City of Alexandria, Virginia

Combined Sewer System Permit and Long-Term Control Plan Update

Public Meeting
June 18, 2015

Bill Skrabak, Deputy Director

Department of Transportation and Environmental Services

ECO-CITY ALEXANDRIA

City of Alexandria, Virginia

AGENDA

- ❑Purpose
- ❑City's Combined Sewer System (CSS)
- ❑Investing In Infrastructure
  - ▪Combined Sewer Overflow Strategies
  - ▪Public Feedback from the Phase 1 Meetings (February 2015)
  - ▪Evaluation Process
  - ▪Combined Sewer Overflow Strategies – Ranking and Shortlist
- ❑Next Steps
- ❑Public Participation and Input

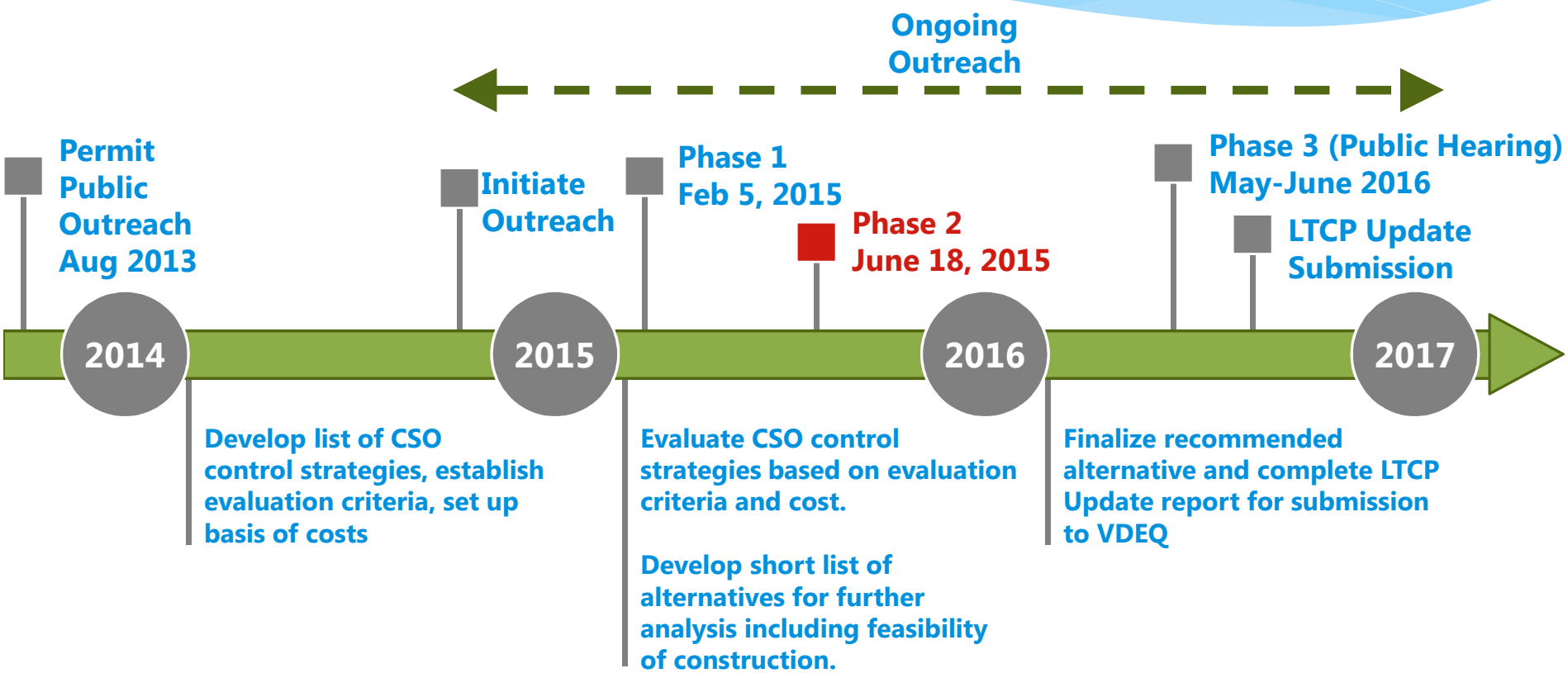
City of Alexandria, Virginia

Purpose

Goals of Today's Meeting

* **Educate.** Develop basic understanding of the Long Term Control Plan Update recommended strategies.
* **Inform.** Increase stakeholder awareness of the City's combined sewer system and the Long Term Control Plan Update program.
* **Be Responsive.** Awareness, consideration and responsiveness on the Long Term Control Plan.
* **Seek Input.** Solicit feedback on the combined sewer control strategy recommendations.

Planning Timeline



CSO: Combined Sewer Overflow
LTCP: Long Term Control Plan
VDEQ: Virginia Department of Environmental Quality

Why We Need Your Participation

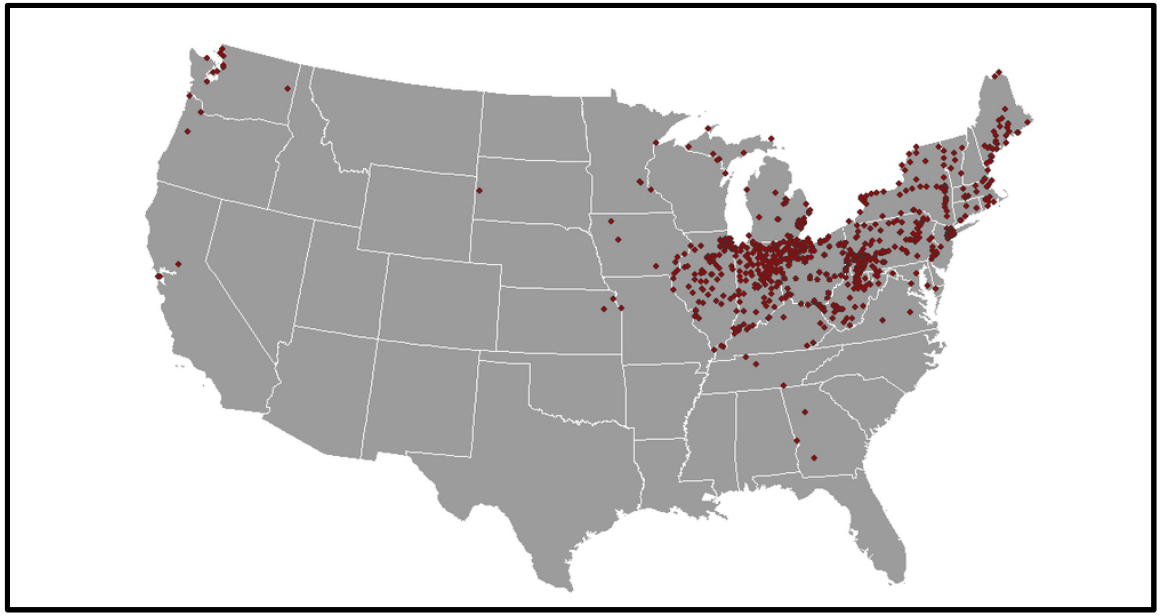
* Alexandria's commitment to environmental stewardship
* Alexandria's commitment to the public participation process and civic engagement (*What's Next Alexandria*)
* Community input and support is essential to the success of the program
* Public input helps the City make the best decision
* It's the Law!
  - City's Combined Sewer Discharge Permit Requirement

City of Alexandria, Virginia

City's Combined Sewer System (CSS)

Location of Combined Sewer System (CSS) Communities

- Combined sewer communities are concentrated in older communities in the North East and the Great Lakes regions.
- Currently, 772 authorized discharges from 9,348 combined sewer outfalls in 32 states and DC
- Nearby combined sewer communities include Washington, DC, Richmond, and Lynchburg.



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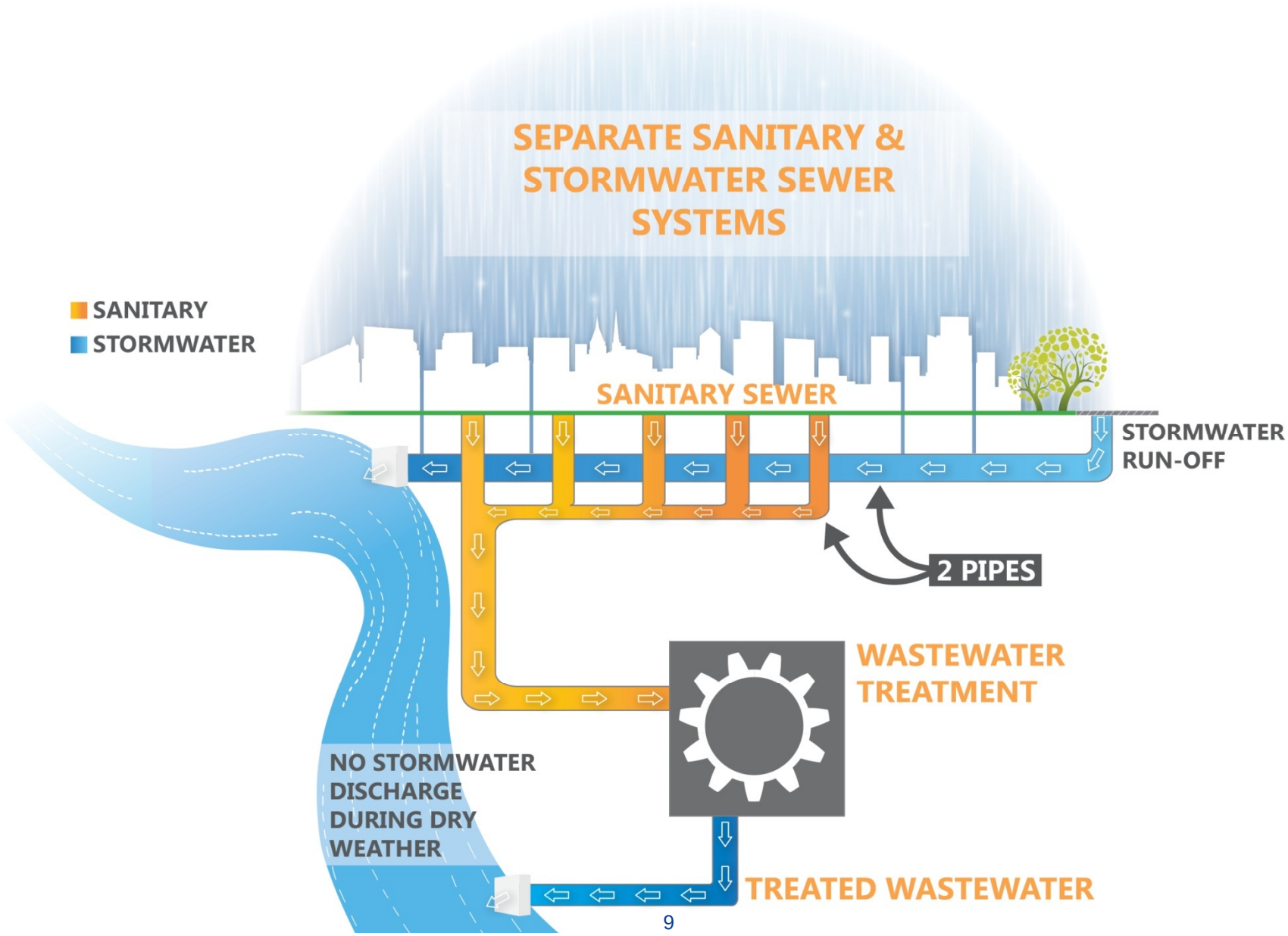
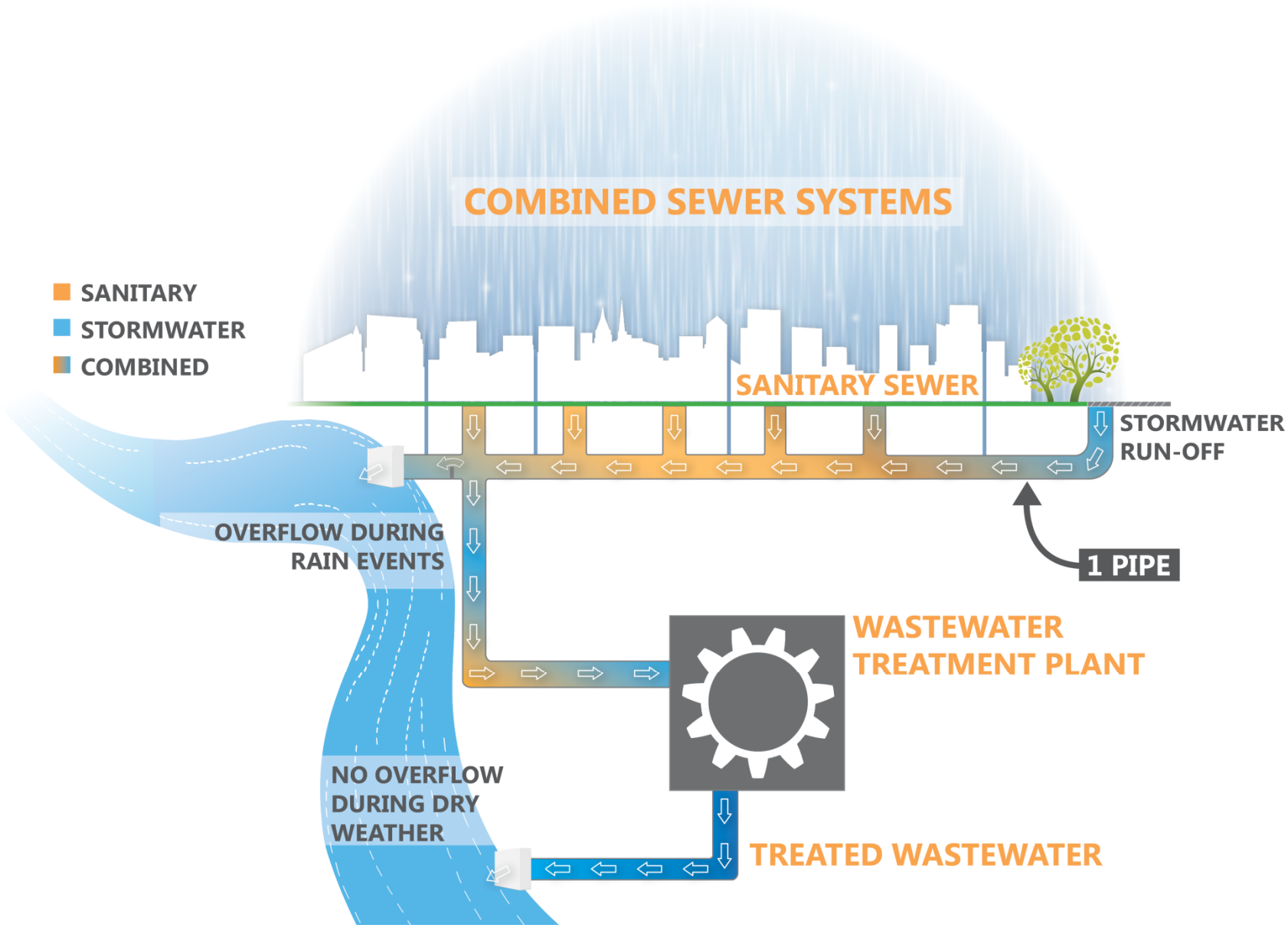
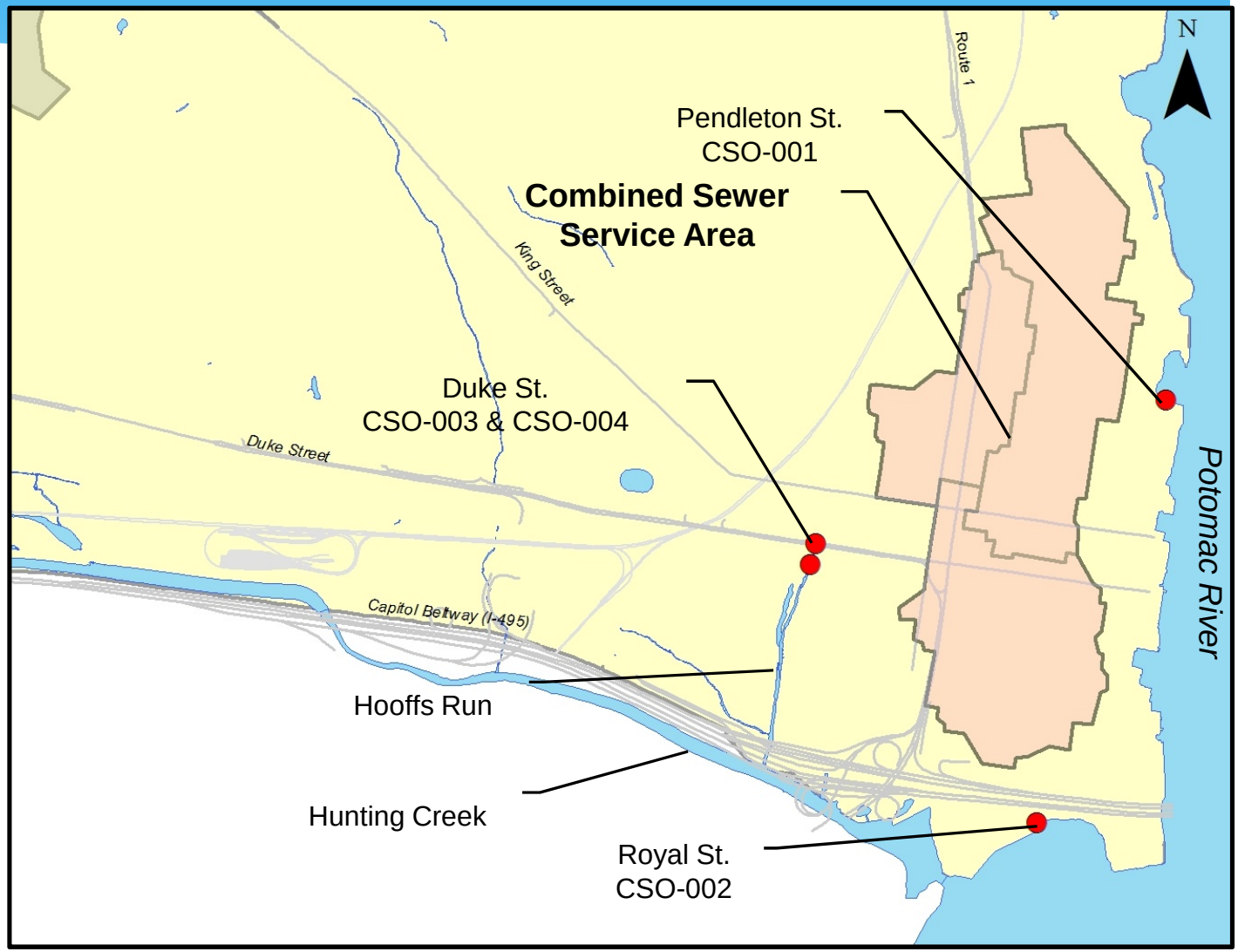

SEPARATE SANITARY & STORMWATER SEWER SYSTEMS
SANITARY
STORMWATER
SANITARY SEWER
STORMWATER RUN-OFF
2 PIPES
WASTEWATER TREATMENT
NO STORMWATER DISCHARGE DURING DRY WEATHER
TREATED WASTEWATER


COMBINED SEWER SYSTEMS
SANITARY
STORMWATER
COMBINED
SANITARY SEWER
STORMWATER RUN-OFF
1 PIPE
OVERFLOW DURING RAIN EVENTS
WASTEWATER TREATMENT PLANT
NO OVERFLOW DURING DRY WEATHER
TREATED WASTEWATER

Combined Sewer System

Four permitted outfalls:

- CSO-001 to Oronoco Bay
- CSO-002 to Hunting Creek
- CSO-003 to Hooffs Run
- CSO-004 to Hooffs Run



Combined Sewer Overflow (CSO) Locations

Hunting Creek: CSO-002

Oronoco Bay: CSO-001

Hooffs Run: CSO-003 & 004

CSO Frequently Asked Questions

What factors influence the frequency, duration, and volume of overflows?

- number of rain events
- frequency of the events
- intensity of the events
- characteristics of the sewershed
- characteristics of the specific outfall

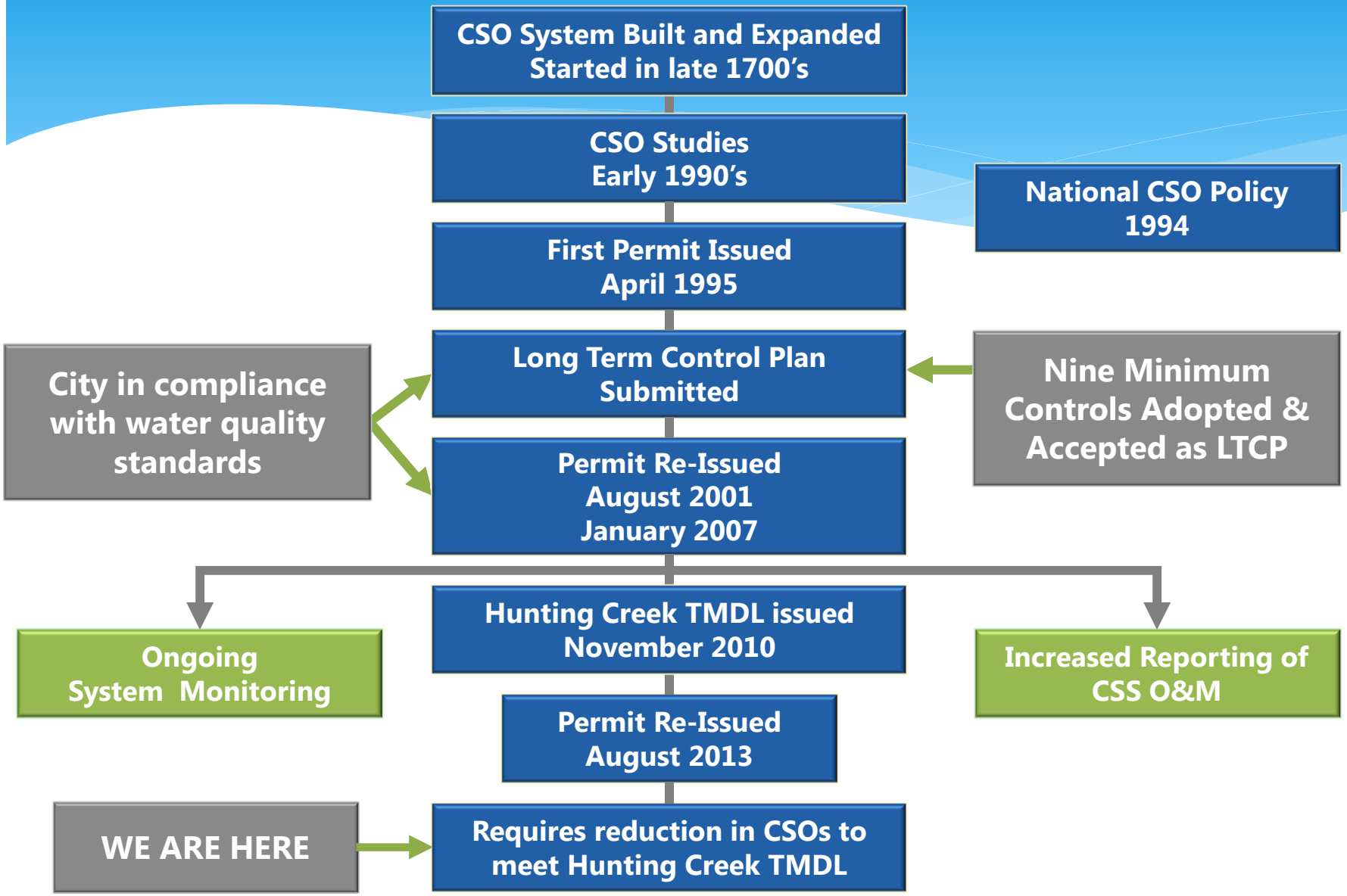
How frequently do the overflows take place?
Typically 30 to 60 times/year

How long the overflow events last?
Typically 2 to 5 hours typically

What is the total number of hours this occur over a year?
Equivalent of 3 to 12 days, depending on the outfall

How much of the overflows is stormwater, and how much is wastewater?
Greater than 90% of the overflows is stormwater

Regulatory History of Alexandria's CSS



Alexandria's Current Long Term Control Plan

Maximize flow to the POTW

Conduct Proper O&M Programs

Develop & Implement a pollution prevention program

Maximize use of the collection system for storage

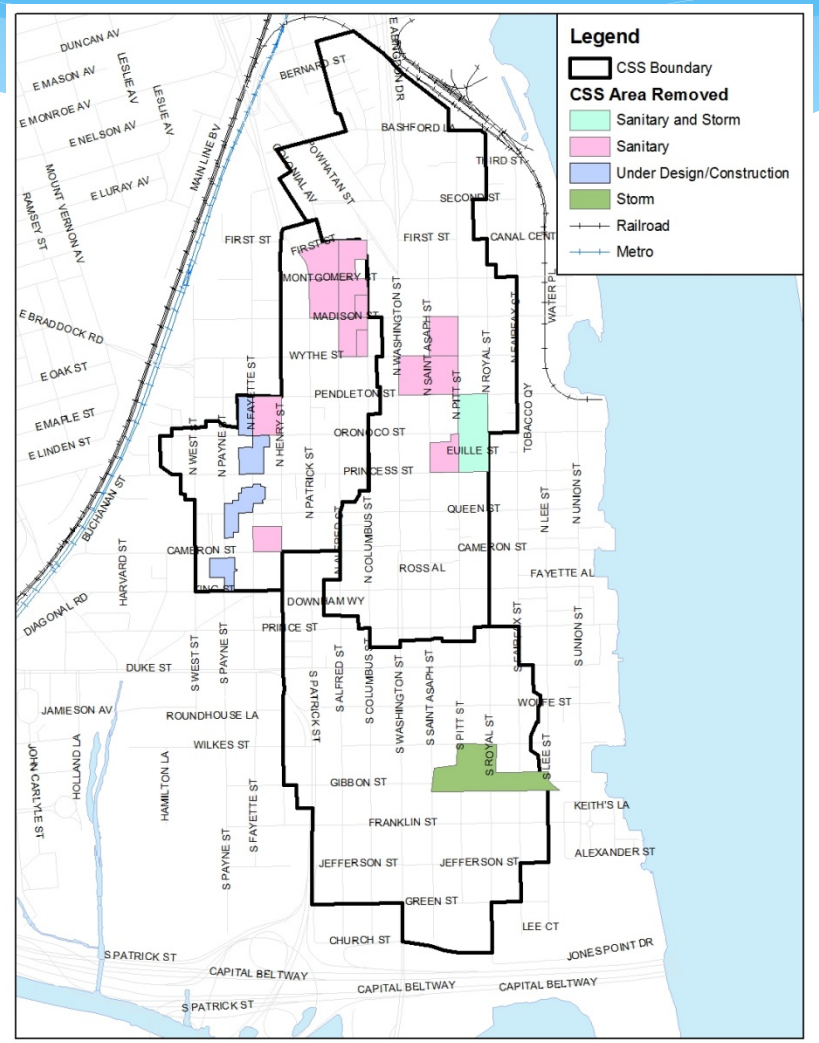
Control solid and floatable material

Prohibit CSOs during Dry Weather

Public Notification

City's Existing Area Reduction Plan

- Proactive program requiring sewer separation as condition of redevelopment
  - If separation infeasible, then contribute funds to City-led projects
- Recently completed sewer separation projects
  - James Bland
  - Harris Teeter
- City-led separation projects
  - Payne and Fayette Sewer Separation Project
    - Under construction
    - ~90 sanitary laterals to be separated



Paradigm Shift

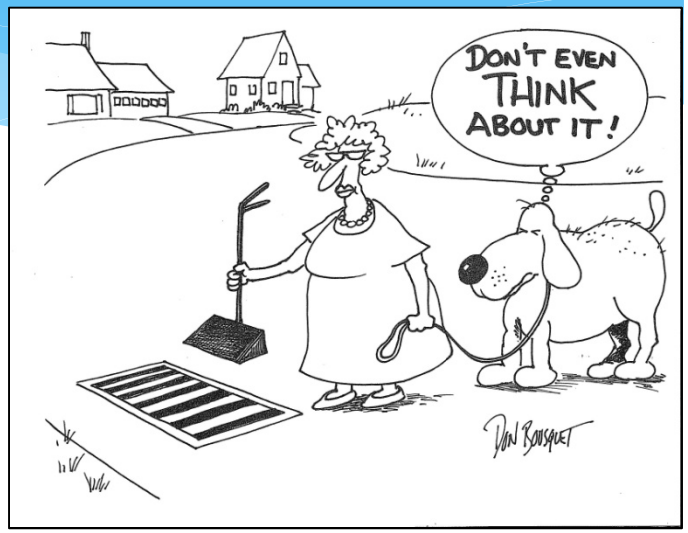
* Previous Combined Sewer System Permits (before 2013):
  - City's Long Term Control Plan based on best practices for operation and maintenance of combined systems
  - Proactive separation as part of Area Reduction Plan
  - Monitoring and modeling of combined sewer overflows

* Current and Future Combined Sewer System Permits:
  - Must address the Hunting Creek Total Maximum Daily Load

Clean Water Act Goals
Total Maximum Daily Load

- Clean Water Act goal that all waters of the United States be "fishable" and "swimmable"
  - State develops impaired waters list and total maximum daily loads
- Hunting Creek listed as an impaired water for *E. coli* bacteria

Sources of Bacteria in Hunting Creek TMDL



- Virginia Bacteria Water Quality Criteria
  - 126 *E.coli* counts per 100mL
- Sources of Bacteria:
  - Stormwater
    - Wildlife
    - Pets
  - Combined Sewer System
  - Sanitary Sewer Overflows
  - AlexRenew Water Resource Recovery Facility
  - Septic Systems

Hunting Creek Bacteria Total Maximum Daily Load

* <u>Hunting Creek Bacteria TMDL and CSOs:</u>
  - Total overall bacteria reduction from CSO discharges of 86%:
    - 99% reduction from Outfalls 003 and 004 (Hooffs Run)
    - 80% reduction from Outfall 002 (Hunting Creek)
  - Applicable to Outfalls 002, 003, and 004 only

* <u>CSS Permit issued in August 2013 requires City to address TMDL through an update to its Long Term Control Plan</u>

Long Term Control Plan Goals

- Comply with the new permit
  - Reduce bacteria load
  - Improve water quality
- Develop a plan that best meets the unique needs of Alexandria
- Active participation by stakeholders
- Limit impacts to residents and businesses
- Preserve the historic character of the City
- Improve and address legacy infrastructure
- Remain fiscally responsible

City of Alexandria, Virginia

Investing in Infrastructure

CSO Control Impacts and Challenges

* Construction in urban and historic area
* Significant conflict with existing utilities
* Quality of life: temporary disruption to residents and community
* Economic: potential for temporary loss to business and tax revenue
* Cost to implement CSO controls

Combined Sewer Strategies Evaluated

- **Store and treat:** build CSO storage and send to wastewater treatment facility after CSO event for high level of treatment
  - Storage tanks (aboveground or underground)
  - Deep tunnels
- **Sewer separation:** build new sewers to separate all storm and sanitary sewers in Old Town
- **Green infrastructure:** Reduce stormwater runoff
- **Disinfection:** kill the bacteria in the overflow
- **Combination** of the above strategies

Storage Tunnels

DC Water: Tunnel Boring Machine

Storage Tanks

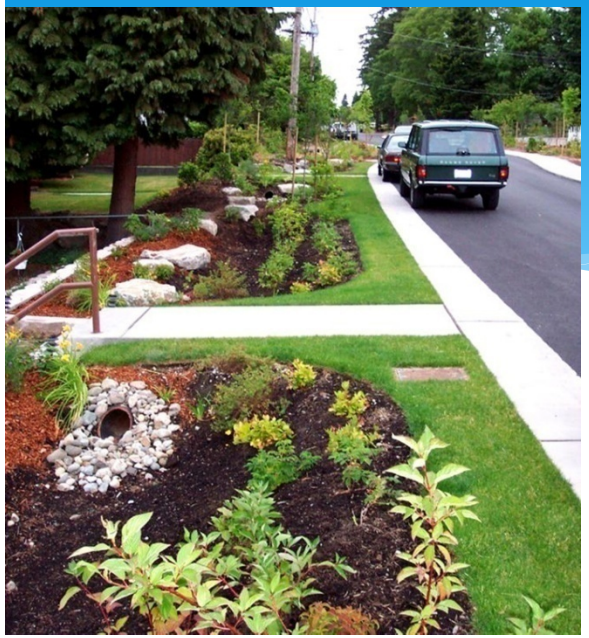
Toronto: Keelesdal-Hyde Ave
Underground CSO Storage Tank

Arlington: Water Pollution Control Plant

Sewer Separation

Alexandria: King & West
Diversion Structure

Green Infrastructure



Bioswales

Rain Gardens

Planter Boxes

Permeable Pavement

Rainwater Harvesting

Downspout Disconnects

Disinfection

NYC: Spring Creek CSO Disinfection Facility

Detroit: Hubbell-Southfield CSO RTB

Evaluation Criteria

City's Evaluation Criteria

- Cost
- CSO Reduction (volume)
- Effectiveness
- Disruption to the Community
- Implementation Effort
- Public Acceptance
- Expandability
- Net Environmental Benefit
- Potential Nutrient Credits for Chesapeake Bay TMDL
- Permitting Issues
- Required Ongoing Maintenance

- **Assigned weighting**
- **Ranked combined sewer control strategies based on criteria**

Phase 1 Outreach

* January 27, 2015: City Council
* January 28, 2015: Federation of Civic Associations
* February 2, 2015: Environmental Policy Commission
* **February 5, 2015: Phase I Public Meeting**
* February 11, 2015: Old Town Civic Association
* March 18, 2015: NorthEast Citizens Association

Public Feedback from Phase 1 Outreach

High Importance Evaluation Criteria

- Combined Sewer Overflow Reduction (Volume)
- Effectiveness
- Net Environmental Benefit

Moderate Importance Evaluation Criteria

- Capital Cost
- Implementation Effort
- Impact to Community
- Permitting Issues
- Required O&M

Low Importance Evaluation Criteria

- Expandability
- Nutrient Credit Trading

Favorable CSO Control Strategy

- Storage Tunnels
- Storage Tanks

Neutral CSO Control Strategy

- Green Infrastructure
- Sewer Separation

Unfavorable CSO Control Strategy

- Disinfection
- Outfall Relocation

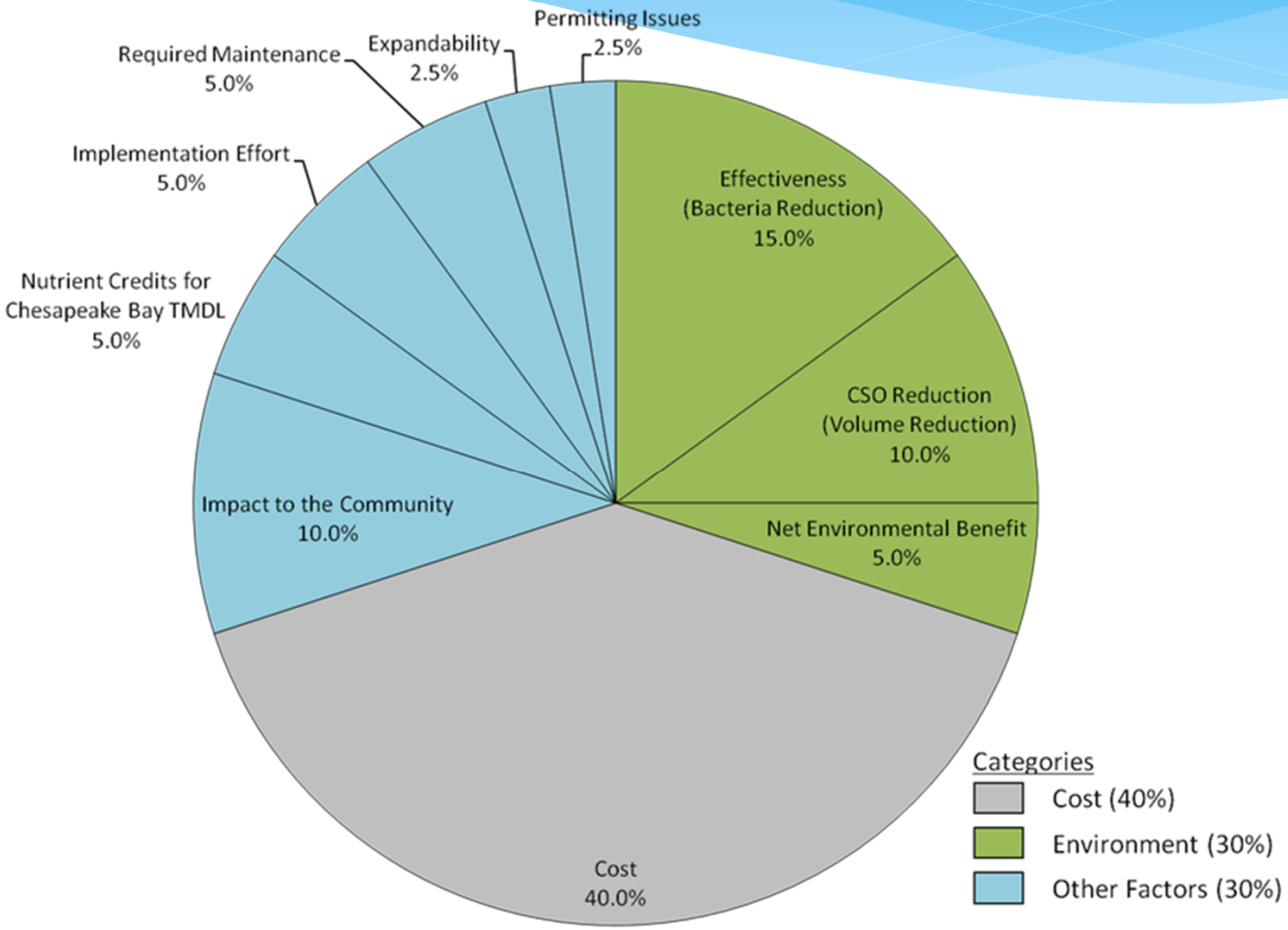
Peer Review Panel

- Independent check of the Long Term Control Plan Update progress to:
  - Confirm approach or identify additional alternatives
  - Facilitate the best possible plan for the City
  - Other observations and/or lessons learned

- Peer Review Panel:
  - Director of the Clean Rivers Program, DC Water
  - Director of Public Utilities, City of Richmond
  - Director of Water Resources, City of Lynchburg
  - Independent Consultant, experience with several large CSO programs

Long Term Control Plan Update Decision Process

Evaluation Criteria Weightings



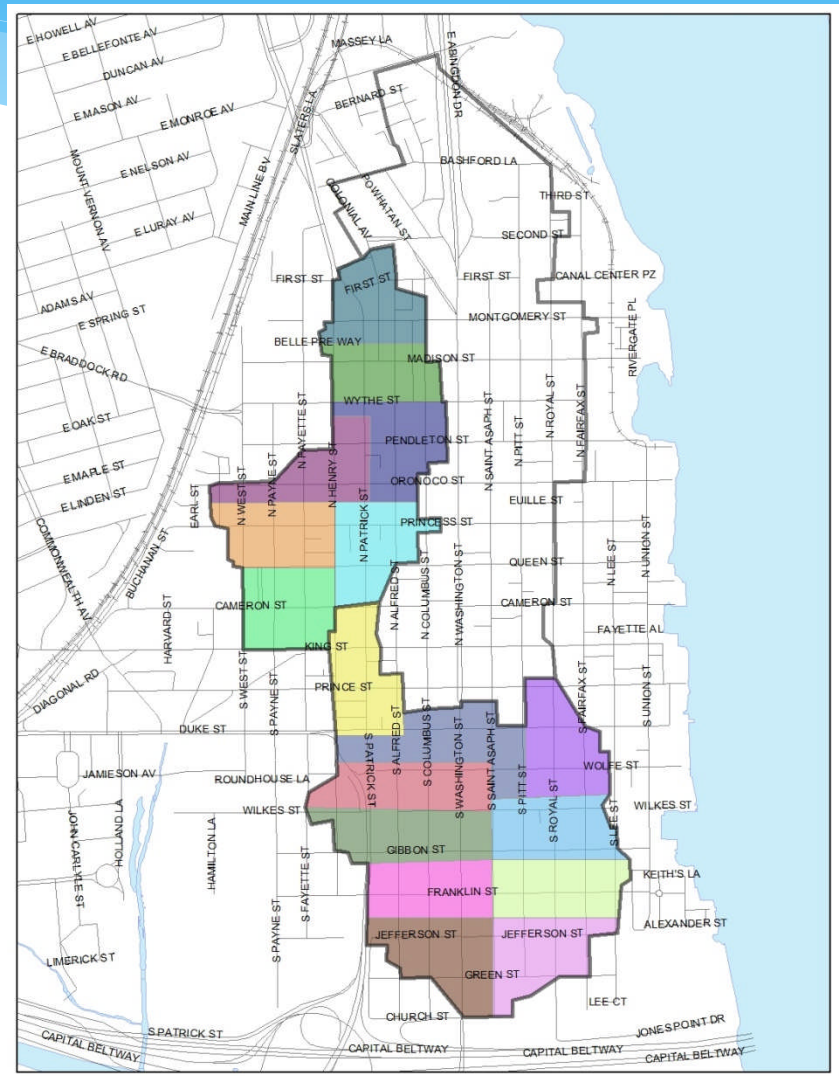
Combined Sewer Control Strategy Rankings

Rank	CSO Control Strategy	Score
9	Complete Sewer Separation	2.10
8	Green Infrastructure	3.13
7	Separate Disinfection Facilities	3.34
6	One Storage Tunnel (relocate outfalls to the Potomac)	3.68
5	Storage Tunnel for Hooffs Run and Disinfection at Royal Street	3.69
4	Separate Storage Tanks	3.76
3	**One Storage Tunnel**	**3.86**
2	**Storage Tunnel for Hooffs Run and Storage Tank at Royal Street**	**3.97**
1	**Separate Storage Tunnels**	**3.98**

9. Complete Sewer Separation

Recommended as a Potential Integrated Complementary Strategy
Not Recommended as Primary Strategy

- 19 acres under construction continuously for 17 years
  - Unrealistic before 2035
- No reduction in number of overflows until full separation is completed
- Additional area added to the stormwater (MS4) permit
  - No nutrient credit
- Potential impact of historical character
- **Most disruptive**
- **Cost: $300 - $450 M**



8. Green Infrastructure

Recommended as Integrated Complementary Strategy
Not Recommended as Primary Strategy

- Reduces stormwater volume, but does not address bacteria load directly
- How evaluated:
  - Implement on **ALL** City-owned parcels and City right-of-way
- Results:
  - 20-30% reduction in combined sewer overflow volume
  - **Will not achieve regulatory compliance**
  - Full implementation of green infrastructure unrealistic by 2035
- Cost: $140 - $210 M

7. Separate Disinfection Facilities

Not Recommended

- **Safety concerns related to transportation and storage of chemicals in residential and urban settings**
- No reduction in combined sewer volume
- Only kills bacteria, other pollutants remain
- Cost: $65 - $100 M

6. One Storage Tunnel

(Substantially reduce overflows and relocate to the Potomac River)
Not Recommended

- Stores and treats CSO to substantially reduce overflows
- Remaining overflows outfall to the Potomac River
  - **Additional regulatory and permitting challenges**
  - <u>Other store and treat strategies considered do not require relocation to the Potomac</u>
- Most costly store and treat option
- Most complex hydraulics
- Cost: $130 - $195 M

5. Storage Tunnel for Hooffs Run and Disinfection at Royal Street

Not Recommended

- **Safety concerns related to transportation and storage of chemicals near Royal Street outfall**
- No reduction in combined sewer volume at Royal Street
- Only kills bacteria, other pollutants remain from Royal Street outfall
- Cost: $85 - $130 M

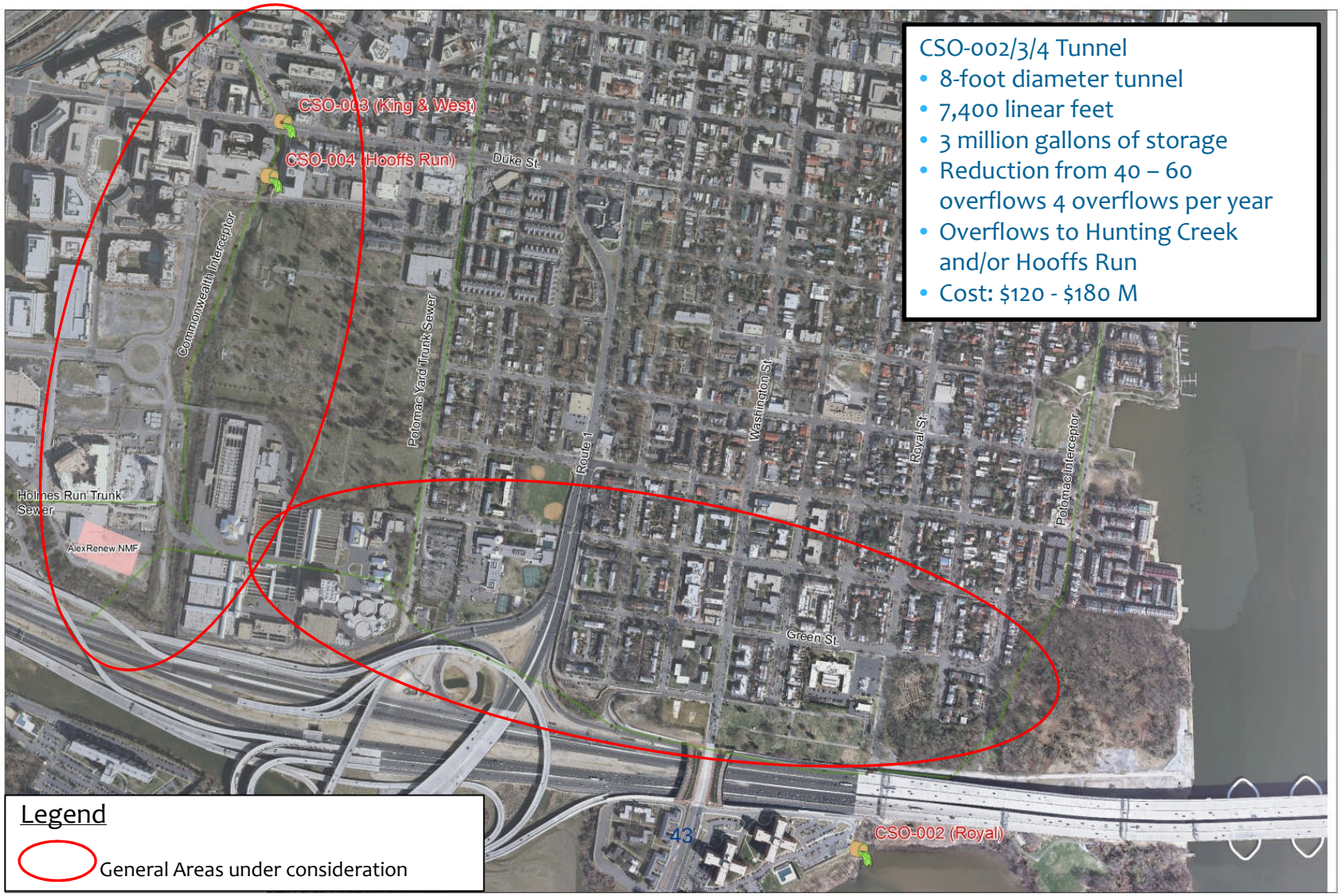
4. Separate Storage Tanks

Not Recommended

- **Does not address additional wet weather issues that control strategies #1-3 address**
- **Siting Challenges**
  - Future challenges related to access and maintenance
  - Tank off of Duke Street
  - Constructability challenges
  - Road closures
- Cost: $90 - $135 M

3. One Storage Tunnel

Recommended for Further Evaluation

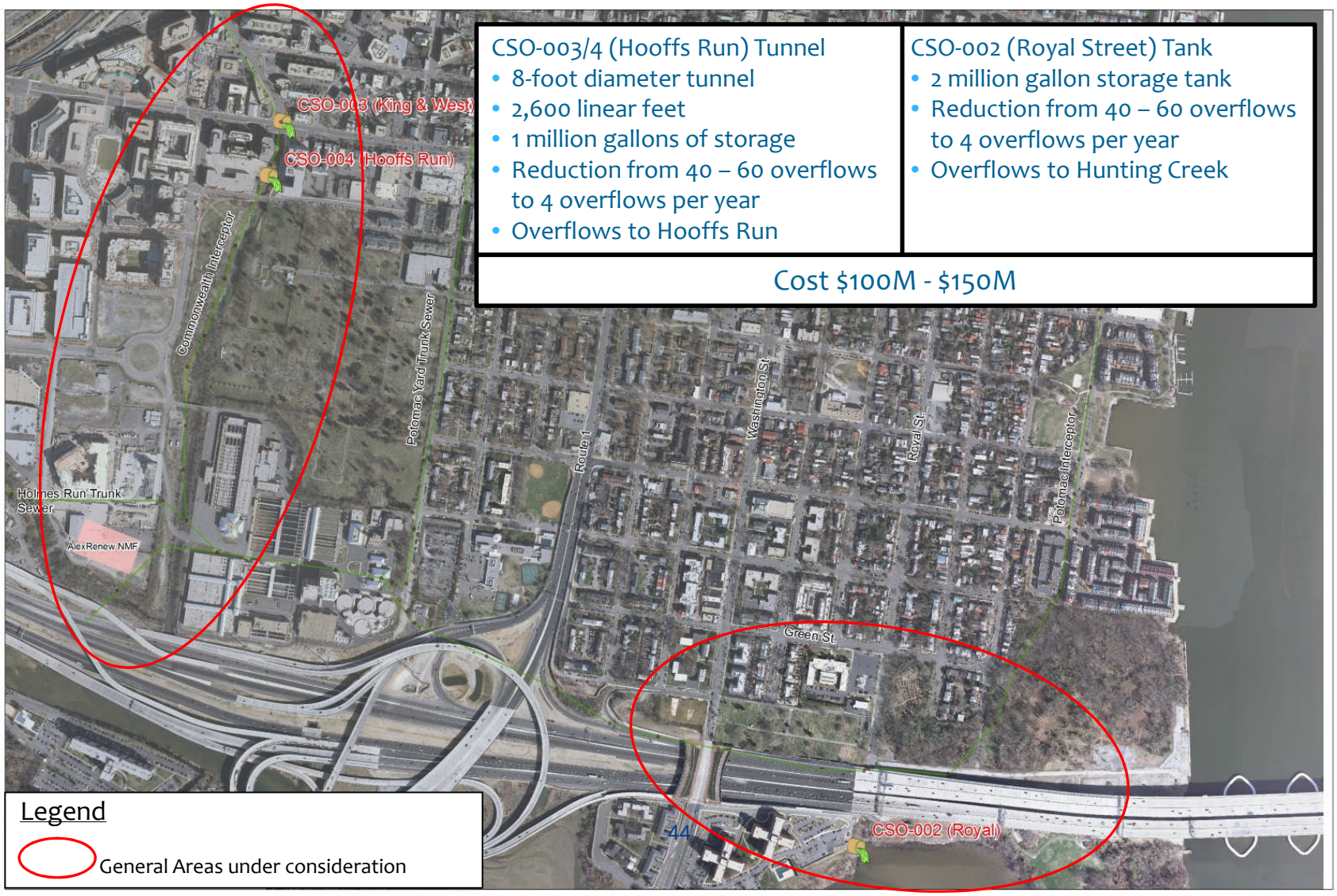


CSO-002/3/4 Tunnel

- 8-foot diameter tunnel
- 7,400 linear feet
- 3 million gallons of storage
- Reduction from 40 – 60 overflows 4 overflows per year
- Overflows to Hunting Creek and/or Hooffs Run
- Cost: $120 - $180 M

2. Storage Tunnel for Hooffs Run and Storage Tank at Royal Street

Recommended for Further Evaluation



CSO-003/4 (Hooffs Run) Tunnel

- 8-foot diameter tunnel
- 2,600 linear feet
- 1 million gallons of storage
- Reduction from 40 – 60 overflows to 4 overflows per year
- Overflows to Hooffs Run

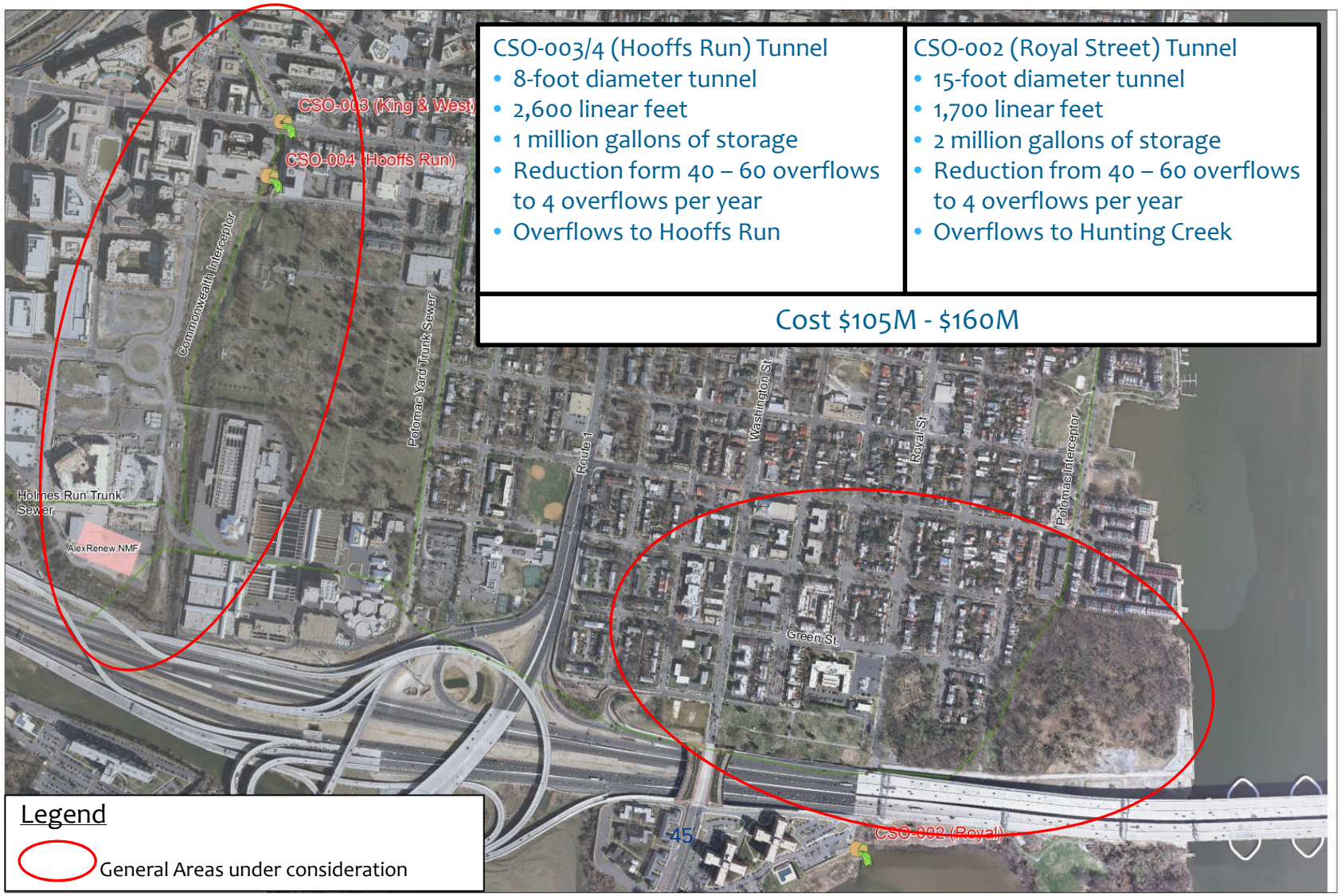
CSO-002 (Royal Street) Tank

- 2 million gallon storage tank
- Reduction from 40 – 60 overflows to 4 overflows per year
- Overflows to Hunting Creek

Cost $100M - $150M

1. Separate Storage Tunnels

Recommended for Further Evaluation



CSO-003/4 (Hooffs Run) Tunnel

- 8-foot diameter tunnel
- 2,600 linear feet
- 1 million gallons of storage
- Reduction form 40 – 60 overflows to 4 overflows per year
- Overflows to Hooffs Run

CSO-002 (Royal Street) Tunnel

- 15-foot diameter tunnel
- 1,700 linear feet
- 2 million gallons of storage
- Reduction from 40 – 60 overflows to 4 overflows per year
- Overflows to Hunting Creek

Cost $105M - $160M

Store and Treat Strategy

- Advantages:
  - Significant reduction in the number of combined sewer overflows
  - Reduces pollutant loadings (bacteria, nutrients, etc.)
  - Reduces floatables
  - Minimal aesthetic impact (underground facilities)
  - Generates credits for stormwater
  - Allows for complementary strategies to be implemented
- Disadvantages:
  - Complexity of construction and construction impacts
  - Easement acquisition
  - Does not eliminate combined sewer system

Recommended Short List of Strategies for Further Evaluation

Primary Strategies

(will select one for final plan)

1. Separate Storage Tunnels
2. Storage Tunnel for Hooffs Run and Storage Tank at Royal Street
3. One Storage Tunnel

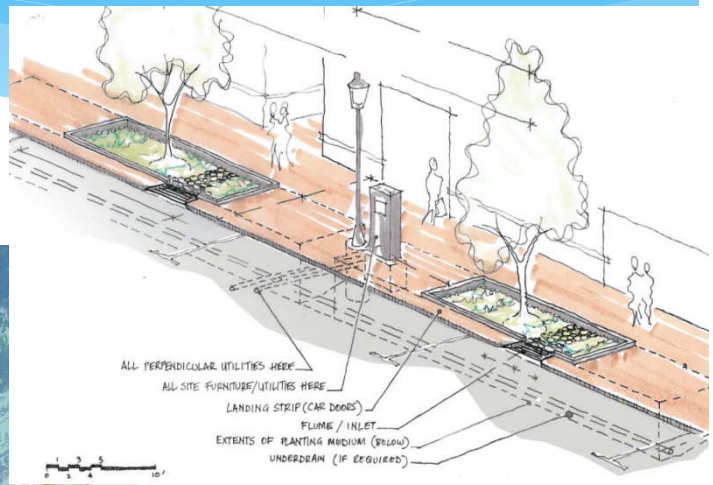
Complementary Strategies

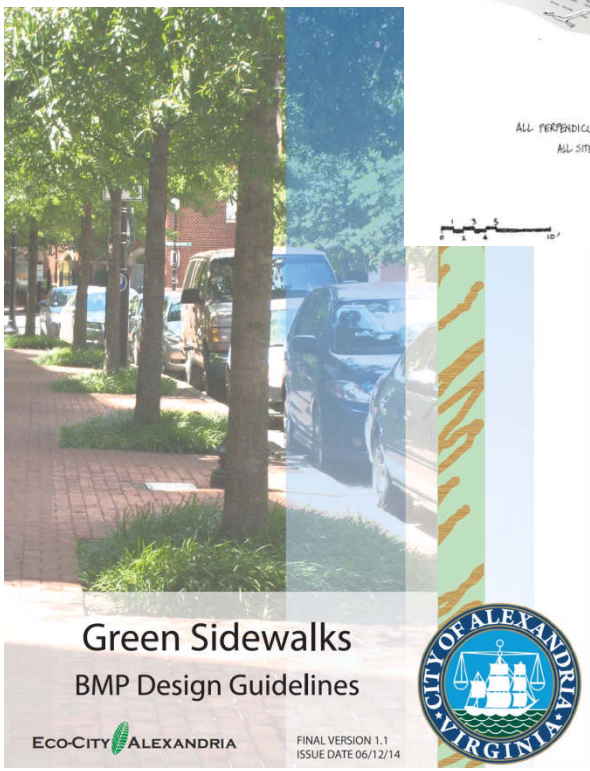
1. Green Infrastructure
   - Implement Citywide
2. Targeted Sewer Separation
   - Area Reduction Plan
3. Other Potential Opportunities
   - Sewer Rehabilitation
   - Downspout Disconnection
   - Low Flow Fixtures

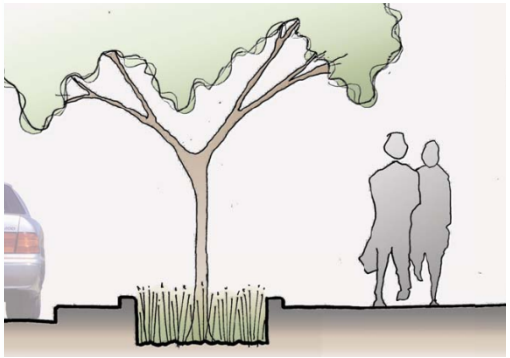
Long Term Control Plan Update
Overall Strategy

Green Infrastructure Policies

* Existing regulations and policies encouraging or requiring green infrastructure:
  - Environmental Management Ordinance
  - Green Building Policy
  - Green Sidewalk Guidelines
  - Holistic approach in development of new Small Area Plans







City Green Infrastructure Projects

- Green Roofs
  - City Hall
  - Charles Houston Rec Center
  - Cora Kelly Elementary
  - Duncan Library
  - Fire Station 202
  - Polk Elementary
  - T.C. Williams
- Cistern/Rainwater Reuse
  - Fire Station 206
  - Jefferson Houston
  - Police Facility
  - T.C. Williams

City Hall Green Roof

Duncan Library Green Roof

City Green Infrastructure Projects

- Stormwater Bioretention
  - Beatley Library
  - Charles Barrett
  - Cora Kelly
  - Jefferson Houston
  - Miracle Field
  - Pocket Park
  - Police Facility
  - T.C. Williams
- Trees, planter boxes and vegetation in the City right-of-way
- Other water quality improvements completed or planned
  - Windmill Hill Park (living shoreline)
  - Stream Restoration (Strawberry Run and Holmes Run)
  - Pond Retrofits (Lake Cook and Ben Brenman)

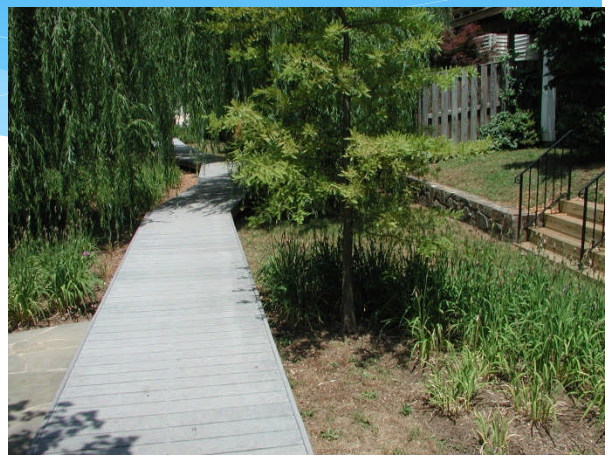
Beatley Library

West Glebe Road

Privately-Owned Green Infrastructure

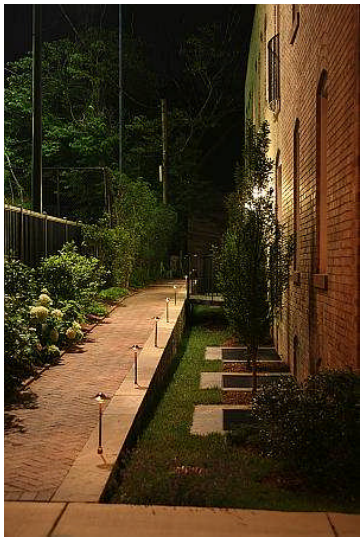
Kings Cloister Bioretention

Cromley Lofts



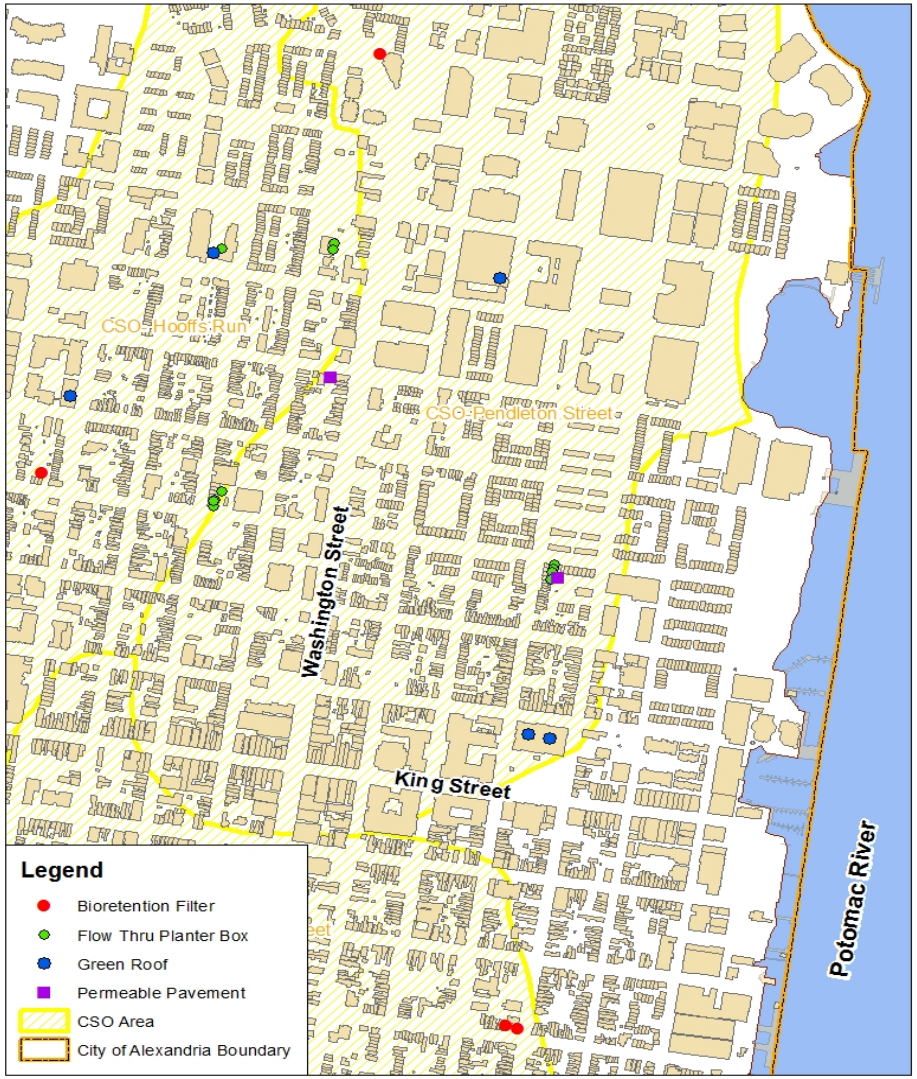
Stonegate Boardwalk

Kensington Court Bioretention



The Henry Green Roof

Green Infrastructure in Old Town



- Green Infrastructure (GI) locations include:
  - Green roofs (4)
  - Biorention (4)
  - Planter boxes (4)
  - Permeable pavement (2)
- Mix of City-owned GI and GI as part of redevelopment

City of Alexandria, Virginia

Next Steps

Next Steps

- **June 2015 – May 2016:** Additional Investigations
  - Alignment studies
  - Site feasibility studies
  - Alternative Refinement
  - Geotechnical Investigation
  - Implementation Plan
  - Permitting Investigation
- **May – June 2016:** Public Meeting and Hearing
  - Present recommended alternative and costs
  - Receive public input and comment
  - City Council consideration of Long Term Control Plan Update
- **August 2016:** Submit updated Long Term Control Plan documents to Virginia Department of Environmental Quality

Implementation

- **Long Term Control Plan Update due August 2016**
  - Must include schedule for implementation
  - Schedule based on cost and complexity of recommended alternative(s)
    - Implementation likely to be done in phases
    - Phases likely to coincide with 5-year permit cycles
    - All phases must be fully implemented (completed) no later than 2035
  - Recommended alternative(s) and schedule will be future permit requirement(s)

Planning and Funding

- Planning:
  - 10 Year Capital Improvement Plan for Sanitary Sewers and Stormwater Management
- Potential Funding Sources:
  - Existing Sanitary Sewer Enterprise Fund
    - User Fees – paid by customers
      - City fee: $1.25/1000 gallons of water usage
    - Connection Fees – paid by developers
  - Potential funding from a future stormwater utility
  - State revolving loans
  - Grant funding
  - Earmarks through legislative efforts

City of Alexandria, Virginia

Public Participation and Input

Public Participation Process – Educate – Inform – Be Responsive

- Follow "*What's Next Alexandria*"
- Information on City's website
  - Presentations from public meetings
  - Annual reports to VDEQ
  - Long Term Control Plan Update (2016)
- General Public Outreach
  - Phase 1 Public Meeting - February 5, 2015
  - Phase 2 Public Meeting - June 18, 2015
  - Phase 3 Public Meeting and Hearing - May-June 2016
- Targeted Outreach and Ongoing Dialog
  - Civic and Neighborhood Associations
  - Environmental Policy Commission
  - Agenda Alexandria

Community Feedback Form

1. Were the goals of this project clearly explained?
2. Did this meeting meet your expectations?
3. What worked well during the meeting and why?
4. What could have been done better during the meeting and why?
5. One objective of today's meeting was to present the evaluation criteria used to rank the possible CSO control strategies. Did we meet this objective?
6. Another objective was to present the initial ranking of possible CSO control strategies. Did we meet this objective?

7-9. Based on your understanding of each of the CSO control strategies presented, do you agree with:

- The strategies being considered for further evaluation as primary control strategies?
- The strategies being considered as integral complementary strategies?
- The strategies removed from further evaluation?

10. Other thoughts?

Community Stakeholder Group

- Purpose: Monitor the progress of the Long Term Control Update, disseminate information and receive public input, provide recommendations to Staff
- To be authorized by City Council June 23, 2015
- Members appointed by the City Manager
- Membership from:
  - Residents (from civic associations and at-large)
  - City Boards and Commissions
  - Environmental Groups
  - Business Community

Questions/Suggestions

For more information, contact:

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