Water Management and Conservation

Presented at the AOBA Greening Existing Buildings Conference and Resource Center

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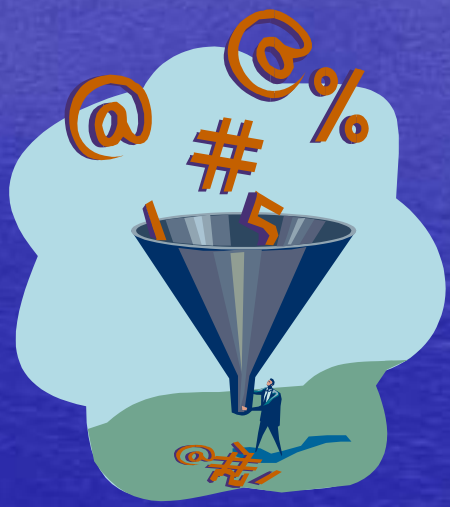
Overview

- Water use statistics
- Why conserve water?
- How can you reduce water use in your building?
  - Water audits
  - Efficient fixtures
  - Landscape design and irrigation
  - Stormwater management
  - Submetering
  - Public education
- Cost-benefit analysis to select program elements

Overview (cont.)

- Lots of information on many different topics

  (Too much for one talk)
- Presentation will be top-level overview with examples
- Handout - web resources for more information



Why Water Conservation?
Good Return on Investment

- For example:
  - DCWASA combined sewer and water rate is about $7.20 / 1000 gallons (www.DCWASA.com)
  - Water conservation programs can reduce water use from ~ 70 to 50 gallons/person/day (achievable per AWWA)
  - Translates to savings of ~ 7,300 gallons/person/year
  - In DC, can save ~ $50 /person/year based on current water rates
  - If residential unit has 1**00 people**, that's a savings of **$5,000 per year**!

Why Water Conservation (cont)? **Eco-Friendly**

- Protect rivers and streams
  - Prevents excessive withdrawals
- Reduce greenhouse gas emissions
  - Water and wastewater facilities use energy to pump and treat water
  - Reducing water use = reducing energy use = reducing GHG emissions

How do people use water inside the home?

End use	Indoor use percent
Toilet	30.9%
Clothes washer	25.1%
Shower	19.4%
Faucet	18.2%
Other domestic	2.7%
Bath	2.0%
Dishwasher	1.7%
TOTAL	100%

Source: 1999 Aquacraft survey of residential water use (12 cities)
http://www.aquacraft.com/Publications/resident.html

What about outside the home?

- Irrigation / outdoor uses can be a big percent
  - Average outdoor residential water use from 1999 Aquacraft study was **58%** of total
- Depends on many factors
  - Presence of pool, garden
  - In-ground sprinker system (35% higher)
- Leaks can significantly increase use
  - Underground
  - Inside the home

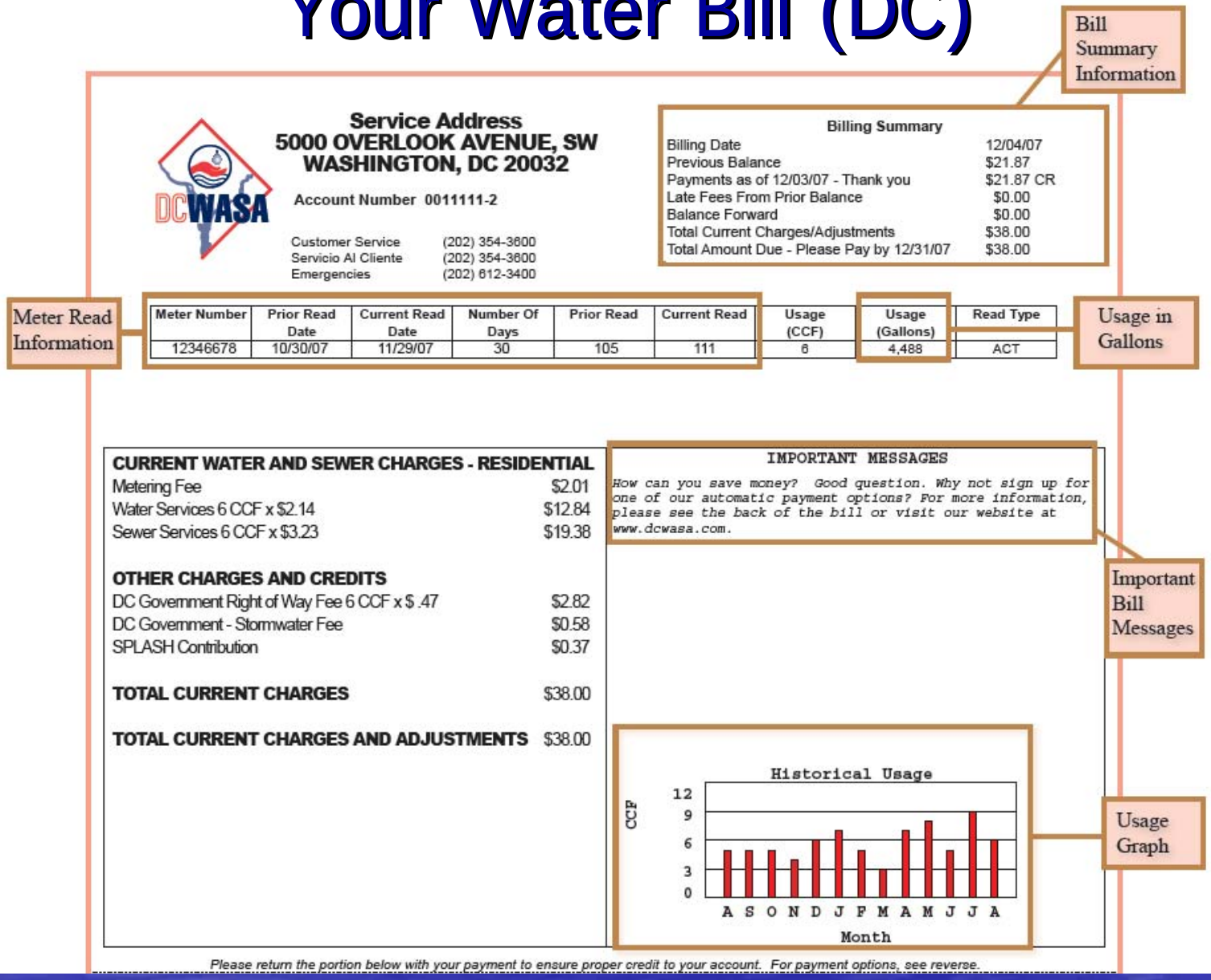
What is a water audit?

An on-site survey and assessment of

- water-using hardware
- fixtures
- equipment
- landscaping
- management practices

Goal is to determine the efficiency of water use and to develop recommendations for improving water-use efficiency.

Your Water Bill (DC)

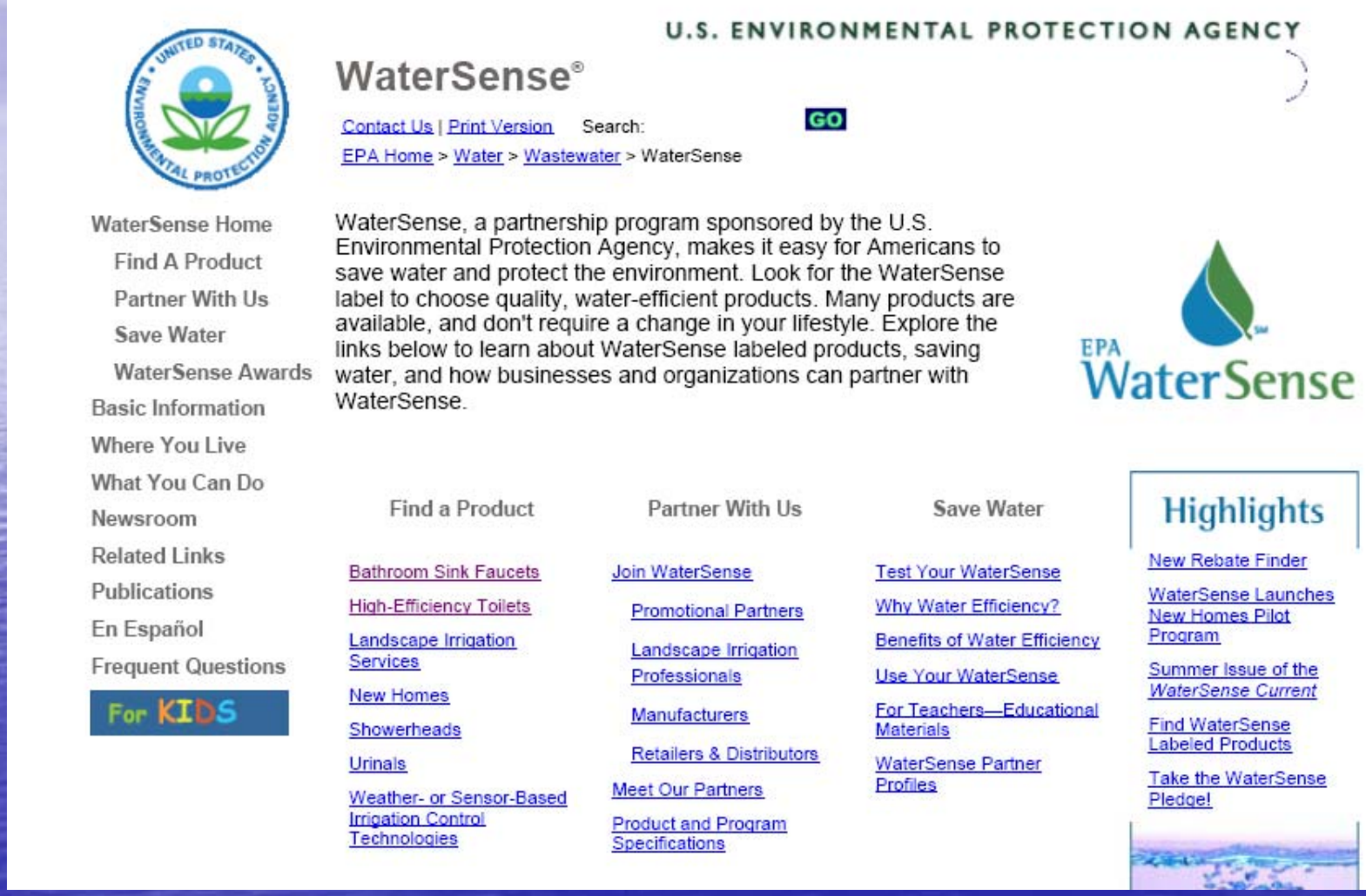


Source: http://www.dcwasa.com/customercare/understanding_bill.cfm

Water audits - General Approach

- Identify areas of greatest water use by metering or measuring
- Inventory water use of equipment
- Evaluate data
  - Night time use higher than expected?
  - Look for leaking fixtures, service lines
  - Compare to national averages
  - Compare use to other buildings of similar size and type
  - Check manufacturers recommendations (boilers/ cooling towers/ dish washers/ ice makers)

Efficient Fixtures - WaterSense



www.epa.gov/watersense/ as of September 21, 2008

Efficient Fixtures - WaterSense

- Products with WaterSense label meet criteria for
  - Water efficiency
    - Labeled products are about **20% more efficient**
  - Performance
- Must pass independent, third party testing
- www.epa.gov/watersense/ provides full list of WaterSense labeled products
  - More than 55 labeled faucets
  - More than 165 labeled high efficiency toilets

  [based on June 2008 data]

More from WaterSense

- Certified landscape irrigation professionals
- WaterSense partners
  - Manufacturers
  - Retailers
- Additional resources on www.epa.gov/watersense/
  - Rebate finder
  - Educational material
- In the works:
  - Developing performance specifications for
    - Showerheads
    - High efficiency urinals
- Launched the new homes pilot program on August 1, 2008

Bricor 1.0 gpm showerhead

How Can You Get WaterSense Labeled Products Into Your Building?

- Rebate or voucher programs
  - Tenant fills out application, submits receipt
  - Receives one-time rent credit
- Direct installation
  - Most reliable but expensive

Landscape and Irrigation

- Landscape design and management
- Irrigation equipment
- Alternative irrigation water sources

EPA's Water-Efficient Landscaping Principles

- Consistent with Xeriscape, started by Denver Water in 1981
- 8 guiding principles:
  - Group plants according to water needs
  - Use native and low-water-use plants
  - Limit turf areas to those needed for practical use
  - Use efficient irrigation systems
  - Schedule irrigation wisely
  - Make sure soil is healthy
  - Remember to mulch
  - Provide regular maintenance

Source: *http://www.epa.gov/watersense/docs/water-efficient_landscaping_508.pdf*

Landscape Design and Management - **Technical Resources**

- Irrigation Association
  - http://www.irrigation.org/
- Alliance for Water Efficiency, Comprehensive Resource for Landscape and Irrigation
  - http://www.allianceforwaterefficiency.org/Landscape_and_Irrigation_Library_Content_Listing.aspx
- WaterSense Publications
  - http://www.epa.gov/watersense/pubs/index.htm
- USEPA Green Acres Toolkit
  - http://www.epa.gov/glnpo/greenacres/toolkit/index.html

Irrigation Equipment

- Smart Water Application Technologies (SWAT) - created in 2001 by water purveyors and irrigation association (non-profit)
- Promotes landscape water use efficiency through use of state-of-the-art irrigation technologies
- Provides a **third party process** for water conservation testing of products that a manufacturer may claim saves water.

Irrigation Equipment SWAT (cont)

- Current Test Protocols for
  - Evapotranspiration (ET) controllers
  - Soil moisture sensors (SMS) controllers [draft]
  - Rain sensors [draft]
- For more information:
  - http://www.irrigation.org/SWAT/Industry/
  - http://www.epa.gov/watersense/specs/controltech.htm

Alternative Irrigation Water Source - Graywater

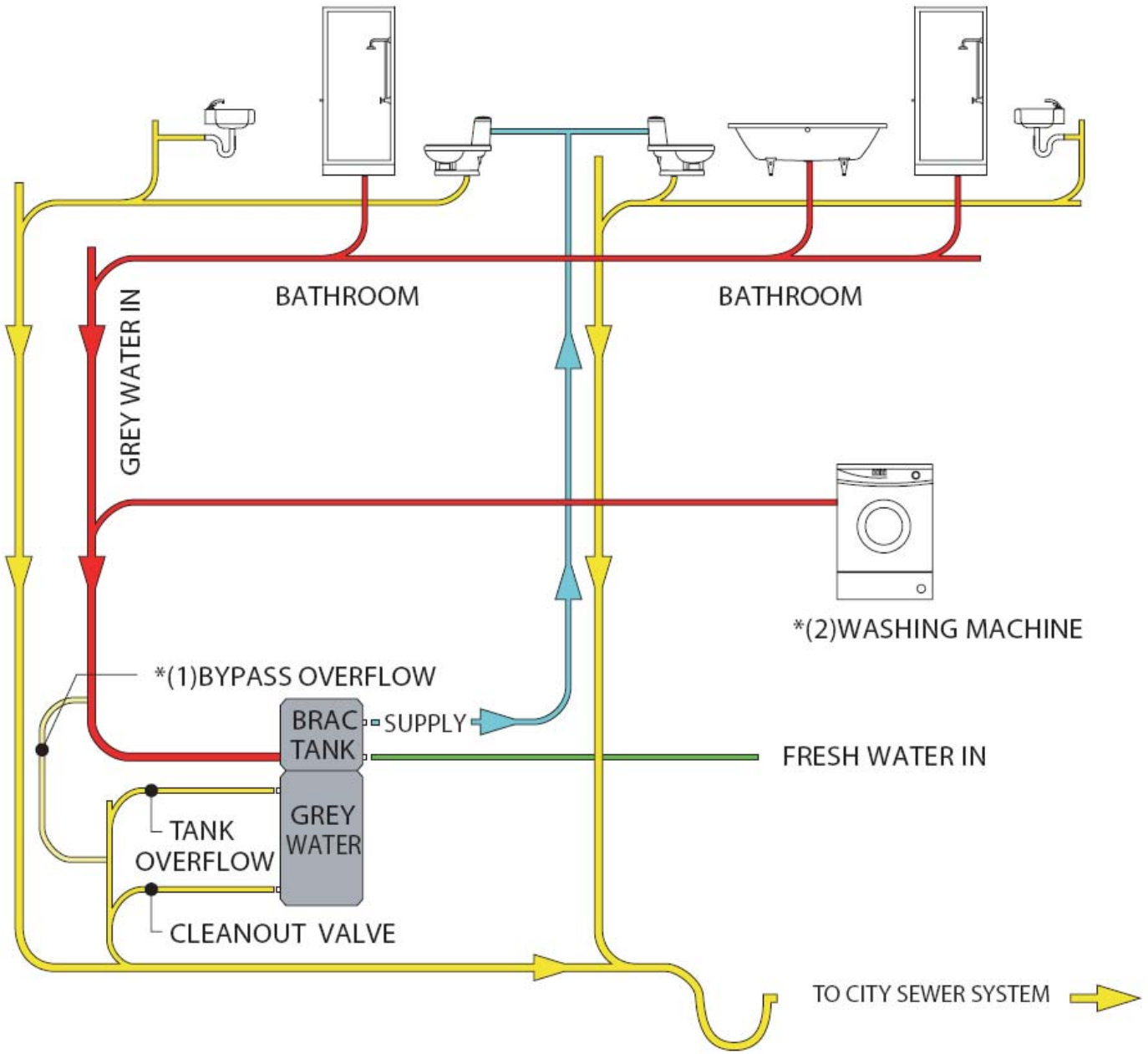
- What is graywater?
  - Untreated wastewater from lavoratory washbasins, laundry, and bathing
  - Most common uses are subsurface irrigation and to flush toilets
- More than ½ the water used in a home could be reused as graywater
- Capture and reuse requires
  - Separate drain lines
  - Storage
  - Treatment (filtration)
- Package graywater recovery and treatment systems are available

Alternative Irrigation Water Sources – Graywater (cont)

- Examples of package systems
  - AQUS TM system by WaterSaver Technologies (U.S.), www.watersavertech.com
  - Rewater Systems (U.S.), www.rewater.com
  - Ponton AquaCycle ® system (German), www.pontos-aquacycle.com/pontos/en/company/pontos.html
  - Perpetual Water (Australia), www.perpetualwater.com.au/
  - Brac system (Canada), www.bracsystems.com/home.html

For an up-to-date list of manufacturers of graywater package systems, see: http://www.allianceforwaterefficiency.org/graywater_introduction.aspx

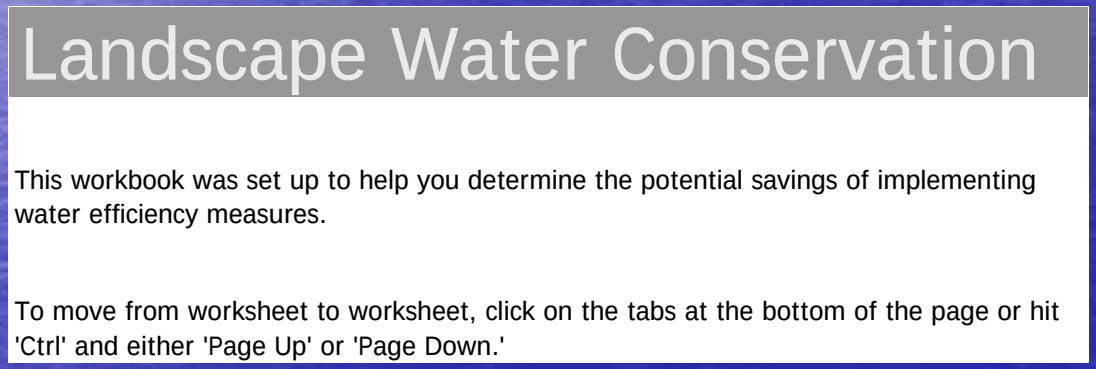
BRAC SYSTEM SCHEMATIC – TOILET FLUSH



www.bracsystems.com

Landscape and Irrigation – Online Tools

Audits - can use online software such as Excel ® workbook developed by Georgia DNR

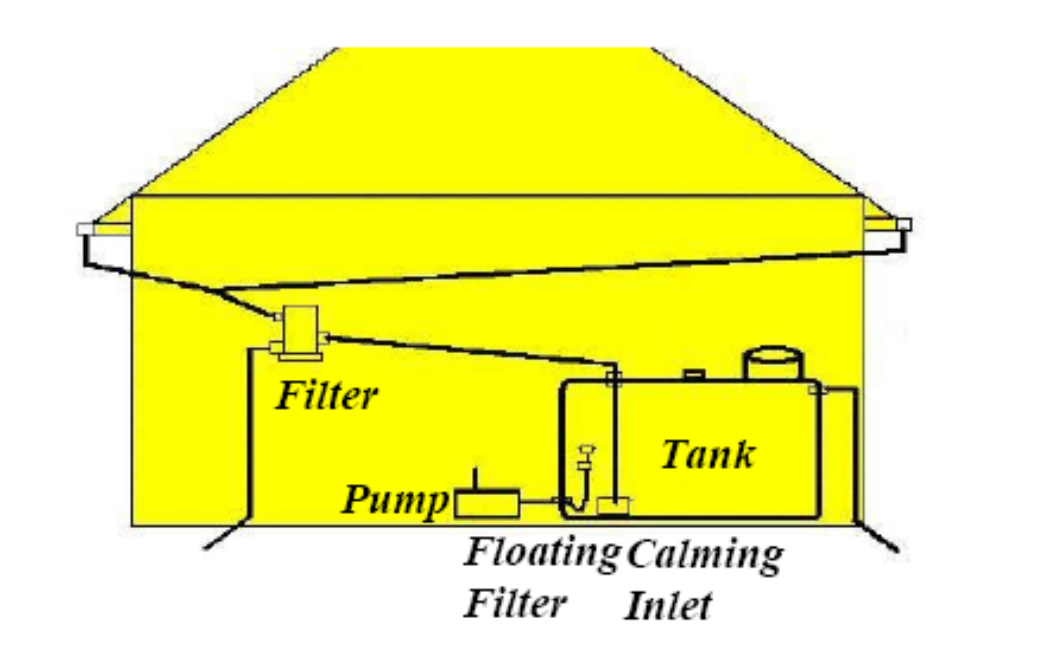


http://www.p2ad.org/files_xls/Landscape%20Audit.xls

Stormwater Management

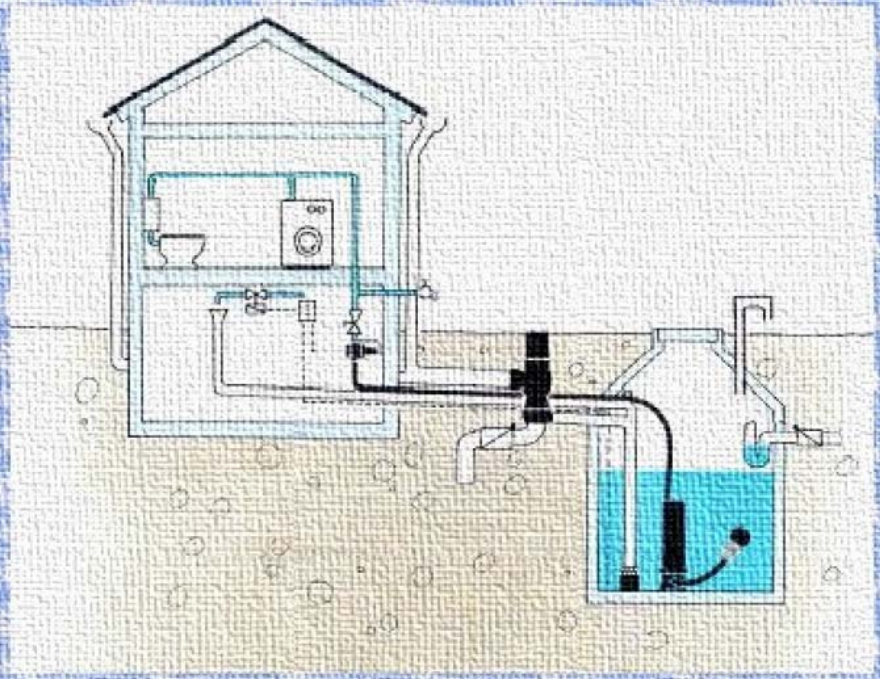
- Stormwater can be captured and reused on site
- “Rainwater harvesting” is gaining popularity
  - Captures rainwater from impervious surfaces (typically roofs)
  - Filters and stores, uses for irrigation and/or toilet flushing
  - Roof washing system is important to remove contaminants and debris
  - Can estimate system capacity based on annual rainfall, capture area
- Dual benefit
  - Reduces water use
  - Reduces stormwater runoff

Rainwater Harvesting



Source: 2007 Virginia Rainwater Harvesting Manual, Photo Courtesy of Rainwater Management Solutions

VIRGINIA RAINWATER HARVESTING MANUAL



A comprehensive guide to examining, designing and maintaining rainwater harvesting systems to abate stormwater runoff.

The Cabell Brand Center 2007

THE CABELL BRAND CENTER

http://www.dcr.virginia.gov/documents/stmrainharv.pdf

Stormwater Management (cont)

- Stormwater runoff can be captured from parking lots and used for irrigation purposes

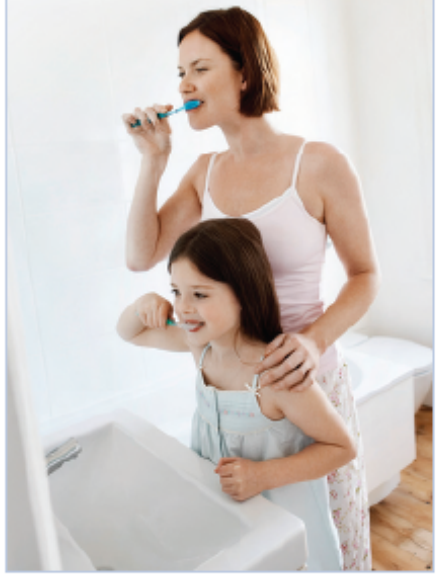
Submetering

- When tenants in multi-family buildings pay for water as part of rent, no incentive to reduce water use
- Submetering is addition of meters to individual units in multi-family dwelling
  - To be effective, needs to be combined with volumetric pricing, i.e., tenants pay for the water they use
  - Nationally, up to 4% of multi-family residents are submetered
- Average reduction in water use is 15%
  - Based on study of 13 cities, 2005 report available online at http://www.aquacraft.com/Projects/submeter.html

Public Education

- Distribute educational materials to tenants
  - Lots of ready-to-use material available on the web
  - Comprehensive list of websites with educational material at http://www.awwa.org/waterwiser/

Saving water around the home is simple and smart. The average household spends as much as $500 per year on its water and sewer bill but could save about $170 per year by retrofitting with water-efficient fixtures and incorporating water-saving practices.



Let WaterSense® show you how to save water—and your wallet.

How much money you save will depend on the cost of water where you live, but it makes sense that using less water lowers your utility bill. More importantly, using less water preserves this limited resource for generations to come.

look for WaterSense Meets EPA Criteria

(866) WTR-SENS (987-7367)
www.epa.gov/watersense watersense@epa.gov

Recycled/Recyclable—Printed with Vegetable Oil Based Inks on 100% Process Chlorine Free Recycled Paper.

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EPA WaterSense

Simple Steps to Save Water

Inside the Home

By giving your bathroom a water efficiency makeover with WaterSense labeled toilets and faucets, you could save more than 11,000 gallons annually—and that's no drop in the bucket.

Get Flush With Savings

- Consider installing a WaterSense labeled toilet, which uses 20 percent less water while offering equal or superior performance. Compared to older, inefficient models, WaterSense labeled toilets could save a family of four more than $90 annually on its water utility bill, and $2,000 over the lifetime of the toilets.
- Check for toilet leaks by adding food coloring to the tank. If the toilet is leaking, color will appear in the bowl within 15 minutes. (Make sure to flush as soon as the test is done, since food coloring can stain the tank.)

Accessorize Your Faucet

- Installing a WaterSense labeled aerator is one of the most cost-effective ways to save water. Also consider replacing the entire faucet with a WaterSense labeled model. Either way, you can increase the faucet's efficiency by 30 percent without sacrificing performance.
- Repair dripping faucets and showerheads. A drip rate of one drip per second can waste more than 3,000 gallons per year.

Clean Up With Savings

- A full bathtub can require up to 70 gallons of water, while taking a 5-minute shower uses only 10 to 25 gallons.
- Turning off the tap while you brush your teeth can save 8 gallons per day.

Lighten Your Loads

- Wash only full loads of dishes and clothes or lower the water settings for smaller loads.
- Replace your old washing machine with a high-efficiency, ENERGY STAR® labeled model, which uses up to 50 percent less water and electricity.

The average single-family suburban home uses at least 30 percent of its water for outdoor purposes such as irrigation and as much as 70 percent in dry climates. Some experts estimate that more than 50 percent of landscape water is wasted due to evaporation, wind, or overwatering.

Water When Needed

- Water your lawn or garden during the cool morning hours, as opposed to midday, to reduce evaporation.
- Look for sprinklers that produce droplets, not mist, or use soaker hoses or trickle irrigation for trees and shrubs.
- Set sprinklers to water lawns and gardens only. Check that you're not watering the street or sidewalk.
- Try not to overwater your landscaping. Learn plants' water needs and water different types appropriately.

Grow Green Grass

- Don't overfertilize. You will increase the lawn's need for water.
- Raise your lawn mower blade to at least 3 inches. Taller grass promotes deeper roots, shades the root system, and holds soil moisture better than a closely cropped lawn.

Garden With Care

- Plant climate-appropriate species. Try plants that are native to where you live, which don't require as much water, and group plants together by water requirements.
- Use mulch around trees and plants to help reduce evaporation and control water-stealing weeds.

Outside the Home

http://www.epa.gov/watersense/docs/ws_simplesteps508.pdf – pg 2

Cost Benefit Analysis

- Simple approach

  Benefits = projected yearly savings in water bill

  Cost = cost of installation and maintenance (labor, materials, O&M)

  Determine payback period (years):

  Cost / projected yearly savings

- Benefits can be difficult to quantify
- Can estimate reduction in water use (e.g., 20% for WaterSense labeled products) or use online resources
  - http://www.cuwcc.org/uploads/tech_docs/Costs_Savings_Study_Final_042805.pdf

Questions?

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