Updated CSO Control Plans: Alternatives Screening and Affordability Analyses

January 22, 2025

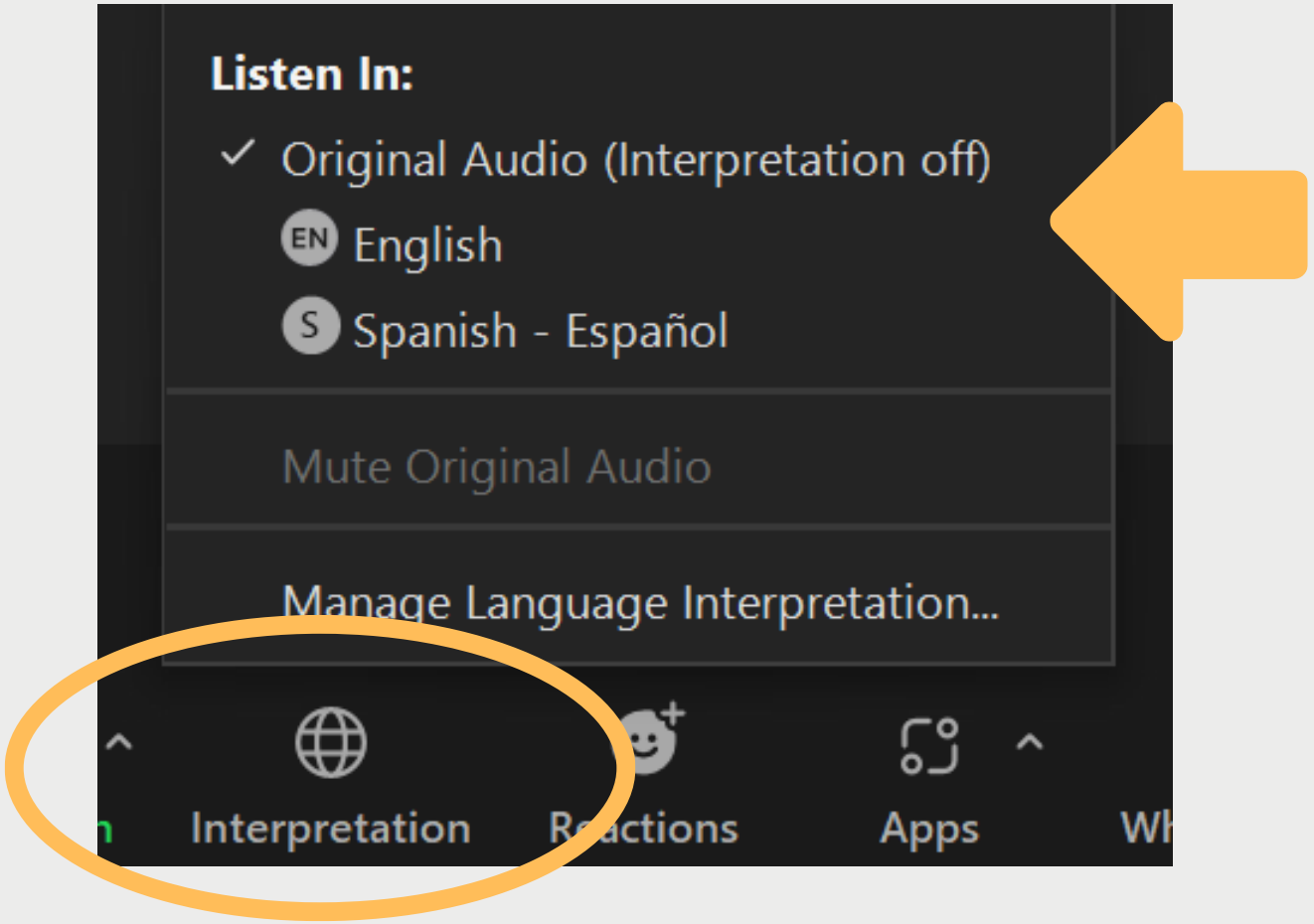
Interpretation

SOMERVIVA

OFFICE OF IMMIGRANT AFFAIRS

WE SPEAK YOUR LANGUAGE
HABLAMOS SU IDIOMA
FALAMOS A SUA LÍNGUA
NOU PALE LANG OU
हामी तपाईंको भाषा बोल्दछौं।
我们会说您的语言

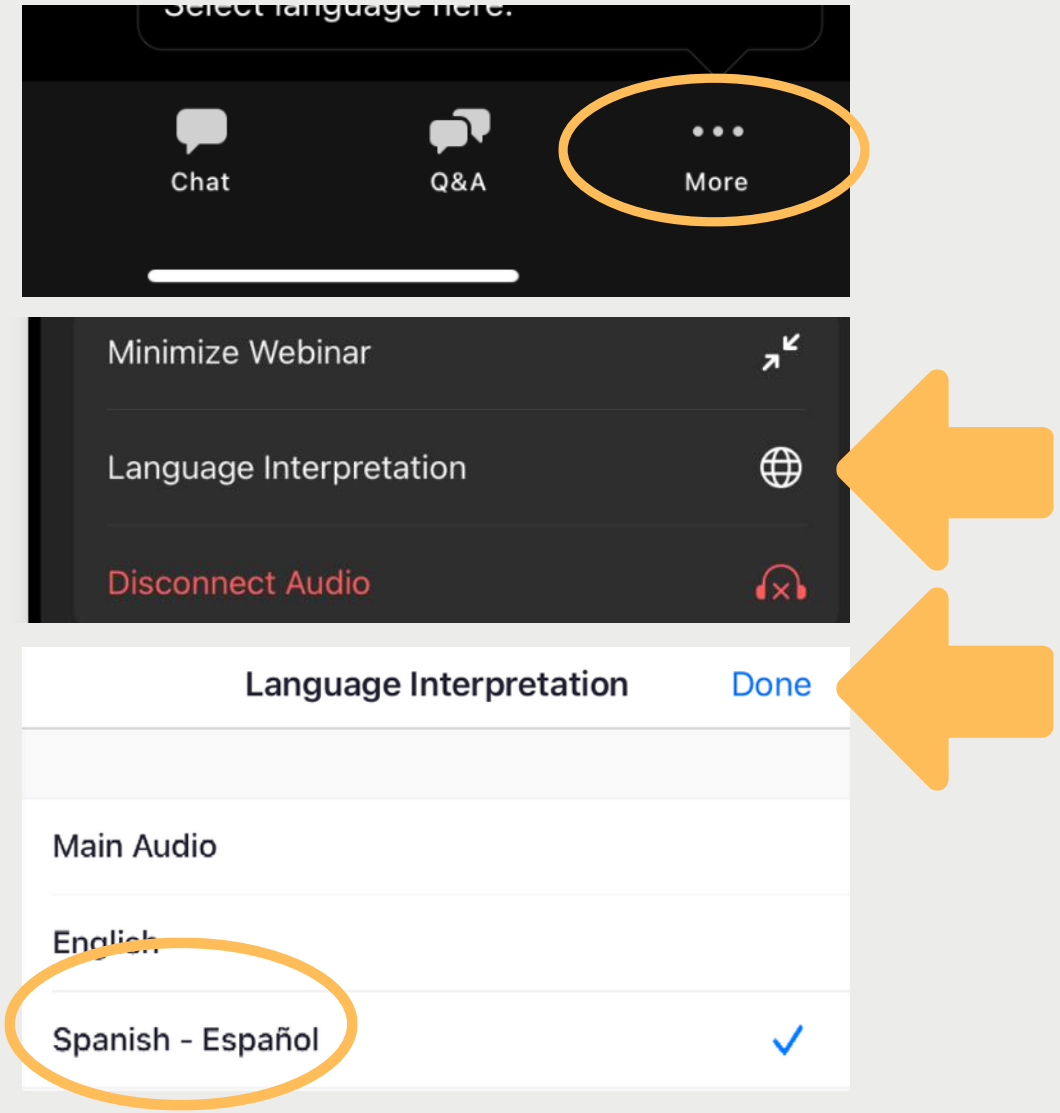
Interpretation on a computer



Click on the globe symbol in the bottom right corner of your screen.

Select the option for the language you speak.

Interpretation on a smartphone



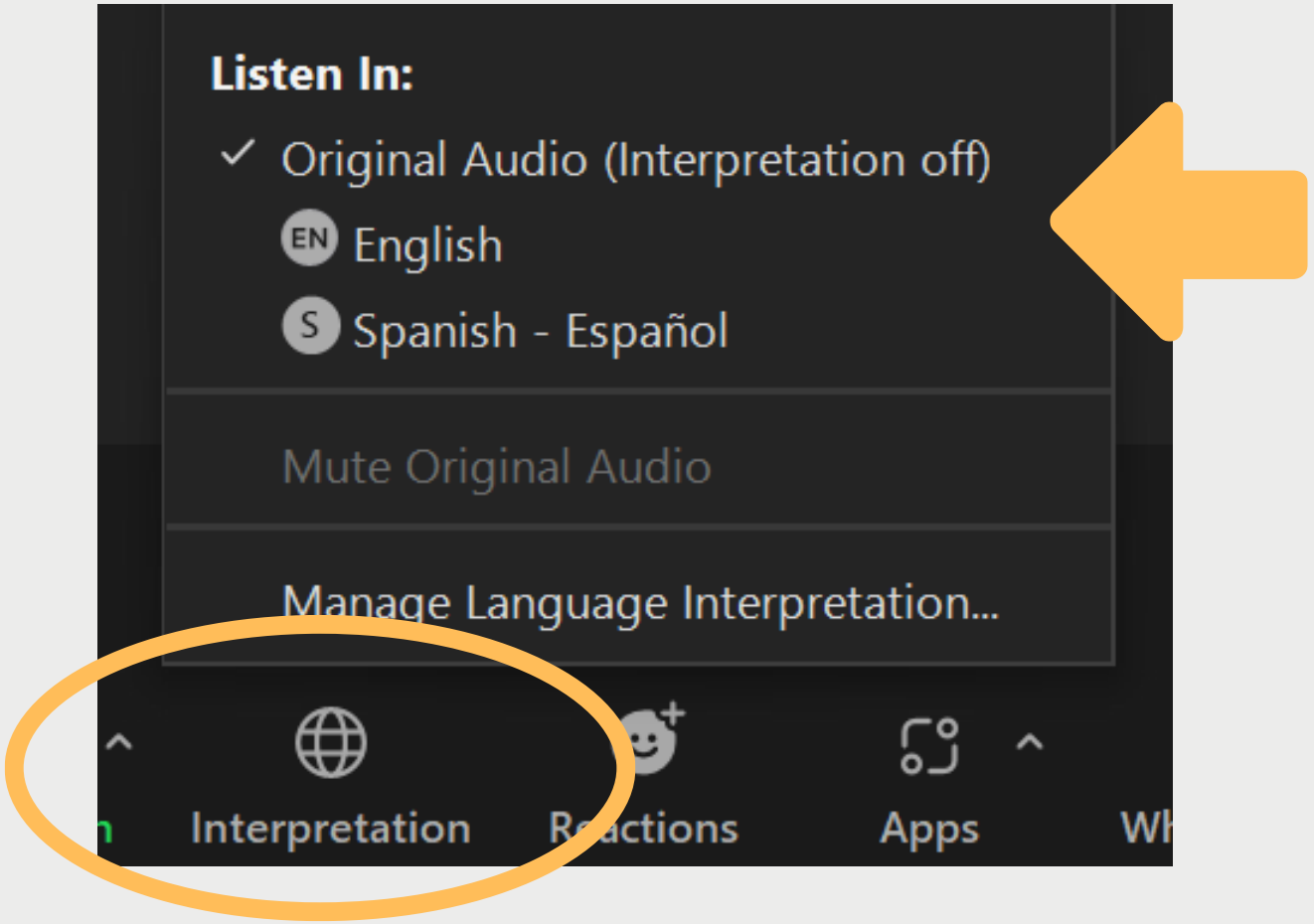
Click on the three dots in the bottom right corner of your screen.

Select the option with the globe symbol.

Select your language. Press "Done" in the top right corner.

Interpretación

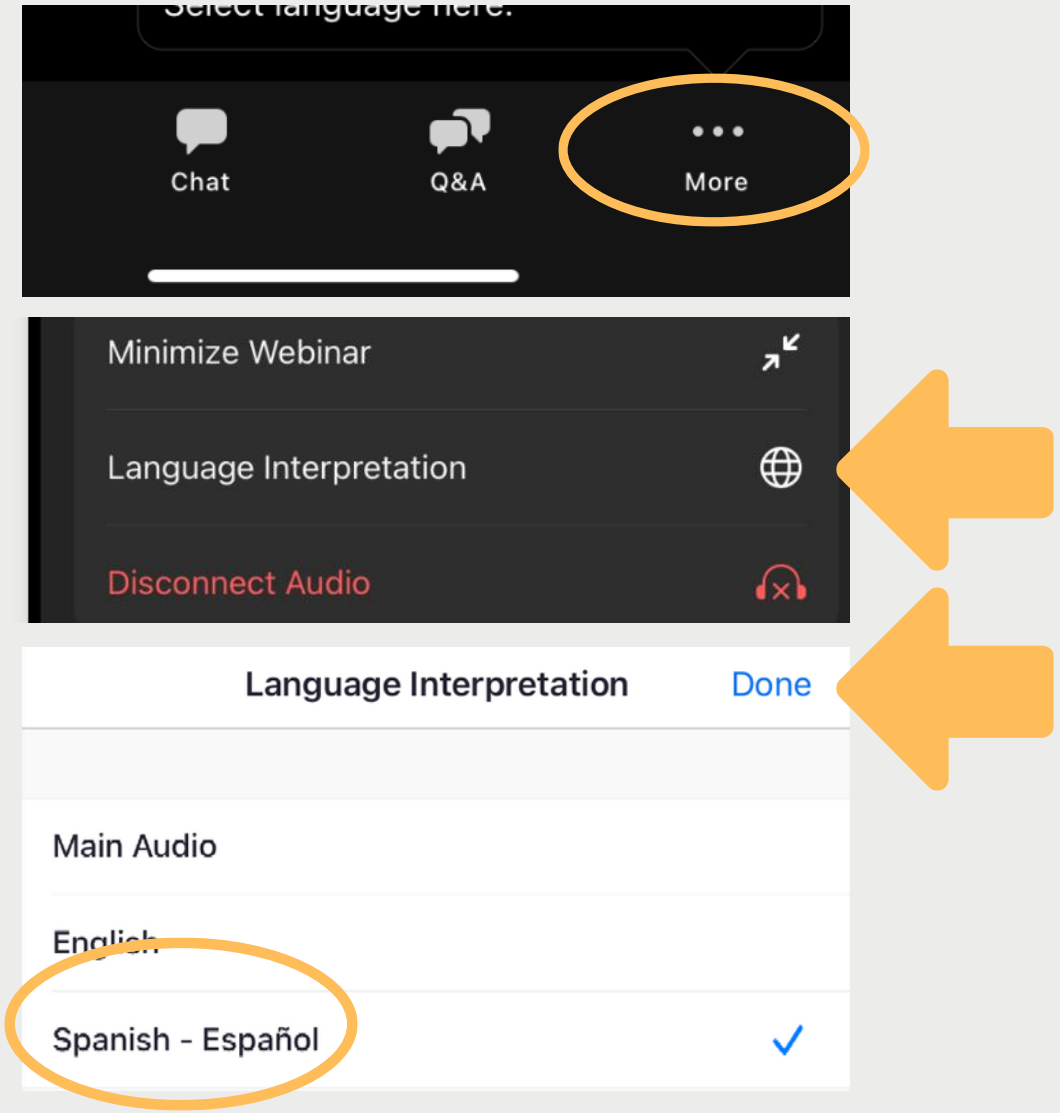
Interpretación en una computadora



Haga clic en el globo terráqueo ubicado en la esquina derecha abajo de su pantalla.

Seleccione la opción para el lenguaje que usted habla.

Interpretación en un teléfono inteligente



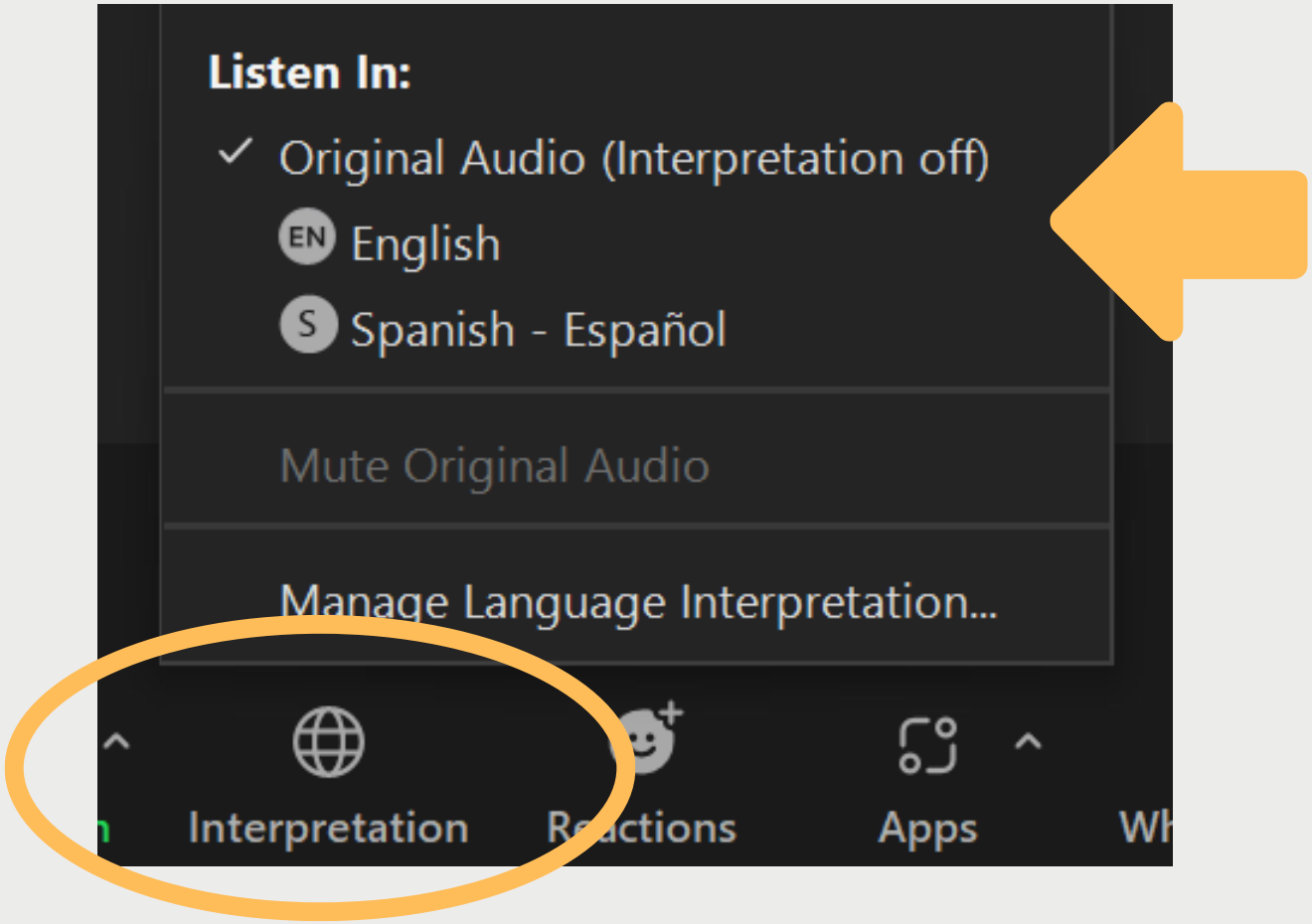
Haga clic en los tres puntos ubicados en la esquina derecha abajo de su pantalla.

Seleccione la opción con el símbolo de globo.

Seleccione su lenguaje. Presione “Done” arriba en la esquina derecha de su pantalla.

Interpretación

ترجمة عبر جهاز الكمبيوتر

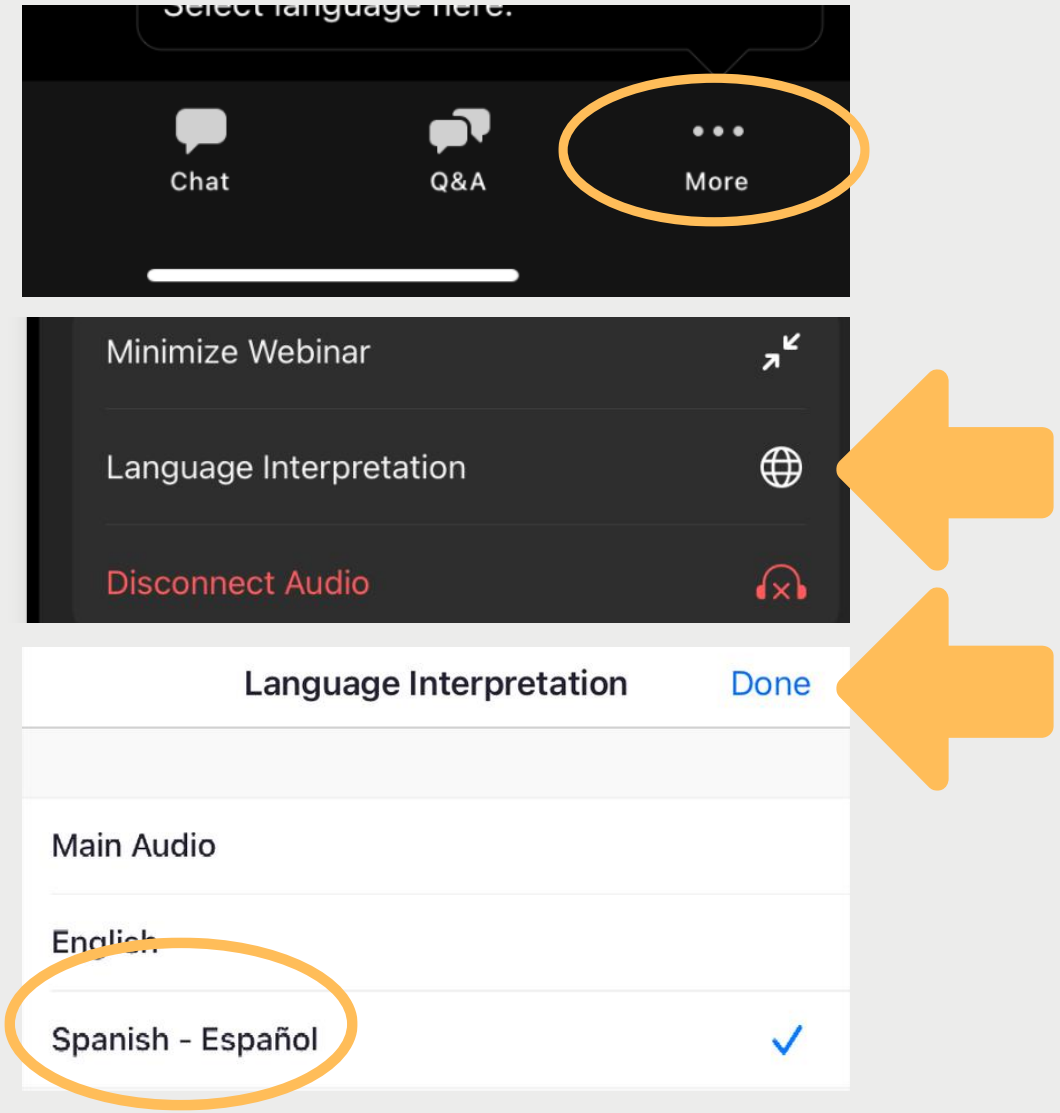


إضغط على رمز الكرة الأرضية في أسفل الجانب اليمين من الشاشة.

حدد خيار اللغة التي تتحدثها.

SOMER VIVA

ترجمة عبر الهاتف الذكي



حدد الخيار باستخدام رمز الكرة الأرضية.

حدد لغتك.
إضغط على "Done" (إنتهى) في أعلى الجانب اليمين.

SOMER VIVA

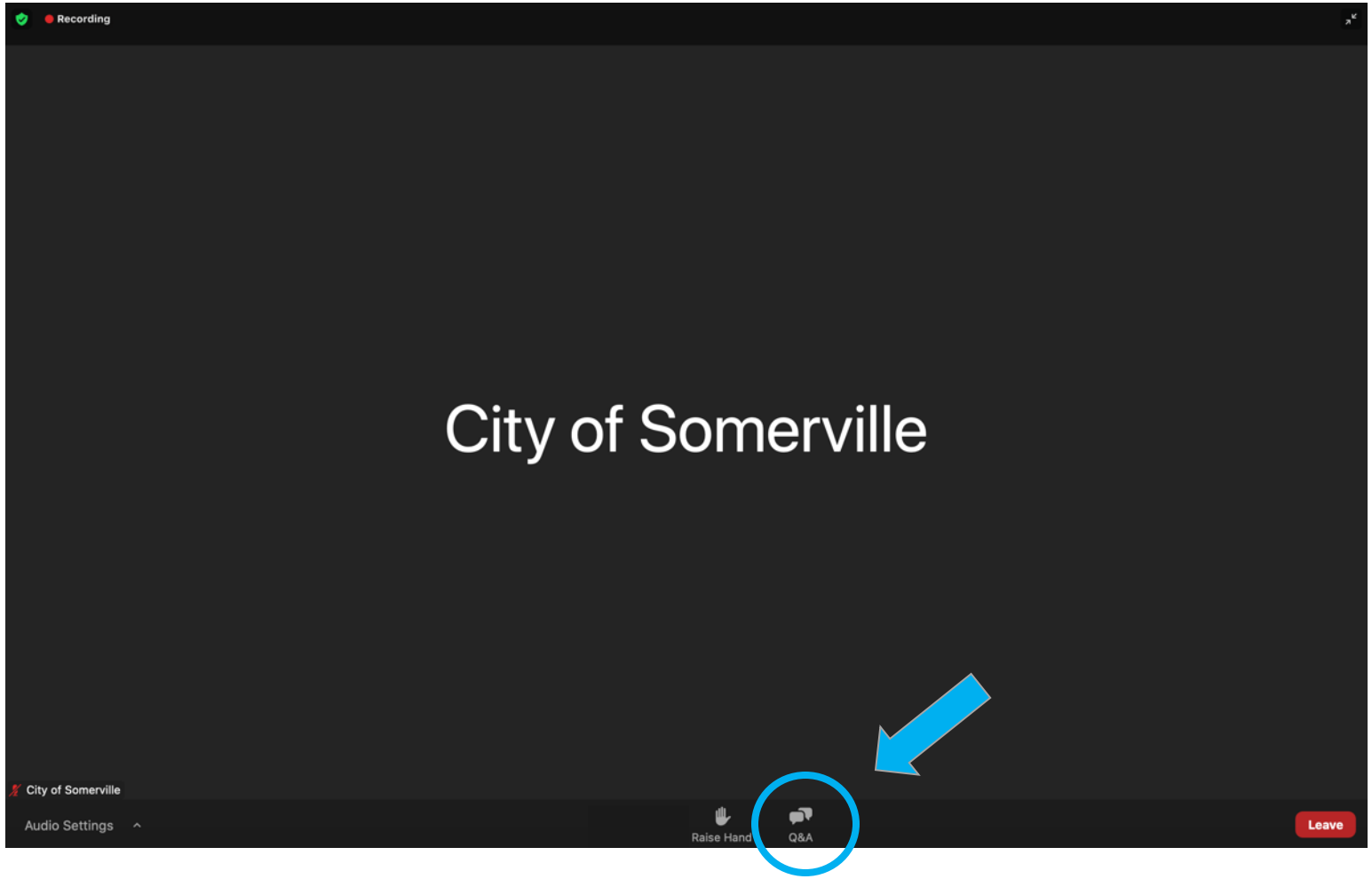
Interpretation will now begin

Meeting Guidelines

- The meeting is being **recorded**.
- We will have time for **questions & answers** (Q&A) following each presentation.
  - We will prioritize questions pertaining to the presentation topic.
  - We will do our best to answer as many questions as possible. We will likely not get to every question given the anticipated high number of participants.
- Post any technical issues in the Q&A.

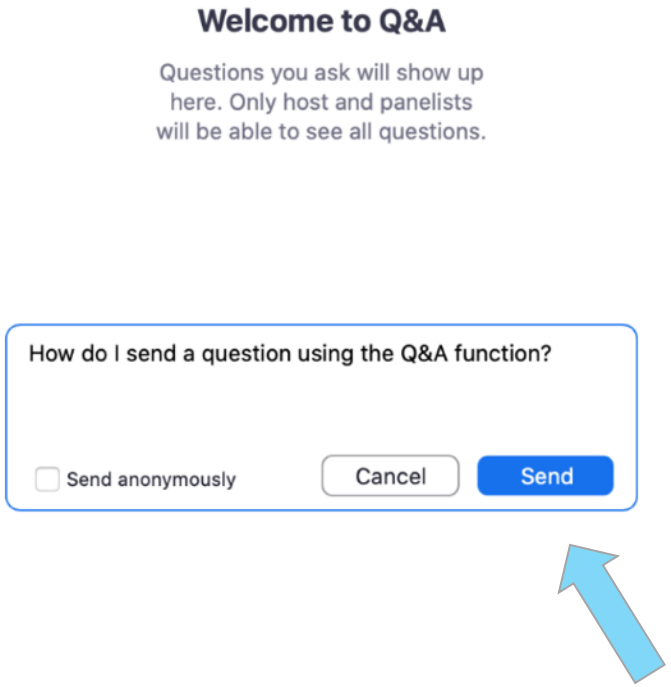
Please pace your speech to allow our interpreters time to translate.

How to Use Zoom's Q&A Function



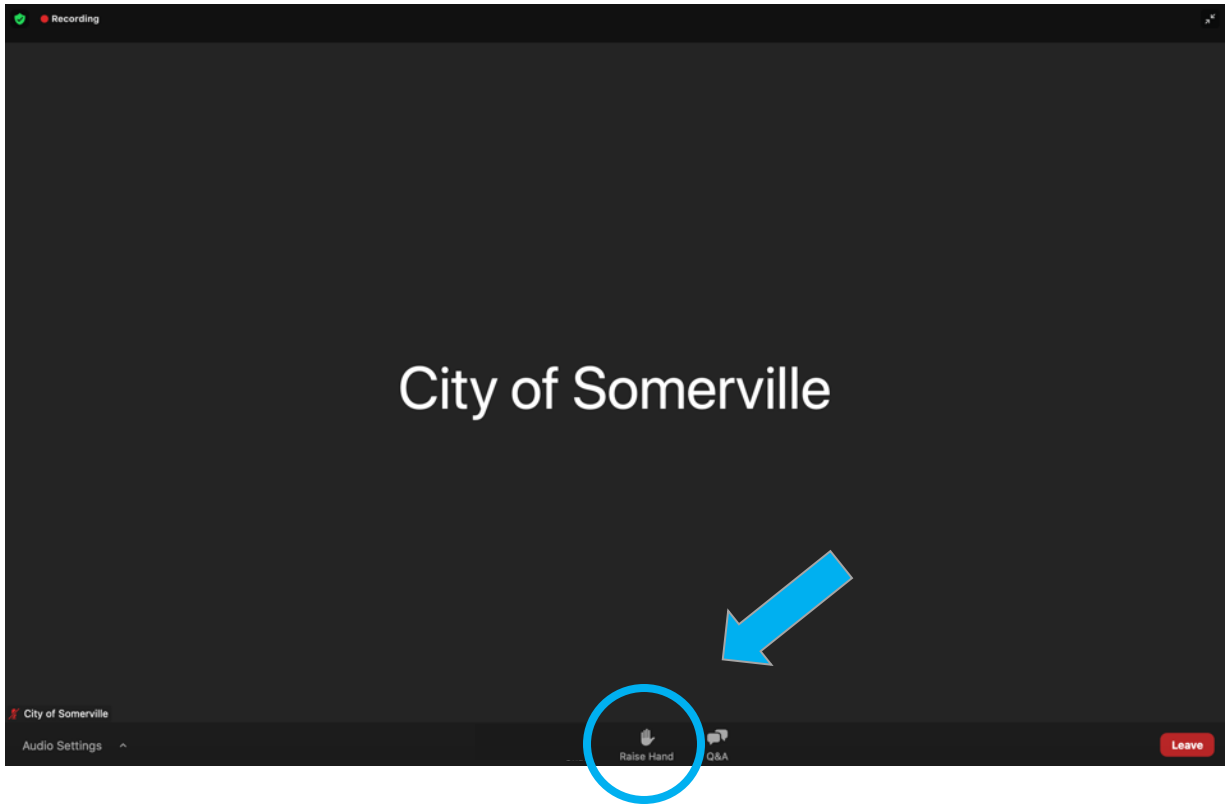
Click the "Q&A" button in the webinar controls bar

Type your question in the bottom of the Q&A window. Click "Send" to submit your question

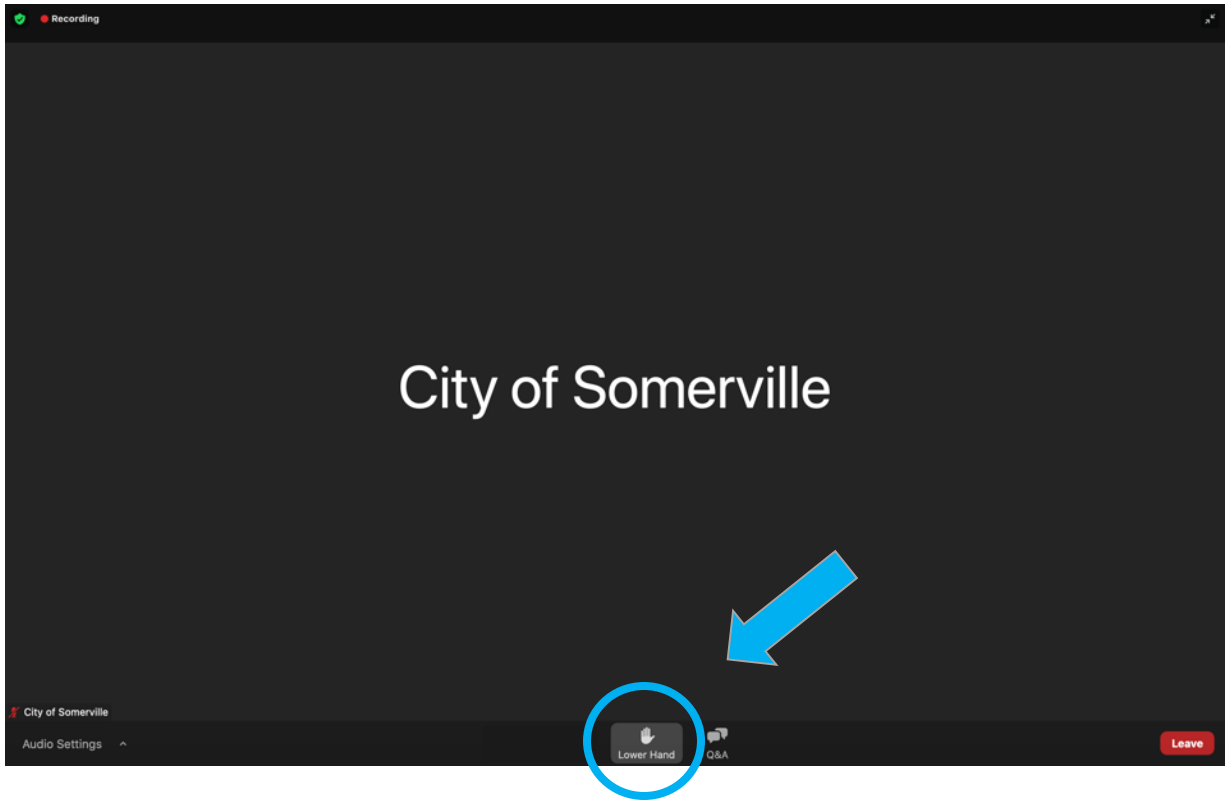


How to Raise Your Hand to Ask a Question

Click the “Raise Hand” button on the webinar controls toolbar



When your question has been answered, click “Lower Hand”



If you are calling in: Dial *9 to raise your hand
Dial *6 to unmute and mute

Updated CSO Control Plans: Alternatives Screening and Affordability Analyses

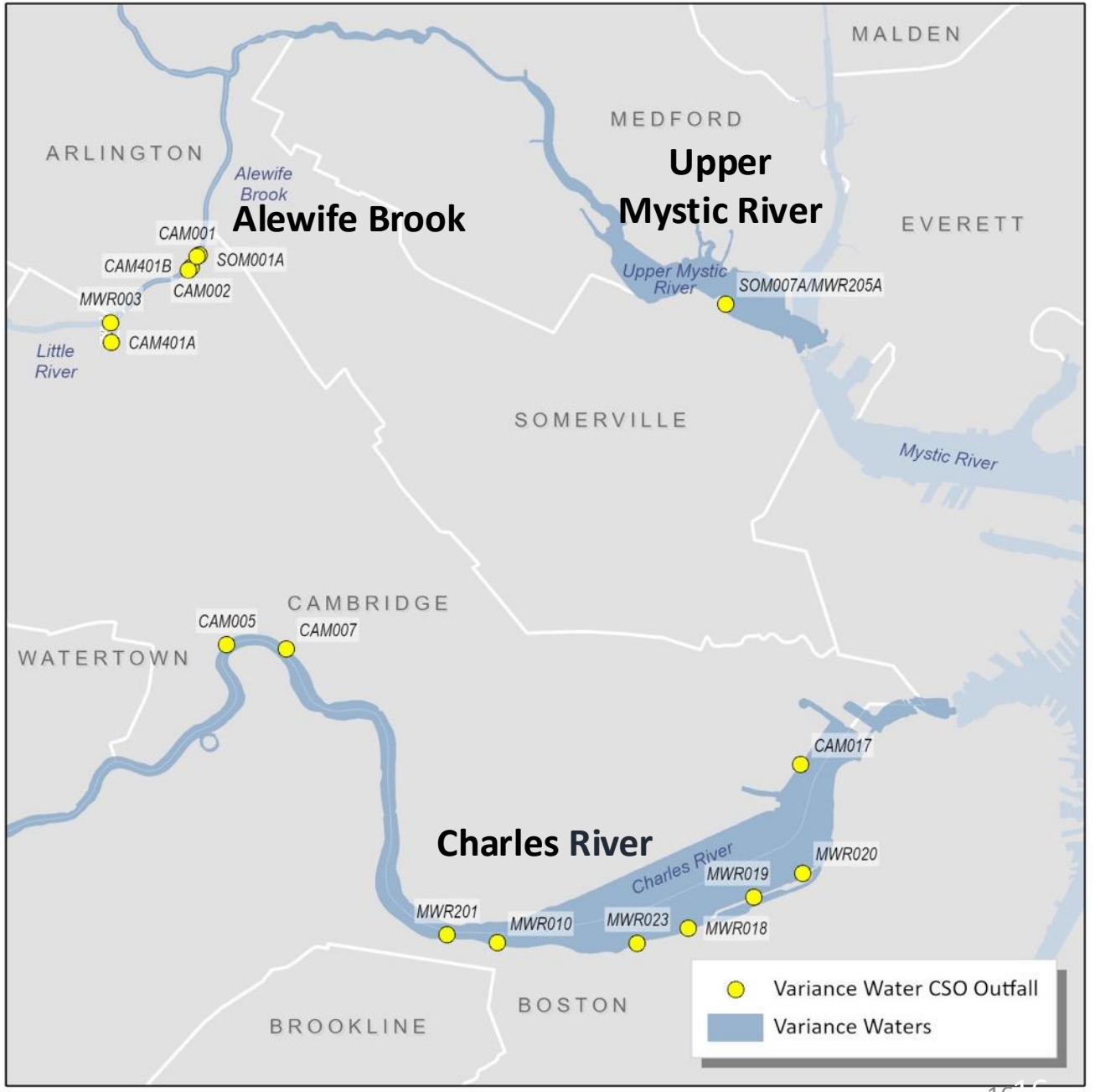
January 22, 2025

Project Partners

City of Somerville

City of Cambridge

Massachusetts Water Resources Authority (MWRA)



https://voice.somervillema.gov/joint-cso-planning

Tonight's Agenda

6:00 PM	**Welcome & Meeting Overview**
6:10	**Overview of the Updated Combined Sewer Overflow (CSO) Control Plans Process and Regional Effort**
6:25	**Alternatives Under Consideration to Reduce or Eliminate CSOs** *What is the process to developing alternatives? What alternatives are under consideration? What are some key alternatives being considered?*
7:10	**Financial Capability Assessment Process** *Where does the process come from? What is it? How is it calculated?*
7:50	**Next Steps & Wrap-up**
8:00	**Adjourn**

Panelists

City of Cambridge

Catherine Woodbury
Diane Stokes
Jim Wilcox
Lucica Hiller
Stef Harrison (Stantec)
David VanHoven (Stantec)
Indrani Ghosh (Weston & Sampson)

City of Somerville

Rich Raiche
Gina Cortese
Magdalena Gomez
Brian Postlewaite
Miles Bateman (Dewberry)

Massachusetts Water Resources Authority

Brian Kubaska
Jeremy Hall
David Wu
Erika Casarano (AECOM)
Don Walker (AECOM)

Resources & Previous Public Meetings

Project Website: www.voice.somervillema.gov/joint-cso-planning

Public meeting 1

June 29, 2022

Agenda:

- Introduction and orientation to the planning process
- Discussion

Public meeting 2

Dec 15, 2022

Agenda:

- CSO planning background
- Goals and priorities
- Typical Year development
- Community feedback session

Public meeting 3

Nov 15, 2023

Agenda:

- CSO Control Plans process
- CSO Control Toolbox
- Goals and priorities – participant feedback

Join at menti.com | use code 1985 8312

Instructions

Go to

www.menti.com

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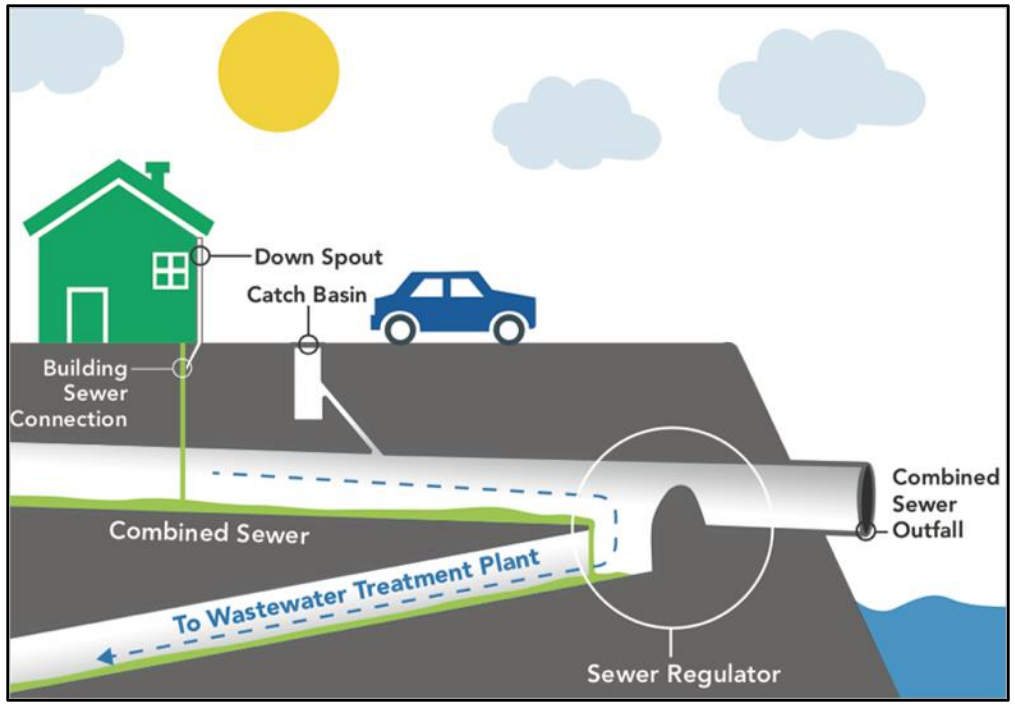
Or use QR code

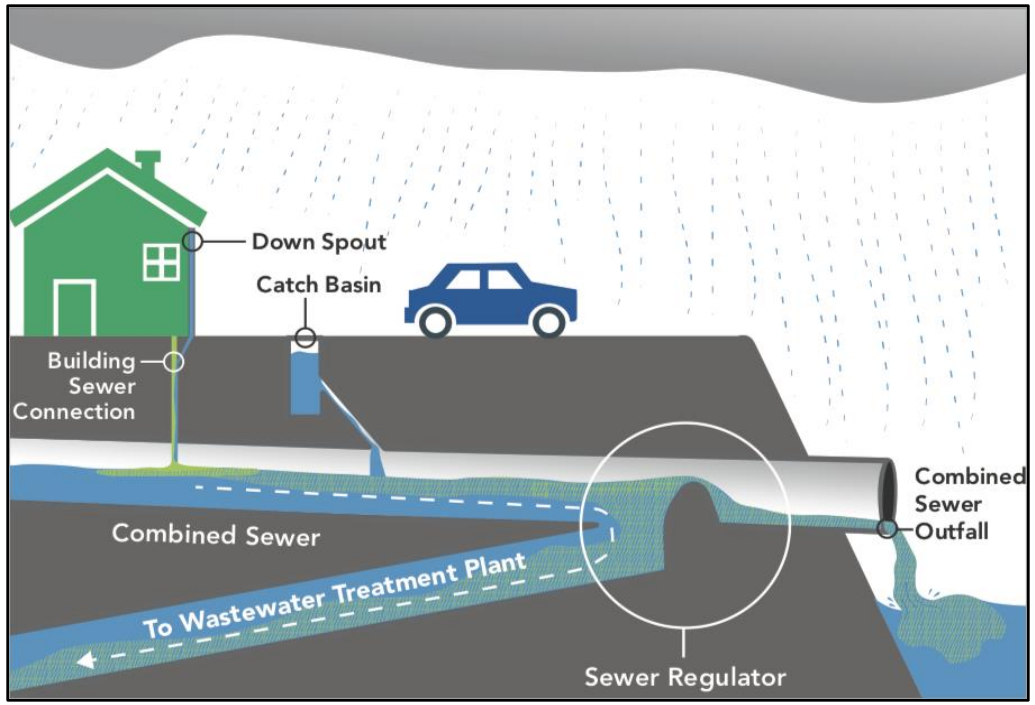
Overview of the Updated Combined Sewer Overflow Process and Regional Effort

What is a Combined Sewer Overflow (CSO)?

Combined System – No or Moderate Rain



Combined System – Heavy Rain

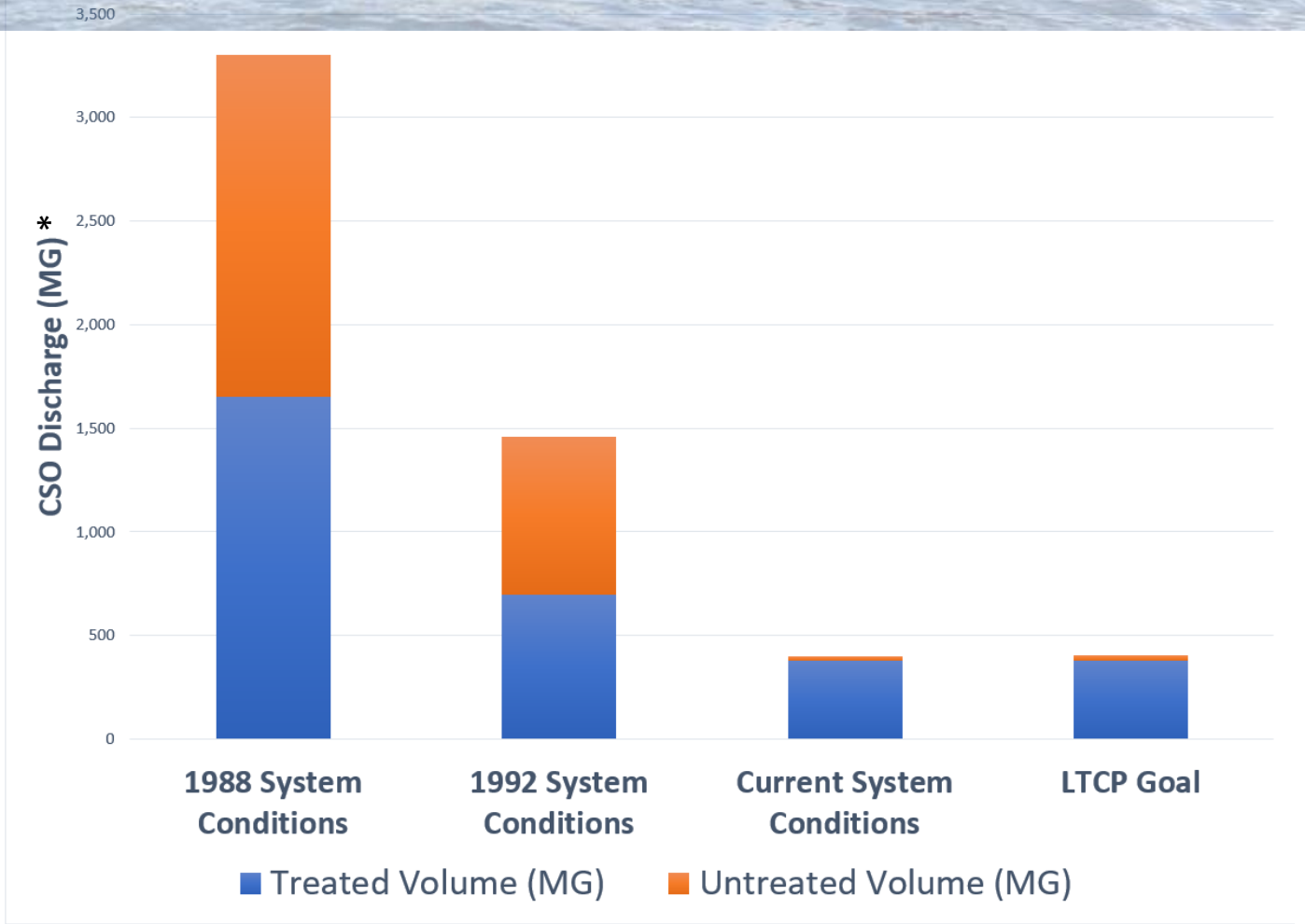


Sewage + Stormwater = Combined Sewer Overflows

System Wide CSO Reduction Since the Start of the CSO Program in the 1980s

Prior Long Term Control Plan

- System wide improvements including the Charles, Alewife, Mystic resulted in significant reductions in CSO discharge since 1980s.

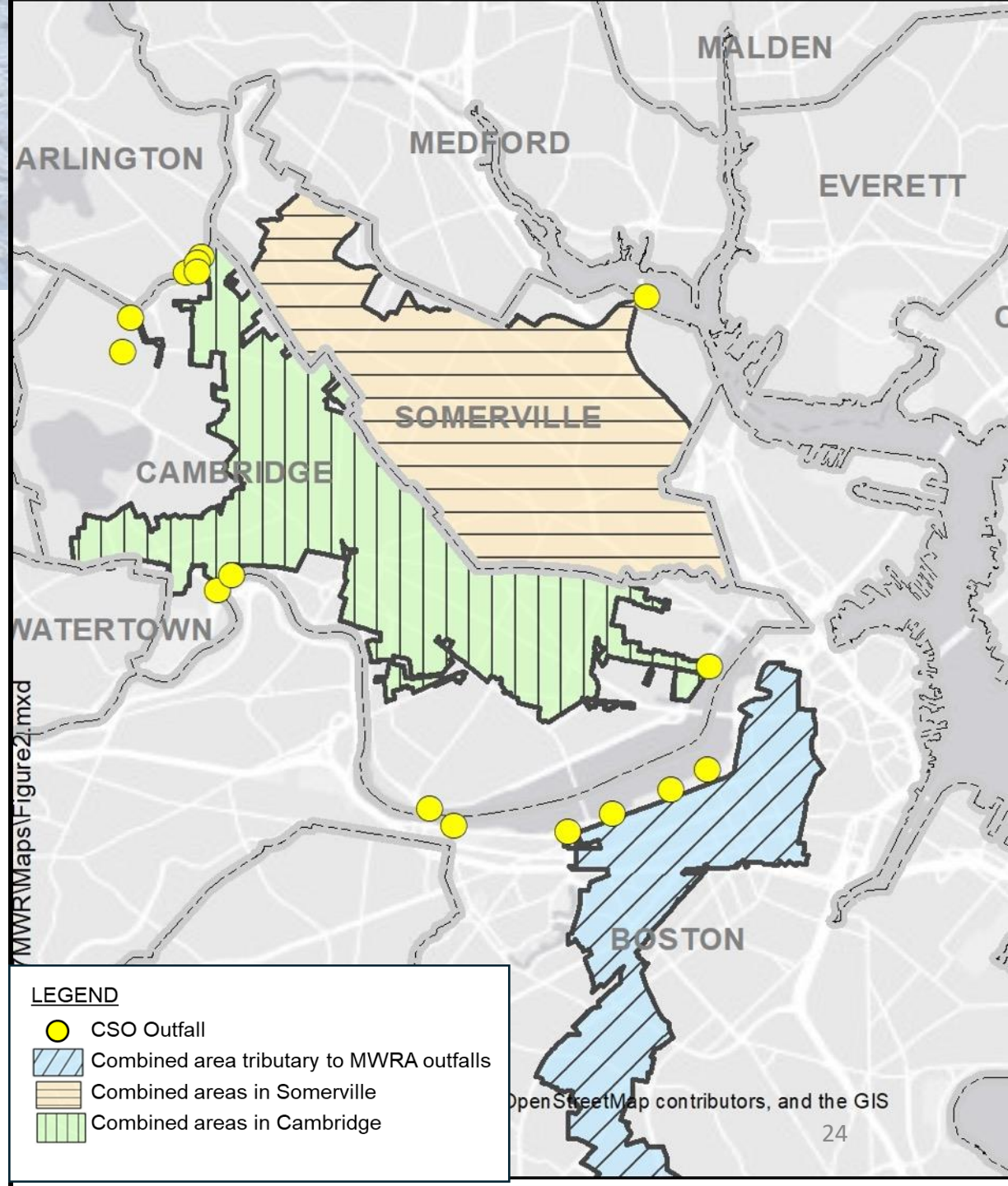


System Wide CSO Reduction Since the 1980s

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

What Are We Doing **Now** About CSOs?

- Cambridge, Somerville, and MWRA are developing Updated CSO Control Plans with the overall goal to reduce or eliminate CSOs.
- The new plans focus on the Charles River, Alewife Brook, and Upper Mystic River (the variance waters).
- New plans incorporate the impacts of climate change.



Updated CSO Control Plan Steps:

1) 2050 Typical Year & 2050 Design Storms

2) Unify Hydrologic & Hydraulic models

3) Create alternatives:

a) Identify scenarios to evaluate CSOs
- 2050 Typical Year
- 2050 5-yr
- 2050 25-yr

b) Combine CSO tools to develop various alternatives

c) Optimize regionally for each variance water

Step 3b Zoom In: CSO Reduction Tools

Sewer Separation

Green Stormwater Infrastructure

Inflow/infiltration reduction

Storage

Conveyance

Updated CSO Control Plan Steps:

4) Develop conceptual layouts and preliminary cost estimates

5) Compare alternatives using weighted criteria

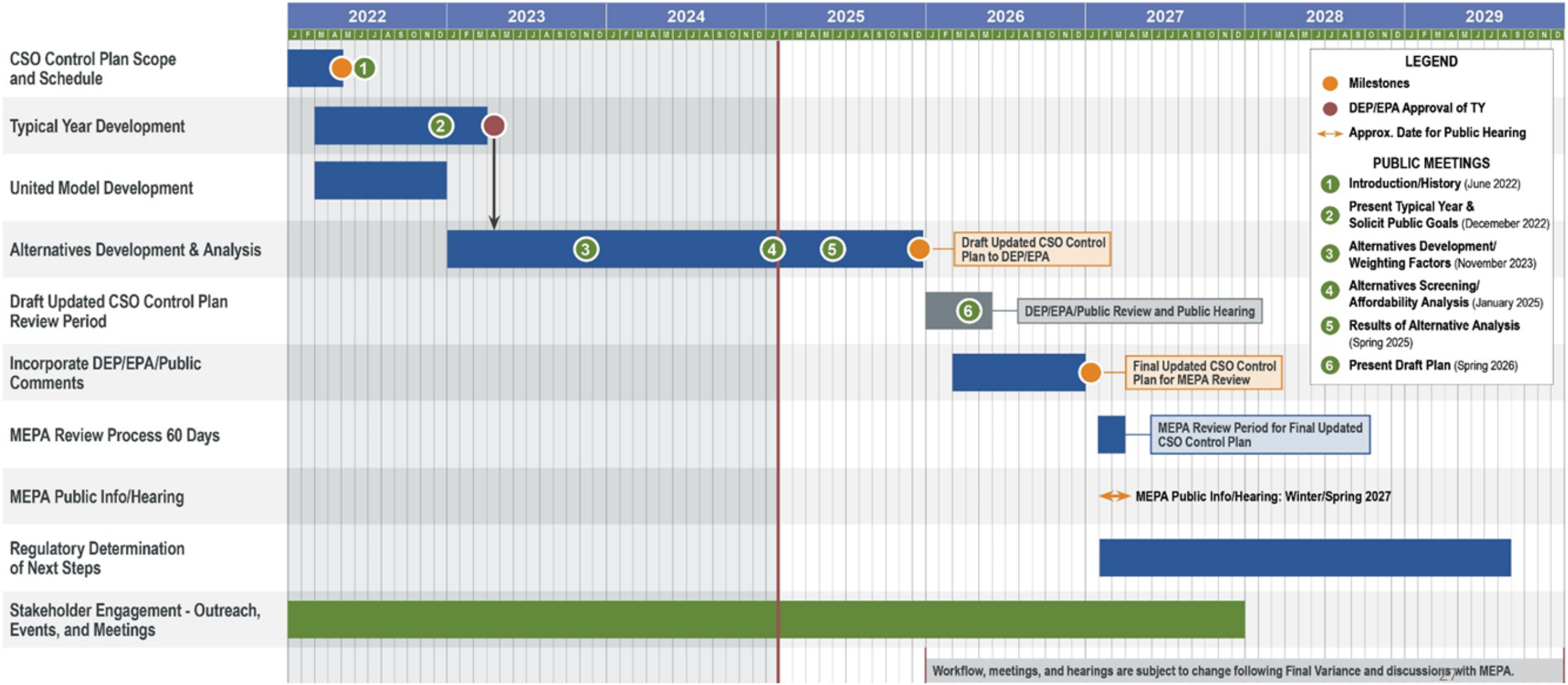
6) Assess Initially Preferred Alternative(s) for:
- Financial Capability Assessment
  - Impact to rate payers
  - Implementation schedule
- Compliance with Water Quality standards
  - What is the highest attainable use without a widespread economic or social impact?

7) Develop Draft Updated CSO Control Plan(s)

Step 5 Zoom In: Alternatives Evaluation Preliminary Criteria

Reduce/eliminate combined sewer overflows
Reduce flooding and flooding impacts
Reduce sanitary sewer overflows
Improve water quality
Rehabilitate old infrastructure (pipes, facilities)
Improve resilience of our infrastructure to future climate conditions
Improve service to low income and minority communities
Offers community co-benefits (e.g., green space, gathering space, heat reduction)
Minimize neighborhood disruption during construction
Minimize costs to ratepayers / taxpayers
Other criteria based on public feedback

Updated CSO Control Plan Schedule



Updated 1/02/2025

Alternatives Under Consideration to Reduce or Eliminate CSO

What is the process to developing alternatives?
What alternatives are under consideration?
What are some key alternatives being considered?

CSO Reduction Tools Included in Alternatives Development

CSO Reduction and Elimination Tools

Sewer Separation

Green Stormwater Infrastructure

Inflow/infiltration reduction

Storage

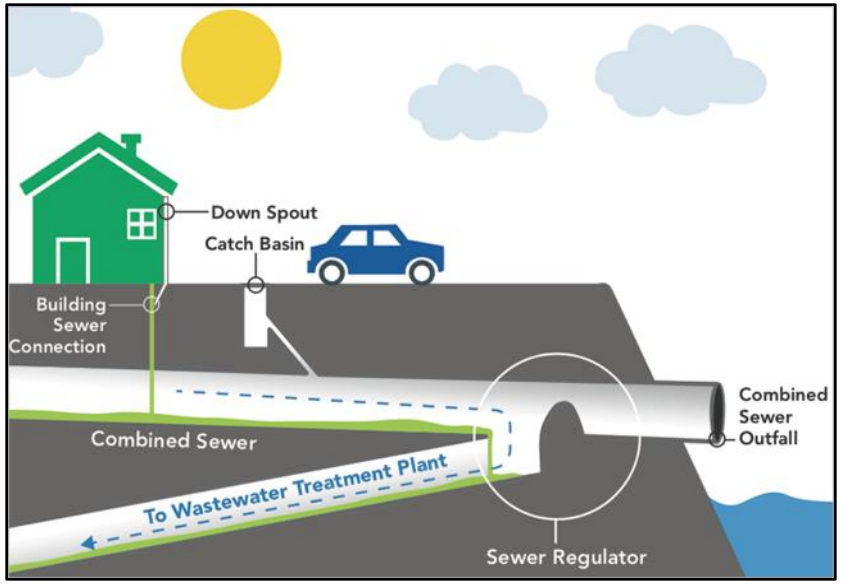
Conveyance

https://voice.somervillema.gov/joint-cso-planning

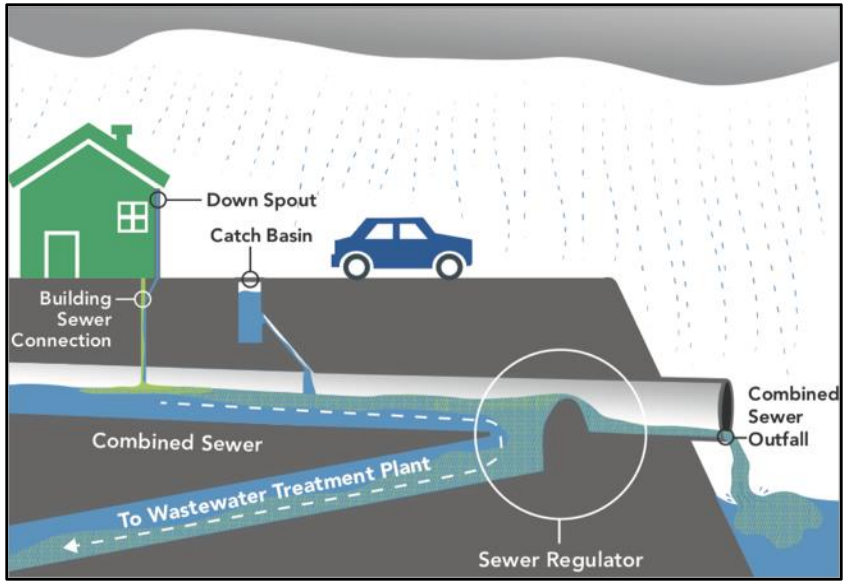
Reducing CSOs Tool: **Sewer Separation**

- Build separate/ parallel pipe networks
- Removes stormwater from combined system into a separate pipe
- All stormwater discharges directly to river untreated

Combined System

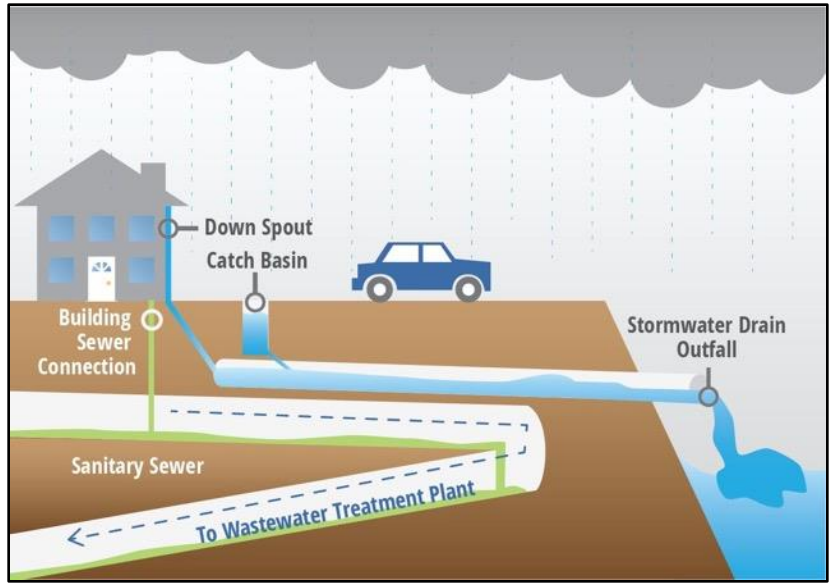


No or Moderate Rain



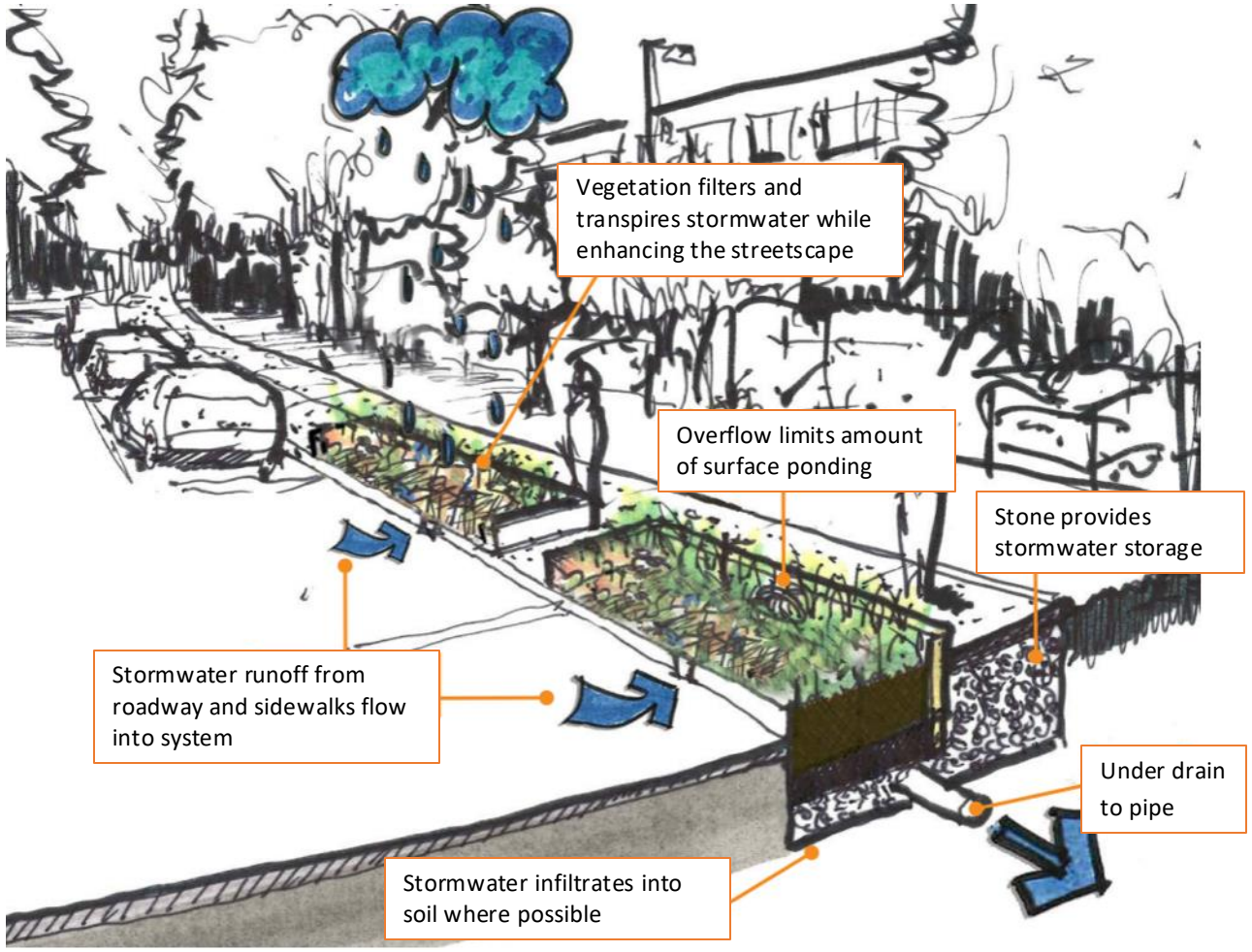
Heavy Rain

Separate System



Any Rain

Reducing CSOs Tool:
Green Stormwater Infrastructure



- Captures/infiltrates some of the stormwater runoff before it enters the pipe network system
- Can treat stormwater to reduce pollutants

Stormwater Bumpout on Somerville Ave, Somerville (200 sf footprint, 250 cf storage)

Reducing CSOs Tool: **Infiltration/Inflow Reduction**

Fix old pipes to reduce groundwater and stormwater entering the pipe network

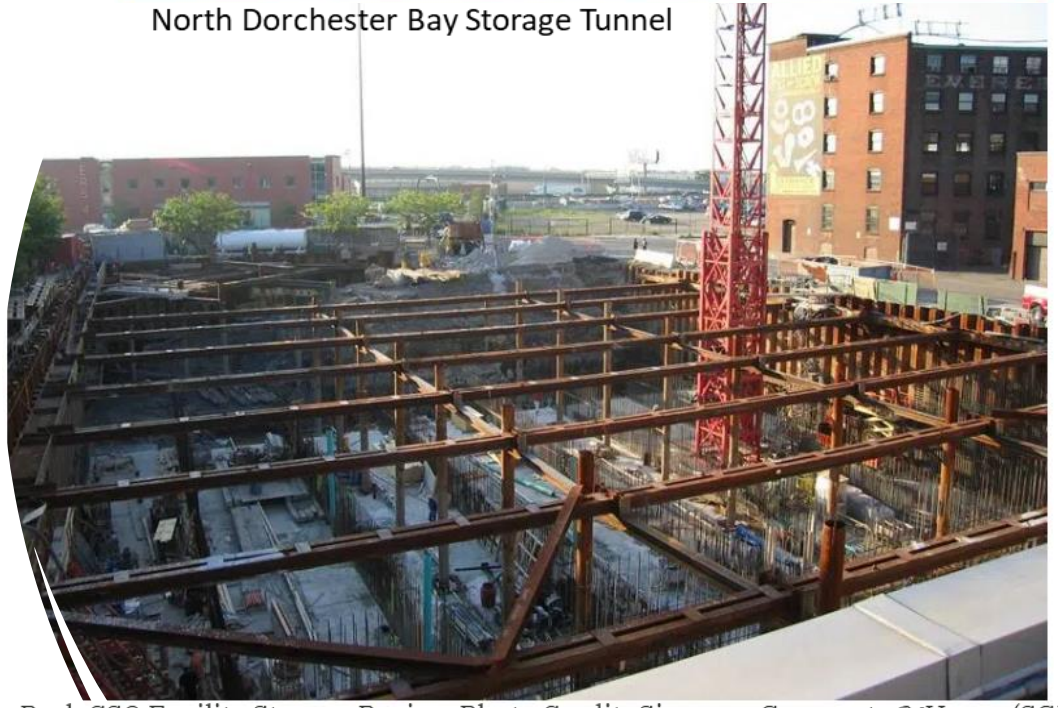
Reducing CSOs Tool: **CSO Storage**

Hold combined sewer overflows until after the storm by:

- Increasing pipe size
- Building a new storage tank or tunnel

Release it back to the system for full treatment at Deer Island Wastewater Treatment Plant.

North Dorchester Bay Storage Tunnel



Union Park CSO Facility Storage Basins: Photo Credit: Simpson Gumpertz &4Heger (SGH)
https://www.sgh.com/project/union-park-detention-facility/

Reducing CSOs Tool: **Conveyance**

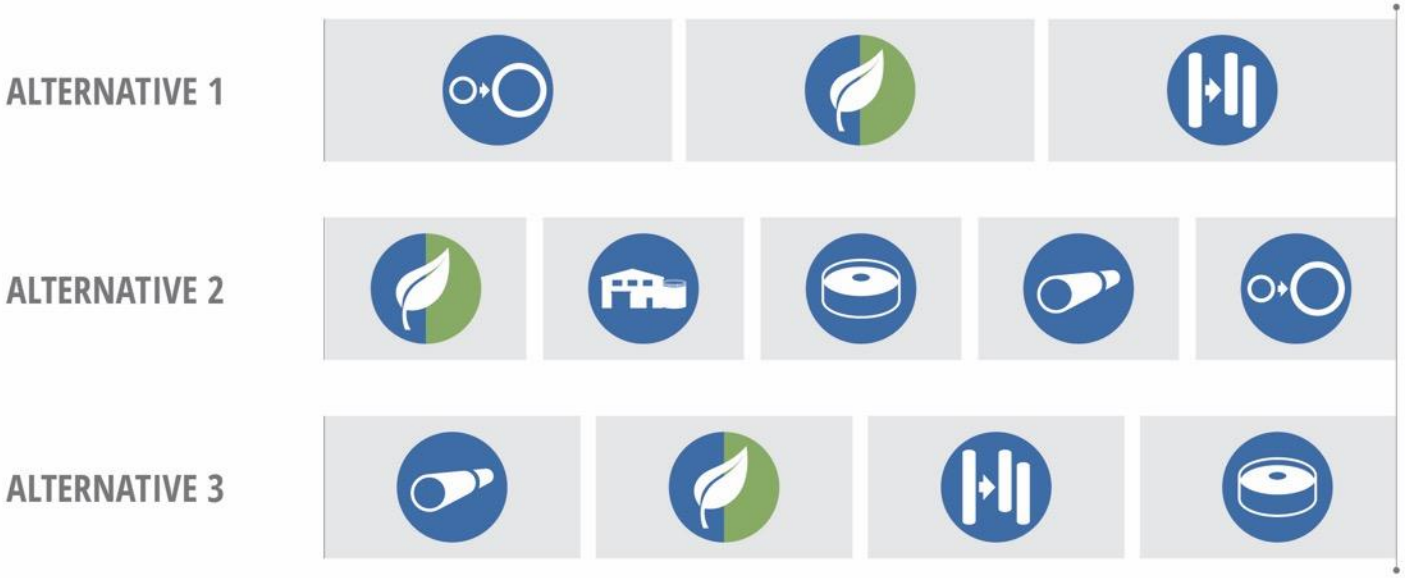
Improve the flow through the pipes by:

- Increasing pipe size
- Increasing size of pumps
- Improve pump station operations

Developing CSO Control Alternatives

What are CSO control alternatives?

A suite of CSO control tools that, in combination, meet a range of CSO reduction targets.



TOOLS ARE
THE BUILDING BLOCKS
FOR ALTERNATIVES.

Sewer separation
Green stormwater infrastructure
Inflow / infiltration reduction
Storage
Conveyance
Treatment

Alternatives Under Consideration & 3 Case Studies of Alternatives

Interim Progress: Alternatives Development Process

"TYPES" OF ALTERNATIVES

- **Integrated Alternative:** Individual projects by CSO outfall
- **Tunnels**
- **Regional Sewer Separation/ Green Stormwater Infrastructure (GSI)**
- **Hybrid:** Combination of the above concepts

LEVELS OF CSO CONTROL

- **2050 Typical Year**
  - Rainfall Depth (largest storm) = 3.3”
- **2050 5-year 24-hour Storm Event***
  - Rainfall Depth = 5.3”
- **2050 25-year 24-hour Storm Event***
  - Rainfall Depth = 7.8”

*As previously shared, a variety of tools can be complementary in the Typical Year, while storage is foundational for CSO control in 5-year and 25-year storm events.

2050 Design Storm CSO Activations and Discharge Volumes by Receiving Water

2050 Typical Year

- A full year of rain data that best represents rain over time
- A representative "average" year for planning, as rain changes from year to year
- For the Updated CSO Control plan a new Typical Year was developed to reflect future climate conditions

Design Storms

- 2050 5-Year 24-hour and 25-year 24-hour design storms were developed to reflect future climate conditions

Receiving Water	Future Baseline Condition Model Results						
	Activation Frequency		CSO Discharge Volume (MG)				
	Prior Typical Year	2050 Typical Year	Prior Typical Year	2050 Typical Year	2050 Largest Storm in the Typical Year	2050 5-year Storm	2050 25-year Storm
Charles River	3	6	7.9	38.4	16.6	65.5	120.6
Alewife Brook	8	13	9.9	20.9	4.84	20.9	40.1
Mystic River	2	8	1.3	29.3	10.5	17.4	27.2

Interim Progress: Preliminary List of Potential Alternatives

Waterway	2050 Typical Year	2050 5-year Storm	2050 25-year Storm
Charles	• Integrated Alternative by Outfall • Tunnel • Tunnel + GSI • Regional Sewer Separation/GSI* • Hybrid	• Tunnel • Tunnel + GSI • Hybrid	• Tunnel • Tunnel + GSI • Hybrid
Alewife	• Integrated Alternative by Outfall • Tunnel • Tunnel + GSI • Regional Sewer Separation/GSI* • Hybrid	• Tunnel • Tunnel + GSI • Hybrid	• Tunnel • Tunnel + GSI • Hybrid
Mystic	• Integrated Alternative by Outfall • Storage • Storage + GSI • Regional Sewer Separation/GSI* • Hybrid	• Storage • Storage + GSI • Hybrid	• Storage • Storage + GSI • Hybrid

*Regional sewer separation/GSI is shown for TY control; simulating full separation of all combined areas, CSOs/SSOs occur in a 5-year event.

Interim Progress: Preliminary List of Potential Alternatives

Waterway	2050 Typical Year	2050 5-year Storm	2050 25-year Storm
Charles	• Integrated Alternative by Outfall • Tunnel • Tunnel + GSI • Regional Sewer Separation/GSI* • Hybrid	• Tunnel • Tunnel + GSI • Hybrid	• Tunnel • Tunnel + GSI • Hybrid
Alewife	• Integrated Alternative by Outfall • Tunnel • Tunnel + GSI • Regional Sewer Separation/GSI* • Hybrid	• Tunnel • Tunnel + GSI • Hybrid	• Tunnel • Tunnel + GSI • Hybrid
Mystic	• Integrated Alternative by Outfall • Storage • Storage + GSI • Regional Sewer Separation/GSI* • Hybrid	• Storage • Storage + GSI • Hybrid	• Storage • Storage + GSI • Hybrid

*Regional sewer separation/GSI is shown for TY control; simulating full separation of all combined areas, CSOs/SSOs occur in a 5-year event.

Case Study A: Potential Regional Sewer Separation/ Green Stormwater Infrastructure (GSI)

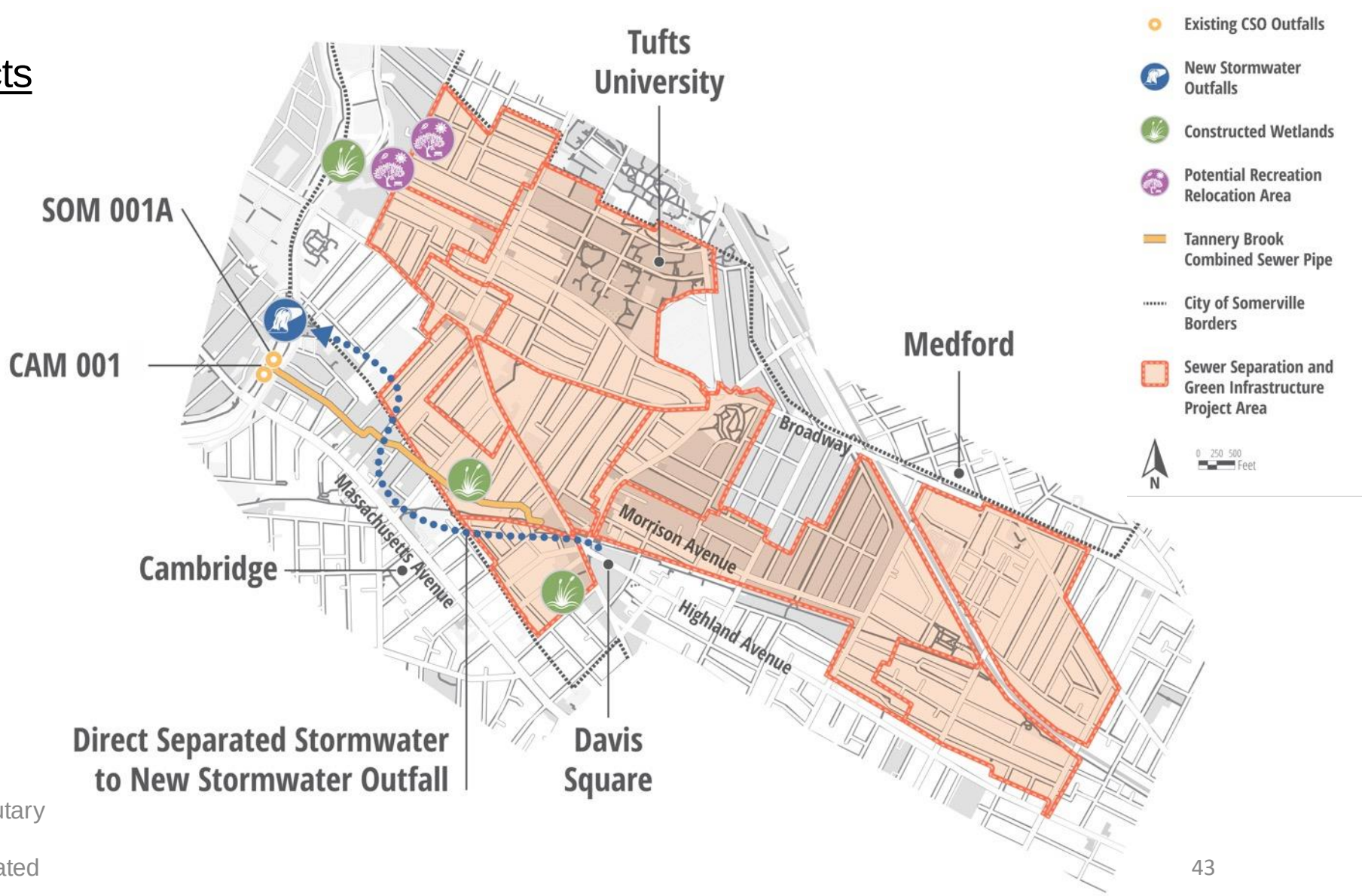
- **Step 1:** Identify tributary area that contributes to CSO discharge(s).
- **Step 2:** Develop project areas to separate the local sewers from the storm drains.
- **Step 3:** Identify project components (conveyance and flow attenuation) that need to be built to handle the additional flow from the separated sources.

Alewife Brook Sewer Separation

City of Somerville - 2050 Typical Year CSO Control

Potential Alewife Brook Projects

- Large trunk storm drain
- 560 acres of localized sewer separation
- New stormwater outfall on Alewife Brook
- 3 constructed wetlands and land acquisition



Prelim. Estimated Cost:
~$850 million *
Prelim. Timeline: ~50 yrs

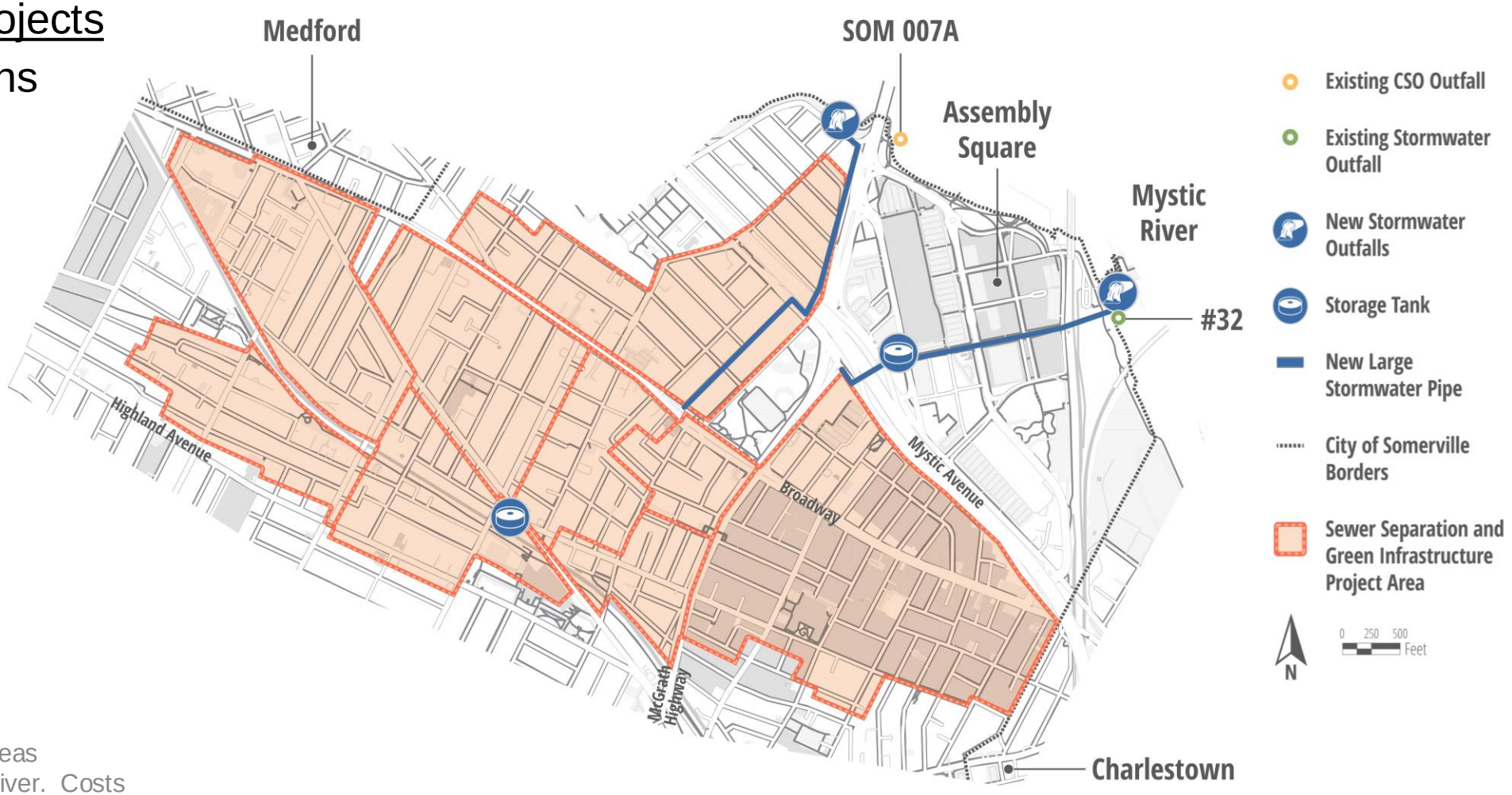
*Costs include sewer separation of some areas tributary to both Alewife Brook and Mystic River. Costs estimated using 2024-dollar amounts and not escalated to construction period. Costs subject to refinement.

Mystic River Sewer Separation

City of Somerville - 2050 Typical Year CSO Control

Potential Mystic River Projects

- Large trunk storm drains
- 5.5MG storage tank
- 0.5 MG storage tank
- 2 Storm drain outfalls
- 560 acres of localized sewer separation



Prelim. Estimated Cost:
~$700 million *
Prelim. Timeline: ~40 yrs

*Costs include sewer separation of some areas tributary to both Alewife Brook and Mystic River. Costs estimated using 2024-dollar amounts and not escalated to construction period. Costs subject to refinement.

Case Study B: Potential CSO Storage Tunnel Alternatives

DRAFT

Potential Alewife Brook and Charles River Tunnel Alternatives:

- Identify outfalls with CSOs in the 2050 Typical Year, 2050 5-year, and 2050 25-year storms
- Develop potential CSO storage tunnels for each level of control

Storage Tunnel to Control CSO Outfalls Tributary to Alewife Brook

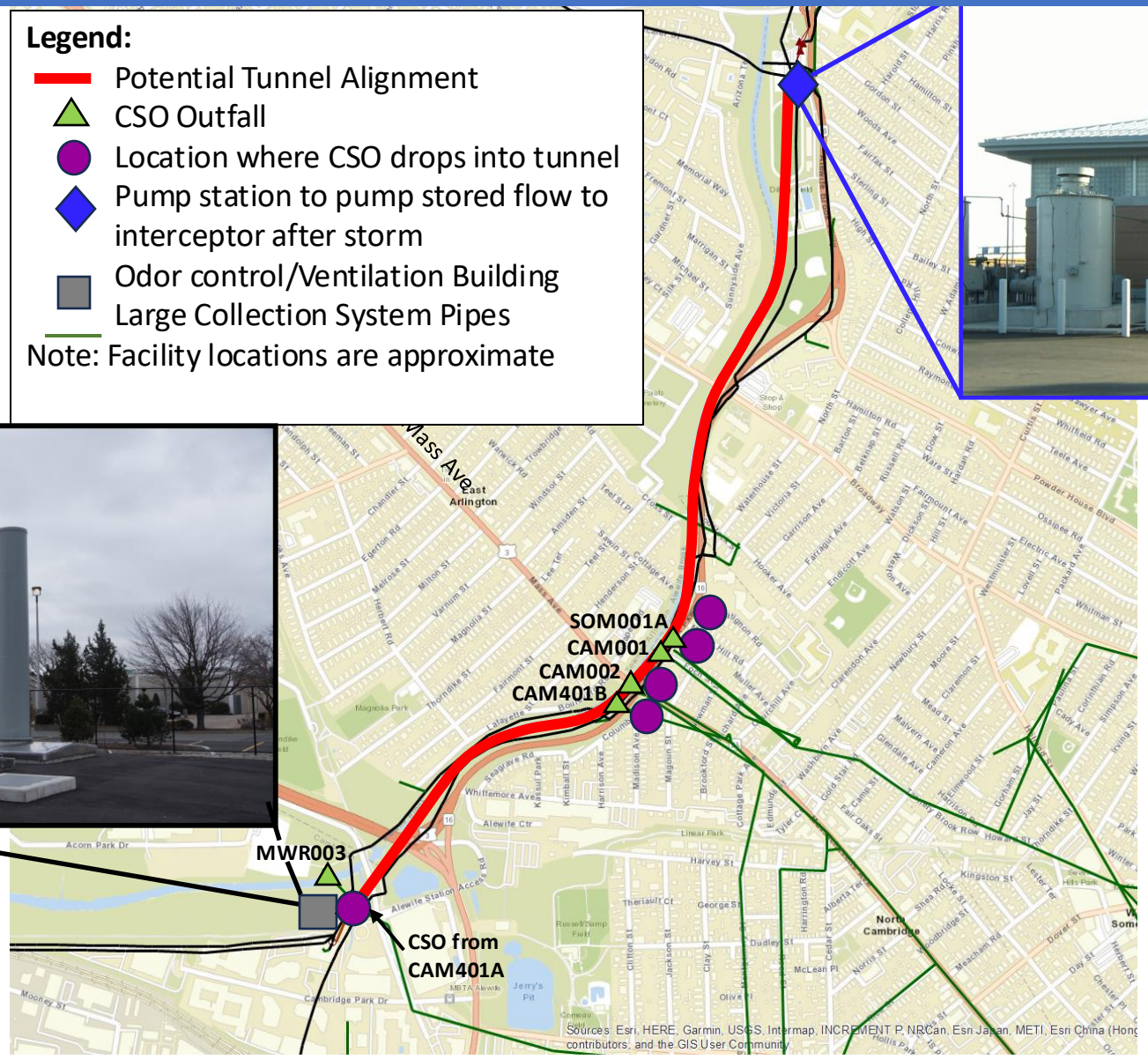
Legend:

- Potential Tunnel Alignment
- CSO Outfall
- Location where CSO drops into tunnel
- Pump station to pump stored flow to interceptor after storm
- Odor control/Ventilation Building
- Large Collection System Pipes

Note: Facility locations are approximate

North Dorchester Bay Odor Control/ Ventilation Facility

North Dorchester Bay Dewatering Pump Station

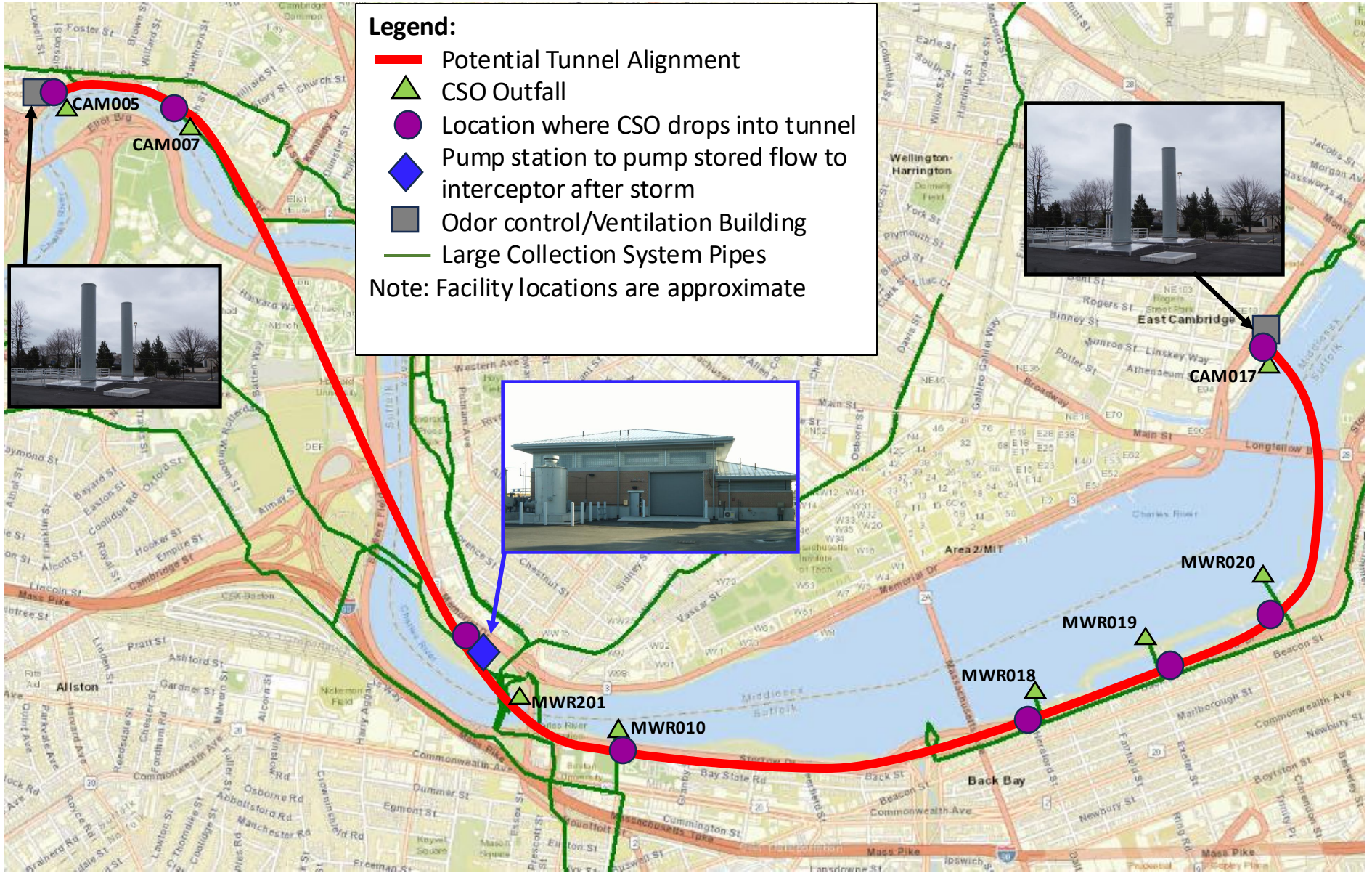


Alewife Brook Potential CSO Storage Tunnel Alternatives (Tunnel Length: 1.4 Miles)		
Level of CSO Control	**Storage Volume (MG)**	**Diameter (feet)**
2050 Typical Year	4.9	11
2050 5 Year	20.6	22
2050 25 Year	41.6	32

Preliminary Estimated Capital Costs Range from ~$700M to ~$1.7B*

*2024 dollars unescalated to construction period. Costs do not include land acquisition and may be further refined.

Storage Tunnel To Control CSO Outfalls MWR201 (Cottage Farm) /MWR010/MWR018/019/020/CAM005/CAM007/CAM017



Charles River Potential CSO Alternatives (Tunnel Length: 4.5 Miles)		
Level of Control	**Storage Volume (MG)**	**Diameter (feet)**
2050 Typical Year	17.8	12
2050 5 Year	71.9	24
2050 25 Year	132.1	32

Preliminary Estimated Capital Costs Range from ~$1.4B to ~$2.3B*

*2024 dollars unescalated to construction period. Costs do not include land acquisition and may be further refined.

DRAFT

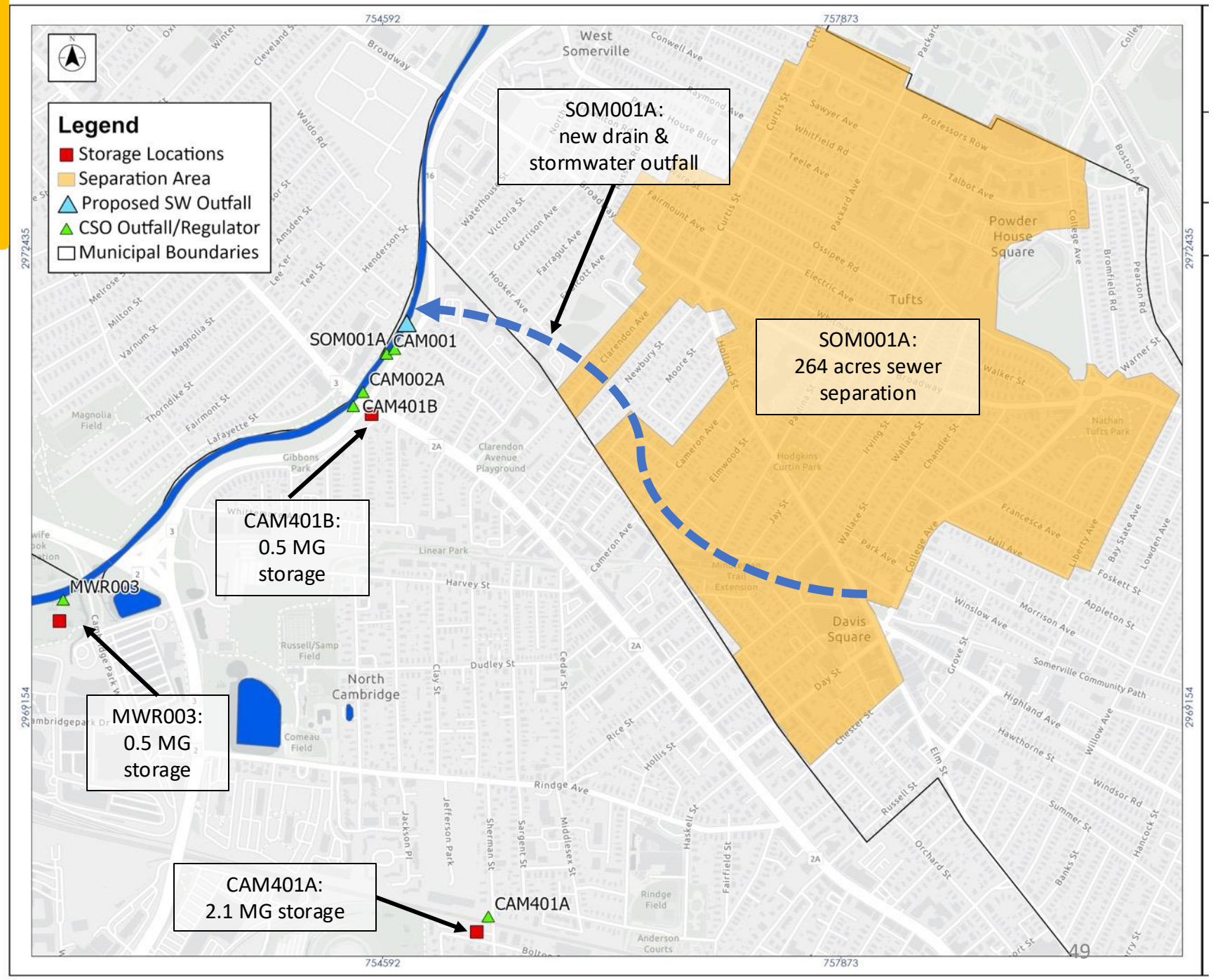
Case Study C: Potential Integrated Alternative

- **Step 1:** Identify outfalls with CSOs in the 2050 Typical Year.
- **Step 2:** Each permittee identifies projects sized to eliminate CSOs in 2050 TY at their outfalls.
- **Step 3:** Combine all projects in Unified Model to verify CSO performance.

Alewife Integrated Alternative: 2050 Typical Year CSO Control

- CAM401A: 2.1 MG storage
- CAM401B: 0.4 MG storage
- MWR003: 0.5 MG storage
- SOM001A: 264 acres separated + inline storage with throttles

Prelim. Estimated Cost: ~$600 million

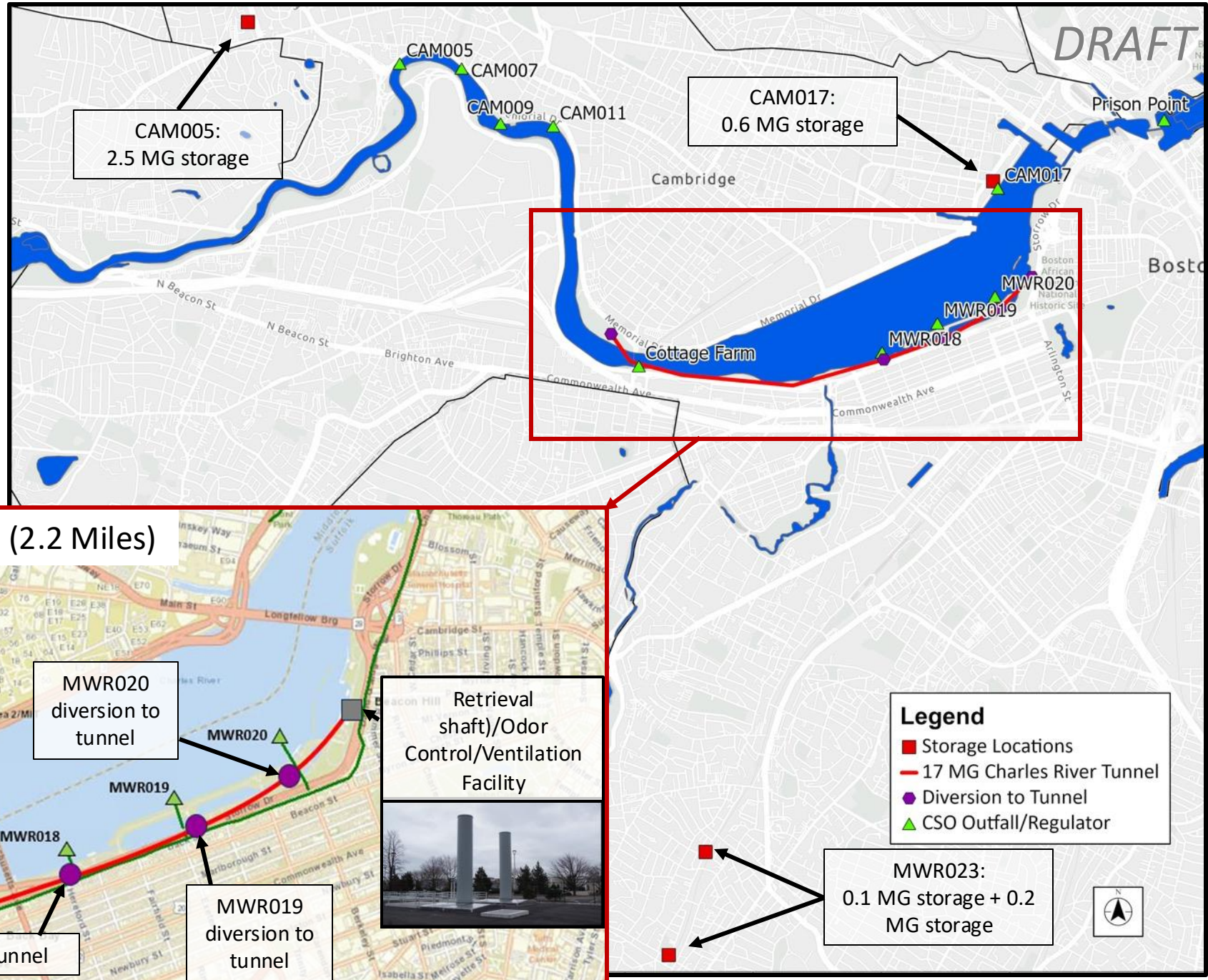


Charles Integrated Alternative: 2050 Typical Year CSO Control

- CAM005: 2.5 MG storage
- CAM017: 0.6 MG storage
- MWR201/MWR018/019/020: 17.2 MG tunnel
- MWR023: 0.3 MG storage

Prelim estimated Capital Costs: ~$1 Billion*

*2024 dollars unescalated to construction period. Costs do not include land acquisition and may be further refined.

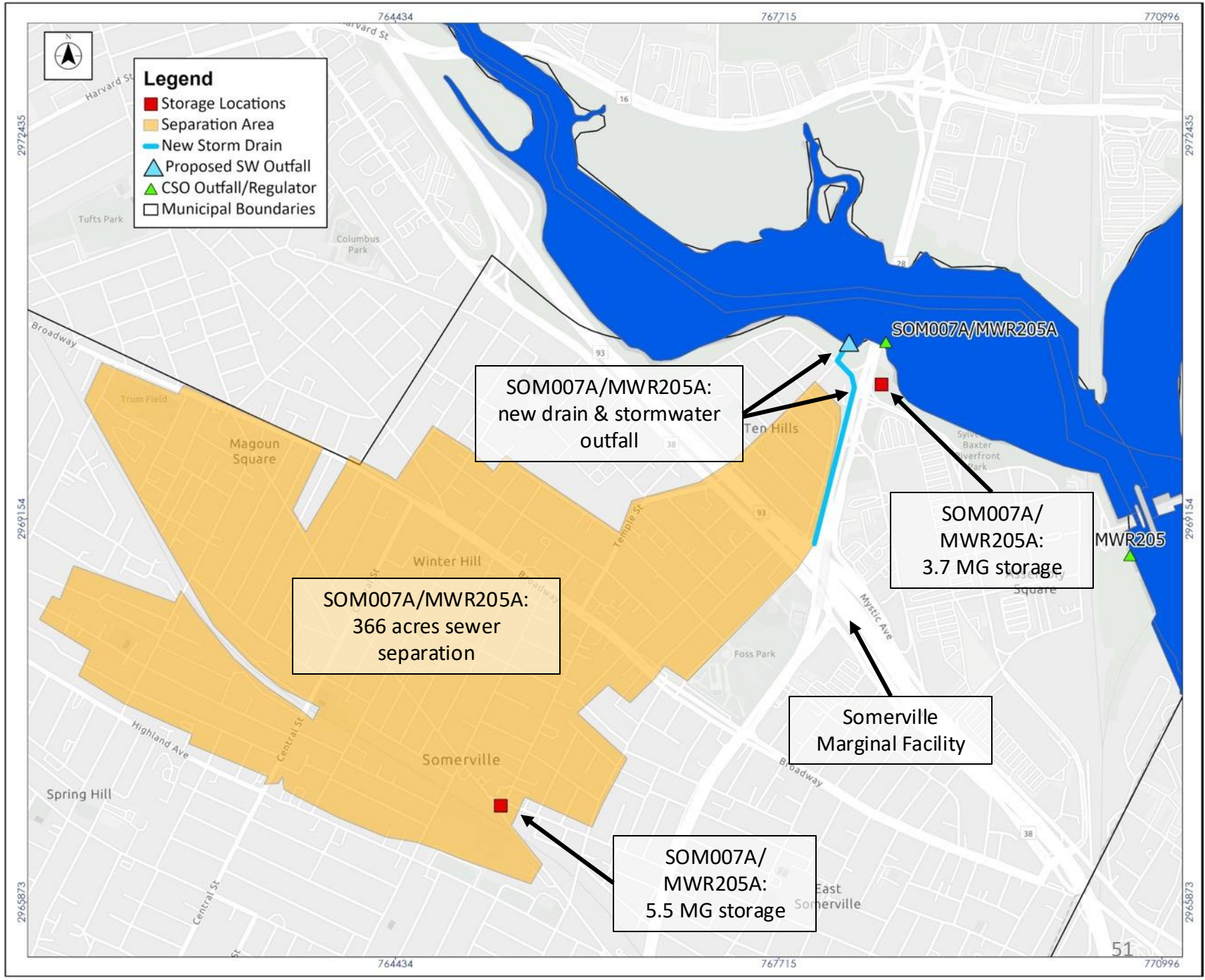


Mystic Integrated Alternative: 2050 Typical Year CSO Control

SOM007A/MWR205A:

- 366 acres sewer separation
- 5.5 MG stormwater storage
- 3.7 MG treated CSO storage

Prelim. Estimated Cost: ~$550 million



Q&A Instructions

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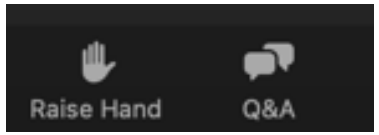

Please pace your speech to allow our interpreters time to translate.

Financial Capability Assessment Process

What is and what is not a Financial Capability Assessment (FCA)?

- ✓ Helps communities understand their ability to implement CSO long-term control plans as mandated by the Clean Water Act (CWA)
- ✓ Helps in developing the schedule for implementing CSO control plans and economic impact analysis for water quality standards decisions
- ✓ Shows the financial impacts of CSO controls
- ✗ Does not evaluate affordability for individual customers
- ✗ Does not consider other financial needs or priorities

Financial Capability Assessment (FCA) Process

EPA guidance prescribes methods to measure financial impact (low, medium, and high) associated with current and future sewer services within community using critical metrics such as:

- **Residential Indicator**
- **Financial Capability Indicators**
- Lowest Quintile Poverty Indicator Score
- Financial and Rate Models

Evaluate the financial impact of alternative CSO controls and schedule

Residential Indicator

Defined as a community's average cost per household for wastewater treatment and Clean Water Act controls needed to meet the requirements of the Clean Water Act.

$$\text{Residential Indicator (\%)} = \frac{\text{Cost per household}}{\text{Median Household Income (MHI)}}$$

Residential Indicator	Financial Impact
< 1.0%	Low Impact
1.0% - 2.0%	Mid-Range Impact
> 2.0%	High Impact

Financial Capability Indicators

Debt Indicators

- Bond Rating
- Net Debt/Property Value

Socioeconomic Indicators

- Unemployment Rate
- Median Household Income

Financial Management Indicators

- Property Tax/Property Value
- Property Tax Collection Rate

Each indicator is given a ranking of

Strong	Mid-Range	Weak

compared to other communities.

FCA Next steps

- Finalize baseline FCA – current conditions (ratepayers costs now)
- Evaluate different levels of CSO control, alternatives, and schedules for impacts to ratepayers, including lowest income households
- Present FCA results at the next public meeting
- Using ratepayer feedback, refine what alternatives, or partial alternatives, may be accomplished for CSO control in an affordable manner

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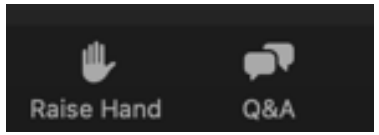

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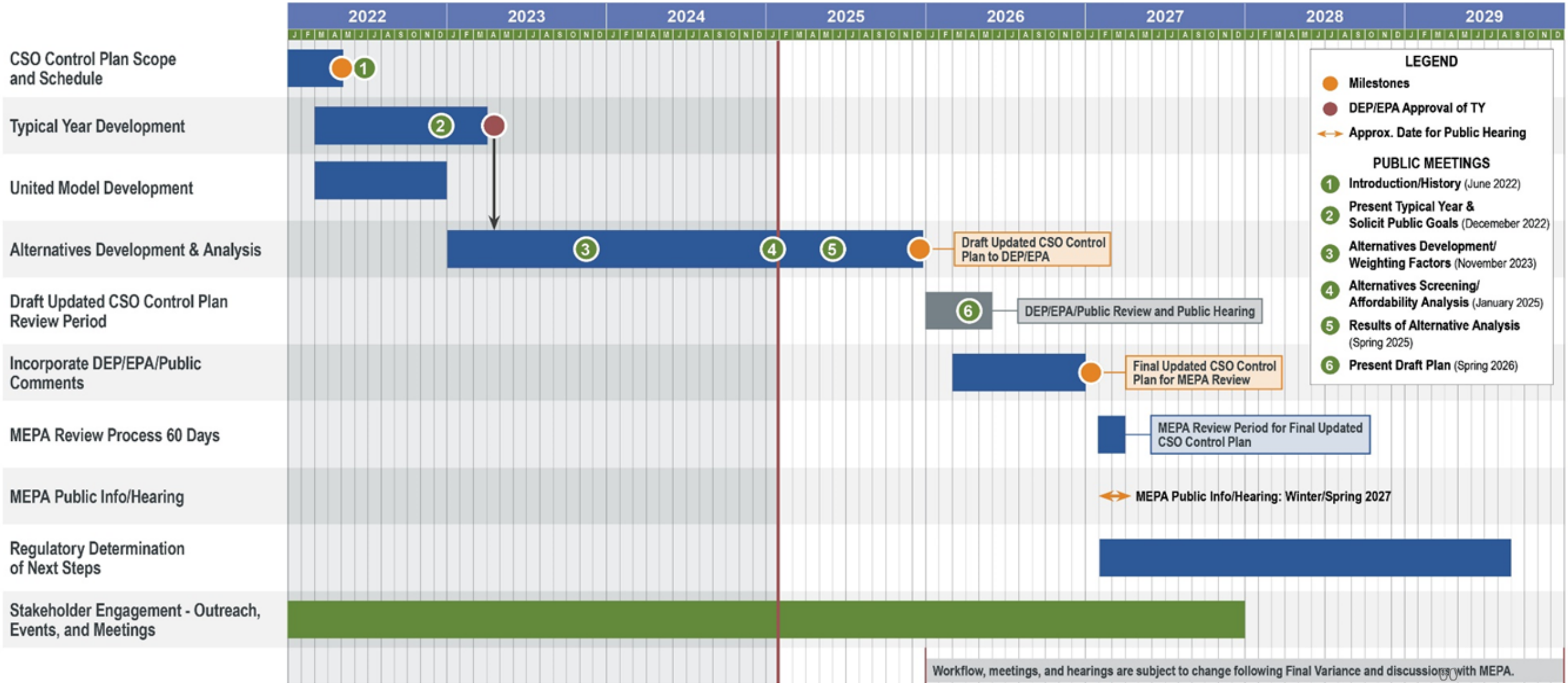
Updated CSO Control Plan Schedule



Updated 1/02/2025

Project Info & Contacts

For additional information on the project, see the project website:

https://voice.somervillema.gov/joint-cso-planning

Or contact

Cambridge: Lucica Hiller - lhiller@cambridgema.gov

Somerville: Gina Cortese - gcortese@somervillema.gov

MWRA: Jeremy Hall - jeremy.hall@mwra.com

Interpretation will now begin.

La interpretación ahora comenzará.

A interpretação começará agora.

Updated CSO Control Plan Steps:

1) 2050 Typical Year & Design Storms ✓
2) Unify Hydrologic & Hydraulic models ✓
3) **Create alternatives:**
   a) Identify CSO performance goals
      - 0 CSO in 2050 Typical Year
      - 0 CSO in 2050 5-yr and 25-yr event
   b) Combine CSO tools to develop various alternatives
   c) Optimize regionally for each variance water
4) Screen and develop scope for alternatives ✓

Step 3:
CSO Reduction Tools

- Sewer Separation
- Green Stormwater Infrastructure
- Inflow/infiltration reduction
- Storage
- Conveyance

Step 4: Screening / Scope Development

- Does it reduce combined sewer overflows?
- Is it buildable?
- Will it cause additional flooding in streets or rivers?
- Is there a site?
- Will it impact water quality in the rivers?

Updated CSO Control Plan Steps:

5) Compare alternatives using weighted criteria. Run analyses such as:
   - H&H modeling
   - Water Quality calculations
   - Desktop concept development
   - Cost estimates

6) Assess Recommended Alternative(s) for:
   - Affordability
     - **Financial Capability Assessment**
   - Implementation schedule
   - UAA applicability

7) Develop Draft Updated CSO Control Plan(s)

Zoom in on Step 5: Alternatives Evaluation – Preliminary Criteria

- ☑ Reduce/eliminate combined sewer overflows
- ☑ Reduce flooding and flooding impacts
- ☑ Reduce sanitary sewer overflows
- ☑ Improve water quality
- ☑ Rehabilitate old infrastructure (pipes, facilities)
- ☑ Improve resilience of our infrastructure to future climate conditions
- ☑ Improve service to low income and minority communities
- ☑ Offers community co-benefits (e.g., green space, gathering space, heat reduction)
- ☑ Minimize neighborhood disruption during construction
- ☑ Minimize costs to ratepayers / taxpayers
- ☑ Other criteria based on public feedback