



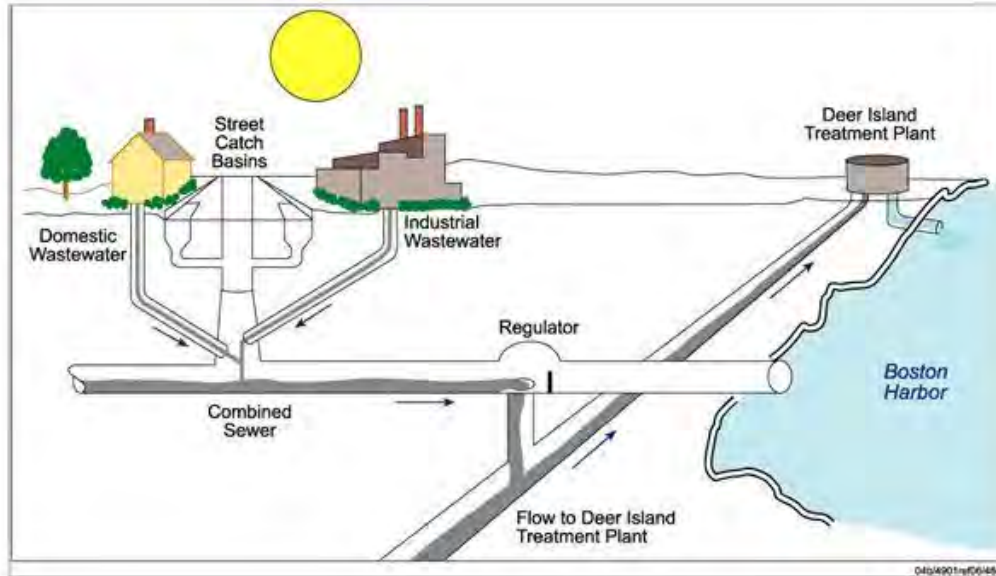
Massachusetts Water Resources Authority

MWRA Cottage Farm CSO Treatment Facility

May 2019



What is a Combined Sewer Overflow (CSO)?

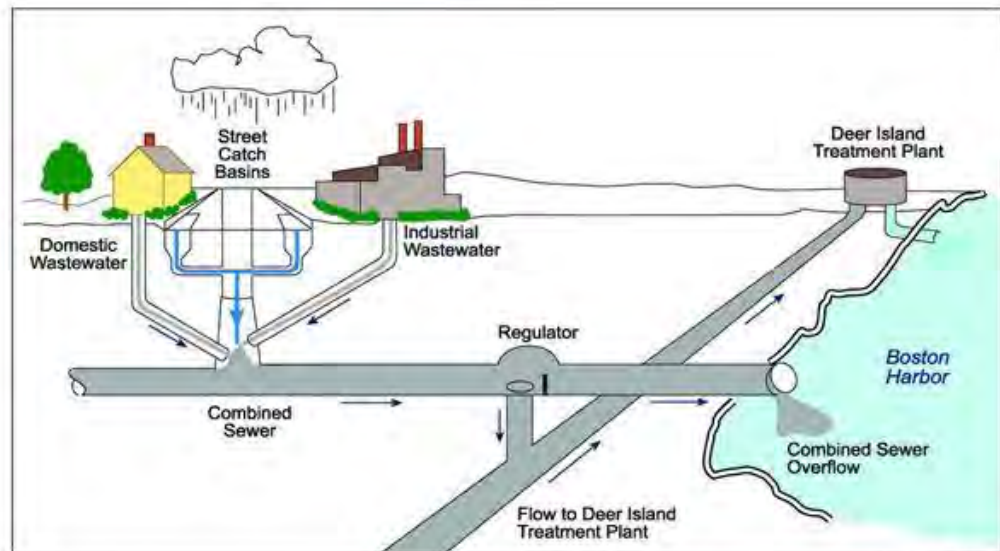


Dry Weather and Most Storms

Local combined sewers and MWRA interceptor sewers have adequate capacity to convey sanitary flows and smaller storm flows to the Deer Island Treatment Plant.

Larger Storms

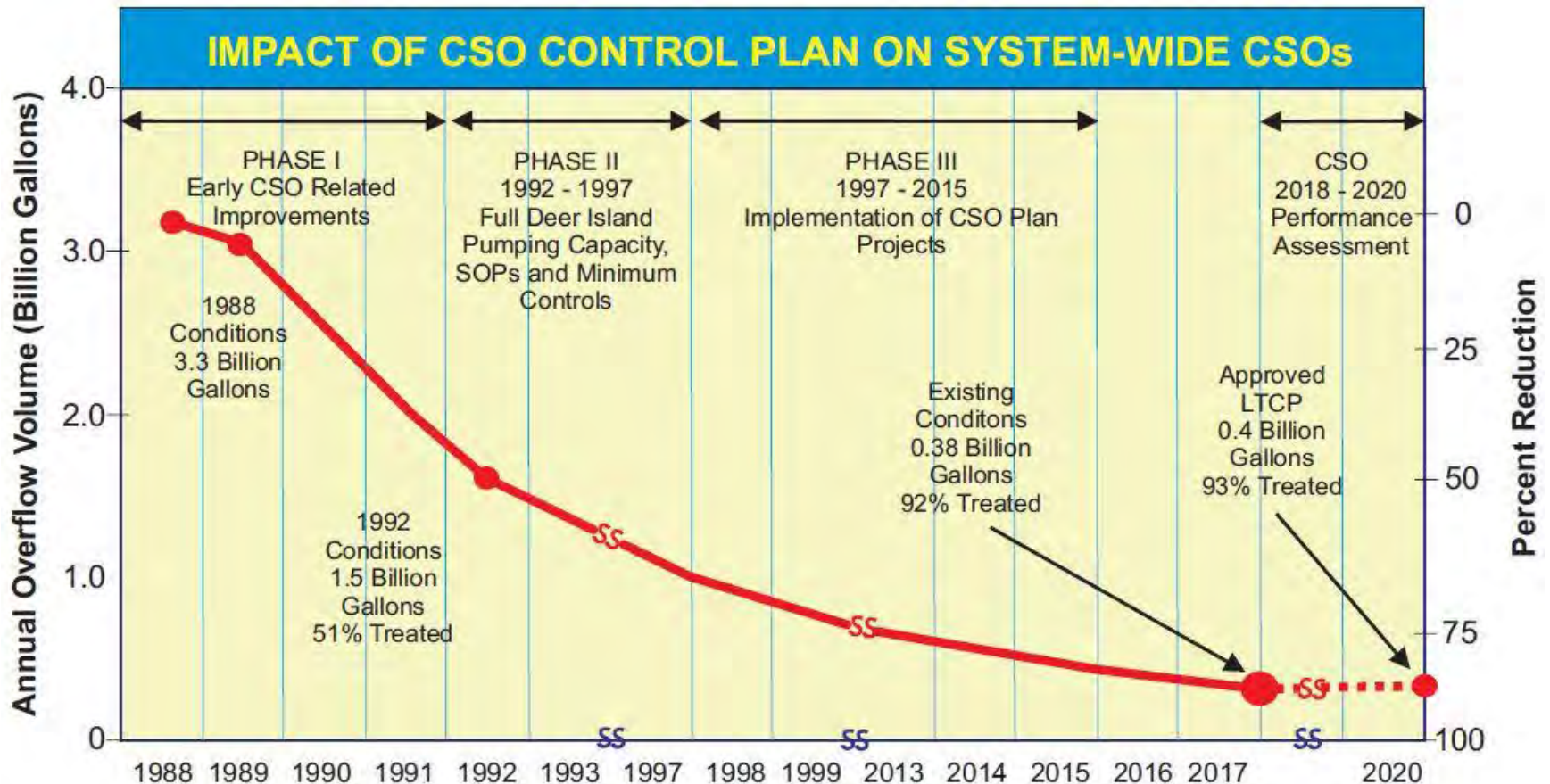
In larger storms, high stormwater flows can exceed the capacities of the local or MWRA sewers. Excess flows released at CSO outfalls protect upstream areas from sewer backups and flooding.





MWRA's Phased Approach to CSO Control

CSO Reduction 1988 to 2020





CSO Plan Efforts and Accomplishments

✓ CSO reduction and water quality improvement every year since 1988

- Many outfalls were closed by the communities (BWSC, Cambridge, Chelsea and Somerville) by the late 1980's.
- Dry weather overflows were eliminated by 1990.
- Completion of Deer Island transport upgrades by 1992 greatly reduced CSO discharges.
- >100 CSO system optimization measures 1993-97 further reduced CSO discharges by up to 25%.
- Construction of 35 CSO projects completed 1996-2015.



✓ 183 CSO-related federal court milestones achieved to date

- Completion of the last construction project in the Boston Harbor Case in December 2015
- One remaining federal court milestone: report on CSO post-construction monitoring and performance assessment due Dec 2020

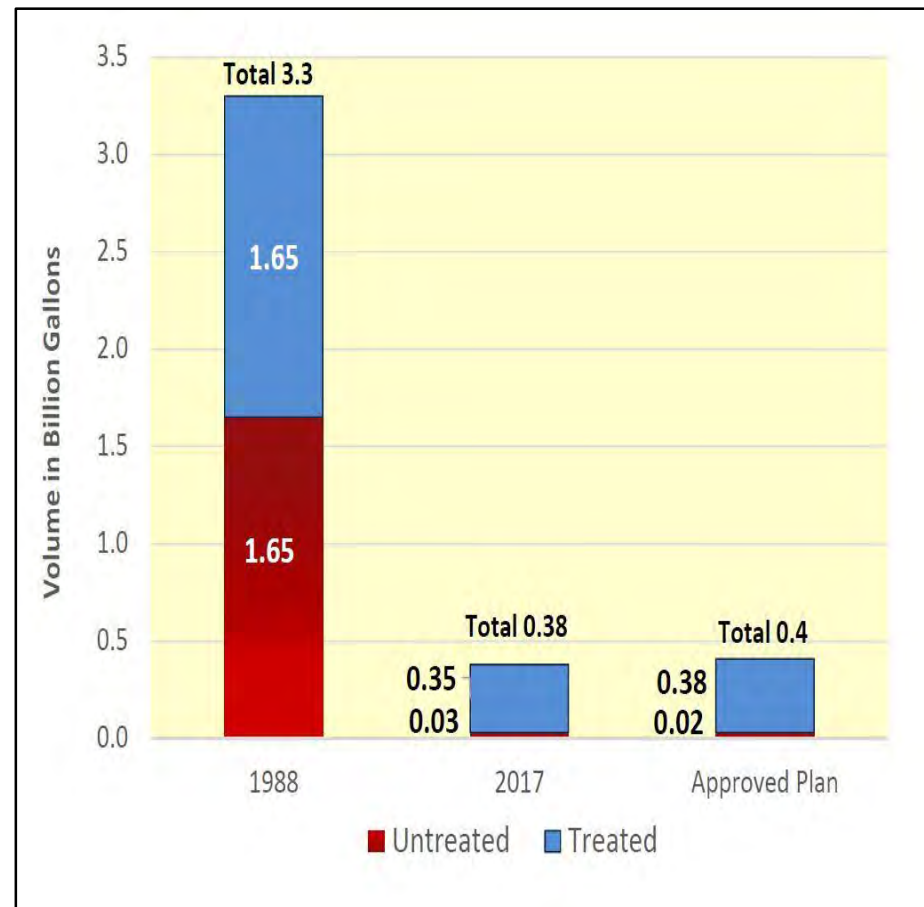


Long-Term CSO Control Plan Benefits

The LTCP is intended to bring 84 CSO outfalls into compliance with the Clean Water Act.

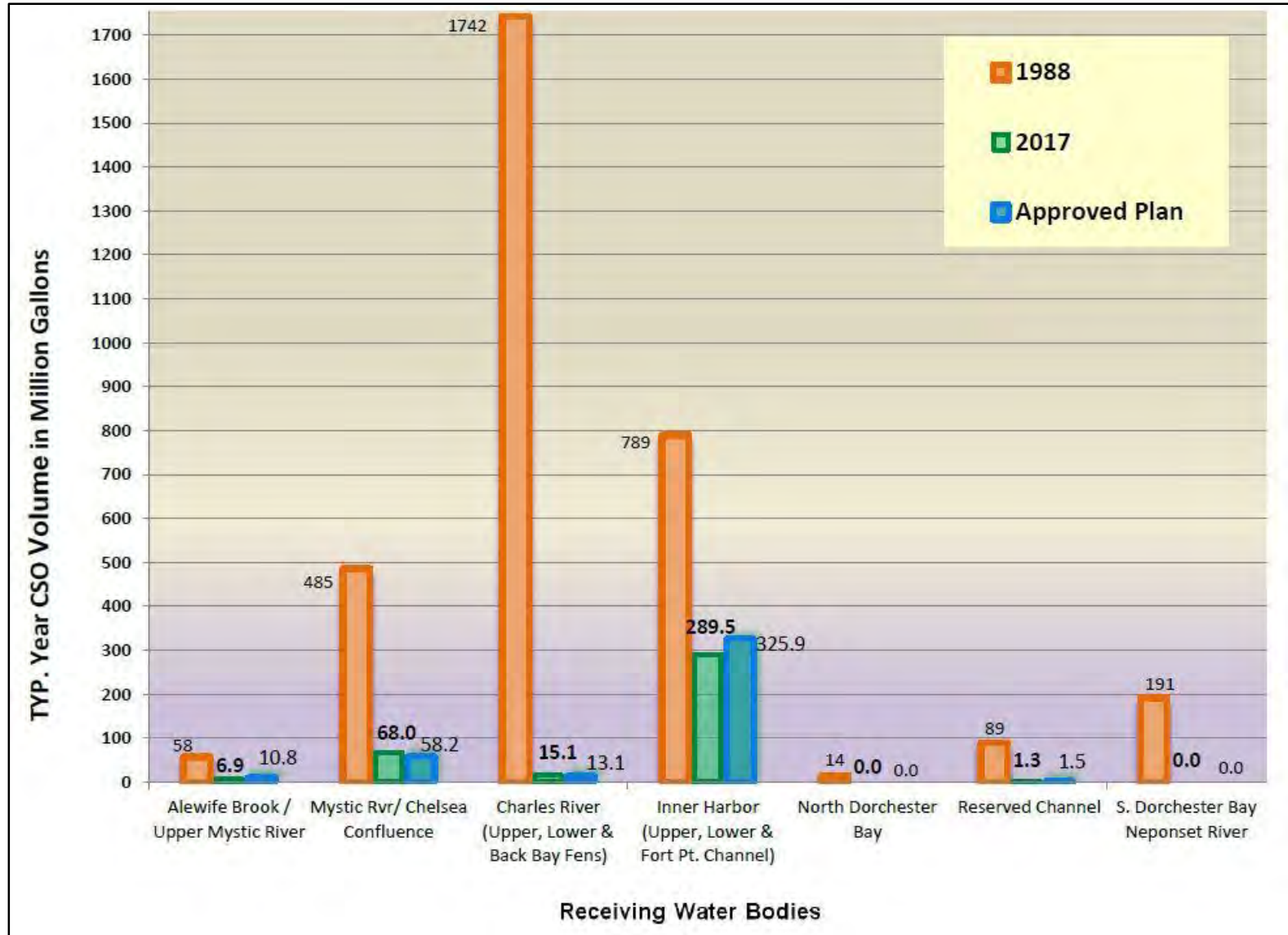
- 35 CSO outfalls are now closed.
- 5 outfalls along the South Boston beaches have 25-year storm level of control.
- 5 outfalls have upgraded wet weather treatment at four CSO facilities.
- Discharge frequency and volume are greatly reduced at the remaining outfalls.

Reduces system-wide CSO discharge volume in a Typical Rainfall Year by 88%, with 93% of remaining volume treated at MWRA's CSO facilities.





CSO Reduction by Receiving Water

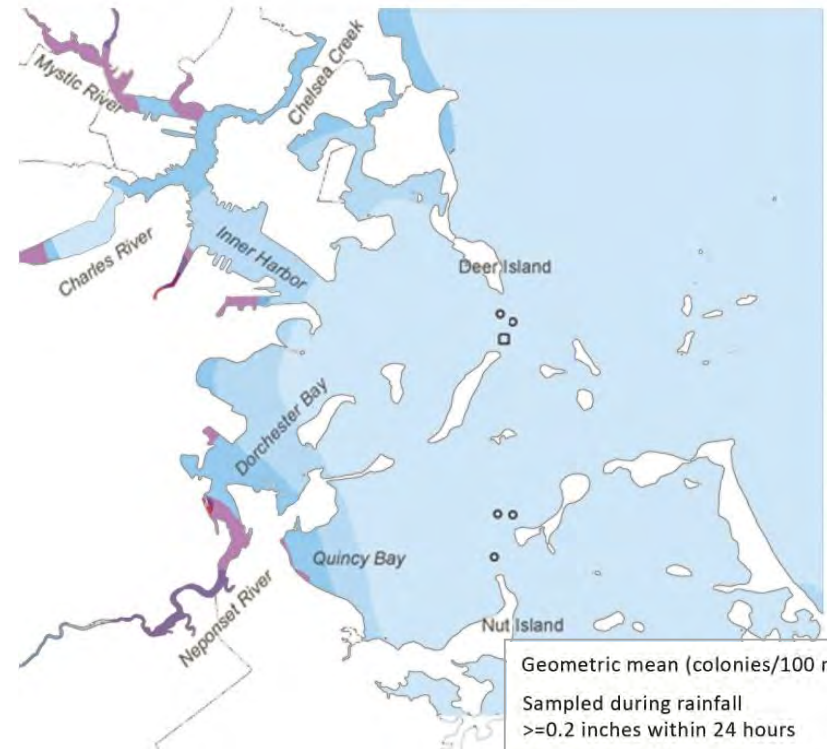
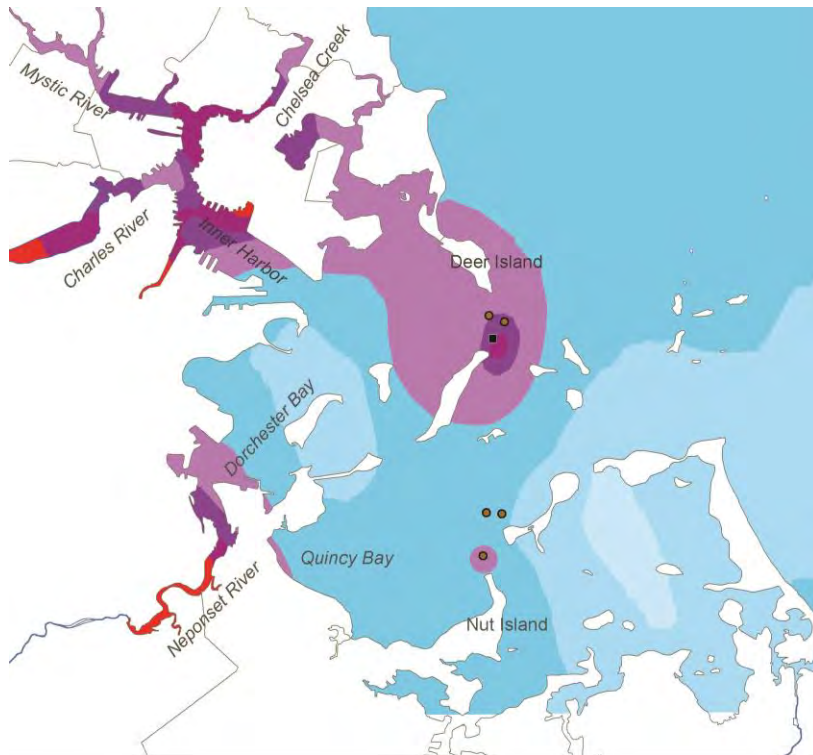




Change in Boston Harbor *Enterococcus* Bacteria in Wet Weather

Prior to Boston Harbor projects (1989-1991)

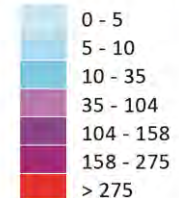
Most Boston Harbor projects complete (2008+)



Geometric mean (colonies/100 mL)

Sampled during rainfall
>=0.2 inches within 24 hours

Blue contours meet swimming
standard, red-purple
contours exceed swimming standard

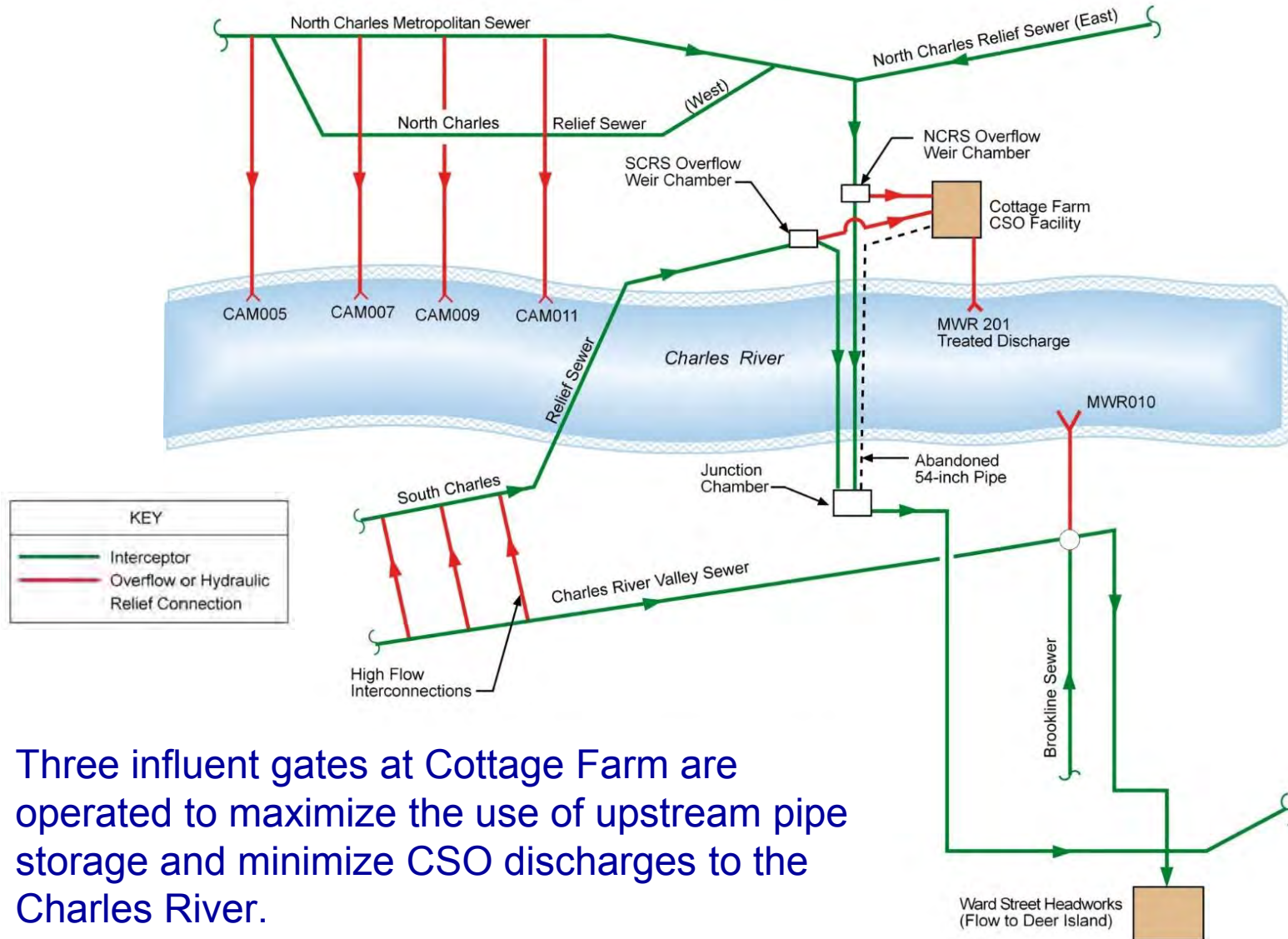


Contours show the geometric means of *Enterococcus* bacteria samples collected when more than 0.2 inches of rain fell in the previous day. Blue areas meet the EPA geometric mean standard for *Enterococcus* (35 cfu/100 mL) and red-purple areas exceed the standard.

The lighter the blue, the better



Charles River Sewers and Cottage Farm Facility



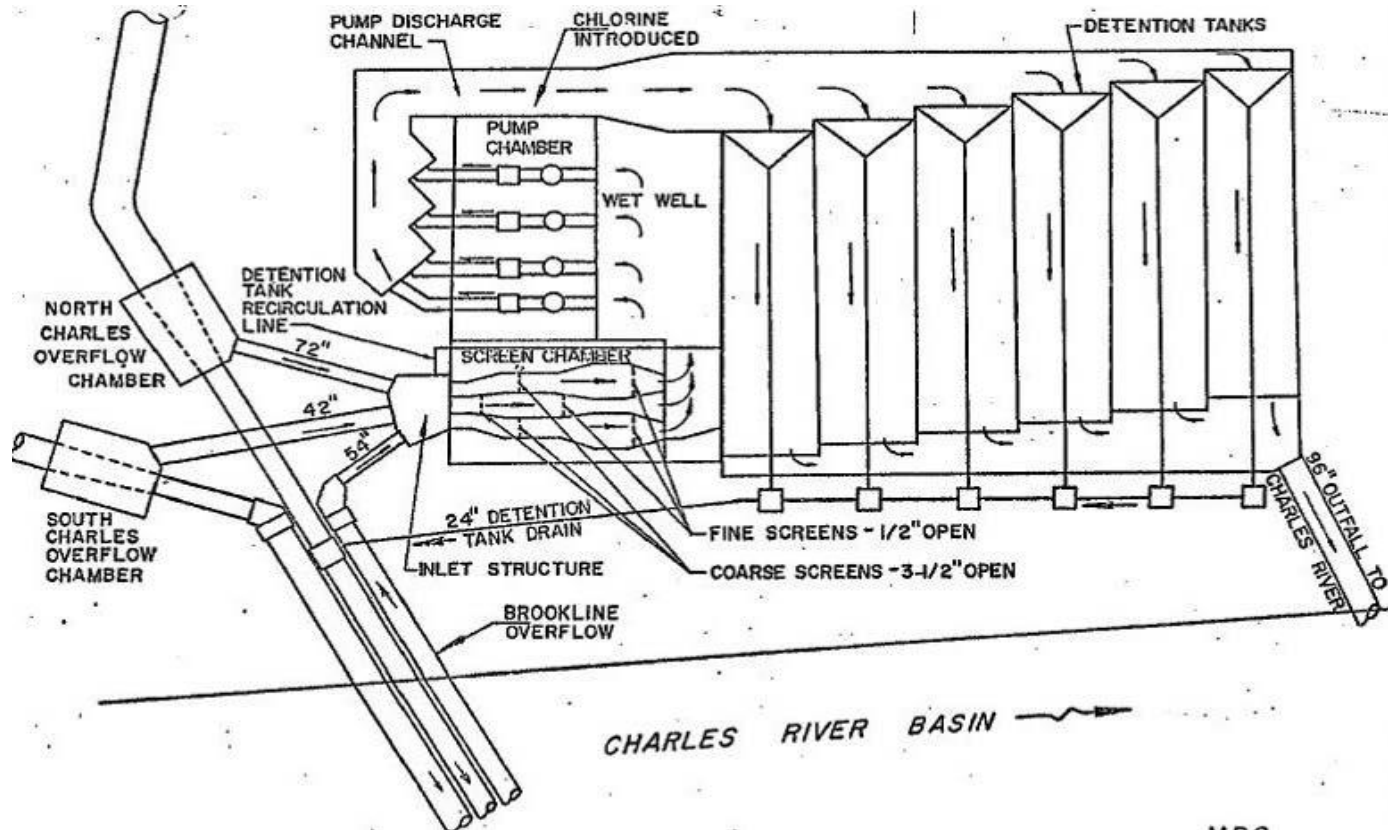


Cottage Farm CSO Treatment Facility

- Operational since May 1971
- Facility includes:
 - coarse and fine screens
 - pumps that lift flows into elevated storage/detention basins
 - sodium hypochlorite dosing prior to the fine screens for ample disinfection contact time through the facility
 - sodium bisulfite dosing downstream of the detention basins that removes residual chlorine to meet strict NPDES permit limits



Cottage Farm CSO Treatment Facility

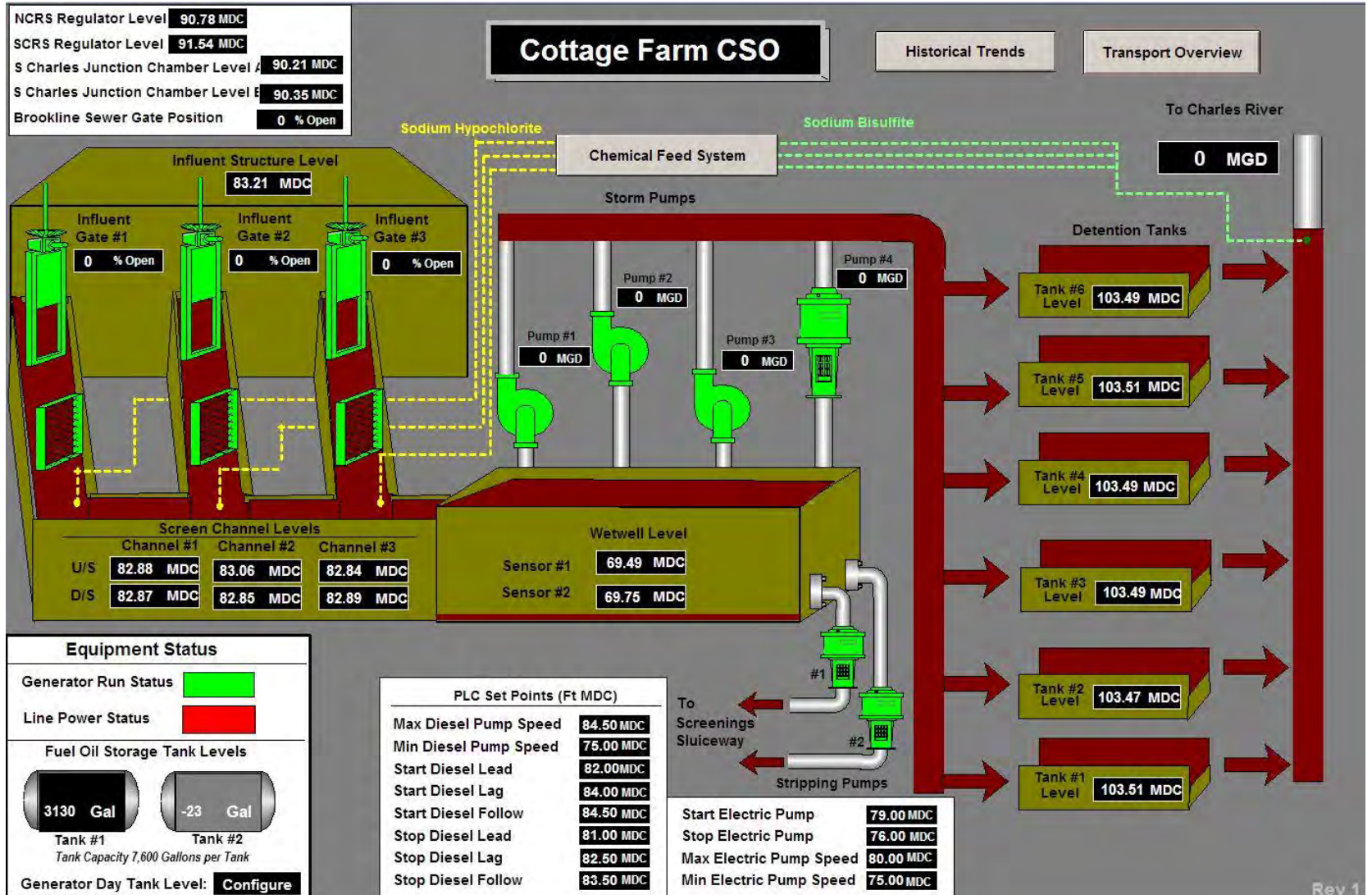


- Total volume of the 6 detention basins and wet well: 1.3 million gals
- Flow through treatment capacity: 210 MGD



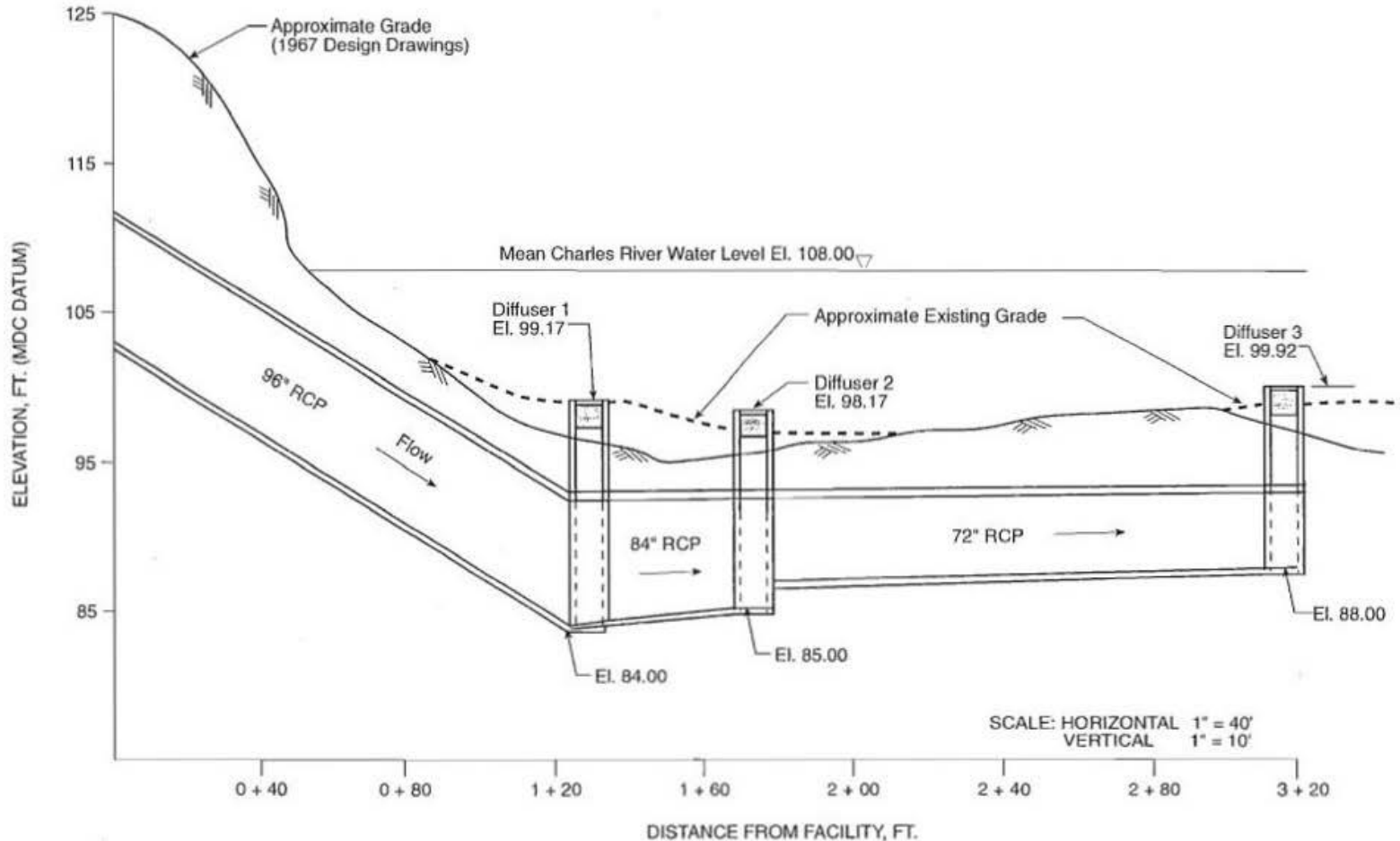
Cottage Farm CSO Treatment Facility

Snapshot January 26, 2018, Dry Weather, No Activation





Cottage Farm Outfall and Diffusers



Treated flows are discharged along the bottom of the Charles River through one outfall with 3 diffuser heads to improve dilution and dispersion.



Cottage Farm CSO Facility Upgrade - 2000



**Chlorination and Dechlorination Chemical Building
Constructed 2000**

Charles River Basin

Capital Cost: \$ 5,700,000

CSO Outfalls: MWR201a, b and c

Environmental Benefits:

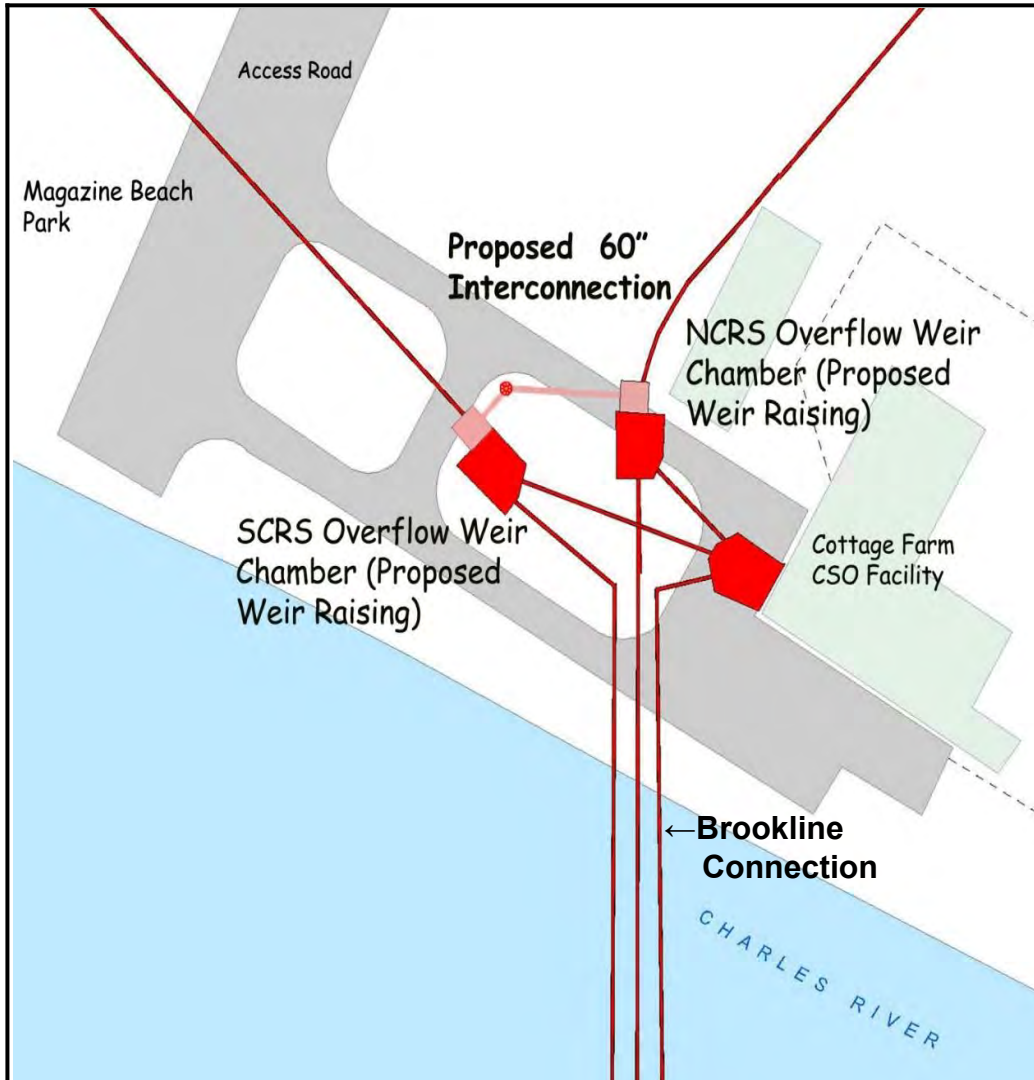
Provided dechlorination of disinfected flow

Upgraded/improved disinfection

Improved reliability



Cottage Farm Brookline Connection and Inflow Controls – 2009



Charles River Basin

Capital Cost: \$2,970,000

CSO Outfalls:

MWR201 (Cottage Farm Facility)
CAM005 and CAM007

Frequency of Discharge (typical year)

Before project: 7 (treated)

With project: 7 (treated)

Annual Discharge Volume (typical year)

Before project: 44.5 mgal (treated)

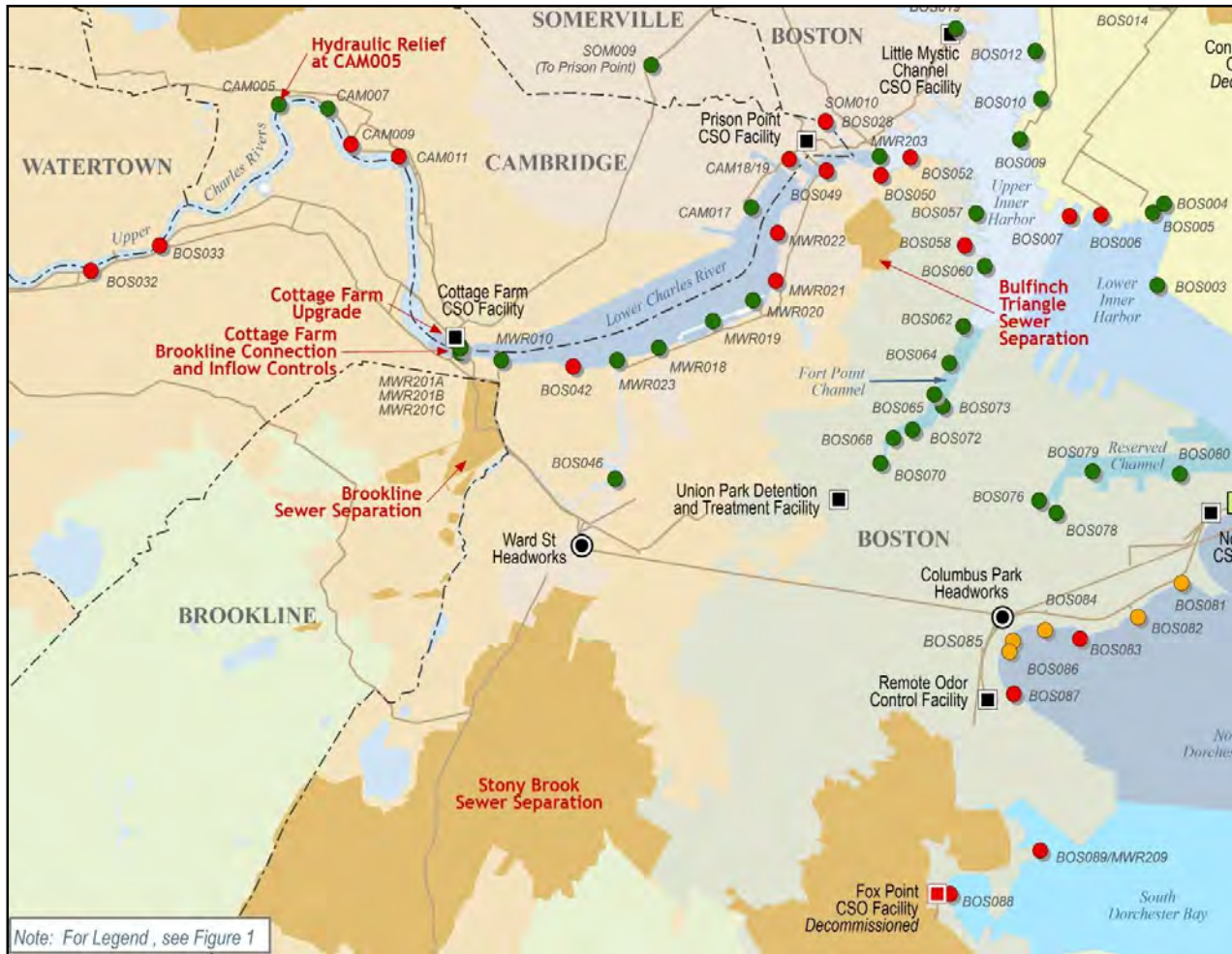
With project: 24.0 mgal (treated)

CSO Reduction by Volume: 46%



Charles River CSO Outfalls and Projects

All CSO projects were complete and operational by December 2015





Charles River CSO Projects

Project	Implementation	Benefit	Complete
Upgrade Cottage Farm CSO Facility	MWRA	Upgrade chlorine disinfection system, add dechlorination system, make process and safety improvements	2000
Outfall CAM005 Hydraulic Relief	MWRA	Increase flow into the MWRA system; reduce CSO	2000
CSO Outfall Closings	Cambridge Somerville MWRA	Eliminate CSO discharges at outfalls BOS028, BOS032, BOS033, BOS042, SOM010, MWR020 and MWR021	2000
Stony Brook Sewer Separation	BWSC	Remove stormwater from the sewer system; reduce overflows to Stony Brook Conduit (outfalls MWR003 and BOS046)	2006
Floatables Controls	BWSC	Control floatable materials at active outfalls	2007
Cottage Farm Brookline Connection and Inflow Control	MWRA	Optimize hydraulic conveyance to reduce CSO overflows into the Cottage Farm Facility	2009
Bulfinch Triangle Sewer Separation	BWSC	Remove stormwater from the sewer system; eliminate CSO discharges at Outfall BOS049	2010
Brookline Sewer Separation	Brookline	Remove stormwater from the sewer system; reduce CSO discharges at Cottage Farm CSO Facility	2013



Charles River CSO Control

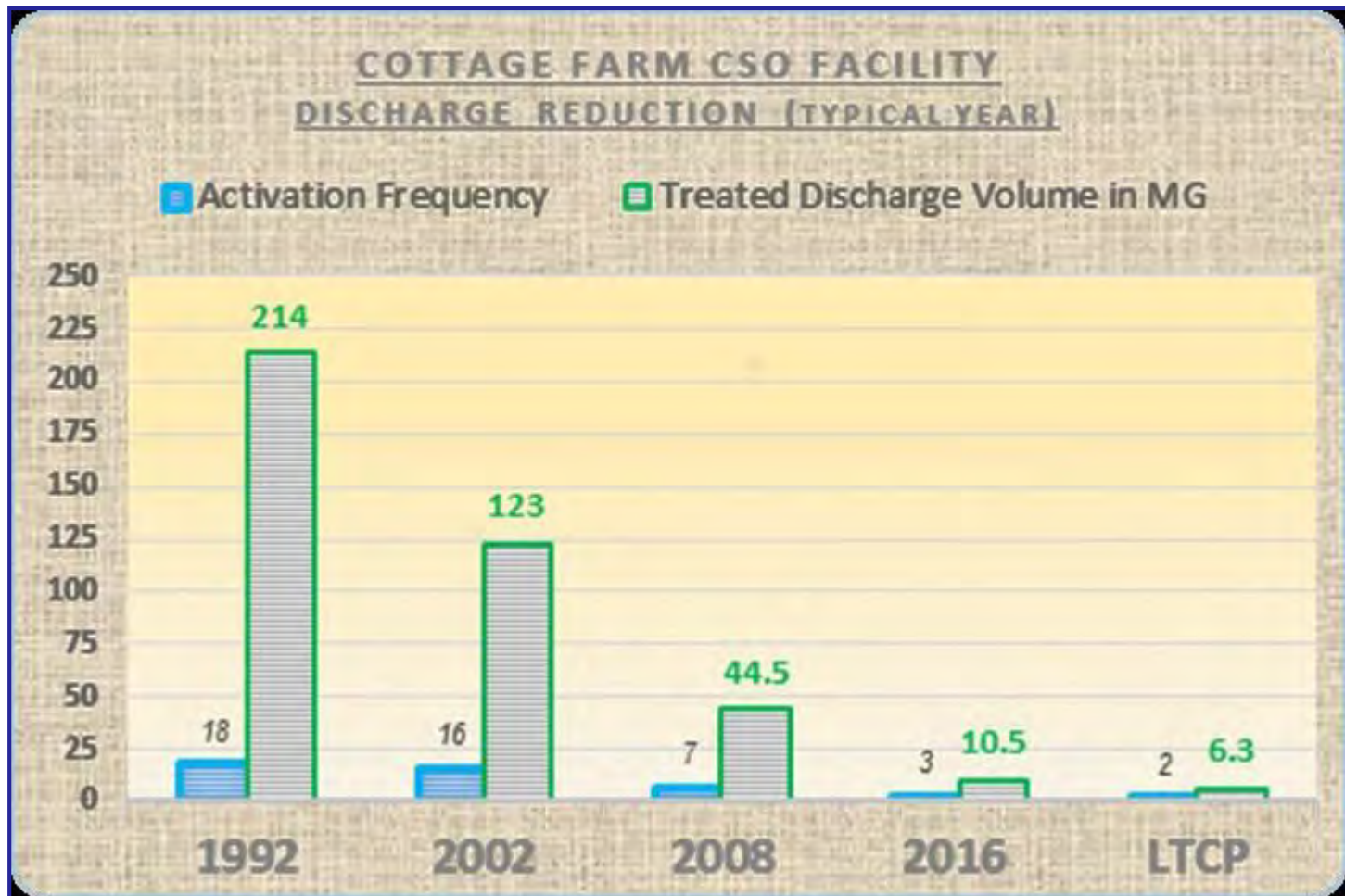
		In the Typical Rainfall Year			
		No. of CSO Outfalls	Frequency of Most Active Outfall	Total Discharge Volume (million gallons)	Treated Discharge Volume ⁽¹⁾ (million gallons)
Charles River Basin	1992	19	39	389.0	214.1 (55%)
	2017	9	3 ⁽¹⁾	13.5	10.6 (79%)
	LTCP	11 ⁽²⁾	2	7.8	6.3 (81%)
Back Bay Fens	1992	1	2	5.3	N/A
	2017	1	1	1.6	N/A
	LTCP	1	2	5.4	N/A

(1) At Cottage Farm CSO Facility, Outfall MWR201a, b and c

(2) The LTCP called for outfalls CAM009 and CAM011 to remain active. Cambridge has permanently closed these outfalls.



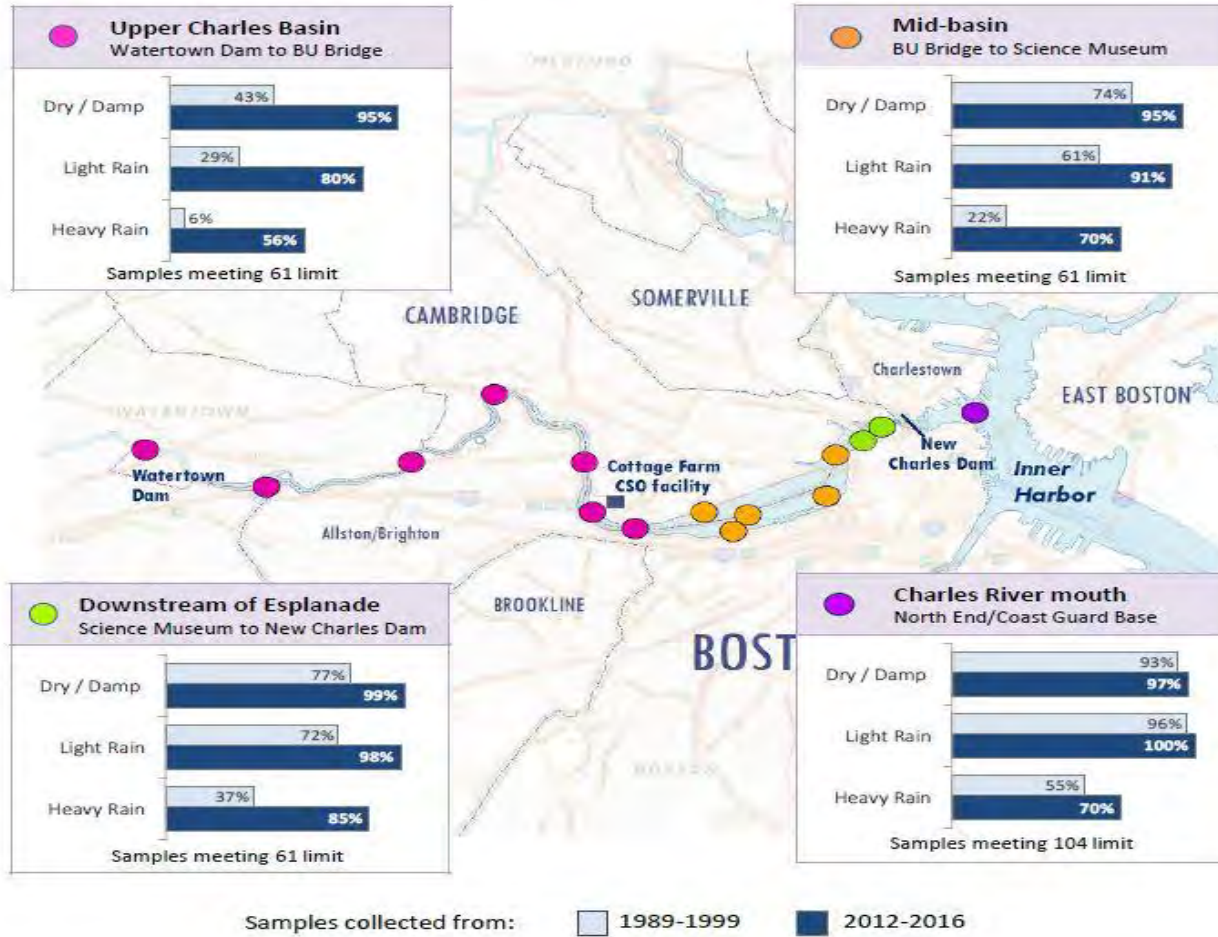
CSO Discharge Reduction at Cottage Farm





Change in Charles River Basin Water Quality Over Time

Graphs show the percent of samples meeting the *Enterococcus* bacteria limit for swimming, by river reach and weather condition.



Dots are MWRA sampling locations. State swimming standards for *Enterococcus* single sample limits are 104 cfu/100 mL for marine waters, and 61 cfu/100 mL in freshwater. Rainfall: Heavy Rain is at least 0.5 inches of rain in previous 48 hours; Light Rain is between 0.1 and 0.5 inches of rainfall in previous 48 hours. 2012 – 2016 period is considered current conditions, following substantial completion of infrastructure improvements. Data from intervening years (2000 – 2011) are excluded.



Charles River CSO Public Poster – 2016

CSOs

Controlling Combined Sewer Overflows in the Lower Charles River Basin

WHAT IS A CSO?

Some older sewer systems, like those in Boston and Cambridge, have "combined sewers" that carry both sanitary flows and stormwater runoff. During normal conditions, flows are delivered to treatment plants. During heavy rains, when flows can double and even triple, these systems become overloaded. In order to prevent sewer backups into homes or roads, these systems were designed with built-in overflows (called combined sewer overflows or CSOs) that act as relief points by releasing excess flows into the nearest water body. These discharges can impact the water quality of the receiving water body.

WHAT'S BEING DONE ABOUT CSOs IN THE CHARLES RIVER?

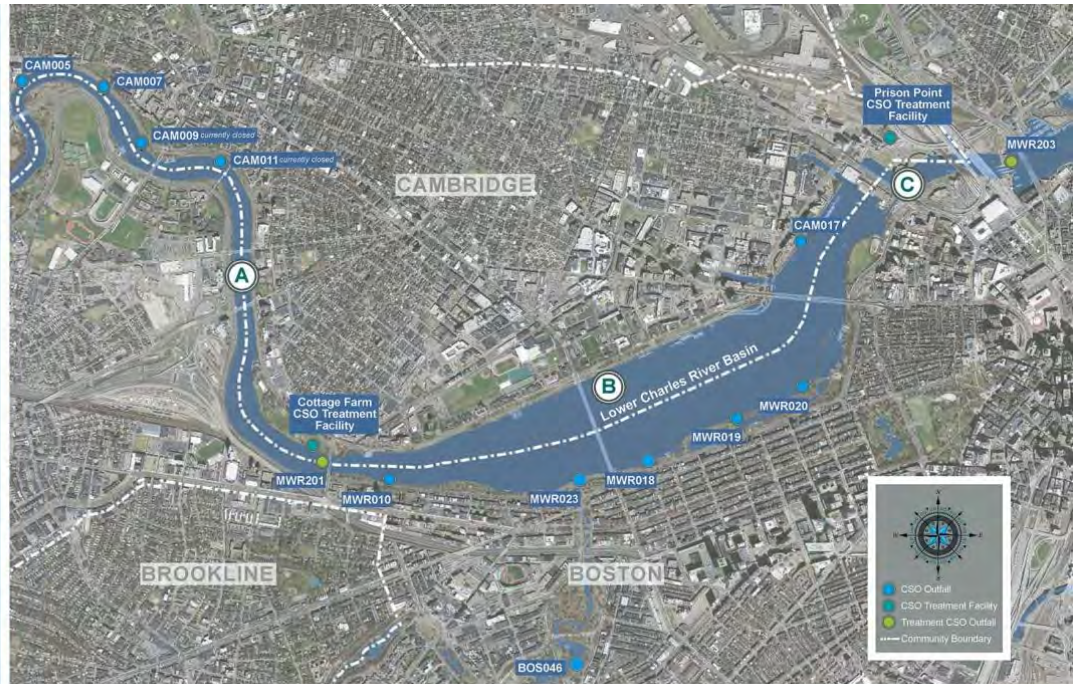
The Massachusetts Water Resources Authority, Boston Water and Sewer Commission, the City of Cambridge and the Town of Brookline have completed several wastewater system improvement projects that have reduced average annual CSO discharge volume to the Charles River Basin by 98% since 1988.

Other wastewater system improvements already completed have dramatically reduced combined sewer overflows to the Charles River by transporting much more flow to MWRA's Deer Island Treatment Plant. The MWRA's Cottage Farm CSO facility on the Charles River at the BU Bridge has been upgraded to optimize treatment system performance and minimize potential harm to aquatic life in the river.

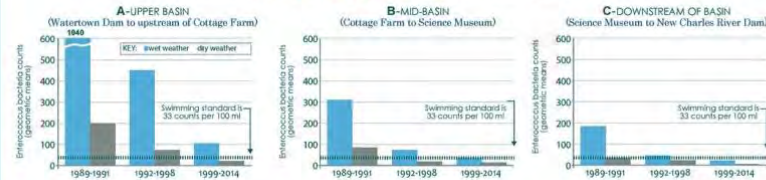
The CSO work is in part guided by the Lower Charles River Basin CSO Variance issued by the Massachusetts Department of Environmental Protection (www.mass.gov/dep/water/wastewater/sewersys.htm). Each year, EPA provides a detailed summary of the progress that has been accomplished toward cleaning up the lower Charles River. The "Charles River Report Card" has been released each year since 1995 (www.epa.gov/region1/charles/). Since that time, the River's grade has gone from "D" to an "B+" for 2014.

IMPORTANT HEALTH INFORMATION

During large storms, CSOs can still be released in the Charles River. Public health officials recommend avoiding contact with the river during rainstorms and for 48 hours afterwards, as there may be increased health risks due to bacteria or other pollutants associated with urban stormwater runoff and CSOs.



IMPROVEMENTS IN Lower Charles River WATER QUALITY OVER TIME



FOR MORE INFORMATION:



Boston Water and Sewer Commission
Web: www.bwsc.org
E-mail: www.bwsc.org/SERVICE/contact.asp
Phone: 617-939-7000, 24 hours



City of Cambridge Dept. Public Works
Web: www.cambridgema.gov/TheWorks/
E-mail: TheWorks@cambridgema.gov
Phone: 617-349-4800, 24 hours



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E-mail: Jeffrey.McLaughlin@mwra.com
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