days with frozen ground be helpful overall re: flooding?

A: The ground will be frozen less, but that will only help the problem so much, given that heavier, more intense rains are a given for our future. The ground can only absorb so much. Soil makeup is also a factor– given where we are, there is likely some sandy soil mixed in with the clay, which helps absorption to some degree.

Notes from Phil Metzler, at "Goshen and the Larger Watershed" hosted by Matt Meersman

1. Desire for improved flood prediction capacity using more gauges upstream from Goshen
    1. Improved emergency response communication

    2. Cited efficiency of flood response and planning efforts in Columbus, IN (https://www.usgs.gov/centers/ohio-kentucky-indiana-water-science-center/science/flood-alert-system-columbus-indiana)
2. As we learn to think more holistically about flooding, how do we translate the complexity involved to be more accessible to the public?
3. Are there any opportunities to "divert" and "reroute" small waterways upstream of Goshen so they pose less risk to developed areas?
4. "We can't dig our way out" of the flooding challenges (acceptance that dredging and deepening waterways isn't a viable solution)
    1. There seems to be a need for better public understanding of dam hydrography and impact, as well as how flooding poses unique challenges in relatively flat land.
5. Discussion of the need to better maintain ditches upstream of Goshen to deal with localized flooding there led to recognition that this might increase vulnerability downstream ("passing the buck")
6. Complaints about beaver dams and damage to private property -- are they part of the floodplain?
7. Where can people access maps to get a clearer picture of the watershed?
    1. Could the library be a partner in maintaining a flood map display and information station, to make more granular information more accessible?

From Aaron Sawatsky-Kingsley, recording at “Green Infrastructure and Flooding”

One resident asked about how floodplain property could be deeded to the City – are there conservation easements or land trust options? He suggested that there might be other property owners along the flood plain who might be interested in conservation easement/land trust options for their property whether or not it is titled to the City.

Councilman Matt Schrock suggested an annual “Flood Resilience” public meeting – maybe in January – to update and educate the public on flood related topics and realities.

ObjectID	CreationDate	Question	How adequately do you think the Plan addresses flooding in Goshen?	General Comments	Why is this area of concern to you? Do you feel the Resilience Plan will address this area of concern?	Name	Phone	Email		
3	2/25/2022 17:44	When are you seriously going to look at dredging the Goshen dam pond and cleaning up the rivers? The canal is also in serious need of dredging.	The Plan does not adequately address flooding in Goshen	Goshen dam pond would be of any value to stop flooding. But you fail to realize that water levels can be dropped in the winter to make room for spring thaw. Also, due to sediment build up, beaver damage, natural factors as well as neglect, our local waterways are full of debris and clogged. Areas that were once deep are very shallow. There is no where for water to flow. When is the last time anyone on city council or the mayor actually went out on the the dam pond or down the river or canal? Did any fishing on any of them?	The Goshen dam pond is the place to start. Cleaning and dredging that, as well as the canal and river, will give the water a place to go. It will also help increase tax revenue and possibly help create jobs for watercraft, bait shops and water recreation.	Kirk Miller		snicklefritz46526@yahoo.com		
4	3/7/2022 13:55		The Plan does not adequately address flooding in Goshen							
5	3/15/2022 19:31	My car is dirt nasty low, how will this plan help alleviate my chances of getting flood water in my straight pipes?	The Plan would make Goshen signficantly more flood resilient that it is now	I'm glad we won't have to live through the Great Flood of 2018 again, I hope for our childrens sake they don't have to experience the apocalyptic event in their lifetime due to the preemptive work in this plan	Hopefully, but in general this road is just terrible, winter has up and reared it's ugly head this year	Trever Rizor		trever.rizor91@gmail.com		
6	3/15/2022 19:32	Will there be any changes to the Bashor Rd wellfield?	Neutral	Previous changes made to drainage on Bashor Road are helpful but insufficient. While this is not an area of great concern as the area of Chicago and Pike, we are not in a flood zone for insurance purposes, despite being flooded out occasionally.	I live near here.	Keri Arriaga	5.74E+09	kerisarriaga@gmail.com		
7	3/15/2022 23:50		The Plan does not adequately address flooding in Goshen							
8	3/16/2022 10:57				Place of residence, and I don't feel that the plan will stop the flooding of this area.	Grant Myers	574-202-0(	grantmyers1955@gmail.com		
9	3/16/2022 17:26	Will the flood probability within the country increase or decrease?, Based on the modifications within roads and other things that may not be elevated in some places.	The Plan would make Goshen signficantly more flood resilient that it is now	We could start to make some strong dams in some places or places that ease the water to lower levels at a slower rate. We could add some structures or foundations for the ground maybe to help minimize the probability of floodings.	This area is of concern to me because of how residents that live around this area may suffer the damages within thier home if thier happends to be a flood thier. And if they do not have insurance for caused damages, they may have to pay some more for that loss. Or people who are living there for a while and are not in control of these circumstances or very little of it when it happens may have to pay more of thier property for this possible flood.	Aaron Ruiz Lariz		aaronruizlariz@gmail.com		
11	44638.51363			Submitting a comment from Glenn Null (319 Dewey Ave) about a drainage issue he mentioned during the Flood Resilience Plan Public Meeting about how when it rains hard there is a lot of water flowing east along Hickory Street towards Dewey Avenue because the water cannot get into the storm drains due to elevation differences.						
12	44638.77632	How and when are the log jams, that are restricting water flow, going to be removed?				Grant Myers		grantmyers1955@gmail.com		
13	44646.02819	Will the natural beauty of the river basin be impacted?	The Plan would make Goshen signficantly more flood resilient than it is now		Due to natural nature of our symbol of Goshen, the maple leaf, how will the areas surrounding the Elkhart River like Rogers Park be affected?					
14	44658.81168	I was unable to get to the meeting, but looked at the slides.	The Plan would make Goshen signficantly more flood resilient than it is now	It was hard for me to see the map on the slides online well enough to see what exactly was in the red area and yellow areas..... We live near Shanklin Park, so I expect that the river from there to Rogers park-Krogers would be significantly affected areas. I like the plan of trying to move buildings from flood-prone areas (I think?) and build new in safer areas, also trying to protect things in the vulnerable areas. What I don't know is what happens next to the plan, and how to be kept abreast. I am pushing legislators to move quickly to adopt significant decreases in fossil fuel use in the US and urgently prioritize clean energy sources, etc. For our children and grandchildren--and those living in areas not producing the greenhouse gases, but suffering most from the rising sea levels--the US has to take national steps now. This climate change is part of what's behind the more frequent floods that we are and will be experiencing.	I said above why it is a concern to me, well, people keep having property destroyed, and this will happen more frequently if we don't take immediate actions to lower carbon levels in the atmosphere. I would be interested in a view of an enlarged map that showed the various parts of the city that are named in the resilience plan.....	Anne Meyer Byler	157462139	ambyler@gmail.com		

APPENDIX 2: BLANK FLOOD RESILIENCE STRATEGIES CHECKLIST

City of Goshen Flood Resilience Plan

COMMUNITY FLOOD RESILIENCE CHECKLIST

The Community Flood Resilience Checklist identifies opportunities to improve resilience to future floods through policy and regulatory tools and non-regulatory programs. The checklist includes strategies that assess how well a community is positioned to avoid or reduce flood damage and recover from floods.

The strategies are organized into the following categories: improve overall resilience; conserve land and discourage development in river corridors and undeveloped floodplain; protect people, businesses and existing facilities in the floodplain; direct future growth away from vulnerable flood areas and coordinate stormwater management practices throughout the watershed.

Christopher B. Burke Engineering has adapted this checklist from the USEPA Smart Growth program and customized it for the City of Goshen. The city should revisit this checklist annually to track progress made and continue to do so until all questions are marked "yes".

A. OVERALL STRATEGIES TO ENHANCE RESILIENCE		
1. Is the Comprehensive Plan current (within 10 years) and adopted by the City?	☐ Yes	☐ No
a. Does the Comprehensive Plan include a goal to preserve the natural and beneficial function of floodplains?	☐ Yes	☐ No
b. Does the Comprehensive Plan include a goal to preserve and enhance urban tree cover for stormwater management?	☐ Yes	☐ No
c. Does the Comprehensive Plan include a goal to provide connectivity of people to the waterways (trails, parks, public access points)?	☐ Yes	☐ No
d. Does the Comprehensive Plan cross-reference the Elkhart County Multi-Hazard Mitigation Plan?	☐ Yes	☐ No
e. Did emergency managers, public works and floodplain administrator participate in the development of the Comprehensive Plan?	☐ Yes	☐ No
2. Is the County Multi-Hazard Mitigation Plan current (within 5 years), approved by FEMA and adopted by the City?	☐ Yes	☐ No
a. Did the city planner participate in the development of the Multi-Hazard Mitigation Plan?	☐ Yes	☐ No
b. Were stakeholders affected by floods involved in the development of the Multi-Hazard Mitigation Plan?	☐ Yes	☐ No
c. Does the Multi-Hazard Mitigation Plan include mitigation practices to preserve the natural and beneficial function of floodplains?	☐ Yes	☐ No
3. Is the Flood Control District based on the IDNR State Model Flood Hazard Ordinance?	☐ Yes	☐ No

a. Does the Flood Control District include a requirement for compensatory flood storage?	☐ Yes	☐ No
b. Does the Flood Control District require critical facilities to be located outside the floodplain as well as access/egress?	☐ Yes	☐ No
c. Does the city require building expansion and new accessory structures in the floodplain to meet additional requirements?	☐ Yes	☐ No
d. Does the city participate in the National Flood Insurance Program (NFIP)?	☐ Yes	☐ No
e. Does the city participate in the Community Rating System (CRS) program?	☐ Yes	☐ No
4. Does the Stormwater Management Code promote low impact development/green infrastructure?	☐ Yes	☐ No
a. Does the Stormwater Management Code include requirements to reduce and treat runoff from impervious areas?	☐ Yes	☐ No
a. Does the Stormwater Management Code include a requirement for channel protection volume?	☐ Yes	☐ No
b. Does the Stormwater Management Code include a requirement for compensatory storage?	☐ Yes	☐ No
c. If not in the Comprehensive Plan, does the Stormwater Management Code include a requirement for fluvial erosion hazard (FEH) areas?	☐ Yes	☐ No
5. Does the Zoning/Subdivision Control Ordinances promote low impact development and green infrastructure?	☐ Yes	☐ No
b. Does the Zoning Ordinance include maximums for impervious cover?	☐ Yes	☐ No
c. Does the Zoning Ordinance promote native plants to meet landscape standards?	☐ Yes	☐ No
d. Does the Zoning Ordinance include tree replacement and/or tree mitigation standards?	☐ Yes	☐ No
6. Is the Capital Plan recent (within 5 years) and been approved and adopted by the City? (Utilities/Redevelopment)	☐ Yes	☐ No
a. Does the Capital Plan cross-reference the Comprehensive Plan and Multi-Hazard Mitigation Plan?	☐ Yes	☐ No
b. Does the Capital Plan include flood mitigation projects with low impact development/green infrastructure solutions?	☐ Yes	☐ No

7. Does the city consider possible flood impacts from climate change in their plans, policies and projects?	☐ Yes	☐ No
8. Does the city have a stormwater utility to fund stormwater projects and programs long-term?	☐ Yes	☐ No
a. Does the funding mechanism include an incentive to promote low impact development/green infrastructure?	☐ Yes	☐ No
9. Does the city conduct an annual review/audit of plans, programs, and policies to ensure consistency?	☐ Yes	☐ No

B. CONSERVE LAND & DISCOURAGE DEVELOMENT IN THE RIVER CORRIDOR & UNDEVELOPED HIGH FLOOD HAZARD/FLOOD STORAGE AREAS		
1. Does the Comprehensive Plan include a goal to prohibit development in stream meander zones or fluvial erosion hazard (FEH) areas?	☐ Yes	☐ No
1. Does the Zoning Ordinance include a river corridor overlay district that prohibits development and land disturbances?	☐ Yes	☐ No
2. Does the Zoning/Subdivision Control Ordinance allow for cluster development, density bonuses as incentives to protect/conserve floodplains?	☐ Yes	☐ No
3. Does the city use incentives or non-regulatory strategies to maintain undeveloped land in the floodplain?	☐ Yes	☐ No
a. Does the city encourage floodplain landowners to restore infiltration properties of the soil?	☐ Yes	☐ No
b. Does the city encourage floodplain landowners to maintain/enhance native vegetation in river corridors, floodplains and wetlands?	☐ Yes	☐ No
c. Does the city encourage floodplain landowners to partner with land trusts or SWCD to hold the land in a conservation easement through a cost-share, donation or purchase agreement?	☐ Yes	☐ No

C. PROTECT PEOPLE & EXISTING BUILDINGS IN FLOODPRONE AREAS		
1. Does the Comprehensive Plan and Multi-Hazard Mitigation Plan identify developed areas that have been or are likely to flood?	☐ Yes	☐ No
a. Does the Multi-Hazard Mitigation Plan identify critical facilities and infrastructure in the floodplain?	☐ Yes	☐ No
b. Does the Multi-Hazard Mitigation Plan include mitigation practices to acquire or floodproof at-risk structures?	☐ Yes	☐ No
c. Is the city willing to cost share with property owners on voluntary acquisition, relocation and/or floodproofing projects?	☐ Yes	☐ No

d. Does the city use incentives or cost-share programs to protect existing critical facilities in the floodplain including access/egress?	☐ Yes	☐ No
2. Does land development codes and building codes promote safer building and rebuilding in floodprone areas?	☐ Yes	☐ No
a. Does the city follow the International Building Code to promote flood-resistant design and construction?	☐ Yes	☐ No
b. Does the city use incentives or cost-share programs to bring non-conforming use and structures into compliance?	☐ Yes	☐ No
c. Does the city require redevelopment projects in the floodplain to provide additional flood storage/meet higher stormwater standards?	☐ Yes	☐ No
3. Is the city able to impose a building moratorium on all new development following a disaster?	☐ Yes	☐ No

D. PLAN FOR AND ENCOURAGE NEW DEVELOPMENT OUTSIDE OF THE FLOODPLAIN		
1. Does the Comprehensive Plan guide future growth and development to areas outside the floodplain?	☐ Yes	☐ No
2. Does the city use incentives such as TIF districts, density bonuses, stormwater utility credits to steer new development to safer areas outside the floodplain?	☐ Yes	☐ No
3. Does the Capital Plan support development and expansion of infrastructure outside of the floodplain?	☐ Yes	☐ No

E. IMPLEMENT STORMWATER MANAGEMENT THROUGHOUT THE WATERSHED		
1. Does the city participate in watershed-based planning activities to manage stormwater?	☐ Yes	☐ No
2. Does the city participate in a multi-jurisdictional/regional effort to link and protect wooded areas, floodplains and wetlands?	☐ Yes	☐ No
3. Does the city coordinate planning, policy, and/or projects with other communities in the watershed?	☐ Yes	☐ No

APPENDIX 3: LIST OF EDUCATION RESOURCES FOR RISK COMMUNICATION AND OUTREACH

List of Education Resources for Risk Communication & Outreach

Flood Risk Communication Toolkit for Community Officials
FEMA
https://www.fema.gov/floodplain-management/manage-risk/communication-toolkit-community-officials
The Flood Risk Communication Toolkit was developed to help community officials begin and maintain an open channel for communication. The Toolkit includes templates and guides for designing a communication plan, effective public meetings, and a social media strategy for addressing flood risk. It is supported by story maps and videos that visually communicate the objectives of updating flood risk data and maps.

No Adverse Impact (NAI) How-to Guide for Education and Outreach
ASFPM
https://s3-us-west-2.amazonaws.com/asfpm-library/FSC/NAI/NAI_Education_2014.pdf
This guide is one of a series of how-to guides that expand on the knowledge base within the No Adverse Impact Toolkit. It identifies tools for incorporating NAI floodplain management into local regulations, policies and programs; while the How-to Guides break down, by subject matter, that information into compact, usable information communities can apply.

Understanding and Managing Flood Risk: A Guide for Elected Officials
ASFPM
https://floodsciencecenter.org/products/elected-officials-flood-risk-guide/
This three-part guide breaks down the key information you need to fulfill your responsibility as an elected official. Wise flood management provides the means to address your flood problems before, during, and after an event, as well as create sustainable development for future generations.

Risk Communication
NOAA
https://www.performance.noaa.gov/risk-communication/
Includes links to several guides and presentations on risk communication basics, behavior and techniques. Materials are based on research from NOAA and its external partners to improve the ability to deliver weather and warnings, communicate local hazards and risks, and provide guidance and decision support tools to stakeholders more effectively.

Understanding Flood Risk Decision-making: Implications for Flood Risk Communication Program Design
Resources for the Future Discussion Paper
https://media.rff.org/documents/RFF-DP-15-01.pdf
Floodplain land-use decisions are made by individuals in households, businesses, and local governments. Whatever the venue, the decisions made are the outcome of multiple interacting influences, with one being consideration of flood risk. The goal of a flood risk communication program may be to improve the understanding of flood risk among those making decisions. An alternative goal may be to change the decisions made. Understanding how individuals make decisions and the mental strategies they employ,

as well as understanding the larger context of decision-making, will contribute to better defining the goals of a flood risk communication program and then designing a program that will secure those goal.

Communicating Flood Risks in a Changing Climate: Nine Principles for Promoting Public Engagement
Climate Outreach
https://climateoutreach.org/reports/communicating-flood-risks-in-a-changing-climate/
The purpose of the workshop was to share and synthesize knowledge, as well as identify areas of agreement and 'best practice' principles for communicating flood risks in a changing climate. A draft of these best practice principles was produced during the second half of the workshop, and then developed through further analysis of audio recordings of workshop discussions. This report reflects the outcomes of the workshop

APPENDIX 4: LIST OF LAND TRUSTS, AGENCIES AND COST-SHARE PROGRAMS

List of Land Trusts, Agencies, and Cost-share Programs

Offering tax or other monetary incentives is an effective way to conserve land and discourage development in river corridors and vulnerable lands. Educating landowners on available programs allows the residents to realize the benefits of enrolling in such programs. More information can be found through the following organizations and institutions:

LAND TRUSTS

Wood-Land-Lakes RC&D Land Trust
59520 County Rd 31
Middlebury, IN 46540-9203
(260) 665-7723
https://wood-land-lakes.org/

ACRES Land Trust
1802 Chapman Road
PO Box 665
Huntertown, IN 46748
(260) 637-2273
https://acreslandtrust.org/

Red-tail Land Conservancy
125 E Charles St., Ste. 200
Muncie, IN 47305-2478
(317) 288-2587
http://www.fortheland.org

The Nature Conservancy
INDIANA FIELD OFFICE
EFROYMSON CONSERVATION CENTER
620 E. Ohio St.
Indianapolis, IN 46202
(317) 951-8818
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/indiana/

Indiana Land Protection Alliance
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/indiana/partners/indiana-land-protection-alliance.xml

Land Trust Alliance
http://www.landtrustalliance.org/

AGENCIES & COST-SHARE PROGRAMS

Elkhart County Soil and Water Conservation District (SWCD)
59358 County Road 7
Elkhart, IN 46517
(574) 523-2030
https://www.elkcoswcd.org/

IDNR
Department of Natural Resources
402 West Washington Street
Indianapolis, IN 46204
(317) 232-4200 or (877) 463-6367
http://www.in.gov/dnr/

IDNR Division of Fish and Wildlife - Landowner Assistance Program
http://www.in.gov/dnr/fishwild/2352.htm

- Classified Forest and Wildlands Program
- Game Bird Habitat Development Program
- Wildlife Habitat Cost-Share Program
- Game Bird Partnership Program
- N.E. Wetland/Grassland Restoration Program

USDA Natural Resources Conservation Service
Indiana NRCS State Office
6013 Lakeside Boulevard
Indianapolis, IN 46278
(317) 290-3200
http://www.nrcs.usda.gov/wps/portal/nrcs/site/in/home/

- Wildlife Habitat Incentives Program (WHIP)
- Wetlands Restoration Program (WRP)
- Environmental Quality Incentives Program (EQIP)
- Conservation Reserve Enhancement Program (CREP)
- Conservation Reserve Program (CRP)
- Conservation Reserve Program (CRP) – Continuous Sign-up Program

U.S. Fish and Wildlife Service
Northern Indiana Ecological Services Sub-Office
1000 WEST OAKHILL ROAD
PORTER, INDIANA 46304-9722
(219) 983-9753
http://www.fws.gov/midwest/northernindiana/

- Partners for Fish and Wildlife Program

APPENDIX 5: IMPLEMENTATION GUIDANCE

Goshen Flood Resilience Plan Implementation Guidance

This table is meant to be help prioritize and track implementation progress of flood resilience strategies. As circumstances change, the timeline for implementation will change and some flood resilience strategies may get implemented sooner and others later than listed below. Implementation is dependent on available funding and staff resources. This table should be reviewed and updated at least annually with the flood resilience checklist in Appendix 2.

FLOOD RESILIENCE STRATEGY	IMPLEMENTATION STEPS	REPORT REFERENCE	IMPLEMENTATION LEAD	IMPLEMENTATION TIMELINE				COMPLETED
				Short-term (1-5 yrs)	Mid-term (5-10 yrs)	Long-term (10+ yrs)	Ongoing	
COMPREHENSIVE PLAN								
Add a discussion on flooding, climate change, and flood resilience planning areas to the Comprehensive Plan.	• Draft language from Flood Resilience Plan (Chapter 1 and Section 4.3) • Incorporate into next plan update (Natural Environment)	5.6	Planning		X			
STORMWATER ORDINANCE								
Customize and adopt the LTAP Model Stormwater Ordinance and Technical Standards and include requirements for fluvial erosion hazard areas, channel protection volume, compensatory flood storage, low impact development/green infrastructure and climate change.	• Review model language from LTAP • Customize to meet local needs and resources • Adopt ordinance into City Code (Title 6, Article 6: Stormwater) • *May require assistance from a consultant*	5.1	Engineering	X				
Adopt standalone fluvial erosion hazard regulations to prohibit and if not possible, discourage new development and redevelopment in this area or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standards recommendation.	• If not included in stormwater ordinance and technical standards, draft language for fluvial erosion hazard regulations • Adopt language into City Code (Title 6, Article 6: Stormwater) • *May require assistance from a consultant*	6.1.1	Engineering	X				
Adopt a standalone minimum 3:1 compensatory flood storage requirement or include it as part of the customized LTAP Model Stormwater Ordinance and Technical Standard recommendation.	• If not included in stormwater ordinance and technical standards, draft language for compensatory flood storage requirements • Adopt language into City Code (Title 6, Article 6: Stormwater) • *May require assistance from a consultant*	6.2.2	Engineering	X				
CITY CODE AND ZONING ORDINANCE – LANDSCAPE STANDARDS								
Expand the tree preservation language in the Zoning Ordinance to include replacement of trees lost to development. Consider a tree mitigation ratio of 5:1 based on tree size and require a variety of native species to reduce the risk of mass tree casualties from future pest damage.	• Draft language to specify tree species, size, etc. and agreed upon ratio for replacement • Adopt language into Zoning Ordinance (Article V, Section 5000: Landscape Requirements); refer to updated native tree list in City Code (5.4)	5.4	Planning Environmental Resilience	X				
Promote the use of native plants in the Zoning Ordinance by requiring a high percentage to meet the landscape standards and update the recommended tree list in the City Code to include more native species and cultivars.	• Draft language to encourage use of more natives, list species • Adopt language into Zoning Ordinance (Article V, Section 5000: Landscape Requirements) • Adopt tree list into City Code (Title 6, Article 8: Trees)	5.4	Planning Environmental Resilience	X				
Allow vegetated green infrastructure practices, including parking areas, to count toward landscape requirements in the Zoning Ordinance.	• Draft language to incentivize green infrastructure • Coordinate with stormwater green infrastructure standards • Adopt language into Zoning Ordinance (Article V, Section 5000: Landscape Requirements)	5.4	Planning Stormwater	X				

FLOOD RESILIENCE STRATEGY	IMPLEMENTATION STEPS	REPORT REFERENCE	IMPLEMENTATION LEAD	IMPLEMENTATION TIMELINE				COMPLETED
				Short-term (1-5 yrs)	Mid-term (5-10 yrs)	Long-term (10+ yrs)	Ongoing	
ZONING ORDINANCE – FLOOD CONTROL DISTRICT								
Update flood resilience planning areas based on updated FIRM information.	• Compare updated FIRM boundaries and revise the flood resilience planning areas accordingly	5.4	Planning Environmental Resilience	X				
Amend the Flood Control District regulations to require new critical facilities to be located outside of known flood hazard areas only, including the 0.2% AEP flood zone. If placement of new critical facilities in flood hazard area is unavoidable, the facility, including access, should be protected to at least one foot above the 0.2% AEP flood elevation.	• Draft language specifying location and access to critical facilities • Adopt language into Zoning Ordinance (Article IV, Section 4270: Flood Control District)	5.4 6.3.1 6.5.3	Planning		X			
Amend the Flood Control District regulations to prohibit and if not possible, discourage new development and redevelopment in the floodway and undeveloped high flood hazard storage areas in the floodway fringe.	• Draft language to direct growth outside flood hazard areas • Adopt language into Zoning Ordinance (Article IV, Section 4270: Flood Control District)	5.4 6.1.2 6.2.1	Planning		X			
Discourage new development and preserve the 0.2% AEP flood zone for additional flood storage for extreme flood events.	• Draft language to preserve flood storage for extreme events • Adopt language into Zoning Ordinance (Article IV, Section 4270: Flood Control District)	6.3.1	Planning			X		
Require new development and redevelopment in the 0.2% AEP flood to have a flood protection grade equal to or greater than that required in SFHA (a minimum of two feet above the 1% AEP).	• Draft language to set flood protection grade • Adopt language into Zoning Ordinance (Article IV, Section 4270: Flood Control District)	6.3.2	Planning		X			
Guide growth and development including utilities and infrastructure to safer areas outside the SFHA, 0.2% AEP flood zone and localized flooding areas.	• Draft language direct growth and development outside known flood hazard areas • Adopt language into Zoning Ordinance (Article IV, Section 4270: Flood Control District)	6.5.1	Planning Redevelopment Engineering		X			
ZONING ORDINANCE – LAND USE								
Promote development that is sensitive to the natural environment through conservation design and development.	• When reviewing site plans, offer suggestions to protect natural areas, minimize impervious footprint and onsite stormwater management • Encourage use of planned unit development in the Zoning Ordinance for more innovative development options (Article IV, Section 4250) and low impact development in proposed stormwater standards update (5.1)	6.5.2	Planning Engineering Stormwater				X	
CAPITAL PROJECTS - REDEVELOPMENT								
Focus redevelopment efforts (site preparation, remediation and public infrastructure) in locations that are designated as safe growth areas outside the 0.2% AEP floodplain and local flooding areas.	• Identify safe growth areas; include these in the Future Growth Plan (5.7) • Prioritize redevelopment efforts in safe growth areas	5.7	Redevelopment	X				
Consider climate change and flood impacts in capital projects; promote low impact development/green infrastructure to manage stormwater.	• Be concerned about future climate conditions and use sustainable stormwater management practices on redevelopment projects	5.7	Redevelopment	X				

FLOOD RESILIENCE STRATEGY	IMPLEMENTATION STEPS	REPORT REFERENCE	IMPLEMENTATION LEAD	IMPLEMENTATION TIMELINE				COMPLETED
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CAPITAL PROJECTS – LAND ACQUISITION								
Continue to acquire available land in the SFHA for flood storage and compatible open space uses; build on the city-owned parkland along the Elkhart River and create a Central Park like amenity for the city and region.	• Identify and prioritize desirable parcels in the SFHA; determine land ownership and availability • As resources allow, continue to acquire land and connect active and passive park properties and natural areas	5.7 6.1.2 6.2.1	Redevelopment				X	
Acquire and demolish structures in the river corridor impact area first then acquire and demolish structures outside the river corridor impact area and inside the SFHA as properties become available and funding allows.	• Inventory and prioritize structures for acquisition and demolition using the Voluntary Acquisition Plan (6.4.4) • Secure funding through FEMA's Building Resilient Infrastructure and Communities (BRIC) grant program • *May require additional staff to implement*	6.4.4 6.4.5	Redevelopment			X		
COMMUNICATION, EDUCATION AND TRAINING								
Train city stormwater inspection and maintenance staff about green infrastructure practices to improve function, performance and appearance.	• Conduct regular trainings for field crews responsible for inspection and maintenance of green infrastructure practices; emphasize preventative maintenance • Cross train all field crews on basic green infrastructure function to provide early detection of a problem • Require green infrastructure to be designed with ease of maintenance in mind (access, limited plant varieties, etc.) • *May require assistance from a consultant*	5.1	Stormwater	X				
Expand current flood communication efforts and develop a flood risk education and outreach program to improve people's risk awareness and motivate them to take measures to protect themselves and their property.	• Use ASFPM and other resources (Appendix 3) to develop a flood risk communication program	5.2	Mayor's Office	X				
SUPPORTING EFFORTS AND PARTNERSHIPS								
Complete the Flood Resilience Checklist at least annually to track progress made and continue to do so until all questions are marked "yes".	• Annually reconvene the project team from the Flood Resilience Plan to compete the checklist (Appendix 2) • Review implementation progress on these flood resilience strategies (this table)	5.3	Environmental Resilience				X	
Cross-reference the Flood Resilience Plan, Comprehensive Plan, Redevelopment Capital Plan and Elkhart County MHMP for strategies and mitigation measures related to flooding, growth and development priorities.	• As plans are updated, review for consistency • Update plans with new information as it becomes available	5.6 5.7 5.8	Environmental Resilience Planning Redevelopment County EMA				X	
Ensure the City of Goshen is represented in the MHMP five-year update.	• Contact the County EMA to express interest to participate and share how implementation of this Flood Resilience Plan meets many of the mitigation strategies listed in the MHMP (5.8)	5.8	Planning Public Safety County EMA				X	

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SUPPORTING EFFORTS AND PARTNERSHIPS – PLANS, PROGRAMS AND STUDIES								
Work with the County to study and update the stormwater utility rate collectively, otherwise complete an independent Stormwater Utility Rate Study that includes stormwater program costs and a fair and equitable rate structure; update the stormwater utility accordingly within the City of Goshen.	• Meet with the County to discuss their intentions and participate if a countywide rate study and rate increase is being considered • If working with the County is not an option, prepare a rate study and identify a rate that meets current and future stormwater needs; explore options for billing • *May require assistance from a consultant*	5.5	Stormwater	X				
Incorporate the flood resilience planning areas into the proposed Future Growth Plan.	• Analyze need and type of growth, industry trends • Identify and prioritize areas for growth outside the SFHA and 0.2% AEP flood zone • Document implementation timeline and funding • *May require assistance from a consultant*	5.7	Redevelopment Planning	X				
Identify willing landowners of undeveloped land in the SFHA and partner them with entities willing to purchase, accept donations or hold conservation easements.	• Identify and prioritize undeveloped land in the SFHA • Facilitate a meeting with landowners and conservation entities (USDA, NRCS, IDNR, SWCD and land trusts) • *May require assistance from a consultant*	6.1.2 6.2.1	Environmental Resilience Redevelopment				X	
Prepare a Flood Response Plan that documents flood detection, warning, response and follow-up protocols	• Correlate river flood stages with expected extent and severity of flooding (road closures, flooded areas, evacuations, etc.) • Document procedures and protocols for flood response notification, communication and expected actions • Adopt, maintain and periodically test procedures in plan • *May require assistance from a consultant*	6.4.2	Mayor's Office	X				
Prepare a comprehensive citywide Stormwater Master Plan to understand and resolve drainage, flooding and water quality conditions citywide.	• Identify existing and future problem areas; complete analysis and recommend structural and nonstructural solutions; conduct detailed evaluation, costs and funding; prioritize solutions for implementation • Prepare report summarizing findings • *May require assistance from a consultant*	6.4.2	Stormwater Engineering	X				
Upon implementation of flood resilience strategies, participate in the NFIP Community Rating System (CRS) program to reduce flood risk and improve flood resiliency and reduce flood insurance premiums for all flood insurance policy holders within the city.	• Review CRS materials and meet with ISO representative to discuss potential points • Assemble initial application • Once enrolled, gather documentation for annual recertification and 5-year cycle visit • Annually revisit CRS checklist and look for opportunities to improve score (and flood insurance premium savings)	6.4.3	Planning			X		

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Prepare a Voluntary Acquisition Plan to prioritize structures for relocation and/or buyout in the vulnerable developed area	• Inventory structures in flood hazard areas; prioritize based on inside/outside river corridor impact area and depth of flooding • *May require assistance from a consultant*	6.4.4 6.4.5	Redevelopment Planning Stormwater		X			
Create a Floodproofing Assistance Program to prioritize nonresidential structures for floodproofing, establish partnerships with willing landowners and secure available funding.	• Inventory nonresidential structures in flood hazard area; identify appropriate dry and wet floodproofing methods • Establish partnerships with willing landowners • Secure funding through FEMA BRIC grant program • *May require assistance from a consultant*	6.4.5	Planning			X		
Implement a Flood Compliance Program to encourage owners of nonconforming uses to voluntarily meet flood regulations.	• Identify noncompliant structures in flood hazard area • Meet with interested landowners and secure funding through FEMA BRIC grant program • *May require assistance from a consultant and/or additional staff to implement*	6.4.6	Planning			X		
SUPPORTING EFFORTS AND PARTNERSHIPS – COUNTY PARTNERSHIPS								
Support (non-monetary) SWCD programs upstream in the watershed to improve flood resiliency in the City of Goshen.	• Be aware of SWCD efforts and look for opportunities to connect landowners and support implementation of their programs	6.6.3	Stormwater				X	
Partner with the County Surveyor to investigate methods to store flood water in the watershed, in flood control facilities, two-stage ditches or similar, to reduce flooding downstream.	• Identify regulated drains upstream of Goshen • Determine maintenance and reconstruction schedule; discuss options for regional facilities, two-stage ditch or similar	6.6.4	Stormwater		X			
SUPPORTING EFFORTS AND PARTNERSHIPS – WATERSHED PARTNERSHIPS								
Partner with the USGS to add a new gage upstream of Goshen to improve flood detection and provide early warning through the NWS.	• Work with the USGS to determine the location for a new gage • Secure funding with partners in watershed to support placement and long-term maintenance of new gage	6.6.1	Stormwater		X			
Partner with the NWS to expand the capabilities of the Elkhart River at Goshen gage to provide daily forecast information.	• Work with NWS to discuss options and costs associated with expanding capabilities of gage	6.6.1	Stormwater		X			
Participate in the Elkhart River Restoration Association and the St Joseph River Basin Commission planning activities and studies that help slow, spread and infiltrate flood water upstream in the watershed.	• Network with watershed groups and collaborate on efforts to manage stormwater and reduce flooding	6.6.2	Stormwater				X	
Partner with the St Joseph River Basin Commission to define a natural resource overlay zone and support local adoption throughout the basin.	• Work collectively to delineate and define the zone (forested areas, wetlands, urban tree canopy, etc.); identify landowners and conservation entities (USDA, NRCS, IDNR, SWCD and land trusts); work to limit encroachment and fragmentation • Manage overlay zone within city	6.6.2	Environmental Resilience Stormwater Planning			X		
Work with the St Joseph River Basin Commission to promote adoption of comprehensive No-Adverse-Impact (NAI) development ordinance and standards, as reflected in the LTAP Model Stormwater Ordinance and Technical Standards, by all counties and communities within the watershed.	• Participate in drafting NAI ordinance and standards with other entities in watershed • Compare with language adopted through implementation of this Flood Resilience Plan and update/amend if needed	6.6.2	Environmental Resilience			X		