Presentation to

MWRA Board of Directors

Draft Updated CSO Control Plan Alternatives Recommendation

February 4, 2026

Agenda

- Background
- Climate Change Impacts
- Alternatives
- Performance of Draft Recommended Plan
- Water Quality
- Financial Impacts
- Next Steps

Background

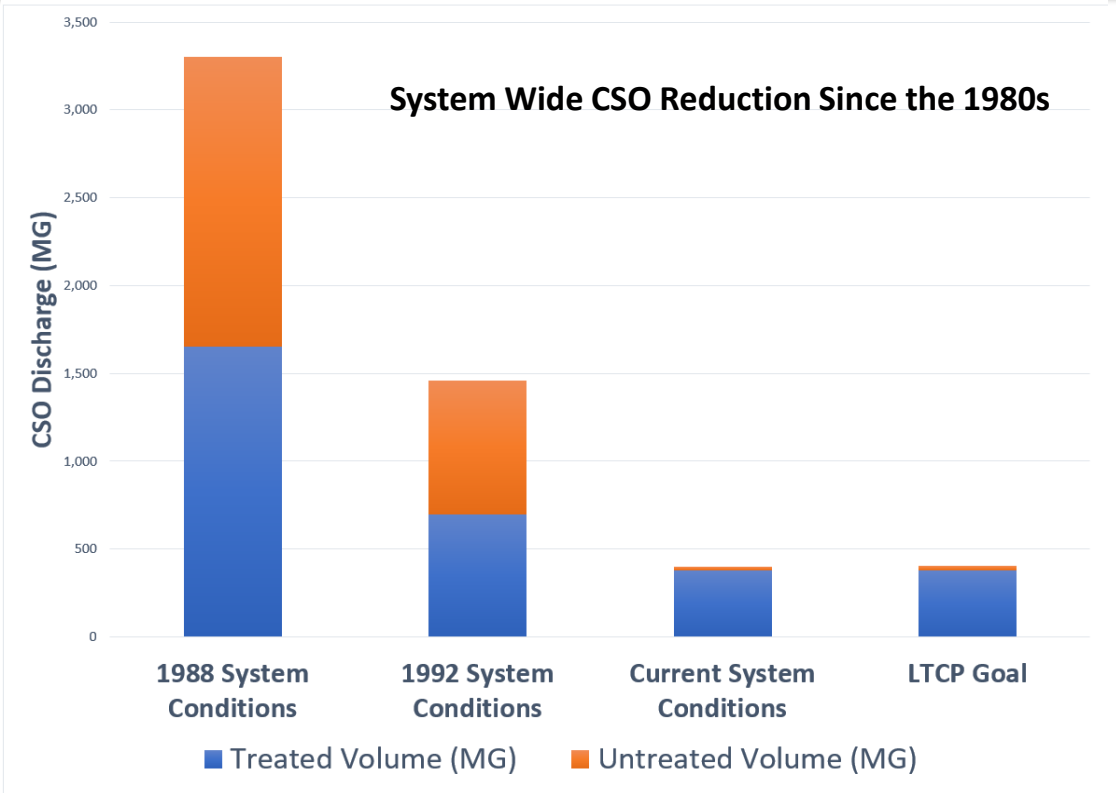
System-wide CSO Reduction Since the Start of the CSO Program in the 1980s

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 *

Draft Updated CSO Control Plan

- Variance Waters CSO reduction of **100%** for Prior and 2050 Typical Year
- CSOs eliminated in 2050 Typical Year** (including treated CSOs)



Annual discharge volume based on the prior Typical Year

**Typical Year is a planning tool used to assess how planned improvements would perform under a series of precipitation conditions

Scope of Study: Variance Water CSOs

Climate Change Impacts

Increased Rainfall Due to Climate Change

- Looking into the future to select a 'Recommended Alternatives' – used the 2050 Typical Year and 2050 Design Storms
- Selected the 2050 planning horizon for the CSO Control Plan (first in the nation)
  - 2050 Typical Year (TY)
    - ➢ 98 storms in TY
    - ➢ More Storms with high intensity
    - ➢ More Storms with higher volumes
    - ➢ Largest Storm 3.3-in 24-hrs.
  - Identified 2050 design storms

24-hr Precipitation Depths (in)		
Return Period	**Current & Actual Storms[1]**	**Future 2050 Storms[2,3]**
2-yr	3.3	4.0
5-yr	4.3	5.3
10-yr	5.2	6.4
25-yr	6.3	7.8
March 2010	**6.2** (24-hr depth around the peak) **10.3** (over 59-hours)	Between 10 & 25-yr
Ida (Sept, 2021)	**5.2 (over 17 hours)**	Approx. 5-yr

REFERENCES

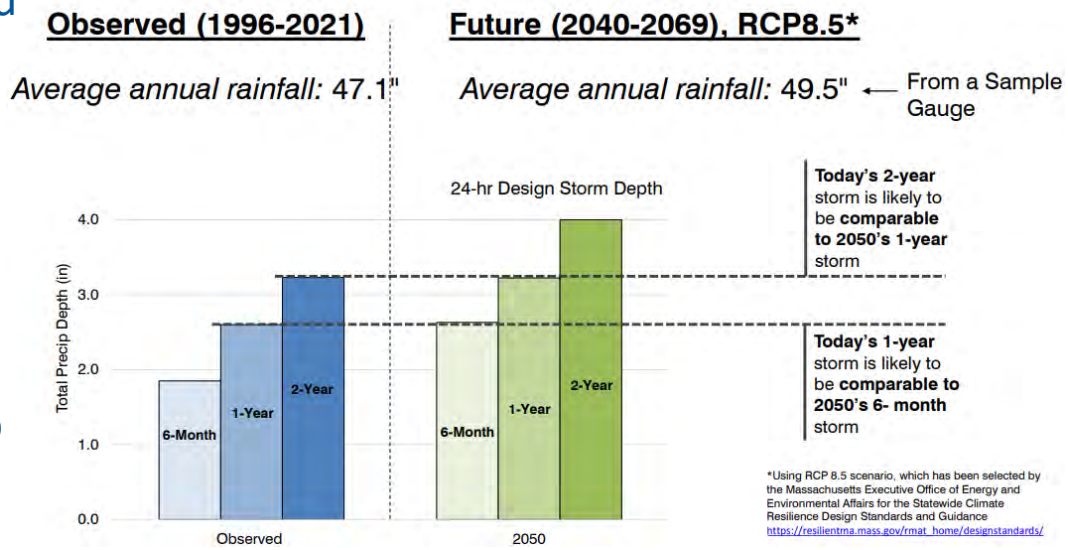
1. Perica, S., Pavlovic, S., StLaurent, M., Trypaluk, C., Unruh, D., Martin, D. 2015. NOAA Atlas 14: Precipitation-Frequency Atlas of the United States; Volume 10 Version 3.0: Northeastern States. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

2. Steinschneider, S., & Najibi, N. (2022). Observed and Projected Scaling of Daily Extreme Precipitation with Dew Point Temperature at Annual and Seasonal Scales across the Northeastern United States, Journal of Hydrometeorology, 23(3), 403-419. https://journals.ametsoc.org/view/journals/hydr/23/3/JHM-D-21-0183.1.xml

3. Climate Resilience Design Standards & Guidelines. Climate Resilience Design Standards Tool. https://resilientma.org/rmat_home/designstandards/

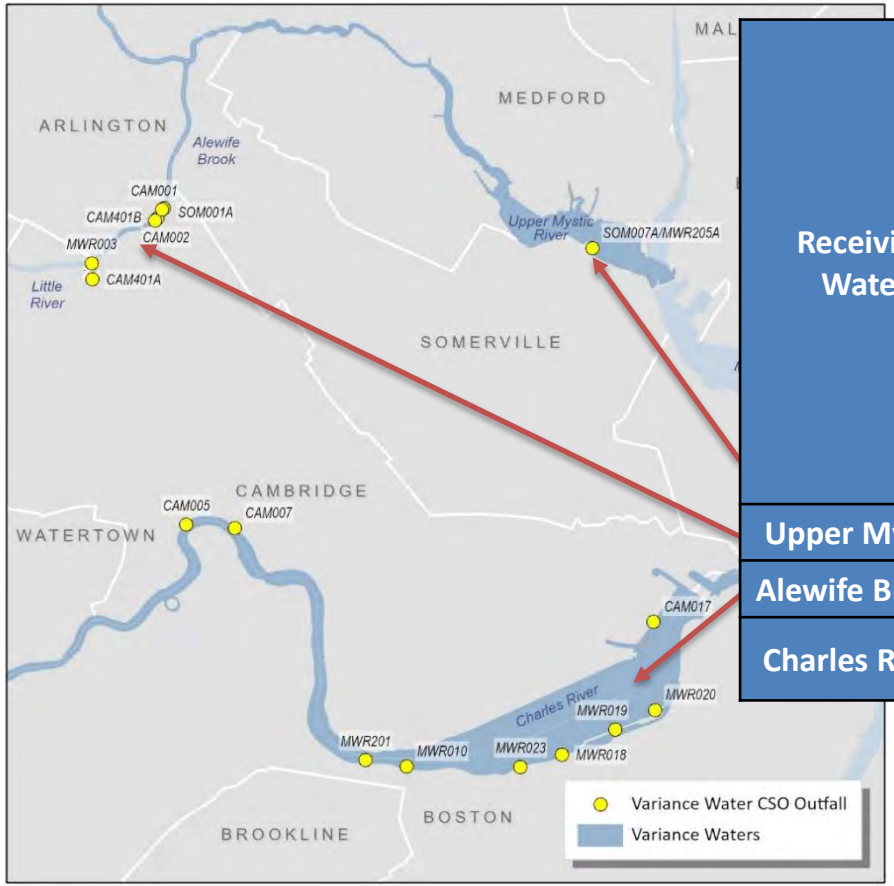
Conservatism Built Into Planning Estimates of CSO

- 2050 TY and Design Storms developed using worst case carbon emissions (RCP8.5)
- 2050 TY considers 30-year average weighted more heavily beyond 2050 (2040-2069)
- Hydrologic Model to predict runoff to the collection system assumes no spatial variation to rainfall.
- 2050 Sea Level Rise included. Impacts Upper Mystic CSO Only.



The detailed methodology for establishing the 2050 Typical Year is documented in the Technical Information in Support of the December 15th Public Meeting: Development of Future Typical Year of Rainfall 12.2.2022 Typical Year Analysis (cambridgema.gov).

CSO Increases Due to Climate Change without New Projects



Receiving Water	Hydraulic Model Predictions						
	Annual Activation Frequency[1]		Annual CSO Discharge Volume (MG)[1]		Single Event CSO Discharge Volume (MG)[1]		
	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 3	4 6	6.6 1.4	29.4 8.2	10.1 3.9	33.8 31.6	55.9 64.6

Green Numbers - Treated CSO
Blue Numbers - Untreated CSO

1. Activation frequency and volumes are baseline conditions without any CSO control projects implemented.

CSOs Will Increase With Precipitation

If **no action** is taken, due to increasing precipitation from climate change, there will be an **increase** in CSO frequency and volume.

With implementation of the recommended alternatives, even with expected increased precipitation resulting from climate change, CSO discharges to the Variance Waters are projected to be eliminated in the 2050 Typical Year and substantially reduced in the infrequent storm events greater than those in the 2050 Typical Year.

Alternatives Developed for Four Levels of Control in 2050

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

"**2050 Typical Year**" - No CSO in a 2050 Typical Year

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

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

Alternatives Developed for Four Levels of Control in 2050

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

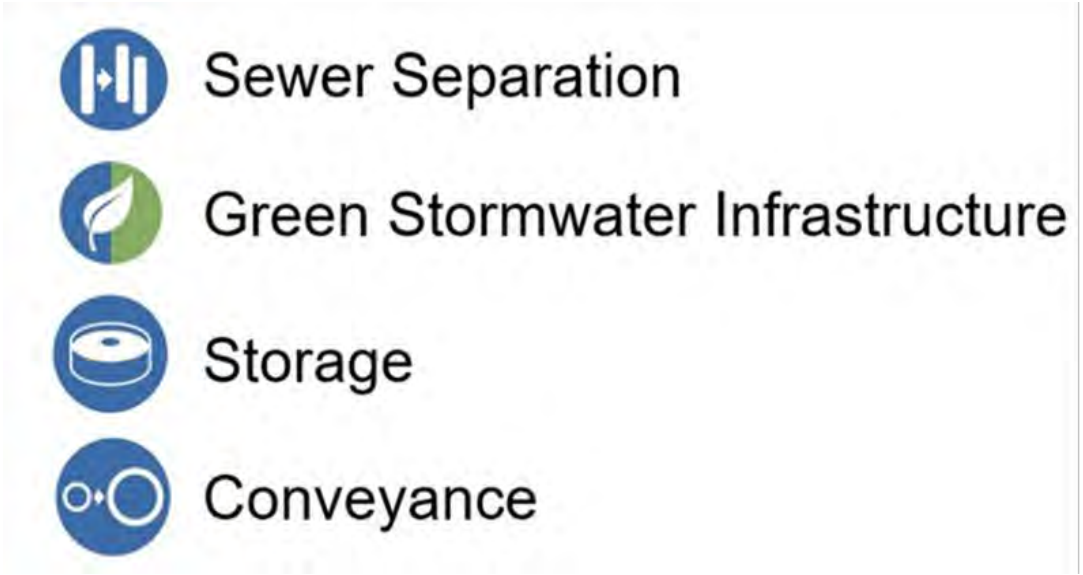
"**2050 Typical Year**" - No CSO in a 2050 Typical Year

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

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

Alternatives

General Components of an Alternative



Alternatives Development Process

- Two considerations before concepts developed:
  - Nutrient and bacteria loading
  - Potential for flooding impacts
- Initial screening of the technologies for individual outfalls
- Looked to address multiple outfalls with a single control tool
- Looked at how control tools influenced each other
- Optimized alternatives by switching out individual controls
- Assessment of elimination of CSO discharges
- Resulted in **39 Alternatives** across four levels of control
- Combination of CSO Tools

Alternative Evaluation/Selection Considerations

- Level of CSO control
  - Permitting uncertainty
  - Site acquisition risks
  - Capital cost and life cycle cost
  - Duration to CSO benefit
  - Impact on priority, vulnerable, and environmental justice populations
  - Benefits criteria (construction considerations, permanent impacts to public uses)
  - Stakeholder input

Alternatives Evaluation Process

- **Step 1: 2050 Typical Year Alternatives Evaluation**
  - Compare the larger/more varied group of alternatives in this level of control
  - Better understand the benefits of alternatives that meet the same CSO control objective
  - Narrow the largest group of alternatives to a more reasonable number of alternatives to compare against other levels of CSO control
  - A scoring rubric was used to assign comparative values to the criteria*

* Additional key factors that influenced the feasibility of an alternative, (cost, permitting uncertainty/regulatory risk, and land acquisition, etc.), considered in conjunction with the overall ratings from the other criteria

Alternatives Evaluation Process

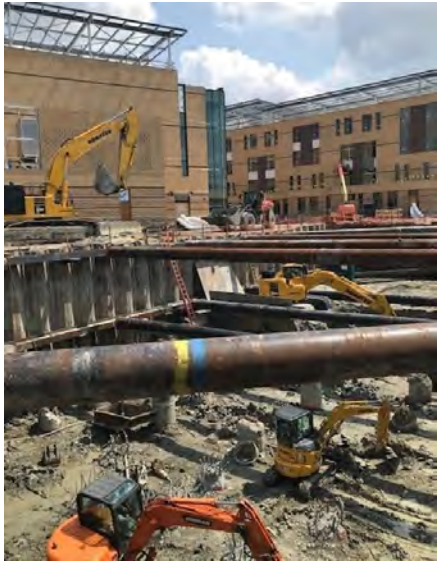
- **Step 2: Level of Control Evaluation**
  - Compare alternatives that rose to top across the four levels of control
  - Focus on balancing considerations (CSO control, timeline to CSO reduction benefits, cost, and implementation considerations, etc.) across levels of control

General Construction Considerations

Construction Aspects – Sewer Separation

- New sewer or stormwater pipes
- Within roadways
- Utility relocation
- Day and night work
- Repaved roads
- Opportunity for GSI
- No new pump stations/odor control facilities
- Flood attenuation (Alewife Brook)

Construction Aspect – Large Storage Tanks



- Constructed below grade
- Primarily confined to site limits
- Mostly daytime work hours
- Portion of site could be returned to previous use when complete
- New pump station/odor control facility

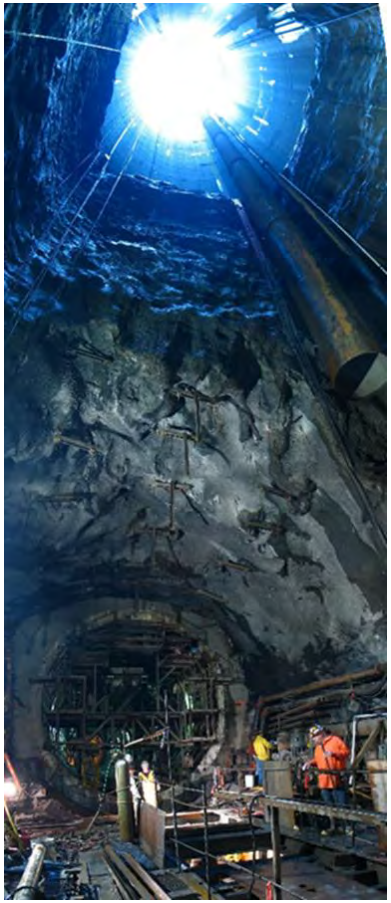
Construction Aspect - Microtunneling

- Specialized construction methods
- Multiple shaft sites along alignment
- Day, night, and 24/7 work hours
- Within and off roadways
- New pump station/odor control facility when used for storage

Construction Aspect – Regional Tunnels

- Large storage volumes
- Specialized construction methods
- Requires large construction staging areas
- 24/7 work hours during tunnel mining
- Very large volume of material would be excavated and trucked off site
- Requires a very large new pump station/odor control facilities

Construction Aspect – Construction Shafts



- Needed for regional tunnel options
- Very deep and large diameter
- Located at each end of the regional tunnel alignment
- Blasting required
- Location of new pump station and odor control facility

Construction Aspect – Drop Shafts

- Needed for regional tunnel options
- Located along the length of the regional tunnel alignment
- Less than ~10 ft diameter and very deep
- Drilled from the ground surface
- Small at grade facility

Charles River

Charles River: Summary of Alternatives Under Consideration

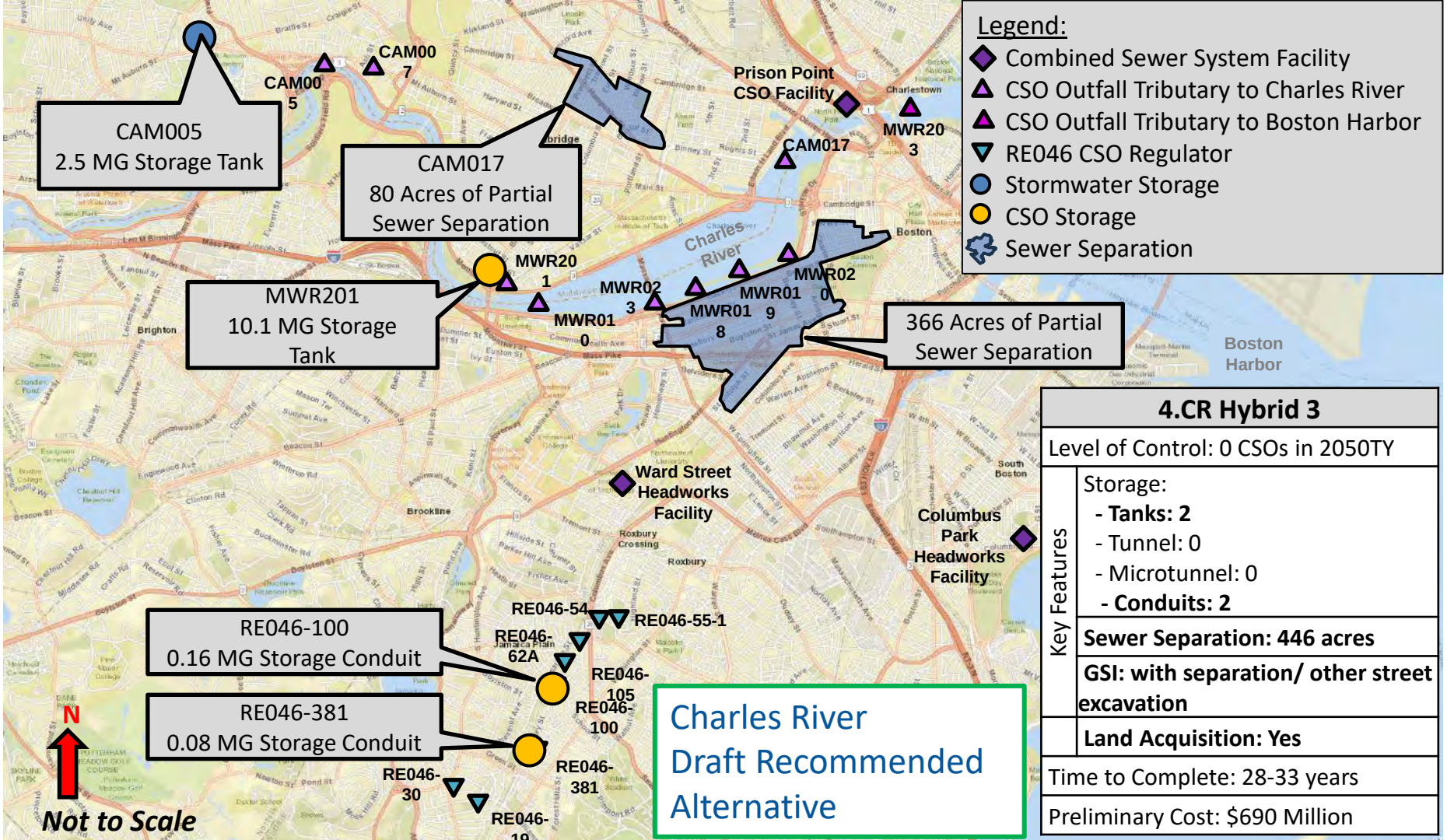
0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.CR Integrated 2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**	**8.CR Hybrid 1** 1 tank (2.5 MG) + 268 acres of sewer separation + 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** 12.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**
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** 12.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**
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** 12.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**		



4.CR Hybrid 3	
Level of Control: 0 CSOs in 2050TY	
Key Features	Storage: **- Tanks: 2** - Tunnel: 0 - Microtunnel: 0 **- Conduits: 2**
	Sewer Separation: 446 acres
	GSI: with separation/ other street excavation
	Land Acquisition: Yes
Time to Complete: 28-33 years	
Preliminary Cost: $690 Million	

Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.CR Integrated
2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**

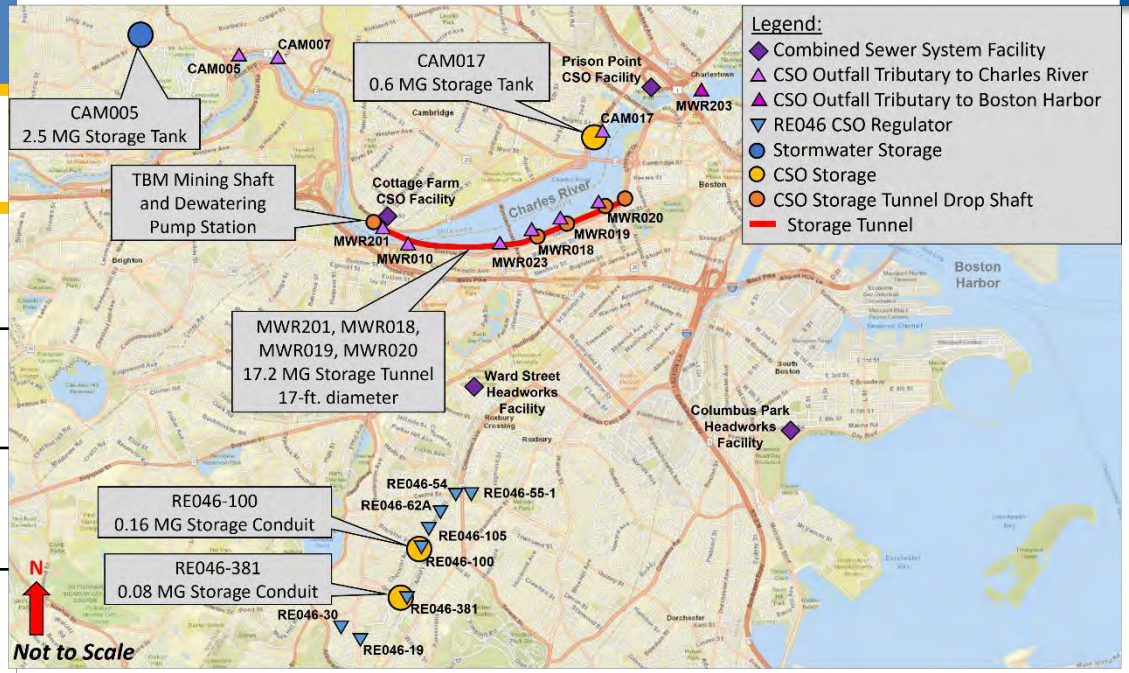
2.CR Hybrid 1
1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**

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**

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**



Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.CR Integrated
2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**

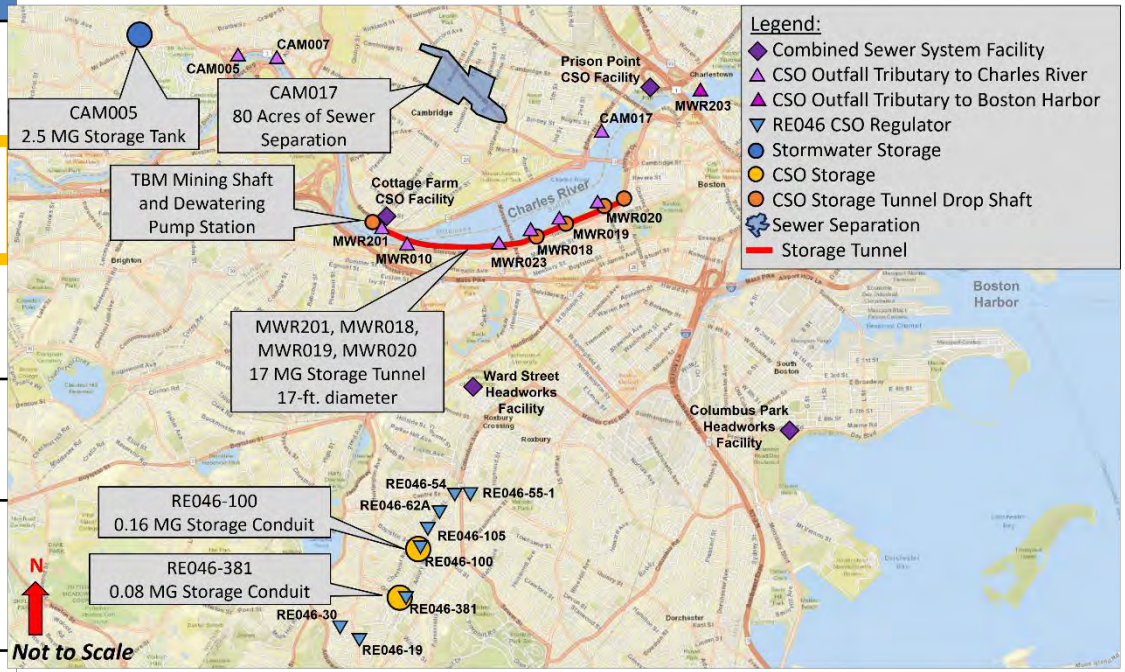
2.CR Hybrid 1
1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**

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**

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**



Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.CR Integrated
2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**

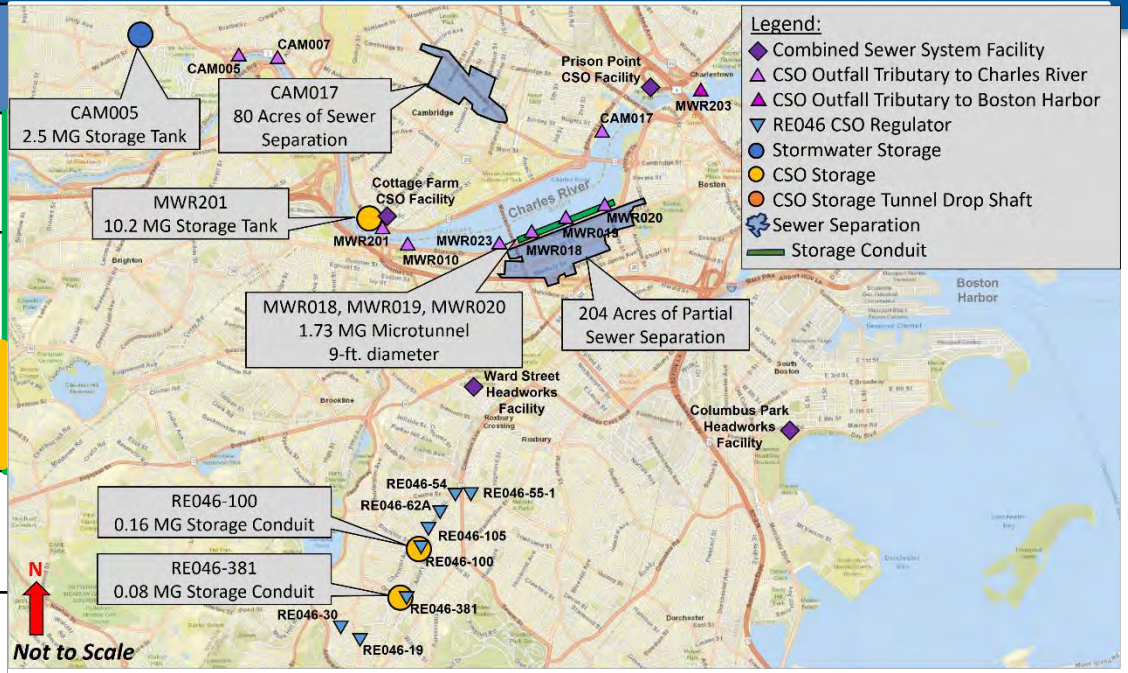
2.CR Hybrid 1
1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**

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**

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**



Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.CR Integrated
2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**

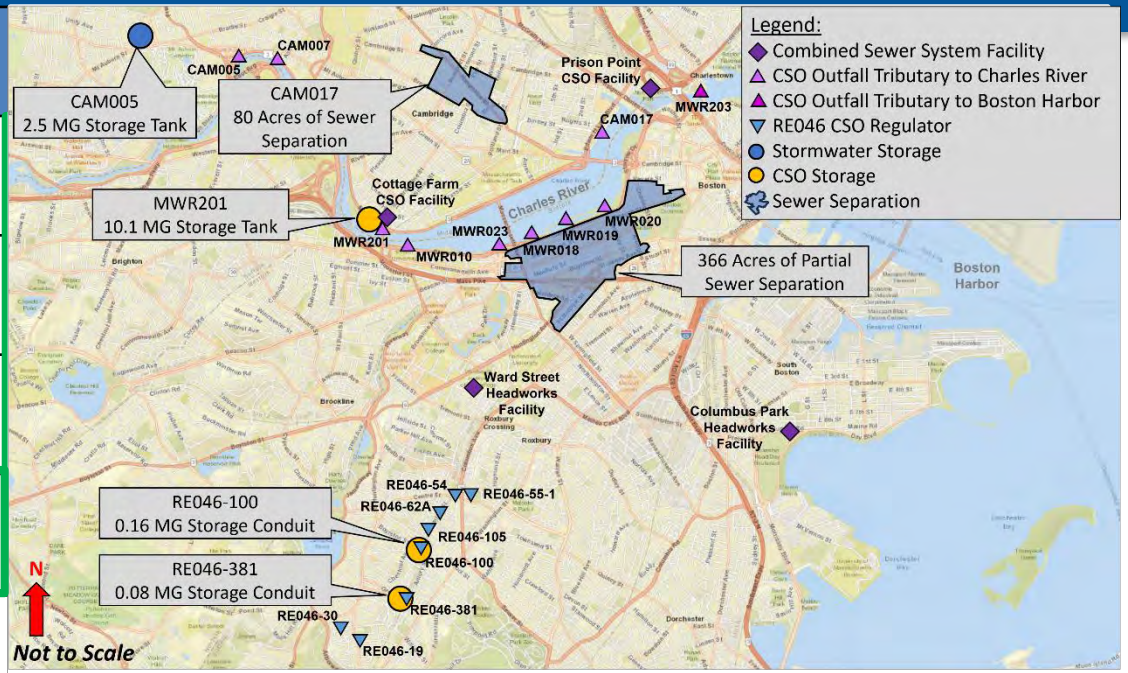
2.CR Hybrid 1
1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**

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**

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**



Charles River: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.CR Integrated
2 tanks (3.1 MG) + 2-mile-long deep tunnel (17 ft diameter) + 2 storage conduits **$1.1B, 13-18 years**

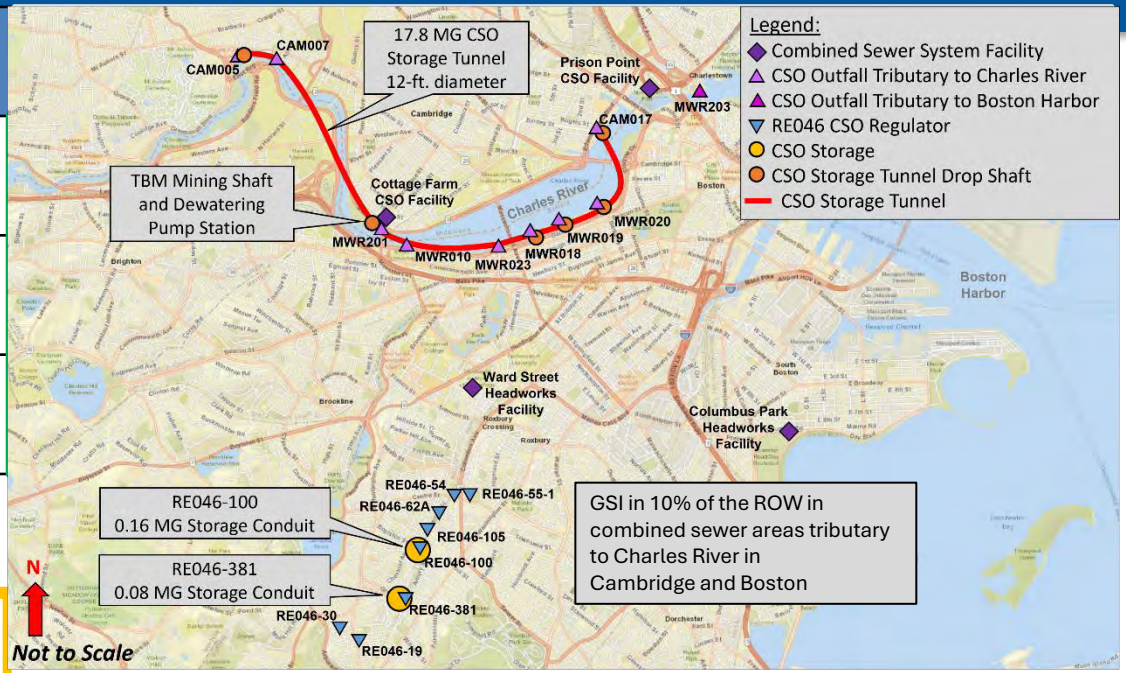
2.CR Hybrid 1
1 tank (2.5 MG) + 80 acres of sewer separation +2-mile-long deep tunnel (17 ft diameter) **$1.2B, 13-18 years**

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**

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**



Charles River – Magazine Beach

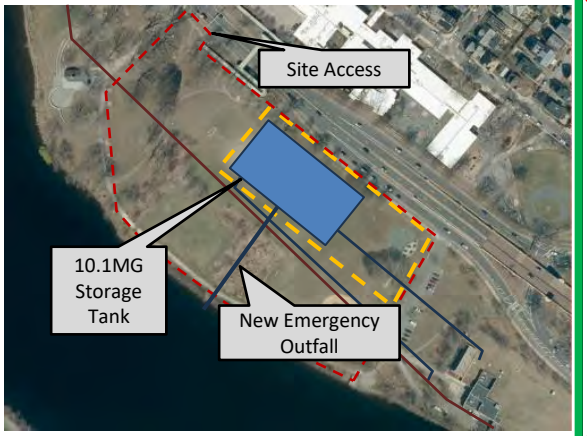
- Property Ownership - DCR
- Access to site from Memorial Drive with new traffic signalized
- Haul route - Memorial Dr to/from I-90
- Tree removal within limits of laydown area
- Article 97 / Legislation required

Charles River – Potential Projects at Magazine Beach

0 CSOs 2050TY

4.CR Hybrid 3

- 10.1MG CSO Storage Tank
- 300 ft x 150 ft
- ~70 ft deep excavation
- At-Grade Dewatering Pump Station & Odor Control Facility (over tank)



Limited CSOs 2050TY

8.CR Hybrid 1

- No new work

5YR Storm 2050TY

11.CR Tunnel + GSI

- 71.4MG CSO Storage Tunnel
- 24 ft diam., ~300 ft deep
- 23,700 ft long (2 segments)
- 50 ft dia. Mining Shaft
- Perm. Dewatering Pump Station w/ 2 Access Shafts (50 ft dia.)

25YR Storm 2050TY

13.CR Tunnel + GSI

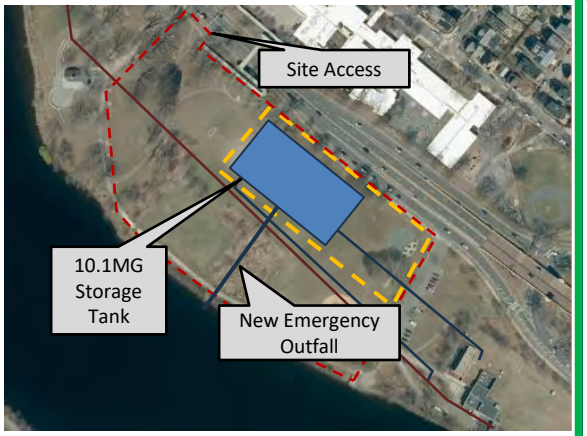
- 131.4MG CSO Storage Tunnel
- 32 ft diam., ~350 ft deep
- 23,700 ft long (2 segments)
- 60 ft dia. Mining Shaft
- Perm. Dewatering Pump Station w/ 2 Access Shafts (50 ft dia.)

Charles River – Potential Projects at Magazine Beach

0 CSOs 2050TY

4.CR Hybrid 3

- Construction duration of ~6 years
- Typical work hours
- ~125,000 cy of material
- Avg. of ~35 trucks per day during tank excavation
- Temporary construction easement ~8.2 acres
- Permanent footprint ~2.3 acres



Limited CSOs 2050TY

8.CR Hybrid 1

- No new work

5YR Storm 2050TY

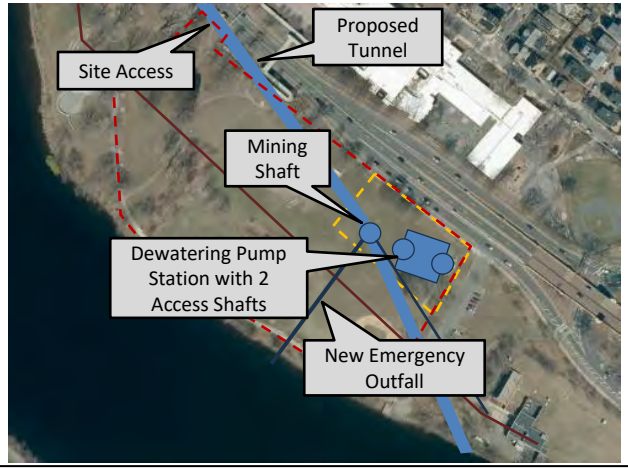
11.CR Tunnel + GSI

- Construction duration of ~8 years
- Construction operations 24/7
- Blasting
- Avg. of 150 trucks per day for ~24 months
- Temporary construction easement ~8.2 acres
- Permanent footprint ~1.0 acre

25YR Storm 2050TY

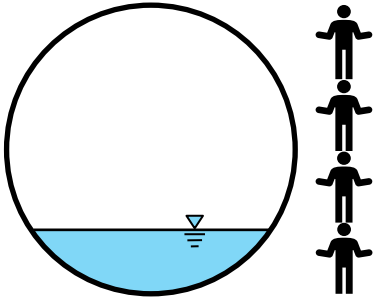
13.CR Tunnel + GSI

- Construction duration of ~8+ years
- Construction operations 24/7
- Blasting
- Avg. of 250 trucks per day for ~24 months
- Temporary construction easement ~8.2 acres
- Permanent footprint ~1.0 acre

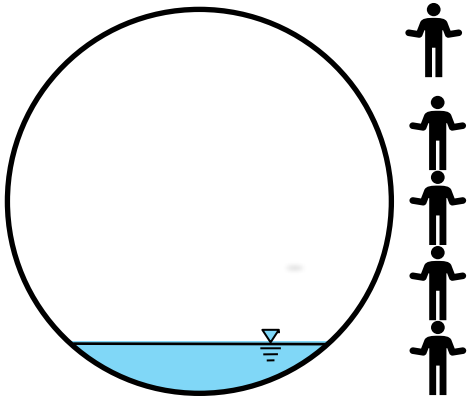


Charles River CSO Storage Tunnel Size Utilization

- The tunnel cross sections below represent two CSO storage tunnels sized to store the largest CSO discharge in the 2050 5-yr, and 2050 25-yr storms.
- The cross sections depict the approximate water level and percentage of the tunnel that would be utilized during the largest CSO discharge in the 2050 TY (17.8 MG)



2050 5-yr Tunnel:
24-ft Diameter
TY Vol. – 22% full



2050 25-yr Tunnel:
32-ft Diameter
TY Vol. – 13% full

6-foot Person

Legend:
Storage Tunnel Cross Section
TY Water Level in Tunnel

Charles River – New MWRA Facilities

Variance Water	Level of Control in 2050	Largest New Facility Type	Capacity (Million Gallons)	Location	MWRA Comparable Facility
Charles River	0 CSOs in a TY	Tank with Pump Station and Odor Control	10.1	Magazine Beach	None
	0 CSOs in 5-year storm	Tunnel with Pump Station and Odor Control	71.4	Magazine Beach	None
	0 CSOs in a 25-year storm	Tunnel with Pump Station and Odor Control	131.4	Magazine Beach	None

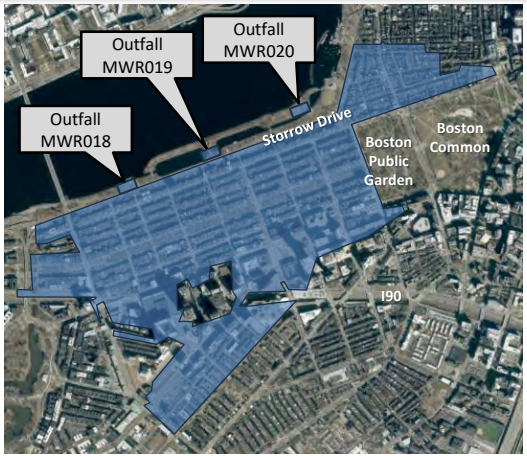
- Facility listed is the largest new facility for each alternative. Several new chambers and regulators would also be constructed as part of the various alternatives; however, those types of facilities do not have as much operational or maintenance impact.
- Facility type and location shown for the regional tunnel options is the primary facility. Additional drop shafts and at least one secondary odor control facility would be required for alternatives involving regional tunnels.
- BOS019 is a CSO Storage Facility located in Charlestown and has a capacity of 0.67 million gallons.
- The North Dorchester Bay CSO Tunnel has a maximum capacity of 18.7 million gallons.

Charles River – Potential Projects at Back Bay & Esplanade

0 CSOs 2050TY

4.CR Hybrid 3

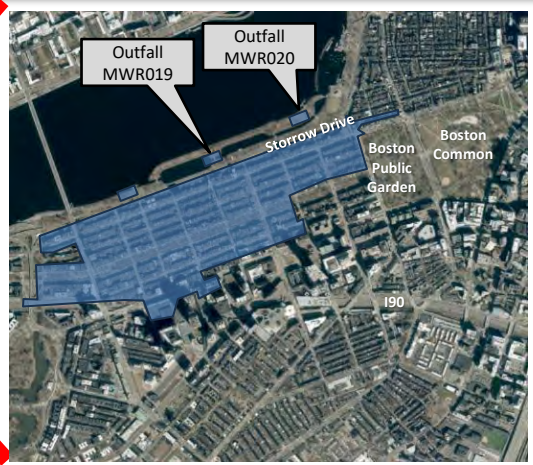
- Sewer Separation ~366 acres
- Microtunnels under Storrow Drive (3 total)
- Connection chamber at each outfall (3 total)
- No above grade permanent footprint



Limited CSOs 2050TY

8.CR Hybrid 1

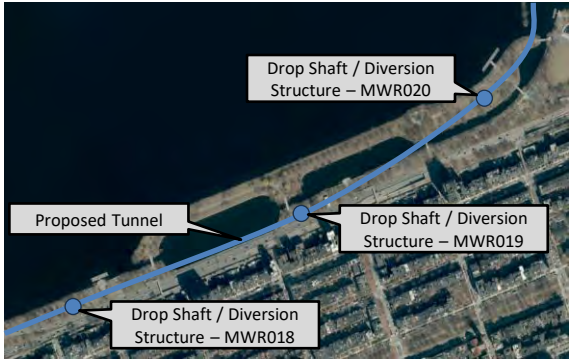
- Sewer Separation ~188 acres
- Microtunnels under Storrow Drive (3 total)
- Connection chamber at each outfall (3 total)
- No above grade permanent footprint



5YR Storm 2050TY

11.CR Tunnel + GSI

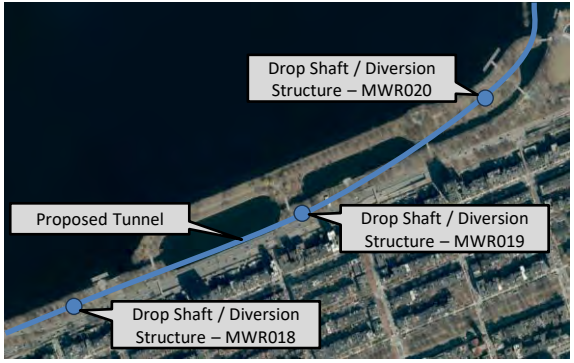
- No work in Back Bay
- Drop Shafts ~300ft deep (3 total)
- Diversion Structure at each outfall (3 total)
- No above grade permanent footprint



25YR Storm 2050TY

13.CR Tunnel + GSI

- No work in Back Bay
- Drop Shafts ~350ft deep (3 total)
- Diversion Structure at each outfall (3 total)
- No above grade permanent footprint

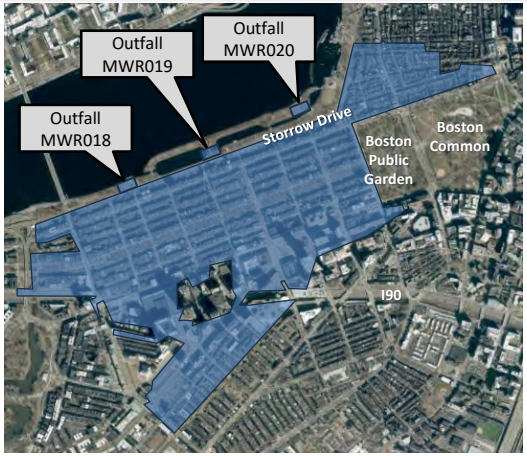


Charles River – Potential Projects at Back Bay & Esplanade

0 CSOs 2050TY

4.CR Hybrid 3

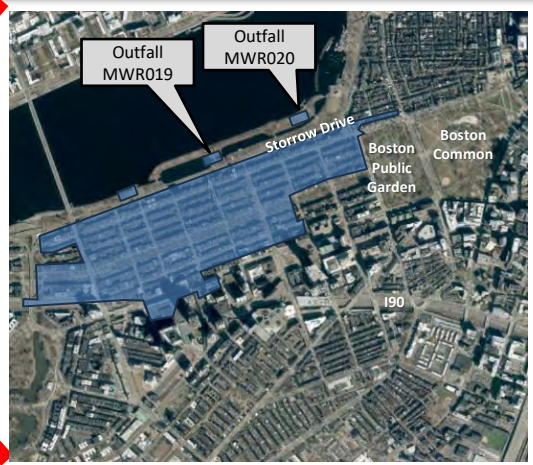
- Construction duration ~25 years
- Phased construction
- Mix of day and night work
- Lane closures and detours expected (Back Bay)
- Temporary construction area varies in Back Bay
- Temporary construction easement, 1 – 2 acres in Esplanade



Limited CSOs 2050TY

8.CR Hybrid 1

- Construction duration ~20yr
- Phased construction
- Mix of day and night work
- Lane closures and detours expected (Back Bay)
- Temporary construction area varies in Back Bay
- Temporary construction easement, 1 – 2 acres in Esplanade



5YR Storm 2050TY

11.CR Tunnel + GSI

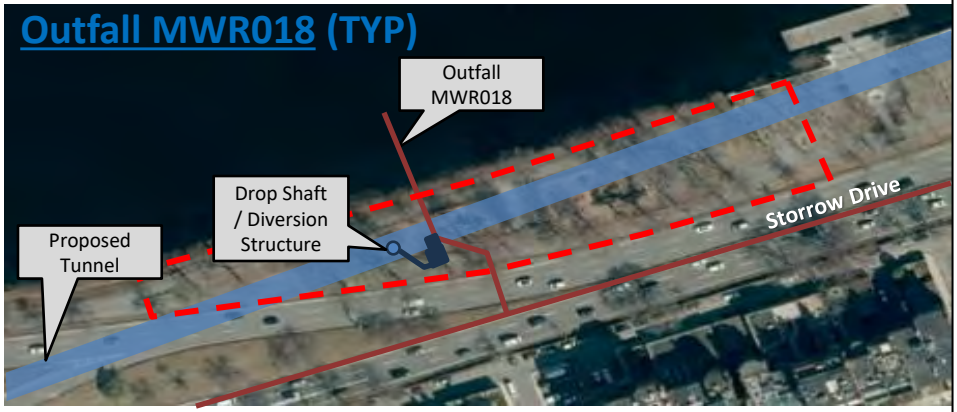
- Active construction duration of ~2+ years per site
- Majority daytime work
- Difficult to deliver large equipment to sites (low bridges)
- Construction area, Esplanade only (1 – 2 acres)
- Below grade chamber with access hatches

25YR Storm 2050TY

13.CR Tunnel + GSI

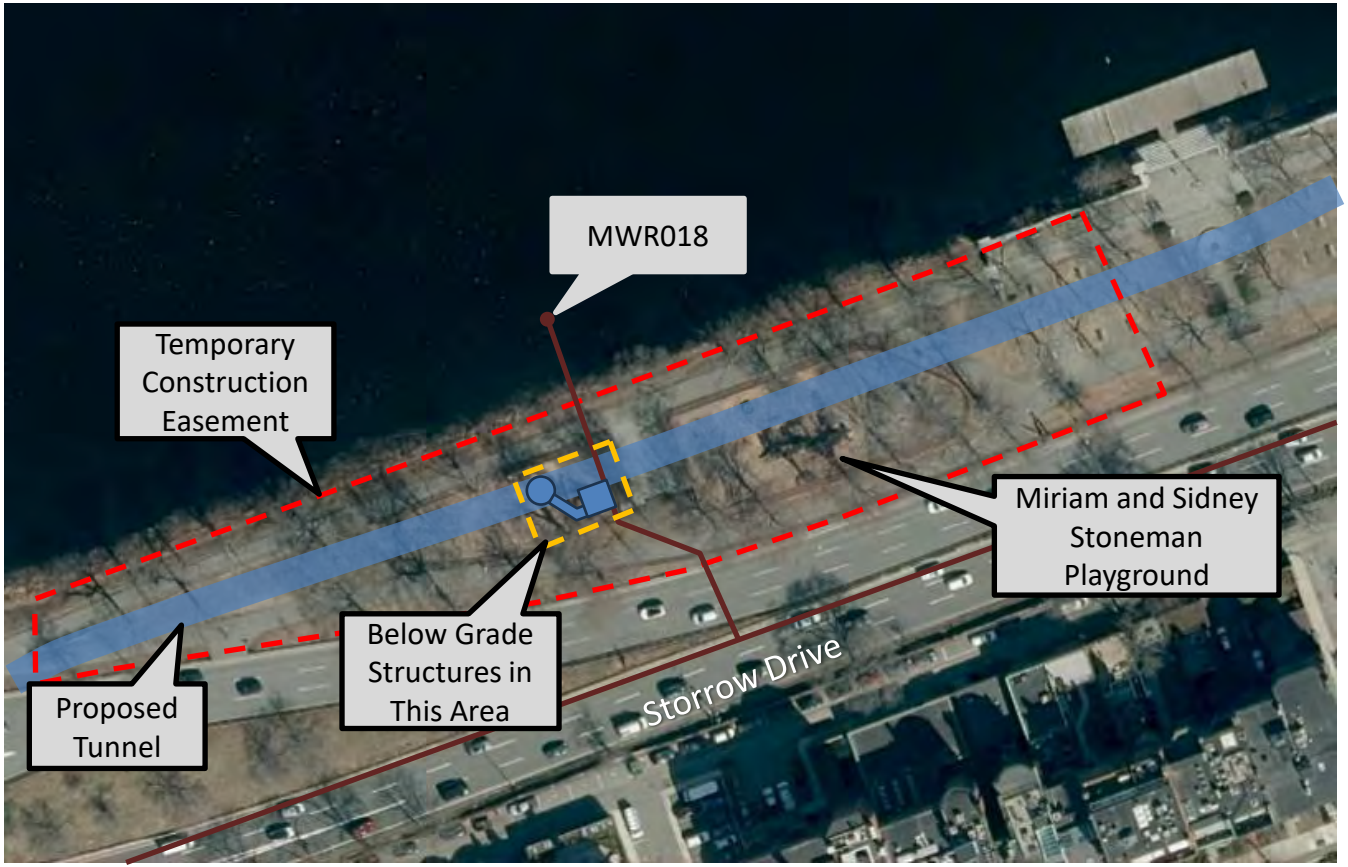
- Active construction duration of ~2+ years per site
- Majority daytime work
- Difficult to deliver large equipment to sites (low bridges)
- Construction area, Esplanade only (1 – 2 acres)
- Below grade chamber with access hatches

Outfall MWR018 (TYP)



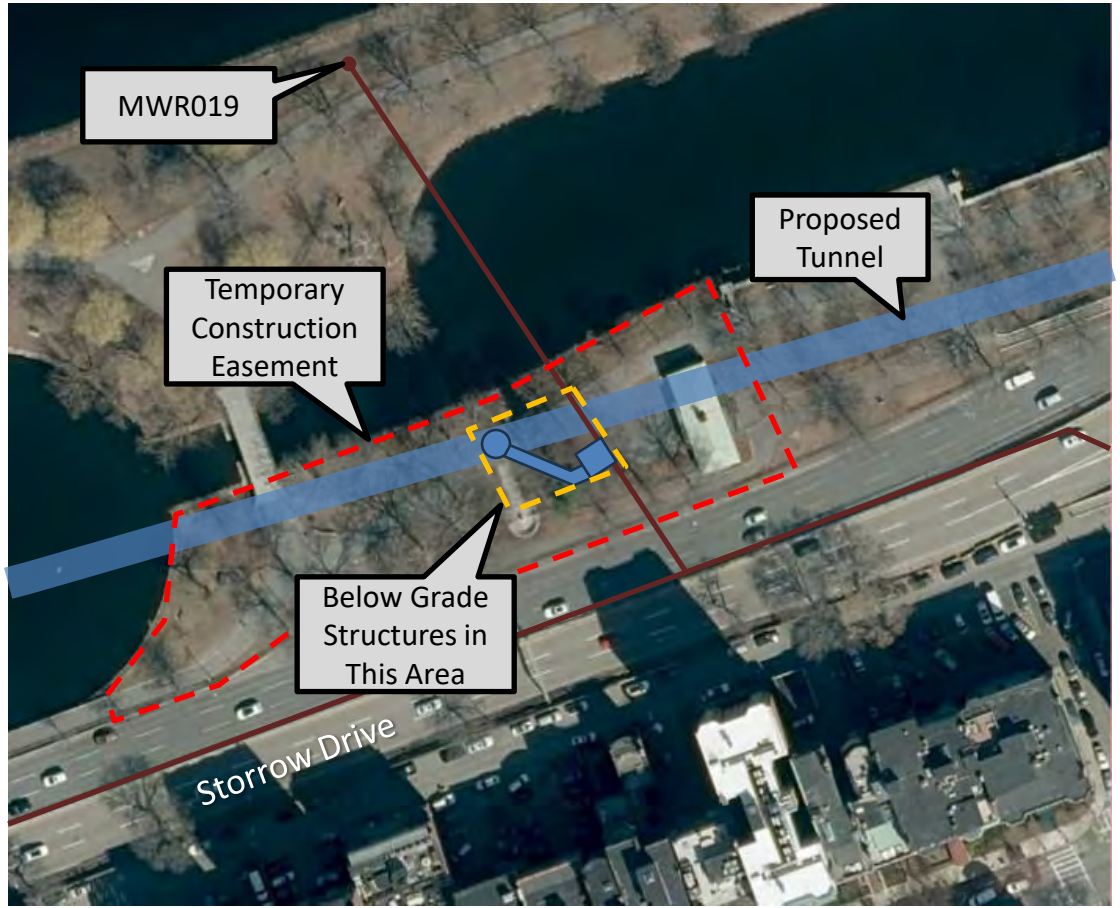
Charles River – Potential Projects at Back Bay & Esplanade

- Outfall MWR018
- Temporary Construction Easement ~1-2 acres
- Below grade permanent structures needed



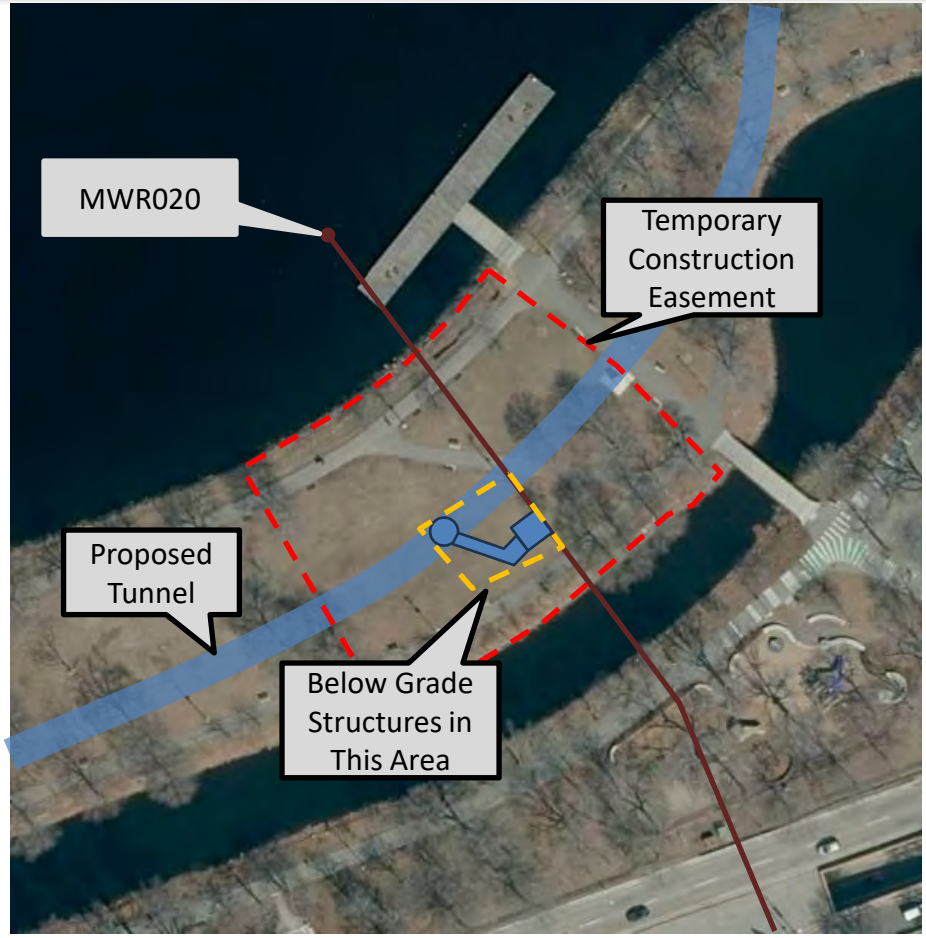
Charles River – Potential Projects at Back Bay & Esplanade

- Outfall MWR019
- Temporary Construction Easement ~1-2 acres
- Below grade permanent structures needed



Charles River – Potential Projects at Back Bay & Esplanade

- Outfall MWR020
- Temporary Construction Easement ~1-2 acres
- Below grade permanent structures needed



Mystic River

Mystic River: Summary of Alternatives Under Consideration

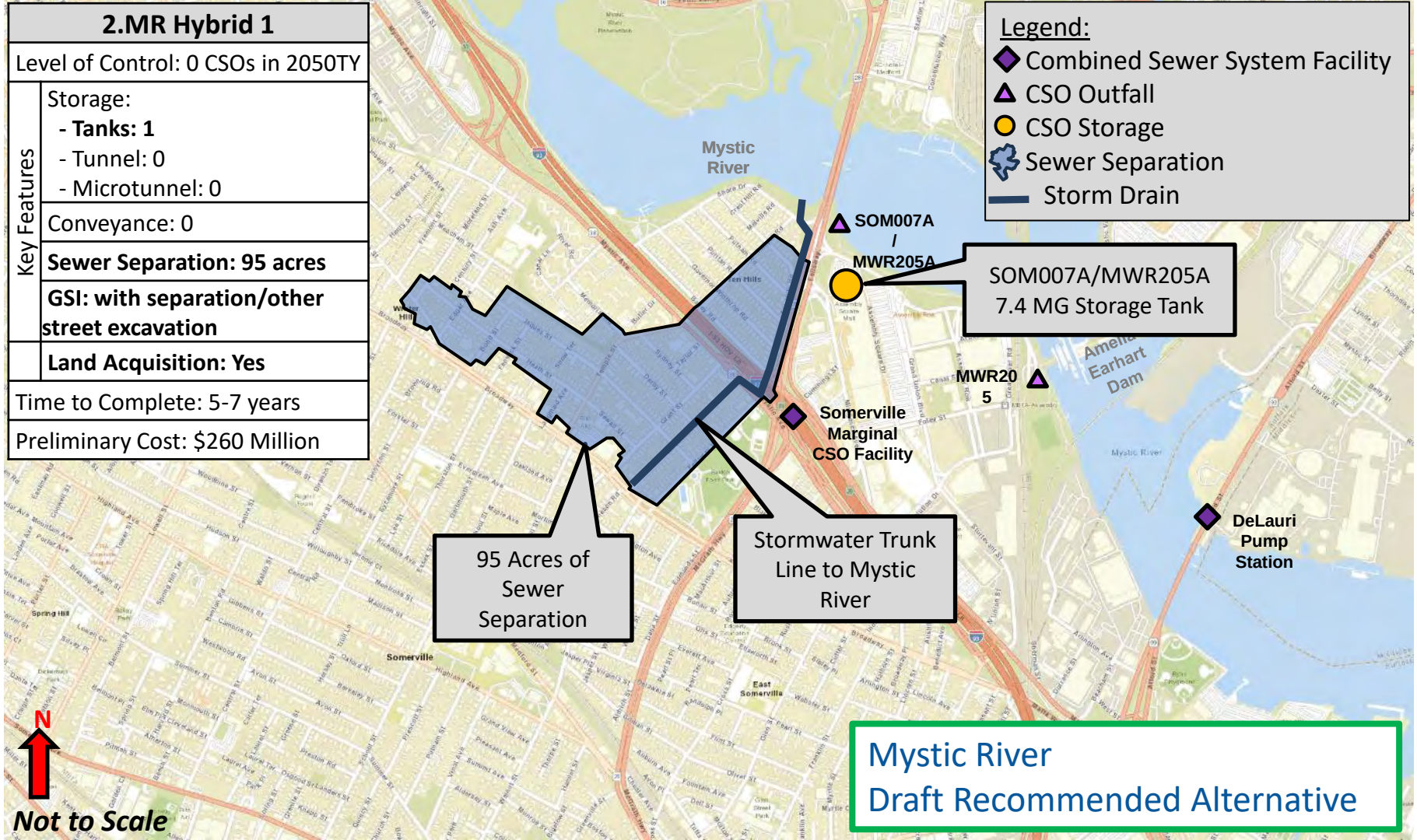
0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm Mid-Tide
1.MR Integrated 1 tank (4 MG) + 366 acres of sewer separation **$500M, 18-23 years**	**6a.MR Hybrid 1** 1 tank (2.7 MG) + 95 acres of sewer separation **$170M, 5-10 years**	**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~~, 810M 50+ years** **With additional sewer separation in Charlestown this alternative can achieve 0 CSOs in 2050 Typical Year*		

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~~, 810M 50+ years** **With additional sewer separation in Charlestown this alternative can achieve 0 CSOs in 2050 Typical Year*		

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~~, 810M 50+ years** **With additional sewer separation in Charlestown this alternative can achieve 0 CSOs in 2050 Typical Year*	0	


2.MR Hybrid 1
Level of Control: 0 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: 5-7 years
Preliminary Cost: $260 Million
Legend:
Combined Sewer System Facility
CSO Outfall
CSO Storage
Sewer Separation
Storm Drain
Mystic River
SOM007A / MWR205A
SOM007A/MWR205A 7.4 MG Storage Tank
MWR205
Somerville Marginal CSO Facility
Amelia Earhart Dam
DeLauri Pump Station
95 Acres of Sewer Separation
Stormwater Trunk Line to Mystic River
Somerville
East Somerville
N
Not to Scale
Mystic River
Draft Recommended Alternative

Mystic River: Summary of Alternatives Under Consideration

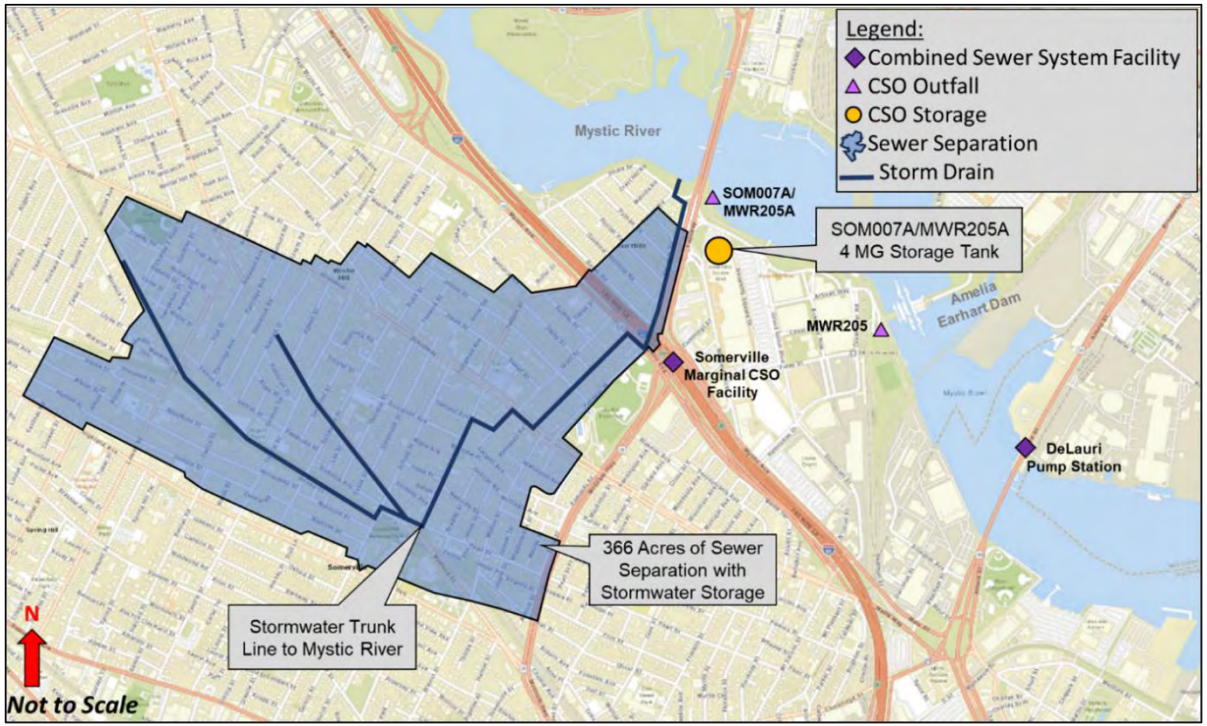
0 CSOs in 2050 Typical Year

1.MR Integrated
1 tank (4 MG) + 366 acres of sewer separation
$500M, 18-23 years

2.MR Hybrid 1
1 tank (7.4 MG) + 95 acres of sewer separation
$260M, 5-7 years

3.MR Storage
1 tank (10.5 MG)
$200M, 5-7 years

4.MR Storage + GSI
1 tank (9.4 MG) + GSI (20 acres)
$260M, 5-7 years



Mystic River: Summary of Alternatives Under Consideration

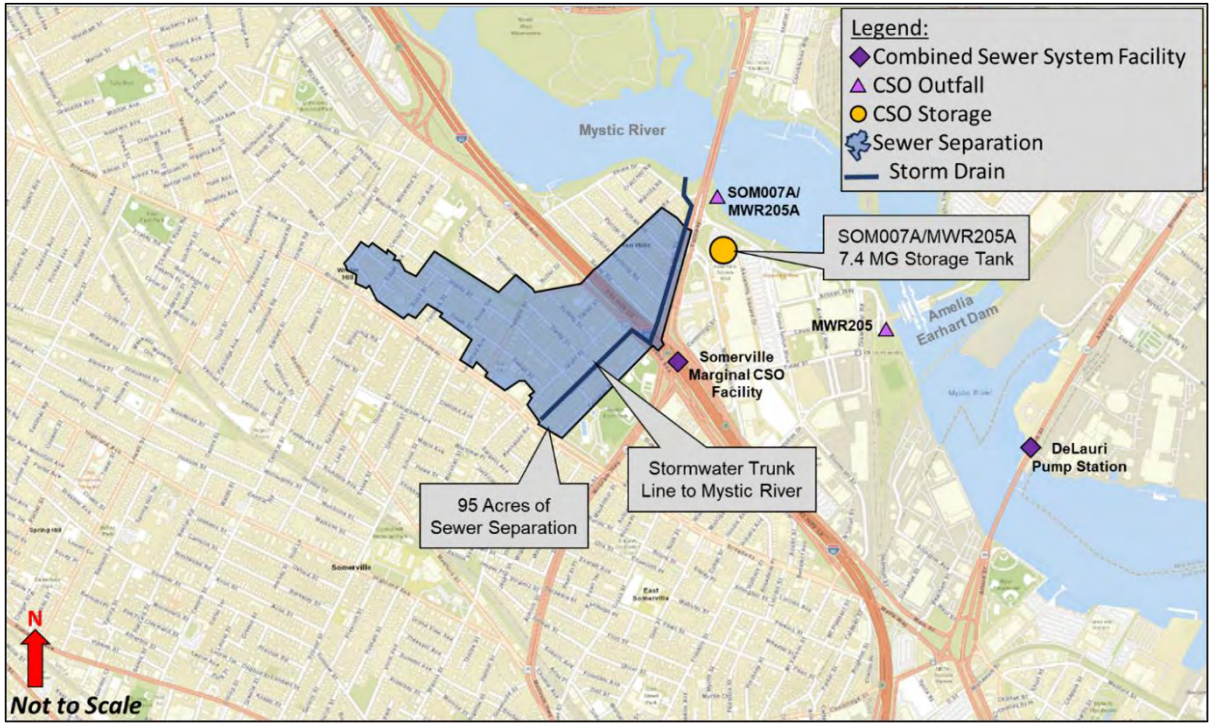
0 CSOs in 2050 Typical Year

1.MR Integrated
1 tank (4 MG) + 366 acres of sewer separation
$500M, 18-23 years

2.MR Hybrid 1
1 tank (7.4 MG) + 95 acres of sewer separation
$260M, 5-7 years

3.MR Storage
1 tank (10.5 MG)
$200M, 5-7 years

4.MR Storage + GSI
1 tank (9.4 MG) + GSI (20 acres)
$260M, 5-7 years



Mystic River: Summary of Alternatives Under Consideration

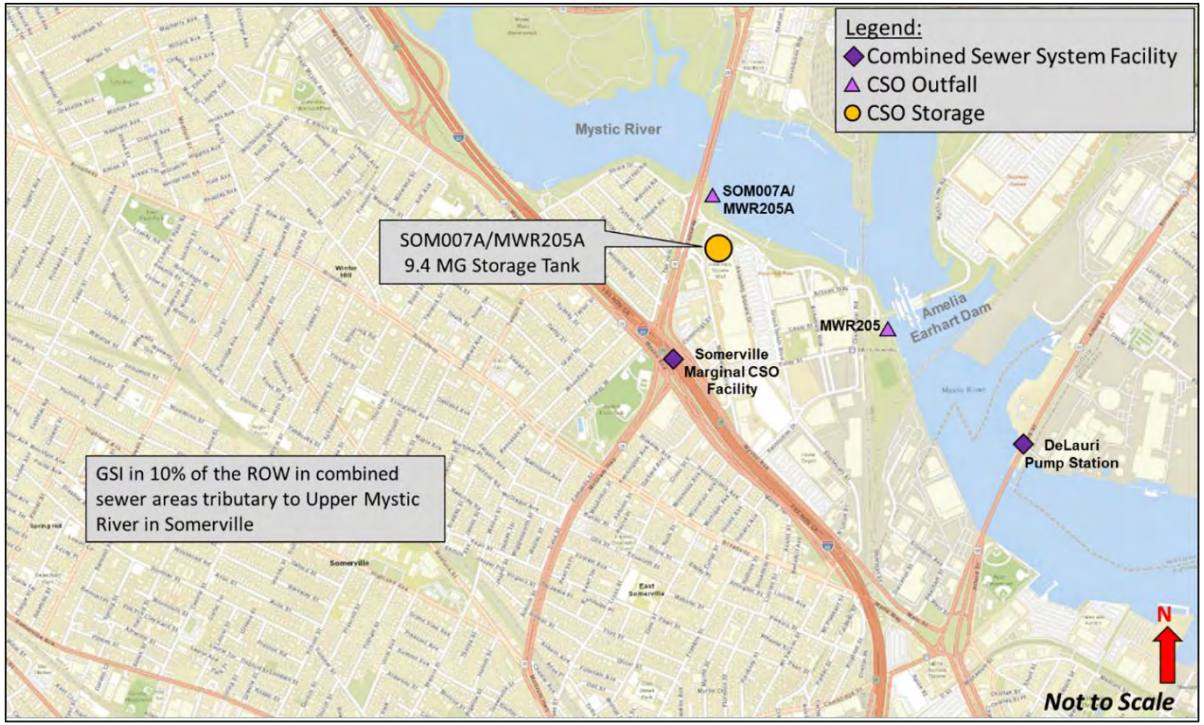
0 CSOs in 2050 Typical Year

1.MR Integrated
1 tank (4 MG) + 366 acres of sewer separation
$500M, 18-23 years

2.MR Hybrid 1
1 tank (7.4 MG) + 95 acres of sewer separation
$260M, 5-7 years

3.MR Storage
1 tank (10.5 MG)
$200M, 5-7 years

4.MR Storage + GSI
1 tank (9.4 MG) + GSI (20 acres)
$260M, 5-7 years



Mystic River – Assembly Square

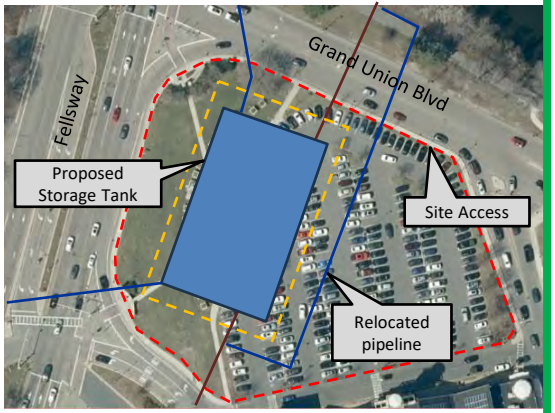
- Property Ownership - Private
- Access to site from Grand Union Boulevard
- Haul route – Mystic Ave to I-93
- Loss of parking

Mystic River - Potential Projects at Assembly Square

0 CSOs 2050TY

2.MR Hybrid 1

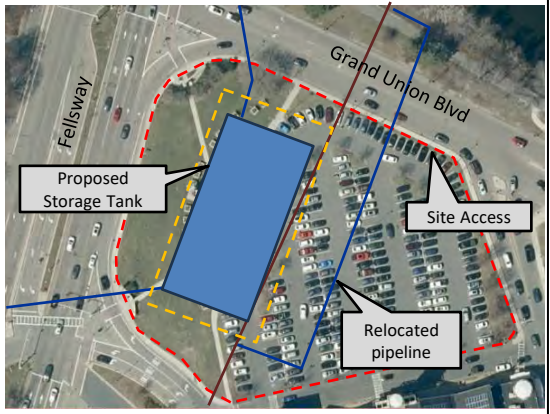
- 7.4 MG CSO Storage Tank – 205 ft x 120 ft
- ~70 ft excavation depth
- At-grade Pump Station / Odor Control (over tank)



Limited CSOs 2050TY

6a.MR Hybrid 1

- 2.7 MG CSO Storage Tank – 205 ft x 100 ft
- ~60 ft excavation depth
- At-grade Pump Station / Odor Control (over tank)

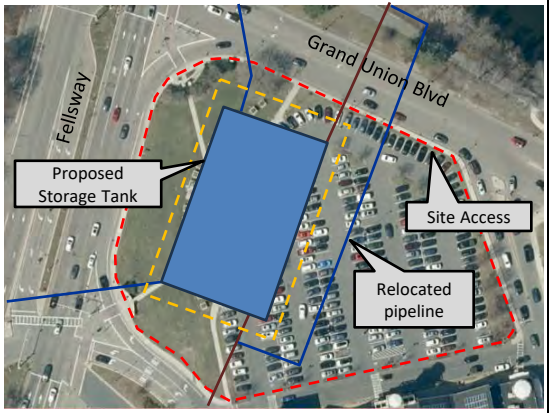


5YR Storm 2050TY*

9.MR Hybrid 1

- 7.4 MG CSO Storage Tank – 205 ft x 120 ft
- ~70 ft excavation depth
- At-grade Pump Station / Odor Control (over tank)

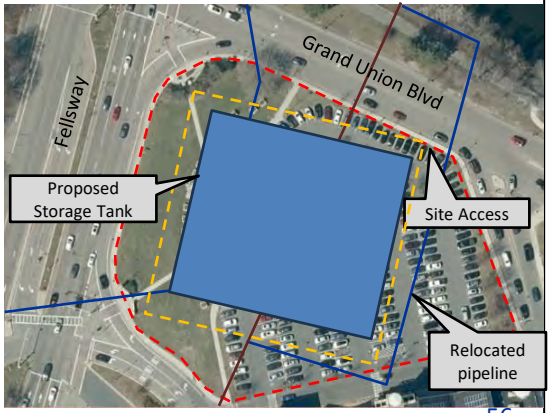
* Designed for Mid-tide level



25YR Storm 2050TY

12.MR Hybrid 1

- 14.2 MG CSO Storage Tank – 205 ft x 225 ft
- ~70 ft excavation depth
- At-grade Pump Station / Odor Control (over tank)

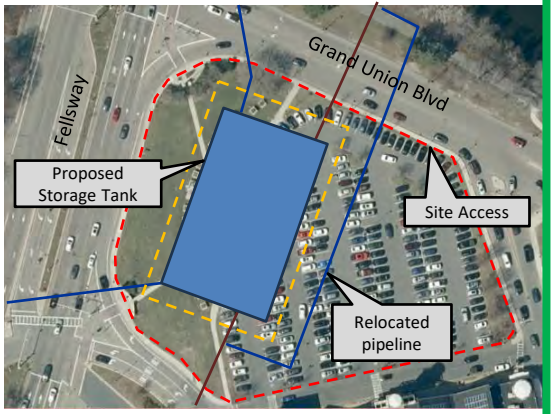


Mystic River - Potential Projects at Assembly Square

0 CSOs 2050TY

2.MR Hybrid 1

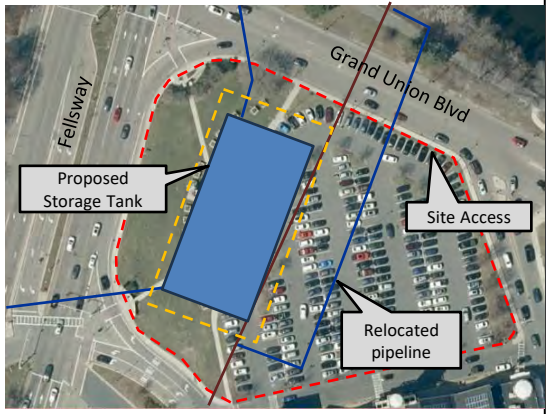
- Construction duration ~4 years
- Typical work hours
- ~100,000 cy of material to be trucked offsite, ~50 trucks per day
- Temporary Construction Easement ~2.7 acres
- Permanent Footprint ~1+ acre



Limited CSOs 2050TY

6a.MR Hybrid 1

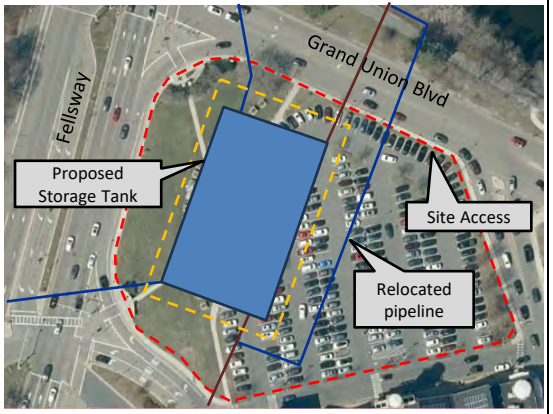
- Construction duration ~3 years
- Typical work hours
- ~50,000 cy of material to be trucked offsite, ~25-50 trucks per day
- Temporary Construction Easement ~2.7 acres
- Permanent Footprint ~1 acre



5YR Storm 2050TY

9.MR Hybrid 1

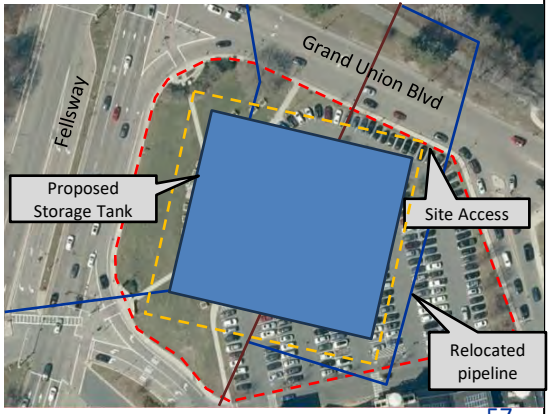
- Construction duration ~4 years
- Typical work hours
- ~100,000 cy of material to be trucked offsite, ~50 trucks per day
- Temporary Construction Easement ~2.7 acres
- Permanent Footprint ~1+ acre



25YR Storm 2050TY

12.MR Hybrid 1

- Construction duration ~7 years
- Typical work hours
- ~150,000 cy of material to be trucked offsite, ~50+ trucks per day
- Temporary Construction Easement ~2.7 acres
- Permanent Footprint ~2+ acre



Mystic River – New MWRA Facilities

Variance Water	Level of Control in 2050	Largest New Facility Type [1]	Capacity (Million Gallons)	Location	MWRA Comparable Facility
Mystic River	0 CSOs in a TY	Tank with Pump Station and Odor Control	7.4	Assembly Square	None
	0 CSOs in 5-year storm	Tank with Pump Station and Odor Control	7.4	Assembly Square	None
	0 CSOs in a 25-year storm	Tank with Pump Station and Odor Control	14.2	Assembly Square	None

- Facility listed is the largest new facility for each alternative. Several new chambers and regulators would also be constructed as part of the various alternatives; however, those types of facilities do not have as much operational or maintenance impact.
- BOS019 is a CSO Storage Facility located in Charlestown and has a capacity of 0.67 million gallons.
- The North Dorchester Bay CSO Tunnel has a maximum capacity of 18.7 million gallons.
- The tank and pump station for the Mystic River would be jointly owned and operated by the MWRA and the City of Somerville.
- Designed for mid-tide level.

Alewife Brook

Alewife Brook: Summary of Alternatives Under Consideration

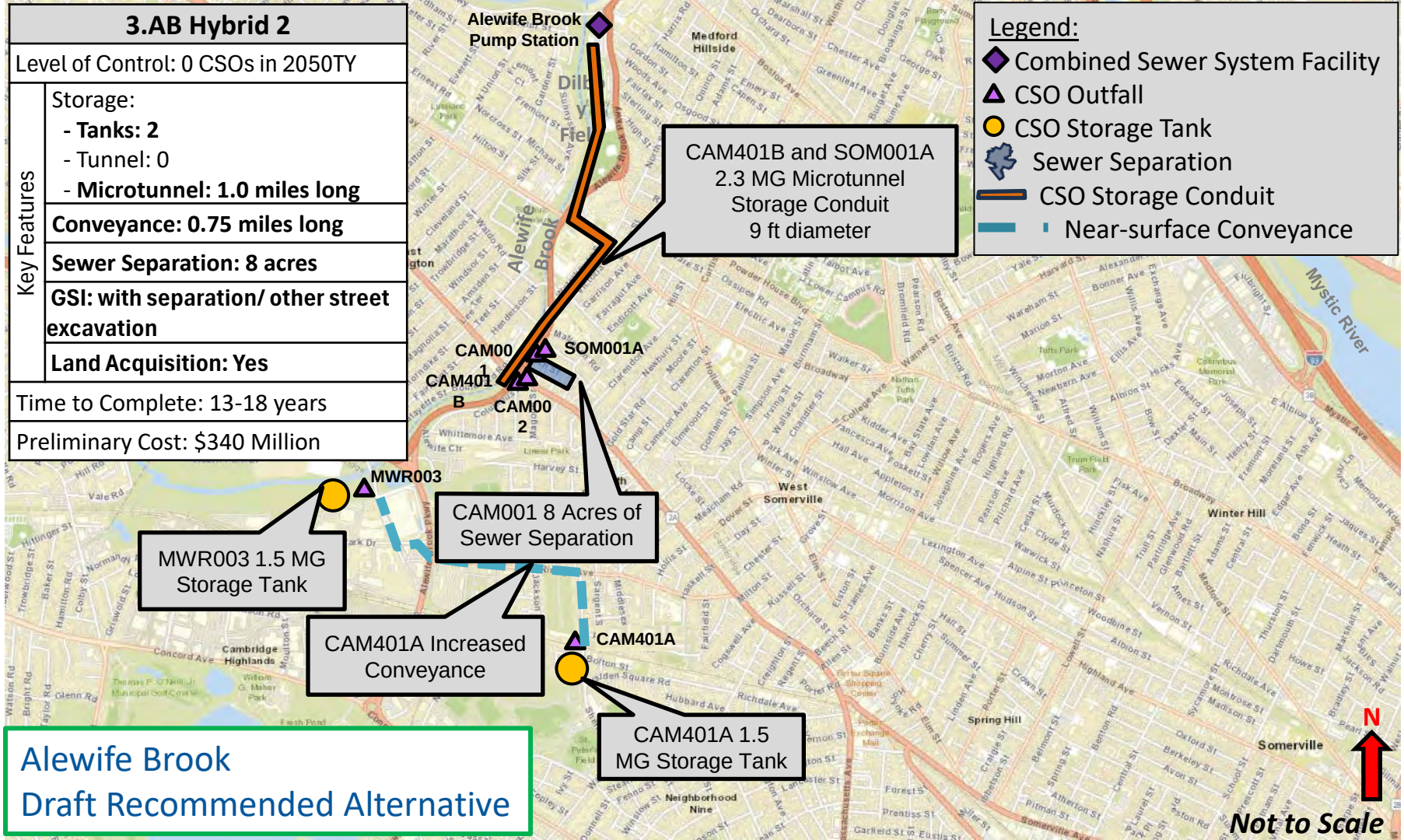
0 CSOs in 2050 Typical Year	Limited CSOs in 2050 Typical Year	0 CSOs in 2050 5-year Storm	0 CSOs in 2050 25-year Storm
1.AB Integrated 3 tanks (3 MG) + 264 acres of sewer separation **$600M, 30-35 years**	**7.AB Hybrid 1** 3 tanks (2.5 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe **$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**			

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**	**.AB Hybrid 1** 3 anks (2.5 MG) + 108 acres of sew r 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 Hy id 2** 3 tanks (2 MG) + 8 a es of sewer sepa tion + 0 5-mile-long conveya ce pi e + 0.5 mile-long microtun el **$240M, 10-20 y rs**	**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**			

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**	**.AB Hybrid 1** 3 anks (2.5 MG) + 108 acres of se r 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 Hy id 2** 3 tanks (2 MG) + 8 a es of sewer sepa tion + 0 5-mile-long conveya ce pi e + 0.5 mile-long microtun el **$240M, 10-20 y rs**	**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
Alewife Brook
Mystic River
Medford Hillside
West Somerville
Winter Hill
Cambridge Highlands
Spring Hill
Somerville
Neighborhood Nine
N
Not to Scale
Alewife Brook
Draft Recommended Alternative

Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

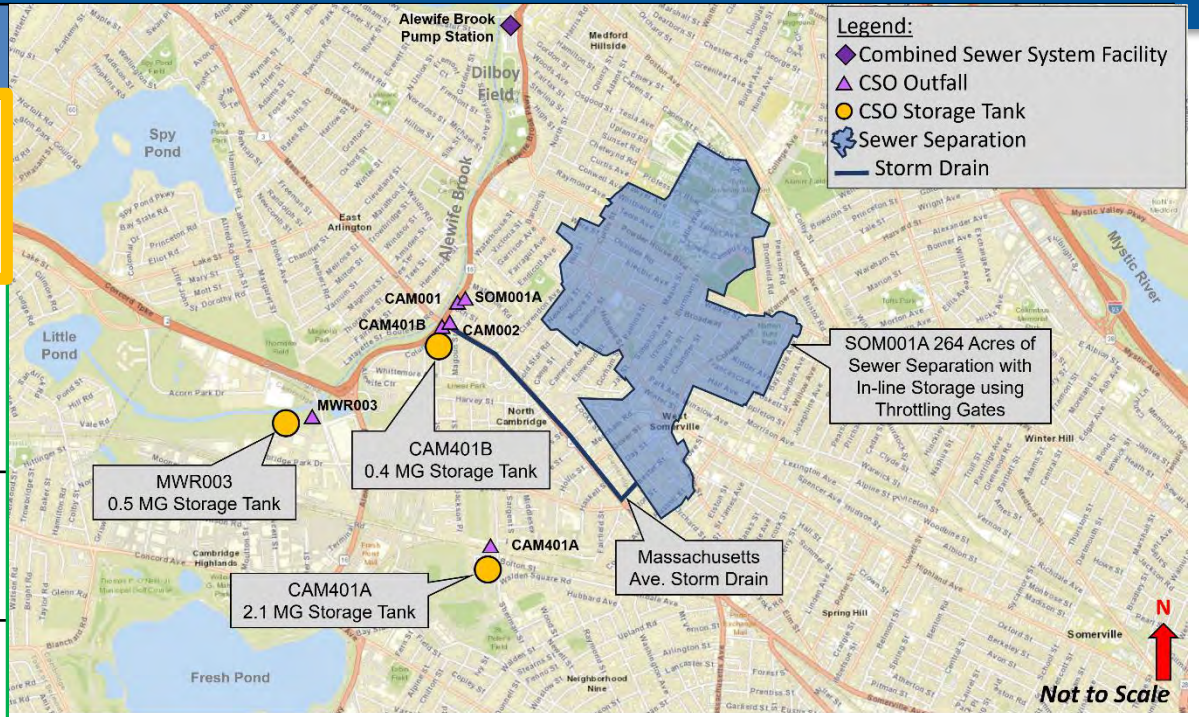
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

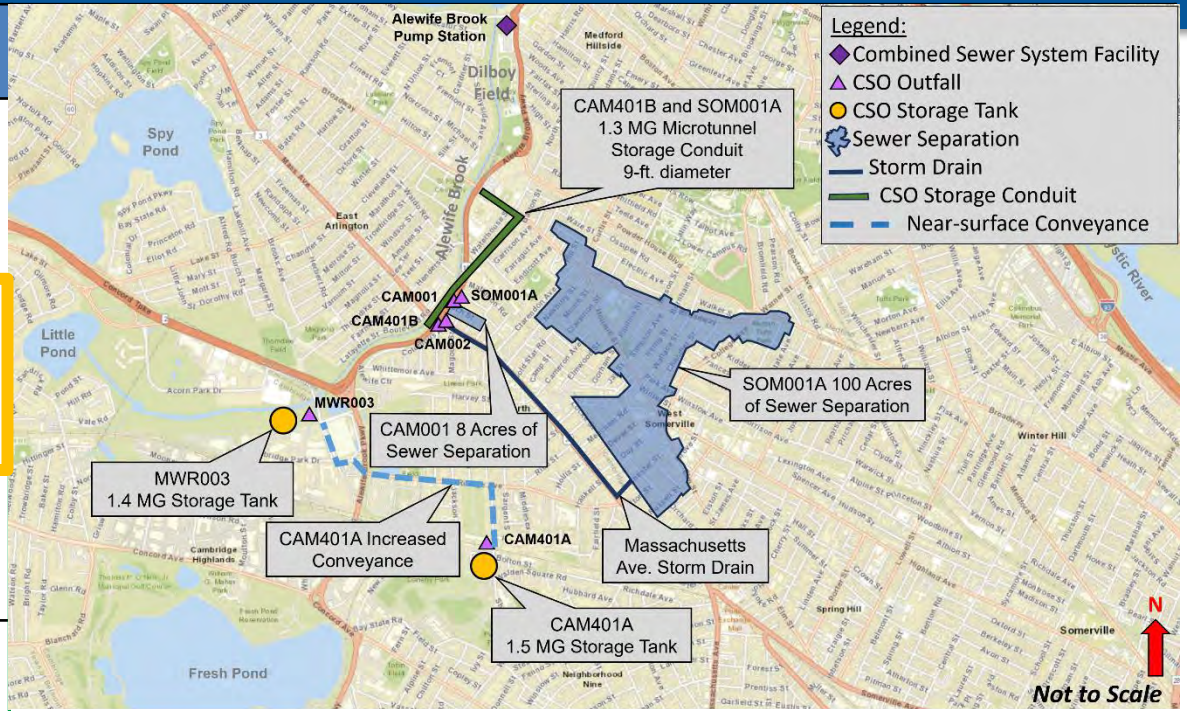
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

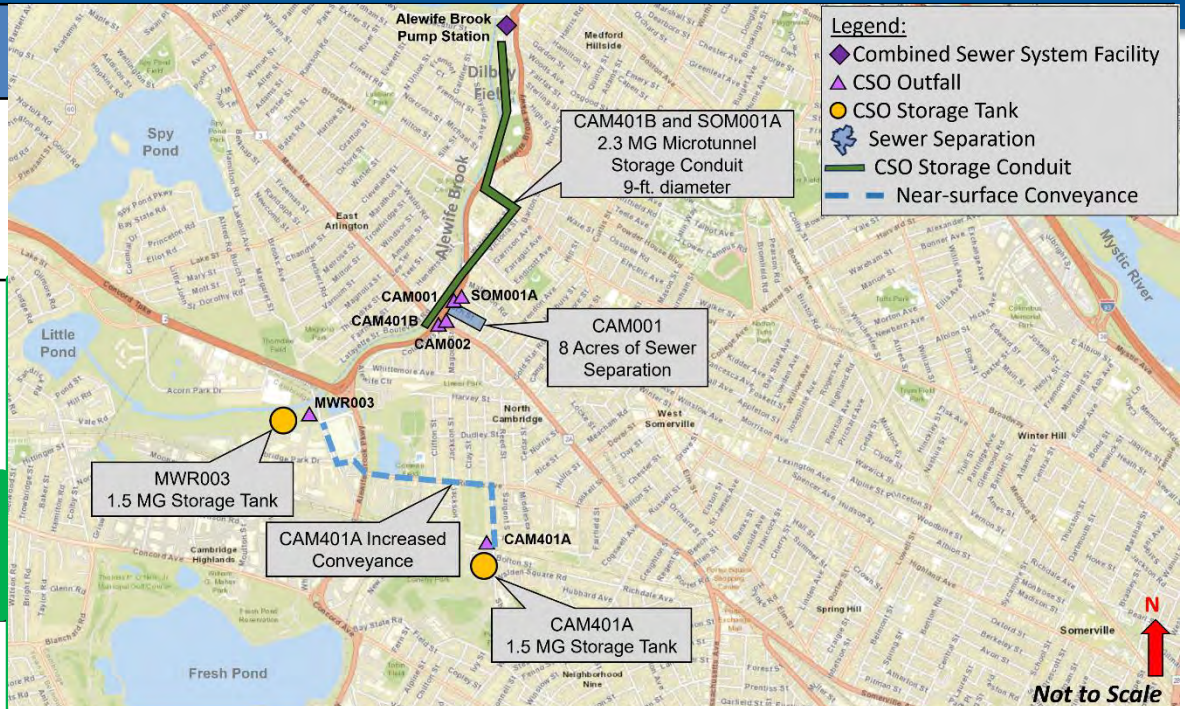
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

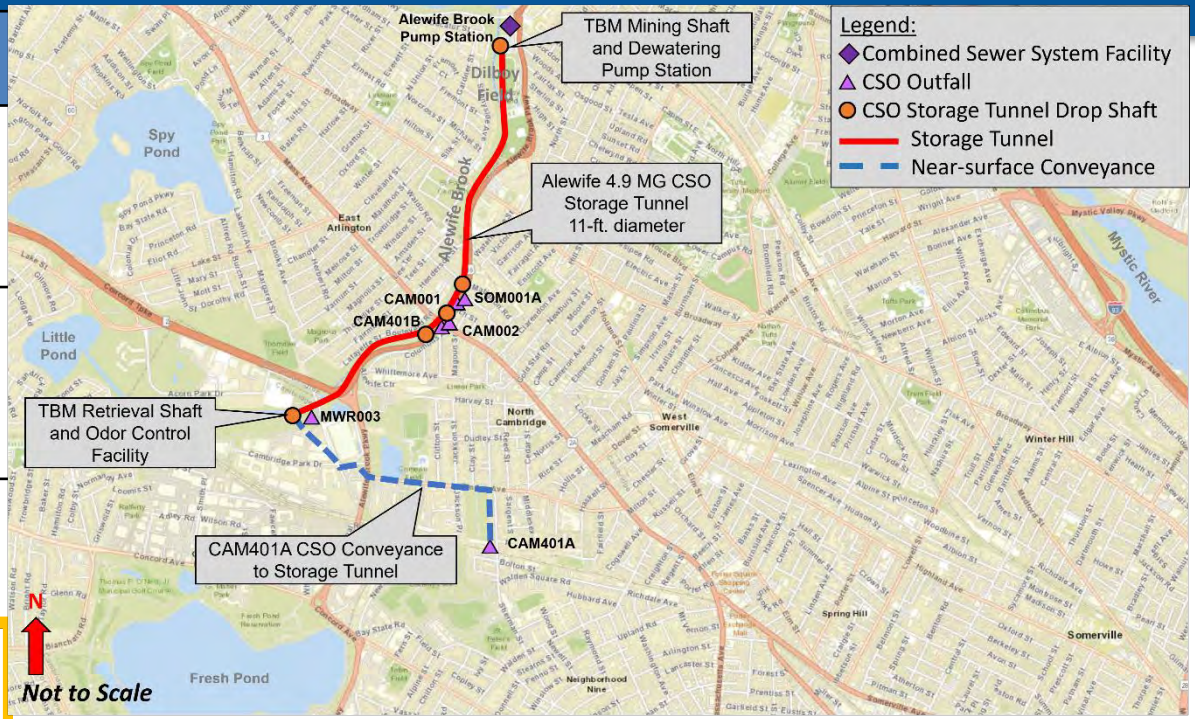
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

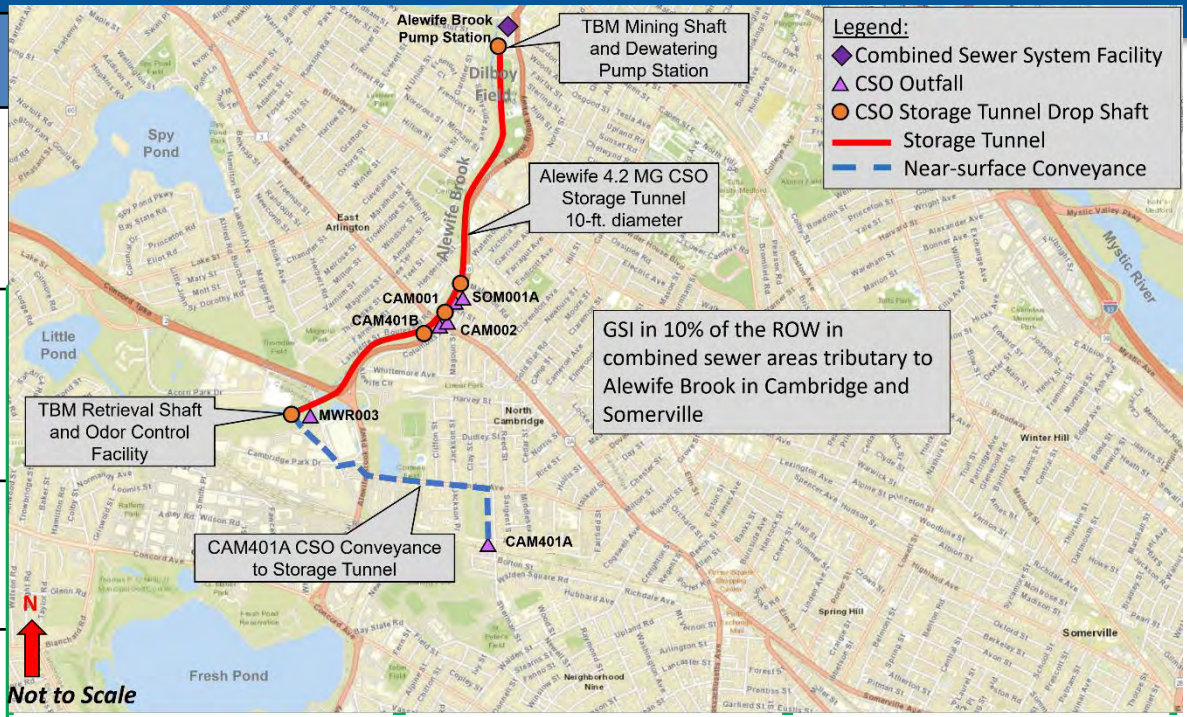
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook: Summary of Alternatives Under Consideration

0 CSOs in 2050 Typical Year

1.AB Integrated
3 tanks (3 MG) + 264 acres of sewer separation
$600M, 30-35 years

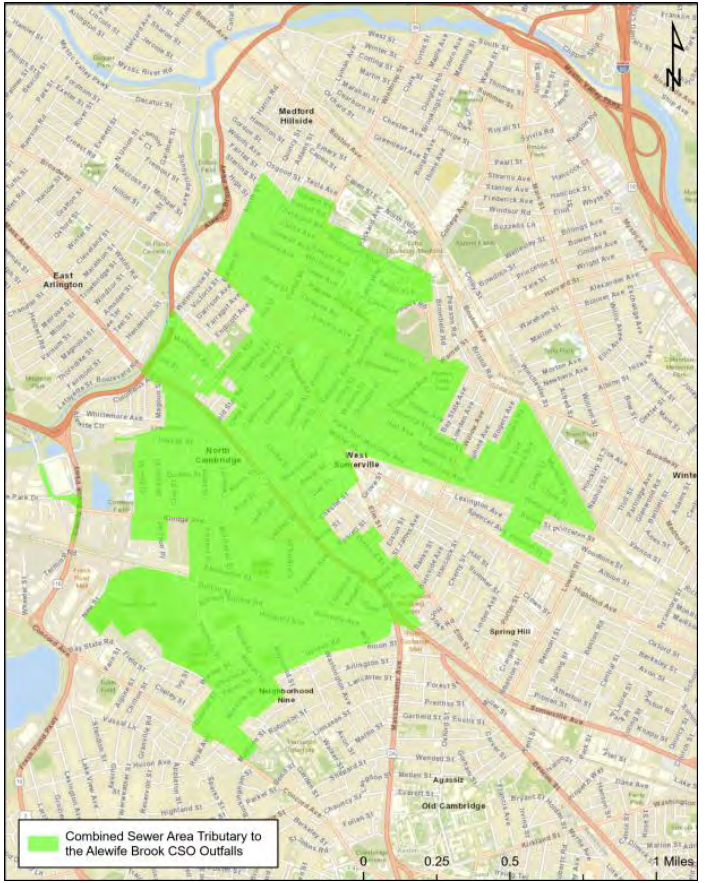
2.AB Hybrid 1
2 tanks (2.9 MG) + 108 acres of sewer separation + 0.75-mile-long conveyance pipe + 0.5 mile-long microtunnel
$440M, 18-23 years

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**



Alewife Brook Potential Projects at Dilboy Field Parking Lot

- Property Ownership – DCR
- Access to site from Alewife Brook Parkway
- Haul Route – Alewife Brook Parkway to Route 2
- Tree removal within limits of construction staging area
- Article 97 / Legislation required

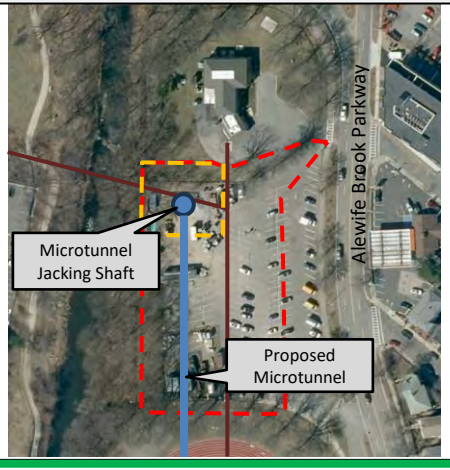
70

Alewife Brook Potential Projects at Dilboy Field Parking Lot

0 CSOs 2050TY

3.AB Hybrid 2

- 2.3MG CSO Storage Microtunnel – 9 ft diameter, 5,400 ft length,
- Jacking Shaft
- Small at-grade Dewatering Pump Station / Odor Control



Limited CSOs 2050TY

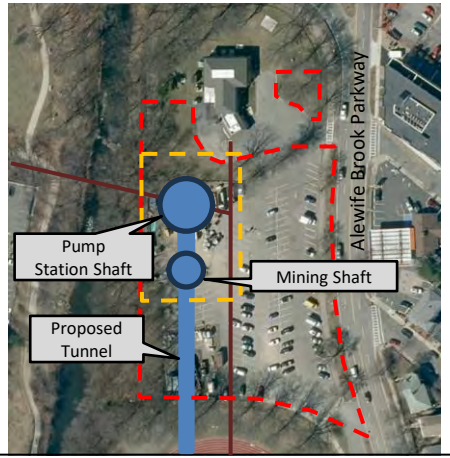
8.AB Hybrid 2

- No new work

5YR Storm 2050TY

10.AB Tunnel + GSI

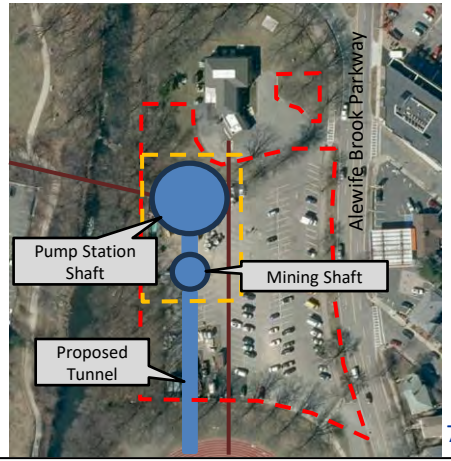
- 20.3MG CSO Storage Tunnel - 22 ft diam., 7,600 ft length, ~125 ft deep
- Mining Shaft - 50 ft diameter
- Pump Station Shaft - 75 ft diameter
- At-grade Pump Station / Odor Control



25YR Storm 2050TY

12.AB Tunnel + GSI

- 41MG CSO Storage Tunnel - 32 ft diam., 7,600 ft length, ~165 ft deep
- Mining Shaft - 50 ft diameter
- Pump Station Shafts - 100 ft diameter
- At-grade Pump Station / Odor Control

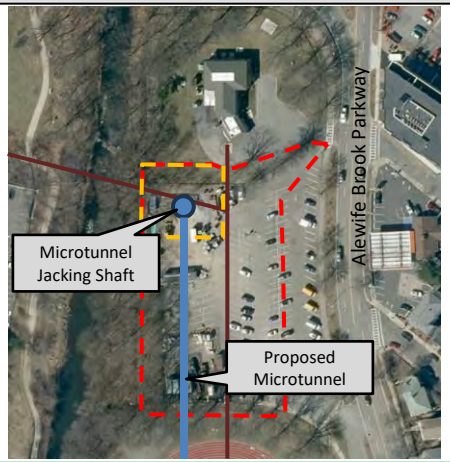


Alewife Brook Potential Projects at Dilboy Field Parking Lot

0 CSOs 2050TY

3.AB Hybrid 2

- Construction duration ~2 years
- Construction Operation 24/7 during Microtunneling (short period)
- Avg. 20 trucks per day
- Temporary Construction Easement ~1.7 acres
- Permanent Footprint ~0.5 acre



Limited CSOs 2050TY

8.AB Hybrid 2

- No new work

5YR Storm 2050TY

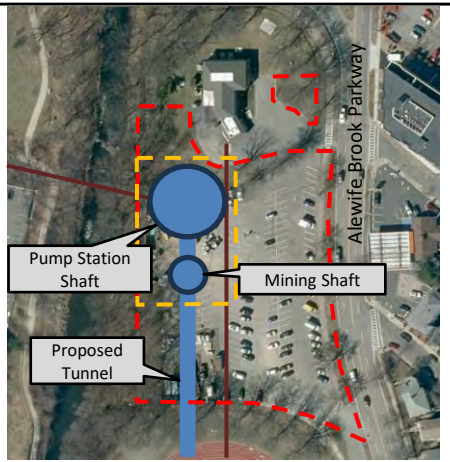
10.AB Tunnel + GSI

- Construction duration ~6 years
- Construction Operations 24/7
- Avg. 100 trucks per day for ~12 months
- Blasting
- Temporary construction easement ~2.5 acres
- Very small site, additional off-site staging area is needed
- Permanent Footprint ~1 acre

25YR Storm 2050TY

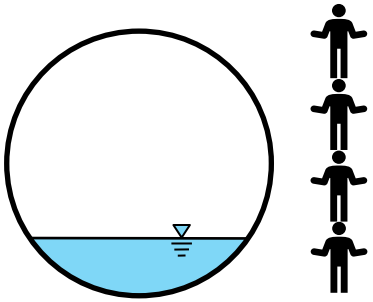
12.AB Tunnel + GSI

- Construction duration ~7 years
- Construction Operations 24/7
- Avg. 200 trucks per day for ~12 months
- Blasting
- Temporary construction easement ~2.5 acres
- Very small site, additional off-site staging area is needed
- Permanent Footprint ~1 acre

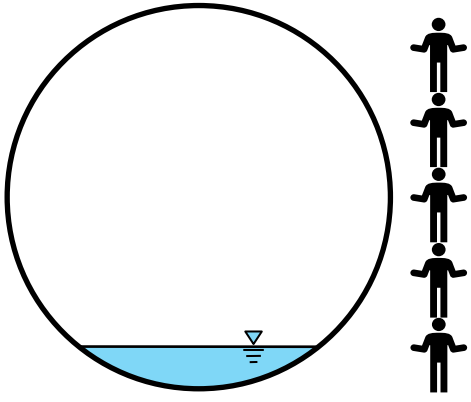


Alewife Brook CSO Storage Tunnel Size Utilization

- The tunnel cross sections below represent two CSO storage tunnels sized to store the largest CSO discharge in the 2050 5-yr, and 2050 25-yr storms.
- The cross sections depict the approximate water level and percentage of the tunnel that would be utilized during the largest CSO discharge in the 2050 TY (4.85 MG)



2050 5-yr Tunnel:
22-ft Diameter
TY Vol. – 22% full



2050 25-yr Tunnel:
32-ft Diameter
TY Vol – 11% full

6-foot Person

Legend:
Storage Tunnel Cross Section
TY Water Level in Tunnel

Alewife Brook – New MWRA Facilities

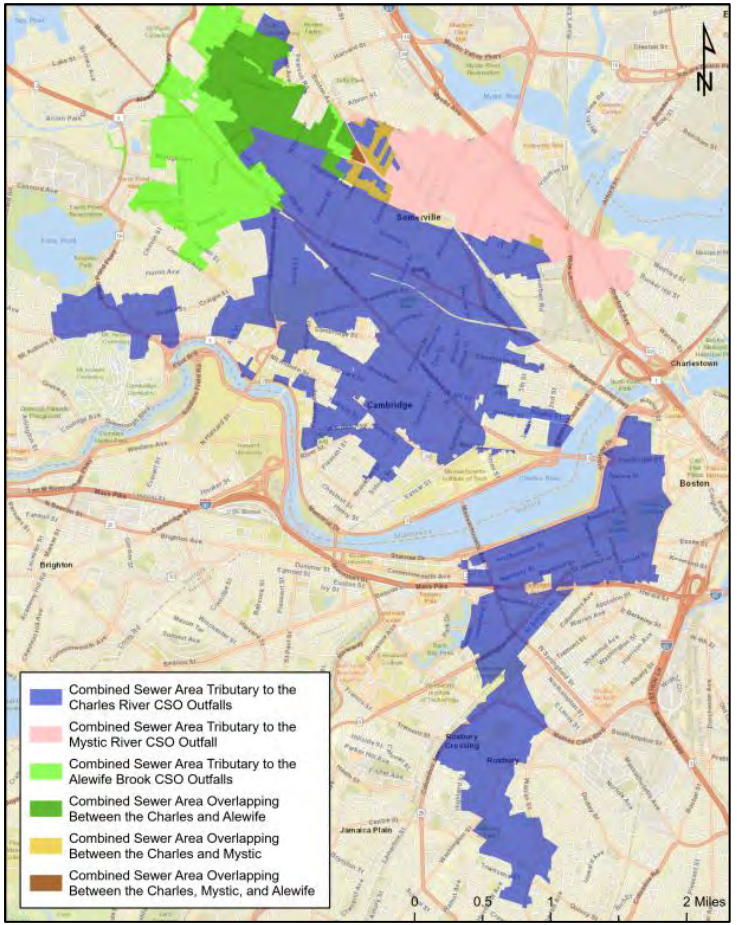
Variance Water	Level of Control in 2050	Largest New Facility Type	Capacity (Million Gallons)	Location	MWRA Comparable Facility
Alewife Brook	0 CSOs in a TY	Tank with Pump Station and Odor Control	1.5	Near Alewife T Station	BOS019
	0 CSOs in 5-year storm	Tunnel with Pump Station and Odor Control	20	Dilboy Field	~NDB CSO Tunnel
	0 CSOs in a 25-year storm	Tunnel with Pump Station and Odor Control	41	Dilboy Field	~2x NDB CSO Tunnel

- Facility listed is the largest new facility for each alternative. Several new chambers and regulators would also be constructed as part of the various alternatives; however, those types of facilities do not have as much operational or maintenance impact.
- Facility type and location shown for the regional tunnel options is the primary facility. Additional drop shafts and at least one secondary odor control facility would be required for alternatives involving regional tunnels.
- BOS019 is a CSO Storage Facility located in Charlestown and has a capacity of 0.67 million gallons.
- The North Dorchester Bay CSO Tunnel has a maximum capacity of 18.7 million gallons.

Sewer Separation

Regional Sewer Separation

- A means of CSO elimination?
- 5,950 Acres of Tributary Inflow to Variance Waters
- Nutrient loading limitations
- Results in flooding in the Alewife Brook.
- Remaining Inflow (10%) plus Inflow & Infiltration from upstream communities can results in overflows.
- Small overflows predicted to Charles in 2050 TY.
- Several locations predicted to overflow in 2050 5-year and 25-year design storms.
- Improves MWRA's Sanitary Conveyance Capacity
- Reduces Non-variance Water CSOs



Summary of Draft 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	2.MR Hybrid 1	0 CSOs in 2050 TY	$260M	5-7 years
Charles River	4.CR Hybrid 3	0 CSOs in 2050 TY	$690M	28-33 years
		Total Cost	**$1.29B**	

Performance of Draft Recommended Alternatives

Proposed Draft Recommended Plan's Impact on Larger Storms

Expected Future 2050 Typical Year Impacts

- All treated and untreated CSO are predicted to be eliminated for all 98 storm events in the future 2050 typical year.

Expected Impacts in Larger Design Storms

- **2050 5-yr 24-hr (5.3-inch storm)** predicted to see a 38%/40MG reduction in CSO, with 43% of remaining CSOs treated.
- **2050 25-yr 24-hr (7.8-inch storm)** predicted to see a 24%/44.5MG reduction in CSO, with 41% of the remaining CSO treated.

Proposed Draft Recommended Plan's Impact on Recent Years

Expected Impacts on Calendar Year 2021 Rainfall

- Year with wettest July on record (2 storms with 4 & 2yr 6hr recurrence interval).
- Hurricane Ida in September 2021, 6hr 23yr recurrence interval.
- Measure number of CSO Activations goes from 18 storm to a maximum of 4 storms.
- Of the 243 MG of CSO measured to discharge to the Variance Waters 56.4 MG remains (77% reduction)

Expected Impact on Calendar Year 2024 Rainfall

- Considered Average with one exception.
- June 26, 2024 storm (2.1 inches in 11hrs) with period of very high intensity (1.2 inches/hour, 1hr 3yr recurrence)
- Measured number of CSO Activations goes from 16 storms to 1 storm.
- Of the 81.6 MG of CSO measured to discharge to the Variance Waters only 0.66 MG remains (99% Reduction).

Water Quality

There are Multiple Sources of Pollution

Pollutants affect water quality, environmental health, and public health.
CSOs are one source of those pollutants.

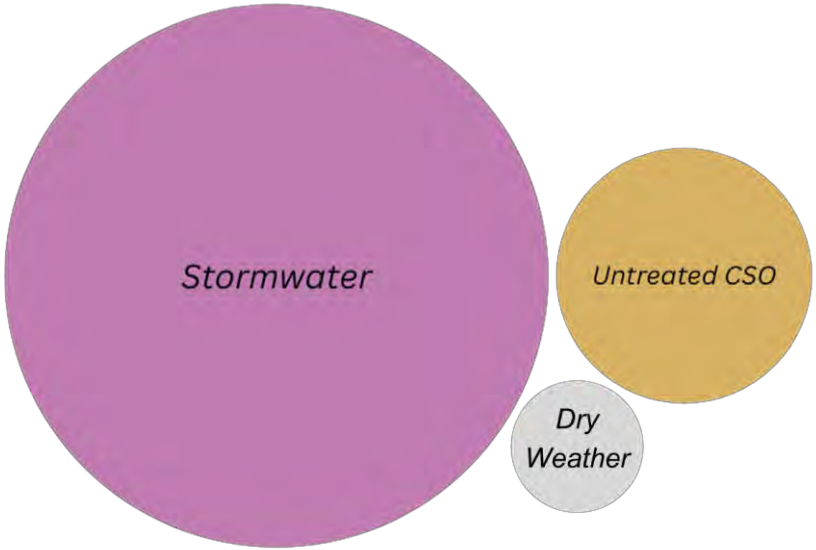
Dry weather (perpetual)	**Stormwater** (every time it rains)	**CSOs** (large, intense storms)
• Illicit sewer connections • Leaky sewer pipes • Wildlife and dog excrement • Decomposing leaves	• Pathogens (bacteria, viruses) • Oil and grease • Nutrients (Phosphorus, Nitrogen) • Trash • Others	• Pathogens (bacteria, viruses) • Oil and grease • Trash • Nutrients (Phosphorus, Nitrogen) • Pharmaceuticals • Industrial waste • Others

Data shows **eliminating CSO would not** make waterbodies fully swimmable or fishable.

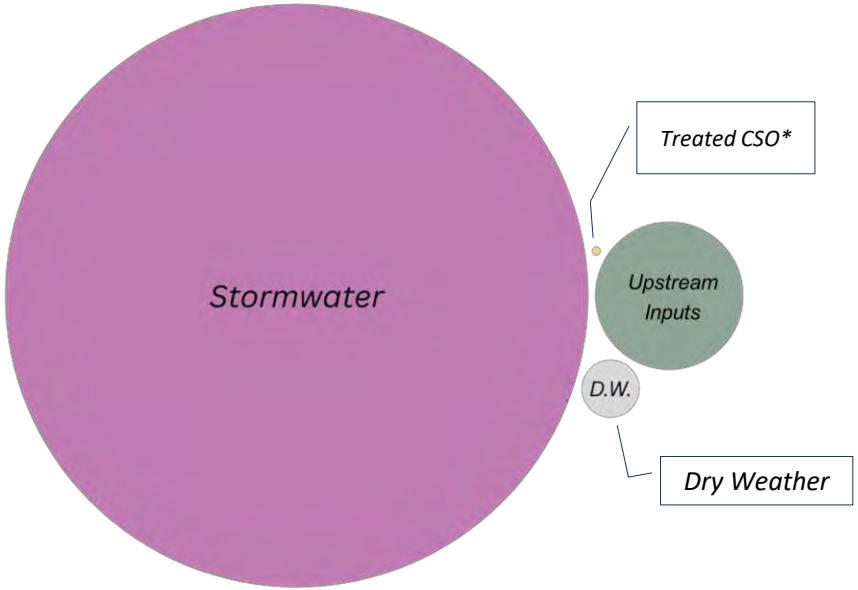
Water Quality – Current Sources of Pollution

Relative annual proportions of *E. coli* by source

Alewife Brook



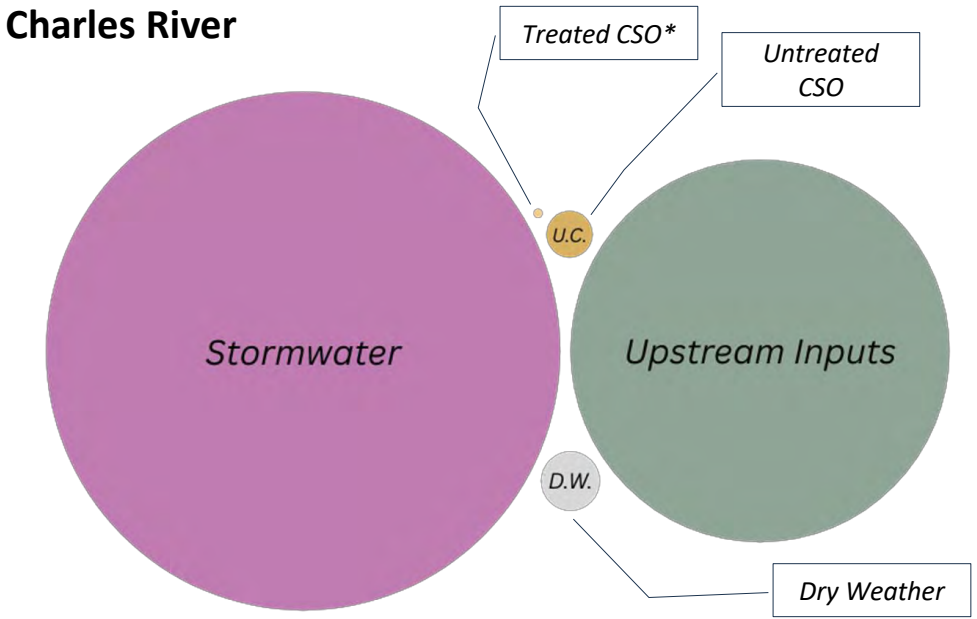
Upper Mystic River



* Treated CSO is disinfected before discharge

Water Quality – Current Sources of Pollution

Relative annual proportions of *E. coli* by source



* Treated CSO is disinfected before discharge

MWRA Has Conducted Water Quality Sampling Since 1989

Test	Number Analyzed	Purpose
E. coli *Enterococcus*	49,000+	Is the water safe for swimming or boating?
Phosphorus	3,900+	Do high nutrients lead to algae blooms?
Dissolved Oxygen Temperature	33,000+	Does the river support aquatic life?

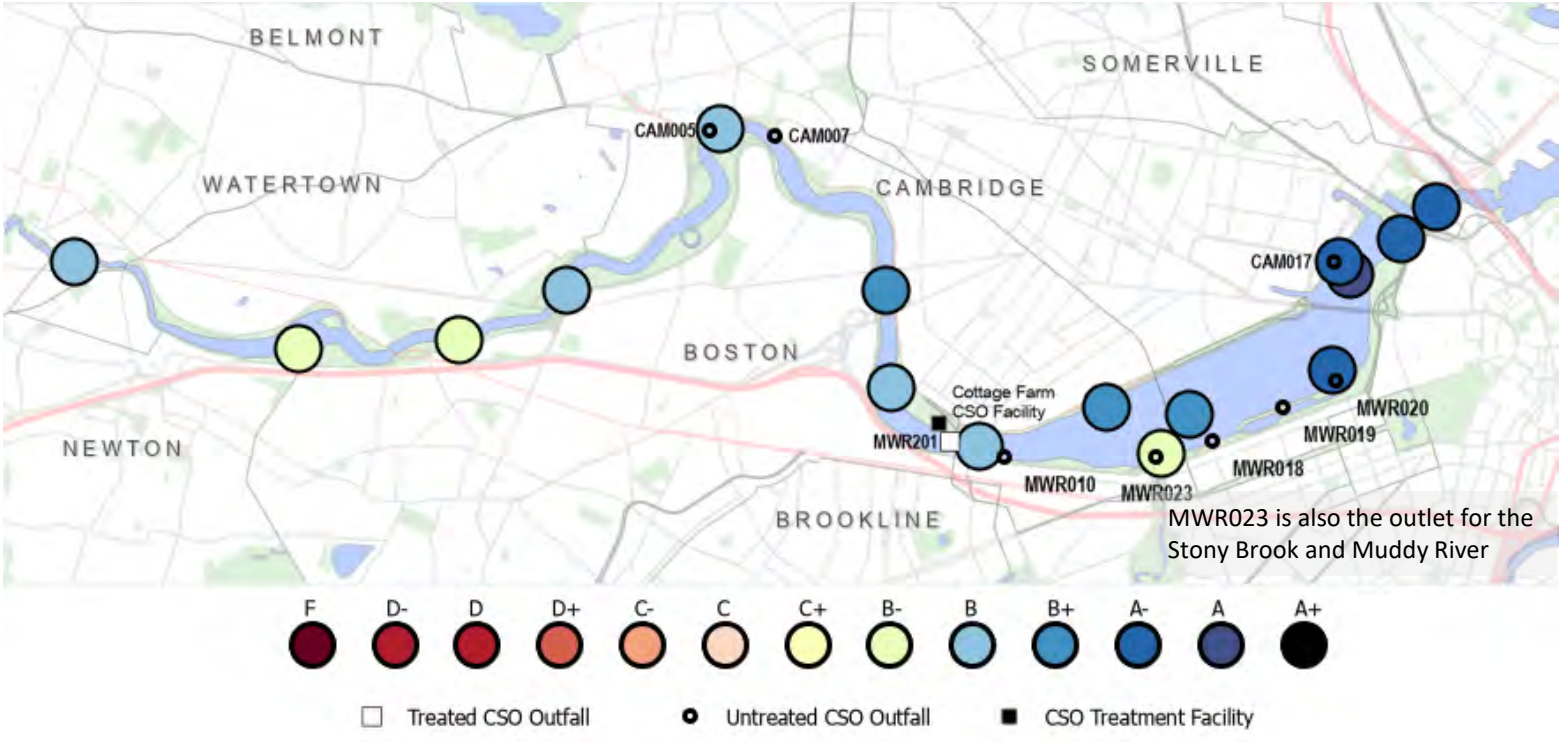
MWRA has monitored the Alewife, Mystic and Charles since 1989.

Data are shared with watershed groups and other interested parties to support their visions for the watershed.

Data are available at: https://www.mwra.com/harbor/download-environmental-data

Charles River Water Quality Is Generally Good

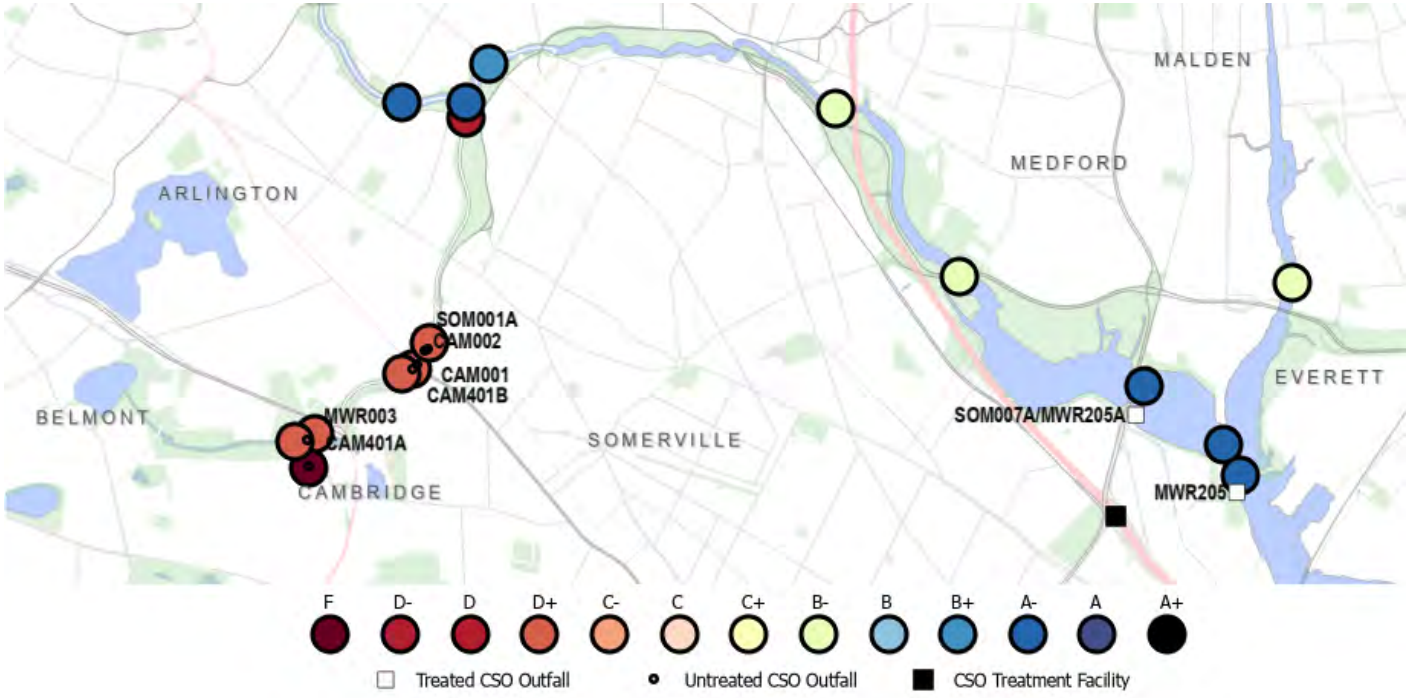
These grades show **high compliance** with swimming and boating ***E. coli* standards.**



Based on EPA Report Card methodology developed by Mystic River Watershed Association.
Includes long-term monitoring data using swimming and boating E. coli criteria under dry and wet weather conditions (2015–2024)

Mystic/Alewife Water Quality Is Mixed

Alewife Brook **does not meet** *E. coli* standards often, **even upstream of all CSOS.**
The Upper Mystic River **meets** *E. coli* standards **most of the time.**



Based on EPA Report Card methodology developed by Mystic River Watershed Association.
Includes long-term monitoring data using swimming and boating E. coli criteria under dry and wet weather conditions (2015–2024)

Water Quality

Water quality exceedances from CSOs occur concurrently with impacts from other sources (e.g., stormwater, upstream boundary conditions) and when CSO discharges occur the duration of exceedance due to CSO discharges is short.

When considering higher levels of control,
water quality modeling demonstrates the diminishing return on investment.

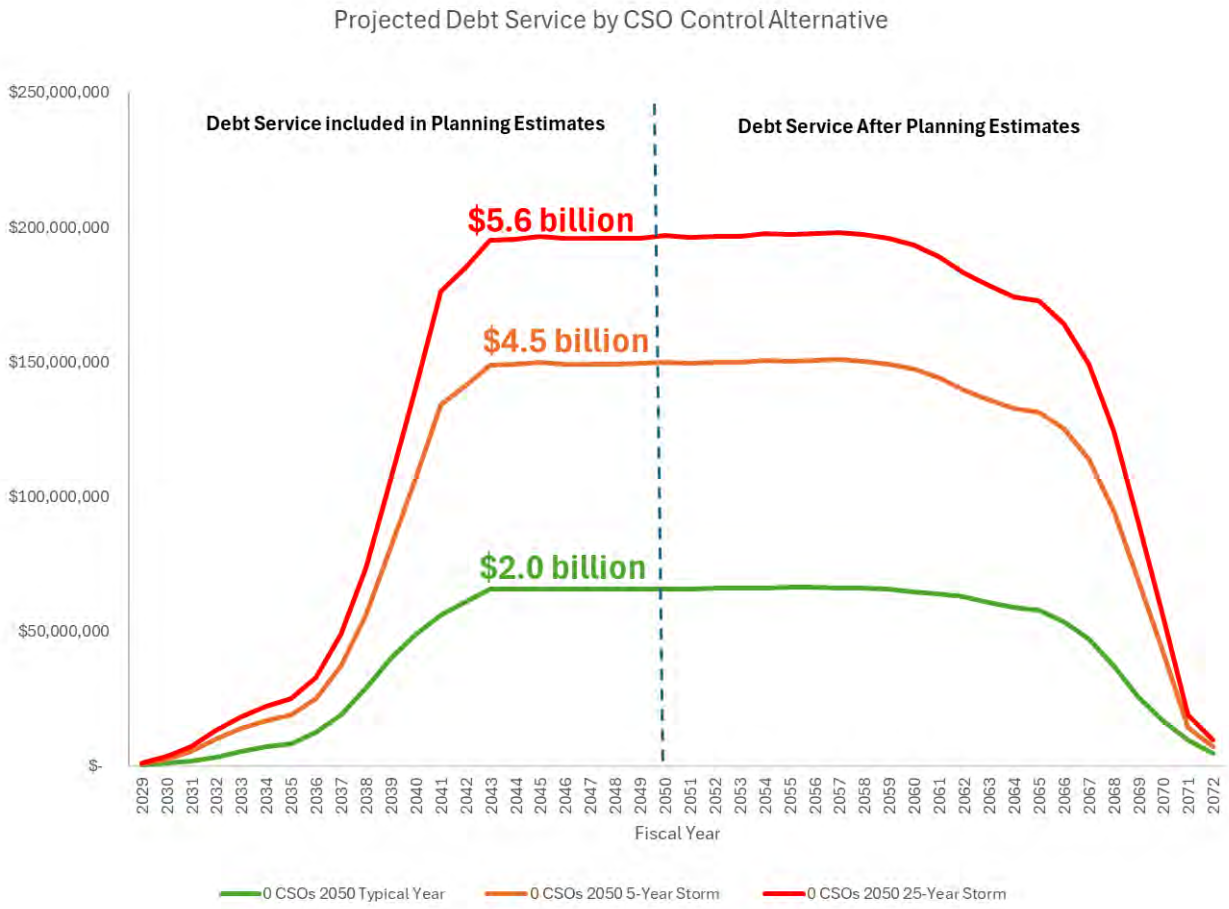
Financial Impacts

CSO Control Plan Potential MWRA Spending by Category

- Estimated MWRA CSO project costs presented in the CSO Control Plan are in today's dollars
- Present day costs are escalated at 2.5% to reflect potential future dollar values

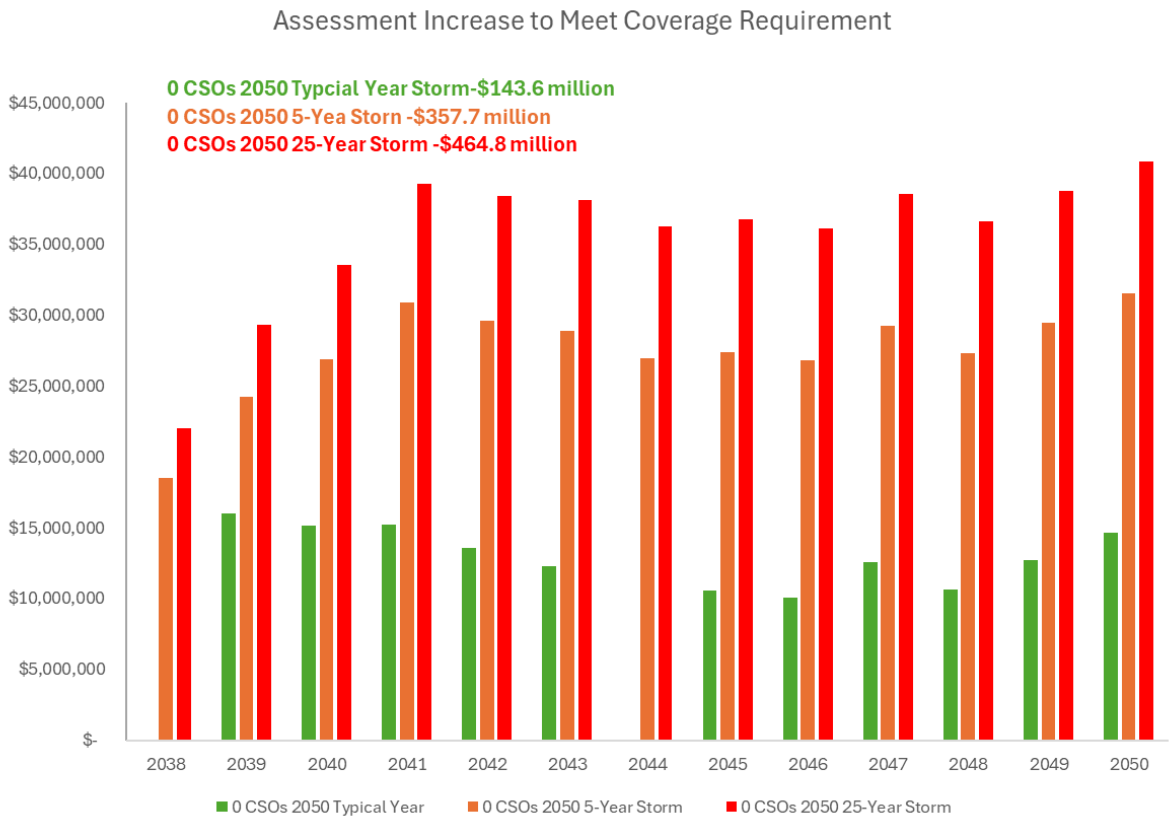
CSO Control Level	CSO Costs in 2026 dollars	Spending (2.5%/year)	CSO Costs in Future dollars
0 CSOs in a 2050 Typical Year	$ 763,700,000	2028-2042 →	$ 1,011,274,416
0 CSOs in a 2050 5-Year Storm	$ 1,730,000,000	2028-2042 →	$ 2,297,632,930
0 CSOs in a 2050 25-Year Storm	$ 2,270,000,000	2028-2042 →	$ 3,014,813,150

Projected Debt Service



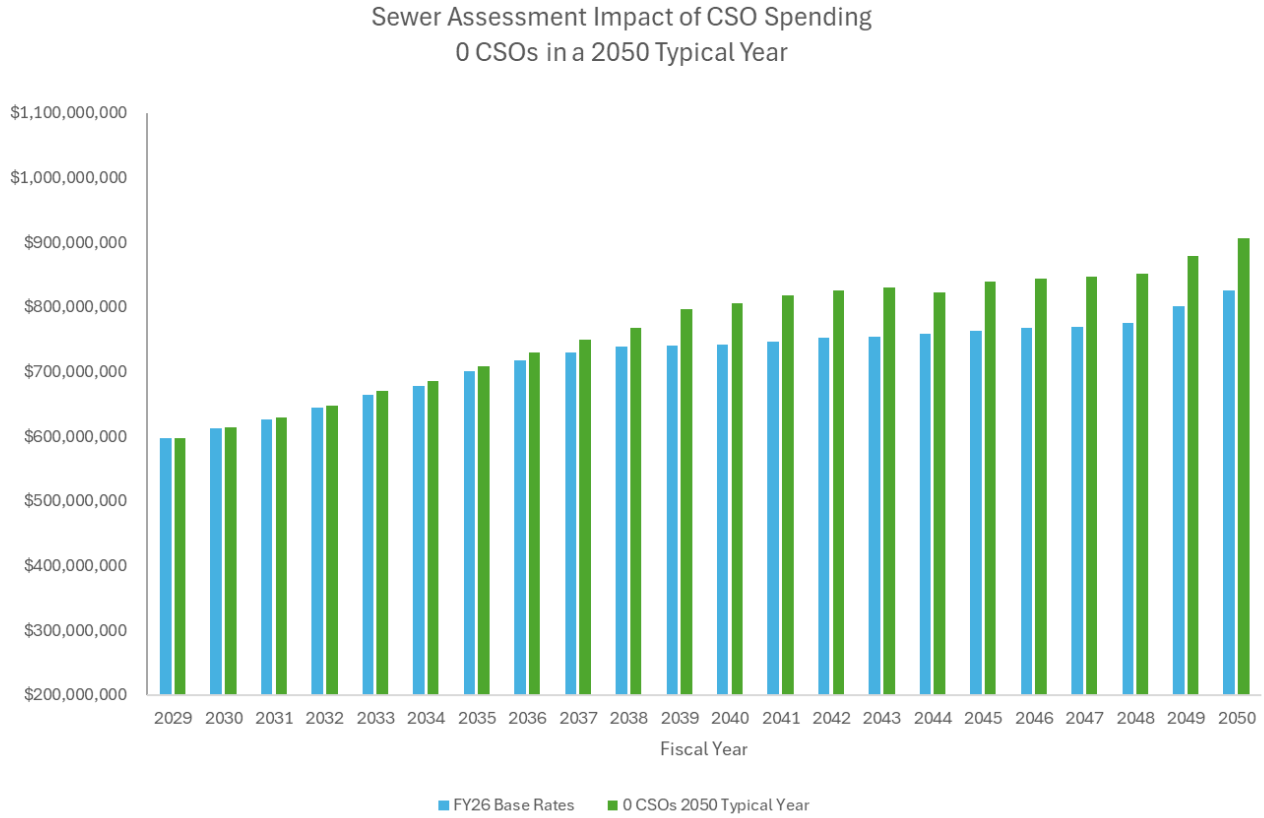
Revenue Bond Coverage Requirement

- The projected additional debt service resulting from CSO spending results in increased assessments to meet coverage.
- MWRA has not had to raise funds to meet the coverage requirement since the 1990s.
- Rating Agencies have indicated that erosion of coverage levels could result in negative ratings actions.



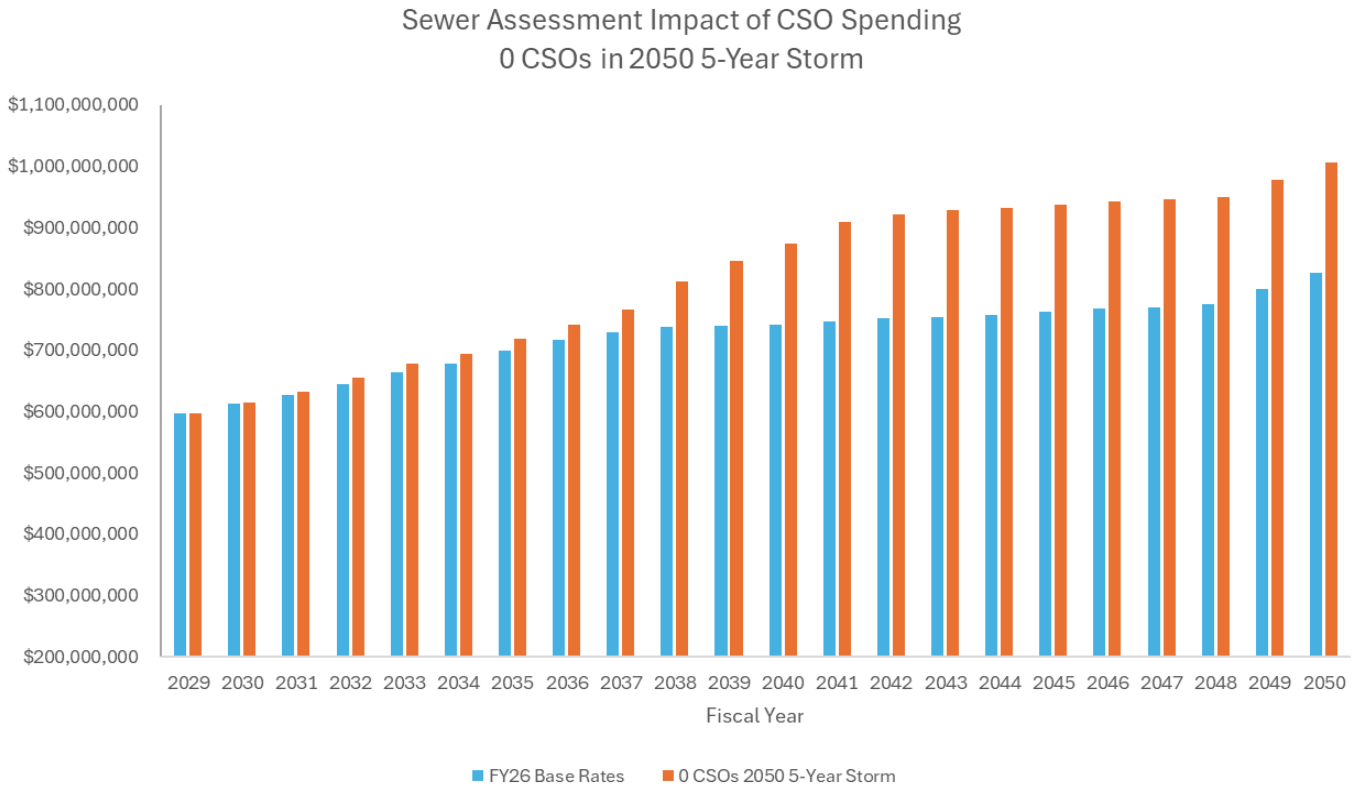
Sewer Assessment Impacts – 2050 Typical Year

- Assessments would increase by $954.1 million over baseline.



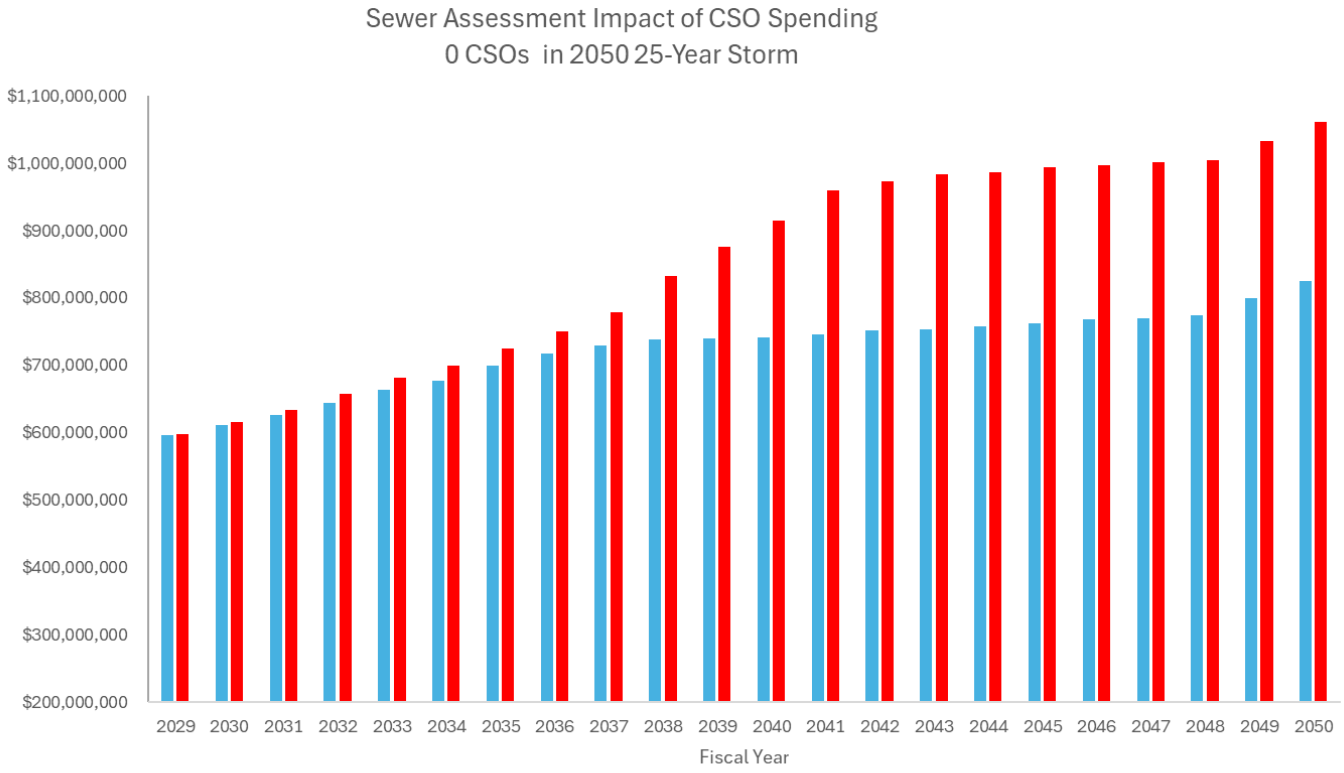
Sewer Assessment Impacts – 2050 5-Year Storm

- Assessments would increase by $2.2 billion over baseline.



Sewer Assessment Impacts – 2050 25-Year Storm

- Assessments would increase by $2.9 billion over baseline.



Sewer System Household Impacts

Projected Sewer System Household Charges

	2029		2050
FY26 Base Rates	$ 999	→	$ 2,337
0 CSOs 2050 Typical Year	$ 999	→	$ 2,380
0 CSOs 2050 5-Year Storm	$ 999	→	$ 2,433
0 CSOs 2050 25-Year Storm	$ 999	→	$ 2,462

Historic Sewer System Household Charges

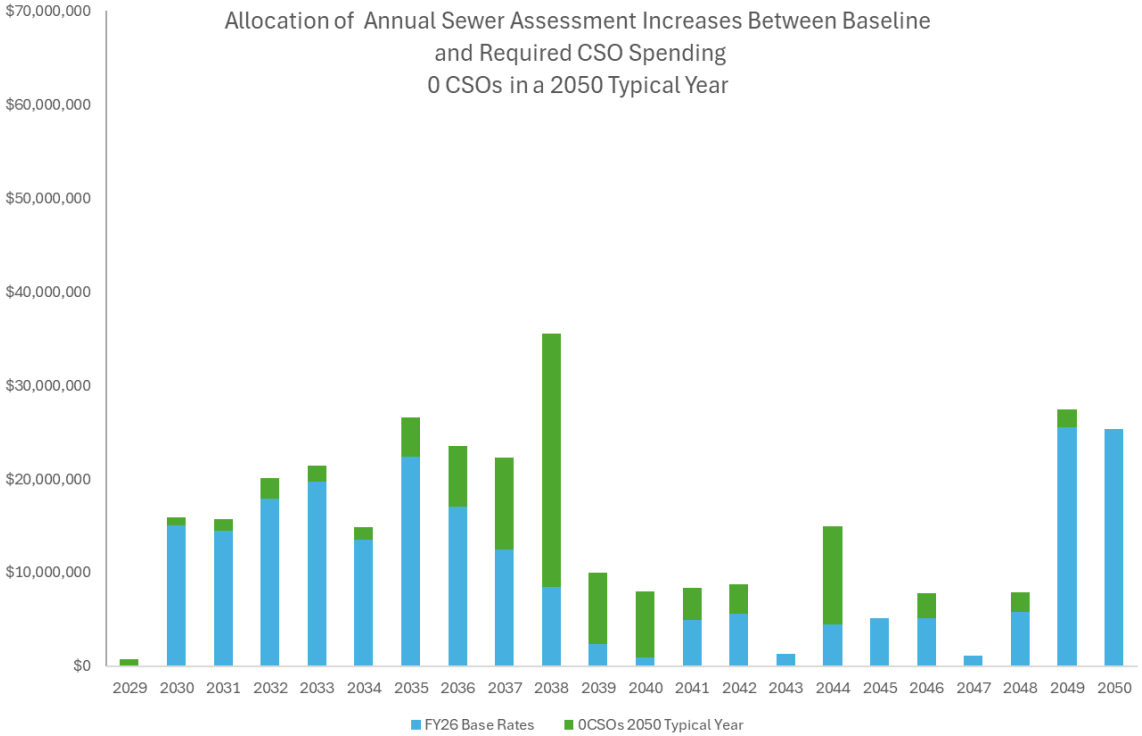
	2002		2026
Historical Household Charges	$ 286	→	$ 884

Long-Term Assessment Management

- MWRA has worked closely with its Advisory Board to provide predicable and sustainable annual assessments to member communities.
- Actively manage operating costs by reducing headcount, pursuing operational efficiencies, consolidating facilities and pursuing green energy and other efficiencies.
- Given historic pressures from capital spending, MWRA established five-year spending caps on capital spending.
- Managing debt service costs through bond structuring, refunding for interest rate savings, defeasances and maximizing subsidized borrowing from the SRF.
- Active budget management has reduced actual and projected spending between FY22 and FY26 by $168.6 million.

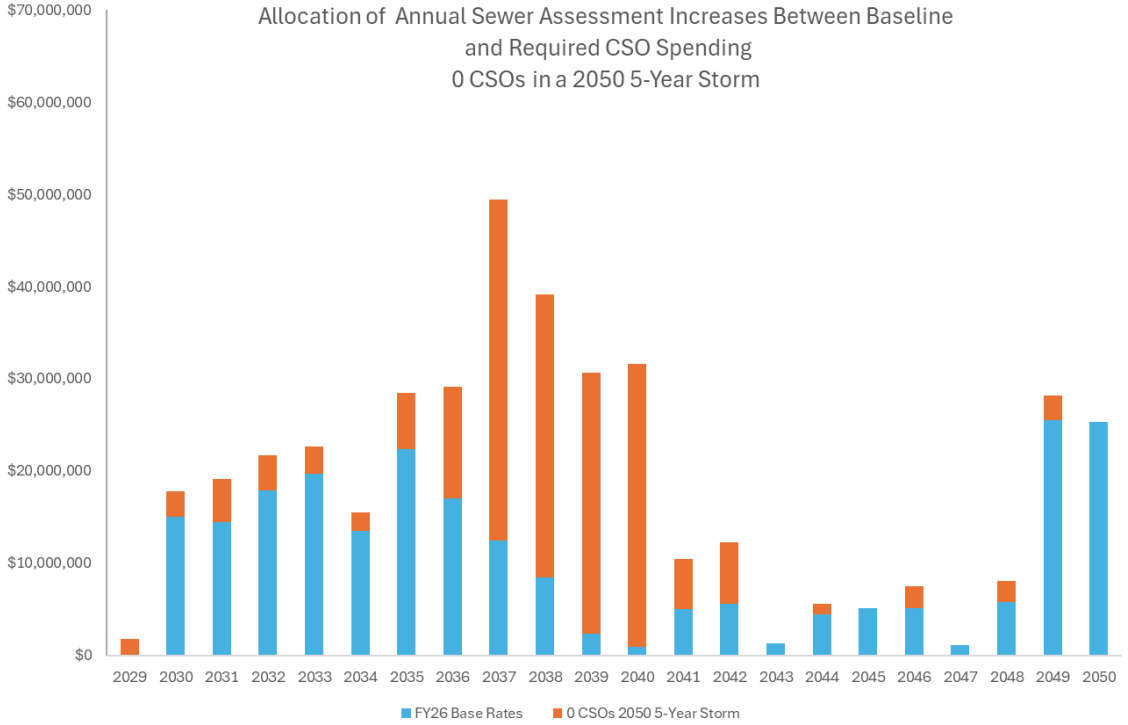
Long Term Assessment Management – 2050 Typical Year

- Historically 64% of total Capital Spending has been on mandated or regulatory required projects which limits MWRA's ability to manage assessments.



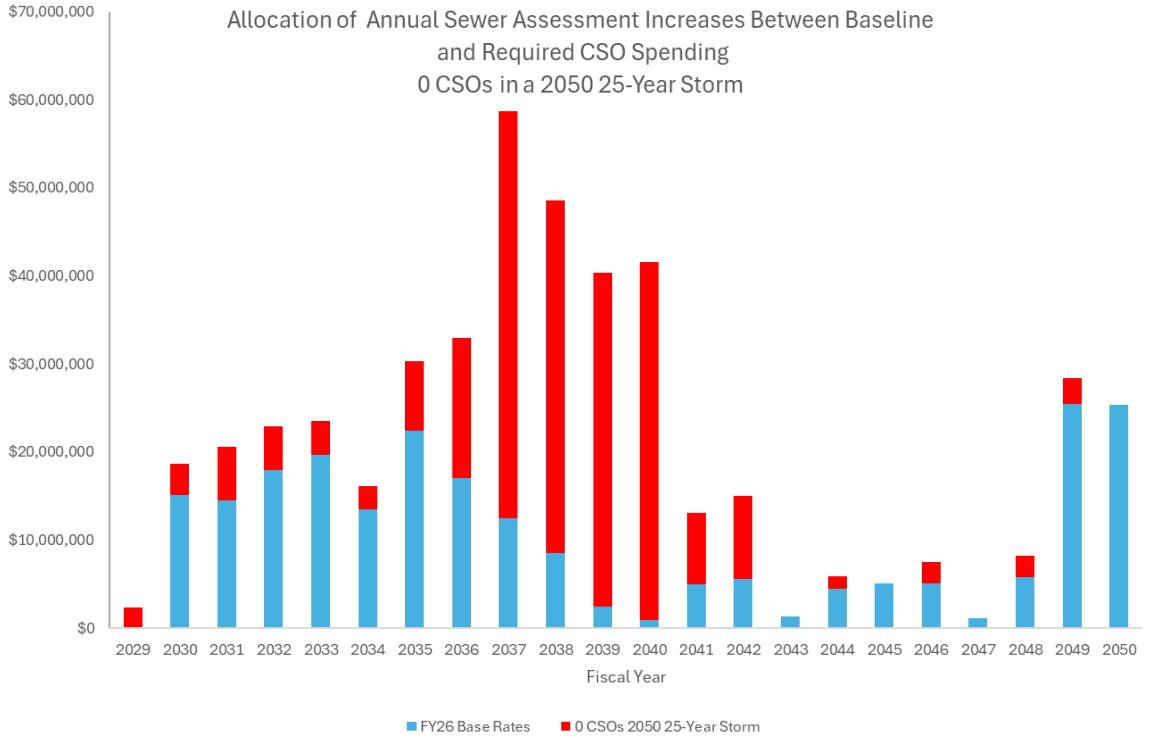
Long Term Assessment Management – 2050 5-Year Storm

- Historically 64% of total Capital Spending has been on mandated or regulatory required projects which limits MWRA's ability to manage assessments.



Long Term Assessment Management – 2050 25-Year Storm

- Historically 64% of total Capital Spending has been on mandated or regulatory required projects which limits MWRA's ability to manage assessments.



Long Term Assessment Management

- Large portions of the Sewer System spending driven by mandated spending will limit MWRA's flexibility in managing rates.
- To ensure sustainable and predictable future assessment MWRA will have to limit non-mandated spending.
- 35 of the 43 communities in the Sewer System receive all or a portion of their water from MWRA's Waterworks System.
- In FY26, the ratepayers in those 35 communities account for 88% of MWRA's total combined water and sewer revenue.
- All operating expenses will have to be reviewed to reduce spending levels.
- All capital spending would have to be reprioritized with some projects being delayed or cancelled.

Top 5-Sewer Assessment Communities by Dollar Value

- The ratepayers in these five communities paid 46% of MWRA's combined water and sewer assessment in FY26.

Community	2050 Typical Year	2050 5-Year Storm	2050 25-Year Storm
Boston Water and Sewer Commission	$ 272,890,957	$ 623,963,011	$ 817,409,406
Cambridge	$ 51,309,999	$ 117,319,906	$ 153,692,436
Newton	$ 42,316,678	$ 96,756,748	$ 126,754,110
Quincy	$ 40,544,196	$ 92,703,982	$ 121,444,870
Somerville	$ 32,113,415	$ 73,427,068	$ 96,191,562
Total	**$ 439,175,244**	**$ 1,004,170,716**	**$ 1,315,492,384**

Bottom 5-Sewer Assessment Communities by Dollar Value

Community	2050 Typical Year	2050 5-Year Storm	2050 25-Year Storm
Westwood	$ 5,806,459	$ 13,276,423	$ 17,392,494
Wilmington	$ 5,653,609	$ 12,926,933	$ 16,934,652
Ashland	$ 5,178,768	$ 11,841,213	$ 15,512,328
Hingham Sewer District	$ 3,781,879	$ 8,647,236	$ 11,328,126
Holbrook	$ 3,564,510	$ 8,150,224	$ 10,677,027
Total	**$ 23,985,226**	**$ 54,842,028**	**$ 71,844,627**

Next Steps

Next Steps

Early 2026 Activities

- Present Recommended Control Level to MWRA BOD Feb. 4th for each Waterbody
- Request MWRA BOD Approval to move forward with Draft Plan
- Draft recommended plan due to EPA and DEP April 30, 2026

Further 2026 Activities

- Public mtg #7 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


WATER RESOURCES AUTHORITY
MASSACHUSETTS