

Addressing the state's water challenges by improving water efficiency through diverse community connections, innovative solutions and valuable member resources.

Welcome to the 2020 Water Conservation Symposium

We will get started in a couple minutes.

Who is CWW?

- Colorado WaterWise is addressing the state's water challenges by improving water efficiency through diverse community connections, innovative solutions and valuable member resources.
- We offer educational tools, events and resources to our members and the public to allow you to make a difference.

2020 Symposium Sessions

- **Oct. 13 1 p.m.** - System-wide technologies: real-world review of AMI and Leak Detection systems
- **Oct. 15 10 a.m.** - Managing water in the headwaters of Colorado
- **Oct. 20 10 a.m.** - Supporting water resources through alternative water supplies
- **Oct. 22 1 p.m.** - Introduction to landscape and irrigation certification programs in Colorado
- **Oct. 27 2 p.m.** - Understanding water conservation efforts across Colorado
- **Oct. 29 10 a.m.** - Advancing Water Efficient Landscape Ordinances: What's been done and where do we go next?

Thank you to our 2020 sponsors



colorado
waterwise



JOIN US!

COLORADO WATERWISE

SYMPOSIUM

HALLOWEEN

HAPPY HOUR

COSTUME
CONTEST!

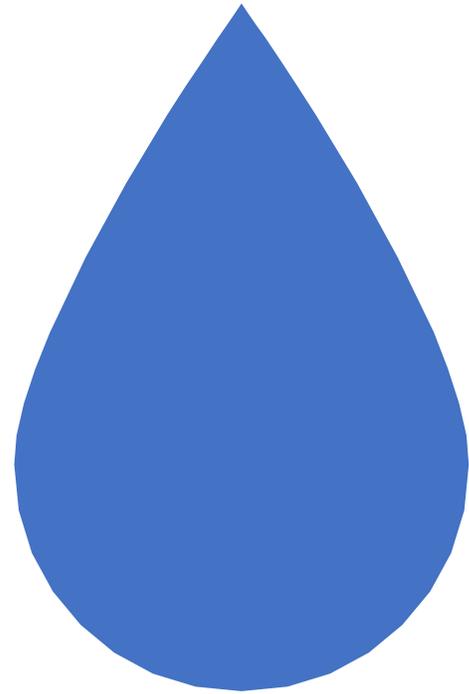
OCTOBER 27 | 4 TO 5:30 PM
ZOOM

Housekeeping items

- Drop questions into the Q&A box and we will address them toward the end.
- We will use audience polling throughout the session, we look forward to hearing from you all!
- A recording will be available to CWW members following the Symposium.



Luke – do you want any more of an intro besides what's on the next slide to set up this session?



Alternative Water Supplies

Jeff Tejral, Denver Water

John Bell, Greyter Systems

Deryn Davidson, CSU Extension

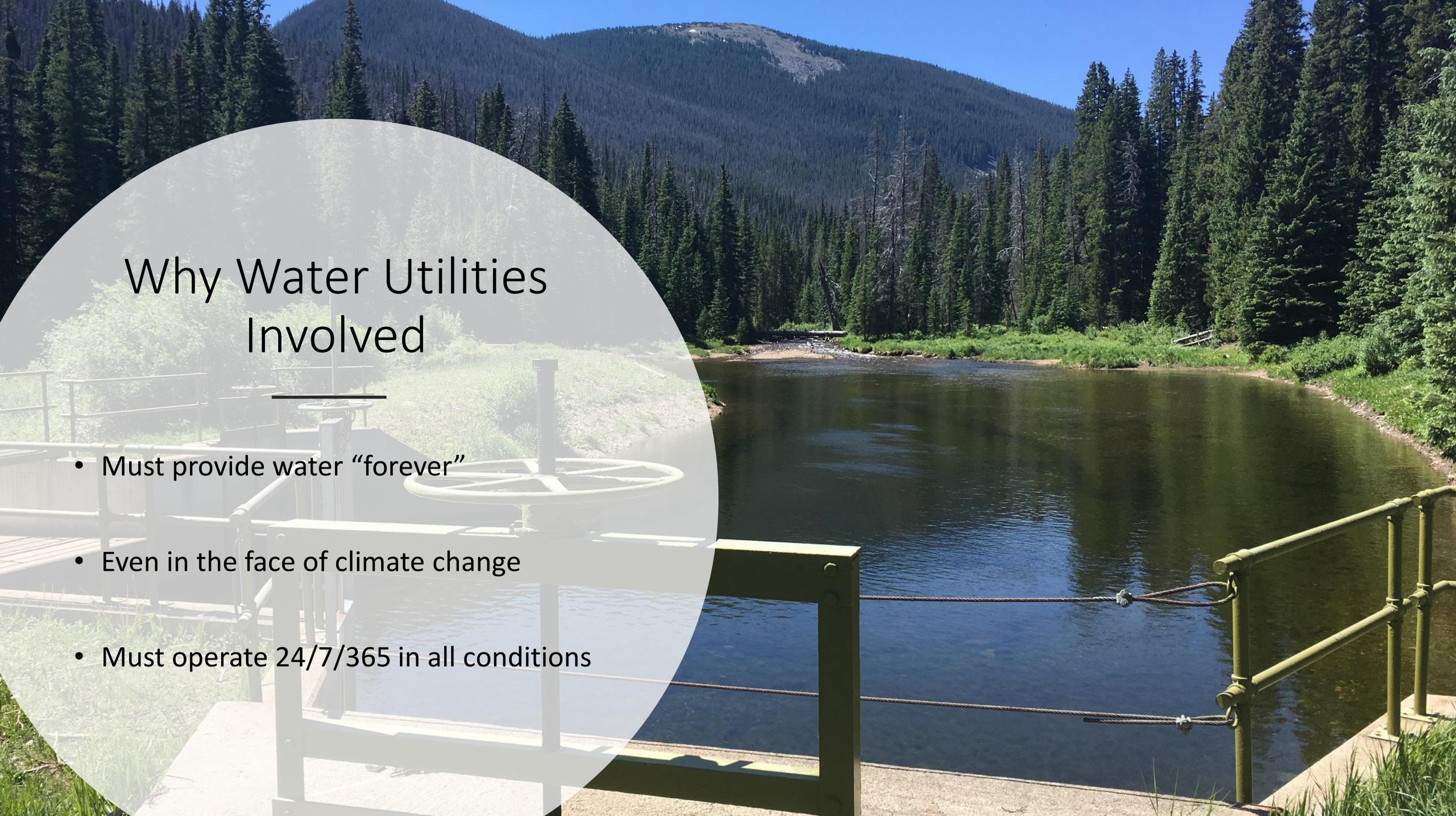
Thersa Worsham, City of Golden

Moderator: Luke Runyon, KUNC

(HIDDEN DURING PRESENTATION)

Framing Alt Water sources – Alt water use

- Why alternative water sources important
- What are the sources
- What are the uses
- Pros and cons
- One Water
- Polling question
 - Pre presentation - Is it legal to:
 - a. Direct water from your roof to landscape
 - b. Store water from showers to irrigate trees
 - c. Direct laundry water to landscape
 - d. Use a bucket to keep warmup water from showers



Why Water Utilities Involved

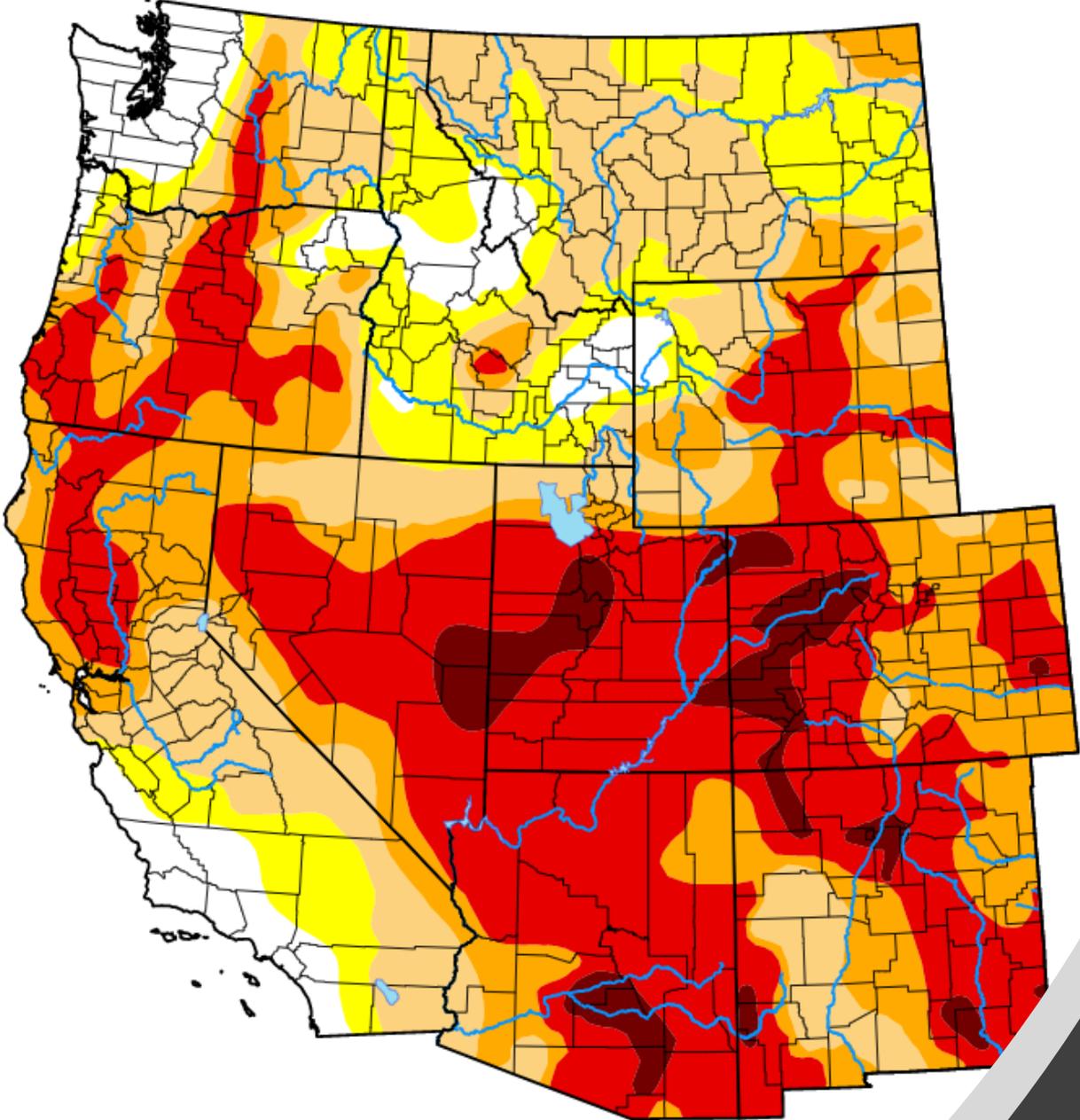
- Must provide water “forever”
- Even in the face of climate change
- Must operate 24/7/365 in all conditions

Water Scarcity - Who Cares?

Top 5 Global Risks in Terms of Impact



Source: World Economic Forum



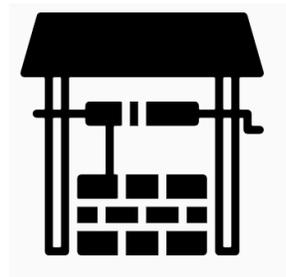
Map released: Thurs. October 15, 2020

Data valid: October 13, 2020 at 8 a.m. EDT

Intensity:

-  None
-  D0 (Abnormally Dry)
-  D1 (Moderate Drought)
-  D2 (Severe Drought)
-  D3 (Extreme Drought)
-  D4 (Exceptional Drought)
-  No Data

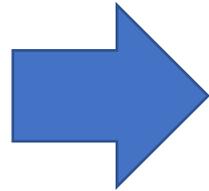
Historic norm



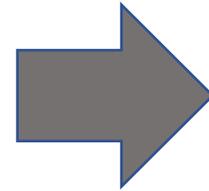
Well water



Potable water



Rainwater



Wastewater



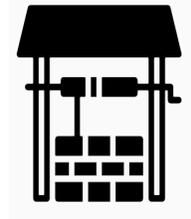
Alternative Water Sources, Use & Regs

State Water Law



Rainwater
• Irrigation

Reg 41 & Reg 11



Well water
• Irrigation
• Domestic
• Cooling

Reg 43 & Reg 22



Black water
• Irrigation
• Toilet flushing

Safe Drinking Water Act

Reg 11



Potable water
• Irrigation
• Domestic
• Cooling

State Water Law

Clean Water Act

Reg



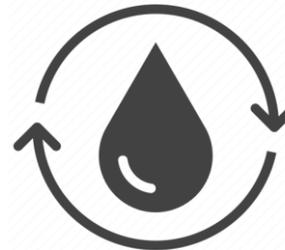
Storm water
• Irrigation

Reg 84



Recycled water
• Irrigation
• Toilet flushing
• Cooling

Reg 86



Gray water
• Irrigation
• Toilet flushing



Other water

Pros and cons of alternative water use

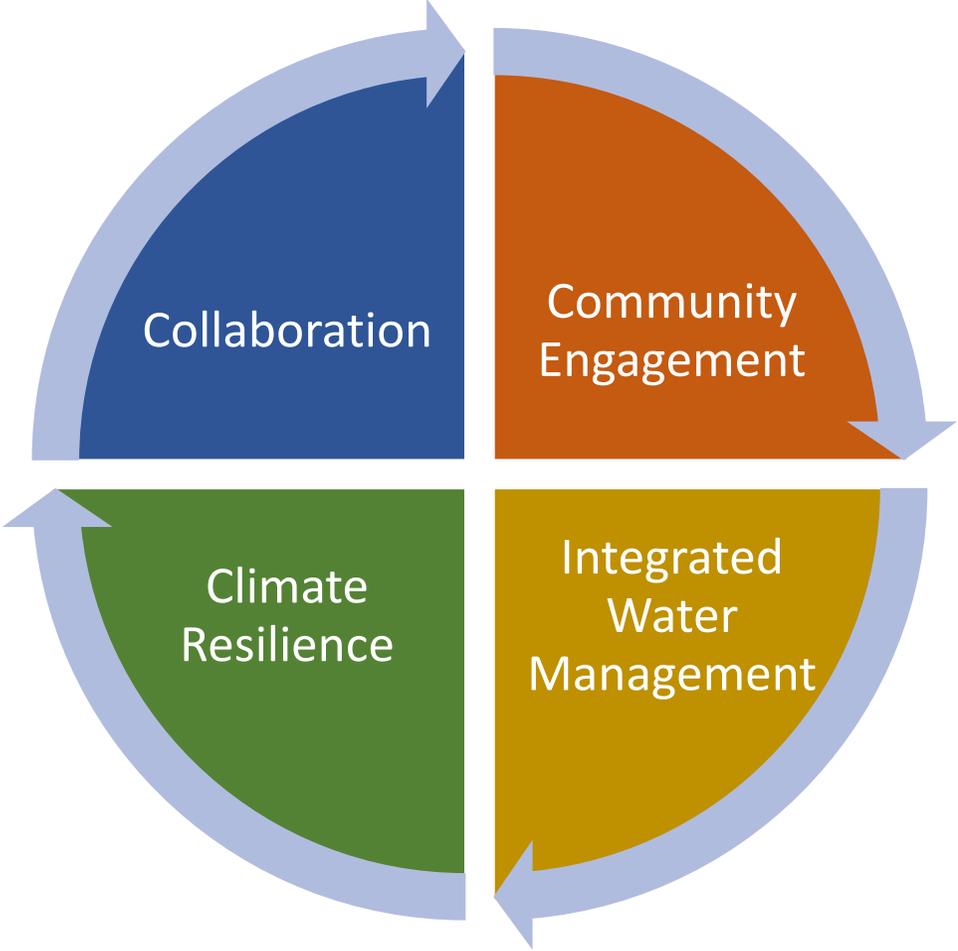
Pros

- Reduce stress on potable system
- Lower long-term costs
- Reliable water during drought
- Increased management

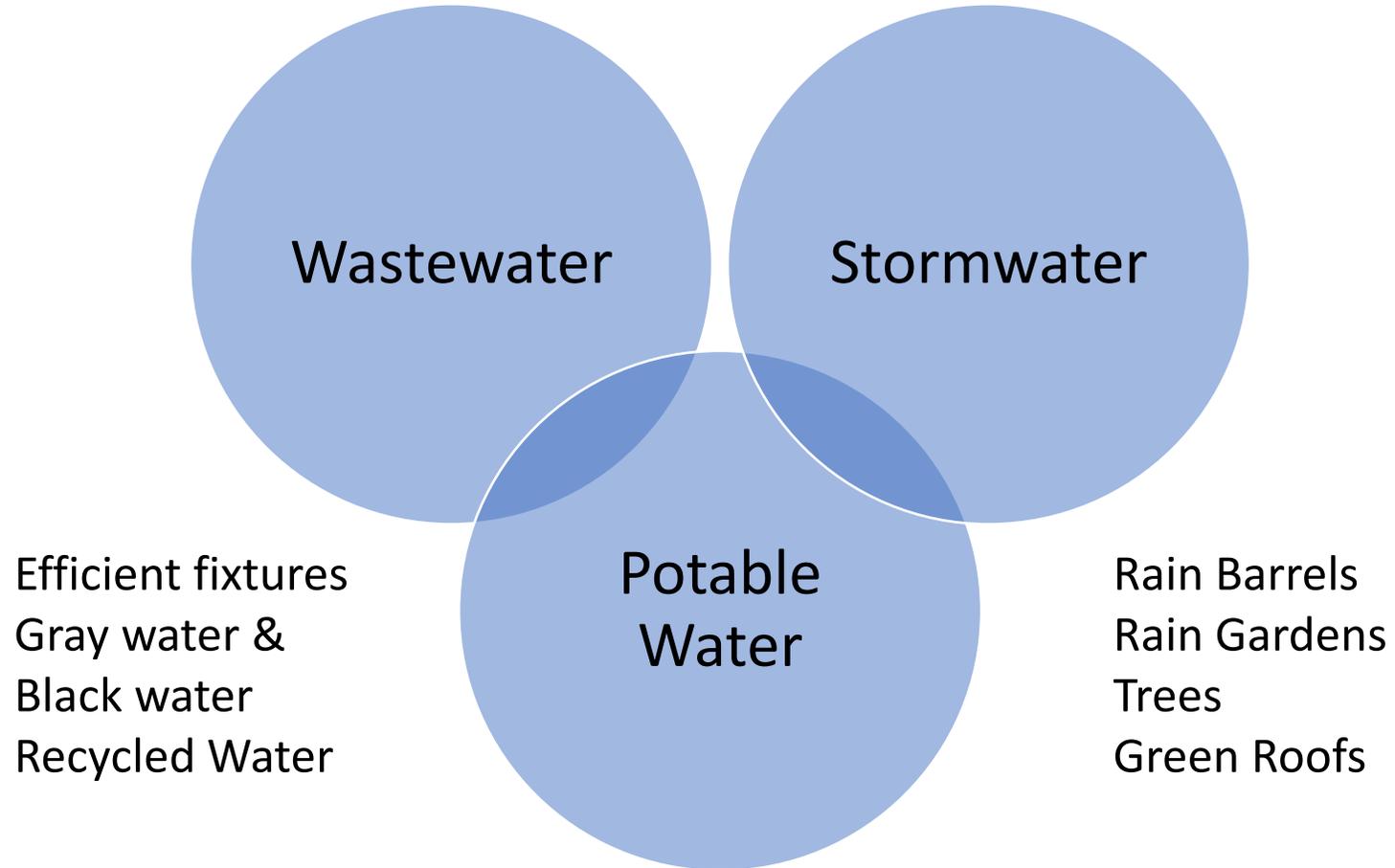
Cons

- Cross connection contamination
- Higher upfront costs
- Conflicting regulations
- Increased management

One Water



Collaboration/Integrated Water Management

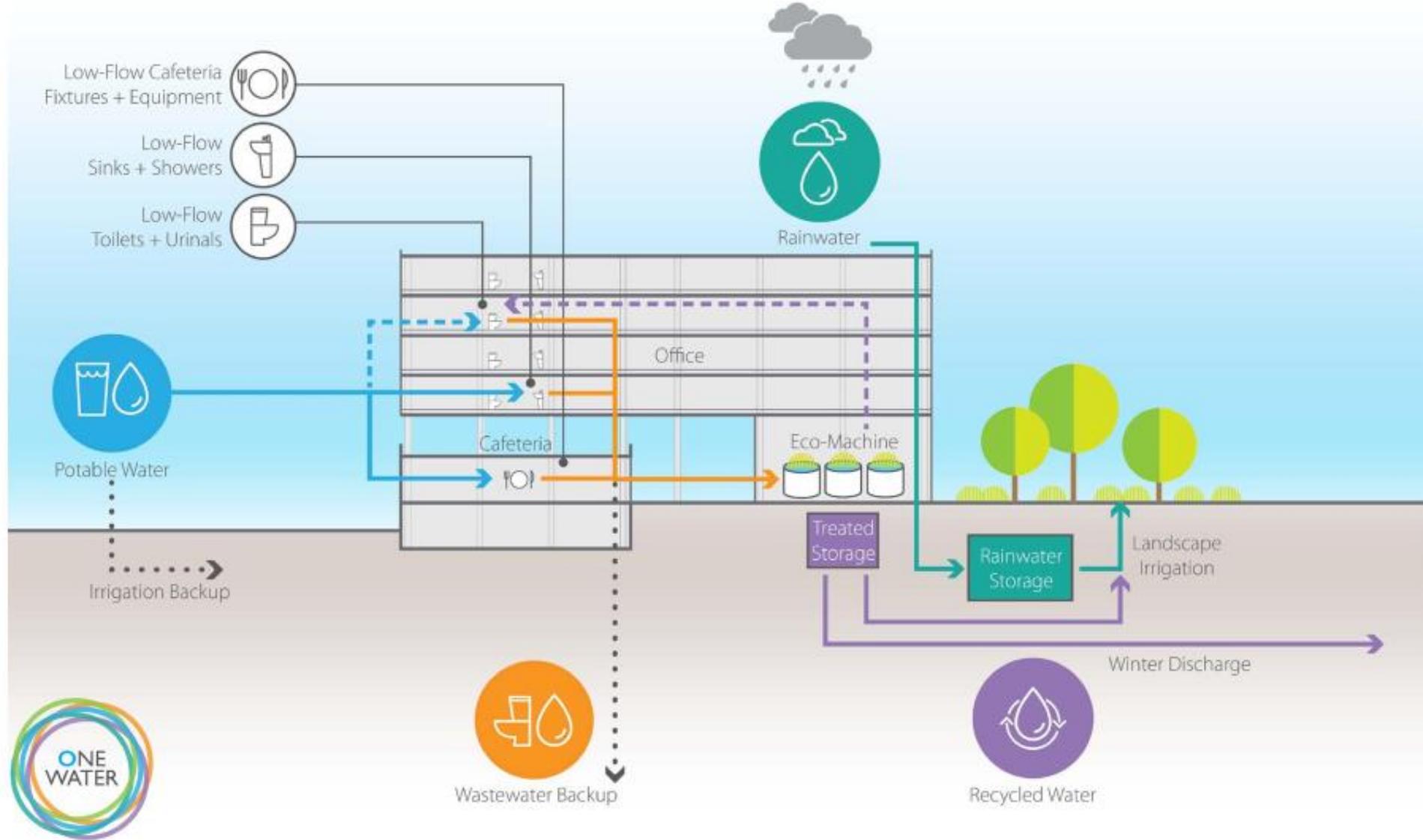


NOTE: Last slide of introduction

I can have my next three slides any time in the presentation but thought it might be nice to have someone else talk for a few minutes.

DO WE WANT TO HAVE JEFF STOP HERE? Or go over the next three slides then more onto Deryn?

ADMINISTRATION BUILDING WATER STRATEGIES





Denver Green School

- Rainwater harvesting
- Augmentation Plan
- Flood mitigation / management pilot
- Mile High Flood District



2015



2020

Rain Gardens

- Infiltrate within 72 hours
- Green Infrastructure needs design and maintenance

GREYTER WATER SYSTEMS, INC.

Colorado WaterWise – Supporting water resources
through alternative water supplies



Certified to
NSF/ANSI
Standard 350



WHAT WE DO

We build water efficient communities and have both a residential and commercial product line.



Showers

We capture greywater which is wastewater generated from showers and baths and bathroom sinks



Flushing

There are many economical ways to reuse greywater on-site such as for toilet flushing, irrigation (watering lawns and gardens)



Irrigation

MOST INTERIOR WATER USAGE HAPPENS IN THE BATHROOM



Showering and Bathing 25-30%



Toilets 20-25%

**Representative of new home construction*

SO, WHY DO WE FLUSH TOILETS WITH DRINKING WATER?



Why do we flush toilets
with potable water?



And, why do we send shower and
bath water directly to the sewer?

WITH THE AWARD WINNING GREYTER HOME YOU DON'T HAVE TO

The **Greyter HOME** captures and treats shower and bathwater so that it can be reused for flushing toilets

Benefits:

- Supplies all of the water for toilet flushing
- Reduces indoor water consumption by as much as 25%

The single greatest water conservation appliance for new homes



Certified to
NSF/ANSI
Standard 350



Greyter[®]
Water Systems

HOW IT WORKS



CERTIFICATION



NSF 350 Certification

The Greyster HOME™ (Model GH1118) by Greyster Water Systems is certified to NSF 350.

The NSF/ANSI 350 standard establishes material, design, construction and performance requirements for onsite residential and commercial water reuse treatment systems. They also set water quality requirements for the reduction of chemical and microbiological contaminants for non-potable water use.

During its 6-month testing period, the Greyster HOME™ was dosed daily with a greywater cocktail that contained raw wastewater, secondary effluent, shampoo, conditioner, soap, toothpaste, bath cleaner and test dust and delivered nearly 30 gallons (~113 L) of processed water per day. The Greyster HOME™ did not require any user maintenance during the testing period and maintained the following stringent water quality requirements:

Criteria	NSF 350 Standard (Class R)	Greyster HOME™ Results
CBOD5 (mg/L)	10	< 2*
TSS (mg/L)	10	< 3*
Turbidity (NTU)	5	0.67
E.Coli (CFU/100 mL)	14	1
Residual Chlorine (mg/L)	0.5 - 2.5	0.95
pH (SU)	6 - 9	7.7



*Note: Average test results less than testing detection limit



The Greyster HOME™ is a one-of-a-kind solution that not only meets the NSF 350 standard for residential greywater reuse, but also meets the following requirements:

- Cost effective (< \$4,000 US*)
- User friendly (annual maintenance)
- Low energy consumption (~185 kWh annually)
- Small foot print (19" D x 28" W x 65" H)
- Easy to install (~1.5 hours)
- Superior water quality

*based on production builder volume pricing

Many U.S. jurisdictions require NSF 350, as it is the emerging water quality standard for residential greywater reuse.

The Greyster HOME™ is designed to capture only shower and bath water to be reused for toilet flushing. Toilets make up 20-25% of indoor water consumption. It makes no sense to let so much perfectly good drinking water, and now with the Greyster HOME™ you don't have to!

Make your Home a GreysterHOME™. Now NSF 350 Certified (Model GH1118).



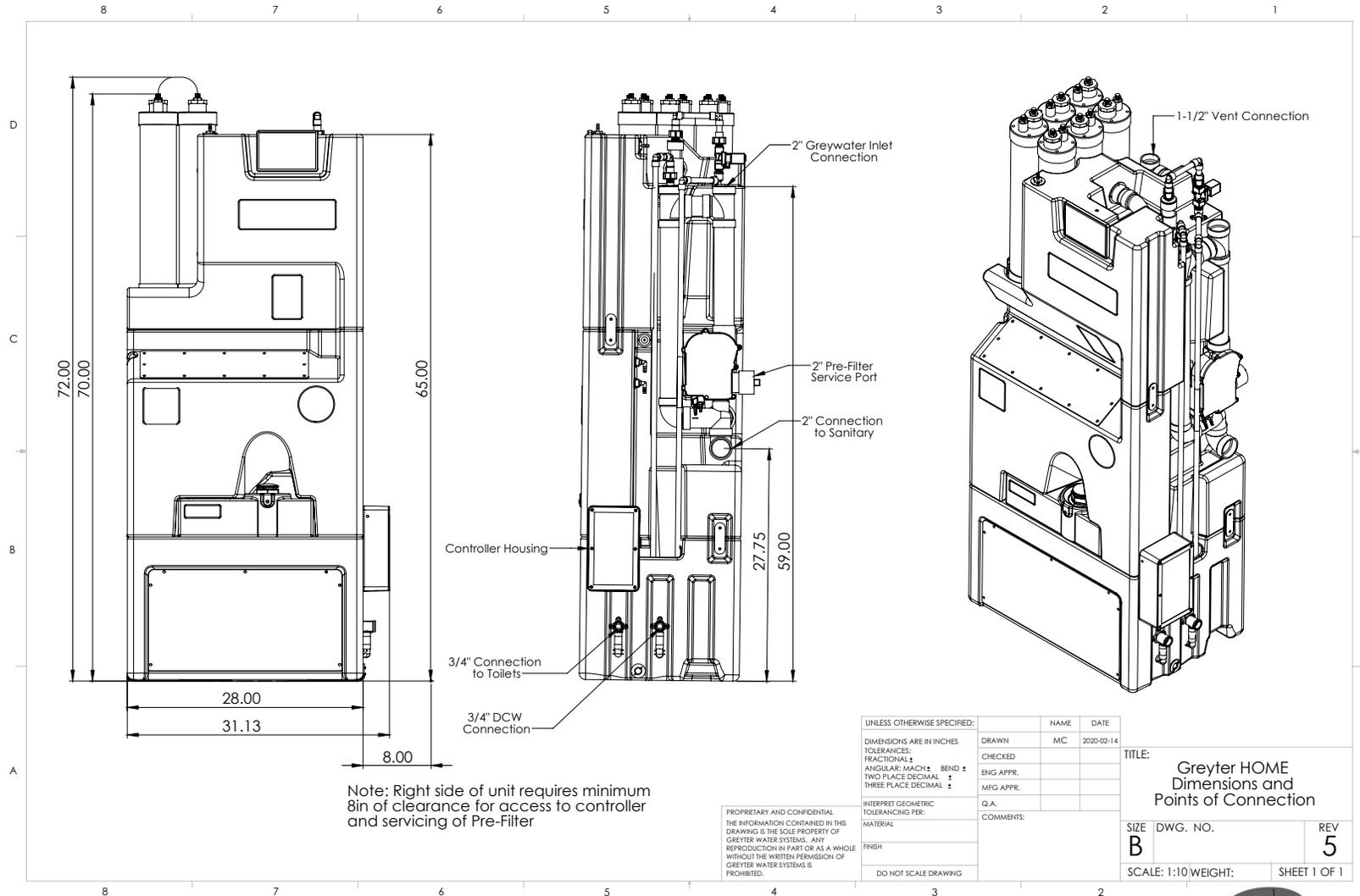
Greyster Water Systems Inc.
 Manufacturing Facilities: Grassie, ON, Canada and Sidney, NE, USA
 info@greyter.com | www.greyter.com
 Toll Free in North America: 1-844-GREYTER (473-9837)
 Outside North America: 1-416-883-2411

Greyster is a registered trademark of Greyster Water Systems Inc. Greyster HOME™ is a trademark of Greyster Water Systems Inc. © 2019 Greyster Water Systems Inc.

- NSF 350 required in most U.S. jurisdictions
- 6-month test
- Most demanding standard for greywater
- Standard driven by public health agencies
- Greyster currently the only solution with NSF for residential (Class R) that meets requirements for builders

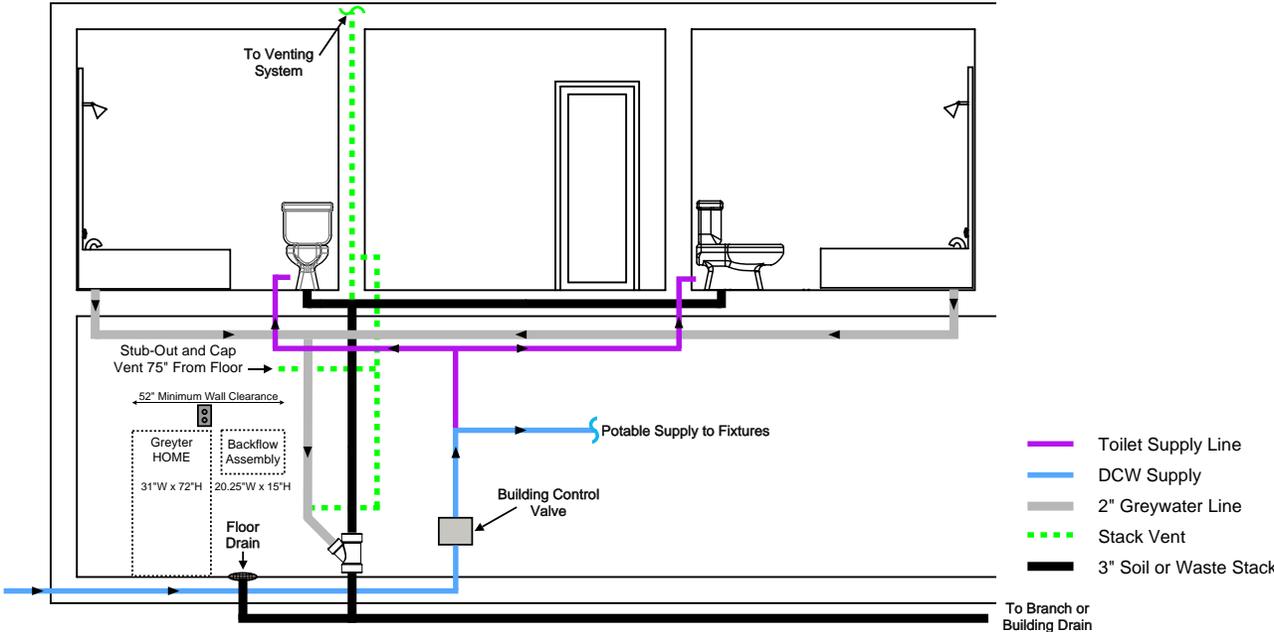


DIMENSIONS



ROUGH-IN

Greyter Water Ready: Rough-In Only (Unfinished Basement or Mechanical Room)

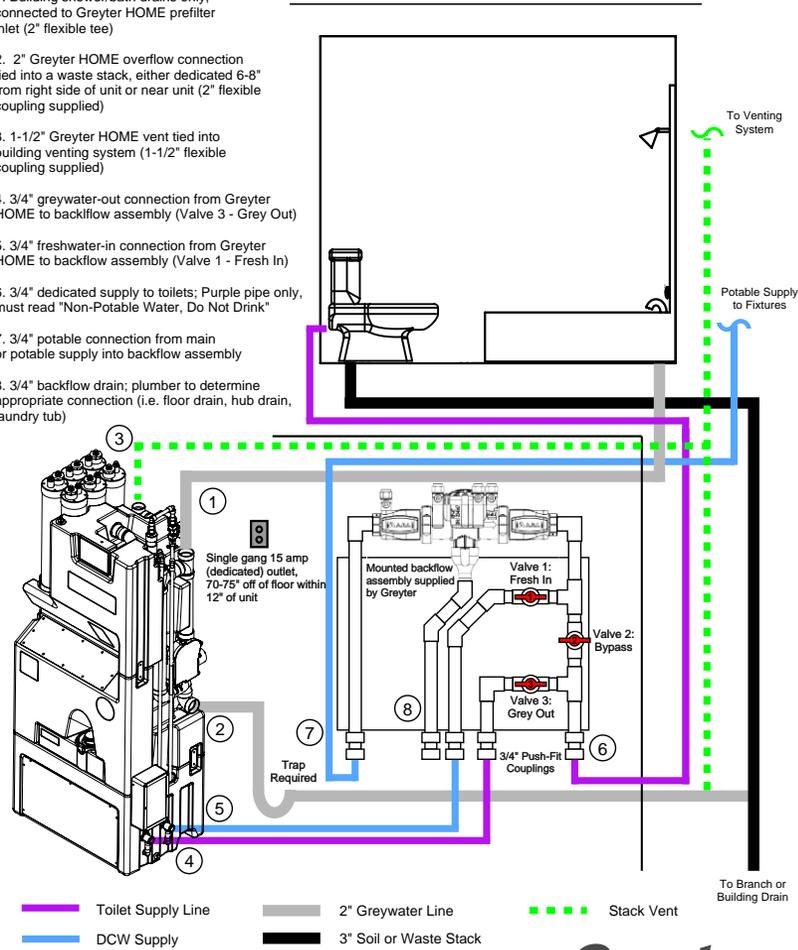


1. Isolate greywater - Minimum 2 showers (2"), and homerun greywater to mechanical room or where future Greyter HOME will be installed
2. If overflow is tying into a 3" soil or waste stack, connection is a 3" x 4" cleanout with 2" side fitting. If tying into a 2" soil or waste stack, connection is a 2" x 2" cleanout with 2" side fitting. Fitting to be tight to the slab
3. Isolate supply lines to toilets (purple pipe only, must read "Non-Potable Water, Do Not Drink")
4. Provide access to future 1.5" vent, must be minimum 75" off finished floor
5. Provide single gang 15 Amp (dedicated), 120V. Plug should be 70-75" above finished floor, within 12" of the right side of unit
6. To accommodate backflow assembly plate, allow a minimum clearance of 3" to the right of the Greyter HOME. Backflow plate is 15" x 20.25", and should be mounted securely to the wall at a minimum height of 36-48" from the finished floor (as measured from the top of the backflow plate)
7. Where space permits, install Greyter HOME within 24" of floor drain. If no floor drain is available, drain to d or alternate location which permits the Greyter HOME mechanical tank to drain under gravity

CONNECTIONS

Greyter HOME Connections

1. Building shower/bath drains only, connected to Greyter HOME prefilter inlet (2" flexible tee)
2. 2" Greyter HOME overflow connection tied into a waste stack, either dedicated 6-8" from right side of unit or near unit (2" flexible coupling supplied)
3. 1-1/2" Greyter HOME vent tied into building venting system (1-1/2" flexible coupling supplied)
4. 3/4" greywater-out connection from Greyter HOME to backflow assembly (Valve 3 - Grey Out)
5. 3/4" freshwater-in connection from Greyter HOME to backflow assembly (Valve 1 - Fresh In)
6. 3/4" dedicated supply to toilets; Purple pipe only, must read "Non-Potable Water, Do Not Drink"
7. 3/4" potable connection from main or potable supply into backflow assembly
8. 3/4" backflow drain; plumber to determine appropriate connection (i.e. floor drain, hub drain, laundry tub)



Greyter
Water Systems

Greyter
Water Systems

DESIGNED WITH BUILDERS INSIGHT

Designed to meet the 7 key requirements of Production Home Builders:

1. Compact Footprint
2. Affordable
3. Delivers Near Potable Water
4. Minimal Maintenance
5. Quick & Easy Installation
6. Highly Efficient Water Recycling
7. Low Energy Requirements

Possible Builder Benefits:

- Build Homes Faster - Accelerated permit approvals
- Development credits
- Build More Homes - Greater density of homes in a development
- Lower Water Connection Charges
- Assist with site plan approval – meet sustainable checklists



COLORADO LAUNCH

Pilot Project in partnership with:

Colorado Conservation Water Board

Denver Water

Lennar Homes

Uponor

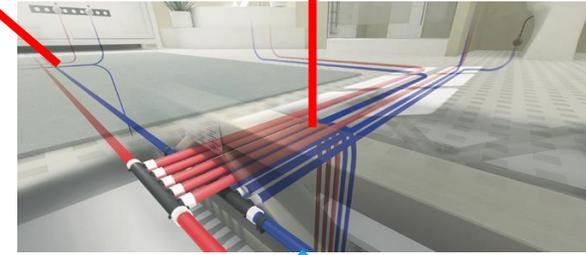
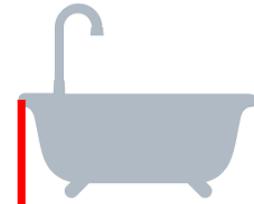
Phyn

40 Homes in Central Park Site

First 2-units installed – 3 homes occupied by mid-December

First project in the state to incorporate greywater for single family indoor use, leak detection and structured plumbing

Sustainable Water Solution – The Best Way to Plumb a Home



1. Water leak device and flow monitor – shuts main off remotely when catastrophic leaks and saves water. Up to 15%

2. Logic plumbing provides faster distribution to fixtures and saves water.

3. 2 showers a day provides enough greywater for a family of 4
The Greyter HOME reduces indoor consumption by up to 25%.

3. Greywater Recycling System



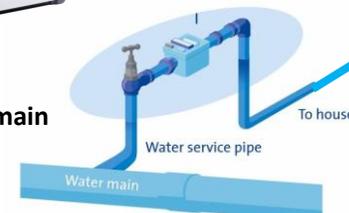
Greywater feeds toilets



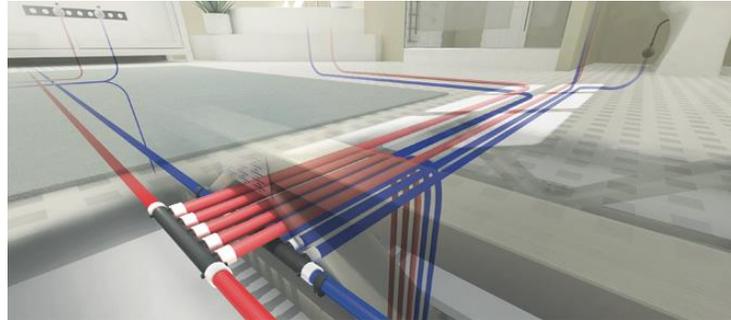
1. Leak detection



Water main



Significant savings with the Sustainable Water Solution



~ 9,300 G + ~1,000 G + ~15,000 G

Single family home of 4 saves ~ 25,000 G annually

COLORADO REQUIREMENTS

Certification – NSF 350

Reg 86 Adoption or local greywater ordinance

Currently for single family low rise – greywater to toilets
only permitted in:

Denver, Castle Rock and Pitkin County.

CDPHE SUPPORT – CASTLE ROCK ORDINANCE



August 13, 2020

Mr. James Eklund
Eklund Hanlon LLC
645 Bellaire Street
Denver, CO 80220

Subject: Supporting Graywater Opportunities throughout Colorado

Dear Mr. Eklund:

Thank you for reaching out to the Colorado Department of Public Health and Environment, Water Quality Control Division (department) about how to help expand graywater reuse opportunities throughout the state. As you are aware, House Bill 13-1044 authorizes the use of graywater under specific conditions. The bill recognized the need for alternate, renewable water supplies that offer opportunities to offset existing water diversions and improve water supply resiliency in accordance with the Colorado's Water Plan. In response, the Water Quality Control Commission, in coordination with the Department, adopted Regulation 86 Graywater Control Regulation. This regulation establishes the minimum requirements for cities and counties to create and oversee local graywater control programs.

The department supports the legal expansion of reclaimed water and graywater reuse to provide water resiliency and conservation consistent with Colorado's Water Plan. While statutes and regulations that allow cities and counties to develop graywater control programs have been around for a number of years, only a few cities and counties have chosen to develop local graywater control programs. The Department offers the following recommendations to help entities when considering the adoption of a graywater program:

- The Department stands ready to work with local governments considering municipal graywater use
- Regulation 86 provides a flexible framework that may be adapted to fit within the various structures of cities and counties in Colorado.
- Cities and counties that are considering adopting a local graywater control program may be able to model their own local ordinance or resolution from an existing Colorado local graywater control program. The City and County of Denver and the Town of Castle Rock may be able to share their experiences.
- As an opt-in program, the city or county may decide to only adopt specific graywater sources and uses depending on resources and need. For example, a local graywater control program may decide to only allow systems for new single-family low-rise construction or laundry to landscape.

ORDINANCE NO. 2018-

AN ORDINANCE AMENDING TITLE 4 OF THE CASTLE ROCK MUNICIPAL CODE ADDING A NEW CHAPTER 4.05 ENTITLED GRAYWATER SYSTEMS

WHEREAS, the Town of Castle Rock recognized that wise water use requires efficient and effective water reuse,

WHEREAS, the Town's preferred water supply strategy, as set forth in Castle Rock's Water Resources Strategic Master Plan, includes fully utilizing its reusable water,

WHEREAS, indoor graywater systems have demonstrated water conservation savings in the amount of 20-25% of indoor water use in a typical residential home,

WHEREAS, the Colorado Department of Public Health and Environment and Colorado's Water Plan value the importance of water reuse to the future of the Front Range and the State of Colorado as a whole,

WHEREAS, Section 13.12.110 of the Castle Rock Municipal Code provides for the adjustment of service charges to defray, among other costs, all "construction of water reuse and water recharge facilities, the establishment of water conservation programs and design, management, planning, operations, maintenance and regional agreements associated with such overall water and sewer long-term resource plans and programs," and

WHEREAS, this ordinance provides clear guidance to homebuilders and homeowners regarding the implementation of graywater systems.

NOW, THEREFORE, IT IS ORDAINED BY THE TOWN COUNCIL OF THE TOWN OF CASTLE ROCK, COLORADO:

Section 1. Amendment. Title 4 of the Castle Rock Municipal Code is amended by the addition of a new Chapter 4.05 entitled Graywater Systems, to read as follows:

4.05.010 Graywater systems.

A. Requirement. Graywater systems shall comply with the minimum requirements of Colorado State Regulation 86, as well as any and all other applicable state and local requirements.

B. Castle Rock Water's service boundary including Town limits and areas served through Extraterritorial Agreements shall constitute the legal boundary for



SUMMARY

- Colorado one of the most water conscious U.S. states (Water Plan)
- Colorado one of the most complicated U.S. states (Water rights)
- Colorado one of the most expensive U.S. states (Tap fees)
- Colorado one the most important U.S. states (Greyter)

Thank you

John Bell, CCO
Greyter Water Systems Inc.
1-844-GREYTER (479-9837)
www.greyter.com

Creating Water Efficient Communities



Every Drop Matters

CWW - Supporting water resources
through alternative water supplies

Deryn Davidson, CSU Extension, Boulder County



**COLORADO STATE UNIVERSITY
EXTENSION**

Rainwater Harvesting

- **Active** water harvesting = capture rainwater in a container to hold for later use (tank storage)
- **Passive** water harvesting = divert water overland to vegetated areas for *immediate* use (soil storage)



(INCLUDED IN ZOOM ALREADY)

Melissa: Poll Question

1. Do you have rain barrels at home? Yes/No
2. Do you see rain barrels at customers homes? Yes/No/NA

Why Do Rainwater Harvesting?

Urbanization and where we live...arid west

- Western US: 60% of municipal fresh water is used for landscape
- ~50% (mostly turf)



Benefits of Rainwater to Plants

- It's water...it's free!
- CO rainwater is generally soft and low in salts
- It's also unchlorinated, which is beneficial to plant growth
- May contain small amounts of nitrogen
 - That's why we generally see a greening effect after a rain event



Colorado Water Law: Active harvesting

- CSU conducted a study that determined there would be no adverse effects on senior or junior water rights of downstream users
- The conclusion was that rain barrels were a fraction of the total water balance and the amount collected by homeowners is miniscule
- Current Law: **HB16-1005**
 - August 2016



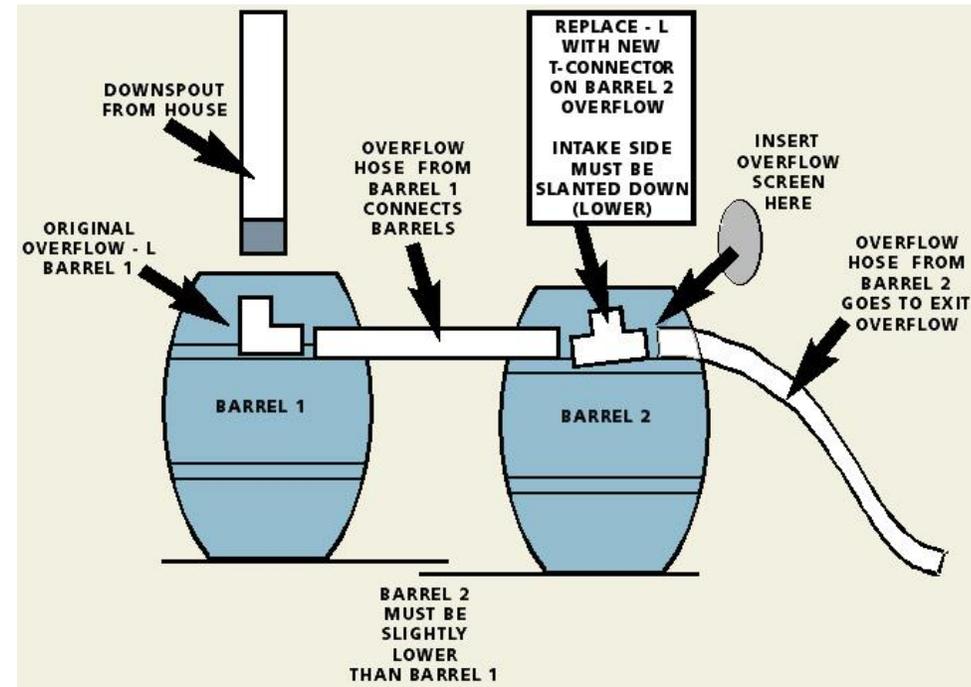
CSU Extension Provides Education

How to ***legally*** use rain barrels

- Allows up to ***two*** rain barrels with a combined storage of no more than ***110 gallons***
- Allows any ***single family*** home, or ***multi family units with 4 or less units*** to collect from the roof
- Water **MUST** be used on **SAME PROPERTY** that it is collected on
- The collected precipitation is used for **OUTDOOR** purposes including irrigation of lawns and gardens

CSU Extension Provides Education

- How to ***safely*** use rain barrels
 - How long to store water
 - Mosquitoes
 - Water quality
 - Controlling overflow
 - Basic system components
 - Choosing a site
 - Installation



A photograph of a balcony garden. In the center is a large red plastic rain barrel with a black owl graphic. A green garden hose is connected to the bottom of the barrel and lies on the grey wooden deck. To the right is a green planter box with several plants, including a tall, thin grass-like plant. In the background, there is a red brick wall and a black metal fence. A white circular overlay on the left side of the image contains text.

How Long to Store Water

- Rain barrels are only ecologically relevant if you USE them
- If a 1000 unit subdivision installs just one rain barrel on every home:
 - If 20% of the homeowners don't use the barrels
 - 11,000 gallons NOT in the water cycle!

Passive Rainwater Harvesting

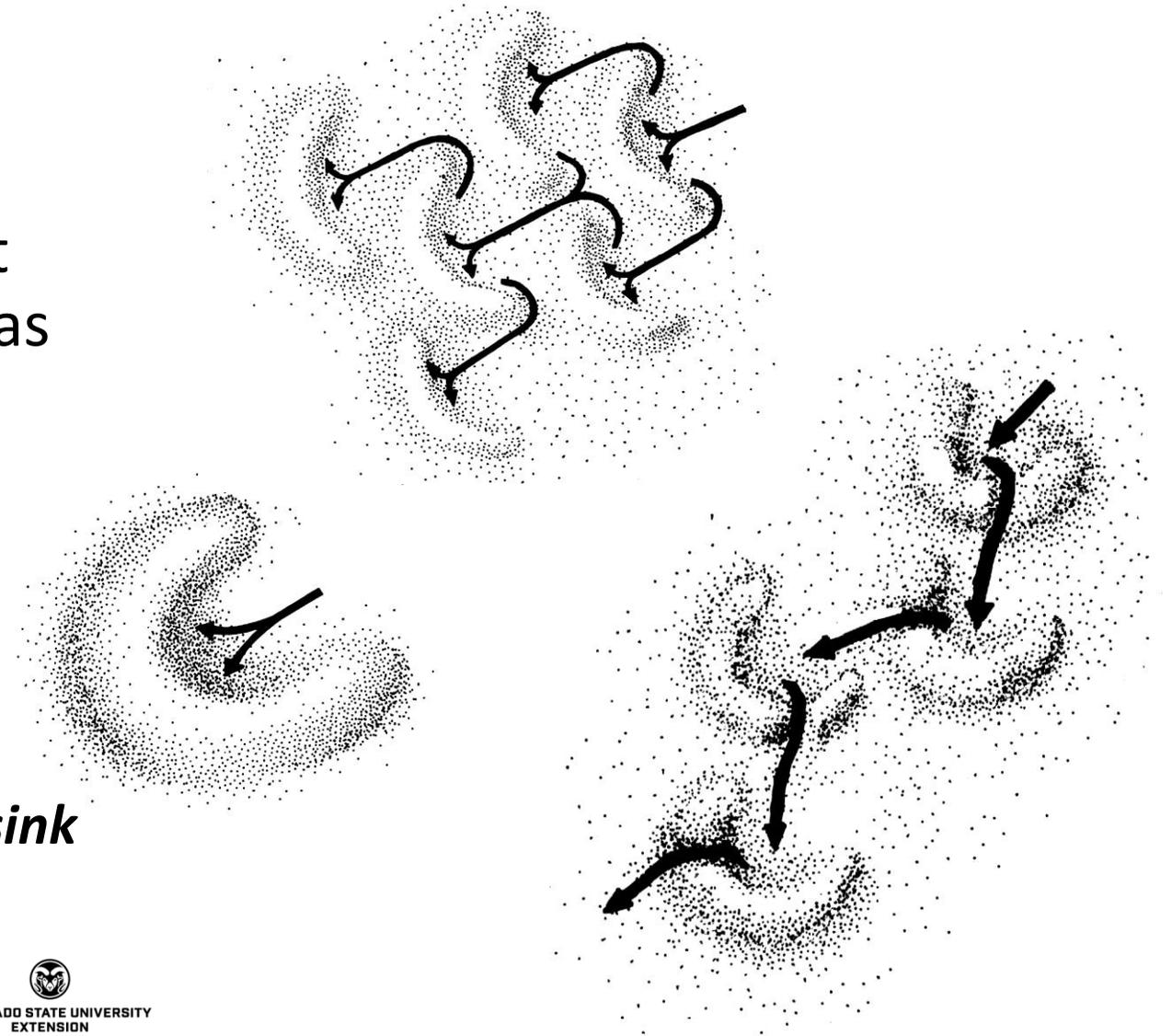
- Age old practice – ancient civilizations developed practices
- Earthworks – managing water where it falls or flows
- Control flood water and collect rain for ag and domestic uses



Passive Rainwater Harvesting

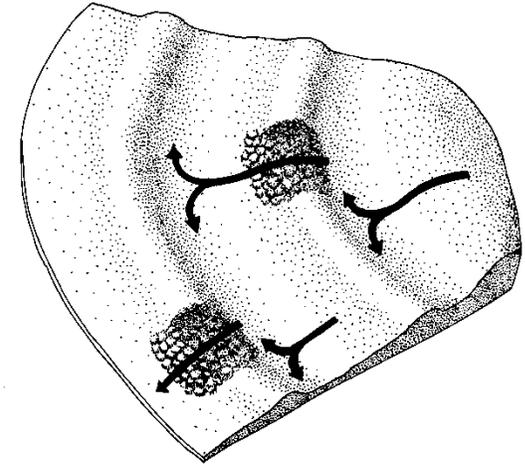
(Green Infrastructure)

- Passive water harvesting = divert water overland to vegetated areas for *immediate* use
- “**Slow it, spread it, sink it**”
- Integrated into landscape
 - Berms – *slow*
 - Swales – *spread*
 - Rain Gardens – *slow, spread and sink*



Passive Rainwater Harvesting (Green Infrastructure)

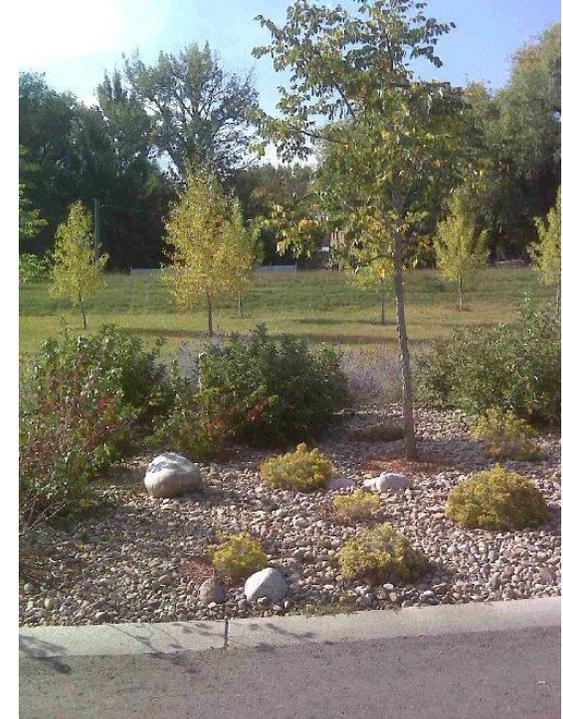
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Passive Rainwater Harvesting

(Green Infrastructure)

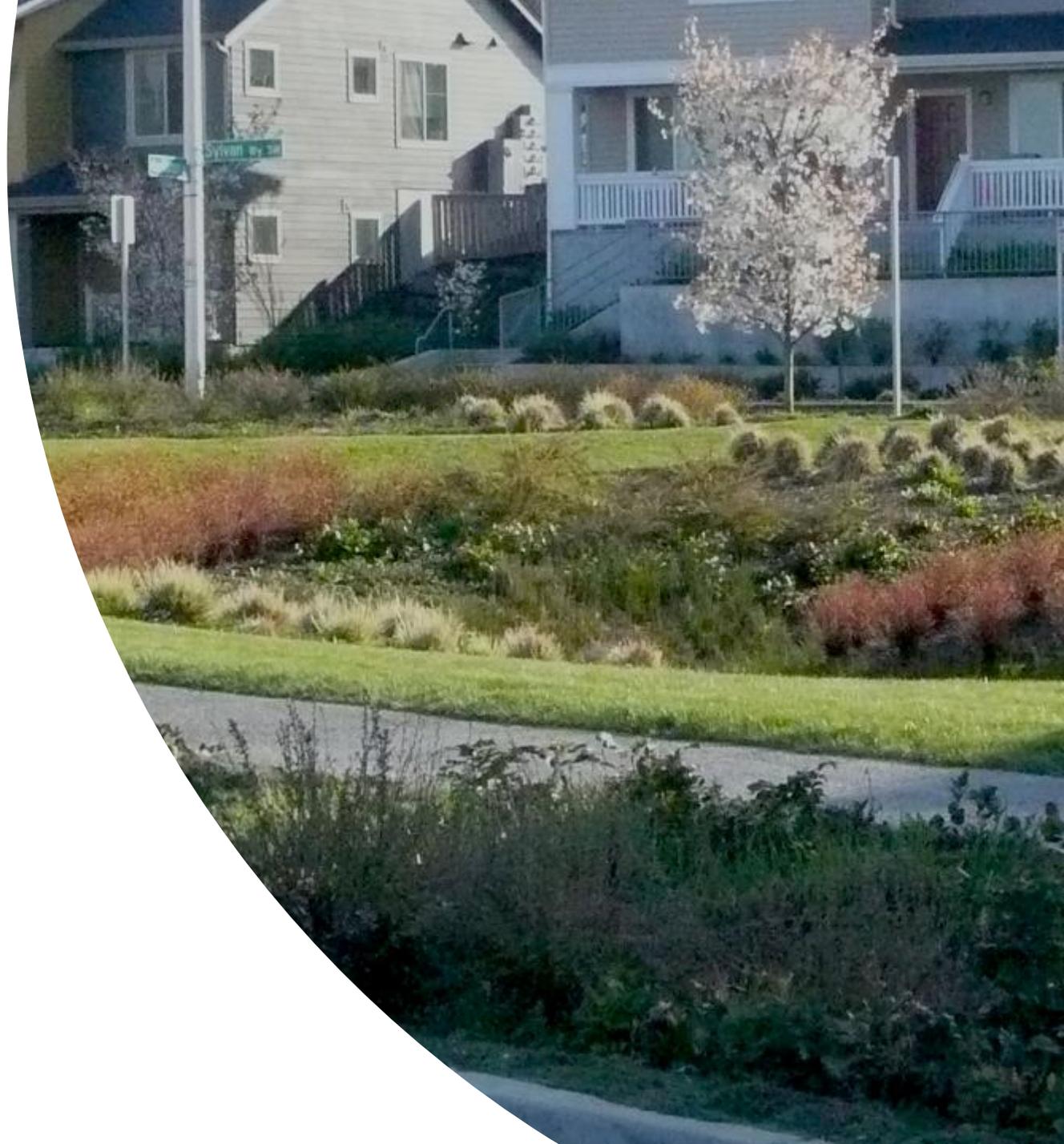
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Rain Gardens

Use plants, soils, mulch and microbes to slow and treat stormwater runoff

- Modeled after natural ecosystems
- Keep water onsite for use AND
- Effectively reduce heavy metals, nutrients, bacteria and other pollutants AND
- Protect local streams and lakes AND
- Replenish groundwater supplies AND...what don't they do?!



Passive Rainwater Harvesting (Green Infrastructure)

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 - *Curb-cuts*



Passive Rainwater Harvesting

(Green Infrastructure)

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**CITY OF
TUCSON**



Incentives for Gray Water and Rainwater Harvesting Systems

Tucson Water Single-Family Residential Gray Water Rebate Program

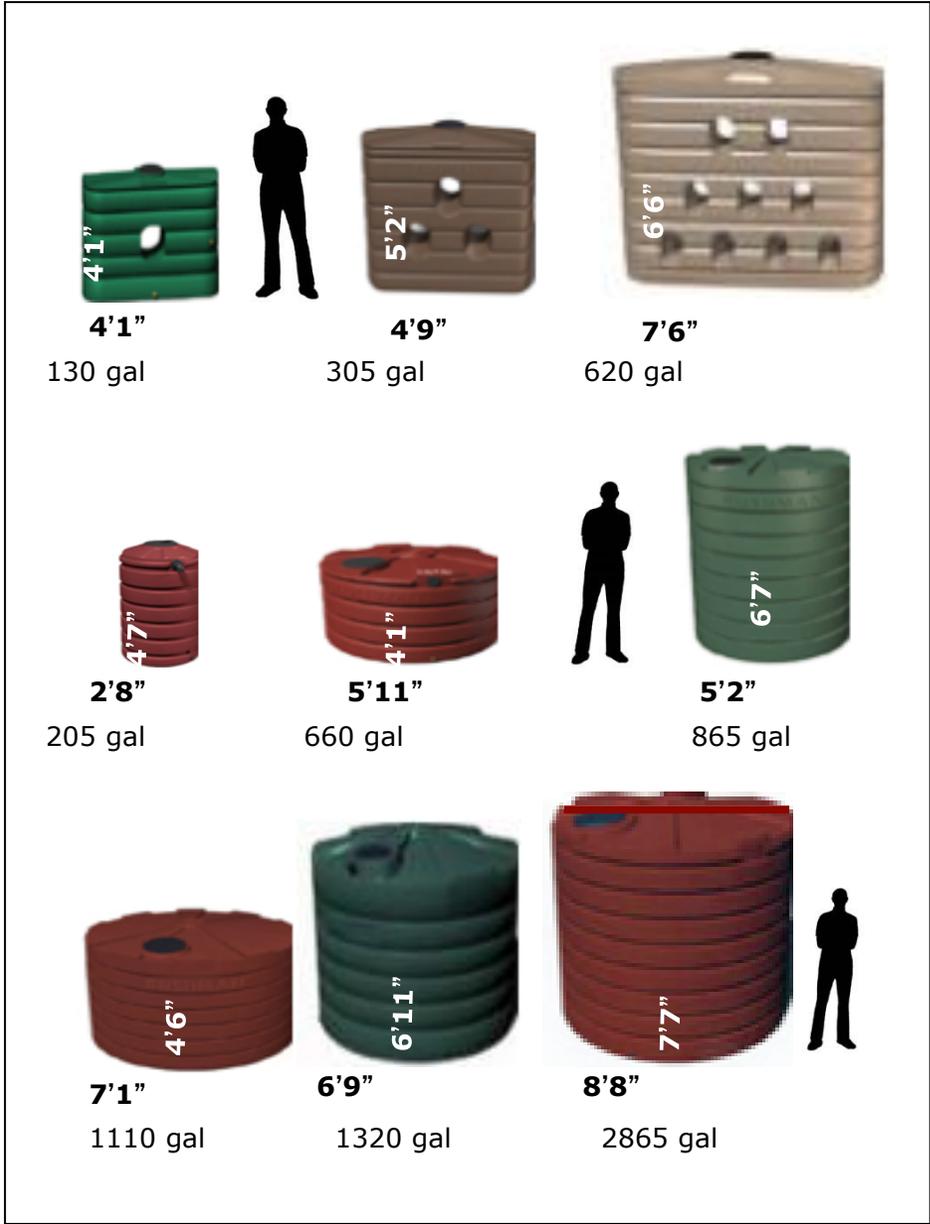
Tucson Water will rebate one-half of qualifying gray water system costs up to \$1,000 per household.

tucsonaz.gov/water/gray-water

Rainwater Harvesting Incentives Rebate Program

Tucson Water will rebate qualifying rainwater harvesting system costs under two levels of funding up to \$2,000 per household.

tucsonaz.gov/water/rwh-rebate

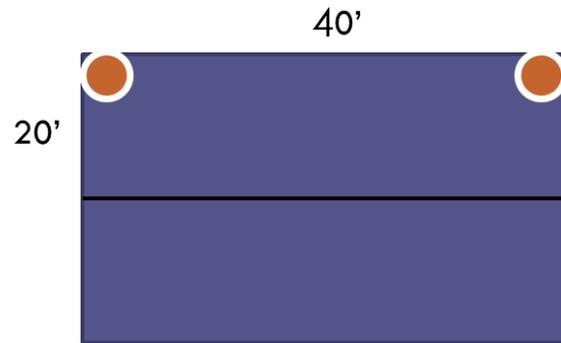




Do we even get enough rain??

- The size of the roof determines how much water you will be able to harvest

Area of roof (feet²) x rainfall depth (inches) x 0.63 = Harvested Water in gallons

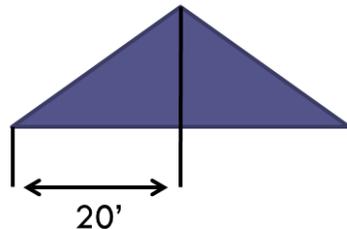


40 feet long by 20 feet wide = 800 square feet of roof

$800 \times 0.5 \times 0.63 = 252$ gallons when it rains $\frac{1}{2}$ inch

$800 \times 0.1 \times 0.63 = 50$ gallons when it rain $\frac{1}{10}$ inch

Over the course of year = 1000s gallons!



Integrated Design – holistic approach

- A design strategy to maximize the potential of a site by creating an efficient design that saves resources and improves the function and sustainability of the site
- Create a design where all elements work together
 - Trees shade house in the summer (microclimate)
 - Runoff is captured by use of green infrastructure and waters vegetation, mitigates runoff
 - Low water use plant palette provides habitat and beauty
- Stacking functions – lighter footprint, allows us to stretch resources

Thank You

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COLORADO STATE UNIVERSITY
EXTENSION



GOLDEN SUSTAINABILITY

PROTECT | PRESERVE | PROSPER

City of Golden Laundry-to-Landscape Ordinance

Theresa Worsham

October 20, 2020

Sustainability Goals

Responsible Use

- To reduce per capita total water use by at least 15% by 2030.



Drought Planning

- To develop a resiliency plan by 2020 to prepare for a time where Golden's and Colorado's climate may be substantially warmer and drier than it is today.

Resource Recovery

- To develop and implement a plan by 2020 where Golden's surplus water is used effectively.
- To recover resources from the City's wastewater by 2030.

Past Efforts

- Conservation Goals
- Irrigation Audits
- Landscaping codes
- Building Codes
- Smart Meter infrastructure



Past Efforts

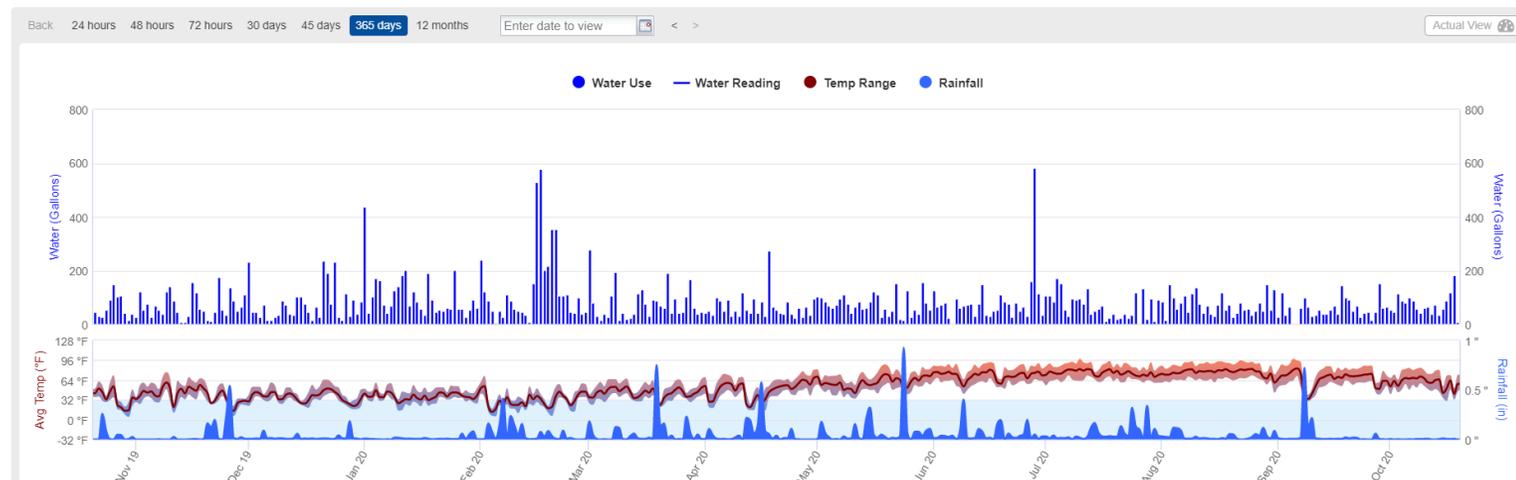


- Online water portal
- Rain barrels
- Grass-to-garden



Last 365 Days (Mon Oct 21, 2019 - Mon Oct 19, 2020)

28.9k Gallons (0 min, 79.2 avg, 584 max)



Colorado Reg 86

First..

- ✓ Conservation
- ✓ Efficiency
- ✓ **Beneficial Reuse**

But now...

- Fixture types?
- Residential vs. Commercial?

Considerations:

- Administration
- Simple concept
- Conflicts with building codes
- Water rights
- Ease of adoption
- Education

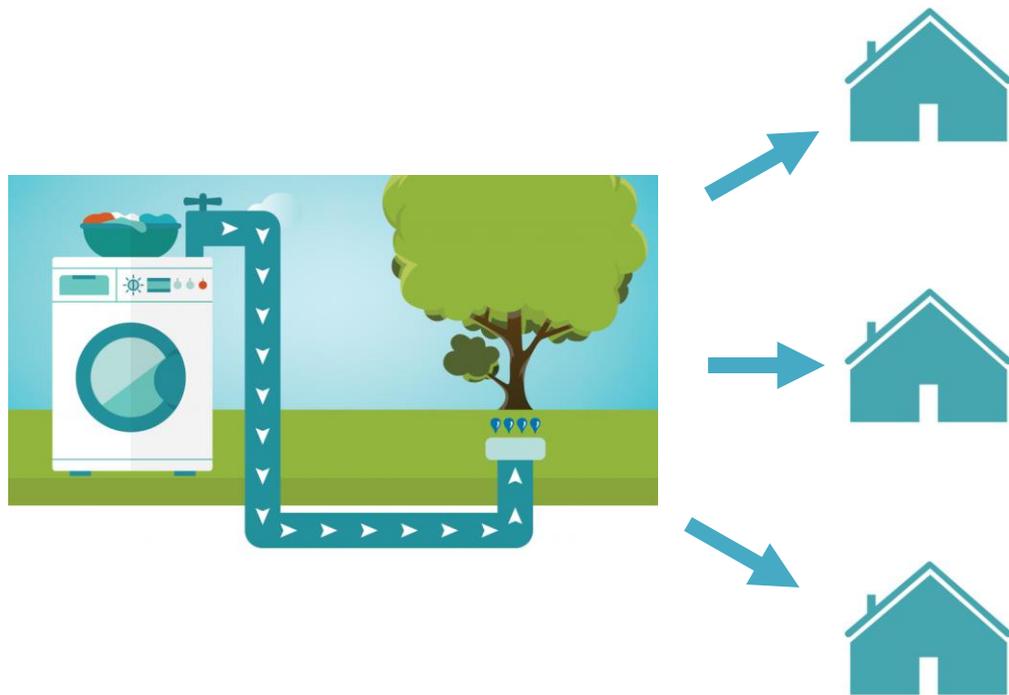
Grants available!

Help with:

- Research
- Draft Ordinance
- Public Outreach
- Adoption
- Pilot projects



Pilot Projects



- Selection
- Design
- Permitting
- Construction
- Inspection
- Tracking
- Maintenance
- Case Studies

Thank You

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**[www.cityofgolden.net/
sustainability](http://www.cityofgolden.net/sustainability)**

WaterNow Alliance

info@waternow.org

www.waternow.org



Discussion and Questions?

- Please type your questions into the Q&A box. We will get to as many questions from attendees as we can.
- Thank you to our speakers today!
- Join us this Thursday for “Introduction to landscape and irrigation certification programs in Colorado” at 1 p.m.