

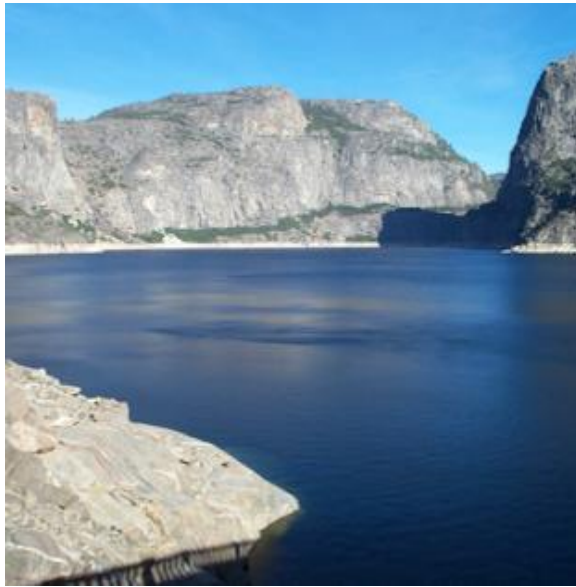


# Onsite Water Reuse

**Paula Kehoe**  
**Director of Water Resources**  
**San Francisco Public Utilities Commission**  
**January 25, 2019**



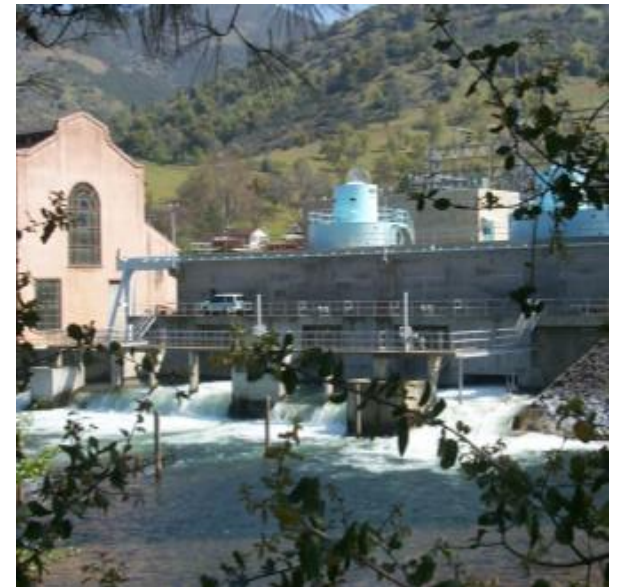
# San Francisco Public Utilities Commission



Water: delivering high quality water every day to 2.7 million people



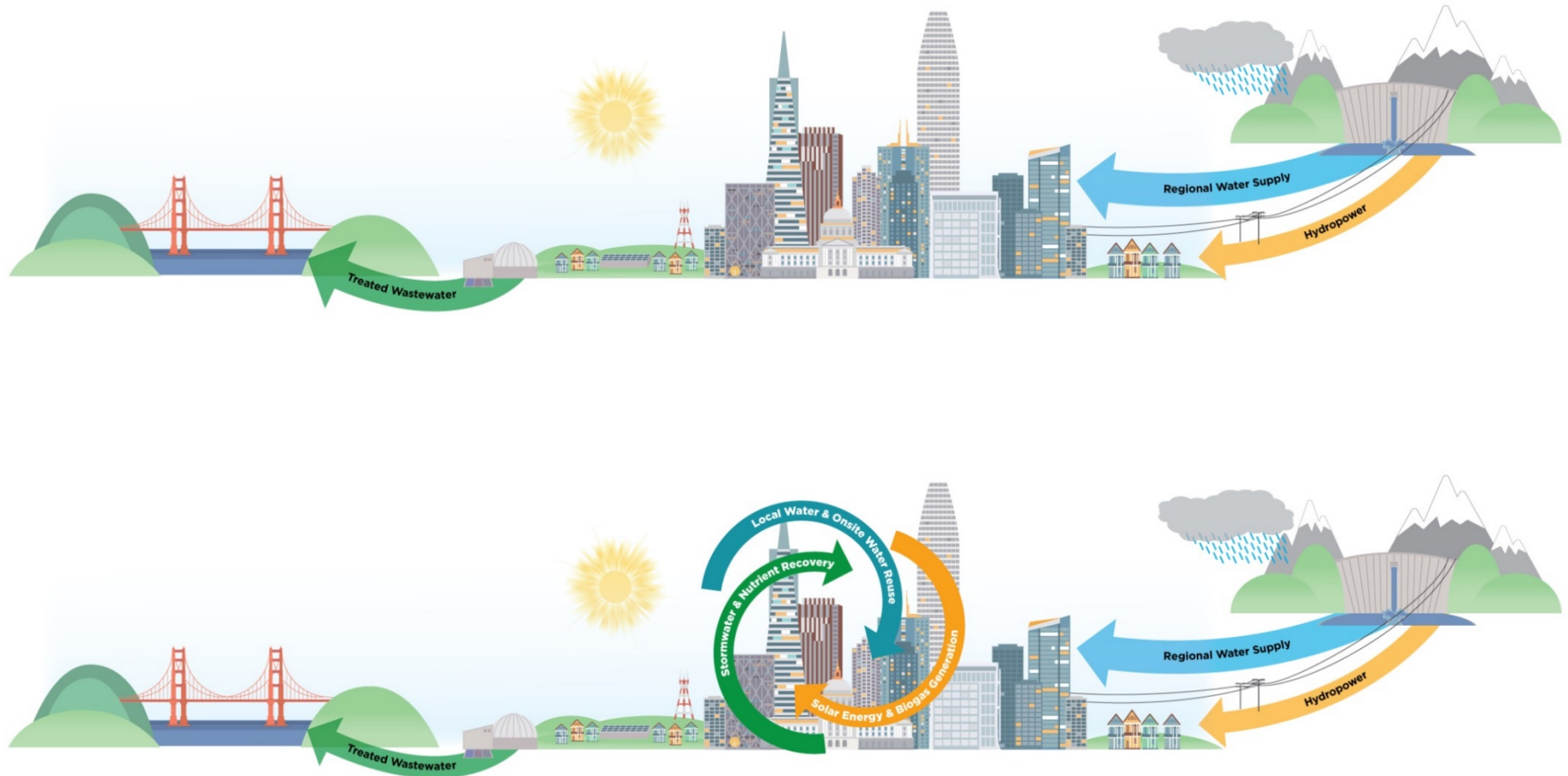
Wastewater: protecting public health and the environment



Power: generating clean energy for vital City and residential services



# OneWaterSF Transition from Linear to Circular





# San Francisco's Local Water Program

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## HETCH HETCHY + LOCAL WATER

**Better together.**

Conservation

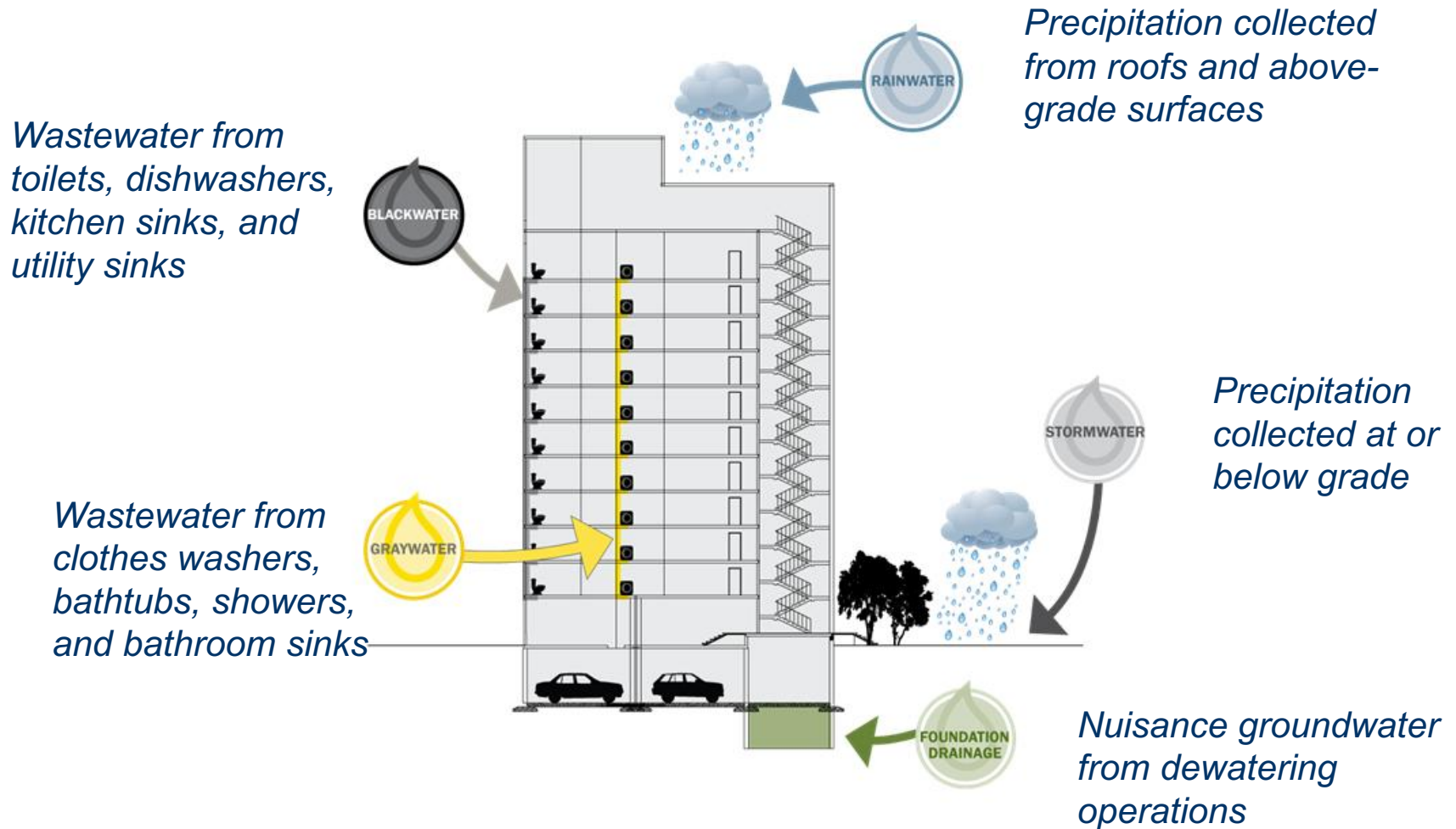
Groundwater

Recycled Water

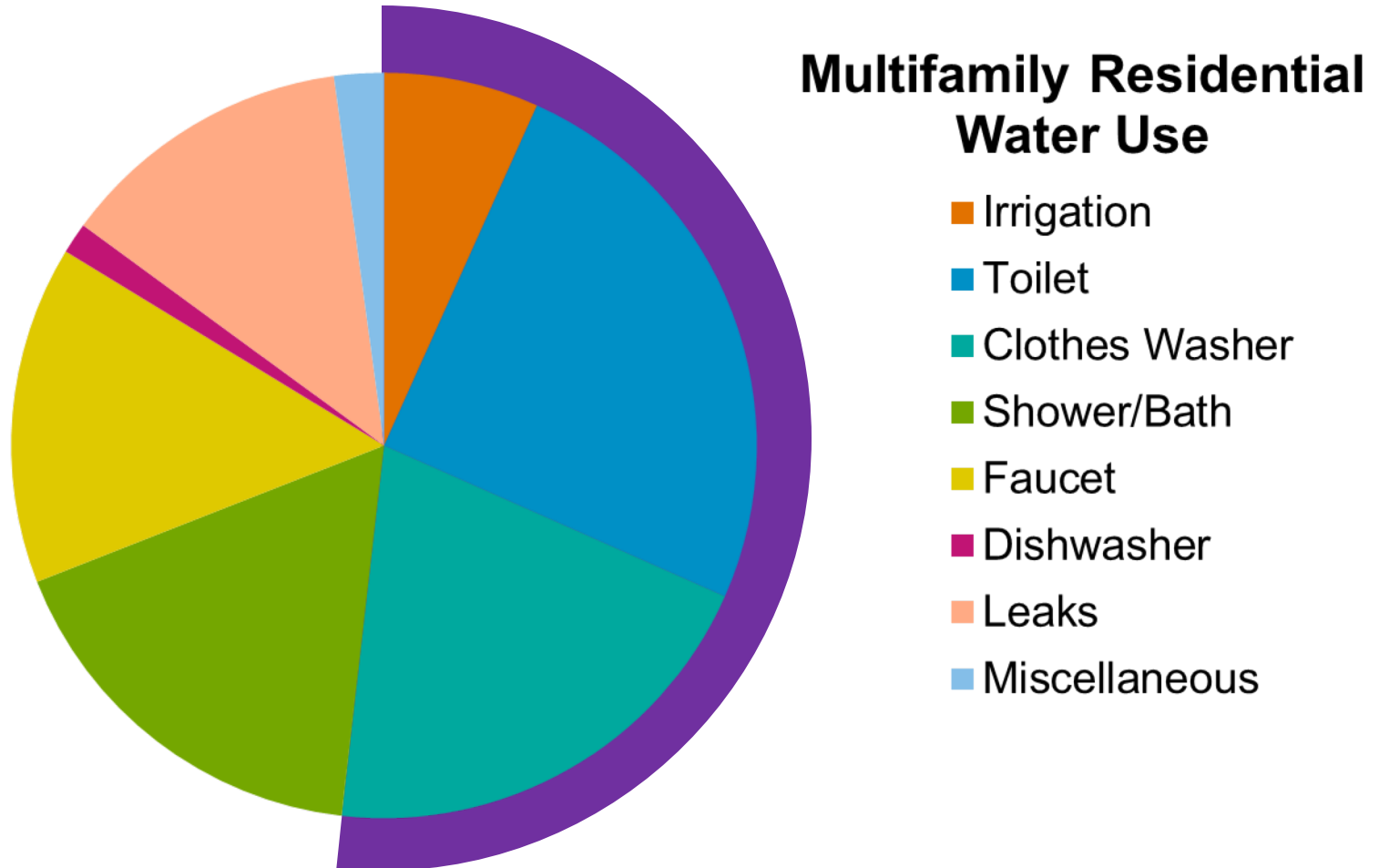
Onsite Water Recycling



# Buildings Produce Alternate Water Sources



# Up to 50% of Demands are Non-potable in Multi-family Residential Buildings



Source: adapted from Alliance for Water Efficiency



# Up to 95% of Demands are Non-potable in Commercial Buildings



## Office Water Use

- Sanitary
- Cooling Tower Make-up
- Irrigation
- Single-Pass Cooling
- Kitchen
- Miscellaneous

## Rainwater Harvesting System

- 25,000 gallon cistern
- Reuse for irrigation

## Wetland Treatment System

- Collects and treats building's wastewater
- Reuse for toilet flushing
- 5,000 gpd capacity
- 60% potable water offset





# Developers Interested in Collecting & Treating Water Onsite



# Regulatory Oversight for Onsite Water Systems

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- Who should set water quality standards?
- Who should issue permits and provide operational oversight?
- What type of on-going monitoring and reporting should be implemented?





- Graywater and Rainwater Uses & Water Quality Standards
- Provides Construction Requirements
- Includes Purple Pipe and Signage Requirements
- No Oversight and Management





# San Francisco Ordinance & Roles and Responsibilities

SFPUC	SFDPH-EH	SFDBI	SFPW
Program Administration and Cross-Connection Control	Public Health	Construction	Right of Way and Mapping
<p>Review onsite non-potable water supplies &amp; demands</p> <p>Administer citywide project tracking &amp; annual potable offset achieved</p> <p>Provide technical support &amp; outreach to developers</p> <p>Manages Cross-Connection Control Program</p>	<p>Issue water quality &amp; monitoring requirements</p> <p>Review and approve non-potable engineering report</p> <p>Issue permit to operate onsite systems</p> <p>Review water quality reporting</p>	<p>Conduct Plumbing Plan check and issue Plumbing Permit</p> <p>Inspect and approve system installations</p>	<p>Issue Encroachment Permits as needed for infrastructure in the Right-of-Way (if needed)</p> <p>Includes condition on a subdivision map or a parcel map requiring compliance with the Non-potable Ordinance prior to approval and issuance of said map (if applicable)</p>

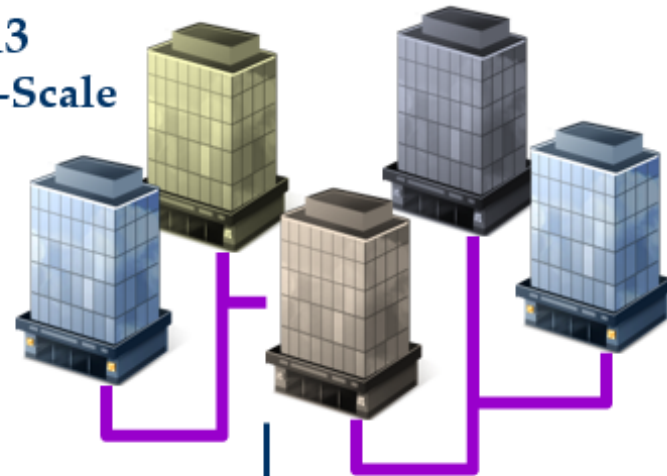
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# An Evolving Non-potable Water Program

**2012**  
**Single Building**



**2013**  
**District-Scale**



**2015**

**Mandatory for projects  $\geq 250,000$  sf**





# 181 Fremont

## Graywater and rainwater for toilet flushing and irrigation



# Salesforce Tower

## Blackwater for flushing, cooling and irrigation





# Chase Center

Rainwater, stormwater, graywater and condensate for  
flushing and irrigation





# Moscone Convention Center

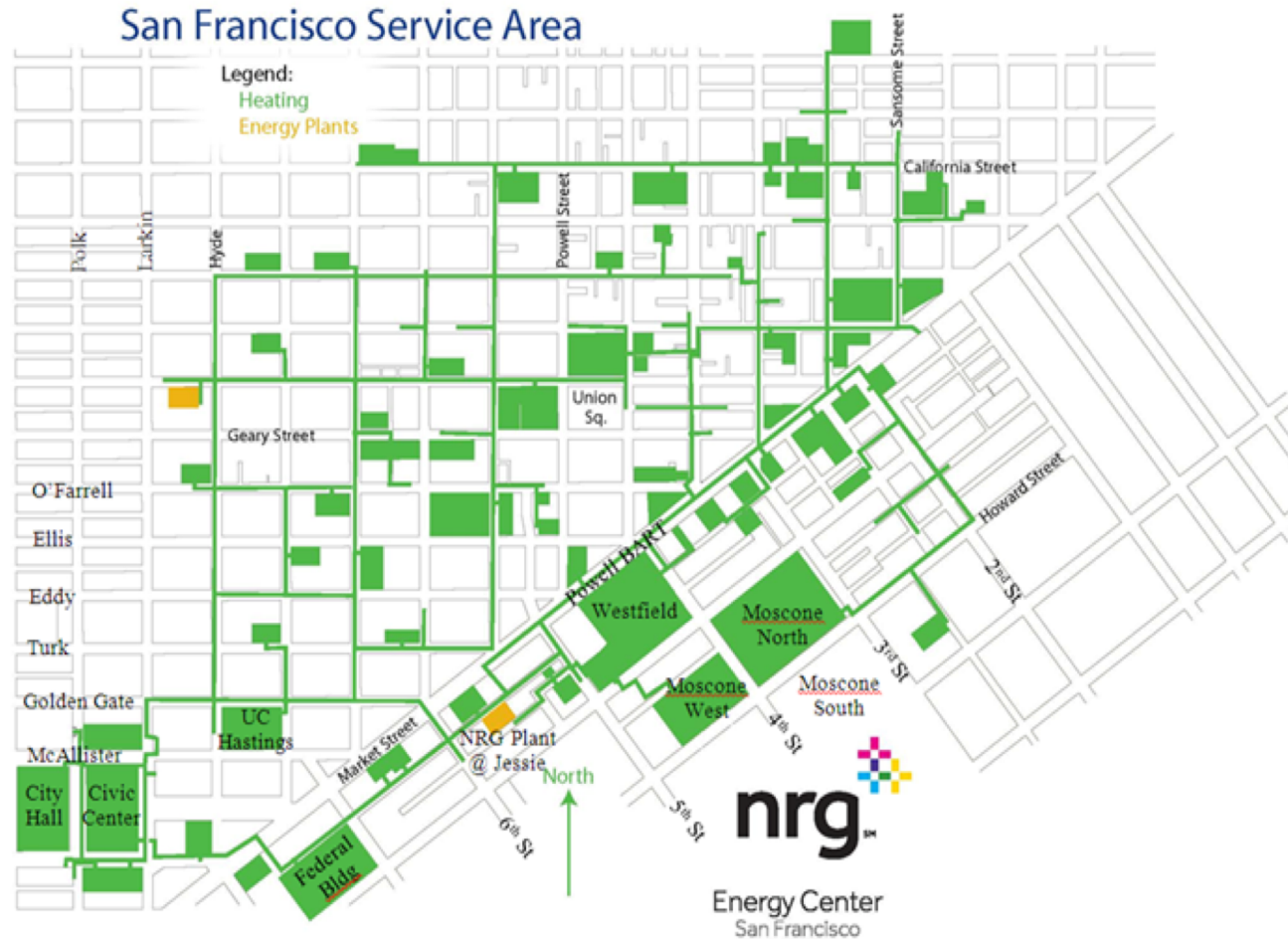
Foundation Drainage for flushing, irrigation, and street sweeping





# NRG-BART Project

## Foundation Drainage for underground steam loop



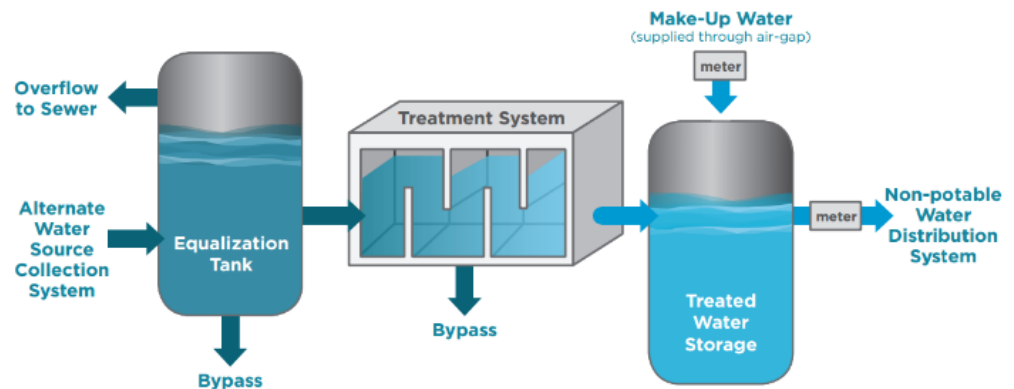
# Key Utility Considerations

- Water and sewer connections
- Wastewater flows and odors
- Revenue impacts
- Capacity charge adjustments
- Enforcement
- Cultural shift



# Key Program Considerations

- Backflow protection requirements
- Cross-connection test prior to operation
- Interagency collaboration
- Operator capacity
- Policy synergies



# Expanding Non-potable Water Program

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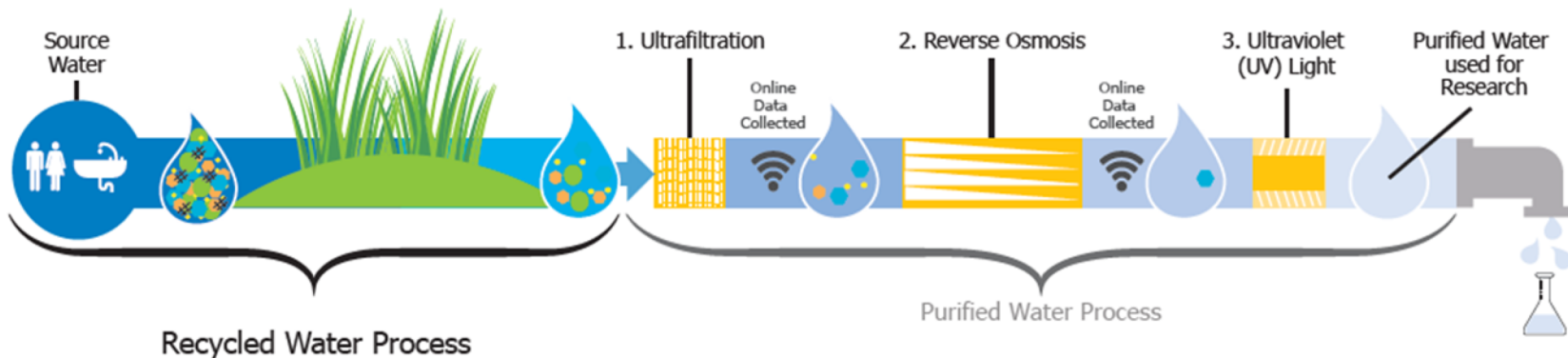
- Expanding focus to include brewery process water onsite treatment and reuse
- Developed chemical and pathogen strategy to protect public health
- Contact and non-contact uses
- Grant opportunities



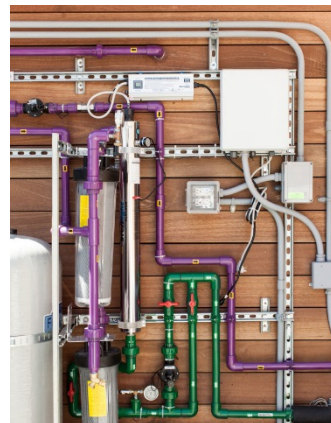


# Piloting Purified Water Project

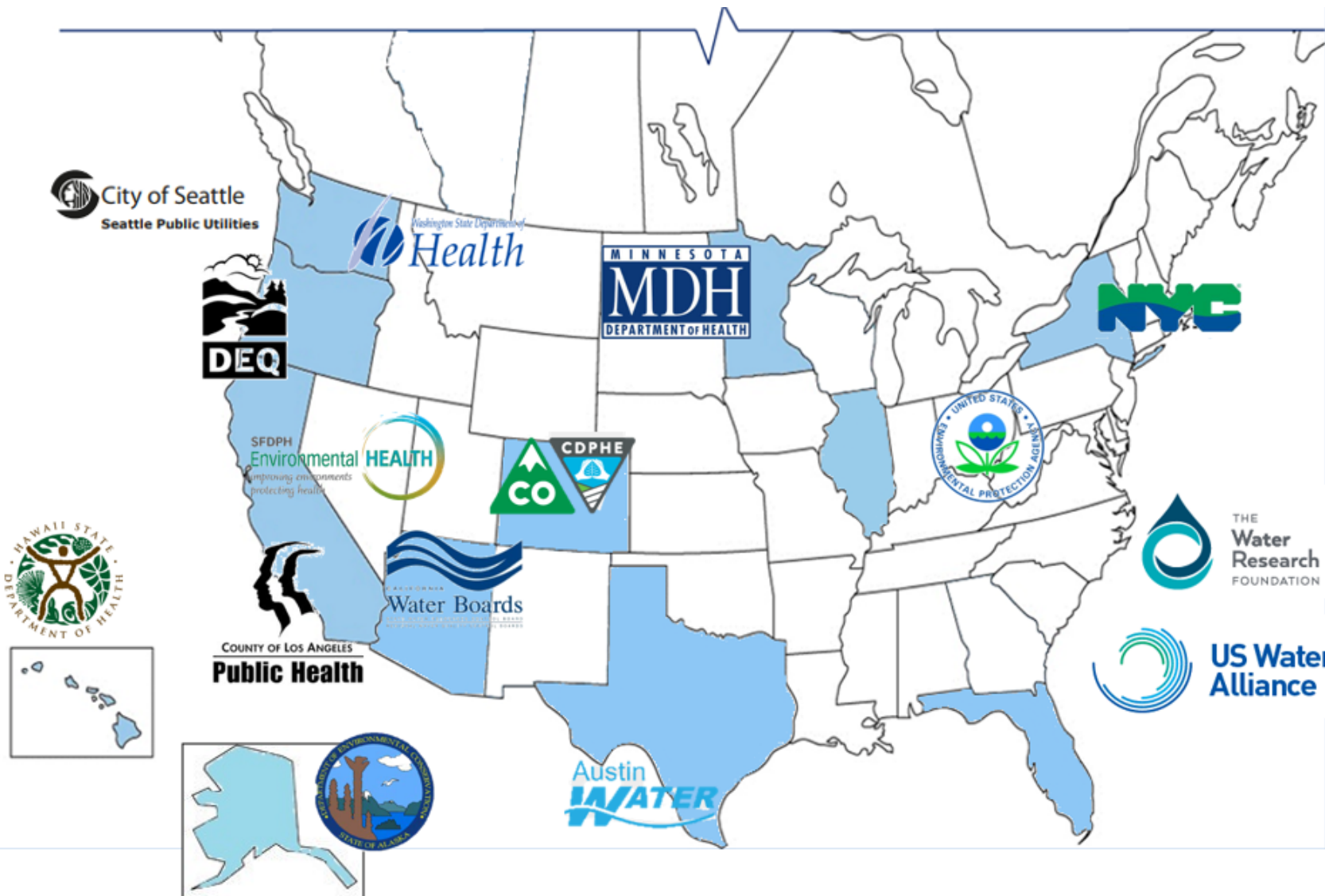
- Produce purified water from recycled water at SFPUC headquarters
- Research project including additional treatment and real time monitoring
- Community outreach and public education



- Rainwater harvesting for potable purposes
- Atmospheric water generation
- Follow Alaska's lead on graywater



# National Blue Ribbon Commission for Onsite Non-potable Water Systems



# Solaire & Verdesian – Battery Park, NYC

## 45% Reduction in Potable Water





# Hassalo on Eighth – Portland, OR

## 45,000 GPD



# **WATERHUB, Emory University- Atlanta, GA**

## **40% Reduction in Potable Water**





# 1 Bligh Street- Sydney, Australia 6M GPY Potable Water Offset



# Dockside Green – Victoria, Canada

## 65% Reduction in Potable Water





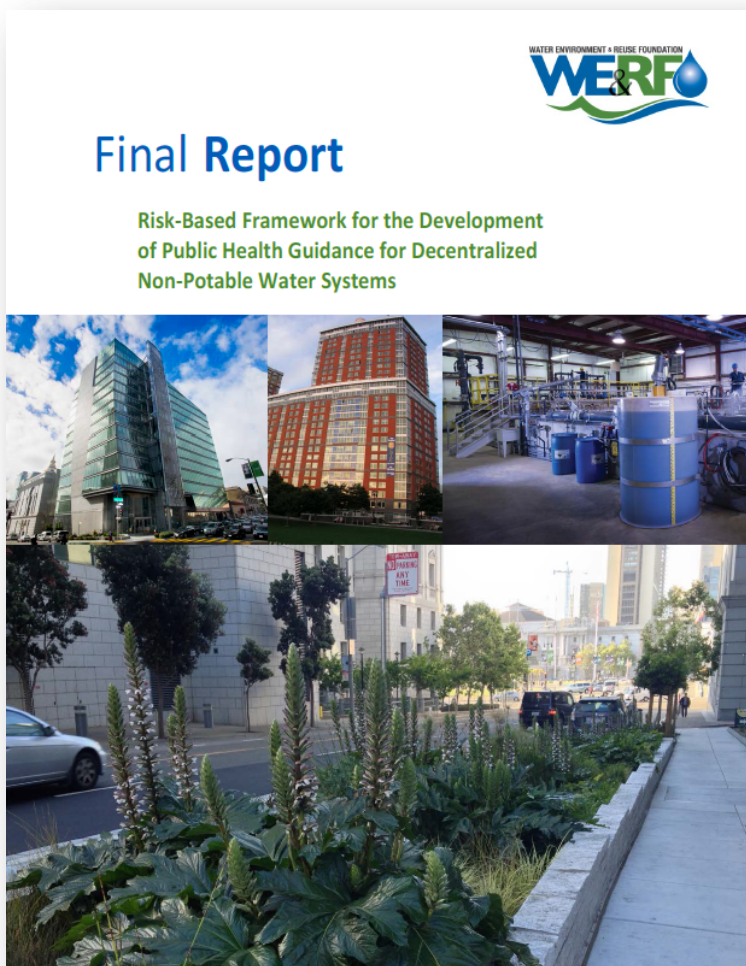
- Oversight and management programs are needed on the local level; and
- Utilities and public health departments are looking for guidance on appropriate water quality standards to govern onsite water reuse.

## Innovation in Urban Water Systems

*San Francisco • May 2014*



# New Technical Guidance for Onsite Water Systems



- Report provides utilities and health departments **guidance on appropriate water quality standards**
- Current standards are **not health risk based**
- Risk-based pathogen **Log Reduction Targets (LRTs)** reduce exposure to potential health risks associated with potential exposure to **viruses, protozoa, and bacteria**
- LRT methodology already widely used in potable reuse and drinking water

# Multiple Barrier Approach

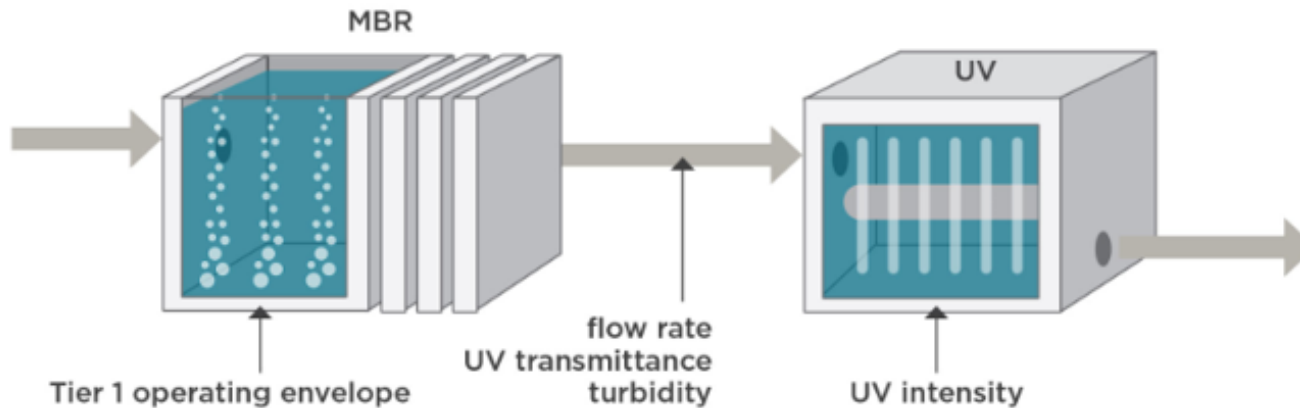
Combine common treatment processes into a multiple barrier **treatment train**

- Microfiltration (MF) / Ultrafiltration (UF)
- Membrane biological reactor (MBR)
- Ultraviolet light (UV) disinfection
- Chlorine and Ozone disinfection



A properly designed treatment train can be used to achieve **pathogen reduction credits** based on accepted **crediting frameworks**.

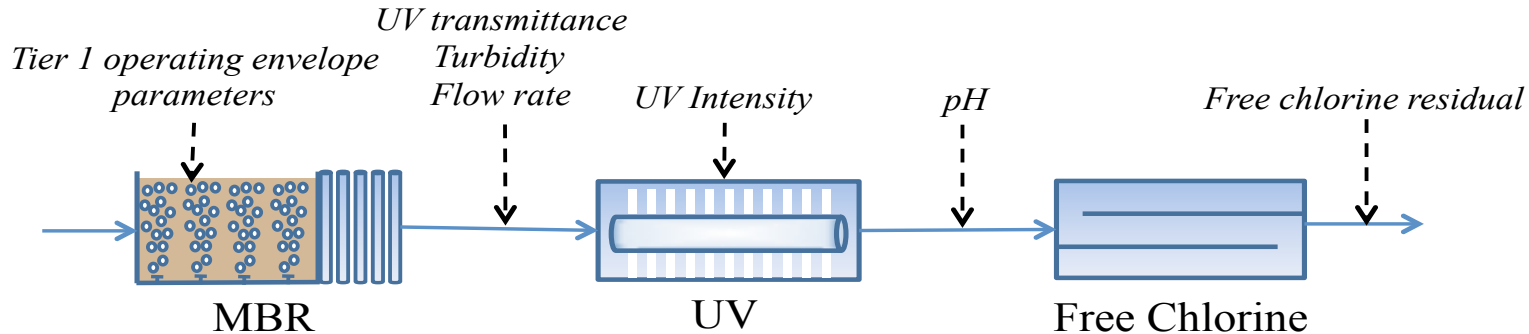
# Example Graywater Treatment Train



			Total	Required
Virus Credit	1.5	6	7.5	6
Protozoa Credit	2	6	8	4.5
Bacteria Credit	4	6	10	3.5

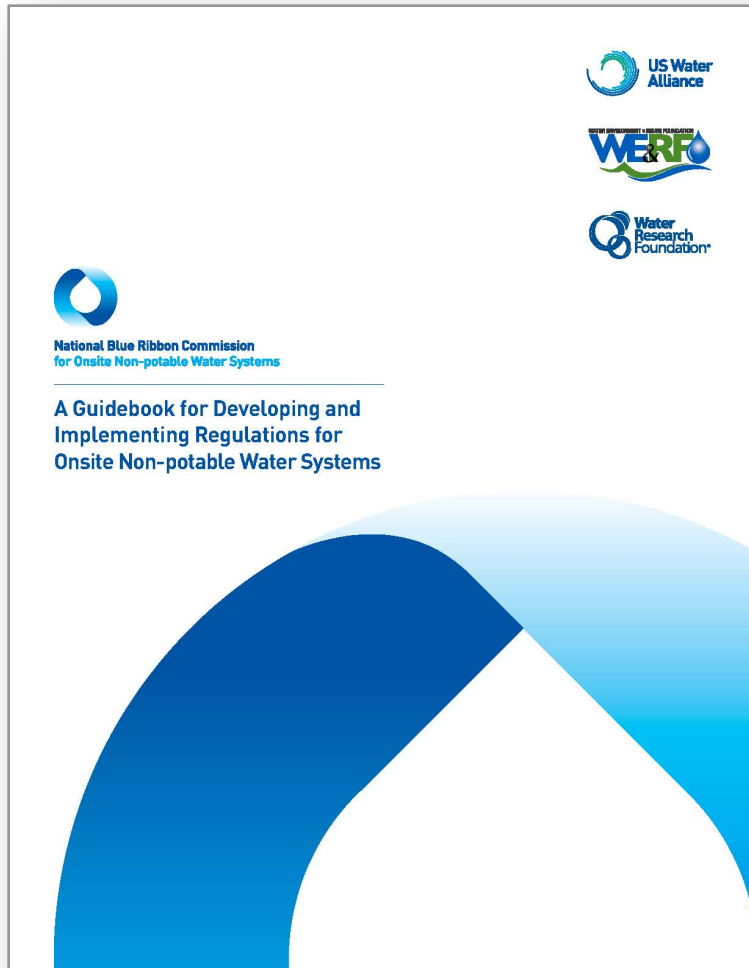


# Example Blackwater Treatment Train



				Total	Required
Virus Credit	1.5	3.5	5	10	8.5
Protozoa Credit	2	6	0	8	7
Bacteria Credit	4	3.5	0	7.5	6

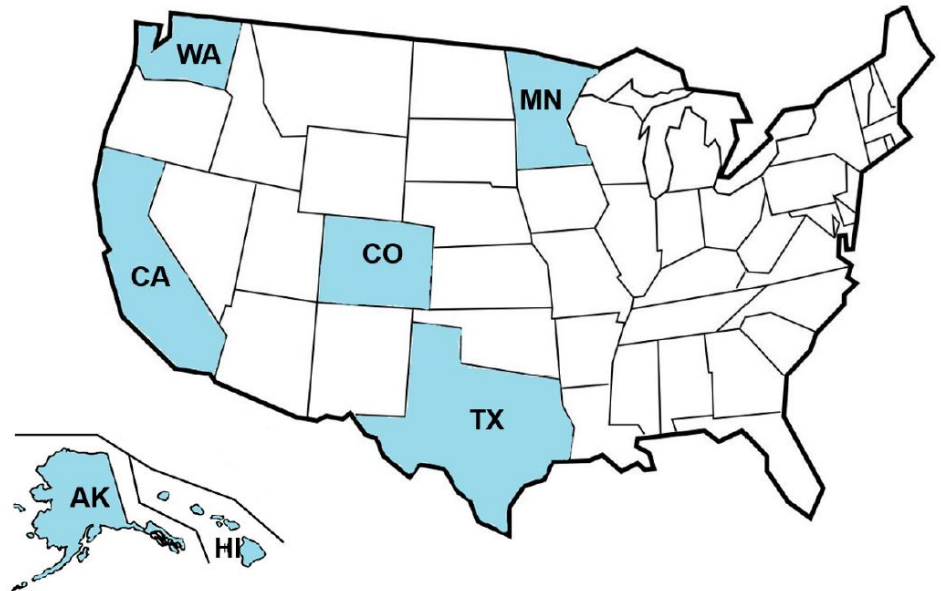
# Guidebook for Developing and Implementing Policies for ONWS



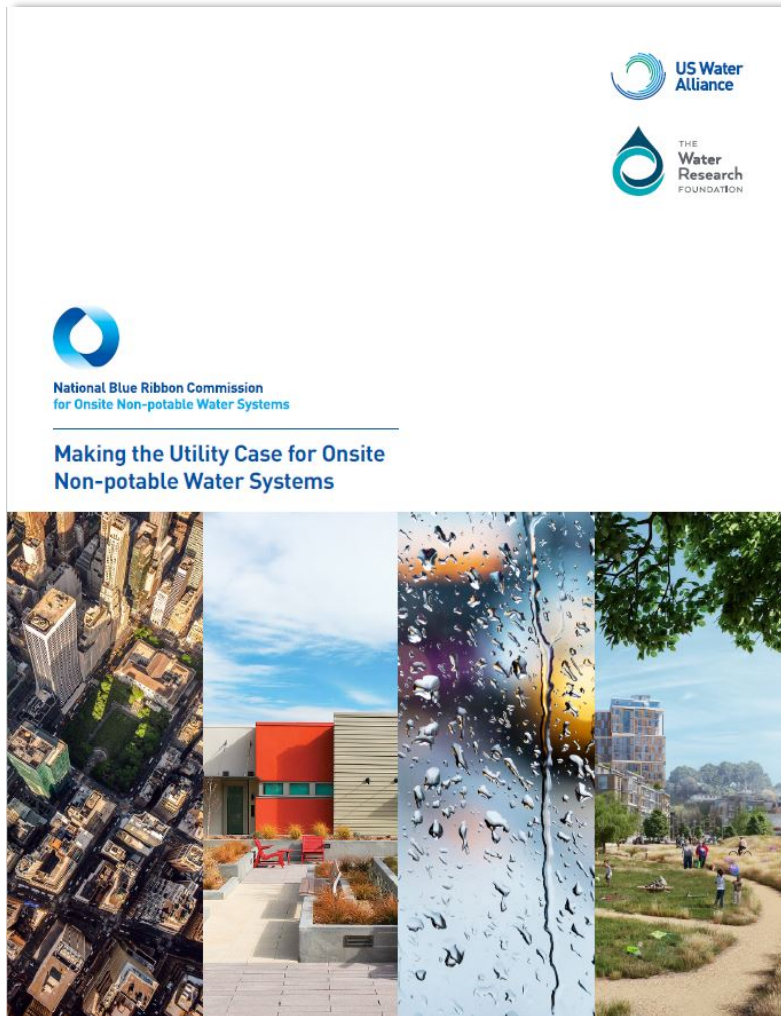
- Guidebook includes:
  - Model State Regulation
  - Model Local Ordinance
  - Program Rules to be implemented with state reg or local ordinance
- Intended to create nationally consistent treatment standards and management approaches

# Jurisdictions Moving Forward with Risk-Based Approach

- San Francisco
- California, SB 966
- Colorado, Regulation #84
- Minnesota
- Oregon, Washington and Hawaii
- Texas



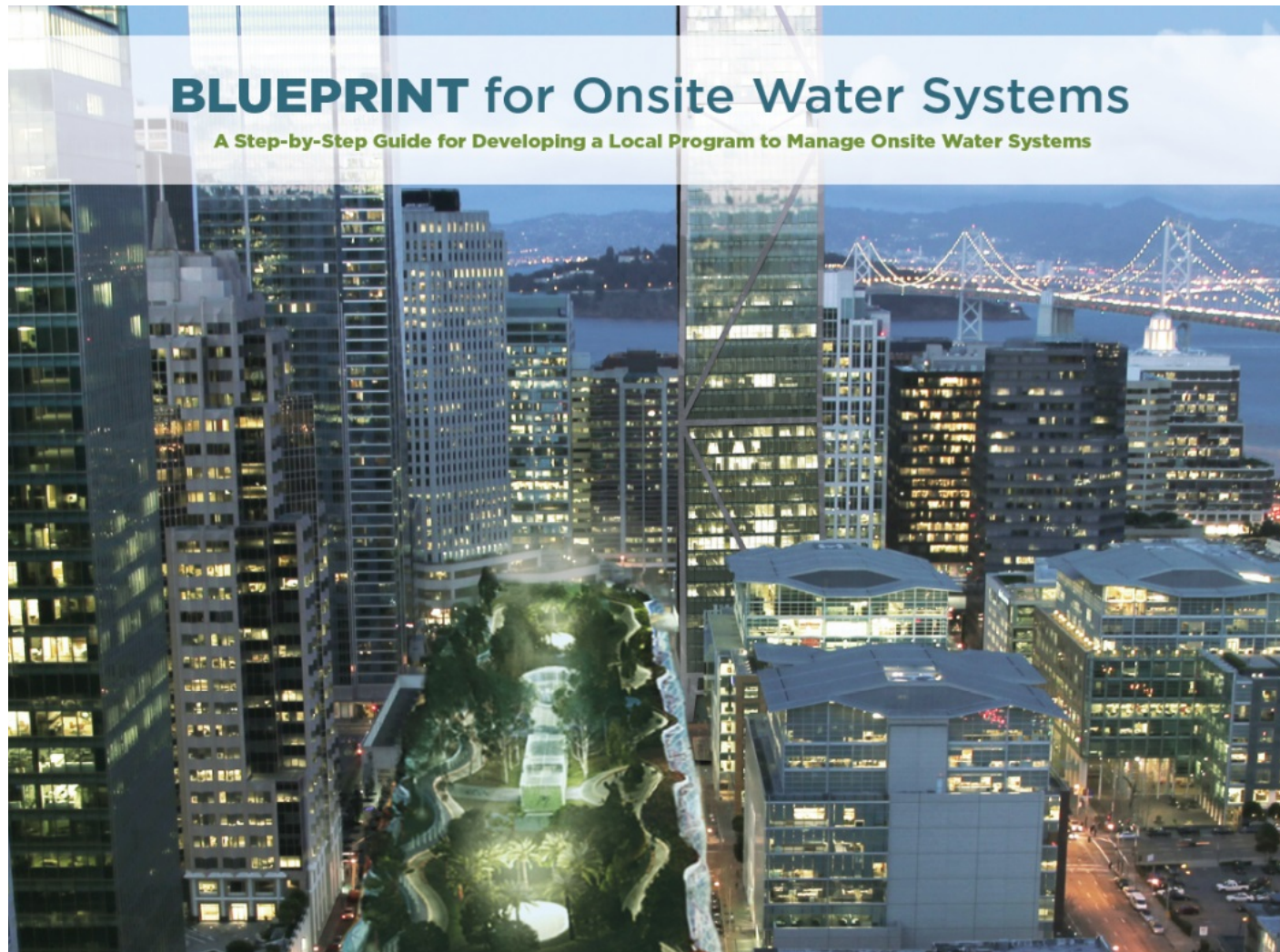
# Making the Utility Case for ONWS



- Benefits and Drivers Behind Onsite Non-potable Reuse
- How Utilities Addressed Potential Challenges
- Best Practices for Ongoing Operation of Onsite Non-potable Water Systems



# Developing Oversight and Management Programs



# Developing Oversight and Management Programs

Developing a local program to manage onsite water systems offers a proactive way to increase water resiliency and promote green building practices while protecting public health. The development of a program should follow a sequence of steps and associated actions, which will inform critical decisions regarding the scope, structure, and implementation of the program.

- 1 Convene a Working Group**  
Establish a small working group to guide the development of the local program.
- 2 Select the Types of Alternate Water Sources**  
Narrow the specific types of alternate water sources covered in the program.
- 3 Identify End Uses**  
Classify specific non-potable end uses for your program.
- 4 Establish Water Quality Standards**  
Establish water quality standards for each alternate water source and/or end use.
- 5 Identify and Supplement Local Building Practices**  
Integrate your program into local construction requirements and building permit processes.
- 6 Establish Monitoring and Reporting Requirements**  
Establish water quality monitoring and reporting requirements for ongoing operations.
- 7 Prepare an Operating Permit Process**  
Establish the permit process for initial and ongoing operations for onsite water systems.
- 8 Implement Guidelines and the Program**  
Publicize the program to provide clear direction for project sponsors and developers.
- 9 Evaluate the Program**  
Promote best practices for onsite water systems.
- 10 Grow the Program**  
Explore opportunities to expand and encourage onsite water systems.

1. Research and understand existing codes and regulations
2. Form a stakeholder advisory committee
3. Engage with local and state regulators (public health, utilities, building department)
4. Formalize roles and responsibilities
5. Adopt local ordinance or state regulation for permitting and oversight of onsite water systems



# Training Manual for Engineers, Operators, Utilities and Regulators

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DESIGN ENGINEER



REGULATOR



OPERATOR



UTILITY

- Developing a guidance manual and training materials to identify the skills and knowledge required to design and permit treatment systems that meet the risk-based water quality standards
- Estimated completion early 2019



National Blue Ribbon  
Commission  
for Onsite Non-potable  
Water Systems

- Operator Certificate/Certification Program
- Continue research and data for alternate water sources



**THANK YOU**  
**[sfwater.org/np](https://sfwater.org/np)**

