

# EPA Water Reuse Program

## Relevant Highlights for the DMV region



Dr. Rabia Chaudhry  
U.S. Environmental Protection Agency  
National Water Reuse Expert



# EPA Water Reuse Program

*Advancing reuse for a secure water future*

**Mission:** Expand water reuse expertise by building technical, financial, and institutional capacity so that interested communities of all sizes can consider when they need an alternative, resilient water supply.

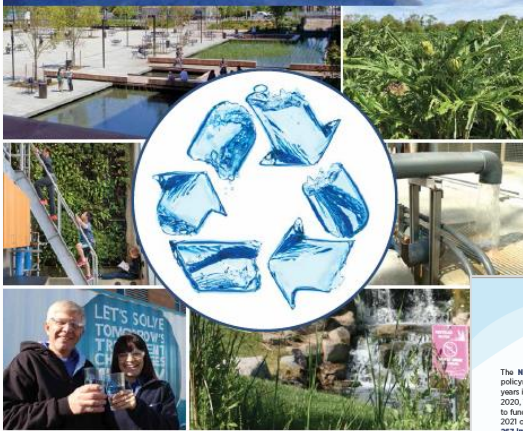
- Facilitate implementation of the **National Water Reuse Action Plan (WRAP)**
- Coordinate the **Federal Interagency Working Group for Water Reuse**
- Integrate water reuse into EPA programs

# NATIONAL WATER REUSE ACTION PLAN (WRAP)

## National Water Reuse Action Plan

Improving the Security, Sustainability, and Resilience of Our Nation's Water Resources

### Collaborative Implementation (Version 1)



February 2020

### NATIONAL WATER REUSE ACTION PLAN

Update on Collaborative Progress—Year 2  
March 2022

The National Water Reuse Action Plan (WRAP) helps drive progress on reuse by leveraging the expertise of scientists, policymakers, and local experts across the country to create a more resilient water future for communities of all sizes. Now two years into WRAP implementation, there are 118 dedicated partner organizations contributing at various scales. Since February 2020, WRAP collaborators have been working through coordinated actions to address barriers to reuse, including issues related to funding, technology, policy, and organizational capacity. Currently, there are 80 WRAP actions, with 13 added since January 2021 on topics such as monitoring practices, plumbing codes and standards, and communication tools. Teams have finished 267 implementation milestones overall and completed 5 total actions to date, which included deliverables related to funding eligibility, initial outreach and training, and raising global awareness for reuse. Through the Bipartisan Infrastructure Law, enacted November 2021, lawmakers called for continued WRAP implementation and the creation of a federal reuse interagency working group "to advance water reuse across the U.S." (Sec. 5023B).

#### WRAP YEAR 2 HIGHLIGHTS

At this stage, WRAP collaborators have delivered many critical outputs that lay the groundwork for more substantial impacts in the coming years. The following is a snapshot of some key activities and accomplishments over the past year.

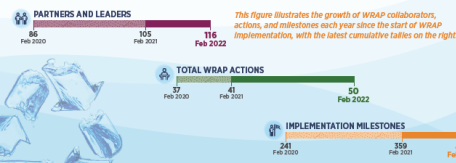
#### Incorporating Water Reuse into Programs and Policies

- **Expert convening and report on stormwater capture and use.** Investigates opportunities, challenges, and next steps to expand the implementation of stormwater harvesting across the country (Action 3.3, led by EPA, NWSA, WaterReuse, WEF, ReNUWII, and the Johnson Foundation).
- **Integrating Water Reuse into the Clean Water State Revolving Fund (CWSRF).** Describe the eligibility of water reuse in the CWSRF and highlights successful policies and practices that state CWSRF programs implement to support reuse (Action 3.2b, led by EPA).
- **\$2.4 million in Conservation Innovation Grants.** Awarded across three proposals in this new priority area, reflecting USDA's broader strategy for water reuse on agricultural land (Action 5.1, led by USDA).
- **Collaboration on NPDES permitting processes.** Enhanced understanding of how permitting can support new water management technologies and strategies, including development of a training webinar (collaboration between three WRAP action teams: Action 2.6, Action 2.16, and Action 3.3).
- **Cooperation of Urban Waters and National Estuary Program water reuse activities.** Highlights the intersection of reuse with these key community-focused programs (Action 1.6, led by EPA).



In February 2022, EPA staff and Assistant Administrator for Water Reuse, Fox found the Scottsdale Water Campus in Arizona. The campus has over two decades of experience in indirect potable reuse, recycling 1.7 billion gallons of treated wastewater annually through aquifer recharge. Photo credit: EPA.

\$1.4 billion invested in 7 reuse infrastructure projects in 2021 through EPA's WIFIA loan program.



- Now in its fourth year, the WRAP facilitates collaborative progress on reuse through a series of Actions by:
  - Enabling multistakeholder collaborations among network of federal, state, tribal, local, and water sector partners
  - Creating necessary tools, knowledge products, and resources for communities
  - Funding critical research and technology development
  - Coordinating federal government activities through IWG
  - Communicating curated information early and often
- Actions are added and maintained within the **online platform: (epa.gov/waterreuse/wraponline)**

# SNAPSHOT OF THE WRAP

140

Action Leaders &  
Partner Organizations

64

Action Commitments

100+


Resources Developed

Numbers since WRAP launch in 2020

RN  
ICC  
NPS  
SAWS  
**Volcani**  
EDF | MoEI  
Commerce  
NGWA | NMSU  
WSWC | NACWA  
Parker Groundwater  
WaTr | AMWA | HUD  
Reclamation | MoEP | FDA  
**Wright Water Engineers** | TTU  
**GHD** | NDRP | GCE | CA SWRCB  
NMED | AHA and ASHE | ECOS  
IWA | USAID | ASTHO | **CESPM** | Purdue  
GWPC | MWD | **BIER** | DOT | **CILA** | USGS | IWMI  
U.S. Water Alliance | SBIR Programs | RTOCs  
FEMA | **Water Innovation Services** | WW | SCCWRP  
**One Water Econ** | Valley Water | JCI | USWP | NSU  
NTWC | Groundwork USA | DOD | WTA | AWWA | **SRE**  
Rice University | NYC DEP | NREL | EPA | USACE | SWAN | DOI  
**Conagua** | WRF | **SEPROA** | NTC | NSF | Penn State | **CWCB**  
USGBC | **Northwest Biosolids** | EPRI | University of California  
NAWI | **Trussel Technologies** | USDA | Austin Water Utilities | CDC  
WEF | NeoTech Aqua | CIFA | **Cambrian Innovation** | CSO | Tyson  
GSA | Pacific Institute | GreenBiz Group | CDPHE | DOS | **CESPT**  
Stantec | UWFP | ASHRAE | **IBWC** | The World Bank | ACWA  
**Veolia** | Jacobs | Columbia Water Center | **NADB** | LADWP  
NRWA | RCAP | ORNL | JFW | Wahaso | DOE | NM-PWRC  
LACSD | IAPMO | Design Aire | **PepsiCo, Inc** | CDM Smith  
Embassy of Israel | **APHC** | GCCI | NMSA | ASDWA | ISPE  
NBRC for ONWS | WateReuse | NWRI | ReNUWit  
**UPenn Water Center** | Xylem  
**University of Arizona**

# WRAP Update on Collaborative Progress

## NATIONAL WATER REUSE ACTION PLAN



Update on Collaborative Progress – Year 3

MARCH 2023

The [WRAP collaborative](#) marks its third anniversary with increasing evidence of impact. Since inception it has grown to more than [60 actions](#). Many of these efforts are ongoing, while 13 have [successfully concluded](#). All action outputs—now totaling more than 100—are freely accessible online. The development of this robust suite of tools and resources by WRAP collaborators directly supports the adoption of reuse in communities of all sizes and will help enhance water resilience both locally and nationwide.

**Water reuse is a key climate adaptation tool that can be leveraged to combat flooding and drought. EPA not only supports the adoption of these innovative solutions but is helping to make them accessible by developing tools and partnerships with the National Water Reuse Action Plan.**

– EPA Administrator Michael Regan

### WRAP YEAR 3 ACTIVITIES ADVANCING POTABLE AND NON-POTABLE WATER REUSE

Now with more than 130 collaborators, the WRAP and its partners are seeing progress in advancing water reuse capacity across the country. The following highlights reflect accomplishments over the past year in several key categories and show forward momentum through new action commitments.

- 135** Action Leaders & Partner Organizations
- 62** Action Commitments
- 100+** Resources Developed

*Numbers since WRAP launch in 2020*

#### Policy and Regulations


- **Compiling state regulations to support reuse adoption.** The [REUSE Explorer](#) now includes nine end-use applications searchable by state, source of water, and end-use. ([Action 3.1](#), led by EPA and supported by ACWA, AMWA, ASDWA, ASTHO, CDPHE, FDA, WRF, and WaterReuse)
- **Creating a better understanding of how to permit water reuse projects under the National Pollutant Discharge Elimination System (NPDES) program.** The [report, Navigating the NPDES Permitting Process for Water Reuse Projects](#), presents key information and strategies for permitting authorities and permittees to better understand how to permit reuse projects. ([Action 2.6](#), output led by EPA, ACWA, NACWA, NMSA, WaterReuse, and WEF)
- **Supporting state regulators through collaborative information exchanges.** Multiple state associations hosted two webinars featuring state perspectives and relevant resources on [aquifer storage and recovery/managed aquifer recharge and direct potable reuse](#). ([Action 2.2](#), outputs led by GWPC and ASDWA)
- **Recharging groundwater to increase local resilience.** A recent [white paper, Water Recycling for Climate Resilience Through Enhanced Aquifer Recharge and Aquifer Storage and Recovery](#), explores technical and policy considerations influencing how recycled water can be used to recharge groundwater. ([Action 7.4](#), output led by EPA)

★ **New action:** [Advance Strategies for Permitting Innovative Wastewater Management Practices and Water Reuse Through the NPDES Program](#) ([Action 2.19](#), led by EPA, UC Berkeley, and Stanford University)

★ **New action:** [Highlight Water Reuse Opportunities in the National Pretreatment Program Framework](#) ([Action 8.2](#), led by EPA)

★ **New action:** [Support Multi-Stakeholder Alignment to Advance Reuse Along the U.S.-Mexico Border](#) ([Action 11.4](#), led by CONAGUA and EPA)

Sign up for EPA's water reuse email updates to learn about the latest activities and find opportunities to get engaged.



- Year 3 highlights
  - Policy and Regulations (supporting states)
  - Research Funding
  - Infrastructure Investment
  - Engagement, Communications, and Education
  - Stormwater Capture and Use
  - Agricultural Reuse
  - Onsite Industrial Reuse
  - Non-potable Reuse
- Access your copy:
  - <https://www.epa.gov/waterreuse/national-water-reuse-action-plan-updates-collaborative-progress#update>

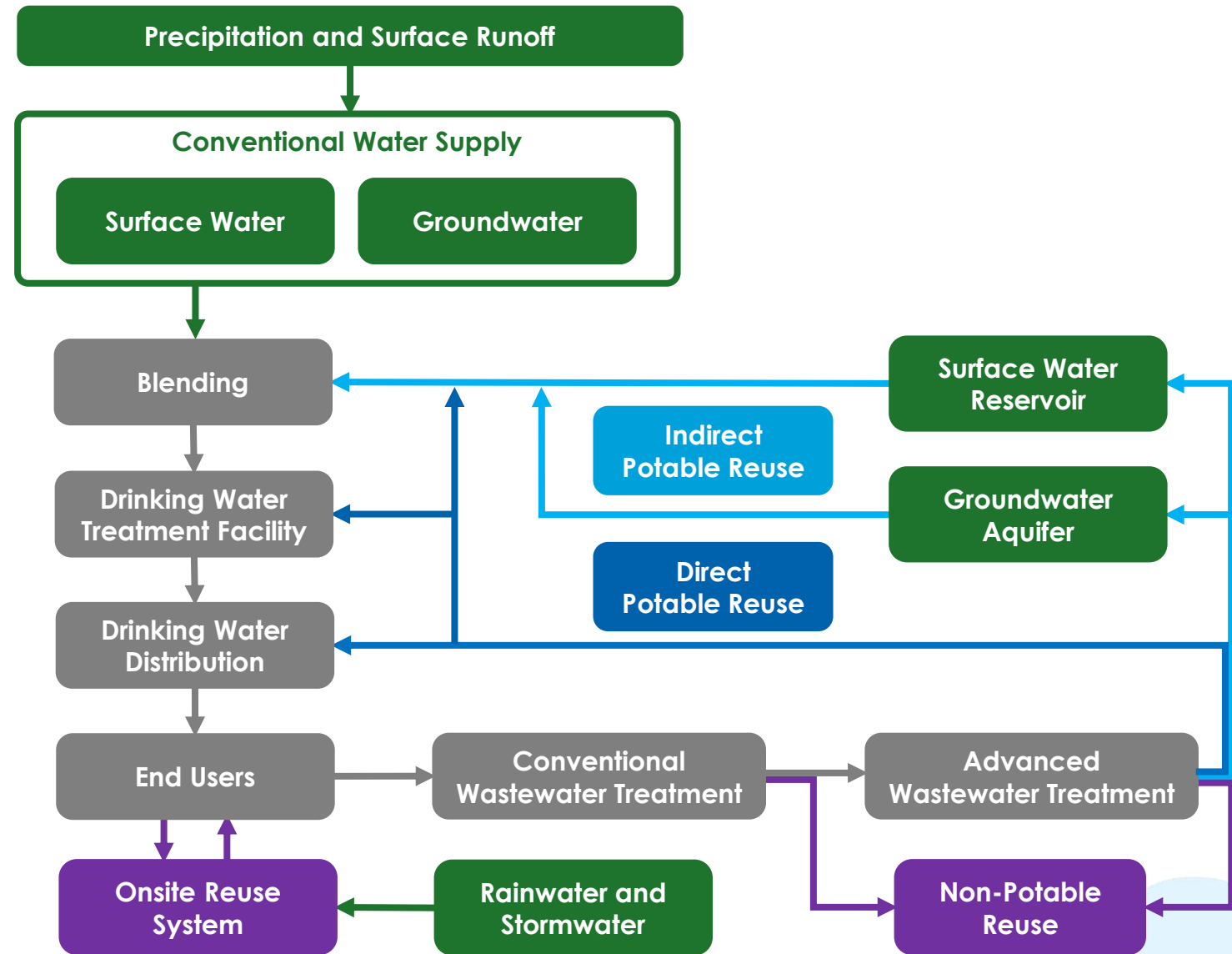




**HOW CAN WATER REUSE BE IMPLEMENTED?**

# WATER REUSE IN THE URBAN WATER CYCLE

Multiple approaches create resiliency at different **scales**, levels of **centralization**, and **treatment**



# DIFFERENT TYPES OF WATER REUSE APPLICATIONS

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Multiple options for **scale**, **centralization**, and **treatment**

Landscape  
Irrigation

Agricultural  
Irrigation

Livestock  
Watering

Potable Reuse

Onsite Non-  
potable Reuse

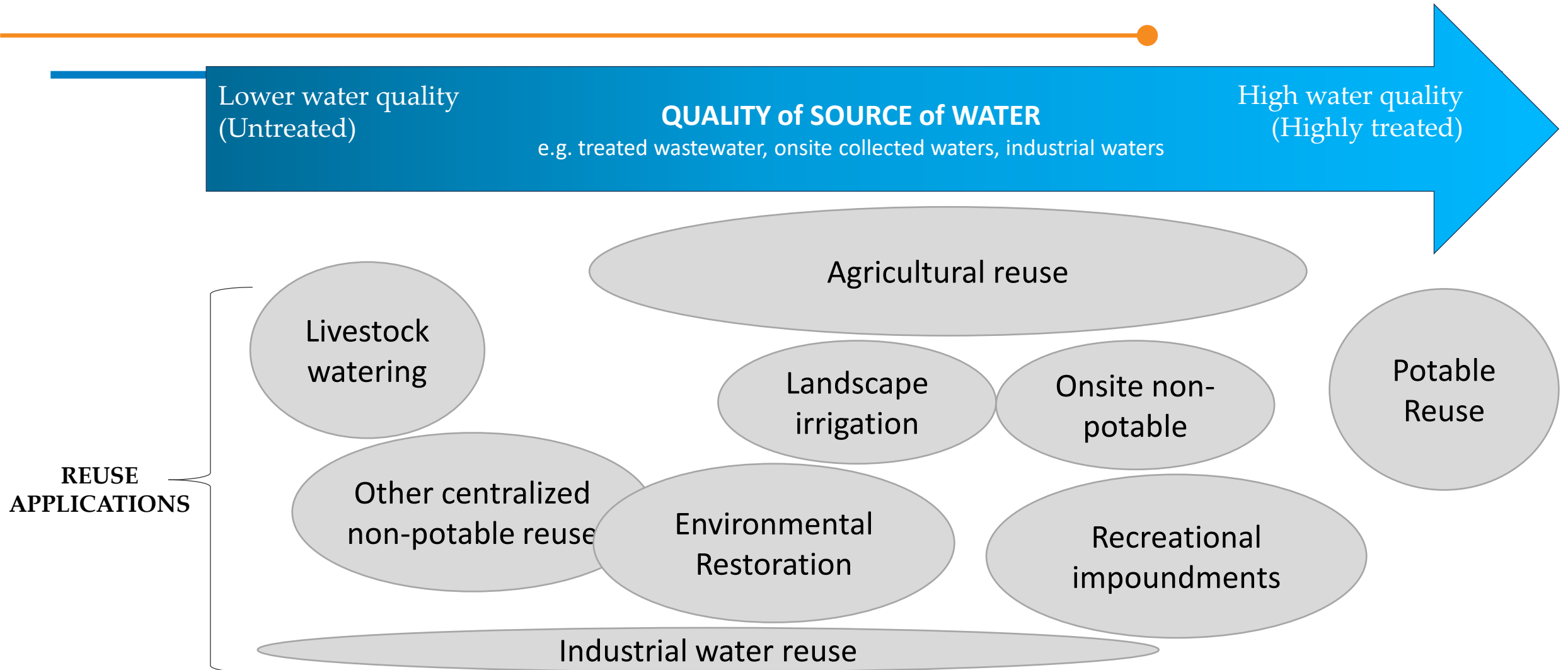
Environmental  
Restoration

Industrial  
Reuse

Impoundments



# Fit-for-Purpose Reuse Conceptual Framework



# TREATMENT AND DISTRIBUTION FOR WATER REUSE

## Non-Potable Reuse

- Level of treatment is dependent on the end-use (“Fit-for-Purpose”)
- Tertiary treatment along with disinfection is typically sufficient for many uses (e.g., landscape irrigation) but higher levels may be needed for other end-uses (e.g., certain industrial uses)
- Removal of salts and other specific compounds can be important for some uses such as agricultural irrigation
- In all cases, a separate “purple-pipe” distribution system is needed

## Potable Reuse

- Utilizes advanced treatment processes to remove pathogens and chemicals with pathogen removal/inactivation of paramount importance
- Can utilize an environmental buffer (indirect potable) or use no buffer (direct potable reuse)
- State regulations and frameworks are quickly evolving
- Advanced treated water can be blended at various points in a drinking water system or directly into a drinking water distribution system

# TREATMENT TRAINS FOR POTABLE REUSE

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## **Membrane-based Treatment**

- Utilizes reverse osmosis for removal of pathogens, chemicals, and salts
- Energy intensive
- Requires management of residuals

## **Carbon-based treatment**

- Uses a combination of ozone and biologically active filtration for removal of pathogens and chemicals
- Salts may be an issue

*Other treatment process such as low-pressure membranes, UV, and other advanced oxidation processes are also used*

Additional information can be found in EPA's 2017 Potable Reuse Compendium:

<https://www.epa.gov/ground-water-and-drinking-water/2017-potable-reuse-compendium>

# TREATMENT TRAINS FOR POTABLE REUSE

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- Utilizes reverse osmosis for removal of pathogens, chemicals, and salts
- Energy intensive
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## Carbon-based treatment

- Uses a combination of ozone and biologically active filtration for removal of pathogens and chemicals
- Salts may be an issue

**Treatment trains for potable reuse generally include processes such as reverse osmosis and/or granular activated carbon that can remove PFAS**

# Program Resources: REGULATIONS AND END-SPECIFICATIONS EXPLORER

**There are no federal level water reuse regulations. States have primacy to develop reuse regulations to supplement CWA and SDWA**



[www.epa.gov/reuseexplorer](http://www.epa.gov/reuseexplorer)

- Supporting states in regulatory development and supporting utilities and practitioners in understanding state regulations
- Comprehensive searchable tool with 150+ state reg summaries
- Common vocabulary to describe *sources of water* and *reuse applications*
- Provides downloadable maps
- Comparable set of specifications across all US states in excel spreadsheets

# Program Resources: Technical assistance to states in supporting water reuse

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## Arizona

- Developing DPR regulations
- ADEQ has sought technical assistance

## California

- Developing DPR regulations
- Using EPA publications and science

## Colorado

- First state to pass DPR regulations
- Technical assistance provided

## Florida

- Developing DPR and IPR regulations
- Concerns regarding regulator capacity

## Maryland

- Legislative mandate for IPR pilots
- MDE has sought technical assistance

## Nevada

- Working group planned on DPR
- Regulations likely to follow

## Ohio

- Limited regulations in place
- Ohio EPA has sought technical assistance on non-potable reuse

- Not just water scarcity!
- East coast states are pursuing reuse in part to manage nutrient and pollutant discharges, including CSOs.

*Informational **tech assistance** provided to several states*

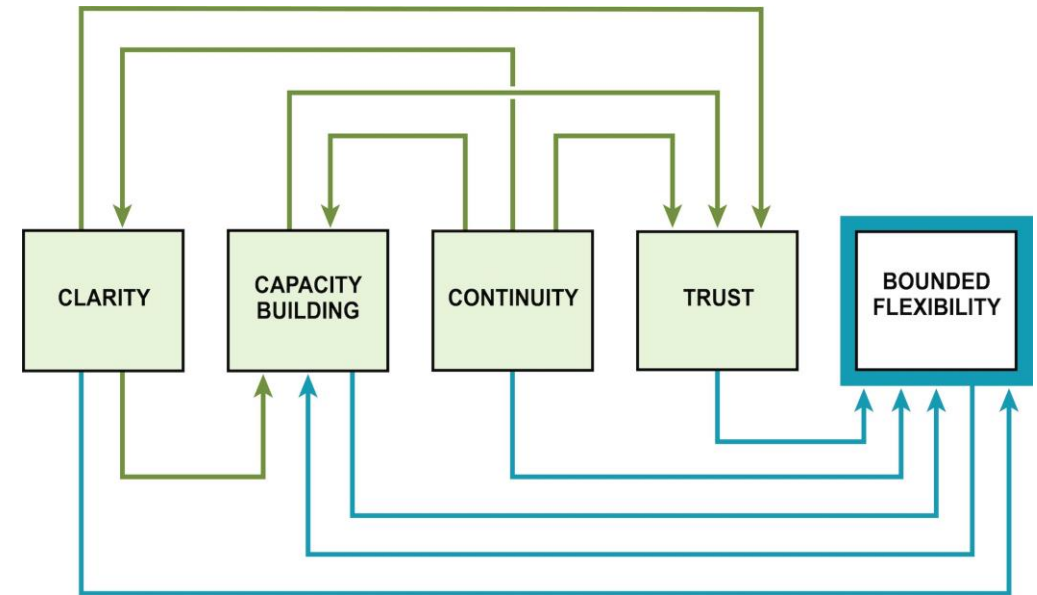
# Program Resources : Water Reuse State Summit



- ~20 states convened at the WaterReuse Symposium to discuss issues in water reuse
- Other states like Hawaii, Kansas, Oklahoma, and Utah are trying to understand how to support potable reuse
- Stakeholders have consistently expressed a need for **best practices to support regulations and permitting**

# Program Resources : Permitting Convening

- **Effective permitting of innovative practices is essential to widespread adoption**
  - Standard practices across states vary
  - Regulatory compliance is a perceived barrier to innovation
- Engaging permitters and permittees to help understand flexibilities
- Ultimate goal: permitter training for innovation and reuse



*August 2023 workshop at the Johnson Foundation at Wingspread to support permitting of water reuse*



# Program Resources: Informational Publications

## WATER RECYCLING FOR CLIMATE RESILIENCE THROUGH ENHANCED AQUIFER RECHARGE AND AQUIFER STORAGE AND RECOVERY



FEBRUARY 2023

- EAR and ASR can help maintain healthy aquifers and save water for later use.
- Tool for climate resiliency and other water quantity and quality goals
- Document provides technical and regulatory information to support communities and states
- Completed in coordination with other documents from ORD and OGWDW
  - Captures lessons learned from the U.S. delegation to Israel
  - Experiences with soil salinity due to agricultural reuse and their mitigation strategies will be especially important for inland states
  - Represents a true “one water” perspective
  - Post-delegation webinar on state perspectives

## From Water Stressed to Water Secure: U.S. Lessons from Israel's Water Reuse Approach

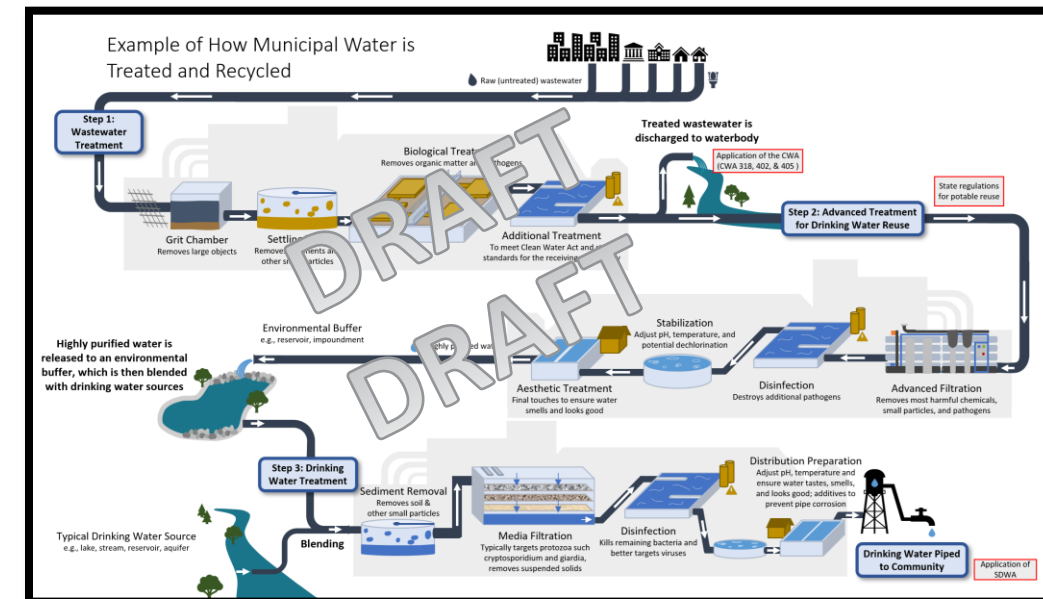
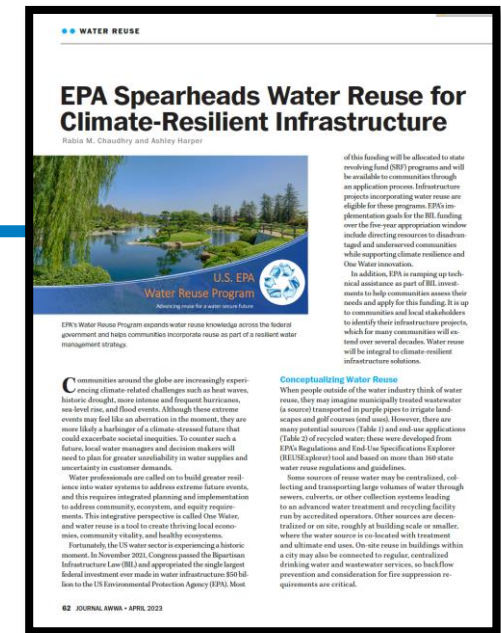


2022 DELEGATION SUMMARY  
March 2023



# Program Resources: Engagement, Communications, Education

- After funding/state reg development, **public perception is usually one of the largest barriers to a water reuse project.**
- Water Reuse Program activities:
  - Finalizing web content and infographics with the CDC to help inform the public about water reuse.
  - CDC and EPA are developing fact sheets for medical professionals, a key group to build public support of reuse projects
  - EPA Water reuse program supported development of a water reuse comms library hosted by the WaterReuse Association
  - We are developing public health issue papers on hot button topics that have plain language explanations



# Program Resources:

## Engagement, Communications, Education

### Community Rainwater and Stormwater Capture and Use

#### Capture

Capturing and using rainwater and stormwater in a community reduces demand for potable water and decreases stormwater discharges that cause combined sewer overflows, stormwater pollution, and aquatic and riparian habitat degradation. The use of infiltration basins, injection wells, large cisterns, and other elements can be used to capture rainwater and stormwater to replenish groundwater or for later use.

**Rainwater Capture**  
Capture of water from rain, snowmelt or sleet that lands on rooftops and other surfaces before it reaches the ground.

**Stormwater Capture**  
Capture of water from rain, snowmelt, or sleet that lands on and flows over the ground.



#### End Use

At a community scale, rainwater and stormwater can be captured to replenish groundwater supplies, potable use, irrigate landscapes, and for other non-potable uses.

**Washing**  
**Irrigation**  
**Infiltration or Injection for Groundwater Recharge**



**Filtration and Disinfection:**  
Stormwater may need additional treatment before injection or other end use applications to meet applicable public health and environmental standards.

Learn more about green infrastructure and stormwater management:  
<https://www.epa.gov/green-infrastructure/what-green-infrastructure>  
<https://www.epa.gov/modes/stormwater-smart-outreach-tools>  
<https://www.epa.gov/scienamatters/assessing-impacts-green-infrastructure-groundwater-quality>  
<https://www.epa.gov/uic/stormwater-drainage-wells>  
<https://www.epa.gov/waterreuse>

### Onsite Rainwater and Stormwater Capture and Use

#### Capture

Capturing and using water onsite within a building reduces demand for potable water and decreases stormwater discharges that cause combined sewer overflows, stormwater pollution, and aquatic and riparian habitat degradation. Rain barrels and cisterns capture and store rainwater for later use.

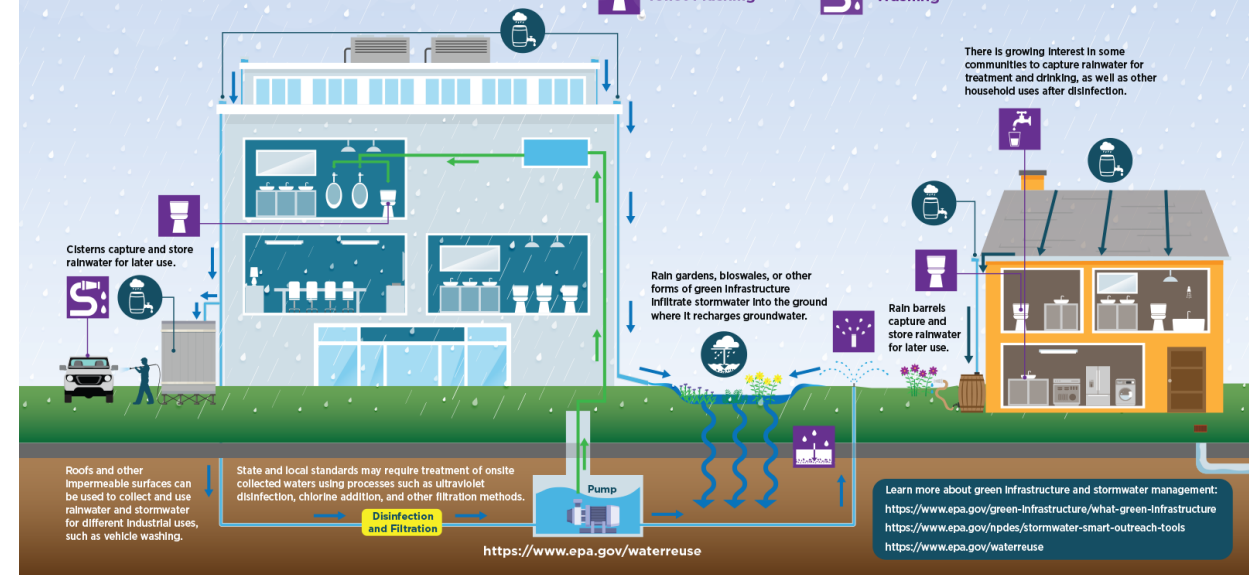
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**Stormwater Capture**  
Capture of water from rain, snowmelt, or sleet that lands on and flows over the ground.

#### End Use

Indoor and outdoor uses for captured and treated onsite collected waters include toilet flushing, wash waters, landscape irrigation, and other uses.

**Drinking Water**  
**Toilet Flushing**  
**Irrigation**  
**Washing**  
**Infiltration for Groundwater Recharge**



There is growing interest in some communities to capture rainwater for treatment and drinking, as well as other household uses after disinfection.

Roofs and other impermeable surfaces can be used to collect and use rainwater and stormwater for different industrial uses, such as vehicle washing.

State and local standards may require treatment of onsite collected waters using processes such as ultraviolet disinfection, chlorine addition, and other filtration methods.

**Disinfection and Filtration**

Learn more about green infrastructure and stormwater management:  
<https://www.epa.gov/green-infrastructure/what-green-infrastructure>  
<https://www.epa.gov/hpdes/stormwater-smart-outreach-tools>  
<https://www.epa.gov/waterreuse>

# Water Reuse Resource Hub

## Water Reuse Resource Hub by End-Use Application

[Water Reuse Home](#) | [WRAP Online Platform](#) | [REUSExplorer](#) | [Information Library](#) | [Latest Quarterly Update](#)

This page is organized by water reuse application, reflecting the recycling of an alternative source of water that is adequately treated for its intended use. Each end-use page compiles resources such as state policies, webinars, information about typical source waters, and publications. Collectively, these materials inform, document, and share stories of approaches taken by communities to initiate and implement water reuse.



### Potable

Highly treated water that is reused for drinking water and meets or exceeds federal Safe Drinking Water Act standards.

[Learn about potable applications](#)



### Onsite Non-Potable

Water that is collected, treated, and reused at single district or building scale for non-potable applications such as toilet flushing or dust control.

[Explore onsite non-potable uses](#)



### Centralized Non-Potable

Water which is generated and treated in one location and then reused in another for non-potable applications, including snowmaking or street cleaning.

[Learn more about centralized non-potable uses](#)

## Key Resources

The following are a sampling of the key water sector resources that are freely available to support water practitioners interested in developing non-potable water reuse projects. Visit the [Water Reuse Information Library](#) for additional water reuse materials.

- [Using Recycled Water for Firefighting \(2021\)](#) - Recycled water can be used to supplement fire supply systems and is becoming more common in states like California that are experiencing prolonged drought. This report describes regulatory oversight of tertiary-treated recycled water use, precautions for drinking water supply protection, quality and safety of recycled water produced in LA County that can be used for firefighting, and best management practices for use of recycled water by fire departments in LA County. This report was created by Los Angeles County Sanitation Districts in collaboration with others for the Los Angeles Chapter of the Water Reuse Association.
- [Making Snow with Recycled Water in Montana \(2018\)](#) - This Sustainable Water article describes the benefits associated with making snow from reclaimed water for Arizona's Snowbowl ski resort, such as reducing river discharges and restoring water supplies.
- [Technical Information Street Sweeping Guide](#)

### Call for resources!

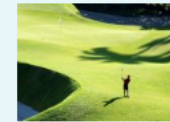
Please help us identify key resources for this page. Email your suggestions to [waterreuse@epa.gov](mailto:waterreuse@epa.gov).



## Project Examples

### [City uses lagoon system, a low input technology, to treat wastewater for golf course irrigation \(Oswego, Kansas\)](#)

The City of Oswego, Kansas reclaims treated municipal wastewater from a lagoon treatment system, a low input



### [Alaska Department of Environmental Conservation holds an onsite non-potable reuse competition to address rural water needs \(Alaska\)](#)



Thousands of residents in rural Alaska lack access to running water or flush toilets due to their remote locations and the local climate. To address this issue, the Alaska Department of Environmental Conservation (DEC) funded the Alaska Water and Sewer Challenge, a research

### [The "Living Machine"® at Corkscrew Swamp Sanctuary Treats Wastewater for Onsite Non-potable Reuse \(Southwest Florida\)](#)

Corkscrew Swamp Sanctuary contains a system—a "Living Machine"®—that treats wastewater generated onsite from the facility restrooms and recycles it for toilet flushing, effectively reducing demand on potable, freshwater supplies and helping



[epa.gov/waterreuse/hub](http://epa.gov/waterreuse/hub)

# All relevant resources on EPA Water Reuse Website



State

Optional Selection

Sources of Water i

Optional Selection

Reuse Application i

Optional Selection

Search

[epa.gov/waterreuse](https://epa.gov/waterreuse)

Join the mailing list or reach out directly

[waterreuse@epa.gov](mailto:waterreuse@epa.gov)

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# THANK YOU!

**Dr. Rabia Chaudhry**

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RN  
ICC  
NPS  
SAWS  
**Volcani**  
EDF | MoEI  
Commerce  
NGWA | NMSU  
WSWC | NACWA  
Parker Groundwater  
WaTr | AMWA | HUD  
Reclamation | MoEP | FDA  
**Wright Water Engineers** | TTU  
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NMED | AHA and ASHE | ECOS  
IWA | USAID | ASTHO | **CESPM** | Purdue  
GWPC | MWD | **BIER** | DOT | **CILA** | USGS | IWMI  
U.S. Water Alliance | SBIR Programs | RTOCs  
FEMA | **Water Innovation Services** | WW | SCCWRP  
**One Water Econ** | Valley Water | JCI | USWP | NSU  
NTWC | Groundwork USA | DOD | WTA | AWWA | **SRE**  
Rice University | NYC DEP | NREL | EPA | USACE | SWAN | DOI  
**Conagua** | WRF | **SEPROA** | NTC | NSF | Penn State | **CWCB**  
USGBC | **Northwest Biosolids** | EPRI | University of California  
NAWI | **Trussel Technologies** | USDA | Austin Water Utilities | CDC  
WEF | NeoTech Aqua | CIFA | **Cambrian Innovation** | CSO | Tyson  
GSA | Pacific Institute | GreenBiz Group | CDPHE | DOS | **CESPT**  
Stantec | UWFP | ASHRAE | **IBWC** | The World Bank | ACWA  
**Veolia** | Jacobs | Columbia Water Center | **NADB** | LADWP  
NRWA | RCAP | ORNL | JFW | Wahaso | DOE | NM-PWRC  
LACSD | IAPMO | Design Aire | **PepsiCo, Inc** | CDM Smith  
Embassy of Israel | **APHC** | GCCI | NMSA | ASDWA | ISPE  
NBRC for ONWS | WateReuse | NWRI | ReNUWit  
**UPenn Water Center** | Xylem  
**University of Arizona**