BILL NO. S-14-09-03

SPECIAL ORDINANCE NO. S-_____

AN ORDINANCE approving the City of Fort Wayne's participation in the MAUMEE RIVER BASIN COMMISSION - FLOOD MITIGATION MASTER PLAN UPDATE - JUNE 2014.

NOW, THEREFORE, BE IT ORDAINED BY THE COMMON COUNCIL OF THE CITY OF FORT WAYNE, INDIANA:

SECTION 1. That the City of Fort Wayne's participation in the MAUMEE RIVER BASIN COMMISSION - FLOOD MITIGATION MASTER PLAN UPDATE - JUNE 2014, is hereby affirmed and approved in all respects, respectfully for:

SECTION 2. That this Ordinance shall be in full force and effect from and after its passage and any and all necessary approval by the Mayor.

____
Council Member

APPROVED AS TO FORM AND LEGALITY

____
Carol Helton, City Attorney

Maumee River Basin Commission 2014 Flood Mitigation Master Plan Update

Executive Summary

Master Plan – converted current document from HTML web-based language to Smart Portable Document Format (PDF) for ease of printing by viewers and for updating purposes;

- **Chapter 1: History and Accomplishments** – includes an overview of the MRBC, its purpose, summary of accomplishments, and organization of this document. Added Section 1.4 covering MRBC and its partner's accomplishments for purposes of tracking the progress and remaining needs of identified mitigation programs.

- **Chapter 2: Description and Trends in the Watershed** – an overview of changes in population, demographics, economy, land use, and regulations as they relate to water quality and quantity issues in the Maumee River Basin. Updated Section 2.3 to include most recent flood events impacting MRBC member communities; National Flood Insurance Program statistics; Community Rating System CRS Program Repetitive Loss data;

- **Chapter 3: Summary of MRBC Programs** – this section includes a review and evaluation of MRBC programs and their effectiveness to improve water quality and quantity issues in the Maumee River Basin. All Stream Reach Classifications were updated to determine future Flood Study needs. The Flood Warning System & River Gage Placement section was updated to reflect new gages added to the Flood Warning Network and future needs were identified. Voluntary Acquisition and Voluntary Retrofitting sections were updated to include comprehensive inventory of all structures located in Special Flood Hazard Area. Prioritized all structures based on a High, Medium, Low ranking and updated all recommendations.

- **Chapter 4: Funding Considerations** – provides an evaluation of funding for master plan implementation, and administrative and management activities. This chapter includes discussion of typical local, state, and federal funding sources.

- **Chapter 5: Implementation Plan** – presents recommended steps (where appropriate) for implementation of recommended programs, policies, and projects.

- **Chapter 6: Summary and Conclusions** - provides a summary of the planning process; list of recommended programs, policies, and projects; and concluding thoughts.

- The original 1995 Master Plan and associated 2008 update can be accessed at:

  http://www.mrbc.org/master_plan/index.html

DIGEST SHEET

Department: Flood Control

Resolution Number: N/A (W/O# N/A)

Title of Ordinance: Maumee River Basiion Commission – Flood Mitigation Master Plan Update – June 2014 Approval

Awarded To: N/A

Amount of Contract: N/A

Number of Bidders: N/A

Description of Project (Be Specific):
Update of the 2008 MRBC – FMMP – Please see attached memo for further explanation

What Are The Implications If Not Approved:
Loss of 10% discount to residents on their flood insurance policies.

If Prior Approval Is Being Requested, Justify: N/A

Additional Comments:

Signature

8/25/14
Date

City of Fort Wayne
FLOOD CONTROL DEPARTMENT
200 E. Berry St. Suite 210
Fort Wayne, IN 46802
260-427-1250

MEMORANDUM

DATE: August 25, 2014
TO: Members of Common Council
FROM: Patrick Zaharako, Assistant City Engineer PZ
SUBJECT: Community Rating System/MRBC Flood Mitigation Master Plan

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The City of Fort Wayne joined the National Flood Insurance Program's Community Rating System (CRS) in 1991. CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities and as a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions and activities. As part of continued participation, it is necessary for the City of Fort Wayne to have an updated flood mitigation master plan.

The Maumee River Basin Commission has just updated its 2008 Flood Master Plan for 2014, which meets the CRS criteria requirements for a flood mitigation master plan. The City of Fort Wayne and Allen County utilize this plan for the required floodplain management plan component for participation in the Community Rating System.

Adoption of the MRBC Flood Mitigation Master Plan will allow the City of Fort Wayne to continue to provide discounts to residents flood insurance policies. In addition, adoption of the Master Plan will also benefit the City of Fort Wayne by better positioning us for future federal grant funding for flood mitigation projects.

City Council members will receive a copy of the MRBC Flood Mitigation Master Plan if requested, or you may view it now by going into the website www.mrbc.org and clicking on Maumee River Basin Commission Flood Mitigation Master Plan.

If you have any questions, please do not hesitate to contact me.

Patrick Zaharako
Assistant City Engineer
427-2789

Flood Mitigation
Master Plan

Prepared for

Maumee River Basin Commission
3864 New Vision Drive
Fort Wayne, IN 46845

June 2014

Prepared by

Christopher B. Burke Engineering, LLC
115 West Washington Street, Suite 1368 South
Indianapolis, Indiana 46204

CBBEL Project No. 01-0409

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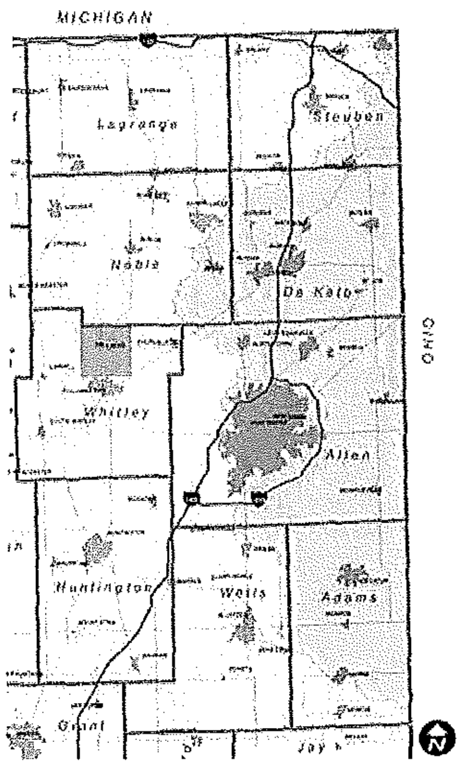

Figure 1-1 Maumee River Basin

The Maumee River Basin Commission (MRBC) Flood Mitigation Master Plan provides recommendations for new programs and projects along with expansion of existing programs that will continue reducing flood damages within the Maumee River Basin (**Figure 1-1**). This plan also highlights major accomplishments of MRBC in implementing master plan recommendations that have successfully reduced flood damages.

The original master plan was completed in 1995 (View the 1995 Maumee River Basin Flood Control Master Plan.) It was updated in 2008 to provide an interactive, web-based plan and add mitigation recommendations for Allen County with reference to future development of similar plans for the other counties in the basin. This current plan builds on and expands the 2008 plan by adding mitigation details and recommendations for Adams, DeKalb, Noble, Steuben and Wells Counties along with updating data and recommendations for Allen County. MRBC intends to continue with future enhancements of this master plan to reflect and highlight ongoing implementation of plan recommendations, to maintain relevance by including latest available flood damage mitigation options, and to reflect current conditions within the basin.

1.2 MAUMEE RIVER BASIN COMMISSION HISTORY

MRBC was established in 1986 by State Law (I.C. 36-7-6.1) to assist Indiana communities in the Maumee River basin to reduce flood damages by exercising sound watershed management. Critical to the success of reducing damages from flooding has been basin-wide implementation of comprehensive structural and non-structural flood mitigation measures. This implementation is in keeping with the MRBC mission of providing regional leadership and promotion of flood mitigation practices through a coordinated and comprehensive planning and implementing approach.

To accomplish this mission, MRBC is composed of representatives from Adams, Allen, DeKalb, Noble, Steuben, and Wells Counties. Each County is represented by the three County Commissioners (or their official designee), the County Surveyor, and a member of the Soil and Water Conservation

District (SWCD) Board of Supervisors (or their official designee). These members play a critical role in the formulation of policy and program recommendations and work closely with individual communities by providing assistance and guidance on flood mitigation projects.

MRBC is able to provide assistance in the areas of flood mitigation project planning and administration, flood mitigation assistance grant writing, 319 water quality improvement grant writing, erosion and sediment control, flood insurance, floodplain ordinances, inventories of flood prone properties, stormwater and erosion control ordinances, soil and water conservation, and public education and outreach programs.

1.3 MRBC ADMINISTRATIVE FUNDING

MRBC's administrative budget is funded locally by each participating county which contributes according to its percentage of land in Maumee watershed. The number of acres and annual Administrative Fund Allocation is shown in **Figure 1-2.**

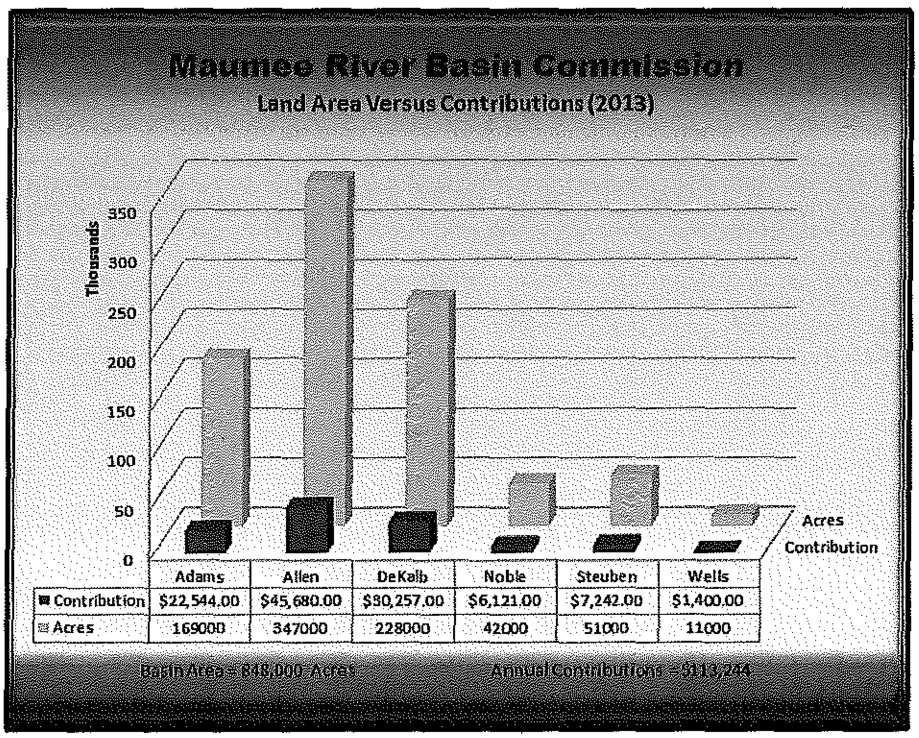

Figure 1-2 Land Area vs. Annual Revenue

1.4 MRBC ACCOMPLISHMENTS

MRBC has successfully implemented many important flood damage reduction measures over the last 28 years. Several examples of MRBC and community accomplishments are provided here.

1.4.1 Identification of Buildings Located in Special Flood Hazard Area

- As illustrated in **Figure 1-3**, identified 6,363 buildings in Special Flood Hazard Area (SFHA) and classified them into mitigation categories of voluntary acquisition, retrofit, further study, and no further action for

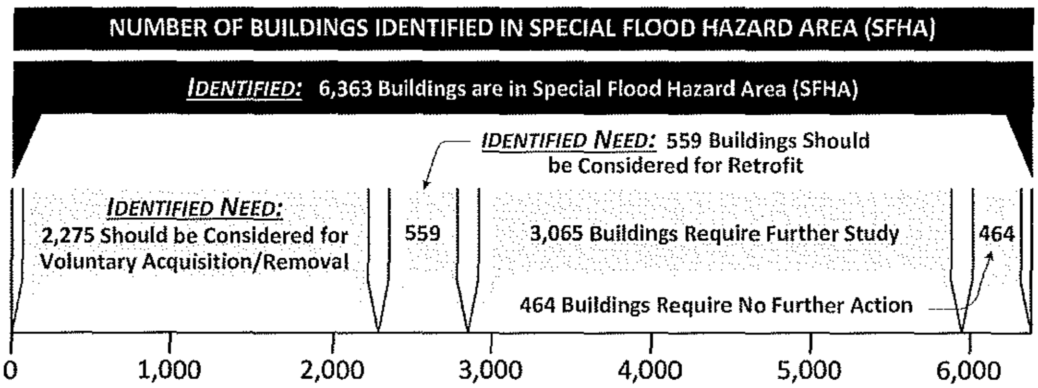

Figure 1-3 Summary of Buildings in the SFHA

1.4.2 Voluntary Buyout Cost-Share Assistance Program

- As illustrated in **Figure 1-4**, acquired 248 of the 2,275 homes identified for voluntary acquisition and removal

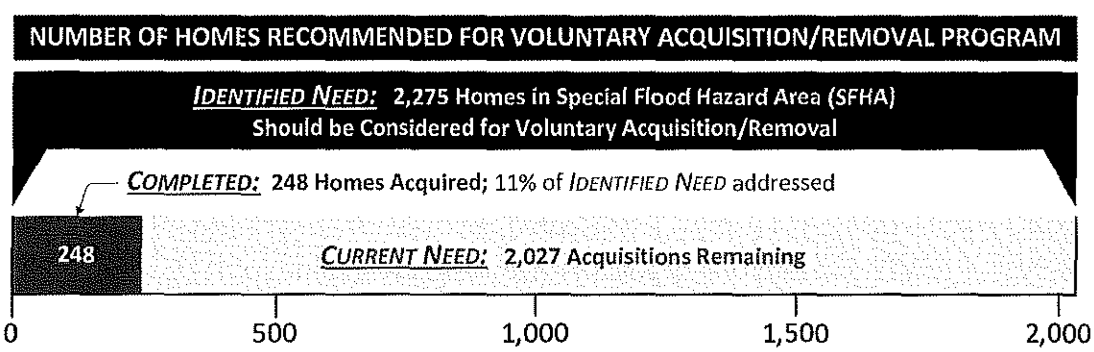

Figure 1-4 Homes Recommended for Voluntary Acquisition/Removal

- As illustrated in **Figure 1-5**, established nearly 100 acres of perpetual open space in the acquisition areas

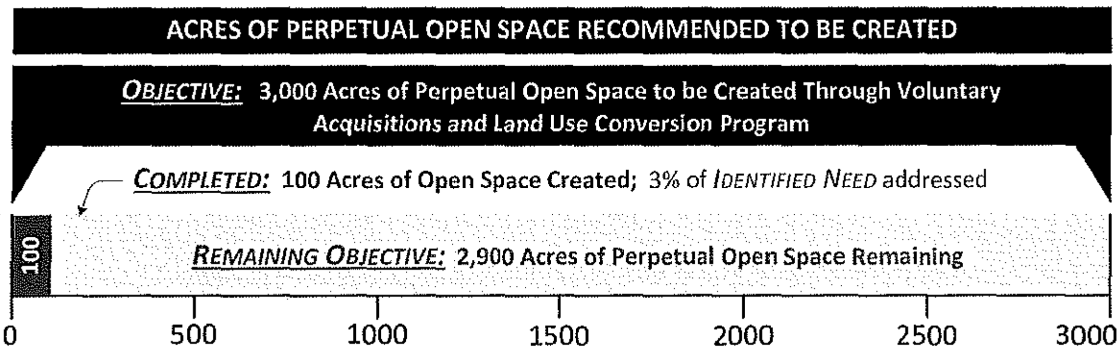

Figure 1-5 Acres of Perpetual Open Space

1.4.3 Retrofitting Cost-Share Assistance Program

- As illustrated in **Figure 1-6**, identified that 559 buildings located in the SFHA should be considered for retrofit to mitigate flooding
- Provided 75% cost-share assistance to homeowners in 100-year floodplain
- Secured Increased Cost of Compliance (ICC) grant for City of Decatur

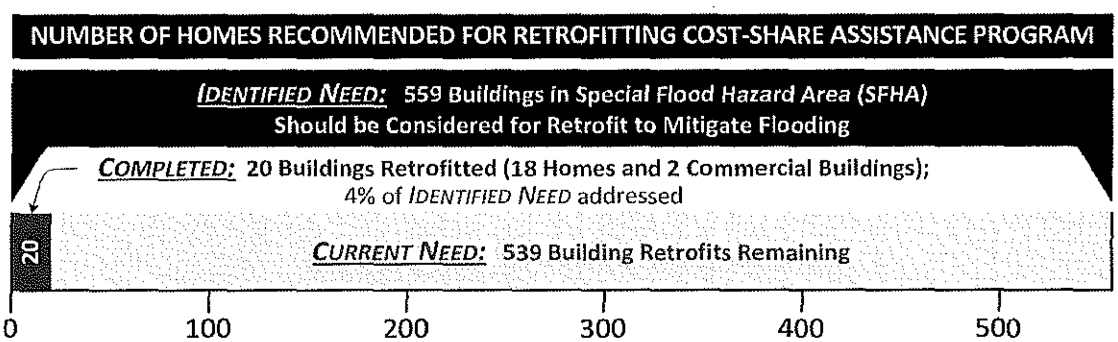

Figure 1-6 Homes Recommended for Retrofitting Cost-Share Assistance Program

1.4.4 Flood Hazard Area Identification and Mitigation

- Identified 1,010 miles of river and stream with drainage area greater than one square mile
- Funded 19 Flood Insurance Studies (FIS)
- Provided cost-share match for Allen, Adams, DeKalb, Noble, and Steuben County Multi-Hazard Mitigation Plans (MHMP)

- To date, 791 miles of stream have been modeled and have base flood elevation data
- As of completion of this 2014 update, the remaining 219 miles of stream are currently being modeled and upon completion, all 1,010 miles of stream in the basin will have modeling, mapping and base flood elevation data (**Figure 1-7**)

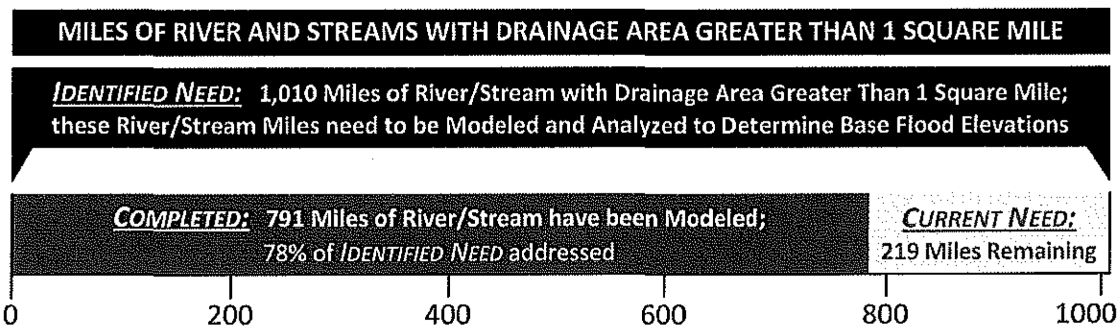

Figure 1-7 Rivers and Streams with Drainage Area Greater than 1 Square Mile

1.4.5 Stream Obstruction Removal

- Developed stream obstruction removal guidance
- Funded logjam removal projects on St. Marys (Adams County) and St. Joseph Rivers (DeKalb County) (**Figure 1-8**)

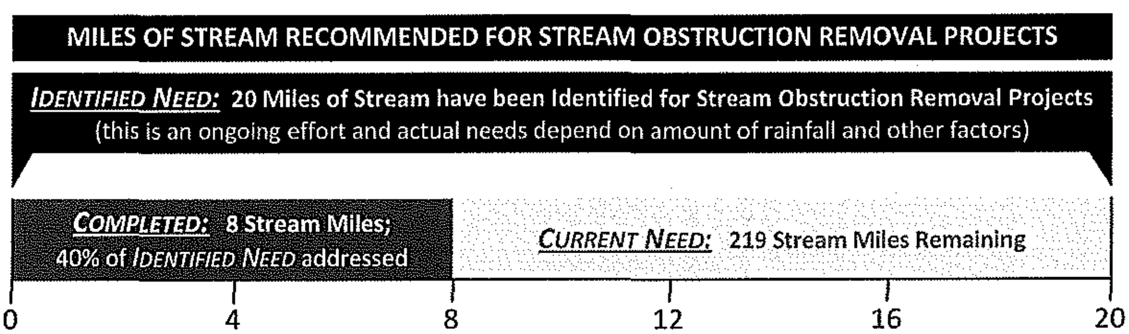

Figure 1-8 Miles of Stream Recommended for Stream Obstruction Removal Projects

1.4.6 Uniform Ordinances

- As illustrated in **Figure 1-9**, established Model Flood Hazard Area Ordinance that 18 (of 19) NFIP communities have adopted

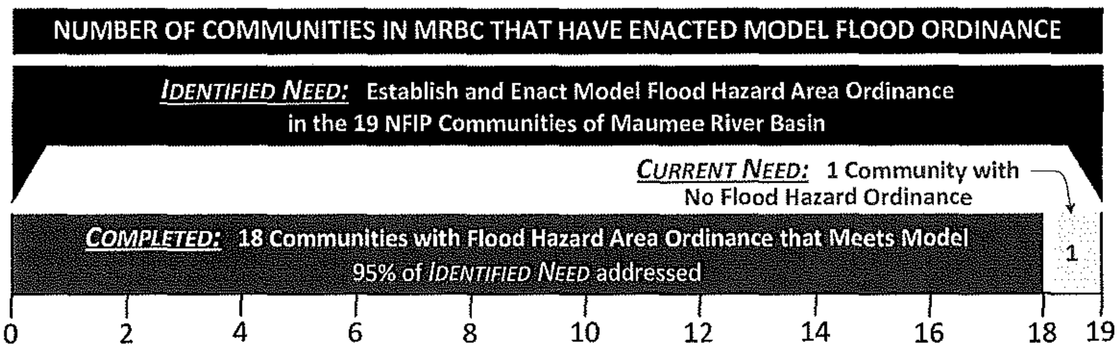

Figure 1-9 Communities in the Maumee River Basin that have Enacted Model Flood Ordinance

- As illustrated below, established Model Storm Drainage & Erosion Control Ordinance that 4 (of 7) Phase II communities have adopted

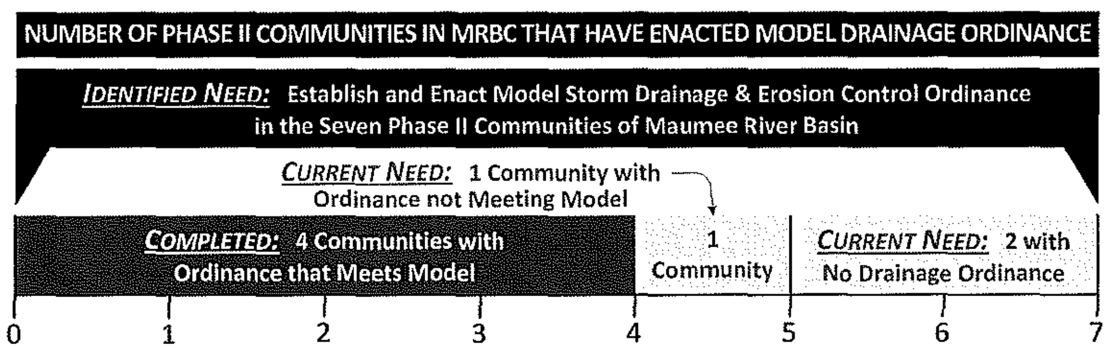

Figure 1-10 Phase II Communities in the Maumee River Basin that have Enacted Model Drainage Ordinance

1.4.7 No Adverse Impact (NAI) Initiative

- Adopted and published NAI position statement
- Established compensatory storage requirements

1.4.8 Education – Public Awareness

- Established partnerships with the Indiana Department of Natural Resources (DNR) and Indiana Department of Homeland Security (IDHS)
- Conducted Disaster Mitigation Act (DMA) training
- Coordinated Decatur Board of Zoning Appeals (BZA) training
- Conducted Floodplain Management 101 seminar
- Participated in a National Weather Service presentation on flooding
- Funded distribution of "Fate of the River Revisited" film

- Ongoing active participation in Indiana Association for Floodplain and Stormwater Management (INAFSM) and national Association of State Floodplain Managers (ASFPM)
- Provide data and cost-share money for early flood warning detection
- Assist with NFIP Community Rating System (CRS) programs

1.4.9 Voluntary Agricultural Land-Use Conversion

- Developed land-use conversion guidance
- Secured two 30-year conservation easements (21.53 Ac) along St. Joseph River

1.4.10 FEMA Map Modernization Program

- Encouraged local involvement resulting in updating FEMA maps to Digital Flood Insurance Rate Map (DFIRM) for all five counties
- Prioritized streams for study
- Funded development of 2-foot contour mapping

1.4.11 Cooperating Technical Partners (CTP) Program

- Represent Adams, Allen, DeKalb, Noble, Steuben and Wells Counties
- Secured more than $1 million in federal cost-share funds for FIS studies in Adams, Allen, and DeKalb Counties

MRBC's continued success in mitigating flood losses in Northeastern Indiana hinges on regular evaluation and refinement of the Master Plan. As noted above, much has been accomplished, and there is still much to do.

1.5 ORGANIZATION OF THIS DOCUMENT

This Master Plan Update includes six chapters and seven appendices with supporting data. A brief summary of the contents of each chapter is presented below:

Chapter 1: History and Accomplishments – includes an overview of the MRBC, its purpose, summary of accomplishments, and organization of this document.

Chapter 2: Description and Trends in the Watershed – an overview of changes in population, demographics, economy, land use, and regulations as they relate to water quality and quantity issues in the Maumee River Basin.

Chapter 3: Summary of MRBC Programs – a review and evaluation of MRBC programs and their effectiveness to improve water quality and quantity issues in the Maumee River Basin. This Chapter includes recommendations for improvement and specific areas to focus efforts with regards to:

3-1 Floodplain Management
3-2 Stormwater Management
3-3 Flood Hazard Mapping Program
3-4 Flood Warning System and River Gage Placement
3-5 Wetland Preservation and Restoration
3-6 Stream Obstruction Removal Program
3-7 Voluntary Mitigation and Flood Protection Projects
3-8 Voluntary Agriculture Land Use Conversion Program
3-9 Public Education and Outreach
3-10 Stormwater Quality Assessment and Characterization
3-11 Post-Flood Damage Assessment Protocol

Chapter 4: Funding Considerations – provides an evaluation of funding for master plan implementation, and administrative and management activities. This chapter includes discussion of typical local, state, and federal funding sources.

Chapter 5: Implementation Plan – presents recommended steps (where appropriate) for implementation of recommended programs, policies, and projects.

Chapter 6: Summary and Conclusions – provides a summary of the planning process; list of recommended programs, policies, and projects; and concluding thoughts.

CHAPTER 2 DESCRIPTION AND TRENDS IN THE WATERSHED

2.1 INTRODUCTION

Trends in a watershed such as population fluctuations, changes in land use, economic diversity, and program development can provide insight regarding the watershed's current situation. This insight is useful in the development of strategies to accommodate future trends while reducing the impact to water quality and quantity.

The following sections describe the trends regarding population, areas of growth and development, and local economic situations. This information provides the background justification for long term planning and program development designed to reduce the economic impact from flooding events as well as water quality degradation. The flooding section provides an overview of recent flooding events within the Maumee River Basin.

2.2 SOCIAL, PHYSICAL, AND ECONOMIC CHANGES IN THE MAUMEE RIVER BASIN

2.2.1 Population

Population growth trends can impact funding sources, political boundaries, and long-term planning efforts. Growth of municipalities brings a need for expanded infrastructure, more fire and police forces, and property value protection through coordinated and planned development. Data on recent population growth, estimated future population, and main population centers in each county are presented in **Table 2-1**. More detailed information regarding population trends and analysis can be found at STATS Indiana.

Table 2-1 Population Statistics for the Maumee River Basin

	Adams	Allen	DeKalb	Noble	Steuben	Wells
Rank in State	46	3	35	29	8	58
1990-2000 Growth	8.1%	10.3%	14.0%	22.2%	21.0%	6.4%
2010 Population	34.387	355,329	42,223	47,536	34,185	27,636
2020 Population (Projection)	35,542	379,731	43,651	48,870	34,679	27,977
Populous areas in MRB	Decatur Berne Monroe	Fort Wayne New Haven Leo-Cedarville	Auburn Garrett Butler	Avilla	Clear Lake Hamilton	

STATS Indiana, 2013

2.2.2 Economics

Understanding the overall economic situation with the Maumee River Basin is also important as the MRBC develops cost share programs related to property acquisitions and floodproofing. Median income, poverty rates, and unemployment rates may also provide important insight regarding the ability for individual homeowners and municipalities to participate in water quantity and water quality protection efforts. Areas where the median household incomes are low and poverty rates are high may prioritize their funding and staffing efforts differently than areas with higher median household incomes and lower poverty rates. These areas may not have the ability to perform upgrades to water treatment facilities designed to discharge properly treated wastewater, extension of sanitary sewers to reduce the number of residential septic systems, or complete detailed flood studies of streams and waterways to better identify floodplains. Areas without such situations may be able to perform those upgrades, extensions, and detailed studies much easier.

Table 2-2 indicates the factors affecting local economies such as income, poverty rates, and major employment categories of those counties within the Maumee River Basin.

Table 2-2 Economics in the Maumee River Basin

	Adams	Allen	DeKalb	Noble	Steuben	Wells
Median Household Income (2011)	$47,265	$47,411	$46,262	$46,690	$45,957	$49,234
Poverty Rate (2011)	15.0%	17.2%	13.1%	13.1%	13.0%	10.2%
Resident Labor Force (2012)	14,480	174,207	19,592	21,412	16,033	13,651
Unemployment (April 2013)	6.8	7.7	8.0	8.1	8.1	7.4%
Major Employment Categories	MFG: 21.4% Other: 19.5% Retail: 10.6%	Other: 24.2% Health: 14.1% MFG: 12.1%	MFG: 28.3% Other: 19.7% Retail 7.9%	MFG: 34.8% Other:18.5% Retail: 8.9%	MFG: 22% Other: 18.5% Retail: 12.9%	MFG: 16.9% Other: 16.3% Health: 13.2%

STATS Indiana, 2013

2.2.3 Land Use

As shifts in populations and economics occur, it can be anticipated that land use will also shift. New development and land use change can serve as a predictor of future water quality and quantity problems. These may include:

- Areas of planned development (construction activities)
  - Increased sedimentation
  - Increased nutrient loadings

- Areas of development lacking sanitary sewers
  - Increased bacteria and pathogens
  - Increased nutrient loadings

- Areas of planned commercial or industrial development
  - Increased heavy metal loadings
  - Increased air pollution (precipitates to surface waters)
  - Increased impervious surfaces

- Increases in impervious surfaces such as roads, parking lots, and rooftops
  - Increased volume and velocity of stormwater runoff
  - Shifted peak discharges and times of concentration
  - Increased temperature of stormwater runoff
  - Increased streambank erosion and habitat degradation

A change in land use may also be beneficial to the water quality and quantity within the watershed. For example, historically agricultural land use converted to open space or a conservation easement may reduce pollutant loadings and may also serve as a floodplain to reduce the damaging effects from flood events.

Overall, within the Maumee River Basin the shift has been from a predominantly agricultural land use to a more residential and commercial land use in many of the populated areas. For this reason, many communities have completed Comprehensive Plans identifying these changes and highlighting areas best suited for future growth and development, as well as those best suited for conservation and protection of natural areas.

Adams County

According to the Adams County Building & Planning Department, the most recent Comprehensive Land Use Plan was developed in April of 1994 and is not available electronically. Intended as a means to establish a "sound, flexible approach to land use decision-making in Adams County", the plan indicates that growth will be directed within areas designated as "Urban Services Areas"; areas where needed infrastructure already exists or can be easily extended. Four such areas have been identified and are synonymous with the incorporated areas of Decatur, Berne, Geneva (outside of the Maumee River Basin), and Monroe. "Rural Service Areas" have also been identified as the unincorporated portions of Adams County and development requiring extension of utility and infrastructure will be discouraged in these areas.

The Comprehensive Plan also indicates the importance of:

- Encouraging development to protect the natural features of the site
- Promoting the protection of the County's groundwater resources
- Promoting the preservation of the County's wetlands
- Encouraging development proposals to provide setbacks from rivers and creeks
- Promoting adequate stormwater management facilities to serve the County
- Promoting practices that minimize the likelihood of flood damage within the County
- Preserve corridors along rivers and streams for future flood control projects
- Considering input from the MRBC when reviewing development proposals

City of Decatur

Adopted in August of 2010, "The City of Decatur's Comprehensive Plan provides a set of goal driven strategies and objectives that will promote the health, safety, and welfare of our citizens." As a part of the planning effort, drainage, topography, soils, floodplains, and wetlands were noted as important characteristics that should be considered for protection. Within the section discussing the Riverfront Redevelopment District, it is highlighted that the Riverfront Master Plan and Flood Overlay District should be utilized to prevent and possibly eliminate environmentally inappropriate uses along river banks.

More information can be obtained from the following websites:

- Adams County Building and Planning Department
- City of Decatur
- City of Berne

Allen County / City of Ft. Wayne

In January of 2007, a draft of the Allen County/City of Fort Wayne Comprehensive Plan was completed. Within this plan, detailed information can be found regarding projections for population growth and the needed development to serve the increased population in the categories of residential, commercial, and industrial land uses. It is estimated that with these projections additional acreage needed is 22,500 acres (12,108 residential acres; 8,000 commercial acres; and 2,400 industrial acres). Further, the development area is expected to occur within the Interstate 469 "loop" primarily to the south and west of the City of Ft. Wayne. It is also anticipated that development will create connections between the City of Ft. Wayne, the

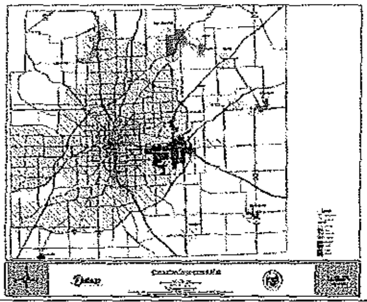

Figure 2-1 Conceptual Development Plan, Allen County/Fort Wayne

Town of Huntertown, and the Town of Leo-Cedarville. **Figure 2-1** identifies the conceptual development plan for Allen County and the City of Fort Wayne.

Land use and the protection of natural features are presented in the Comprehensive Plan and include such recommendations as:

- Encourage development that is sensitive to natural areas such as parks, wetlands, and floodways.
- Identify and implement additional floodplain and watershed management tools.
- Inform and educate the public about conserving natural features and preserving sensitive areas.
- Collaborate with non-governmental organizations (NGOs) to acquire and/or protect natural and sensitive areas.

More information regarding the Allen County/City of Ft. Wayne Comprehensive Plan can be found by visiting the Allen County Comprehensive Plan Webpage. Additional information is available at the Allen County and City of Fort Wayne's Department of Planning Services.

City of New Haven

According to the 2002 City of New Haven Comprehensive Land Use and Strategic Economic Plan, "...it is recommended that the flood plain areas, which are not optimum building sites as determined by FEMA (Federal Emergency Management Agency), be left as open space networks throughout the community". A further recommendation is to "adopt zoning regulations to reserve floodplain as open space, especially where it is located within proposed residential subdivisions. This may be done through open space requirements and enhancement that the developer can most easily meet by preserving this open space within the floodplain".

City of New Haven

Town of Leo-Cedarville

Town of Leo-Cedarville

DeKalb County

It is anticipated that future growth rates regarding both population and development will continue current trends and increase steadily over the years, especially as the City of Ft. Wayne and Allen County continue to expand and develop. DeKalb County has stated that they intend to manage growth in order to maintain the small town atmosphere and rural character of the county. Further, development will be encouraged in and around cities and towns to avoid the expense of extending public services and infrastructure.

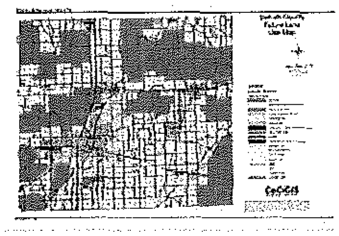

Figure 2-2 DeKalb County Future Land Use Map

With this plan in mind, **Figure 2-2** indicates residential land use is expected to increase within the 2 mile perimeter of Auburn, Garrett, and Waterloo creating a larger, connected urban area. The perimeter of Butler, Hamilton, Altona, Spencerville and St. Joe are also anticipated to show an increase in residential development.

Chapter 5, Protecting Environmental Assets, of the DeKalb County Comprehensive Plan includes the following objectives:

- Protect the quality and quantity of the County's aquifers, streams, and rivers
- Discourage development within floodplains, wetlands, and riparian corridors
- Reduce damage to life and property from flood and other natural hazards by not allowing loss of storage within the floodplain and not allowing development to occur within the floodway.

City of Auburn

While the City's most current Comprehensive Plan is dated 1987, there are considerations for needed attention to natural areas and the benefits provided. These include:

- Rezoning and proposed developments must be compatible with existing and planned land uses.
- A proposed development should maintain the integrity of the area to be developed in terms of drainage, topography, and vegetation.

Recent additions to the Comprehensive Plan include a Pedestrian Walkways and Recreational Trailways Plan (2009) developing an overall plan to provide recreational opportunities throughout the City. In addition a Downtown Revitalization Plan (2011) focuses on the downtown districts of Auburn and the opportunities to connect residents and businesses to stimulate economic growth.

City of Butler

The 2001 Comprehensive Plan denotes the importance of land use planning to ensure a rural atmosphere while providing ample open space and natural land uses within the community.

More information can be obtained from the following websites:

- DeKalb Plan Commission
- Auburn Building, Planning, and Development
- Butler Community Development, Planning, and Zoning
- Garrett Codes and Services

Noble County

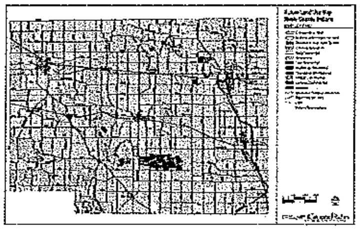

Figure 2-3 Future Land Use Map, Noble County, Indiana

Projecting needs and determining the location of future land uses is one of the purposes of the Noble County Comprehensive Plan developed in 2006. Similar to the other Comprehensive Plans previously discussed, the intent is to focus future growth and development to the 2 mile radius of the towns and cities in Noble County (**Figure 2-3**). While very little of Noble County lies within the Maumee River Basin, it can be anticipated that growth within Kendallville and the areas southward toward Avilla will have an impact on the Maumee River and tributary streams.

Within the Comprehensive Plan it is noted that nearly 83% of respondents to the Community Values Survey believe that the natural and environmental features should be protected. With this in mind, the Plan states that this means minimizing development practices that encroach into or destroy these areas. Areas such as surface water protection areas and floodplains have been identified on the future land use map. View the Noble County Comprehensive Plan.

Steuben County

As team members in Steuben County Government, the Plan Commission plays a key role in creating and communicating the vision of the County and acts as the primary coordinating agency in the development, adoption, and implementation of the County's plans and policies relating to development and use of the land.

The Steuben County Plan Commission is responsible for the Steuben County Comprehensive Plan, and its implementation through the County Zoning Ordinance, the Subdivision Control Ordinance, and various policies and practices. Guided by the Comprehensive Plan, the Plan Commission controls the type, location, and timing of development in unincorporated Steuben County.

According to the Plan Director, the Comprehensive Plan contains an objective to reduce conflicts between growth and the environment. It also suggests implementing regulations for development in floodplains and on steep slopes. The document also provides a background section on the importance of floodplain management to minimize economic loss. For more specific information regarding the Steuben County Comprehensive Plan, please contact the Steuben County Plan Commission.

Clear Lake

The Town of Clear Lake within Steuben County and the Maumee River Basin completed their Comprehensive Plan in 2006 and updates were completed in the 2013 Update to the Comprehensive Plan. Within this plan, objectives such as assisting with the preservation of natural areas around Clear Lake; protect sensitive areas such as wetlands, streams, and riparian corridors, and to preserve the high quality of water feeding the lake by minimizing negative impacts to the lake and feeder streams by development.

More information regarding the Town of Clear Lake and their Comprehensive Plan can be located at Town of Clear Lake's website.

Wells County

The Wells County Comprehensive Plan, adopted in 2014, encourages several floodplain mitigation measures over the course of the next ten years. These include utilizing flood prone areas for recreational uses that are not negatively impacted by flood waters, increased participation in the NFIP, updating floodplain maps, discouraging development in the mapped floodplains, and promoting conservation and open spaces' uses such as parks and trails in the floodplain.

2.3 FLOODING

Stakeholders in the Maumee River basin have expressed great concern about flooding of homes, businesses, roads, and critical infrastructure. Historic climate and disaster data shows a strong prevalence of high water events, carrying with them the ability to wash out valuable in-stream habitat and streambanks, increase pollutant loadings to receiving waterbodies, and associated destruction of aquatic communities. Debris from infrastructure and buildings damaged by flood events, oils, grease, and toxins from submerged vehicles and septic systems, and common chemicals and solvents that are present in nearly every home and can all become mobile when flooding occurs. These mobilized pollutants can exacerbate property damages while also reducing water quality in the area.

Residents of the Maumee River basin have suffered from floods of the St. Marys, St. Joseph, and Maumee Rivers since the area has been inhabited. Flooding in the basin may occur as a result of rapid spring thaws or significant accumulations of snow, heavy rainfall, or river blockage from ice jams, or combinations of these factors. Floods in the Maumee River are intensified when the St. Joseph and St. Marys rivers reach peak flow at the same time. Some of the most recent and damaging floods are highlighted below. Much of the information was obtained from the National Climatic Data Center (NCDC).

2.3.1 Recent Flood Events

January 1993 Flood

Figure 2-4 Flooding in Low Lying Areas

As recorded by the NCDC, extensive flooding, such as in **Figure 2-4**, occurred along several rivers in northern Indiana including the St. Joseph, and also around many lakes. Approximately 1,400 homes were affected. Snow cover of 3 – 5 inches melted quickly in late December and was followed by 2 – 3 inches of rain. An additional 1.5 – 2.5 inches of rain fell as the floodwaters began to subside. Floodwaters along the St. Joseph River reached their highest level since the flooding events that occurred in 1985. Steuben County was one of the hardest hit areas in the region. NCDC reported damages were $5.0 million over 9 counties.

June 2002 Flood

In Ft. Wayne, flash flooding resulting from 4-6 inches of rain in 3 hours and some reports of 8+ inches in 3 hours resulted over 200 people were evacuated from homes and approximately 500 homes received flood damage;15 homes were condemned. Three businesses sustained major damage and a local car dealership reported damage beyond repair to 95 vehicles. Total property damage was reported by NCDC to be $5.0 million.

July 2003 Flood

Adams and Allen counties were severely affected by flooding as a result of the 8 – 15 inches of rainfall in early July. Emergency Management reported damage to over 200 homes and 10 businesses along with numerous public facilities along the St. Marys River in Decatur and Ft. Wayne. Later in July, over 4 inches of rain fell in the Spy Run Creek basin in 2-3 hours. Sandbagging efforts by local volunteers and National Guardsmen were prevalent throughout the basin to protect properties from flood damages. While no specific monetary damages were reported in regard to crop losses and damages, reports in The Journal Gazette on July 9, 2003 described "...corn plants that traditionally are knee high by this time of year are partly or fully submerged. The situation is worse for soybeans..." Within the City of Ft Wayne, the neighborhood of Lakeside along the Maumee River credited 20 years and $91 million worth of efforts to construct a 10-mile network of levees and dikes for being saved from flood damages. In other areas of Ft Wayne and Allen County, the Health Department offered free well water testing for residents whose wells were submerged during the flooding. As reported by the NCDC, property damages were estimated to be $16.5 million within Adams, Allen, and Wells Counties.

January 2005 Flood

Early January rain mixed with significant snow melt led to prolonged flooding throughout the Maumee River Basin and the St. Marys River threatened many areas within Decatur and Ft Wayne. The initial flood warnings expired and flood waters began to recede by January 9th but as additional rain was forecasted, sandbagging efforts continued and property owners and response agencies remained on alert. Residents along Junk Ditch, Spy Run, St. Marys River, and the Maumee River sought emergency shelter, moved possessions to higher levels, and utilized sandbags and pumps as flood water rose quickly, up 1.3 feet in 6 hours as reported in The Journal Gazette. The St. Marys River in Ft Wayne crested Friday, January 11th at just over 19 feet, less than the expected 21.4 feet which would have exceeded the record set in July of 2003 (21.2 feet). As a result of the event, several families had to leave their homes, over 80,000 sandbags were utilized, 1,000 truckloads of clay were used to construct emergency levees, and approximately 1,000 volunteers assisted with flood protection efforts. Final property damage estimates were not provided for this event.

Winter 2008 Flood

Figure 2-5 Winter Flooding

This event occurred in January and February of 2008. Winter flooding (**Figure 2-5**) throughout 21 counties in Indiana resulted in more than $10 million in disaster grants and loans following a Presidential disaster declaration. Within the Maumee River basin applications for assistance were made by 80 Allen County residents, 12 within DeKalb County, 19 within Noble County. Damages were less than those reported as a result of the 2003 flood and it was reportedly due to the number of homes in high risk areas that were bought out through grant and loan programs as well as increases in technology which provides a greater warning time and more efficient information transfer. As reported in the Journal Gazette, within the City of Decatur the St. Marys River reached 23.5 feet on February 8th and was expected to crest at 24.5 feet the following day. Flood stage is reported to be 17 feet. Final damage estimates are not yet available.

Latest Flood Events

The most recent flooding within the Maumee River Basin includes the following events:

- Record flooding along Cedar Creek in March 2009
- Flash flooding in Fort Wayne in June 2011
- Flash flooding in Fort Wayne along Fairfield and Bullerman Ditches on May 31, 2013

Within Allen County, the City of Ft. Wayne, and throughout the Maumee River basin, numerous other flood and flash flood events have been reported to the NCDC. However, no associated monetary property or crop damages were provided. Brief damage descriptions included information such as various street closures and sandbagging efforts.

As population and development continues to increase throughout the Maumee River basin, it is anticipated that flood damages will increase. However, protective measures such as flood insurance studies, floodplain ordinances, and the MRBC buyout and floodproofing programs help to greatly reduce property damages associated with flood events. These programs will be discussed in greater detail in future sections of this plan.

2.3.2 Flood Insurance

Information gathered regarding flood insurance premiums and claims since 1978 indicates that Allen County, and more specifically the City of Fort Wayne, has received the largest amount of claims disbursements with nearly $8.9 million for 1,262 claims. Following Fort Wayne is the remainder of Allen County with 146 claims since 1978 and payouts reaching $1.0 million. **Table 2-3** shows the total amount of premiums, number of policies, claims, and payments for Adams, Allen, DeKalb, Noble, Steuben, and Wells Counties and individual NFIP communities. No information is provided for NFIP communities with no flood insurance premiums or claims.

Table 2-3 Flood Insurance Premiums, Policies, Claims, and Disbursements in Maumee River Basin

	Premiums	Policies	Claims since 1978	Total Payments
Adams County	$48,000	59	15	$118,000
Berne	$567	1	6	$201,000
Decatur	$48,000	66	74	$929,000
Allen County	$175,000	265	155	$1.1 million
Ft Wayne	$851,000	981	1320	$10.3 million
Huntertown	$659	2	0	$0
Leo-Cedarville	$1,600	4	0	$0
Monroeville	$10,400	8	0	$0
New Haven	$31,000	31	17	$57.1K
DeKalb County	$23,000	29	14	$243,000
Auburn	$50,000	47	50	$1.3 million
Butler	$2,100	3	0	$0
Garrett	$391	1	1	$0
Waterloo	$2,300	2	3	$55,000
Noble County	$139,000	223	158	$1.5 million
Steuben County	$190,000	251	52	$205,000
Hamilton	$5,200	6	3	$8,200
Wells County	$14,000	21	6	$104,000

FEMA, 2013

2.3.3 National Flood Insurance Program (NFIP)

U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the Nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs and to actuarially rate new construction for flood insurance.

The three basic components of the program are identifying and mapping flood-prone communities, adoption and enforcement of floodplain management regulations, and the provision of flood insurance.

NFIP Communities within the Maumee River Basin include:

Adams County

- City of Berne
- City of Decatur
- Town of Monroe

Allen County

- City of Ft. Wayne
- Town of Grabill
- Town of Huntertown
- Town of Leo-Cedarville
- Town of Monroeville
- City of New Haven
- City of Woodburn

Wells County

- Wells County

DeKalb County

- City of Auburn
- City of Butler
- City of Garrett
- Town of St. Joe
- Town of Waterloo

Noble County

- Town of Avilla
- Noble County

Steuben County

- Town of Clear Lake
- Town of Hamilton

View details about the National Flood Insurance Program.

2.4 COMMUNITY RATING SYSTEM (CRS)

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood losses;
2. Facilitate accurate insurance rating; and
3. Promote the awareness of flood insurance.

For CRS-participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount; while a Class 9 community would receive a 5% discount (a Class 10 community is not participating in the CRS and receives no discount). The CRS classes for local communities are based on 18 creditable activities, organized under four categories:

1. Public Information,
2. Mapping and Regulations,
3. Flood Damage Reduction, and
4. Flood Preparedness.

Within the Maumee River Basin, Allen County, the City of Decatur and the City of Ft. Wayne are currently at a Class 8 which allows for a 10% discount on flood insurance premium rates.

2.5 FLOODPLAIN MANAGEMENT ORDINANCES

Flood Hazard Areas ordinances have been adopted by all NFIP communities as part of the NFIP. Optional provisions are included in the Indiana Model Ordinance for Flood Hazard Areas. The most noteworthy optional provision requires that when any portion of the Special Flood Hazard Area (SFHA) is authorized for use, the volume of space that will be occupied by the authorized fill or structure below the Base Flood Elevation (BFE) shall be compensated for and balanced by an equivalent volume of excavation taken below the BFE. The excavation volume must be equal to the volume of storage lost (or a replacement ratio of 1 to 1) due to the fill or structure. In 1995, the MRBC Flood Control Master Plan recommended adoption of compensatory storage provisions by all communities in the Maumee River Basin.

This additional language has been adopted by:

Adams County
- City of Berne
- City of Decatur
- Town of Monroe

Allen County
- City of Ft. Wayne
- Town of Grabill
- Town of Huntertown
- Town of Leo-Cedarville
- Town of Monroeville
- City of New Haven
- City of Woodburn

DeKalb County
- City of Auburn
- City of Butler
- City of Garrett
- Town of St. Joe
- Town of Waterloo

Noble County
- Noble County

Steuben County
- Town of Clear Lake
- Town of Hamilton

With the optional language added, these ordinances are an effective tool to control development activity within outlined floodplains by prohibiting development unless it has been deemed a permitted use, such as agriculture, parks or roadways, or the proposed development is considered a special use, such as a public well, golf course, or sewage treatment plant. These ordinances would require measures to be taken to prevent increased damages by outlining that no development activities within the flood hazard area may increase the flood depth or flow velocity.

2.6 DISASTER MITIGATION ACT OF 2000 (DMA 2000)

Development of a Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). According to DMA 2000, the purpose of mitigation planning is for state, local, and Indian tribal governments to identify natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

In order for National Flood Insurance Program (NFIP) communities to be eligible for future mitigation funds, they must adopt either their own MHMP or participate in development of a multi-jurisdictional MHMP. The Indiana Department of Homeland Security (IDHS) and the Federal Emergency Management Agency (FEMA) Region V offices administer the MHMP program in Indiana.

Development of MHMPs is the necessary first step of a multi-step process to implement programs, policies, and projects to mitigate the effect of hazards in Counties and NFIP communities. The intent of these planning efforts is to identify hazards such as flooding and dam failure, and the extent that they affect specific areas, and to formulate mitigation strategies or projects that could be undertaken to mitigate for these hazards. Although MHMPs may meet the requirements of DMA 2000 and eligibility requirements of the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM-c) Grant, as well as other FEMA programs including the NFIP Community Ratings System (CRS), additional detailed studies will need to be completed prior to applying for these grants or programs.

Funding to prepare MHMPs for the Counties and NFIP communities within the Maumee River Basin was made available through PDM-c grants awarded to the respective County Commissioners by FEMA. The required 25% local match contribution was provided by MRBC in the form of grants awarded to the County Commissioners.

The following is a listing of participating counties and communities within the Maumee River Basin with approved MHMPs:

Adams County (EMA)
- City of Berne
- City of Decatur
- Town of Monroe

Allen County (Homeland Security)
- City of Ft. Wayne
- Town of Grabill
- Town of Huntertown
- Town of Leo-Cedarville
- Town of Monroeville
- City of New Haven
- City of Woodburn

DeKalb County (Homeland Security)
- City of Auburn
- City of Butler
- City of Garrett
- Town of St. Joe
- Town of Waterloo

Noble County (EMA)
- Noble County

Steuben County (EMA)
- Town of Clear Lake
- Town of Hamilton

Wells County (EMA)

2.7 WATER QUALITY

The Clean Water Act (CWA) enacted in 1972 required states to address severe water quality issues caused by sources such as industry, wastewater treatment plants, and commercial facilities. In the 1980s, the CWA was amended to add other sources such as nutrients from fertilizers and manure runoff, failing septic systems, and sedimentation. The CWA requires states to identity waters not meeting established water quality standards, not able to support aquatic biota, and not supporting recreation or drinking water sources. The following sections of this chapter describe programs designed to identify those waters, reduce pollutant loadings, and improve impaired waters to meet requirements.

2.8 USACE WESTERN LAKE ERIE BASIN STUDY

The United States Army Corps of Engineers (USACE) led the multi-purpose/multi-objective evaluation of the western Lake Erie Basin watersheds for 3 reasons; to integrate existing projects, plans, and studies; to assess program progress; and to plan future lake and watershed revitalization programs and projects from various federal, state, local, and non-governmental organizations. The result is a Western Lake Erie Basin and Watershed Framework to provide agencies, watershed groups, and other stakeholders with a tool to facilitate the restoration, protection, and sustainable use of the water and related natural resources within the area.

Individual watershed descriptions and assessments can be viewed on the Western Lake Erie Basin Partnership website.

2.9 STATEWIDE STUDIES

2.9.1 Indiana Integrated Water Quality Report

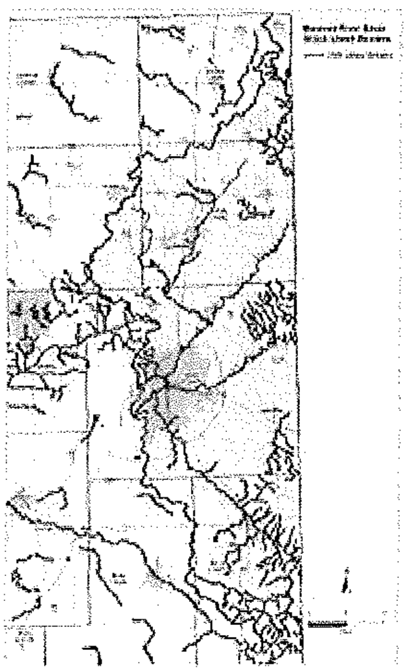

Figure 2-6 303(d) Listed Streams in the Maumee River Basin

The Indiana Department of Environmental Management (IDEM) is the primary agency involved in surface water quality monitoring and assessment in the State of Indiana. In conjunction with the requirements of the Clean Water Act (CWA) and the State's goals for protecting its natural and recreational resources, IDEM operates several monitoring programs designed to monitor and assess the chemical, physical, and biological conditions of Indiana's rivers, streams, and lakes.

IDEM's Office of Water Quality's surface water quality basin strategy is designed to describe the overall environmental quality of each major river basin in the state and to identify monitored water bodies that do not fully support designated uses. IDEM's surface water monitoring was revised in 2001 to meet the goals of assessing all waters of the state within five years.

The 305(b) report provides a compilation and summary of all of the IDEM's water quality monitoring and assessment data (compiled from Assessment Information Management System (AIMS) database and other datasets and reports within the IDEM). Each subwatershed is given a water quality rating relative to its streams status in meeting Indiana's Water Quality Standards (WQS). WQS are set at levels necessary for protecting a waterway's designated use(s), such as swimmable, fishable, or drinkable. Each subwatershed is given a rating of fully, partially, or not supportive of its designated uses.

Chapter 303(d) of the CWA requires states to identify waters that do not or are not expected to meet applicable water quality standards with technology based standards alone (**Figure 2-6**). States are also required to develop a priority ranking for these waters, taking into account the severity of the pollution and the designated use of the waters. Once this listing and ranking of waters is completed, States are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve water quality standards. In an attempt to ensure greater consistencies between the 305(b) report and 303(d) list, the two reports are now submitted together as an integrated report to U.S. EPA every two years.

The streams and tributaries within the Maumee River Basin have been listed for various impairments. The primary impairments are *E. coli*, nutrients, impaired biotic communities, and algae as well as fish consumption advisories (FCA) for Polychlorinated Biphenyls (PCBs) and mercury. For specific impairments on individual stream segments, please visit IDEM's webpage.

2.9.2 Fish Consumption Advisory (FCA)

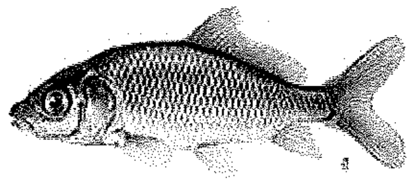

Figure 2-7 Common Carp (Cyprinus carpio)

The FCA is based on levels of Polychlorinated Biphenyls (PCBs) and mercury found in fish tissue. In each area, samples were taken of bottom-feeding fish, top-feeding fish, and fish feeding in between. Fish tissue samples were analyzed for PCBs, pesticides, and heavy metals. Of those samples, the majority contained some level of mercury. However, not all fish tissue samples had mercury at the levels considered harmful to human health. If the samples resulted in higher than normal levels of mercury, those waterbody segments were listed in the fish consumption advisory. There is a statewide FCA for carp (**Figure 2-7**) in all Indiana streams, the Indiana portion of Lake Michigan, and inland lakes due to the bioaccumulation tendencies of PCBs.

Groups refer to the frequency of meals of the associated species that may be safely consumed per week or per month; Group 1: unlimited meals; Group 2: 1 meal per week; Group 3: 1 meal per month; Group 4: 1 meal per 2 months; and Group 5: DO NOT EAT. There are no waterways within the Maumee River Basin (Indiana portion) that are considered to be a Group 5 category. View county-specific FCA information such as location, species, size, contaminant, and group.

2.9.3 Total Maximum Daily Loads (TMDL)

A TMDL is a tool for implementing water quality standards and is based on the relationship between pollutant sources and in-stream water quality conditions. The TMDL establishes the allowable loadings or other quantifiable parameters for a water body and thereby provides the basis to establish water quality-based controls. These controls should provide the pollutant reduction necessary for a water body to meet water quality standards.
The TMDL process provides a flexible assessment and planning framework for identifying load reductions or other actions needed to attain water quality standards (i.e. water quality goals to protect aquatic life, drinking water, and other water uses). The process has three steps:

1. Identify Quality Limited Waters - States must identify and prepare a list of waters that do not or are not expected to meet water quality standards after applying existing required controls (e.g. minimum sewage treatment technology).
2. Establish Priority Waters/Watersheds - States must prioritize waters/watersheds and target high priority waters/watersheds for TMDL development.
3. Develop TMDLs - For listed waters, states must develop TMDLs that will achieve water quality standards, allowing for seasonal variations and an appropriate margin of safety. A TMDL is a quantitative assessment of water quality problems, contributing sources, and load

reductions or control actions needed to restore and protect individual water bodies.

States are responsible for implementing the TMDL process. EPA reviews and approves lists of quality-limited waters and specific TMDLs. If EPA disapproves lists or TMDLs, EPA is required to establish the lists and/or TMDLs. Landowners, other agencies, and other stakeholders can often assist states or EPA in developing TMDLs for specific watersheds.

To date, the only TMDL that has been completed within the Maumee River basin is for *E. coli*, IBC, ammonia, and nutrients within the St. Marys River and Maumee River watershed in Adams and Allen Counties. More information related to development of TMDLs and access to completed TMDLs can be found at the TMDL page of The Indiana Department of Environmental Management.

2.10 LOCAL WATERSHED PLANS

2.10.1 IDEM 319 Watershed Management Plans (WMPs)

According to the Indiana Department of Environmental Management's (IDEM) watershed planning guidance – the Indiana Watershed Planning Guide – "Watershed planning connects the community's decision-making to sensible data collection and defensible analysis. Recording those decisions in a watershed plan increases the probability that the problems will be addressed." The top ten reasons for developing a WMP are:

- To be able to use grant funds to leverage existing programs
- To provide the partners with a tangible success story
- To make it easier to obtain grant funds
- To empower the local community to create change
- To enable the community to get additional agency support
- To provide a way to track progress with measurable results
- To help the project grow bigger and last longer
- To inform the community, and market the project to new partners
- To record the group's decisions
- To improve the quality of life for people in the watershed by helping ensure clean water and healthy natural resources

2.10.2 St. Joseph River Watershed Initiative (SJRWI)

According to the February 2006 St. Joseph River WMP, there are nine 11-digit Hydrologic Unit Code (HUC-11) areas that complete the larger 8-digit HUC (HUC-8) in the St. Joseph River watershed (**Figure 2-8**). The vision for the SJRWI includes key points with respect to water quality and quantity.

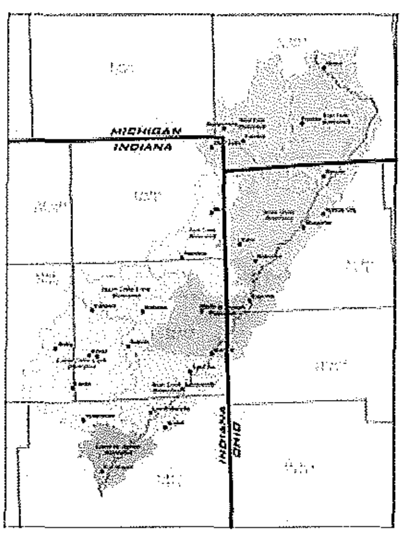

Figure 2-8 Map of Areas in the St. Joseph River Watershed Initiative

- Full body recreational contact is supported year round.
- Fish consumption advisories are eliminated.
- Maintain economic viability with full consideration to environment
- Increases in bio-diversity, recreational activities, and aesthetics.
- Economic and ecologic drainage maintenance and improvement for agriculture, development, and flood control.

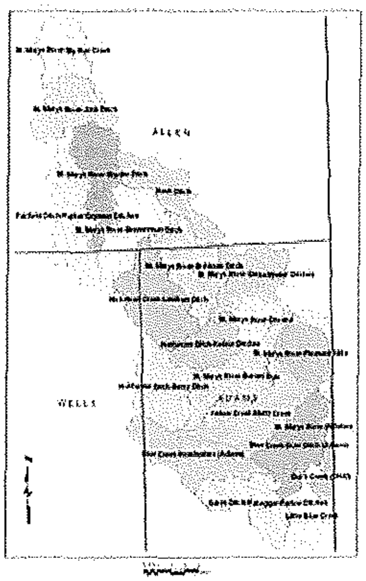

Figure 2-9 Areas in St. Marys River Watershed Project

As outlined in the original WMP, efforts have been taken to complete individual WMPs for Upper and Lower Cedar Creek, Lower St. Joseph River, and Bear Creek (IN). Also, The Nature Conservancy's Upper St. Joseph River Project has focused on the Fish Creek watershed for several years.

2.10.3 <u>St. Marys River (IN) Watershed Project</u>

The primary basis for the project is to complete a WMP for the Indiana portion (Adams, Allen, and Wells Counties) of the St. Marys River watershed (**Figure 2-9**). Through public meetings and with the assistance of the Steering Committee the major pollutants have been identified as sediment, nutrients, and bacteria. Other tasks to be completed through this project include:

- Development of a GIS based natural resource inventory
- Water quality monitoring
- Development and implementation of a cost share program
- Development of an education and outreach program

2.10.4 <u>Upper Maumee Watershed Partnership</u>

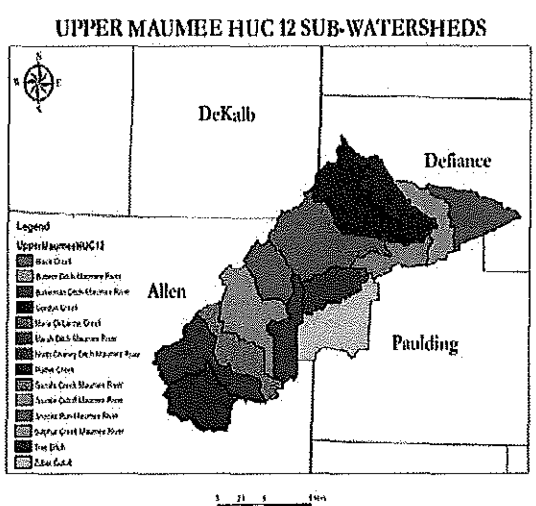

Figure 2-10 Upper Maumee River Watershed

The local partnership works to improve water quality throughout the Upper Maumee River Watershed (**Figure 2-10**) and eventually to the Western Lake Erie Basin. The focus will continue to be development of watershed management plans, implementation of best management practices, and continued outreach and education for the watershed's residents. The primary issues include:

- Flooding and Associated Drainage
- Degraded Water Quality/Maintaining Water Supply
- Soil Erosion and Sedimentation
- Limited Recreational Use
- Degraded Wildlife & Fish Habitat
- Commercial/Recreation Navigation
- Point & Non-Point Source Pollution

2.10.5 **DNR Lake and River Enhancement (LARE)**

The goal of the Division of Fish and Wildlife's Lake and River Enhancement Section is to protect and enhance aquatic habitat for fish and wildlife, to insure the continued viability of Indiana's publicly accessible lakes and streams for multiple uses, including recreational opportunities. This is accomplished through measures that reduce non-point sediment and nutrient pollution of surface waters to a level that meets or surpasses state water quality standards.

To accomplish this goal, the LARE Program provides technical and financial assistance for qualifying projects. Approved grant funding may be used for one or more of the following purposes:

1. Investigations to determine what problems are affecting a lake/lakes or a stream segment.
2. Evaluation of identified problems and effective action recommendations to resolve those problems.
3. Cost-sharing with land users in a watershed above upstream from a project lake or stream for installation or application of sediment and nutrient reducing practices on their land.
4. Matching federal funds for qualifying projects.
5. Watershed management plan development.
6. Feasibility studies to define appropriate lake and stream remediation measures.
7. Engineering designs and construction of remedial measures.
8. Water quality monitoring of public lakes.
9. Management of invasive aquatic vegetation.
10. Sediment removal from qualifying lakes.
11. Stream obstruction removal.

For more information on the LARE program and to view individual reports for waterbodies within the Maumee River Basin, please visit IDNR's Lake & River Enhancement Program web page.

2.11 REGULATORY PROGRAMS

2.11.1 **Stormwater Permitting**

The emphasis of Indiana Department of Environmental Management (IDEM) stormwater permits is water quality. Water quantity, while an integral part of storm water, is typically regulated through ordinances developed and implemented by local governmental entities. Following are three storm water permitting programs that are administered by IDEM and related information associated with urbanization and land development.

- Construction/Land Disturbance Storm Water Permitting (327 IAC 15-5, Rule 5) IDEM administers a General Permit program that targets construction activities that result in land disturbance of one acre or more. These permits are applicable to a variety of projects including, but not limited, to residential, commercial, institutional, industrial, public, and special land uses.

  327 IAC 15-5 is a performance-based regulation designed to reduce pollutants, principally sediment, that are a result of soil erosion and other activities associated with construction and/or land disturbing activities.

- Industrial Storm Water Permitting (327 IAC 15-6, Rule 6) IDEM administers a general permit program that targets storm water runoff associated with industrial activities. Requirements of this rule apply to specific categorical industrial facilities, which are exposed to storm water and have a point source discharge of storm water from the industrial activities. Facility managers are required to submit a Notice of Intent and implement a storm water pollution prevention plan to address the discharge of pollutants associated with storm water runoff from their facility.

- Municipal Separate Storm Sewer Systems (327 IAC 15-13, Rule 13) Under Phase II, Rule 13 was written to regulate most MS4 entities (cities, towns, universities, colleges, correctional facilities, hospitals, conservancy districts, homeowner's associations and military bases) located within mapped urbanized areas, as delineated by the U.S. Census Bureau, or, for those MS4 areas outside of urbanized areas, serving an urban population greater than 7,000 people. In addition to these generalized criteria, designation of MS4 entities is potentially determined by other factors, including population growth and documentation which indicates water quality impairment. **Table 2-4** shows those communities regulated under the MS4 program within the Maumee River basin as well as the MS4 Operator name, address, and Rule 13 permit number as found on IDEM's website.

Table 2-4 MS4 Communities within the Maumee River Basin

Entity Name	MS4 Operator Title	MS4 Operator Address	Rule 13 Permit Number
Allen County, Towns of Huntertown, Leo-Cedarville, Grabill, and Monroeville	Board of County Commissioners President	1 East Main Street, Rm 200 Fort Wayne, IN 46802	INR040131
City of Auburn	Superintendent	2010 South Wayne Street Auburn, IN 46706	INR040119
City of Decatur	Mayor	City Hall 225 West Monroe Street Decatur, IN 46733-1606	INR040055
City of Fort Wayne, IU/PU-Fort Wayne, Ivy Tech State College-Northeast, Indiana Institute of Technology, University of Saint Francis	Board of Public Works and Utilities Director	480 City-County Building One Main Street Fort Wayne, IN 46802	INR040029
City of New Haven	Superintendent of Utilities	City Hall 815 Lincoln Highway East New Haven IN 46774	INR040063

IDEM, 2013

2.12 SUMMARY

Each watershed, small or large, has unique characteristics and problem sets partially determined by demographics, natural resources, and the interactions of the two. By being cognizant of the trends regarding population growth, land use change, development patterns, policy implementation, and water quality, decisions can be made that will promote organized development while allowing preservation of natural resources, protection of water quality, as well as mitigation of flood damages and risks. Policies and procedures such as ordinances, plan review, landowner assistance programs, and increased funding allocations are needed to manage water quality and quantity at the local level as well as basin-wide.

CHAPTER 3 SUMMARY OF MRBC PROGRAMS

This chapter provides an overview of the 11 MRBC-supported flood mitigation programs. Each section of this chapter (listed below) includes a description of the program, a discussion of the program's application in the Maumee River Basin, and recommendations for continued improvement.

3.1 FLOODPLAIN MANAGEMENT

3.1.1 Introduction

Floodplains and their associated streams, wetlands, and shoreline areas are among Indiana's greatest assets. They provide multiple benefits related to environmental quality, natural resource management, and recreational opportunity. Floodplains generally provide the most benefit when kept in a natural condition. Alterations to floodplains and natural streams have contributed to increased flood hazards, impaired water quality, loss of habitat and recreational opportunities, and poor aesthetics. Therefore, floodplains and their associated water bodies should be restored and preserved, where feasible. Floodplain management and watercourse protection ordinances are two methods that communities have used successfully throughout the United States.

Participants in the National Flood Insurance Program (NFIP) are required to adopt and enforce a floodplain management ordinance that meets or exceeds the minimum NFIP standards. The Indiana Model Ordinance for Flood Hazard Areas meets the NFIP standards and also includes state regulations regarding development in Special Flood Hazard Areas, as well as optional, more restrictive provisions that individual communities may adopt. MRBC developed the **Model Ordinance for Flood Hazard Areas** (Appendix A) by modifying the Indiana model ordinance in 1995, with updates in 2008 and again with this 2014 master plan update.

The following 19 NFIP communities are located In the Maumee River Basin:

- Adams County
- DeKalb County
- Steuben County
- City of Auburn
- City of Butler
- City of Fort Wayne
- City of New Haven
- Town of Avilla
- Town of Huntertown
- Town of Monroeville
- Allen County
- Noble County
- Wells County
- City of Berne
- City of Decatur
- City of Garrett
- Town of Hamilton
- Town of Leo-Cedarville
- Town of Waterloo

In addition to floodplain management ordinances, watercourse protection ordinances have been used successfully throughout the United States for establishment, protection, and maintenance of vegetated buffers along natural watercourses. Vegetated buffers can provide numerous environmental protection and resource management benefits such as:

- reducing flooding impacts
- reducing velocity of floodwaters
- providing runoff infiltration areas and recharging the aquifers
- stabilizing streambanks
- reducing streambank erosion
- filtering pollutants from stormwater runoff
- providing tree canopy for wildlife habitat and shade to regulate stream temperatures benefitting aquatic species
- providing recreational opportunities
- preventing encroachment along stream banks
- allowing space for natural stream meandering

3.1.2 Application in Maumee River Basin

The MRBC model ordinance exceeds minimum NFIP requirements. It was developed by enhancing the IDNR model ordinance to provide additional definitions related to regulatory and technical terminology, and to clarify ordinance provisions regarding performance and administrative requirements. The model ordinance includes the requirement for compensatory storage. Compensatory storage is new storage within the floodplain to replace, on a one-to-one basis, natural floodplain storage that would be lost due to fill placed in the floodplain.

Compensatory storage was added based on recommendations from the Association of State Floodplain Managers (ASFPM). ASFPM has been a leading voice in floodplain management, flood hazard mitigation, flood preparedness, and flood warning and recovery since 1977. Today ASFPM is the premier voice in floodplain management practice and policy throughout the nation.

16 Maumee River Basin NFIP communities have adopted the MRBC model ordinance and three use a slightly modified version of the Indiana model ordinance. No Maumee River basin community has adopted a watercourse protection ordinance.

3.1.3 Recommendations

MRBC should:

1. Continue using ASFPM's "Building Public Support for Floodplain Management Guidebook" to increase awareness and support for better floodplain management.

2. Continue working with floodplain administrators from each NFIP community to adopt the current **Model Ordinance for Flood Hazard Areas** (Appendix A).

3. Request that Indiana Department of Natural Resources update the Indiana Model Ordinance for Flood Hazard Areas to add language requiring IDNR approval prior to local adoption.

4. Continue working with local floodplain administrators to monitor status and enforcement of floodplain management ordinances, with special focus on cumulative impacts and preventing adverse impacts from new development.

5. Develop a new Model Watercourse Protection Ordinance and distribute it to member communities. The intent of this ordinance will be to safeguard and preserve watercourses, protect lives and property, prevent damage from flooding, protect drainage facilities, control erosion and sedimentation, reduce channel resizing, and enhance recreation and beneficial uses of watercourses.

3.2 STORMWATER MANAGEMENT

3.2.1 Introduction

Phase II of the National Pollutant Discharge Elimination System (NPDES) permit program was published in the Federal Register in 1999. This program requires permit coverage for stormwater discharges from small municipal separate storm sewer systems (MS4s) and for construction activity that disturbs one acre or more of land. Currently, the following communities within the Maumee River Basin are required to meet the Phase II requirements:

- Allen County
- City of Auburn
- City of Decatur
- City of Fort Wayne
- City of New Haven
- Town of Huntertown
- Town of Leo Cedarville

The other counties and many more communities will likely be added in the near future as this regulatory program continues to expand.

3.2.2 Application in Maumee River Basin

Each county in the Maumee River basin has a Storm Drainage, Erosion, and Sediment Control Ordinance in place to regulate stormwater runoff to protect, conserve and promote the orderly development of the land and water resources. However, these ordinances are not all consistent and may need updating to enhance effectiveness and also to address water quality.

In 2008, Allen County, City of New Haven, Town of Huntertown, and Town of Leo Cedarville adopted **Model Stormwater Management Ordinance & Stormwater Technical Standards** (Appendix B), which was developed in 2008, and updated in 2011 and 2012). Fort Wayne adopted its own stormwater ordinance in 2007, design standards in 2012, and has drafted, but not yet adopted, green standards. Decatur's stormwater ordinance, adopted in 2006, references the Indiana Water Quality Manual for stormwater management practices. DeKalb County updated its Unified Development Ordinance and added stormwater management requirements to the zoning, subdivision control, and design standards in 2013. Auburn adopted its stormwater ordinance and technical standards in 2008.

In addition to improving water quality and protecting water resources, adopting stormwater ordinances and technical standards can bring communities additional benefits in the form of credits for FEMA's Community Rating System (CRS). The CRS program offers reduced flood insurance premiums for participating communities who complete activities including stormwater management regulations, master plans, erosion and sediment control regulations, and water quality regulations. Fort Wayne, Allen County, and Decatur currently participate in the CRS program and will continue to benefit from the model ordinance and technical standards.

3.2.3 Recommendations

MRBC should:

1. Continue encouraging communities within the Maumee River Basin to adopt the MRBC Model Stormwater Management Ordinance and Stormwater Technical Standards Manual (Appendix B).

2. Continue providing technical and financial assistance to communities that adopt the MRBC Model Stormwater Management Ordinance and Stormwater Technical Standards Manual (Appendix B).

3.3 FLOOD HAZARD MAPPING PROGRAM

3.3.1 Introduction

Congress created the National Flood Insurance Program (NFIP) in 1968 to offer flood insurance to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding.

Floodplains are shown as high-risk areas or Special Flood Hazard Areas (SFHAs) on Flood Insurance Rate Maps (FIRMs) that are approved by the Federal Emergency Management Agency (FEMA). To be effective for communities to practice sound floodplain management, these maps must provide accurate data regarding flood risks. To that end, MRBC has provided funding, data, and coordination to create new maps and improve the accuracy of existing FIRMs throughout the basin.

Flood depth grids have been recently used by FEMA to enhance flood risk map data presentation by graphically depicting the varying flood depths expected during the 1 percent annual chance and other flood events. A flood depth grid can help local officials and the community better understand, communicate and relay the variability and severity of flooding at any given location within the study area. This product is a valuable tool for local community officials to better understand the risks throughout a community and offers better communication of risk to residents and business owners. It is easier to communicate flood depths in feet rather than the flood elevation data provided in a Flood Insurance Study and Flood Insurance Rate Map (FIRM). For example, a FIRM may indicate a flood elevation of 752 feet above sea level, versus a flood depth grid that can show a flood event of that magnitude would result in a 3 foot flood depth. Using measurements that residents can relate to will allow community officials to more effectively discuss the risk of an area being flooded in a storm event.

Flood depth grids are an essential component of FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program. In 2010, the Risk MAP program was initiated with a vision "to deliver quality data that increases public awareness and leads to mitigation actions that reduce risk to life and property." To achieve this vision, FEMA is expanding its traditional flood hazard identification and mapping efforts to integrate risk assessment, risk communication, risk planning, and risk mitigation.

Fluvial erosion hazard (FEH) mapping is another tool that further expands hazard identification to show areas subject to erosion caused by the natural movement of streams. Stream movement is normal and beneficial along many of Indiana's streams. Predicting where streams will move is a primary goal of fluvial erosion hazard mapping. Community officials can use FEH mapping to avoid future hazards by protecting the erosion hazard areas. FEH mapping can also be used to identify risk to roads and bridges, and also buildings that may have been built close to stream banks.

3.3.2 Application in Maumee River Basin

MRBC has worked closely with the Indiana Department of Natural Resources (IDNR), FEMA, local officials and consultants to complete updated and new Flood Insurance Rate Maps for most rivers and major streams within the Maumee River basin. Several issues and opportunities remain, including the following:

- Approximately 31 miles of stream remain unstudied. Since flood risk has not been determined, county officials and developers could mistakenly assume no flood hazard exists and allow construction within flood prone areas. This could put new construction at risk and increase flood elevations due to filling natural flood storage areas. These areas are currently being studied and should be complete in 2015.

- Nearly 200 miles of stream were mapped using old approximate studies that do not include base flood elevations. IDNR's recent policy has been to show base flood elevations from new approximate studies on their website. This data is or will be made available for approximate studies completed since 2008. However, approximate studies completed earlier show only the estimated flood risk area with no elevations. Additionally, several miles of recent approximate studies are upstream of old approximate studies. This results in published "approximate" base flood elevations for only the recently-completed upstream reaches. There are also some streams with detailed studies of the downstream reach and old approximate studies upstream that did not extend to the one square mile cutoff. In those cases, the IDNR completed new approximate studies for the unstudied reach with no modification of the older approximate studies. This has resulted in streams with base flood elevations along the downstream reach, along the recently completed upstream reach, and nothing in the area between the detailed and new approximate studies. Flood elevations are important to help communities avoid flood risk and comply with NFIP requirements. These areas are currently being studied and should be complete in 2015.

- Some streams have detailed studies that were completed decades ago and may not reflect current conditions due to changes in topography, development, or inaccurate data.

- To date, flood depth grids have been completed in Fort Wayne as part of the most recent Multi-Hazard Mitigation Plan (MHMP). This should be considered in other developed and developing areas to assist with public awareness and outreach, and with hazard mitigation and emergency response planning.

- Fluvial erosion hazard mapping tools are currently being developed for use on Indiana rivers and streams. The tools will allow engineers to identify erosion risk areas and help MRBC plan and protect resources.

Table 3-1 shows current miles of stream by floodplain designation in each county.

Table 3-1 Miles of Stream by Floodplain Designation in Each County

County	Stream Reach Classification and Total Miles in Maumee River Basin *(greater than one square mile of drainage area)*				
	Detailed Study	*Old Approximate Floodplain*	*New Approximate Floodplain*	*Unstudied*	**TOTAL**
Adams	48	39	102	6	**195**
Allen	245	40	139	17	**441**
DeKalb	68	96	101	4	**269**
Noble	17	1	26	0	**44**
Steuben	1	10	44	1	**56**
Wells	0	2	0	3	**5**
TOTAL	**379**	**188**	**412**	**31**	**1,010**

3.3.1 Floodplain Study Prioritization

Stream reaches with no floodplain mapping, or with mapping based on old, outdated approximate studies need a new study. The outdated approximate studies do not include base flood elevations and were completed using old topographic data. Also, many detailed studies were completed decades ago and should be updated using the latest available data. The update can be done either by redelineating floodplain boundaries using current topographic information, or if base flood elevations and floodways are suspect, through new detailed studies. These reaches were assigned to categories shown in **Table 3-2** to prioritize and recommend appropriate action.

Table 3-2 Stream Reach Categories

Category*	Description
1	Unstudied, no floodplain mapping
2	Outdated approximate study (Zone A with no BFE) outside municipal boundary or expected growth area
3	Outdated approximate study (Zone A with no BFE) within a municipal boundary or expected growth area
4	Suspect floodplain and floodway delineations due to outdated methods or data

Table 3-3 shows reach lengths by category for each County.

Table 3-3 Stream Reach Lengths by Category for Each County

County	Total Miles of Stream in Each Category			
	1	*2*	*3*	*4*
Adams	6	13	26	tbd
Allen	17	23	17	tbd
DeKalb	4	92	4	tbd
Noble	0	1	0	tbd
Steuben	1	10	0	tbd
Wells	3	2	0	tbd
TOTAL	**31**	**141**	**47**	**tbd**

Categories 1- 3 are currently being studied and should be completed by mid-2015

3.3.2 Recommendations

MRBC should:

1. Continue pursuing cost-share funding through the Federal Emergency Management Agency (FEMA) Cooperating Technical Partner Program (administered by Indiana Department of Natural Resources, Division of Water) and local contributions to complete the restudy of stream reaches with suspect floodplain and floodway delineations.

2. Assist DeKalb County with acquisition of 2-foot contour interval mapping.

3. Identify appropriate stream reaches and pursue funding for, and partnership with the United States Geologic Survey (USGS) to complete flood depth grids.

4. Identify appropriate stream reaches and partner with Center for Earth & Environmental Science to complete fluvial erosion hazard mapping.

3.4 FLOOD WARNING SYSTEM AND RIVER GAGE PLACEMENT

3.4.1 Introduction

Gages measuring flow depth (stage) and discharge (volume) along a stream form the backbone of Flood Warning Systems. Stream gages provide historic and real-time data that the Ohio River Forecast Center and National Weather Service use to predict timing and height of flood crests. Emergency management agencies and communities can then use this information for mitigation and response planning efforts.

Flood warning information is also available directly to the public via the National Weather Services Advanced Hydrologic Prediction Services (AHPS) website. The Advanced Hydrologic Predictions Services (AHPS) is the National Weather Service's (NWS) frontline solution to provide improved river and flood forecasting and water information across America.

AHPS displays the predicted magnitude of floods (and droughts) when available, usually hours but sometimes days or weeks before the event. Flood forecast level and time of peak is illustrated with a hydrograph, as shown in **Figure 3-1**.

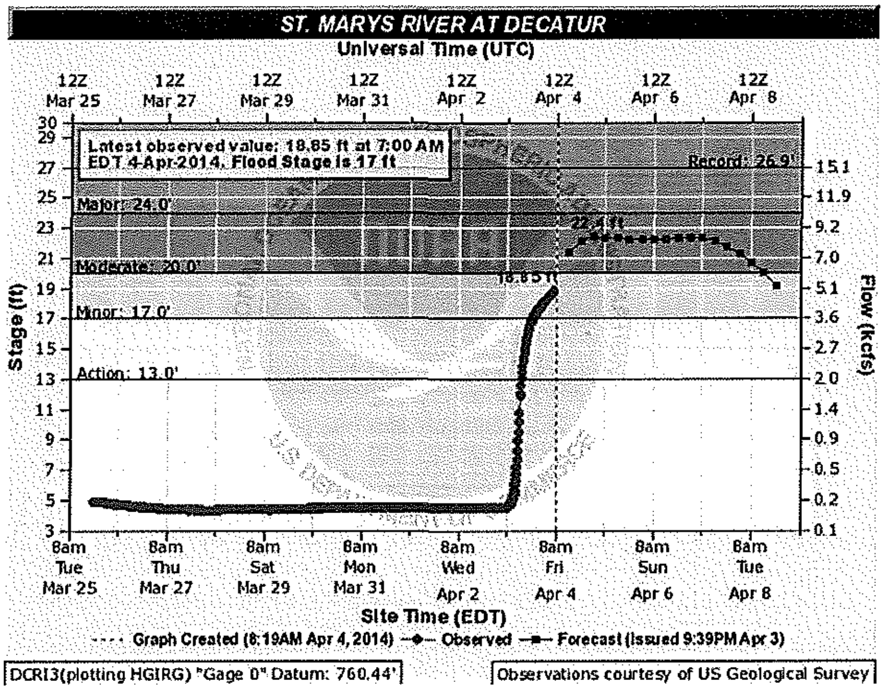

Figure 3-1 Flood Forecast Levels and Time of Peak

The U. S. Geological Survey (USGS) began developing flood inundation map libraries several years ago. This data is used with the AHPS flood forecasting system to show inundation areas at various flow depths at the stream gage. Inundation map libraries provide additional flood information that communities may use for mitigation and response planning efforts. Flood response managers and the media can also use the inundation maps to communicate an impending flood risk.

3.4.2 Application in Maumee River Basin

The network of rain, snow, and stream flow gages in the Maumee River Basin is a critical component of the flood warning system. The National Weather Service uses data from rainfall/snowfall gages to issue warnings for affected areas. A good coverage of rainfall gages also provides information on timing and distribution of rainfall. This data is used to calibrate hydrologic models of the watershed that are used to estimate runoff to predict future flood events. A complete stream gage network is also important to understand the relationship of rainfall to runoff and the timing and volume of stream flow.

The gage network can also provide water quality benefits with flow quantity data used to calculate pollutant loading. Water quality sampling near a gage allows calculation of the concentration of bacteria, pathogens, nutrients and sediment. This information is used to understand the impacts of land use changes and best management practices on water quality.

The following is a list of new gages in the Maumee River Basin:

- Maumee River – Columbia Street Bridge (12/11)
- St. Marys River – Main Street, Fort Wayne (10/09)
- Eagle Marsh – near Fort Wayne (12/10)
- Junk Ditch – Fillmore Street and Covington Road, Fort Wayne (06/12)
- St. Joseph River – Parnell Avenue, Fort Wayne (anticipated in early 2014); MRBC is participating in funding installation and maintenance of this new gage

Additional stream gages are needed to provide sufficient coverage for flood forecasting, and to provide data needed to calibrate hydrologic and hydraulic models used for flood hazard mapping and project analysis.

3.4.3 **Recommendations**

MRBC should:

1. Coordinate with USGS to install a stream gage on Cedar Creek near Waterloo.

2. Coordinate with USGS to install a gage on the St. Joseph River at Montpelier, Ohio to provide similar warnings as the Rockford gage on the St. Marys River.

3. Continue upgrading early warning system technology in Fort Wayne and outlying communities when upgrade capabilities are made available.

4. Contact the following communities/organizations about becoming a regional partner: DeKalb County Department of Homeland Security; Towns of Leo, Cedarville, and New Haven; DeKalb Eastern School Corporation (due to location of a school in the St. Joseph River floodplain); and City of Auburn (their wastewater treatment facility operator needs to know stream discharge for appropriate effluent release.)

5. Encourage EMA Directors, Floodplain Administrators, Planning Directors and other agency heads to sign up to receive USGS river gage notifications so that appropriate actions can be taken, and also to become familiar with the AHPS website and capabilities.

6. Work with USGS to develop more flood inundation libraries at AHPS forecast gages in the Maumee River Basin (especially the St. Joseph and Maumee Rivers to update these gages and models with new information) by leveraging existing detailed study modeling.

7. Coordinate with NWS to convert stream gages to forecast gages when sufficient data is available.

8. Encourage each county to prepare a Flood Response and Evacuation Plan.

3.5 WETLAND PRESERVATION AND RESTORATION

3.5.1 Introduction

Wetlands provide many benefits such as improving water quality, providing habitat for fish and wildlife, and providing areas for outdoor recreation. In the context of this master plan, the critical role wetlands play in storing and delaying floodwaters may be the most important benefit of all.

The Natural Resource Conservation Service (NRCS) Wetlands Reserve Program (WRP) has been successfully working with willing landowners to restore wetland habitat since 1994. The northern third of the state, including the Maumee River Basin, is a WRP focus area. Projects have included tree planting, macro topography restoration, ditch plugs, tile breaks, dikes, and water control structures. The success of the WRP depends on the diverse partnerships of private and public entities.

3.5.2 Application in Maumee River Basin

Preservation and restoration of wetlands may be useful as flood mitigation measures **in small drainage areas of the Basin**. MRBC acknowledges the efforts of the NRCS Wetland Reserve Program in the Maumee River Basin and will continue to encourage wetland preservation and enhancement. However, MRBC does not intend to be involved in the permitting, funding, or planning of wetland projects.

3.5.3 Recommendations

MRBC should:

1. Continue to acknowledge the flood mitigation benefits of wetland preservation and enhancement.

2. Refer owners of prime land for wetland restoration to NRCS.

3.6 STREAM OBSTRUCTION REMOVAL PROGRAM

3.6.1 Introduction

Logjams, fallen trees, garbage and other stream obstructions can restrict flow and increase flooding, erosion, sedimentation, property damage, and loss of wildlife habitat.

MRBC developed the Stream Maintenance and Debris Removal Program in 1996 that focused on removing logjams, fallen trees, and general garbage to significantly reduce the need for extensive river restoration work. This program continues to function well and there are no plans for updates. A copy of this document is provided in Appendix C.

The Indiana Department of Natural Resources (IDNR) has established Logjam Removal and River Restoration guidelines including: 1) logjam removal using hand-held tools, 2) logjam removal using heavy machinery, and 3) large-scale river restoration. Logjam removal using hand-held tools or heavy machinery is preferred over large-scale river restoration because they maintain the stream's natural meander geometry and have long-term environmental and economic benefits. Additionally, IDNR has recently allowed use of Lake and River Enhancement (LARE) funds for logjam removal. This funding source is an alternative for counties since MRBC funds cannot be used on county regulated drains.

3.6.2 Application in Maumee River Basin

Logjams and other stream obstructions can exacerbate local flooding problems. Therefore, MRBC will continue to be involved in identifying, prioritizing, and funding stream obstruction removal projects.

3.6.3 Recommendations

MRBC should:

1. Continue to assist communities with stream obstruction removal by providing technical and coordination assistance, and also assisting County Surveyors with obstruction removal projects on St. Joseph, St. Marys, and Maumee Rivers.

3.7 VOLUNTARY MITIGATION AND FLOOD PROTECTION PROJECTS

3.7.1 Introduction

History has shown repeatedly the high economic, social, and emotional costs associated with flooded homes, businesses, infrastructure, and cropland.

Consequences reach beyond the immediate interruption of activity and emergency rescue operations to the sometimes crippling cost of clean-up and repair, lost property and production, and the ongoing emotional toll on those impacted. Flooded homes, businesses, and farm fields cost everyone.

Structural methods like ponds, diversions, and levees, and non-structural methods like acquisitions and retrofitting have been used nationwide (not always successfully) with a goal of protecting people and property from flood damage. MRBC's goal is to go beyond a simple reduction in the probability of flooding during the regulatory (100-year, or 1% annual chance) flood event by also considering impacts from flood events that exceed the regulatory flood.

This master plan update included a revised evaluation to identify flood prone buildings and a reevaluation of previously recommended plans and priorities for mitigation.

3.7.2 Identification of Flood Prone Buildings

MRBC and its member communities have acquired 248 flood prone buildings since 1995. For this update, MRBC completed a comprehensive inventory of buildings located in the floodplain for each of the six counties in the basin using the following sources of best available data:

- Indiana Department of Natural Resources, Division of Water Flood Information Portal (INFIP), for Base Flood Elevations
- Updated FIRMs for Base Flood Elevations, where INFIP data was unavailable (this information can be viewed using FEMA's Map Service Center)
- Latest available LIDAR topographic data for estimating lowest ground elevation near the structure (this information may be downloaded from the Indiana Spatial Data Portal)

Buildings shown within the floodplain or floodway but on ground higher than the Base Flood Elevation (BFE) were not designated as needing mitigation. Conversely, buildings shown outside the floodplain limits, but on ground lower than the BFE were categorized as needing mitigation based on the estimated depth of flooding. These cases were typically found along streams with older floodplain mapping that was done years ago using less detailed topographic mapping than what is currently available.

3.7.3 Large-Scale Structural Measures

Large-scale structural measures include long reaches of levees, major channel improvements, and other projects of the type often associated with the U.S. Army Corps of Engineers (USACE). Several were evaluated for the 1995 master plan and 2008 update, and their costs were found to far exceed anticipated benefits. However, other agencies or groups may find value for future projects that are outside the scope or intent of this master plan. One example is Fort Wayne's current evaluation of the potential for reducing peak flow rates along St. Marys River through the city in support of their Riverfront Development Study that began in 2013. Therefore, even though not recommended for implementation by MRBC, the following discussion is provided as information for potential future use by others. Copies of the 1995 master plan location maps are provided in Appendix G.

St. Marys River Reservoir Upstream of Decatur

The 1995 master plan included an evaluation of a project called "St. Marys River Impoundment" upstream of Decatur. That evaluation was conceptual only, to get an idea of the magnitude and cost of such a project, and it concluded the costs would far exceed the anticipated benefits and implementation was not recommended. This conceptual evaluation was revised using more recent data after the 2008 master plan update and reached similar conclusions. A copy of the fact sheet with a location map and additional details is provided in Appendix G.

The project would be located upstream of Decatur, and downstream of the Yellow Creek confluence. It would include a 3,000 foot long dam and an inundation area of more than 4,500 acres.

The following benefits were identified:

1. Approximately 29,000 acre-feet of flood storage
2. Potential reduction of 1% annual chance flood discharge as follows:
    a. to approximately 8,700 cfs, from 14,400 cfs through Decatur
    b. to approximately 10,200 cfs from 15,7000 cfs at Anthony Boulevard in Fort Wayne
3. Reduce 1% annual chance flood elevation by about 3 feet through Decatur
4. Potentially reduce 1% annual chance flood elevation by about 1.5 feet along the river through Anthony Boulevard near the southern edge of Fort Wayne. However, this benefit is uncertain and will depend on the impact of timing of the St. Marys and St. Joseph River peaks which requires additional detailed analysis.

The following negative impacts were identified:

1. Total project costs would be quite large with earthmoving costs alone estimated to exceed $20 million.
2. Increased risk from damages in the event of a catastrophic failure of the dam during a flood event.
3. The 1% annual chance flood elevations just upstream of the reservoir would be increased by 3.5 feet with associated larger floodplain.

4. Cropland within the inundation area upstream of the dam would be impacted by the flooding and sediment deposition.
5. Stream crossings upstream of the dam and impacted by increased flood elevations would need modification and upgrade.
6. Although the conceptual analysis completed for the master plan shows reduced flood elevations through Fort Wayne, the potential exists for increased flood elevations due to proposed project's impact on timing of St. Marys River peak flows and combination with St. Joseph River flows. St. Marys River peak flows currently occur sooner than St. Joseph River peaks; the project could result in coincident peaks with higher flood elevations. Additional detailed hydrologic and hydraulic modeling is needed to fully understand impacts on flood elevations at St. Joseph River confluence.
7. Ongoing cost of maintenance of the dam and spillway(s).

Yost Levee Removal/Bypass Channel

The 1995 master plan included an evaluation of the impact of removing an existing levee (Yost Levee), or adding a bypass channel through the area located along Winchester Road about 2 miles downstream of Decatur. The levee was apparently built in the 1930s, and has been raised over the years without approval of Indiana Department of Natural Resources. The analysis concluded that the reduction in flood elevations would be insignificant and not worth the costs, and was not recommended for implementation.

St. Marys River Overflow Paths (40% & 20% Trier Ditch Cutoff, Junk Ditch Bypass)

The 1995 Master Plan and 2008 update considered the following three alternatives to increase the capacity of St. Marys River overflow paths to reduce flood damages:

1. Cut-off channel that would carry 40% of the 1% annual chance St. Marys River peak discharge along Houk Ditch and Trier Ditch directly to the Maumee River.
2. Cut-off channel that would carry 20% of the 1% annual chance St. Marys River peak discharge along Houk Ditch and Trier Ditch directly to the Maumee River
3. Increase capacity of the Junk Ditch and Little River overflow from St. Marys River to the Wabash River to divert 30% of the St. Marys River 1% annual chance flood flow.

A 1974 report by the US Army Corps of Engineers (USACE) included the following conclusions:

1. Approximately 20% of the St. Marys River 1% annual chance flood flowed through the Trier Ditch cutoff during the 1913 flood.

2. Approximately 30% of the St. Marys River 1% annual chance flood flowed from the St. Marys River to the Wabash River via Junk Ditch and Little River during the 1913 flood.
3. The capacity of the Trier Ditch overflow path in 1974 was half of what existed during the 1913 flood.
4. Obstructions in the floodway of Junk Ditch had reduced its overflow capacity by more than 30% from what existed during the 1913 flood.

Accurately predicting the impacts of changes to the overflow paths is difficult due to uncertainties in calculating the St. Marys River flood elevations, varying backwater conditions, as well as variations in timing and distribution of rainfall throughout the watershed during flood events. However, based on the reports and observations, every effort should be made to keep these St. Marys River overflow paths functioning and clear of further encroachment and obstructions so future flood elevations are not increased along the St. Marys River. Additionally, with the uncertainties caused by the overflow paths, additional freeboard (more than the normal 2 feet) is strongly suggested for buildings along the St. Marys River corridor.

The floodplain along Junk Ditch has been delineated, and acquisition of buildings in the floodplain has begun. This should continue in order to maintain that overflow and remove buildings from harm's way. No additional development should take place in the Junk Ditch/St. Marys River overflow floodplain. Additionally, the US Army Corps of Engineers' goal of eliminating the inter-basin transfer of Asian Carp from the Wabash River Watershed to the Great Lakes Basin seems likely to increase flood elevations and should be investigated further.

There is currently no mechanism in place to prevent the loss of overflow capacity caused by development along the Houk Ditch/Trier Ditch overflow path. If additional development or filling (such as elevating existing roads) occurs in the overflow path, those new buildings and their inhabitants will be in danger due to their location in the (unmapped) floodplain, and existing buildings (and people) will be impacted by increased water surface elevations along the St. Marys River caused by reduction or elimination of overflow capacity.

The following actions are recommended to prevent further reduction of the capacity of this "emergency spillway" for the St. Marys River:

1. Evaluate existing condition and capacity of the Houk Ditch/Trier Ditch overflow path.
2. Identify the best location for a controlled overflow path.
3. Identify and recommend steps for designating this overflow path as an Impact Area that must be protected from any future encroachments or activities that could reduce the capacity to convey river overflows.

4. Evaluate measures, including a pilot channel in the saddle area, to prevent flooding of existing properties along the path.
5. Evaluate other measures needed to maintain the existing "emergency spillway" capacity.
6. Evaluate the induced adverse impact on the Junk Ditch and St. Marys River floodplain of the potential USACE Aquatic Nuisance Species project of total basin separation on Junk Ditch at Eagle Marsh.

Cedar Creek Reservoir

The 1995 master plan included an evaluation of a project called "Cedar Creek Impoundment" upstream of Waterloo, west of I-69. That evaluation was conceptual only, to get an idea of the magnitude and cost of such a project, and it concluded the costs would far exceed the anticipated benefits and implementation was not recommended.

3.7.4 Small-Scale Structural Measures

Small-scale structural measures considered in the 1995 Master Plan included berms that could provide some protection for a large number of buildings. Initially, the recommended berms were to be designed and constructed following IDNR and FEMA specifications for flood control works. However, since MRBC's goal with the recommended berms was to significantly reduce damages from the 1% annual chance flood without providing a false sense of security that is sometimes associated with levees, the recommended freeboard was subsequently reduced below IDNR and FEMA requirements. Recent levee failures in other states provide stark reminders of the sometimes extreme risk to properties landward of and seemingly protected by levees either through inadequate maintenance or when flood levels exceed the design flood.

Since the MRBC goal was to reduce flood damages without removing properties from the mapped floodplain, a maximum of 1 to 2 feet of freeboard would be provided. This is less than FEMA's minimum 3 foot freeboard criteria which means buildings located behind (and protected by) the berms would remain in the mapped floodplain and properties with federally guaranteed mortgages would be required to purchase flood insurance through the National Flood Insurance Program. The requirement for flood insurance will be a constant reminder that levee systems are not fail proof and floods greater than the designed level of protection do and will happen.

City of Fort Wayne should consider construction of low berms that could provide protection from more frequent flood events and serve as foundations for temporary sandbag levees that would be built during higher flood events. These low berms could be combined with acquisitions to provide mitigation and protection for some residential areas.

Potential berm projects should be evaluated and designed to provide No Adverse Impact. This includes preventing unintended increases in erosion, discharge, and stage in other areas that could result from reductions in effective flood storage in the proximity of the proposed project.

An updated discussion of small-scale structural alternatives recommended in the 1995 master plan is provided below. Copies of the 1995 master plan location maps are provided in Appendix G.

St. Marys River, west bank generally from Hale Avenue to SR 14 (Reach 14 (W6SM) in the 1995 Master Plan)

Preliminary studies completed for the 1995 Master Plan indicated properties in this reach could potentially be protected from flood damages from the 1% annual chance flood by constructing approximately 3,200 feet of protection (consisting of floodwalls, levees, Taylor Street closure structures, and internal drainage measures) along the St. Marys River, and another 3,200 feet of 2-foot high berm alongside the Norfolk & Western Railroad embankment to block flow from Junk Ditch. The 2008 master plan update included discussions with Fort Wayne officials who explained that this area, even though shown in the floodplain with existing ground elevations about two feet lower than the base flood elevation, has not experienced flooding problems. Based on that information, no immediate action was recommended. However, due to uncertainties regarding the potential overflow path and the impact of changes, development along this area should only be allowed when it will not reduce the capacity to convey St. Marys River overflow to Junk Ditch.

Junk Ditch, east bank between RR near Jefferson Boulevard and RR near Edgerton (Reach 47 (E1JD) in 1995 Master Plan)

The 2008 update of the 1995 Master Plan included the following recommendation:

"...split the area into two sections with two different approaches. The buildings northeast of Jefferson Boulevard are inundated more frequently. One of them, the largest, is also a Repetitive Loss structure and has gone out of business. The City has expressed interest in purchasing the property and incorporating some wetlands and wildlife areas to revert the area to a natural setting. Grant money or private funds are being sought for this project. It is suggested that these buildings be bought out and Jefferson Boulevard be raised. The open space area created by buying out the buildings could have a variety of uses as traffic enters the downtown area and could provide additional flood storage capacity for the St. Marys River overflow. Traffic flow would benefit by the availability of use of Jefferson Boulevard during floods and the raised Jefferson Boulevard could be a main component of providing flood protection to the businesses on the southwest side that experience shallower flooding than those on the north, allowing them to still be in business during flood events."

Fort Wayne has subsequently acquired some of the property in this area and plans to maintain the area as open space, as discussed above. With this acquisition and plans to acquire additional property in the area as it becomes available, a protection levee is no longer recommended. Instead, officials should consider elevating Jefferson Blvd to provide flood-free access. This project would need to include enlarging the bridge as needed to prevent increases in flood elevations due to blocking the over-the-road flow area.

3.7.5 Discussion of Additional Structural Alternatives Not Considered in the 1995 Master Plan

Allen County

The 2008 master plan update included the recommendation of the purchase of two buildings, and construction of a flood-fight berm along the alley in the Ross Michaels area. The buildings have been acquired; therefore, the berm should be built to protect existing homes.

Adams County

Saddle Lake (also called Clem's Lake) is a high hazard dam built through the WPA in 1930s. Over the years, a number of homes have been built on the dam crest along County Road 200 East, including one home directly over the dam's outlet structure. IDNR officials completed analysis of the lake, determined that several homes on the dam are located below the 1% annual chance flood elevation, and designated the dam as high hazard. They also issued a notice of violation to the property owner over the outlet structure, demanding remedial action. IDNR and Indiana Department of Homeland Security (IDHS) officials have recommended that MRBC apply for advance assistance from IDHS to pay for analysis and project development of a small, localized risk reduction project that would create an auxiliary flood path through the property over the dam's primary spillway.

DeKalb, Noble, Steuben and Wells Counties

No additional structural alternatives have been identified in DeKalb, Noble, Steuben or Wells Counties.

3.7.6 Voluntary Acquisition, Voluntary Retrofitting, or No Action

Most flood-prone buildings in the basin are better suited for acquisition or retrofitting than protection through structural measures. Therefore, a categorization system was created as a first step in identifying target areas that communities can use to prioritize mitigation efforts. The priorities should be adjusted as more detailed information is obtained for each specific area.

Buildings were categorized and assigned a priority as shown in **Table 3-4**. Category and priority were assigned based on which flood zone (floodway or floodway fringe) the building is located in, and the estimated depth of flooding.

Table 3-4 Flood Mitigation Category

Category	Description	Priority
Category A	In floodway, flood depth of 2 feet or more	High
Category B	In fringe, flood depth of 3 feet or more	High
Category C	In floodway, flood depth of less than 2 feet	Medium
Category D	In fringe, flood depth between 1 and 3 feet	Medium
Category E	In fringe, flood depth less than 1 foot	Low
Category F	In 0.2% chance flood zone	Further Study
Category G	In outdated approximate study floodplain (Zone A)	Further Study
Category H	In floodplain but existing ground above BFE	No Action
Category I	Outside floodplain but existing ground at or below BFE	Further Study
Category J	Previously in floodplain, existing ground above BFE	No Action

Table 3-5 shows the number of buildings in each category for each MRBC county.

Table 3-5 Number of Buildings in Each Category

NFIP Community	Category										TOTALS
	A –Floodway, depth ≤ 2'	B – Fringe, depth > 3'	C –Floodway, depth < 2'	D – Fringe, 1'<depth <3'	E – Floodplain, depth < 1'	F – In 0.2% chance floodplain	G– In Zone A (approximate)	H–Zone AE, ground > BFE	I–Not Zone AE, ground ≤ BFE	J–No longer in flood zone	
Adams County (unincorporated)	19	12	22	24	7	11	99	37	4	16	*251*
City of Berne	0	0	0	0	0	0	1	0	0	0	*1*
City of Decatur	8	19	10	89	17	146	3	25	3	22	*342*
Totals	*27*	*31*	*32*	*113*	*24*	*157*	*103*	*62*	*7*	*38*	*594*
Allen County (unincorporated)	44	50	46	135	113	135	150	23	246	173	*1,115*
Fort Wayne	85	333	121	803	297	1,361	6	13	354	43	*3,416*
Huntertown	0	0	0	0	0	0	0	0	1	0	*1*
Leo-Cedarville	0	0	1	0	1	0	1	0	7	0	*10*
Monroeville	0	0	3	1	0	0	0	0	0	0	*4*
New Haven	4	10	10	36	19	67	0	2	65	6	*219*
Totals	*133*	*393*	*181*	*975*	*430*	*1,563*	*157*	*38*	*673*	*222*	*4,765*
DeKalb County (unincorporated)	1	7	7	19	10	0	102	18	2	8	*174*
Auburn	2	3	22	42	71	0	1	63	0	7	*211*
Butler	0	0	0	0	0	0	43	0	0	0	*43*
Garrett	0	0	0	0	0	0	1	0	0	0	*1*
Waterloo	0	0	0	1	0	0	0	0	0	0	*1*
Totals	*3*	*10*	*29*	*62*	*81*	*0*	*147*	*81*	*2*	*15*	*430*
Noble County (unincorporated)	1	5	10	1	2	0	4	3	0	3	*29*
Avilla	0	0	0	2	0	2	0	0	0	0	*4*
Totals	*1*	*5*	*10*	*3*	*2*	*2*	*4*	*3*	*0*	*3*	*33*
Steuben County (unincorporated)	0	0	0	0	0	0	127	0	0	0	*127*
Hamilton	0	1	17	1	2	0	122	1	0	1	*145*
Totals	0	1	17	1	2	0	249	1	0	1	*272*
Wells County (unincorporated)	0	0	0	0	0	1	0	0	0	0	*1*
Total Basin	***164***	***440***	***269***	***1,154***	***539***	***1,723***	***660***	***185***	***682***	***279***	***6,095***

Based on expected flood risk, discussions with the steering committee, and MRBC experience, the following actions are recommended for each priority. Repetitive loss buildings should be given higher priority within each priority class listed below.

1. **High Priority Mitigation Projects**: Pursue voluntary acquisition and remove buildings exposed to the highest flooding risks. These buildings are located either in the main flow conveyance paths of rivers and streams subjecting them to high flow velocities and damaging flood depths (Category A), or outside main flow conveyance paths but with damaging flood depths (Category B). Buildings in this category are at the highest risk of receiving the most damage and exposing the occupants to danger. This category also includes buildings that the community or MRBC identify as high priority for voluntary acquisition due to proximity to a group of contiguous Category A and B buildings and/or inclusion in the community's flood fight or open space plans.

2. **Medium Priority Mitigation Projects:** Pursue voluntary acquisition and remove buildings exposed to significant flooding risks. These buildings are located in areas either in the main flow conveyance paths with lower flood depths (Category C), or outside of the main flow conveyance paths of rivers and streams with high flood depths (Category D). Category D buildings should be evaluated on a case by case basis to determine if they would qualify for retrofitting, which is generally less costly than buyout.

3. **Low Priority Mitigation Projects**: Offer voluntary retrofitting assistance for buildings exposed to relatively low flooding risks. Category E buildings are theoretically exposed to shallower flood depths and should be considered for retrofitting in areas that have flood free access. If there is no reasonably safe flood free access, a building should be considered for voluntary acquisition. This category also includes buildings that should be given lower priority for pursuing voluntary acquisition, based on the community's knowledge and experience.

4. **Buildings Needing Further Study**: Determine appropriate mitigation actions (if any) for buildings in Categories F, G, and I when additional floodplain studies are completed as recommended in the Flood Hazard Mapping section of this Master Plan.

5. **Buildings that are or will be protected by a Flood Control Project**: Monitor the progress, success, and sustainability of existing and planned flood protection projects in reducing the flood risk for buildings. This includes buildings in all categories that community officials believe are protected against 1% annual chance flooding. Acquisition or retrofitting measures are not currently recommended for these buildings. However, intensive education and outreach efforts are recommended in these areas to caution residents against a false sense of security that is often

associated with structural flood control projects, particularly berms and levees. As situations or plans for construction of proposed flood control projects change, the buildings in this action class should be reevaluated for potential transfer to other classes.

6. **No Immediate Action Required**: Monitor the occurrence and extent of flooding of buildings that, even though shown in one of the Categories A through E, a community has requested that no mitigation action be taken. As situations change and more flood data is collected, the buildings in this action class should be reevaluated for potential transfer to other classes.

7. **Others**: Although no actions are currently recommended for buildings in Categories H and J, MRBC may provide retrofitting assistance when requested by the property owner.

Table 3-6 shows the number of buildings in each priority class for each MRBC county.

Table 3-6 Number of Buildings in Each Priority Class

NFIP Community	Priority							
	High	Medium	Low	Further Study	No Action	Acquired	Retrofitted	TOTALS
Adams County (unincorporated)	31	46	7	114	53	0	0	*251*
City of Berne	0	0	0	1	0	0	0	*1*
City of Decatur	27	99	17	152	47	63	6	*411*
Totals	*58*	*145*	*24*	*267*	*100*	*63*	*6*	*663*
Allen County (unincorporated)	94	181	113	531	196	0	1	*1116*
Fort Wayne	418	924	297	1721	56	152	9	*3577*
Huntertown	0	0	0	1	0	0	0	*1*
Leo-Cedarville	0	1	1	8	0	0	0	*10*
Monroeville	0	4	0	0	0	0	0	*4*
New Haven	14	46	19	132	8	0	0	*219*
Totals	*526*	*1156*	*430*	*2393*	*260*	*152*	*10*	*4927*
DeKalb County (unincorporated)	8	26	10	104	26	9	0	*183*
Auburn	5	64	71	1	70	11	2	*224*
Butler	0	0	0	43	0	0	0	*43*
Garrett	0	0	0	1	0	0	0	*1*
Waterloo	0	1	0	0	0	0	0	*1*
Totals	*13*	*91*	*81*	*149*	*96*	*20*	*2*	*452*
Noble County (unincorporated)	6	11	2	4	6	0	1	*30*
Avilla	0	2	0	2	0	0	0	*4*
Totals	*6*	*13*	*2*	*6*	*6*	*0*	*1*	*34*
Steuben County (unincorporated)	0	0	0	127	0	0	0	*127*
Hamilton	1	18	2	122	2	13	1	*159*
Totals	1	18	2	249	2	13	1	*286*
Wells County *(unincorporated)*	0	0	0	1	0	0	0	*1*
Total Basin	***604***	***1423***	***539***	***3065***	***464***	***248***	***20***	***6363***

Mitigation project prioritization recommendations are based on best available data and are intended to assist communities with their mitigation efforts. Since the prioritization is risk-based, properties with greater risk of flooding were assigned a higher priority. This prioritization helps communities meet FEMA's benefit-cost criteria, which are mandated for all projects focusing on acquisition and demolition. Communities may include lower priority buildings in a mitigation project application only when the acquisition of the lower priority buildings will complete the community's mitigation efforts in a particular area. Acquisition projects should focus on buildings where mitigation objectives can be achieved for the entire target area instead of on isolated, "spot" acquisitions. This approach will allow communities to focus their flood response efforts on critical areas that have not yet been mitigated.

Selection of acquisition targets should be coordinated with other agencies and departments to identify opportunities for combining objectives, where appropriate. An example would be park projects in flood hazard areas that may include acquisition of buildings. Those projects could qualify for grant funding when the acquired area would be maintained as open space in accordance with FEMA requirements.

Fort Wayne has established its own funding source to combine with federal grant funds for acquisitions, which has accelerated the reduction of potential flood damages. This local initiative to create a dedicated funding source for acquisitions has proven valuable in reducing flood damages and should be considered in more communities where feasible.

The following is a list of available Hazard Mitigation Assistance programs with information on grant requirements for each:

1. Flood Mitigation Assistance (FMA): FMA program project grants are available to implement measures to reduce flood damage losses. Such measures may include acquisition and demolition, elevating the building, and relocation. Buildings must be insured through the National Flood Insurance Program.

2. Hazard Mitigation Grant Program (HMGP): HMGP project grants are available to implement long-term hazard mitigation measures after a major disaster declaration. Project examples include acquisition and demolition, elevating the building, relocation, and retrofitting.

3. Pre-Disaster Mitigation Grant Program (competitive) (PDM-c): PDM-c program project grants are available annually to implement measures such as acquisition and demolition, dry flood proofing, structural retrofitting of existing buildings, safe-room construction, minor localized flood reduction projects, infrastructure retrofit, and soil stabilization. The Pre-Disaster Mitigation program was established to

reduce overall risk to people and buildings while reducing reliance on federal funding after a disaster.

DHS-FEMA Grant Programs fund 75% of project costs with the local community being responsible for a 25% Local Cost-share. Severe Repetitive Loss (SLR) properties may receive up to 100% Federal funding and Repetitive Loss (RL) properties may receive up to 90% Federal Cost-share funding.

View additional information about DHS-FEMA Hazard Mitigation Assistance Programs.

The MRBC website includes directions for accessing an interactive map showing structures in each mitigation priority class and whether those buildings have been purchased, demolished, or retrofitted. By clicking on a structure, the user can view additional information about that structure including:

- Parcel Number, Address, NFIP Community, Assessed Value
- Priority Classification
- FEMA Flood Zone
- Nearest Tributary, Watershed
- Approximate Inundation Depth during the 1% Annual Chance Flood Hazard

For this master plan update, acquisition costs were estimated using the assessed property value or the residential (real) improvement value plus 20%. This accounts for demolition, appraisals, title search, closing costs, and other administrative costs. Costs for retrofitting were estimated using the MRBC program allowable cost-share limits of up to $5,000 for single-family residential properties located within the 1% annual chance floodplain, up to $2,500 for single-family residential properties located within the 0.2% annual chance floodplain, and up to $10,000 for commercial properties. **Table 3-7** provides a summary of estimated costs for the proposed High, Medium, and Low Priority mitigation projects within the MRBC jurisdiction.

Table 3-7 Estimated Costs for Proposed High, Medium, & Low Priority Mitigation Projects

Jurisdictional Area	Total Number of Buildings and Estimated Mitigation Cost					
	High Priority		Medium Priority		Low Priority	
	Buildings	Cost	Buildings	Cost	Buildings	Cost
Adams County	31	$3,020,100	46	$10,607,400	7	$35,000
Decatur	27	$12,826,700	99	$9,332,700	17	$85,000
Allen County	94	$10,906,000	181	$17,576,200	113	$565,000
Fort Wayne	418	$40,911,001	924	$80,098,920	297	$1.5mil.
Leo-Cedarville	0	0	1	$120,500	1	$5,000
Monroeville	0	0	4	$692,900	0	0
New Haven	14	$2,750,000	46	$5,000,600	19	$95,000
DeKalb County	8	$140,000	26	$3,296,500	10	$50,000
City of Auburn	5	$865,500	64	$3,986,900	71	$355,000
Town of Waterloo	0	0	1	$185,400	0	0
Noble County	6	$593,300	11	$486,300	2	$10,000
Avilla	0	0	2	$68,000	0	0
Steuben County	0	0	0	0	0	0
Town of Hamilton	1	$14,600	18	$1,104,200	2	$10,000
TOTALS	**604**	**$72,027,201**	**1423**	**$132,556,520**	**539**	**$2,710,000**

3.7.7 Recommendations

MRBC should:

1. Continue to pursue funding and encourage voluntary acquisition or retrofitting of buildings identified in High, Medium, and Low Priority classes. Continued removal of buildings from the floodplain eliminates the need for flood fighting efforts in these areas, restores floodplain storage, eliminates worries about access to these areas and the need for evacuation during a flood, eliminates the need for clean up or damage assessment of the areas after a flood, and eliminates emotional and financial toll on residents. This also provides land that could be used for things like water quality buffers, habitat restoration areas, outdoor recreation, or community park areas.

2. Continue to encourage and facilitate the acquisition of structures in the Junk Ditch floodplain and recommend that no more development be allowed in the Junk Ditch/St. Marys River overflow floodplain.

3. Recommend consideration of the modified proposal for the reach of Junk Ditch between Edgerton Road and Jefferson Boulevard including the acquisition of properties in the reach northeast of Jefferson Boulevard and raising Jefferson Boulevard in conjunction with retrofitting of the buildings southwest of Jefferson Boulevard. The impact of raising Jefferson Boulevard on flood flows to or from St. Marys River will need to be evaluated and designed to create no adverse impact.

4. Maintain up-to-date structure inventory. This will require floodplain administrators in each community to collect and forward to MRBC data on new buildings in or near a floodplain. Data should include location and lowest adjacent grade for each new building. Additionally, MRBC should review new aerial photography, when available, to identify new construction in or near flood hazard areas.

5. Initiate an evaluation of a proposed Impact Area designation and additional measures along Houk Ditch/Trier Ditch to maintain the bypass capacity for the St. Marys River.

3.8 VOLUNTARY AGRICULTURE LAND USE CONVERSION PROGRAM

3.8.1 Introduction

The rich, fertile soil and gentle slopes typical of floodplain areas in northeastern Indiana are good for agricultural production. In an effort to maximize crop production, some farmers till and plant to the edge of natural watercourses and regulated drains. During a flood, the highly productive floodplain may be inundated for an extended period of time resulting in significant crop losses and where streambanks have been exposed there may be significant erosion.

3.8.2 Application in Maumee River Basin

MRBC, through its Voluntary Agricultural Conversion Program, and also through existing Natural Resource Conservation Service (NRCS) Conservation Programs and land trusts, continues to help landowners reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. For the most part, these programs allow the landowner to continue to own the property. In exchange for monitory compensation, a conservation easement, with use restrictions, is placed on the property. In Northeastern Indiana there are a number of land trusts willing to acquire land for conservation through fee simple purchase or donation. These include: ACRES Land Trust, Inc., Blue Heron Ministries, Trillium Land Trust, Nature Conservancy, Wood-Land-Lakes RC&D, among other land trusts. Typical with a land trust, ownership of the property is transferred entirely to the land trust and use restrictions applied.

To address flood-related losses in the agricultural areas, MRBC has recommended converting land in these areas from traditional agricultural use to flood tolerant woodland, wetlands, park corridors, or flood tolerant crops. The intent of MRBC is to support, promote, and fund land acquisition, flowage easements, and land set-aside programs available to landowners through the United States Department of Agriculture's (USDA's) Conservation Reserve and Conservation Easement Programs (CRP and CEP), USDA's Wetland Reserve Program, the Natural Resource Conservation Service's Emergency Watershed Protection Program, US Fish & Wildlife Five Star Restoration Program, and other compatible programs funded and/or supported by the MRBC.

In 1995, MRBC estimated that 32,000 acres of cropland would be damaged during the 1% annual chance flood, and approximately 14,000 acres would be damaged during the 20% annual chance flood. As recommended in the 1995 master plan, MRBC should continue to focus efforts on the area flooded by the 20% annual chance flood event.

MRBC recently completed an inventory of agricultural lands with presence of oxbows. Oxbow locations and associated properties were inventoried for the Maumee, St. Marys, and St. Joseph Rivers as potential candidates for MRBC's Voluntary Agricultural Land-Use Conversion Program.

The change in agricultural land use could be achieved through:

- Land use regulations or zoning changes
- Acquisition of land either through donation or by the fee simple purchase
- Purchase of flowage easements in the floodplain area;
- Land set-aside
- Conversion to alternative flood-tolerant crops

Successful implementation will depend on soil conditions, property location in relation to existing or planned parks, open space or woodland corridors, erosion potential, drainage considerations, and an owner's willingness to participate.

3.8.3 Recommendations

MRBC should:

1. Continue to network with, and collaborate on conservation projects with local SWCD, NRCS, ACRES Land Trust, Inc., Blue Heron Ministries, Trillium Land Trust, Nature Conservancy, Wood-Land-Lakes RC&D, and US Fish & Wildlife, for example.

2. Continue to identify and provide cost-share match to landowners in the Maumee River Basin willing to participate in land use conversion programs.

3.9 PUBLIC EDUCATION AND OUTREACH

3.9.1 Introduction

Much good can be accomplished by changing attitudes and behaviors of the public through a solid and consistent public education and outreach program. Recently, the focus of public education has been on materials presenting the actual risk. The Association of State Floodplain Managers (ASFPM) and FEMA are good sources of materials and suggestions for conveying the actual risk to residents located in flood hazard areas. Presentation materials may also include flood depth grids (described in section 3.3) when they are completed.

3.9.2 Application in Maumee River Basin

The Dale Hughes Jr. Public Education and Outreach Program has been very effective to raise the level of awareness of flooding issues among decision-makers, elected officials and the public in the Maumee River Basin. The education and outreach efforts of MRBC have been recognized throughout the State and at a national level.

In Allen County, the websites of the Surveyor's Office, Department of Planning Services, Allen County Partnership for Water Quality, and the City of Fort Wayne all have public information on watersheds, water quality, stormwater and flooding. Wells County Surveyor's Office has information on flood maps and regulated drains. Allen County, City of Fort Wayne, and City of Decatur have educational information available as part of their Community Rating System (CRS) credits, especially to repetitive loss areas. Other communities located in the basin should be encouraged to post flood information on their websites with links to MRBC's website.

Each of the county SWCDs work with farmers to prevent soil erosion on their land, and provide education to local landowners and students through school presentations, camps, and workshops.

3.9.3 Recommendations

MRBC should:

1. Work with local school corporations to incorporate "Floodplain Management" into their 4th grade curriculum.

2. Continue to build partnerships with upstream communities in Ohio to encourage them to adopt more restrictive floodplain and stormwater management standards.

3. Promote continued public education and outreach to reduce flood losses, meet the requirements of the CRS program, and improve water quality through the NPDES Phase II program requirements.

4. Encourage member communities and partnering organizations to add a link to the MRBC on their webpage.

3.10 STORMWATER QUALITY ASSESSMENT AND CHARACTERIZATION

3.10.1 Introduction

Stormwater quality is a growing concern nationwide for drinking water, manufacturing, agricultural production, economic development, recreation and tourism, and quality of life.

The Indiana Department of Environmental Management (IDEM) maintains a list of waterways that do not or are not expected to meet water quality standards. Several waterways in the Maumee River Basin have been listed for E. coli, Impaired Biotic Community, and nutrient impairments, as well as a Fish Consumption Advisory for PCBs and mercury violations. IDEM's 303(d) Impaired Stream List shows impairments by individual stream. The Indiana Water Monitoring Inventory is a list of groups conducting water quality monitoring throughout the state. Their website provides a summary of the water quality data collection methods and results.

Additionally, the United States Army Corps of Engineers (USACE) completed a Comprehensive Study of the Western Lake Erie Basin to evaluate the water quality data that has been collected in the St Marys, St. Joseph, and Maumee River watersheds.

3.10.2 Application to Maumee River Basin

As part of the NPDES Phase II program, Allen County; Cities of Auburn, Decatur, Fort Wayne, and New Haven; and Towns of Grabill, Huntertown, and Leo-Cedarville are required to monitor municipally owned outfalls within their respective jurisdictions. That, along with penalties for dumping and pollution, ordinances related to illicit discharges, and the improvement of their own actions help reduce stormwater pollutants entering the receiving streams in the Maumee River Basin.

3.10.3 **Recommendations**

Although stormwater quality is not a main focus, MRBC should continue supporting water quality improvement efforts of local communities including assistance with and advice on adoption of MRBC's Model Stormwater Management Ordinance.

3.11 POST-FLOOD DAMAGE ASSESSMENT PROTOCOL

3.11.1 **Introduction**

Immediately after a flood, the primary focus of community leaders is on assessing the damages and recovery operations. This time, however, also affords the opportunity to gather data that will improve the tools for evaluating future flood risks and potential alternatives for reducing those risks. Potential data to collect includes aerial mapping of the flood at or near its peak crest, setting high water marks, collecting rainfall distribution data, and comparing high water marks and inundated areas with how the risk areas associated with a similar type of an event are delineated on existing FIRMs. NFIP communities, by virtue of their agreement with the Federal Emergency Management Agency, are obligated to complete and submit damage assessments after each disaster. The following sections provide details to help communities fulfill their obligations.

3.11.2 **Application in Maumee River Basin**

MRBC's Post Flood Damage Assessment Flow Chart is provided in Appendix H.

3.11.2.1 Damage Assessments

In order to help communities carry out their post flood responsibilities and damage assessments, IDNR has published a document titled "Flooding and Post-Disaster Responsibilities, A Local Administrator's Guide". This document includes sample forms and checklists that can be used for the following:

- Notify the public of permit needs
- Document damage to buildings and extent of flooding
- Conduct a damage assessment including determining pre-damage value and cost of repairs
- Determining floodplain status and repairs and/or reconstruction limitations
- Building protection requirements

- Increased cost of compliance

MRBC created a flow chart to assist MRBC communities in meeting post flood damage assessment responsibilities. It is the Floodplain Administrator's responsibility to see that this process is carried out and required documentation is gathered and cataloged. The Floodplain Administrator has the option of contacting people such as the local Emergency Management Agency Director, local building inspectors, County Surveyor, or other appropriate personnel who may be available and qualified to become part of the Damage Assessment team and aid in completing the needed flood damage assessments.

As a damage assessment team (or teams) is assembled, the Floodplain Manager should also gather items for the team's use. These may include copies of applicable FIRMs, locations of flooded structures, blank copies of damage assessment forms (from IDNR's Local Administrator's Guide), blank High Water Mark forms, copies of a Damage Notice or door hanger printed on high visibility card stock to be placed on each damaged structure (from IDNR's Local Administrator's Guide) and cameras. As damaged areas become safe to reenter, the Damage Assessment team can deploy. The Floodplain Administrator should provide a news release to alert residents about the need for appropriate permits before repairs can occur. A sample news release is also included in the IDNR's Local Administrator's Guide noted above.

To expedite the Damage Assessment Process, Floodplain Administrators should incorporate the triage process to categorize flood-damaged buildings as follows:

1. Category A: Structures damaged less than 35% of the Fair Market Value (FMV)
2. Category B: Structures damaged more than 65% of the FMV
3. Category C: Structures damaged between 35% and 65%

By following this triage process, property owner notifications can be immediately sent to the owners of structures in Categories A and B. Damage Assessments for Category C structures should be further refined by performing a detailed Damage Assessment and interviewing the owner to prevent the final Damage Assessment from inadvertently penalizing the property owner. An example of inadvertent penalty would be if a property owner decides to elevate using the Increased Cost of Compliance (ICC) grant program through the National Flood Insurance Program (NFIP). Local Floodplain Administrators could jeopardize the property owner's eligibility for ICC grant funds if they are reluctant to declare the structure Substantially Damaged. Likewise, an overzealous Floodplain Administrator could cause a property owner to incur unwarranted costs by incorrectly declaring a structure Substantially Damaged.

The Category A, B, and C letters and notifications noted in the flow chart are described below. The Floodplain Administrator can assign appropriate personnel to each task as they coordinate the process.

Category A structures – Send letter to owner and list to Building Department informing them that the property owner(s) **MAY** proceed with repairs **after they obtain the necessary permits from the local Building Department**. If the structure is Category A2, it should be noted that a permit from IDNR for Construction in a Floodway will also be required and the structure will be required to satisfy the NFIP requirements.

Category B structures – Send letter to owner and list to Building Department informing them that the property owner(s) **MAY NOT** commence any repair until they have presented an elevation plan, a certified Elevation Certificate, and any other required information to the local Building official and obtained the necessary local Building Department permits. If the structure is Category B2, it should be noted that a permit from IDNR for Construction in a Floodway will also be required.

Category C structures – Send letter to owner and list to Building Department informing them that the property owner(s) **MAY NOT** commence any repair until the Floodplain Administrator has had an opportunity to perform a detailed Damage Assessment and reclassify as Category A or B.

3.11.2.2 Aerial Photography

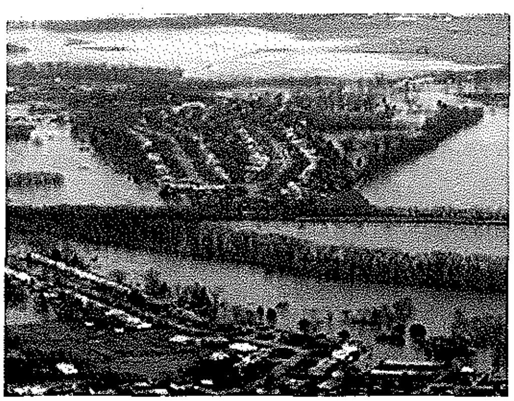

Figure 3-2 Example of Aerial Photography

Aerial photography can be captured in several different forms. There are companies that conduct aerial photography for a fee. Sometimes, a local pilot is curious enough to fly over the flooded area and could take passengers with cameras such as was the case for **Figure 3-2** from the 2003 flood in Decatur.

A community should maintain a list of potential pilots or companies to contact during a flood to arrange a fly over. Local news media are often willing to cooperate and even cost-share on a fly over of flooded areas. Video taken by the media is typically better quality and most are willing to share with community officials. Cooperating with the local news media can prove to be a valuable tool when the need arises to distribute messages to the local community.

Aerial photos provide information on areas affected by flooding that can be used immediately to locate areas needing assistance. They can also be used to improve FIRMs that are used to regulate development in the floodplain. For example, the photo above and others helped document that some flood water bypassed the bridge over the stream, circled an area of higher ground, and reentered the main stream via a tributary downstream. The location and direction of all photos should be noted on a map. Additionally, each photo should be labeled with the location, date and time (actual time of day, and also time in relation to the flood peak) of the photograph. It is critical to photograph areas and objects where the "high water" demarcation (highest flood level) can be field surveyed after the floodwaters recede.

When an MRBC community undertakes aerial reconnaissance for the purpose of documenting flood elevations and extents, those plans should be coordinated with MRBC. As a Cooperating Technical Partner (CTP) with FEMA, MRBC reviews and coordinates on all Physical Map Revisions. It is therefore critical that MRBC have knowledge of best available data that may be used for redelineation of flood hazard areas. Including MRBC in the process will provide consistency in data collection and documentation, and an opportunity for cost savings if multiple areas can be photographed during the same flight

3.11.2.3 High Water Marks

The Indiana Department of Natural Resources (IDNR) will typically send available staff to set high water marks as soon as practical after severe flood events. High water marks are typically as simple as a nail set in a tree, a crow's foot scribed on a bridge abutment, a paint mark on street pavement, or a distance down or up from some physical feature noted, then describing the location and having a surveyor tie in the elevation at a later date. It is crucial for post-flood analysis to document the date and time that the high water marks are set. This information is kept on file and used later for a variety of purposes, with the main purpose being calibration of hydraulic models.

High water marks set by IDNR were used to calibrate the St. Marys River hydraulic model after the 2003 flood. The 2003 flood had a discharge close to the 1% annual chance event flood and flood elevations higher than those shown on the Flood Insurance Rate Maps (FIRMs). For this record event, the City of Decatur had also set some high water marks by contracting with a local private surveyor. Those marks proved useful in supplementing the IDNR high water marks to create a more realistic computer simulation of flooding. With the high water mark data, the FIRM was revised using results of the calibrated model, and is now a better representation of expected flood risks. This means the model is also a better tool for evaluating options for reducing those risks. When flooding is only in a small area, IDNR staff set the high water marks. When flooding is more widespread, however, local communities could benefit themselves by assisting in the high water mark setting process. Since local officials are on site, they can document flood crest elevations while still carrying on with other responsibilities. Any documentation is valuable, even if only at a few representative locations. To that end, it is preferable to set marks upstream and downstream of areas such as bridges and other structures that are likely to impact flood elevations.

High water mark data should be kept in a permanent file with the community for future. In addition, a copy of the data should be provided to MRBC which should increase the likelihood availability for future mapping for mitigation projects. Other flood information such as ground photos, aerial photography, rainfall data, and news articles should also be collected and kept on file for future use.

The ideal process would be to submit high water mark data directly to the IDNR to add to their data base. This would make the data available to the widest audience that may have need for it. When a community plans to set high water marks, they should contact the North Basin Section Team Leader at the IDNR Division of Water (317-232-4160) to coordinate efforts. IDNR may be able to set and document the marks, tie them into an appropriate vertical datum, serve as a repository for the information, or any combination of these activities.

3.11.2.4 Comparison of Flooded Areas to FIRMs

Flood events also provide a good opportunity to compare Flood Insurance Rate Map delineations with inundated areas. If large discrepancies are found, it could indicate that the mapping used for the floodplain delineation or the data used for the hydraulic or hydrologic modeling were not detailed enough or accurate. Noting differences is good documentation for either showing the need for the community to pursue a Letter of Map Revision or to have documentation to provide to the State for selecting and prioritizing revisions under the Floodplain Map Modernization Program. Noted discrepancies should be communicated to MRBC due to its role as CTP for communities under its jurisdiction.

Detailed post-flood damage assessment guidance materials assembled by the MRBC are provided in Appendix H.

3.11.3 **Recommendations**

MRBC should:

1. Assist and encourage each community to establish post flood damage assessment processes that include the items presented in this chapter.

2. Coordinate with local airport authorities to populate a list of pilots available for aerial reconnaissance after a major flood event.

3. Continue to provide High Water Mark Training for community officials to ensure that a uniform protocol is being followed in the establishment, collection, and submission of High Water Mark data.

CHAPTER 4 FUNDING CONSIDERATIONS

This chapter provides a brief discussion of funding sources that may be available to assist in implementing recommendations from this master plan. It is expected that implementation of many recommendations will be completed over several years depending on interest, urgency, and available funding.

With continued reductions in available funds, the selection process and award of grants and other funding has become increasingly competitive. Therefore, it is important to show the following in funding applications:

1. A diverse group of partners and funding sources.
2. The ability to use one funding source to either leverage additional funds or to complement those funds for the same project.
3. The ability to accomplish multiple goals with one project.

A floodplain and watershed study is an example of a project that would accomplish multiple goals. This type of study would provide benefits of flood damage reduction alternatives, and also water quality benefits for the studied watershed and stream(s). The water quality findings and recommendations would benefit not only the studied watershed, but also the entire basin that ultimately drains to Lake Erie. Floodplain studies identify areas at risk of flooding, provide materials to communicate those risks to landowners, and provide data that local officials may use to prevent future losses within those areas. These studies can also be beneficial for separate watershed management plans by highlighting sensitive areas and recommending actions to prevent further degradation of receiving streams and waterways.

Each recommendation discussed in earlier chapters is listed below along with examples of potential funding sources that may be appropriate. These listings are not exhaustive since funding availability, priorities, and qualification standards change frequently.

4.1 FLOODPLAIN/WATERSHED STUDIES

Potential funding sources to complete approximate floodplain and watershed studies and also to complete inventories of riparian corridors within the Maumee, St. Joseph, and St. Marys River systems include the following:

1. **Federal Funding:**

   - FEMA Cooperating Technical Partner (CTP) – A main objective and benefit of the CTP Program is leveraging available funding and local data to get more updated flood hazard maps from limited resources. National mapping needs and partnering opportunities determine FEMA funding priorities. Federal funding is managed by the FEMA Regional Offices and provided through a cooperative agreement.

2. **State Funding:**

- Indiana Department of Environmental Management (IDEM) Section 319 Program – The Federal Clean Water Act Section 319(h) provides funding for various types of projects that work to reduce nonpoint source water pollution. Funds may be used to conduct assessments, develop and implement Total Maximum Daily Loads (TMDLs) and watershed management plans, provide technical assistance, demonstrate new technology and provide education and outreach. Organizations eligible for funding include nonprofit organizations, universities, and local, State or Federal government agencies. A 40% (non-federal) in-kind or cash match of the total project cost must be provided.

- Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) Program – The LARE program focuses on problem prevention. Its purpose is to ensure the continued viability of Indiana's publicly accessible lakes, streams, and reservoirs. Program goals include (a) controlling inflows of eroded soil and associated nutrients to lakes, streams, and reservoirs and (b) where appropriate, forestalling or reversing degradation from these inflows through remedial actions. To accomplish these goals, the LARE Section of the DNR Division of Fish and Wildlife provides technical and financial assistance to qualified projects. These include: (a) studies, management plans, sediment removal and design and construction activities involving specific lakes or streams; (b) land treatment practices or management plans for designated watersheds; (c) management plans and control of exotic plants and animals in targeted lakes; and (d) logjam removal from qualifying rivers.

- Indiana State Department of Agriculture (ISDA) Clean Water Indiana (CWI) Program – The CWI program was established in 1999 to conserve and enhance our land, lakes, and rivers by reducing the amount of polluted stormwater runoff that reaches Indiana's water resources. This will be accomplished by strengthening local Soil & Water Conservation Districts (SWCD). Ability to provide technical, coordination, and financial assistance to urban and rural landowners. The CWI fund is divided into two components: (1) State Match for Local Conservation Initiatives and (2) Urban and Rural Conservation on the Land.

- Community Development Block Grants (CDBG) – The CDBG program works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses. It is an important tool for helping local governments tackle serious challenges facing their communities. The CDBG program has made a difference in the lives of millions of people and their communities across the nation. This program is currently considering funding flood-related projects such as stream studies, floodplain management, ordinance development, and similar types of projects to reduce the impacts associated with flood events in their prioritized areas. These funds may be administered through the Indiana Office of Community and Rural Affairs or the Indiana Housing and Community Development Authority.

- Office of Community and Rural Affairs Grants (OCRA) – The Office of Community and Rural Affairs (OCRA) is the lead state agency in distributing funding appropriated to Indiana for disaster assistance. These funds may be used for public infrastructure restoration, economic revitalization, and other non-housing disaster recovery activities. OCRA serves as the state's primary liaison to the U.S. Department of Housing and Urban Development (HUD) the source of federal funds for long-term disaster recovery in areas affected by natural disasters. Examples of previous projects funded through OCRA grants include providing the local match for the FEMA Hazard Mitigation Home Buyout Program and local match for the FEMA Public Assistance Program.

3. **Local Funding:**

- MRBC – local cost-share match (in-kind and/or cash) to support programs in NFIP communities in the Maumee River Basin that have adopted Model Floodplain and Stormwater Management Ordinance language.

- County Commissioners/Municipal Councils – local cost-share match (in-kind and/or cash) required by State and Federal grants

- Developers – provide funding necessary to complete studies to ensure new development will not adversely impact the stream or floodplain.

- Local Watershed Groups – local in-kind and/or cash match required by State and Federal grants

- SWCDs – local in-kind and/or cash match required by State and Federal grants

- Indiana Resource, Conservation, & Development Districts (RC&D) – provides local in-kind and/or cash match required by State and Federal grants to accelerate the conservation, development, and utilization of natural resources, improve the general level of economic activity, and enhance the environmental and standard of living in the districts.

4.2 GIS/DATABASE MANAGEMENT

Potential funding sources to create a GIS layer and/or a database to track information specific to stream reaches and effected areas include the following:

1. **Federal Funding:**

   - FEMA Pre-Disaster Mitigation (competitive) (PDM-c) Grant Program – PDM(c) funds are available annually if funded by Congress. This program is nationally competitive, but provides communities with an opportunity to advance local mitigation projects. PDM(c) funds are limited to $3 Million per project award, which is enough to complete many local mitigation projects. Funding to produce a GIS layer or database may be provided as a key portion of a larger objective.

2. **State Funding:**

   - Community Development Block Grants (CDBG) - The CDBG program works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses. It is an important tool for helping local governments tackle serious challenges facing their communities. The CDBG program has made a difference in the lives of millions of people and their communities across the nation. This program is currently considering funding flood-related projects such as stream studies, floodplain management, ordinance development, and similar types of projects to reduce the impacts associated with flood events in their prioritized areas. These funds may be administered through the Indiana Office of Community and Rural Affairs or the Indiana Housing and Community Development Authority.

   - IDEM 319 Program – The Federal Clean Water Act Section 319(h) provides funding for various types of projects that work to reduce nonpoint source water pollution. Funds may be used to conduct assessments, develop and implement Total Maximum Daily Loads (TMDLs) and watershed management plans, provide technical assistance, demonstrate new technology, and provide education and outreach. Organizations eligible for funding include nonprofit organizations, universities, and local, State or Federal government agencies. A 40% (non-federal) in-kind or cash match of the total project cost must be provided.

3. **Local Funding:**

- MRBC – Local match (in-kind and/or cash) to support programs in NFIP communities in the Maumee River Basin that have adopted Model Floodplain and Stormwater Management Ordinance language.

- County Commissioners/Municipal Councils – Local cost-share match (in-kind and/or cash) required by State and Federal grants

- University of Toledo Center for of GIS & Applied Geographics - Local in-kind match required by State and Federal grants. The Center seeks to solve complex problems related to regional and community issues, environmental protection, land use planning, economic development, site characterization, resource mapping and GIS/GPS support.

- ESRI Grants – ESRI sponsors programs that help organizations serve society and better the environment using geographic information system (GIS) technology. ESRI-sponsored grants offer free software, hardware, and/or training for programs.

4.3 STREAM GAGES

Potential funding sources to establish additional gages include the following:

1. **Federal Funding:**

- United States Geological Survey (USGS) National Streamflow Information Program (NSIP) – The mission of NSIP is to provide the stream flow information and understanding required to meet local, State, regional, and national needs. Information obtained from these stream gages needs to be consistent, obtained using standard techniques and technology, and be subject to the same quality assurance and quality control.

- National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) – NOAA's National Weather Service has awarded integrated Automated Flood Warning System grants to reduce the loss of life, property damage and disruption of commerce from floods. Automated Flood Warning System are used in numerous communities to alert officials about flood threats, and also for environmental monitoring, water resource management, fire risk assessment, and homeland security. AFWS grants are awarded each year through a nationally competitive process.

2. **State Funding:**

- USGS Indiana – Can provide limited matching funds for operation and maintenance of stream gages as well as provide gage equipment as available.

- IDEM 319 – The Federal Clean Water Act Section 319(h) provides funding for various types of projects that work to reduce nonpoint source water pollution. Funds may be used to conduct assessments, develop and implement Total Maximum Daily Loads (TMDLs) and watershed management plans, provide technical assistance, demonstrate new technology and provide education and outreach. Organizations eligible for funding include nonprofit organizations, universities, and local, State or Federal government agencies. A 40% (non-federal) in-kind or cash match of the total project cost must be provided. (Can be utilized if water quality sampling is included in the real-time or interval sampling regime.)

3. **Local Funding:**

- MRBC – Local match (in-kind and/or cash) to support programs in NFIP communities in the Maumee River Basin that have adopted Model Floodplain and Stormwater Management Ordinance language.

- Allen County/City of Fort Wayne Emergency Management Agency – Local in-kind or cash match required by grants or partnership agreements.

- City of Fort Wayne – Local in-kind or cash match required by grants or partnership agreements.

- Allen County Partnership for Water Quality – Local in-kind or cash match required by grants or partnership agreements.

- County Commissioners/Municipal Councils – local cost-share match (in-kind and/or cash) required by State and Federal grants

4.4 ACQUISITION

Potential funding sources to continue voluntary acquisition of structures identified in High, Medium, and Low priority classes include the following:

1. **Federal Funding:**

   - FEMA Hazard Mitigation Grant Program (HMGP) - Post-disaster HMGP funds are disaster driven and only become available when a community receives a Presidential Disaster Declaration. HMGP funds provide an opportunity to accelerate mitigation efforts to reduce future flood damages.

   - FEMA Flood Mitigation Assistance (FMA) Grant Program – FMA funds are pre-disaster driven and available annually. The FMA Grant Program includes the former Repetitive Flood Claims (RFC) and Sever Repetitive Loss (SRL) grant programs. Eligibility criteria limit the use of this program to those structures that have an active Flood Insurance Policy. Each state receives an annual allocation from the NFIP.

   - FEMA PDM(c) Grant Program – PDM(c) funds are pre-disaster driven and available annually if funded by Congress. This program is nationally competitive, and provides communities with an opportunity to advance local mitigation projects. PDM(c) funds are limited to $3 Million per project award, enough to complete many local mitigation projects.

   - Land and Water Conservation Fund (LWCF) – LWCF provides matching grants to state and local governments for acquisition and development of public outdoor recreation areas and facilities. Funds have been widely used for land acquisition, open space/green space development, and similar projects that can reduce flooding impacts.

2. **State Funding:**
   - Indiana RC&D - Provides local in-kind and/or cash match required by State and Federal grants with the purpose of accelerating the conservation, development, and utilization of natural resources, improving the general level of economic activity, and enhancing the environment and standard of living in the districts.

   - IDNR – Heritage Trust – The purpose of the Indiana Heritage Trust Program is to acquire state interests in properties that are examples of outstanding natural resources and habitats, or that provide areas for conservation, recreation, protection or restoration of native biological diversity. IHT could serve as a cash or in-kind match for areas slated for acquisition that also provide a benefit that matches the goals of the IHT.

- Community Development Block Grants (CDBG) - The CDBG program works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses. It is an important tool for helping local governments tackle serious challenges facing their communities. The CDBG program has made a difference in the lives of millions of people and their communities across the nation. This program is currently considering funding flood-related projects such as stream studies, floodplain management, ordinance development, and similar types of projects to reduce the impacts associated with flood events in their prioritized areas. These funds may be administered through the Indiana Office of Community and Rural Affairs or the Indiana Housing and Community Development Authority

3. **Local Funding:**

- MRBC – Local match (in-kind and/or cash) to support programs in NFIP communities in the Maumee River Basin that have adopted Model Floodplain and Stormwater Management Ordinance language.

- County Commissioners / Municipal Councils – Local in-kind or cash match required by grants or partnership agreements.

- Local Land Trusts – May provide funding or technical assistance with acquired lands in environmentally sensitive areas where water quality and natural resource protection will be enhanced.

4.5 LOCAL FLOOD MITIGATION PROJECTS

Potential funding sources to mitigate flooding resulting from inadequate stormwater conveyance systems include the following:

1. **Federal Funding:**

- US Army Corps of Engineers (USACE) - Funding through USACE requires Authorization by Congress.

2. **State Funding:**

- IDNR Division of Water - Water Resources Development Funds - These funds can be accessed if specifically included in the IDNR biennial budget and approved by the Indiana legislature.

3. **Local Funding:**

   - MRBC – Local match (in-kind and/or cash) to support programs in NFIP communities in the Maumee River Basin that have adopted Model Ordinance language.

   - County Commissioners / Municipal Councils – Local in-kind or cash match required by grants or partnership agreements.

4.6 RESPONSE PLANS

Potential funding sources to develop evacuation plans or emergency action plans for areas protected by flood protection controls include the following:

1. **Federal Funding:**

   - FEMA PDM(c) Grant Program – PDM(c) funds are pre-disaster driven and available annually if funded by Congress. This program is nationally competitive, but provides communities with an opportunity to advance local mitigation projects. PDM(c) funds are limited to $3 Million per project award; enough to complete many local mitigation projects.

2. **State Funding:**

   - IDNR – Division of Water – Providing the necessary funding for the development of Emergency action plans for all State owned High Hazard dams.

3. **Local Funding:**

   - County Commissioners / Municipal Councils – Local in-kind or cash match required by grants or partnership agreements.

CHAPTER 5 IMPLEMENTATION PLAN

5.1 INTRODUCTION

MRBC's mission is to provide regional leadership and promotion of flood mitigation practices through a coordinated and comprehensive planning and implementing approach. MRBC's continued success in accomplishing this mission will depend on successful implementation of the recommendations from this Flood Mitigation Master Plan. This chapter presents recommended actions for implementing the recommendation from Chapter 3.

5.2 FLOOD HAZARD MAPPING

1. Continue pursuing cost-share funding through the Federal Emergency Management Agency (FEMA) Cooperating Technical Partner program (administered by Indiana Department of Natural Resources, Division of Water) and local contributions to complete new approximate studies, redelineations of suspect Zone AE areas, and restudy of streams with suspect floodways and base flood elevations. The following steps are listed in order of priority:

    a. Complete new approximate studies to delineate flood hazard areas and calculate approximate base flood elevations that IDNR will show on their website for the remaining 31 miles of unstudied streams.
    b. Complete new approximate studies to delineate flood hazard areas and calculate approximate base flood elevations that IDNR will show on their website for the remaining 188 miles of stream with outdated Zone A hazard mapping. Stream reaches in areas that are outside of municipal boundaries are the higher priority.
    c. Update mapping in suspect Zone AE areas.

2. Identify appropriate stream reaches and pursue funding for, and partnership with the United States Geologic Survey (USGS) to complete flood depth grids.

    a. Maintain professional relationship with USGS officials located in Indiana and participate in depth mapping efforts when appropriate.

3. Identify appropriate stream reaches and partner with Center for Earth & Environmental Science to complete fluvial erosion hazard mapping.

    a. Use mapping tools when they become available to identify risk areas.

5.3 VOLUNTARY MITIGATION AND FLOOD PROTECTION

1. Continue to pursue funding and encourage voluntary acquisition or retrofitting of buildings identified in High, Medium, and Low Priority classes.

    a. Work with local officials to prepare and submit grant applications, and assist throughout acquisition or retrofitting process.

2. Continue to encourage and facilitate acquisition of buildings in the Junk Ditch floodplain and recommend that no more development be allowed in the Junk Ditch/St. Marys River overflow floodplain.

    a. Send letter signed by board members detailing willingness to participate in acquisitions and also including the recommendation

3. For Junk Ditch between Edgerton Road and Jefferson Boulevard, encourage Fort Wayne to continue acquiring properties in the reach northeast of Jefferson Boulevard, raise Jefferson Boulevard, and retrofit the buildings located southwest of Jefferson Boulevard.

    a. Advise, encourage, and support Fort Wayne officials as they continue implementing flood reduction plans in this area.
    b. Participate in completion of hydraulic analysis to determine impact of raising Jefferson Boulevard and required size of new bridge opening to prevent upstream increases in flood elevation.
    c. Assist with building acquisition and retrofit projects.

4. Maintain up-to-date structure inventory.

    a. Remind floodplain administrators in each community to collect and forward data on new buildings in or near a floodplain. Data should include location and lowest adjacent grade for each new building.
    b. Review new aerial photography, when available, to identify new construction in or near flood hazard areas.

5. Initiate an evaluation of a proposed Impact Area designation and additional measures along Houk Ditch/Trier Ditch to maintain the bypass capacity for the St. Marys River.

    a. Meet with Fort Wayne officials to discuss the concept and work towards a plan for maintaining the bypass capacity.

5.4 FLOOD WARNING AND RIVER GAGES

1. Coordinate with USGS to install a stream gage on Cedar Creek near Waterloo.

2. Coordinate with USGS to install a gage on the St. Joseph River at Montpelier, Ohio to provide similar warnings as the Rockford gage on the St. Marys River

3. Continue upgrading early warning system technology in Fort Wayne and outlying communities when upgrade capabilities are made available.

4. Contact the following communities/organizations about becoming a regional partner: DeKalb County Department of Homeland Security; Towns of Leo, Cedarville, and New Haven; DeKalb Eastern School Corporation (due to location of a school in the St. Joseph River floodplain); and City of Auburn (their wastewater treatment facility operator needs to know stream discharge for appropriate effluent release.)

5. Encourage EMA Directors, Floodplain Administrators, Planning Directors, and other agency heads to sign up to receive USGS river gage notifications so that appropriate actions can be taken, and also to become familiar with the AHPS website and capabilities.

6. Work with USGS to develop more flood inundation libraries at AHPS forecast gages in the Maumee River Basin (especially the St. Joseph and Maumee Rivers to update these gages and models with new information) by leveraging existing detailed study modeling.

7. Coordinate with USGS to convert stream gages to forecast gages when sufficient data is available.

8. Encourage each county to prepare a Flood Response and Evacuation Plan.

5.5 FLOODPLAIN AND STORMWATER ORDINANCES

1. Continue using ASFPM's "Building Public Support for Floodplain Management Guidebook" to increase awareness and support for better floodplain management.

   a. Distribute copies to local officials, decision-makers and local media.
   b. Post electronic copies on MRBC webpage.

2. Continue working with floodplain administrators from each NFIP community to adopt the current **Model Ordinance for Flood Hazard Areas** (Appendix A).

3. Request that Indiana Department of Natural Resources update the Indiana Model Ordinance for Flood Hazard Areas to add language requiring IDNR approval prior to local adoption.

4. Continue working with local floodplain administrators to monitor status and enforcement of floodplain management ordinances, with special focus on cumulative impacts and preventing adverse impacts from new development.

5. Develop a new Model Watercourse Protection Ordinance and distribute it to member communities. The intent of this ordinance will be to safeguard and preserve watercourses, protect lives and property, prevent damage from flooding, protect drainage facilities, control erosion and sedimentation, reduce channel resizing, and enhance recreation and beneficial uses of watercourses.

6. Continue encouraging communities within the Maumee River Basin to adopt the MRBC Model Stormwater Management Ordinance and Stormwater Technical Standards Manual.

    a. Meet with floodplain administrators, stormwater managers, and elected officials to discuss benefits of adoption.
    b. Assist in setting a timeline for amending existing ordinances, local adoption, and process for incorporating future MRBC updates.

7. Continue providing technical and financial assistance to communities that adopt the MRBC Model Stormwater Management Ordinance and Stormwater Technical Standards Manual.

5.6 POST-FLOOD DAMAGE ASSESSMENT PROTOCOL

1. Assist and encourage each community to establish post flood damage assessment processes that include the items presented in Section 3.11.3.

2. Coordinate with local airport authorities to populate a list of pilots available for aerial reconnaissance after a major flood event.

3. Continue to provide High Water Mark training for community officials to ensure a uniform protocol is followed in establishing, collecting, and submitting High Water Mark data.

5.7 OTHER RECOMMENDATIONS

1. Continue to assist communities with stream obstruction removal by providing technical and coordination assistance, and also assisting County Surveyors with obstruction removal projects on St. Joseph, St. Marys, and Maumee Rivers.
2. Continue to network with, and collaborate on conservation projects with local SWCD, NRCS, ACRES Land Trust, Inc., Blue Heron Ministries, Trillium Land Trust, Nature Conservancy, Wood-Land-Lakes RC&D, and US Fish & Wildlife, for example.

3. Continue to identify and provide cost-share match to landowners in the Maumee River Basin willing to participate in land use conversion programs.

4. Work with local school corporations to incorporate "Floodplain Management" into their 4th grade curriculum.

    a. Obtain materials developed by IDNR Education Center and St. Joseph River Watershed Initiative.
    b. Encourage floodplain administrators to assist 4th grade classes to conduct a lesson on floodplain management, ideally during Flood Safety Awareness Week.

5. Continue to build partnerships with upstream communities in Ohio to encourage them to adopt more restrictive floodplain and stormwater management standards.

    a. Identify and meet with local officials in Ohio NFIP communities to discuss benefits of floodplain and stormwater management.
    b. Provide editable versions of MRBC model ordinances for the communities to use and consider adopting.

6. Promote continued public education and outreach to reduce flood losses, meet the requirements of the CRS program, and improve water quality through the NPDES Phase II program requirements.

7. Encourage member communities and partnering organizations to add a link to the MRBC on their webpage.

8. Although stormwater quality is not a main focus, MRBC should continue supporting water quality improvement efforts of local communities including assistance with and advice on adoption of MRBC's Model Stormwater Management Ordinance.

CHAPTER 6 SUMMARY AND CONCLUSIONS

The original master plan was completed in 1995 and, after evaluation of a wide range of alternatives, recommended several components for reducing flood damages to buildings and agricultural lands, and also to prevent additional damages from future development. MRBC updated the master plan in 2008 to provide an interactive, web-based plan and add mitigation recommendations for Allen County with reference to future development of similar plans for the other counties in the basin. This current plan builds on and expands the 2008 plan by adding mitigation details and recommendations for Adams, DeKalb, Noble, Steuben and Wells Counties along with updating data and recommendations for Allen County.

Since 1995, MRBC and its member communities have been working to implement those recommendations. Nearly 250 flood-prone buildings have been acquired and demolished, several small scale structural measures have been constructed, several flood prone structures have been retrofitted using MRBC funds, stricter, more uniform floodplain, storm drainage, and erosion control ordinances have been adopted, and various agricultural related opportunities to reduce flood risks have been made available.

The 2014 Flood Mitigation Master Plan update provided the opportunity to document accomplishments, and to update recommendations based on evaluations using latest available data and technological advances. An inventory of flood prone structures was completed for the entire basin using best available data and GIS database tools. This inventory showed nearly 6,000 buildings are located within the 1% annual chance floodplain. In addition, a large acreage of agricultural land is still affected by flooding along the stream corridors within the Maumee River Basin.

To address the mitigation or protection of these buildings, recommendations from the original Master Plan as well as additional ideas were evaluated to develop a new set of recommendations. Since most of the recommended structural measures for providing protection have been completed, continuation of the voluntary acquisition program is the main recommendation for reducing flood damages. To assist with the voluntary acquisition program, the building inventory was evaluated to assign a priority class to each building. MRBC and member communities can use this inventory and categorization to prioritize and focus on providing greatest benefit with available mitigation funds.

Other recommendations include continued adoption of MRBC policies and programs to prevent future flood related losses. To address the prevention of future increased flood risks, the model ordinances have been updated and principles to guide future development and maintenance of overflow paths for the St. Marys River are recommended. Stream reaches needing additional study were identified and categorized to properly identify flood risk areas throughout the basin.

Funding for these policies, programs, and projects will come from cooperative efforts with other local, state, and federal funding sources. Many of the recommendations in the Flood Mitigation Master Plan update are already in progress by MRBC and will continue or be enhanced. Other recommendations can be carried out immediately or will depend on funding availability and public or community cooperation and acceptance.

Recommendations and their implementation plans were selected based on the following overriding principles:

1. The overall goal of No Adverse Impact (NAI).

2. Recognition of the benefit of coordinating efforts between MRBC, local communities, and other available resources.

3. A desire to provide accurate information about the extent and implications of flooding.

When the original Master Plan was completed in 1995, the need for ongoing and regular updates to reflect changed circumstances due to additional data, new regulations, funding considerations, new policy directions, and experience gained as the plan is implemented was recognized. To that end, MRBC updated the original master plan in 2008, and again with this 2014 Flood Mitigation Master Plan update that reflects current conditions. Evaluation of the Flood Mitigation Master Plan will continue as the current recommendations are implemented and additional data is available.