Lessons for Optimizing the Adoption of Water Reuse in Underserved Communities

An Output of the National Water Reuse Action Plan (WRAP) Action 8.5

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Disclaimer

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Summary

Droughts, aging infrastructure, and lack of funding resources leave many communities around the United States struggling to maintain a reliable source of water in a changing climate. Effective technical assistance (TA) approaches can support small and underserved communities with improving their water infrastructure and implementing innovative strategies, such as water recycling, to augment their water supplies. This report showcases three communities and documents their engagement with TA providers and regulators through TA engagement pilots. The authors believe that the lessons learned from these TA engagement pilots will provide valuable insight for developing future TA approaches that are catered to small and underserved communities.

- Section 1 describes some of the challenges faced by small and underserved communities and provides information about the TA engagement team (i.e., action 8.5 team).
- Section 2 describes the communities that participated in the TA engagement pilots—three self-nominated small, underserved communities in Idaho, California, and Kansas and details the approaches used in the TA engagement pilots.
- Section 3 describes lessons learned from the three TA engagement pilots.
- Section 4 describes future TA efforts, including those funded by the Bipartisan Infrastructure Law (BIL).

This report was written as part of National Water Reuse Action Plan (WRAP) Action 8.5, *Engagement with Disadvantaged and Rural Communities on Water Reuse*. The goals of that action are to:

- Characterize the unique challenges faced by disadvantaged and rural communities in pursuing water recycling and integrated water management.
- Improve understanding of the needs of disadvantaged and rural communities to implement water recycling and improve water system reliability.
- Develop water reuse training materials to build capacity for disadvantaged and rural communities to consider, evaluate, and implement safe water reuse projects.
- Evaluate models for supporting individual, rural communities in evaluating reuse opportunities and developing recycling project plans.

1 Background

1.1 Small and underserved communities: context and need for support

The United States has over 50,000 community water systems, 92 percent of which serve communities with populations under 10,000 people. Of the community water systems that serve less than 10,000 people, 60% serve very small communities with populations under 500 people (Figure 1). Similar to communities with larger populations, small communities often face problems related to water and climate resiliency, water quality, water management, and aging infrastructure. However, due to their size, and the fact that many are underserved and under-resourced, small communities can face additional challenges when seeking to improve the climate resiliency of their water infrastructure—for example, through water reuse (Box 1).

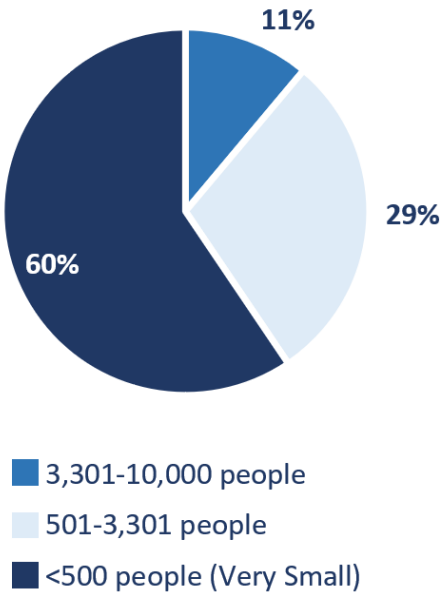


Figure 1. Distribution of the population served by small community water systems (<10,000 people) in the United States—most of which serve fewer than 500 people. (Based on data collected by the EPA in 2022)

Small and under-resourced communities often struggle to fund their water systems, and due to their small population, revenues from rate payments may not cover the cost of maintaining pumps, pipes, and other water infrastructure. A smaller tax base also limits the ability of small communities to subsidize the cost of water and wastewater systems; these factors may drive water utilities to increase water rates to levels which are unaffordable for their customers. Many of these small communities face additional water challenges such as: aging or inadequate wastewater treatment infrastructure, partial access to wastewater services among residents, limited stormwater management infrastructure, regulatory compliance difficulties, and a lack of program planning expertise.

Furthermore, it is common for municipal and utility staff in smaller communities to fulfill many roles. Competing priorities may lower the time available to focus specifically on water infrastructure improvements. Time constraints may also drive staff to focus on solving near-term problems and can limit proactive or long-term planning.

Despite limited financial resources or staff time, leaders in small communities often have a deep knowledge about local priorities and concerns. Therefore, successful technical assistance programs, which are intended to support small communities with accessing financial resources and project planning/implementation expertise, depend on establishing strong relationships with local communities. In addition, the

Water reuse: the practice of reclaiming water from a variety of sources, treating it, and reusing it for beneficial purposes.

Underserved: communities that have historically received inadequate services.

Under-resourced: communities that have experienced a historical lack of basic or adequate resources and that may lack the capacity to address regulatory and funding challenges.

Box 1. Definitions of key terms used in this report.

factors that are unique to small communities must be taken into consideration and any solutions must be compatible with their specific existing infrastructure.

1.2 Community engagement and training through WRAP Actions 2.15 and 8.5

The Water Reuse Action Plan (WRAP), a national plan to drive progress on water reuse and address local and national barriers to reuse across a range of topics, includes actions related to small and underserved communities. For example, in actions 2.15 *(Conduct Outreach and Training with Tribes to Build Water Reuse Capacity)* and action 8.5 *(Engagement with Disadvantaged and Rural Communities on Water Reuse)*, WRAP partners conducted outreach through webinars and listening sessions (see Figure 2).

Figure 2. Collage of public webinars delivered as part of WRAP Action 8.5.

Action 2.15

As part of their efforts to help tribal communities build capacity to adopt water reuse, WRAP partners developed factsheets and held outreach and listening sessions including a webinar*, Keys to Success: Water Recycling in Tribal Communities*, presented by the EPA in partnership with the San Pasqual Band of Mission Indians. A customizable outreach presentation on tribal water reuse was also created to engage the National Tribal Water Council, the National Tribal Caucus, and the Regional Tribal Operations Committees in EPA Regions 2, 6, 8, and 9. The presentation addressed various water reuse topics, including an introduction to water reuse, case study examples of reuse applications on tribal land, and how to get started on a water reuse project.

Action 8.5

Based on the positive reception of the tribal presentations, WRAP action 8.5 was initiated to:

- Continue outreach and education about climate-resilient water management practices, such as water reuse, in underserved and under-resourced communities (defined in Box 1)
- Pilot technical assistance (TA) engagements to match communities with appropriate TA providers who can help communities apply for infrastructure funding (Box 2)

EPA's TA Program
Check out EPA's Water Infrastructure Technical Assistance Webpage

Box 2. EPA's Technical Assistance Program

As part of action 8.5, two national webinars/listening sessions held in the summer of 2021 helped the action team identify and prioritize needs for TA in underserved communities. During the webinars, a voluntary poll was conducted to identify barriers to the adoption of water reuse among the communities present. Results of the poll indicated that access to funding was a barrier for more than half of the attendees. Additionally, more than twenty percent of the webinar attendees faced barriers

such as regulatory challenges, lack of public/decision-maker support, lack of technical expertise, insufficient time and staff resources, and organizational/coordination issues (Figure 3).

Figure 3. A poll of WRAP Action 8.5 webinar attendees describes multiple barriers to advancing water reuse within their communities.

In addition to the poll, the listening sessions also established relationships between the action 8.5 team and communities in need of TA. For example, during listening sessions, three communities in Idaho, California, and Kansas self-selected to receive EPA's support through water reuse TA engagement pilots, which are described in subsequent sections of this report.

2 Piloting Water Reuse Technical Assistance to Communities

2.1 Technical assistance engagement pilot approach

The action 8.5 team worked with three self-identified small and underserved communities in Idaho, California, and Kansas through TA engagement pilots (***please note: this report uses pseudonyms to anonymize the three communities***). The TA engagement pilots served to determine the support needed in each community to integrate water recycling into their water management portfolios, and to help them define the scope of their water reuse projects.

This section explains the drivers, context, and nuances of each TA engagement pilot in detail. Separately, the action 8.5 team approached other public and private TA providers already operating in each region to understand their business models, services, and eligibility requirements. The action 8.5 team also spoke with community members, state regulators, and a range of other stakeholders as part of the TA engagement pilots. Key partners who contributed to the TA engagement pilots are listed in Figure 4. Specifically, the TA engagement pilots were focused on recycling treated municipal wastewater for agricultural or other irrigation uses (Box 3).

Action Leaders
• U.S. Environmental Protection Agency (EPA)
• Ochotona LLC
Action Partners
• WateReuse Association
• U.S. EPA Region 9
• American Water Works Association (AWWA)
• U.S. Department of Agriculture (USDA)
• T8 Environmental LLC
• National Rural Water Association (NRWA)
• Idaho Rural Water Association (IRWA)
• Rural Community Assistance Corporation (RCAC)
• State-associated departments of environmental quality for California, Idaho, and Kansas
• Water Finance Exchange (WFX)
• Three small town public works agencies

Figure 4. Collaborating organizations for WRAP Action 8.5, *Engagement with Disadvantaged and Rural Communities on Water Reuse.*

Source water and reuse application for the TA engagement pilots

- **Treated municipal wastewater (source of water)**: treated wastewater effluent discharged from a centralized wastewater treatment plant of any size.
- **Water reuse for agriculture (reuse application)**: the use of recycled water on land to assist in the production of both commercially and non-commercially processed food crops consumed by humans or livestock and non-food crops.

See the full list of water reuse sources and applications and their definitions as derived from EPA's Regulations and End-Use Specifications Explorer tool (REUSExplorer) in Appendix A.

Box 3. Source water and end use for the TA engagement pilots discussed in this report.

The action 8.5 team envisioned the following components as essential for working alongside each community:

1. Determine where a community lies within the phases of reuse adoption (initiation, planning, and implementation), as detailed in Figure 5.
2. Identify the barriers to reuse adoption and where TA would be the most helpful, in partnership with the communities.
3. Connect communities with appropriate TA providers so they could become competitive for infrastructure funding opportunities, such as the Clean Water State Revolving Fund, Drinking Water State Revolving Fund or other funding sources.

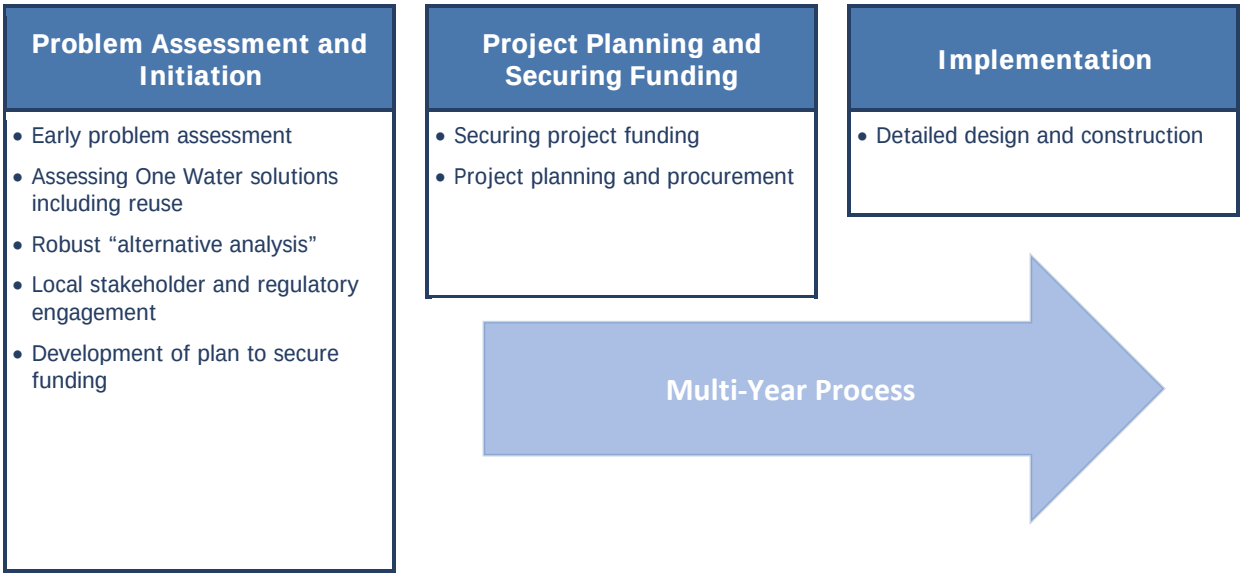


Figure 5. Phases of an infrastructure project as part of a multi-year process include initiation, planning and funding, and implementation.

Prior to starting the TA engagement pilots, the action 8.5 team sent leaders from each of the three communities a set of discussion topics to identify the local community context and needs. This element was core to the action 8.5 team's due diligence in researching and understanding the local community's setting, priorities, and challenges before the kickoff meetings for the TA engagement pilots.

The success of the TA engagement pilots may have been impacted by the COVID-19 pandemic, which required switching from in-person to virtual meetings and could have stalled project development. In the TA engagement pilots, person-to-person engagement might have been more effective in building trust and advancing projects, if it had been an option.

For the sake of candid knowledge transfer, this report uses pseudonyms to anonymize the three communities.

2.2 "Shadygrove-Sunnygrove," Idaho

Shadygrove and Sunnygrove are two adjacent small towns in Idaho, with populations just under 500 and 150 respectively. These towns are in an area of Idaho that is financially depressed, with much of the population comprised of retired, low-income seniors. The COVID-19 pandemic caused drastic demographic shifts in the area, as younger citizens moved from urban to more rural areas, including to Shadygrove and Sunnygrove. This growth was challenging, but the towns saw it as a new opportunity for economic development.

There are two separate sewer districts in these towns, each with their own governing board of five members. The sewer districts collectively serve Shadygrove and Sunnygrove's 600+ residents and share employees and equipment. Shadygrove and Sunnygrove have a history of collaboration and cooperative resource management. In the 1980s, they combined to create a third entity, the Shadygrove-Sunnygrove Sewer Project, whose six-lagoon wastewater treatment plant receives wastewater from both districts. Currently, treated wastewater effluent from the lagoon treatment plant is discharged into a tributary of a nearby lake. Entities that use the lake - including a federally recognized tribe - have expressed concerns about the discharge of nutrients (i.e., phosphorus) into the lake, due to the impact on water quality and for cultural reasons.

Drivers

In Shadygrove-Sunnygrove, there are two key drivers for adopting water reuse. The first is compliance with the Idaho Pollutant Discharge Elimination System Program (IPDES) permit, which is anticipated to impose more stringent limits on nutrient discharges in the future. The second driver is eliminating discharge into the local river and lake to improve water quality. By recycling treated wastewater for agricultural use, agricultural end users would have a reliable supply of water for irrigation during droughts. The nutrients in the recycled water could also provide a benefit by offsetting the use of chemical fertilizer on crops. Water recycling would also lower demand on the local freshwater supply by offsetting the use of existing freshwater sources for irrigation. Overall, recyling treated wastewater for agricultural use in Shadygrove-Sunnygrove is viewed positively at the state and local levels, as an alternative to discharging the treated wastewater effluent into surface waters.

Challenges

The Shadygrove-Sunnygrove communities face several barriers to recycling treated wastewater for agricultural use:

- In Idaho, any water recycling project must obtain a state-issued permit, which requires technical expertise and staff time to create a successful application.
- A feasibility analysis is needed to implement a water recycling project, which requires technical expertise in natural systems, agriculture, and wastewater treatment.
- A reliable end user for the recycled water is critical to implement a successful project and determine the level of treatment required for the intended end use. Communities will also need to develop and foster relationships and trust with the landowners who will use the recycled water.
- Additional full-time operators will be needed to run the system after construction. Because of the remoteness of the area—and because of a general decline in the number of wastewater

professionals in the workforce—new operators with the appropriate state credentials are difficult to hire and retain.

- Small and under-resourced communities often lack financial capacity to upgrade and expand existing infrastructure.

Currently, Shadygrove-Sunnygrove does not have the infrastructure in place to support a recycled water project and will need to secure funding to make capital improvements. To implement water recycling for agricultural use, they will likely need to upgrade the existing lagoon treatment system and build a distribution system to deliver the recycled water to end users.

At the outset of the TA engagement pilot, Shadygrove-Sunnygrove had exhausted all known and applicable grant funding options (from government grant and forgivable loan programs) through prior investments in their water infrastructure. For example, State Revolving Funds (SRFs) are programs that provide low-cost financing to communities for a wide range of water quality and drinking water infrastructure projects. However, these communities did not receive funding from the state SRF programs, despite applying for them. They were also unable to pass new bonds through the bonding authority, as they already had two bonds for sewer and drinking water upgrades from 2011 (which they are still repaying).

Exploring solutions

The action 8.5 team and Shadygrove-Sunnygrove started the TA engagement pilot by meeting with a handful of TA providers: the American Water Works Association, the Idaho Department of Environmental Quality, the Idaho Rural Water Association, the National Rural Water Association, the local engineering firm hired by the sewer district, the Rural Community Assistance Corporation, and the Water Finance Exchange. Over the course of a year, the action 8.5 team built relationships with these groups to determine the scope of TA engagement pilot. Partnerships formed, building trust between local parties, and laying the foundation for planning and implementing the water recycling project.

Many of the TA providers who met with the action 8.5 team (listed in the previous paragraph) already had relationships with Shadygrove-Sunnygrove prior to the TA engagement pilot. They had worked together previously on water infrastructure issues and were closely familiar with the community's assets and challenges. Building off these connections helped establish trust between the U.S. EPA and the communities and expedited planning and strategy development to help them address barriers to adopting water recycling.

Financial planning technical assistance

During the TA engagement pilot with Shadygrove-Sunnygrove, the Bipartisan Infrastructure Law (BIL) passed. It included guidance on allotting funding to underserved communities to improve water infrastructure and encouraging proposals that include climate adaptation strategies. Following the BIL announcement, the action 8.5 team reached out to potential TA providers, such as university researchers and water industry practitioners, who have experience in climate data projections specific to Idaho's conditions. The researchers with the required skillset were not available to volunteer their time to include climate adaptation modeling in the draft facility plan. Therefore, the climate modeling technical assistance aspect was unsuccessful. Ideally, this supplemental information would have been submitted in the draft plan along with the SRF grant application, making it more competitive for funding.

To improve access to funding for the water recyling project, Shadygrove-Sunnygrove was connected to the Water Finance Exchange (WFX). According to their website, WFX, a 501(c)(3), is "a trusted intermediary that works closely with federal and state stakeholders, communities, philanthropy, and the financial sector to address the water infrastructure funding shortage facing thousands of communities across the U.S." The WFX connection was made to help Shadygrove-Sunnygrove identify matching fund sources and highlight opportunities for new funding for a grant or a forgivable loan (due to limited debt capacity and high existing rates). WFX collaborated with Shadygrove-Sunnygrove to create a financial summary that detailed various scenarios and recommendations. It was the first time the Shadygrove-Sunnygrove leadership had access to such financial modeling to make data informed decisions, and they found the support beneficial. In order to pursue a reuse project, Shadygrove-Sunnygrove would have needed to significantly raise its rates to service the resulting debt. Unfortunately, WFX concluded that in the absence of other funding sources, the rates would become unaffordable when compared to the area's household median income.

New, more stringent nutrient discharge requirements are likely to be implemented in the area due to growing concerns about the impacts of nutrients on Idaho's fresh surface waters. However, Shadygrove-Sunnygrove will be unable to meet the new standards and renew their IPDES permit without significant upgrades to their wastewater treatment infrastructure. Without treatment upgrades, they may incur costly penalties from noncompliance. Whether investing in water recycling or paying penalties for noncompliance, Shadygrove-Sunnygrove will have to decide on, and fund, the best path forward.

Shadygrove-Sunnygrove's diligence in addressing these challenges is well known. They have reached out to staff at the state level as well as engaged with the Idaho Rural Water Association, the Rural Community Assistance Corporation, and USDA Rural Development to explore all funding possibilities. Through these efforts, it was determined that the towns should seek the state of Idaho's help in convening and facilitating a conversation among the multiple departments that inform permitting and funding. This would enlist more stakeholders in developing a funding solution that fits the needs of these communities. Several months after the TA engagement pilot ended, Shadygrove-Sunnygrove successfully secured funding for their reuse project. Specifically, in March of 2023, a local committee who advises the Idaho Department of Environmental Quality recommended the Shadygrove-Sunnygrove water recycling project to receive over $7 million from a new funding program that utilizes federal pandemic relief funding to implement projects that reduce phosphorus pollution in the area's waterways. This funding is dependent on Shadygrove-Sunnygrove's ability to secure an end-user for the recycled water.

2.3 "Sunnyfields," California

"Sunnyfields" is in California's central coast region, in one of the most agriculturally productive areas of the United States. Its population exceeds 25,000 and is historically underserved (i.e., a community that has historically received inadequate services). The primary industries in Sunnyfields include agriculture and a correctional facility. Sunnyfields uses groundwater from an aquifer that is not overdrafted for agricultural irrigation and agricultural users pay very little for the water (i.e., roughly only the cost of the electricity to extract the water).

Drivers

The adoption of water reuse aligns with the Sunnyfields' goals of becoming a more sustainable and self-sufficient community—as shown by their previous investments in wind turbines to supply power to their wastewater treatment facility. Leadership in Sunnyfields recognizes that while groundwater is not currently overdrafted, this may not always be the case. Climate change and increased future groundwater demands could force farmers to fallow fields or switch crops, as has been required in other parts of California during prolonged drought. The main driver for reuse in Sunnyfields is the concern that the state may apply groundwater use limitations to Sunnyfields as climate conditions worsen. Groundwater use limitations have already been implemented in other parts of California.

Sunnyfields is not new to the idea of water recycling. They regularly discuss water recycling strategies with another regional community who already recycles most of their treated wastewater effluent for irrigation. In the early 2010s, Sunnyfields funded the construction of a new wastewater treatment facility. This state-of-the-art facility can process 5.7 million gallons per day of wastewater and meets California's Title 22 water quality requirements for the use of recycled water in agriculture.

Challenges: reclaimed water end users and funding

Sunnyfields has faced challenges with adopting water recycling due to a lack of interested end users in the area. Although Sunnyfields invested in a new wastewater treatment plant capable of producing recycled water, the surrounding agricultural regions had no interest in using the recycled water, mostly due to the availability of cheap groundwater. Because the presumed end users did not materialize, the goal of recycling over 100 acre-feet per year of treated wastewater (as outlined in Sunnyfields' 2015 Urban Water Management Plan) did not come to fruition. A nearby correctional facility could have been an appropriate end user for the recycled water for landscape irrigation, but the lack of funding for new infrastructure to transport recycled water to the correctional facility posed a challenge. Regardless, the city needed to find funding to develop the infrastructure to deliver recycled water to any potential end users.

Exploring solutions

Communication with Sunnyfields began in 2021. Like many underserved communities, Sunnyfields had limited personnel time and resources. Regardless, its leadership showed tremendous vision, passion, and optimism about the integrated role of water recycling in the region. To build trust and capacity early on, the action 8.5 team met with regional leadership. The action 8.5 team identified the key areas for TA and sought confirmation with Sunnyfields' leadership. After several attempts to further engage with local leadership, continuation of the TA engagement pilot stalled. When the TA engagement pilot ended, Sunnyfields had no customers for their high-quality recycled water.

Although the action 8.5 team was unable to directly help the community identify end users or apply for funding, Sunnyfields was eventually able to do both independently. In February of 2023, Sunnyfields received $17 million in grant funding to build a pipe system capable of delivering recycled water to the city's public turf areas for the irrigation of ballfields and parks. The project was funded by an Urban Community Drought Relief Grant from the California Department of Water Resources.

2.4 “Wheat,” Kansas

“Wheat” is a community of over 4,000 whose economy is primarily based on agriculture (e.g., wheat gluten and ethanol manufacturing) and oil and gas. Water reuse has been a strategy to promote water resilience since the 1970s, when Wheat began using recycled water (i.e., from treated municipal wastewater) to irrigate public grounds and golf courses. Wheat also relies on both surface and groundwater sources for irrigation and augments its supply through reuse and by purchasing water from a separate rural water district.

Drivers

Wheat’s desire to expand their recycled water supply from treated municipal wastewater stems from a handful of drivers. Primarily, the community hopes to prepare for future fluctuations in the water supply—including from droughts seen elsewhere in the region—and to ensure there is enough water for residential and commercial needs. The community also sees water reuse as a means of ensuring regulatory compliance through their National Pollutant Discharge Elimination System (NPDES) permit, with the goal of eliminating discharge of treated wastewater effluent into local surface waters. Lastly, Wheat hopes to avoid the need to purchase imported water in the future.

Challenges: inability to dig deeper

Wheat’s leadership was interested in expanding water reuse but did not have the time to take on a new water reuse project while balancing their existing duties. It became clear that a lack of staff time in this small community hindered the adoption of a new water recycling project. While the action 8.5 team could devote resources to early-stage problem identification, a base level of community participation is needed for the TA engagement pilot to take off. In the case of Wheat, the community was excited and wanted to do this work but did not have adequate staff time to embark on new projects.

2.5 Summary table of the TA engagement pilots

State	Population	Driver for reuse	Summary of TA Engagement Pilot	Outcome
Idaho	• 500 (Shadygrove) • 150 (Sunnygrove)	• Compliance with more stringent nutrient discharge limits anticipated in future IPDES permit requirements • Eliminate discharge into the local surface waters to improve water quality	The action 8.5 team fostered connections between Shadygrove-Sunnygrove and a handful of potential TA providers including: The American Water Works Association, the Idaho Department of Environmental Quality, the Idaho Rural Water Association, the National Rural Water Association, the local engineering firm hired by the sewer district, the Rural Community Assistance Corporation, and the Water Finance Exchange.	• New funding pathways were proposed based on a financial analysis performed by the Water Finance Exchange. • The action 8.5 team attempted to match Shadygrove-Sunnygrove to TA providers who could integrate climate data into infrastructure planning but could not identify a provider during the TA engagement pilot. • After the TA engagement pilot ended, Shadygrove-Sunnygrove secured funding for their reuse project. In March 2023, Shadygrove-Sunnygrove was recommended for $7 million in funding.
California	• 25,000+ (Sunnyfields)	• Desire to become a more sustainable and self-sufficient community • Potential future groundwater use limitations issued by California	Prior to the start of the TA engagement pilot, Sunnyfields had already invested in a wastewater treatment facility that produced water of sufficient quality for agricultural irrigation but had not secured a reliable end user for the water. The action 8.5 team worked with regional leadership to discuss the key areas in which TA was needed.	• The action 8.5 team attempted to identify appropriate end users for Sunnyfields recycled water but were unsuccessful. • Independently from the TA engagement pilot, Sunnyfields was able to identify public turf fields as end uses for their recycled water. Sunnyfields successfully secured $17 million in grant funding to construct a pipeline to deliver the water for irrigation.
Kansas	• 4,000+ (Wheat)	• Preparing for unknown fluctuations in the water supply • Ensuring regulatory compliance • Eliminate future needs to purchase imported water	Leadership of the Wheat, KS and the action 8.5 team met in November 2021 to discuss how water reuse can address the challenges of water scarcity, as well as strategies for improving public perception of water recycling. The action 8.5 team attempted to reconvene the leadership group but was unsuccessful.	• Despite their interest, Wheat did not have the staff time to take on a water recycling project while balancing their existing duties.

3 Transferable Lessons for Community Technical Assistance Programs

Many small and underserved communities across the U.S. need to invest in their water infrastructure to provide a safe, clean, and reliable water supply to their ratepayers and to remain in regulatory compliance. The action 8.5 team worked with three anonymous communities as they considered reuse and matched them with TA providers through TA engagement pilots. Lessons from the TA engagement pilots outlined in the next section could help inform future TA approaches.

3.1 Devote resources toward early-stage engagement and ensure solutions are catered to community-specific needs

Among the phases of planning for adoption of water reuse (Figure 5), initiation involves problem assessment, identifying solutions, stakeholder engagement and initial funding planning. The TA engagement pilots, which primarily occurred during the initiation phase, were most productive when the action 8.5 team sufficiently researched the local community context and needs. For example, the action 8.5 team conducted community assessments; found documents that outlined local and state goals and mandates; and studied facility planning documents, master plans, and other guiding community documents. Through the TA engagement pilots, the action 8.5 team learned that it is important for any outside group to work with communities during the early phases to build trust and match communities with appropriate TA providers.

Additionally, it is important to consider the unique challenges faced by each community to develop successful solutions. For example, a key facet of TA is helping communities identify which water management solutions might fit their needs and water reuse is just one of many tools for water resource management and climate resiliency. Interviews with a wide array of stakeholders in each community provided the action 8.5 team with a more holistic understanding of the challenges they faced. By engaging with the communities early in the process, the action 8.5 team could correctly identify the problems they faced and what, if any, TA was needed by the community (e.g., integrating projected impacts of climate change into infrastructure planning or providing financial application support).

3.2 Convene diverse stakeholders in decision-making

To ensure that feedback is representative of the community needs, the action 8.5 team found that diverse stakeholders should contribute to conversations about water infrastructure planning early in the process. This should include stakeholders who are aware of local conditions and are able to make and/or inform decisions on water infrastructure investment. Some key stakeholders and participants include:

- State-level representation for funding, regulation, and water resource management
- Funders and financers
- Volunteer-based service providers who can supplement the existing capacity of the town or utility; and
- Local engineers who work with communities to develop regulatory documents (such as facility plans)

The action 8.5 team made a concerted effort to meet with people in all these roles for each pilot site to enhance collaboration. Engaging local stakeholders early was key, as it furthered local buy-in and ownership of the challenges and most effective solutions. These conversations allowed the action 8.5 team to support more meaningful relationships between the communities and potential TA providers.

3.3 Leverage existing, trusted relationships and partnerships to advance common goals

While smaller, underserved, and under-resourced communities may struggle with securing the financial or staff resources for a water reuse project, they may have access to strong social networks that can be creatively leveraged as project champions. To understand who these local champions are, consider the community's perspective: Who do they typically go to for support? Who would they like support from that they can't get? Through the TA engagement pilots, the action 8.5 team found that potential champions could include engineers, utilities, elected and appointed officials, and community or faith-based organizations.

Key community leaders who can champion water recycling projects as invested stakeholders may help build capacity within a community. For example, champions may be more willing to devote voluntary time to a project and expand the network of stakeholders involved in the project, which could increase the technical expertise and resources available to implement a new infrastructure project. In particular, engineering firms that have strong relationships with local communities already serve as "first responders."

The most meaningful TA engagements involved supporting local experts and community groups without overstepping trusted relationships. This is a way of acknowledging and honoring those relationships and building trust with other key community leaders.

3.4 Understand the most effective role for each technical assistance provider

The goal of the TA program is to provide valuable, appropriate, and viable assistance to communities without creating more challenges. Setting the expectations for each individual or team involved in a water reuse project and TA program is essential for success—and it can provide transparency on what needs to happen for a project to advance.

Two standard project management tools, RACI matrixes and Gantt charts, can be useful in these efforts. See Appendix B for examples of both.

When matching TA providers with a community, it is important to understand the landscape of organizations involved with small communities around the country. Key players could include the National Rural Water Association and their state chapters, USDA Rural Development programs, the Rural Community Assistance Corporation, and their respective regional chapters. Bringing together TA providers and stakeholders who already work with small communities can help ensure TA is appropriate for them.

It is important to consider the specialization of various TA providers, because they often work in specialized and siloed sectors (e.g., water, wastewater, energy) and their expertise can vary substantially across organizations and across the country. Some TA providers are skilled in wastewater and drinking

water system operations and infrastructure, but less experienced in water supply planning, including the incorporation of water recycling. Many TA providers are also unfamiliar with the wide range of available funding and financing strategies that could complement SRF, USDA, and other conventional funding programs. It is critical to assemble a range of TA providers who have the specific expertise needed by communities. In addition, TA providers could be trained in a broader set of skills to help communities consider a full range of water management strategies.

3.5 Limited staff time and competing priorities may slow communication between TA providers and small communities

Water resource planning, including water reuse, requires a base level of community staff time and financial resources. For example, TA will require the community to gather documents and coordinate communication about the community's specific needs to bring TA providers up to speed. The TA engagement pilots were time-intensive and challenging for the action 8.5 team to maintain.

When working with small communities and staff who may have limited time available for the project, keep in mind that follow-through on action items (if even possible) and general communication may take longer than planned. Communities may have resource limitations because community staff perform multiple roles within a single community. Thus, it is essential to allow substantial time to plan and implement TA with small and underserved communities. Likewise, effective TA and planning support needs to be adequately funded to enable TA providers to work with these communities for months to years (throughout the project lifecycle).

Enthusiasm within a small community may not directly translate into the capacity to plan, design, and implement a project. However, support and encouragement from local officials as well as relevant regional and state-level officials can contribute to a project's success.

3.6 Be sensitive to mistrust of outsiders

It takes time to build rapport with community members and stakeholders. Separately, preconceived perceptions of a particular external TA provider will inform how much the community trusts or mistrusts the provider. TA engagements should be sensitive to historical wrongdoings by TA providers or other outside groups and seek to improve relationships by building trust. For example, engaging with entities that have existing relationships in a small community—tribal groups, environmental agencies, etc.—may help TA providers build community buy-in and credibility.

4 Additional Technical Assistance Efforts

4.1 Train-the-trainer engagements

Partnerships with state and national-level organizations allowed the action 8.5 team to expand the scope of the TA engagement pilots through train-the trainer presentations, which educated a wider audience about water recycling. For example, the action 8.5 team partnered with the National Rural Water Association (NWRA) to present at two NWRA national conferences. These presentations included state-level Rural Water Association staff and provided education in settings where rural TA providers are surrounded by their peers. Additional outreach to water professionals included presentations at the American Water Works Association's ACE conference.

The presentations at national conferences discussed case studies of other small, underserved communities that had successfully adopted water recycling. They helped attendees consider water recycling as a resilience strategy that can benefit communities of all sizes, especially when solutions are designed for the specific needs of a community. Continuing to contribute to these trainings will enable TA providers to help small communities consider, plan, finance, and implement reuse and other innovative water management infrastructure strategies.

4.2 New federal funding and support for infrastructure technical assistance

President Biden signed the Bipartisan Infrastructure Law (BIL) on November 15, 2021. The law's investment in the water sector is transformational; it includes $50 billion to EPA to strengthen the nation's drinking water and wastewater systems—the single largest investment in clean water that the federal government has ever made. BIL priorities include improved infrastructure flexibility to meet local water needs, dedicated investment in disadvantaged communities, and support for climate resilience and water innovation, including water reuse. The importance of water reuse as a strategy for climate resilience is further amplified through the Federal Water Reuse Interagency Working Group (IWG), which was established under the BIL (Section 50218). The IWG is composed of senior officials from 15 federal agencies and is charged with developing and coordinating actions, tools, and resources to advance water reuse across the country.

Despite new funding available for improving water infrastructure, small and underserved communities may require assistance in successfully applying for funding and identifying appropriate solutions. Therefore, the U.S. EPA's Office of Water is developing technical assistance initiatives to support communities as they identify water challenges, develop plans, build technical, financial, and managerial capacity, and develop application materials to access water infrastructure funding.

Through the action 8.5 team's TA engagement pilots, the importance of building and expanding TA providers' capacity to meet the full range of needs of small and underserved communities became apparent. Supporting training and development for TA providers can improve their understanding of how innovative water management strategies may be applied in small communities, enable planning for climate change impacts, unlock a wider range of funding and financing resources, and enhance community capacity to manage such infrastructure.

TA engagement pilots could help underserved and disadvantaged communities successfully apply for SRF funding for improving their drinking water, wastewater, stormwater, and other water infrastructure. The goal is to have a greater number of disadvantaged communities move onto state SRF project

priority lists. The Office of Water plans to have close collaboration with states to inform them of where and how EPA BIL TA can complement state TA to address infrastructure challenges using SRF funding.

Appendix A: Water Reuse Sources and Applications

The following definitions are derived from EPA's Regulations and End-Use Specifications Explorer (REUSExplorer) as of January 2023.

Sources of water

A source of water for reuse purposes is any alternative water source that can help offset the demand for traditional freshwater supplies.

Treated municipal wastewater
Treated wastewater effluent discharged from a centralized wastewater treatment plant of any size. Other terms for this source of water include *domestic wastewater, treated wastewater effluent, reclaimed water,* and *treated sewage*.

Onsite collected waters
Waters generated within or in the area surrounding a building, residence, or district. Other terms for this source of water include *onsite collected rainwater, greywater, blackwater, air conditioning condensate,* and *foundation water*.

Industry process water
Water produced during industrial and manufacturing processes. Other terms for this source of water include *air handling condensate; boiler, cooling, or wash water;* and *water generated during oil and natural gas extraction*.

Stormwater
Precipitation that is collected from land or impervious surfaces at a district or regional scale for beneficial reuse. Rainwater collection at the building scale is classified separately under *onsite collected waters*.

Reuse applications

A reuse application is the recycling of an alternative source of water that is adequately treated for its intended use.

Potable water reuse
The use of highly treated recycled water for drinking water purposes. Includes the introduction of recycled water into an environmental buffer, such as a groundwater aquifer or surface reservoir being withdrawn for potable purposes (indirect potable reuse), and the introduction of recycled water into a drinking water treatment facility or directly into a potable water distribution system (direct potable reuse).

Onsite non-potable water reuse
Collection, treatment, and use of water from onsite sources for non-potable purposes at the single-building or district scale. Excludes the use of recycled water from a centralized treatment and distribution system for landscaping or commercial uses (refer to "Water reuse for landscaping" and "Centralized non-potable reuse").

Centralized non-potable reuse
The non-potable reuse of recycled water that does not derive from the same site where it is to be reused. Can include, but is not limited to, toilet flushing, dust control, soil compaction, fire protection, commercial laundries, vehicle washing, street cleaning, snowmaking, and other similar uses. Excludes onsite non-potable water reuse and the use of recycled water for agriculture or landscaping.

Water reuse for agriculture
The use of recycled water on land to assist in the production of both commercially and non-commercially processed food crops consumed by humans or livestock and non-food crops. Includes pasture for milking and non-milking animals, fodder, fiber, and seed crops, vineyards, orchards, ornamental nursery stock, Christmas trees, and silviculture. Excludes consumption by livestock, onsite non-potable reuse, and landscaping.

Water reuse for landscaping
The use of recycled water on land to assist in the irrigation of vegetation in residential and non-residential areas. Includes impoundments to store water for irrigation, ornamental vegetation, parks, school yards, sporting facilities (including golf courses), private gardens, roadsides and greenbelts, and cemeteries. Excludes irrigation of areas used for agriculture, commercial reuse applications, or any centralized onsite non-potable reuse.

Water reuse for consumption by livestock
The use of recycled water for livestock drinking water supplies. Excludes physical application of reclaimed water to pasture for milking and non-milking animals, forage crops used as animal feed, and land used for livestock grazing.

Water reuse for environmental restoration
The use of recycled water to create, sustain, or augment water bodies including wetlands, aquatic habitats, or stream flow. Includes groundwater or aquifer recharge for protection from saltwater intrusion, stream flow augmentation and wildlife habitat, and source water protection.

Water reuse for impoundments
The use of recycled water in an impoundment (body of water within an enclosure). This includes both unrestricted use (use of reclaimed water in an impoundment in which no limitations are imposed on body-contact water recreation activities) and restricted use (use of reclaimed water in an impoundment where body contact is restricted). Includes recreational impoundments, aesthetic impoundments, and ornamental impoundments with and without public access. Excludes landscaping, impoundments, and storage of recycled water intended for other specific reuse applications (e.g., for agricultural irrigation).

Water reuse for industry
The use of recycled water for industrial applications, often created at the industrial facility. This includes recycled water generated through onsite processes such as boiler water, cooling water, manufacturing water, and oil and gas production, as well as recycled water generated offsite and imported elsewhere for industrial reuse applications.

Appendix B: RACI Matrix and Gantt Chart

The following pages show examples of:

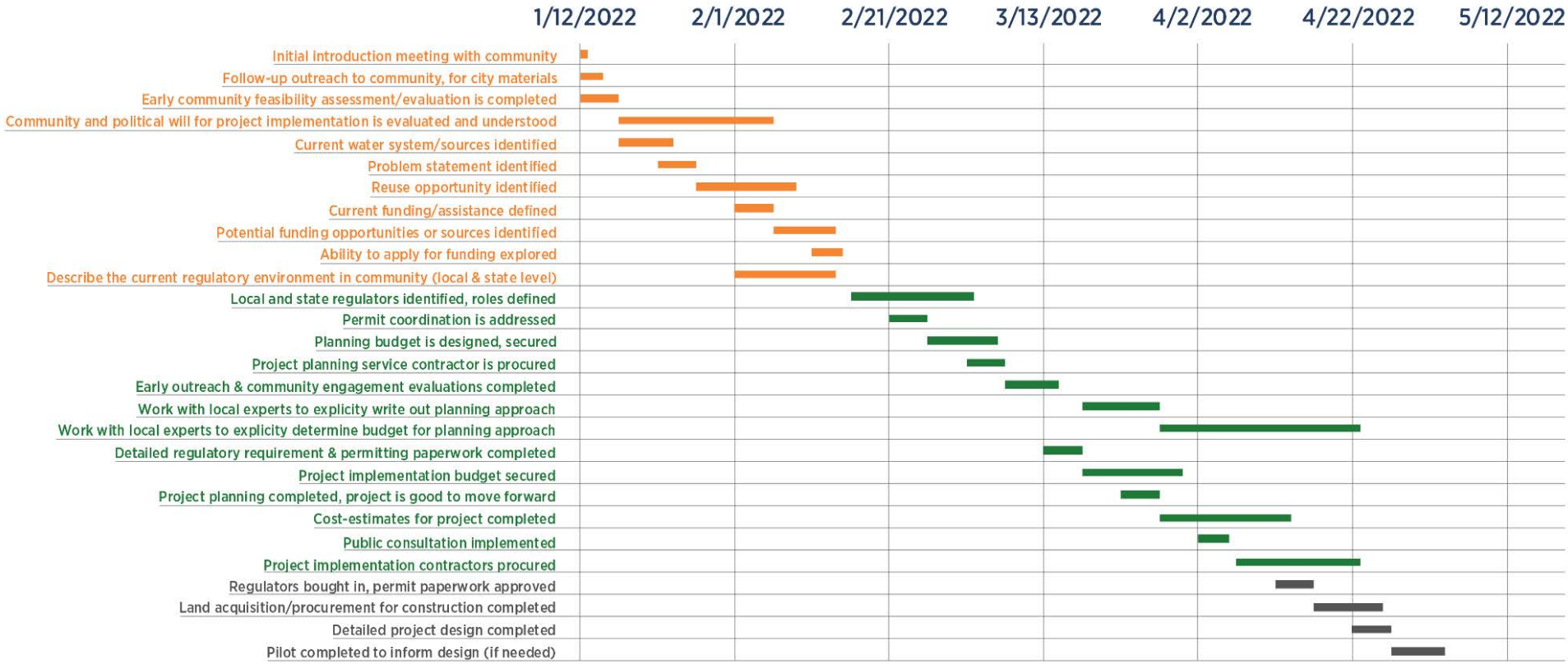
- A RACI matrix, which defines defined roles and responsibilities for tasks. On the right side of this matrix:
  - *R* means an entity is responsible for completing a task.
  - *A* means an entity is accountable for ensuring the task is completed.
  - *C* means an entity is consulted for input into the task or deliverable.
  - *I* means an entity is informed of the task for awareness, but not asked for input.
- A Gantt chart, which offers an overarching view of tasks and timeframes.

RACI matrix

Broad Phases	Detailed Phases	Task	EPA Action Team	TA Organization	Community Leader(s)	State Representative
Initiation	Project identification and definition	Initial introduction meeting with community	R	I	A	I
Initiation	Project identification and definition	Follow-up outreach to community for city materials	A	I	R	I
Initiation	Project identification and definition	Early community feasibility assessment/evaluation completed	A	I	R	I
Initiation	Project identification and definition	Community and political will for project implementation evaluated and understood	A	C	R	I
Initiation	Project identification and definition	Current water system/sources identified	A	C	R	I
Initiation	Project identification and definition	Problem statement identified	R	C	A	I
Initiation	Project identification and definition	Reuse opportunity identified	R	C	A	I
Initiation	Funding identification	Current funding/assistance defined	C	A	R	C
Initiation	Funding identification	Potential funding opportunities or sources identified	C	A	R	R
Initiation	Funding identification	Ability to apply for funding explored	C	A	R	C
Planning	Regulatory engagement	Current regulatory environment in community (local and state levels) described	A	C	C	R
Planning	Regulatory engagement	Local and state regulators identified, roles defined	R	A	C	C
Planning	Regulatory engagement	Permit coordination addressed	C	R	A	C
Planning	Regulatory engagement	Planning budget designed, secured	I	A	R	C
Planning	Regulatory engagement	Project planning service contractor procured	I	A	R	C
Planning	Regulatory engagement	Early outreach and community engagement evaluations completed	I	A	R	C
Planning	Acquisition planning for early project design	Work with local experts to explicitly write out planning approach	I	R	A	C
Planning	Acquisition planning for early project design	Work with local experts to explicitly determine budget for planning approach	I	A	R	C
Planning	Acquisition planning for early project design	Detailed regulatory requirement and permitting paperwork completed	I	R	A	C
Planning	Acquisition planning for early project design	Project implementation budget secured	I	A	R	C
Planning	Acquisition planning for early project design	Project planning completed; project is good to move forward	I	R	A	I
Planning	Acquisition planning for early project design	Cost estimates for project completed	I	R	A	I

Planning	Acquisition planning for early project design	Public consultation implemented	**I**	**R**	**A**	**I**
Planning	Acquisition planning for early project design	Project implementation contractors procured	**I**	**A**	**R**	**I**
Imple-men-tation	Detailed project design	Regulators bought in, permit paperwork approved	**I**	**A**	**R**	**C**
Imple-men-tation	Detailed project design	Land acquisition/procurement for construction completed	**I**	**A**	**R**	**C**
Imple-men-tation	Detailed project design	Detailed project design completed	**I**	**R**	**A**	**C**
Imple-men-tation	Detailed project design	Pilot completed to inform design (if needed)	**I**	**R**	**A**	**C**

Gantt chart


1/12/2022
2/1/2022
2/21/2022
3/13/2022
4/2/2022
4/22/2022
5/12/2022
Initial introduction meeting with community
Follow-up outreach to community, for city materials
Early community feasibility assessment/evaluation is completed
Community and political will for project implementation is evaluated and understood
Current water system/sources identified
Problem statement identified
Reuse opportunity identified
Current funding/assistance defined
Potential funding opportunities or sources identified
Ability to apply for funding explored
Describe the current regulatory environment in community (local & state level)
Local and state regulators identified, roles defined
Permit coordination is addressed
Planning budget is designed, secured
Project planning service contractor is procured
Early outreach & community engagement evaluations completed
Work with local experts to explicity write out planning approach
Work with local experts to explicity determine budget for planning approach
Detailed regulatory requirement & permitting paperwork completed
Project implementation budget secured
Project planning completed, project is good to move forward
Cost-estimates for project completed
Public consultation implemented
Project implementation contractors procured
Regulators bought in, permit paperwork approved
Land acquisition/procurement for construction completed
Detailed project design completed
Pilot completed to inform design (if needed)

Appendix C: References

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