

Coastal Watershed Hazards Resiliency Needs Assessment

A self-assessment tool for Indiana's coastal watershed communities to evaluate vulnerability to natural hazards and increase resilience



Top: Little Calumet River flooding in Munster (Credit: John Lucito, Flickr; Bottom left: A coastal storm on Lake Michigan (Credit: Joe Exl); Bottom right: Fluvial erosion (Credit: Indiana Geological and Water Survey)

Funding was provided by the Indiana Lake Michigan Coastal Program and the National Oceanic and Atmospheric Administration, Office for Coastal Management under Grant # NA21NOS4190081.

Why should my local government complete this self-assessment?

This self-assessment is intended to help local government (municipal and county) staff and decision-makers of Indiana coastal watershed communities evaluate potential impacts of natural hazards and consider planning and mitigation actions to increase resilience. Resilience, in the context of this self-assessment, is the ability to respond to, withstand, and adapt to the impacts of natural hazards.

This self-assessment will assist the Indiana Lake Michigan Coastal Program (LMCP) in identifying, developing, and delivering the technical resources needed by coastal watershed communities to reduce or prevent natural hazard risks. LMCP has contracted with the Northwestern Indiana Regional Planning Commission (NIRPC) to help communities complete the self-assessment and conduct listening sessions.

This self-assessment is not a complete vulnerability assessment nor is it intended to rank communities against each other. Rather, this is an exercise to help communities consider actions that can build their resilience to coastal watershed hazards while also informing LMCP enhancement strategies.

Coastal Watershed Counties & Communities

The LMCP is based on a watershed approach and operates within Northwest Indiana's Lake Michigan watershed, the area of land that drains to Lake Michigan. Figure 1 shows the incorporated and county areas located within the program boundary and covered by this needs assessment.

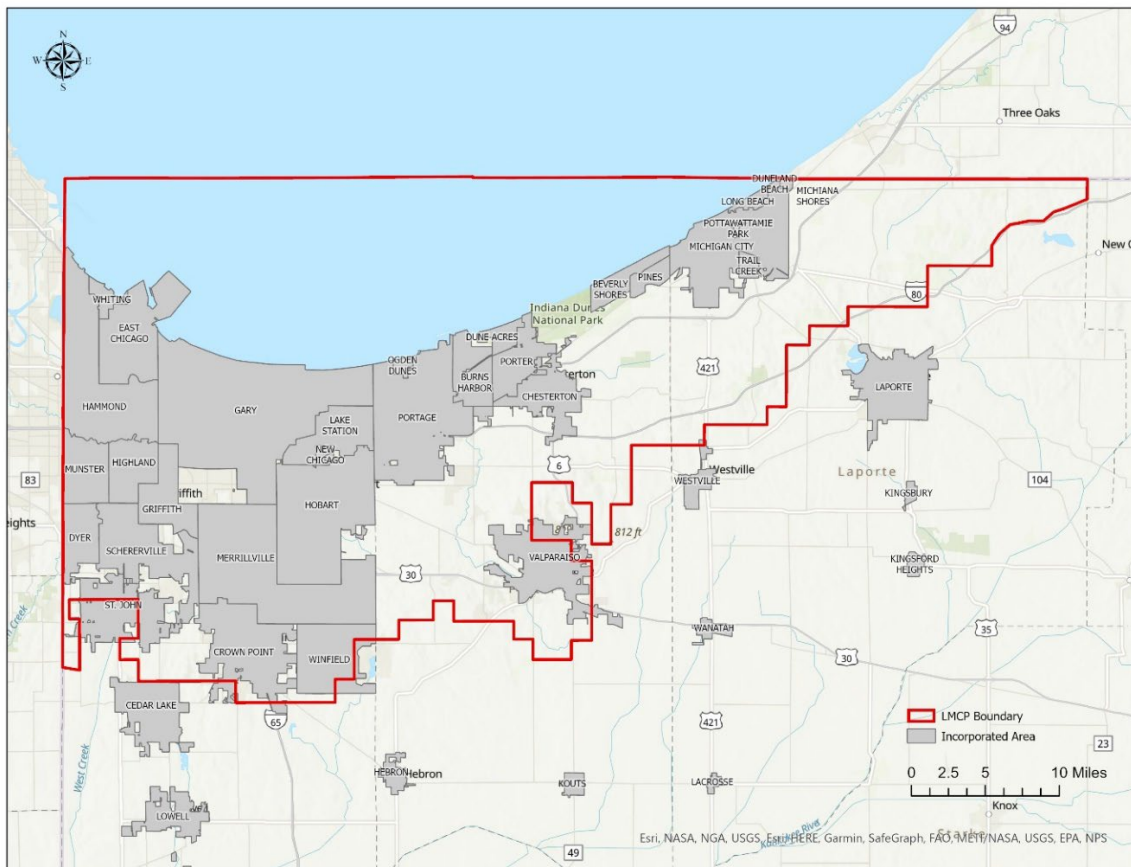


Figure 1. The Lake Michigan Coastal Program boundary.

Who should use this self-assessment?

This self-assessment tool is intended for use by local government staff and decision-makers. Interdepartmental coordination is an important aspect of community resilience and is vital for ensuring your local government is prepared for potential natural hazard events. LMCP and NIRPC recommend that your local government convene a team of staff, elected officials, and board or commission members with diverse knowledge about local conditions, plans, policies, and operations and complete one assessment together.

This page can be used to coordinate your local governments' resiliency assessment team. You may share the contacts with LMCP and NIRPC for communication purposes but are not required to. Names of local government units and their staff or representatives will not be shared or listed in any reports.

Local Government Unit: _____

Assessment Team Lead/Coordinator Name: _____

Title: _____

E-mail: _____

Department	Title	Name	e-mail
Emergency Management/Floodplain Administrator			
Engineering			
Environmental			
Marina/Harbor			
Parks and Recreation			
Planning and Zoning			
Public Works			
MS4/Stormwater			
Transportation			

Department	Title	Name	e-mail

What is in the self-assessment?

Part 1: Identifying Coastal Watershed Hazard Risks - This tool will help prioritize coastal watershed hazards issues in a local government by rating:

- (1) Frequency of occurrence
- (2) Impact to the community
- (3) Level of preparedness.

Part 2: Resilient Practices Questionnaire - This series of yes/no questions will help identify common planning and mitigation actions that the local government can implement to address coastal watershed hazard issues.

How do I complete the self-assessment?

The self-assessment can be completed either by hand with a printed version of the form or electronically using the fill-in capabilities of this PDF form (requires Adobe Reader). Questions about the self-assessment or results may be directed to:

Northwestern Indiana Regional Planning Commission
 Jen Birchfield, Natural Resources Planner
Jbirchfield@nirpc.org
 (219) 254-2511

Natural Hazard Descriptions

Coastal Flooding - Coastal flooding occurs when low-lying coastal land is flooded by lake water. Coastal flooding is primarily caused by storm surge and waves but many other factors have an influence. On the Great Lakes shorelines, flooding is dependent on local lake levels, which vary due to precipitation, evaporation, and other natural processes, as well as anthropogenic activities.¹

Riverine Flooding- Riverine flooding occurs when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow causing water to overflow the banks, spilling out into adjacent land.²

Coastal Erosion - Coastal erosion is the process where wave energy moves material from the shore out to greater water depths.³ Coastal erosion is caused mainly by storms and winds. While coastal erosion occurs even during low water levels, it is exacerbated when lake levels are high.

Fluvial Erosion - Fluvial erosion refers to the in-stream erosion of the bed and banks. Fluvial erosion includes bed erosion, meaning lowering of the bed of a stream, as well as bank erosion, meaning the retreat of stream banks that occurs as a stream widens or migrates laterally.⁴

Lake Level Change - Great Lakes water level changes result from cyclical changes in rainfall, evaporation, and river and groundwater inflows. These factors work together to raise and lower the water levels of the Great Lakes in small increments daily and larger increments seasonally and over the course of years and decades. Long-term water levels fluctuate by multiple feet.⁵

Coastal Storms – Coastal storms can cause large waves and storm surge, or “piling up” of water along the coast due to storm winds and atmospheric pressure gradients. Coastal storms can increase coastal flooding and erosion.⁶

¹ The Great Lakes Coastal Flood Study. (2022, July 7). Wave Hazards and VE zones on the Great Lakes. https://www.greatlakescoast.org/pubs/factSheets/Region_V_VE_Zone_FS_V7_012219_FINAL.pdf

² Federal Emergency Management Agency. (2022, July 7). *National Risk Index: Riverine Flooding*. <https://hazards.fema.gov/nri/riverine-flooding>

³ Wisconsin Department of Natural Resources. (2022, July 7). *History and geology of the Great Lakes*. <https://dnr.wisconsin.gov/topic/Waterways/shoreline/greatLakesProcesses.html>

⁴ U. S. Geological Survey. (2022, July 7). *Fluvial erosion hazards primer*. <https://wim.usgs.gov/geonarrative/FEHprimer/>

⁵ Resilient Michigan. (2022, July 7). Northwest lower Michigan coastal resilience atlas. http://www.resilientmichigan.org/nw_atlas.asp

⁶ Wisconsin Coastal Resilience. (2022, July 7). *Waves and coastal storms and erosion, oh my!* <https://wicoastalresilience.org/waves-coastal-storms-erosion/>

Part 1: Identifying Coastal Watershed Natural Hazard Risks

This matrix will help your team to identify what coastal watershed hazards pose the most critical risks to your local government. Risk is the potential for negative impacts or damage due to a hazard event, a combination of (1) the probability that a hazard event will occur, (2) the consequences that the hazard would have, and (3) the actions that have been or should be taken to mitigate those consequences.

Instructions

For each coastal watershed hazard issue described on Page 4, you will assign a score of **Low**, **Moderate**, **High**, or **NA** (Not Applicable) for your perception of each of the following criteria:

- Probability- The likelihood that an issue is expected to occur.
- Impact- The extent to which a given coastal watershed hazard issue can cause death or injury, property damage, or service interruption.
- Preparedness- The level of effective planning or action that has taken place to reduce the overall impact of a hazard to your community.

If your local government would like to learn more about an issue to inform your response, please provide a short explanation.

Hazard Issue	Probability	Impact			Preparedness	We have questions and/or want to learn more about this issue (Explain)
	Likelihood this issue will occur	Possibility of death or injury	Property loss or damage	Interruption of services	Level of planning for issue	
Coastal Flooding	Choose One	Choose One	Choose One	Choose One	Choose One	
Riverine Flooding	Choose One	Choose One	Choose One	Choose One	Choose One	
Coastal Erosion	Choose One	Choose One	Choose One	Choose One	Choose One	
Fluvial Erosion	Choose One	Choose One	Choose One	Choose One	Choose One	
Lake Level Change	Choose One	Choose One	Choose One	Choose One	Choose One	
Coastal Storms	Choose One	Choose One	Choose One	Choose One	Choose One	

Part 2: Resilience Practices Questionnaire

The following series of yes/no questions will help to identify opportunities to strengthen your local government’s approach to planning for and mitigating the impacts of coastal watershed hazards and may reveal vulnerabilities not previously considered.

Instructions: Answer each question by checking “Yes”, “No”, “NA”, “?” (meaning “not sure”) or other listed options. More detailed answers or explanations can be entered in the “Comments” section of each question. For instance, it may be useful to reference specific portions or pages of a plan or strategy that addresses the question or to identify what information is needed to resolve a “?” response.

Understanding Coastal Watershed Hazard Impacts

Knowing the locations, populations, and properties that are vulnerable to coastal watershed hazards is the starting point to developing resilient strategies to reduce risk and avoid losses.

1. Has your local government identified and documented the historical geographic extent and impacts of coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

2. Has your local government identified and documented the damage and/or cost of past coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

3. Has your local government assessed potential future coastal watershed hazard risks?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

4. Does your local government staff have access to Geographic Information System (GIS) mapping and analysis?

Yes, No, ?	Comments
Choose One	

5. If yes, is GIS mapping and analysis done by staff, external consultants, or both?

Staff, Consultants, Both, ?	Comments
Choose One	

6. Does your local government have maps or spatial data that identify areas at risk to coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

7. Is your local government aware of potential risks of contamination of waterways due to coastal watershed hazards, such as flooding or erosion of infrastructure or contaminated land?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

Hazard Mitigation Planning

It begins with governments identifying natural disaster risks and vulnerabilities common in their area. After identifying these risks, they develop long-term strategies for protecting people and property from similar events. A current, approved Multi-Hazard Mitigation Plan is required to be eligible for certain types FEMA funding assistance.

8. Does your local government have a FEMA-approved Multi-Hazard Mitigation Plan?

Yes, No, ?	Comments (If yes, please include year approved)
Choose One	

9. Does your local government participate in a county level FEMA-approved Multi-Hazard Mitigation Plan?

Yes, No, ?	Comments
Choose One	

10. If “Yes”, how often does your local government consult the county plan and consider it in planning and zoning decisions?

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11. Has your local government adopted the county level FEMA-approved Multi-Hazard Mitigation Plan?

Yes, No, ?	Comments
Choose One	

12. The Federal Disaster Mitigation Act of 2000 requires that FEMA approve Multi-Hazard Mitigation Plans every five years to main eligibility for federal mitigation assistance grants. Is your local Multi-Hazard Mitigation Plan approved and not expired?

Yes, No, ?	Comments
Choose One	

13. Does the Multi-Hazard Mitigation Plan document past coastal watershed hazard mitigation efforts, along with their costs and effectiveness?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

14. Does the Multi-Hazard Mitigation Plan identify strategies to address all the coastal watershed hazards that you identified in [Part 1: Identifying Coastal Watershed Natural Hazard Risks?](#)

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

15. Have the strategies from the Multi-Hazard Mitigation Plan been implemented as described in your local jurisdiction?

Fully, Partially, No, NA, ?	Comments
Choose One	

16. Does the Multi-Hazard Mitigation Plan identify opportunities to integrate hazard mitigation with other planning mechanisms, such as land use, capital investment, economic development, or other local jurisdiction plans?

Yes, No, ?	Comments
Choose One	

17. Is your local government aware of FEMA’s Hazard Mitigation Grant program and the types of coastal projects that may be eligible for funding?

Yes, No, ?	Comments
Choose One	

18. Is your local government aware of the Building Resilient Infrastructure in Communities (BRIC) program and the types of coastal projects that may be eligible for funding?

Yes, No, ?	Comments
Choose One	

19. Does your local government have a disaster response and recovery plan that includes short- and long-term actions and policies? (If yes, please list plan name and date in comments)

Yes, No, ?	Comments
Choose One	

20. If yes, does your disaster response and recovery plan identify personnel responsible for those actions?

Yes, No, ?	Comments
Choose One	

Local Government Planning

Local government planning efforts, such as comprehensive, land use, capital investment, and economic development plans, guide development and other investment actions by the local government. Integrating strategies to mitigate the effects of coastal watershed hazards into these plans can help reduce the exposure of development and other local assets to risk.

21. Does your local government address resiliency (the ability to respond to, withstand, and adapt to the impacts of natural hazards) in your plans?

Yes, No, ?	Comments
Choose One	

22. Does your local government have a shared vision of 'community resilience' documented in plans?

Yes, No, ?	Comments
Choose One	

23. Does your local government include climate mitigation goals and objectives in the comprehensive plan or other policy document?

Yes, No, ?	Comments
Choose One	

24. Does your local government have a land use plan that makes recommendations to reduce coastal watershed hazard vulnerabilities?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

25. Do planning horizons incorporate potential long-term coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

26. Do plans for public infrastructure, such as buildings, roads, water, sewer, and other utilities include recommendations for relocation, abandonment, or protection of infrastructure at-risk to coastal watershed hazards?

Yes, No, or ?	Comments
Choose One	

27. Does your local government update its plans in consideration of and/or have joint plans with nearby municipalities' plans for future development?

Yes, No, ?	Comments
Choose One	

28. Did your local government conduct a natural resource inventory or assessment and incorporate protection of priority natural systems through the subdivision or development process?

Yes, No, ?	Comments
Choose One	

29. What are your local government's highest priorities or major initiatives planned to improve resiliency?

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Local Ordinances

Local zoning ordinance provisions can reduce the risk that new development is exposed to and limit adverse impacts.

30. Does your local government use zoning regulations to reduce natural hazard damages to the built environment?

Yes, No, ?	Comments
Choose One	

31. Has your local government adopted codes and ordinances to support sustainable development and conserve natural resources?

Yes, No, ?	Comments
Choose One	

32. Do existing ordinances require new development to be set back some distance from shorelines and streambanks?

Yes, No, ?	Comments
Choose One	

33. Do existing ordinances require new development in the 1% annual chance (100-year) floodplain to take measures that reduce flood impacts such as elevating buildings a certain height above the base flood elevation?

Yes, No, ?	Comments
Choose One	

Implementing Best Practices

The National Flood Insurance Program works with communities required to adopt and enforce floodplain management regulations that help mitigate flooding effects. The Community Rating System (CRS) is a voluntary program for communities participating in the National Flood Insurance Program. The Community Rating System offers National Flood

Insurance Program policy premium discounts in communities that develop and execute extra measures beyond minimum floodplain management requirements to provide protection from flooding.

34. Does your local government participate in the National Flood Insurance Program?

Yes, No, ?	Comments
Choose One	

35. If your local government participates in the National Flood Insurance Program, does your local government also participate in the Community Rating System?

Yes, No, ?	Comments
Choose One	

36. If no, has your local government considered participating in the National Flood Insurance Program's Community Rating System?

Yes, No ?	Comments
Choose One	

37. Would your local government be interested in participating in a regional Community Rating System program?

Yes, No, ?	Comments
Choose One	

38. Does your local government know how many flood insurance policy holders are within your jurisdiction?

Yes, No, ?	Comments
Choose One	

39. Has your local government considered relocation or voluntary acquisition of repetitive loss structures or those structures which are at high risk to coastal watershed hazards?

Yes, No, ?	Comments
Choose One	

40. Do permitting processes review practices that could have adverse impacts on shoreline stability, such as vegetation removal, stormwater management, and on-site waste disposal?

Yes, No, ?	Comments
Choose One	

Public Education & Engagement

Properties can frequently change hands, leaving property owners unaware of or unprepared for hazards. On the other hand, residents and business owners may have local knowledge of hazards that can inform resilience strategies. Educating and engaging residents can help to manage coastal watershed hazards.

41. Does your local government routinely conduct public outreach and education focused on coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

42. Does your local government have hazard information, such as maps and guidance on management practices, available to residents and property owners upon request?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

43. Has the public been involved with identifying historic coastal watershed hazard impacts, areas that are at risk, or strategies to address coastal watershed hazards?

Hazard	Yes, No, NA, ?	Comments
Coastal Flooding	Choose One	
Riverine Flooding	Choose One	
Coastal Erosion	Choose One	
Fluvial Erosion	Choose One	
Lake Level Change	Choose One	
Coastal Storms	Choose One	

Shoreline and Fluvial Erosion Protection

Structural shoreline and fluvial protection measures are commonly used to protect property from erosion and flooding. To achieve the expected level of protection, these structures need to be engineered, monitored, maintained, and replaced when necessary. Alternative hybrid-structural options (nature-based, living shoreline, or engineering with nature approaches) or non-structural options (slope stabilization, vegetation, beach nourishment, or asset relocation) may be considered due to cost, aesthetics, public access, habitat, or adverse impacts to adjacent properties.

44. Has your local government documented the location of erosion protection structures?

Yes, No, ?	Comments
Choose One	

45. Does your local government routinely inspect and maintain erosion protection structures?

Yes, No, ?	Comments
Choose One	

46. Has your local government documented the condition, effectiveness, and life expectancy of erosion protection structures?

Yes, No, ?	Comments
Choose One	

47. Has your local government documented instances where erosion protection structures adversely impact adjacent shoreline or downstream areas?

Yes, No, ?	Comments
Choose One	

48. Does your local government consider hybrid-structural options (nature-based, living shoreline, or engineering with nature approaches) or non-structural options (slope stabilization, vegetation, beach nourishment, or asset relocation)?

Yes, No, ?	Comments
Choose One	

49. Does your local government have internal expertise and capacity for maintenance of hybrid-structural options?

Yes, No, ?	Comments
Choose One	

Stormwater Management

Stormwater management practices on the landscape can mitigate or exacerbate coastal watershed hazards, such as flooding and erosion. Your community may or may not be a Municipal Separate Stormwater System (MS4). MS4s are defined as “a conveyance or system of conveyances owned by a state, city, town, or other public entity that discharges

to waters of the United States and is designed or used for collecting or conveying stormwater”⁷. If your community is an MS4, your MS4 coordinator should contribute to this section.

50. Is your local government an MS4 community?

Yes, No, ?	Comments
Choose One	

51. Has your local government adopted stormwater infiltration/management strategies to reduce or mitigate runoff from impervious surfaces?

Yes, No, ?	Comments
Choose One	

52. Does your local government consider projected increases in precipitation intensity in its stormwater management plans? Please include what timeframe you use for projected increases (20, 30, 50 years, etc.).

Yes, No, ?	Comments
Choose One	

53. Does your local government manage stormwater infrastructure to mitigate risk from future climate change?

Yes, No, ?	Comments
Choose One	

54. Does your local government have a flood management plan?

Yes, No, ?	Comments
Choose One	

Natural Areas, Open Space, and Public Access

Open space and natural areas can buffer against coastal watershed hazards and also provide for public access, recreation, and tourism. Open space means there are no buildings, storage, fill, significant pavement, or other encroachments to flood flows.⁸ Open space can include green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). Open space can also include natural areas, such as forests or wetlands.

⁷Indiana Department of Environmental Management. (2022, August 17). Municipal Separate Stormwater Systems. <https://www.in.gov/idem/stormwater/municipal-separate-storm-sewer-systems-ms4/>

⁸ U. S. Environmental Protection Agency. (2022, July 8). *What is open space/green space?* <https://www3.epa.gov/region1/eco/uep/openspace.html>

55. Has your local government mapped and documented the following natural floodplain function related resources?

	Yes, No, NA, ?	Comments
Beaches	Choose One	
Dunes	Choose One	
Wetlands	Choose One	
Riparian areas		
Threatened and/or endangered species habitat	Choose One	
Open space	Choose One	
Recreational uses	Choose One	

56. Does your local government inventory open space?

Yes, No, or ?	Comments
Choose One	

57. If yes, have you developed plans and ordinances to protect open space, particularly in areas where it is lacking (e.g., park master plan, comprehensive plan, redevelopment plan)?

Yes, No, ?	Comments
Choose One	

58. Does your local government have a plan, such as a beach management plan or park master plan, that details strategies for *beach management operations* during periods of high lake levels or shoreline erosion?

Yes, No, NA, ?	Comments
Choose One	

59. Does your local government have a plan that details strategies for *public beach or river public access* during periods of high lake levels or shoreline erosion?

Beaches	Rivers
Yes, No, NA, ?	Yes, No, NA, ?
Choose One	Choose One
Comments:	

Marinas

Marinas are centers of commerce and recreation. The ability for these facilities to withstand coastal hazards is important to the economic security of communities that rely on them.

60. Does your local government have a public marina?

Yes, No, ?	Comments
Choose One	

61. Is your marina included in community hazard planning efforts?

Yes, No, NA ?	Comments
Choose One	

62. Does your marina use information related to historic water level trends, past extreme weather events, and future climate conditions in facility planning?

Yes, No, NA ?	Comments
Choose One	

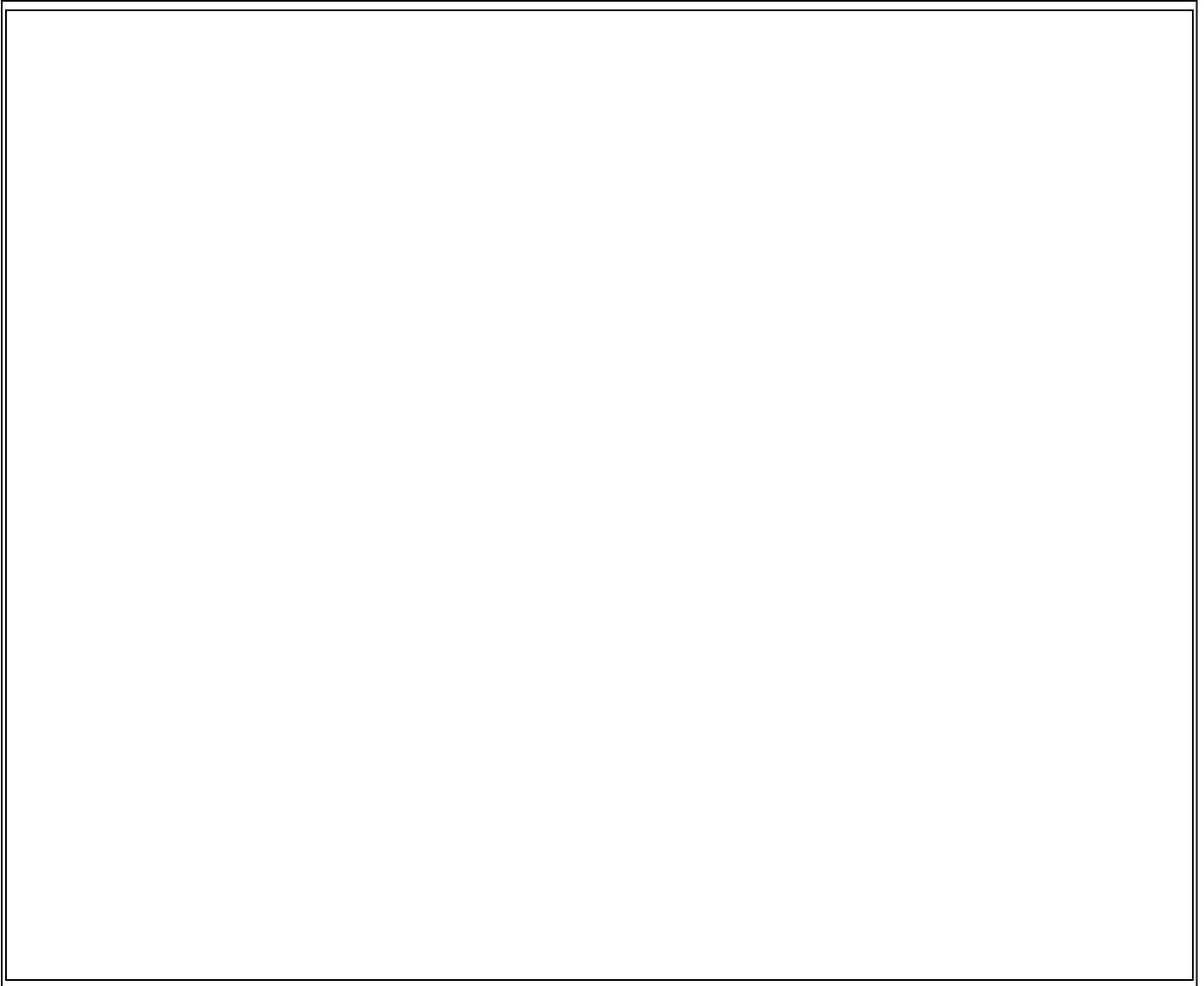
63. Has your marina performed risk assessments to identify the property upgrades necessary to limit damage and maintain function for the following hazards?

Hazard	Yes, No, NA, ?	Comments
High water level	Choose One	
Low water level	Choose One	
Ice	Choose One	
Coastal storms	Choose One	
Extreme precipitation	Choose One	
Flooding	Choose One	

64. Have you invested in property upgrades that limit damage and maintain function during varying lake levels, ice, coastal storms, extreme precipitation, and flood events? If so, please identify investments in Comments box

Yes, No, ?	Comments
Choose One	

Additional Questions or Comments:

A large, empty rectangular box with a thin black border, intended for providing additional questions or comments. The box is currently blank.