COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
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Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

To: The Honorable Terence R. McAuliffe, Governor

The Honorable Molly Joseph Ward
Secretary of Natural Resources

The Honorable Thomas K. Norment, Jr.
Co-Chairman, Senate Committee on Finance

The Honorable Emmett W. Hanger, Jr.
Co-Chairman, Senate Committee on Finance

The Honorable Richard H. Stuart
Chairman, Senate Committee on Agriculture, Conservation and Natural Resources

The Honorable S. Chris Jones
Chairman, House Committee on Appropriations

The Honorable Daniel W. Marshall III
Chairman, House Committee on Agriculture, Chesapeake and Natural Resources

The Honorable L. Scott Lingamfelter
Vice-Chair, Chesapeake Bay Commission

The Honorable Frank W. Wagner
Member, Chesapeake Bay Commission

The Honorable David L. Bulova
Member, Chesapeake Bay Commission

The Honorable Margaret B. Ransone
Member, Chesapeake Bay Commission

Dennis H. Treacy
Member, Chesapeake Bay Commission

From: David K. Paylor

Date: December 29, 2017

Subject: Combined Sewer Overflow Outfall Progress Report (2017)

In accordance with the 2017 Virginia Acts of Assembly Chapters 826 and 827, the Department of Environmental Quality is transmitting the attached 2017 Annual Progress Report from the City of Alexandria.

If you have any questions concerning this report or would like a hard copy of this report, please contact Brandon Bull, Water Policy Manager, at (804) 698-4092.

December 18, 2017

Tom Faha, Director
Virginia Department of Environmental Quality
Northern Regional Office
13901 Crown Court
Woodbridge, VA 22193-1453

RE: 2017 Annual Progress Report (Virginia Law SB898/HB2383)

Dear Mr. Faha:

Thank you for continuing to engage in meaningful discussions regarding the City of Alexandria's (City's) and Alexandria Renew Enterprises' (AlexRenew's) plans to address the combined sewer overflow (CSO) control requirements prescribed in SB898/HB2383. We appreciate the willingness of you and your colleagues to meet with us in order to provide guidance as we strive to identify the performance and projects necessary to meet the legislation.

As you know, the legislation requires, *"Any owner of a CSO outfall that discharges into the Chesapeake Bay Watershed not under a state order or decree related to the CSO as of January 1, 2017, shall report annually to DEQ on its progress pursuant to §3."* The intent of this letter is to convey to you the significant progress we have made since the legislation was signed into law in April of 2017.

History

In December 2016, the City of Alexandria submitted an updated Long Term Control Plan for its combined sewer system (CSS) to the Virginia Department of Environmental Quality (VDEQ) for approval. This plan included a substantial reduction in overflows from outfalls that overflow into the Hunting Creek watershed (outfalls 002, 003, and 004) through the construction of an underground storage tunnel approximately 0.5 miles long and an underground storage tank. The plan also included commitments for green infrastructure and sewer separation resulting in reductions in the overflows from the outfall into Oronoco Bay (outfall 001).

The 2017 legislation greatly accelerates the timeframe in which the CSO controls have to be fully implemented and required that we also address Outfall 001 on the accelerated schedule. As a result of the legislation we are working to update the City's 2016 plan in terms of scope and schedule.

Partnership with AlexRenew (collaboration)

As a critical step, the City of Alexandria has partnered with our local wastewater treatment utility, Alexandria Renew Enterprises (AlexRenew), in order to take advantage of the efficiencies each agency can bring to the CSO control planning and implementation process. AlexRenew is a political subdivision of the Commonwealth of Virginia created in 1952 under the Virginia Water and Wastes Authorities Act, and provides wastewater interception, pumping and treatment for most of the City of Alexandria and eastern portions of Fairfax County. It has significant capital project experience and has invested over $500M in major upgrades to improve the Chesapeake Bay and address local water quality. AlexRenew has experience and expertise in treatment technology and innovation, and progressive project delivery methods. The partnership with AlexRenew leverages planned plant projects to help the City meet the statutory deadline. The CSO control options being considered will result in extremely high levels of CSO control also in part by sending more combined sewer flows to the AlexRenew Water Resource Recovery Facility (WRRF) for treatment. This will require significant investment in additional infrastructure at the WRRF in a short period of time to receive and treat the additional flow. To leverage each entity's expertise and abilities, AlexRenew is currently in active discussions with the City about taking ownership of CSO outfalls 003 and 004, along with constructing major components of the needed combined sewer facilities. This will allow for the timely and successful implementation of these controls. We believe that such a partnership will give both AlexRenew and the City the best opportunity to meet their respective requirements.

Progress

Even before the new legislation was finalized, the City and AlexRenew began evaluating technical options to revise the 2016 plan and accelerate the projects for meeting the statutory deadlines. Conceptual planning and engineering to date has yielded several promising opportunities centered on underground tunnels, storage tanks and improvements at the AlexRenew WRRF. While we are optimistic about these opportunities, we must note that these are large, complex and expensive civil infrastructure projects that will have a significant impact on the community and the rate payers of Alexandria due to the compressed schedule. There are also significant permitting challenges.

The technical options are currently being refined and vetted through a team of engineering consultants to further evaluate and optimize a preferred approach. Given the statutory deadlines, we anticipate AlexRenew will take the lead in advancing implementation for the outfall 003 and 004 controls and needed enhancements at the treatment facility, while the City develops the approach for outfalls 001 and 002. This planning is complicated and will require close coordination because the solutions are significantly interrelated, especially in relation to the WRRF capacity and constraints inherent in leveraging the existing WRRF infrastructure within its limited site. Other progress to date includes the collection of initial geotechnical soil borings to aid in the design of future infrastructure, preliminary identification of potential infrastructure

locations and sizing of facilities, and identification of permits and land/easement acquisition that will likely be required before construction can commence.

Due to the statutory deadlines, we are unable to follow a normal, prudent, wastewater infrastructure planning approach. Instead, we are forced to make assumptions based upon relatively preliminary information. Thus, our CSO solutions will remain fluid – likely right up to the point we commence construction in 2023.

It should be noted that the City, as part of its current permit cycle, has completed or is in the process of completing a number of projects to help mitigate the impact of combined sewer discharges. Projects include separation of approximately 90 sewer laterals from the CSS, diversion structure and outfall improvements to send more flow to the AlexRenew WRRF, and the implementation of a green infrastructure demonstration project.

The City and AlexRenew provided an update on the progress made to date at the December 4th meeting of the State Water Commission. Since the legislation was signed in April of this year, the City has met on a regular basis with VDEQ, including meetings in May, September, and November. Finally, the City and AlexRenew will continue to meet with VDEQ as the plan is developed.

CSS Stakeholder Group (Outreach)

During the development of the 2016 plan, the Alexandria City Council convened a Combined Sewer System (CSS) Stakeholder Group that represented the diverse commercial and residential interests of the City. The Group provided input and feedback as significant decisions were made during the development of the 2016 plan. In addition to the members of the CSS Stakeholder Group, all meetings were open to the general public so that they could provide feedback as well. As a result of this collaboration, the CSS Stakeholder Group wrote a letter to the City Council recommending approval of the 2016 plan.

Since the recent legislation requires a major revision to 2016 plan in terms of scope and schedule, the City Council has reconvened a reconstituted CSS Stakeholder Group to help inform and provide feedback on the development of the revised plan. To date, there have been two CSS Stakeholder Group meetings, one held on October 12 and one on November 20, 2017. We anticipate 3-4 additional meetings between now and March 2018. Following the public engagement process, a draft plan will be presented to the Alexandria City Council in the spring of 2018. An overview of upcoming proposed Stakeholder Group meetings is provided on Attachment A. The City is also meeting with other interested stakeholders throughout the planning process.

Schedule

The City and AlexRenew are working expeditiously to submit a comprehensive Long Term Control Plan Update to address all four outfalls to DEQ in June of 2018. The plan will include an implementation schedule intended to meet the statutory requirements by July 1, 2025. Attachment B shows the overall program schedule. It should be noted that this schedule is currently at a high level and a more detailed scheduled will be available as the plan is developed

and approved. As noted above, we are sprinting to comply with the legislation and our process will necessarily remain fluid as a result.

Funding

The City has included approximately $385 million in funding, which represents a cost of about $5,000 per Alexandria household, as part of its Capital Improvement Program (CIP) to implement the infrastructure projects required in the plan. Additional funding may be required in order to meet the legislative mandate due to the accelerated schedule and newly realized impacts at AlexRenew. This additional funding is still under evaluation and impacts to rate payers are being considered.

In order to ameliorate this significant financial burden, the City's intention to will solicit funding support from the Governor and the General Assembly for the CSO program, similar to what has been provided for other Virginia CSO communities.

Closing

The City and AlexRenew are diligently and expeditiously working through the technical challenges, while engaging in a meaningful dialog with the impacted citizens, to finalize a plan that meets the regulatory and legislative requirements. We will provide an update on our ongoing progress at our meeting with you in January and welcome any feedback you may wish to offer as we work toward submitting our plan to VDEQ for in June of 2018.

Regards,

Emily A. Baker, P.E.
Deputy City Manager
City of Alexandria

Karen Pallansch
Chief Executive Officer
Alexandria Renew Enterprises

Attachments:
A: CSS Stakeholder Meeting Schedule
B: CSS Timeline
C: November 20, 2017 Presentation to CSS
D: December 4, 2017 Presentation to Virginia State Water Commission

cc: Alexandria's Legislative Delegation
The Honorable Mayor and Members of City Council
Board of Directors, Alexandria Renew Enterprise
Mark B. Jinks, City Manager

Attachment A - CSS Stakeholder Meeting Schedule

OCTOBER 2017	NOVEMBER 2017	JANUARY 2018	FEBRUARY 2018	FEB/MAR 2018	MARCH 2018
Introduction/ Background	Evaluation Criteria and Shortlist of Alternatives (all four outfalls)	Water Quality Benefits/ Level of Control	Preferred Alternative	Implementation	Wrap-Up
Discuss the CSS/WW Plan history, the 2016 LTCPU submission, and the new legislation. Introduce the technologies under consideration.	Introduce the shortlist of alternatives. Review and discuss the evaluation criteria and process	Discuss benefits and challenges of the alternatives.	Present and discuss the preferred alternative. Discuss the potential impacts to the community.	Discussion implementation, costs, rate impacts and schedules.	Wrap and present draft plan.

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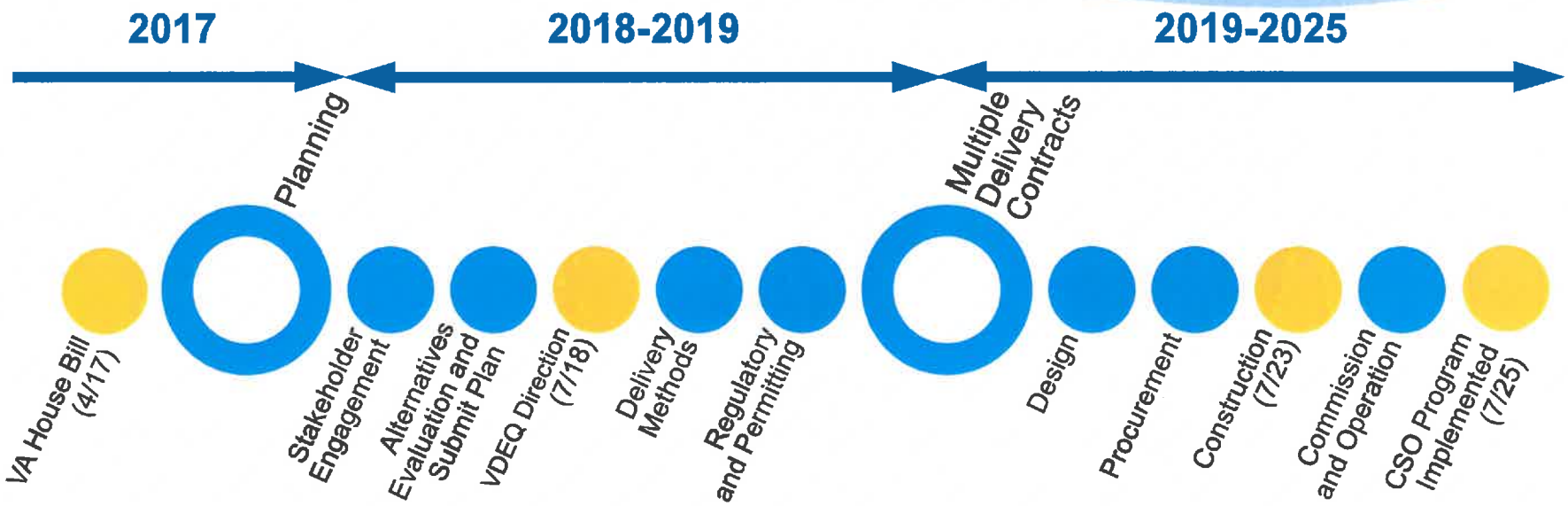
Attachment B – CSS Timeline



VA House Bill 2383 Milestone

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CLEAN WATERWAYS

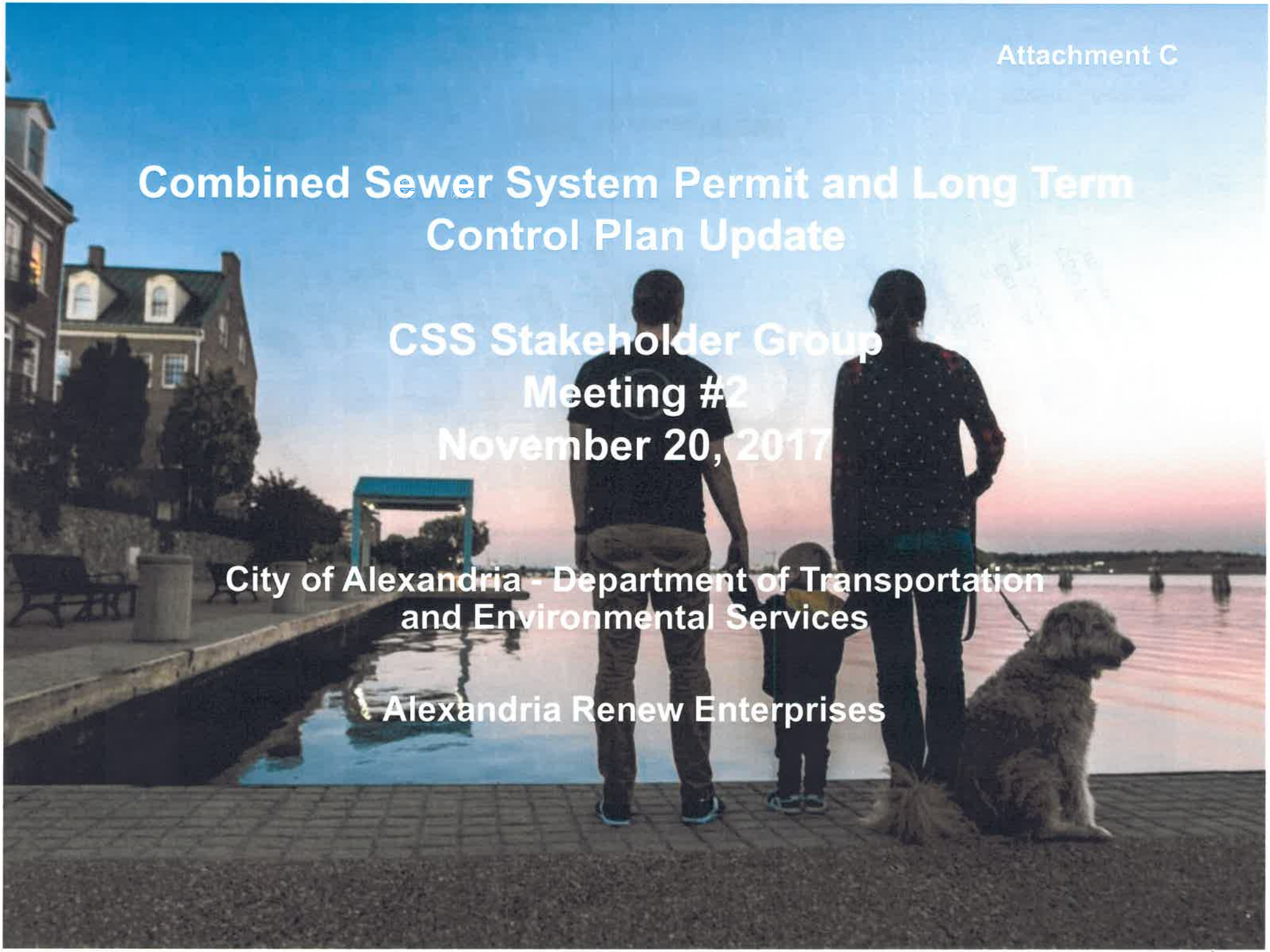
Attachment C

Combined Sewer System Permit and Long Term Control Plan Update

CSS Stakeholder Group Meeting #2 November 20, 2017

City of Alexandria - Department of Transportation and Environmental Services

Alexandria Renew Enterprises



PRESENTATION OUTLINE

- ❑ Purpose and Goals
- ❑ CSO Program Options
- ❑ Evaluation Criteria
- ❑ Green Infrastructure Recap and Discussion
- ❑ Public Comment
- ❑ Wrap-Up

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Purpose and Goals

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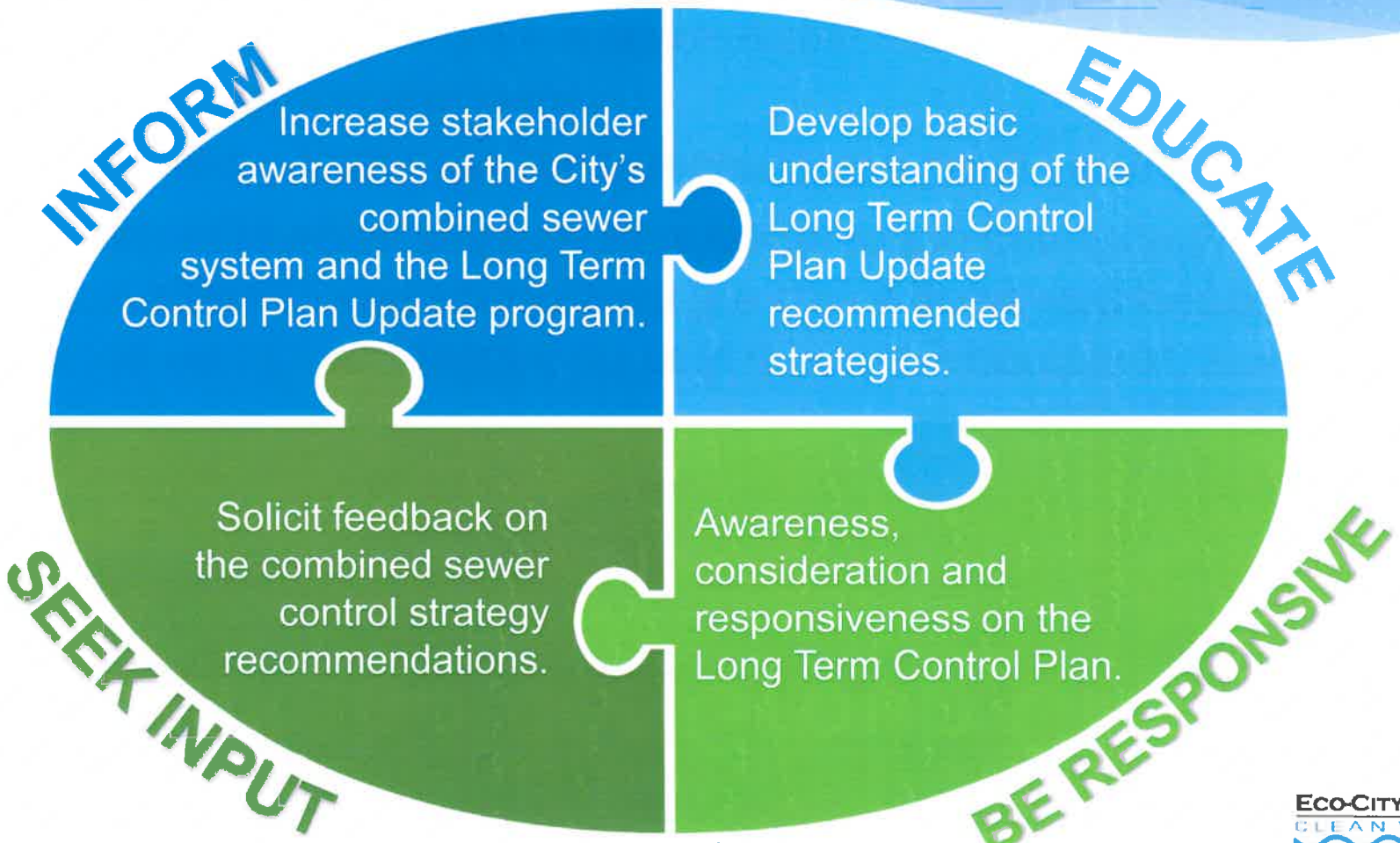
Public Participation Goals



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Stakeholder Group Charge

(Resolution No. 2781)

* Provide recommendations on how a primary combined sewer system control strategy can accomplish the City's goals and permit requirements while minimizing impacts to the community
* Review and monitor the preparation of the Long Term Control Plan
  - Permit and regulatory issues
  - Engineering and analysis of infrastructure alternatives
  - Implementation plan schedule and funding strategy
* Serve as a central information receiving/dissemination body related to the Long Term Control Plan
* Additional engagement opportunities following submission of the plan (working groups, implementation groups)

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Alexandria's Goals for the CSO Program

WATER QUALITY

Enhance local infrastructure to improve the water quality of Alexandria's waterways.

INVESTMENT STEWARDSHIP

Be good stewards of the rate payers' investments in both the short term and long term.

COMMUNITY BENEFITS AND CONSTRUCTION IMPACTS

Engage the community, explore opportunities, and be a good neighbor.

LEGISLATIVE MANDATE

Implement the CSO Program to meet the legislative mandate.

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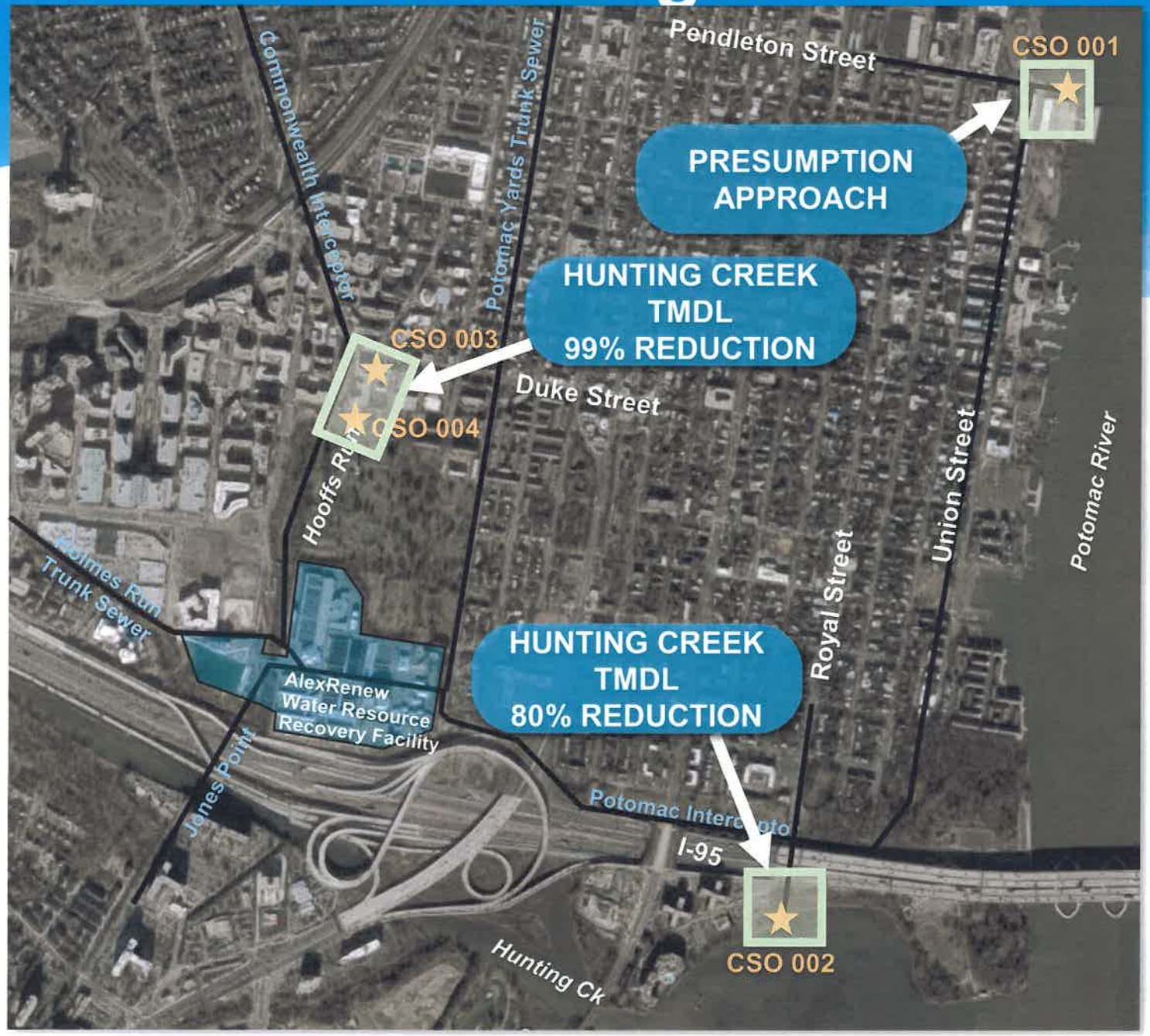
Recent State Legislation Drivers



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Recent State Legislation Drivers Presumption Approach

* Defined under the EPA CSO Control Policy

*"A program that meets **any** of the criteria listed below would be presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA [Clean Water Act]…*

1. *No more than an average of four overflow events per year, provided that the permitting authority may allow up to two additional overflow events per year*
2. *The elimination or the capture for treatment of no less than 85% by volume of the combined sewage*
3. *The elimination or removal of no less than the mass of pollutants…for the volumes that would be eliminated or captured for treatment under paragraph [2] above*

Recent State Legislation Drivers

* CSO Performance
  - VDEQ approval of approach by July 1, 2018
  - Completion of construction activities at all outfalls by July 1, 2025
  - Leverage capabilities of the AlexRenew facility
* Schedule
  - Consider alternative delivery methods
  - Collaborative approach to design and construction
  - Retain flexibility in the approach, size, and location
  - Simultaneous solutions/construction, may result in higher costs

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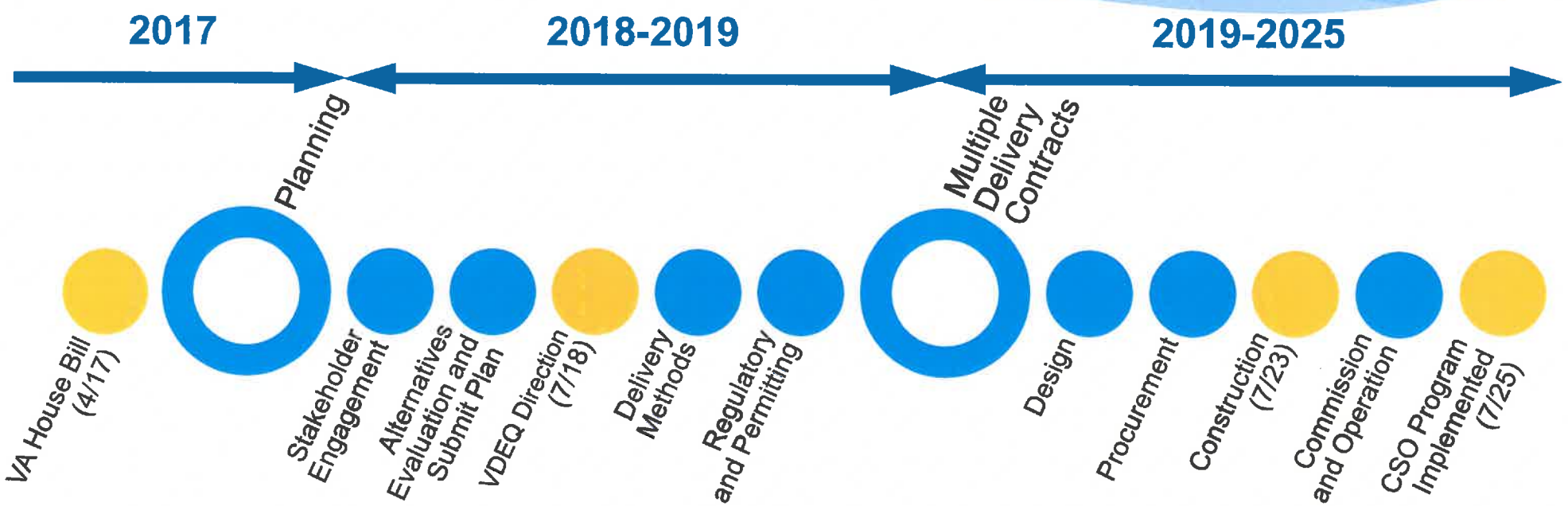
Timeline



VA House Bill 2383 Milestone

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CSO Program Alternatives

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City – AlexRenew Partnership

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Major Components

* **Store and treat:** build CSO storage and send to AlexRenew *after* CSO event for high level of treatment (basis of 2016 LTCPU)
  - Underground storage tanks
  - Deep tunnels
* **Convey, store, and treat**: leverage the AlexRenew wastewater treatment facility to treat the flow *during* a CSO event
  - Convey additional flows to AlexRenew through deep storage tunnels and pumping
  - May require upsizing of certain processes for additional capacity including building a separate wet weather treatment facility (i.e. disinfection)

Storage and Conveyance Tunnels

DC Water:
10-ft Diameter Tunnel Boring Machine and Finished Tunnel

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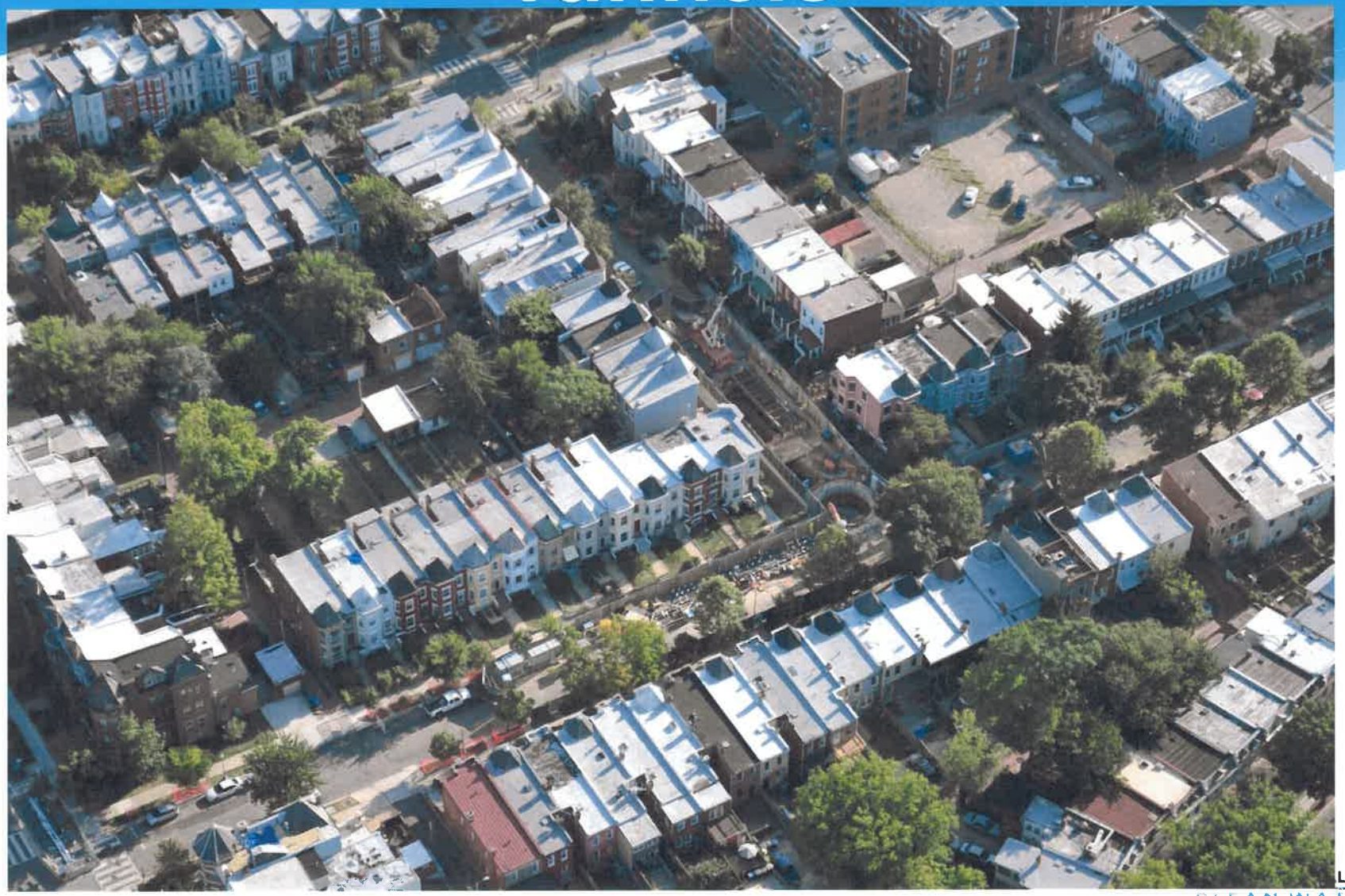
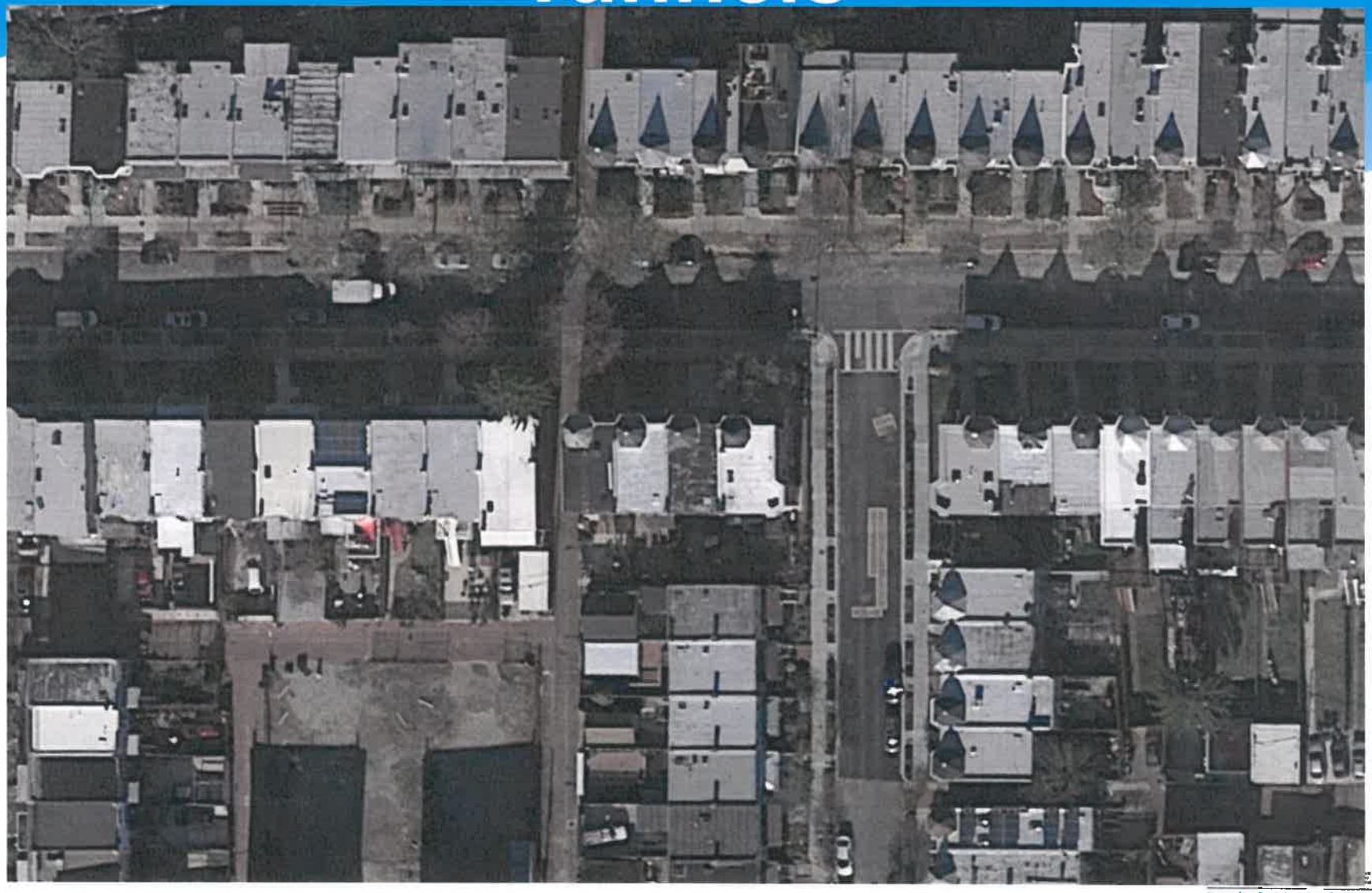
Storage and Conveyance Tunnels



DC Water: During Shaft Construction

Storage and Conveyance Tunnels

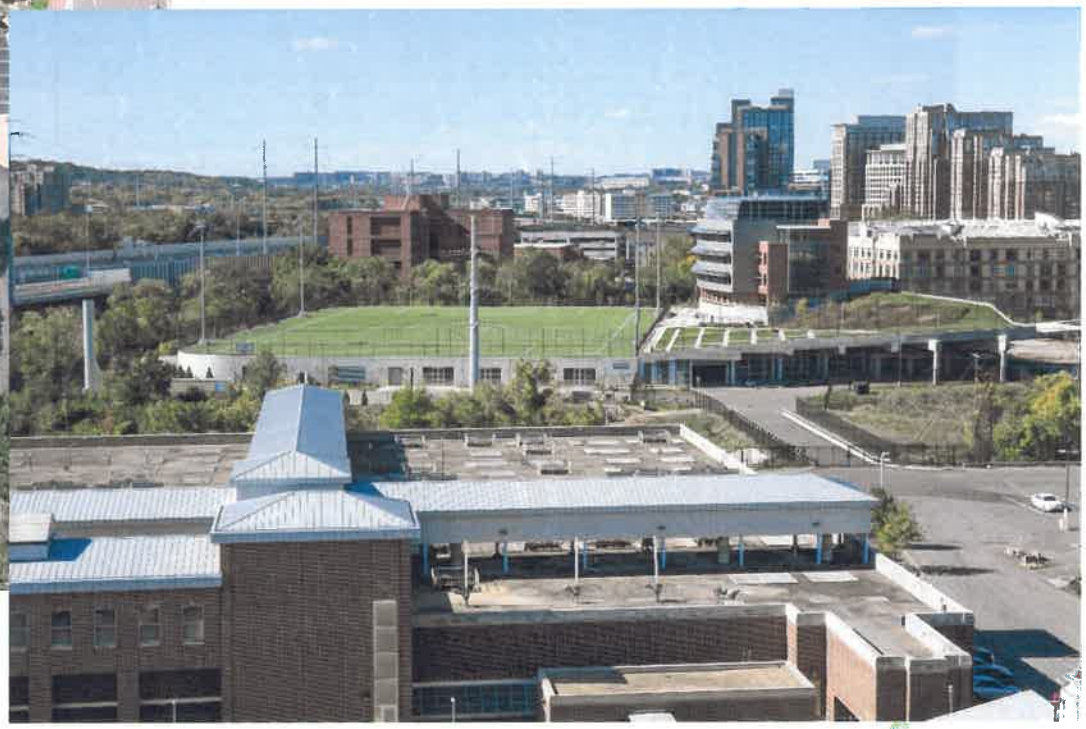


DC Water: After Shaft Construction

Storage Tanks

Tysons Corner:
4.5 MG Underground Tanks

AlexRenew:
Nutrient Management Facility Tank



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Storage Tanks

City of Duluth:
3 MG storage capacity

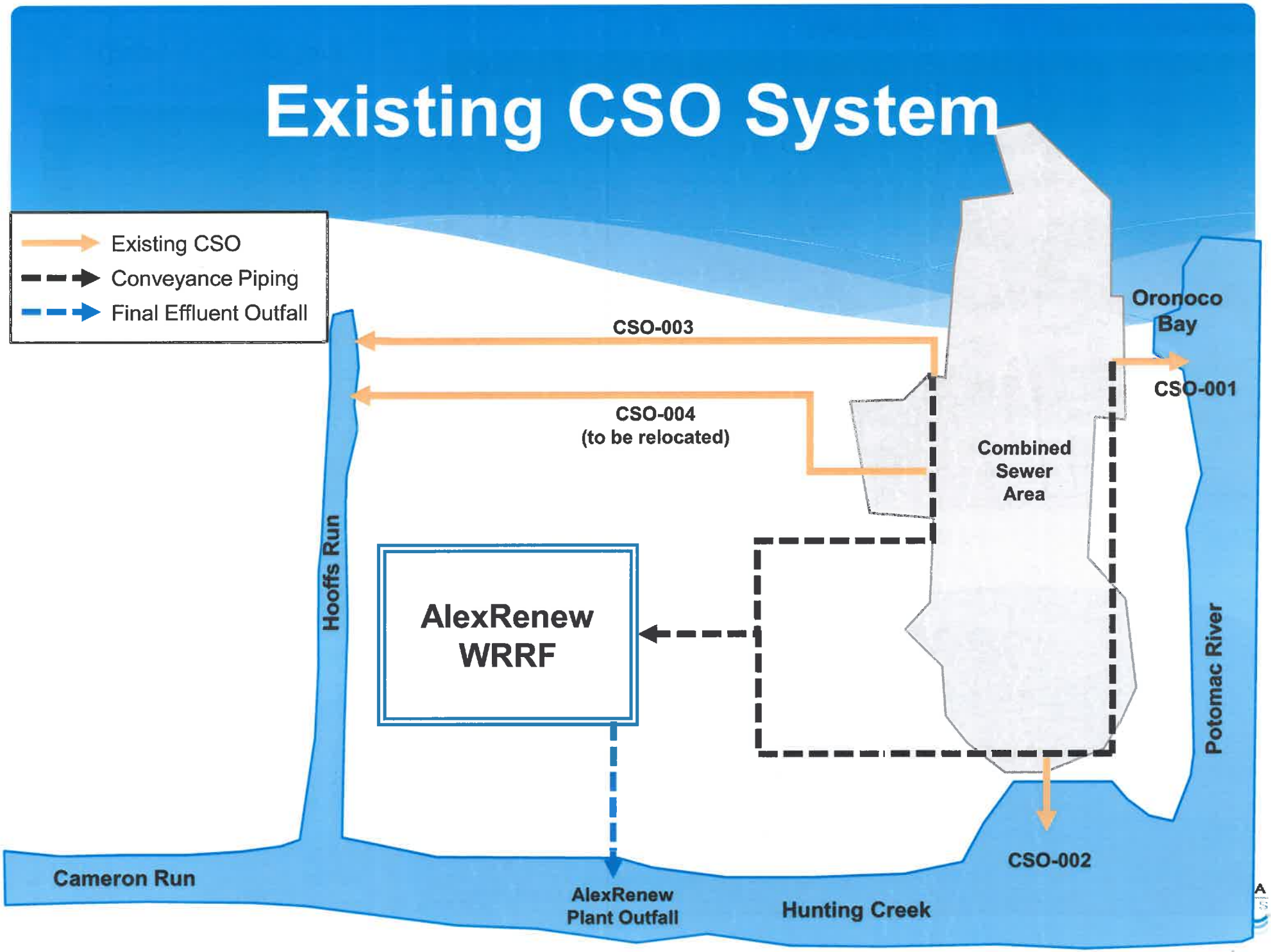
Maximize Flow to the Plant

Disinfection

NEORSD Easterly Plant:
Chlorine Contact Tank

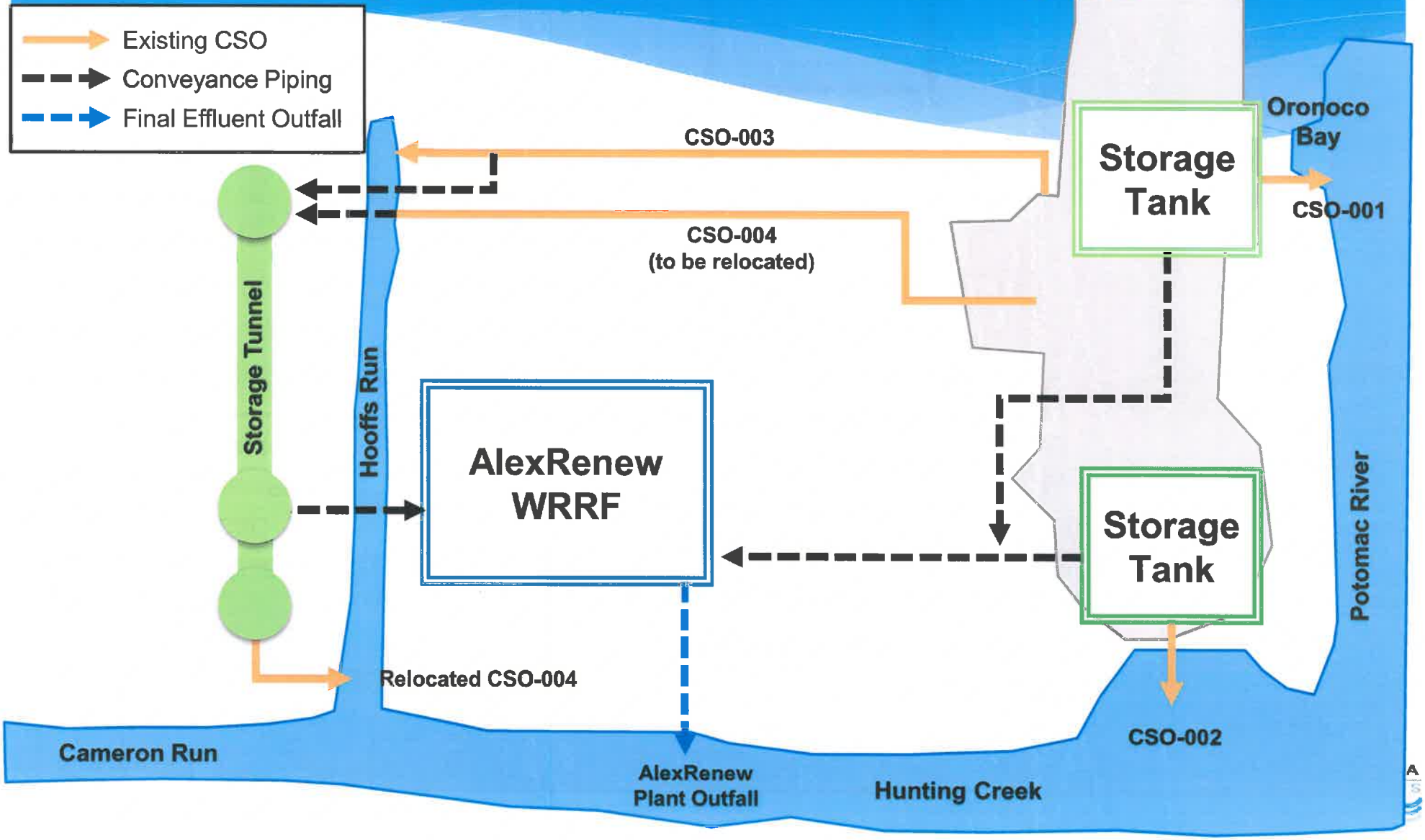
AlexRenew:
UV Disinfection Facility

Existing CSO System



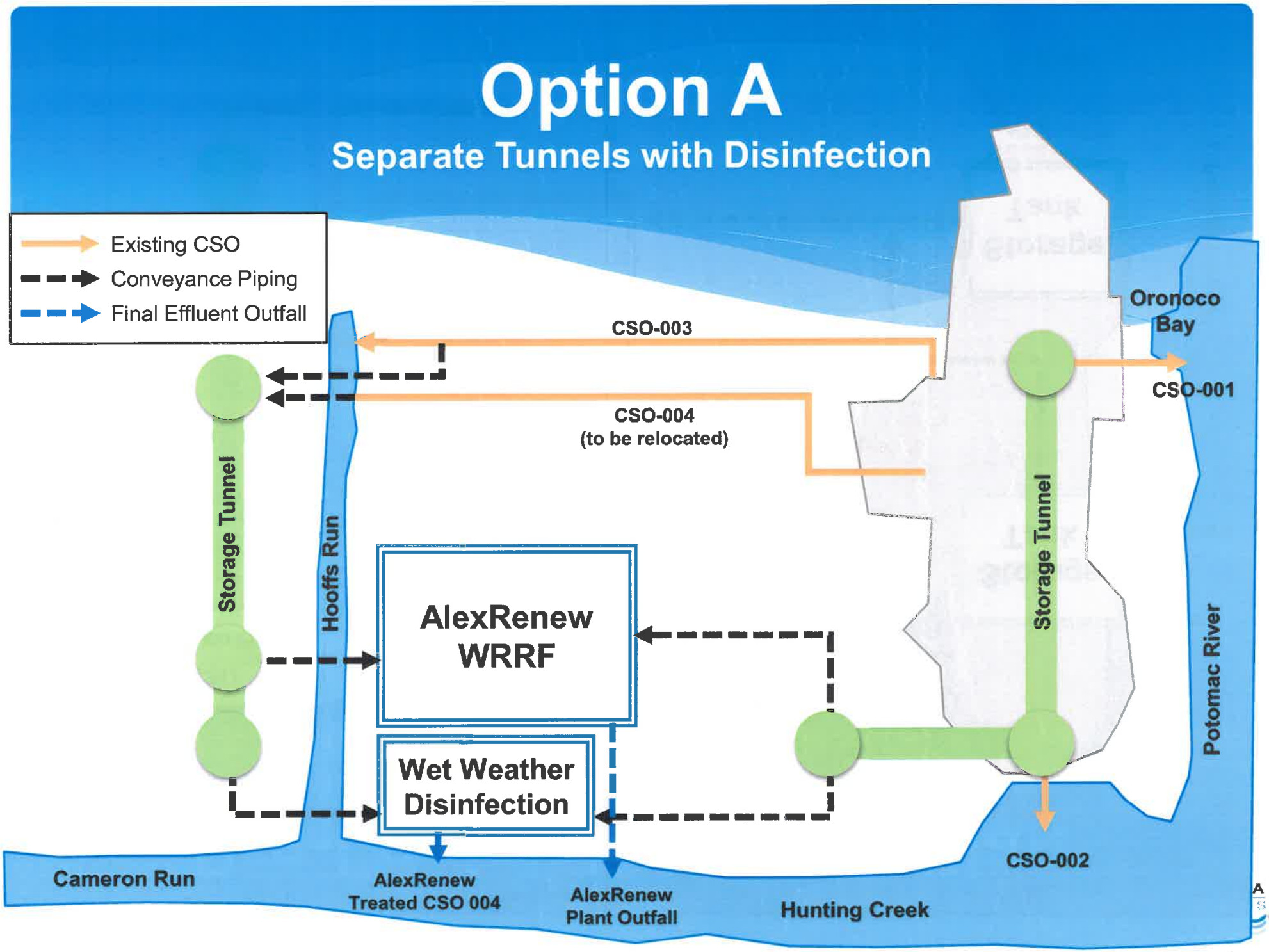
Pre-Legislation CSO Plan

Tunnels/Tanks Dewatered After the Storm
(2016 Plan for Outfalls 002/003/004)



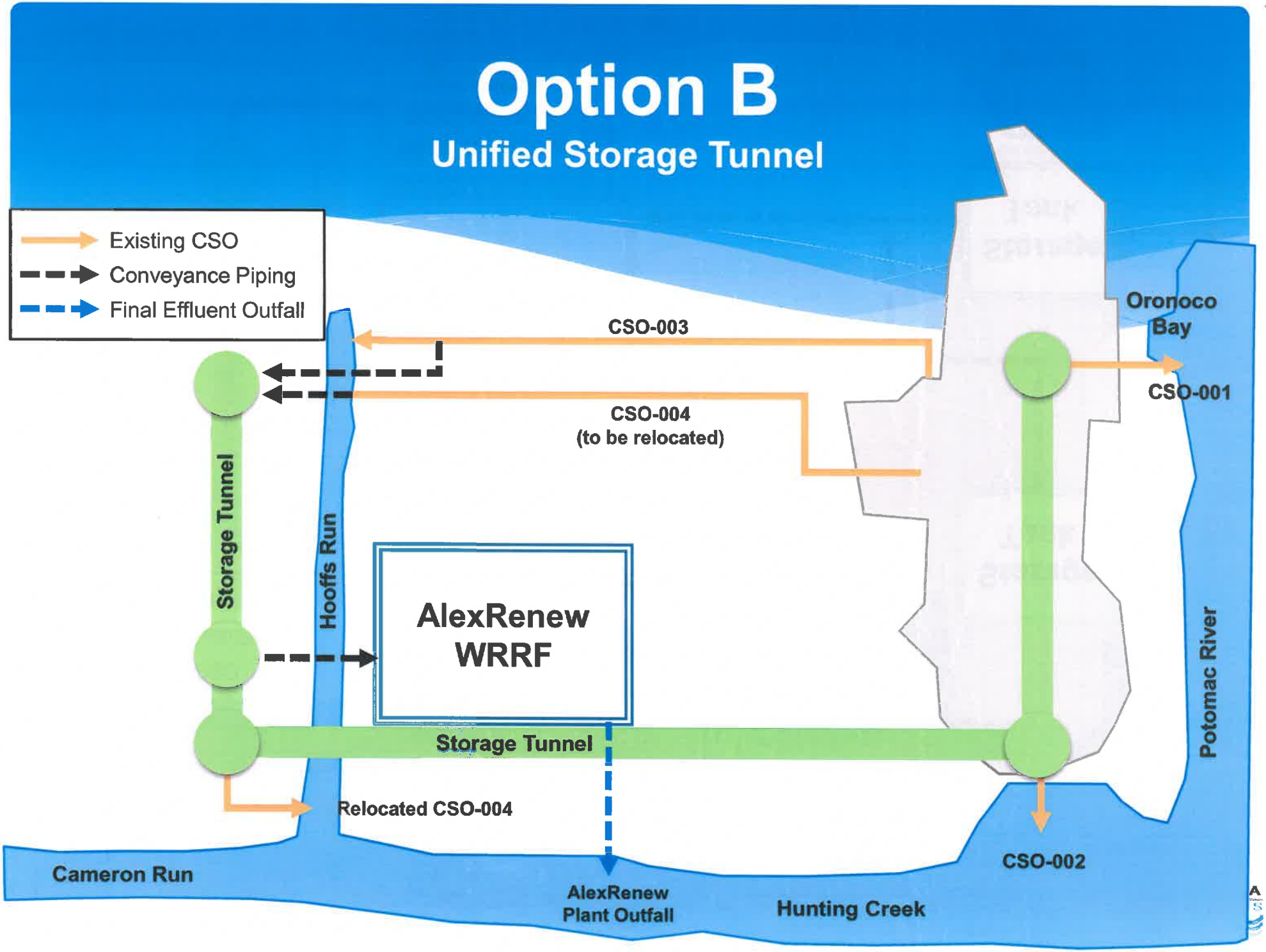
Option A

Separate Tunnels with Disinfection



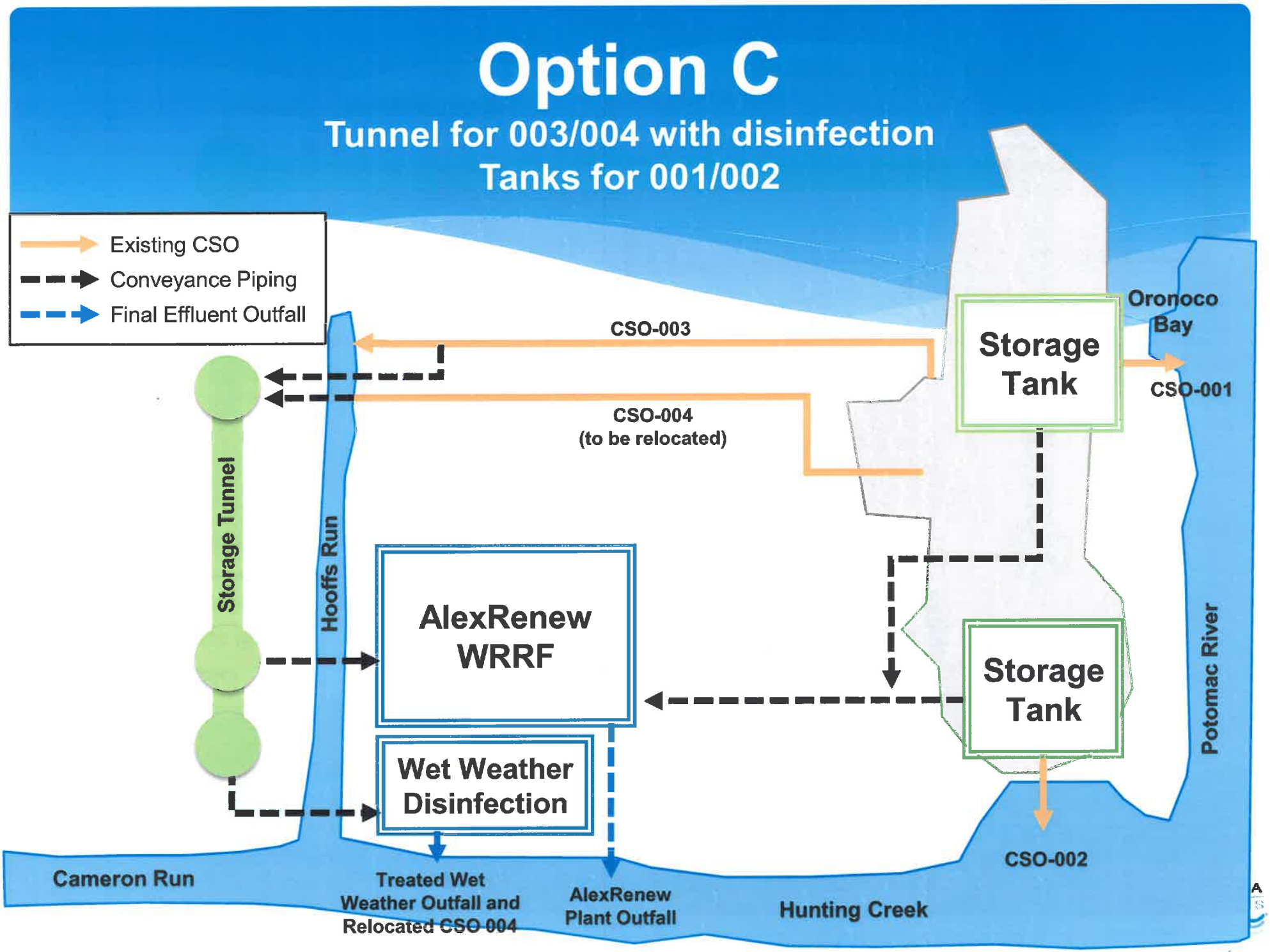
Option B

Unified Storage Tunnel



Option C

Tunnel for 003/004 with disinfection
Tanks for 001/002



15 Minute Break to Review Options

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Goals and Evaluation Criteria

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Alexandria's Goals for the CSO Program

WATER QUALITY

Enhance local infrastructure to improve the water quality of Alexandria's waterways.

INVESTMENT STEWARDSHIP

Be good stewards of the rate payers' investments in both the short term and long term.

COMMUNITY BENEFITS AND CONSTRUCTION IMPACTS

Engage the community, explore opportunities, and be a good neighbor.

LEGISLATIVE MANDATE

Implement the CSO Program to meet the legislative mandate.

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Evaluation Criteria
O&M Complexity and Reliability

* Maximizes reliability of meeting VPDES permit
  - Combined Sewer System Permit
  - AlexRenew Wastewater Treatment Facility Permits
* Minimizes location and number of facilities to operate and maintain

WATER QUALITY

Enhance local infrastructure to improve the water quality of Alexandria's waterways.

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Evaluation Criteria
Adaptability

* Ability for future expansion to meet future capacity, environmental, or regulatory needs
* Provides for opportunities for adaptive management and resiliency

WATER QUALITY

Enhance local infrastructure to improve the water quality of Alexandria's waterways.

Evaluation Criteria
Life Cycle Costs

* Optimize the solution to minimize the impact to rate payers
  - Capital costs: planning, design, and construction
  - Annual Operation and Maintenance Costs
* Integrate other mitigation project needs if feasible

INVESTMENT STEWARDSHIP

Be good stewards of the rate payers' investments in both the short term and long term.

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Evaluation Criteria
Community Acceptance

* Minimize disruption to the community during construction
* Minimize disruption to the community caused by regular operation and maintenance activities
* Maximize opportunities to incorporate community benefits

COMMUNITY BENEFITS AND CONSTRUCTION IMPACTS

Engage the community, explore opportunities, and be a good neighbor.

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Evaluation Criteria Schedule

* Risk of compliance with the mandated schedule
* Ability to secure necessary construction permits in a timely manner from local, state, and federal agencies
  - Virginia Department of Environmental Quality
  - Virginia Marine Resources Commission
  - U.S. Army Corps of Engineers
  - National Park Service
  - Historical and Cultural Resources

LEGISLATIVE MANDATE

Implement the CSO Program to meet the legislative mandate.

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Discussion Questions

1. Do the goals and evaluation criteria reasonably represent the diverse interests of the CSS Stakeholder Group?
2. What is missing?

Green Infrastructure Recap and Discussion

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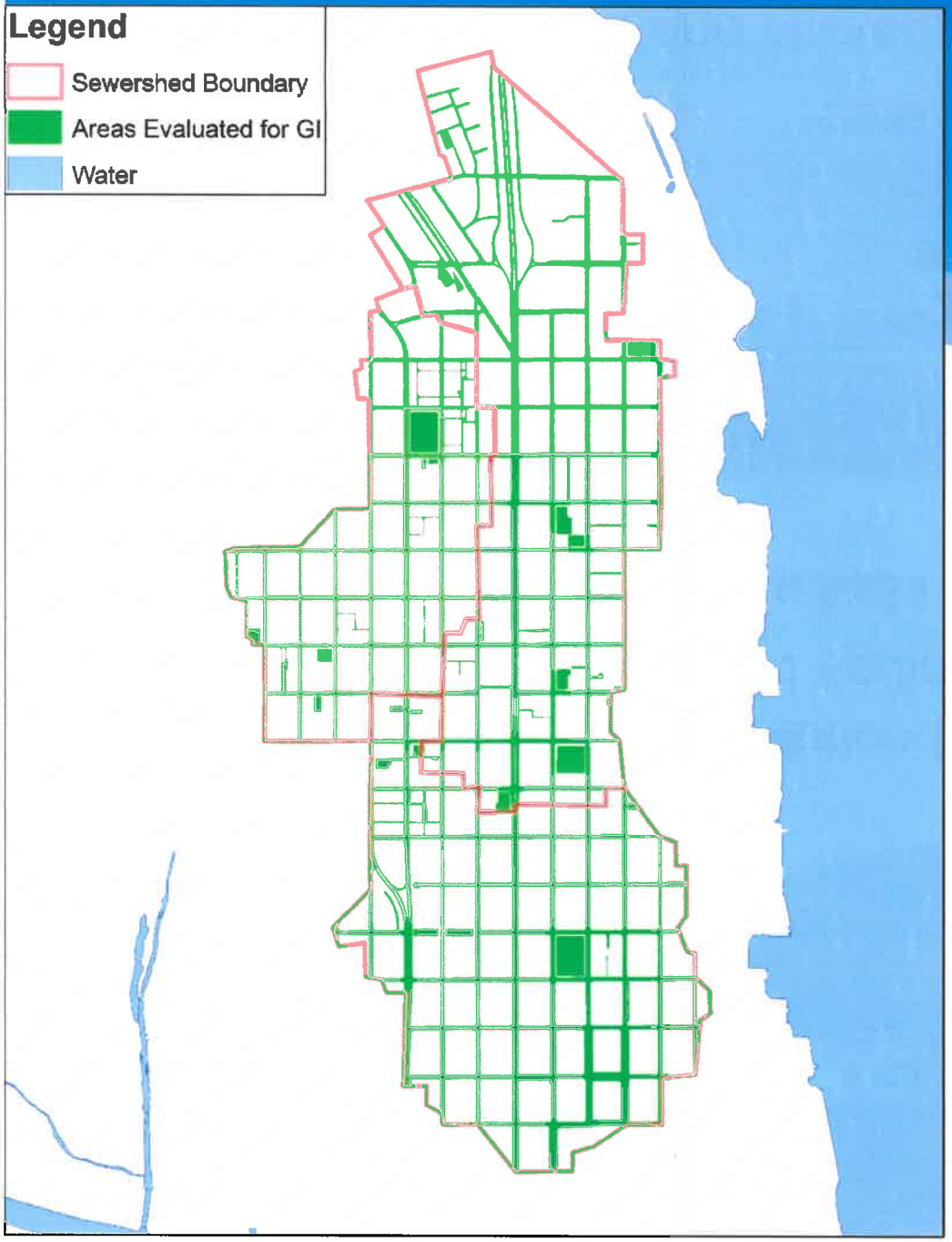
Green Infrastructure CSO Evaluation



* Implement GI on all City right-of-way (streets, sidewalks, alleys, parking lots, etc.)
* Implement on all City buildings
* Implement on all City green space
* Capture 1st inch of rain
* Results:
  - 20-30% reduction in combined sewer overflow volume
  - 2016 Plan: Complementary Strategy
  - **Will not achieve regulatory compliance**
  - **Full implementation of green infrastructure not achievable by 2025**

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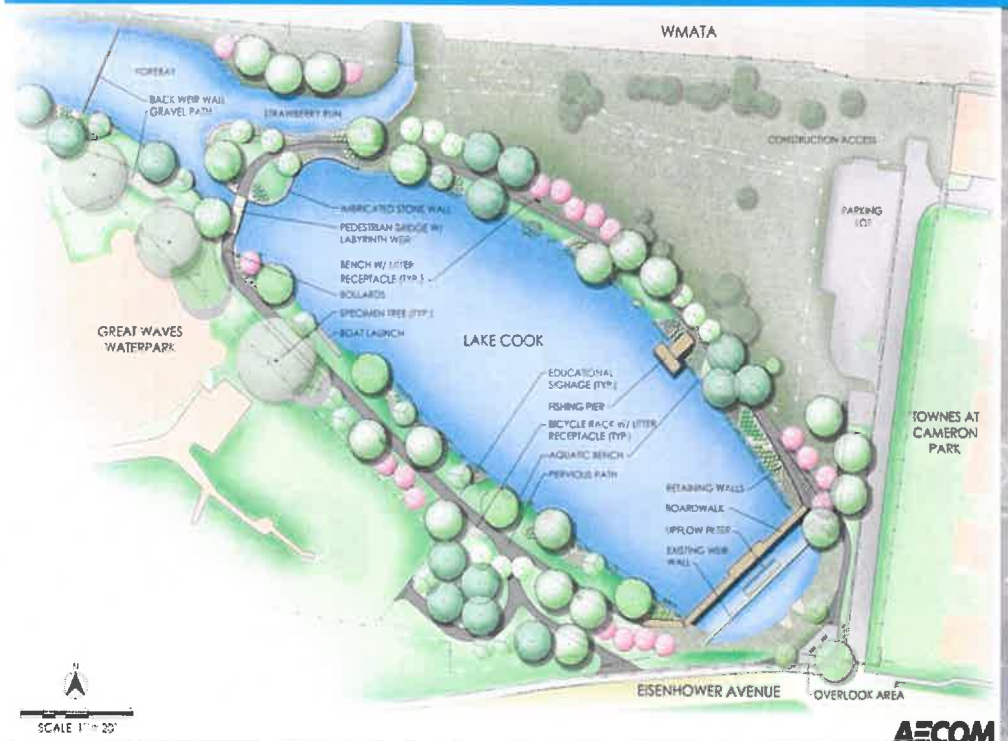
Chesapeake Bay TMDL

* Requires reductions in pollution from nitrogen, phosphorous and sediment
* Targets reductions in City's MS4 (stormwater) permit cycle

Reduction	Permit Cycle	Approx. Equivalent (ac)*
5%	2013 – 2018	120 – 330
35%	2018 – 2023	660
60%	2023 – 2028	1,440
100%	By 2028	2,220 – 2,400

* Green Infrastructure one strategy to meet Bay TMDL requirements

Green Infrastructure Recently Completed or Under Construction



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Green Infrastructure Planned Projects

Second Street Green Infrastructure Project

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Green Infrastructure

* City support of Green Infrastructure
  - Help meet Chesapeake Bay Total Maximum Daily Load (TMDL)
  - Provides green spaces
  - Creates environmental education opportunities
  - Other ancillary benefits (heat island effect, flood mitigation, etc.)

* Will not meet CSO General Assembly Legislative mandate – gray infrastructure is required

Next Steps

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CSS Stakeholder Meeting Schedule

OCTOBER 2017	NOVEMBER 2017	JANUARY 2018	FEBRUARY 2018	FEB/MAR 2018	MARCH 2018
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CLEAN WATERWAYS

Questions/Suggestions/Comments

For more information, contact:

William.Skrabak@alexandriava.gov
703.746.4065

Erin.BevisCarver@alexandriava.gov
703.746.4154

www.alexandriava.gov/CleanWaterways

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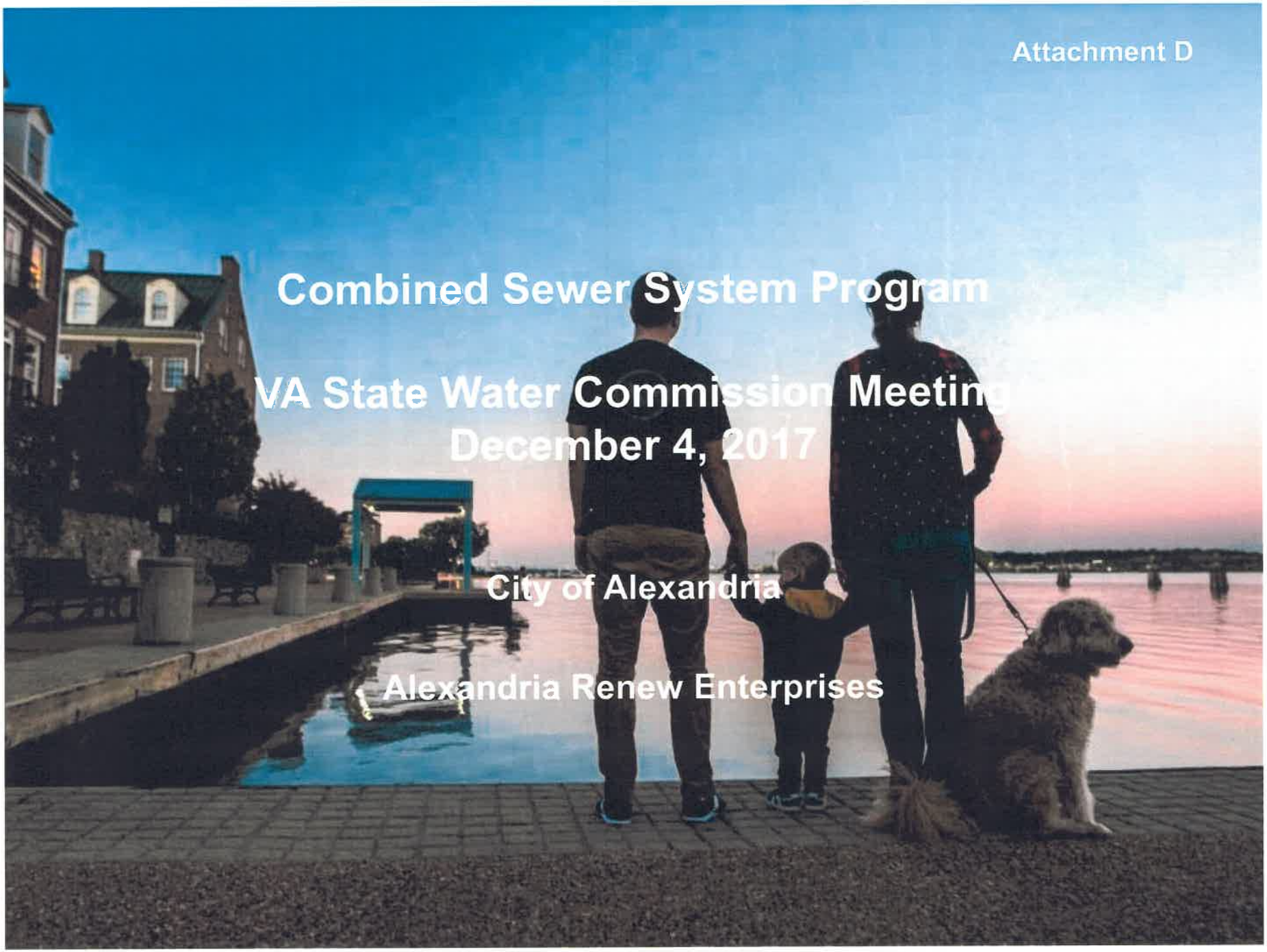
Thank You

Attachment D



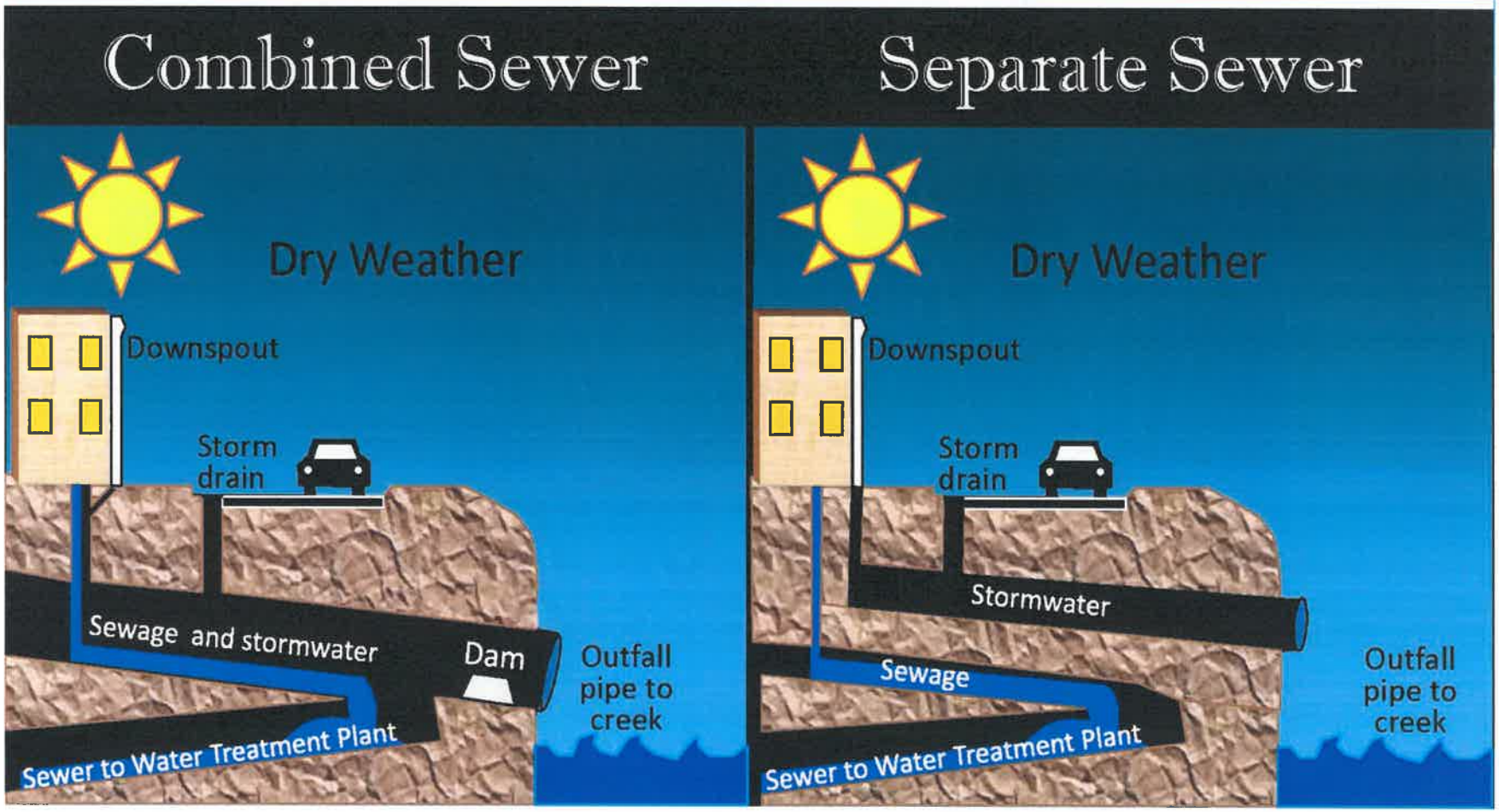
Combined Sewer System Program

VA State Water Commission Meeting
December 4, 2017

City of Alexandria

Alexandria Renew Enterprises

Sewer Systems – Dry Weather



~ 6% of Alexandria

~94% of Alexandria

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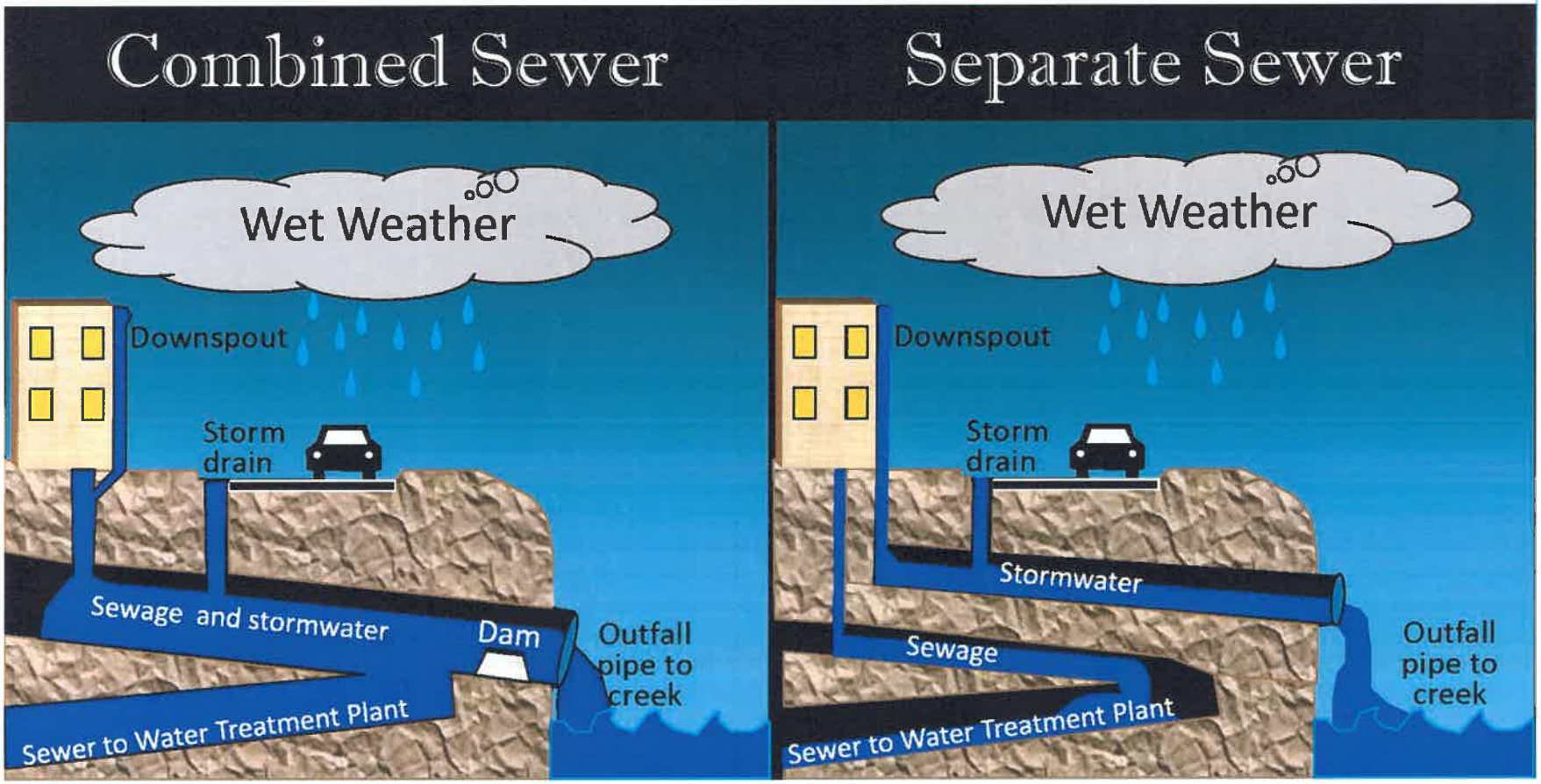
Photo/Graphics Source: www.phillyriverinfo.org

Sewer Systems – Wet Weather



~ 6% of Alexandria

~94% of Alexandria

Photo/Graphics Source: www.phillyriverinfo.org

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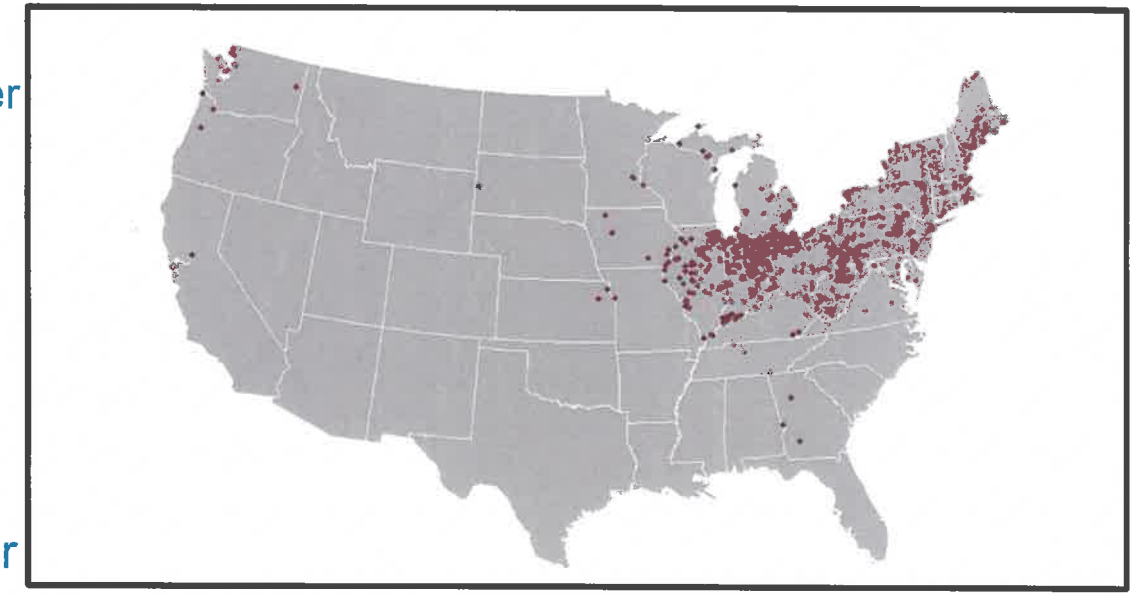
Location of Combined Sewer System (CSS) Communities

* Combined sewers are concentrated in older communities
  - City of Alexandria sewer system early 1800s
* Currently, 772 authorized discharges from 9,348 combined sewer outfalls in 32 states and DC
* Nearby combined sewer communities include Richmond, Lynchburg, and Washington, DC



Photo/Graphics Source: www.theodorelim.gov

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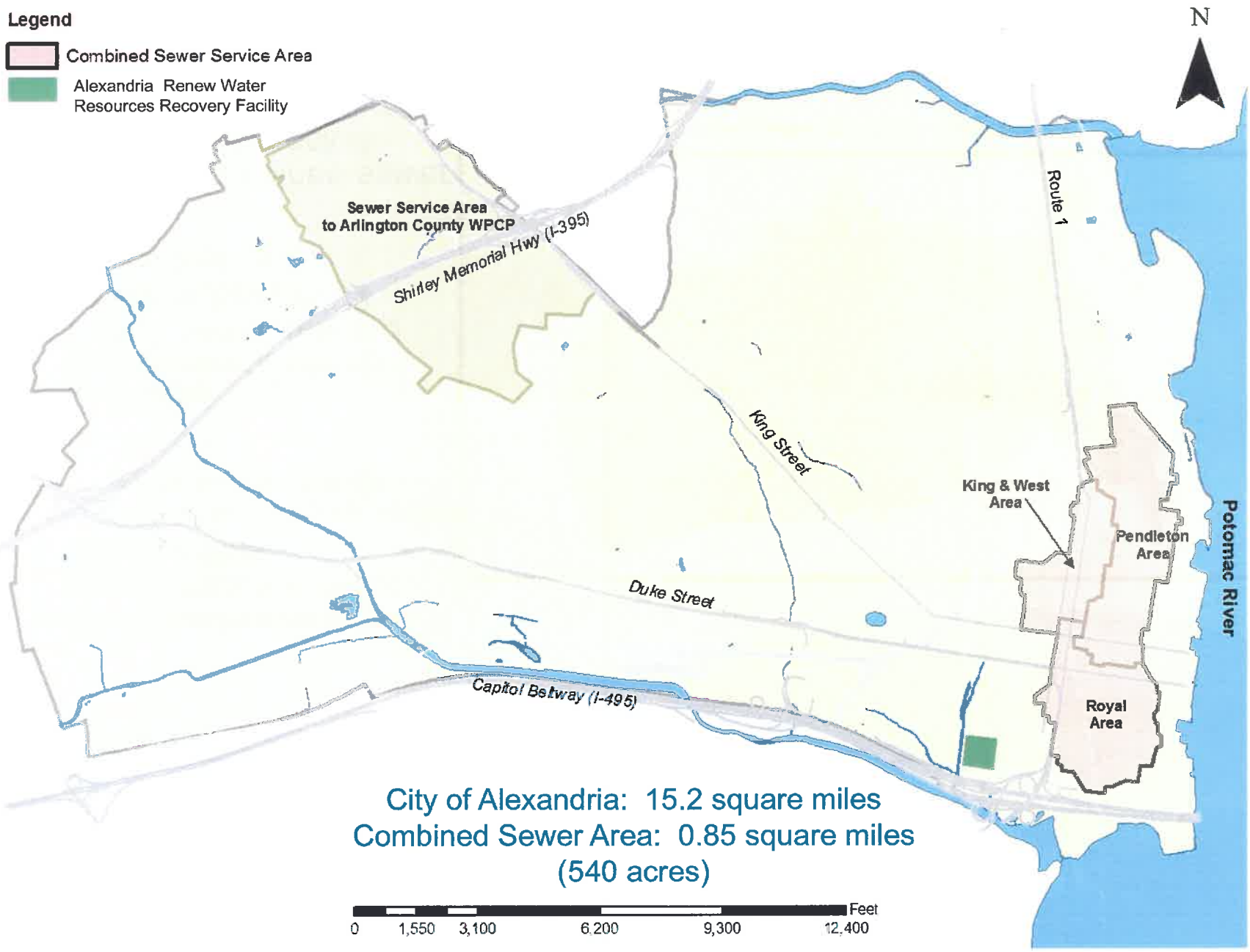
CLEAN WATERWAYS

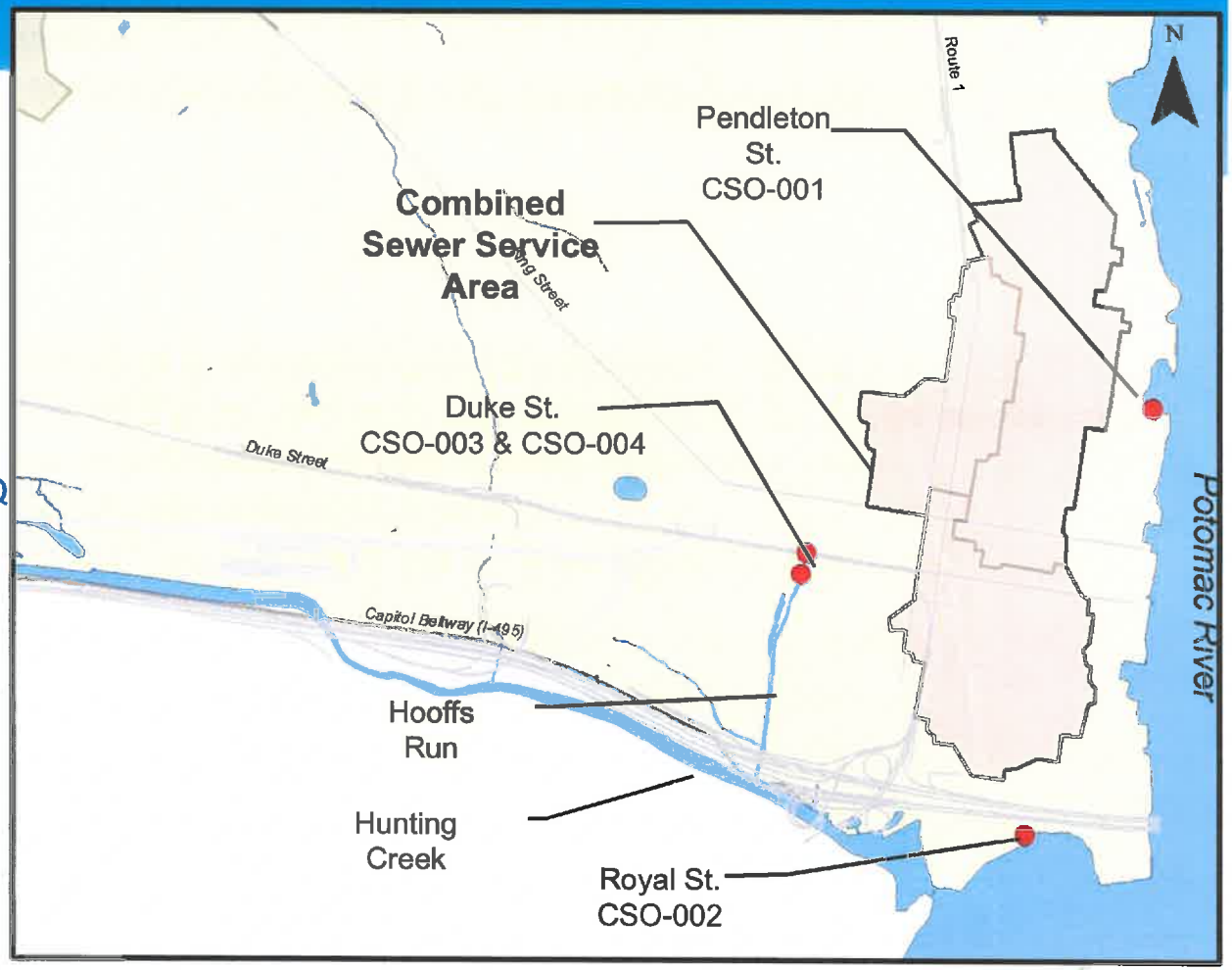

Legend
Combined Sewer Service Area
Alexandria Renew Water Resources Recovery Facility
N
Sewer Service Area to Arlington County WPCP
Shirley Memorial Hwy (I-395)
Route 1
King Street
King & West Area
Pendleton Area
Potomac River
Duke Street
Capitol Beltway (I-495)
Royal Area
City of Alexandria: 15.2 square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

Combined Sewer System

City ~ 15.2 square miles

CSO area ~ 540 acres, 6% of the city

Four permitted outfalls by DEQ
- CSO-001 (Oronoco Bay)
- CSO-002 (Hunting Creek)
- CSO-003/004 (Hooffs Run)



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Regulatory Paradigm Shift

PREVIOUS (BEFORE 2013) COMBINED SEWER SYSTEM PERMITS

- City's Long Term Control Plan – Nine Minimum Controls
- City led sewer separation projects
- Proactive separation as part of Area Reduction Plan
- Best practices for operation and maintenance of combined systems
- Monitoring and modeling of combined sewer overflows

CURRENT AND FUTURE COMBINED SEWER SYSTEM PERMITS

- Must address the Hunting Creek Total Maximum Daily Load (TMDL) for Bacteria
- Must address the 2017 state legislation
  - Must address all 4 outfalls
  - Construction to begin no later than 2023, completed by 2025

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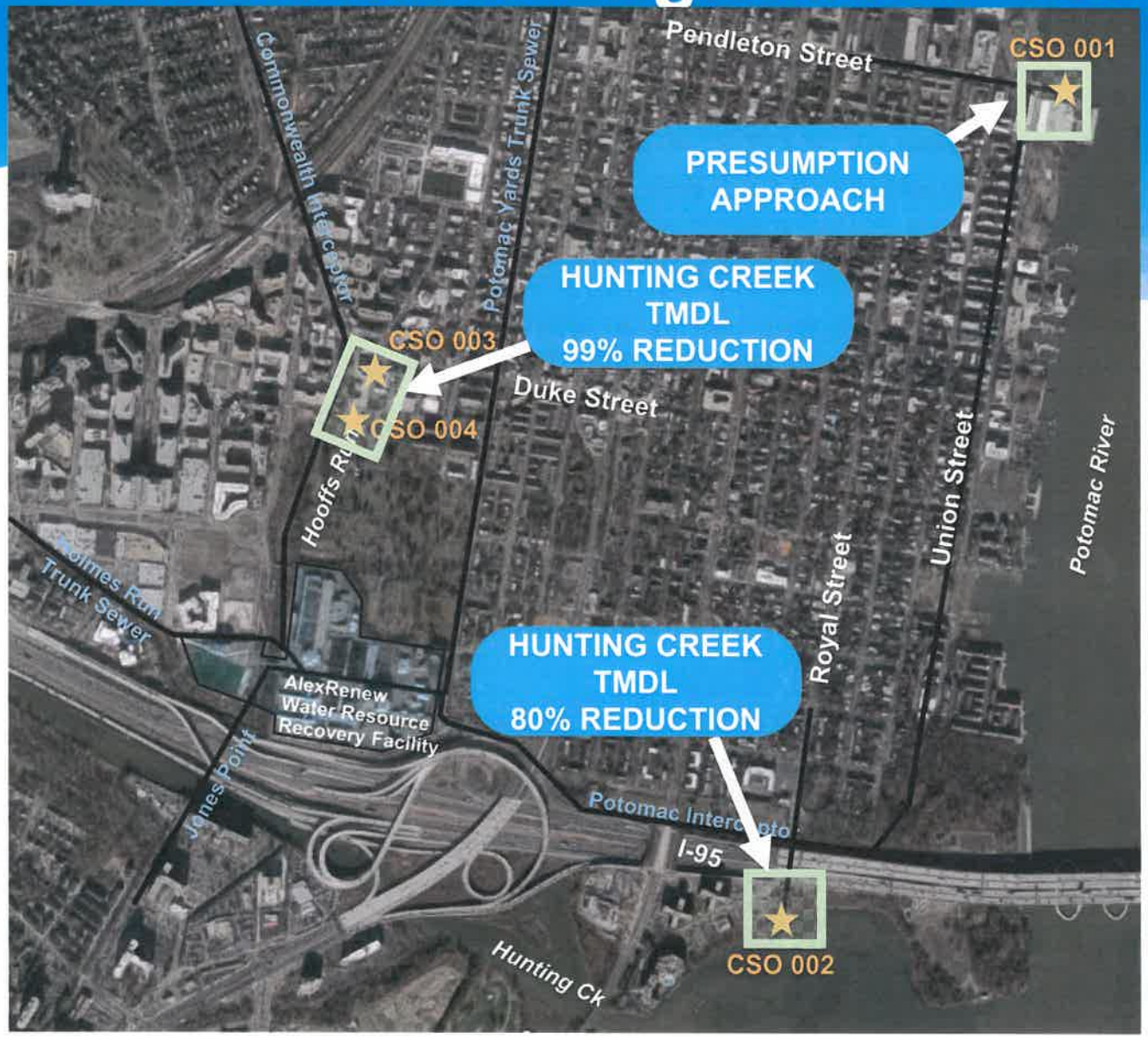
Recent State Legislation Drivers



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Recent State Legislation Drivers Presumption Approach

* Defined under the EPA CSO Control Policy

*"A program that meets **any** of the criteria listed below would be presumed to provide an adequate level of control to meet the water quality-based requirements of the CWA [Clean Water Act]…*

1. *No more than an average of four overflow events per year, provided that the permitting authority may allow up to two additional overflow events per year*
2. *The elimination or the capture for treatment of no less than 85% by volume of the combined sewage*
3. *The elimination or removal of no less than the mass of pollutants…for the volumes that would be eliminated or captured for treatment under paragraph [2] above*

Impacts of July 2025 Deadline on CSS Program

* Schedule Driven
  - Construction must begin by July 1, 2023
  - Projects must be completed and operational by July 1, 2025
  - Must meet strictest of applicable TMDL or EPA's Presumption criteria
  - Will result in higher costs due to compressed schedule
* Revise CSO Plan
  - Selection of technology and projects to achieve regulatory compliance within mandated schedule
* Additional community engagement to develop the plan

How the CSS Program Will Affect the Community

- Noise, road closures, construction traffic, right-of-way acquisition, dust, other community impacts

- The Long Term Control Plan projects will be part of the City's and AlexRenew's capital improvement budgeting process
- Sewer rate impacts

Project Challenges and Construction Impacts (Examples)

- ~10,000 truckloads of excavation
- ~3600 truckloads of concrete
- ~10 months of pile driving
- ~4 years of construction
- Utility conflicts and resulting relocations
- Parking and traffic disruption
- Impacts to businesses
- Community and neighborhood disruption
- Noise and dust pollution

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Project Challenges and Construction Impacts (Examples)

- Environmental and regulatory permits (NPS, VDEQ, USCOE etc.)
- Acquisition of private property/R-O-W
- Construction in urbanized and fully developed neighborhoods
- Space limitation and design complexities
- Challenging geology
- Construction cost premium because of compressed schedule

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Alexandria Renew Enterprises
Who We Are
Alexandria's Water Transformers

* Political subdivision of the Commonwealth of Virginia created in 1952 under the Virginia Water and Wastes Authorities Act
* Provide wastewater interception, pumping and treatment for most of the City of Alexandria and eastern portions of Fairfax County.
* Annually clean about 13 billion gallons of wastewater for more than 300,000 customers
* Smallest plant footprint in U.S. for capacity and quality of cleaned water produced
* Perfect compliance record meeting strictest nutrient removal requirements in US for over 12 consecutive years

Leveraging Our Strengths to Create a Sustainable Water Future

- Large capital project experience
  - Invested over $500M in major upgrades to improve Chesapeake Bay and address local water quality
- Expertise in treatment technology and innovation
- Experienced in Progressive Delivery Methods
- Leveraging of planned plant projects for CSS remediation to help City meet deadline
  - Sanitary Sewer Excess Flow Remediation Investment
  - Plant Primary Treatment Renewal Investment

CSO Program Alternatives
Collaborative Solutions

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Major Components

* **Store and treat:** build CSO storage and send to AlexRenew *after* CSO event for high level of treatment
  - Underground storage tanks
  - Deep tunnels
* **Convey, store, and treat**: leverage the AlexRenew wastewater treatment facility to treat the flow *during* a CSO event
  - Convey additional flows to AlexRenew through deep storage tunnels and pumping
  - May require upsizing of certain processes for additional capacity including building a separate wet weather treatment facility (i.e. disinfection)

Storage and Conveyance Tunnels

DC Water:
10-ft Diameter Tunnel Boring Machine and Finished Tunnel

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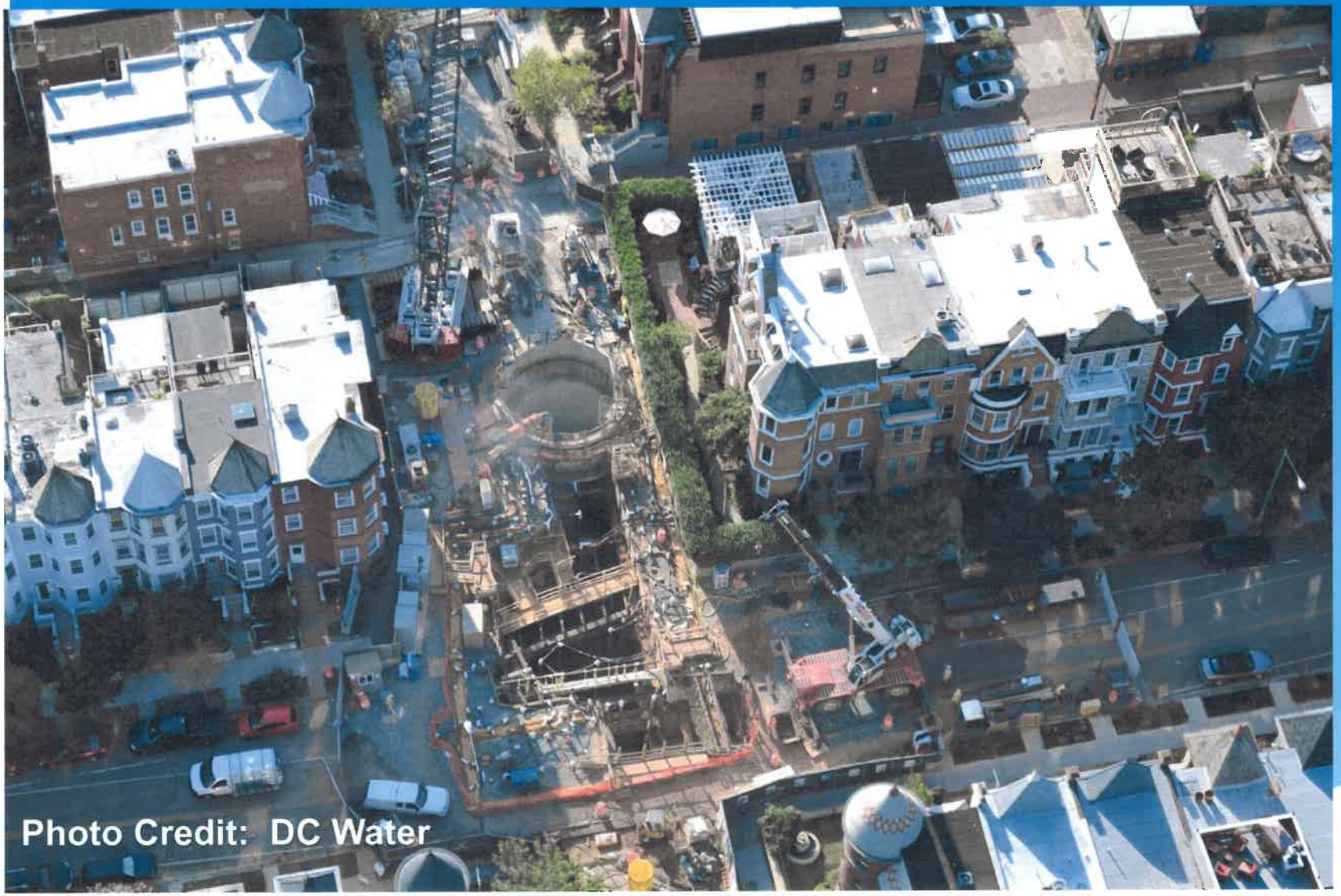
Storage and Conveyance Tunnel



Storage Tanks

City of Duluth:
3 MG storage capacity

Maximize Flow to the Plant

Disinfection

Easterly Plant, Cleveland, OH
Chlorine Contact Tank

AlexRenew:
UV Disinfection Facility

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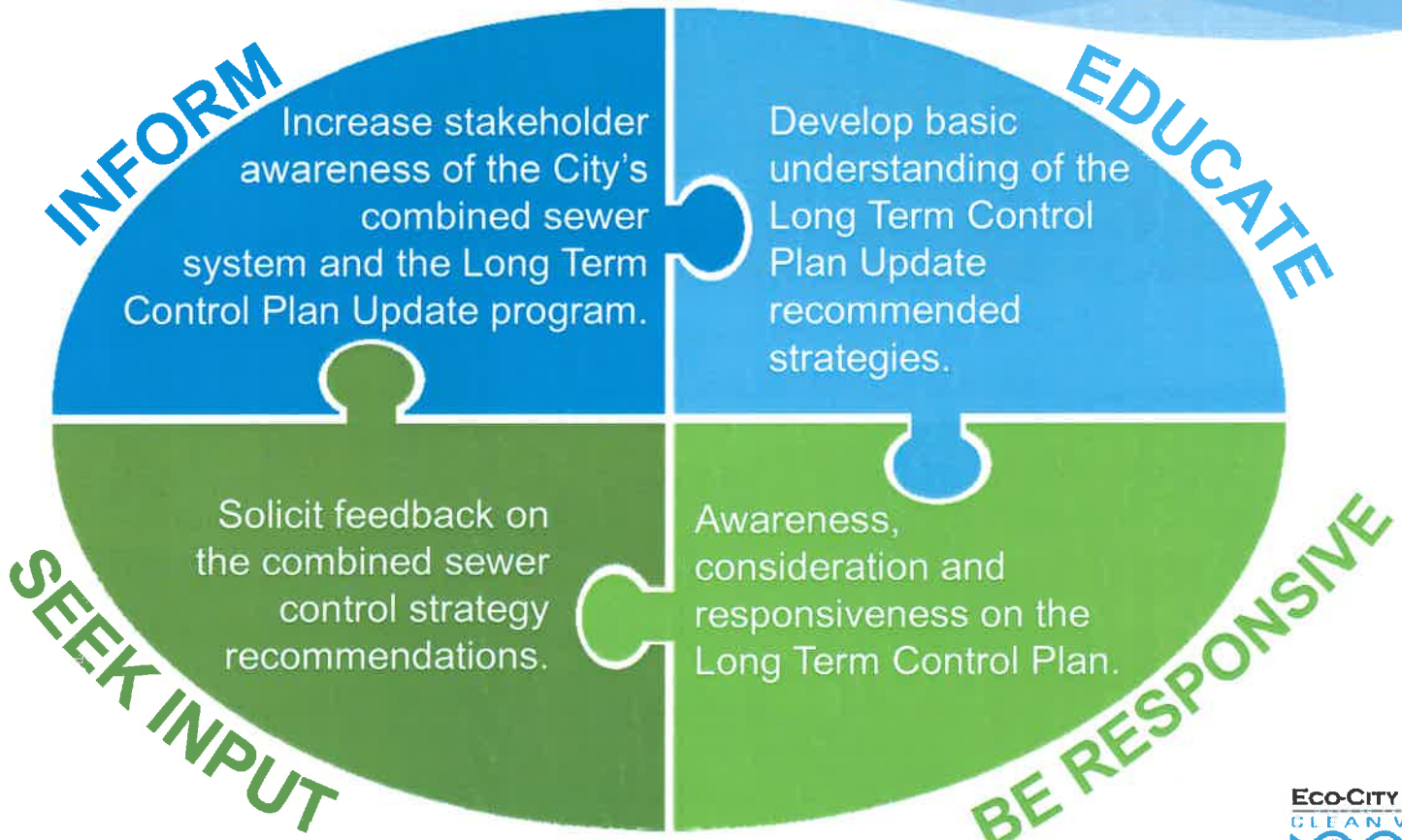
Public Participation
CSS Stakeholder Group



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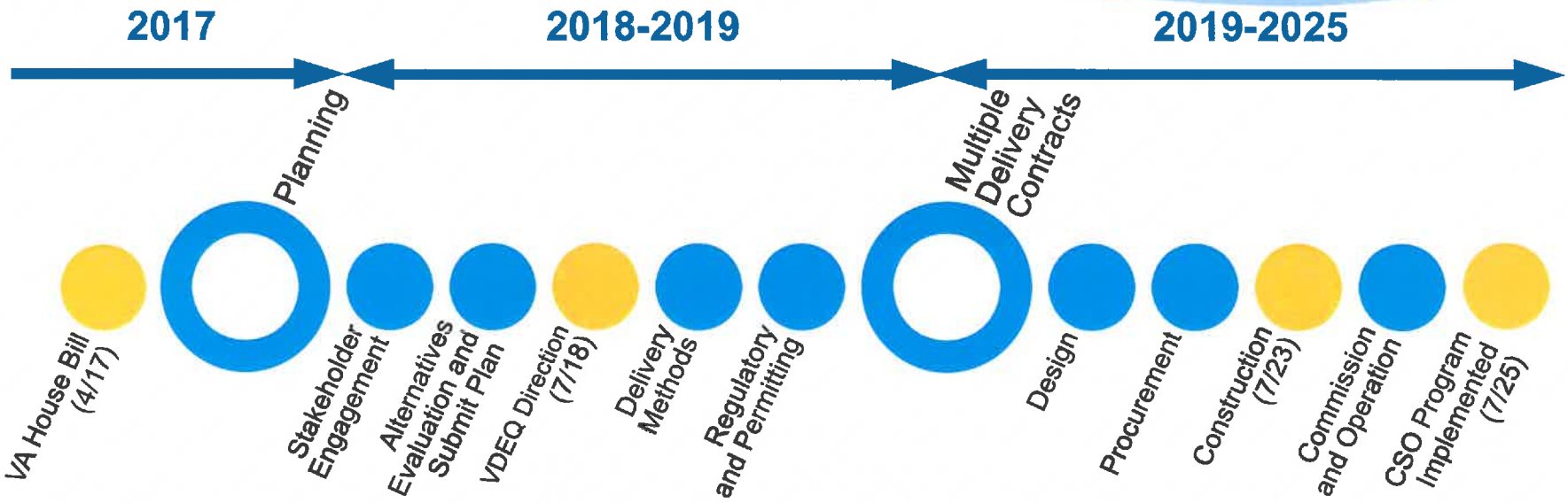
Timeline



VA House Bill 2383, VA Senate Bill 898 Milestone

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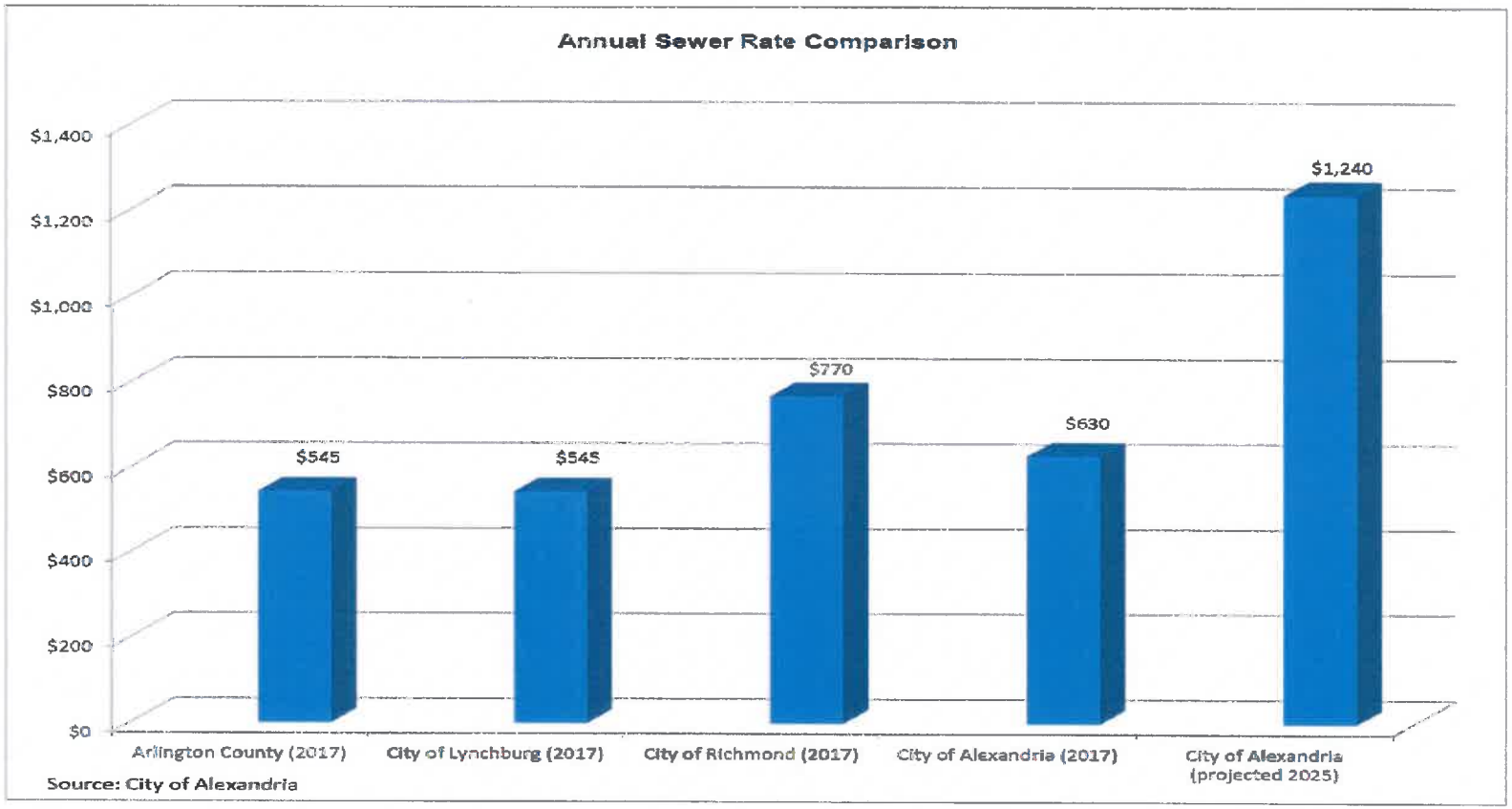
Early Cost Estimates
Expenditures by Year

Capital Projects	FY 2019	FY 2020	FY 2021-2025	Total FY 2019-2025
Outfall 001	$3 M	$6 M	$171 M	$180 M
Outfall 002	$2 M	$4 M	$49 M	$55 M
Outfall 003 and 004	$20 M	$45 M	$85 M	$150 M
Total	**$25 M**	**$55 M**	**$305 M**	**$385 M**

Sewer Rate Comparison and Impacts



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Thank You

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