
Metropolitan Water Reclamation District of Greater Chicago

STORMWATER

MASTER PLANNING

Partnering for Resilient Communities



March, 2019



Presentation Outline

- **Introduction**
 - Brief history of MWRD Stormwater Management
 - Riverine vs. Urban Flooding
 - Pilot Stormwater Master Plans & Key Findings
 - Definitions
- **Stormwater Master Planning Program**
 - Program Goals & Outcomes
 - Overview of Program Scope & Process
- **Questionnaire for Municipal Staff**
 - Overview
 - Tutorial of Online Mapping Tool
- **Next Steps**
- **Questions**



Introduction: MWRD - Mission

Protect Drinking Water Supply



Prevent CSOs to Waterways



Manage and Treat Wastewater



Recover Resources



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Introduction: Brief History of MWRD Stormwater Management

Phase I Projects

Identified from the DWPs to address overbank flooding “riverine flooding”

Phase II Projects

Working with local communities and agencies to address local drainage problems.

Stormwater Masterplans

Investigate “urban flooding” issues and evaluate potential green and gray infrastructure solutions.

2004

The authority for general supervision of stormwater management in Cook County was conveyed to the District by the Illinois State legislature.

2011 2012 2013 2014 2015 2016 2017 2018

Detail Watershed Plans (DWPs)

completed for the 6 major watersheds of Cook County: Cal-Sag Channel, Little Calumet River, Lower Des Plaines, North Branch of the Chicago River, Poplar Creek, and Upper Salt Creek.

District’s authority was amended to allow for flood-prone property acquisition and to plan, implement, finance, and operate local stormwater management projects.

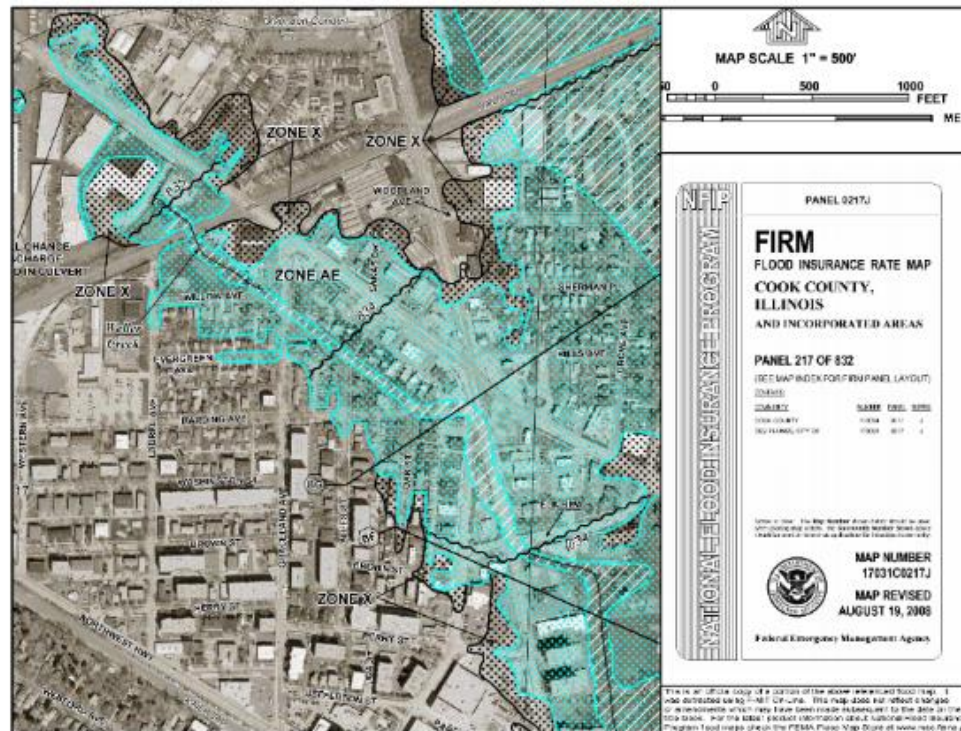
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Introduction: Riverine vs. Urban Flooding

“Riverine flooding” occurs when excess run-off causes a natural drainage-way (river, creek, etc.) to exceed its capacity. These areas are identified as flood hazards by FEMA.



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Introduction: Riverine vs. Urban Flooding



“Urban Flooding” is the inundation of property in a built environment caused by rainfall overwhelming the capacity of local drainage systems.

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Introduction: Riverine vs. Urban Flooding

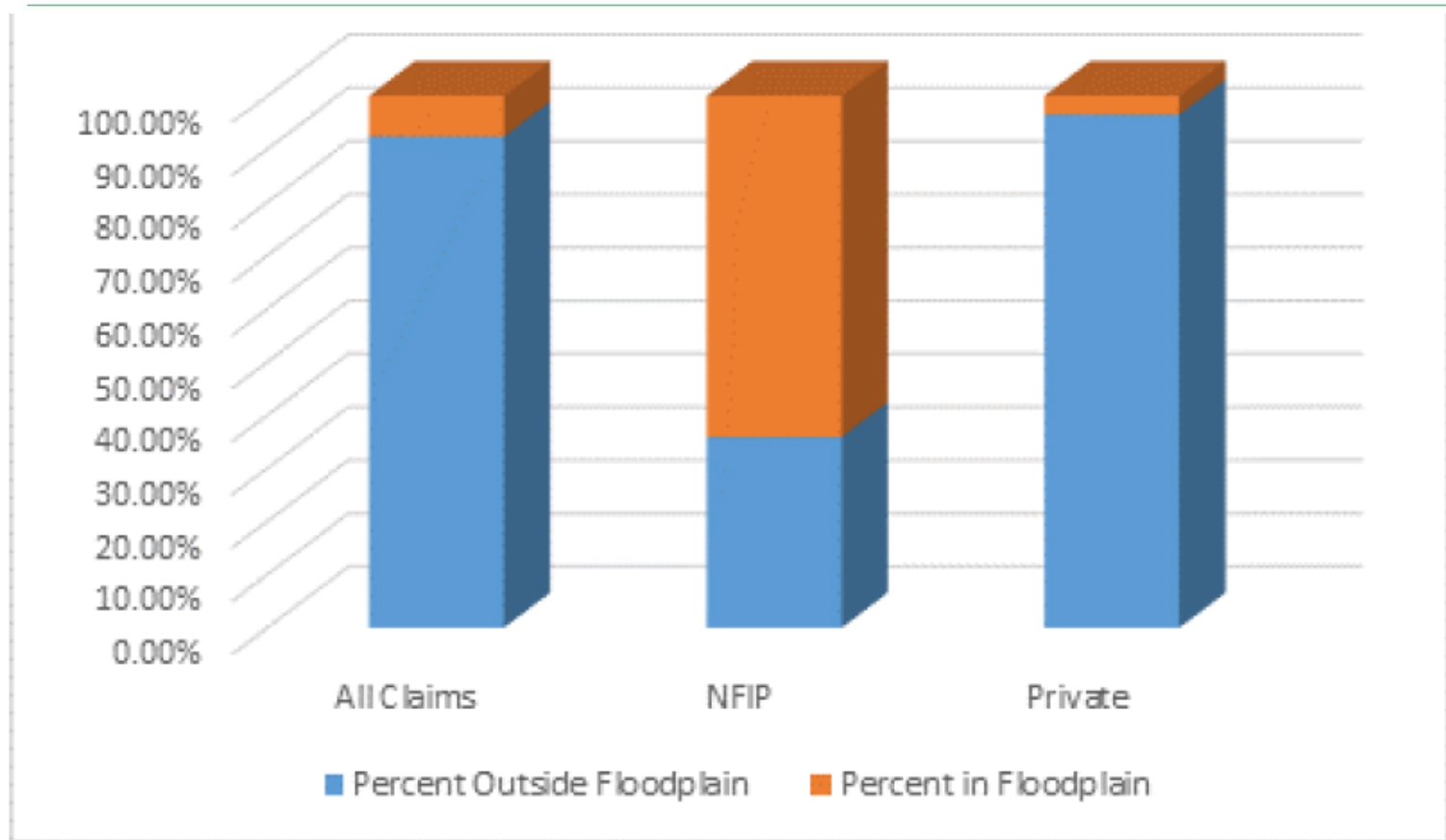


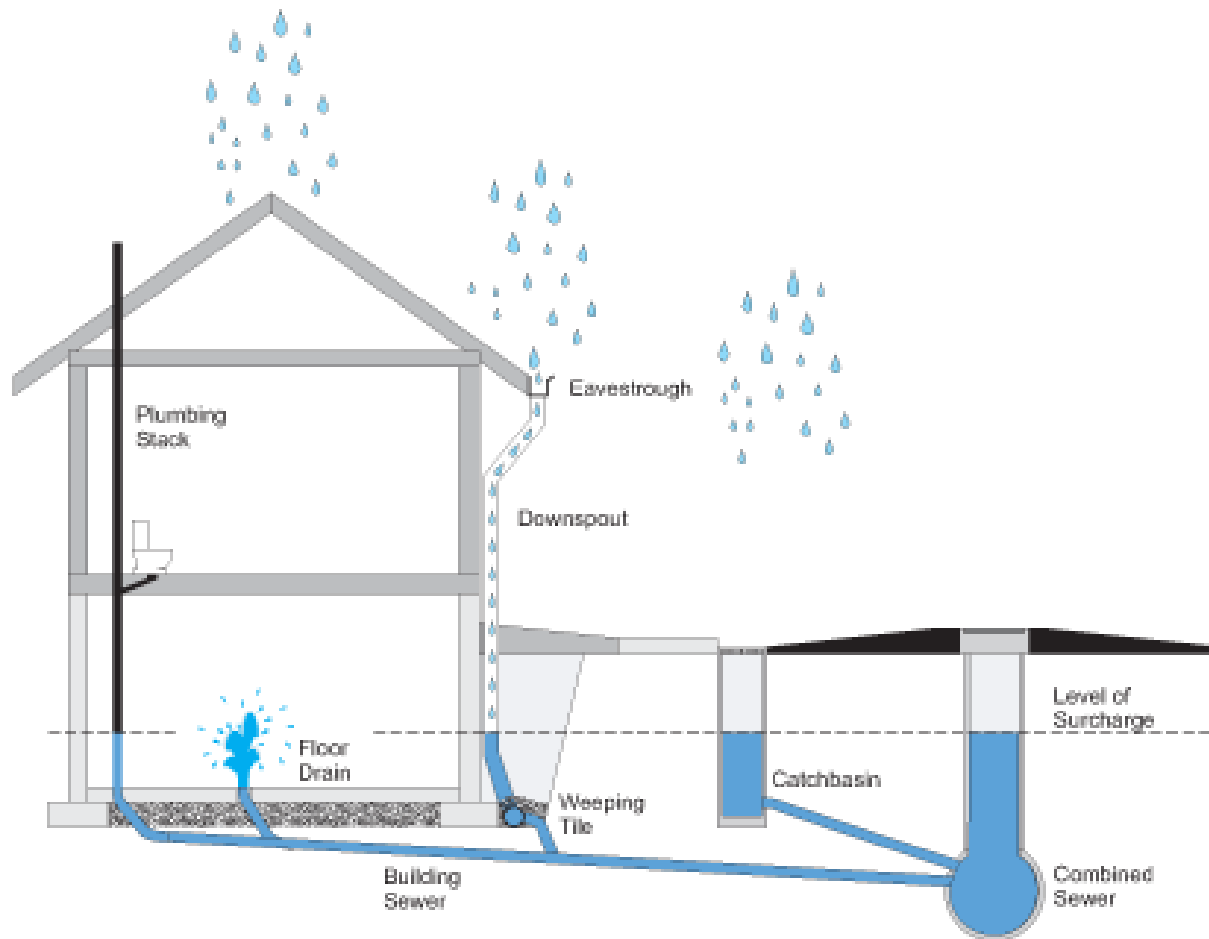
Figure 1.3: Between 2007 and 2014, most (96.5%) of private insurance claims are for structures outside the mapped floodplain; however, a significant number of NFIP claims (35.9%) are outside the mapped floodplain.

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Introduction: Riverine vs. Urban Flooding



BASEMENT FLOODING DUE TO COMBINED SEWER BACKUP

During periods of heavy rainfall, or snowmelt, the municipal sewer system becomes overloaded and the surcharge backs up and floods basements through low plumbing connections. It is essential to properly clean up the flooded area after the flooding subsides because the sewage may contain numerous harmful bacteria and contaminants.

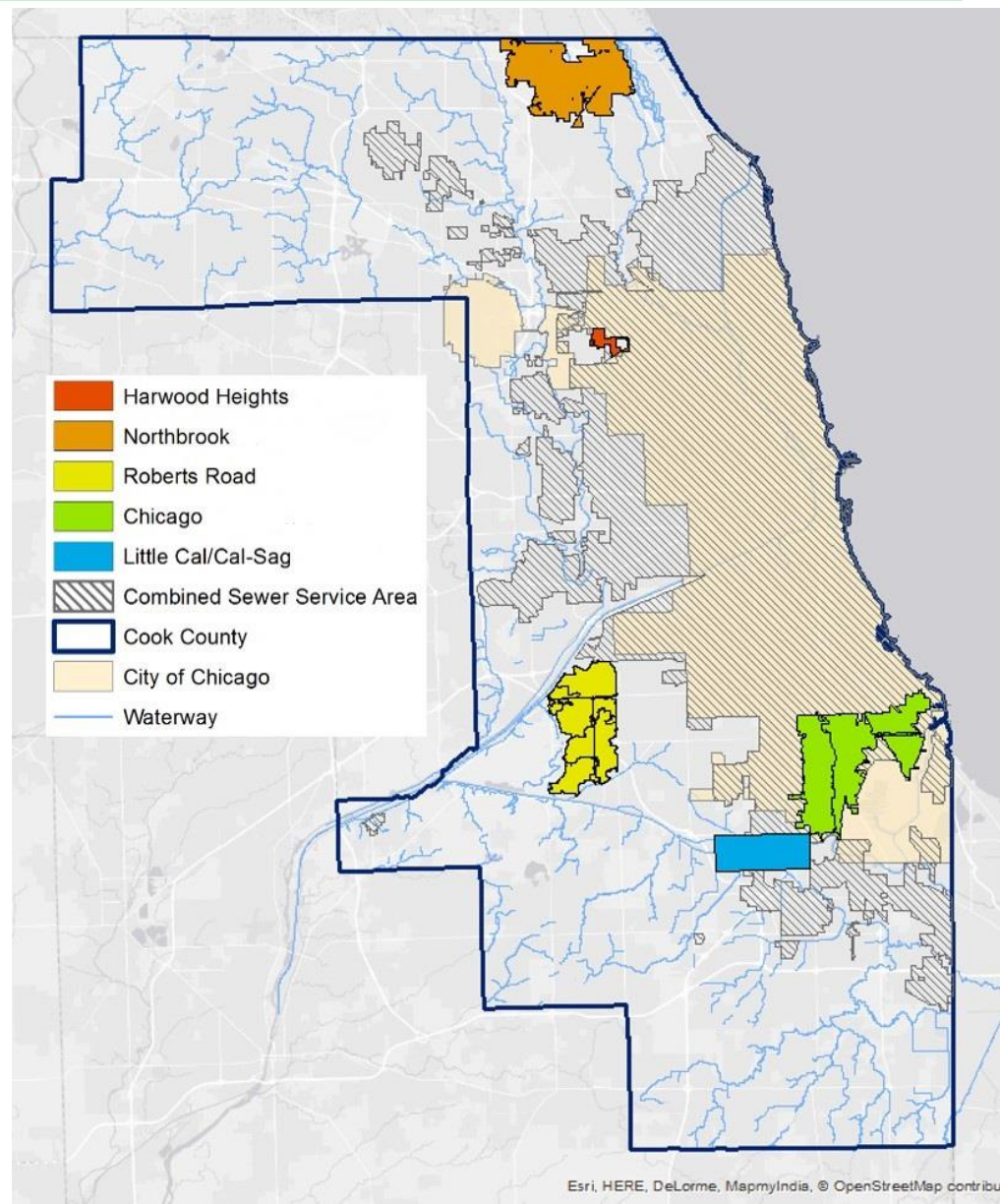
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Introduction: Stormwater Masterplan Pilots

- Pilot study areas identified by four Councils of Government and the City of Chicago
- Study areas comprised of both separate or combined sewer areas
- Goal: identify flooding solutions to protect structures in storms up to a 100-year event



“Let’s design a flood control solution that will maximize local assets and spur economic development.”





Introduction: Stormwater Masterplan Pilots

- **Key Findings:**

- Traditional and even blended green and grey solutions to provide 100-year protection require exorbitant investments
- In combined sewer areas private property interventions can be more cost effective to address basement backups
- Solutions in separate sewer areas should be examined to identify efficiencies in constructing along with local transportation or other utility improvements
- A holistic approach with a focus on stormwater solutions that engage key partners and other stakeholders in the planning and implementation process.
- Prioritizing Master Planning throughout the county based on flood risk, targeting areas in need of planning resources.

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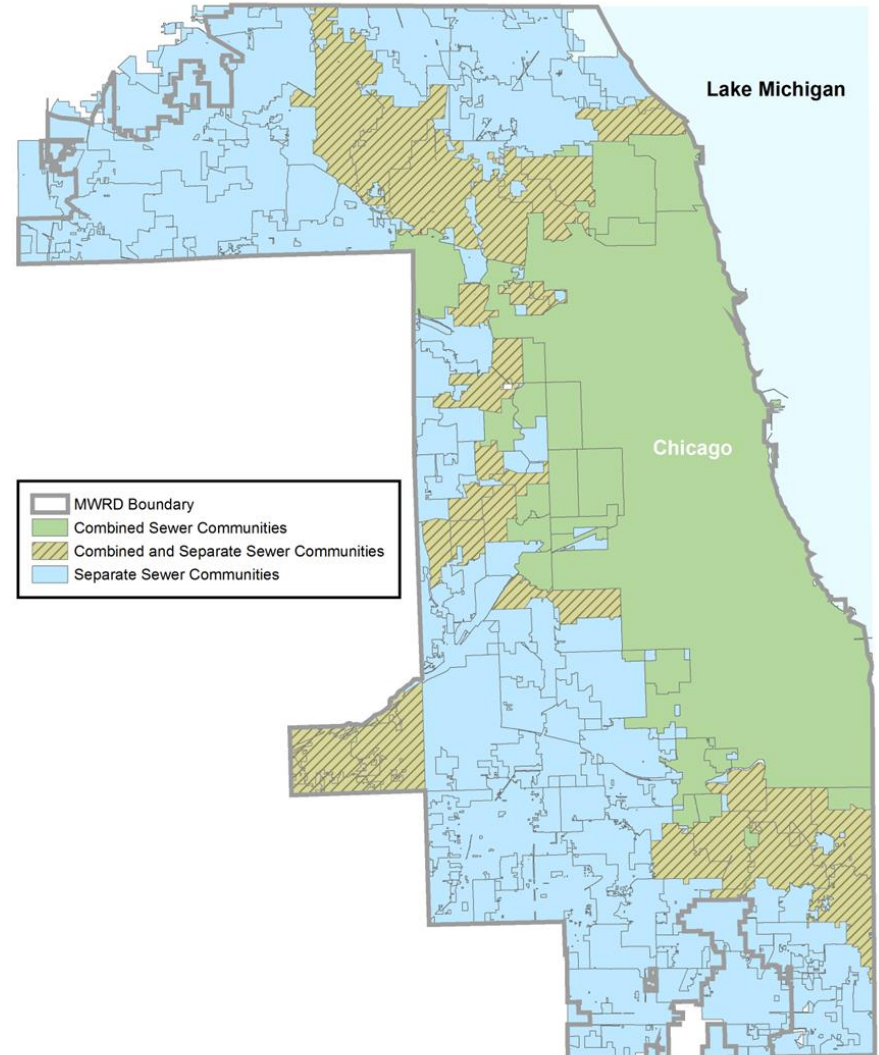
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Introduction: Stormwater Masterplan Pilots

Moving Forwards after Pilot SMPs:

- Evaluate Master Planning needs throughout county
- Develop adaptive approach, centered on managing local stormwater issues with multi-disciplined teams
- Leverage and build upon work of others
- Develop a repeatable process
- Create actionable plans
- Teams focused on separate and combined areas





Introduction: Definitions

- **Program**: The MWRD's Stormwater Master Planning Program. This Program is the MWRD's plan of action to empower communities to address stormwater issues.
- **Guidance Document (GD)**: a document containing overarching principles to guide holistic stormwater master planning. The GD can be used by future consultants and/or municipalities.
- **Individual Study Profile (ISP)**: A document prepared for a specific geographic study area which identifies the needs and opportunities for holistic solutions to stormwater problems in that area. The ISP is used to inform the RFP process and the future stormwater master planning consultant.



Introduction: Definitions

- **Plan**: A Stormwater Master Plan (SMP). The SMP is prepared with the community and provides concept-level alternatives to reduce flooding while also addressing other community needs, for future implementation by the community.
- **Project**: Typically, a capital improvement project.
- **Phase II**: MWRD's Phase II Stormwater Management Program. The Phase II program provides stormwater funding, engineering, or other MWRD assistance to communities who seek to address local flooding. Communities could apply for Phase II assistance to advance recommendations of the SMPs.

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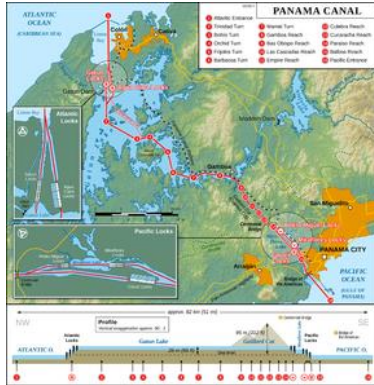
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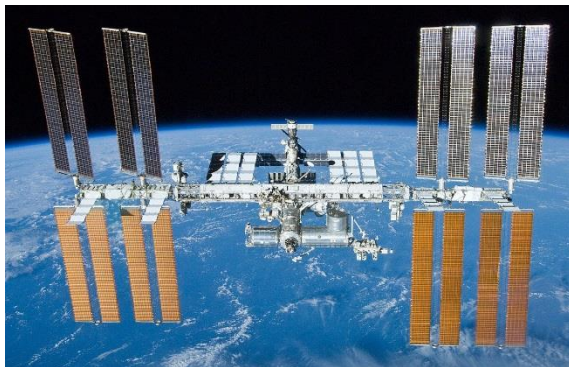
Program Goals & Outcomes

From Initial 5 Pilot Studies projected Countywide to
address Urban Flooding \$70 Billion

Panama Canal \$9.4 Billion



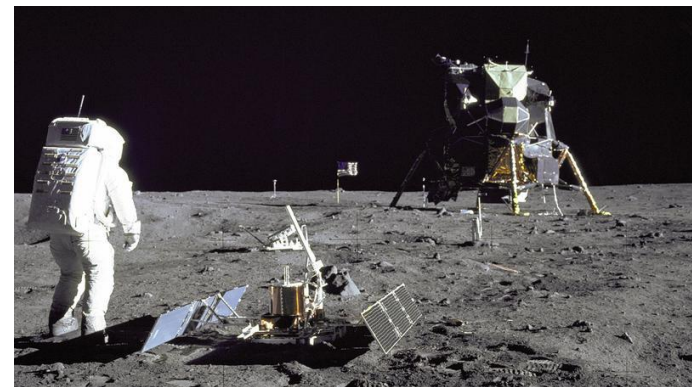
**International Space Station
\$60 Billion**



Chunnel \$36 Billion



Moon Landing \$144 Billion

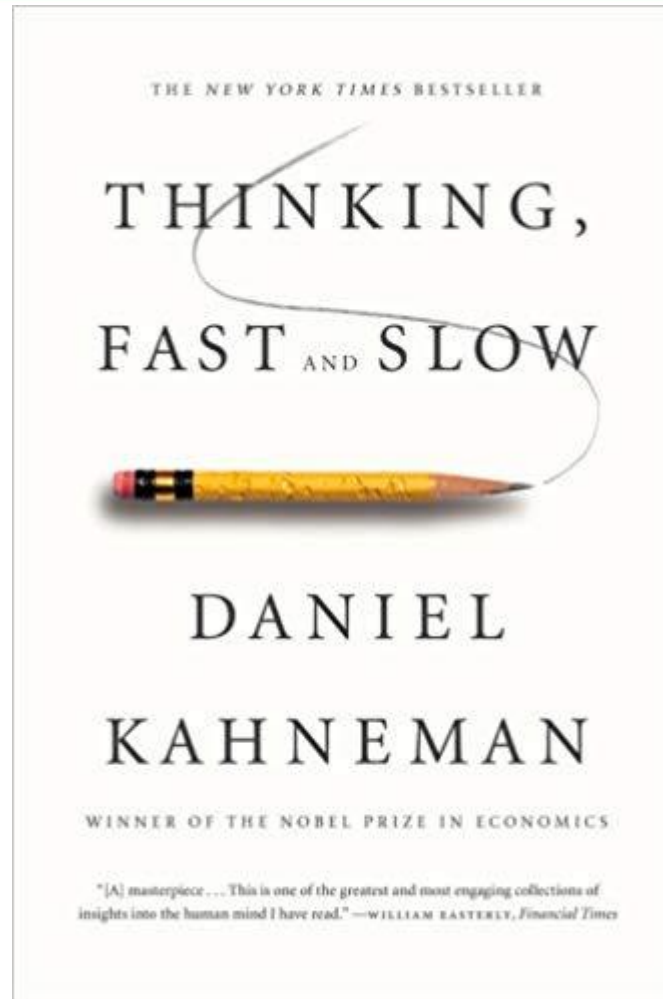


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Program Goals & Outcomes



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Program Goals & Outcomes

What will the SMP Program accomplish?

- Empower municipalities to reduce the risk of flooding for Cook County homes, businesses and critical facilities
- Create partnerships among agencies and local communities to plan and implement priority projects
- Institute a transparent methodology to prioritize stormwater management investments



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Program Goals & Outcomes

Guiding Principles:

- Perform planning in coordination with local communities and regional agencies
- Craft innovative approach for flood reduction
- Consider holistic solutions and opportunities
- Leverage and build upon work of others
- Develop a repeatable process
- Create actionable plans to be implemented by municipalities

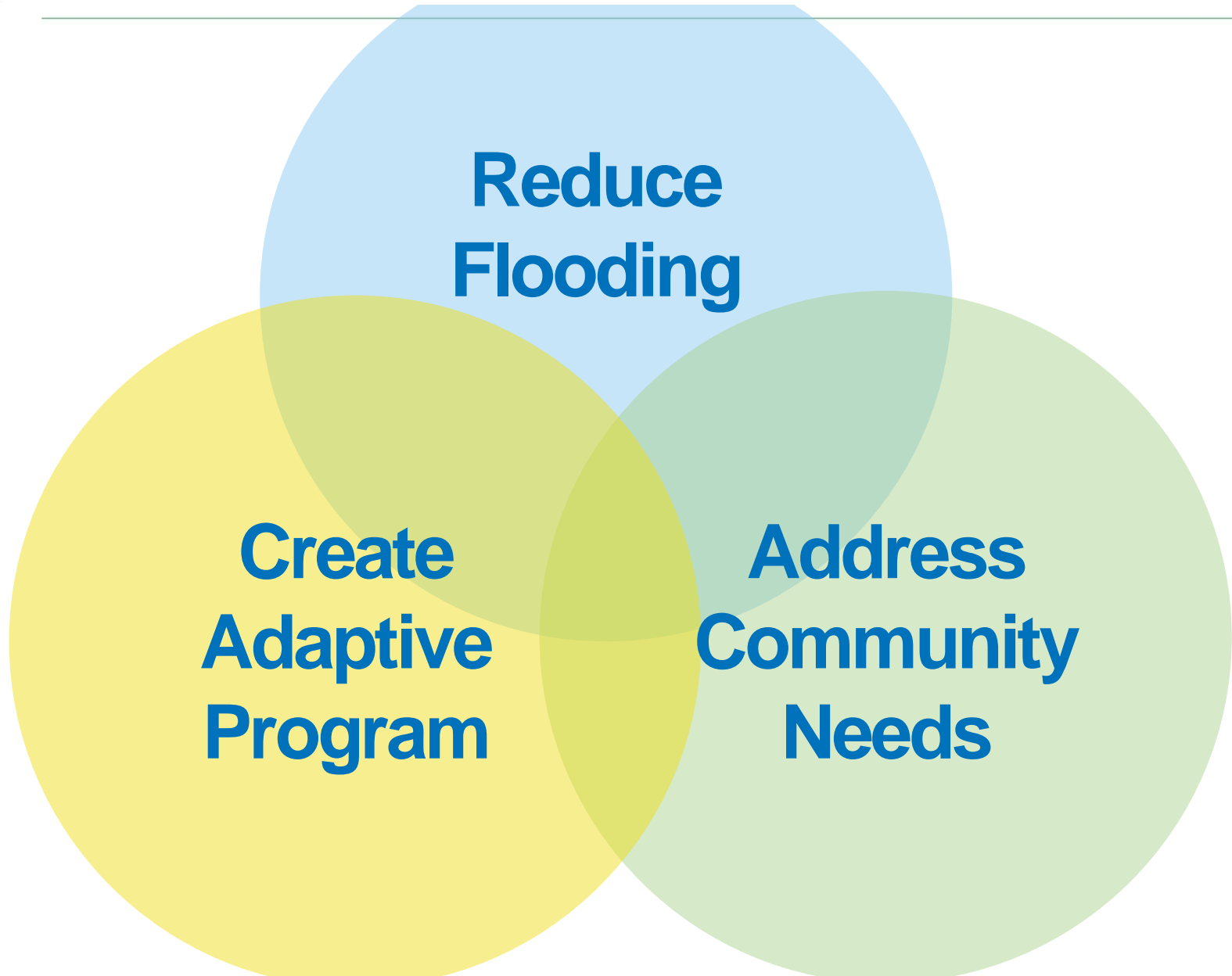


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Program Goals & Outcomes





Program Goals & Outcomes





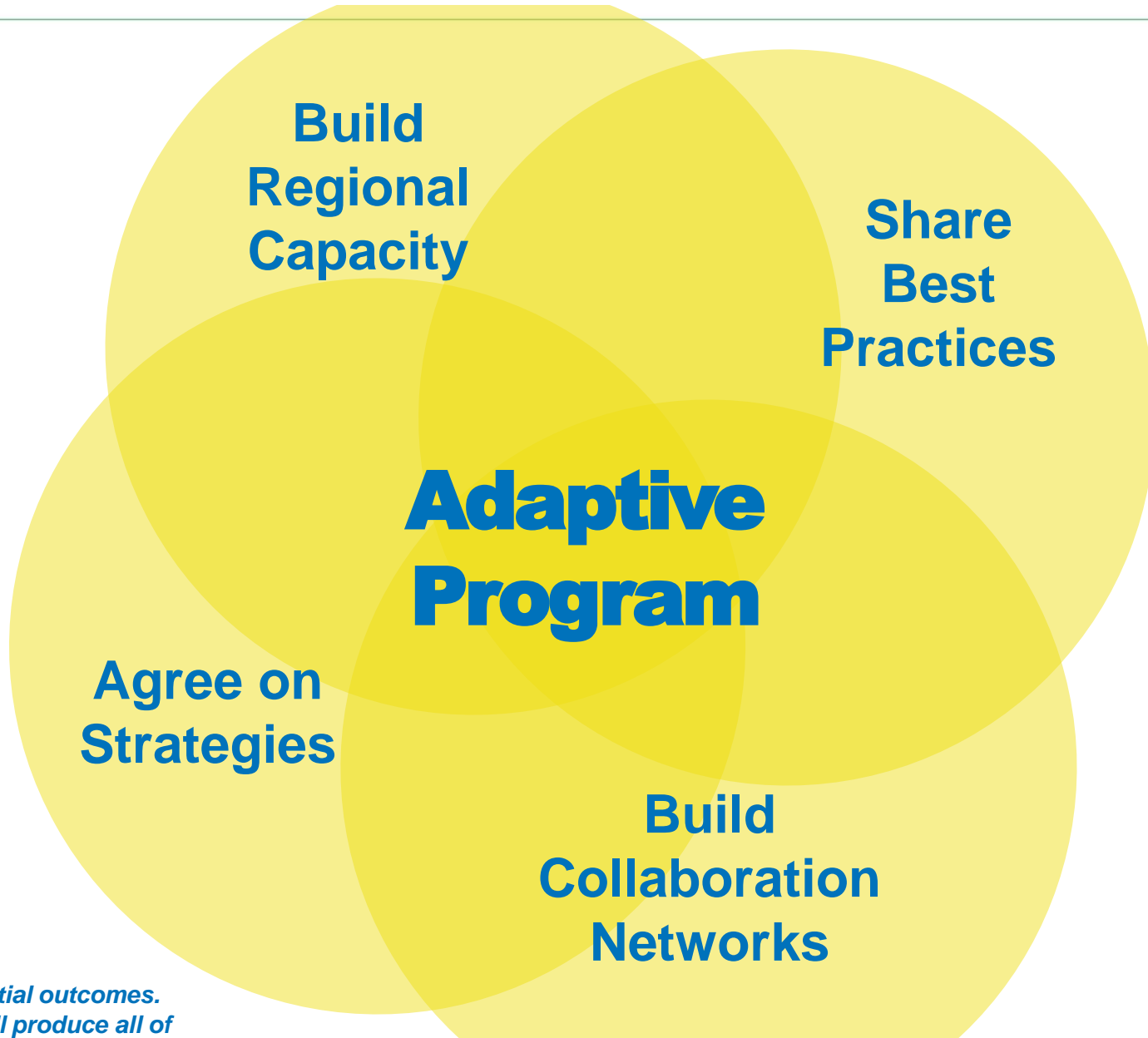
Program Goals & Outcomes



**These are potential outcomes.
Not every SMP will produce all of*



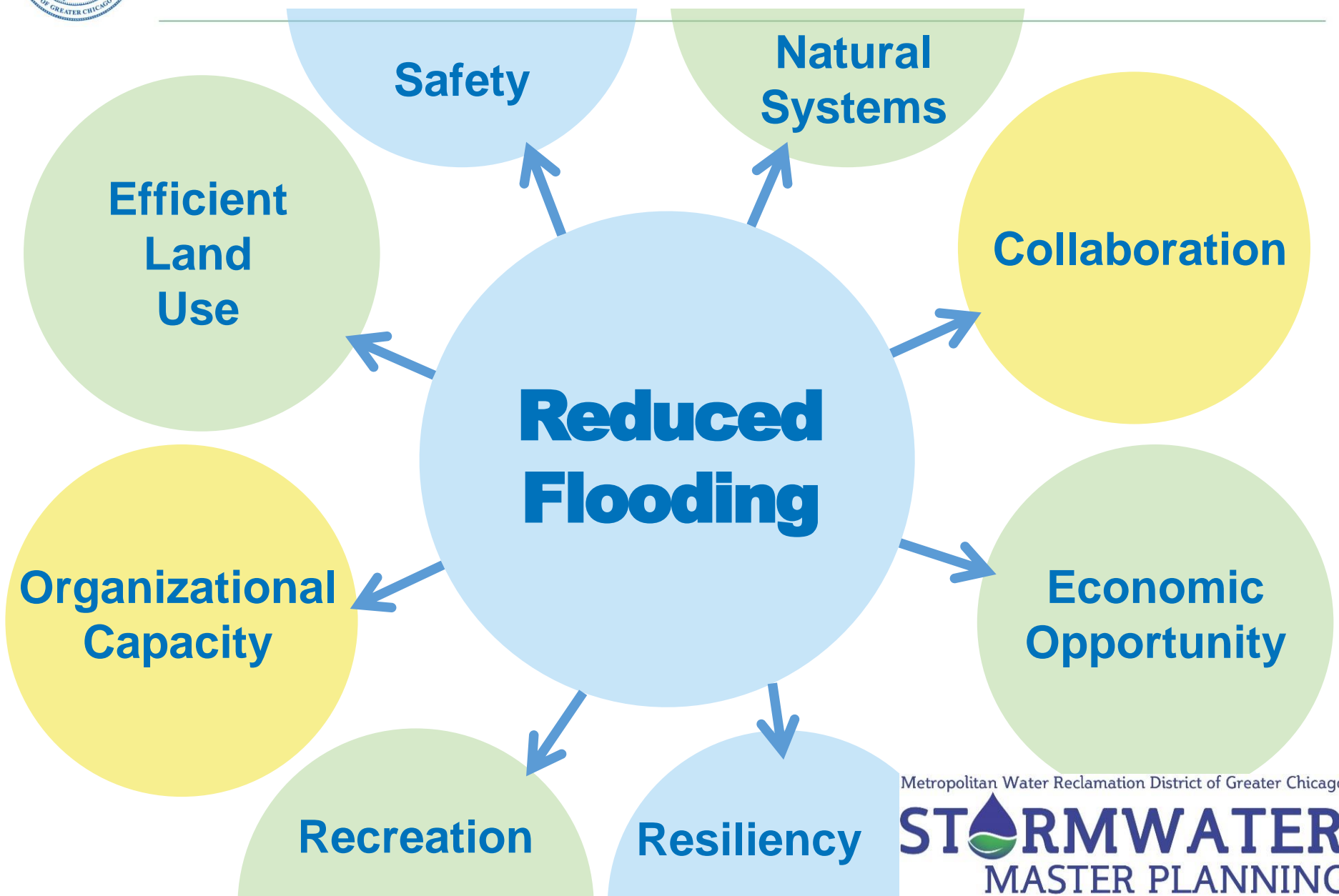
Program Goals & Outcomes



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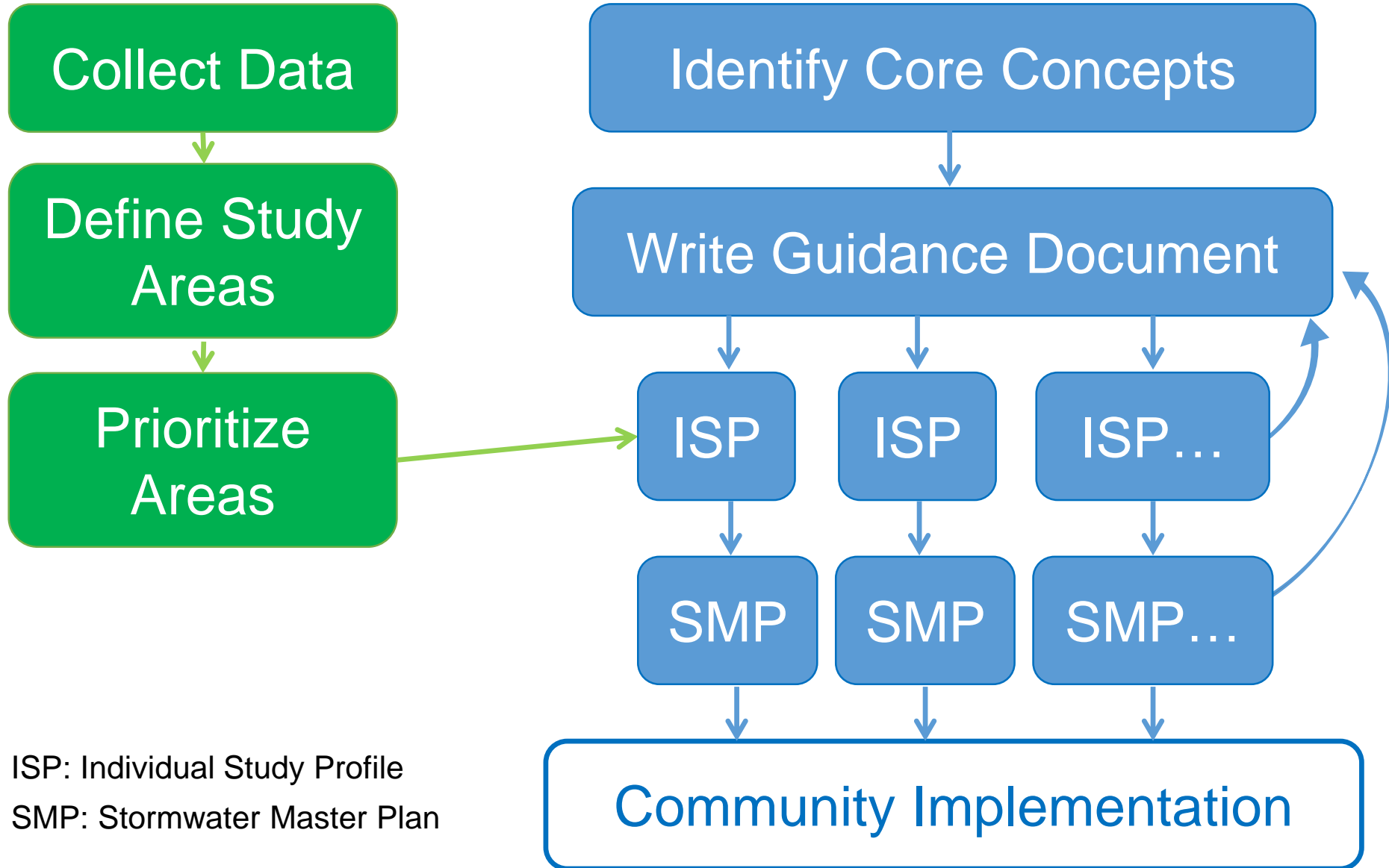


Program Goals & Outcomes





Overview of Program Scope & Process

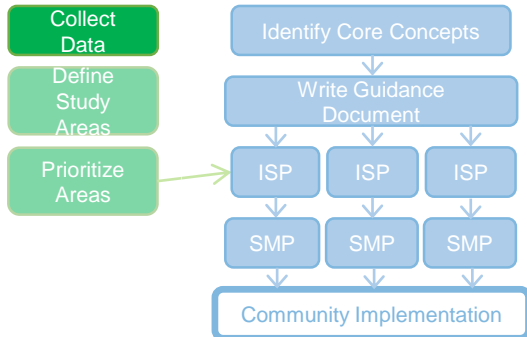
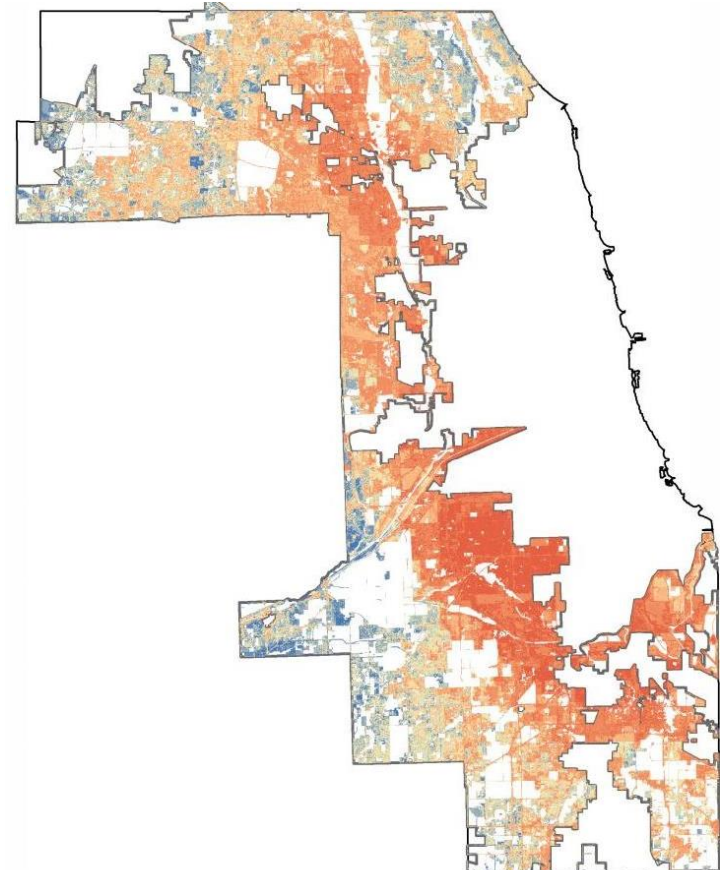




Overview of Program Scope & Process

Collect Data

- **Available data sets.** Sources include CMAP, ISWS, MWRD, available municipal data.
- **New Questionnaire to Municipal Staff** sent March 2019

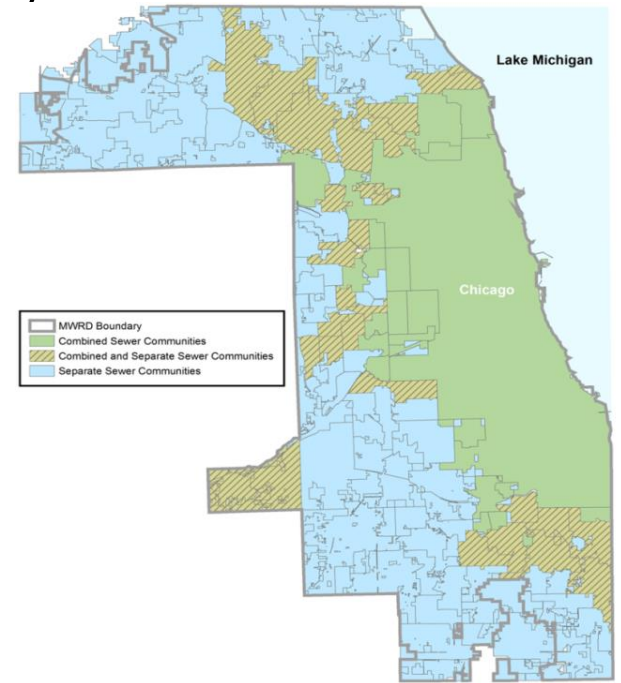
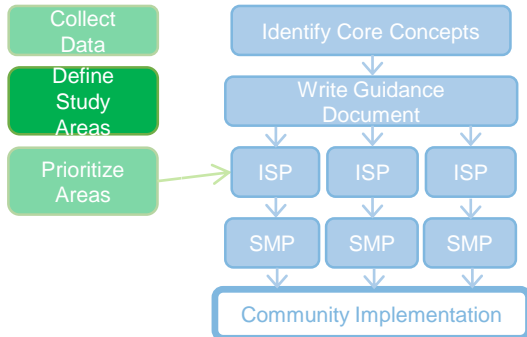




Overview of Program Scope & Process

Define Study Areas

- **Size will vary**, may be 10 to 40 square miles
- **Delineation may be based on:**
 - Subbasin delineations
 - Combined sewer area delineation
 - MWRD corporate boundary
 - Other logical geographic, topographic, or political boundary

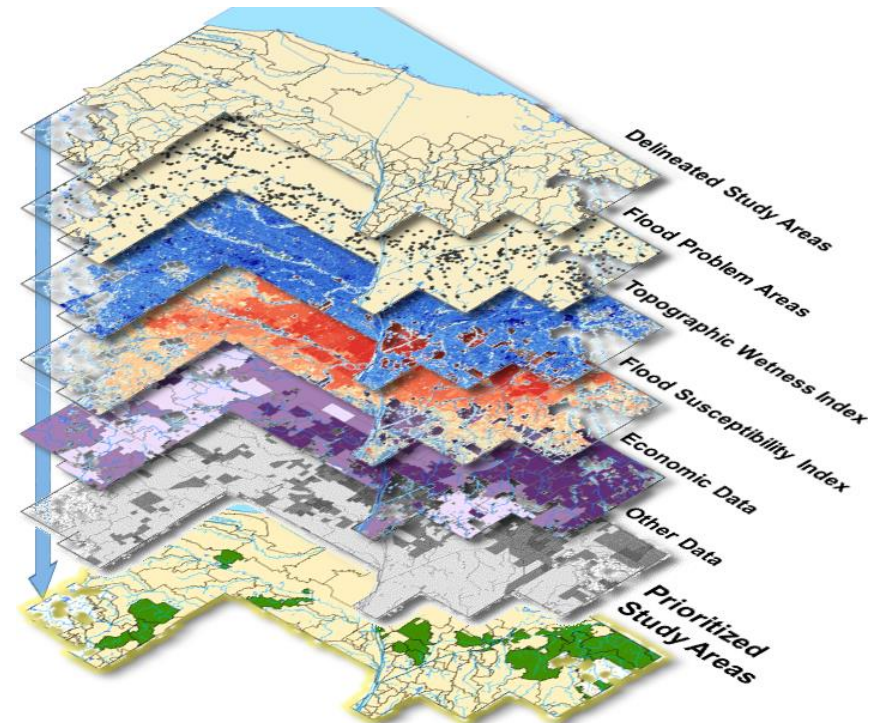
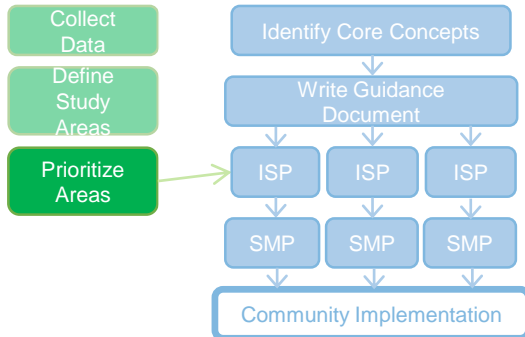




Overview of Program Scope & Process

Prioritize Areas

- **Initial prioritization** based on best available data, and to meet both flood needs and socio-economic needs.
- **Prioritization of subsequent SMPs** use results of municipal questionnaire for prioritization, process TBD.





Overview of Program Scope & Process

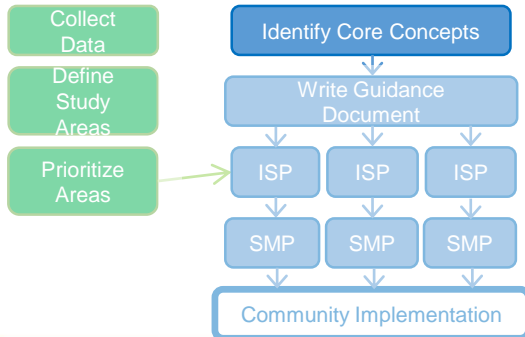
Identify Core Concepts

What is a Core Concept?

- Suite of common elements to consider in SMPs

Why develop and define Core Concepts?

- Include in the GD for consistent use by future MWRD plans
- Available to any future user of the Guidance Document, including those outside the MWRD service area
- Describe innovative techniques
- Encourage thinking outside of the box



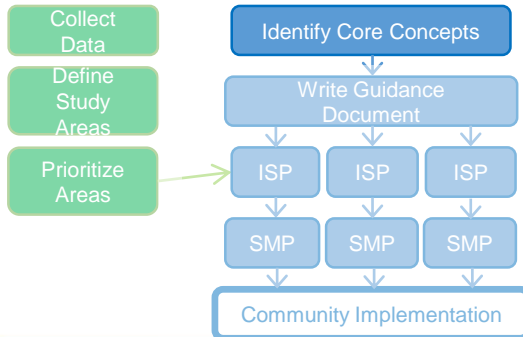
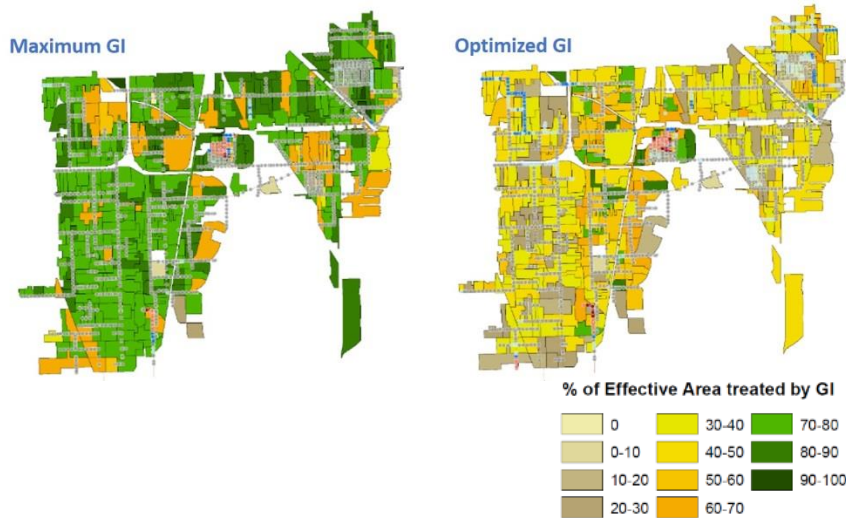
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Overview of Program Scope & Process

Identify Core Concepts



Example: Technology & Innovation

- **Real time controls** to actively manage and monitor stormwater infrastructure and maximize storage
- **Leverage analytical tools** to evaluate and identify optimized solutions
- **Innovation** – what haven't we thought of yet? New concepts repeatable elsewhere will be added to the document.

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Overview of Program Scope & Process

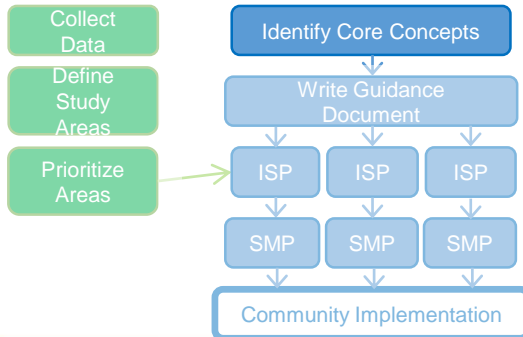
Identify Core Concepts



Figure 5-9: BMPs incorporated into a wide sidewalk (modified from San Mateo 2009)

Example: Green Infrastructure

- Integrate green infrastructure as a component of stormwater management infrastructure



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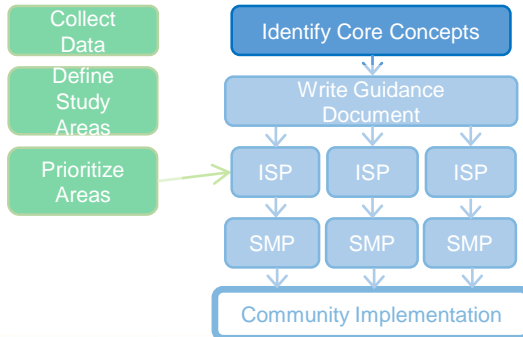
Overview of Program Scope & Process

Identify Core Concepts



Example: Programs and Policy

- Adopt policies and foster programs to enhance flood reduction efforts
 - Cost-share program for overhead sewers
 - Policy changes to allow, encourage, and/or incentivize public-private partnerships



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Overview of Program Scope & Process

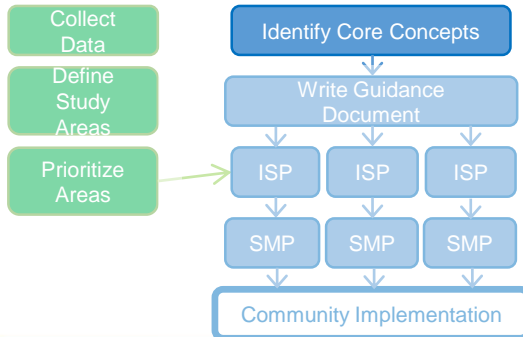
Identify Core Concepts



Photo credit: Journal-topics.com, February 2012

Example: Maximize Infrastructure Opportunities

- Modify existing infrastructure to fully utilize available capacity
- Look for regional storage opportunities
- Rethink roadway design
- Add stormwater improvements to all capital projects



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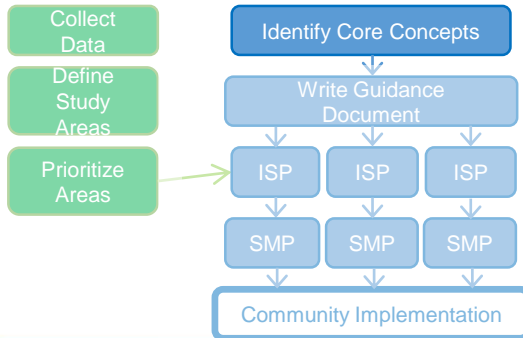
Overview of Program Scope & Process

Identify Core Concepts



Example: Land Use & Planning

- Balanced land use development
- Land use efficiency
- Mid and higher density developments
- Strong links to infrastructure
- Conserve habitats and natural systems
- Restore natural role of streams and wetlands



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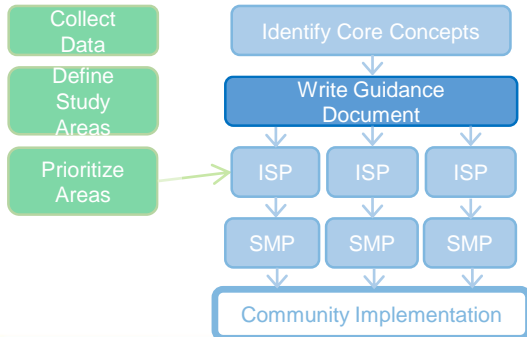


Overview of Program Scope & Process

Write Guidance Document

Purpose of Guidance Document:

- Identify process and procedure for developing and updating SMPs
- Provide consistency among Plans
- Describe overarching principles and Core Concepts to consider (and apply where appropriate) when developing SMPs
- Adaptable document, will be updated based on lessons learned during planning process
- Available publicly to all stormwater master planners.



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Overview of Program Scope & Process

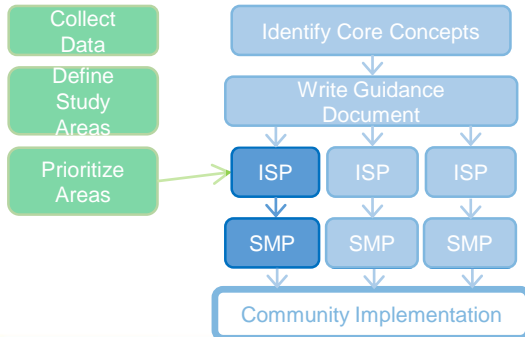
ISP
(Individual
Study Profile)



SMP
(Stormwater
Master Plan)

What is an Individual Study Profile (ISP)?

- Profile of study area that represents initial assessment of current conditions, needs, & opportunities
- Prepared for a specific geographic study area
- Provides framework for SMP
- Prepared by MWRD & Program Management Consultant, in coordination with Communities.
- Used to inform the RFP process and the future SMP consultant.



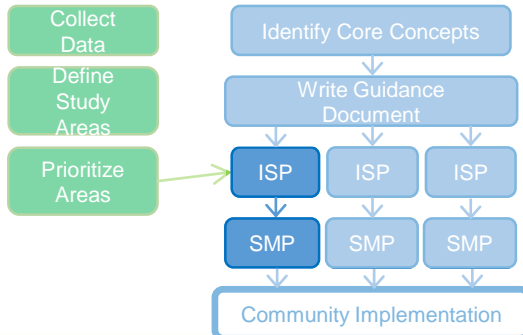


Overview of Program Scope & Process

ISP
(Individual
Study Profile)



SMP
(Stormwater
Master Plan)



What is a Stormwater Master Plan (SMP)?

- Roadmap for reducing flooding and enhancing quality of life
- Provides concept-level alternatives for flood and community resiliency
- Empowers communities to reduce flooding
 - Establishes platform and framework for stakeholder engagement and collaboration
 - Identifies project concepts, funding sources, policies, and stakeholders or partners
 - Seeks to leverage resources to avoid single purpose, capital projects
- Prepared by consultant hired by MWRD. Team works in coordination with MWRD & Communities

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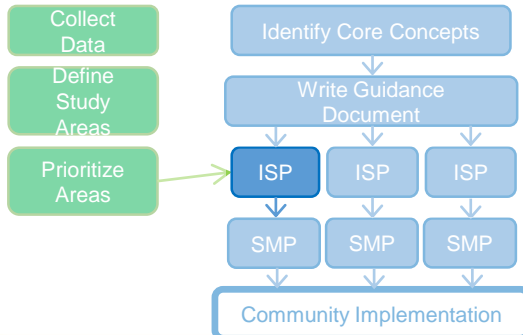


Overview of Program Scope & Process

ISP (Individual Study Profile)

Individual Study Profile (ISP)

- **Section 1: Stormwater Management Plan Background**
 - Broad overview of community background
 - Planning process & engagement strategy
- **Section 2: Existing Condition Assessment**
 - Urban Stormwater Management
 - Socio-Economic Conditions
- **Section 3: Stormwater Plan Vision and Goals**
 - Translate program goals to study area
- **Section 4: Problem Statement, Target Outcomes, & Core Concepts**
 - Explicitly state flooding problems of interest & quantify target outcomes
 - Identify and screen core concepts



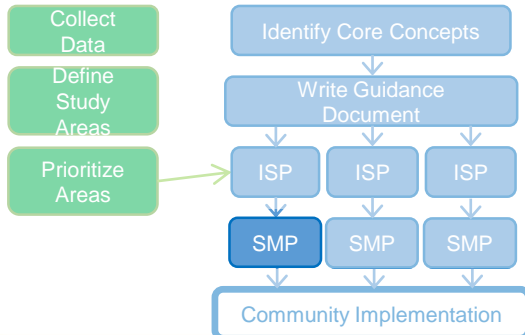


Overview of Program Scope & Process

SMP (Stormwater Master Plan)

Stormwater Master Plan (SMP)

- **Sections 1-4:** Repeats and builds upon ISP
 - Section 1: SMP Background
 - Section 2: Existing Condition Assessment
 - Section 3: SMP Vision & Goals
 - Section 4: Problem Statement, Target Outcomes Core Concepts
- **Section 5:** Development of Recommendations
 - Alternatives analysis and ranking
 - Integrated solutions
 - Policy strategy, Financial strategy
 - Barriers & strategy to overcome
- **Section 6:** Opportunities and Concept Plans
 - Project opportunities, Policy opportunities
- **Section 7:** Program Implementation
 - Leadership structure
 - Measuring success
 - Adaptive management protocol



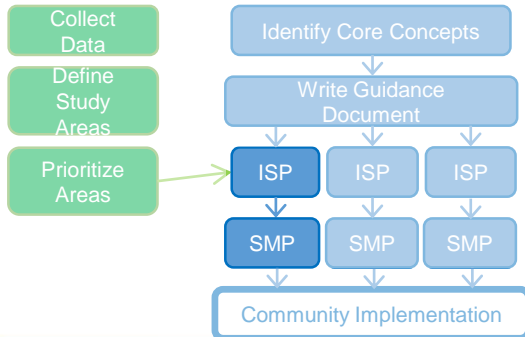


Overview of Program Scope & Process

SMP (Stormwater Master Plan)

A successful Stormwater Master Plan will:

- Empower communities by providing clear, actionable information
- Develop holistic, cost-effective solutions
- Seek innovative & integrated solutions
- Leverage resources – existing infrastructure, cross-agency funding, technology, and information
- Identify funding strategies
- Integrate economic benefits & quality of life benefits
- Include program and policy recommendations
- Empower champions: establish platform and protocol for broad collaboration and cooperation
- Establish adaptive management protocol for plan implementation



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Overview of Program Scope & Process

Community Implementation

Upon completion, SMPs will be given to municipalities for stewardship & implementation.

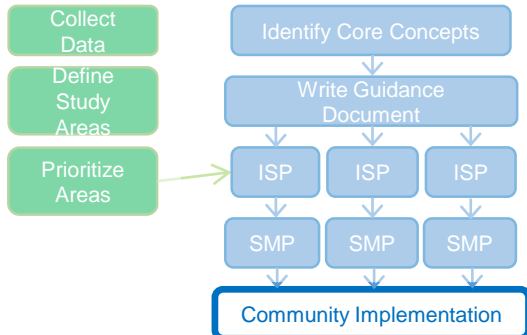
Municipal responsibilities:

Community Leadership: SMP success depends on community leadership embracing the program

- Support plan development
- Foster development of champions
- Serve as steward of implementation

Staff Level Support: SMP success depends on local insight and engagement

- Share knowledge and understanding
- Support plan development
- Seek opportunities for cross collaboration and plan



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Overview of Program Scope & Process

Common Questions

What's the Timeline?

Collect Data

Data collection: Questionnaire due 4/1

Define Study Areas

Definition of Study Areas: 2019

Prioritize Areas

Prioritization of study areas:

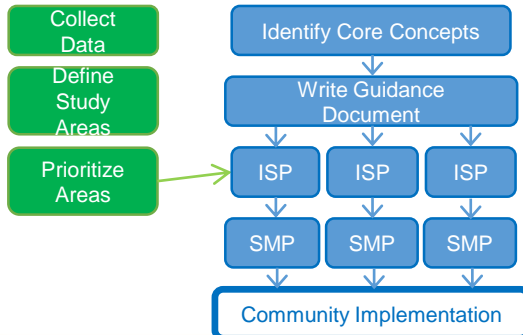
- Initial prioritization: Dec 2018
- Subsequent prioritization based on questionnaire results: summer 2019

Identify Core Concepts

Identify core concepts & write GD:

Write Guidance Document

- Initial draft: Summer 2019
- Updated frequently throughout process to reflect innovations and lessons learned



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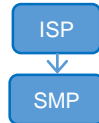
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Overview of Program Scope & Process

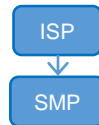
Common Questions

What's the Timeline (continued)?



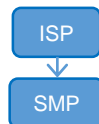
First six ISPs & SMPs

- Initial meetings February/March 2019
- Individual Study Profiles completed April/May 2019
- RFPs to consultant community Summer 2019
- Stormwater Master Plans completed Spring 2020



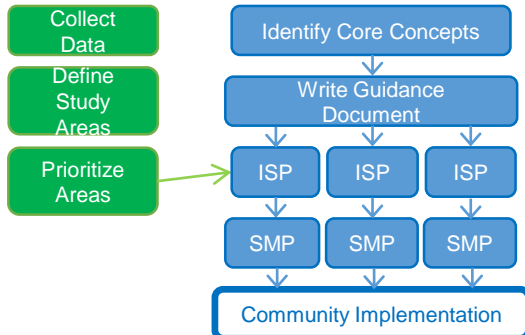
Next six ISPs & SMPs (tentative timeline)

- Prioritization of areas summer 2019
- Initial meetings with municipal partners Fall 2019
- ISPs completed early Spring 2020
- RFPs to consultant community Spring 2020
- SMPs completed winter 2020-2021



Subsequent six ISPs & SMPs (tentative)

- Process initiated Summer 2020



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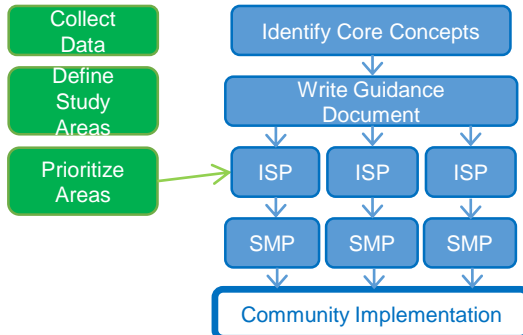


Overview of Program Scope & Process

Common Questions

Who Provides the Funding?

- The Individual Study Profiles and the Stormwater Master Plans are funded 100% by MWRD
- The recommendations contained in the SMPs will be developed in cooperation with the local municipalities, for future implementation by municipalities.
- Municipalities and other stakeholders will be responsible for funding the SMP recommendations.
- Municipalities may apply for MWRD funding assistance through the “Phase 2” program.



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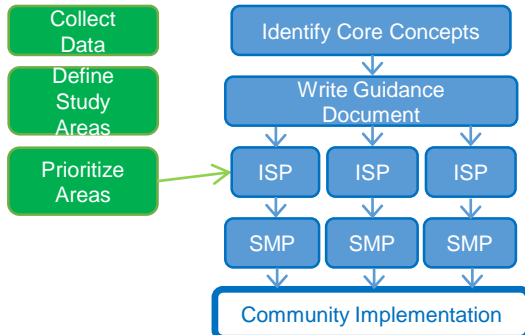


Overview of Program Scope & Process

Common Questions

Why should my municipality participate? What's the benefit?

- Plans provide a comprehensive framework to address local flooding and enhance resilience.
- Holistic approach will generate multi-objective recommendations tailored to community needs.
- Robust participation during planning will lay foundation for municipalities to successfully implement plan recommendations.
- Agencies may prioritize funding allocation to projects and programs recommended in SMPs.
- Communities outside Cook County can benefit by using the GD's holistic planning approach.



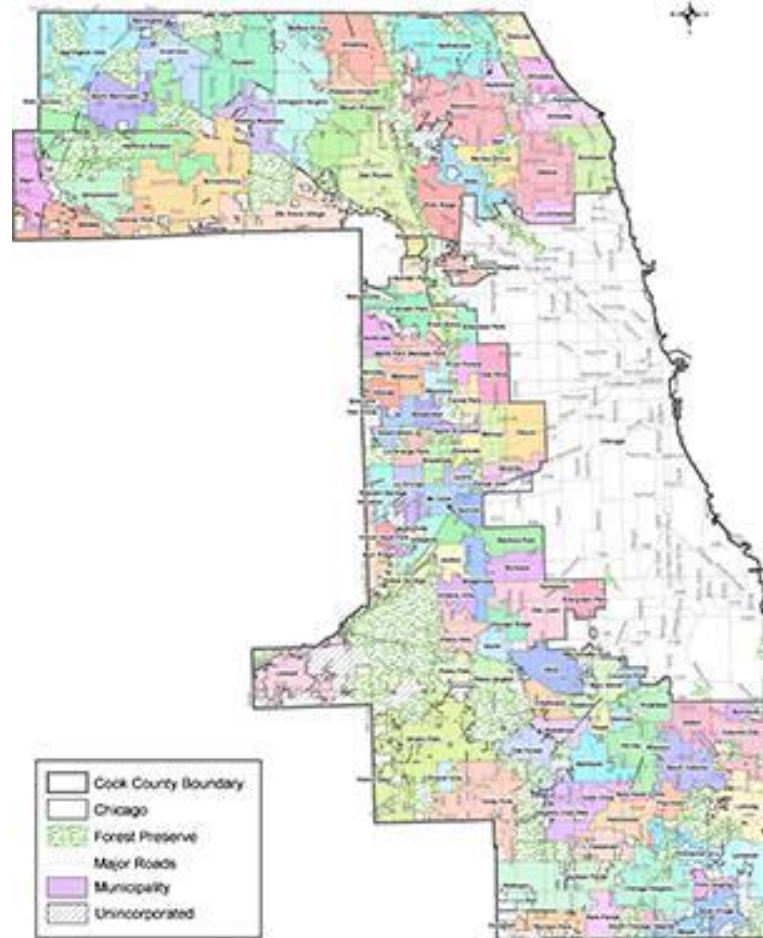
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Questionnaire for Municipal Staff

- Purpose: collect data to inform the study area definition and prioritization process.
- Sent early March
 - Questionnaires sent to Village / City Administrators and Township contacts
 - Distribution via e-mail and U.S. Mail



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Questionnaire for Municipal Staff

Data sought in the questionnaire includes:

- Location, frequency and severity of flood problems
- Whether flooding and flood solutions are an important need in the community
- Other top community needs
- If planning or engineering efforts have already been made to address stormwater issues



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Questionnaire for Municipal Staff

Two-Part Questionnaire:

- Part 1: General Questions
 - Online
www.surveymonkey.com/r/MWRD-1
 - Hard copy
- Part 2: Show flood locations on map
 - Online (interactive map tool)
www.tinyurl.com/MWRD-map
 - Hard copy

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Partnering for Resilient Communities

Municipal Staff Survey on Urban Flooding

March 2019



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Questionnaire for Municipal Staff Online Tutorial: Part 1

[SurveyMonkey.com/r/MWRD-1](https://www.surveymonkey.com/r/MWRD-1)

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MWRD Urban Flooding Survey for Municipal Staff

Part 1, Page 3

3. Has your municipality been impacted by urban flooding?

☒ Yes

☐ No





Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool

<https://s3.amazonaws.com/mwrd/src/index.html>



tinyurl.com/MWRD-map redirects to AWS

Stormwater Master Planning Program: Partnerships for Resilient Communities

Part 2 of the Municipal Staff Questionnaire: Locations of Urban Flooding

Directions: For each location of urban flooding, please (1) answer the questions below, (2) draw a boundary around the corresponding area using the interactive map below, (3) click "Save", and (4) return to this form and repeat the process for each location that experiences urban flooding in your municipality.

This survey is for municipal staff use only and not for the general public.

For tech help, contact developer

Important! Once you click "save" you will not see the data that you submitted or have access to edit the data. Please keep track of your submissions so you don't duplicate or omit any locations of flooding.

If you have questions about the data you submitted, need to edit the data, or if you have technical difficulties with this application, please contact Urban GIS:

Shaun Langley, GIS Developer, 312-666-7581 ext.5624, sl@urbangis.com or
Brad Lindgren, GIS Developer, 312-666-7581 ext.5613, bl@urbangis.com

If you have questions about the MWRD's program for Stormwater Master Planning or need other assistance, please contact MWRD:
Richard Fisher, Senior Civil Engineer, 312-751-5479, FisherR@mwrd.org or
Brian Wawczak, Senior Civil Engineer, 312-751-5836, WawczakB@mwrd.org.





Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool

Respondent's Information:

Name:

Title:

Municipality/Gov Entity:

Email:

Phone (10 digit number):

Enter your information as respondent, in case we have questions about the data



Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool

1. Enter New Urban Flood Location Information

1. Describe this location (eg, address, intersection, neighborhood, street, etc):

2. What type of flooding occurs at this location? Check all that apply

- ☐ Basement flooding of homes or businesses
- ☐ First floor/main floor flooding of homes or businesses
- ☐ Roadway flooding that prevents access by emergency vehicles
(i.e. hospitals, fire stations, police departments, pump houses, etc)
- ☐ Other:

3. How often does this area flood?

4. How would you classify the severity of flooding in this area?

5. If known, how many buildings suffer interior flood damage at this location during the worst storm?

Single Family Homes

Multi-Family Homes

Answer brief questions about each area of urban flooding within your community.

Fill out this form for one area of flooding at a time.

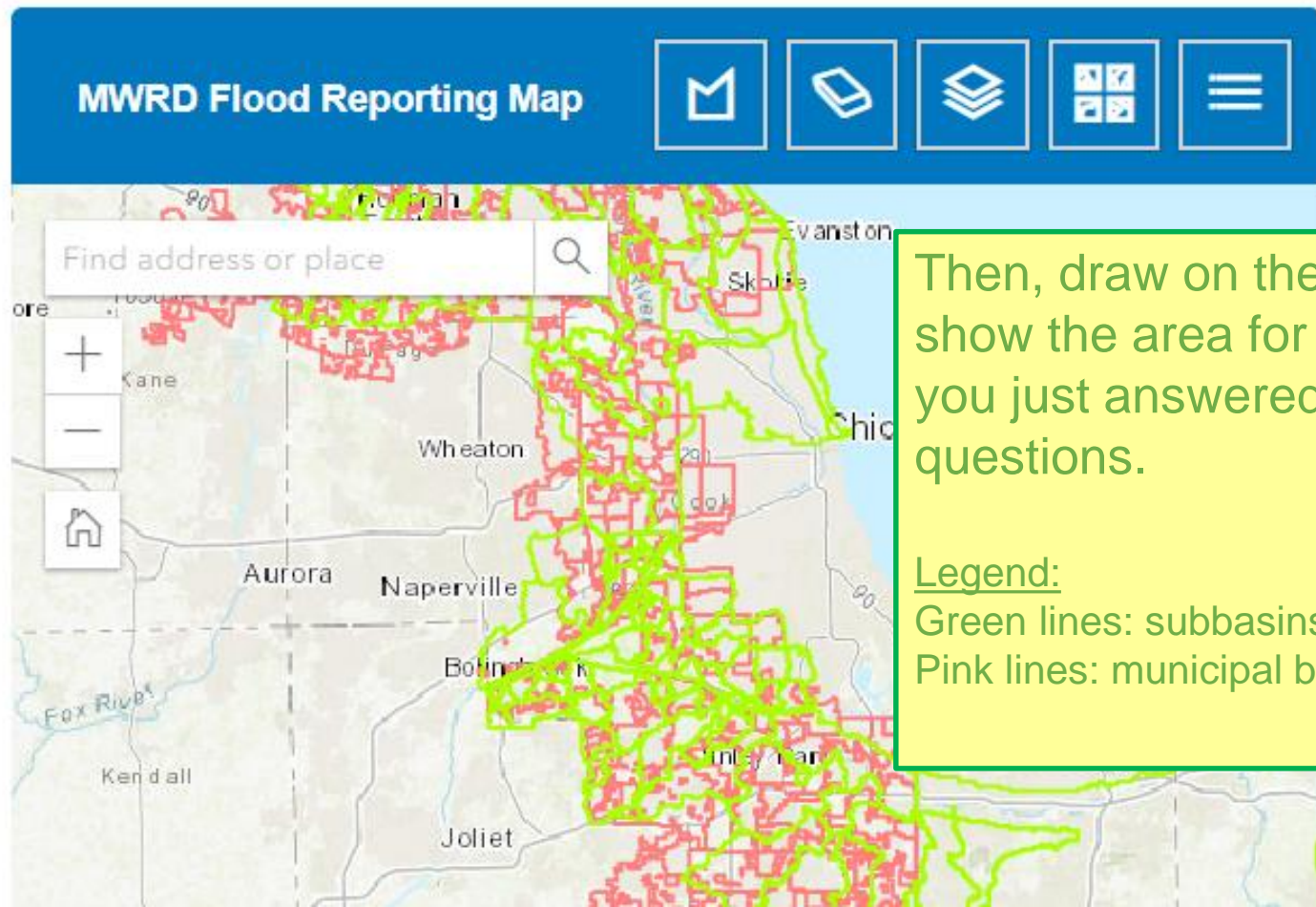


Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool

2. Draw Location of Urban Flooding

Select the Draw tool (icon furthest to the left). Click once to start drawing, and continue clicking to draw a polygon (shape) on the map that defines the approximate limits of the urban flood problem area. Double click to conclude drawing. If you make a mistake while drawing, click the Draw tool again to re-start your drawing..



Then, draw on the map to show the area for which you just answered questions.

Legend:

Green lines: subbasins

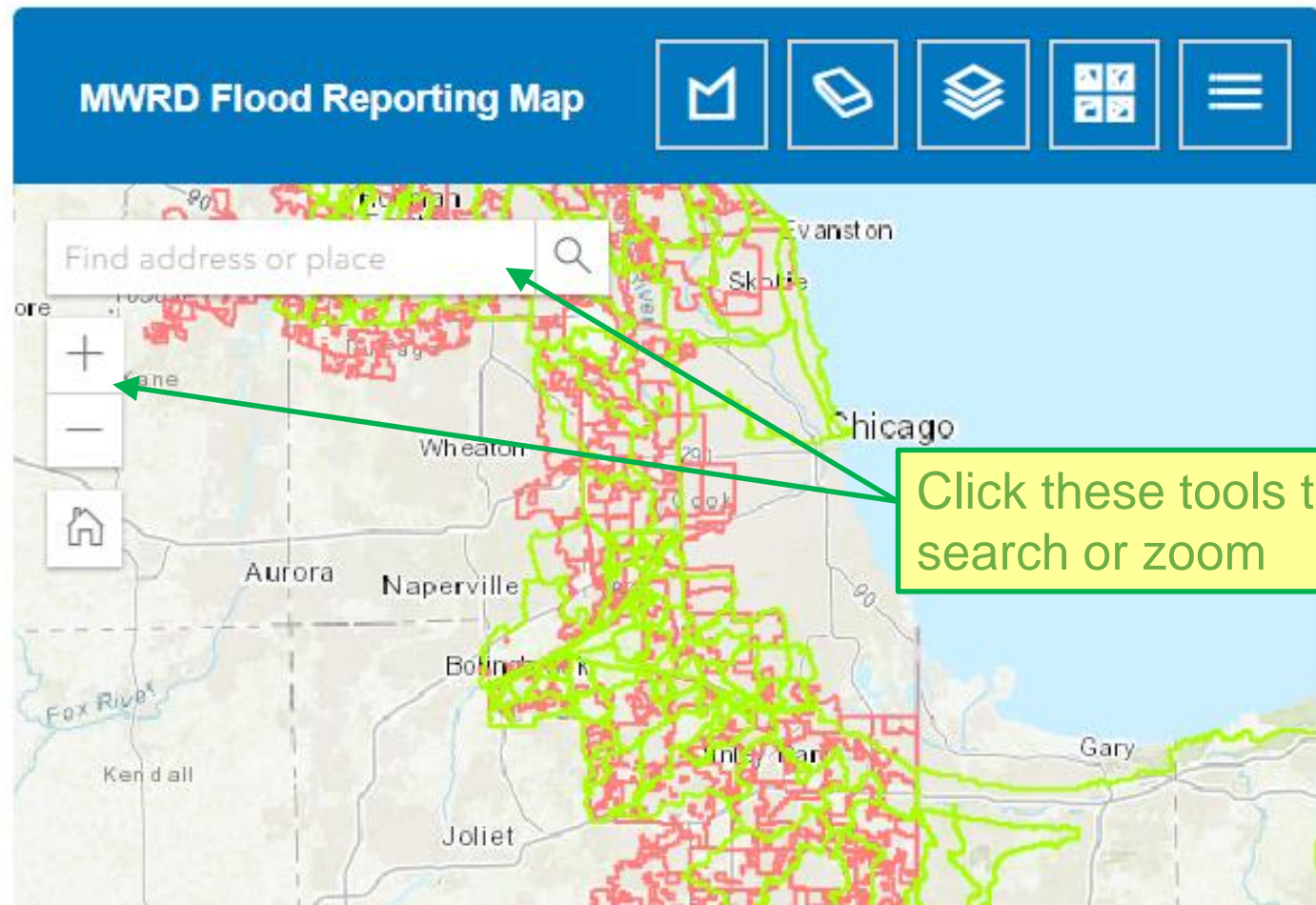
Pink lines: municipal boundaries



Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool

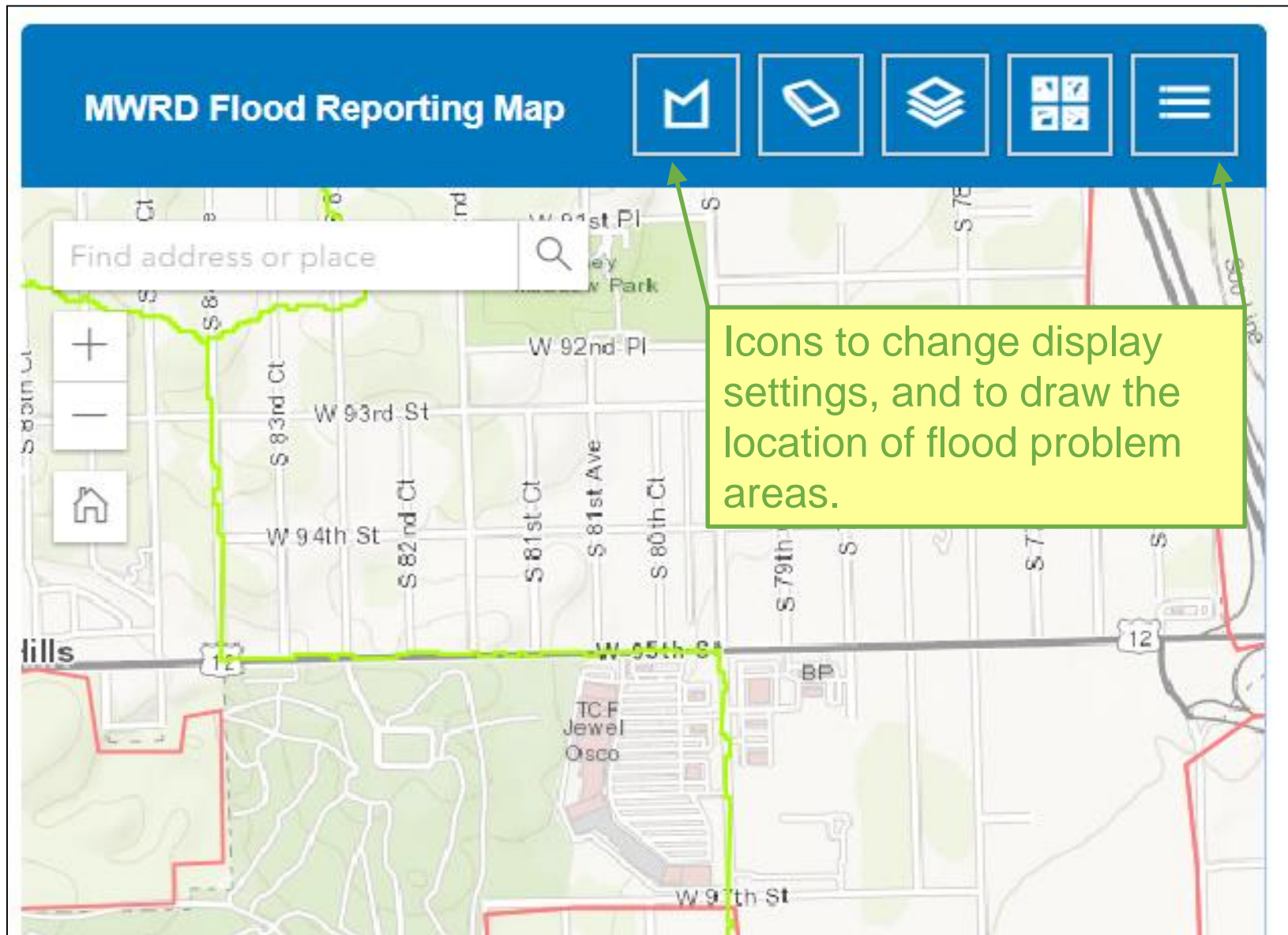
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Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool





Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool

MWRD Flood Reporting Map

Find address or place

Subbasin

MunicipalBoundary

Legend

The screenshot displays the MWRD Flood Reporting Map interface. At the top, a blue header bar contains the title "MWRD Flood Reporting Map" and five icons: a map, a document, a stack of layers, a grid of four squares, and a green menu button. Below the header, a map of a city area is shown, with a search bar labeled "Find address or place" and a home button. A legend overlay is visible on the right side of the map, showing a yellow triangle for "Subbasin" and a red triangle for "MunicipalBoundary". The map itself shows a grid of streets, including S 83rd Ct, S 82nd Ct, S 81st Ct, W 93rd St, W 94th St, and W 97th St. A red line indicates the Municipal Boundary, and a yellow line indicates a Subbasin. The map also shows a highway labeled "12" and a building labeled "TCF Jewel Osco".



Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool

MWRD Flood Reporting Map

Find address or place

Basemaps

- Imagery
- Imagery with Labels
- Streets
- Topographic

The screenshot shows the MWRD Flood Reporting Map interface. At the top is a blue header with the title "MWRD Flood Reporting Map" and five icons: a map, a document, a stack of layers, a green square with a white 'X' (highlighted), and a hamburger menu. Below the header is a map of Chicago with a yellow line indicating a flood path. A search bar with the text "Find address or place" and a magnifying glass icon is positioned above the map. To the left of the map are zoom controls (+, -, home). On the right side, there is a panel titled "Basemaps" with four options: "Imagery", "Imagery with Labels", "Streets", and "Topographic". Each option has a small preview image. The "Imagery" option is currently selected. The map shows a grid of streets including W 92nd St, W 93rd St, W 94th St, S 81st Ct, S 82nd Ct, S 83rd Ct, and S 81st Ave. A red line indicates a boundary or flood zone. The map also shows landmarks like TC F Jewel and OSCO.



Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool

MWRD Flood Reporting Map

Find address or place

Turn Layers On / Off

Subbasin

MunicipalBoundary

The screenshot shows the MWRD Flood Reporting Map interface. At the top is a blue header with the title "MWRD Flood Reporting Map" and five icons: a map, a document, a layers icon (highlighted in green), a window icon, and a menu icon. Below the header is a satellite map of a residential area. A yellow line outlines a specific subbasin, and a red line outlines the municipal boundary. On the left side of the map, there are three icons: a plus sign for zooming in, a minus sign for zooming out, and a house icon for home. A search bar with the placeholder text "Find address or place" is located at the top left of the map area. A layers panel is open on the right side of the map, showing two layers: "Subbasin" and "MunicipalBoundary", each with an eye icon. A yellow callout box points to the layers panel with the text "Turn Layers On / Off".



Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool

MWRD Flood Reporting Map

Find address or place

Subbasin

MunicipalBou

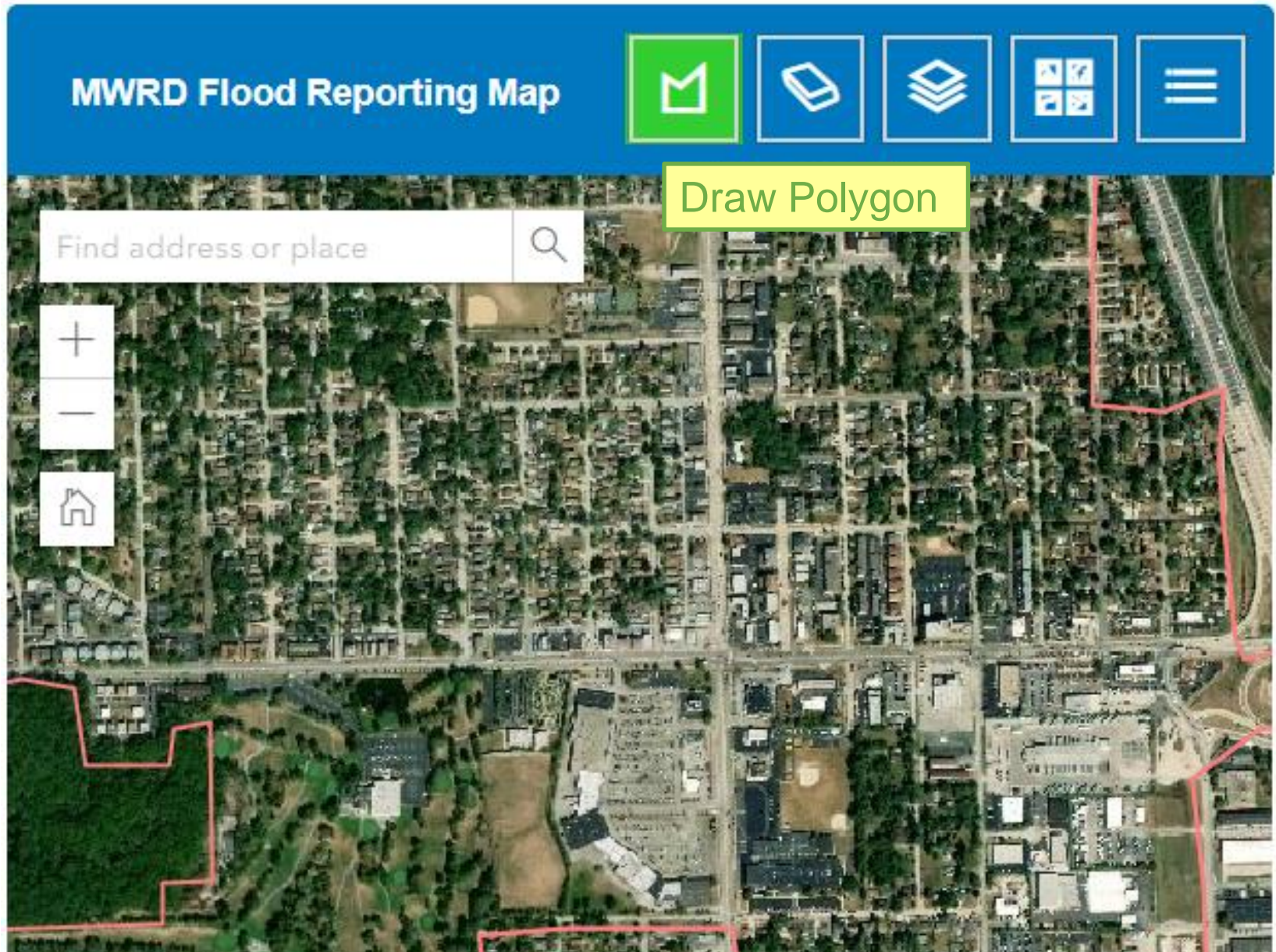
Click layer name to turn that layer on or off

The screenshot shows the MWRD Flood Reporting Map interface. At the top is a blue header with the title "MWRD Flood Reporting Map" and five icons: a map, a document, a stack of layers (highlighted in green), a grid, and a menu. Below the header is a search bar with the placeholder text "Find address or place". To the left of the map are three buttons: a plus sign for zoom in, a minus sign for zoom out, and a house icon for home. On the right side, a layer control panel is visible, showing two layers: "Subbasin" and "MunicipalBou". A yellow callout box points to the "Subbasin" layer name with the text "Click layer name to turn that layer on or off". The main map area displays an aerial view of a residential neighborhood with a red outline indicating a specific subbasin boundary.



Questionnaire for Municipal Staff

Online Tutorial: Part 2, Mapping Tool





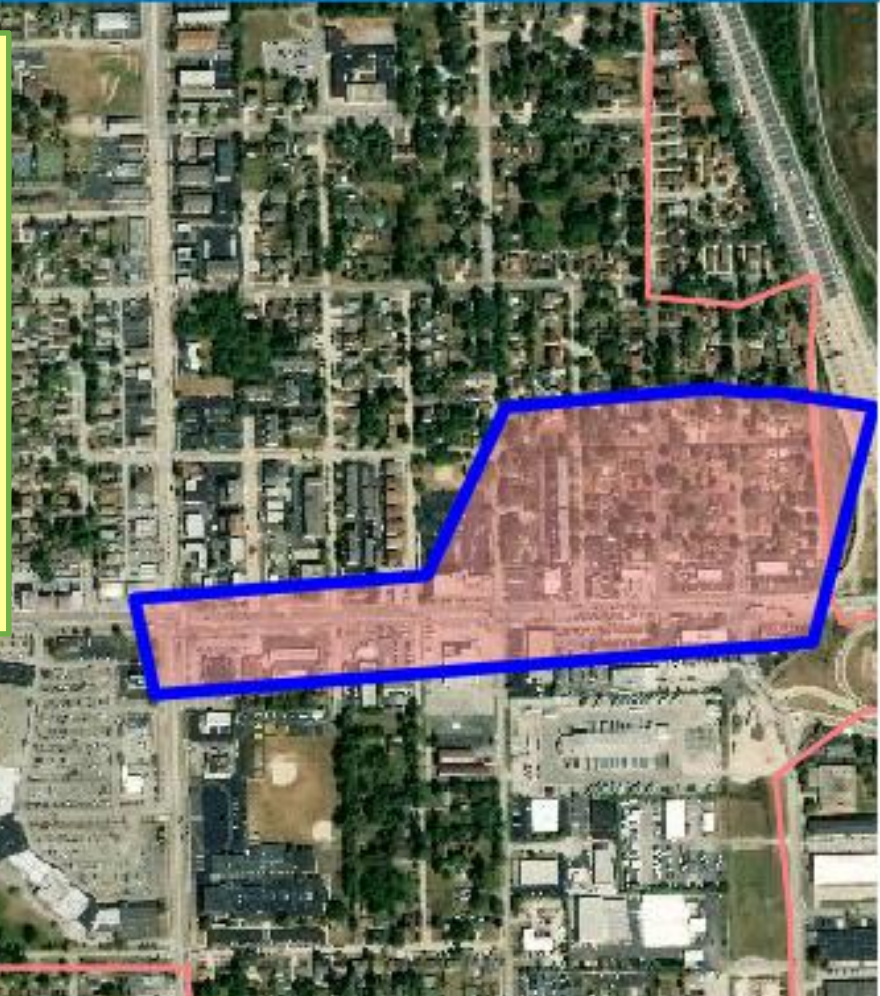
Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool

MWRD Flood Reporting Map



Using the mouse, single click for each vertex of the polygon. Double click to close (finish) the shape.

If you make a mistake, click the eraser (right of the polygon icon) or re-click the polygon icon to start over.





Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool



3. Complete Form

Add this information to the map.

Save

When finished drawing the problem area, scroll to the bottom of the page.

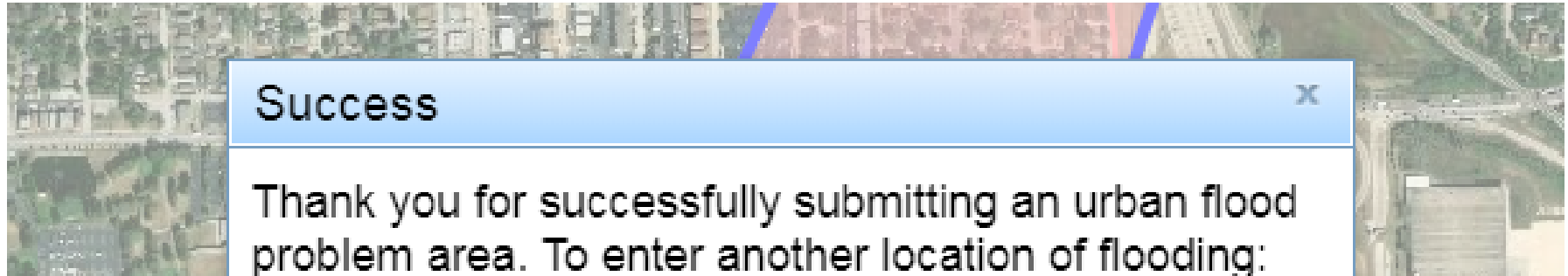
Click “Save” to submit the problem area.

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Questionnaire for Municipal Staff Online Tutorial: Part 2, Mapping Tool



3. Com

Add this inform

Save

After receiving the "Success" message, click "close" and the page will automatically re-load.

To enter another location of urban flooding problems, repeat this process.

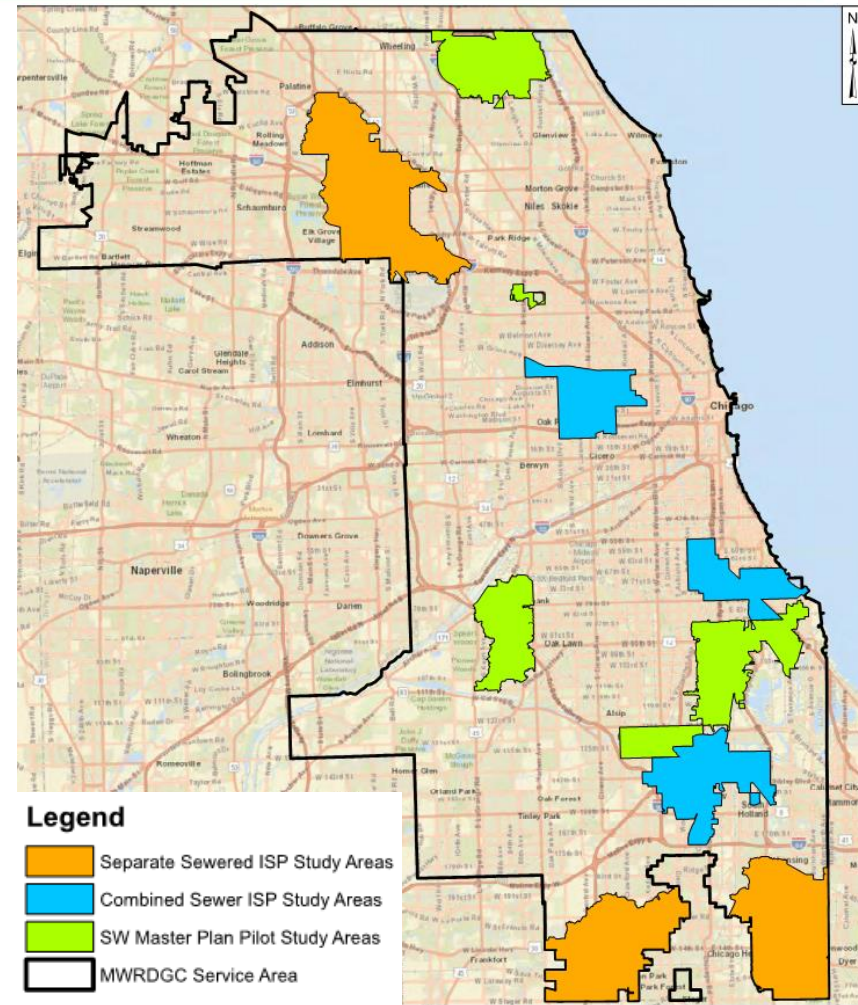
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Next Steps

- Municipalities: Submit questionnaires by 4/1
- MWRD Program Managers:
 - Six ISPs done by spring 2019
 - Collect municipal questionnaire data and reprioritize areas to select second round for study
- MWRD:
 - Issue Requests for Proposals (RFPs) based on the first six ISPs



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Questions?

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