# CEE/EHS 597B

## Class #4:

## Options for Local Case studies & The Res'Eau Community Circle Approach

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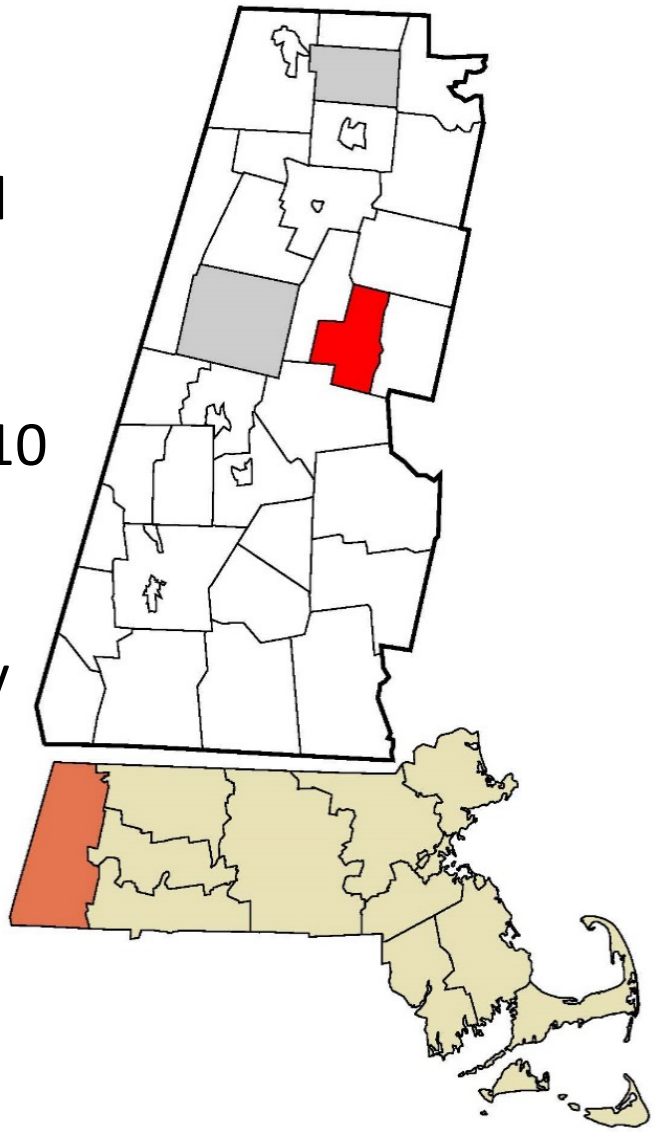
# Local case study sites

- Hinsdale (MA1132000)
  - Serves ~1000 (424 connections)
  - Surface water, slow sand filtration
- Monroe (MA1190000)
  - Serves 60 (31 connections)
  - Surface water, slow sand filtration
- South Royalston (MA1255000)
  - Serves 275 (57 connections)
  - Groundwater, chlorination

# Hinsdale, MA

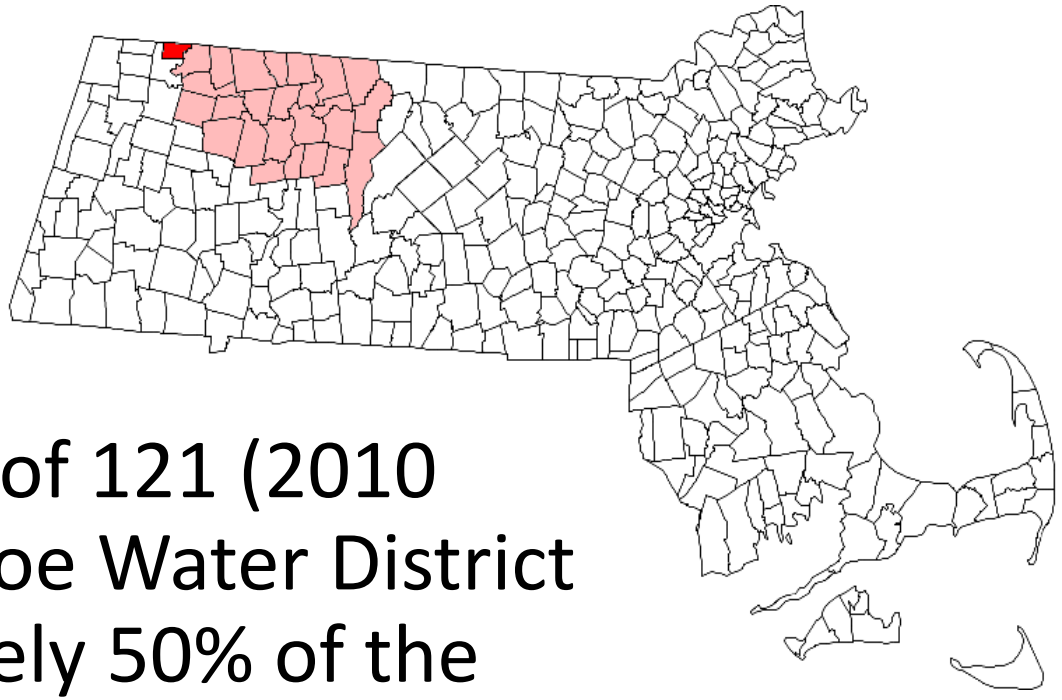
- The Hinsdale Water Department was formed in the late 1880's (then referred to as the Hinsdale Fire District) and has supplied the town since that time.
- Hinsdale had a population of 2,032 (2010 census) with the water department supplying approximately 55% of the town's population along with a majority of the firefighting needs.
- 39 miles from Amherst; 63 minutes by car
- Tighe & Bond has served as their consultant for water



# Hinsdale, MA

- **Source water**: The Belmont Reservoir has served as Hinsdale's source of water since 1889. Located at an elevation of 1,692-feet (USGS) the source water is characteristically soft, has little alkalinity and has a pH of approximately 5.5 (SIU). The 440-foot long dam was constructed in the summer of 1889 with the gate house completed during the same year. The dam has an elevation of 1692-feet (at the spillway) making the depth of the reservoir approximately 20-feet deep. With a surface area of approximately 10 acres, the reservoir has a capacity of approximately 44 million gallons. The source is primarily a spring supplied water body as there are only two small feeder streams to impoundment. The safe yield is reported to be 197,000 gallons per day at the spillway elevation
- **Treatment**: Water from the Belmont Reservoir is treated at the Hinsdale Water Department's filter plant (0.4 MDG) located adjacent to the reservoir. The slow sand water treatment plant was built between late 1994, and early 1995 and started treating water in December 1995

# Monroe, MA



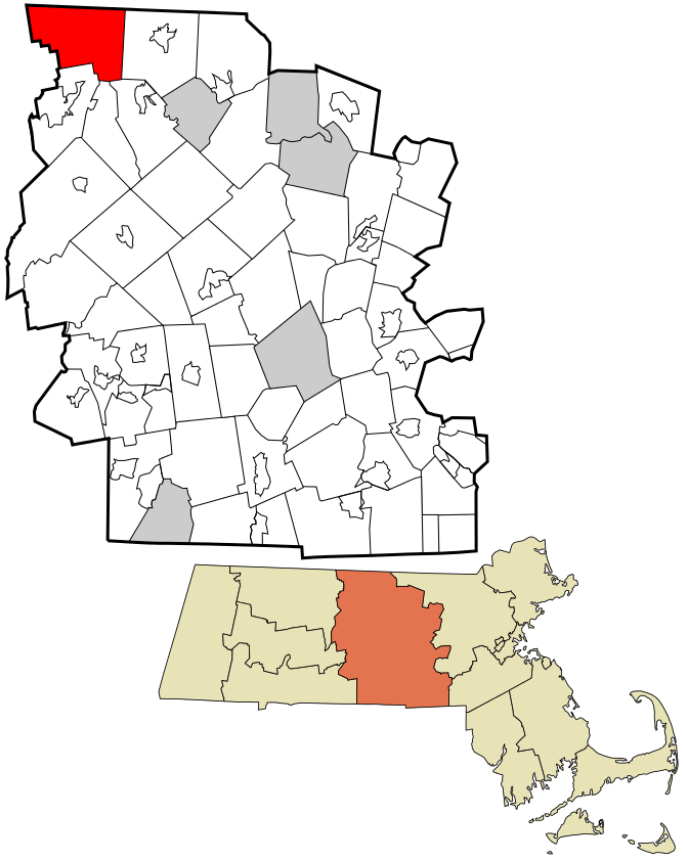
- With a population of 121 (2010 Census), the Monroe Water District serves approximately 50% of the Town's population. The water system currently has 30 connections serving a population of approximately 60
- 52 miles from Amherst; 72 minutes by car

# Monroe, MA

- **Source Water**: The Monroe Water District is supplied by water from Phelps Brook Reservoir, which is located approximately 1/4-mile north of the center of town, on Kingsley Hill Road. The impoundment was constructed in 1935, has a watershed area of approximately 539 acres, with an estimated storage capacity of 100,000 gallons. The reservoir covers an area of 60-feet long by 80-feet wide (approximately 0.11 acres).
- **Treatment**: The new 4 inch line from Phelps Brook carries water approximately 500 feet down the hill and across Kingsley Hill Road to the slow sand treatment facility (0.025 MGD). The slow sand facility was built around 1940 and consists of two filter beds, a pipe gallery, chemical feed equipment and a finished water storage tank.

# South Royalston, MA

- South Royalston Improvement Corporation
- Demographics from Wikipedia:
  - The median income for a household in the town was $44,444, and the median income for a family was $51,818. Males had a median income of $36,328 versus $27,361 for females. The per capita income for the town was $18,297. About 5.4% of families and 8.7% of the population were below the poverty line, including 10.1% of those under age 18 and 6.5% of those age 65 or over
- 32 miles from Amherst; 48 minutes by car



# South Royalston, MA

- **System History**: Development of the well that serves the South Royalston Improvement Corporation (SRIC) dates to the late 1890s, as the source serving the former Mason/Parker American Woolen Mill. When the Mill was destroyed by fire in the late 1920s, the mill owner deeded access to the well to the nineteen mill housing properties located near the mill site. The current owners of those nineteen properties continue to have controlling interest over the water system, although the system has been expanded to serve a total of fifty-five homes and businesses. The system was formally established in the 1950s as the "South Royalston Improvement Corporation". In the 1990s the Town of Royalston secured a grant to replace the Corporation's storage tank, reconstruct the well house, and replace water mains, as a means of rehabbing the water system, and increasing fire flow capacity

# South Royalston, MA

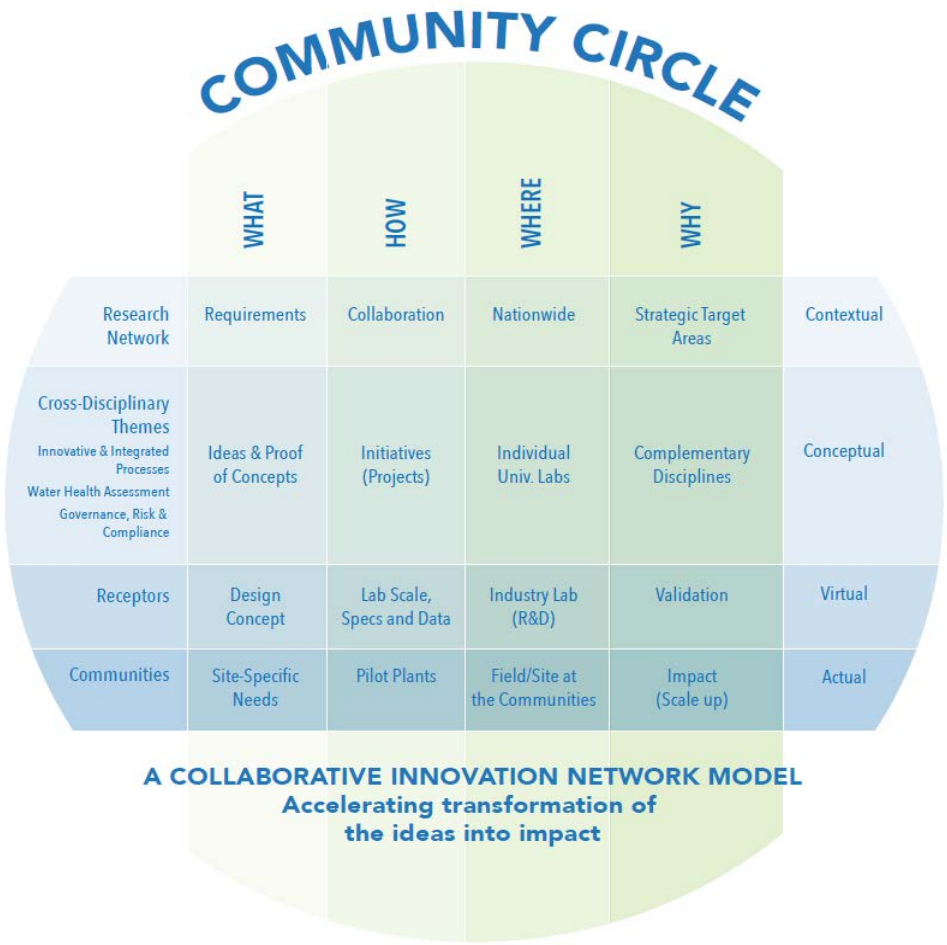
- **Source**: The water system is supplied by a single 8-inch bedrock well located off Blossom Street, approximately 150 feet from the Millers River. The well is drilled to a depth of approximately 290 feet in the 1890s. The well has a reported yield of 130 gallons per minute. No pump test or other yield analysis has been performed.
- **Treatment**: This system is required to operate its chlorinator because of persistent total coliform bacteria detections. The chlorinator was permitted in 2009 as an emergency installation, but was required after persistent total coliform bacteria detections in July 2014. The chlorinator consists of a small feed tank and peristaltic pump

# South Royalston, MA

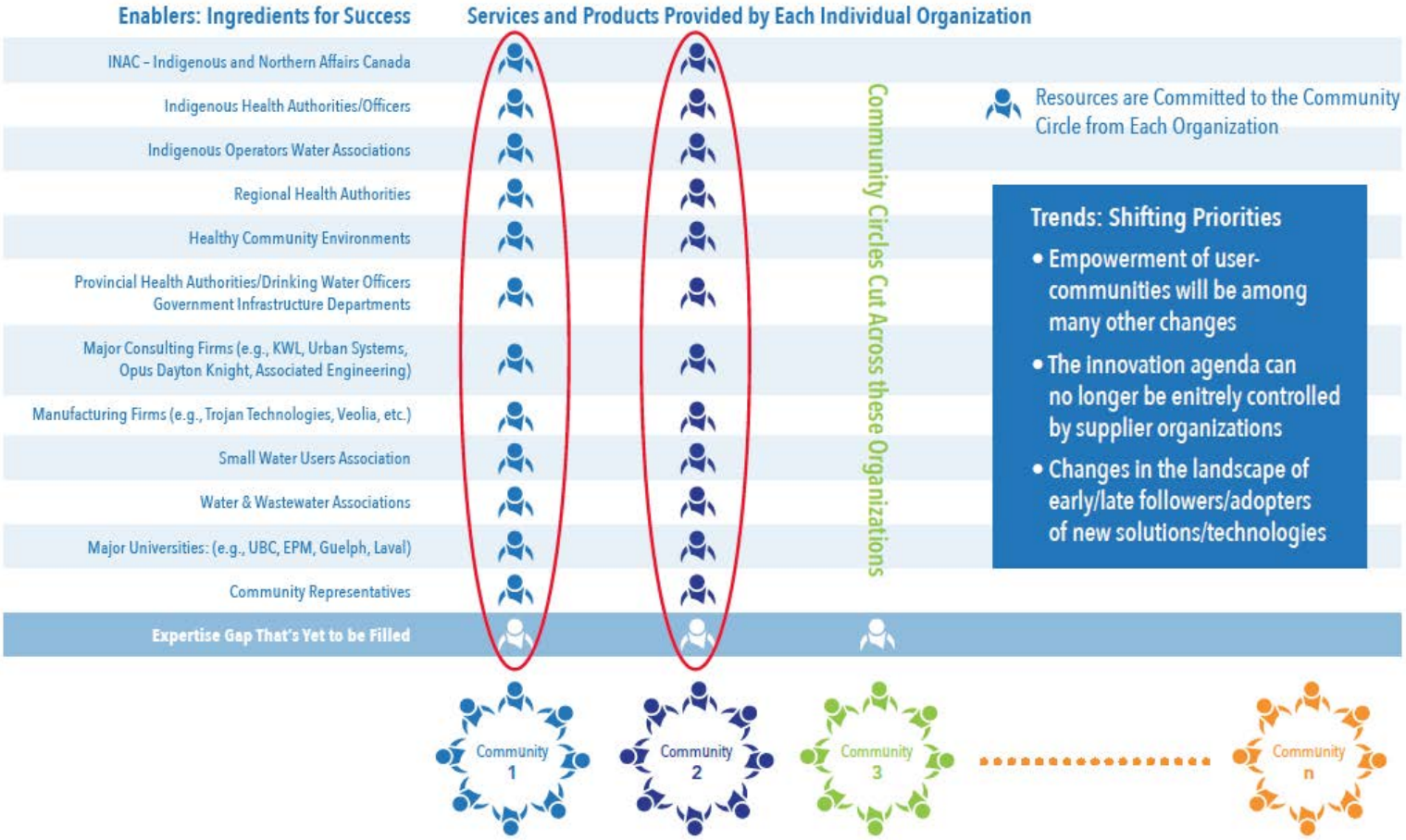
**South Royalston Well**

**South Royalston Storage**

# The Res'Eau Community Circle



# *EXAMPLE* OF CONSTRUCTING CROSS-ORGANIZATIONAL INTERACTIONS IN THE COMMUNITY CIRCLE MODEL




**GOAL: ACHIEVING SOCIALLY AND TECHNOLOGICALLY SUSTAINABLE OUTCOMES FOR SMALL RURAL AND INDIGENOUS WATER SYSTEMS**

# Flow of information in the community circle ecosystem

Global Expertise

Input from our RES'EAU investigators, students, provincial, national and international public and private sector partners AND the **partner communities**

## Achieving Socially Sustainable Outcomes for Small Rural and Indigenous Water Systems

## Community Circle

The Knowledge needed to achieve sustainable outcomes will not be produced and the commitment will not be mobilized **unless and until the interests of the various actors are included,** hence, the need for better understanding the consequences of different patterns of interactions among the collaborators and necessity of conducting better analyses of innovation on the demand side, as well as information from the supply side. In particular:

- Cultural aspect of the supply of innovators and entrepreneurs
- Cultural aspects of the demand for innovation

**Translates into innovative partnerships and frameworks for collaboration relevant to rural communities:**
Conversation will broaden the impact of training, education, outreach and consensus-building efforts among relevant decision makers in a way that favor innovation and technology adoption.

**Translated into RES'EAU three Themes of Innovation priorities relevant to rural communities:**
**Themes:**
1. Innovative & Integrated Treatment Processes
2. Water Health Assessment & Monitoring
3. Governance, Risk Management & Compliance

**Priorities**
- Simplicity of operation
- Ease of maintenance
- Absence of chemicals
- Robustness of technologies
- Awareness of water health

Community

Operators could also be men and women from the community

Operator

**Meet the community's immediate water demand as well as its well-being**
- Drink
- Clean
- Gardening/Farming
- Emergencies/Fire
- Recreational
- Food/Fishing
- etc.

**Core Competencies**
- ✓ Uncovering and exploring unarticulated needs of the communities
- ✓ Understanding both technological aspects of the solution products as well as behavioral allowing people to adapt to these solutions and ideas; and
- ✓ Create new solutions, removing situational and conceptual barriers to effective knowledge and technology translation by harnessing opportunities in:
  - Economies of Scope
  - Complementarities
  - Experience Curves

**Operators' job Characteristics**

**Physical attributes**
Start, shut down, Change, replace, repair, transport, and clean. lubricate equipment, prepare, feed and dispose chemicals, collect, preserve, store, and ship samples, prime or repack pumps, etc.

**Technical attributes**
Adjust flow, chemicals, process units, Calculate dosage rates, pump drawdown and pump efficiency, calibrate instruments, check/make reagents, create log book, perform measurements, etc.

**Tactical attributes**
Translate technical language into common terminology and inform stakeholders, monitoring & control systems, assess likelihood of emergencies, Diagnose/troubleshoot processes, etc.

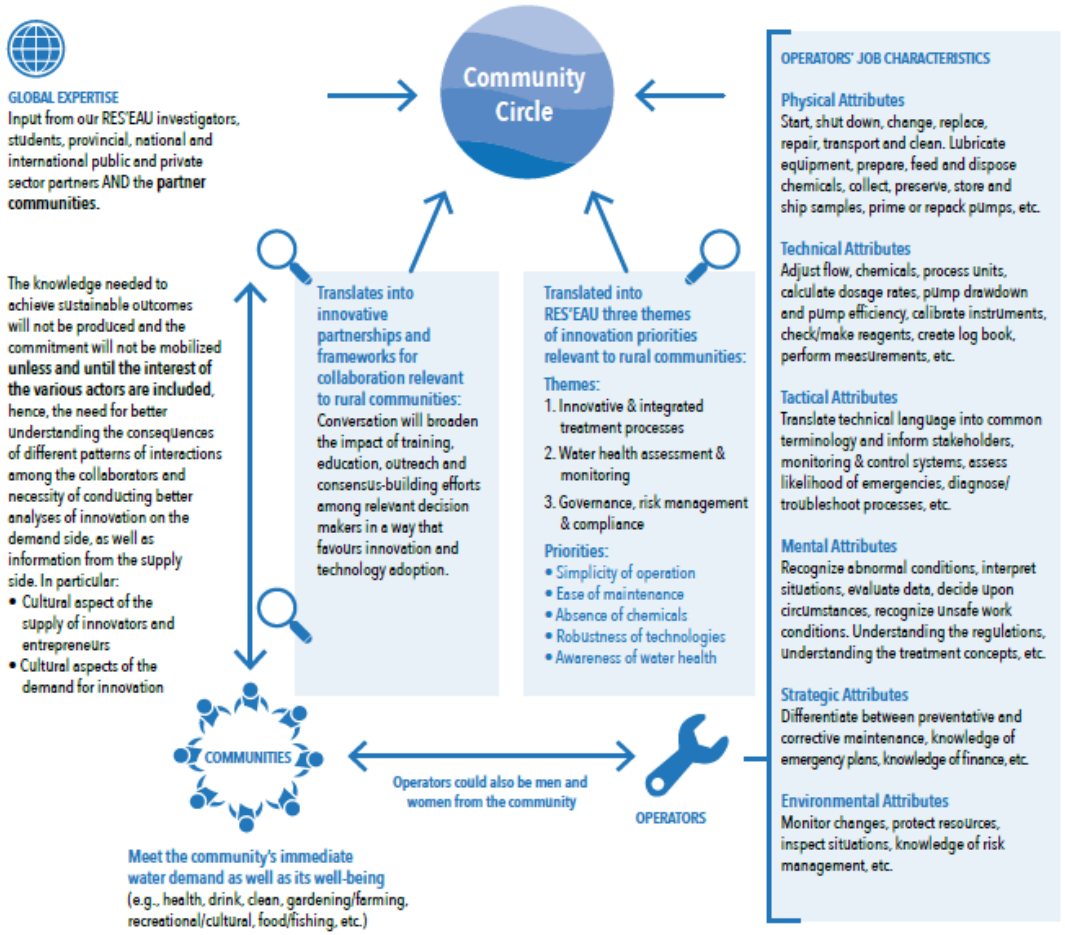
**Mental attributes**
Recognize abnormal conditions, Interpret situations, evaluate data, decide upon circumstances, Recognize unsafe work conditions. Understanding the regulations, understanding the treatment concepts, etc.

**Strategic attributes**
Differentiate between preventative and corrective maintenance, knowledge of emergency plans, knowledge of finance, etc.

**Environmental attributes**
Monitor changes, Protect resources, Inspect situations, knowledge of risk management, etc.

# FLOW OF INFORMATION IN THE COMMUNITY CIRCLE ECOSYSTEM

## Achieving Socially and Technologically Sustainable Outcomes for Small and Rural Water Systems

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