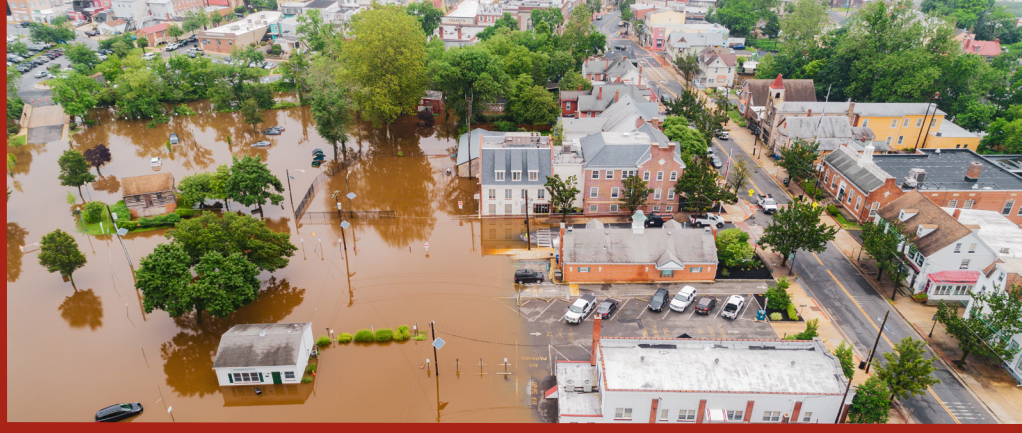

Wisconsin Flood Resilience Scorecard

A guided conversation for local officials to improve flood-related health outcomes in their community

Module 2

WISCONSIN DEPARTMENT of HEALTH SERVICES

Sea Grant University of Wisconsin

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Introduction

Welcome to the Wisconsin Flood Resilience Scorecard (FRS). By completing this guide, local governments will be able to:

- Gather valuable information about flood vulnerability in their community;
- Identify potential sources of vulnerability; and
- Consider recommendations for improvement on a variety of scales.

The FRS can support communities in preparing for flooding events, such as the 2008 flooding experienced in southern Wisconsin. This guide is not designed to address catastrophic events such as a 500-year flood.

This guide is intended for use by Wisconsin public officials in local government. This guide will refer to counties and municipalities collectively as "communities". It is intended to be comprehensive, encompassing three categories of vulnerability:

Module 1: Environmental - Physical and natural landscape characteristics such as soil and slope

Module 2: Institutional - Government and infrastructural capacity and content of existing policies and community plans

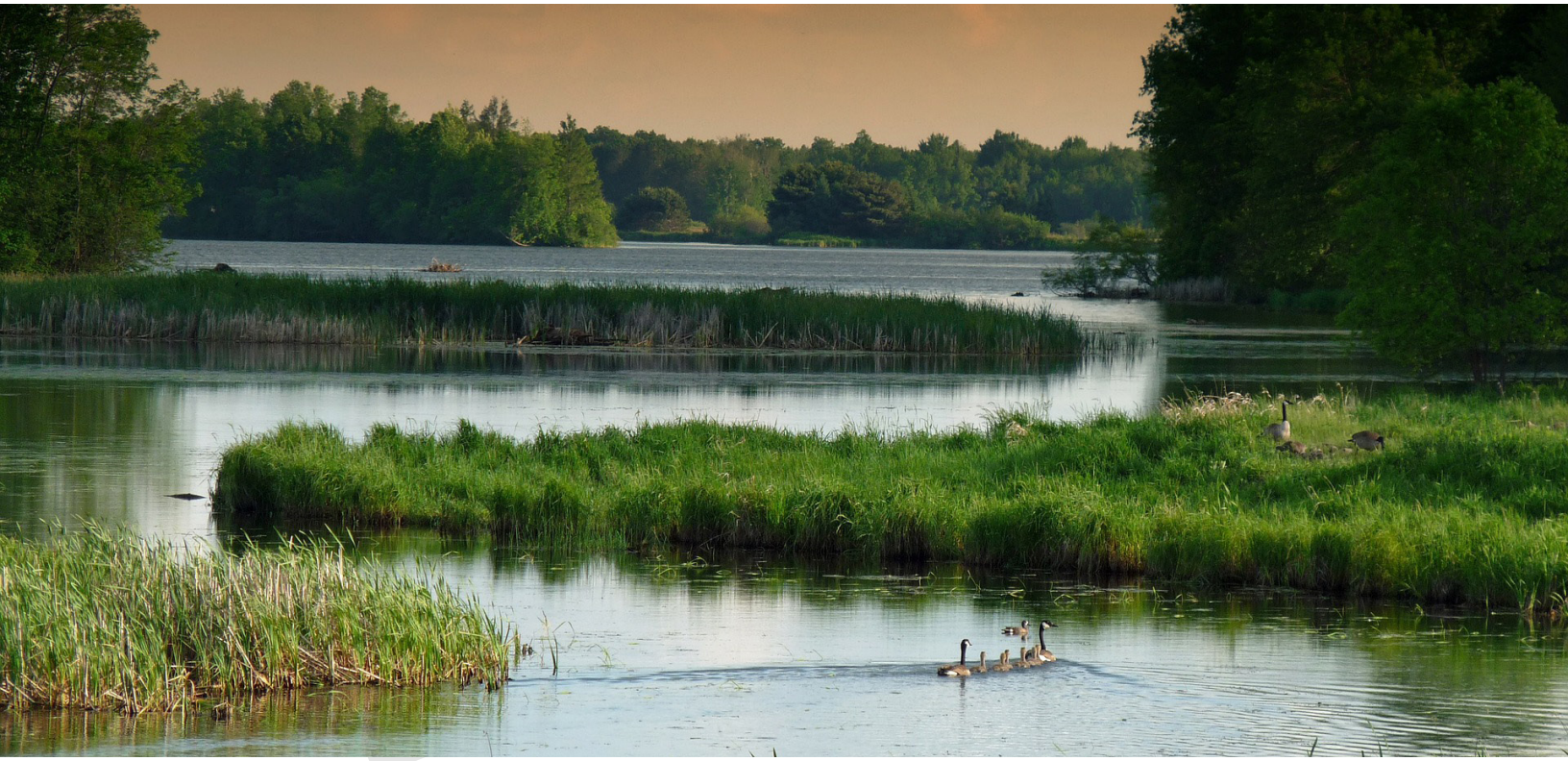
Module 3: Social - Cultural and socioeconomic sources of vulnerability and the potential for community partnerships

Public officials benefit from completing all three modules; however, each can be considered independently if only certain portions are of interest. While flooding intensity and the severity of outcomes are influenced by a variety of factors, this guide focuses specifically on reducing the quantity of floodwater.

Ultimately, this guide will help decision makers prioritize projects for improving flood resilience. The benefits of flood resilience are many: limiting the adverse impacts of excess runoff into streams, reducing the financial burden of replacing damaged infrastructure and homes, and limiting negative public health outcomes.

Flooding in Wisconsin

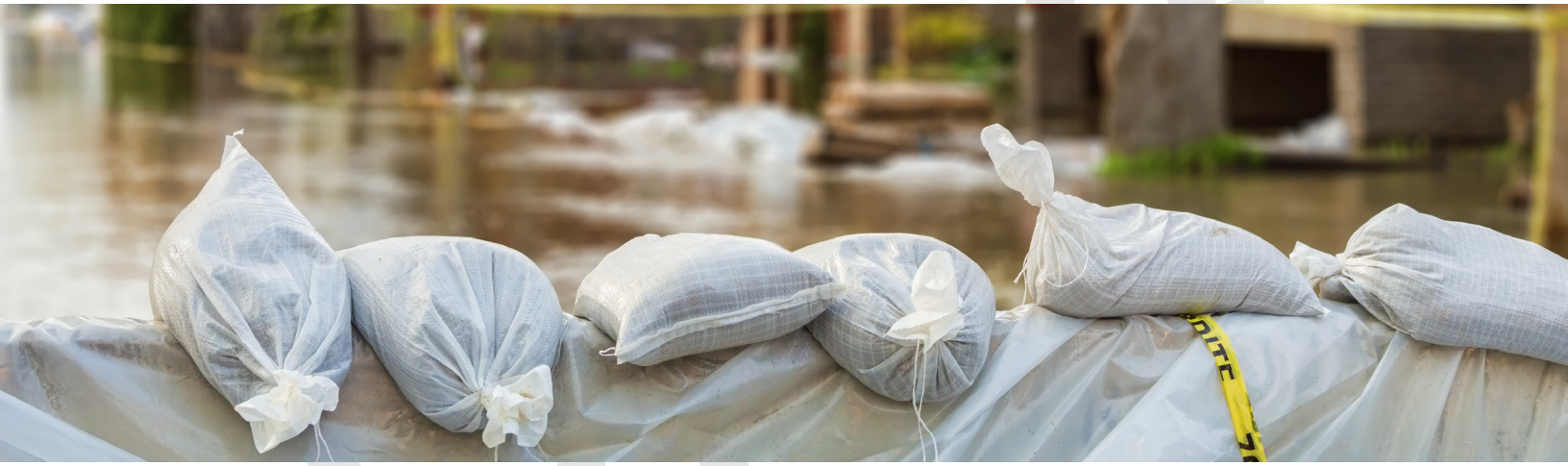
Wisconsin has an abundance of water features, including 15,000 lakes and 84,000 miles of river (Wisconsin Department of Natural Resources, 2020), which provide livelihoods and recreation for its residents. While this water contributes to rich agriculture, fishing and boating, and ample clean drinking water, it also presents a challenge as detrimental flooding events become increasingly common across the state.



According to the Pew Charitable Trusts, flooding is the costliest and most common natural disaster in the United States (The Pew Charitable Trusts, 2019). In 2013 Americans spent approximately $400 per household in an average year on such extreme weather events but expenses have likely increased with increasing frequency of natural disasters (Weiss & Weidman, 2013). Flooding was a principal cause of damage in 32 of 46 presidential disaster declarations and one of six presidential emergency declarations in Wisconsin from 1971 through June 2016 (Wisconsin Emergency Management & State of Wisconsin Homeland Security Council, 2017).

As an example, unprecedented amounts of rain tore through southern Wisconsin in August 2018, resulting in more than $200 million of dollars in damage (Kirwan & The Associated Press, 2018), as well as a statewide state of emergency declaration from Governor Scott Walker (Federal Emergency Management Agency, 2018). While average precipitation in the city of Madison for the month of August is 4.27 inches (National Oceanic and Atmospheric Administration, 2010), the storm hitting August 20th -21st of 2018 brought 11 inches in a 24-hour period (National Weather Service & National Oceanic and Atmospheric Administration, 2018b, 2018a). The official all-time Wisconsin 24-hour rainfall record is 11.72 inches from 1946, but during the August 2018 storm unofficial measurements reached up to 15 inches west of Madison in the Cross Plains area (Burt, 2019). Exacerbating these issues are the predictions that these extreme flooding events are only anticipated to increase in the coming years.

Recent climate modeling predicts that high-intensity storms and subsequent flood events are likely to increase throughout the Upper Midwest, including Wisconsin (Wisconsin Initiative on Climate Change Impacts, 2020) . While temperatures have been increasing throughout the state over the past century, precipitation patterns are more difficult to predict (Wisconsin Initiative on Climate Change Impacts, 2020). Over the past 70 years, annual precipitation has increased approximately 15%, or on average 4.5 inches throughout the state (Wisconsin Initiative on Climate Change Impacts, 2020). However, these trends are not uniform, with western and south-central Wisconsin seeing the wettest conditions and the north experiencing a drying trend (Wisconsin Initiative on Climate Change Impacts, 2020). Some of Wisconsin's most populous cities can be found in these wettest areas. Wisconsin public officials will need to consider these conditions when creating emergency preparedness, hazard mitigation and management plans, and developing policies.



Creating policies, retrofitting existing structures, and developing green infrastructure solutions comes at a cost, but these steps are essential if communities hope to withstand the natural hazards of the future. Ultimately, investing in solutions earlier will minimize the much greater costs that result from damage after an event has already occurred.

Public Health Effects of Flooding

Not only does flooding damage physical infrastructure, it can contribute to adverse health impacts for some of the state's most vulnerable populations. Flooding is the one of the greatest causes of death associated with natural disasters in the United States (Greenough et al., 2001). This includes both direct and immediate effects as well as indirect, long-term consequences. Direct effects may include drowning, electrical injuries associated with standing water, blunt trauma from objects caught in a storm surge and hypothermia (Greenough et al., 2001). People seeking medical care may also have difficulty accessing care during a flood event (Du et al., 2010), and the effects of flooding can continue to plague individuals for days, months, or even years. Floods can damage critical facilities such as hospitals and nursing homes, which makes routine care for patients with chronic diseases exceedingly difficult. Health facilities, overwhelmed by flood victims and physical damage, may lose medical records or have very limited resources to treat patients while also conducting surveillance on exposures to toxic materials or waterborne diseases (Du et al., 2010).

While contact with floodwaters alone may not pose health risks, sewage overflows may contaminate the water with pathogens such as Escherichia coli, Salmonella, and the hepatitis A virus (Du et al., 2010). Floodwaters can also flow through industrial sites and spread chemicals and other hazardous materials (Du et al., 2010). Overcrowded conditions and lack of sanitary facilities contribute to spread of communicable diseases, and stagnant water allows for the breeding of many disease vectors such as mosquitoes (Du et al., 2010). Finally, if cleanup is not conducted shortly after the flood event (a challenge for financially limited communities), mold is able to grow in damaged buildings. This results in the exacerbation of respiratory conditions such as asthma (Du et al., 2010).

There is also growing interest in the mental health impacts of flooding. Those who experience flood events report higher levels of depression, anxiety, and post-traumatic stress disorder (Waite et al. 2017). If a flooded individual also experiences utility disruptions, their poor mental health outcomes are even greater (Waite et al. 2017). People who are displaced from their homes due to flooding also report higher depression, anxiety, and post-traumatic stress disorder (Munro et al. 2018). French et al. (2019) also found that repeat flood victims may experience slightly higher levels of reported poor mental health. This may be important in considering health equity, as individuals who lack the means to relocate may be more susceptible to repeat flood events.

It is in the best interests of community members, local government and public health officials to minimize these adverse effects by putting preventative measures in place before events occur.

What to Expect from this Guide

Each module of this guide contains the following:

- A “Before you Begin” section explaining why to use this module, who should complete it and what that person or persons will need in order to complete it;
- Definitions and acronyms that will be used throughout the module;
- The module itself;
- A series of recommendations;
- And additional resources.

It is our intention that upon completion of this guide, a community will be able to choose from a variety of solutions and tailor them to be most appropriate for their financial and administrative capacity. The results can also be used to build support from regional partners and to apply for state and federal grant opportunities. Each community may find it appropriate for different staff members to complete the guide — we have provided a partial list of potentially suitable officials at the top of each module. Because this guide was designed to be comprehensive, it is possible that certain portions are not applicable to every community or that certain portions have already been thoroughly examined by a community in the recent past. Each community can customize this guide as is sensible for their needs.

Who Should Participate

The Scorecard was designed for use by public officials and local government staff. It is up to those leading the process to recruit a team of people with the backgrounds and experiences necessary to complete this Scorecard. The Scorecard requires knowledge of the technicalities of infrastructure, zoning, and policy as well as knowledge of community inner workings and relationships. Those on your staff with water resources, engineering, planning, zoning, emergency management and/or community organizing experience are recommended. Other community members, e.g., those who lead health programs and long-time residents, may also be important contributors to this process because of their first-hand experiences living and working in the community.

While every community is encouraged to use the Flood Resilience Scorecard, we recognize some limitations in the usability of the FRS for tribal nations of Wisconsin. Wisconsin has an important population of Indigenous people among 11 federally recognized tribes that have faced severe flood events exacerbated by systemic inequities. The FRS relies on a significant amount of mapping and, in its current form, is tailored for Wisconsin's incorporated municipalities and counties. This inherently leaves some circumstances and institutional conditions of tribal nations unaddressed.

For example, many tribes are geographically dispersed. A reservation can include many other jurisdictions, making it difficult to assess vulnerabilities or makes changes within jurisdictional lines. Similarly, tribal nations have had a historically strained relationship with FEMA, limiting available mapping technologies of floodplains in reservations. Equally important to note is the historical reality of trauma and miscommunication tribes have experienced. Tribal communities' possible mistrust, particularly for government agencies and their work, is levied through centuries of violence, abuse, and mistreatment, often a result of state and federal governments impending on tribes' sovereignty. While the FRS may not be perfectly applicable, it can still serve as a resource to tribes. One benefit of this tool is how it is rooted in the individual community. By using local knowledge and experts who know your community best, it gives a sense of control and agency in flood resilience.

Tribes are encouraged to participate and can contact Maggie Thelen at Margaret.thelen@dhs.wisconsin.gov if interested in exploring how this document can be adapted to a specific tribe.

Scoring

Questions are equally weighted within the guide. It does not result in a numeric score, instead, if a community does not reach a particular threshold of favorably answered questions, they will be redirected to the appropriate recommendations section. For example, if a community has scored poorly on the "Resource Inventory and Monitoring" section of the Institutional module, the corresponding "Resource Inventory and Monitoring" section of recommendations should be consulted. Some strategies are relatively inexpensive, whereas others require a greater amount of money, staff, and technological capacity. It is possible to increase flood resilience with a variety of tools and strategies.

There are dozens of resources to be found online that can provide more information than is contained in this guide alone. Many of these tools and data, including from the Federal Emergency Management Agency (FEMA), the National Oceanic and Atmospheric Administration (NOAA), the Wisconsin Department of Natural Resources (DNR) and many other authorities can be found in the Recommendations section.

The causes and effects of floods are complex and interconnected; it can be difficult to anticipate where and when flooding will occur and what strategies can ensure community resilience. However, this guide provides a foundation of concepts that are appropriate for communities both unfamiliar and well-versed in flood hazard mitigation.

Flood Resilience Scorecard Data Companion

Many of the questions in this guide request data that is publicly available but often difficult to obtain, analyze or interpret. To make these data more accessible to the users of the Flood Resilience Scorecard, the developers of this guide created the Flood Resilience Scorecard Data Companion.

The Data Companion is a separate document that contains 32 data points that serve as answers to questions in this guide. The Data Companion is specific to your community, with a unique document for all 72 counties and more than 600 cities and villages in the state. If you would like to access your Data Companion, contact Margaret Thelen, Climate and Health Program Coordinator at the Wisconsin Department of Health Services, at Margaret.Thelen@dhs.wisconsin.gov.

The 32 data points provided in the Data Companion are coded to align with the question number in this guide. For example, question E-B3 in this guide related to steep slopes can be answered with the information found in the Data Companion listed as E-B3. Questions in this guide that refer to information that can be found in the Data Companion will be noted with the symbol found to the right.

The Data Companion is currently only available for incorporated municipalities (cities and villages) and counties in Wisconsin. Other jurisdictions such as towns or watersheds, are encouraged to use the Flood Resilience Scorecard using the Data Instruction Manual described below.

Flood Resilience Scorecard Data Instruction Manual

Although the Flood Resilience Scorecard Data Companion is only available for municipalities and counties in Wisconsin, other communities and jurisdictions such as towns and watersheds are encouraged to participate. In absence of the Data Companion, we created the Flood Reslience Scorecard Data Instruction Manual.

The Data Instruction Manual details how to access the data required in a step-by-step walkthrough. For each question in this guide that contains the Data Companion logo shown above, you may also use the Data Instruction Manual to access the data for yourself. The Data Instruction Manual is for users both with and without access to Geographic Information Systems (GIS).

Acknowledgments

This Scorecard was initially developed by Haley Briel as a professional project for M.S. completion with the Department of Planning and Landscape Architecture at the University of Wisconsin – Madison. Further development of the guide, including its current iteration, has been completed by the Climate and Health Program at the Wisconsin Department of Health Services (DHS). Editing and professional expertise have been provided by:

- Asli Gocmen, Ken Genskow and Jim LaGro, University of Wisconsin – Madison Urban and Regional Planning Department;
- Ken Potter, University of Wisconsin – Madison Civil Engineering Department;
- Troy Maggied and his staff, Wisconsin Southwest Regional Planning Commission;
- Roxanne Gray and Katie Sommers, Wisconsin Emergency Management;
- Emma Holtan, Climate and Health Program Limited Term Employment (LTE);
- Jackson Parr, Flood Resilience Fellow at the Wisconsin Department of Health Services;
- The Association of State Floodplain Managers;
- The Climate and Health Program's Science Advisory Group members; and
- The University of Wisconsin Sea Grant Institute.

Many thanks are in order to these individuals and organizations for their insight in developing this guide. For questions or comments concerning this guide, please contact Margaret Thelen, Climate and Health Program Coordinator, at Margaret.Thelen@dhs.wisconsin.gov.

Module Two: Institutional

Overview

Planning and mitigation are less costly and more efficient approaches to building resilience than response and recovery. Successful planning relies on coordination across multiple levels of government and organizations, strong community plans and well-informed floodplain regulation. The institutional parameters to be assessed in this portion of the Scorecard include:

Resource Inventory & Mapping

- Up-to-date maps of floodplains, flood hazards and past flood impacts are important to community development and emergency response planning and can inform policy and regulation so as to best prevent future property damage and loss.
- Enrollment in FEMA's National Flood Insurance Program (NFIP) and Community Rating System provide protection for community members and property by providing flood insurance commonly left out of regular homeowners insurance and incentivizing flood mitigation practices.

Plan Quality & Coordination

- Having consistent maps, language and regulations around flooding across all community plans strengthens future planning and limits confusion.
- Including an array of different stakeholders, departments and expertise in community planning will move your community toward a more comprehensive and holistic approach to flood resilience.

Staff & Technological Capacity

- Having your staff trained in floodplain management or collaborating with trained staff within your region allows your community to plan for flooding with the most up-to-date and well-informed practices.
- Access to geographic information systems (GIS) or other mapping technology in your community or through regional connections is essential to flood mitigation planning.

Tools

- In a time when infrastructure across the country is in disrepair, making sure to closely monitor existing gray infrastructure and implement green infrastructure whenever possible in future development helps build flood resilience.
- Outside of infrastructure, your community can also implement numerous non-structural policy tools that regulate and incentivize proper floodplain and stormwater management.

Implementation & Enforcement

- Having a sound process to assess properties deemed "Substantially Damaged" by FEMA is important in order to get the best relief and support possible after a flood event.
- Having flood resilience goals can help your community streamline, prioritize and collaborate effectively around flood mitigation and management.

Who Should Complete this Assessment?

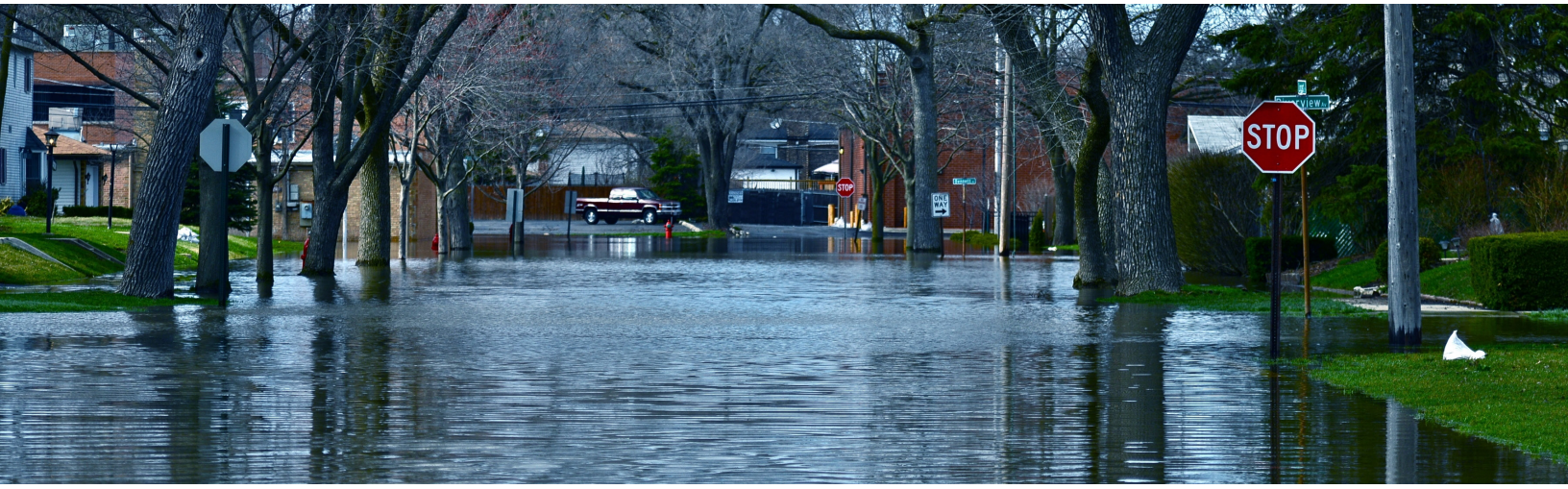
One or more individuals from the following groups may be appropriate to conduct this assessment:

- City planning staff
- Community development staff
- Economic development staff

Alternatively, whoever knows the most about your community plans (e.g., comprehensive plan, hazard mitigation plan, area plans, transit plans) could complete this section.

What Will you Need to Complete this Assessment?

- The Flood Resilience Scorecard Data Companion or the Data Instruction Manual
- All land-use-related community plans, such as your stormwater management plan, comprehensive plan and so on
- Flood Insurance Rate Maps (FIRMs) from FEMA
  - » A FIRM is an official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.
  - » Full FIRM panels are 36”x25.875,” so most users prefer to print a smaller selected version called a FIRMette, which is adapted to print on a standard home printer.
  - » Individual maps can be downloaded from msc.fema.gov by entering an address or place in the search bar. Then click the “DYNAMIC MAP PRINT MAP/FIRMette” button to download and print your map or maps. Some communities may be small enough that their entire area is contained within one map.
- Any other flood-related maps within your community plans and/or reports
- Flood or hazard mitigation-related policies
- Knowledge of the status of both current and planned green and gray infrastructure within your community



Definitions

A Zone: Areas subject to inundation by the 1% annual chance flood event. Detailed hydraulic analyses have not been performed, so no base flood elevations (BFEs) or flood depths are shown.

Best Management Practices: Best management practices (BMPs) are defined by the North Carolina Forest Service as "a practice, or combination of practices, that is determined to be an effective and practicable (including technological, economic, and institutional considerations) means" for meeting goals; for the purpose of this assessment, this goal is reducing flood damage.

Certified Floodplain Manager (CFM): This is a national floodplain management certification program administered by the Association of State Floodplain Managers (ASFPM). A floodplain manager is a professional trained in strategies and policies to reduce flood losses and protect natural resources and functions of floodplains.

Channel modification: Human-induced changes to the natural flow and location of a stream channel.

Closed-basin lakes: Lakes that have either a small outlet or no outlet and may remain above flood stage for years.

Coastal erosion: The wearing away of material from a coastal profile, including the removal of beach, sand dunes or sediment by wave action, tidal currents, wave currents, drainage or high winds.

Combined sewer system (CSS): A system that is designed to collect rainwater runoff, domestic sewage and industrial wastewater in the same pipe (US EPA, 2020).

Combined sewer overflow (CSO): When the volume of wastewater exceeds the capacity of a CSS (e.g., during heavy rainfall events or snowmelt), untreated stormwater and wastewater overflow and discharge into nearby streams, rivers and water bodies, which has negative implications for local water quality (US EPA, 2020).

Community Rating System (CRS): A program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP (defined below) standards.

Dam failure inundation area: The area that would be flooded if a dam were to be damaged and no longer function.

Emergency Action Plan: A written document required by particular OSHA standards to facilitate and organize employer and employee actions during workplace emergencies, including floods.

Future conditions hydrology: Flood discharges are modeled and mapped by communities based on projected land use conditions, not just current conditions. More information can be found in the FEMA document "Modernizing FEMA's Flood Hazard Mapping Program: Recommendations for Using Future-Conditions Hydrology for the National Flood Insurance Program."

Geographic information system (GIS): Software designed to store, retrieve, manage, display and analyze all types of geographic and spatial data.

Green infrastructure: A flood management technique that uses vegetation, soils and other elements and practices to enhance on-site stormwater infiltration and treatment utilizing natural processes. These techniques can be used in partnership with traditional gray infrastructure, such as dams and levees.

Green roof: A flat or slightly sloped building roof that is partially or completely covered with vegetation and a growing medium, planted over a waterproof membrane.

Hazus: A nationally applicable standardized methodology developed by FEMA that contains models for estimating potential losses from earthquakes, floods and hurricanes. It uses GIS technology to estimate physical, economic and social impacts of disasters.

Ice jam: Pieces of floating ice carried with a stream's current can accumulate and create an obstruction to streamflow which is called an ice jam. They generally develop near river bends, mouths of tributaries, points where the river slope decreases, downstream of dams and upstream of bridges or obstructions (National Weather Service, n.d.).

Land subsidence: The gradual settling or sudden sinking of the Earth's surface due to subsurface movement of earth materials (United States Geological Survey, 2020).

Mudflow: A river of liquid mud similar in consistency to a milkshake.

National Flood Insurance Program (NFIP): A federal program administered by FEMA that enables property owners in participating communities to purchase insurance against flood losses, in return for that community adhering to certain development regulations.

Open space zoning district: A zoning strategy that requires new construction on a parcel to be located on only a portion—typically half—of the parcel. The remaining open space is permanently protected under a conservation easement (Arendt, 1992)

Permeable pavement: An alternative paving surface that allows stormwater runoff to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated.

Rain garden: A garden of native shrubs, perennials and flowers planted in a small depression, designed to temporarily hold and soak in rain water runoff that flows from roofs, driveways, patios or lawns.

Repetitive loss property: Any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling 10-year period, since 1978.

River erosion: The wearing away of rock and soil found along the riverbed and banks.

Stormwater management plan: A plan made by a community to identify potential sources of stormwater pollution on a construction, industrial or municipal site and describe best management practices to reduce pollutants in stormwater discharge from these sites.

Substantially damaged: In Wisconsin, a property is considered substantially damaged if the cost of repairs is 50% or more of the structure's equalized assessed value as listed before the damage occurred (Wisconsin Department of Natural Resources, n.d.).

Uncertain flow paths: Alluvial fans, movable bed streams or other floodplains where the channel moves during a flood.

V Zone: Velocity zones subject to storm surge and wave action. Buildings located here will likely be damaged or demolished unless constructed to certain high standards.

I-A) Resource Inventory & Mapping

This section includes an assessment of your community's up-to-date flood maps, historical records and other background information necessary to inform planning for the future.

For this section you will need to find your community's Flood Insurance Rate Maps (FIRMs); please visit the FEMA Map Service Center at msc.fema.gov.

Here, you can input an address or set of longitude and latitude coordinates to focus in on your community, and you will be directed to your FIRMs. There may be more than one, depending on the size of your area of interest.

On the map itself, there is a date listed that indicates the most recent update of your map (it is indicated as "eff. 2/3/2016"). In this example, the FIRM for this selected area was last updated February 3, 2016. This is important for evaluating whether another update is necessary.

To complete this section, it may also be helpful to have any other flood-related maps delineated for your community and your floodplain management policies.

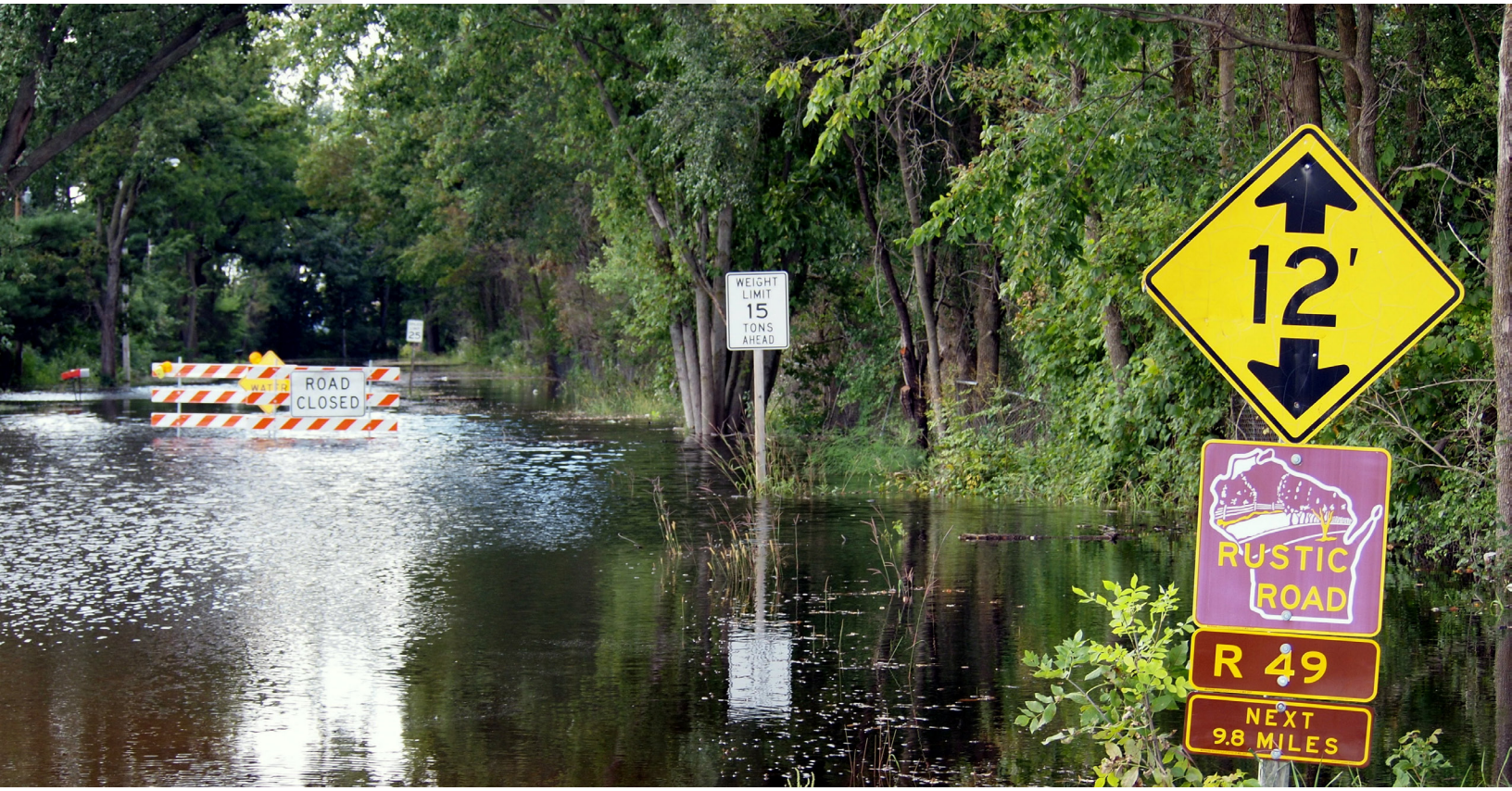
I-A1. Does your community have a Flood Insurance Rate Map(s)?

A. Yes, and it has been updated <5 years ago

B. Yes, but it hasn't been updated in >5 years

C. Yes, but only part of our community has been mapped

D. No, we have no flood hazard map of any kind



I-A2. How frequently have major flood events impacted your community in the past ten years?

A. Never

B. Infrequently

C. Approximately every other year

D. At least once a year

I-A3. Has your community mapped the extent of previous flood events?

A. Yes, all previous floods have been mapped and documented

B. Yes, some of the previous floods have been mapped and documented

C. Previous flood extents have been documented but not mapped

D. Previous flood extents have been neither documented nor mapped

I-A4. Does your community participate in the National Flood Insurance Program (NFIP)?

A. Yes, and we are in full compliance

B. Yes, but we are not in full compliance

C. No, but we have considered participating or did previously

D. No, we have never explored this option

I-A5. How many NFIP policies are in force in your community?

A. None (0)

B. Less than 5

C. Between 5 and 50

D. More than 50

I-A6. What is the total coverage of your community's NFIP policies in force?

A. None ($0)

B. Less than $1 million

C. Between $1 - $5 million

D. More than $5 million

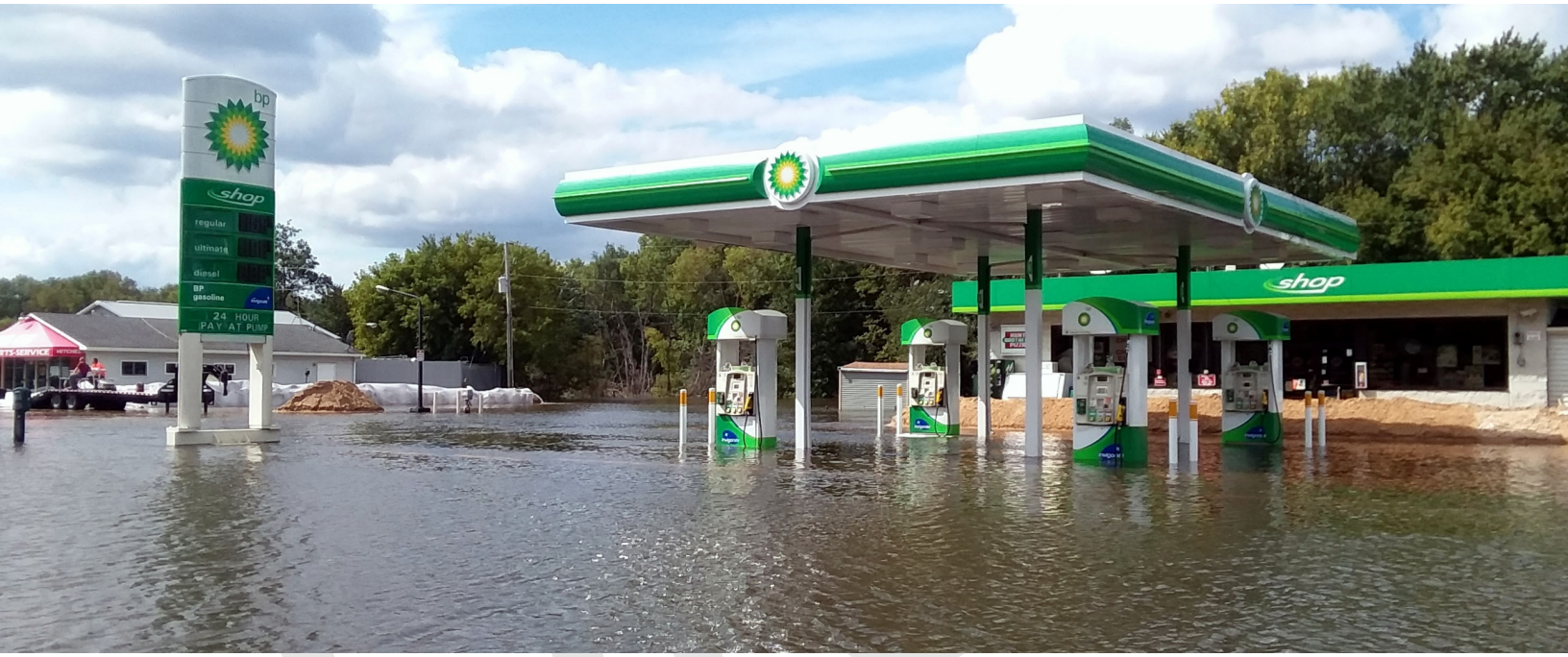
I-A7. How many NFIP claims have been filed in your community?

A. None (0)

B. Less than 10

C. Between 10 - 50

D. More than 50



I-A8. Does your community participate in the Community Rating System program through the National Flood Insurance Program (NFIP)?

A. Yes

B. No, but we have considered participating or did previously

C. No, we have never explored this option

I-A9. In your community, has a plan, including funding and designated staff or a responsible department, been designated to keep flood hazard maps up to date?

A. Yes, there is a plan or policy that designates both funding and staff/responsible department to update hazard maps

B. Yes, there is a plan or policy that designates either funding or staff/responsible department, but not both

C. Updating flood maps is mentioned in our plans, but with no specifics as to funding or staff/responsible department

D. We do not take an active role in updating flood maps

I-A10. Does your community require that developers provide detailed flood data (base flood elevation data), particularly if they are developing within a flood zone?

A. Yes, we require developers to provide flood data for all size developments anywhere in the community, not just the floodplain

B. Yes, we require development anywhere in the community to provide flood data, but only for larger developments and not residential homes

C. Yes, we require developers to provide flood data, but only within floodplain zones

D. No, we do not require developers to provide flood data

I-A11. Are you aware of any of the following flood-related hazards affecting your community?

- Uncertain flow paths
- Closed-basin lakes
- Ice jams
- Debris and sediment blockage
- Land subsidence
- Mudflow hazards
- Dam failure inundation
- Coastal erosion
- River erosion
- Channel modification

A. Yes

B. No

C. Unsure

I-A12. If yes, how many of the flood-related hazards that affect your community have you mapped?

A. We have mapped all flood-related hazards that affect our community

B. We have mapped some of these hazards

C. We have not mapped these hazards

Scoring Resource Inventory & Mapping

Review your responses to the questions in this section and sum the number of times you responded with each letter. Provide that number in the appropriate row to the right.

If you answered “c”, “d”, or "e" to six or more questions, please refer to the Resource Inventory & Mapping recommendations section on page 76.

Number of “a” answers: _____

Number of “b” answers: _____

Number of “c” answers: _____

Number of “d” answers: _____

Number of “e” answers: _____

I-B) Plan Quality & Coordination

For this section, you will need to assemble all of your community plans, zoning code, and ordinances. These may include comprehensive land use plans, transportation plans, economic development plans, downtown improvement plans, historic district plans, coastal zone management plans, watershed management plans, and so on.

List the plans your community uses below:

Plan Name	Identifies current flood-prone zones	Identifies future flood-prone zones	Restricts damage-prone development in such zones
Plan 1:			
Plan 2:			
Plan 3:			
Plan 4:			
Plan 5:			
Plan 6:			
Plan 7:			
Plan 8:			

I-B1. How many of your community's plans identify current flood-prone zones?

A. All of them

B. Some of them

C. None

I-B2. How many of your community's plans identify future flood-prone zones?

A. All of them

B. Some of them

C. None

I-B3. How many of your community's plans suggest restricting development in flood-prone zones, current or future?

A. All of them

B. Over half of them

C. Less than half of them

D. None

I-B4. Is there a designated floodplain management plan in your community?

A. Yes, and it has been updated in the past five years

B. Yes, but it has not been updated in the past five years

C. No, but there are elements of floodplain management included in our other plans

D. No, no such plan or plan elements exist

I-B5. Are floodplains in your community designated as an open space zoning district (such as recreation or conservation) that will limit flood damage?

A. Yes, all areas within the floodplain are zoned to limit development

B. Some, but not all, of the floodplain is zoned to limit development

C. No, floodplains are not zoned to limit flood damage

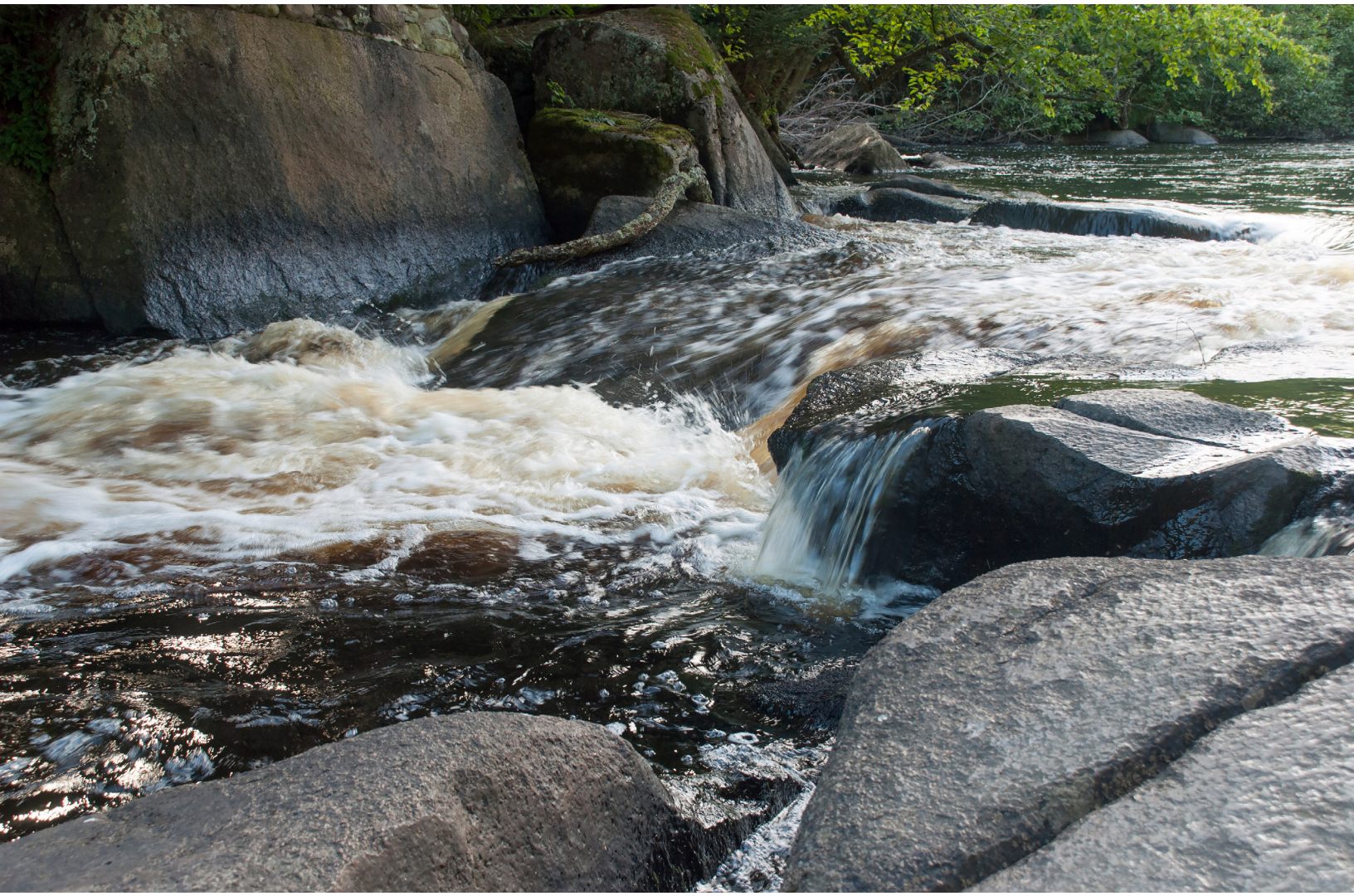
I-B6. Is there a community-wide open space or parks plan that specifies the role of open space in stormwater management?

A. Yes, and it has been updated in the past five years

B. Yes, but it has not been updated in the past five years

C. No, but there are elements of open space and stormwater management included in our other plans

D. No, no such plan or plan elements exist



I-B7. Are designated stormwater management plans required from developers in your community?

A. Yes, stormwater management plans are required of developers

B. Stormwater management plans are required of developers in flood zones or for larger developments

C. No, we do not require stormwater management plans from developers in our community

I-B8. How frequently do your departments communicate on stormwater planning and issues to develop compatible messages and goals concerning stormwater?

A. Extensive efforts have been made to coordinate messaging and goals

B. Some efforts have been made to coordinate messaging and goals

C. No efforts have been made to coordinate messaging and goals

I-B9. Does the community involve staff with scientific training in water issues when developing comprehensive land use plans?

A. Always

B. Sometimes

C. No

I-B10. Are regular interdepartmental meetings or trainings held regarding flood-based issues in your community?

A. Once a year or more

B. These meetings are only held as issues emerge

C. We rarely host such meetings, but have in the past

D. No, these sorts of meetings are not held

I-B11. Do you work with other governmental agencies or other communities on water-related hazards projects?

A. Yes

B. We have before, but it is inconsistent

C. No

I-B12. Are your community's comprehensive plans, stormwater reports and other water resources management documents easily accessible to the public and officials?

A. Yes, these documents are available and easy to locate online for public and official use

B. Yes, these documents are available, but only upon request

C. No, these documents are available for officials, but not for the public

D. No, these documents are difficult to access or do not exist at all

Scoring Plan Quality & Coordination

Review your responses to the questions in this section and sum the number of times you responded with each letter. Provide that number in the appropriate row to the right.

If you answered "c", "d", or "e" to seven or more questions, please refer to the Plan Quality & Coordination recommendations section on page 76.

Number of "a" answers: _____

Number of "b" answers: _____

Number of "c" answers: _____

Number of "d" answers: _____

Number of "e" answers: _____

I-C) Staff & Technological Capacity

For this section, you will need to review flood-related policies and descriptions of staff responsibilities to determine roles and functions related to flooding. While you don't need specific materials, you may need to consult community plans.

I-C1. Does your community have a designated department to address flooding issues?

A. Yes, one specific department has been identified to address flooding issues

B. No, but specific employees from multiple departments have been identified to address flooding issues

C. No, responsible departments are not identified until a flooding event has already happened

I-C2. Does your community have staff to perform site assessments specifically to evaluate flood potential?

A. Yes, we have designated staff to perform site assessments

B. No, but we have performed site assessments in the past

C. No, we do not perform site assessments

I-C3. Does your community have any individuals on staff who have completed the Certified Floodplain Manager (CFM) program through the Association of State Floodplain Managers?

A. Yes, we have at least one CFM on staff

B. No, but we consult with at least one CFM at a regional or county level

C. No, we do not have access to a CFM

I-C4. Does your community have access to geographic information system (GIS) software or other mapping technology?

A. Yes, at least one department has access to GIS and has committed full time staff trained in it

B. Yes, at least one department has access to GIS, but it has limited training or capacity to use the software

C. No, but we have had some analyses done previously in GIS by an external partner

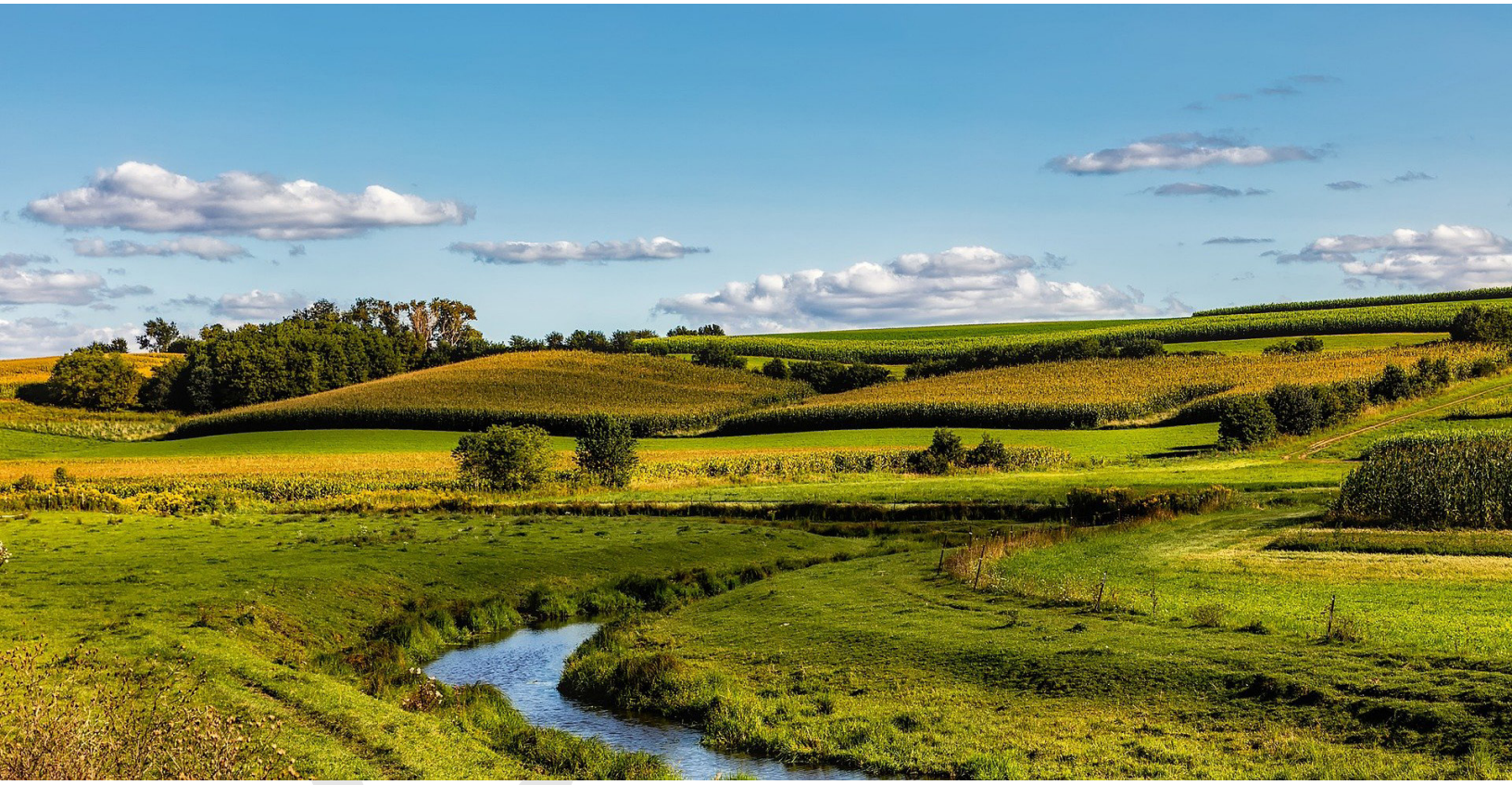
D. No, we have no staff or software to support mapping in-house, nor have such maps been made

I-C5. If yes, have you used tools in GIS including the Flood Loss Estimation Model or FEMA's Hazus?

A. Yes, we have explored and used additional flood-specific tools through GIS

B. Yes, we have at least explored additional flood-specific tools

C. No, we have not explored these options in GIS



I-C6. Has your community worked in collaboration with other regional partners to enhance staff and technological capacity?

A. Yes, we frequently work closely with regional partners on projects

B. Yes, we have reached out to at least one regional partner to initiate collaboration

C. No, we have not made attempts to coordinate with regional partners for flood resilience

Scoring Staff & Technological Capacity

Review your responses to the questions in this section and sum the number of times you responded with each letter. Provide that number in the appropriate row to the right.

If you answered "c" or "d" to three or more questions, please refer to the Staff & Technological Capacity recommendations section on page 77.

Number of "a" answers: _____

Number of "b" answers: _____

Number of "c" answers: _____

Number of "d" answers: _____

I-D) Tools

For this section, you will need knowledge of both structural (physical infrastructure such as dams and rain gardens) and non-structural (policies and regulations) tools related to flooding. This may just be common knowledge among your staff or contained within community plans.

Structural

I-D1. Does your community have a combined sewer system (CSS)?

A. Yes

B. No

I-D2. If yes, has your community experienced a combined sewer overflow (CSO)?

A. No, this has never been a problem in our community

B. Yes, it has happened, but more than ten years ago

C. Yes, it happens, but not regularly

D. Yes, this happens at least once a year

Incentivizing and Promoting Green Infrastructure

I-D3. Are green infrastructure strategies such as green roofs and permeable pavement permitted and encouraged in your community's plans?

A. Yes, they are actively encouraged

B. Yes, they are permitted

C. Some but not all are permitted

D. Green infrastructure is not mentioned in our plans

I-D4. Do your community's transportation plans promote green infrastructure in new street design?

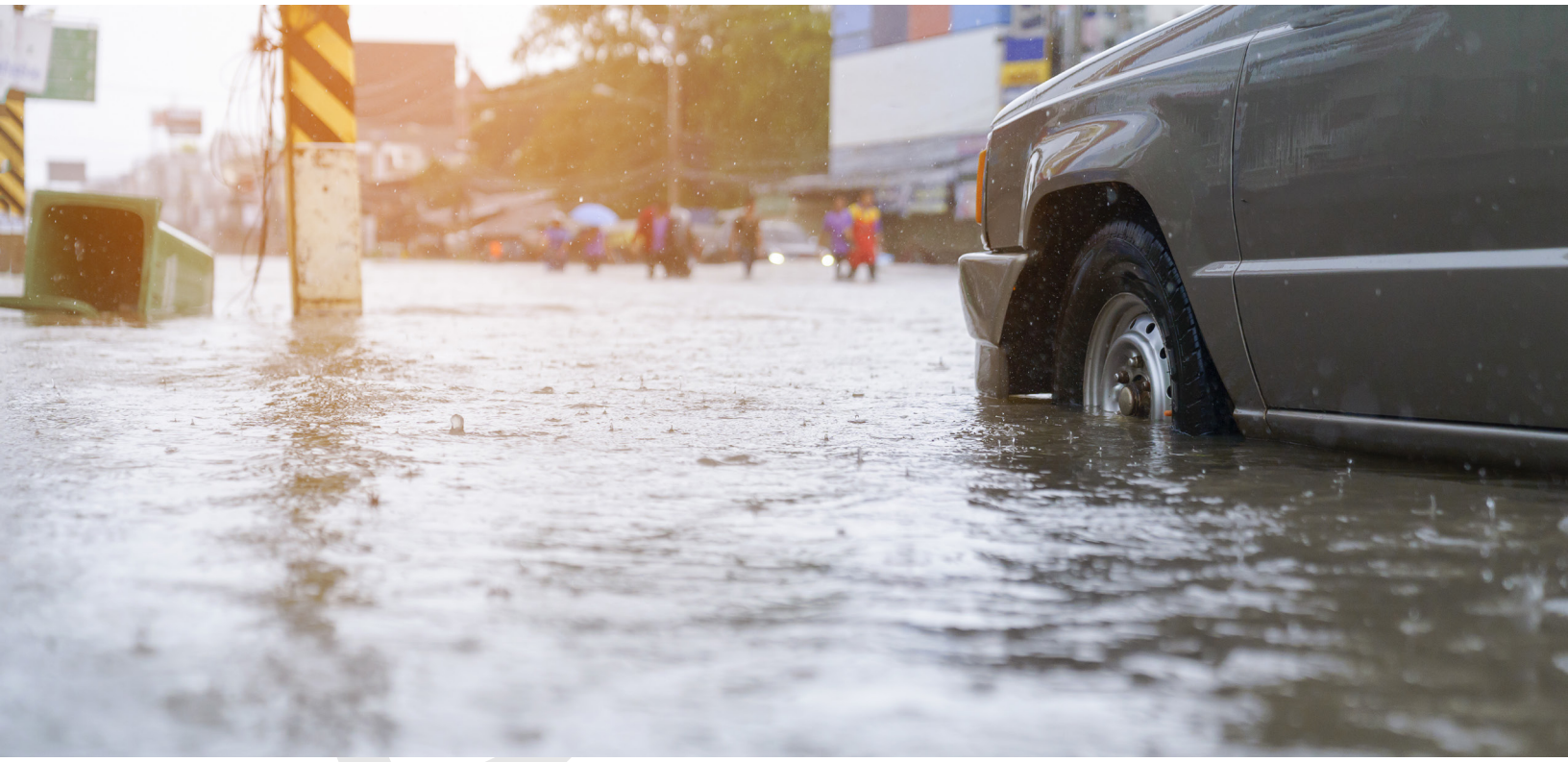
A. Yes, it is actively encouraged

B. Yes, it is permitted

C. Green infrastructure is not mentioned in our street design policies

I-D5. Does your community analyze sites for possible redevelopment as green infrastructure sites?

A. Yes, sites have been both identified and redeveloped into green infrastructure sites already
B. Yes, sites have been identified, but not yet redeveloped
C. We have redeveloped sites for green infrastructure in the past
D. No, this is not our practice



I-D6. Does your community have demonstration sites for green infrastructure such as rain gardens or green roofs to use as educational tools to inform the public of benefits?

A. Yes, we have at least one such demonstration site
B. No, but we have other resources where people can learn more about green infrastructure
C. No, we do not have or promote any sites

I-D7. Does your community have an incentive for businesses or individuals who adopt stormwater conservation or green infrastructure practices?

A. Yes, we sponsor and publicize our own program
B. Yes, we promote and publicize a program from another organization
C. No, we have no such program

Gray Infrastructure

I-D8. Are there structural flood barriers, such as dams, levees, floodwalls or berms within your community?

A. No

B. Unsure

C. Yes

I-D9. Have these structures been evaluated for structural stability?

A. Yes, all structures have been evaluated by an engineer within the past five years

B. Yes, some structures have been evaluated by an engineer within the past five years

C. Yes, all structures have been evaluated, but not within the past five years

D. Yes, some structures have been evaluated, but not within the past five years

E. No, structures have not been evaluated professionally at any point

I-D10. Are these structures sound and able to manage the amount of stormwater they were initially designed for?

A. Yes, all structures are structurally sound

B. Yes, most structures are structurally sound

C. No, most or all structures are insufficient or damaged

D. We have not conducted such an analysis

I-D11. Is there an established, regular schedule and designated staff to reevaluate structural stability, based on clear criteria?

A. Yes, there is designated staff to reevaluate flood structures on an annual basis

B. Yes, there is designated staff to reevaluate flood structures, but this is not conducted on any regular schedule

C. Yes, there is either designated staff or a regular schedule, but not both

D. Flood structure evaluations are only conducted after a flood event has occurred

I-D12. Does your community have emergency action plans to prepare downstream communities if a structural failure were to occur?

A. Yes, such a plan exists and community members have access to it

B. Yes, such a plan exists, but it is only accessible upon request

C. Yes, but the plan has not been updated in the past 5 years

D. No, such a plan does not exist

Non-structural

Do you participate in any of the following land use regulatory strategies for land known to be flood prone?

	A. Yes, we have implemented that practice	B. Yes, our plans call for that strategy to be used	C. Our plans do not specify this strategy, but we have used it in the past	D. We have not implemented this strategy and it is not mentioned in our plans
I-D13. Buyouts of flood-prone land				
I-D14. Cluster development				
I-D15. Transfer of development rights				
I-D16. Requiring on-site compensatory storage				
I-D17. Directed downspouts to pervious areas				
I-D18. Stormwater impact fees				

I-D19. Do you prohibit any residential or commercial development in floodplains?

A. We do not have floodplains in our community

B. Development is regulated at least to NFIP standards

C. No types of development are banned

Scoring Tools

Review your responses to the questions in this section and sum the number of times you responded with each letter. Provide that number in the appropriate row to the right.

If you answered “c”, “d”, or "e" to 13 or more questions, please refer to the Tools recommendations section on page 78.

Number of “a” answers: _____

Number of “b” answers: _____

Number of “c” answers: _____

Number of “d” answers: _____

Number of “e” answers: _____

I-E) Implementation and Enforcement

For this section, you will need to know about your community's procedures for evaluating flood damage and the long-term planning process. No specific materials are required; you should rely on local knowledge.

I-E1. Does your community have clear, regularly updated evacuation plans for all regions of your community?

A. Yes

B. Some, but not all areas

C. No

I-E2. How many repetitive loss structures are in your community?

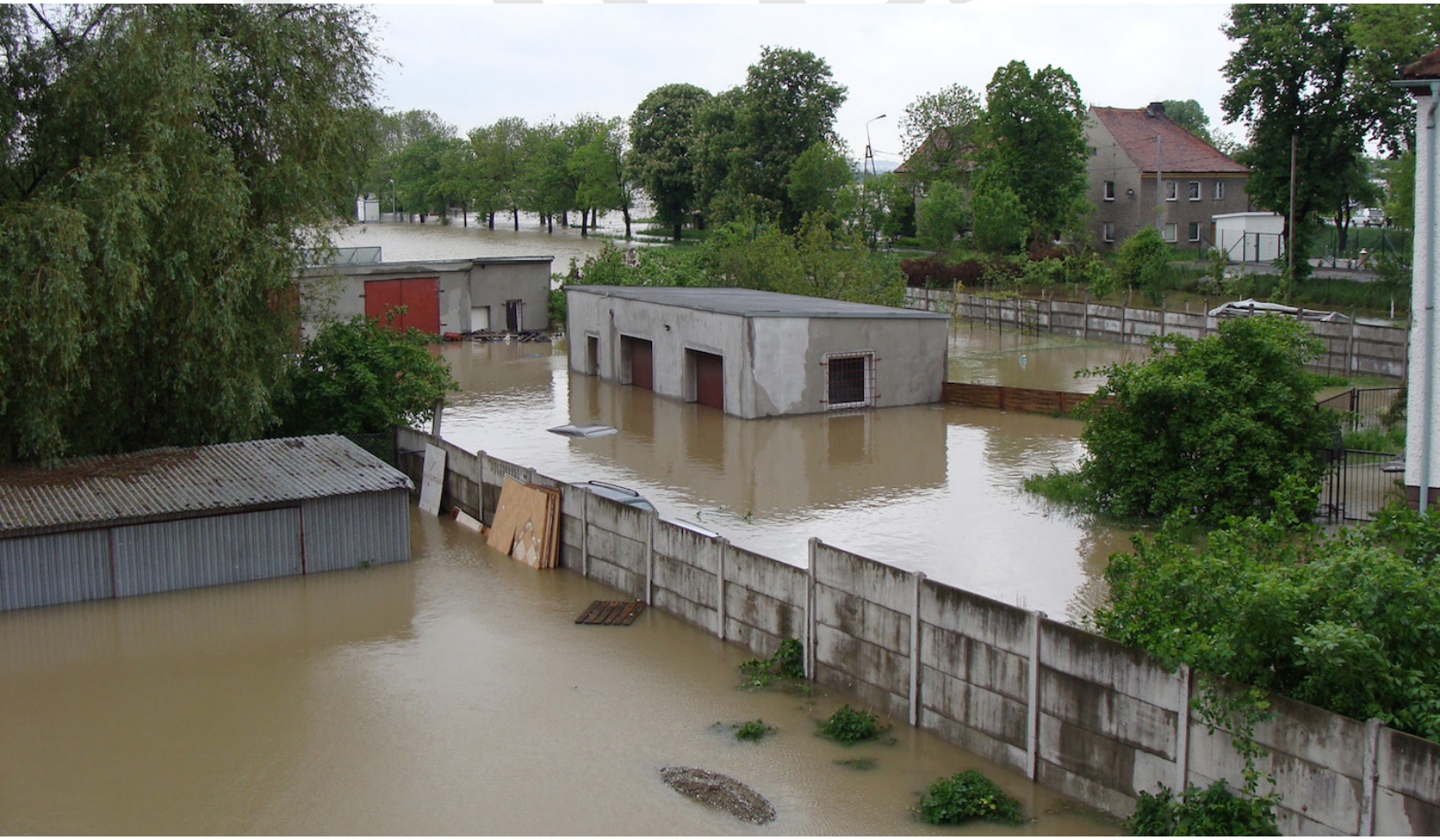
A. Zero (0)

B. 3 structures or fewer

C. 4 - 10 structures

D. More than 10 structures

Flood Resilience Scorecard
Data Companion



I-E3. Does your community have a process to determine whether a home has been "substantially damaged" following a flood event? (e.g., FEMA Residential Substantial Damage Estimator program)

A. Yes

B. No, but the community works with county or regional resources to fill this need

C. No

I-E4. Does your community have dedicated staff for evaluating flood damage? If you select "C" or "D", skip to question I-E6

A. Yes, the community has regular dedicated staff with the explicit duty of evaluating flood damage

B. No, but the community works with county or regional resources to fill this need

C. No, the community has not had flooding that necessitates this staff

D. No, the community needs this staff but does not have them

I-E5. What is done after a property is evaluated and deemed substantially damaged in your community?

A. The property is required to convert to open space or other low-impact development

B. The house may be rebuilt, but to state or NFIP standards

C. The house may be rebuilt structurally as it was before the flooding

D. There is no standardized protocol for this situation

I-E6. Is there a system in place in your community to reevaluate flood policies over time and ensure they have been successful?

A. Yes, the community reevaluates policies regularly and updates them with new information

B. Yes, the community has reevaluated policies, but not in recent years

C. No, the community does not have a system to regularly reevaluate flood policies

I-E7. Has your community established specific and quantifiable flood resilience goals?

A. Yes, the community has established goals that are both specific and quantifiable

B. Yes, the community has established goals, but they are broad and not quantifiable

C. No, the community has not established clear flood resilience goals

I-E8. Has your community established funding sources and strategies, both long and short term, to meet identified goals?

A. Yes, the community has a clear idea of where flood resilience funding will come from for the long term

B. Yes, the community has a clear idea of where flood resilience funding will come from over the short term, but not the long term

C. No, the community has not established funding sources or strategies for the future

Scoring Implementation & Enforcement

Review your responses to the questions in this section and sum the number of times you responded with each letter. Provide that number in the appropriate row to the right.

If you answered “c” or "d" to four or more questions, please refer to the Implementation & Enforcement recommendations section on page 79.

Number of “a” answers: _____

Number of “b” answers: _____

Number of “c” answers: _____

Number of “d” answers: _____

Recommendations

In this section, you will find recommendations, resources and contacts to learn more about how to improve your community's resilience to flooding. Recommendations are grouped into the same sections as the guide itself. Keep in mind that you may benefit from recommendations in a variety of sections, not just those that you were suggested for you based on your scoring during the assessment. It may be valuable to review all or many suggestions below before choosing the best course of action. Please note that this list of recommendations is not exhaustive and does not represent the full spectrum of possibilities for your community.

Module 2: Institutional

Resource Inventory and Mapping

Update existing floodplain maps

- Compare FIRMs with local flood knowledge and check for discrepancies.
    - » If discrepancies exist or if maps are too old to include contemporary development, contact FEMA to receive an updated FIRM or submit a Letter of Map Amendment (LOMA).
    - » More information about the creation of new flood maps can be found on the Wisconsin DNR website.
    - » Become a cooperating technical partner with FEMA. In this case, costs to update maps will be shared with FEMA and your community will have higher priority for a new flood study.
- Contact FEMA to include future conditions hydrology on your FIRMs. If the community requests, FEMA will include this information and designate it as Zone X (Future Base Flood).
- Contact Wisconsin state NFIP Coordinator for more local information.
- Gather historic data about where and how intensely flooding has happened in the past to identify critical areas.

Maintain existing floodplain maps

- Create a specific plan for updating maps that includes potential funding sources and identifies the responsible municipal department.
- Publicize and make these maps clearly available online for all community members to access.

Supplement these maps with other hazard-related maps

- Map the extent of other flood-related hazards. These include land subsidence, coastal erosion and others
    - » This is an opportunity to get Community Rating System credit.

Plan Quality & Coordination

Review and update all community plans to include language about flood resilience

- Include at least one scientific or engineering consultant when any new community plans are developed to ensure that language about stormwater is included.
- Review and update your emergency operations plan.
- Review and update your hazard mitigation plan.
- Review and update your comprehensive plan and other plans your community may use (e.g., economic development plan, capital improvements plan).

Staff & Technological Capacity

Hire or train existing staff in floodplain management or emergency management

- Hire staff trained in GIS or other mapping technology. Review and update your emergency operations plan.
- Hire a grant writer to both research existing grant opportunities and apply for them.
- If possible, buy GIS or other software, or dedicate staff to learn free tools such as FEMA's HAZUS.
- Compensate at least one staff member to complete the Certified Floodplain Manager training offered through the Association of State Floodplain Managers.
    - » Contact: cfm@floods.org.
- FEMA's Emergency Management Institute (EMI) offers several trainings, including some that are free. All emergency management, fire, police and emergency volunteers should complete at least Incident Command System (ICS)-100, and potentially ICS-200.
- Wisconsin Emergency Management's Emergency Response Training.
    - » Training Portal—more information from Kevin Wernet program supervisor: kevin.wernet@wisconsin.gov

Reach out to potential regional or national partners

- Consider partnering with local UW extension office to see if there are college students who could complete research or projects in collaboration with you.
- Become involved with the League of Wisconsin Municipalities to share knowledge with other cities that also have flooding issues.
- Participate in FEMA's National Flood Insurance Program (NFIP) and the Community Rating System (CRS). Note that many of the recommendations in this document count for CRS credit.
    - » Depending on the level of participation, flood insurance premium rates for policyholders in these communities can be reduced up to 45%.
    - » Wisconsin state NFIP Coordinator: Brian Cunningham, Brian.Cunningham@wisconsin.gov
- Contact your regional planning commission to see if they can provide any technical or administrative assistance.
- Contact Wisconsin Emergency Management for trainings or help with applications to grants or subsidized loans.

Create coalitions and partnerships between staff and residents

- Activate your Local Emergency Planning Committee (LEPC).
    - » A local emergency planning committee should include (at a minimum): elected officials; police, fire, civil defense and public health professionals; environment, transportation and hospital officials; facility representatives; representatives from vulnerable populations or that represent these vulnerable populations; and the media.
    - » This group should meet at least twice a year to evaluate emergency procedures and to determine strategies for educating the public. LEPCs are eligible for Emergeny Planning Grants, which provides matching funds for computer equipment and hazardous materials response equipment.
    - » More information about what these groups do can be found at in this fact sheet created by FEMA.
- Start a Community Emergency Response Team (CERT).
    - » FEMA has a recommended training for volunteers involved in such teams. This is a good way to engage residents without professional background in emergency management.
    - » Volunteers can be a powerful and affordable addition to your emergency response.

Tools

Gray Infrastructure

- Hire engineers to both identify and evaluate the state of the built environment.
- Using flow modeling, have engineers determine whether these structures are capable of handling volumes of water associated with a 1% annual chance flood event.
- Prioritize infrastructure projects for flood resilience within your capital improvements plan (CIP).
- Establish a schedule to conduct this evaluation at regular intervals into the future, based on clear and established criteria.
    - » A potential resource is FEMA's Checklist for Vulnerability of Flood-Prone Sites and Buildings.

Green Infrastructure

- Audit your local codes and ordinances using Wisconsin Sea Grant's guide Tackling Barriers to Green Infrastructure.
- Ensure that green infrastructure is not unnecessarily prohibited in any plans.
- Include language about green infrastructure in transportation plans, not only allowing for it but actively encouraging it.
- Analyze abandoned sites for possible redevelopment as green infrastructure sites.
- Create demonstration sites for green infrastructure to use as educational tools (potentially at schools, local government offices or on public land).
- When a demonstration site is created, host a community event to encourage the public to visit and learn about its benefits.
- Set clear guidelines about long-term maintenance responsibilities for green infrastructure sites.

Non-structural

- Adopt or update your Flood Damage Prevention Ordinance.
    - » This activity can earn you credit for the National Flood Insurance Program and Community Rating System.
    - » Wisconsin DNR has created a model floodplain ordinance for communities to adopt.

Implementation & Enforcement

Determine a clear procedure for assessing flood damage once an event has occurred

- Determine a clear and objective process to determine whether a home has been "substantially damaged" following a flood event.
    - » The Building Code Effectiveness Grading Schedule (BCEGS) may be useful as a guide if you do not already have building codes.
    - » Consider requiring a lower threshold for damage before a building is required to meet new building flood requirements (the standard is 50% damaged, but some places, such as the state of Indiana, lowered it to 40% damaged).
- Hire or designate existing staff members as responsible for evaluating flood damage.

Develop long- and short-term goals

- Establish both long- and short-term flood resilience goals to help gauge the success of your efforts.
    - » Review the funding resources identified at the end of this document.
- Host either tabletop exercises or full-scale exercises to test your preparedness and response capabilities.
    - » The Extreme Event Game from LabX is one example of an exercise.
    - » Wisconsin Emergency Management can provide guidance about how to run such exercises. Contact Kevin Wernet program supervisor: kevin.wernet@wisconsin.gov

Funding Resources

Federal

Federal Emergency Management Agency (FEMA)

Hazard Mitigation Assistance Grants: Provides funding for eligible mitigation measures that reduce disaster losses.

Flood Mitigation Assistance Grants: Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program.

Building Resilient Infrastructure And Community (BRIC): Support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards.

Department of Housing and Urban Development (HUD)

Community Development Block Grants (CDBG): Provides grants to states, cities, and counties to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and moderate-income persons.

National Park Service (NPS)

Land and Water Conservation Fund: This grant program helps urban communities address outdoor recreation deficits by supporting projects in cities and urbanized areas that create new outdoor recreation spaces, reinvigorate already existing parks, and form connections between people and the outdoors.

Rivers, Trails And Conservation Assistance Program: Partners with community groups, nonprofits, tribes, and state and local governments to design trails and parks, conserve and improve access to rivers, protect special places, and create recreation opportunities.

Department of Agriculture (USDA)

Community Facilities Direct Loan & Grant Program: Provides affordable funding to develop essential community facilities in rural areas. An essential community facility is defined as a facility that provides an essential service to the local community for the orderly development of the community in a primarily rural area.

Water And Waste Disposal Loan And Grant Program: Provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas.

Conservation Innovation Grants (CIG): Supports the development of new tools, approaches, practices, and technologies to further natural resource conservation on private lands. CIG partners work to address our nation's water quality, air quality, soil health and wildlife habitat challenges, all while improving agricultural operations.

Special Evaluation Assistance For Rural Communities And Households (SEARCH): Helps very small, financially distressed rural communities with predevelopment feasibility studies, design and technical assistance on proposed water and waste disposal projects.

Environmental Protection Agency (EPA)

Recreation Economy For Rural Communities: Planning assistance program to help communities develop strategies and an action plan to revitalize their Main Streets through outdoor recreation.

Urban Waters Small Grants Program: Help local residents and their organizations, particularly those in underserved communities, restore their urban waters in ways that also benefit community and economic revitalization.

Greening America's Communities: Help cities and towns develop an implementable vision of environmentally friendly neighborhoods that incorporate innovative green infrastructure and other sustainable design strategies.

Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program: Provides financial assistance to eligible organizations working on or planning to work on projects to address local environmental and/or public health issues in their communities.

Economic Development Administration (EDA)

Public Works And Economic Adjustment Assistance Program: Support work in Opportunity Zones by leading to the creation and retention of jobs and increased private investment, advancing innovation, enhancing the manufacturing capacities of regions, providing workforce development opportunities, and growing ecosystems that attract foreign direct investment.

Fish and Wildlife Service

North American Wetlands Standard/Small Grant: Supports public-private partnerships carrying out projects in the United States that further the goals of the North American Wetlands Conservation Act. These projects must involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats for the benefit of all wetlands-associated migratory birds.

National Urban And Community Forestry Challenge Cost-Share Grant Program: Supports critical management of existing and future urban and community forests to promote disaster risk reduction and community resilience and better prepare communities for the increasingly destructive impacts of climate change.

State

Municipal Flood Control Grant Program (DNR): Assists cities, villages, towns and metropolitan sewerage districts concerned with municipal flood control management.

Clean Water Fund Program (DNR): Provides affordable financial assistance to municipalities for publicly-owned wastewater and water-quality-related storm water infrastructure projects that are needed to achieve or maintain compliance with federal and state regulations.

Safe Drinking Water Loan Program (DNR): provides affordable financial assistance to municipalities for publicly-owned drinking water infrastructure projects that are needed to protect public health and achieve or maintain compliance with federal and state regulations relating to water supply.

Urban Forestry Grants (DNR): Provides regular, startup, or catastrophic storm grants that support the creation or further development of urban forestry programs and help recover from storms.

Producer-Led Watershed Protection Grants (DATCP): Provides funding to producer-led groups that focus on nonpoint source pollution abatement activities.

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