Public Meeting No. 1: CSO Control Plan Update

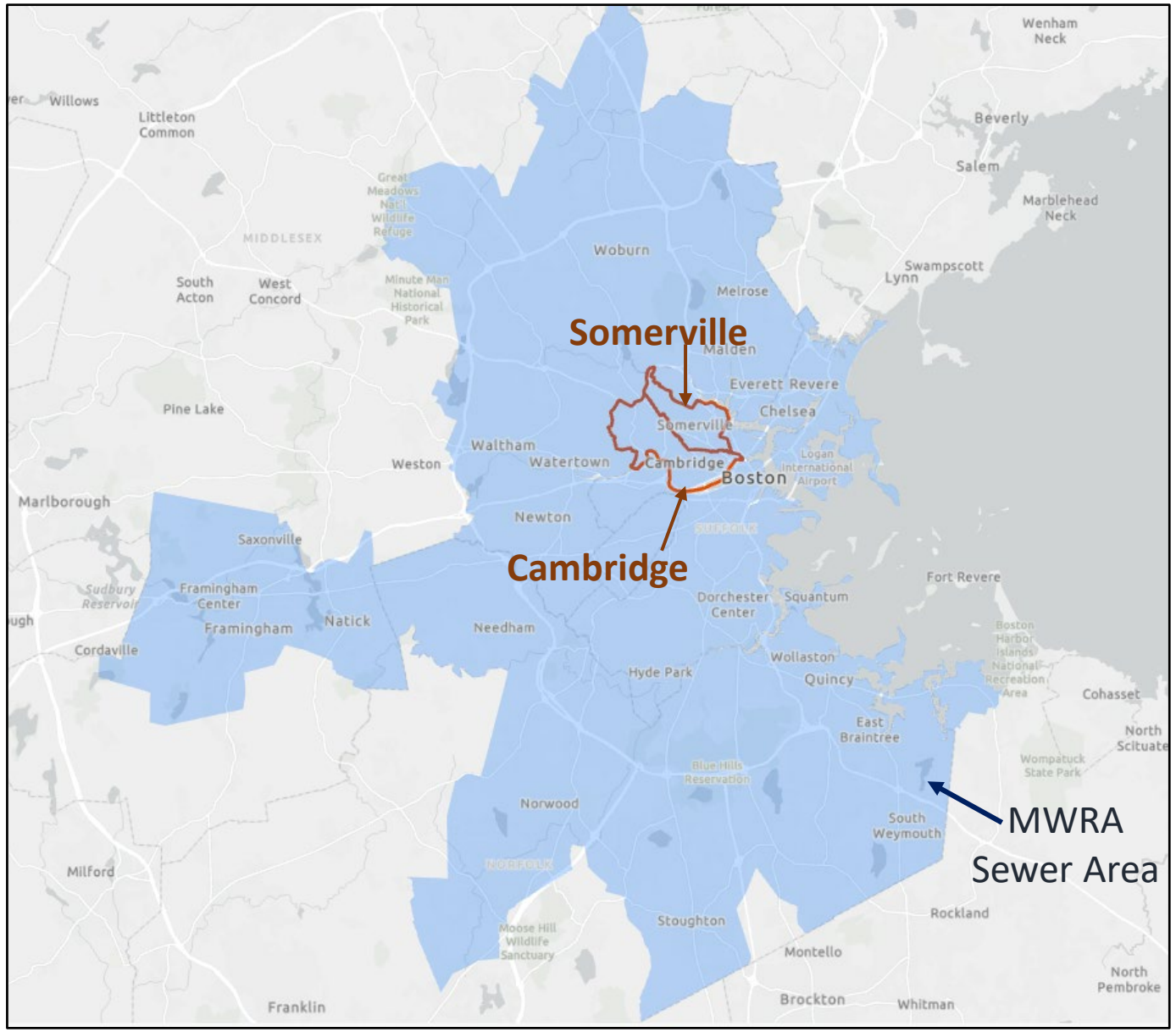
June 29th, 2022

Who We Are

City of Cambridge

City of Somerville

Massachusetts Water Resources Authority (MWRA)



Cambridge and Somerville within the MWRA Sewer Service Area

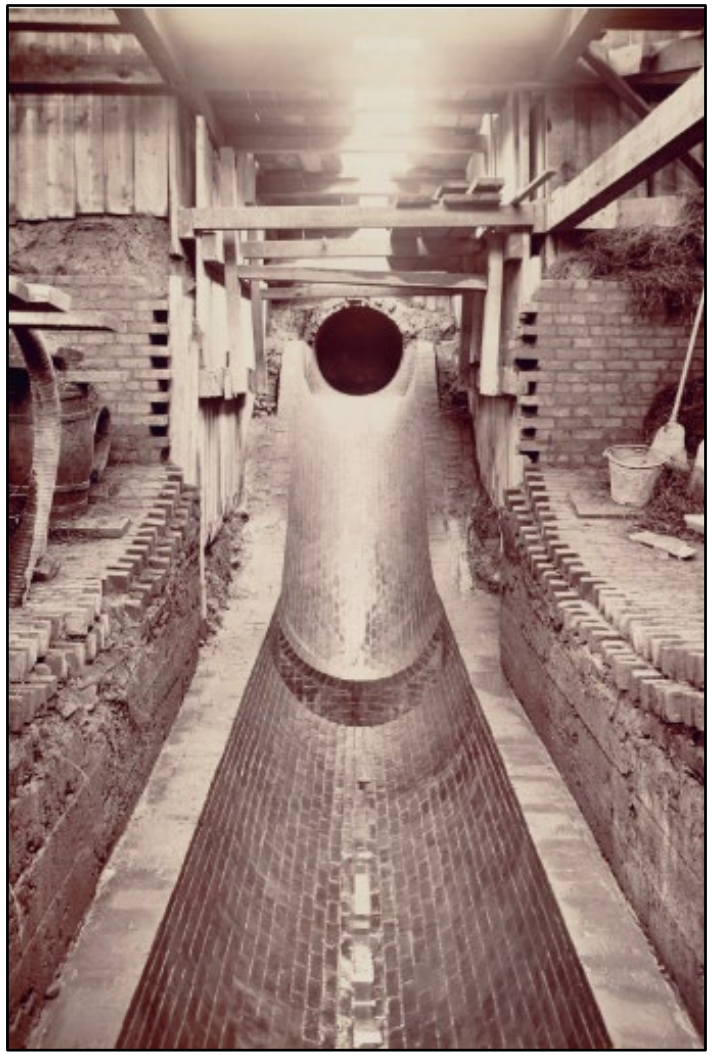
Today's Presentation and the Planning Process

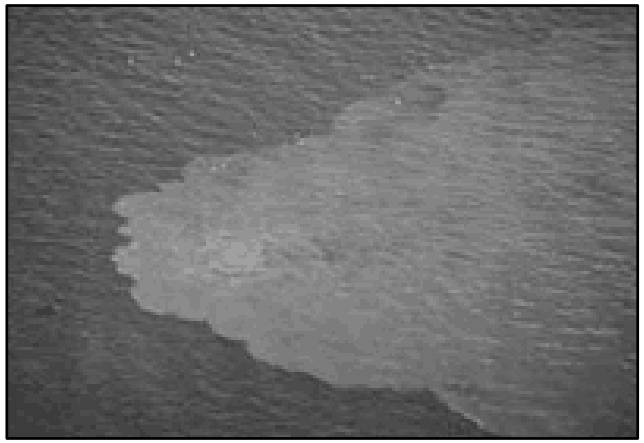
- **Today's Goal:** Introduction and Orientation to the Planning Process
- **Future Meetings:** Details on Updated Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) Development
- **Current Regulatory Schedule:**
  - Draft Plan June 2023
  - Final Plan December 2023

A Historical Background

History of Combined Sewer

- **Combined sewer:** sewage and stormwater share a common pipe
- Constructed in the 1800s for public health reasons to remove wastewater efficiently from cities
- Sewage and surface runoff released directly to water bodies with no treatment
- Following the Clean Water Act (1972), primary and secondary treatment required
- During large storm events, overflows provided relief from backups when system capacity was exceeded





Poorly Treated Discharge "Plume"

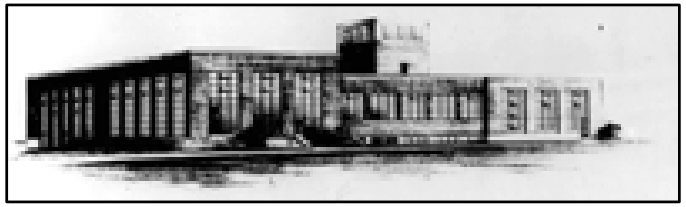
Construction of Metropolitan Sewer District combined sewers, 1880s

MWRA System Timeline

1889 – Regional sewer construction begins under Metropolitan Sewerage District

1876 – Boston sewer interceptor construction begins

1952 – First regional sewage treatment plant



1972 – Clean Water Act

1985 – MWRA assumes control of sewer system

1995 – New Deer Island Treatment Facility begins operation

1994-2015 – Capital Improvement Projects completed as part of original LTCP

2022 – Planning for updated CSO Control Plans

What is a CSO?

During large storm events in the combined sewer system, large amounts of stormwater runoff combine with existing sewer flows and can cause the combined sewers to reach capacity. Most of these flows are directed to the MWRA for treatment. However, rather than resulting in backups into homes and the street, the system discharges the excessive flows via outfalls to local waterways in what is known as a **combined sewer overflows (CSO)**.

Cambridge's sewer system is approximately 55% separated, where sewage goes to the MWRA for treatment and the stormwater separately discharges directly to Alewife Brook or the Charles River. Similarly, Somerville's sewer system is approximately 10% separated with stormwater discharges to the Alewife Brook and Mystic River.

Combined

Separated

What is a CSO Control Plan?

The Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) require CSO communities to:

- Abide by the National Pollutant Discharge Elimination System (NPDES) Permit requirement that regulate CSO discharges
- Develop and implement a **CSO Control Plan**

CSO Control Plan

- Lays out the approach to meeting water quality and discharge requirements
- Justifies the approach using computer models of the collection system to project how planned improvements would perform under typical rainfall conditions (the "typical year")

Original MWRA System Wide CSO Long Term Control Plan Near Completion

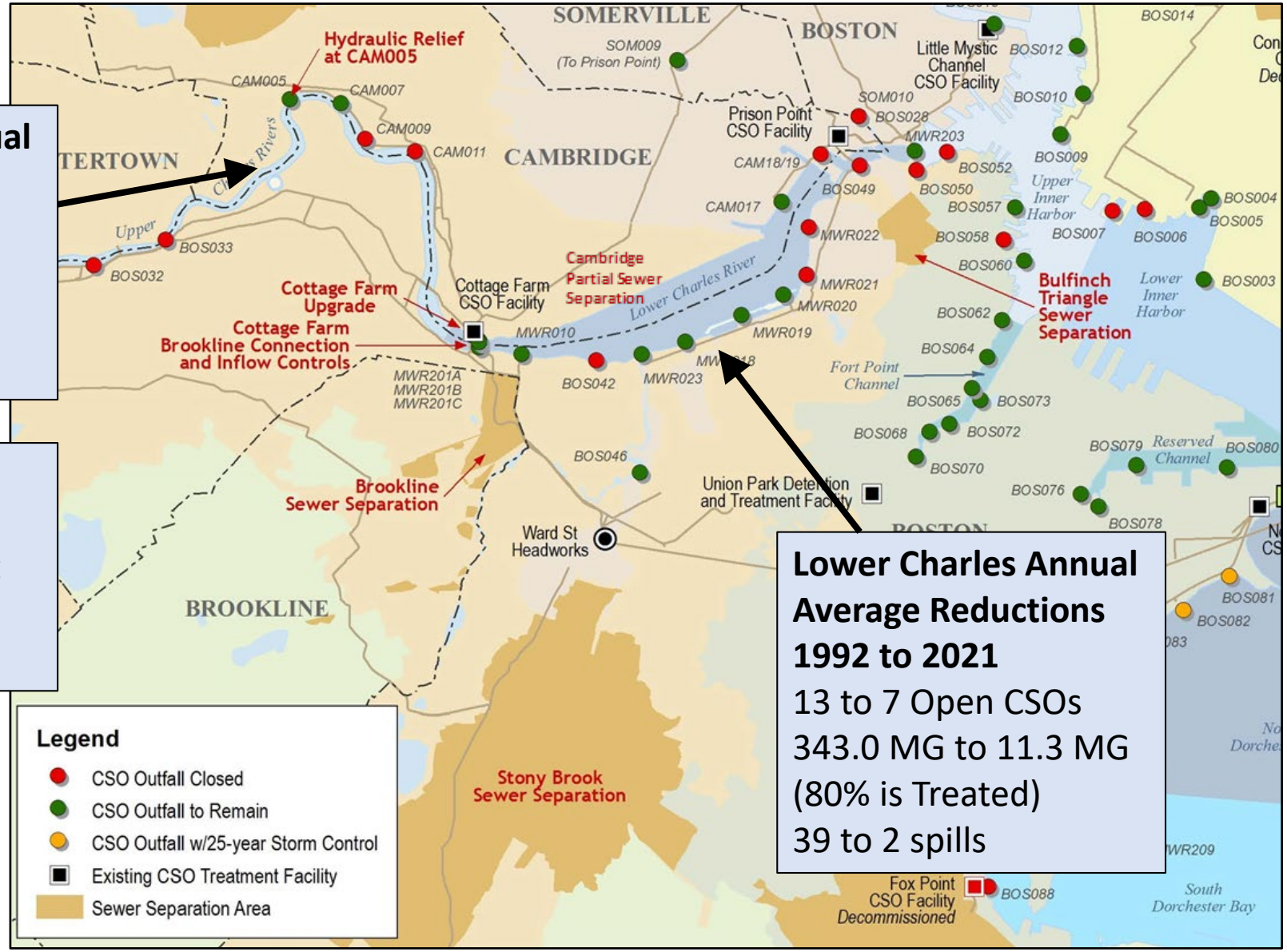
25 Years of Major Investment in sewer and stormwater infrastructure and maintenance overall resulting in:

- CSO volume reduction of 2.9 billion gallons / year
  - 87% reduction in overall CSO volume
  - 93% of remaining CSO volume is treated
- Closure of 40 / 86 CSO outfall points (5 effectively closed along South Boston beaches)
- $911 million spent on 35 projects to reduce CSOs
- Boston's beaches are now considered the cleanest urban beaches in the country
- CSOs now only contribute to bacterial water quality standard being exceeded ***a very small percentage*** of an average year (8hrs and 35hrs, in the Charles and Alewife/Mystic respectively).

Completed Projects Reducing or Eliminating CSOs to the Charles River

Upper Charles Annual Average Reductions 1992 to 2021
6 to 2 Open CSOs
46.0 MG to 1.2 MG
19 to 8 spills

Upper & Lower Charles Projects
Approx. $90M spent
Not including Partial Sewer Separation

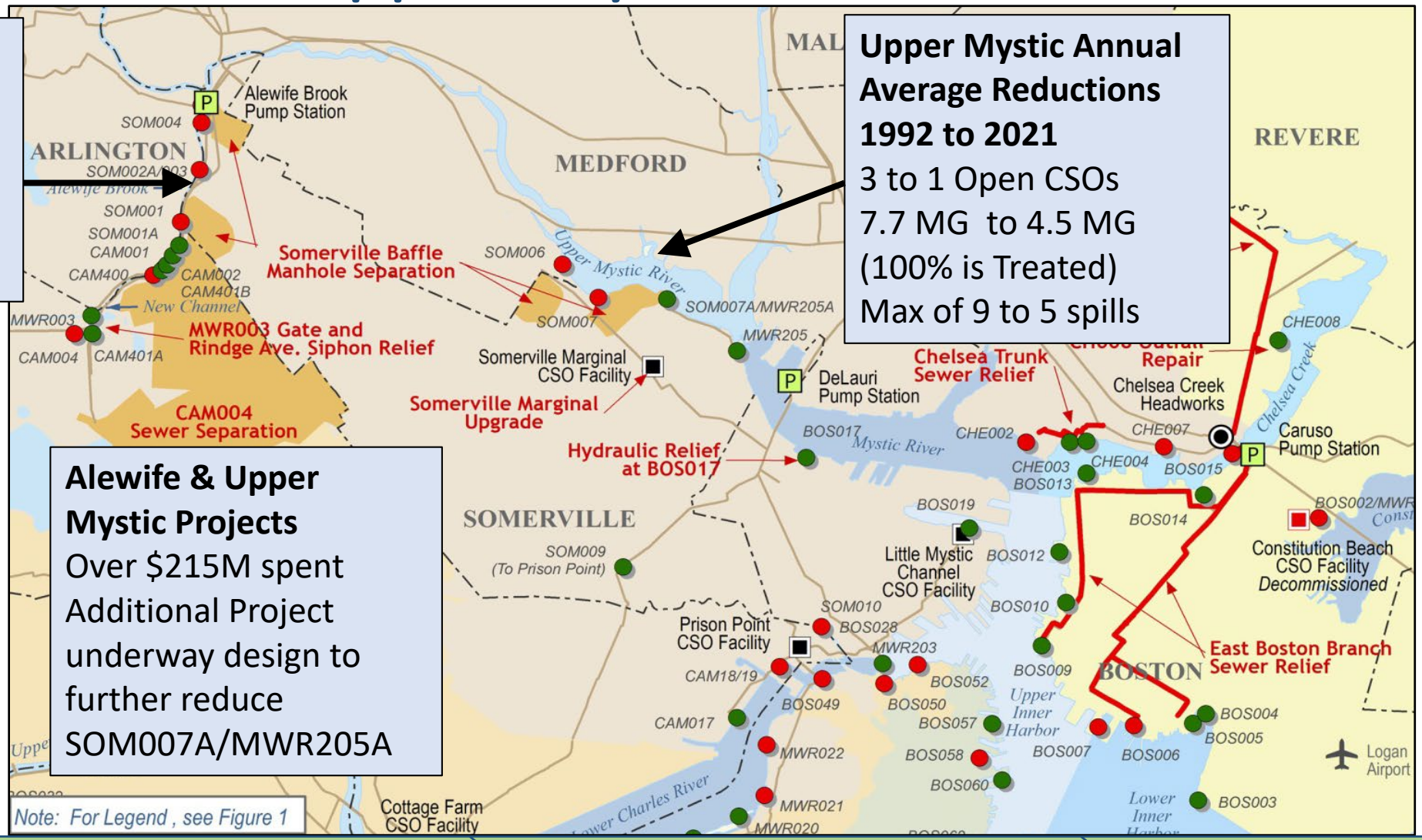


Lower Charles Annual Average Reductions 1992 to 2021
13 to 7 Open CSOs
343.0 MG to 11.3 MG
(80% is Treated)
39 to 2 spills

Completed Projects Reducing or Eliminating CSOs to the Alewife Brook & Upper Mystic

Alewife Brook Annual Average Reductions 1992 to 2021
13 to 6 Open CSOs
26.8 MG to 6.3 MG
Max of 20 to 8 spills

Upper Mystic Annual Average Reductions 1992 to 2021
3 to 1 Open CSOs
7.7 MG to 4.5 MG
(100% is Treated)
Max of 9 to 5 spills



Alewife & Upper Mystic Projects
Over $215M spent
Additional Project underway design to further reduce SOM007A/MWR205A

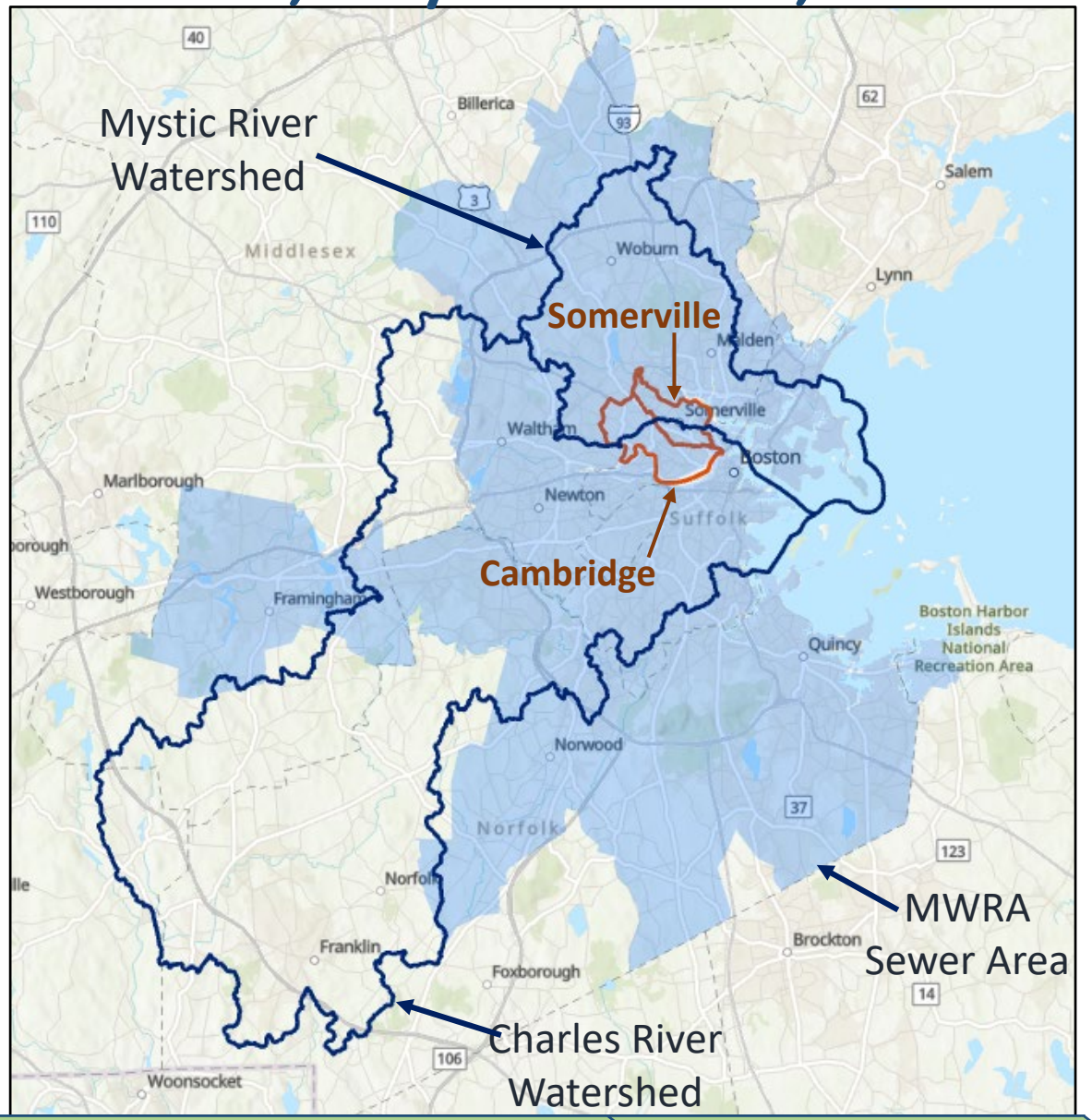
Variance Water Bodies: Charles River, Mystic River, and Alewife Brook

Most receiving waters in metropolitan Boston, where CSOs were not eliminated -- such as Boston Inner Harbor -- were designated as allowing limited CSOs.

- Limited CSOs impaired water quality for only very short periods of time and in very small areas.
- Additional CSO control beyond the LTCP not required

Variance Waters: Charles River basin, the Alewife Brook and the Upper Mystic River, regulatory agencies decided not to change the water quality classification

- Issue water quality standards variances starting around 2000.
- Variances are allowed when discharges do not meet the requirements of the Clean Water Act, but the dischargers are working toward that goal. **The current Variances end on August 31, 2024.**



CSO Control Planning

Issues to Address: SSO and Stormwater Flooding

- Sanitary Sewer Overflows (SSO) – stormwater, groundwater, or blockages cause a sewer to back up and outflow raw sewage
- Flooding – conveyance network lacks capacity to clear surface water

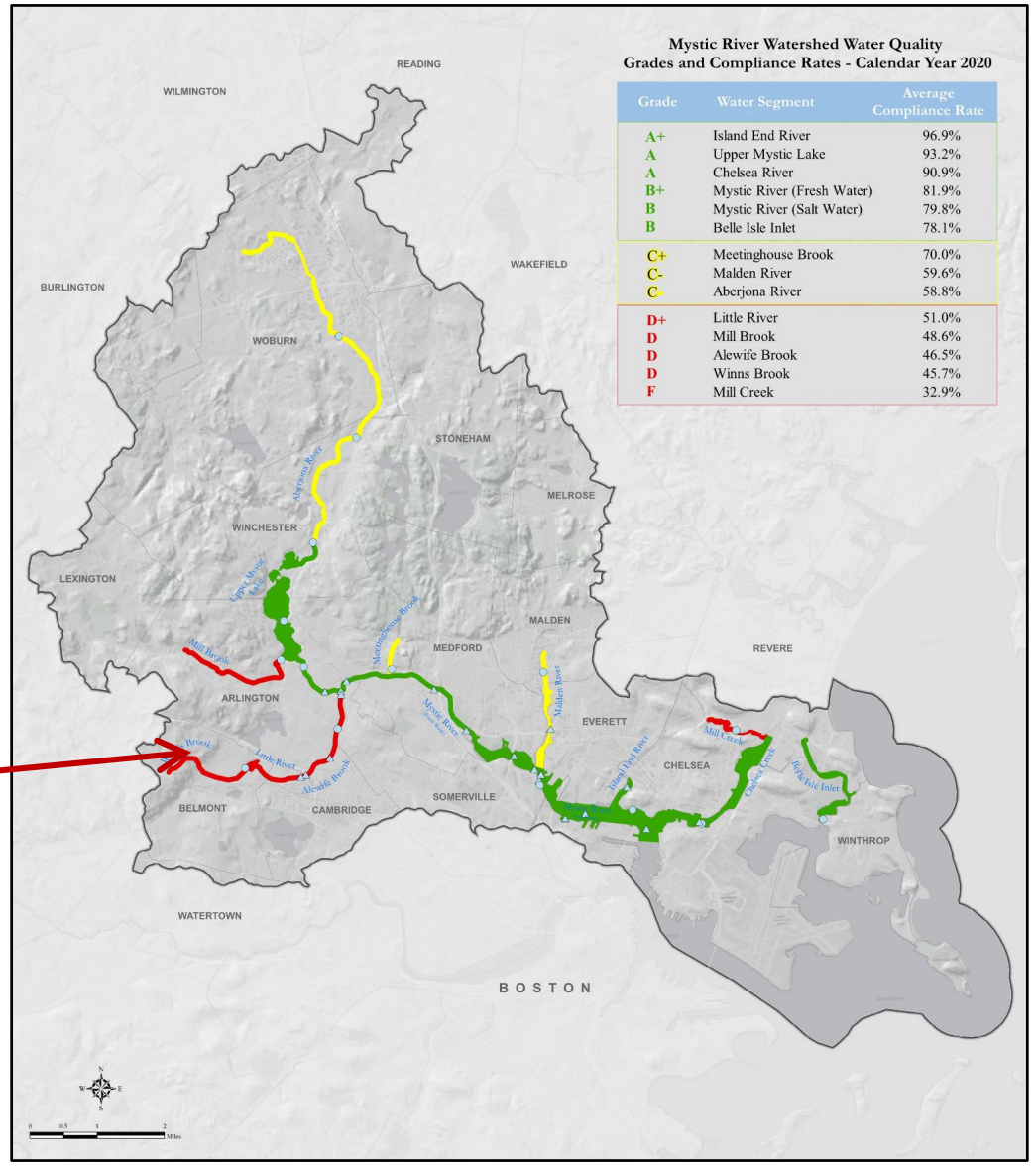
Sanitary Sewer Overflow

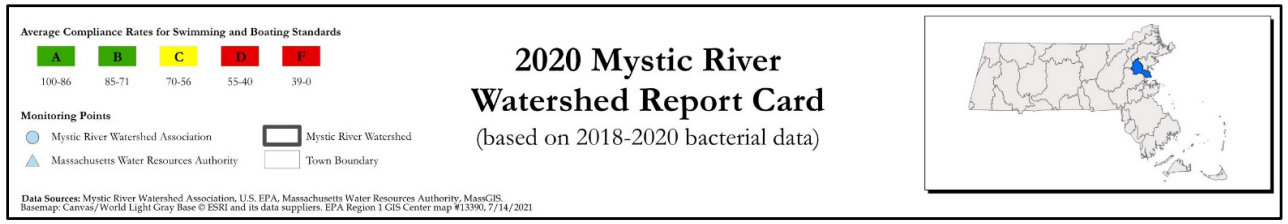
Flooding in Cambridge

Issues to Address: Water Quality

- Water quality in the Charles River, Alewife Brook and Mystic River is impacted by
  - Stormwater
  - CSOs
  - SSOs

Alewife Brook – Grade D





Issues to Consider: Climate Change Impacts

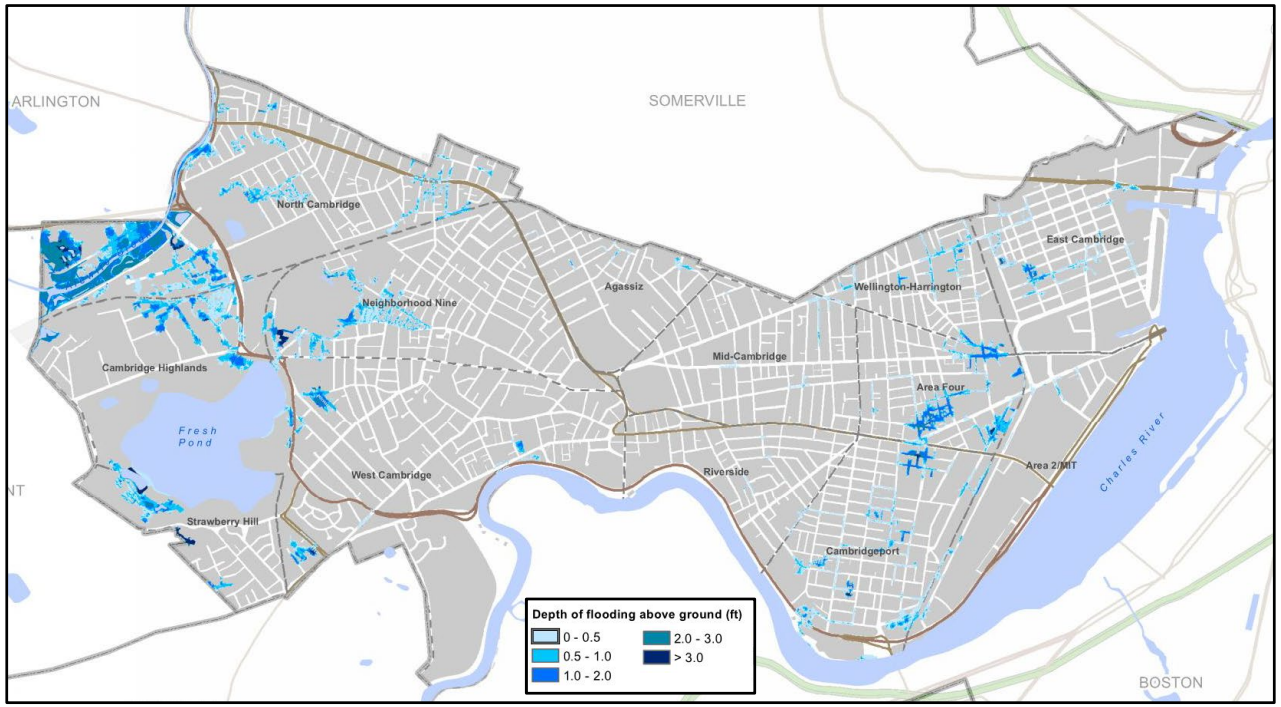
The Updated CSO control plans need to account for stresses from Climate Change that affect how the sewer system performs including:

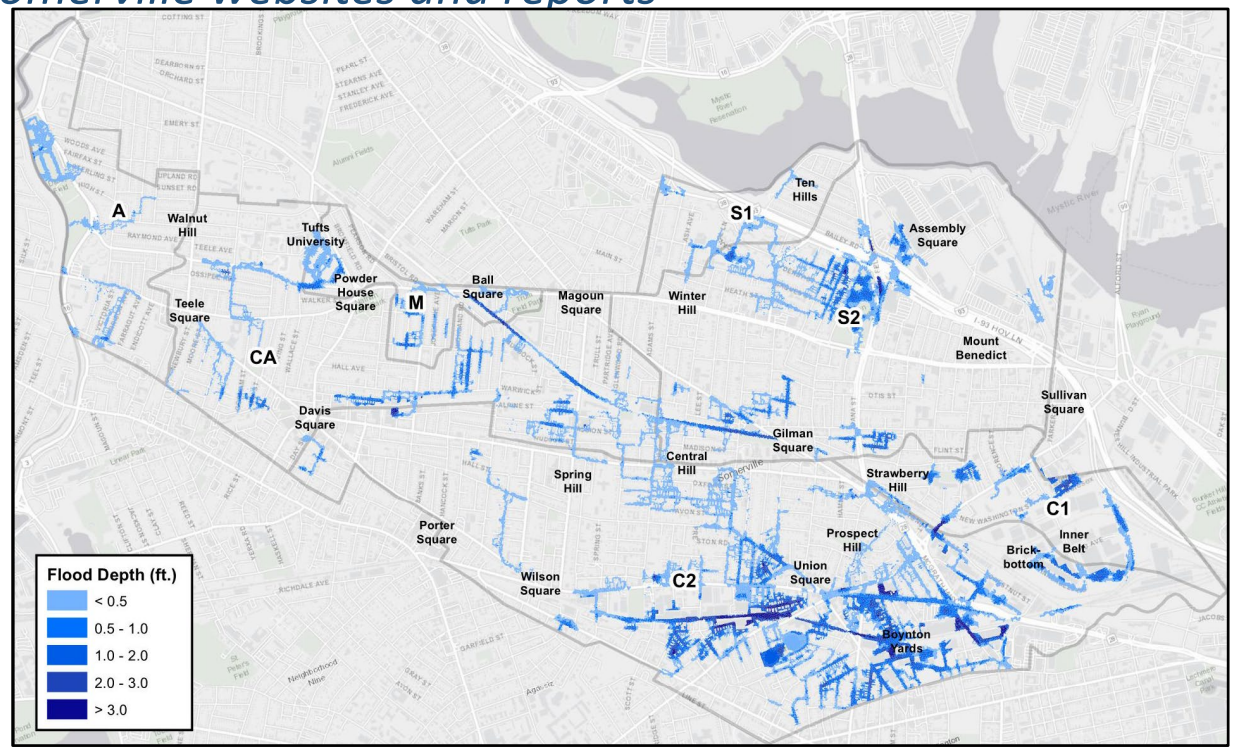
- Increased frequency of extreme events
- Increased precipitation variability in rainfall patterns
- Sea level rise

Issues to Consider: Climate Change Impacts

Projected stormwater flooding from the 2070 10% probability storm in Cambridge and Somerville

- *For more information, refer to the Cambridge and Somerville websites and reports*





CSO Mitigation Strategies

- Sewer Separation
- Treatment of CSOs (i.e. Cottage Farm Facility)
- Storage for Stormwater and/or Sewer
- Green Infrastructure



Implementation of the CSO Control Plan

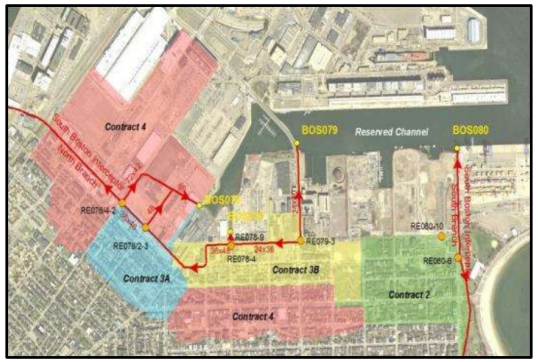
MWRA's implemented plan included a range of cost-effective projects targeted to site specific control including:

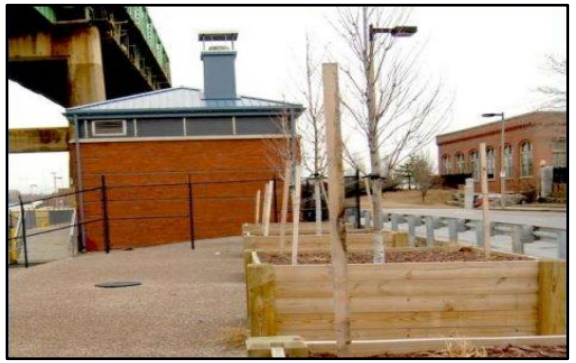
- System optimization
- Sewer separation
- Interceptor relief
- Detention treatment facilities
- Storage facilities
- Upgrades to existing facilities
- Outfall closure

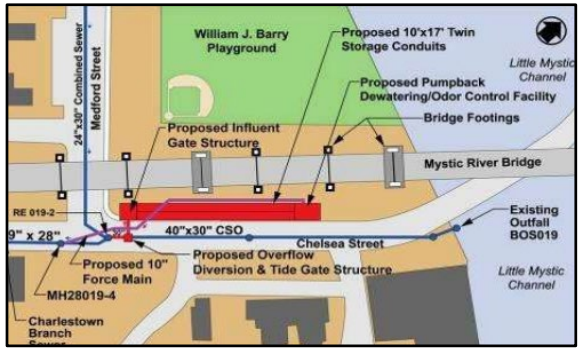
35 projects were constructed between 1988 to 2015

A Performance Assessment was required to be completed by December 2021

Total MWRA Program cost $911 million. Well **over $1 Billion** when adding CSO Community spending







Implementation of the CSO Control Plan

CAM004 Sewer Separation (Alewife Brook)

- Closed 1 CSO outfall
- Separated 211 acres in West Cambridge
- New 3.5-acre wetland
- Construction of 55,300 LF of sewer and storm drains, new water mains, and reconstruction of streets and sidewalks
- Completed in 2015
- Cost over $200 M, multiple projects and many years of construction and permitting

Sewer Separation on Concord Ave, Cambridge

Stormwater Wetland to Manage Separated Stormwater Flows

Updated CSO Control Plan

Updated CSO Control Plan - Goals

- Develop alternatives for decreasing / eliminating CSOs
- Improve water quality in the Charles River, Alewife Brook, and Mystic River
- Update typical year to reflect the climate conditions
- Engage with the community throughout the planning process
- Ensure impacts of CSOs towards Environmental Justice communities are considered and addressed

Developing the Updated CSO Control Plan: How Alternatives are Evaluated and Progress is Tracked

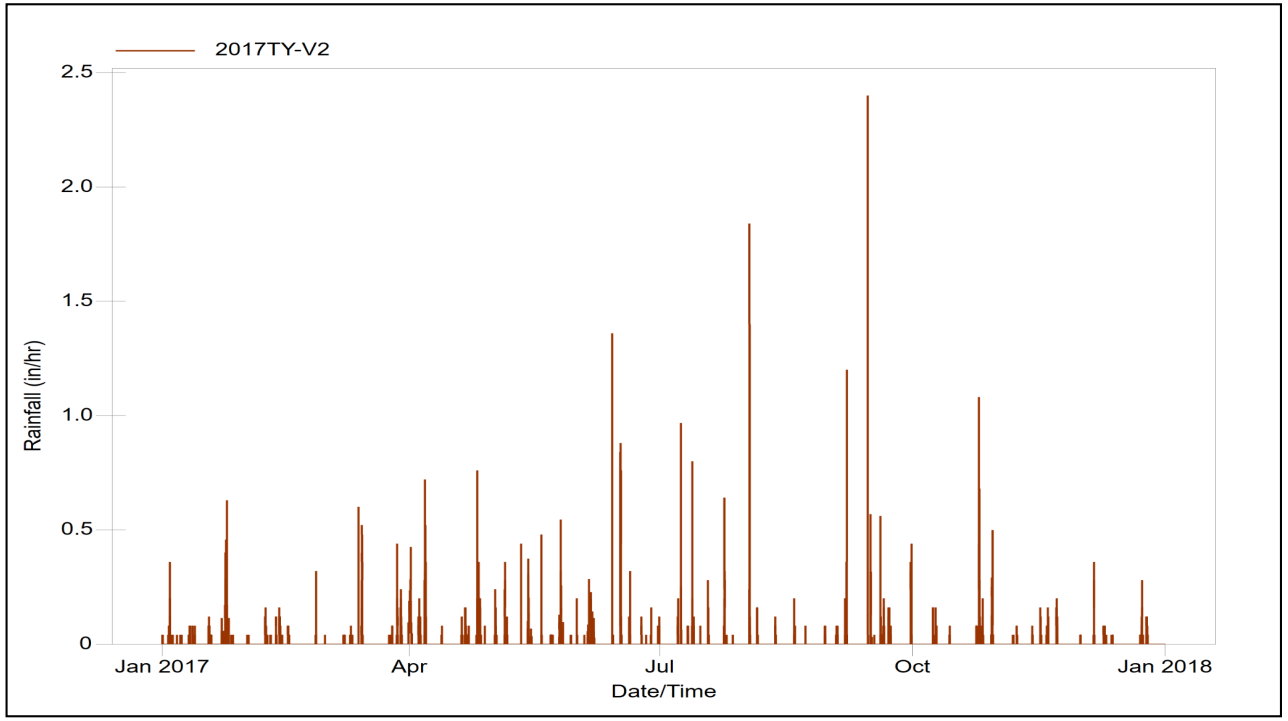
- Create a **unified hydraulic model** detailing Cambridge, Somerville, and MWRA's systems.
  - Model used to simulate how runoff collects and enters the conveyance system and then how runoff, sanitary flows, and infiltration are routed through the conveyance system.
- Perform a **calibration check** against measurements taken in the system to confirm model is able to predict actual conditions and CSO accurately.
- Develop a Typical Year

Typical Year Explanation

The Typical Year is a 365-day design period used to represent average annual rainfall.

EPA supports continuous simulation modeling of long-term rainfall records rather than records for individual storms.

The key performance objective of approved CSO Control Plan includes **annual frequency and volume of CSO discharge** at each outfall based on Typical Year rainfall.



Typical Year rainfall series includes

- Analyzing rainfall data at a gauge close enough to the service area to reflect conditions within the area;
- Assessing the total volumes, return periods, and peak intensities
- Using data to identify typical years and analyze variations.

Developing an Updated Typical Year

Required by EPA in order to evaluate alternatives, system performance and level of CSO control

How will we develop a Typical Year?

- Rigorous technical analysis
  - Review of recent rainfall data and rainfall projections
  - Consulting with Dr. Indrani Ghosh (Weston & Sampson) and Dr. Arthur DeGaetano (Cornell University)
- Include a range of storm events
- Review with EPA, DEP, and the community

Public Input / Collaboration

Public engagement will occur throughout the process:

Public Meetings

- Kick-off Meeting June 29, 2022
- Typical Year development
- Development of alternatives
- Evaluation and prioritization of alternatives

Outreach Events

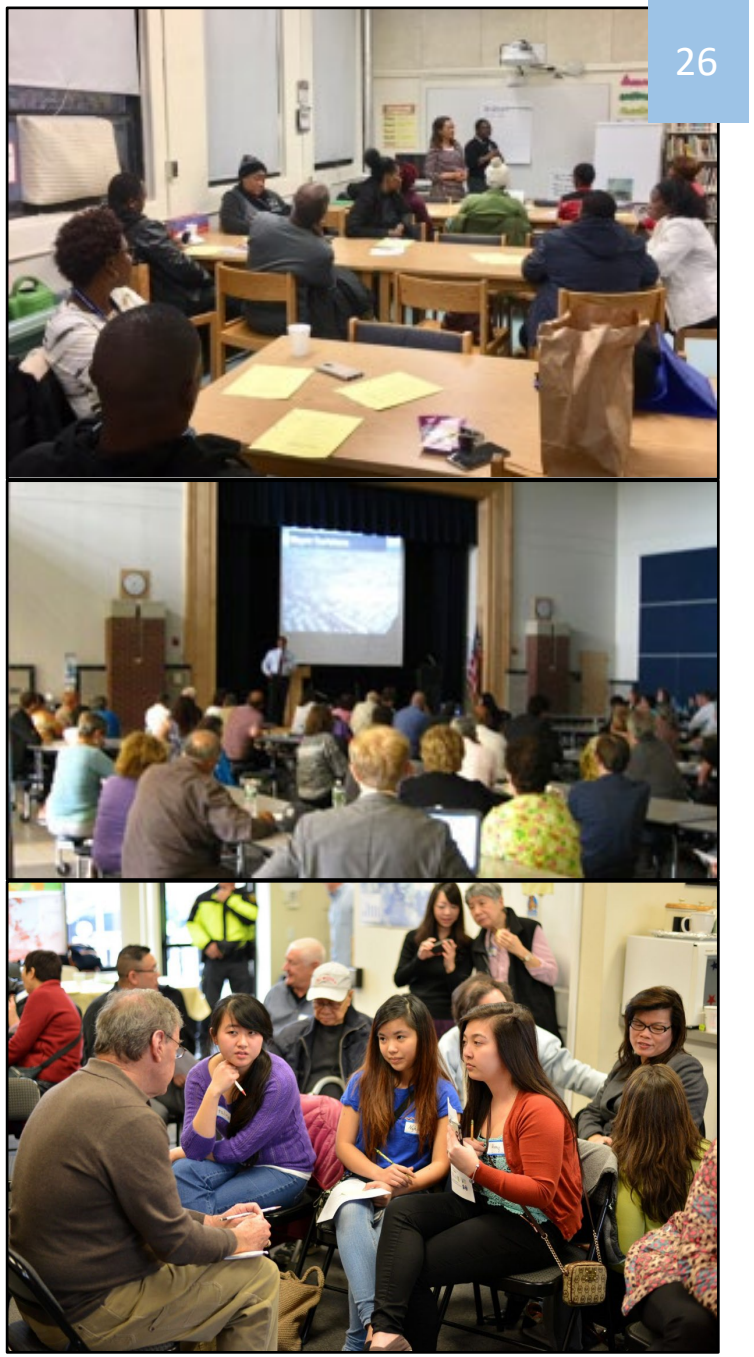
- Commitment to reaching EJ and underserved communities

Websites

Somerville: www.Somervillema.gov/cso

Cambridge www.cambridgema.gov/cso

MWRA: www.mwra.com/03sewer/html/sewcso.htm



Next Steps

Current Schedule and Activities

<u>Submission Deadlines</u>

June 30, 2023 – DRAFT CSO Control Plan to DEP and EPA

December 31, 2023 – Final CSO Control Plan to DEP and EPA

We want your input and to work with us throughout this process

Tentative Topics for Future Public Meetings

- Input on Typical Year and Alternatives Ranking Criteria/Weighting
- Input on Proposed Alternatives and Financial Capability Analysis
- Review Preliminary Alternatives and Implementation Schedule
- Review submitted Draft Updated CSO Control Plan

Questions & Discussion

Discussion Topics:

1. Is this information clear / helpful? Does anything need clarification?
2. What is your experience with CSOs and stormwater in our community?
3. Are there any priorities you feel the new CSO plan should address?
4. Do you have suggestions for how we can best reach underserved communities?
5. Anything else that the team should be considering?

Written comments can be submitted to (include **"CSO Control"** in the subject):

- Cambridge: Catherine Woodbury @ cwoodbury@cambridgema.gov
- Somerville: Lucica Hiller @ lhiller@somervillema.gov
- MWRA: Brian Kubaska @ brian.kubaska@mwra.com