City of Alexandria, Virginia

Combined Sewer System Permit and Long-Term Control Plan Update

Public Meeting
February 5, 2015

Bill Skrabak, Deputy Director
Lalit Sharma, PE, Division Chief

Department of Transportation and Environmental Services

ECO-CITY ALEXANDRIA

City of Alexandria, Virginia

AGENDA

- Purpose
- City's Combined Sewer System (CSS)
- Compliance with Federal/State Laws and Regulations
- Investing In Infrastructure
- Public Participation and Input

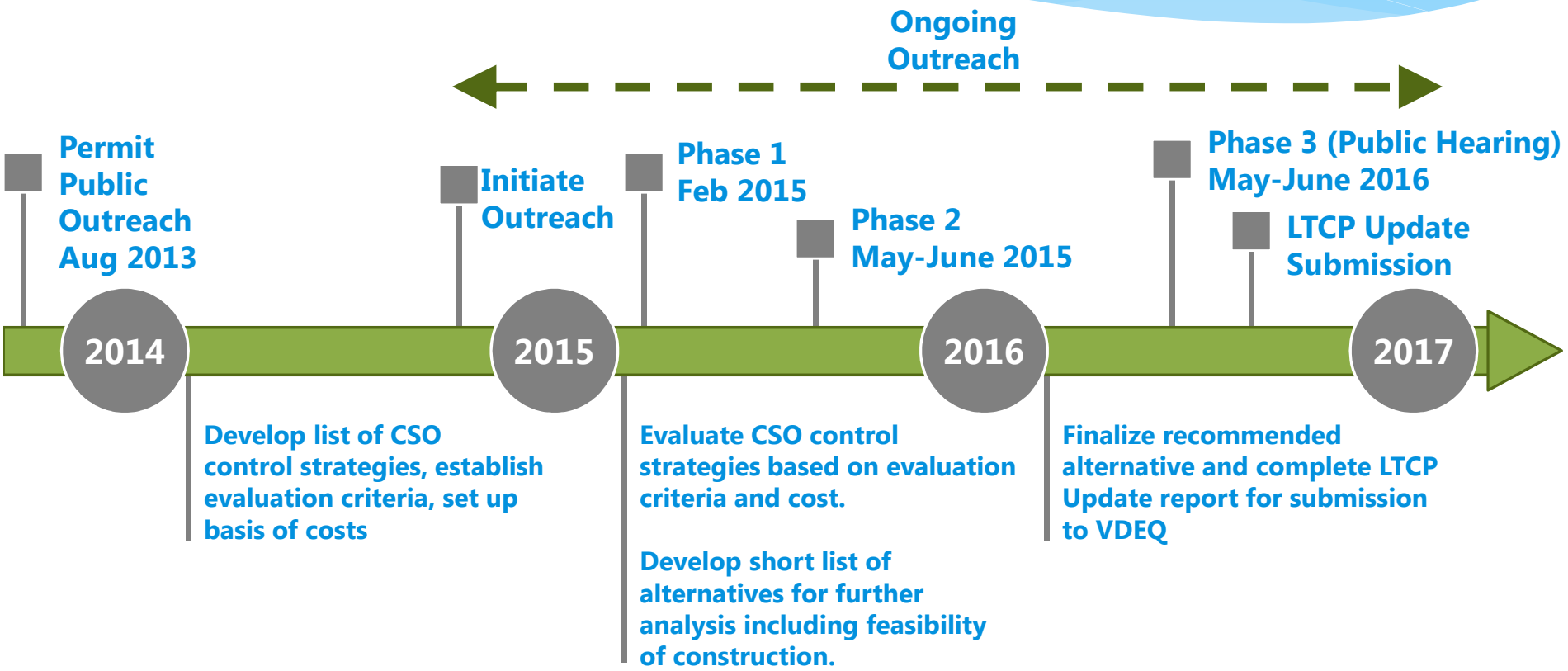
City of Alexandria, Virginia

Purpose

Goals of Today‘s Meeting

* **Educate.** Develop basic understanding of the Long Term Control Plan Update and combined sewer control technologies.
* **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 technologies and the City’s evaluation approach.

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

How the Long Term Control Plan Update Might Affect You

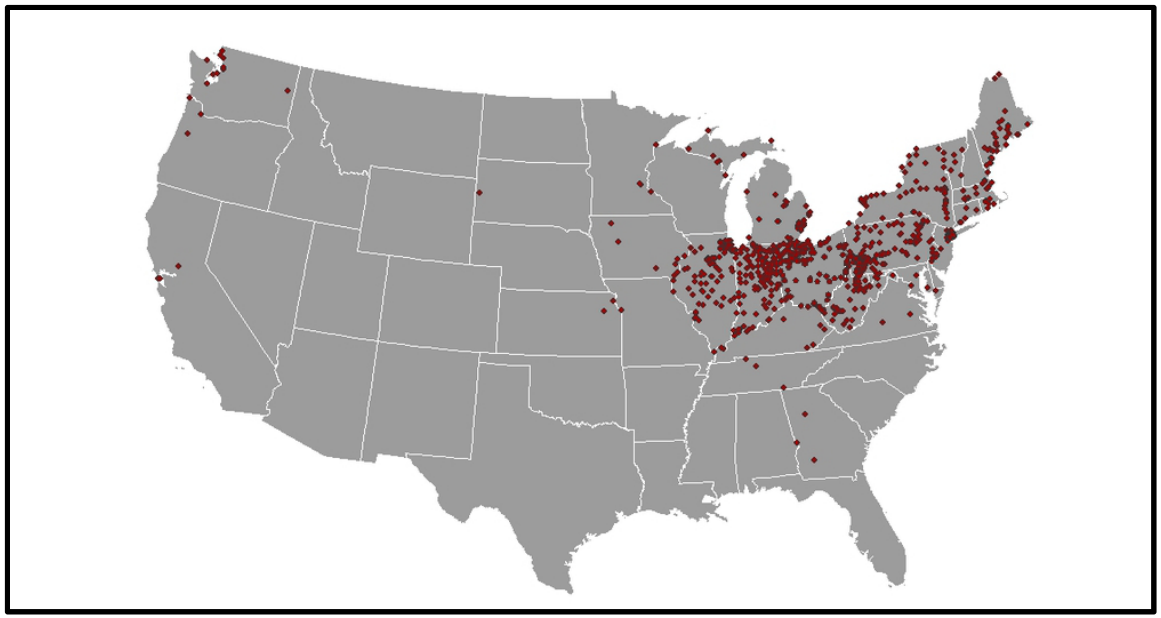
* Cost
  - The Long Term Control Plan projects will be part of the City's budgeting process
  - Potential sewer rate impacts
* Construction Impacts
  - Noise, dust, road closures
* Improved water quality in Hunting Creek
* Potential for ancillary benefits

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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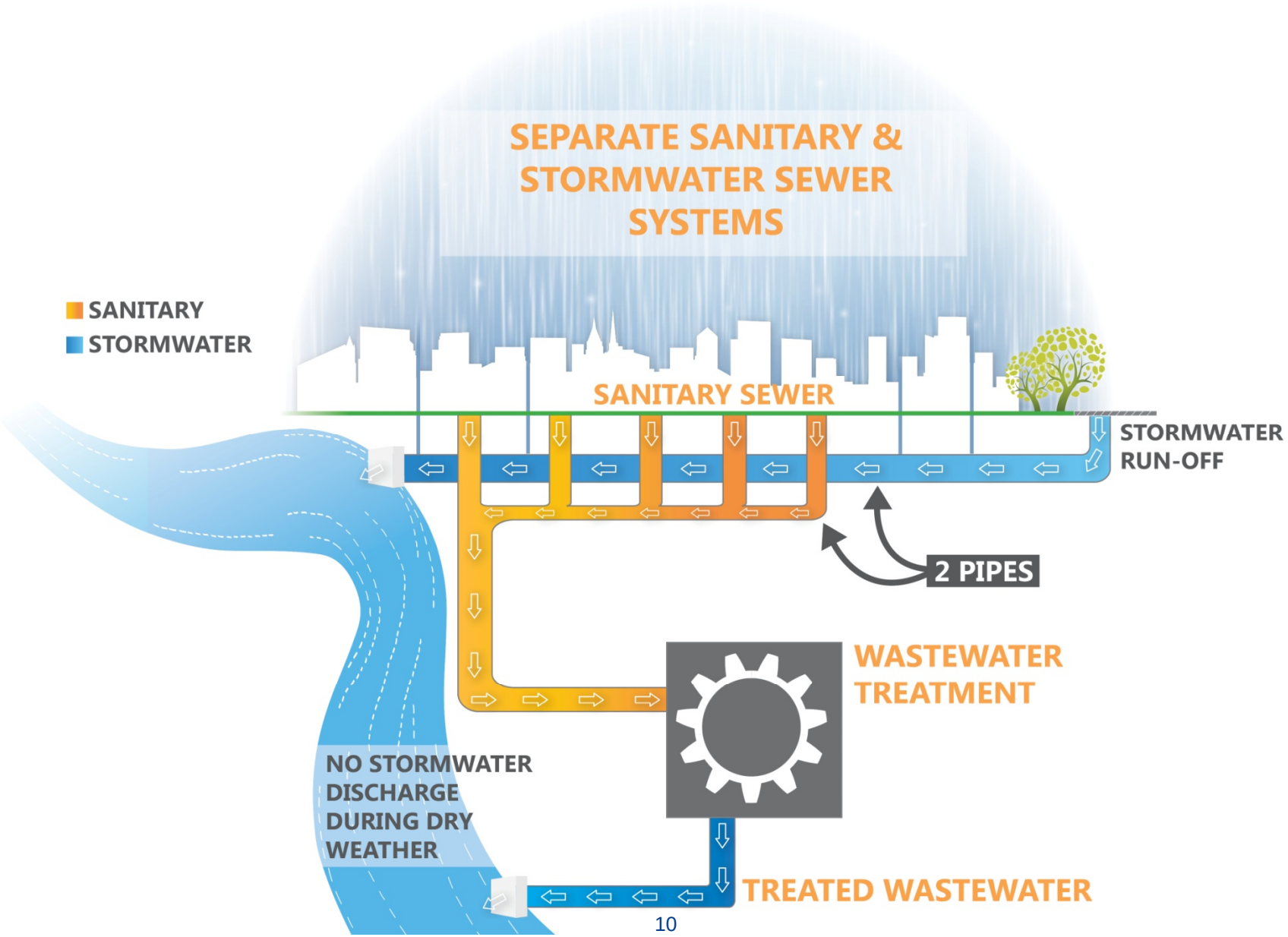
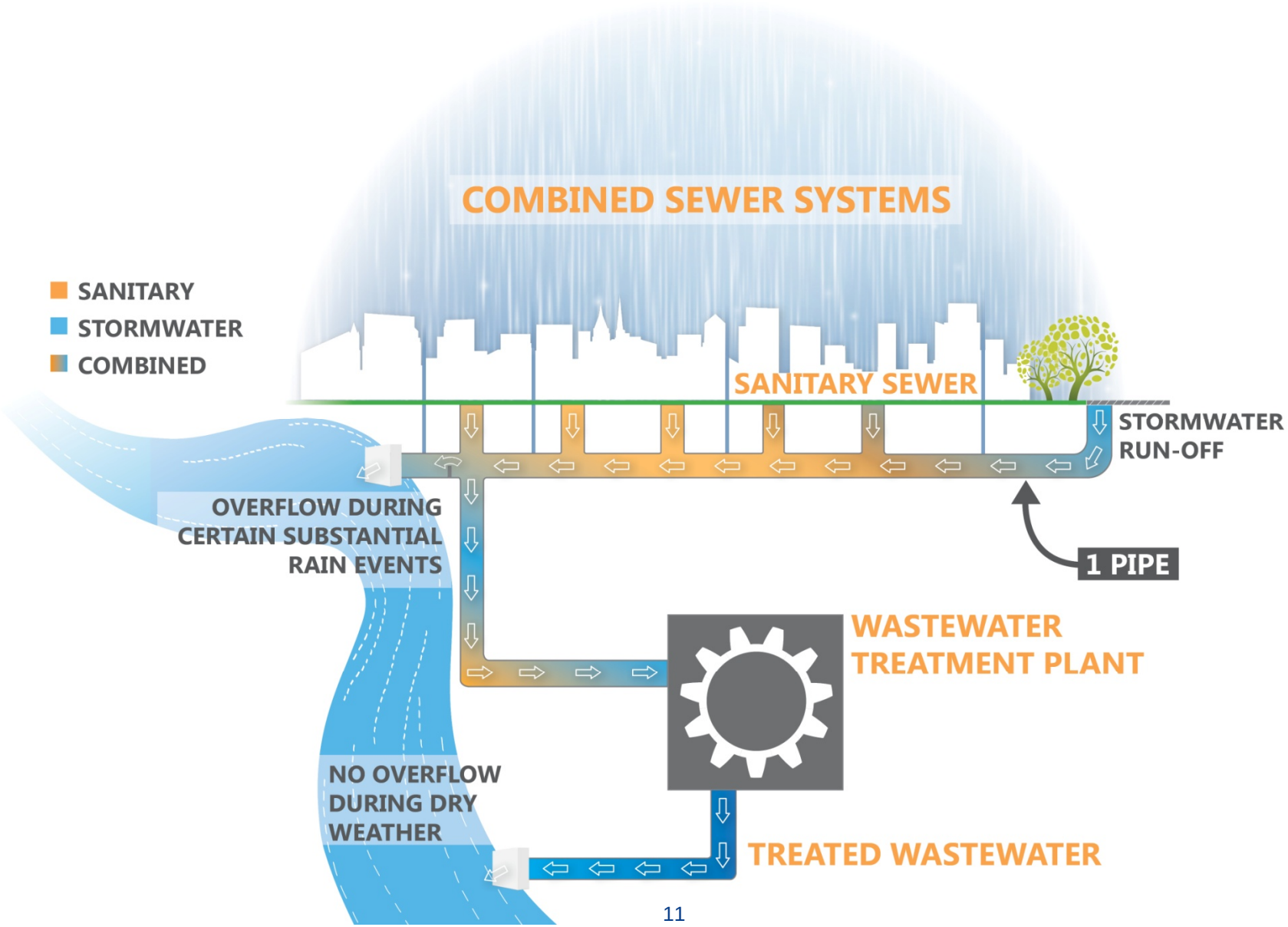
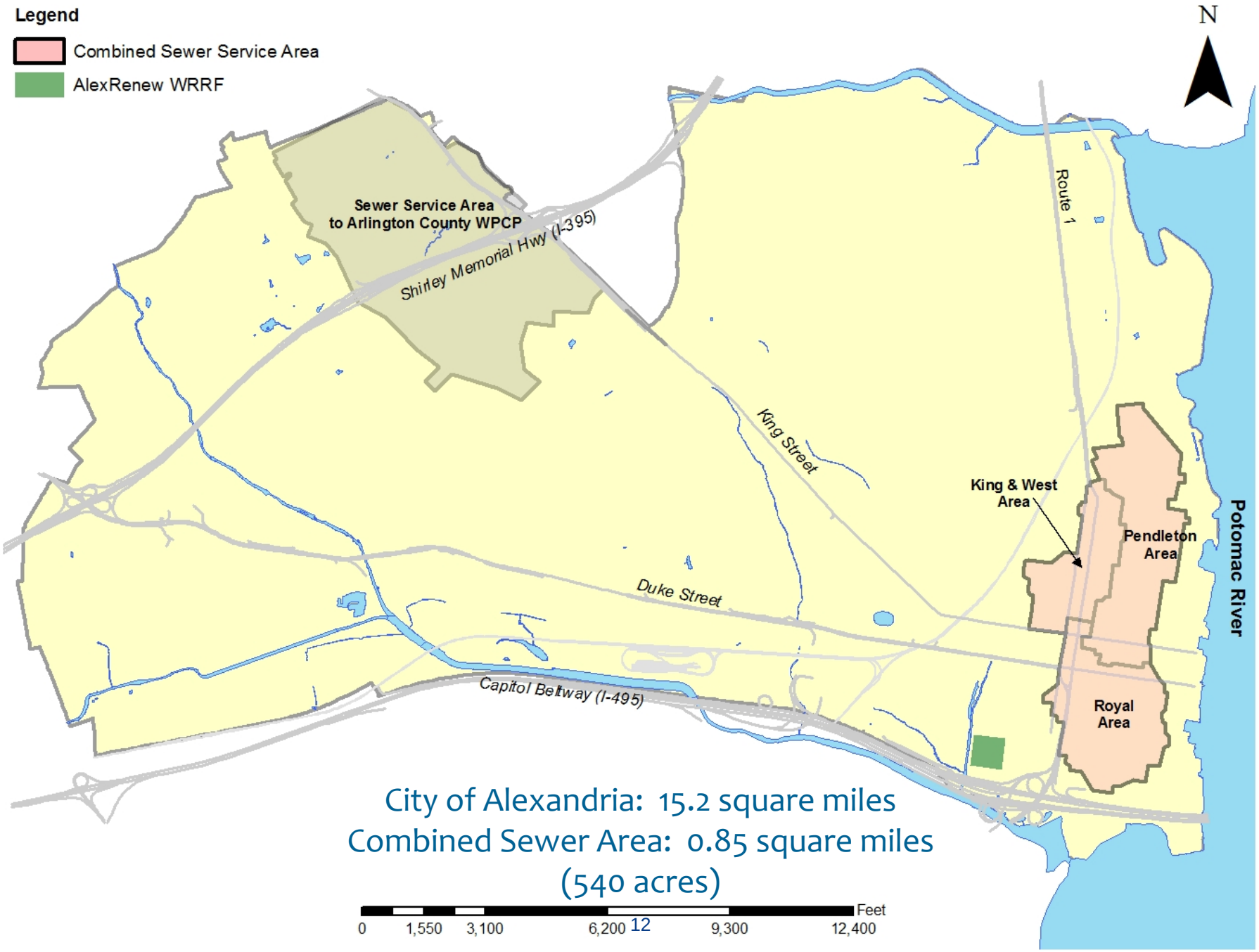

SEPARATE SANITARY & STORMWATER SEWER SYSTEMS
SANITARY
STORMWATER
SANITARY SEWER
STORMWATER RUN-OFF
2 PIPES
WASTEWATER TREATMENT
NO STORMWATER DISCHARGE DURING DRY WEATHER
TREATED WASTEWATER

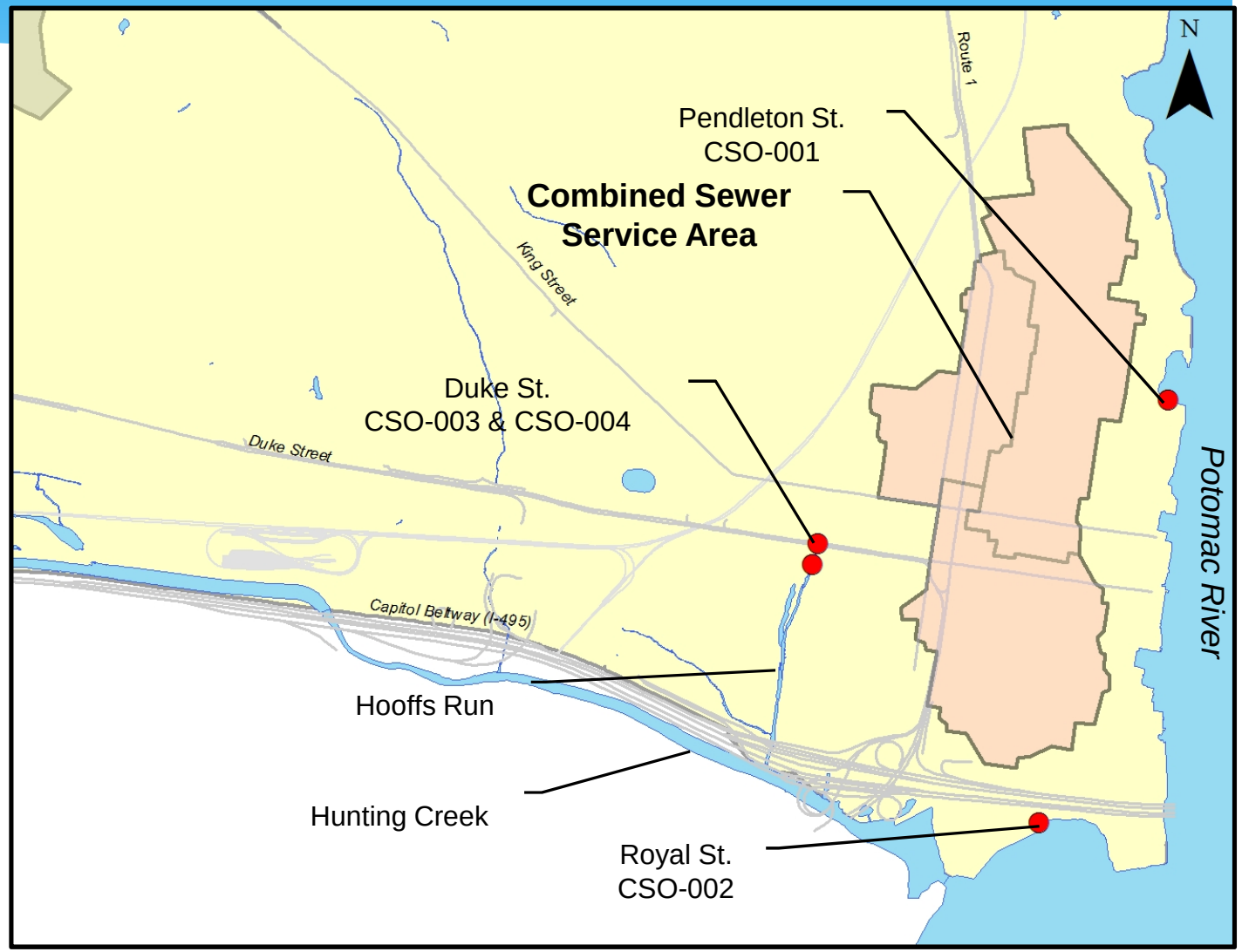

COMBINED SEWER SYSTEMS
SANITARY
STORMWATER
COMBINED
SANITARY SEWER
STORMWATER
RUN-OFF
OVERFLOW DURING
CERTAIN SUBSTANTIAL
RAIN EVENTS
1 PIPE
WASTEWATER
TREATMENT PLANT
NO OVERFLOW
DURING DRY
WEATHER
TREATED WASTEWATER


Legend
Combined Sewer Service Area
AlexRenew WRRF
N
Sewer Service Area
to Arlington County WPCP
Shirley Memorial Hwy (I-395)
Route 1
King Street
King & West
Area
Pendleton
Area
Potomac River
Duke Street
Capitol Beltway (I-495)
Royal
Area
City of Alexandria: 15.2 square miles
Combined Sewer Area: 0.85 square miles
(540 acres)
0
1,550
3,100
6,200
9,300
12,400
Feet

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

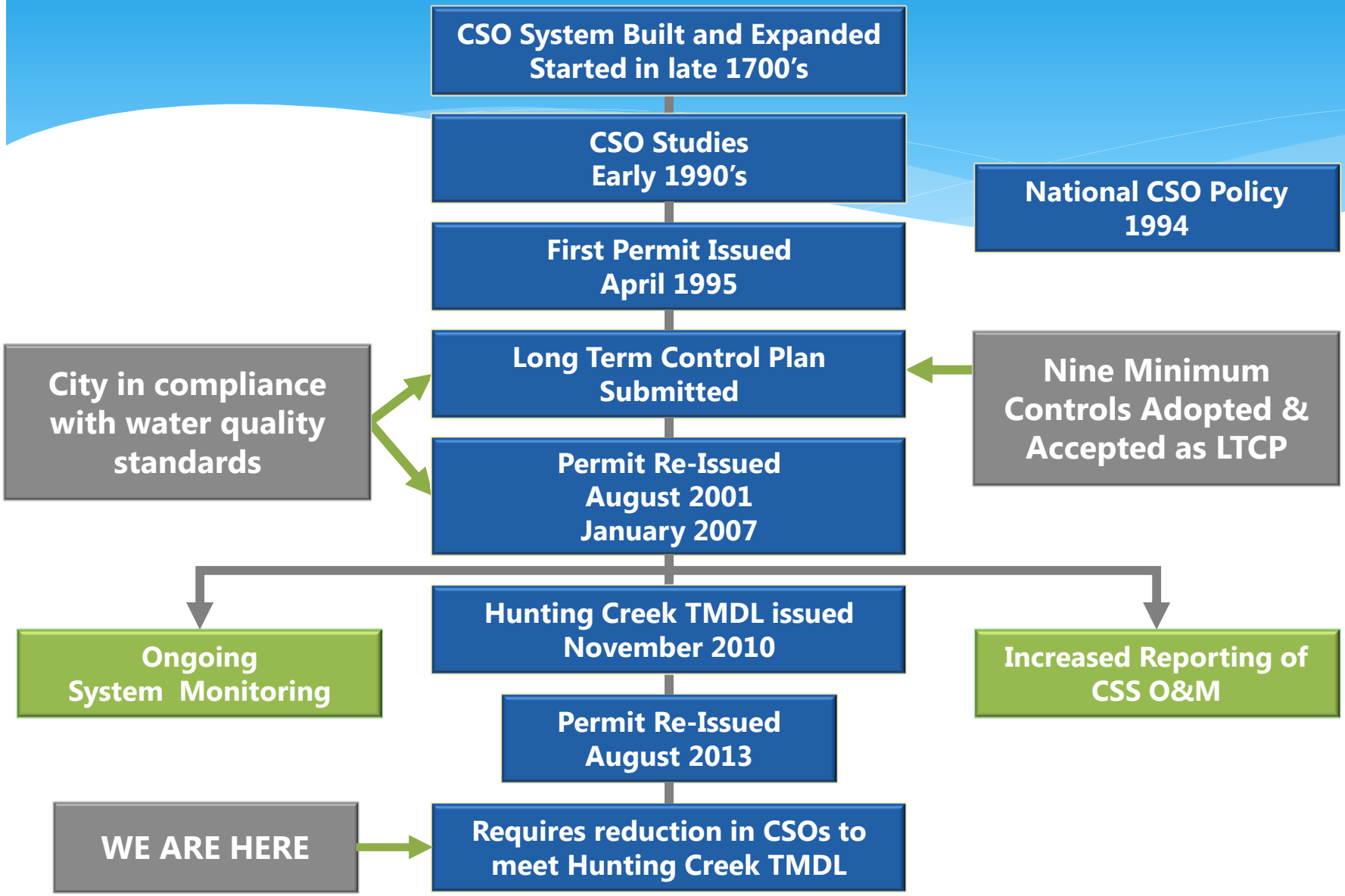
How much of the overflows is stormwater, and how much is wastewater?

Greater than 90% of the overflows is stormwater

City of Alexandria, Virginia

Compliance with Federal/State Laws and Regulations

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

Paradigm Shift

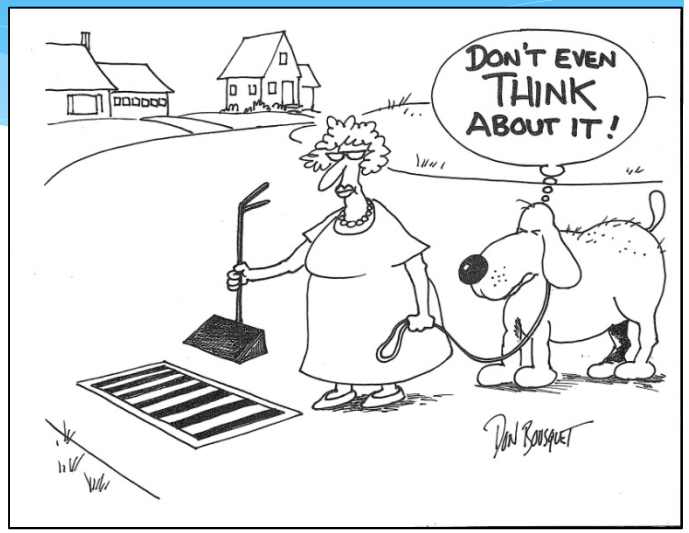
* Previous Combined Sewer System Permits (before 2013):
  - City's Long Term Control Plan based on best practices for operation and maintenance of combined systems
  - Monitoring and modeling of combined sewer overflows

* Current and Future Combined Sewer System Permits:
  - New regulations due to Hunting Creek Total Maximum Daily Load
  - Must address new regulations and incorporate required reductions in CSO bacteria discharged

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
* Aspirational goals of Clean Water Act versus actual conditions of Hunting Creek

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 Reclamation Facility
  - Septic Systems

Hunting Creek Bacteria Total Maximum Daily Load

* Hunting Creek Bacteria TMDL and CSOs:
  - 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

* CSS Permit issued in August 2013 requires City to address TMDL through update to its Long Term Control Plan

Long Term Control Plan Goals

* Comply with the new regulations
* 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 old and historic area
* Significant conflict with existing utilities
* Existing infrastructure is old and antiquated and may require rebuilding beyond planned sewer work
* Quality of life: temporary disruption to community and businesses
* Economic: potential for temporary loss to business and tax revenue
* Cost to implement CSO controls

CSO Control Strategies to be 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
- **Reduce stormwater runoff:** green infrastructure
- **Disinfection:** kill the bacteria in the overflow
- **Outfall Relocation:** redirect outfalls directly to Potomac River (out of Hunting Creek embayment)
- **Combination of the above strategies**

Storage Tunnels

DC Water: Tunnel Boring Machine

Storage Tunnels

Advantages:

* Captures and stores the combined sewer overflow and then sends it to the wastewater treatment plant for a high level of treatment
* Minimal aesthetic impact and spatial requirements, as the facilities are largely underground
* Generates credits for stormwater

Disadvantages:

* Complex construction project
* Easement acquisition likely required
* Construction impacts at tunnel access shafts

Storage Tanks

Toronto: Keelesdal-Hyde Ave
Underground CSO Storage Tank

Arlington: Water Pollution Control Plant

Storage Tanks

Advantages:

- Captures and stores the combined sewer overflow and then sends it to the wastewater treatment plant for a high level of treatment
- Anticipated to be one of the less costly infrastructure control strategies
- Generates credits for stormwater

Disadvantages:

- May be difficult to site due to lack of available space
- Easement acquisition likely required

Sewer Separation

Alexandria: King & West
Diversion Structure

Sewer Separation

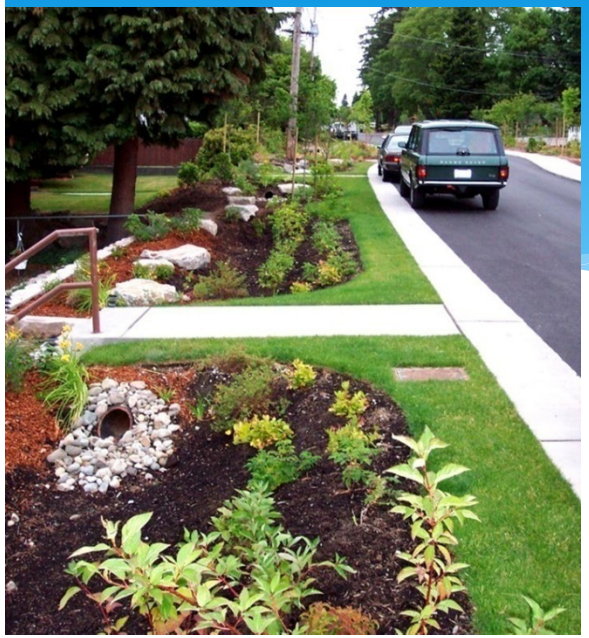
Advantages:

* Over time will eliminate the combined sewer system (separate storm and sanitary sewers)
* New sewer infrastructure constructed

Disadvantages:

* Design complexity – significant conflicts with existing utilities
* Anticipated to be the most costly control strategy
* Anticipated to be the most disruptive to the local residents and businesses as construction will be throughout entire Old Town area
* Will take longer to implement
* Additional stormwater discharges to be regulated

Green Infrastructure



Bioswales

Rain Gardens

Planter Boxes

Permeable Pavement

Rainwater Harvesting

Downspout Disconnects

Green Infrastructure

Advantages:

* Reduces the stormwater entering the combined sewers
* Provides ancillary environmental and community benefits

Disadvantages:

* May not achieve bacteria reduction requirements as a stand-alone strategy
* Highly site specific – existing soils, utilities, and community needs will dictate effectiveness.
* Disruptive to local residents and businesses as multiple projects will be required
* Will take longer to implement

Disinfection

NYC: Spring Creek CSO
Disinfection Facility

Detroit: Hubbell-Southfield
CSO RTB

Disinfection

Advantages:

* Disinfects (i.e. kills) the bacteria associated with the combined sewer overflow
* Smaller footprint than storage tanks

Disadvantages:

* May be difficult to site due to lack of available space
* Easement acquisition likely required
* Requires storage of chemicals in an urban/residential area (chlorine)
* Requires significant electrical infrastructure (UV)
* Does not reduce volume of combined sewer overflows
* Does not treat other pollutants and nutrients

Outfall Relocation

Richmond: CSO-001
Relocation

Outfall Relocation

Advantages:

* Captures and stores some of the combined sewer overflow and then sends it to the wastewater treatment plant
* Removes all overflows from the Hunting Creek embayment
* Minimal aesthetic impact and spatial requirements, as the facilities are largely underground
* Generates credits for stormwater

Disadvantages:

* Complex construction project
* Requires a significantly longer tunnel and construction of a new outfall on the Potomac River
* Regulatory and permitting challenges.
* Easement acquisition likely required
* Construction impacts at tunnel access shafts

Combination of CSO Control Strategies

* Long Term Control Plan Update will also consider a combination of strategies presented
* Advantages:
  - Can evaluate combined sewers outfalls both individually or group together
  - Takes into account differences in the each combined sewer outfall including surrounding location
  - Can result in the most cost-effective solution

Criteria	Description
Capital Cost	The capital cost category of the evaluation criteria measures the relative cost of each CSO control strategy.
Combined Sewer Overflow Reduction (Volume)	One of the most effective ways to reduce the bacteria load to the receiving waters is to limit the volume of combined sewer overflow. In some instances there may be a reduction in the bacteria load (e.g., disinfection) without a reduction in CSO volume.
Effectiveness	The effectiveness criterion is a rating of how well a control strategy meets the Hunting Creek TMDL requirements. The reduction in bacteria will be determined for each control strategy.
Implementation Effort	The implementation criterion is the feasibility with which all the projects in a CSO control strategy can be successfully completed.
Impact to Community	The CSO control strategies will result in capital projects that will impact the businesses and citizens of the City of Alexandria during implementation (i.e., construction). Alternatives that result in improved quality of life for residents and business and with minimal negative impact during implementation will receive more favorable ratings. The strategies that could have disruptive impacts to the community and business operations during implementation will receive less favorable ratings.

Criteria	Description
Expandability	The expandability criterion describes how well a strategy will adapt to future updates and expansion to the sewer and stormwater infrastructure in the City of Alexandria.
Net Environmental Benefit	The net environmental benefit criteria observes how the potential negative environmental impacts of constructing the projects compares to the overall environmental benefits the projects provide in the long-term.
Credit Trading	It may be possible to implement combined sewer controls that will capture both sanitary flow and storm flow to be treated at the AlexRenew Water Resources Reclamation Facility (i.e., the wastewater treatment plant). Due to the high level of treatment at the wastewater plant, the pollutant reduction associated with the treatment of stormwater could potentially be applied to the City's stormwater program.
Required Operation and Maintenance	This criterion is a rating of the predicted operation and maintenance a completed project will need over its lifetime.

Evaluation Criteria

* Assign weighting to each criteria
* Rank alternatives based on criteria
* Develop short list of alternatives for further analysis
* Alternatives evaluation and short list to be presented May-June 2015

Next Steps

Next Steps

* **May-June 2015:** Public Meeting
  - Present results of alternatives evaluation
  - Present short list of alternatives for further study including feasibility of construction
  - Receive public input and comment
* **May-June 2016:** Public Hearing
  - Present recommended alternative and costs
  - Receive public input and comment
  - City Council adoption 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)

* **Total Estimated Cost: $150-300 million**

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 – May-June 2015
  - Phase 3 Pubic 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 with your expectations?
3. Please provide us with your thoughts about the importance of the proposed evaluation and any criteria you would suggest.
4. Based on your understanding of the preliminary advantageous and disadvantages of each of the potential sewer overflow control strategies presented.
5. Are there other Combined Sewer Overflow (CSO) Control Strategies the City should consider evaluating or do you have specific concerns about the strategies listed above?
6. For future community meetings, what information would you like the City to present? Are there changes to the meeting format that the City should consider?
7. Other thoughts?

Questions/Suggestions

For more information, contact:

Erin.BevisCarver@alexandriava.gov
703.746.4154

William.Skrabak@alexandriava.gov
703.746.4065

www.alexandriava.gov/sewers