WATER FORWARD & ALTERNATIVE WATER ORDINANCES

Austin Water Staff: Robert Stefani and Katherine Jashinski, P.E.

OUTLINE

1. INTRO TO WATER FORWARD PLAN & IMPLEMENTATION
2. NATIONAL BLUE RIBBON COMMISSION FRAMEWORK FOR IMPLEMENTING ONSITE NON-POTABLE WATER SYSTEMS
3. APPLYING THE NATIONAL BLUE RIBBON COMMISSION FRAMEWORK IN AUSTIN
4. ALTERNATIVE WATER ORDINANCE DEVELOPMENT APPROACH
5. QUESTIONS

AUSTIN WATER'S DECENTRALIZED REUSE TECHNICAL TEAM

Robert Stefani, Environmental Program Coordinator

- B.S. in geography from Texas State University, specializing in Resource & Environmental Science
- Over 10 years experience working on auxiliary water and intergovernmental issues
- Member of the 2012 City of Austin Graywater Working Group
- Member of the National Blue Ribbon Commission for On-site Non-potable Water Systems since 2015

Katherine Jashinski, P.E., Engineer C

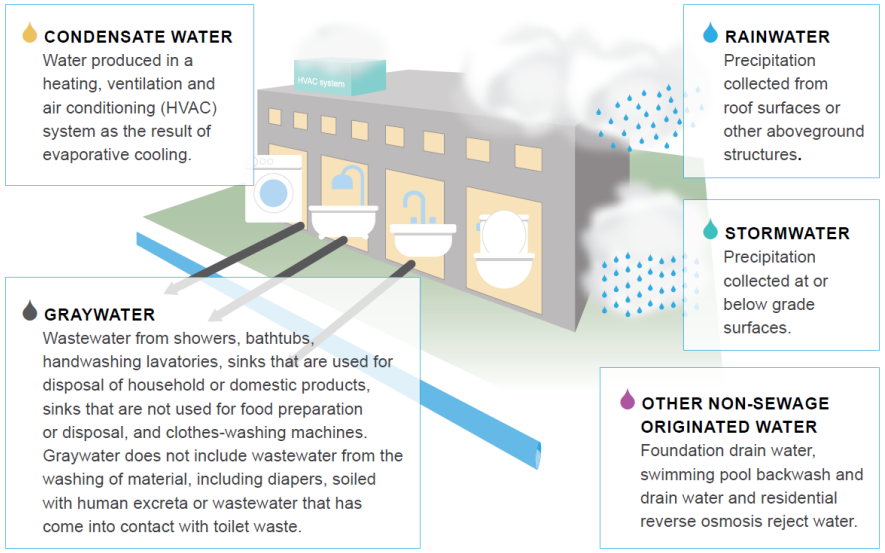
- B.S. & M.S. in engineering from UT Austin, specializing in Environmental & Water Resources
- 5 years experience as an on-site sewage facility program regulator
- 4 years experience with disaggregated demand modeling & decentralized reuse planning
- Design & installation experience of residential rainwater, graywater, & condensate systems
- Project manager for the PDC blackwater reuse system

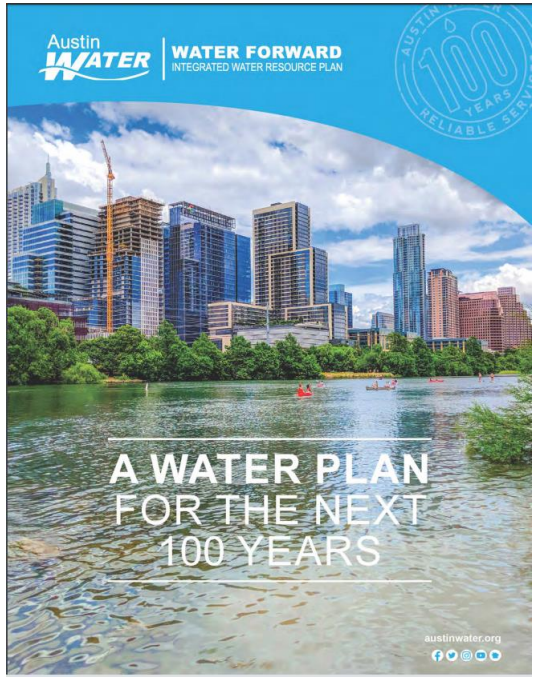
INNOVATIVE WATER STRATEGIES COMMITTEE

Purpose Statement:
Austin Water's Innovative Water Strategies (IWS) Steering Committee was created to develop a guiding process and framework for the evaluation and implementation of innovative decentralized water and wastewater systems.

The Committee is charged with (among other things):

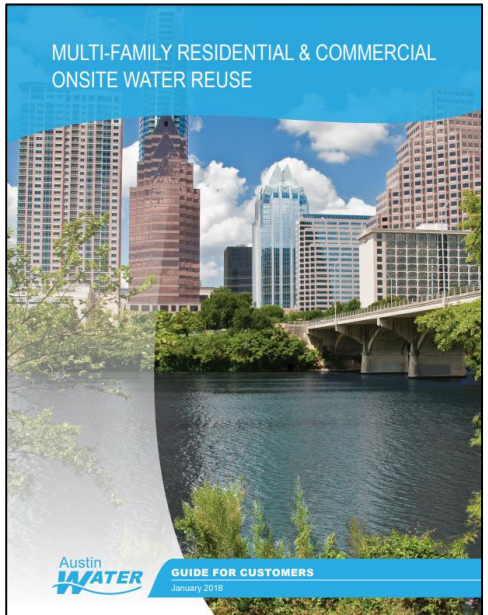
- **Integrating with AW's concurrent integrated water resources planning process, Water Forward**





IWS COMMITTEE HIGHLIGHTS & ACCOMPLISHMENTS

- ✓ Published webpage and Onsite Water Reuse System guides
- ✓ Initiated Planning and Development Center Onsite Water Reclamation Facility: building-scale blackwater reuse pilot (Anticipated May 2020)
- ✓ Dedicated staff resources to meet with developers & review projects for decentralized reuse opportunities
- ✓ Education and outreach to local professional organizations & at events
- ✓ Applied for funding from WRF to study costs to dual plumb buildings in Austin (Anticipated Dec 2019)



Water Forward

Austin's Integrated Water Resource Plan

- Austin Water-led interdepartmental effort to develop a 100 year water plan that:
  - Reflects our community's values
  - Ensures a diversified, sustainable, and resilient water future
  - Places strong emphasis on conservation
- Council-appointed Task Force met monthly
- Plan approved by Council in November 2018, with planned updates on a five year cycle

Water Forward Plan Strategies

Demand Management

Implement Advanced Metering Infrastructure (AMI)

Enhance distribution system water loss control

Provide customer water use benchmarking information and implement water budgets

Transform to regionally appropriate landscapes

Expand irrigation efficiency incentives

Water Supply

Store water for drought via Aquifer Storage and Recovery and a new Off Channel Reservoir

Bring on additional supplies via Brackish Groundwater Desalination

Expand the Centralized Reclaimed Water System

Use Indirect Potable Reuse as a deep drought strategy

Capture local inflows to Lady Bird Lake

Decentralized

Use on-site and neighborhood scale alternative water sources for non-potable end uses

Rainwater, Stormwater, Wastewater, Graywater, and AC Condensate

Direction from Council 5/2/19

"To ensure that the Land Development Codes and permitting process are streamlined to the greatest extent possible upon adoption of any revision to the Land Development Code, the regulatory requirements adopted as part of Water Forward, Austin's 100-year integrated water resource plan, that are related to the Land Development Code and are able to be accelerated and implemented this year should be codified and implemented as part of this comprehensive land development code revision process.

The staff should report back at least on the following areas if they were not able to accelerate and implement this year (especially as concerns commercial buildings larger than 250,000 square feet): water benchmarking, dual plumbing, landscape transformation, and alternative water."

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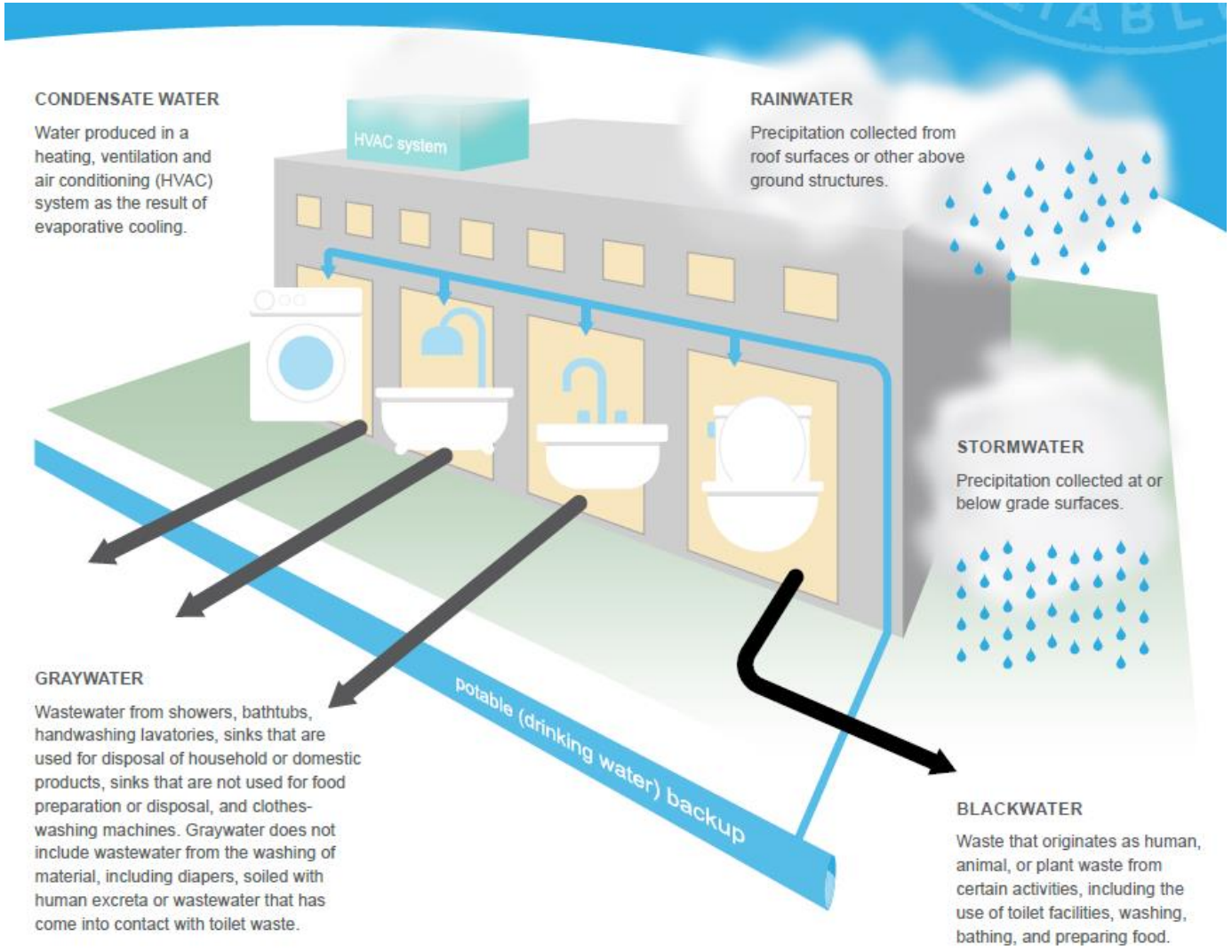
AUSTIN WATER AND THE BLUE RIBBON COMMISSION

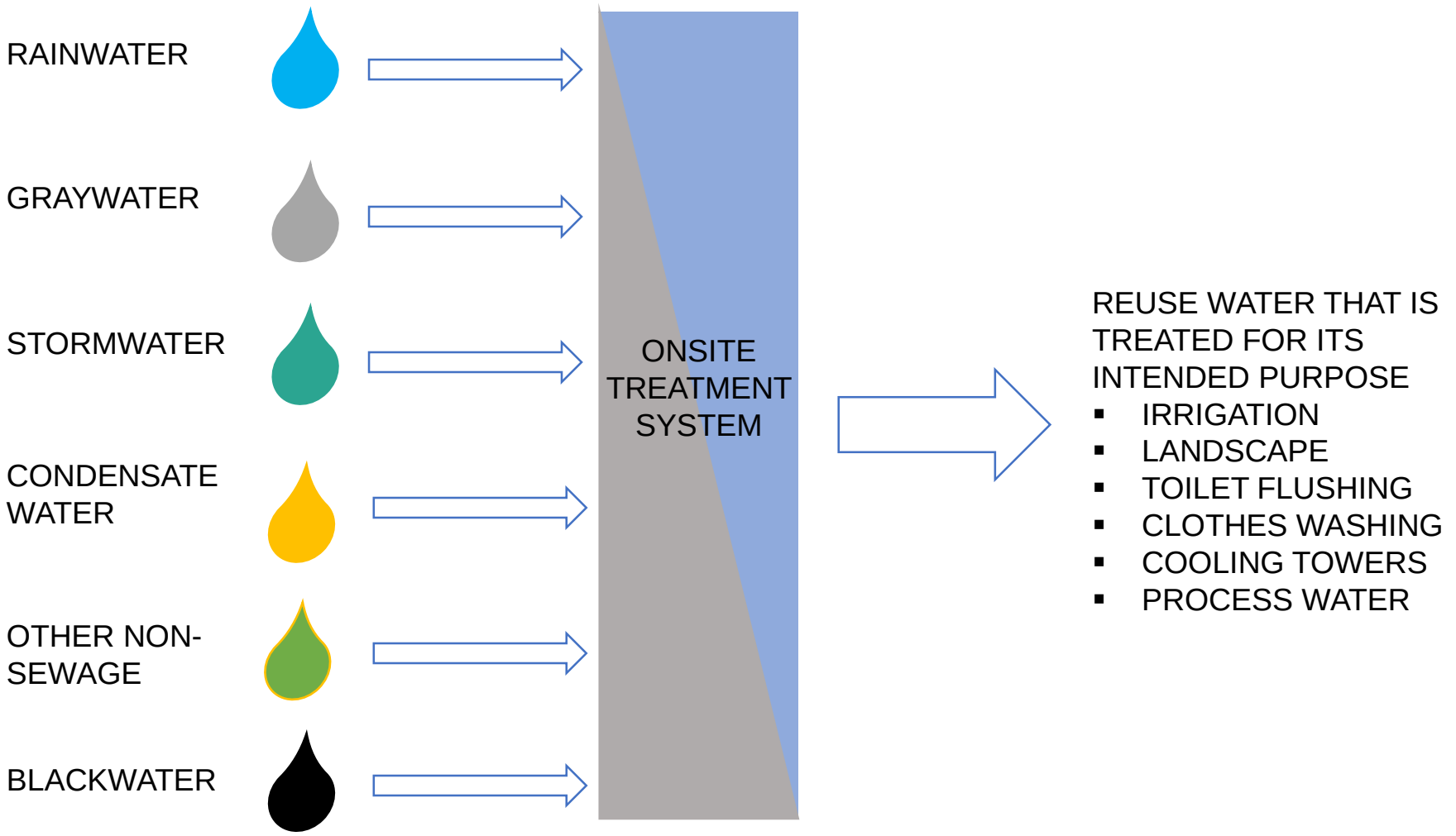
National Blue Ribbon Commission for Onsite Non-potable Water Systems

The National Blue Ribbon Commission advances best management practices to support the use of onsite non-potable water systems within individual buildings or at the local scale. We are committed to protecting public health and the environment, and sustainably managing water—now and for future generations.

DEFINITIONS: ALTERNATIVE WATER SOURCES



DEFINITIONS: ONSITE WATER REUSE SYSTEMS



REUSE WATER THAT IS TREATED FOR ITS INTENDED PURPOSE

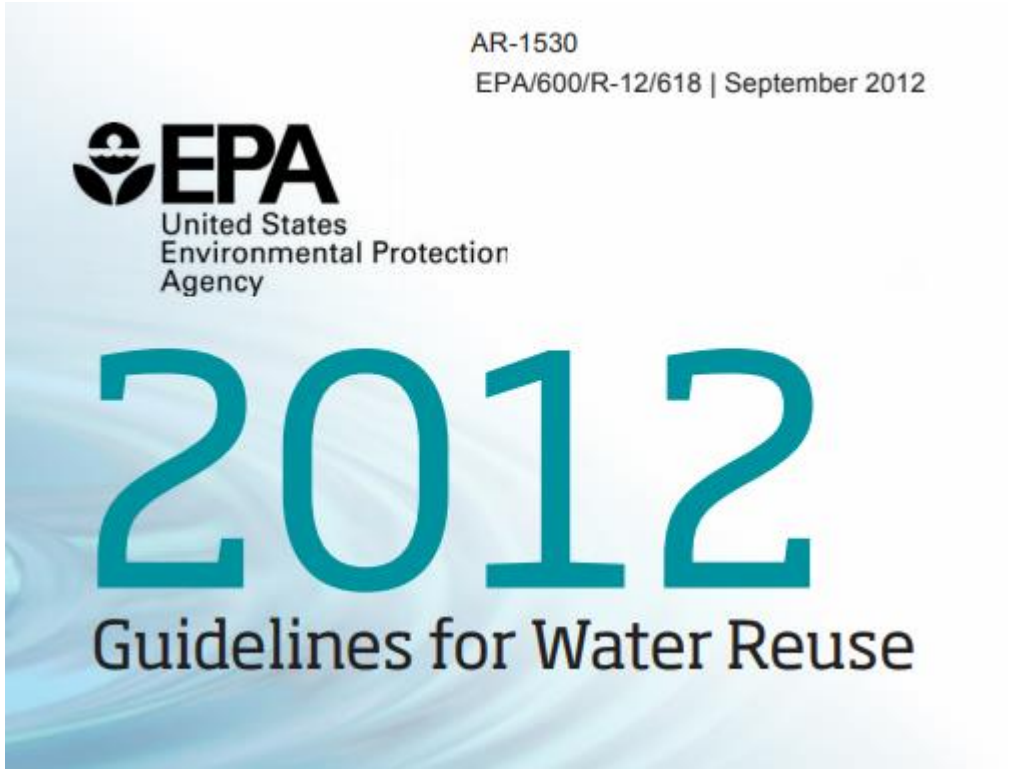
- IRRIGATION
- LANDSCAPE
- TOILET FLUSHING
- CLOTHES WASHING
- COOLING TOWERS
- PROCESS WATER

VARYING STANDARDS ACROSS THE U.S.

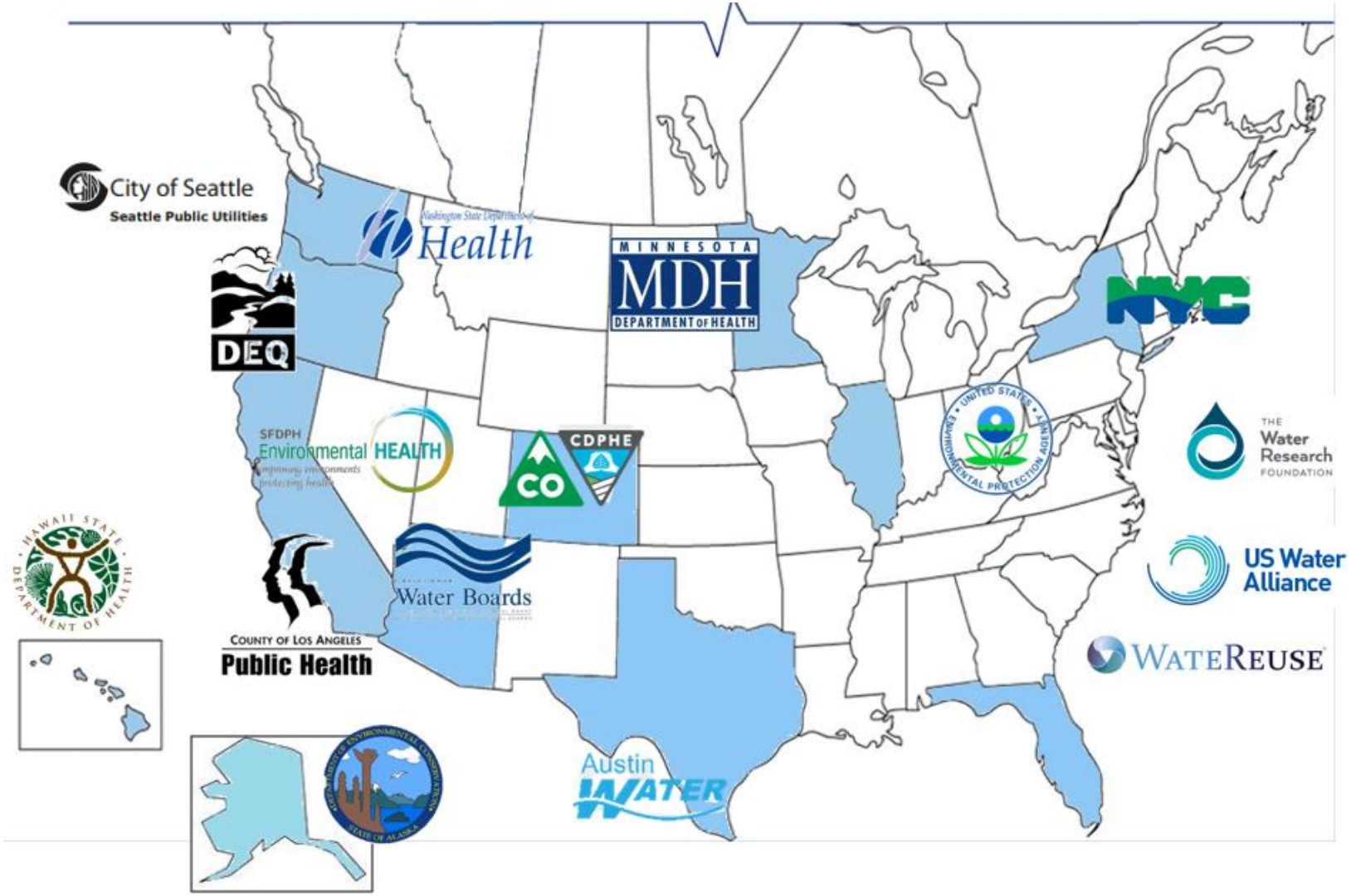
Graywater Use to Flush Toilets						
	BOD_5 ($mg\ L^{-1}$)	TSS ($mg\ L^{-1}$)	Turbidity (NTU)	Total Coliform (cfu/ 100ml)	*E. Coli* (cfu/ 100ml)	Disinfection
California	10	10	2	2.2	2.2	0.5 – 2.5 mg/L residual chlorine
New Mexico	30	30	-	-	200	-
Oregon	10	10	-	-	2.2	-
Georgia	-	-	10	500	100	-
Texas	-	-	-	-	20	-
Massachusetts	10	5	2	-	14	-
Wisconsin	200	5	-	-	-	0.1 – 4 $mg\ L^{-1}$ residual chlorine
Colorado	10	10	2	-	2.2	0.5 – 2.5 mg/L residual chlorine
Typical Graywater	80 - 380	54 -280	28-1340	$10^{7.2} – 10^{8.8}$	$10^{5.4} – 10^{7.2}$	N/A

LACKING GUIDANCE ON HOW TO MEET STANDARDS

NSF/ANSI 350 and 350-1: Onsite Water Reuse

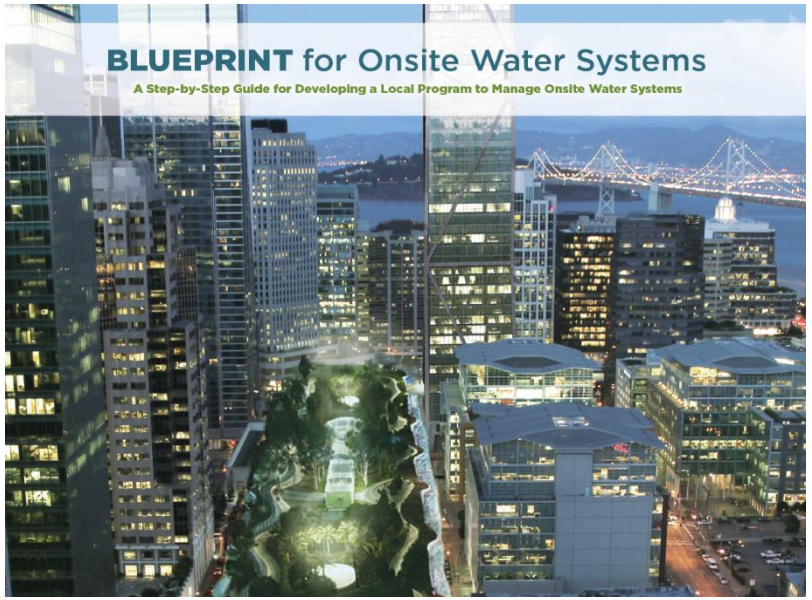


LEADERS IN ADVANCING INNOVATIVE WATER SOLUTIONS



NBRC FRAMEWORK FOR DEVELOPING A LOCAL PROGRAM

Blueprint for Onsite Systems: A Step-by-Step Guide for Developing a Local Program to Manage Onsite Water Systems (2014)

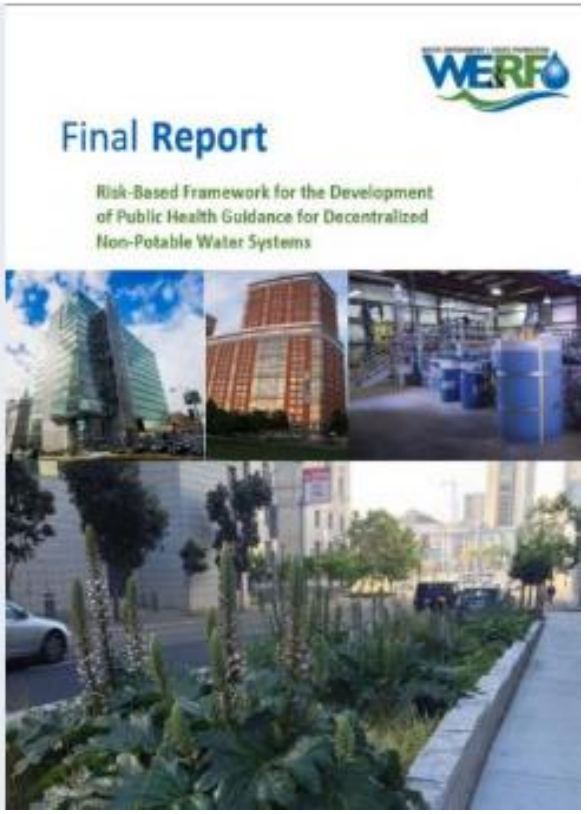


Having a consistent policy framework across cities and states is one of the best ways that we can integrate onsite systems in a way that protects public health and meets our water needs.

ESTABLISHED WATER QUALITY STANDARDS FOR ONSITE NON-POTABLE REUSE SYSTEMS

Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems

March 2017: This panel report provides a risk-based framework to develop public health guidance for decentralized non-potable water systems. More >



GUIDEBOOK, MODEL ORDINANCE, AND RULESET

A Guidebook for Developing and Implementing Regulations for Onsite Non-potable Water Systems (2017) To help develop water quality criteria and standards for ONWS and present pathways for implementation and management of these systems at the local and/or state level.

Model Local Ordinance for Onsite Non-Potable Water Programs (2017) Provides template local ordinance for establishing regulatory programs for ONWS. To be used with the Guidebook.

Model Program Rules for Onsite Non-potable Water Systems (2017) Provides specific details on implementation of an ONWS, including system design criteria, permitting, cross-connection control, reporting, notification, and enforcement. To be used with the Guidebook.

Guidance Manual for Engineers, Operators, Utilities and Regulators (Anticipated 2019) Provides recommendations for how to implement the NBRC's public health recommendations in an Onsite Non-potable Water Systems program.

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THE NBRC FRAMEWORK IS A PARADIGM SHIFT

CURRENT REGULATORY FRAMEWORK & WATER QUALITY STANDARDS FOR ON-SITE NON-POTABLE WATER SYSTEMS

WATER SOURCE	STATE REVIEW	LOCAL REVIEW	END USES	WATER QUALITY LIMITS	MONITORING
RAINWATER STORMWATER CONDENSATE WATER GRAYWATER OTHER NON-SEWAGE	NONE	BUILDING/PLUMBING DESIGN, CROSS-CONNECTION CONTROL	TOILET/URINAL FLUSHING CLOTHES WASHING COOLING MAKEUP IRRIGATION & LANDSCAPE	TOTAL SUSPENDED SOLIDS E. COLI	MONTHLY E. COLI TESTING WITHOUT REPORTING
BLACKWATER	TREATMENT SYSTEM DESIGN & SOLIDS DISPOSAL PLAN	BUILDING/PLUMBING DESIGN, CROSS-CONNECTION CONTROL	TOILET/URINAL FLUSHING CLOTHES WASHING COOLING MAKEUP IRRIGATION & LANDSCAPE	BOD TOTAL SUSPENDED SOLIDS ENTEROCCOCI & E. COLI TURBIDITY PH	TWICE PER WEEK TESTING WITH MONTHLY REPORTING TO TCEQ

NATIONAL BLUE RIBBON COMMISSION RISK-BASED FRAMEWORK FOR ON-SITE NON-POTABLE WATER SYSTEMS

WATER SOURCE	STATE REVIEW	LOCAL REVIEW	END USES	WATER QUALITY LIMITS	MONITORING
RAINWATER STORMWATER CONDENSATE WATER GRAYWATER OTHER NON-SEWAGE **BLACKWATER**	NONE **(EXCEPT TCEQ HAS REGULATORY AUTHORITY OVER BLACKWATER)**	**TREATMENT SYSTEM DESIGN,** BUILDING/PLUMBING DESIGN, CROSS-CONNECTION CONTROL	TOILET/URINAL FLUSHING CLOTHES WASHING COOLING MAKEUP IRRIGATION & LANDSCAPE	**LOG REDUCTION TARGETS:** **VIRUS** **PROTOZOA** **BACTERIA**	**CONTINUOUS MONITORING OF SURROGATE PARAMETERS WITH ANNUAL REPORTING TO CITY OF AUSTIN**

STEPS TO DEVELOP A LOCAL 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.

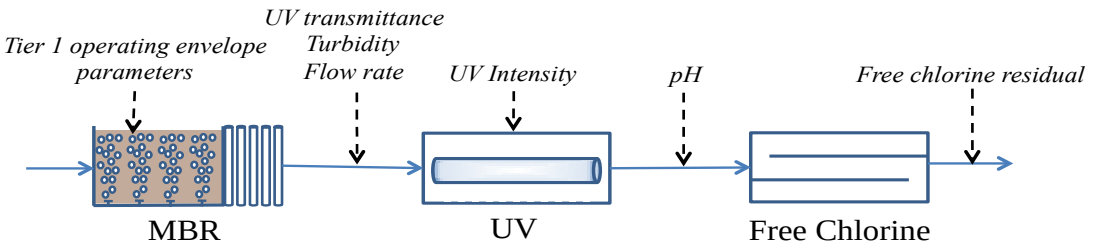
RISKS ASSOCIATED WITH PROGRAM IMPLEMENTATION

Examples of Risk-Based Considerations for Identifying the Management Category of the ONWS

Example	Number of Persons Exposed	Likelihood of Malfunction	Management Category and Considerations	Health Agency Role
Single-owner occupied system using roof runoff for irrigation	Small user base (<~20 pe/d[1])	Low—low pathogen content—simple process	Low Risk—Building owner serves as the Responsible Management Entity (RME) with full responsibility	Provides educational information to building owners and issues permit
Single-owner occupied system using graywater for toilet flushing and irrigation	Small user base (<~20 pe/d[1])	Moderate—equipment maintenance required	Low Risk—Building owner serves as RME with full responsibility	Requires manufacturer certification of equipment, operation and maintenance (O&M) manual and issues permit
Single-owner occupied system using roof runoff and treated wastewater for toilet flushing, laundry, and subsurface irrigation	Small user base (<~20 pe/d[1])	Considerable—complex equipment requires routine O&M by trained staff	Moderate Risk—Independent registered service agent provides O&M	Registers/licenses service agent, defines reporting of data and issues permit
Multi-user building with roof runoff system for irrigation	Moderate user base (20–100 pe/d[1])	Low—low pathogen content—simple process	Low Risk—Building owner or HOA serves as RME with full responsibility	Registers/licenses service agent, defines performance reporting and issues permit
Multi-user system using treated graywater for toilet flushing and irrigation	Large user base (100–1,000 pe/d[1])	Moderate—equipment and distribution system requires trained O&M staff oversight	High Risk—Qualified full service RME with financial security and routine reporting	Establishes RME qualifications, ensures financial guaranty, requires data reporting, and issues permit
District/multi-user system serving mixed uses, collecting roof runoff and treated wastewater sources for toilet flushing, laundry, cooling, and irrigation	Large user base (100–5,000 pe/d[1])	Significant—Complex process and distribution system requiring skilled O&M	High Risk—Qualified full service RME with financial security and routine reporting	Establishes RME qualifications, ensures financial guaranty, requires data reporting, and issues permit

THE NBRC FRAMEWORK ENSURES ONSITE TREATMENT SYSTEMS ARE ACHIEVING PUBLIC HEALTH GOALS

Unit Process	Pathogens: Virus	Pathogens: Protozoa	Pathogens: Bacteria	Water Quality: Particulates	Water Quality: Organics	Removal / Inactivation Mechanisms
Biological Treatment						
Non-membrane options						Biodegradation, adsorption, predation
MBR						Same as above plus size exclusion
Filtration						
Granular media filter						Physical removal (e.g., size exclusion, interception, diffusion)
Cartridge filter						
Membrane filter						Physical removal (e.g., size exclusion)
Reverse osmosis						
Disinfection						
UV						Physical degradation
Free chlorine						Chemical inactivation and oxidation
Chloramine						
Ozone						



ROLES & RESPONSIBILITIES MUST BE CLEARLY DEFINED

PROJECT TEAM	REGULATOR	DEVELOPMENT REVIEW
INITIAL PROJECT DEVELOPMENT		
• Prepare Project Application/Water Balance		
PRELIMINARY DESIGN		
• Preliminary design • Engineering Report (Preliminary)		
FINAL DESIGN, CONSTRUCTION AND INITIAL INSPECTIONS		
• 100% Design • Engineering Report (Final) • Operations & Maintenance Plan including Commissioning Plan • Construction • Cross-connection Inspection		
PROJECT STARTUP		
• Commissioning		
ON-GOING MONITORING AND REPORTING		
• On-going monitoring and reporting		

BUILDING A PROGRAM FROM SCRATCH REQUIRES INVOLVEMENT FROM MANY STAKEHOLDERS

Onsite Reuse System Professionals

The General Public/Users of Buildings

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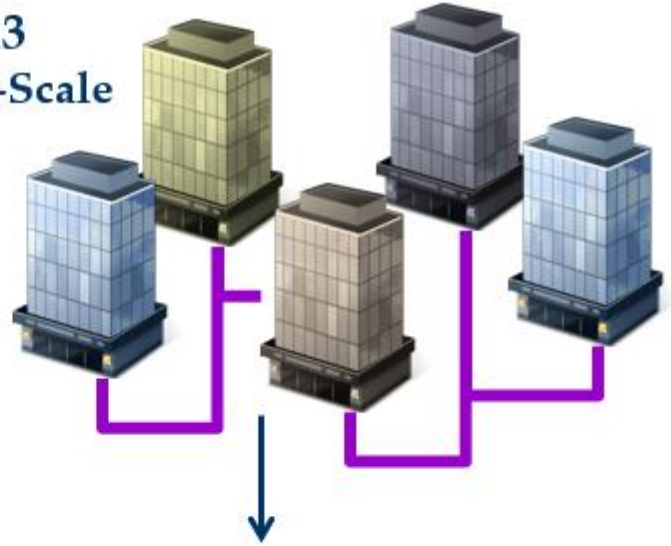
THE SFPUC ORDINANCE APPROACH

2012
Single Building

2013
District-Scale



2015
Mandatory for projects ≥ 250,000 sf

PUBLIC STAKEHOLDER MEETINGS

June 25th 2019
Alternative On-Site Water Use Workshop #1

Morning Focus: Case Studies in Alternative Onsite Water Systems

- Heard first-hand experiences with designing and building alternative onsite water systems

Afternoon Focus: Water Forward Ordinance Development Workshop

- Gave input to shape future City of Austin ordinance requirements regarding alternative water systems

July 23rd 2019
Alternative On-Site Water Use Workshop #2

Morning Focus: Testing Example Developments

- Walked through typical development projects seen in Austin to provide feedback on the proposed ordinance approach and requirements

Stakeholder Workshop #2 Feedback

Major Theme	Specific Feedback
1. Cost of Onsite Reuse Systems	• Is there/will there be a cost-benefit analysis for this mandate? • Consider public perception. At some point you're going to have to sell it to the public. • Show savings that offset permit costs.
2. Development Incentives to Incorporate Onsite Reuse	• Would like as many cross-credits as possible with other City mandates. • How do stormwater/water quality requirements interact with the future mandate? Can double-credit be given for water quality credits? • Will there be incentives relating to capital recovery fee/impact fee to encourage adoption? • Downtown density bonus is precedent-incentive-based menu of options.
3. Interdepartmental Coordination	• An Onsite Reuse System review adds extra complexity that will be difficult to navigate if not properly supported by city staff and coordinated between depts. • Dream would be to have 1 meeting upfront with all City departments that have sustainability goals in a single discussion and to get clear direction on building design requirements
4. Alternative Mandate Threshold	• 250K SF seems arbitrary, mandate should be based on usage (1M gal/yr). • Certain building typologies are better suited to produce demand savings. • Construction type or FAR could be triggers for single buildings (Type 1, stick frame) • Look at differing geographic requirements (downtown vs. edge of service area)

AUSTIN WATER ALTERNATIVE WATER ORDINANCES APPROACH

Fall 2019 | New PDC Opening | Incentive Phase | Mandatory Phase

WATER USE BENCHMARKING

Mandatory Water Balance Submittal Required

- New commercial and multi-family developments submit water balance with site plan
- >250,000 square feet developments meet with AW staff to discuss water balance results, water efficiency benchmarks, alternative water incentives and grant program

RECLAIMED WATER USE & DUAL PLUMBING

Expanded Reclaimed Water Use & Connection Requirements

- New commercial and multi-family developments >250,000 square feet must connect to reclaimed water system & dual plumb buildings if located within 500 feet of a reclaimed water main

ONSITE WATER REUSE SYSTEMS & DUAL PLUMBING

Program & Incentive Development	Program Implemented with Incentive	Mandate Implemented
• Establishes new rules/regulatory framework for Onsite Water Reuse Systems • Incentive program developed to incentivize systems under new rules	• All new Onsite Systems required to meet new rules & obtain permit from Austin Water • Incentives issued to large projects to incentivize program participation for non-mandated systems	• All new commercial and multi-family developments >250,000 square feet must incorporate Onsite Water Reuse & dual plumb buildings

Existing A/C Condensate Recovery Rules for Cooling Systems

- New facilities with 100 tons or more cooling capacity must offset at least 10% of make-up water with alternative water
- New facilities with 200 tons or more cooling capacity must reuse A/C condensate onsite

Time to develop the program prior to mandate:

- Cost data & affordability implications
- Benefits to developers (expedited permits, density bonuses, reduced water bills, etc.)
- Successful project implementation & continued use
- Establish system operator proficiencies

Next Steps

Date	Event
8/30	Draft LDC language due for Oct 4th release
9/3	Full Water Forward Task Force Meeting
10/04	Public release of draft LDC
10/7 – 10/11	Water Forward Task Force Ordinance Subcommittee Meeting
10/16 (tentative date)	Two 2-hour workshops to present staff code recommendations
10/2019 -11/2019	Water Forward Task Force, W/WW Commission RCA
12/2019	Potentially seek Council action

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Questions?

SPECIFIC GUIDANCE ON MEETING WATER QUALITY STANDARDS

Table 1

Log reduction targets for 10^{-4} per person per year benchmarks for ONWS using blackwater, graywater, or roof runoff

Water Use Scenario	Enteric Viruses	Parasitic Protozoa	Enteric Bacteria
Domestic Wastewater or Blackwater			
Unrestricted Irrigation	8.0	7.0	6.0
Indoor Use	8.5	7.0	6.0
Graywater			
Unrestricted Irrigation	5.5	4.5	3.5
Indoor Use	6.0	4.5	3.5
Roof runoff			
Unrestricted Irrigation	Not applicable[1]	No data[1]	3.5
Indoor Use	Not applicable[1]	No data[1]	3.5

Notes:

1. States and/or local regulators can define the LRTs for virus and protozoa for roof runoff systems using one of the following suggested options:
   - Assign LRT values based on stormwater LRTs
   - Conduct research on the presence of virus and protozoa in roof runoff and assign LRT values based on research

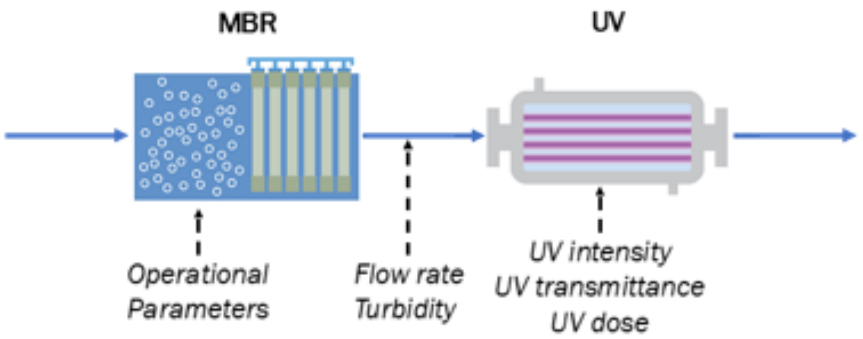
Source: Adapted from Sharvelle et al., 2017 (Table 3-3, page 26).

Table 3
Example Treatment Process Log_{10} Reduction Credits

Treatment Process	Log_{10} Reduction Credits Virus/Protozoa/Bacteria	Example Information to be Included in an Engineering Report
Microfiltration or Ultrafiltration	0/4/0	Manufacturer's informational sheet indicating ability to detect 0.3µm breach
Membrane Biological Reactor (MBR)	1.5/2/4	Operation with the Tier 1 operating envelope as defined in the AWRCE 2016, *Membrane bio-reactor*, WaterVal validation protocol[2]
Reverse Osmosis	Up to 2/2/2	Manufacturer's informational sheet indicating ability to reject sodium chloride. Allow pathogen removal credit with continuous monitoring of either electrical conductivity or total organic carbon
Ultraviolet (UV) Light Disinfection	Up to 6/6/6 (dose dependent)	UV reactor's Validation Report following state-approved procedures[3] or NSF/ANSI 55 Class A validated.
Chlorine Disinfection	Up to 5/0/5 (CT dependent)	Calculations demonstrating log inactivation using CT disinfection, where CT = Concentration of Chlorine x Contact Time
Ozone Disinfection	Up to 4/3/0 (CT dependent)	Calculations demonstrating log inactivation using CT disinfection, where CT = Concentration of Ozone x Contact Time

DESIGNING A MULTIPLE BARRIER TREATMENT SYSTEM

Graywater System for Toilet Flushing and Irrigation



Pathogen	Unit Process Pathogen Credits		Total Log Removal	LRT for Graywater
	MBR	UV		
Virus	1.5	6.0	7.5	6.0
Protozoa	2.0	6.0	8.0	4.5
Bacteria	4.0	6.0	10.0	3.5

Mixed Use Water Balance Calculator

Enter the site information for the project:

Project Information		Site Information		Building Information	
Project Name	Mixed-Use Ground Floor Retail	Net Site Area (Square Feet)	138,521	Roof Area/Footprint	108,540
Project Address	123 Cedar St.	Impervious Area (Square Feet)	122,230	Total Building Area (Gross Square Feet)	212,538
Project Date	6/1/2019	Irrigated Landscaped Area (Square Feet)	1,146	Primary Use Type	Mixed Use
	Estimated project construction completion date	Impervious Cover (%)	88%	Does the building have a cooling tower?:	No
Project Contact	Katherine Jashinski 512-972-0390 katherine.jashinski@austintexas.gov		= Impervious Area / Net Site Area	Does the building have a pool and/or spa?:	Outdoor
				Does the building have a water feature?:	Outdoor

Enter the building information for the project:

Residential Area Information

Type of Building (Apartments, Condos, Other?)	Description of Dwellings (Range of bedrooms in units)	Gross Floor Area (Square Feet)	Number of Dwelling Units	People per Dwelling Unit		Number of days occupied per year		Number of Building Occupants
Mixed-Use Ground Floor Retail	1&2 bedroom apartments	185,356	150	1.8		365		270
								= Number of Dwelling Units x People Per Dwelling Unit

Commercial Space Information

Type of Use	Description of Use	Gross Floor Area (Square Feet)	Additional Variable	Value (where applicable)	Number of equivalent days occupied per year		Maximum occupied days per year	Maximum Number of Occupants	Number of Full-Time Equivalents (FTEs) Employees	Number of Full-Time Equivalents (FTEs) Transient/Visitors
Hospital			Number of Beds		0		0	0	0	0
Office	Office	8,627	--	--	250		250	40	28	0
Retail	Retail	2,396	--	--	206		206	40	4	36
Eating & Drinking	Restaurant	14,283	Number of Seats	100	299		299	1,020	71	949
Medical Office	Medical Office	1,876	--	--	250		250	10	4	6
Grocery Store			--	--	0		0	0	0	0
Assisted Living			Number of Beds		0		0	0	0	0
Warehousing/Storage			--	--	0		0	0	0	0
Lodging			Number of Rooms		0		0	0	0	0
Education			--	--	0		0	0	0	0
Manufacturing/Light Industrial			--	--	0		0	0	0	0
Places of Assembly			--	--	0		0	0	0	0
Auto Service			--	--	0		0	0	0	0
Personal Services (Spa, Salon, Fitness, etc.)	Salon	15,626	--	--	228		228	160	24	136
Laundry & Sanitation			--	--	0		0	0	0	0
Car Wash			--	--	0		0	0	0	0
Other			--		--			--	--	--
	Total	27,182			299		299	1,110	131	1,127
		= Sum of Gross Floor Area by Type of Use			= SUM (# Occupied Hours/Day x Number of Each Type of Day per Year) / 24 Hours per Day		=MAX (Number of equivalent days occupied per year)	= Gross Floor Area / Allowable Floor Area Per Occupant	= Gross Floor Area / Average COA Floor Area Per Employee	= Maximum Occupancy - Estimated Number of Employees

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WATER FORWARD & ALTERNATIVE WATER ORDINANCES

Summary of the water balance:

Potable water demands

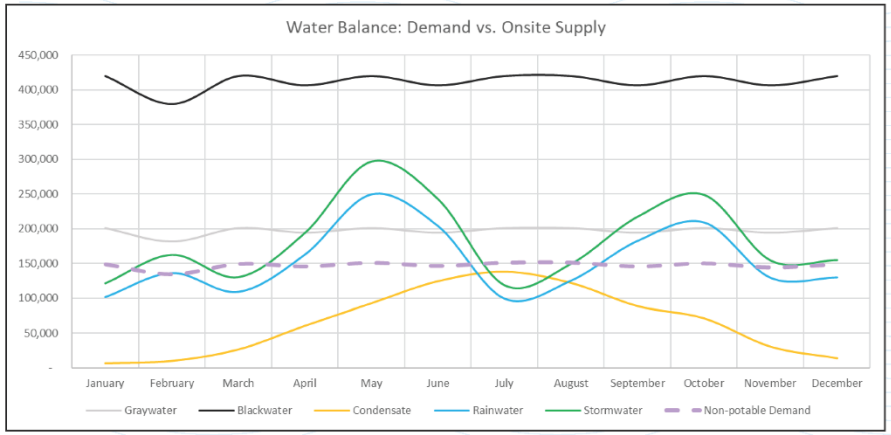
Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual	
Indoor fixtures (gallons)	319,000	288,100	319,000	308,700	319,000	308,700	319,000	319,000	308,700	319,000	308,700	319,000	**3,755,500**	Retrieved from Sheets 2 and 3
Pools/spas (gallons)	1,700	2,000	2,900	3,500	4,200	4,600	4,700	4,700	3,700	3,000	2,000	1,700	**38,500**	
Total potable demand (gallons)	320,700	290,100	321,900	312,200	323,200	313,300	323,700	323,700	312,400	322,000	310,700	320,700	**3,794,000**	

Non-potable water demands

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual	
Indoor fixtures (gallons)	148,200	133,800	148,200	143,400	148,200	143,400	148,200	148,200	143,400	148,200	143,400	148,200	**1,744,400**	Retrieved from Sheets 2 and 3
HVAC makeup water (gallons)	-	-	-	-	-	-	-	-	-	-	-	-	-	
Outdoor irrigation (gallons)	100	300	700	1,800	2,200	2,500	2,500	2,500	1,900	1,500	500	100	**16,600**	
Water features (gallons)	100	100	100	200	200	200	200	200	200	100	100	100	**1,900**	
Total non-potable demand (gallons)	148,400	134,200	149,000	145,400	150,600	146,100	150,900	150,900	145,500	149,800	144,000	148,400	**1,762,900**	
(gallons per day)	4,900	4,400	4,900	4,800	4,900	4,800	4,900	4,900	4,800	4,900	4,700	4,900	**1,762,900**	

On-site alternative water supplies

Month	January	February	March	April	May	June	July	August	September	October	November	December	Annual	
Graywater (gallons)	200,900	181,500	200,900	194,400	200,900	194,400	200,900	200,900	194,400	200,900	194,400	200,900	**2,365,400**	Retrieved from Sheets 4 and 5
Blackwater (gallons)	420,200	379,500	420,200	406,600	420,200	406,600	420,200	420,200	406,600	420,200	406,600	420,200	**4,947,500**	
Condensate water (gallons)	6,400	9,800	26,200	60,300	92,300	123,900	137,500	121,400	88,200	70,900	30,200	13,600	**780,900**	
Rainwater (gallons)	101,800	136,300	109,300	162,800	249,000	203,600	99,500	125,400	182,300	208,800	129,400	130,000	**1,838,100**	
Stormwater (gallons)	121,400	162,500	130,300	194,100	296,900	242,800	118,600	149,500	217,400	248,900	154,300	155,000	**2,191,700**	



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