Presentation to

MWRA Board of Directors

Draft Updated CSO Control Plan Alternatives Recommendation

October 29, 2025

Agenda

- Background
- Water Quality
- Levels of Control
- CSO Reduction and Elimination Tools
- Public Engagement
- Alternatives Development
- Alternatives Evaluation and Scoring
- Recommended Alternatives
- Projected CSO Reduction
- Cost Sharing and Financial Considerations
- Next Steps

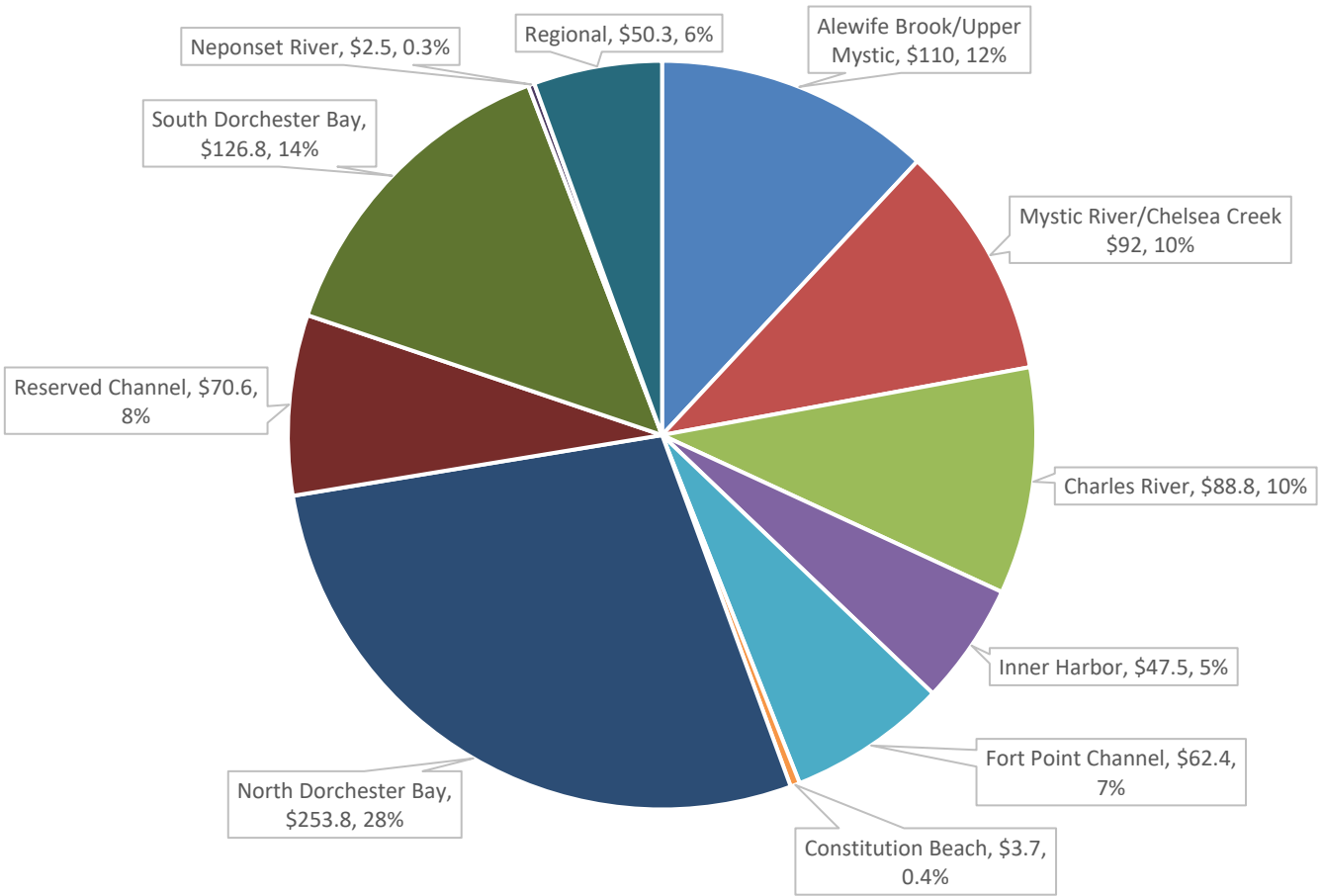
Background

Completed Long Term Control Plan

Types of CSO Control Projects

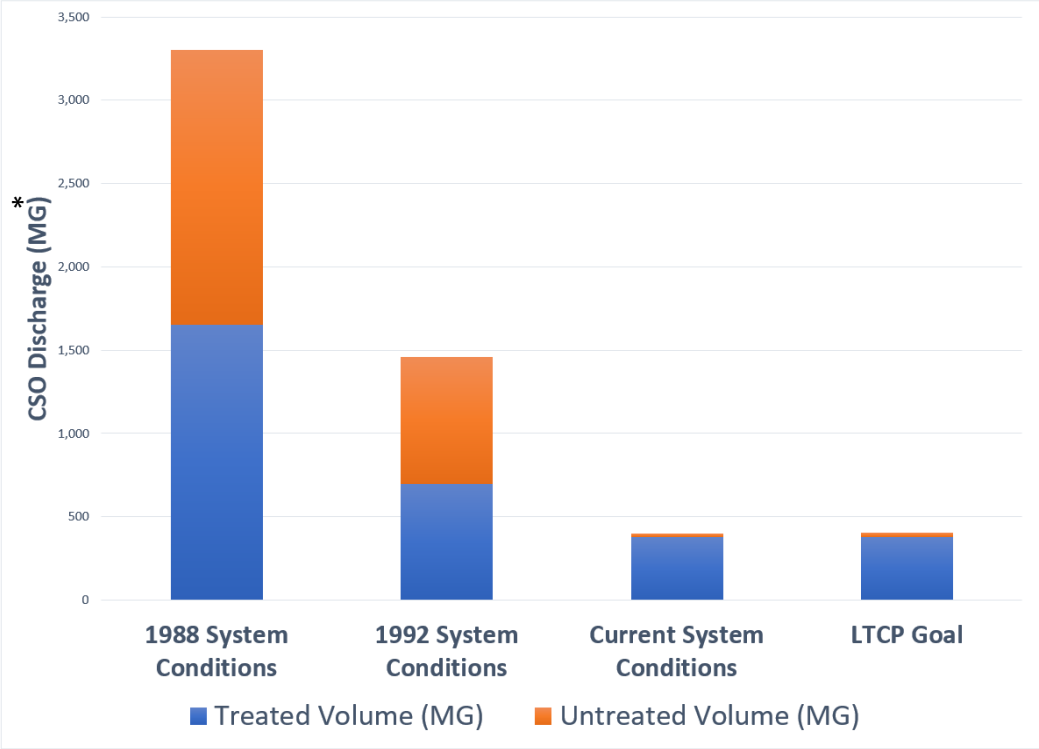
- Included a range of projects (35 total) targeted to site specific control including:
  - System optimization
  - Sewer separation
  - Interceptor relief
  - Detention treatment facilities
  - Storage facilities
  - Upgrades to existing CSO facilities
- **Total cost $911 million ($1.52 billion in today's dollars)**
- When combined with related local community projects, that investment is **over $1 billion**.

MWRA CSO Investments By Receiving Water



Prior Long Term Control Plan

- System wide improvements resulted in an 88% reduction in CSO discharge since 1980s.
- 94% of remaining CSO is Treated using Prior Typical Year.



System Wide CSO Reduction Since the 1980s

Annual discharge volume based on the prior **Typical Year*

Variance Water CSOs

Water Quality

Water Quality – Sources of Pollution

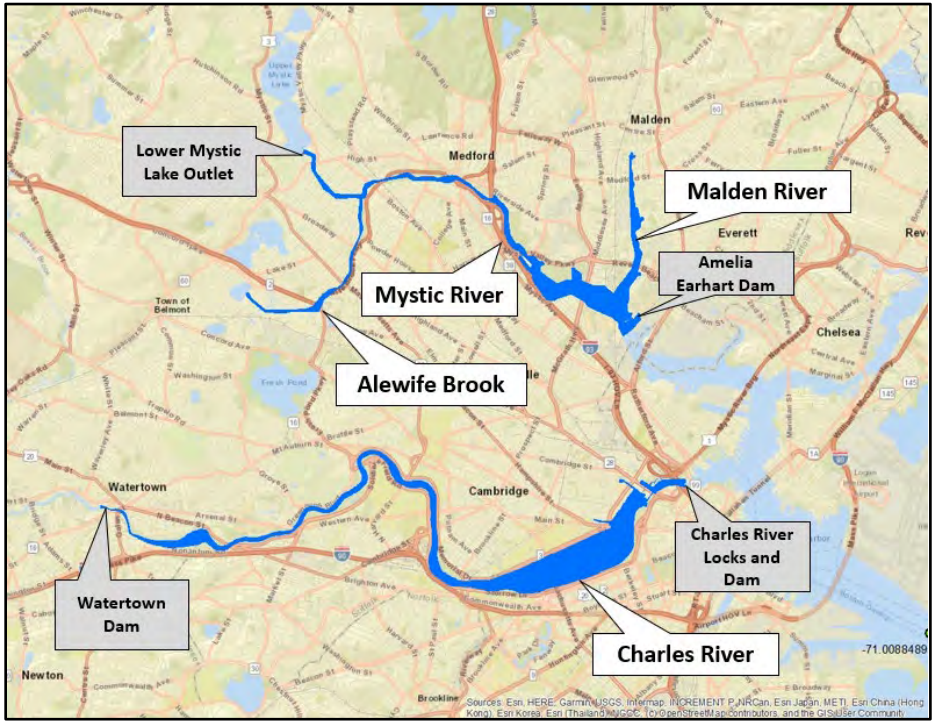
Dry weather	Stormwater	CSOs
• Illicit connections • Leaky sewer pipes • Wildlife and dog excrement • Decomposing leaves	• Pathogens (bacteria, viruses) • Oil and grease • Nutrients (Phosphorus, Nitrogen) • Trash • Others	• Pathogens (bacteria, viruses) • Oil and grease • Wipes • Nutrients (Phosphorus, Nitrogen) • Pharmaceuticals • Industrial waste • Others

These pollutants have negative impacts on water quality, environmental health, and public health.

Eliminating CSOs alone does not result in swimmable and fishable waterbodies.

Water Quality – Model Results

- Separate models run for the Charles River and Mystic/Alewife for the full 2050 Typical Year
- Following results are preliminary
- Compliance with WQ benchmarks as recommended by DEP
  - Use of 410 #/100mL *E. coli* as the benchmark
- Models show impacts of non-CSO sources such as stormwater and conditions upstream of the model area
- **Model results do not account for additional CSO control measures in the Updated CSO Control Plan**

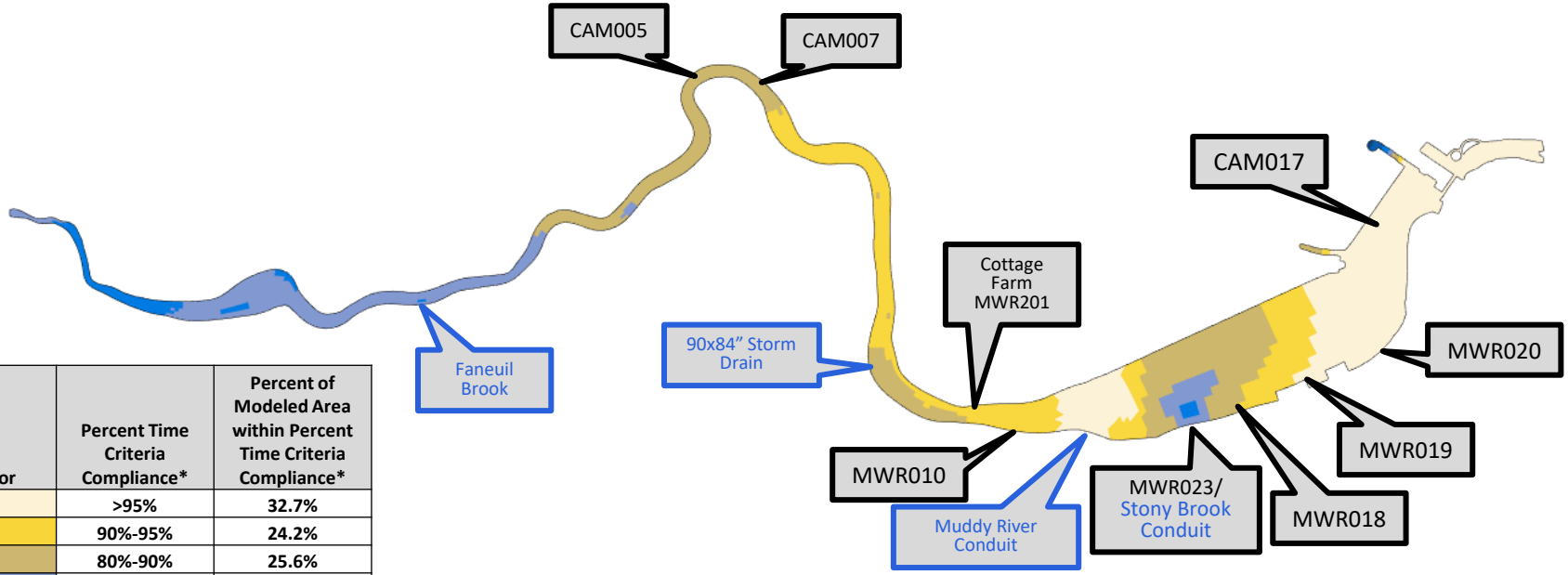


Water Quality Modeling Results – Charles River

Percentage Time Entire Modeled River is in Compliance*				
Model Run	*E. coli* (410#/100mL)			
	All Sources	**Non-CSO Sources**	**CSO Only**	**Stormwater Only**
2050 Typical Year	51% (186 days)	51% (186 days)	99.7% (364 days)	64% (234 days)

*Based on guidance from DEP, model results were analyzed for a single sample maximum equivalent to the value of the Class B Statistical Threshold Value Criterion (STV) for bacteria. The Class B water quality criteria for bacteria at 314 CMR 4.05 (5)(f.1) do not identify a single sample max criterion but rather identify a geometric mean and a 90th percentile STV.

Charles River - % of time in compliance – All Sources



Color	Percent Time Criteria Compliance*	Percent of Modeled Area within Percent Time Criteria Compliance*
	>95%	32.7%
	90%-95%	24.2%
	80%-90%	25.6%
	75%-80%	14.0%
	70%-75%	3.3%
	65%-70%	0.1%
	<65%	0.04%

2050 Typical Year

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Water Quality Modeling Results – Alewife Brook / Mystic River

Percentage Time Entire Modeled River is in Compliance*				
Model Run	*E. coli* (410#/100mL)			
	All Sources	**Non-CSO Sources**	**CSO Only**	**Stormwater Only**
Alewife Brook				
2050 Typical Year	41% (150 days)	41% (150 days)	99% (361 days)	43% (157 days)
Mystic River				
2050 Typical Year	52% (190 days)	52% (190 days)	96% (350 days)	54% (197 days)

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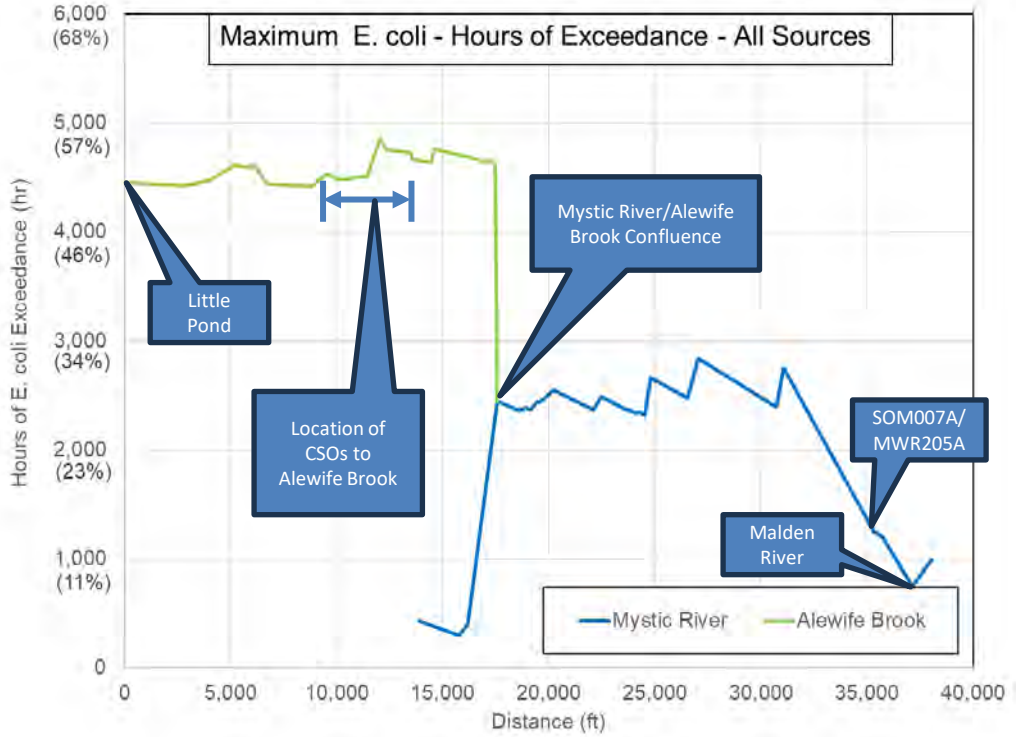
Alewife Brook/Mystic River - % of time in exceedance – All Sources

2050 Typical Year



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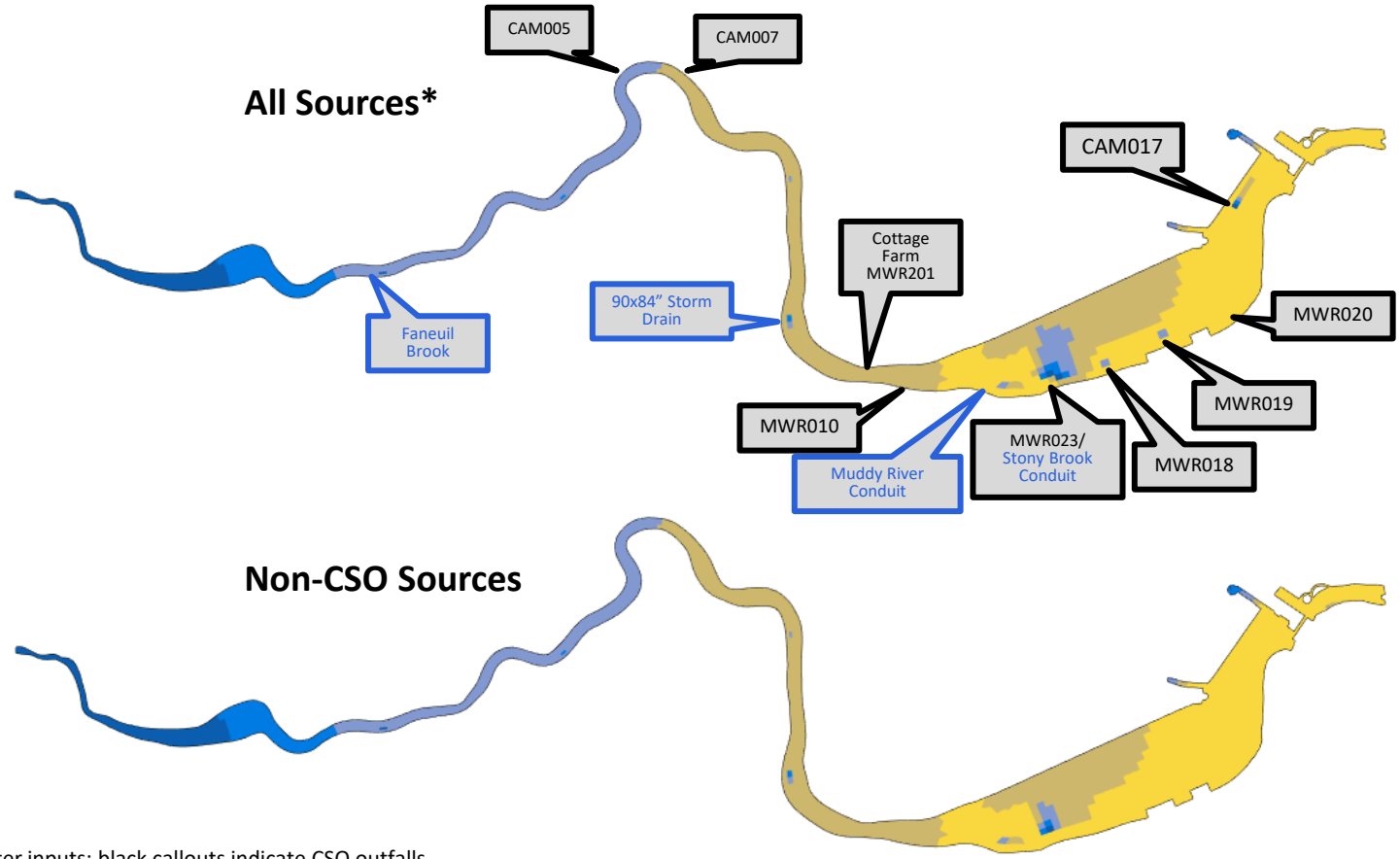
Water Quality – Acute Impacts

- Stakeholders have expressed interest in evaluating the peak counts of bacteria after CSO discharges
- These acute impacts from CSO only occur concurrently with impacts from other sources
- This preliminary analysis compares the maximum *E. coli* concentration in the 2050 Typical Year with and without CSO

Charles River - Maximum *E. coli* Counts (2050 TY)

Color	Maximum *E. coli* Concentration #/100mL
	0
	0 - 2,500
	2,500 – 5,000
	5,000 – 10,000
	10,000 – 15,000
	15,000 – 1,000,000



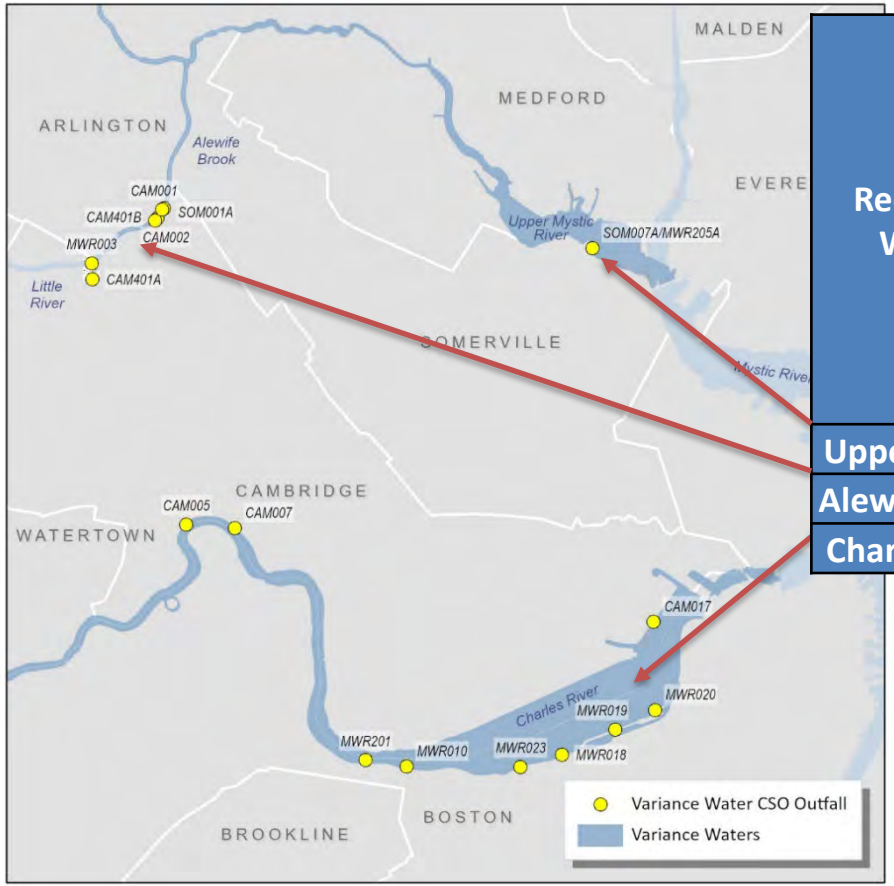
*Blue callouts indicate major stormwater inputs; black callouts indicate CSO outfalls

Alewife Brook/Mystic River - Maximum *E. coli* Counts (2050 TY)

- Preliminary analysis shows that CSOs do have an impact on maximum counts of *E. coli* – these peak counts range from:
  - 120,000 in portions of the Alewife Brook
  - 80,000 at the confluence of the Alewife and Mystic
  - 20,000 by SOM007A/MWR205A near the Amelia Earhart Dam
- Without CSO, these peak counts range from 20,000 (Alewife Brook) and 10,000 (lower reaches of the Mystic)
- These results are orders of magnitude higher than the *E. coli* benchmark of 410 #/100mL.

Levels of Control

CSO Increases When Considering Climate Change



Receiving Water	Hydraulic Model Predictions						
	Activation Frequency		CSO Discharge Volume (MG)				
	Prior TY	2050 TY	Prior TY	2050 TY	2050 Largest Storm in TY 3.3 - inches	2050 5-year Storm 5.3 - inches	2050 25-year Storm 7.8 - inches
Upper Mystic	2	8	1.3	29.3	10.5	17.4	27.2
Alewife Brook	8	13	9.9	20.9	4.84	20.9	40.1
Charles River	3	6	7.9	38.4	16.6	65.5	120.6

Considering Climate Change Impacts

- 2050 Planning Year
- Larger more intense storm events
- Larger CSO volumes expected

Four Levels of Control Being Evaluated

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Significantly reducing CSO discharges from those predicted to occur in a 2050 Typical Year ("**Limited CSO in 2050 Typical Year**")

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No CSO in a 2050 Typical Year ("**2050 Typical Year**")

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No CSO in a 2050 Typical Year ("**2050 Typical Year**")

No CSO in a 2050 5-year, 24-hour design storm ("**2050 5-year**")

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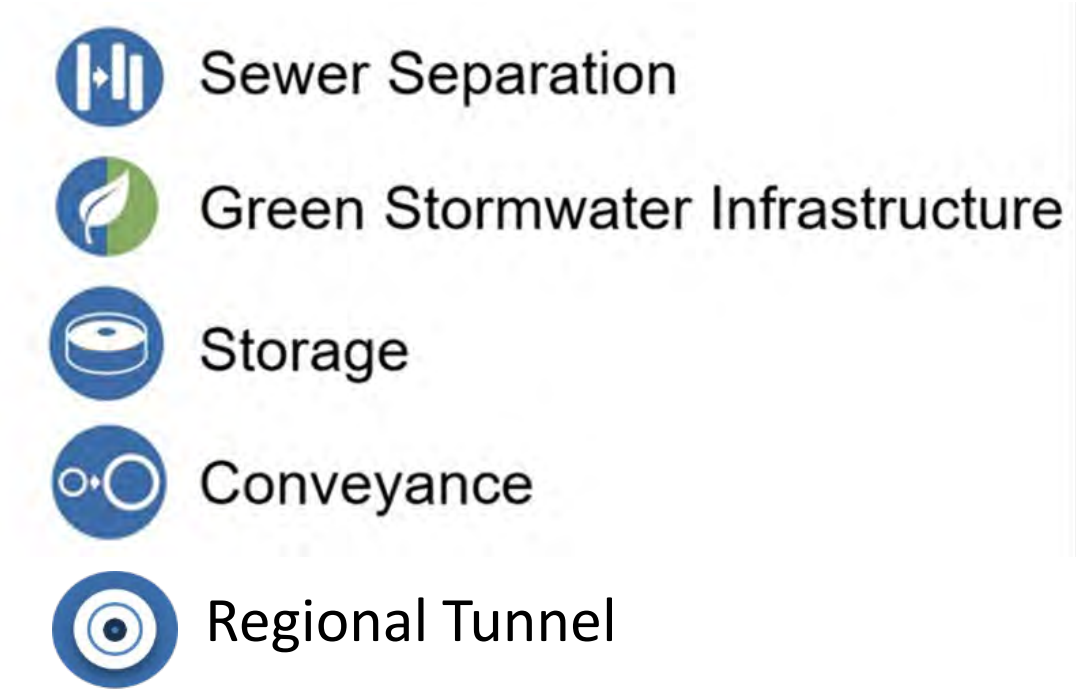
No CSO in a 2050 Typical Year ("**2050 Typical Year**")

No CSO in a 2050 5-year, 24-hour design storm ("**2050 5-year**")

No CSO in a 2050 25-year, 24-hour design storm ("**2050 25-year**")

CSO Reduction and Elimination Tools

General Components of an Alternative



Tool – Sewer Separation

Tool – Green Stormwater Infrastructure

Stormwater Bump-out on Somerville Ave, Somerville (200 sf footprint, 250 cf storage)

Tool – Storage

- Effective method to temporarily store CSO flow
- Need to be pumped out prior to next storm event
- Very large tanks are difficult to site and construct

Tool – Conveyance

- Increase pipe capacity to move CSO to location with available capacity or storage.
- Limited opportunities in MWRA system.
- Requires large bypass systems to maintain flows during construction.

Tool – Regional Tunnel

Assembling North Dorchester Bay Tunnel Boring Machine in Mining Shaft, September 2007

NDB CSO Overflow Pump Station

NDB Odor Control Facility

Alewife and Charles Tunnel Alternative Launch Sites

Conceptual layout near Alewife Brook Pump Station
Mining Shaft/Influent Screening Shaft and Dewatering Pump Station

Conceptual Layout adjacent to Cottage Farm

Public Engagement

Engagement Process Goals

- Provide up-to-date information to facilitate involvement and feedback
- Invite active participation from all stakeholders
  - Public Meetings
  - Watershed Group Meetings
- Conduct expansive outreach, including to Environmental Justice populations
- Commit to being receptive and responsive to public comment and suggestions

Meetings and Outreach

- Developed a joint public website https://voice.somervillema.gov/joint-cso-planning
- Hosted five public meetings to share information on plan development and obtain timely public input
- Held a listening session for stakeholders to share priorities and concerns
- Hosted four meetings with Watershed Associations

Public Meeting	Topic	Date	Participants
1	CSO Overview & Intro to CSO Plan	June 29, 2022	226
2	Plan Priorities & New Typical Year Development	December 15, 2022	177
3	CSO Tools & Alternative Development	November 15, 2023	243
4	Alternatives Screening & Affordability Analysis	January 22, 2025	355
Listening Session		April 3, 2025	173
5	Results of Alternative Analysis	September 25, 2025	170+
6	Present Draft Plans	Spring 2026	Planned
7	Present Final Plans	Winter 2027	Planned

Integrating Stakeholder Input in the Plan

Recurring feedback themes and efforts to address them:

- Act with urgency for both short- and long-term solutions
  - Implemented additional signage prior to storms, & evaluated floatables and odor control solutions
  - Preference for alternatives that can be completed more quickly
- Include green infrastructure in solutions
  - Recommended alternatives include green infrastructure where feasible as part of sewer separation areas or other street excavation
- Consider the impacts of climate change
  - The Partners established a first of its kind approach – 2050 Typical Year to evaluate projects

Integrating Stakeholder Input in the Plan

Recurring feedback themes and efforts to address them:

- Act with urgency for both short- and long-term solutions
  - ✓ Implemented additional signage prior to storms, & evaluated floatables and odor control solutions
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- Consider the impacts of climate change
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Alternatives Development

Alternatives Development Process

- Two considerations before concepts developed:
  - Nutrient and bacteria loading
  - Potential for flooding impacts
- Initial development and screening of the technologies for individual outfalls;
- Assessment of opportunities to address two or more outfalls with a single control tool;
- Assessment of the impact of control tools on certain outfalls;
- Optimization of combinations of control tools; and
- Assessment of elimination of CSO discharges.

Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.AB Integrated 3 tanks (3 MG) + 264 acres of sewer separation	7.AB Hybrid 1 3 tanks (2.5 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe	9.AB Tunnel 1.5-mile-long deep tunnel (22 ft. diameter)	11.AB Tunnel 1.5-mile-long deep tunnel (32 ft. diameter)
2.AB Hybrid 1 2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel	8.AB Hybrid 2 3 tanks (2.5 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel	10.AB Tunnel + GSI Same tunnel as 9.AB + GSI (36 acres)	12.AB Tunnel + GSI Same tunnel as 11.AB + GSI (36 acres)
3.AB Hybrid 2 2 tanks (3 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 1 mile-long microtunnel			
4.AB Tunnel 1.5-mile-long deep tunnel (11 ft. diameter)			
5.AB Tunnel + GSI Same tunnel as 4.AB + GSI (36 acres)			
6.AB Full Sewer Separation 900 acres of sewer separation			

Mystic River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm Mid-Tide
1.MR Integrated 1 tank (4 MG) + 366 acres of sewer separation	6a.MR Hybrid 1 1 tank (2.7 MG) + 95 acres of sewer separation	7.MR Storage 1 tank (10.5 MG)	10.MR Storage 1 tank (16.7 MG)
2.MR Hybrid 1 1 tank (7.4 MG) + 95 acres of sewer separation	6b.MR Hybrid 2 1 tank (5 MG)	8.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres)	11.MR Storage + GSI 1 tank (15 MG) + GSI (20 acres)
3.MR Storage 1 tank (10.5 MG)	6c.MR Hybrid 3 95 acres of sewer separation	9.MR Hybrid 1 1 tank (7.4 MG) +95 acres of sewer separation	12.MR Hybrid 1 1 tank (14.2 MG) + 95 acres of sewer separation
4.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres)			
5.MR Sewer Separation 690 acres of sewer separation			

Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.CR Integrated 2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits	**8.CR Hybrid 1** 1 tank (2.5 MG) + 268 acres of sewer separation + 1 storage conduit	**10.CR Tunnel** 4.5-mile-long deep tunnel (24 ft diameter) +1-mile-long Microtunnel	**12.CR Tunnel** 4.5-mile-long deep tunnel (32 ft diameter)+ 1-mile-long Microtunnel + 1 storage conduit
2.CR Hybrid 1 1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter)			
3.CR Hybrid 2 2 tanks (12.7 MG) + 284 acres of sewer separation +0.75 mile-long Microtunnel + + 2 storage conduits			
4.CR Hybrid 3 2 tanks (12.6 MG) + 446 acres of sewer separation + 2 storage conduits	**9.CR Hybrid 2** 1 tank (2.5 MG) + 80 acres of sewer separation + 0.75 mile-long Microtunnel + storage conduit	**11.CR Tunnel + GSI** Same tunnel as 10.CR + GSI (90 acres) + 1-mile-long Microtunnel (same tunnel as 10. CR)	**13.CR Tunnel + GSI** Same tunnel as 12.CR + GSI (90 acres) + 1-mile-long Microtunnel + 1 storage conduit
5.CR Tunnel 4.5-mile-deep tunnel (12 ft diameter) + 2 storage conduits			
6. CR Tunnel + GSI Same tunnel as 5.CR + GSI (90 acres) + 2 storage conduits			
7.CR Full Separation 4,400 acres			

Alternatives Evaluation and Scoring

Alternative Evaluation/Selection Considerations

- Level of CSO control
- Permitting uncertainty
- Site acquisition risks
- Capital Cost and Life Cycle Cost
- Timeline to implementation/CSO benefits
- Impact on priority, vulnerable, and environmental justice populations
- Benefits criteria
- Stakeholder input

Benefits Criteria	
Criteria Category	**Evaluation Criterion**
CSO Performance	**Water quality impact; nutrient load reduction**
	Schedule: minimize duration to CSO reduction benefit
Construction	**Minimize construction impacts**
	• Impacts to public uses during construction
	• Neighborhood impacts during construction
	Minimize construction complexity/risk
	• Depth to excavation
	• Construction complexity
Operations, Maintenance & Resiliency	**Operation and maintenance/safety considerations**
	Resiliency and adaptability
	Opportunity to upgrade existing infrastructure
Community & Ancillary Benefits	**Flooding: reduce sewer/stormwater flood risk**
	Community co-benefits and long-term site impacts
	• Community co-benefits
	• Permanent impacts to public uses
	Impacts to non-variance CSOs

Alewife Brook: Scoring

0 CSOs in 2050 Typical Year	Preliminary Score[1,2]
1.AB Integrated 3 tanks (3 MG) + 264 acres of sewer separation	21.48
2.AB Hybrid 1 2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel	**24.94**
3.AB Hybrid 2 2 tanks (3 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 1 mile-long microtunnel	**23.67**
4.AB Tunnel 1.5-mile-long deep tunnel (11 ft. diameter)	19.16
5.AB Tunnel + GSI Same tunnel as 4.AB + GSI (36 acres)	18.82
6.AB Full Sewer Separation 900 acres of sewer separation	20.81

Notes:

1. Based on numeric criteria only.
2. Scores may be refined as part of Draft Report

Scoring Example – Sensitivity Analysis ("Heat Maps")

	Alewife Brook					
WEIGHTED SCORES:	1. AB - Integrated Alternative	2. AB - Hybrid 1 Alternative	3. AB - Hybrid 2 Alternative	4. AB - Tunnel Alternative	5. AB - Tunnel + GSI Alternative	6. Sewer Separation
WS 1	228.4	265.0	244.7	205.6	215.2	248.9
WS 2	238.2	276.6	269.4	227.4	234.8	229.9
WS 3	230.2	249.0	268.6	237.5	231.3	157.8
WS 4	203.8	239.6	241.6	231.6	248.2	140.1
WS 5	251.3	287.1	299.1	281.6	305.7	193.6
WS 6	214.8	249.4	236.7	191.6	188.2	216.6
WS 7	207.4	239.7	219.6	183.5	182.7	224.2
WS 8	287.9	341.7	376.4	380.0	383.0	79.4
WS 9	214.8	249.4	236.7	191.6	188.2	216.6

Alternative Evaluation/Selection Considerations

- Level of CSO control
- Permitting uncertainty
- Site acquisition risks
- Capital Cost and Life Cycle Cost
- Timeline to implementation/CSO benefits
- Impact on priority, vulnerable, and environmental justice populations
- Benefits criteria
- Stakeholder input

Recommended Alternatives

Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.AB Integrated 3 tanks (3 MG) + 264 acres of sewer separation **$600M, 30-35 years**	7.AB Hybrid 1 3 tanks (2.5 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe **$320M, 18-23 years**	9.AB Tunnel 1.5-mile-long deep tunnel (22 ft. diameter) **$990M, 12-15 years**	11.AB Tunnel 1.5-mile-long deep tunnel (32 ft. diameter) **$1.7B, 12-15 years**
2.AB Hybrid 1 2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel **$440M, 18-23 years**	8.AB Hybrid 2 3 tanks (2.5 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel **$240M, 10-20 years**	10.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 9.AB) + GSI **$1.1B, 12-15 years**	12.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 11.AB) + GSI **$1.7B, 12-15 years**
3.AB Hybrid 2 2 tanks (3 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 1 mile-long microtunnel **$340M, 13-18 years**			
4.AB Tunnel 1.5-mile-long deep tunnel (11 ft. diameter) **$600M, 15-20 years**			
5.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 4.AB) + GSI area **$630M, 18-23 years**			
6.AB Full Sewer Separation 900 acres of sewer separation: **$1.7B, 50+ years**			

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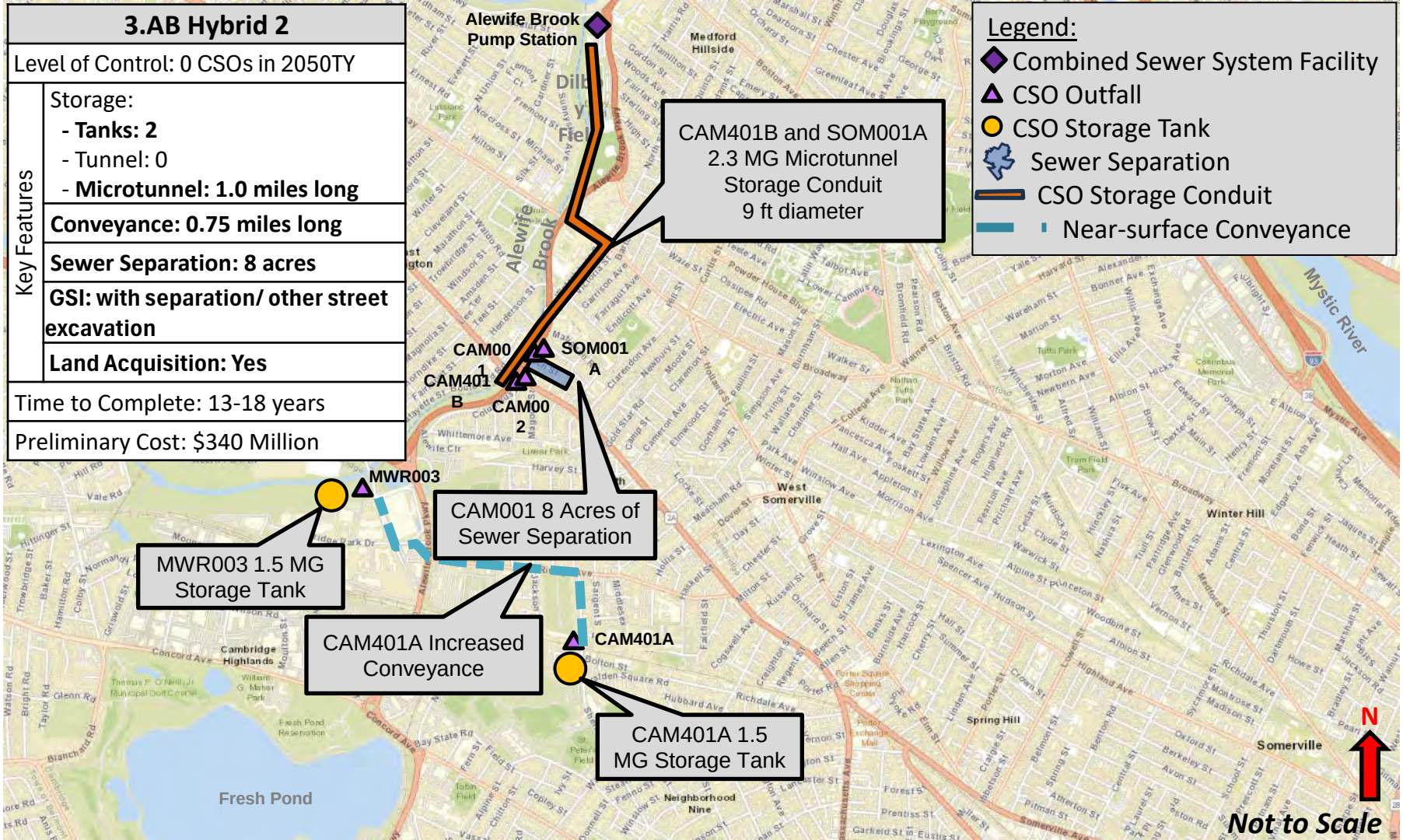
Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.AB Integrated 3 tanks (3 MG) + 264 acres of sewer separation **$600M, 30-35 years**	7.AB Hybrid 1 3 tanks (2.5 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe **$320M, 18-23 years**	9.AB Tunnel 1.5-mile-long deep tunnel (22 ft. diameter) **$990M, 12-15 years**	11.AB Tunnel 1.5-mile-long deep tunnel (32 ft. diameter) **$1.7B, 12-15 years**
2.AB Hybrid 1 2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel **$440M, 18-23 years**	8.AB Hybrid 2 3 tanks (2.5 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel **$240M, 10-20 years**	10.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 9.AB) + GSI **$1.1B, 12-15 years**	12.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 11.AB) + GSI **$1.7B, 12-15 years**
3.AB Hybrid 2 2 tanks (3 MG) + 8 acres of sewer separation + 0.75-mile-long conveyance pipe + 1 mile-long microtunnel **$340M, 13-18 years**			
4.AB Tunnel 1.5-mile-long deep tunnel (11 ft. diameter) **$600M, 15-20 years**			
5.AB Tunnel + GSI 1.5-mile-long deep tunnel (same tunnel as 4.AB) + GSI area **$630M, 18-23 years**			
6.AB Full Sewer Separation 900 acres of sewer separation: **$1.7B, 50+ years**			


3.AB Hybrid 2
Level of Control: 0 CSOs in 2050TY
Key Features
Storage:
- Tanks: 2
- Tunnel: 0
- Microtunnel: 1.0 miles long
Conveyance: 0.75 miles long
Sewer Separation: 8 acres
GSI: with separation/ other street excavation
Land Acquisition: Yes
Time to Complete: 13-18 years
Preliminary Cost: $340 Million
Legend:
Combined Sewer System Facility
CSO Outfall
CSO Storage Tank
Sewer Separation
CSO Storage Conduit
Near-surface Conveyance
Alewife Brook Pump Station
CAM401B and SOM001A 2.3 MG Microtunnel Storage Conduit 9 ft diameter
CAM001
SOM001A
CAM401B
CAM002
MWR003
MWR003 1.5 MG Storage Tank
CAM001 8 Acres of Sewer Separation
CAM401A Increased Conveyance
CAM401A
CAM401A 1.5 MG Storage Tank
Medford Hillside
Alewife Brook
Mystic River
West Somerville
Winter Hill
Cambridge Highlands
Fresh Pond
Spring Hill
Somerville
Neighborhood Nine
N
Not to Scale

Mystic River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm Mid-Tide
1.MR Integrated 1 tank (4 MG) + 366 acres of sewer separation **$500M, 18-23 years**	6a.MR Hybrid 1 1 tank (2.7 MG) + 95 acres of sewer separation **$170M, 5-10 years**	7.MR Storage 1 tank (10.5 MG) **$200M, 5-7 years**	10.MR Storage 1 tank (16.7 MG) **$260M, 5-10 years**
2.MR Hybrid 1 1 tank (7.4 MG) + 95 acres of sewer separation **$260M, 5-7 years**	6b.MR Hybrid 2 1 tank (5 MG) **$120M, 3-8 years**	8.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres) **$200M, 5-7 years**	11.MR Storage + GSI 1 tank (15 MG) + GSI (20 acres) **$260M, 5-10 years**
3.MR Storage 1 tank (10.5 MG) **$200M, 5-7 years**	6c.MR Hybrid 3 95 acres of sewer separation **$100M, 5-10 years**	9.MR Hybrid 1 1 tank (7.4 MG) +95 acres of sewer separation **$260M, 5-7 years**	12.MR Hybrid 1 1 tank (14.2 MG) + 95 acres of sewer separation **$340M, 5-10 years**
4.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres) **$260M, 5-7 years**			
5.MR Sewer Separation 690 acres of sewer separation **$640M, 50+ years**			

Mystic River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm Mid-Tide
1.MR Integrated 1 tank (4 MG) + 366 acres of sewer separation **$500M, 18-23 years**	6a.MR Hybrid 1 1 tank (2.7 MG) + 95 acres of sewer separation **$170M, 5-10 years**	7.MR Storage 1 tank (10.5 MG) **$200M, 5-7 years**	10.MR Storage 1 tank (16.7 MG) **$260M, 5-10 years**
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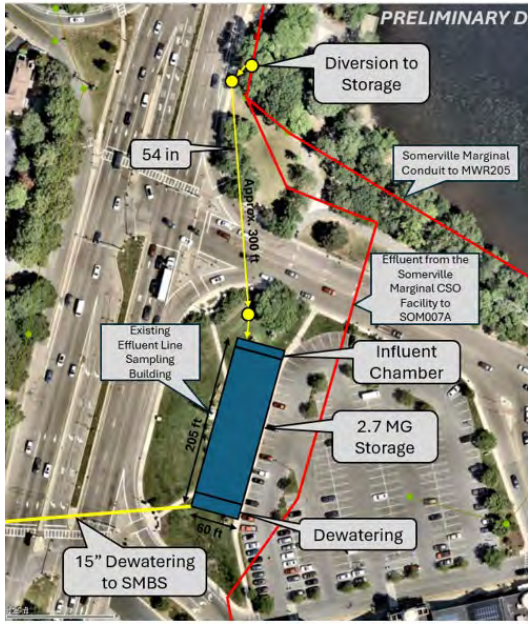
4.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres) **$260M, 5-7 years**			
5.MR Sewer Separation 690 acres of sewer separation **$640M, 50+ years**			

Upper Mystic Storage Tanks



Limited CSOs TY – 2.7 MG
(2 Activations/6.8MG of 29.3MG Remaining)

2050 TY – 7.4 MG

2050 25-yr – 14.2 MG

These scenarios all include 95 acres of sewer separation

Mystic River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm Mid-Tide
1.MR Integrated 1 tank (4 MG) + 366 acres of sewer separation **$500M, 18-23 years**	6a.MR Hybrid 1 1 tank (2.7 MG) + 95 acres of sewer separation **$170M, 5-10 years**	7.MR Storage 1 tank (10.5 MG) **$200M, 5-7 years**	10.MR Storage 1 tank (16.7 MG) **$260M, 5-10 years**
2.MR Hybrid 1 1 tank (7.4 MG) + 95 acres of sewer separation **$260M, 5-7 years**	6b.MR Hybrid 2 1 tank (5 MG) **$120M, 3-8 years**	8.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres) **$200M, 5-7 years**	11.MR Storage + GSI 1 tank (15 MG) + GSI (20 acres) **$260M, 5-10 years**
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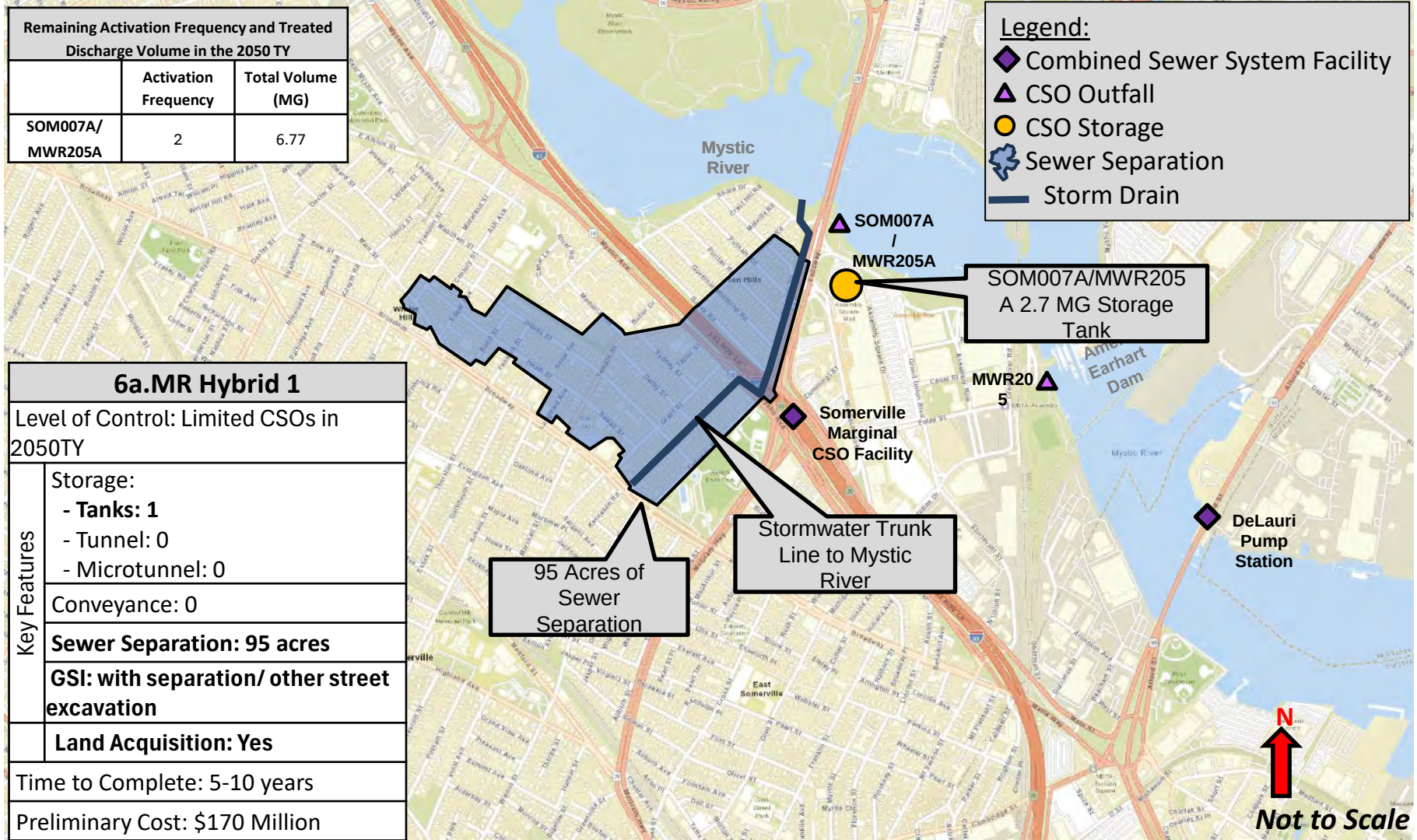
4.MR Storage + GSI 1 tank (9.4 MG) + GSI (20 acres) **$260M, 5-7 years**			
5.MR Sewer Separation 690 acres of sewer separation **$640M, 50+ years**			

Remaining Activation Frequency and Treated Discharge Volume in the 2050 TY		
	Activation Frequency	Total Volume (MG)
SOM007A/ MWR205A	2	6.77



6a.MR Hybrid 1	
Level of Control: Limited CSOs in 2050TY	
Key Features	Storage: **- Tanks: 1** - Tunnel: 0 - Microtunnel: 0
	Conveyance: 0
	Sewer Separation: 95 acres
	GSI: with separation/ other street excavation
	Land Acquisition: Yes
Time to Complete: 5-10 years	
Preliminary Cost: $170 Million	

Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.CR Integrated 2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**	8.CR Hybrid 1 1 tank (2.5 MG) + 268 acres of sewer separation + 1 storage conduit **$360M 23-28 years**	10.CR Tunnel 4.5-mile-long deep tunnel (24 ft diameter) +1-mile-long Microtunnel **$1.9B, 15-20 years**	12.CR Tunnel 4.5-mile-long deep tunnel (32 ft diameter)+ 1-mile-long Microtunnel + 1 storage conduit **$2.6B, 15-20 years**
2.CR Hybrid 1 1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**			
3.CR Hybrid 2 2 tanks (12.7 MG) + 284 acres of sewer separation +0.75 mile-long Microtunnel + + 2 storage conduits **$750M, 23-28 years**			
4.CR Hybrid 3 2 tanks (12.6 MG) + 446 acres of sewer separation + 2 storage conduits **$690M, 28-33 years**	9.CR Hybrid 2 1 tank (2.5 MG) + 80 acres of sewer separation + 0.75 mile-long Microtunnel + storage conduit **$300M, 8-13 years**	11.CR Tunnel + GSI 10.CR + GSI (90 acres) **$2B, 15-20 years**	13.CR Tunnel + GSI 13.CR + GSI (90 acres) **$2.7B, 15-20 years**
5.CR Tunnel 4.5-mile-deep tunnel (12 ft diameter) + 2 storage conduits **$1.4B, 15-20 years**			
6. CR Tunnel + GSI 5.CR + GSI (90 acres) **$1.5B, 15-20 years**			
7.CR Full Separation 4,400 acres **$4.5B, 50+ years**			

Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.CR Integrated 2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**	8.CR Hybrid 1 1 tank (2.5 MG) + 268 acres of sewer separation + 1 storage conduit **$360M 23-28 years**	10.CR Tunnel 4.5-mile-long deep tunnel (24 ft diameter) +1-mile-long Microtunnel **$1.9B, 15-20 years**	12.CR Tunnel 4.5-mile-long deep tunnel (32 ft diameter)+ 1-mile-long Microtunnel + 1 storage conduit **$2.6B, 15-20 years**
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6. CR Tunnel + GSI 5.CR + GSI (90 acres) **$1.5B, 15-20 years**			
7.CR Full Separation 4,400 acres **$4.5B, 50+ years**			

3.CR - Hybrid Alternative 2 (0 CSOs in 2050 TY) components: MWR201

Description:

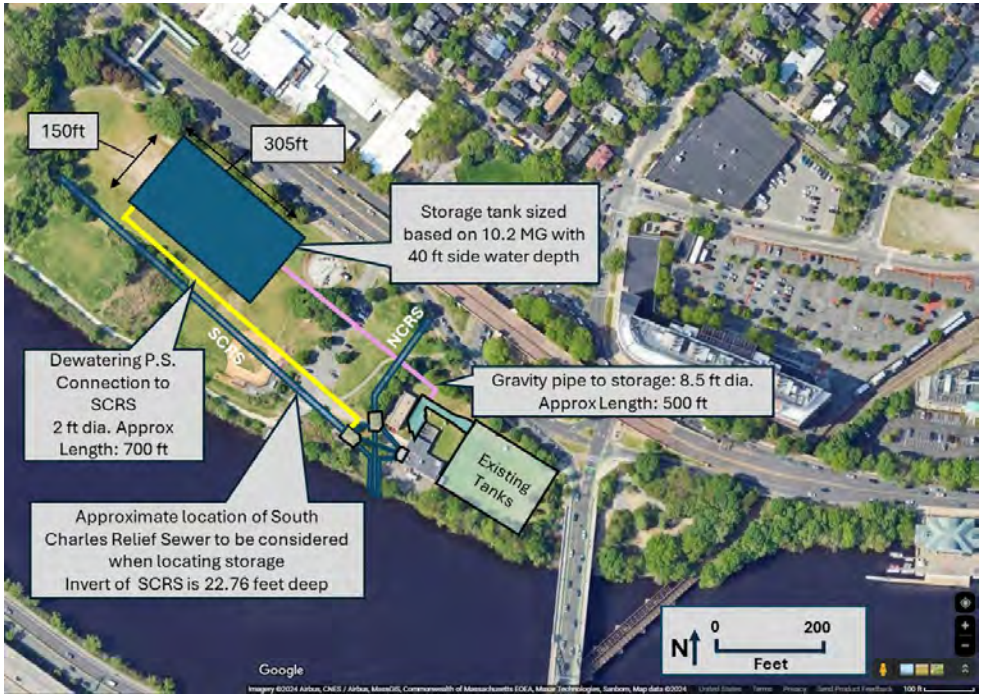
- A below-grade storage tank would be constructed to capture overflow from Cottage Farm.
  - Overall facility length: 305 ft.
  - Overall facility width: 150 ft.
  - Volume: 10.2 MG
  - Sidewater depth: 40 ft.
- Influent screens, 10.2 MGD dewatering pump facility, and odor control
- Above-grade building and at-grade access hatches upon completion of construction
- Land Owner- Commonwealth of Massachusetts - DCR

Project Timeline: 5 to 10 years

Performance:

CSOs: 0 activations in 2050 TY at Outfall MWR201. Treated CSO reduction in TY= 30.12 MG

Phosphorus load impact: 777 lb annual reduction at MWR201



Challenges

- Article 97 required for constructing storage facility in Magazine Beach Park.
- Extensive impacts to park during construction. Small above-grade building to remain at site permanently.
- Deep excavation adjacent to Charles River.
- Long-term maintenance access needed to storage facility.

Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.CR Integrated 2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**	8.CR Hybrid 1 1 tank (2.5 MG) + 268 acres of sewer separation + 1 storage conduit **$360M 23-28 years**	10.CR Tunnel 4.5-mile-long deep tunnel (24 ft diameter) +1-mile-long Microtunnel **$1.9B, 15-20 years**	12.CR Tunnel 4.5-mile-long deep tunnel (32 ft diameter)+ 1-mile-long Microtunnel + 1 storage conduit **$2.6B, 15-20 years**
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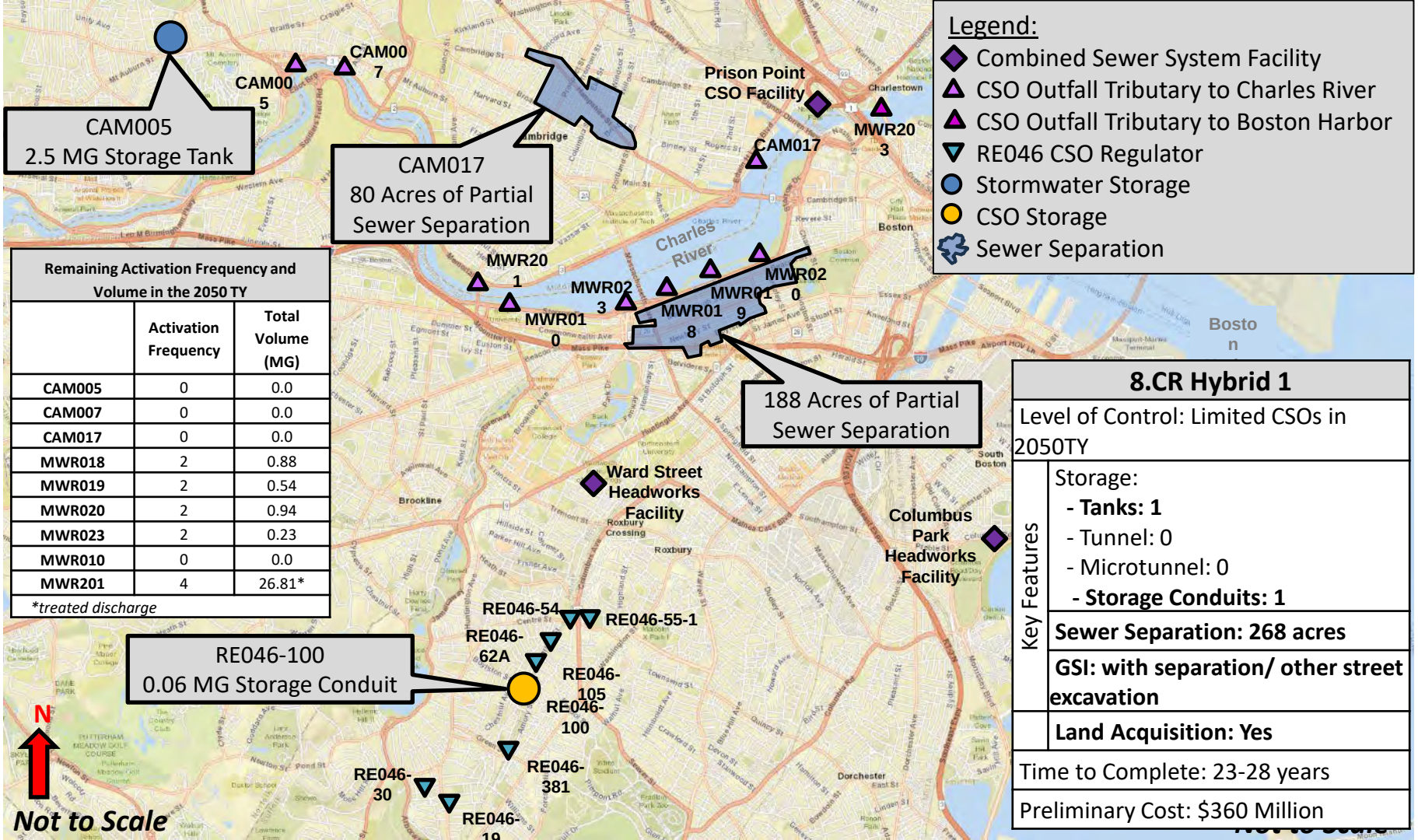
5.CR Tunnel 4.5-mile-deep tunnel (12 ft diameter) + 2 storage conduits **$1.4B, 15-20 years**			
6. CR Tunnel + GSI 5.CR + GSI (90 acres) **$1.5B, 15-20 years**			
7.CR Full Separation 4,400 acres **$4.5B, 50+ years**			



Remaining Activation Frequency and Volume in the 2050 TY		
	Activation Frequency	Total Volume (MG)
CAM005	0	0.0
CAM007	0	0.0
CAM017	0	0.0
MWR018	2	0.88
MWR019	2	0.54
MWR020	2	0.94
MWR023	2	0.23
MWR010	0	0.0
MWR201	4	26.81*
*treated discharge		

8.CR Hybrid 1

Level of Control: Limited CSOs in 2050TY

Key Features

Storage:
- **Tanks: 1**
- Tunnel: 0
- Microtunnel: 0
- **Storage Conduits: 1**

Sewer Separation: 268 acres

GSI: with separation/ other street excavation

Land Acquisition: Yes

Time to Complete: 23-28 years

Preliminary Cost: $360 Million

Summary of Recommended Alternatives

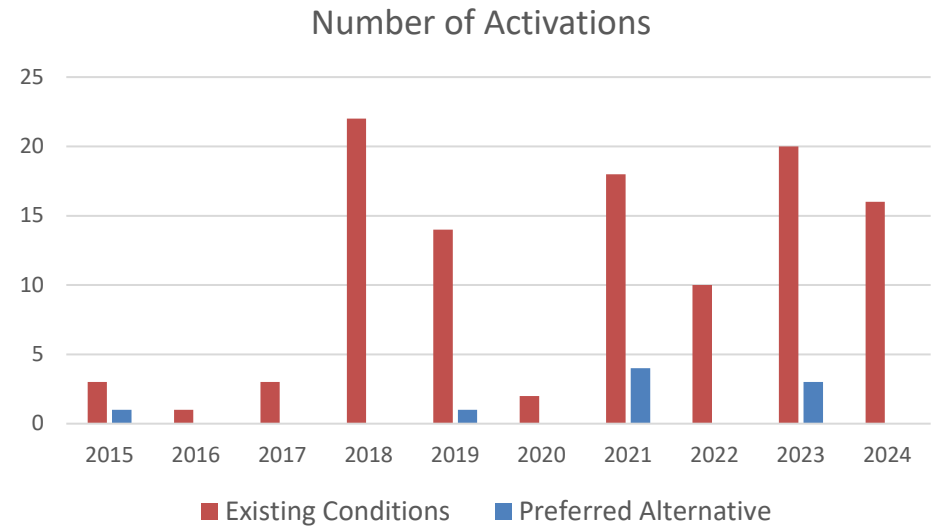
Receiving Waterbody	Alternative Name	Level of Control	Cost	Duration
Alewife Brook	3.AB Hybrid 2	0 CSOs in 2050 TY	$340M	13-18 years
Upper Mystic	6a.MR Hybrid 1	Limited CSOs in 2050 TY	$170M	5-10 years
Charles River	8.CR Hybrid 1	Limited CSOs in 2050 TY	$360M	23-28 years
		Total Cost	**$870M**	

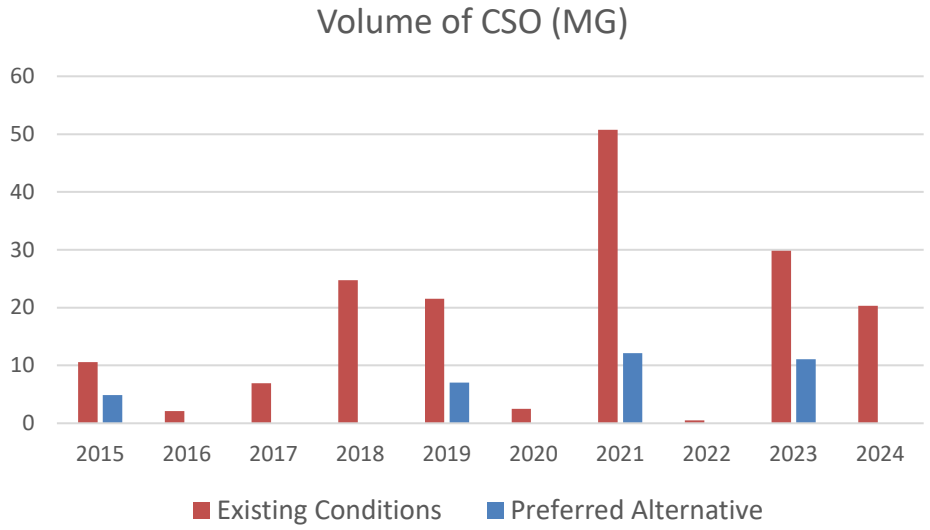
Projected CSO Reduction

Plan performance – 2050 Typical Year

Receiving Water	Level of Control	Hydraulic Model Predictions 2050 TY			
		Activation Frequency		CSO Discharge Volume (MG)	
		Baseline Conditions	Recommended Plan	Baseline Conditions	Recommended Plan
Upper Mystic	1 – Limited CSOs in 2050 Typical Year	8	2	29.3	6.7 Treated
Alewife Brook	2 – Zero CSOs in 2050 Typical Year	13	0	20.9	0
Charles River	1 – Limited CSOs in 2050 Typical Year	6	4	38.4	1.2 Untreated 26.8 Treated

Plan performance – Historical record
Alewife Brook



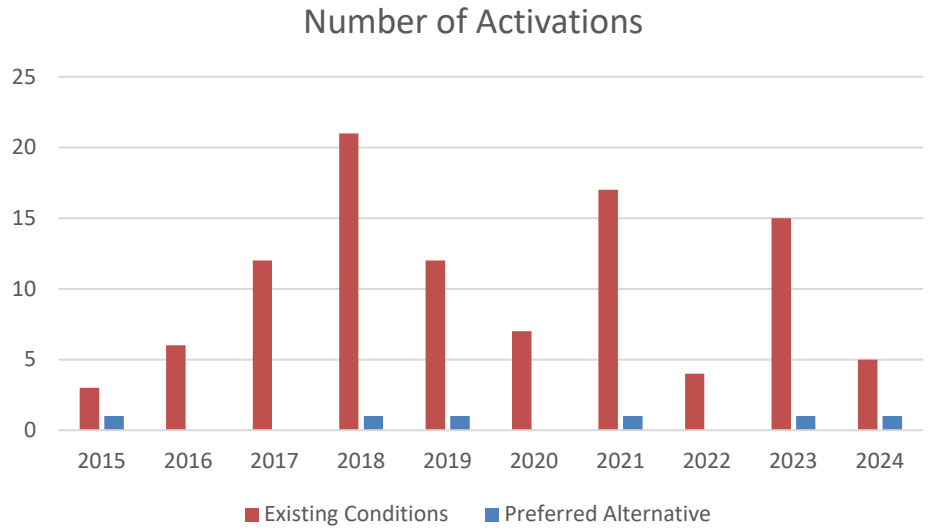


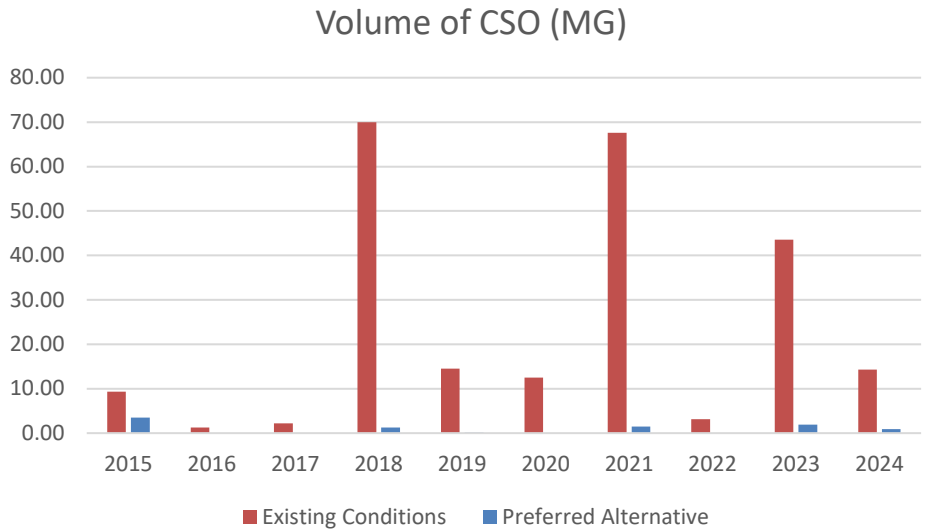
92% reduction in activation frequency
(109 to 9 for 10-year period)

79% reduction in total volume
(170 to 35 MG for 10-year period)

Recorded/reported events at all 7 Alewife outfalls 1 Jan 2015 thru 31 Dec 2024 versus model results for recommended alternative for that rainfall record

Plan performance – Historical record
Upper Mystic River





94% reduction in activation frequency
(102 to 6 for 10-year period)

96% reduction in total volume
(239 to 9 MG for 10-year period)

Recorded/reported events at SOM007A/MWR205A outfall 1 Jan 2015 thru 31 Dec 2024 versus model results for recommended alternative for that rainfall record

Cost Sharing and Financial Considerations

Cost Sharing Methodologies

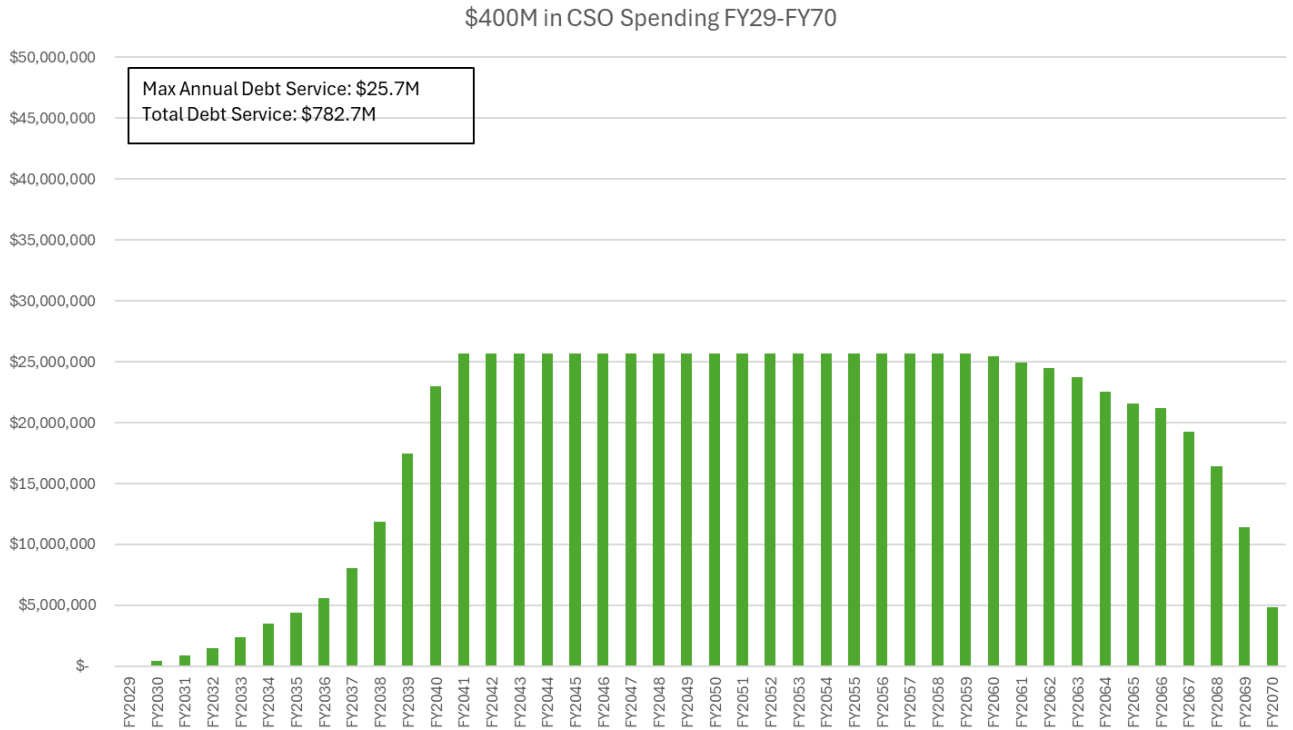
- CSO Ownership:
  - Owner of outfall would pay for the solution
  - Regional projects, costs would be allocated between multiple owners by CSO volume

- Project Type and Location:
  - Separation or green infrastructure projects would be paid by the community being separated or where projects are located
  - Local storage projects within a community collection system would be paid for by the community whose flow is being captured.
  - Regional storage would be allocated by contributing flow.

- CSO Volume Reduction:
  - Costs would be apportioned for each receiving water based on the reduction in CSO volume by each outfall owner.

Projected $400 Million in CSO Project Debt Service

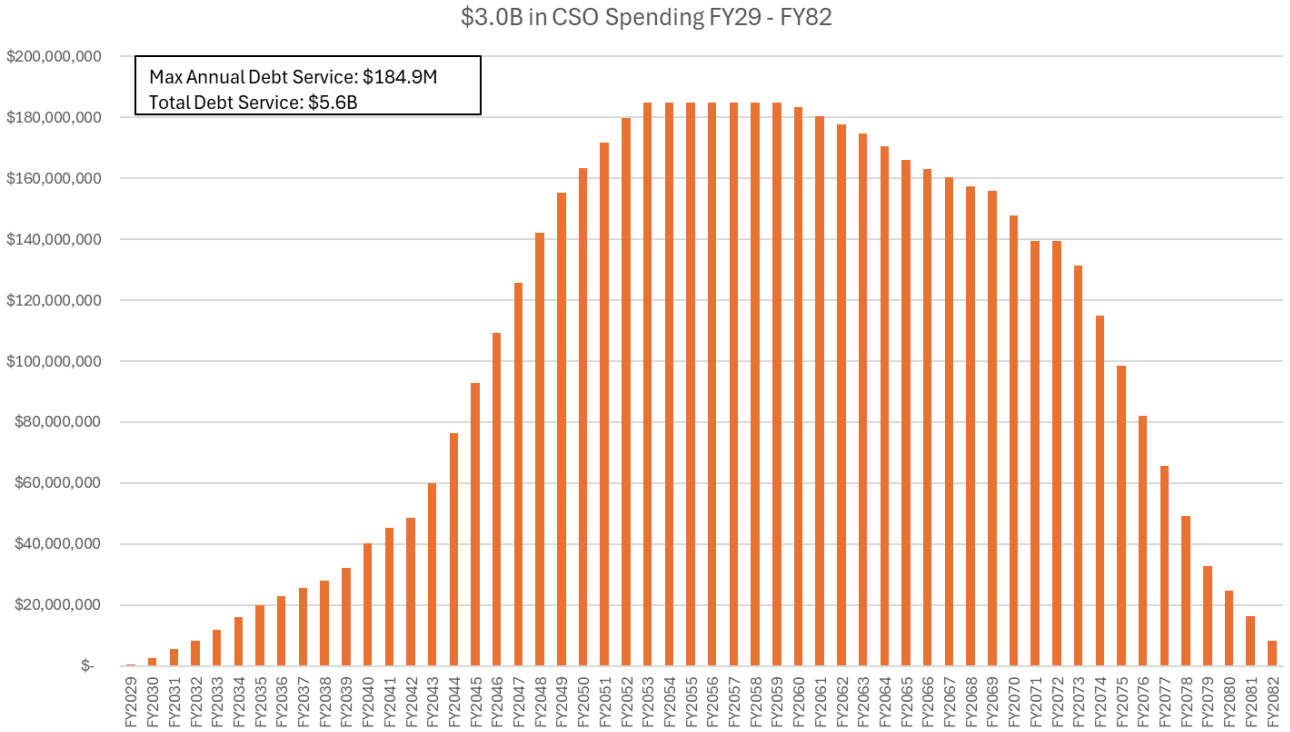
- Projected Design and Construction Spending between 2028 and 2039.
- Total Debt Service Cost **$782.7 million** in debt service costs.



- All bonds issued as level debt service for 30 years at 5.0% interest. Preliminary projected project costs are in today's dollars.

Projected $3.0 Billion in CSO Project Debt Service

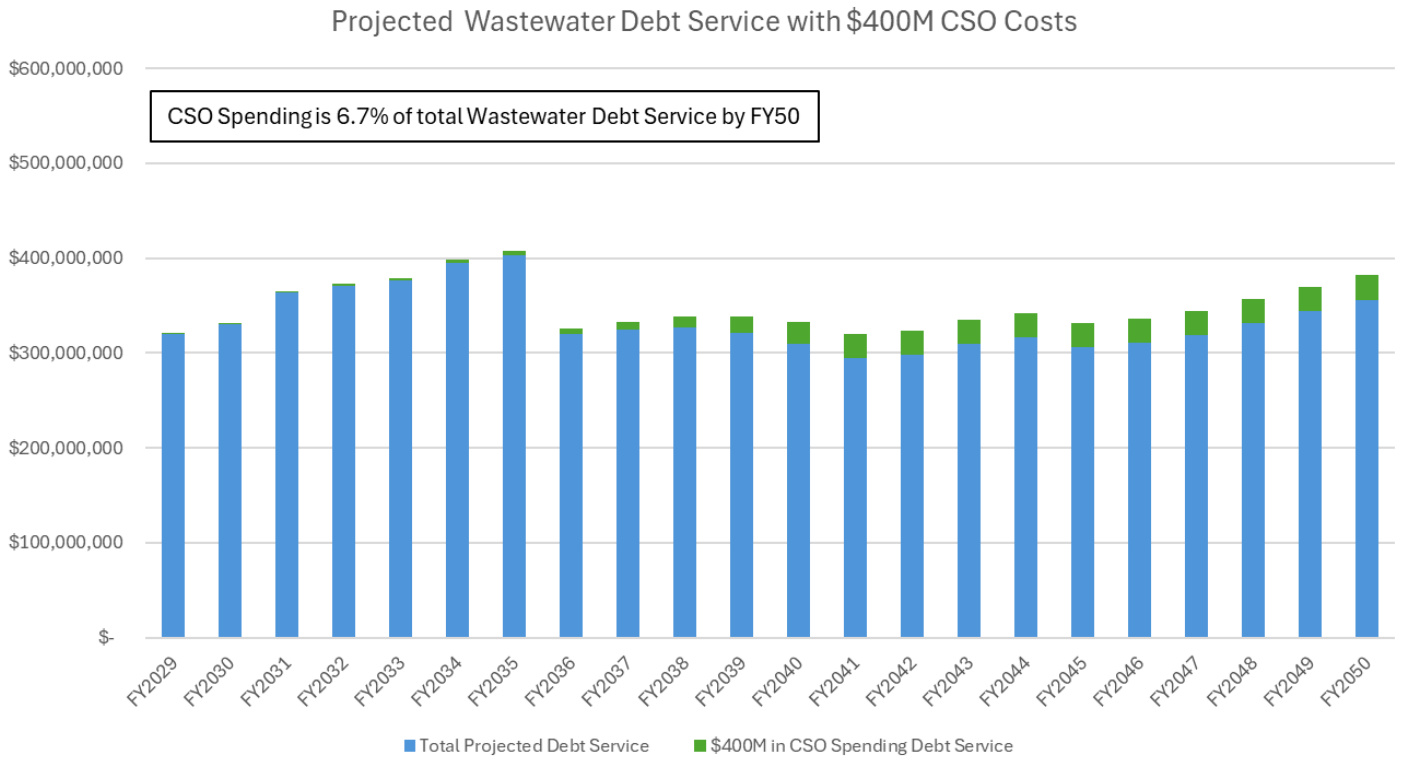
- Design and construction spending between 2028 and 2053.
- Results in **$5.6 billion** in debt service costs.



- All bonds issued as level debt service for 30 years at 5.0% interest. Preliminary projected project costs are in today's dollars.

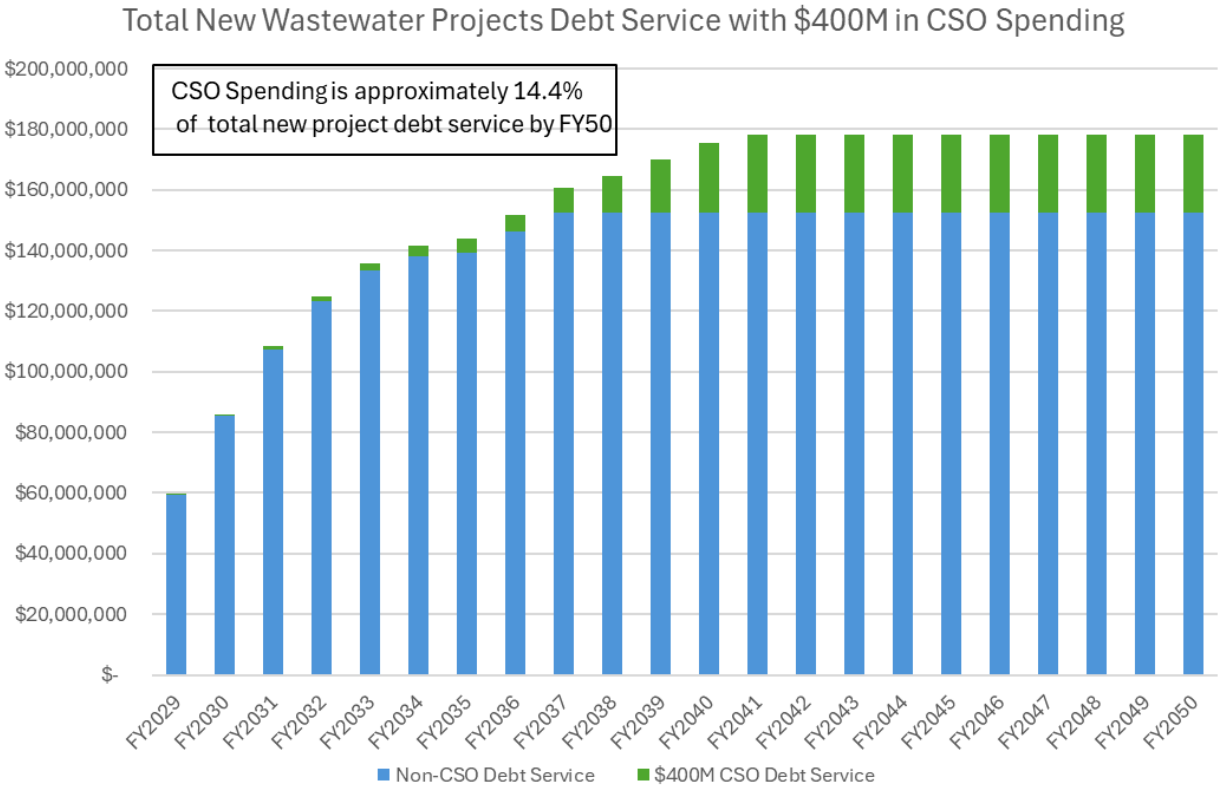
Projected Wastewater Debt Service with $400 million in CSO Costs

- $400 million in CSO spending results in **$335.8 million** in additional debt service costs between FY29 and FY50.



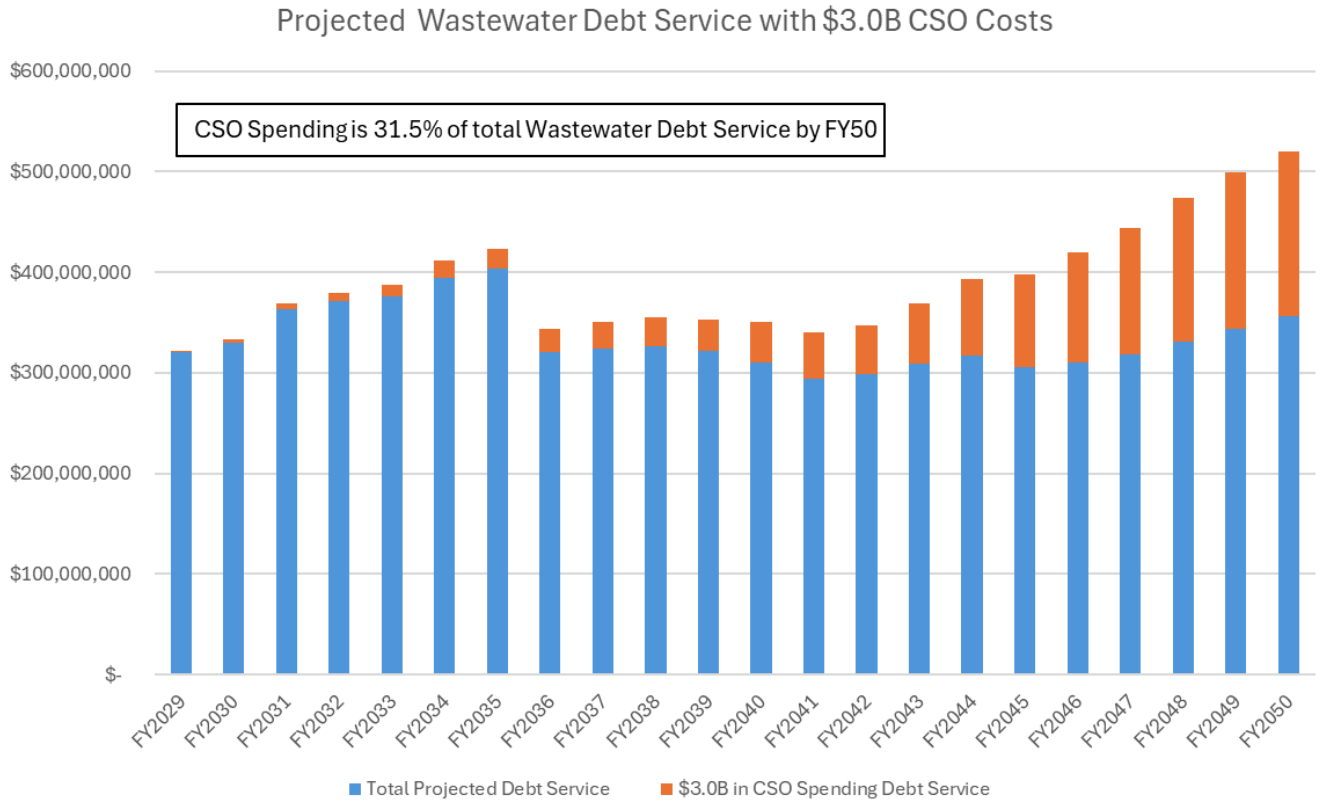
Projected Wastewater Debt Service with $400 million in CSO Costs

- $400 million in CSO spending would comprise **14.4%** of total wastewater debt service costs in FY50.



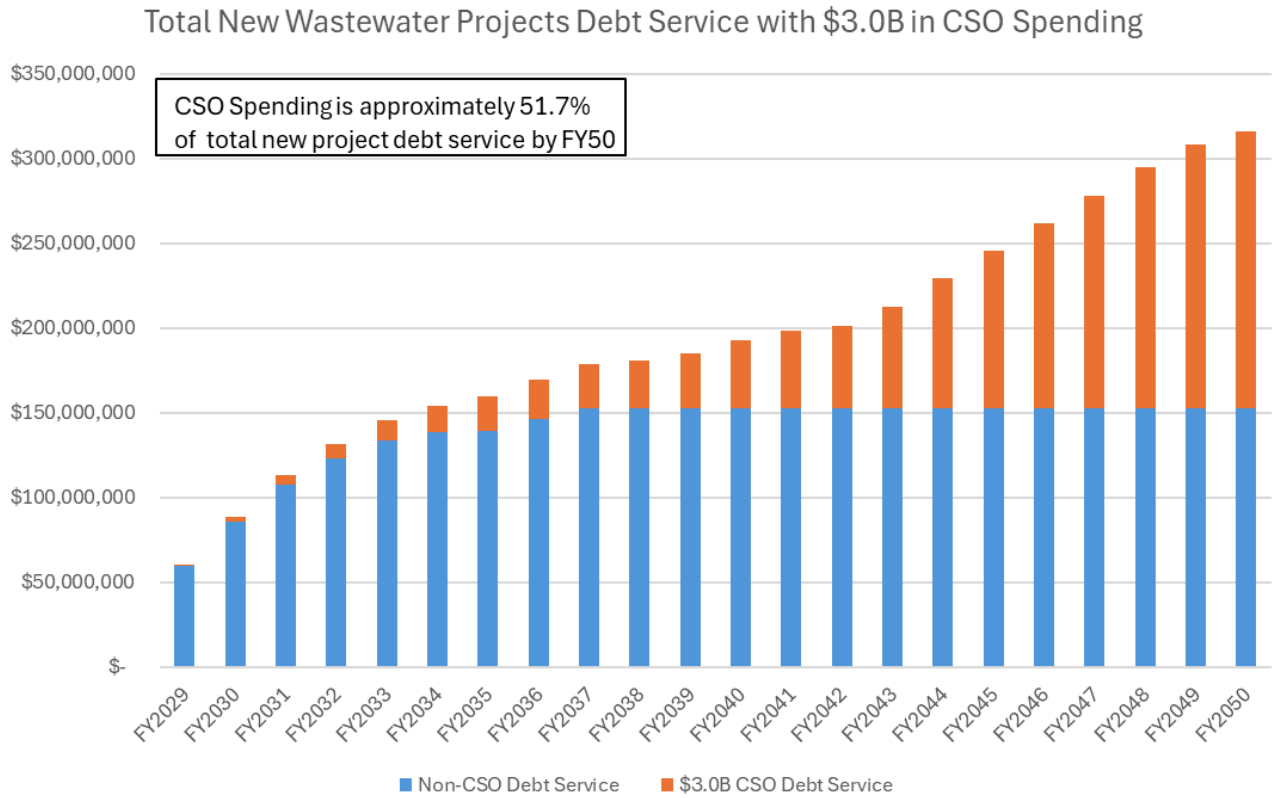
Projected Wastewater Debt Service with $3.0 billion in CSO Costs

- $3.0 billion in CSO spending results in **$1.2 billion** in additional debt service costs between FY29 and FY50.



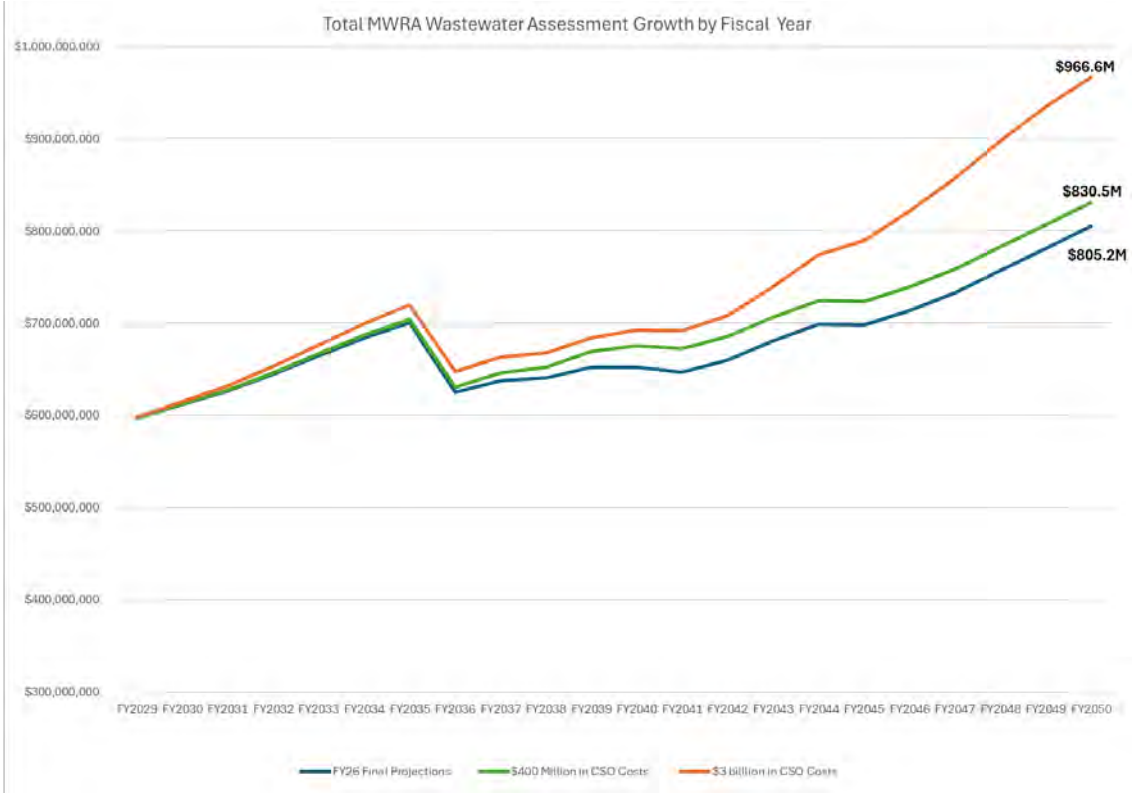
Projected Wastewater Debt Service with $3.0 billion in CSO Costs

- $3.0 billion in CSO spending would comprise **51.7%** of total wastewater debt service costs in FY50.



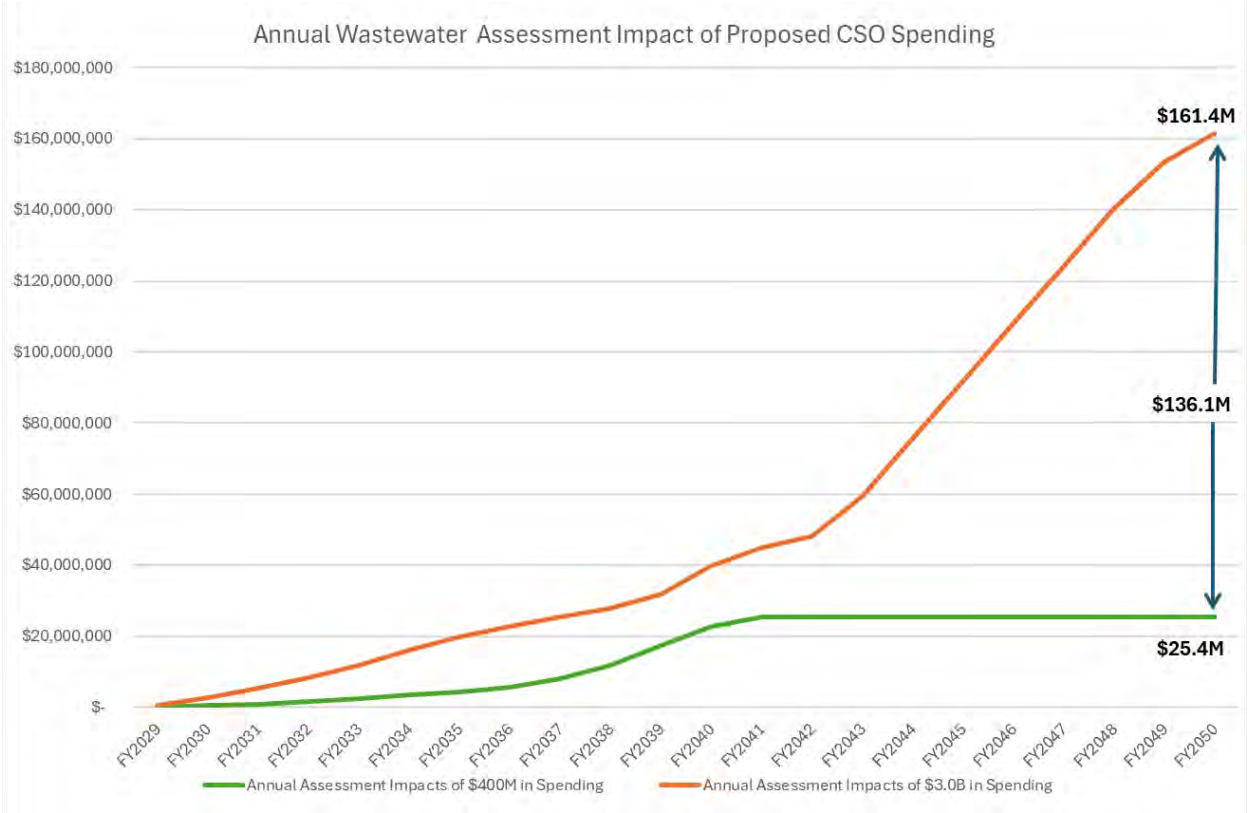
Projected Wastewater Assessment

- $400 million in spending increases assessment by **$25.4 million** and $3.0 billion increases assessment by **$161.4 million** by FY50.



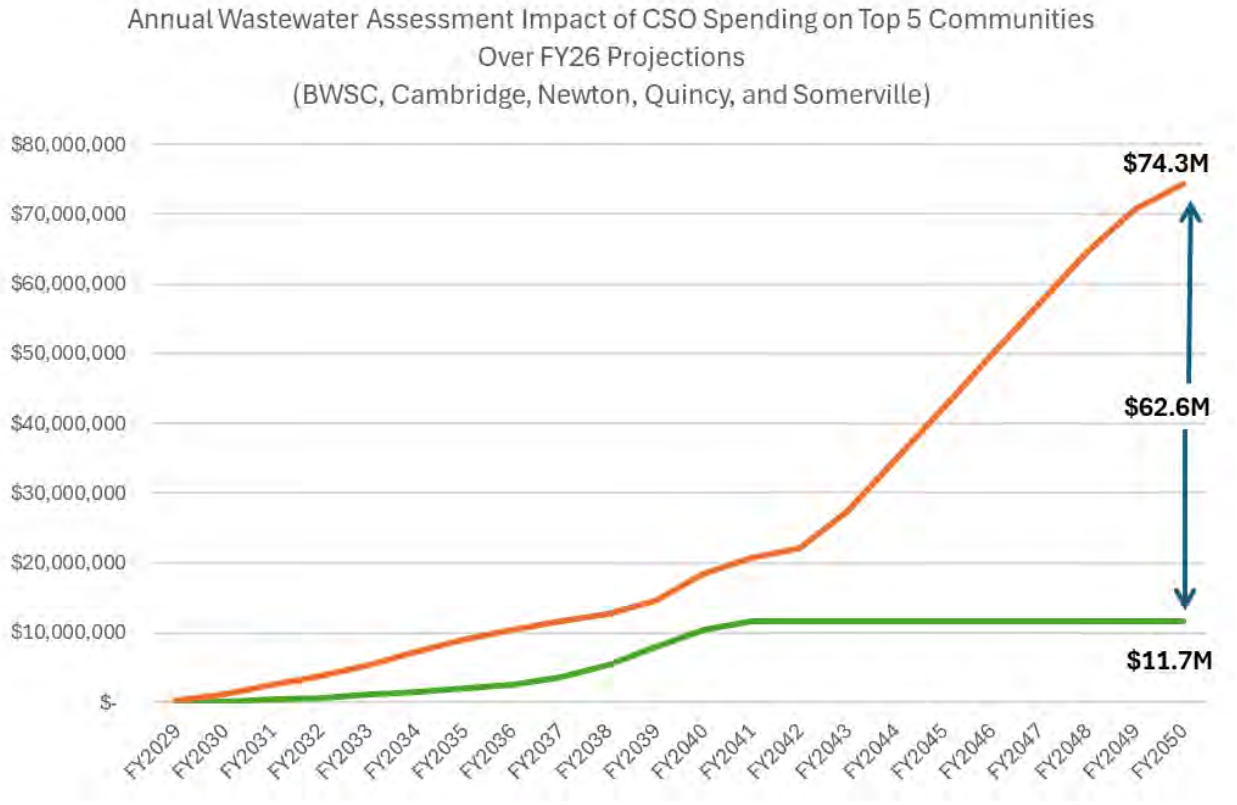
Projected Wastewater Assessment Impacts

- $400 million in CSO spending increases the total community charges by **$331.8 million** between FY29 and FY50.
- $3.0 billion in CSO spending increases the total community charges by **$1.2 billion** between FY29 and FY50.



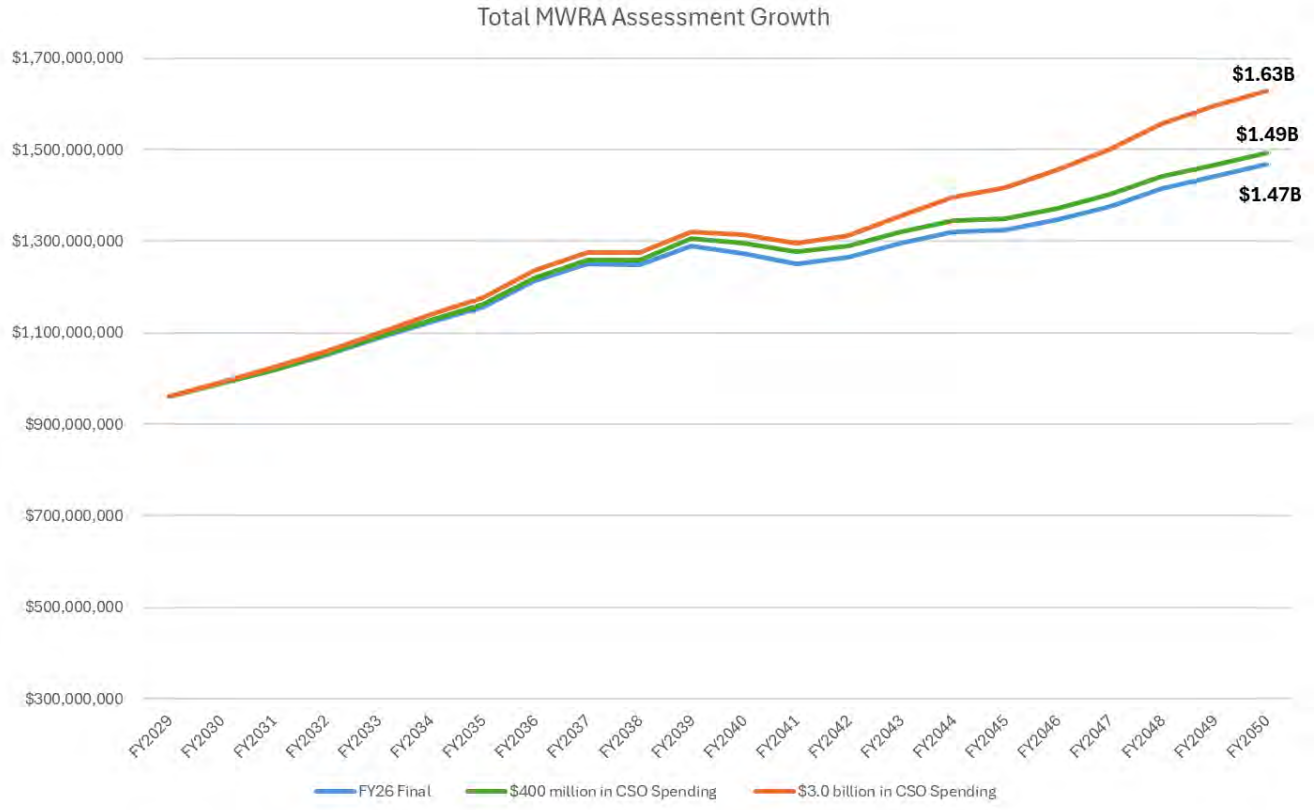
Projected Wastewater Assessment on Top 5 Users

- $400 million in CSO spending increases the total assessed by **$152.7 million** between FY29 and FY50.
- $3.0 billion in CSO spending increases the total assessed by **$560.7 million** between FY29 and FY50.



Projected Total Assessments

- 35 of the 43 wastewater communities receive all or a portion of their drinking water from MWRA.



Next Steps

Next Steps

2025 Activities

- Scoring alternatives and recommending one per waterbody
- Affordability of recommended alternatives
- Water quality impacts of recommended alternatives
- Draft recommended plan due to EPA and DEP December 31, 2025

2026 Activities

- Public mtg #6 on draft recommended plan
- Public hearing and public comment period
- Additional outreach in affected communities
- Team reviews comments and modifies plan

2027 and Beyond

- Final plan submitted January 2027
- EPA and DEP review the plan for further CSO control
- Design of projects
- Construction!

Questions


WATER RESOURCES AUTHORITY
MASSACHUSETTS