

# Cambridge Partial Sewer Separation & Charles River Water Quality

MWRA Wastewater Advisory Committee Meeting  
April 14, 2023



# Agenda



Overview of Cambridge



Cambridge and MWRA  
Collaboration.



What is Cambridge doing for  
stormwater management



Details of partial sewer  
separation



Questions / Comments

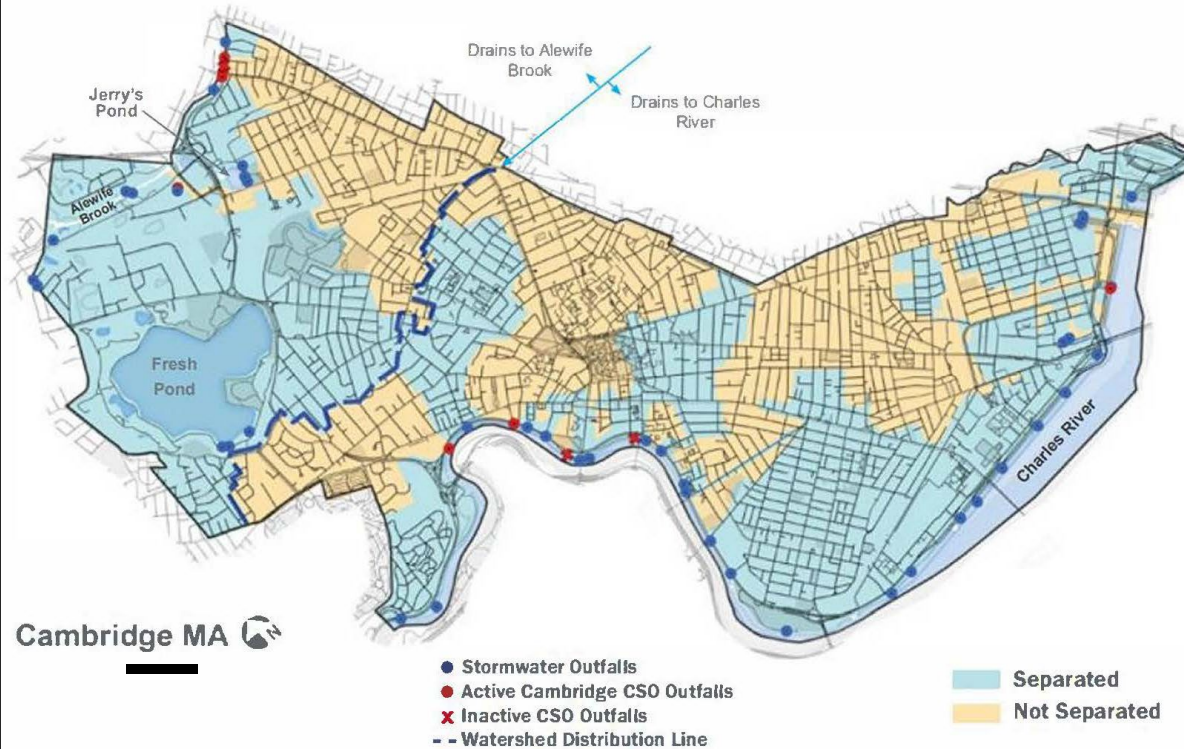
# Cambridge Overview

Cambridge combined sewer community (45%).

Lies within two watersheds.

The 2020 U. S. Census recorded 118,403 residents in 6.4 sq mi

Cambridge is the ninth most densely populated city in the United States





# Cambridge/MWRA Collaboration

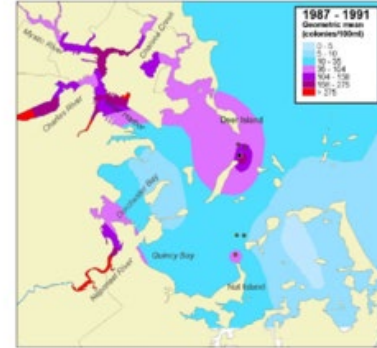
- Strong partners during the implementation of the LTCP for the Alewife Brook and the Charles River.
- Committed to collaborating with the MWRA to improving water quality and continue reducing CSO discharges.



## Dramatic Improvements In Bacterial Water Quality

1987-1998 (Before Secondary Treatment and South System transfer)

Elevated bacteria around outfalls, rivers, Inner Harbor, shoreline



1999 - 2003 (After Secondary Treatment and New Outfall)

Most of Harbor well within swimming criteria, most remaining problems in rivers



Average *Enterococcus* counts in Boston Harbor



Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

## Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Baker

Kathleen A. Th

DiIorio  
Governor

Martin  
Com

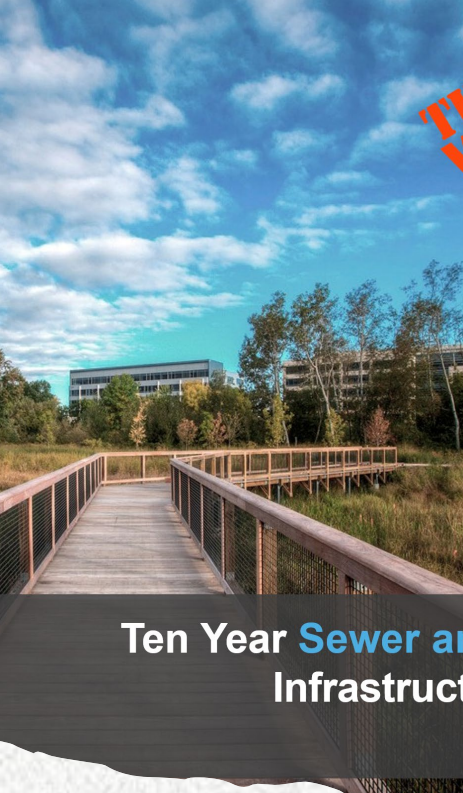
### FINAL DETERMINATION TO ADOPT A VARIANCE FOR COMBINED SEWER OVERFLOW DISCHARGES TO CHARLES RIVER BASIN

The Massachusetts Department of Environmental Protection (“MassDEP”) hereby adopts a variance for Combined Sewer Overflow (“CSO”) Discharges to the Charles River Basin (the “Variance”), originally issued on October 1, 1998, from September 1, 2019 to August 31, 2024. This discharger-specific variance, if finalized, would authorize limited CSO discharges from the Massachusetts Water Resources Authority (“MWRA”) and the City of Cambridge which are

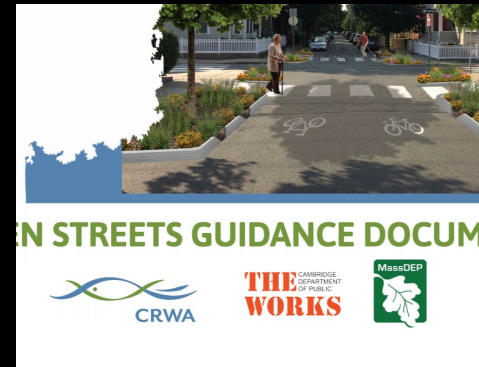
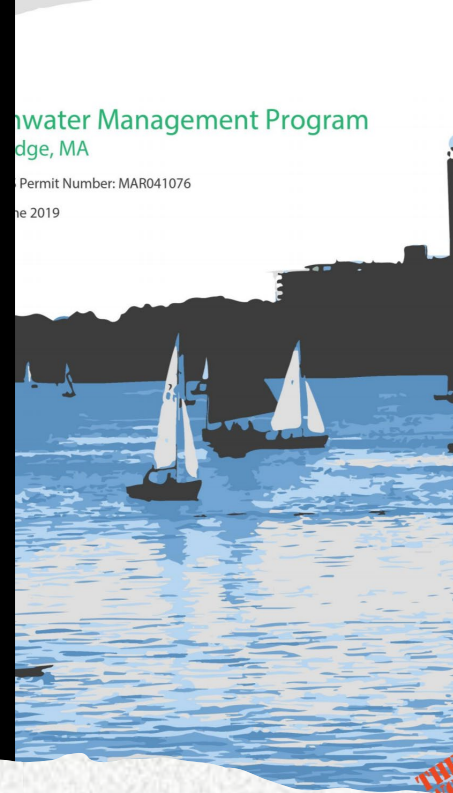
## Full Sewer Separation

- All stormwater goes to the receiving water bodies.
- Reduces CSOs.
- Increases phosphorous and other nutrients.
- Not consistent with Phosphorous TMDL in the Charles River and Alternative TMDL in the Alewife Brook.





Ten Year Sewer and  
Infrastructure



Cambridge is committed to stormwater management and improving water quality



# Commitment to Stormwater Management

City Projects:  
Large to Small



3.5-acre Alewife  
Stormwater Wetland.

\$13.8M+ project funded by  
the City as part of the  
larger Alewife Sewer  
Separation Program.

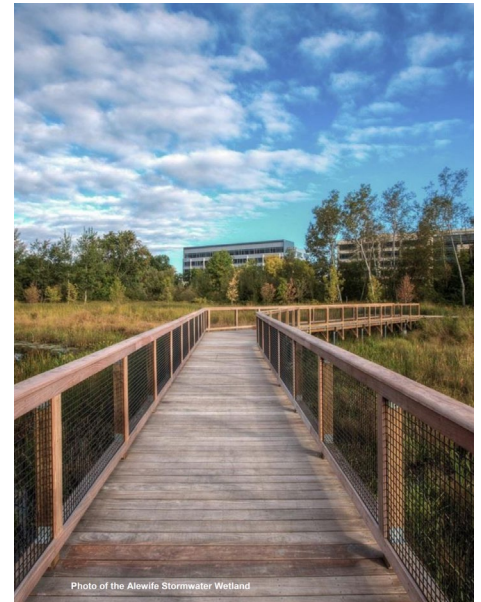
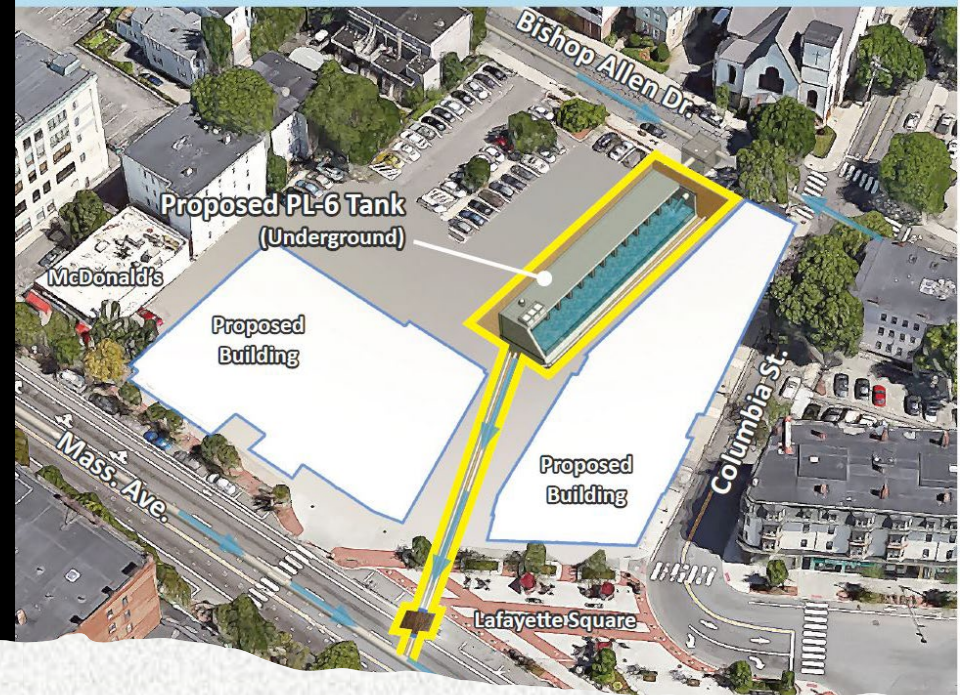


Photo of the Alewife Stormwater Wetland

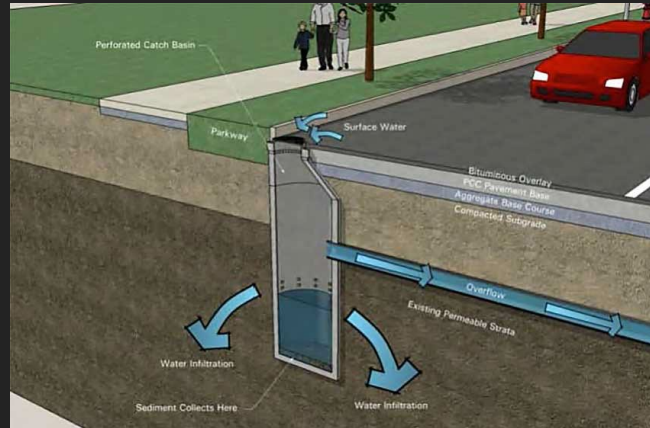


## Commitment to Stormwater Management

## City Projects: Large to Small

480,000 gallon stormwater tank in Central Square. \$20M+ project funded by City and MWRA II funds.





**Commitment to  
Stormwater  
Management**

City Projects: Large to Small  
Infiltration Systems

# Commitment to Stormwater Management

Private Development Plays a Role



Rain Garden at Stata Center, MIT

Requirement for private development to reduce Phosphorous load by 65-100%, EPA requirement 62%





## **Phosphorus Reduction Conventional Alternatives**

Infiltration not feasible → clay soils, high groundwater

Structural BMP with large footprints (wetlands) not feasible → highly dense urbanized area



# Other Control Measures

## Other Best Management Practices

- Vacuum street sweeping: up to 4% reduction
- Rain gardens: 0.2% reduction
- Deep sump catch basins + cleaning: up to 2% reduction

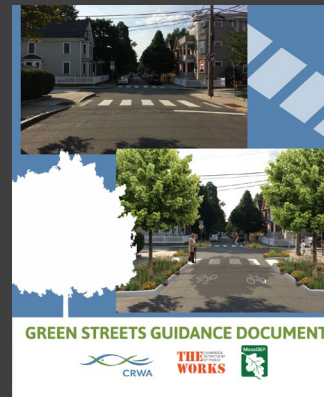
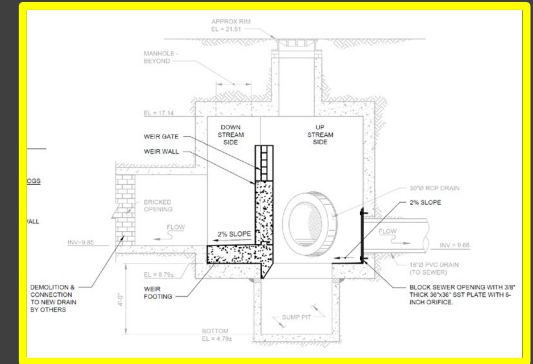
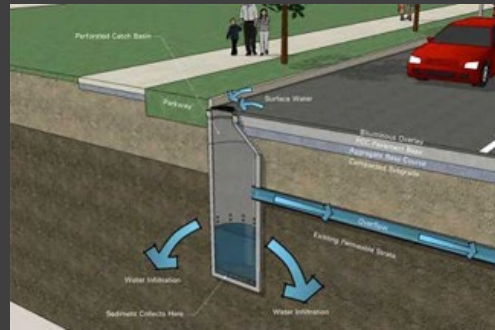
**TOTAL TP REDUCTION  
CONVENTIONAL BMPs: 6.2%**

**• STILL 59% TO GO!!**



Cambridge committed to stormwater management and improving water quality.

Partial Sewer Separation – additional tool





**WARNING**  
**WET WEATHER**  
**AVERAGE DISCHARGE**  
**MWRA OUTFALL**  
**023**

## **Partial Sewer Separation**

**Sewer Separation in Cambridgeport, an area tributary to Cottage Farm, was identified by the MWRA as critical to reducing the CSO volumes at Cottage Farm.**





# Partial Sewer Separation: Stormwater Overflow

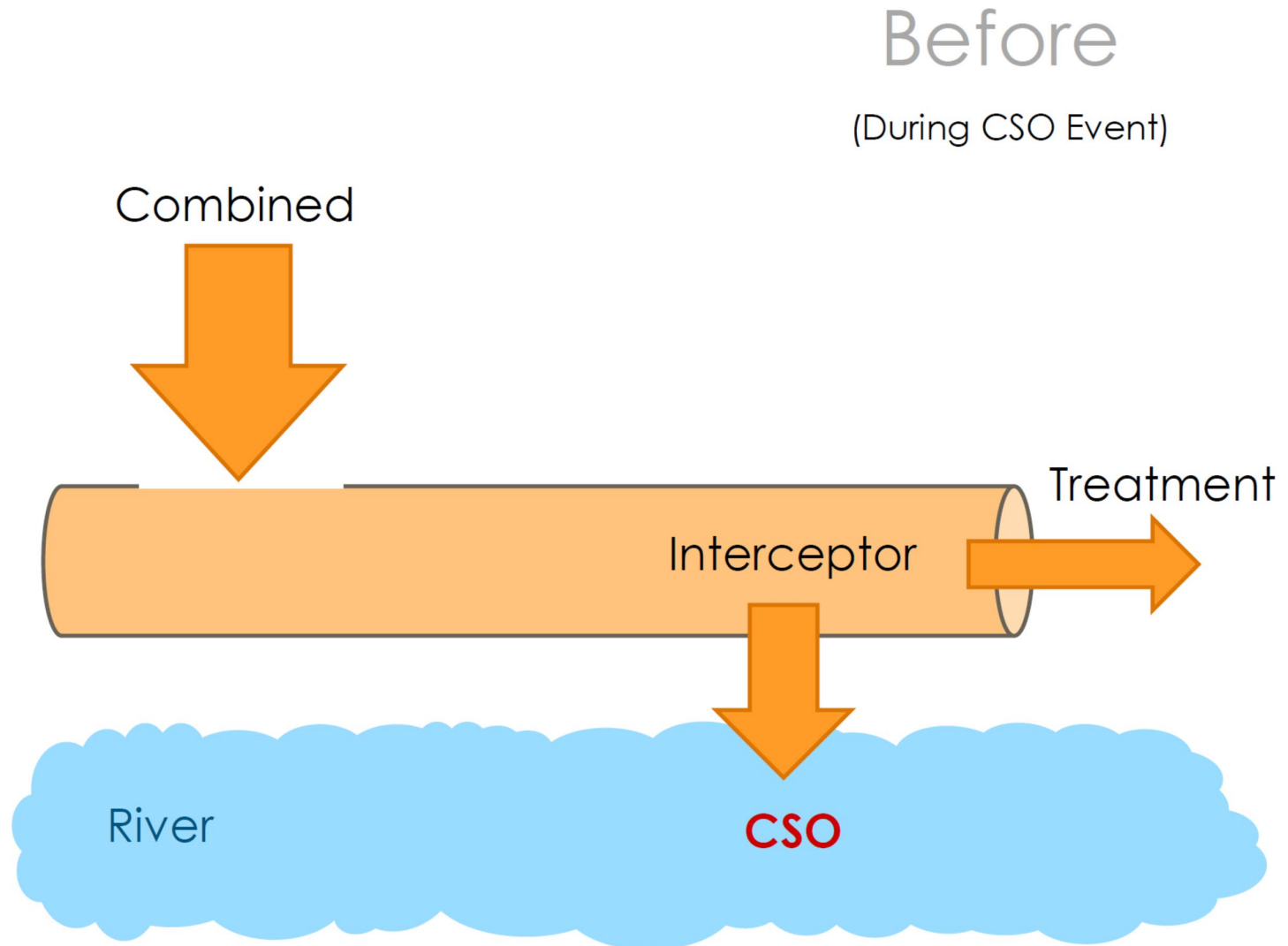
## Main goals:

- Hydraulic level of service can not decrease with the TP treatment scheme
- Downstream hydraulic conditions in the receiving MWRA system must be improved
- Optimize TP loading reduction while minimizing flow deflection
- Minimize cost – capital and O&M
- Passive control system preferred



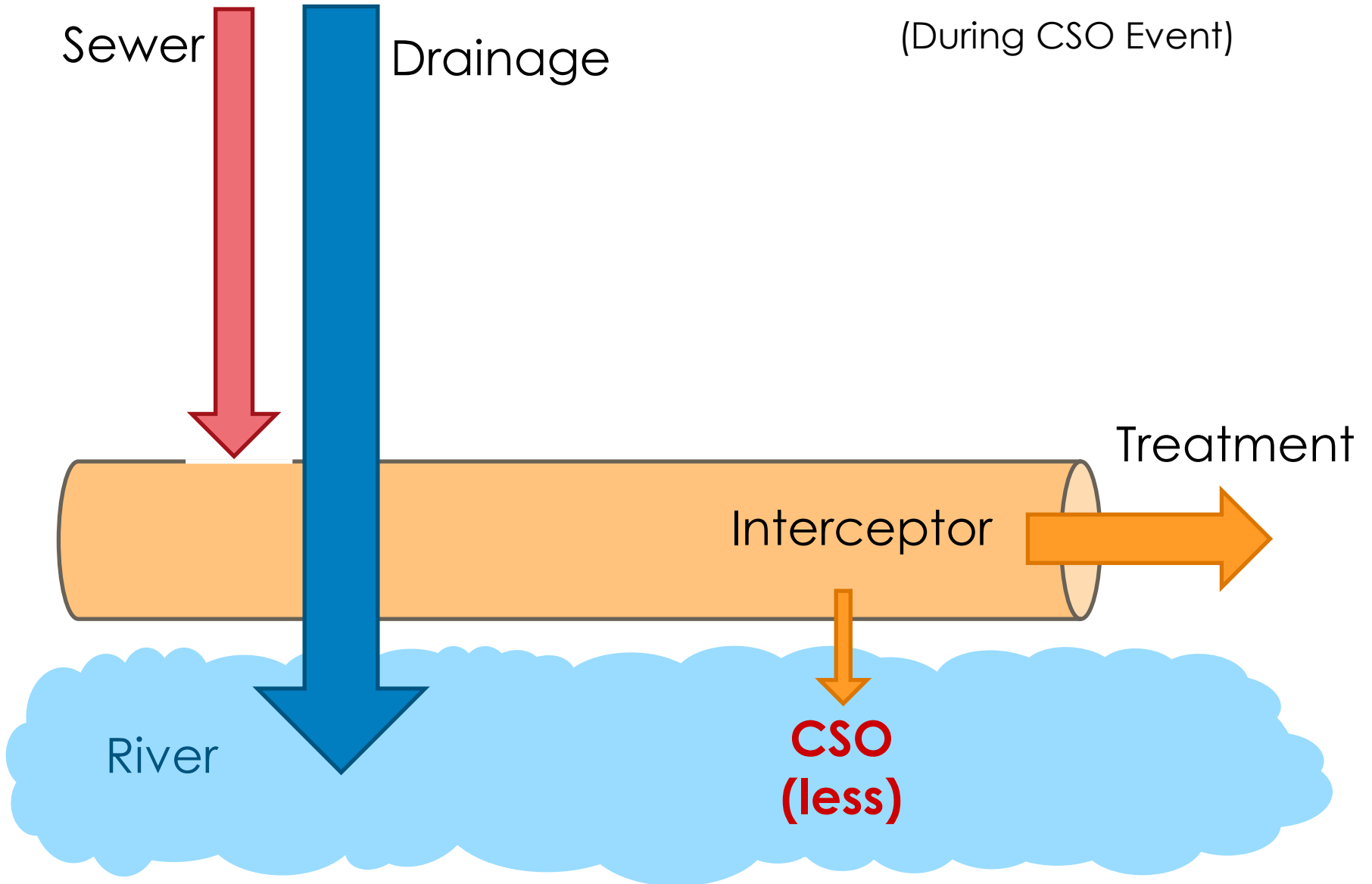
# How does combined sewer system currently work during larger storms?

All sewage and stormwater is combined and goes to the MWRA system until there is a CSO activation.



# After Full Separation

(During CSO Event)

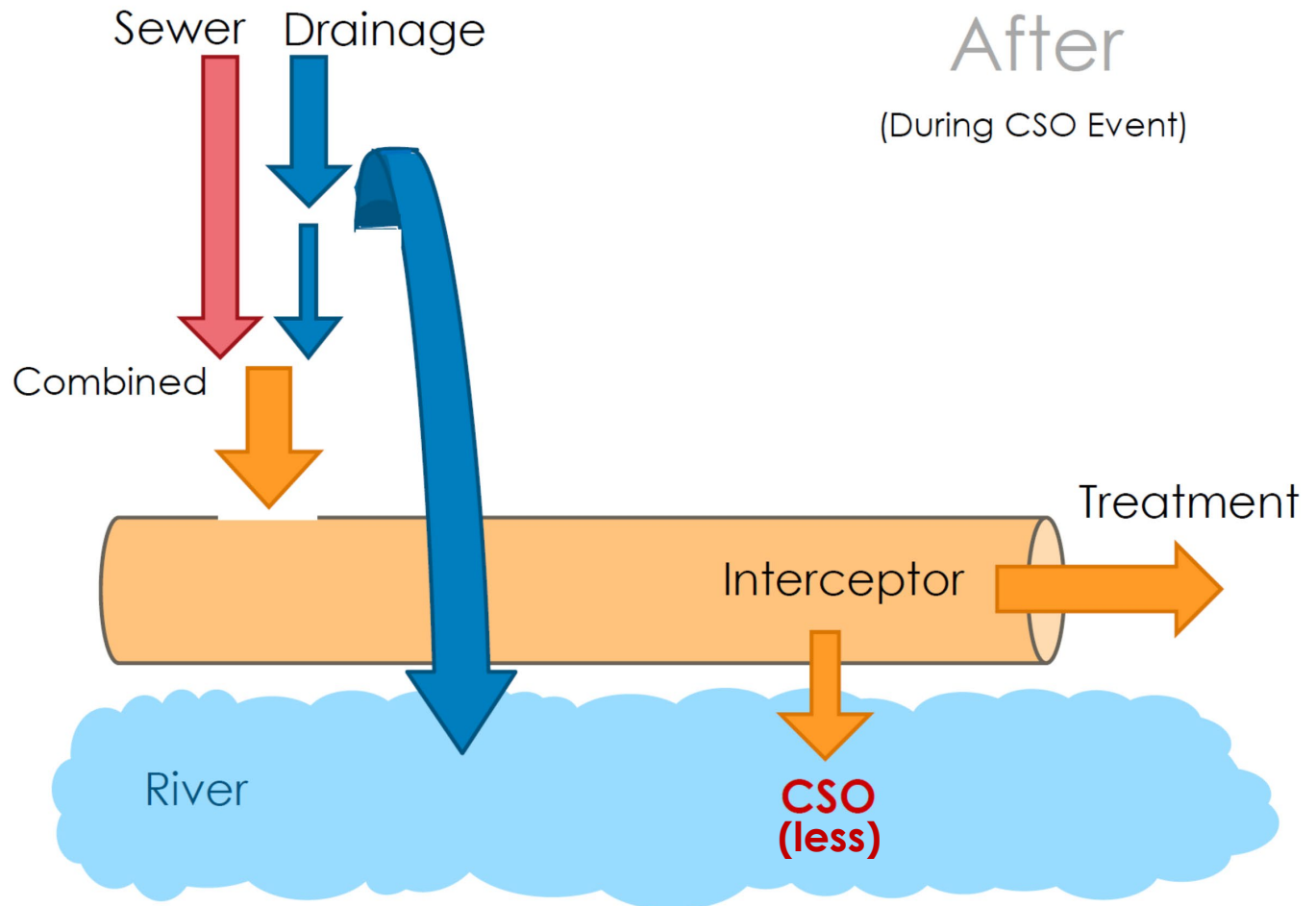




# How would system work with partial sewer separation?

During smaller storm events the stormwater stays connected to the MWRA system; reducing the impact of phosphorous and other nutrients on the river.

During larger storm events, stormwater is diverted to the river; reducing the frequency and volume of CSOs.



## How it works

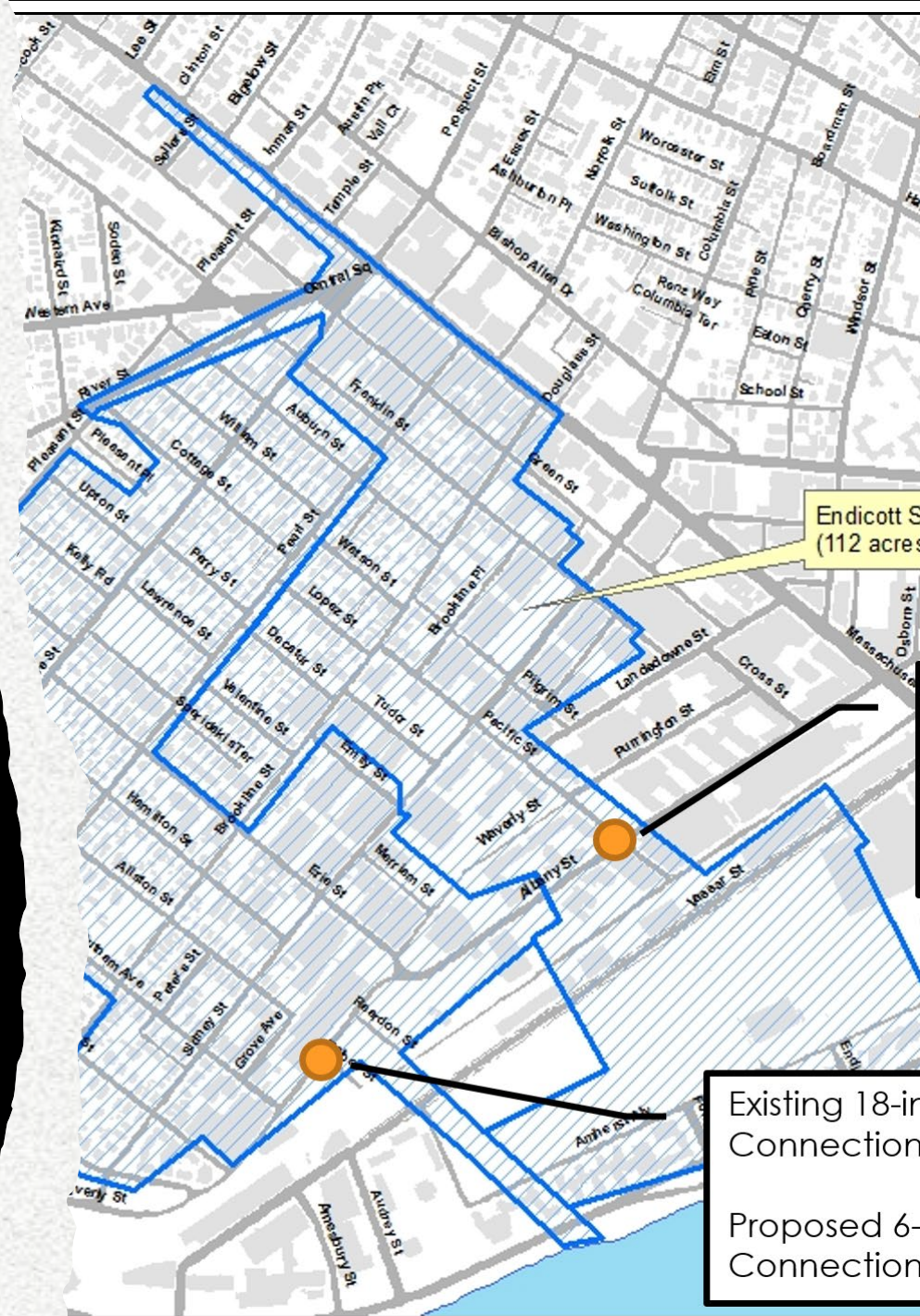
Reduces the existing 10" and 18" connections from the Cambridge separated drainage system to the MWRA sewer system to 2 - 6" connections (shown in orange).

During heavy rains an overflow weir allows stormwater to build up and discharge to the river

Approx 26% CSO volume reduction at Cottage Farm<sup>1</sup>

Approx 88% TP reduction<sup>1</sup>

<sup>1</sup>Analysis from July 2022 Summary Report from the City of Cambridge to the MWRA







**WARNING**  
WET WEATHER  
SEWERAGE DISCHARGE  
MWRA OUTFALL  
**023**

# Partial Sewer Separation

- Partial and full sewer separation provide similar levels of CSO benefit to the MWRA's system. However, partial sewer separation also reduces the impact of phosphorus and other nutrients on the receiving waters.

- Both Cambridge and the MWRA understand the importance of continued sewer separation to the MWRA meeting the LTCP and continuing to further decrease CSO activations and volumes.



# Questions/Comments

## For more information:

City of Cambridge  
Department of Public Works  
147 Hampshire Street  
Cambridge, MA 02139  
617-349-4800

[www.cambridgema.gov/theworks/tenyearplan](http://www.cambridgema.gov/theworks/tenyearplan)

