

City of Cambridge CSO Control Plan Scope

In accordance with the Variances for Combined Sewer Overflow (CSO) Discharges to the Charles River Basin and to the Alewife Brook/Upper Mystic River Basin, the City of Cambridge (City) is developing an update to the Massachusetts Water Resources Authority's (MWRA) CSO Long-Term Control Plan (LTCP) for the CSO outfalls that the City owns and operates. Through its NPDES CSO Permit, the City is authorized to discharge flows from eleven (11) CSOs. Since the permit was issued in 2009, two (2) of the CSOs have been permanently closed, while two (2) more are temporarily closed pending hydraulic evaluations along the Charles River. Today, four (4) and three (3) active CSO outfalls remain open along the Alewife Brook and Charles River, respectively.

Over 150 years ago, the City's original sewer system was designed as a combined sewer, where sewage and stormwater are collected into the same pipe and discharged directly into the Alewife Brook or Charles River. Major investment in sewer and stormwater infrastructure and maintenance has had a significant, positive impact on improving the water quality of discharges to receiving waters. The amount of CSOs to the Charles River and Alewife Brook have significantly decreased over the past two decades: Charles River by 98%, Alewife Brook by 85%. In the Lower Charles, water quality has improved from a grade of D to a B. This is a significant accomplishment, but the work is not done.

Since the 1980s, the City and the surrounding CSO community partners (including Somerville and MWRA) with permitted CSO outfalls have reduced CSO discharges through the separation of combined sewers and construction of new storm drain systems. Thousands of hours of engineering and hundreds of millions of dollars of construction have been allocated to realize a more efficient and environmentally friendly system.

The scope of Cambridge's CSO Control Plan update was intentionally written to leverage existing assessment reports, optimize collaboration amongst CSO community partners, enhance public participation, and facilitate the development of CSO Control alternatives with co-benefits. The following outlines the tasks of the Cambridge CSO Control Plan scope:

1. Introduction
2. History of CSO Planning
 - 2.1. Regulatory Requirements
 - 2.2. Document Prior CSO Control Projects
3. Characterization of Existing Conditions
 - 3.1. Current Level of CSO Control
 - 3.2. Public Health
 - 3.3. Climate Equity and Resiliency
 - 3.4. Water Quality

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4. Future CSO Planning Approach
 - 4.1. Hydraulic Model Updates and Calibration
 - 4.2. Regional Technical Collaboration
5. Development and Evaluation of CSO Control Alternatives
6. Public Participation and Outreach
7. Water Quality Analysis
8. Alternative Analysis and Ranking Prioritization
9. Affordability Analysis
10. Recommended Plan
11. Report Development

The following activities under each scope task and the documentation of the work completed will be incorporated into the chapters of the Recommended Plan.

1. Introduction

1.1. Background Cambridge CSO Program

Describe the City's approach to CSO management and control including a timeline of milestone and events leading up to the current CSO variances. This background narrative is one of several aspects of the CSO Control planning process that will be used in the community engagement process.

1.2. City Objectives and Water Management Goals

1.2.1. Establish Goals, Priorities, and Objectives

Develop a succinct goals and objectives statement that will build upon prior vision and mission statements developed for the MWRA LTCP, the Resilient Cambridge Plan, and other City initiatives.

1.2.2. Review and Validate Projects

Review the City's Capital Improvement Plan (CIP) and information as to how the CIP's projects were sequenced and/or prioritized. Review of the CSO projects included in the previous Facilities Plans, as well as non-CSO projects (from Inflow/Infiltration (I/I) projects, flood improvement projects, etc.) which are necessary for continued reliable operation and performance of existing system infrastructure and facilities. This review and validation of identified City improvement projects (both CSO and non-CSO improvement projects for City-owned facilities) will enable the City to further refine the CSO Control Plan to be implemented.

2. History of CSO Control Planning

Document the CSO compliance related regulations applicable to the CSO Control Planning development work and the prior work completed to meet those compliance requirements.

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2.1. Regulatory Requirements

2.1.1. Discharge Requirements

Discharge Requirements (NPDES permit): Summarize the NPDES permits governing performance of the City's systems. Include current and future permit requirements (to the extent identified) pertaining to operation, maintenance, discharge limits, and any other obligations. The permits consist of the following:

- CSO Discharge to Receiving Waters (LTCP Goals for CSO activations and discharge volumes)
- Municipal Separate Storm Sewer System (MS4)

2.1.2. Other Regulatory Requirements

Summarize other regulatory policies/practices that apply to the City's operation and maintenance of its systems impacting CSOs and receiving water quality. These include the following:

- Nutrient Control and Phosphorous Reduction
- Stormwater Regulations
- Inflow/Infiltration Control
- Nine Minimum Control Requirements
- Climate Change Preparedness and Resiliency

2.2. Document Prior CSO Control Projects

Describe the prior CSO control projects completed by the City and the benefit (both CSO and non CSO-related) achieved through their implementation.

3. Characterization of Existing Conditions

Review and summarize the current existing conditions in the City within the following categories: (1) current level of CSO control, (2) public health, (3) climate equity and resiliency, and (4) water quality.

3.1. Current Level of CSO Control

Describe the current discharges under the MWRA Typical Year (MWRA TY) to the Alewife Brook and Charles River as compared to the MWRA LTCP goals.

- Alewife Brook – CAM001, CAM002, CAM004, CAM400, CAM401A, and CAM401B
- Charles River – CAM005, CAM007, CAM009, CAM011, and CAM017

3.2. Public Health

a. Flooding Extents

b. System Backups and Overflows

c. Public Health and Safety

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3.3. Climate Equity and Resiliency

- a. Environmental Justice Populations affected by CSOs and floods
- b. Resiliency in larger storm events

3.4. Water Quality

- a. Receiving Waters and Use Impairments
- b. Review and summarize available water quality data

4. Future CSO Control Planning Approach

4.1. Collection System Model Updates and Calibration

- a. Model updates will include incorporating as-built information for completed projects in the previous year as incorporated into the City's online GIS.
- b. Complete the modeling build-out of the following catchment areas:
 - CAM 401A
 - CAM 401B
 - CAM 017
- c. Calibrate the collection system model, relying on rain gauge data from the City's permanent rain gauges and flow monitoring data being collected for the CAM017, 401A, and 401B catchment areas.

4.2. Regional Technical Collaboration Support

Collaborate with MWRA and Somerville and coordinate with MassDEP and EPA in the following:

- 4.2.1. Work with MWRA and Somerville to determine the appropriate Typical Year storm scenario(s) to be utilized in this analysis in the development of alternatives.

Approval/agreement on an updated Typical Year by May 31, 2022, is assumed in order to meet the required CSO Control Plan schedule requirements per the Variances.

- 4.2.2. H&H Baseline Model. Coordinate with Somerville and MWRA to obtain updated H&H models, including the incorporation of planned future projects that achieve CSO reduction. The three H&H models will be integrated together to constitute the baseline model for CSO evaluation in Task 5. Baseline CSO performance against original LTCP requirements will be evaluated in Task 5.1.

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4.2.3. Coordinate with Somerville and MWRA to define the criteria for CSO elimination (e.g. controlling CSOs in a specific large design storm, closing all CSOs, or other). Coordinate with DEP/EPA on criteria for CSO elimination.

4.2.4. Coordinate with Somerville and MWRA to identify boundary conditions (e.g. tide and storm surge conditions) to be applied.

4.3. Document the Basis of Design Goals

Identify and document the following:

- Typical Year storm scenario(s) to be used;
- Climate change boundary conditions (e.g. tide and storm surge conditions) and resiliency criteria (e.g. specific design storm and/or extreme rainfall events for evaluating impacts on flooding) to be considered in proposed alternative development and evaluation;
- How systems will be hydraulically evaluated (levels of service and model set up);
- Water quality goals related to Phosphorous control the Charles River and Alewife Brook;
- Evaluate peak flow limitations to Alewife Brook to ensure no increases to flooding.

5. Development of Alternatives

Develop alternative pathways and candidate projects to address the CSO Control needs and opportunities.

5.1. CSO Benchmarking and Performance Gap Analysis: The City will run the MWRA Typical Year storm scenario (utilized in developing the current LTCP) in the model baseline (Task 4.2.2) to evaluate CSO performance. CSO activation frequency and discharge volume will be compared against MWRA's obligations for CSO control in the Court Order as set forth in the March 15, 2006, Second Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflow Control (the "Second Stipulation") as amended. Any identified gaps in MWRA compliance will be quantified as the CSO needs.

5.2. Additional CSO Control Opportunities: Define additional CSO control opportunities, beyond the benchmarking gap analysis, including CSO performance improvements in an Updated Typical Year (Task 4.2), and up to and including completely eliminating CSOs.

5.3. Develop Alternatives

5.3.1. Evaluate Concepts, Identify Alternative Pathways, and Develop Candidate Projects:

Concepts. After reviewing prior facility reports and other past CSO control studies completed by the City and evaluating new concepts, the City will confirm the

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concepts that could apply to each CSO location. Concepts will include, but not be limited to, the following:

- a. Conveyance improvements
- b. Raising overflow weir elevations
- c. Implementing or modifying real-time control strategies
- d. Regional updates to the MWRA system and modifying operation of regional CSO facilities
- e. Sewer separation, including full and partial separation of separated areas that connect to the combined sewer network
- f. Implementation of large-scale green infrastructure and/or inflow and infiltration reduction programs.
- g. Storage tanks, pipelines/tunnels, and manholes
- h. Closing CSO outfalls.

Alternative Pathways. The City will assemble local and regional concepts for CSO Variance waterways to identify one or multiple alternative pathways to provide CSO control to address identified needs (Task 5.1) and opportunities (Task 5.2). At least one pathway for each waterway will be a “path to zero,” consisting of a suite of concepts that collectively result in eliminating all CSO activations, while meeting the other goals outlined in Task 4.3.

The most feasible pathway alternative(s) for each of the CSO Variance waterways, up to and including full CSO elimination, will be characterized by the incremental gains (activation frequency / discharge volume) to be achieved by each individual component (or “candidate project”).

Candidate projects. Will be refined with a high-level consideration of the following:

- a. CSO performance
- b. Other goals identified in Task 4.3.
- c. Project costs and O&M requirements.
- d. Outside influences (i.e. commercial or business development/redevelopment goals, streetscaping plans, funding, etc.).
- e. Project phasing (i.e. multiple phases of implementation for affordability or other reasons).
- f. Project sequencing considerations
- g. Multi-benefit projects that address many needs within the same project (i.e. flooding, water quality, etc.).
- h. Opportunities for cost-effective green infrastructure implementation.

- 5.3.2. Planning Level Opinions of Probable Capital Cost: Prepare planning level opinions of probable capital cost for candidate projects where cost data is not already developed previously. Where required, the City will use cost data available from the City, data from recent projects of a similar nature, or through industry standards

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(such as RS Means, MassDOT, or Rental Rate Blue Book). Costs will include Planning/Study, Design, Bidding, Permitting, Easement and/or Land Taking, Construction, Post-Construction Monitoring/Start-up and Closeout, and Contingency as may be applicable. Costs will be reported in current year dollars (inflation will be applied in the Rate Analysis).

- 5.3.3. Project Sheets: Prepare a 1-2 page Project Sheet with key information for each candidate project developed.

The Project Sheets will be included in the final Recommended Plan report.

6. Public Participation Plan and Outreach

Complete preparation activities, begin the process of educating and mobilizing the public in support of the approach to the CSO Control Plan update to the LTCP. The Public Participation Plan and Outreach activities will include the following:

6.1. Public Engagement Strategy

- 6.1.1. Strategy Kick-Off Meeting with Somerville and MWRA

6.2. Public Participation Plan

6.2.1. Public Participation, Outreach, and Communications Plan

- a. Develop a Public Participation, Outreach, and Communications Plan to detail the goals and objectives, messaging, communications strategies, tools, and schedule for the outreach program. It will also provide a flexible roadmap for the components below.

6.3. Stakeholder Identification and Interviews

6.3.1. Stakeholder Identification

- a. Finalize list of stakeholders developed during strategy session.

6.3.2. Stakeholder Interviews

- a. Conduct interviews with key stakeholders identified through the strategy session and initial stakeholder outreach. The goal is to collect direct input and feedback from group of stakeholders that reflect the diverse populations in the City. The input for the interview will be used to further align the City's approach towards stewarding the Recommended Plan development process from ideas on project alternatives (Task 5) to perspectives on criteria ranking (Task 9). Interviews will be conducted within the first 3 months of the CSO Control Plan update to the LTCP. Prepare a list of questions and informative items and share those items with the stakeholder individual in advance of the interviews.

6.4. Planning for Public Outreach Communications and Print Materials

6.4.1. Develop Project Fact Sheet

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Draft content and prepare graphics for the project fact sheets. The purpose of the fact sheet will be to introduce the project and explain the process and schedule. It will include an educational component about CSOs, water quality, and general water resources. It will include several FAQs and describe how to be involved and include contact information. Update the fact sheets as needed.

6.4.2. Newspaper Editorial Briefings

Coordinate one meeting each with the local newspaper and the Boston Globe to discuss the CSO Variance/CSO Control Plan update to the LTCP.

6.4.3. Social Media

Develop Facebook, Twitter and YouTube platforms, independent of the existing the City channels.

6.4.4. City Website

Updates to the City's CSO landing page as needed to reflect information in the one-page fact sheet/FAQ.

6.5. Public Meetings and Events

6.5.1. Regional Initial Public Meeting:

Hold an initial public meeting in collaboration with MWRA and Somerville, which will be scheduled within the first 3 months of the project. The goal of the meeting will be to provide information on the history of CSOs, and review and receive feedback on the CSO Control Plan update process. The meeting will also include an overview of concepts for improving CSO performance, including discussing the Typical Year development approach, the complexities of water quality improvements and potential flooding impacts.

6.5.2. Public Meetings During CSO Planning:

Through the CSO planning process, hold two public meetings to discuss and facilitate public input on:

- a) Benefits criteria and weighting factors, and
- b) Alternatives being evaluated (during their development).

Breakout groups for Alewife Brook and Charles River may be facilitated.

6.5.3. Public Outreach Events

- a) Develop and facilitate up to 3 public outreach events. The purpose of these events is to engage the general public in a less formal and more accessible setting, with a focus on targeting priority populations including individuals from EJ communities within the City.
- b) Develop posters and handout materials for distribution during the meeting.

6.5.4. Public Meeting to present Draft Recommended Plan:

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Once the draft Recommended Plan report has been developed, the City will coordinate with MWRA and Somerville to hold one public meeting open to stakeholder group participants, and the general public. The intent of this meeting is to inform the public on how their input through events, direct feedback, and stakeholder meetings have been incorporated into the development of the Draft Recommended Plan and to receive feedback prior to the development of the Final Recommended Plan.

7. Water Quality Analysis

The MWRA has completed its Water Quality Assessment report (dated August 27, 2021). The report looked to demonstrate whether the CSO LTCP goals have been met for the Lower Charles River and the Alewife Brook/Upper Mystic River as defined in the Second Stipulation. The goals of the assessment included assessing the relative impact of CSOs on water quality vs. the impacts from stormwater and non-CSOs sources by predicting E. coli and Enterococcus counts in the receiving waters during the typical year. The assessment results determined that stormwater was the largest source of E. coli and Enterococcus during the typical year. A sensitivity analysis also identified that CSO loadings had a marginal impact on the receiving water's ability to meet the single-sample maximum criterion for E. coli.

The City intends to use the above information and the model used by the MWRA on its water quality assessment, where appropriate, to evaluate the water quality impacts of alternatives to reduce CSOs, identify measures needed to address these impacts, and factor the results into the decision made for CSO controls. To the maximum extent possible, the City will rely on the receiving water quality results reported in MWRA's Water Quality Assessment from its CSO Post Construction Monitoring and Performance Assessment, as well as additional water quality modeling runs performed by the MWRA to assess water quality impacts from an updated Typical Year and to assess impacts from proposed alternatives (i.e. sewer separation or partial separation).

8. Alternative Analysis and Ranking Prioritization

Working in collaboration with the MWRA and Somerville, the City will establish and apply benefits criteria and weighting to provisionally rank the alternatives.

The City will develop a benefits model to support in the prioritization of the candidate projects developed in Task 5 above.

8.1. Benefits Criteria: Identify the benefits to be used in the decision-making model that consider the City's needs, goals, and socio-economic baseline. Benefits will include some or all of the following:

1. Capital Cost
2. Constructability

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3. Disruption Reduction
4. Ease of Implementation
5. Efficiency
6. O&M Cost
7. Water Quality improvements
8. Reduction of CSO
9. Reduction of Flooding
10. Reduction of SSO
11. Redundancy
12. Regulatory Consideration
13. Renewed Infrastructure
14. Risk Reduction
15. Secondary Community Benefit
16. Affordability

Each Benefit will be described in terms of its definition and how projects are evaluated or rated against it.

8.2. Benefit Weightings: The City will weight each of the benefits criteria to establish its relative importance. Benefits weighting will likely be modified throughout the Recommended Plan benefits modeling activities.

8.3. Rating Candidate Projects and Prioritization of Candidate Projects: The City will utilize the Benefits Model to rate each candidate project against each benefits criterion. The ranking and weighting of each benefits criterion will then be used to develop an overall Benefits Score (prioritization ranking).

Stakeholder Input collected from interviews, public meetings, and public events (Task 6) will be essential in the process of developing and weighting benefit criteria.

8.4. Evaluation of Benefits Modeling Results and Model Refinement and Calibration: The City will proof, screen, and fine-tune the results after all candidate projects have been evaluated through the Benefits Model and ranked accordingly to be incorporated in the first draft of the Recommended Plan.

8.5. Alternative Analysis and Ranking Review Workshop: the City will facilitate a workshop with MWRA and Somerville to review the Benefits Modeling results and prioritized list of projects reviewed in public meetings (6.5.2).

9. Affordability Analysis

The City will conduct a Rate Analysis to identify potential long-term impacts to water and sewer rates. This will be used to complete an affordability analysis for the City's service area

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based on the affordability metrics outlined by EPA's November 24, 2014 Memorandum on Financial Capability Assessment Framework for Municipal Clean Water Act Requirements (water and sewer bills as a percentage of median household income across the entire service area).

The affordability analysis will use affordability as a metric to set the thresholds and timing for capital expenditures that will influence the development of the Recommended Plan and schedule for implementation.

10. Develop Recommended Plan and Implementation Schedule

10.1. The City will utilize the prioritized list of projects and the results from the affordability analysis to formulate the Recommended Plan.

10.2. The City will develop a schedule for implementing the recommended plan that maintains affordability as determined by the results of the affordability analysis.

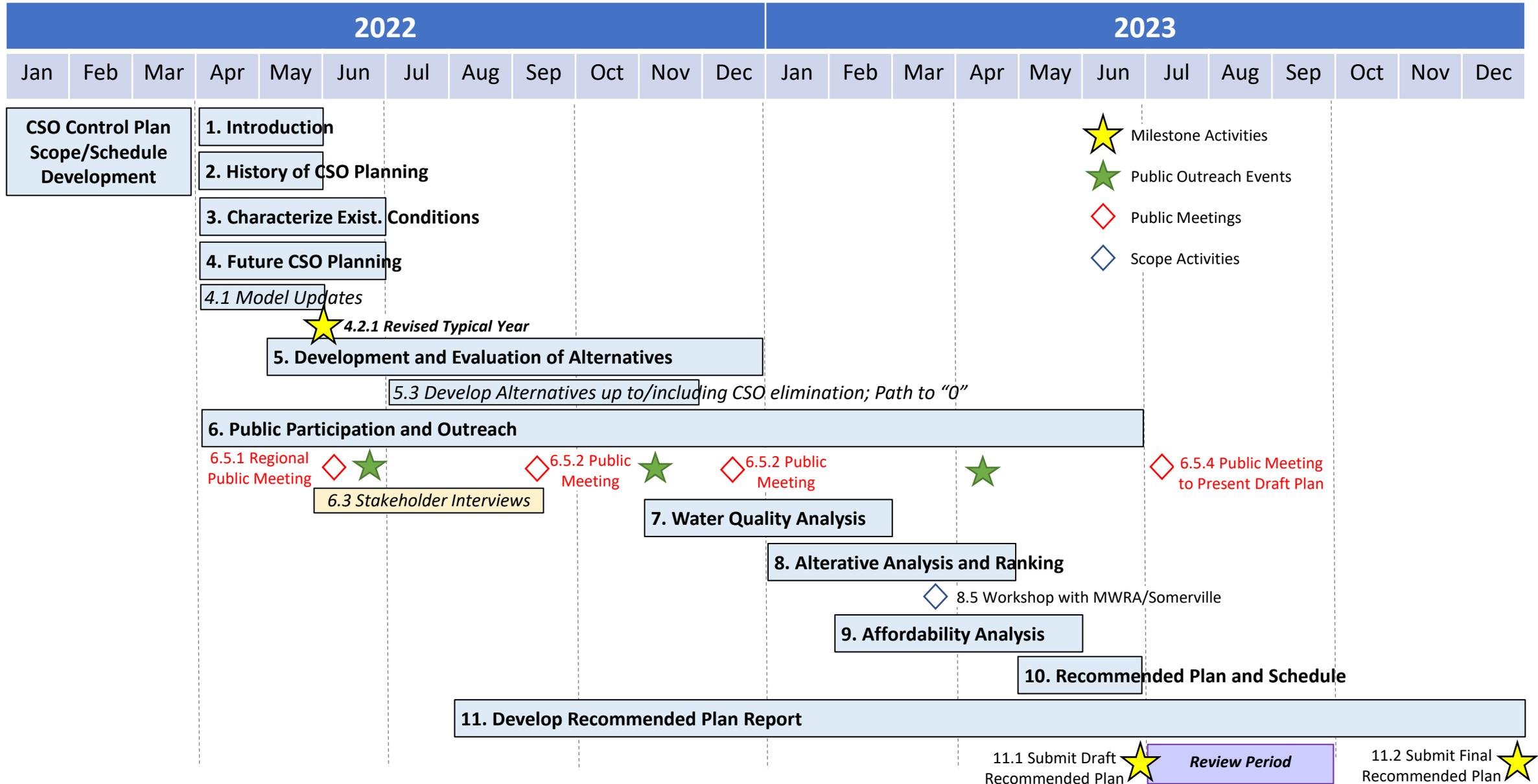
11. Draft and Final Report Development

As work progresses throughout the project the City will draft chapters of what will become a final report for the Recommended Plan. At the conclusion of the prior tasks, the City will summarize activities of Task 1 through 10 into a Draft Recommended Plan Report for submittal to EPA and MassDEP and initiation of the public comment process. Once comments are received, the City will work with MWRA and Somerville to generate responses and will develop the Final Recommended Plan Report.

12. Schedule

See attachment 1.

City of Cambridge CSO Control Plan Schedule (April 1, 2022)



- ★ Milestone Activities
- ★ Public Outreach Events
- ◇ Public Meetings
- ◇ Scope Activities