City of Alexandria and Alexandria Renew Enterprises

Long Term Control Plan Update Public Meeting

ECO-CITY ALEXANDRIA
CLEAN WATERWAYS

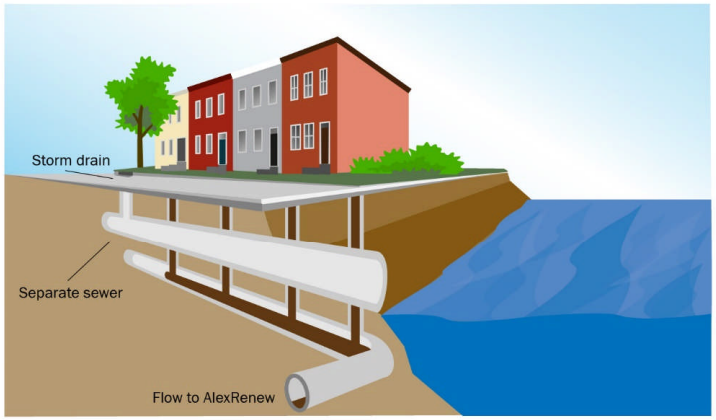
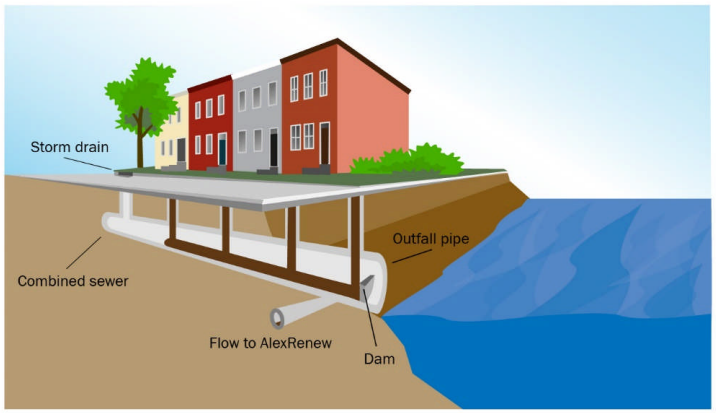
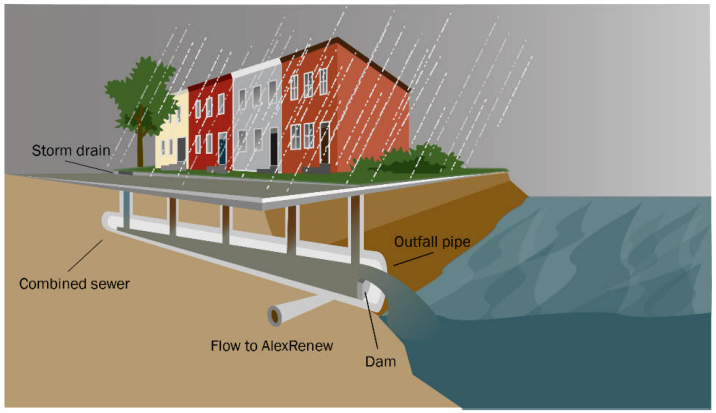
April 5, 2018

Presentation Outline

- Background
- CSS Stakeholder Group Process
- Technical Options
- Performance
- Cost
- Evaluation Criteria/Recommendation
- Stakeholder Feedback
- Outfall Transfer Initiative
- Rate Forecast
- Next Steps
- Public Questions and Comment

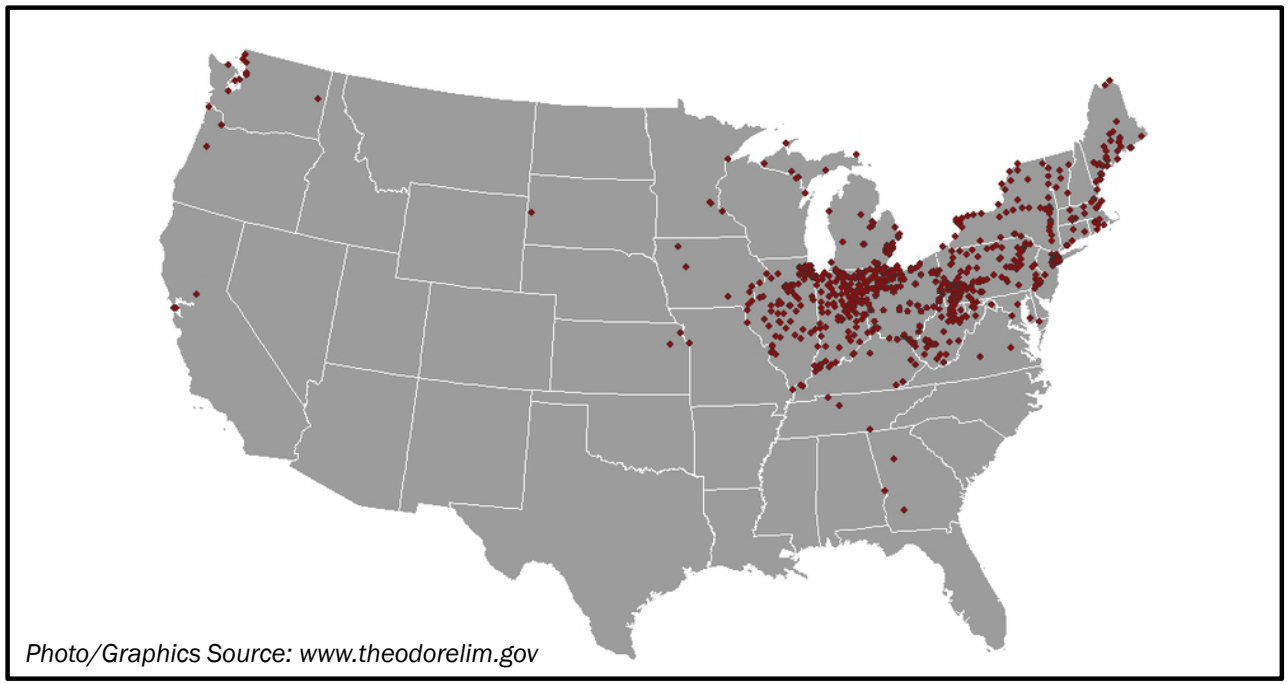
Background

What is a Combined Sewer Overflow (CSO)?

	Dry	Wet
Separate		
Combined		

Locations of combined sewer system communities in the U.S.

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



Photo/Graphics Source: www.theodorelim.gov

Alexandria's Combined Sewer System

544
approximate number of acres of total area within CSS

390
acres of impervious area within CSS (72% of total area)

4
CSO outfalls

Regulatory paradigm shift occurred for CSO control in the City of Alexandria

- City's existing 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
- Green infrastructure was part of solution because of extended timeframe for implementation

- Must address the 2017 CSO Law
- Must address the Hunting Creek Total Maximum Daily Load (TMDL)
- Must meet Presumption Approach per EPA's 1994 CSO Policy at CSO 001

What the 2017 CSO Law Mandates:

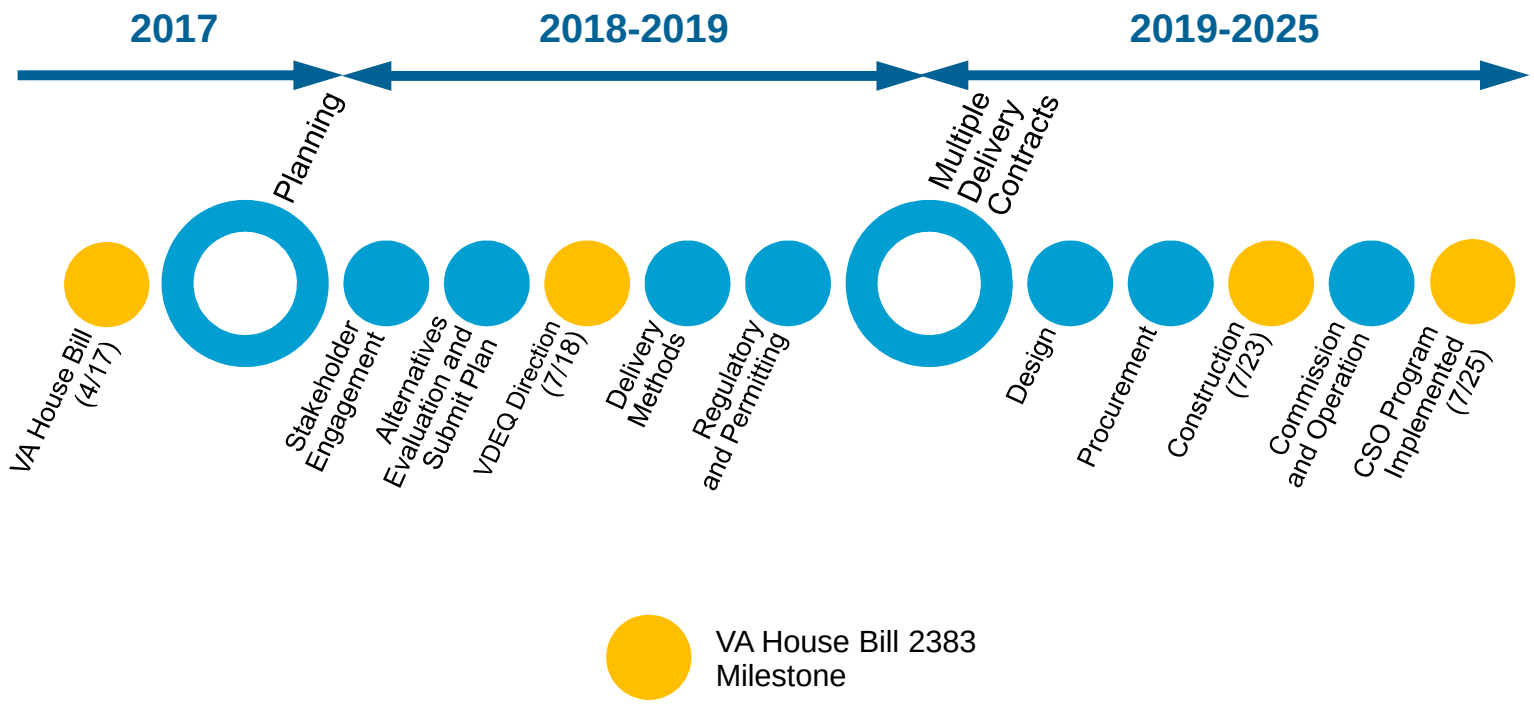
Presumption Approach Requirements per EPA CSO Policy

- Must meet any of the following criteria:
  1. 4-6 overflows per year
  2. 85% capture or elimination by volume
  3. 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

Hunting Creek TMDL Compliance Requirements

- Hunting Creek TMDL assigns Waste Load Allocations to CSO's 002/3/4
- Requires significant reduction in Bacteria
  - CSO 002: 80% Removal
  - CSO 003: 99% Removal
  - CSO 004: 99% Removal

2017 CSO Law requires completion by 2025, with interim milestones established



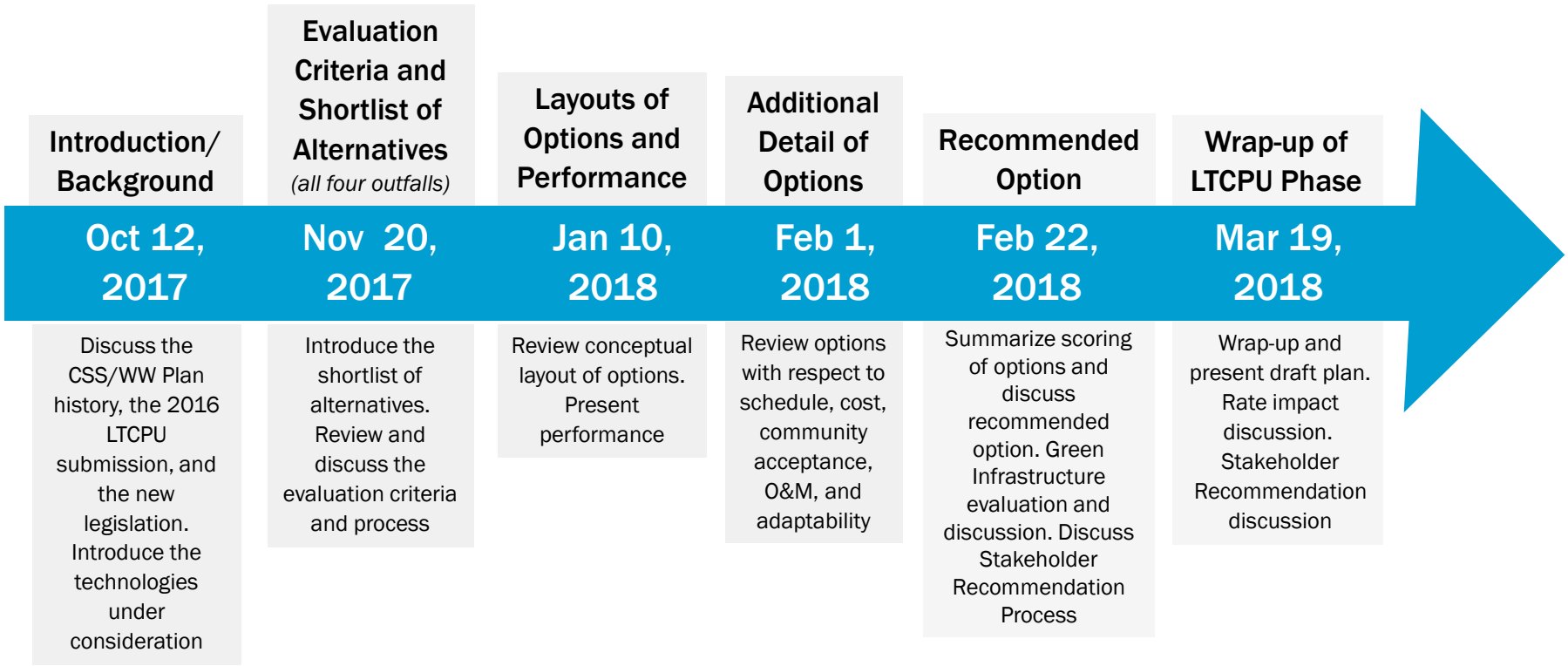
CSS Stakeholder Process

CSS Stakeholder Group Responsibility

Resolution No. 2781

- Convened by City Council with the charge of providing input to the Long Term Control Plan Update (LTCPU)
- Consists of 14 members representing:
  - Civic groups
  - Residents
  - City departments
  - Environmental groups
- **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 LTCPU
- **Serve as a central information receiving/dissemination body** related to the development of the LTCPU

CSS Stakeholder Process Timeline



Technical Options Reviewed with Stakeholders

Performance Requirements

CSO 001
Presumption Approach per EPA's 1994 CSO Policy

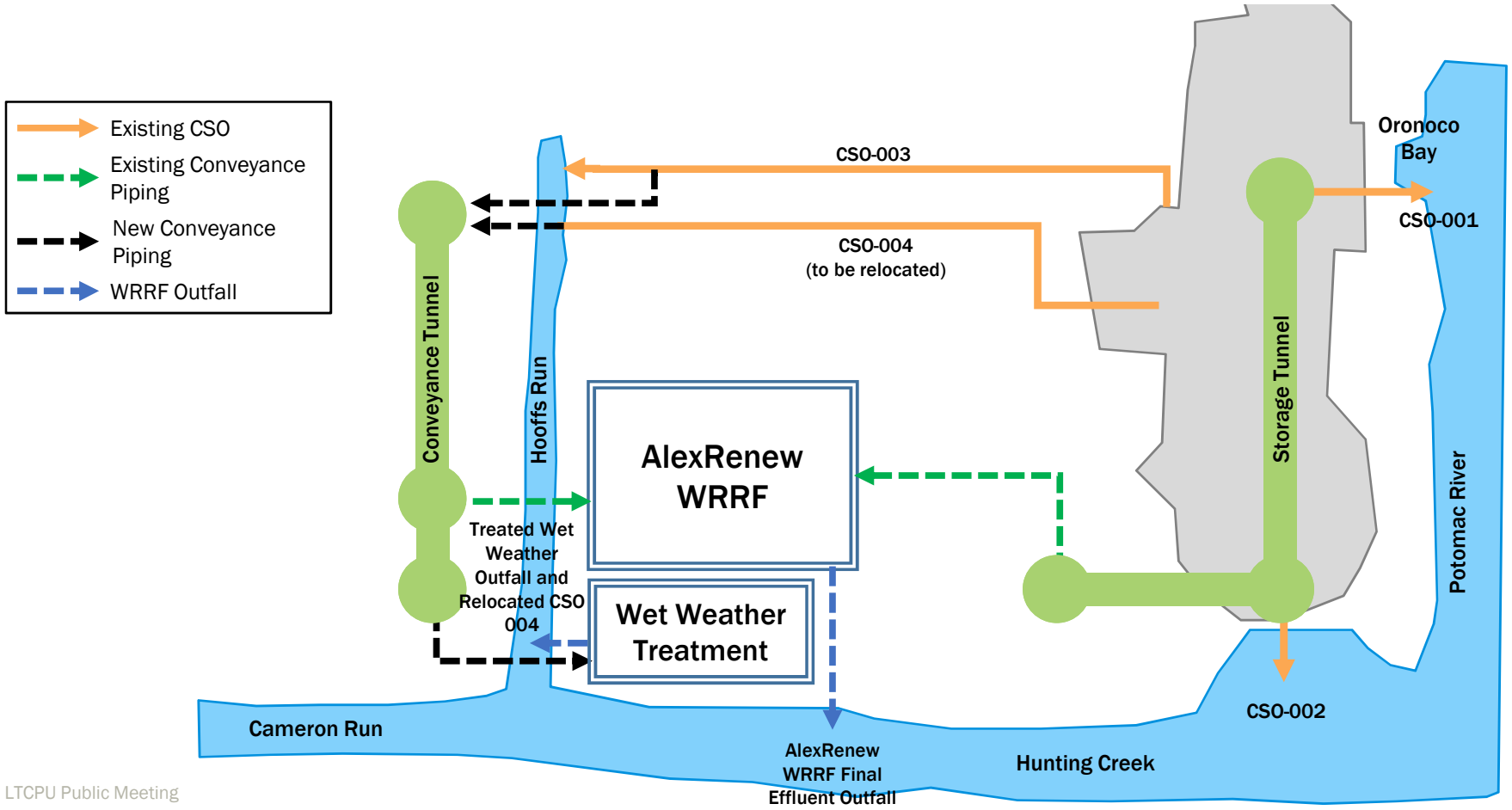
CSO's 003 and 004
99% Reduction per Bacteria TMDL

CSO 002
80% Reduction per Bacteria TMDL

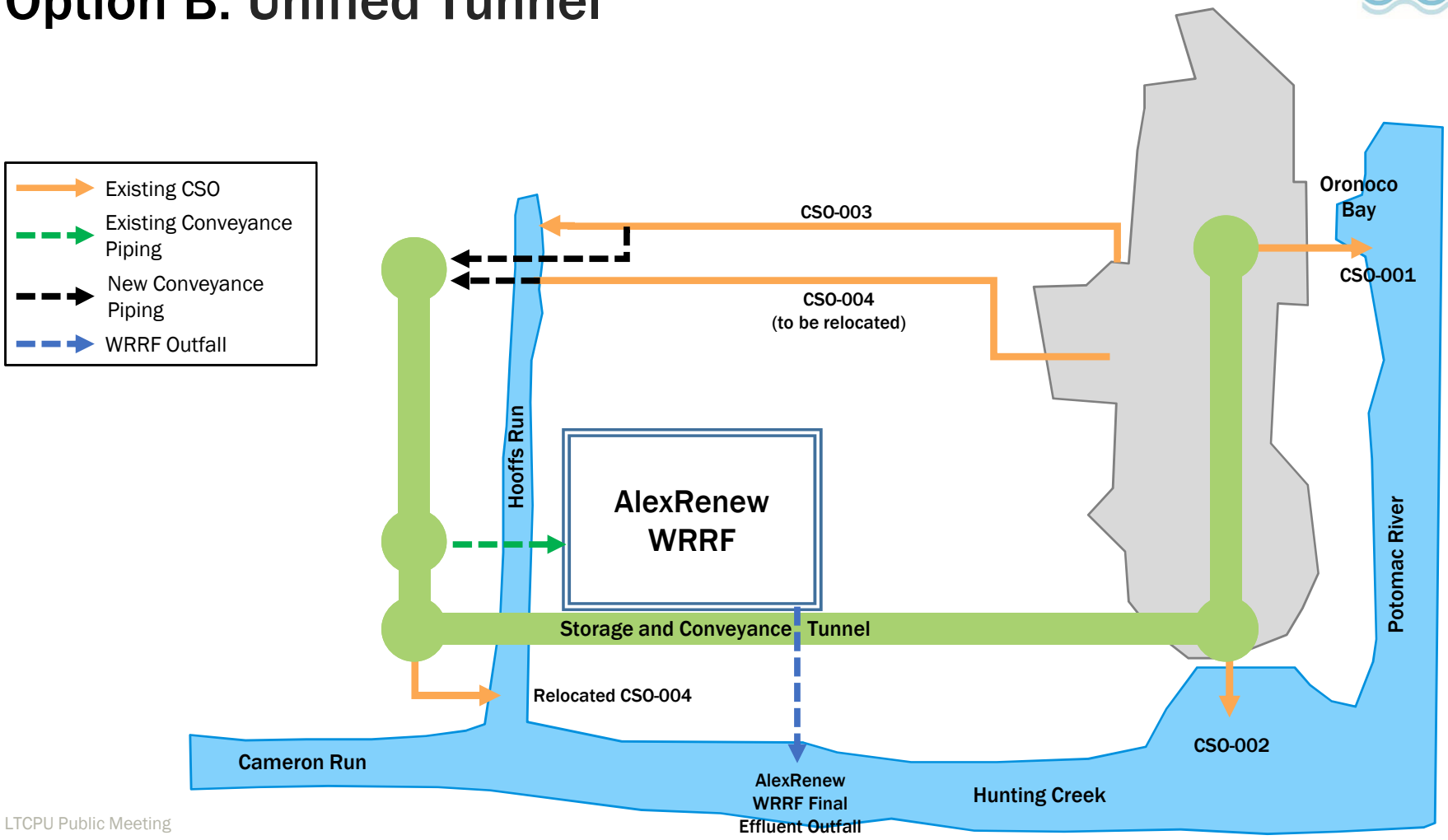
Shortlist of CSO Control Options Presented to Stakeholder Group

Option	CSO Control Strategy/Description
A	Separate tunnels for CSOs 003/004 and CSOs 001/002 with new wet weather treatment facility at AlexRenew for CSOs 003/004 only
B	Unified tunnel connected by pumping from CSO 003/004 tunnel to CSO 001/002 tunnel
B+	Unified tunnel connected by pumping from CSO 003/004 tunnel to CSO 001/002 tunnel plus wet weather treatment through dual-use facilities **(Developed in response to CSS Stakeholder Feedback)**
C	Separate tunnel with new wet weather treatment facility at AlexRenew for CSOs 003/004 only and separate storage tanks for CSOs 001 and 002

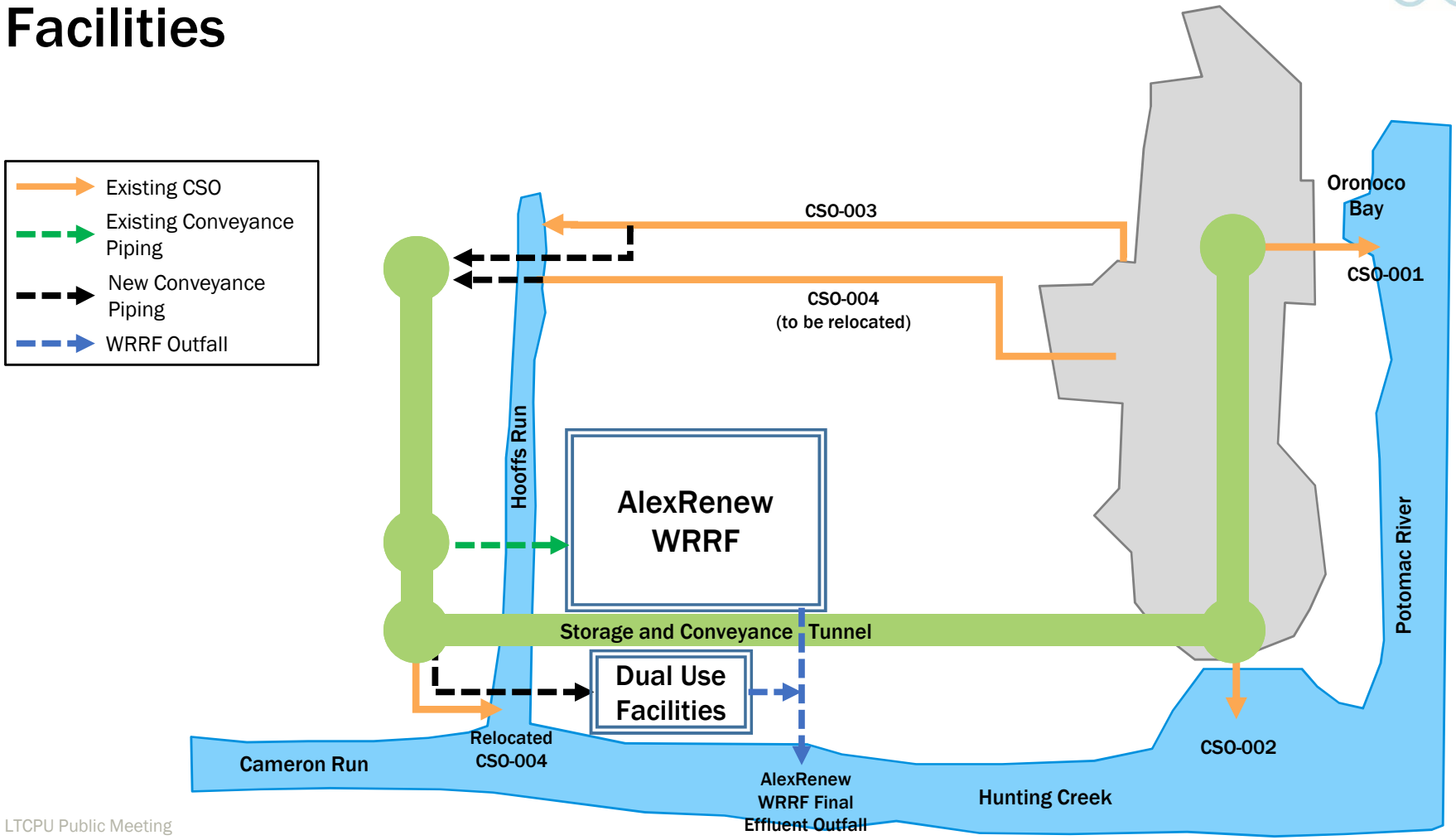
Option A: Separate Tunnels with Wet Weather Treatment



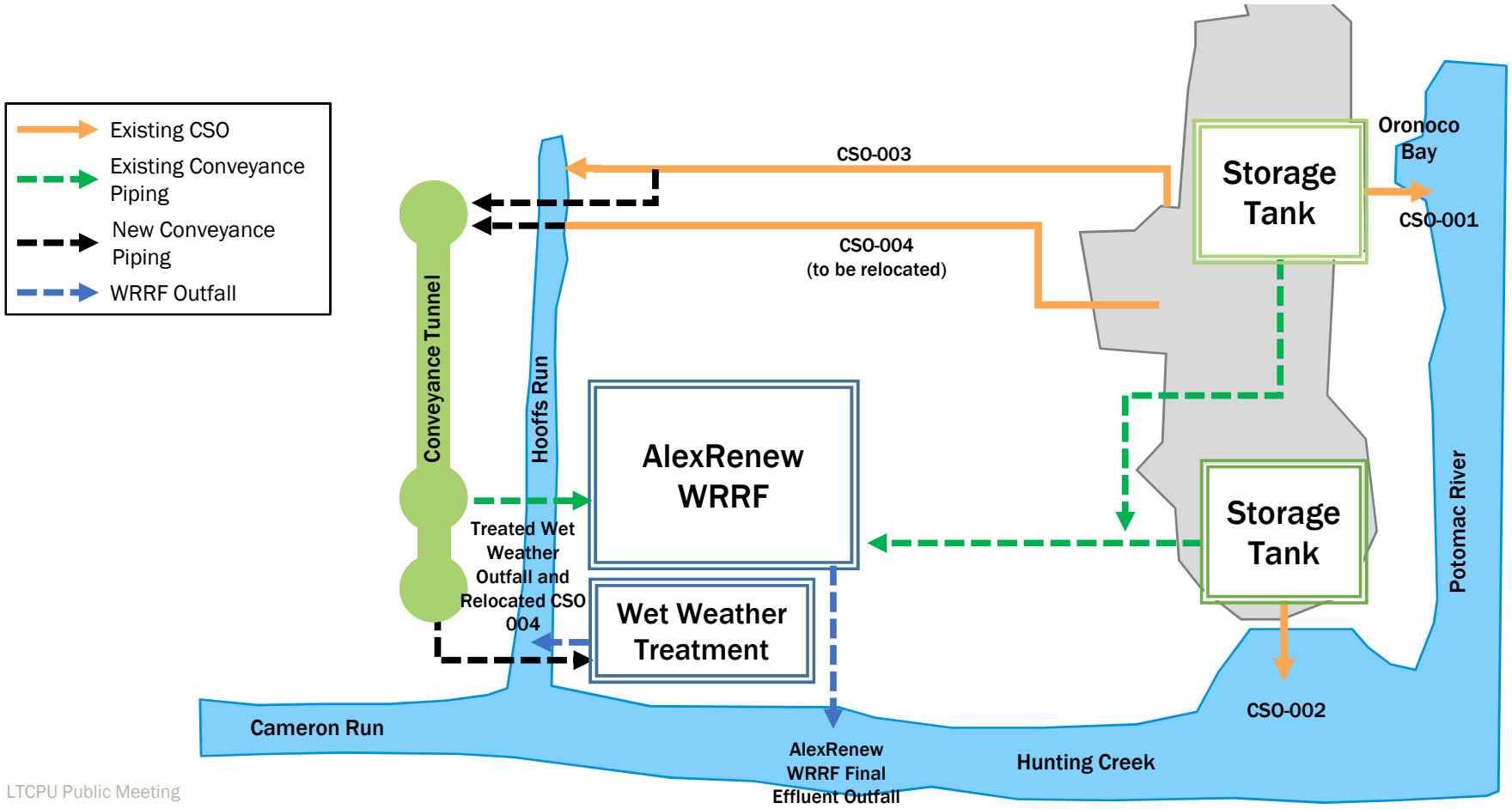
Option B: Unified Tunnel



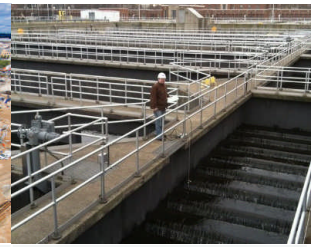
Option B+: Unified Tunnel with Dual Use Facilities



Option C: Tunnel and Tanks with Wet Weather Treatment



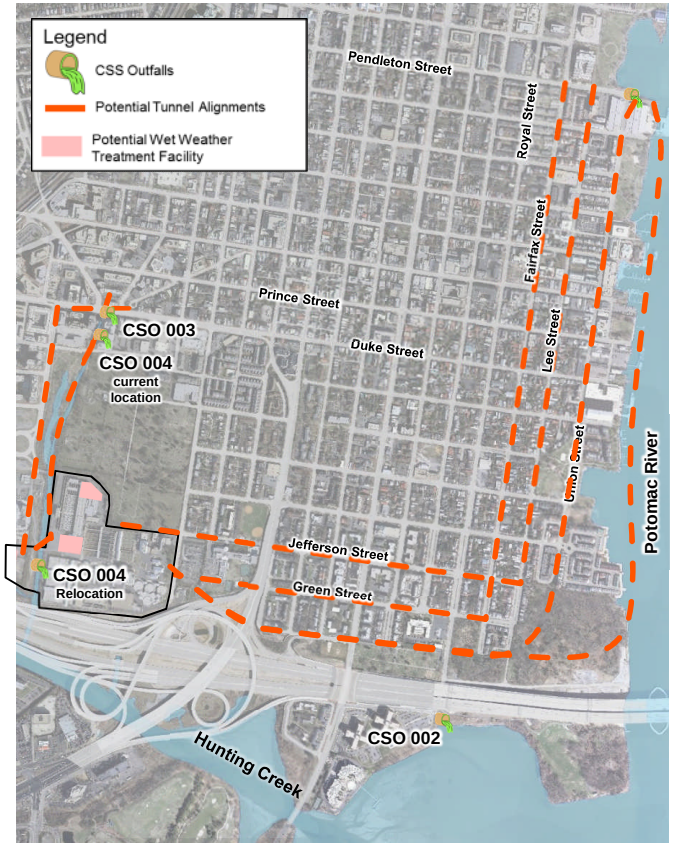
Options considered include the following major infrastructure:

Option	Diversion Chambers	Drop Shafts	Deep Tunnels	Storage Tanks	Wet Weather Treatment
					
A	✓	✓	✓		✓
B	✓	✓	✓		
B+	✓	✓	✓		✓
C	✓	✓	✓	✓	✓

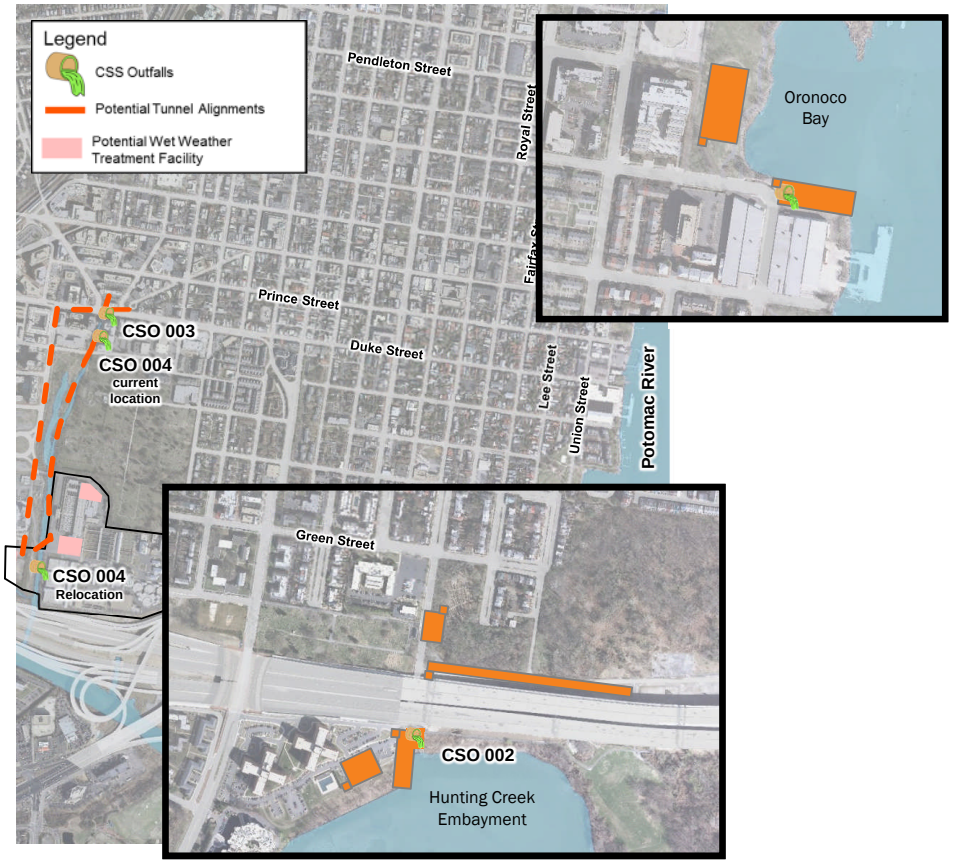
Potential Alignments for Options

Note: Potential tunnel alignments and tank locations currently under evaluation, only one tunnel alignment or tank location will be selected

Options A and B/B+ (Tunnels)



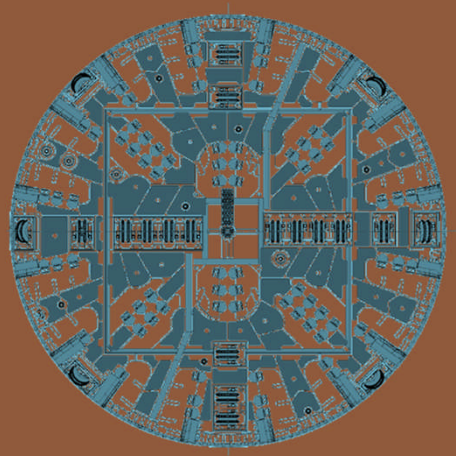
Option C (Tanks)

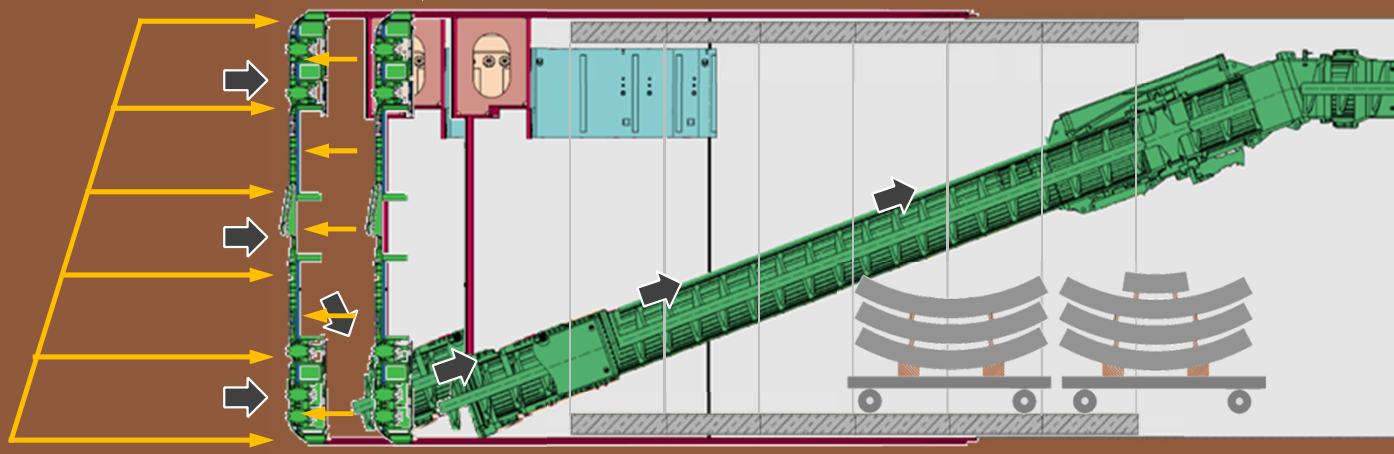


How Do We Build a Tunnel?

Ground Surface

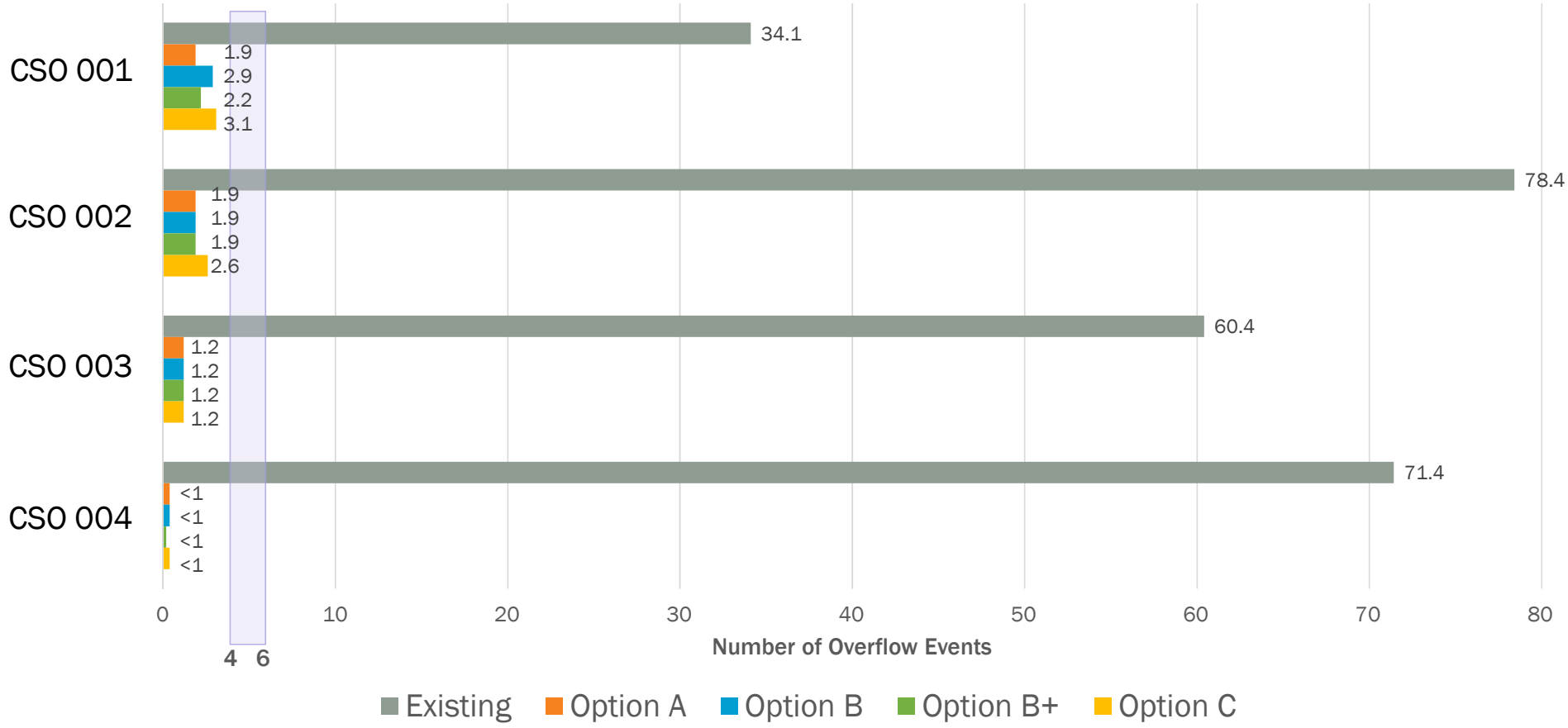
100 to 120 feet deep



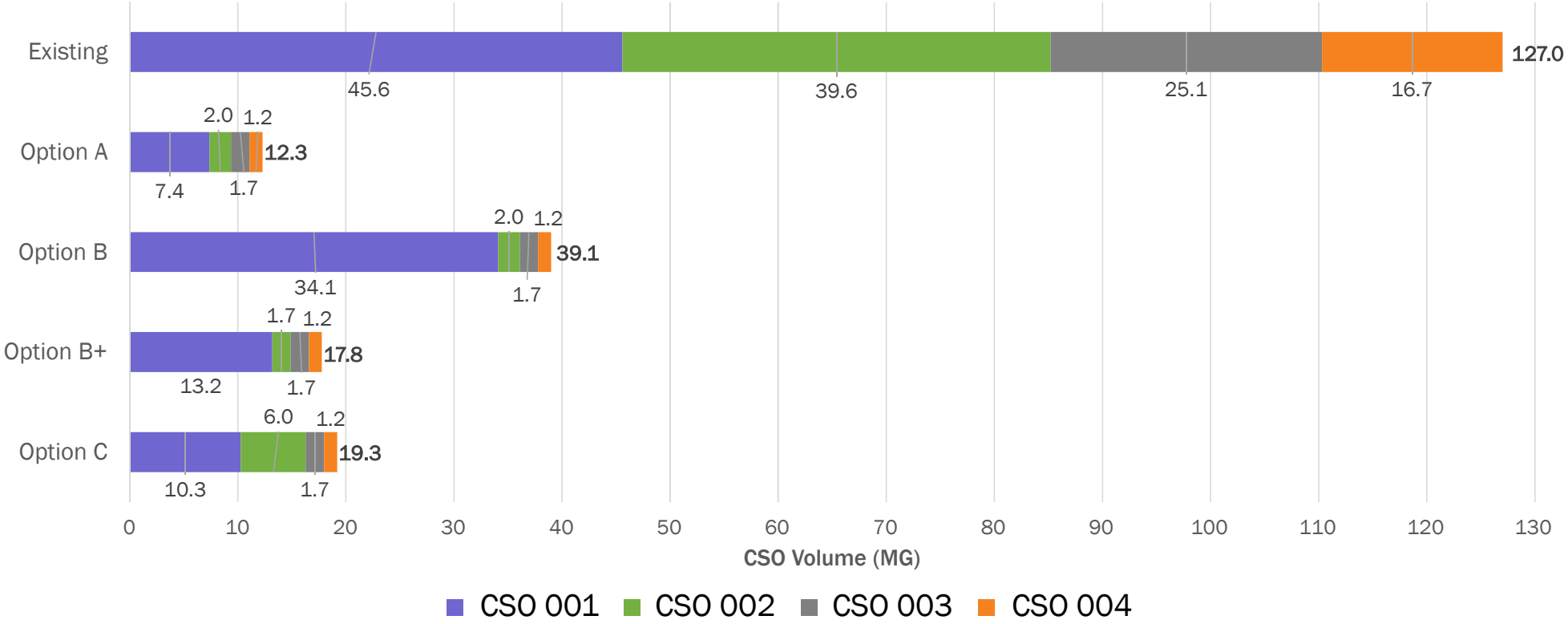


Performance of CSO Remediation Options

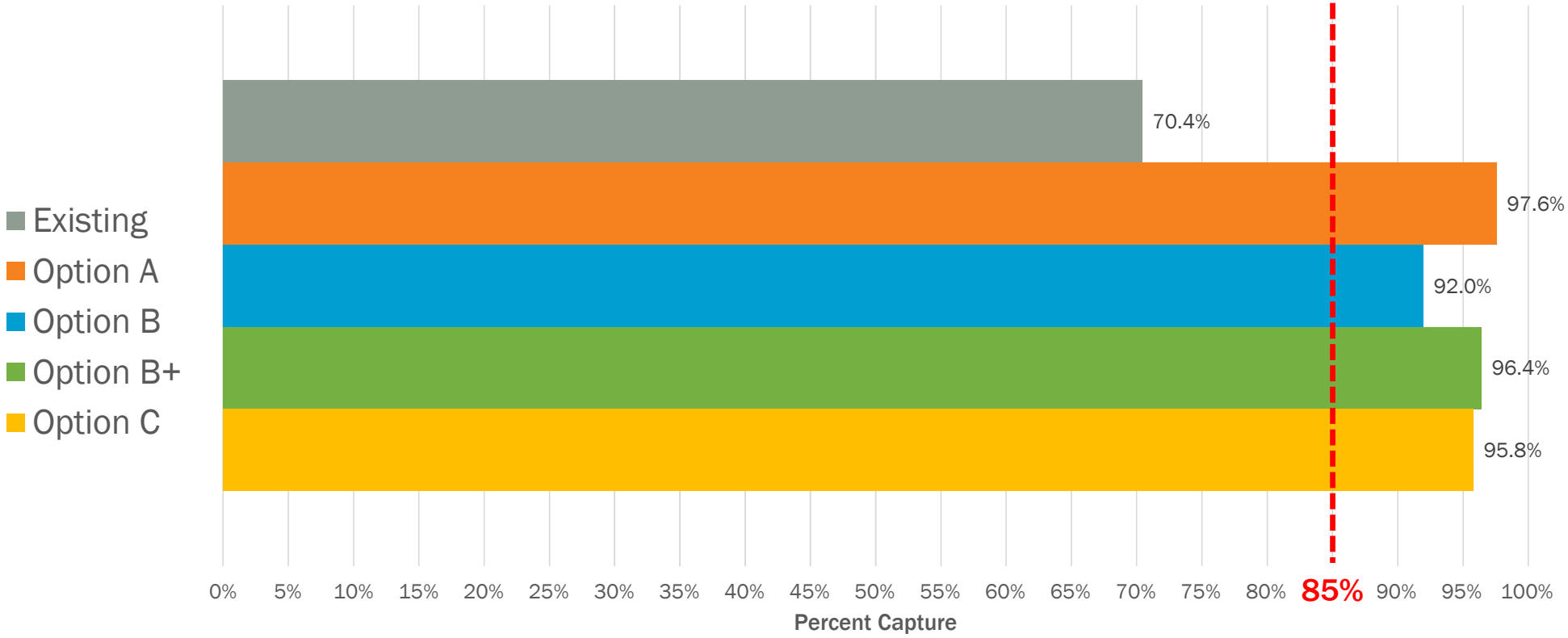
Average Number of Overflows 2000-2016 before and after CSO remediation



Average Volume of Overflows 2000-2016 before and after CSO Remediation Program



Average Percent Capture 2000-2016 before and after CSO Remediation Program



Estimated Capital Costs of Options

Estimated Capital Costs

Cost $ Millions

(escalated to the midpoint of construction)

	Option A Separate Tunnels	Option B Unified Tunnels	Option B+ Unified Tunnels w/ Dual-use Facilities	Option C Tunnel and Tanks
WRRF Upgrades	2.7	2.7	2.7	2.7
CSO 003/4 Tunnel + Pumps	130	130	130	130
Wet Weather Facility	92	–	10	92
CSO 001/2 Tunnel	200	213	213	–
CSO 001/2 Tanks	–	–	–	147
TOTAL ESTIMATES	424	346	356	371
+50% TOTAL ESTIMATES	635	520	535	560

Evaluation of Options

Evaluation Criteria used to evaluate the Options

Evaluation Criteria	Description

Life Cycle Costs	• Optimize the solution to minimize the impact to ratepayers
	  • Capital costs: planning, design, and construction
	  • Annual Operation and Maintenance Costs

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

Adaptability	• Ability to meet future capacity, environmental, or regulatory needs and navigate climate change impacts • Provides for opportunities for adaptive management and resiliency • Integrate other planned City project needs if feasible • Opportunities for complementary Green Infrastructure
Schedule Risk	• Risk of compliance with the mandated schedule • Ability to secure necessary construction permits in a timely manner from local, state, and federal agencies
Community Impact	• 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

Evaluation Criteria summary for all Options

Less successful — More successful

	Option A Separate Tunnels	Option B/B+ Unified Tunnel	Option C Tunnel and Tanks
Life Cycle Costs	Highest	Lowest	High
O&M Complexity	High	Lowest	Highest
Adaptability	High	Highest	Lowest
Schedule Risk	Highest	Moderate	Moderate
Community Impact • During Construction	High	High	Highest
• Post Construction	Low	Low	Highest

Evaluation Criteria Description

Evaluation Criteria	Option A	Option B/B+	Option C
Life Cycle Costs	• Highest estimated capital and life cycle costs	• Has the lowest estimated capital and life cycle costs	• High estimated capital and life cycle costs
O&M Complexity	• Moderate complexity due to multiple locations of mechanical equipment (but sited near WRRF) and infrequently used wet weather treatment facility	• Is the simplest to maintain due to centralized location of facilities and no wet weather treatment	• Highest complexity due to multiple locations of mechanical equipment and infrequently used wet weather treatment facility
Adaptability	• Flexible since connectivity is maintained with WRRF	• Provides the most adaptability due to connectivity with WRRF and unified system	• Least flexible due to need for new tankage and limitations to getting flow to the WRRF through existing interceptor
Schedule Risk	• Most complex schedule to meet legislative milestone based on current planning	• Meets the legislative milestone based on current planning	• Moderate schedule complexity to meet legislative milestone based on current planning
Community Impact	• Has fewer short and long-term impacts	• Has fewer short and long-term impacts	• Has the most short and long-term impacts

Option B+ is the recommended option for Long Term Control Plan implementation

Life Cycle Costs	• Has the lowest estimated capital and life cycle costs
O&M Complexity	• Is the simplest to maintain due to centralized location of facilities and no wet weather treatment
Adaptability	• Provides the most adaptability due to connectivity with WRRF and unified system
Schedule Risk	• Meets the legislative milestone based on current planning

Community Impact
• During Construction
• Post Construction
	• Has fewer short and long-term impacts
	  • Minimal short-term impact over larger area
	  • Low long-term impact: Most mechanical equipment located at WRRF

Stakeholder Group Feedback

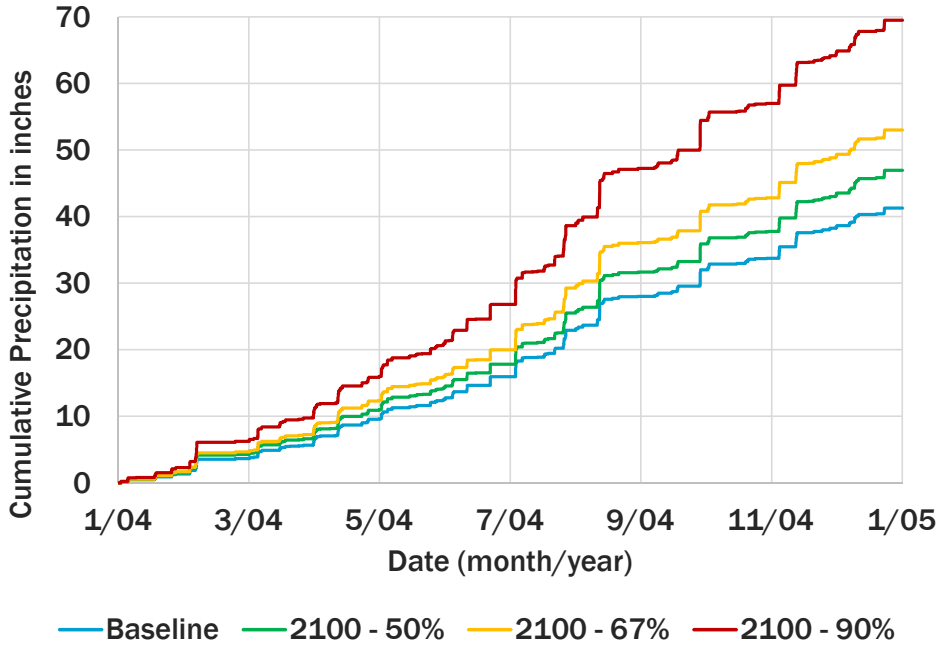
Stakeholder Group Feedback

Stakeholder Group:

- **Unanimously supports Option B+ as recommended option for LTCPU implementation**
- Supports the implementation of green infrastructure
- Challenged team to review impacts of future climate change
- Asked team to review extension of CSO 001 out of Oronoco Bay
- Suggested to consider rate affordability for low-and fixed-income residents

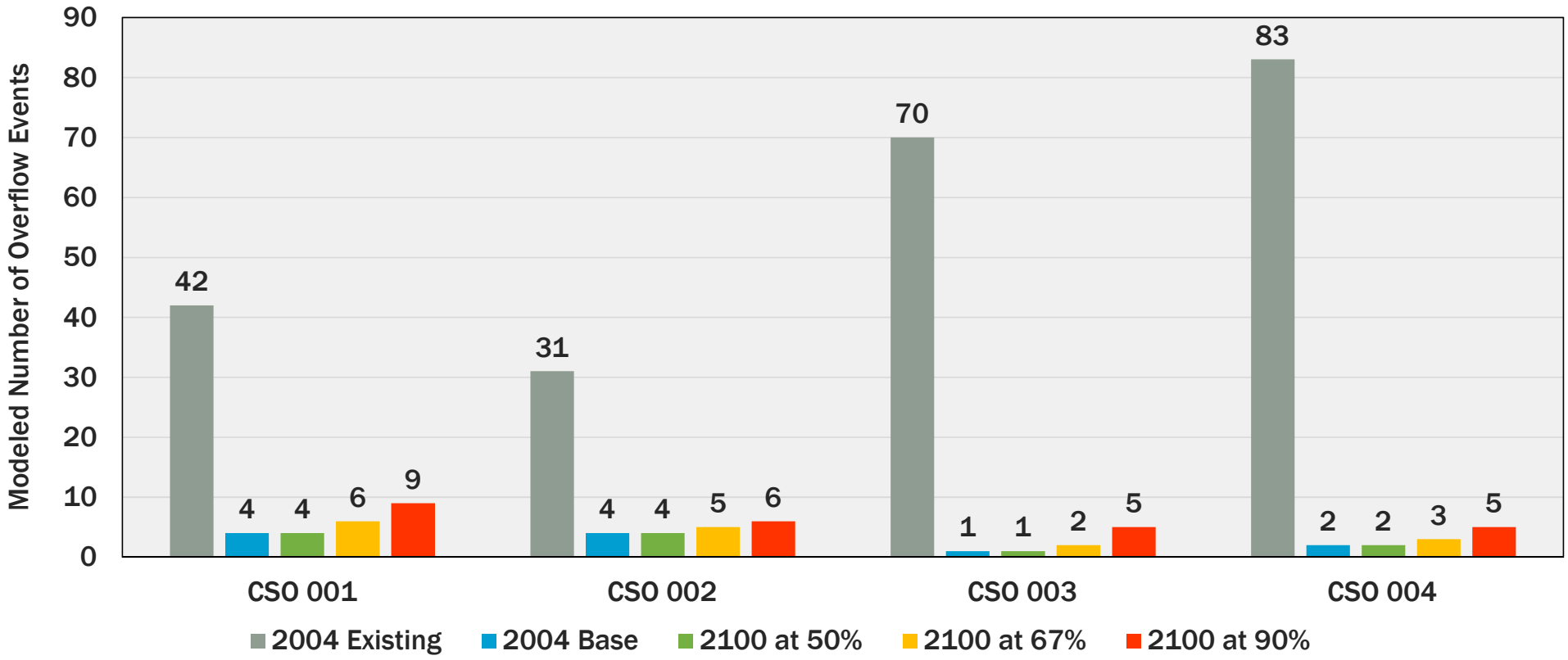
Estimated future climate precipitation for year 2100

Annual Results	Baseline	Median (50%)	High (67%)	Higher (90%)
Total precipitation (inches)	41.3	47.0	53.0	69.5
Added precipitation (inches, over baseline)	-	5.7	11.7	28.2
Percent increase	-	14%	28%	68%



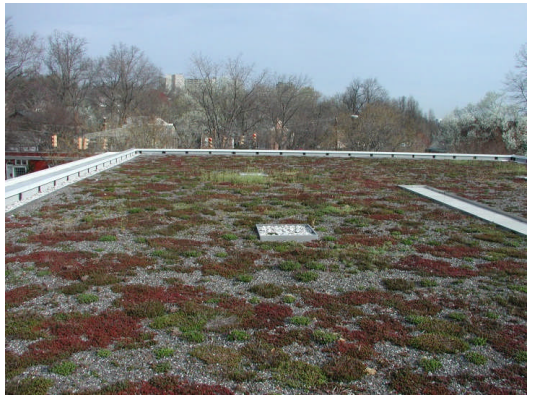
Option B performs well under future predicted climate conditions

Note: Analysis performed for Option B only. It is anticipated that Option B+ would perform as well or better than Option B under future climate conditions



City supports green infrastructure as a long-term adaptive management tool

- City 10-year CIP commits approximately $50M for stormwater treatment
- Green infrastructure identified as major stormwater treatment strategy
- Continue to encourage and promote green infrastructure in development and redevelopment
- Implement green infrastructure in a city-wide approach



Green Roof, Duncan Library

Permeable Pavers and Bioretention Cell, 4MR Park

Implementing green infrastructure will not reduce the sizing of gray infrastructure required for CSO's 001/2

- Analyzed green infrastructure at various implementation rates per other national programs
- Assumed implementation cost of $0.8M per acre
- Calculated potential volume managed by green infrastructure
- Estimated reduction of CSO 001/2 storage volume and associated tunnel diameter
- Developed overall program cost including green infrastructure

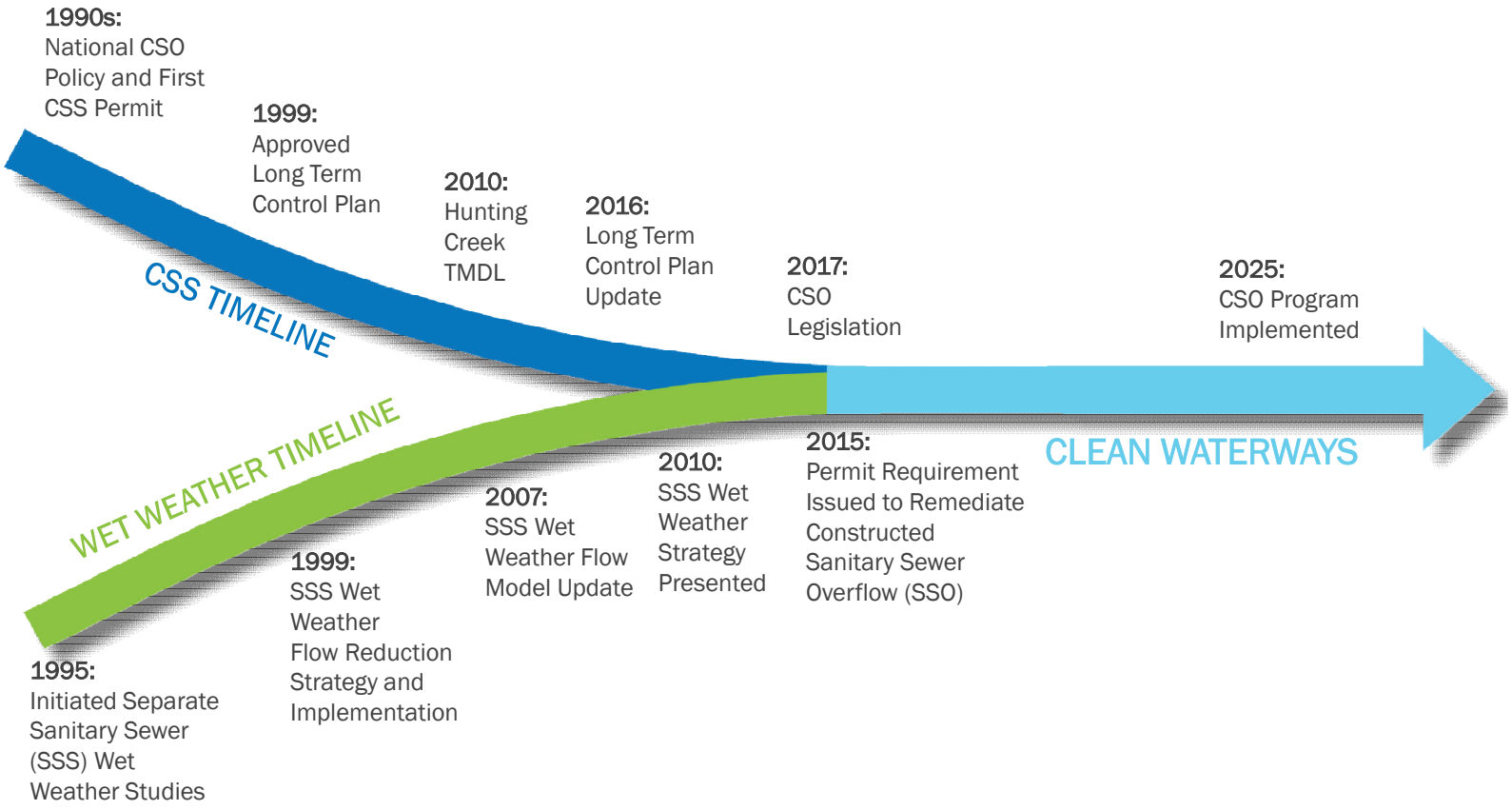
	% Implementation			
	0%	3%	8%	34%
Volume managed by gray (MG)	7.5	7.4	7.1	5.8
Estimated cost for green (Millions)	$0	$8	$25	$106
Estimated cost for gray (Millions)	$200	$200	$200	$197
Total Estimated Program Cost (Millions)	**$200**	**$208**	**$225**	**$303**

Outfall Transfer Initiative

Introducing Alexandria Renew Enterprises as a CSO partner to the City

- Political subdivision of the Commonwealth created in 1952
- First independent authority created in Virginia
- Single purpose mission is to collect and process wastewater
- Smallest plant footprint in U.S. for capacity and quality of cleaned water produced
- Perfect compliance record for 12+ consecutive years

How the City of Alexandria and AlexRenew Wet Weather Partnership Formed



Outfall Transfer Initiative

Partnering means leveraging our mutual experience and abilities

Implementation Advantages

- Efficiencies of single entity owning the Program
- AlexRenew has significant experience in implementing large-scale Programs
- Can leverage planned water resources recovery facility (WRRF) projects assist in meeting deadline
- Tunnels connect to WRRF
- Simplified permitting
- Manages overall capital financial needs of our community

Operational Advantages

- Integration of operations and maintenance under single entity
- AlexRenew has expertise in treatment technology and innovation

Rate Forecast

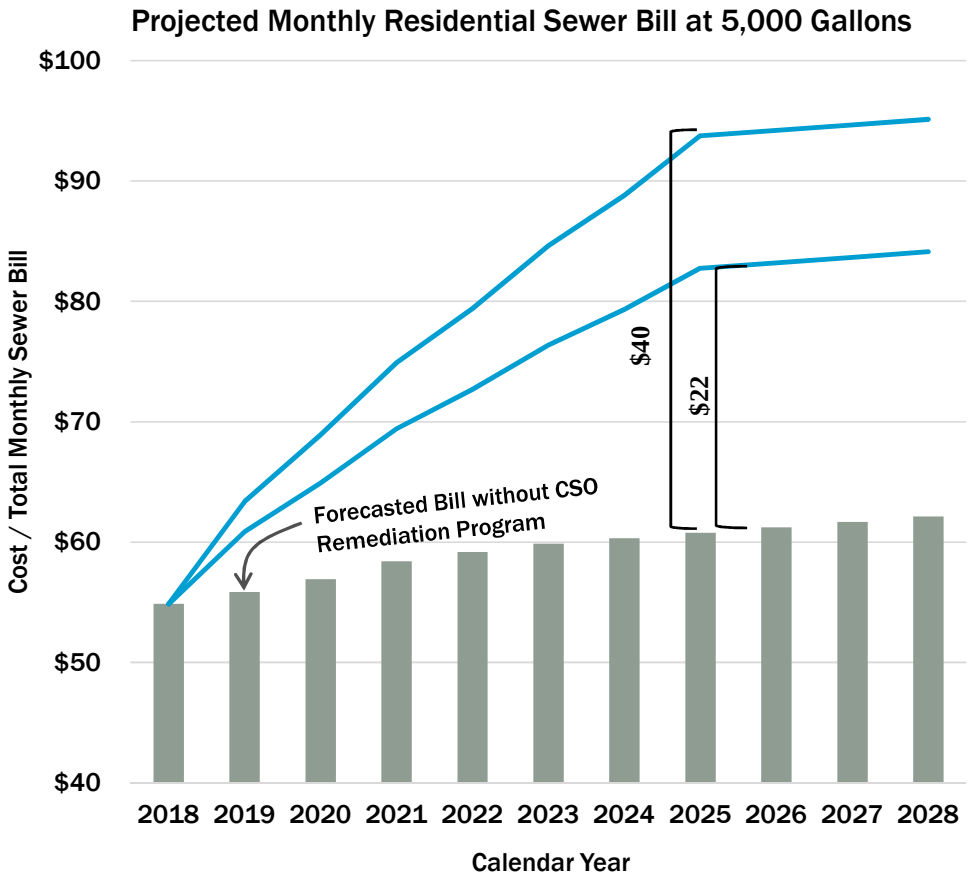
Rate Forecast

What makes up your current bill?

- Base charge
- Wastewater treatment charge (AlexRenew)
- Sanitary sewer system capital investment and maintenance fee (City)

Current bill at 5,000 gallons of use is approximately $52 per month (average)

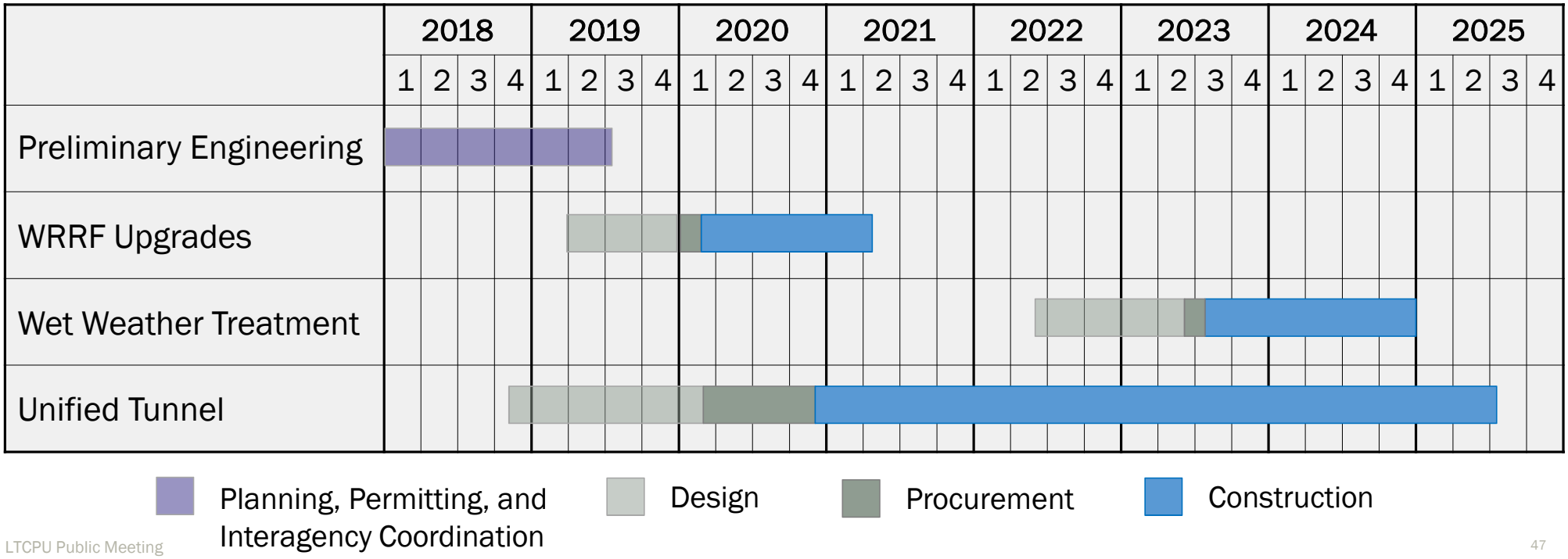
Projected surcharge of $22 to $40 per month per user in addition to current bill



Next Steps

Long Term Control Plan Implementation Schedule

- City will transfer permit and outfall-related assets to AlexRenew
- AlexRenew will lead the implementation of the LTPCU, with support from the City



Long Term Control Plan Update Timeline

Submit comments on the LTCPU to: https://www.alexandriava.gov/Sewers

- **Tuesday, April 10** City Council Legislative Meeting @ City Hall
- **Saturday, April 14** City Council Public Hearing @ City Hall
- **Tuesday, April 17** AlexRenew Board Meeting @ AlexRenew
- **Monday, April 23** LTCPU Public Comment Period Ends
- **Tuesday, April 24** City Council Legislative Meeting @ City Hall

Public Questions and Comment

Extra Slides

Green Infrastructure in the Combined Sewer System