

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



The Washington, D.C. Stormwater Retention Credit Program – A Model for the Nation?

By:

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HEALTHY BUILDINGS' SOLUTIONS

Testing & Diagnostics Group

Proactive IAQ
Reactive IAQ
Assessments & Documentation
Construction Monitoring
Industrial Hygiene Services

- Mold
- Asbestos
- Lead
- Legionella

Sustainability Group

Corporate Sustainability
LEED Certification
LEED a la carte
BOMA 360
Green Point Rated
Climate Solutions

Energy & Resource Group

Energy Star Rating/Label
Level 1 Audit
Level 2 Audit
LEED EA c2.1/2.2 Audit
Commissioning (Cx)
Retro-Commissioning (RCx)
Energy Modeling
Onsite Generation
Water Efficiency Technologies
Rainwater Harvesting
Steam System Efficiency

“We Make Buildings More Valuable”

Let's Play:

**“How Much Water Does it
Take.....?”**

Q: How much water does it take to produce a cheeseburger?



A: 634 gallons

Q: How much water does it take to produce a circuit board?



A: 1,100 (ultra pure) gallons

Q: How much water does it take per round of golf to maintain the course?



A: 2,100 gallons

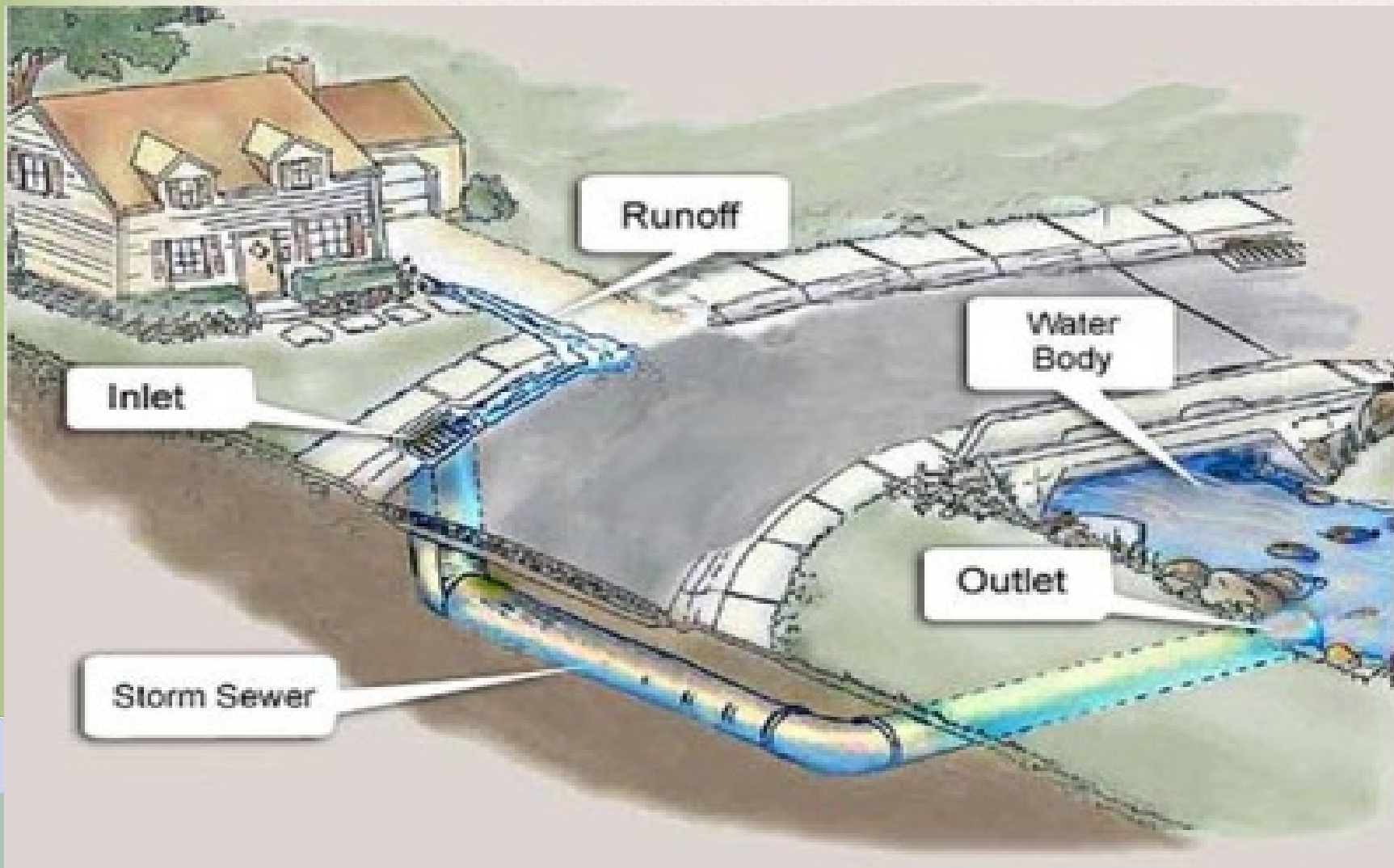
East: Aging Infrastructure



Environmental Issues Also Contribute to the Rapidly Rising Cost of Water

- 1. Stormwater Runoff**
- 2. Combined Sewer Overflow**

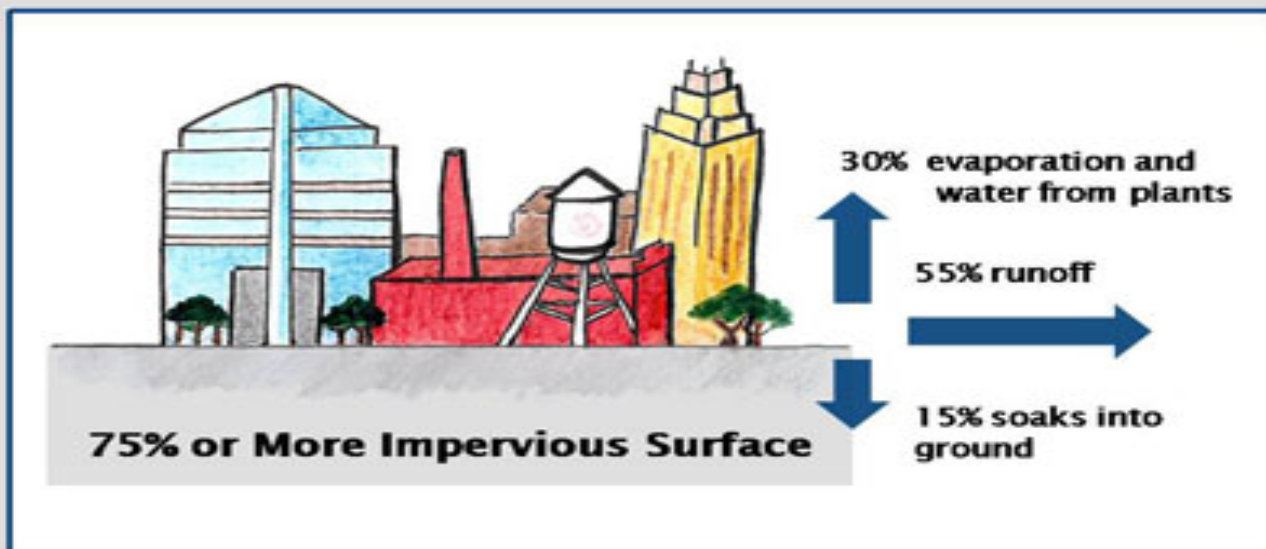
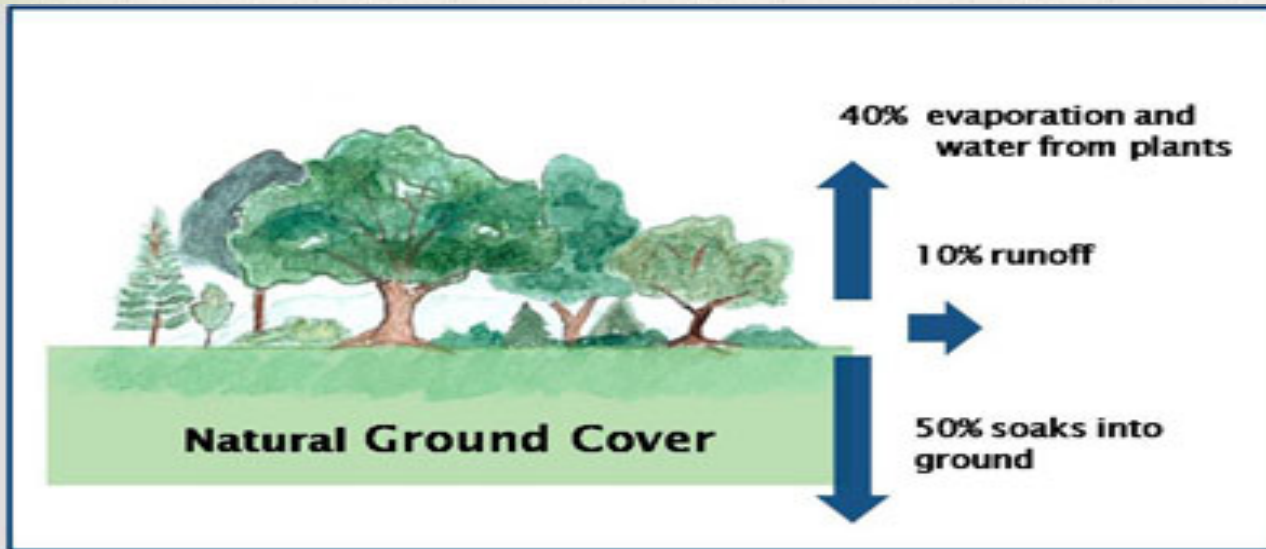
Stormwater Runoff



Stormwater Runoff



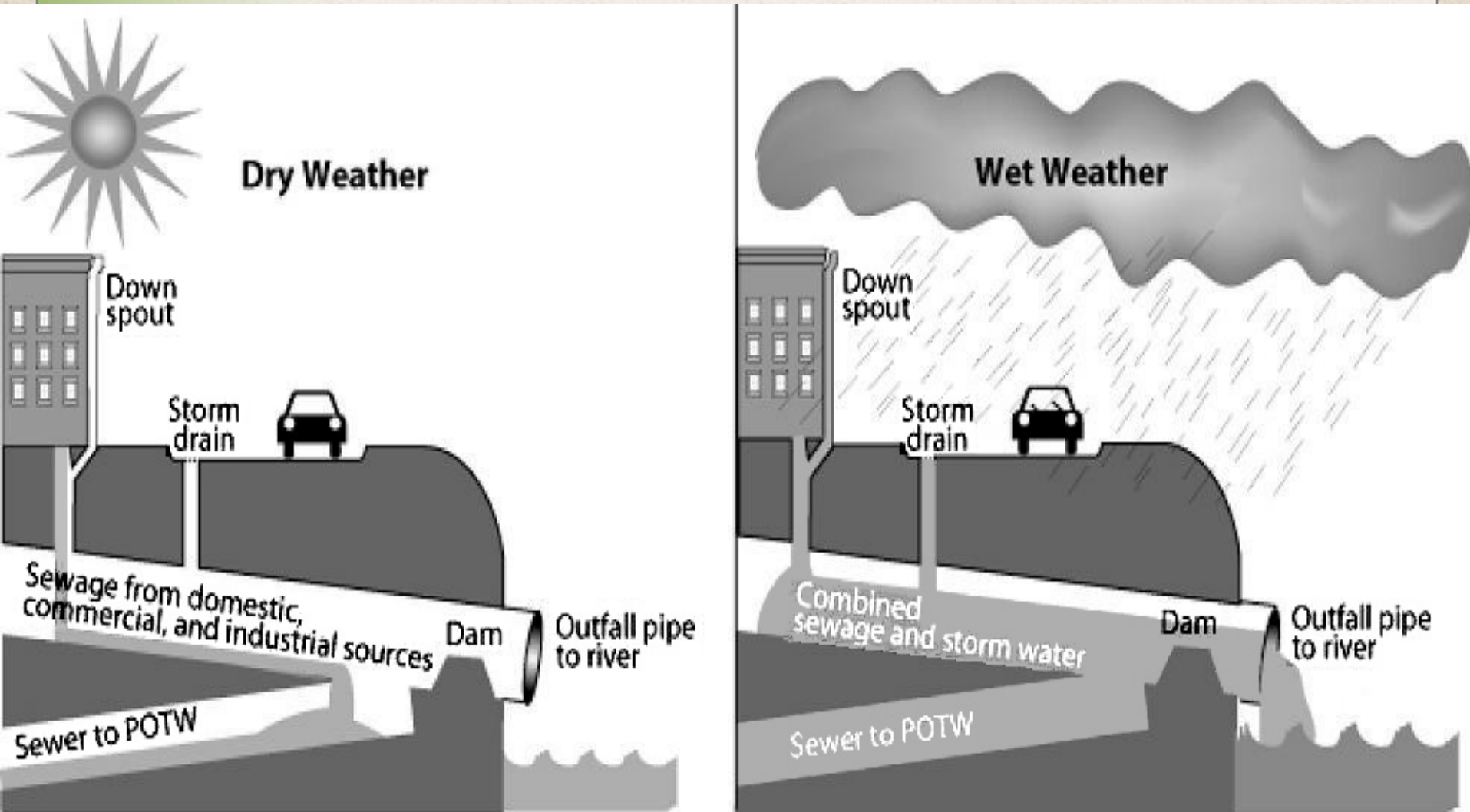
Stormwater Runoff



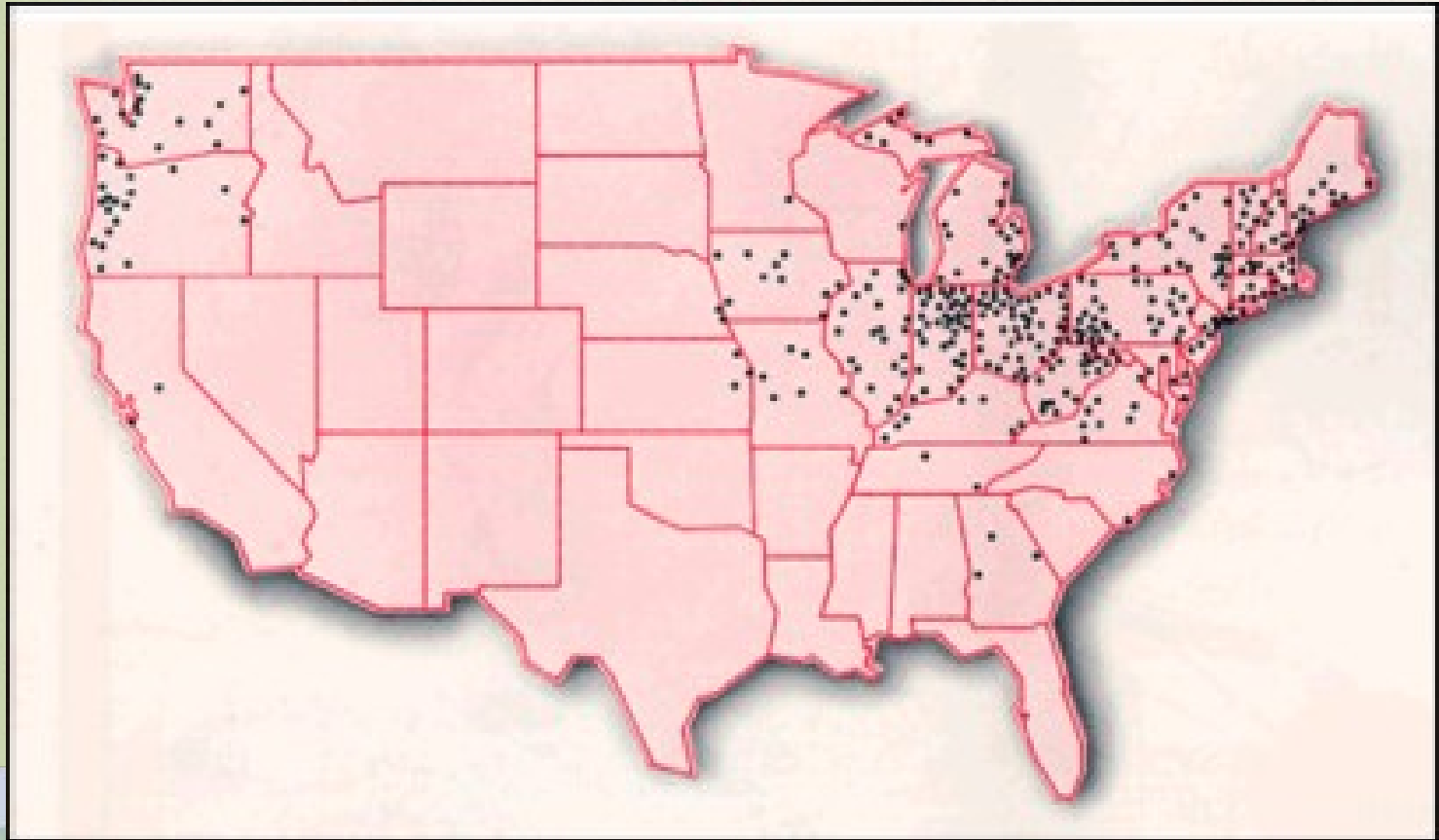
Stormwater Runoff



Combined Sewer Overflow



U.S. Cities With Combined Sewer Systems (approx. 800)



Washington Harbor, Georgetown



WDC Clean Rivers Project



Rainwater Capture

WDC DDOE Best Management Practices

- **Green Roofs**
- **Rainwater Harvesting Systems***
- **Rain Gardens**
- **Permeable Pavement Systems**
- **Bioretention**
- **Stormwater Filtering Systems**
- **Stormwater Infiltration**
- **Open Channel Systems**
- **Stormwater Ponds**
- **Stormwater Wetlands**
- **Proprietary Practices**
- **Tree Planting & Preservation**

WHAT SETS RHS APART FROM THE OTHER BMP?

With a RHS you, as a rule, use the retained water for a needed purpose!

**(reduce your monthly water &
sewer bill)**

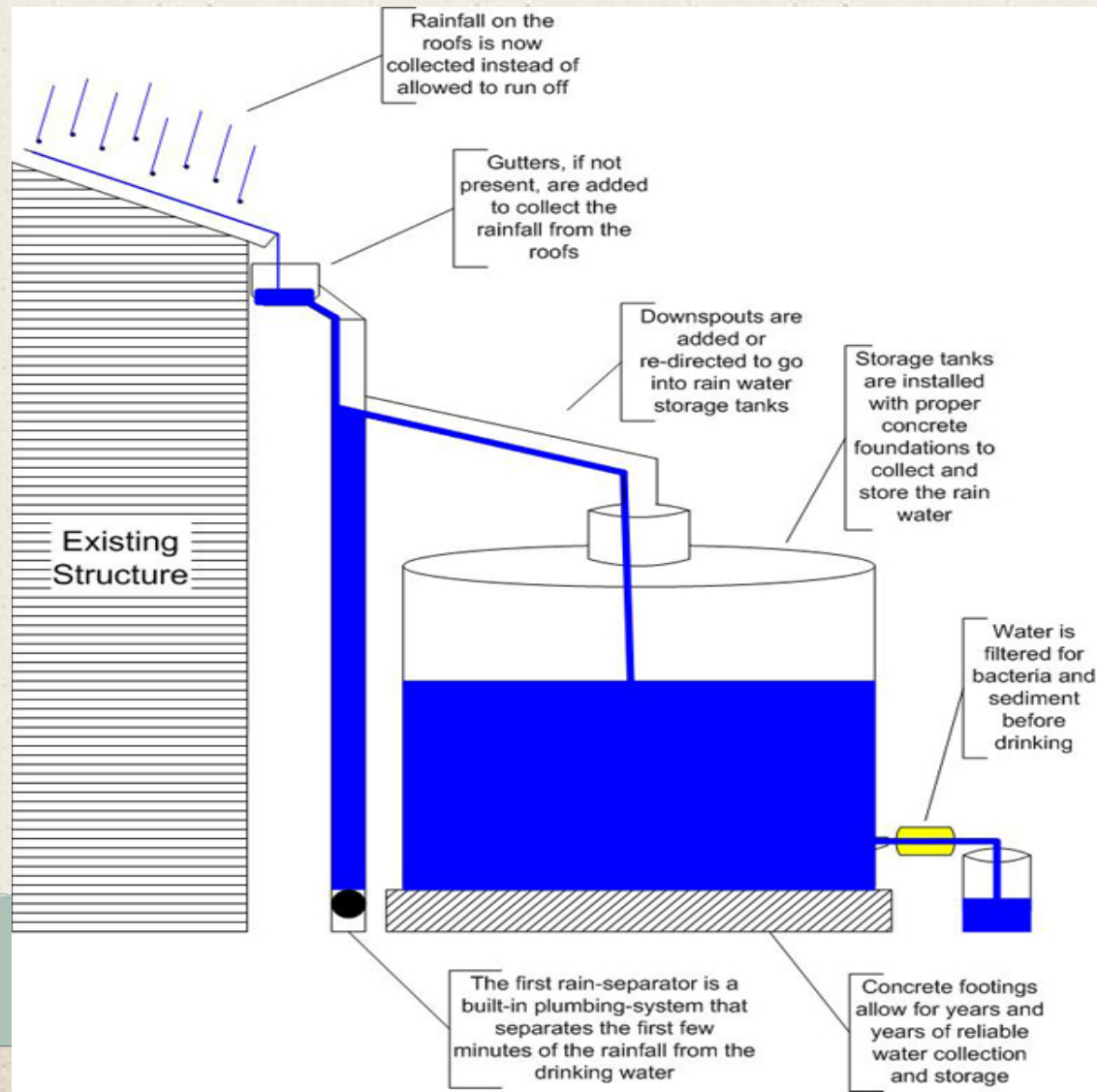
Some Benefits of Rainwater Harvesting Systems

- **Reduce surface runoff**
- **Reduce combined sewer overflow**
- **Reduce municipal fresh water and sewer use**
- **Avoid impervious surface charges & fees**
- **Reduce energy use to move water long distances**
- **Easy to maintain**
- **High quality water**
- **LEED and other green building certification credits**
- **Showcase property for corporate green branding**
- **Meet permitting requirements**

Rainwater Harvesting Systems: As Old as Civilization



Rainwater Harvesting Systems



Cistern Outside



Cistern in Basement or Parking Garage



©The Kestrel Design Group, Inc.

Cistern on Roof



Using Harvested Rainwater: Irrigation



Using Harvested Rainwater: Cooling Tower Makeup



Using Harvested Rainwater: Toilet Flushing



Washington, D.C.

Stormwater Retention Credit Program



Performance Standards

Major land-disturbing activity (New Construction)

- 5,000 ft² or more of land-disturbing activity.
- Retain the first 1.2” of rainfall (90% event) on site or through a combination of on-site and off-site retention.

Major substantial improvement activity

Renovation for which:

- Cost exceeds 50% pre-project value of structure and
- Combined footprint of structure and land disturb \geq 5,000 ft².
- Retain the first 0.8” of rainfall on site or through a combination of on-site and off-site retention.

Key Program Transition Dates

- **January 15, 2015** – Fully effective for Major Land Disturbing Activities.
- **July 14, 2015** – Fully effective for Major Substantial Improvements

Key Term Defined

Stormwater Retention Volume (SWRv)

- amount of stormwater that must be retained during a storm event to meet Program requirements. A calculated volume.*
- SWRv = f(surface area, impervious cover, type of cover)*
- retention can be a combination of onsite and offsite*

Allowable Use of Off-Site Retention

- At least 50% of stormwater must be captured onsite.
- Onsite retention $\geq 50\%$ of SWRV, free to go offsite for the balance.

Note: for onsite retention to be $<50\%$ it must be proven to DDOE that onsite retention is technically infeasible or environmentally harmful.

Allowable Use of Off-Site Retention

Example 1

- SWRv = 10,000 gallons
- Onsite Minimum = 5,000 gallons
- Onsite Achievable = 3,000 gallons
- **PROJECT INELIGIBLE TO RECEIVE CONSTRUCTION PERMIT!**

Example 2

- SWRv = 10,000 gallons
- Onsite Minimum = 5,000 gallons
- Onsite Achievable = 7,000 gallons
- Offsite necessary = 3,000 gallons

Two Options to Achieve Offsite Retention

1. In-lieu fee payment = **\$3.57**

- Paid to DDOE
- Corresponds to 1 gallon of retention for 1 year
- Achieves 1 gallon of offsite retention for 1 year
- Inflation adjusted annually

2. Stormwater Retention Credits

- Privately tradable via DDOE SRC 'Cap & Trade' program
- Corresponds to 1 gallon of retention for 1 year
- Achieves 1 gallon of offsite retention for 1 year
- Can purchase 3 years worth of SRC at one time
- Can purchase SRC from yourself (SRC generated at different facility)

Stormwater Retention Credits

First generated SRC

- April 29, 2014
- 4 large rain gardens
- The Westchester Apartments, NW WDC
- 51,249 SRC

First SRC Trade

- September 19, 2014
- 11,013 SRC @ \$2.27/SRC = \$25,000

DDOE SRC CURRENTLY FOR SALE

Stormwater Database - SRCs for Sale

Page 1 of 1

Stormwater Database : Offsite Retention | SRCs for Sale

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SRCs for Sale

Contact name	Contact email	Contact phone	Watershed where SRCs are generated	Asking price per SRC	SRCs in range (tot)
<u>Ann Benefield</u>	<u>ABENEFIELD@THEWESTCHESTERCORP.COM</u>	<u>(202) 338-7700</u>	<u>Potomac</u>	<u>\$2.45</u>	40,236
<u>Greg DeHaven</u>	<u>GDEHAVEN@LENKIN.COM</u>	<u>(202) 477-9917</u>	<u>Rock Creek</u>	<u>\$2.00</u>	12,948
<u>Lano Parcel 12 LLC c/o CityInterests LLC</u>	<u>LBARDHI@CITYINTERESTS.COM</u>	<u>(202) 944-4729</u>	<u>Anacostia</u>	<u>\$2.55</u>	19,413
<u>Ronan Heritier</u>	<u>RONAN.HERITIER@DIPLOMATIE.GOUV.FR</u>	<u>(202) 944-6196</u>	<u>Potomac</u>	<u>\$2.45</u>	30,495
<u>USP 700 6th Street LLC</u>	<u>MNATHAN@AKRIDGE.COM</u>	<u>(202) 756-3085</u>	<u>Anacostia</u>	<u>\$2.40</u>	8,732
Totals (5 groups)					111,824

DDOE CURRENT EXPECTED SRC

Stormwater Database : Expected SRCs and Offv | Expected Offv SEP-15-2015 12:17 PM

Expected Offv

Watershed	Subshed	Sewershed	Offv (gal)
Anacostia	Anacostia River	CSS	1035
Anacostia	Anacostia River	CSS	150
Anacostia	Anacostia River	CSS	621
Anacostia	Anacostia River	CSS	3077
Anacostia	Anacostia River	CSS	14574
Potomac	Foundry Branch	MS4	8304
Anacostia	Anacostia River	CSS	2098
Anacostia	Anacostia River	CSS	903
Anacostia	Anacostia River	CSS	705
Anacostia	Anacostia River	CSS	419
Anacostia	Hickey run	MS4	1622
Anacostia	Anacostia River	CSS	1455
Potomac	Oxon Run	MS4	1825
Anacostia	Anacostia River	CSS	7097
Anacostia	Northwest Branch	MS4	15052
TOT			58937

Achieving Offsite Stormwater Retention Volume (Offv)

- **Offv stated on Stormwater Management Plan**
- **Offv must be met as of DDOE final construction inspection**
- **Offv is an ongoing obligation:**
 - ✓ **Met on yearly or multi-year basis**
 - ✓ **Met with a mix of in-lieu of fee payments & SRC, and mix can change**
 - ✓ **Can be reduced in the future by increasing onsite retention**

Calculating Cost to Achieve Offv

Assumptions

- SWRv calculated to = 10,000 gallons
- Onsite minimum retention = 5,000 gallons
- Achievable onsite retention = 7,000 gallons
- Offv = 3,000 gallons
- SRC In-Lieu Fee = \$3.57/SRC
- SRC market fee available = \$2.50/SRC

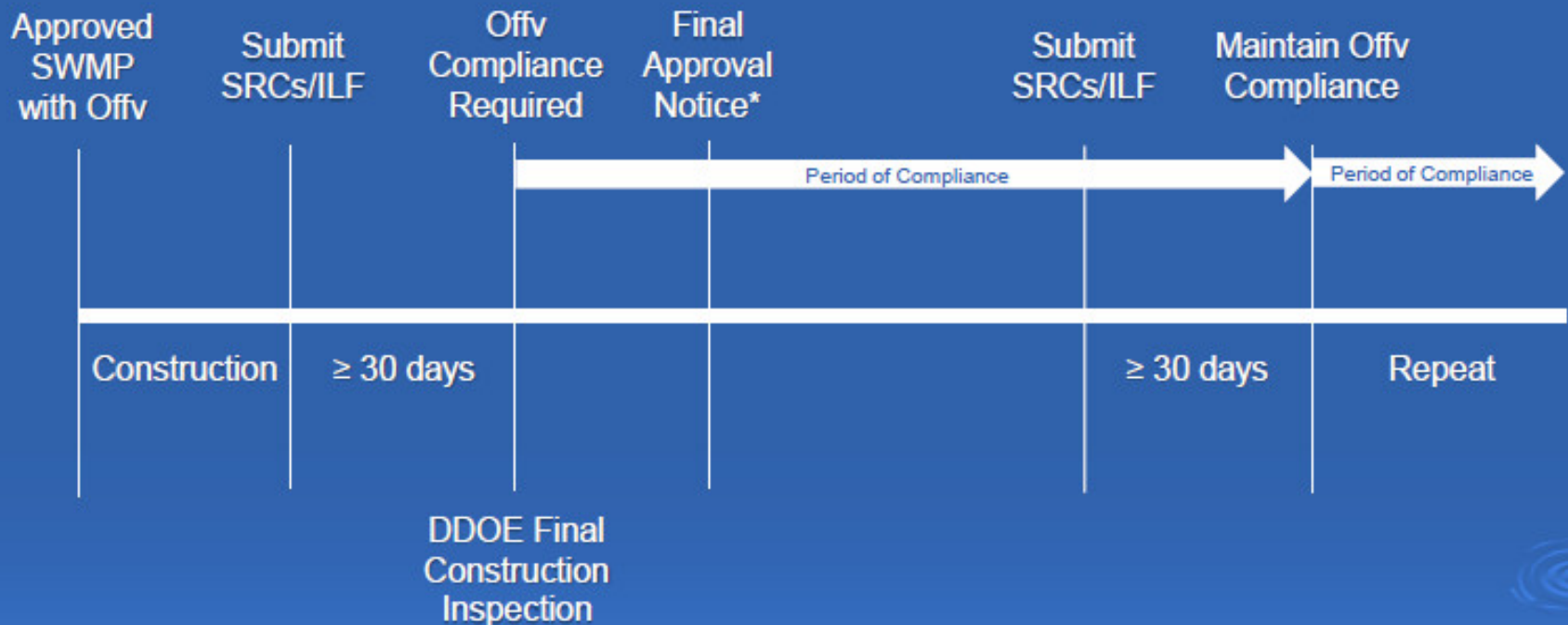
Using In-Lieu Fee

Annual = 3,000 gal x \$3.57/SRC = **\$10,710**

Using SRC Market Fee

Annual = 3,000 gal x \$2.50/SRC = **\$7,500**

Timeline for Achieving Offv



* To receive a Final Approval Notice, regulated sites must submit an As-Built SWMP and proof of meeting any Offv obligation.

More on SRCs

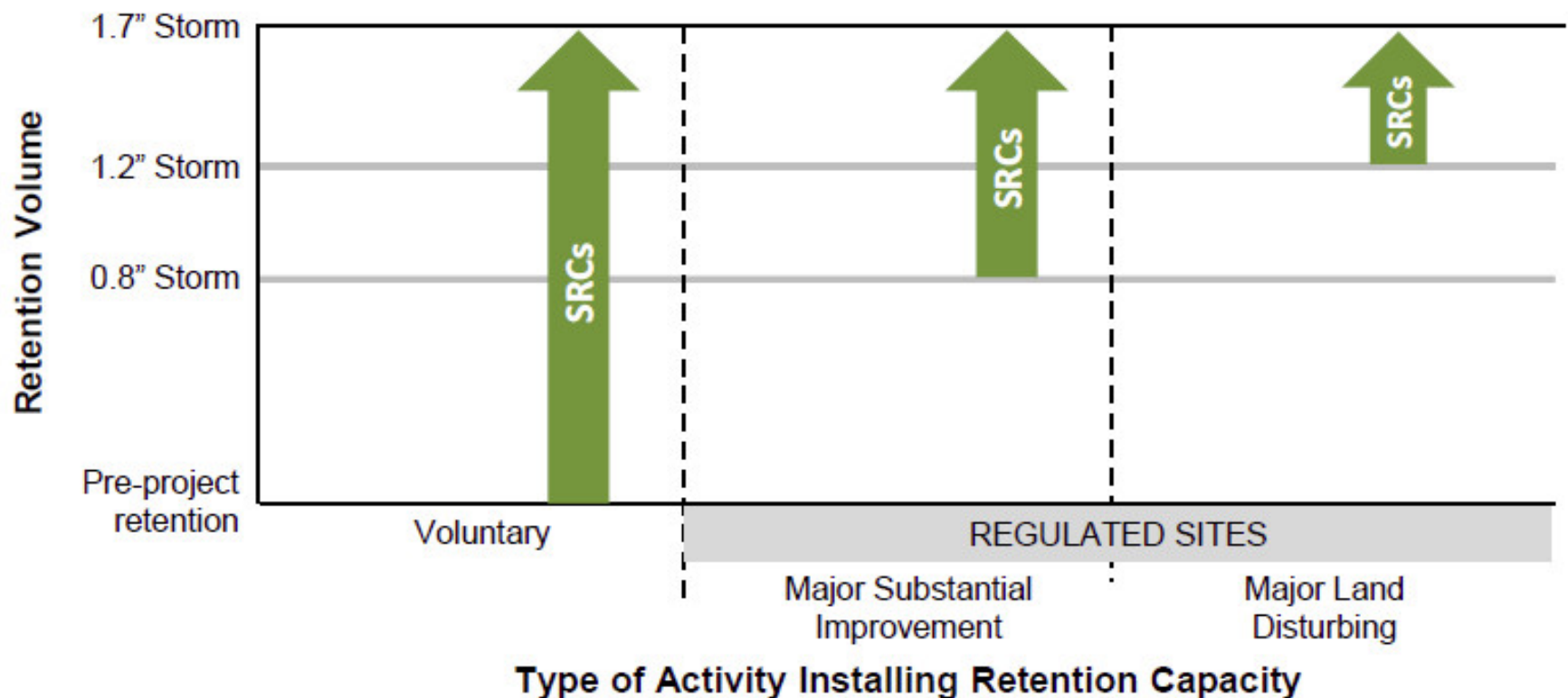
- SRCs can be banked indefinitely
- Maintenance failure at SRC-generating site does not invalidate SRCs purchased from that site
- An SRC owners can retire SRCs without using
- Retention capacity must be located in WDC
- SRCs certified for up to 3 years, every 3 years.
- SRCs can be certified for retention above what is necessary for regulatory compliance, or existing retention, up to 1.7” storm.

Eligibility for SRC Certification

Eligible BMPs & land cover changes must:

- 1) Achieve retention above existing retention or regs.

Retention Volume Eligibility: Stormwater Retention Credits (SRCs)



BMP Requirements for Drawing Down Retained Stormwater in Order to Earn SRCs

- **Green Roofs – within 72 hours**
- **Rain Gardens – within 72 hours**
- **Permeable Pavers – within 48 hours**

Rainwater Harvesting Systems – a different story.

No Ongoing Time Requirements for the Drawing Down of RHS Captured Stormwater to Earn SRCs

Instead captured water draw down rate is built into an available SRC calculation, which is a function of:

- *Average Daily Water Demand (building usage & profile)*
- *Average daily rainfall (30 year average 1977 – 2007)*

Economics of Installing a Rainwater Harvesting System in Washington, D.C.

TWO EXAMPLES

1. **New Construction – RHS to meet 1.7” storm event as part of SWMP and to earn some SRC**
2. **Retrofit of Existing Building – voluntary RHS with no SWMP requirements**

ASSUMPTIONS

(for both examples)

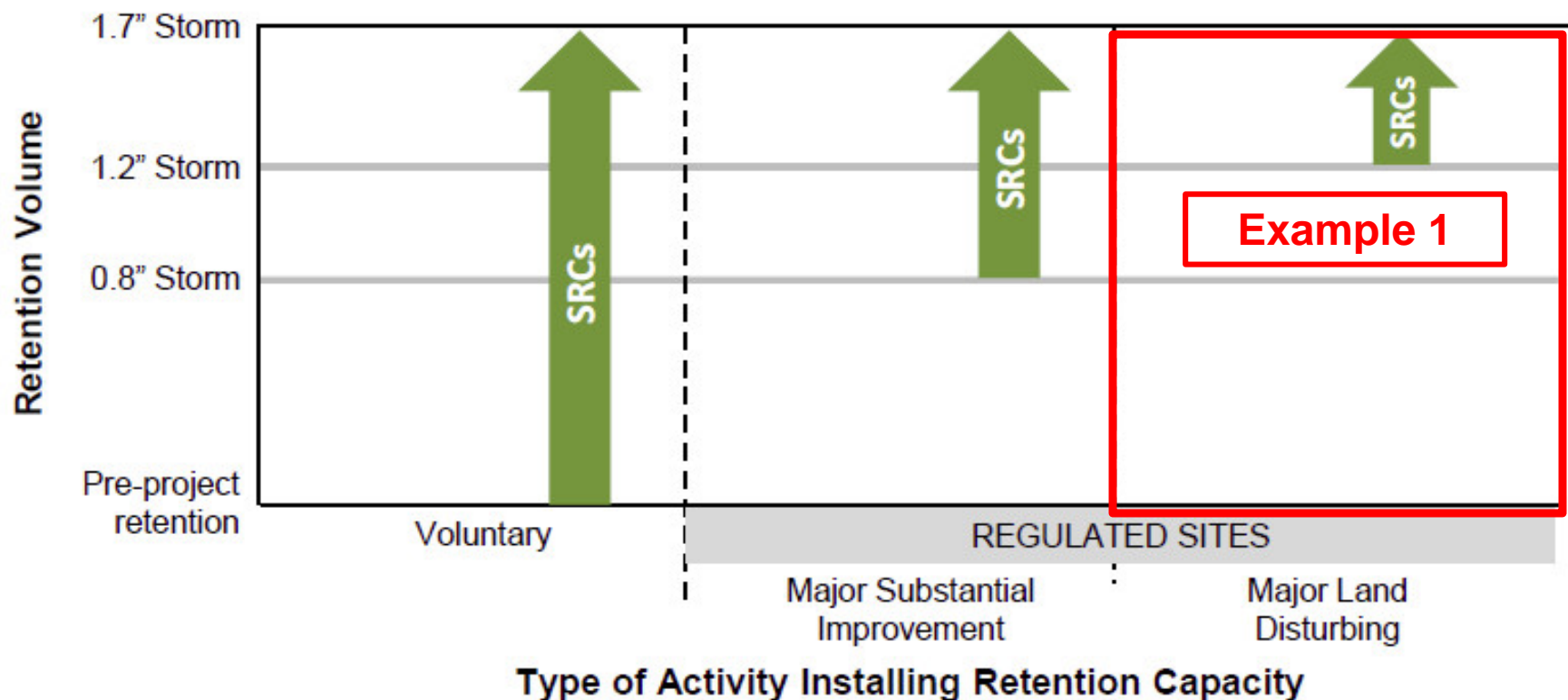
- Washington, D.C. CBD, 250,000 ft²/12 floors, office building
- Roof footprint onsite = **25,000 ft²**
- Total site impervious area onsite = **30,000 ft²**
- Central business district location – 100% impervious cover
- Use for RHS captured rainwater: one cooling tower which operates year-round.
- For new construction: plan is to satisfy 100% of SWRv onsite, 50% with RHS, 50% with other BMP

Eligibility for SRC Certification

Eligible BMPs & land cover changes must:

- 1) Achieve retention above existing retention or regs.

Retention Volume Eligibility: Stormwater Retention Credits (SRCs)



EXAMPLE 1: NEW CONSTRUCTION – RHS TO MEET 1.7” STORM EVENT AS PART OF SWMP AND TO EARN SOME SRC

CALCULATING MINIMUM TANK SIZE REQUIRED TO MEET SWR_v (> 1.2’ RAIN EVENT)

SWR_v = inches rain event x imperv surf area x runoff coeff x 7.48 / 12

SWR_v = 1.2 x 30,000 x 0.95 x 7.48 / 12 = 21,318 gallons

50% with RHS = 21,318/2 = 10,659 gallons

Minimum Tank size required = 11,000 gallons

EXAMPLE 1: NEW CONSTRUCTION – RHS TO MEET 1.7” STORM EVENT AS PART OF SWMP AND TO EARN SOME SRC

CALCULATING MAXIMUM TANK SIZE ALLOWED TO EARN SRC (< 1.7” RAIN EVENT)

$SWR_{1.7} = \text{inches rain event} \times \text{imperv surf area} \times \text{runoff coeff} \times 7.48 / 12$

$SWR_{1.7} = \text{inches rain event} \times \text{imperv surf area} \times \text{runoff coeff} \times 7.48 / 12$

$SWR_{1.7} = 1.7 \times 30,000 \times 0.95 \times 7.48 / 12 = 30,201 \text{ gallons}$

Maximum Tank Size Allowed = $30,201 / 2 = 15,101 \text{ gallons}$

Tank Size Selected = 15,000 gallons

$11,000 < 15,000 < 15,101$

EXAMPLE 1: NEW CONSTRUCTION – RHS TO MEET 1.7” STORM EVENT AS PART OF SWMP AND TO EARN SOME SRC

CALCULATING SRC EARNED

New Construction That Must Meet 1.2” Requirement

A = B-C-E, however A cannot be greater than D-E

A = SRC earned

B = tank volume (gallons)

C = average daily volume in the tank (gallons)*

D = volume of runoff water from a 1.7” storm (gallons)

E = volume of runoff water from a 1.2” storm (gallons)

$$\text{SRC earned} = 15,000 - 750 - 10,659 = \mathbf{3,591 \text{ SRC}}$$

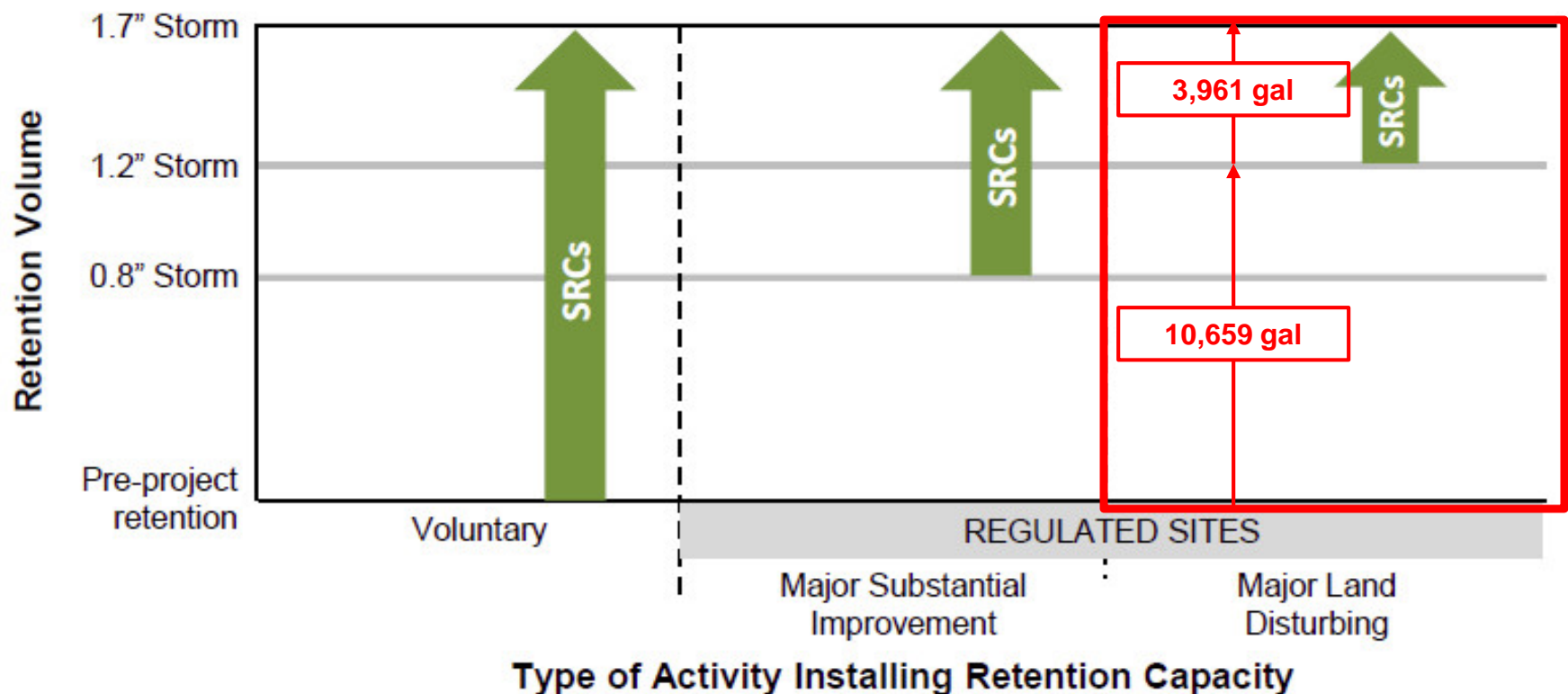
*determined based on daily average demand and rainfall, using DDOE online Rainwater Harvesting Retention Calculator

Eligibility for SRC Certification

Eligible BMPs & land cover changes must:

- 1) Achieve retention above existing retention or regs.

Retention Volume Eligibility: Stormwater Retention Credits (SRCs)



Example 1: New Construction – RHS to meet 1.7” storm event as part of SWMP and to earn some SRC

Savings in Annual Water and Environmental Fees From Installation of RHS



Service Address
 Washington, DC 20036-5104
Account Number 0031839-4
Square/Suffix/Lot 0107/ /0074
Impervious Surface Square Footage 28600
 Customer Service / Servicio Al Cliente: (202) 354-3600
 Emergencies / Emergencia: (202) 612-3400

Bill Summary

Billing Date 08/22/14
Previous Balance \$9,881.78
Payments as of 08/21/14 - Thank you \$9,881.78 CR
Late Fees From Prior Balance \$0.00
Outstanding Amount Due \$0.00
Total Current Bill \$7,009.86
Total Amount Due - Please Pay by 09/16/14 \$7,009.86

Meter Number	Prior Read Date	Current Read Date	Number Of Days	Prior Read	Current Read	Usage (CCF)	Usage (Gallons)	Read Type
19001494	07/18/14	08/20/14	33	8482	9450	968	724,064	EST

Water Charges (Reductions)

- Water Use Fee
- DC Govt. Pilot Fee
- DC Govt. ROW Fee

CURRENT WATER AND SEWER CHARGES - COMMERCIAL	
Coding Tower Adjustment 479.48CR CCF x \$ 4.41	\$2,114.51 CR
Metering Fee	\$268.14
Water Services 968 CCF x \$ 3.61	\$3,494.48
Sewer Services 968 CCF x \$ 4.41	\$4,268.88
Clean Rivers IAC 28.60 ERU x \$ 11.85	\$338.91
CURRENT CHARGES AND CREDITS	
DC Government PILOT Fee 968 CCF x \$.53	\$513.04
DC Government Right of Way Fee 968 CCF x \$.17	\$164.56
DC Govt Stormwater Fee 28.60 ERU x \$ 2.67	\$76.36
TOTAL CURRENT CHARGES	\$7,009.86
TOTAL CURRENT BILL	\$7,009.86

IMPORTANT MESSAGES
 As of August 31, 2014 TD Bank and Premier Bank will no longer accept DC Water in-person payments. Please visit www.dowater.com for a list of convenient payment options.

Historical Usage

Please return the portion below with your payment to ensure proper credit to your account. For payment options, see reverse.

"WATER IS LIFE"

Take the opportunity to help your neighbor. Make a **SPLASH** by signing up for bill roundup. We will automatically roundup your bill each month to the next highest dollar. Your pennies will help those in need to pay their water bills. This program is administered by the Greater Washington Urban League for DC Water. See reverse for more details.

- Roundup Roundup plus \$1.00 Roundup plus \$2.00

Account Number 0031839-4
Please Pay By 09/16/14 \$7,009.86
Amount Due after 09/22/14 \$7,710.85
 1-Time SPLASH Donation
 Amount Enclosed

Pay online at www.dowater.com
 Pay By Telephone (202)354-3600

00000134 01 MB 0.432 1/1 18 00001 08222014 UTL DCWA ITPG S:D



ROCKVILLE MD 20852-4282

DC Water and Sewer Authority
 Customer Service Department
 P.O. Box 97200
 Washington, D.C. 20090

000003183948 1 0007009860 0007710858

Environmental Charges (Credits)

- Clean River Project
- DC Govt. Pilot Fee

Annual Water Charge Reductions = f(annual rainfall, catchment area)



Example 1: New Construction – RHS to meet 1.7” storm event as part of SWMP and to earn some SRC

Estimating Annual Rainfall Captured

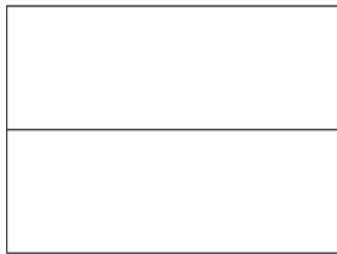
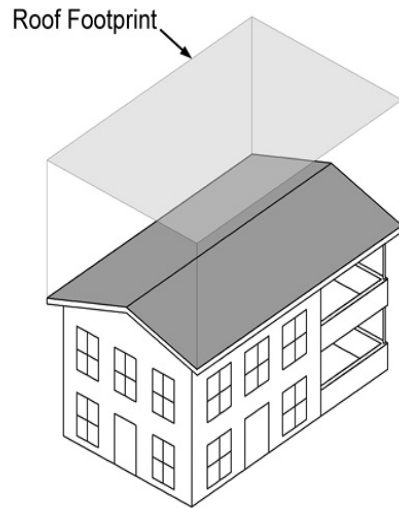
30-Year Average Monthly and Annual Rainfall

Redding, CA	6.5	5.5	5.2	2.4	1.7	0.7	0.1	0.2	0.5	2.2	4.0	4.7	33.5
Sacramento, CA	3.8	3.5	2.8	1.0	0.5	0.2	0.1	0.1	0.4	0.9	2.2	2.5	17.9
San Diego, CA	2.3	2.0	2.3	0.8	0.2	0.1	0.0	0.1	0.2	0.4	1.1	1.3	10.8
San Francisco AP, CA	4.5	4.0	3.3	1.2	0.4	0.1	0.0	0.1	0.2	1.0	2.5	2.9	20.1
San Francisco C.O., CA	4.7	4.2	3.4	1.3	0.5	0.1	0.0	0.1	0.3	1.2	3.3	3.2	22.3
Santa Barbara, CA	3.6	4.3	3.5	0.6	0.2	0.1	0.0	0.1	0.4	0.5	1.3	2.3	16.9
Santa Maria, CA	2.6	3.2	2.9	0.9	0.3	0.1	0.0	0.1	0.3	0.5	1.2	1.8	14.0
Stockton, CA	2.7	2.5	2.3	1.0	0.5	0.1	0.1	0.1	0.3	0.8	1.8	1.8	13.8
Alamosa, CO	0.3	0.2	0.5	0.5	0.7	0.6	0.9	1.2	0.9	0.7	0.5	0.3	7.3
Colorado Springs, CO	0.3	0.4	1.1	1.6	2.4	2.3	2.9	3.5	1.2	0.9	0.5	0.4	17.4
Denver, CO	0.5	0.5	1.3	1.9	2.3	1.6	2.2	1.8	1.1	1.0	1.0	0.6	15.8
Grand Junction, CO	0.6	0.5	1.0	0.9	1.0	0.4	0.7	0.8	0.9	1.0	0.7	0.5	9.0
Pueblo, CO	0.3	0.3	1.0	1.3	1.5	1.3	2.0	2.3	0.8	0.6	0.6	0.4	12.4
Bridgeport, CT	3.7	2.9	4.2	4.0	4.0	3.6	3.8	3.8	3.6	3.5	3.7	3.5	44.2
Hartford, CT	3.8	3.0	3.9	3.9	4.4	3.9	3.7	4.0	4.1	3.9	4.1	3.6	46.2
Wilmington, DE	3.4	2.8	4.0	3.4	4.2	3.6	4.3	3.5	4.0	3.1	3.2	3.4	42.8
Washington Dulles AP, DC	3.1	2.8	3.6	3.2	4.2	4.1	3.6	3.8	3.8	3.4	3.3	3.1	41.8
Washington Nat'l AP, DC	3.2	2.6	3.6	2.8	3.8	3.1	3.7	3.4	3.8	3.2	3.0	3.1	39.4
Apalachicola, FL	4.9	3.8	5.0	3.0	2.6	4.3	7.3	7.3	7.1	4.2	3.6	3.5	56.5
Daytona Beach, FL	3.1	2.7	3.8	2.5	3.3	5.7	5.2	6.1	6.6	4.5	3.0	2.7	49.3

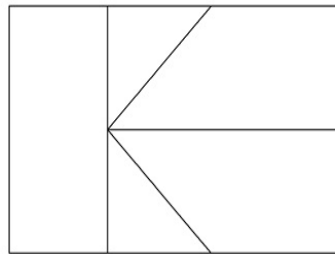
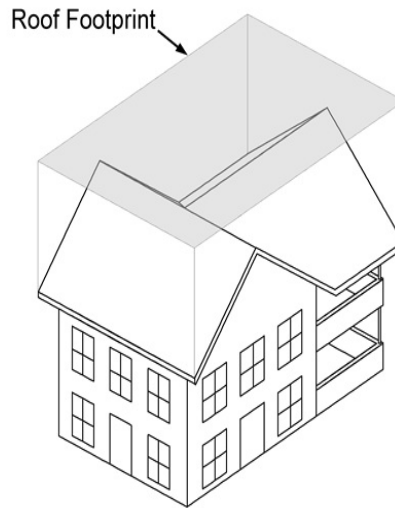
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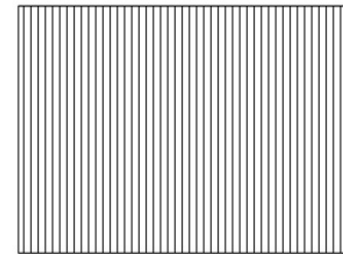
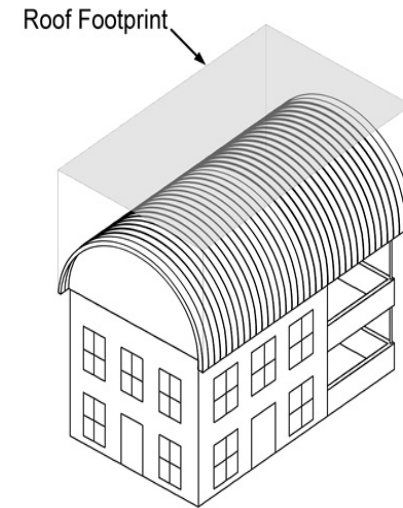
CALCULATING STORMWATER CAPTURE IT'S THE FOOTPRINT, NOT THE SHAPE, OF THE ROOF THAT COUNTS!



Roof Footprint



Roof Footprint



Roof Footprint

Example 1: New Construction – RHS to meet 1.7” storm event as part of SWMP and to earn some SRC

Savings in Annual Water and Environmental Fees From Installation of RHS Over 10 Years

Year	1	2	3	4	5	6	7	8	9	10	
Annual Savings											
Water Services	\$2,635	\$2,793	\$2,961	\$3,139	\$3,327	\$3,527	\$3,738	\$3,963	\$4,200	\$4,452	
DC Govt. Pilot Fee	\$387	\$410	\$435	\$461	\$488	\$518	\$549	\$582	\$617	\$654	
DC Govt. ROW Fee	\$124	\$132	\$139	\$148	\$157	\$166	\$176	\$187	\$198	\$210	
Clean Rivers IAC	\$276	\$293	\$311	\$329	\$349	\$370	\$392	\$416	\$440	\$467	
DC Govt. Stormwater Fee	\$3	\$3	\$4	\$4	\$4	\$4	\$5	\$5	\$5	\$5	
TOTAL SAVINGS	\$3,426	\$3,631	\$3,849	\$4,080	\$4,325	\$4,585	\$4,860	\$5,151	\$5,460	\$5,788	\$45,156

* Assumes 6% annual rise in water/environmental rates

EXAMPLE 1: NEW CONSTRUCTION – RHS TO MEET 1.7” STORM EVENT AS PART OF SWMP AND TO EARN SOME SRC

CALCULATING ANNUAL REVENUE OPPORTUNITY FROM SRC EARNED

$$\text{Annual Revenue Opportunity} = 3,591 \text{ SRC} \times \$2.50/\text{SRC} = \mathbf{\$8,978}$$

Example 1: New Construction – RHS to meet 1.7” storm event as part of SWMP and to earn some SRC

Economic Analysis Over 10 Years

Year	1	2	3	4	5	6	7	8	9	10
Revenue – SRC Sale	\$8,978	\$9,158	\$9,341	\$9,528	\$9,718	\$9,912	\$10,111	\$10,313	\$10,519	\$10,730
Water/Env Fee Savings	\$3,426	\$3,631	\$3,849	\$4,080	\$4,325	\$4,585	\$4,860	\$5,151	\$5,460	\$5,788
Total Annual Savings	\$12,404	\$12,789	\$13,190	\$13,608	\$14,043	\$14,497	\$14,970	\$15,464	\$15,979	\$16,517
Cumulative Savings	\$12,404	\$25,193	\$38,383	\$51,991	\$66,034	\$80,531	\$95,501	\$110,965	\$126,945	\$143,462

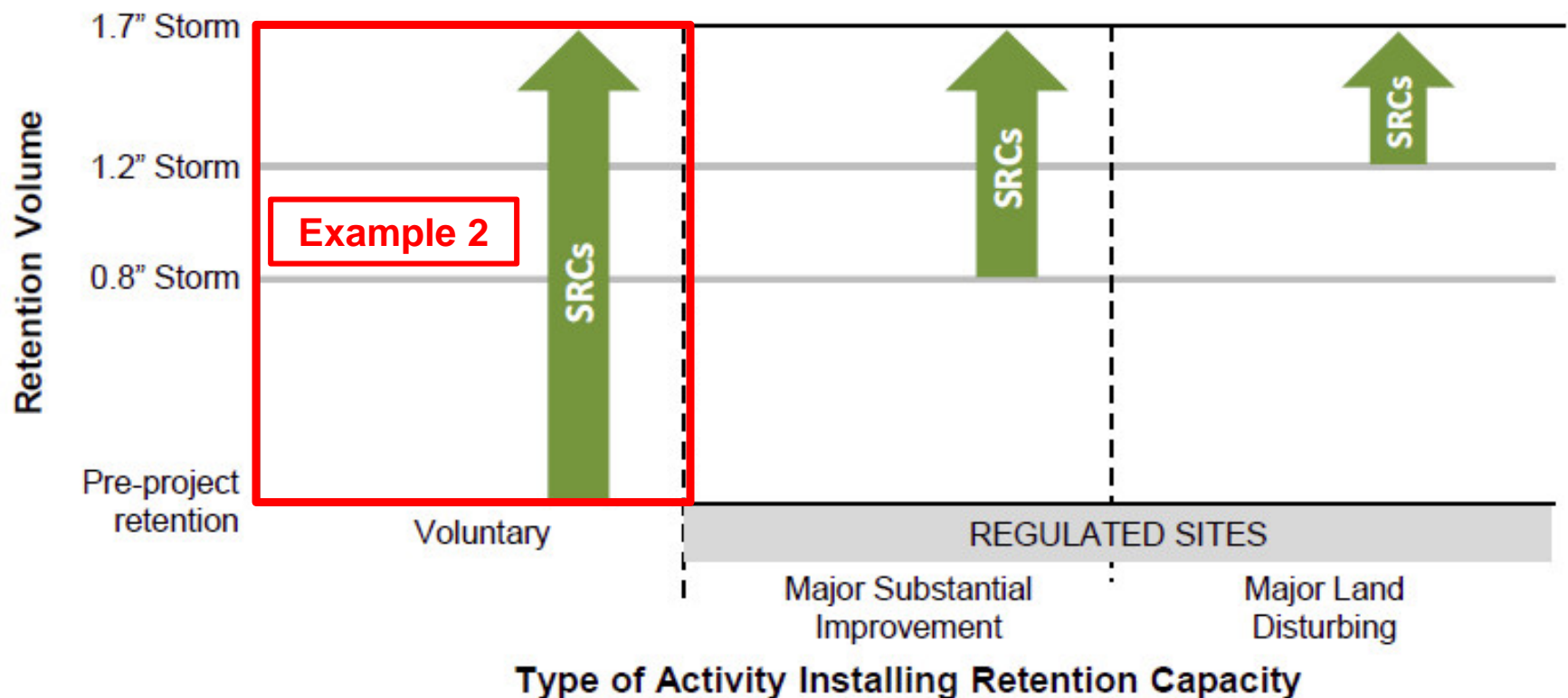
* Assumes 2% annual rise in \$/SRC

Eligibility for SRC Certification

Eligible BMPs & land cover changes must:

- 1) Achieve retention above existing retention or regs.

Retention Volume Eligibility: Stormwater Retention Credits (SRCs)



EXAMPLE 2: RETROFIT OF EXISTING BUILDING – VOLUNTARY RHS WITH NO SWMP REQUIREMENTS

- No minimum tank size requirements
- Same maximum tank size allowed based on 1.7” storm (15,101 gallons)

Again assume tank size = **15,000 gallons**

EXAMPLE 2: RETROFIT OF EXISTING BUILDING – VOLUNTARY RHS WITH NO SWMP REQUIREMENTS

CALCULATING SRC EARNED

Retrofit of Existing Building, No Volume Requirements

A = B-C, however A cannot be greater than D

A = SRC earned

B = tank volume (gallons)

C = average daily volume in the tank (gallons)*

D = volume of runoff water from a 1.7” storm (gallons)

E = volume of runoff water from a 1.2” storm (gallons)

SRC earned = 15,000 – 750 = **14,250 SRC**

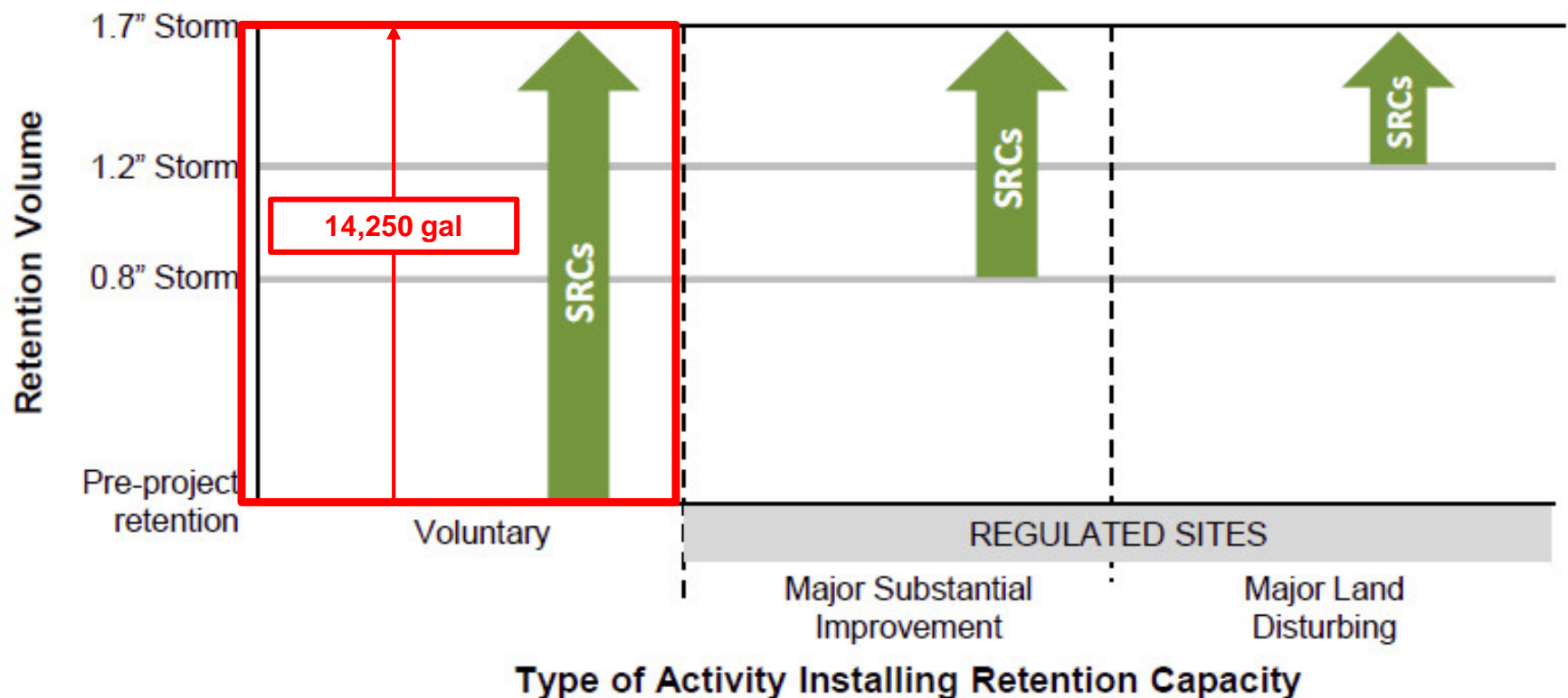
*determined based on daily average demand and rainfall, using DDOE online Rainwater Harvesting Retention Calculator

Eligibility for SRC Certification

Eligible BMPs & land cover changes must:

- 1) Achieve retention above existing retention or regs.

Retention Volume Eligibility: Stormwater Retention Credits (SRCs)



Example 2: Retrofit of Existing Building – voluntary RHS with no SWMP requirements

Savings in Annual Water and Environmental Fees From Installation of RHS Over 10 Years

Same as Example 1:

Year	1	2	3	4	5	6	7	8	9	10	
	Annual Savings										
Water Services	\$2,635	\$2,793	\$2,961	\$3,139	\$3,327	\$3,527	\$3,738	\$3,963	\$4,200	\$4,452	
DC Govt. Pilot Fee	\$387	\$410	\$435	\$461	\$488	\$518	\$549	\$582	\$617	\$654	
DC Govt. ROW Fee	\$124	\$132	\$139	\$148	\$157	\$166	\$176	\$187	\$198	\$210	
Clean Rivers IAC	\$276	\$293	\$311	\$329	\$349	\$370	\$392	\$416	\$440	\$467	
DC Govt. Stormwater Fee	\$3	\$3	\$4	\$4	\$4	\$4	\$5	\$5	\$5	\$5	
TOTAL SAVINGS	\$3,426	\$3,631	\$3,849	\$4,080	\$4,325	\$4,585	\$4,860	\$5,151	\$5,460	\$5,788	\$45,156

* Assumes 6% annual rise in water/environmental rates

EXAMPLE 2: RETROFIT OF EXISTING BUILDING – VOLUNTARY RHS WITH NO SWMP REQUIREMENTS

CALCULATING ANNUAL REVENUE OPPORTUNITY FROM SRC EARNED

Annual Revenue Opportunity = 14,250 SRC x \$2.50/SRC = \$35,625

Example 2: Retrofit of Existing Building – voluntary RHS with no SWMP requirements

Economic Analysis Over 10 Years

Year	1	2	3	4	5	6	7	8	9	10
Revenue – SRC Sale	\$35,625	\$36,338	\$37,064	\$37,806	\$38,562	\$39,333	\$40,120	\$40,922	\$41,740	\$42,575
Water/Env Fee Savings	\$3,426	\$3,631	\$3,849	\$4,080	\$4,325	\$4,585	\$4,860	\$5,151	\$5,460	\$5,788
Total Annual Savings	\$39,051	\$39,969	\$40,914	\$41,886	\$42,887	\$43,917	\$44,979	\$46,073	\$47,201	\$48,363
Cumulative Savings	\$39,051	\$79,020	\$119,933	\$161,819	\$204,706	\$248,623	\$293,603	\$339,676	\$386,876	\$435,240

* Assumes 2% annual rise in \$/SRC

KEY FACTORS IN DETERMINING THE FEASIBILITY OF A RHS IN AN EXISTING BUILDING:

- Proximity of chiller to cooling tower
- Proximity of an existing condenser water loop to potential cistern location
- Existing conveyance system from rooftop drains to potential cistern location
- Local jurisdictional water treatment requirements
- Existing wet stack running to proximity of rooftop cooling tower
- Annual cooling tower load profile
- Existence of dual plumbing for fixture flushing
- Building irrigation needs
- Local water/sewer rates
- Existing unused cistern

Thank You For Your Attention!

Questions?

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