

# Understanding Inflow and Infiltration: Causes, Impacts, and Solutions

Part 2: NOV. 18, 2025, 10 am PT/ 1 pm ET



# Understanding Inflow and Infiltration: Causes, Impacts, and Solutions

Q&A

**You ask:** 13:05  
How do I use these awesome tools?

**Joshua Jones answered:** 13:06  
You are already using one of the most awesome tools. We'll discuss the rest right away.

Please input your question

Send Anonymously Send

Part 2: NOV. 18, 2025, 10 am PT / 1 pm ET



# About EFCN

The **Environmental Finance Center Network (EFCN)** is a university- and non-profit-based organization creating innovative solutions to the difficult how-to-pay issues of environmental protection and water infrastructure.

The EFCN works collectively and as individual centers to address these issues across the entire U.S, including the 5 territories and the Navajo Nation. The EFCN aims to assist public and private sectors through training, direct professional assistance, production of durable resources, and innovative policy ideas.



# Certificate of Completion

This session has **NOT** been submitted for pre-approval of Continuing Education Credits, but eligible attendees will receive a certificate of attendance for their personal record.

## **To receive a certificate:**

- You must attend the entire session
- You must register and attend using your real name and unique email address - group viewing credit will not be acceptable
- You must participate in polls
- Certificates will be sent via email within 30 days

If you have questions or need assistance, please contact [smallsystems@syr.edu](mailto:smallsystems@syr.edu).



WaterNow works to advance transformation in the water sector, to accelerate the widespread adoption of sustainable, affordable and resilient water strategies.

We do this as a national network for local water leaders and decision makers, empowering them with the technical assistance, resources, and tools they need to implement innovative One Water drinking water, stormwater, and wastewater solutions in their communities.





Please Complete the Post-Webinar Survey!

# WEBINAR OBJECTIVES



Describe the causes and impacts of I&I



Describe strategies for assessing and evaluating vulnerabilities to I&I



Share solutions for addressing I&I



Highlight funding, financing and technical assistance opportunities

# AGENDA

- Meet Today's Speakers
- Audience Polls
- I&I Case Studies
- Technical Assistance Opportunities
- Q&A



# TODAY'S SPEAKERS



**Andy Kricun, P.E.**  
Principal  
Moonshot Missions



**Rania Bashar, PhD, P.E.**  
Senior Program Manager  
Moonshot Missions



**Nick Meurer**  
Utility Advisor  
Moonshot Missions

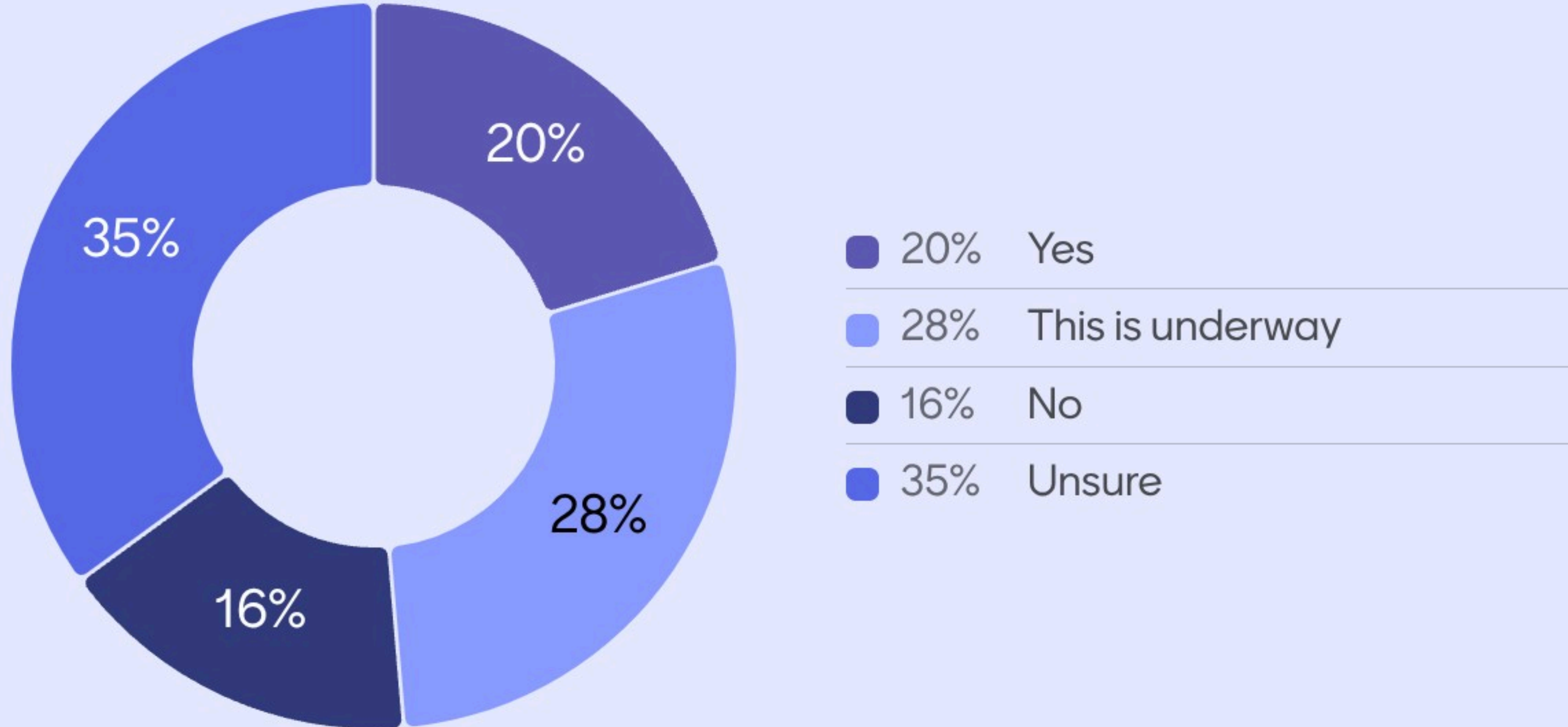


**Emerson O'Donnell**  
Senior Program Manager  
WaterNow Alliance

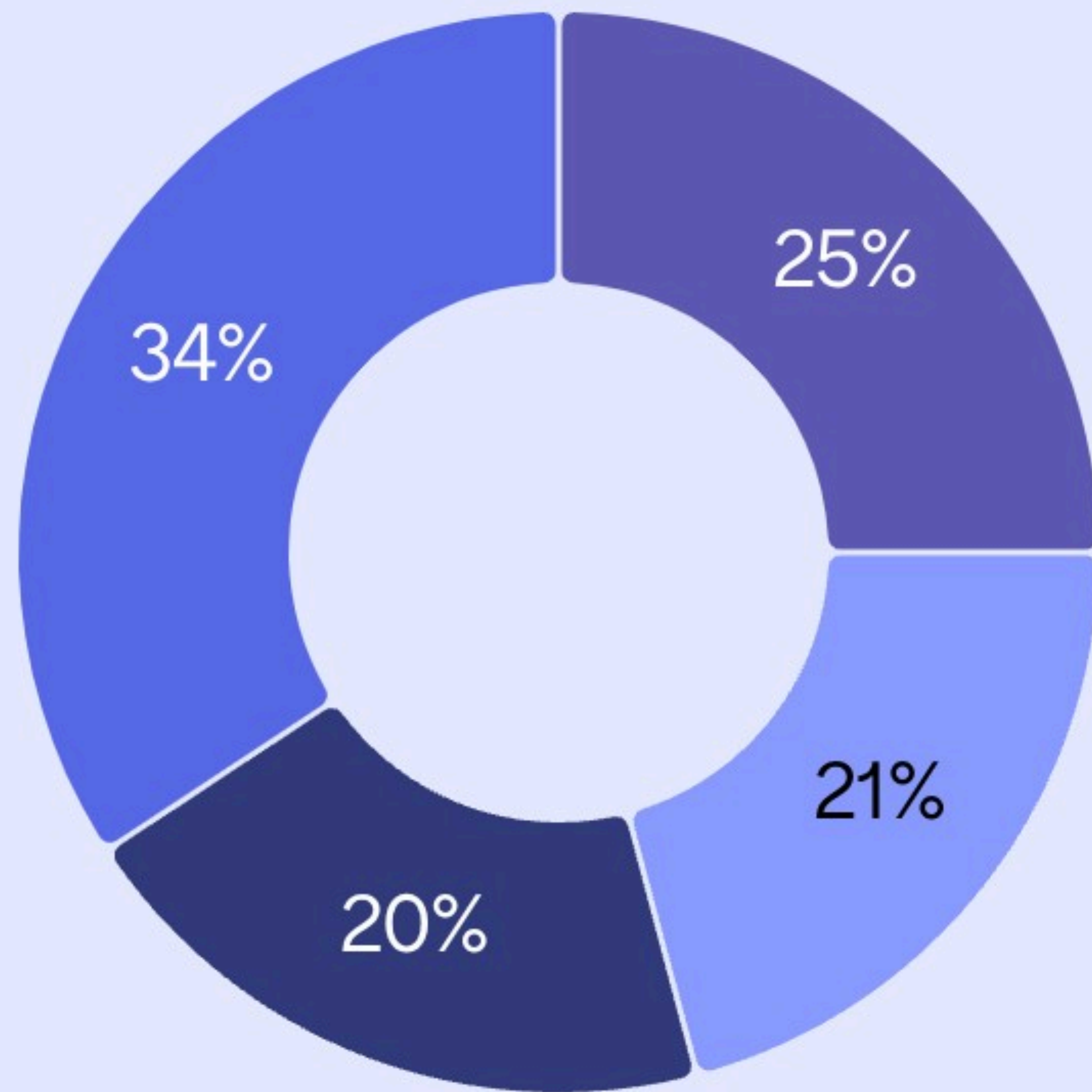
**Time for  
a few  
polls!**



# Has your system assessed the extent of inflow and infiltration occurring?



# Does your system have an active I&I reduction plan or strategy in place?



- 25% Yes
- 21% Under development
- 20% No
- 34% I'm not sure



**MOONSHOT**  
MISSIONS

# **Understanding Inflow and Infiltration: Causes, Impacts, and Solutions Part 2**

*by*  
**Moonshot Missions**

*For*  
**WaterNow National Trainings**  
11/18/2025



**MOONSHOT  
MISSIONS**

Every person deserves clean water at the tap and in local waterways, regardless of who they are or where they live.

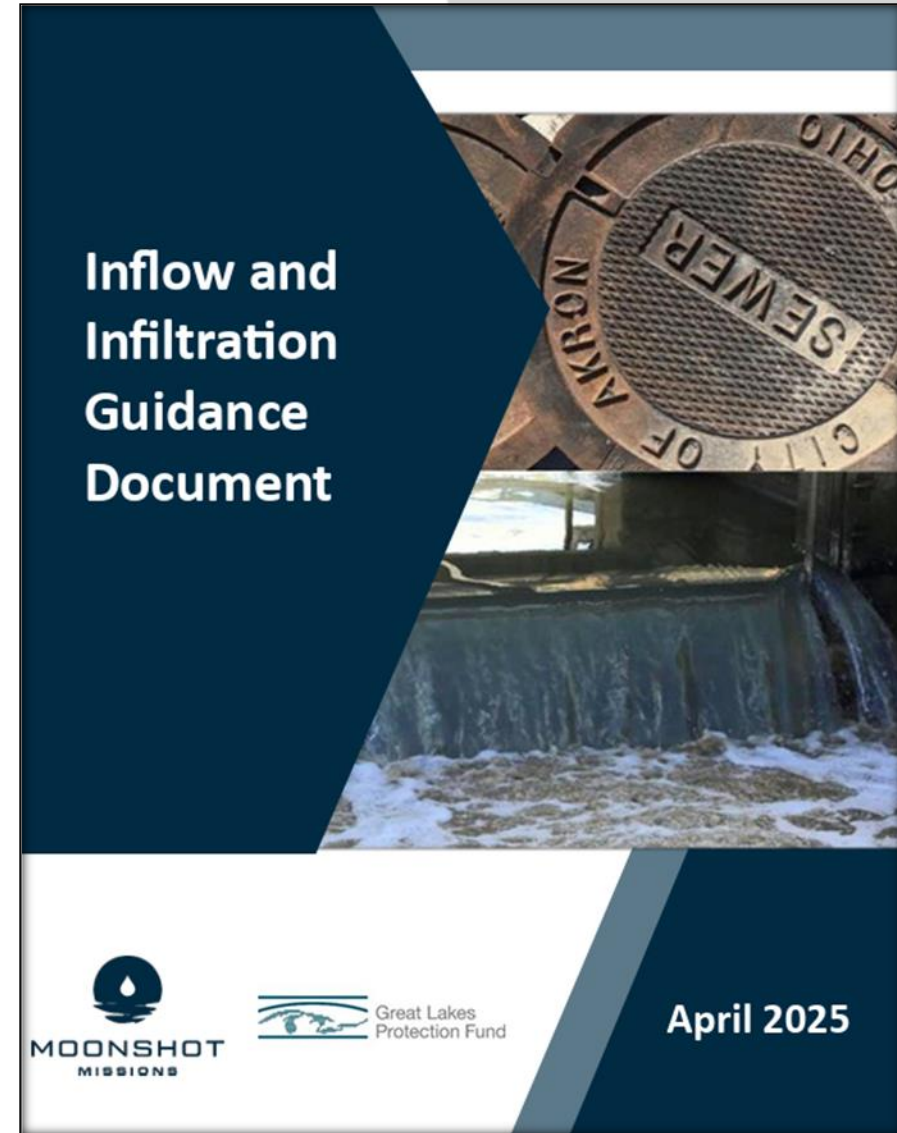
## **OUR MISSION**

*Serve as a trusted peer advisor for communities to secure safe, accessible, and affordable drinking water and clean waterways, regardless of zip code.*



## Webinar Part 1 Recap

- **I&I Sources and Impacts:** Overview of I&I and the financial and environmental impacts.
- **Determining Sources of I&I:** Different testing and calculation methods to determine the amount and source of I&I.
- **Solutions and Implementation:** Sewer rehabilitation, private lateral replacement, and green infrastructure.
- **Maintenance Best Practices:** Asset management, GIS, monitoring, and general maintenance.



Regional Reduction Program

**CASE STUDY: MADISON, WI**

- Utility Name: Madison Metropolitan Sewerage District
- Service Area: 187 Square Miles
- Population Served: 407,000
- Number of Municipalities: 25
- Treatment Size: Average 36 MGD

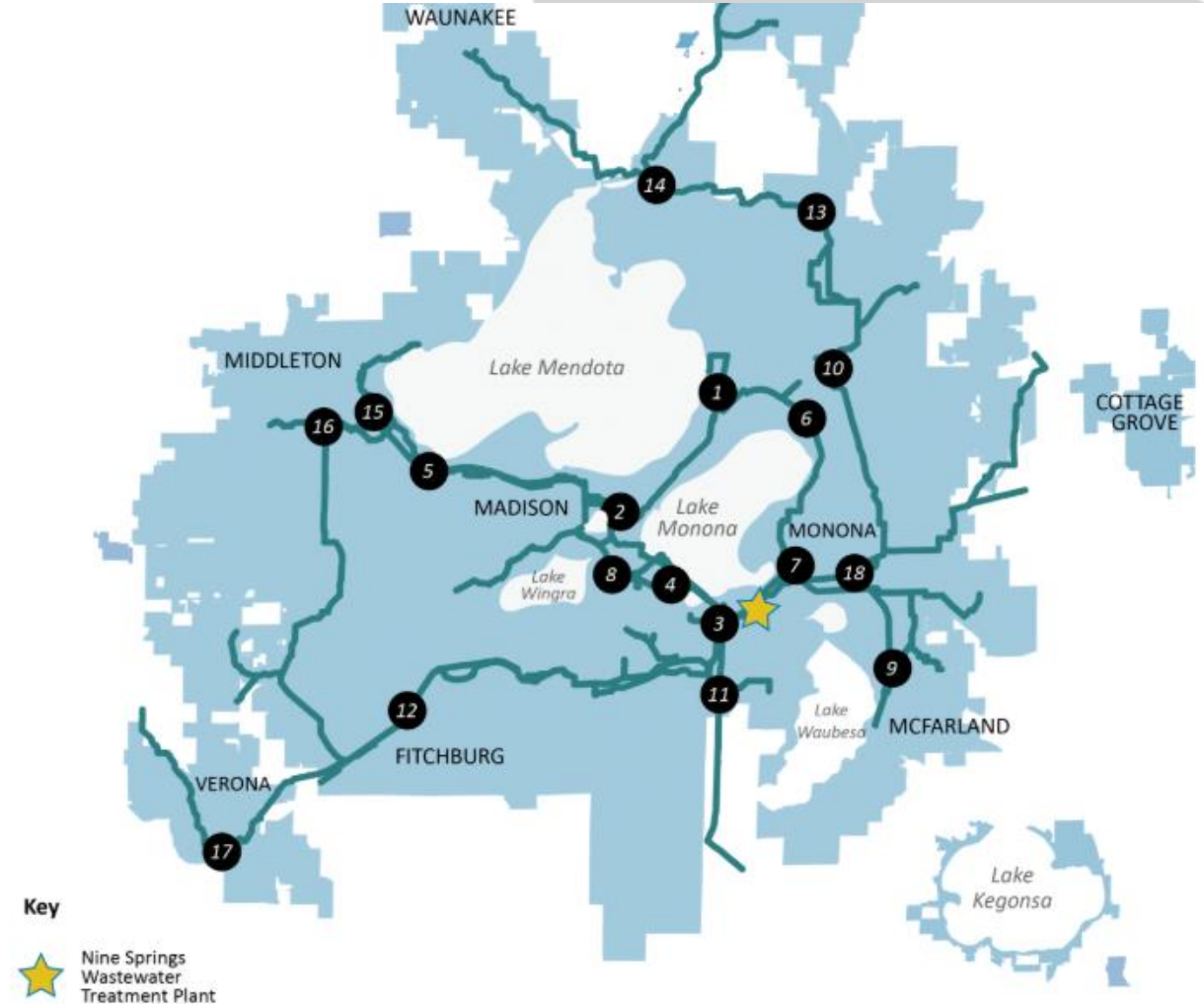
Madison Metropolitan  
Sewerage District



# CASE STUDY: MADISON, WI

## REGIONAL I&I REDUCTION PROGRAM

- **Technical Advisory Committee**
  - Representatives from the 25 district municipalities to provide input on I&I reduction
  - Program strategy that focused on targeting areas that will yield the greatest net benefit for cost
- **Monitoring Program**
  - Develop and Implement a flow monitoring plan
  - Upgrade collection system hydraulic model to better represent dynamic I&I conditions
  - Identify high-priority areas and establish phased monitor installation and maintenance



## CASE STUDY: MADISON, WI REGIONAL I&I REDUCTION PROGRAM CONTINUED

- **Adopt Changes to Sewer Use Ordinance (SUO)**
  - Changes to I&I Reduction Program
  - Requirements for municipal work plans
  - Establish limits on I&I daily volume
- **Establish Technical Support Capabilities**
  - Provide guidance, investigation, and design resources for municipalities
  - Offer targeted assistance upon request, with costs passed to requesting communities
  - Ensure support is available in time for municipal work plan development

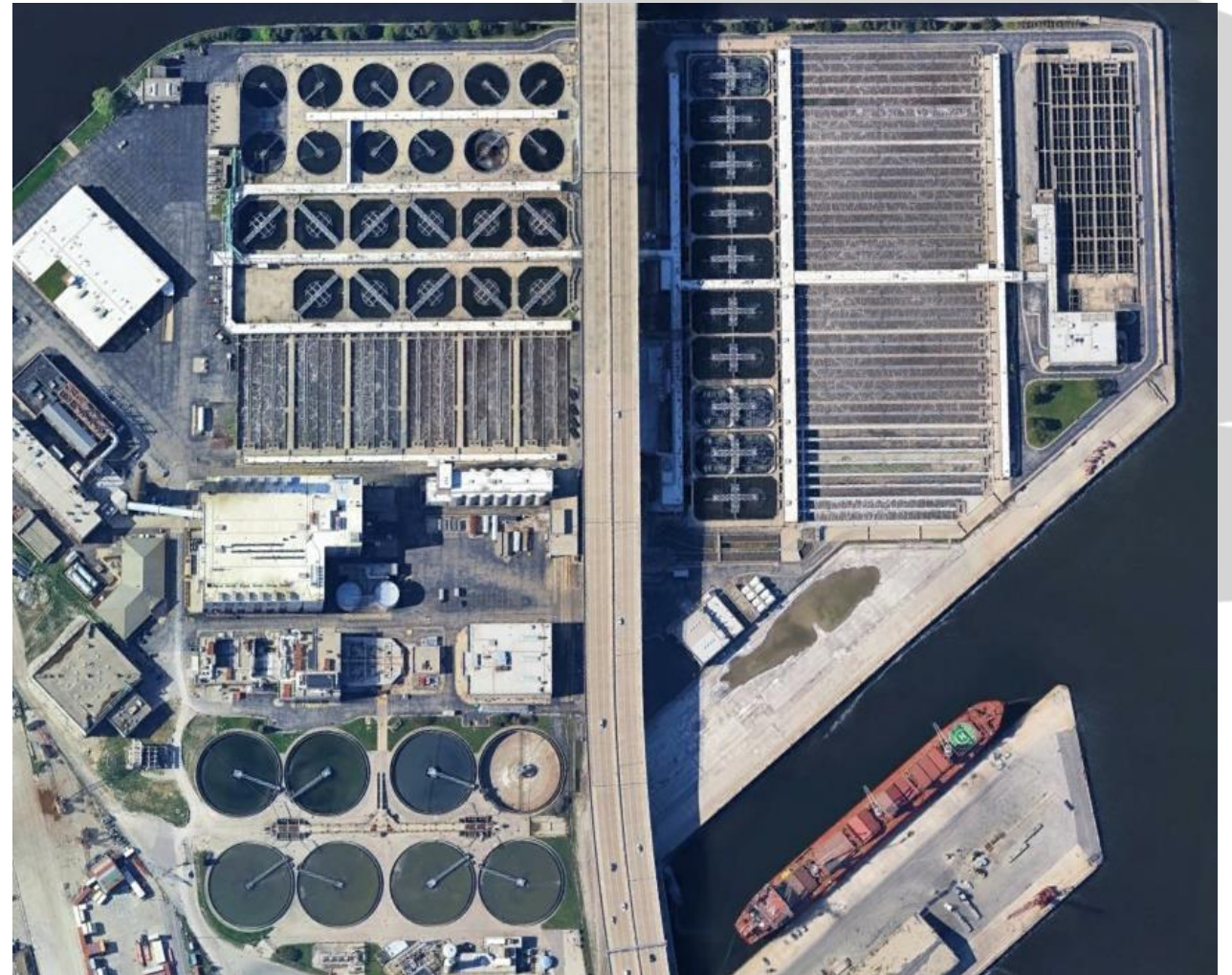
- **Establish Education Support Capabilities**
  - Create educational materials such as web content, mailer templates, and brochures
  - Promote public and municipal awareness of I/I reduction efforts
- **Begin Enforcement Process**
  - Initiate enforcement only after sufficient data confirms I/I exceedances and SUO updates are in place
  - Enforcement expected to begin around Year 2027 (Year 7 of program)



Address private property I/I sources

## CASE STUDY: MILWAUKEE, WI

- Utility Name: Milwaukee Metropolitan Sewerage District
- Service Area: 423 Square Miles
- Population Served: 1,100,000
- Number of Municipalities: 29
- Treatment Size: Average 150 MGD



## CASE STUDY: MILWAUKEE, WI PRIVATE PROPERTY I&I SOURCES PROGRAM (PPII)

- Focus: Address private property I/I sources—laterals and foundation drains.
- Engagement: Ongoing outreach to inform and involve residents.
- Public Involvement Tools:
  - Public engagement meetings
  - Pipe Check Program (lateral replacement & drain disconnection)
  - Rain barrel workshops
  - Community green infrastructure projects
  - Educational events & website updates



## CASE STUDY: MILWAUKEE, WI PRIVATE PROPERTY I&I SOURCES PROGRAM (PPII) CONTINUED

- **Pipe Check Program**
  - Helps homeowners assess and correct I/I from laterals or drains
  - MMSD pays incentive directly to contractor; homeowner covers remaining cost
- **Sanitary Lateral Replacement**
  - Identifies failing laterals via camera inspection
  - Replaced using pipe bursting or excavation to prevent groundwater intrusion
- **Foundation Drain Disconnection**
  - Targets pre-1954 homes with connected drains
  - Disconnection via sump pump installation and homeowner training
- **Municipal Program**
  - Provides funding to municipalities for large-scale PPII projects
  - Typical work: foundation drain disconnections, lateral replacements, downspout disconnections
- **Rain Barrel Program**
  - Free rain barrels and workshops for homeowners
- **Green Infrastructure**
  - GI installations reduce stormwater inflow and enhance community value
- **Program Impact**
  - Over 100 million gallons of I/I removed annually through the PPII program



# I&I TOOLKIT

- I&I Tracking Guide
- Lift Station Pump Data Tracking Spreadsheet
- Manhole Inspection Form
- Smoke Testing Inspection Form
- I&I Prioritization Spreadsheet
- I&I Metric Calculation Spreadsheet

Source	Section	Steps for Tracking				Solutions
		1	2	3	4	
<b>Inflow</b>						
Roof Drains	2.1.1.1	Lift Station Pump Monitoring/Flow Data Analysis	Smoke Testing	On Site Inspections		Enforce Disconnection Ordinances, Homeowner Education
Storm Sewer Cross Connection	2.1.1.3 and 2.1.1.5	Lift Station Pump Monitoring/Flow Data Analysis	Smoke Testing	Sewer System Cleaning/CCTV		Disconnect and Plug Connection, Divert Flow If Needed
Sump Pumps/Foundation Drains	2.1.1.3	Lift Station Pump Monitoring/Flow Data Analysis	Smoke Testing	On Site Inspections		Enforce Disconnection Ordinances, Homeowner Education
Manhole Covers	2.1.1.2	Lift Station Pump Monitoring/Flow Data Analysis	Manhole Inspections	Sewer System Cleaning/CCTV	Smoke Testing	Replace Seal or Cover
Sewer Lateral Cleanouts	2.1.1.4	Smoke Testing				Cleanout Replacement
<b>Infiltration</b>						
Cracked Pipeline	2.1.2.1	Lift Station Pump Monitoring/Flow Data Analysis	Sewer System Cleaning/CCTV	Smoke Testing		Open-Cut Pipe Replacement, Sewer Lining, Slip Lining, Pipe Bursting, Point Repair, CIPP



# FEDERAL TECHNICAL ASSISTANCE AND FUNDING SUPPORT

## EPA WaterTA Program

- Free TA for small & disadvantaged communities
- Asset management, funding navigation, compliance support
- Helps prepare for SRF, and other federal funding programs

## EPA WaterTA Engineering Support

- No-cost, supplemental WaterTA service to help communities
- Engineering expertise needed to apply for EPA funding
- Identify needs, conduct preliminary project planning analyses, and produce the engineering documents

## EPA Environmental Finance Centers (EFC Network)

- Rate-setting, asset management, financial planning
- Guidance for SRF/BIL funding requirements
- Utility board and leadership training

## USDA Rural Development (Circuit Riders)

- On-site troubleshooting for rural systems
- Lagoon & lift station support
- Grants + low-interest loans for small communities



## NONPROFIT & REGIONAL TA PROVIDERS

### Rural Community Assistance Partnerships (RCAP)

- Asset management, rate studies, SRF readiness
- Financial sustainability support
- Community capacity-building

### State Rural Water Associations

- Leak detection, troubleshooting, energy audits
- Operator mentoring & facility walk-throughs

### WaterNow Alliance

- Funding readiness & policy support
- Water loss, reuse, and infrastructure TA



# STATE & UNIVERSITY TA PROGRAMS

## State SRF Programs

Planning & engineering review

- Eligibility guidance for SRF loans + principal forgiveness
- State-level technical support

## University Extensions

- Operator training & workshops
- Watershed planning and community engagement
- Applied research support



## Funding Programs for I&I Reduction

### Clean Water State Revolving Fund (SRF)

- Low-interest loans
- Principal forgiveness for disadvantaged communities
- Eligible for I/I reduction, collection system rehab

### USDA RD Water & Waste Disposal

- Grants + loans for rural communities
- Ideal for lagoons, pump stations, wastewater rehab

### EPA WIFIA

- Large-scale project financing
- Flexible repayment & low-cost capital

### State Grant Programs (e.g., H2Ohio)

- Infrastructure upgrades & local watershed support



## **CASE STUDY: CAMDEN, NJ**

- 35 separate sewer systems
- 2 combined sewer systems
- Feeding one regional sewage treatment plant



# STORMWATER CONTROL STRATEGIES

## **Combined Sewer Systems:**

- Prioritize stormwater control in combined sewer systems vs separate sewer systems

## **System-Specific Approach:**

- Apply different strategies for combined vs. separate systems
- Target the most impactful controls based on system type

## **Cost-Capacity Analysis:**

- Compare the cost of reducing infiltration and inflow (I/I)
- Versus the cost of expanding downstream treatment or conveyance capacity



# MINIMIZING RATEPAYER IMPACTS

- Use of State Revolving Funding (lower interest rates/longer payback periods) to reduce annual debt service
- Seek grant funding if/when available
- Implement green infrastructure in conjunction with stormwater fees corresponding to impervious surface area





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# QUESTIONS?

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## Contact

Rania Bashar, PhD, PE  
Senior Program Manager  
[rania@moonshotmissions.org](mailto:rania@moonshotmissions.org)

An aerial photograph of a river system, showing a main river channel and several tributaries. The water is a mix of dark blue and brownish-orange, suggesting sediment or organic matter. The surrounding land is a mix of brown and green. A solid blue shape is overlaid in the top right corner of the image.

# Accessing Technical Assistance for Small, Rural & Tribal Systems

# What support is available?

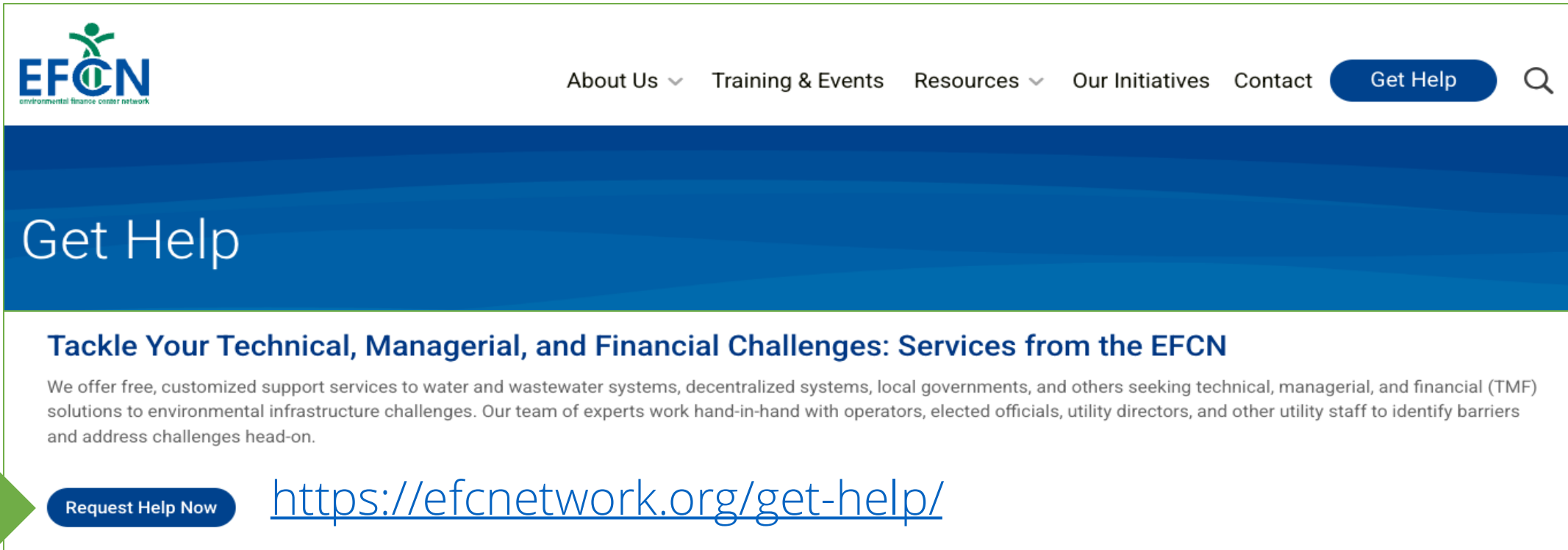
WaterNow can provide technical assistance for rural, small and tribal systems in a variety of ways:

- Support for **planning and assessing system needs**
- Building **planning technical, financial, and managerial capacity**
- Support for engaging the community to **map challenges and assets**
- Identifying **funding and financing opportunities**
- Navigating **grant and loan application processes**



# Specialized Technical Assistance: Rural, Small, & Tribal Systems

Pro bono support for **wastewater and stormwater systems** across the U.S., serving communities of **10,000 people or fewer**.



**EFCN**  
environmental finance center network

About Us ▾ Training & Events Resources ▾ Our Initiatives Contact **Get Help** 🔍

## Get Help

### Tackle Your Technical, Managerial, and Financial Challenges: Services from the EFCN

We offer free, customized support services to water and wastewater systems, decentralized systems, local governments, and others seeking technical, managerial, and financial (TMF) solutions to environmental infrastructure challenges. Our team of experts work hand-in-hand with operators, elected officials, utility directors, and other utility staff to identify barriers and address challenges head-on.

**Request Help Now** <https://efcnetwork.org/get-help/>

# What to expect?

- Dedicated team of **subject matter experts** to help answer your questions
- **Step-by-step assistance** to help rural, small, and tribal water systems address storm and wastewater challenges
- **Resources & guidance** to ensure compliance with all applicable federal, state, and local regulations
- The **technical assistance process** includes:



Additional technical assistance programs and resources can be found at the [WaterTA website](#)

# Getting Started: Determine Project Readiness

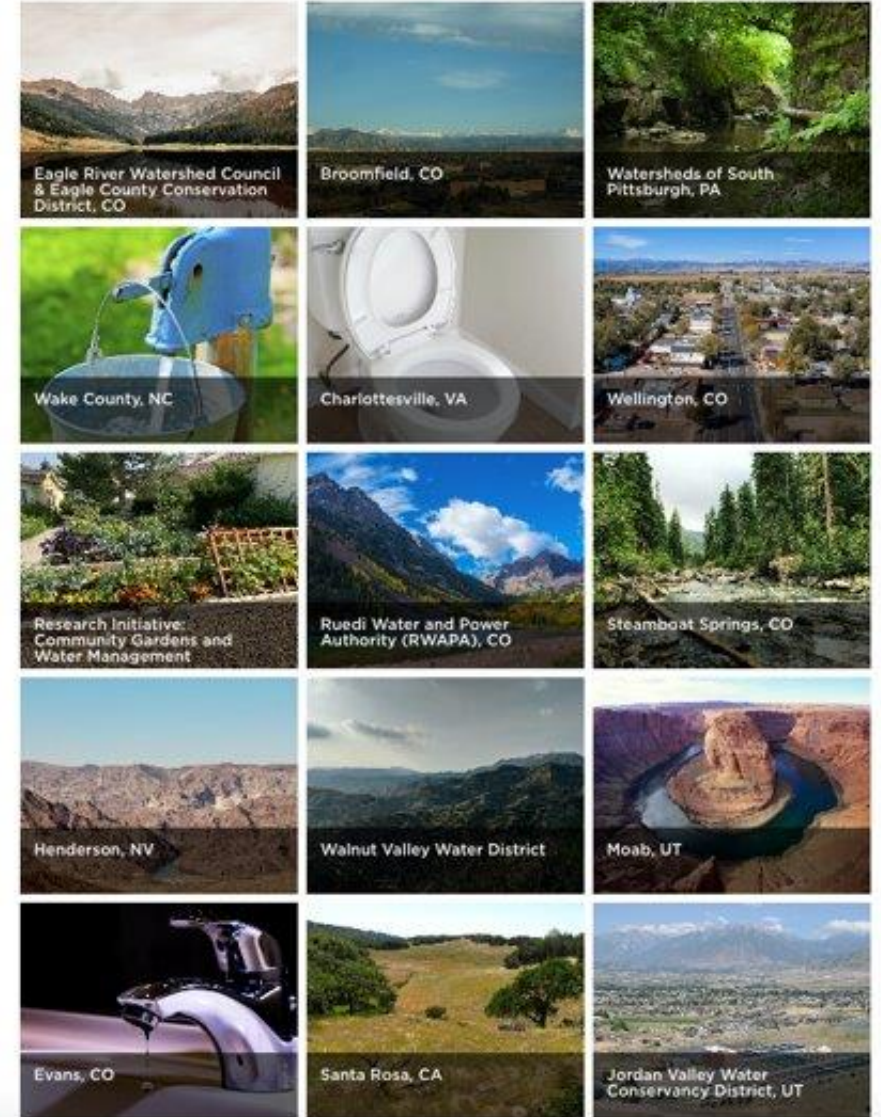
- What is the **primary purpose** of your project and what outcomes are expected?
- Where are you in the **planning and design** process?
- Have you selected an **architectural or engineering** firm?
- What is your **project schedule**?
- If planning to utilize a loan, what the project's **sources of repayment**?
- What is the total **estimated project cost**?



# Project Accelerator Support

- 250 hours of **pro bono technical assistance**
- Over a **6-12 month** period
- City/Agency identified project, driven by **local priorities**
- **Jump start** innovative water management initiatives

## FEATURED PROJECTS



# TiR Pilot Communities: Accelerating Investments in Sustainable Projects



## Become a TiR Pilot Community

Ready to bring your localized water infrastructure strategies to scale? Become a TiR Pilot Community!

WaterNow and our TiR Experts are available to provide up to **300 hours of hands-on technical support** to cities and utilities interested in activating and scaling-up innovative water strategies in their communities to address water security challenges. TiR communities have access to legal, policy, finance, and accounting expertise over a **6-12 month period, free of charge**, to help them strategize the full scale financing of their particular localized infrastructure project.

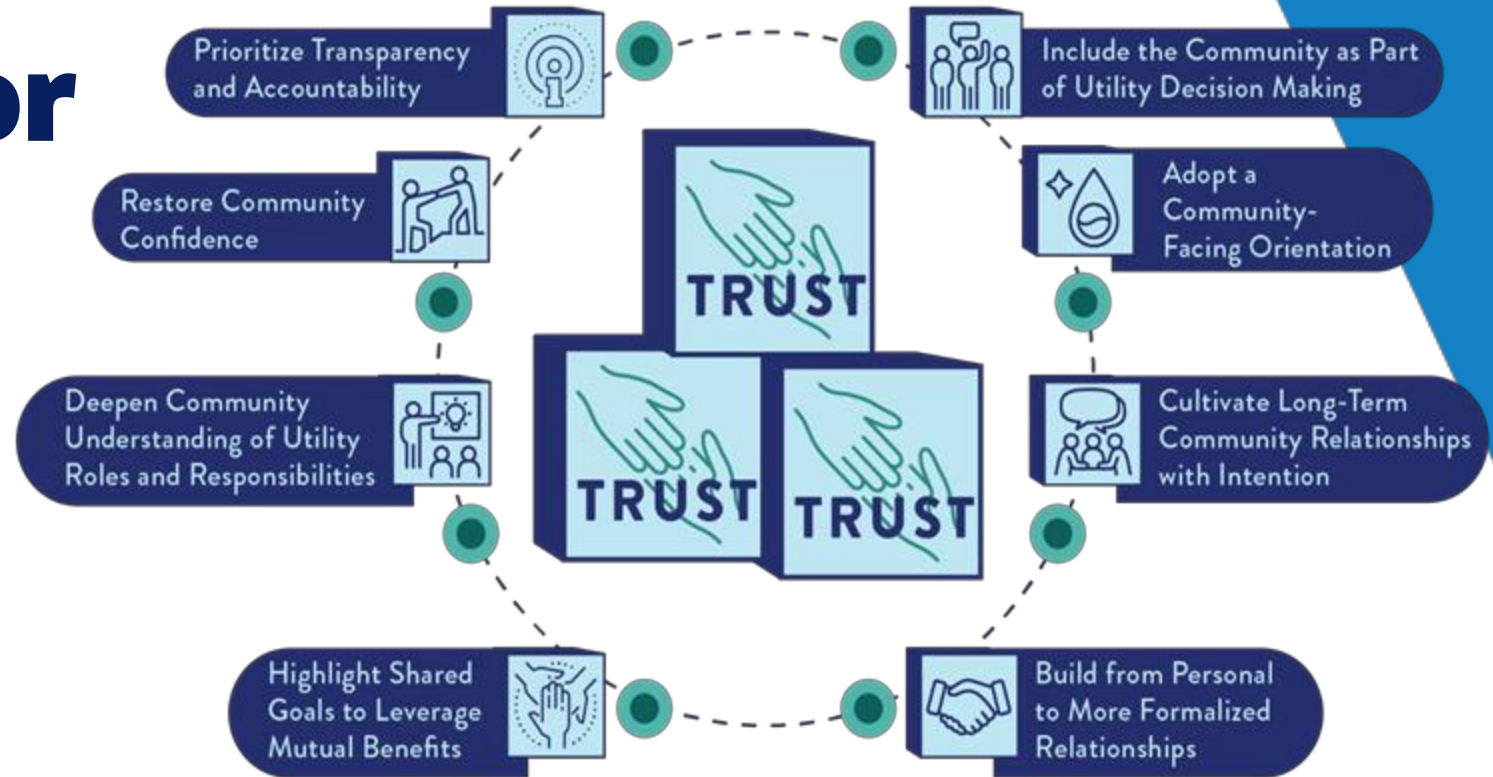
Benefits include:

- Access to a team of financing, bond, tax, and accounting experts to identify and execute on financing options.
- Tailored research and analysis on using debt financing mechanisms to pay for localized infrastructure.
- Facilitation of stakeholder meetings to build consensus on localized infrastructure financing options.
- Support on developing bond packets, capital improvement plans, city council resolutions, ordinances, or other materials to advance full scale localized infrastructure financing.
- Guidance on best practices for communicating with customers about localized infrastructure.
- Become a national leader on sustainable water management.

To find out more about becoming a TiR Pilot Community fill out this short form, and WaterNow staff will be in touch.

<https://tapin.waternow.org/start-implementing/#pilot>

# Building Blocks of Trust: Best Practices for Authentic Partnerships & Community Engagement



# Building Blocks of Trust Training Series

Based on the Building Blocks of Trust report, this online, self-paced training series covers the 8 “Foundations of Trust.” Created to support community groups and water utilities in building strong relationships for clean and safe water, this training aims to uplift long-term partnerships with mutual benefits.

Sign Up Now





# Q&A

# PLEASE COMPLETE OUR SURVEY!



 **waternow** alliance  
water leaders. resilient solutions.

# JOIN WATERNOW

LEARN MORE AND SIGN UP

[www.waternow.org/join-the-leaders](http://www.waternow.org/join-the-leaders)



# THANK YOU!



**For more information email:**

Emerson O'Donnell, [eo@waternow.org](mailto:eo@waternow.org)



**Resources:**

<https://efcnetwork.org/>