





*Storm Impacts on MWRA's Wastewater System  
and Receiving Waters*

September 13, 2023

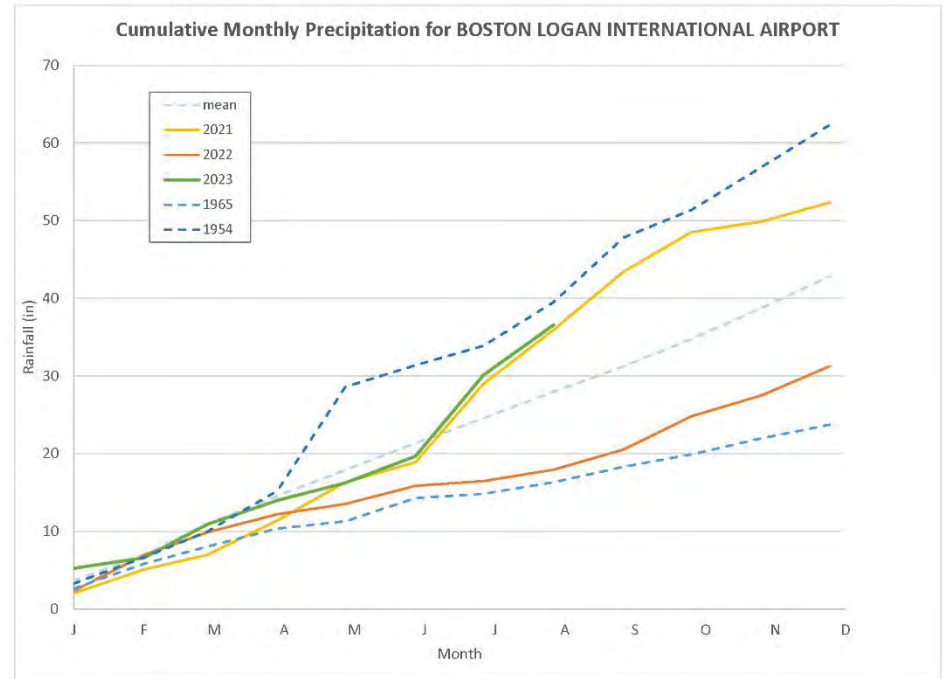


# Summer 2023 Precipitation

- Historic levels of precipitation

Year	Total Rainfall (June, July, August)
1955	24.89
2023	20.33
1959	19.68
2021	19.64
1982	19.64

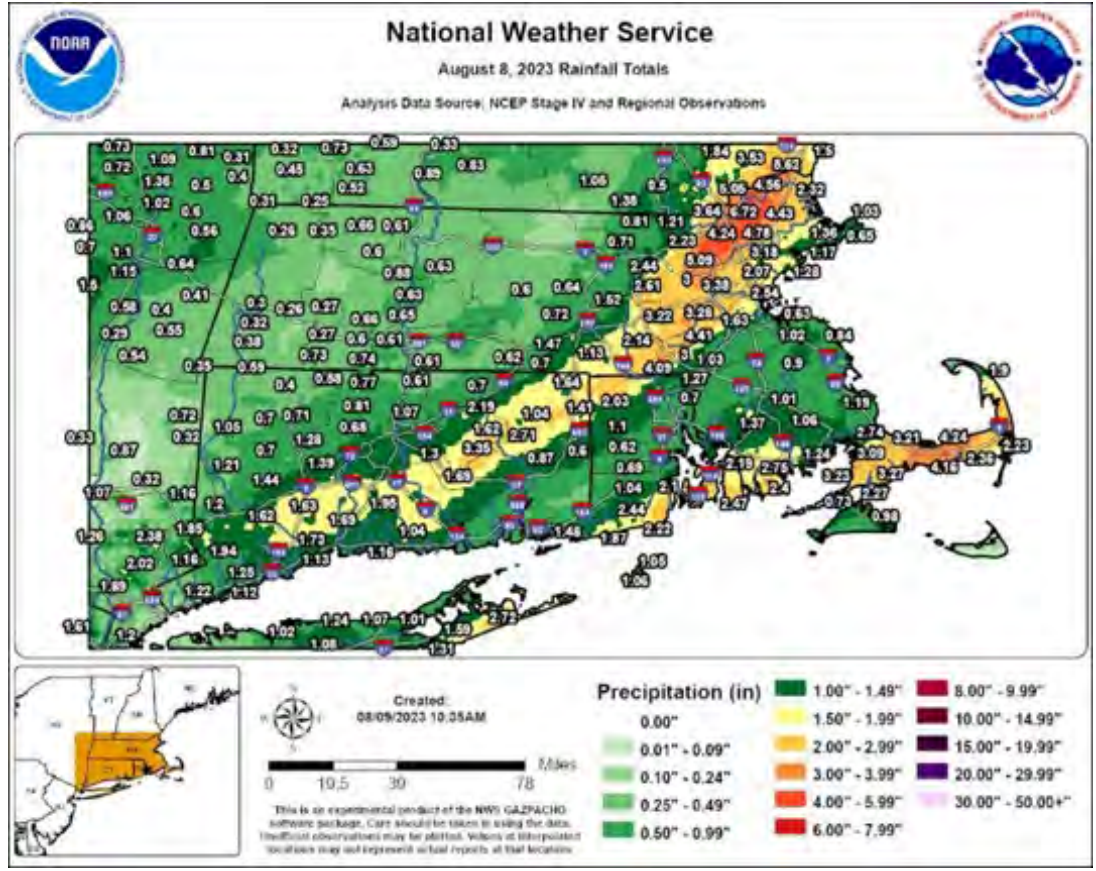
- High intensity events - peak hourly intensities of 1.5 to 2 in/hr





# Summer 2023 Precipitation

- Highly localized
- Storm paths have been difficult to predict
- Staff will always prepare for the higher prediction

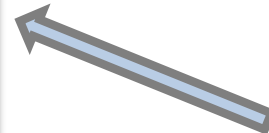




# System Response

- High intensity events quickly fill the wastewater system, increasing system levels requiring the activation of the CSO treatment facilities
- If levels continue to increase the untreated CSO's are activated which are considered relief points in the system which prevent backup into homes and private property

11:36am Prison Point discharging  
 11:35am Ward St screen #3 misaligned, maintenance on site  
 11:23am Columbus Park screen 1 tripping, maintenance responding  
 11:17am Cottage Farm filling tanks  
 11:13am Ward St choking gates  
 11:12am MWR205A discharging  
 11:03am Prison Point filling tanks  
 10:57am BOS019 filling compartments  
 10:56am MWR-003 discharging  
 10:46am Union Park filling tanks  
 10:45am Framingham PS online  
 10:36am Somerville Marginal online



**LOG**

4:37pm Rain has left the service area, last snapshot for this rain event (unless one is warranted)  
 4:20pm BOS019 stopped filling compartments  
 4:05pm Framingham PS offline  
 4:04pm Prison Point stopped discharging  
 3:46pm Columbus Park free flow  
 3:45pm Chelsea screen #1 repaired  
 3:30pm Chelsea Creek free flow  
 3:22pm Ward St free flow  
 3:00pm Cottage Farm stopped discharging  
 2:28pm Chelsea Screen House closing sluice gate #1 to wet side  
 2:06pm Somerville Marginal offline  
 1:48pm Ward St screen #3 repaired  
 1:35pm Union Park stopped discharging  
 1:23pm Chelsea Screen House opening sluice gate #1 to wet side  
 1:04pm Chelsea Creek screen #1 misaligned, maintenance responding  
 12:40pm MWR018 stopped discharging  
 12:33pm MWR023 (RE048-019 & RE046-100 & RE046-381) stopped discharging  
 12:29pm MWR010 (RE037) stopped discharging  
 12:29pm MWR019 stopped discharging  
 12:27pm MWR205A stopped discharging  
 12:26pm MWR-003 stopped discharging  
 12:23pm MWR020 stopped discharging  
 12:17pm Columbus Park screen #1 back online  
 12:15pm Staff visually confirmed signs of an SSO at two MHS on the BMC on Storrow Dr. EnQual staff are reporting to regulators as required  
 12:13pm MWR010 (RE037) discharging  
 12:11pm Columbus Park choking  
 12:11pm BOS019 Compartment #1 is full, filling compartment #2  
 12:11pm Union Park discharging  
 11:57am MWR020 discharging  
 11:56am Cottage Farm discharging  
 11:52am MWR019 discharging  
 11:52am MWR018 discharging  
 11:43am MWR023 (RE048-019 & RE046-100 & RE046-381) discharging  
 11:36am Prison Point discharging  
 11:35am Ward St screen #3 misaligned, maintenance on site  
 11:23am Columbus Park screen 1 tripping, maintenance responding  
 11:17am Cottage Farm filling tanks  
 11:13am Ward St choking gates  
 11:12am MWR205A discharging  
 11:03am Prison Point filling tanks  
 10:57am BOS019 filling compartments  
 10:56am MWR-003 discharging  
 10:46am Union Park filling tanks  
 10:45am Framingham PS online  
 10:36am Somerville Marginal online  
 8:45am Prison point hydraulic pump motor #1 failed maintenance responding second hydraulic

August 8<sup>th</sup> event: 57.4 MG Treated vs 1.49 MG Untreated



# Combined Sewer Overflows

- The majority of CSO discharges receive partial treatment (screening, some solids removal, disinfection and dechlorination)
- CSO is mostly stormwater
- **There are no CSO discharges to the Boston area Beaches**
- But there are stormwater discharges to several beaches: Wollaston, Tenean, Malibu, and Constitution

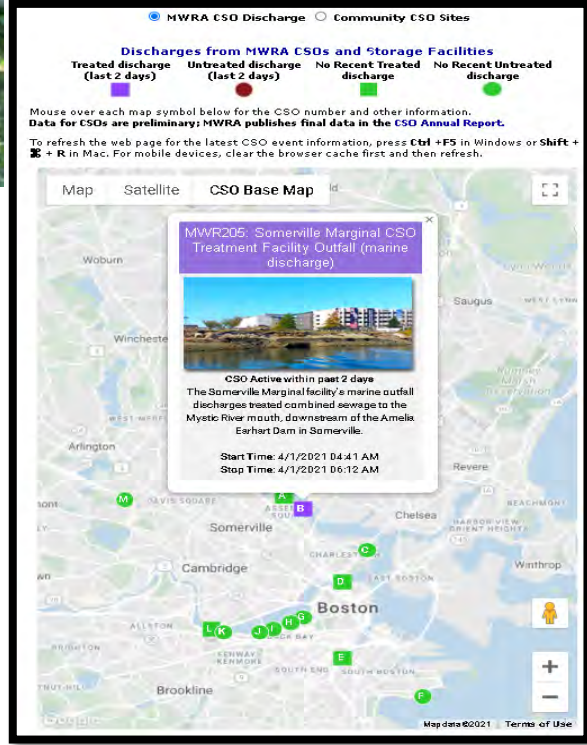






# CSOs and Sewage Notifications

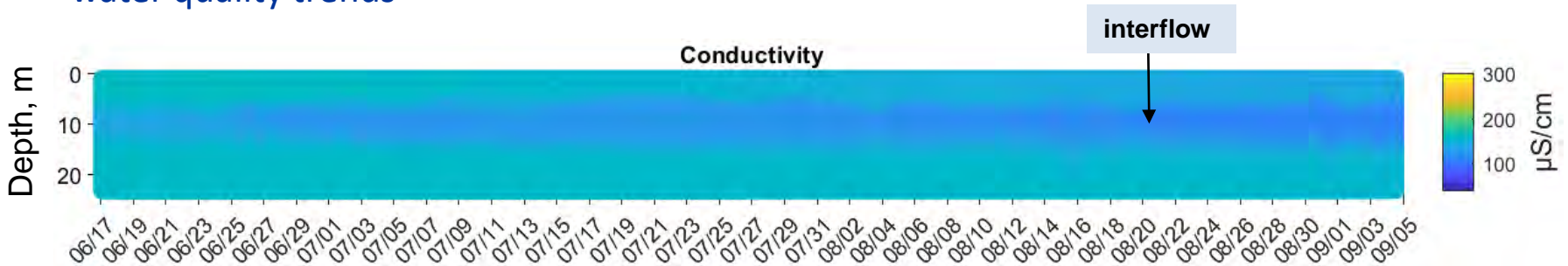
- Notification Requirements to Promote Public Awareness of Sewage Pollution has required notification of CSO and SSO discharges since July 2022
- Since Memorial Day weekend, 1,271 CSO discharge events; 182 from MWRA and MWRA CSO Communities
- Public reporting and notification to news agencies may lead to conflating the issue with beach water quality





# Reservoir Water Quality and Wet Weather

- Transfers of Quabbin water through Wachusett creates a band of high quality water (interflow)
- Benefits include decreases in UV254, and reduced ozone and chlorine demand
- Since July, precipitation events have reduced our ability to maintain higher transfer rates
- Buoy monitoring stations are helpful to watch water quality trends

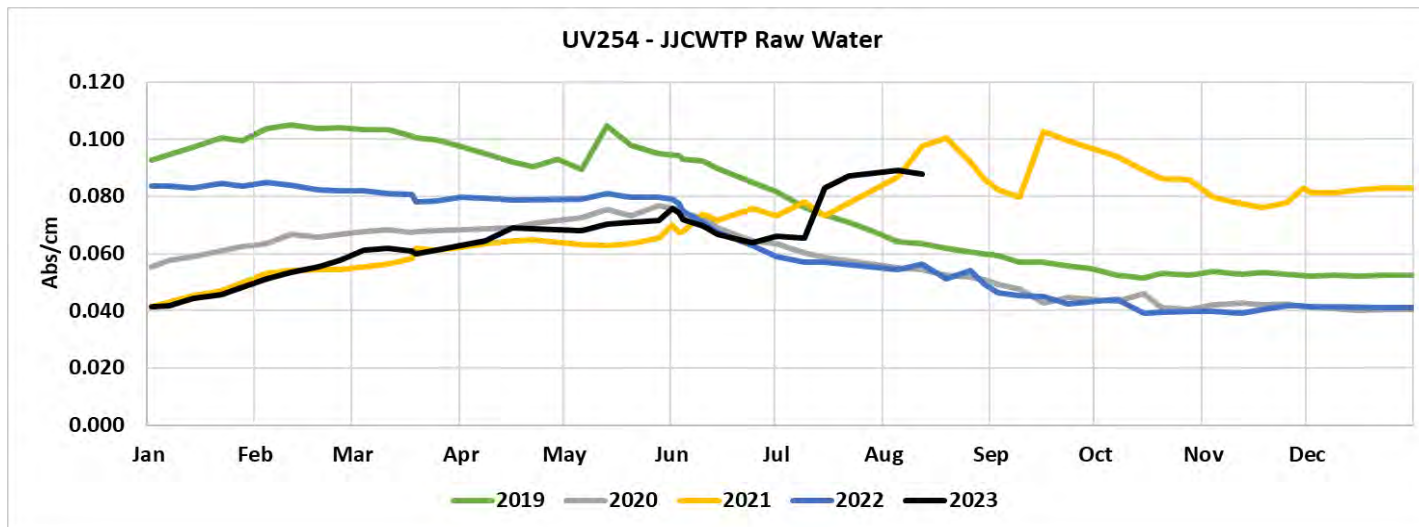






# UV254 Trends in Wachusett Reservoir

- Elevated UV254 results in increased ozone demand, chlorine demand & decay, lead solubility
- Current UV254 levels
  - Quabbin 0.024 Abs/cm, Wachusett 0.095 Abs/cm





# Climate Change

- Climate forecasts predict:
  - Longer periods of drought
  - Periods of increased rain intensity and volume
- The higher the intensity of the rainfall, the more likely it is that more CSOs will discharge during the storm
- Future planning for CSO control will incorporate climate change projections
- There are also measurable impacts to water quality



*Nut Island Headworks  
Odor Control and HVAC Improvements  
Inspections, Evaluations, Design, Construction  
Administration and Resident Engineering Services,  
Contract 7517, Amendment 5*

September 13, 2023



# Nut Island Headworks





# HVAC System







# Odor Control System





# Odor Control Roof







# Regrading Laydown Area





# Final Paving at Parking Lot





## Amendment 5

### **ADDITIONAL TIME:**

Extend Contract Term by 7 Months (215 Days) to January 2025

### **ADDITIONAL COSTS:**

RE & RI (partial) Services through January 2024	\$319,953.48
ESDC Services through January 2024	<u>\$113,163.86</u>
	<b>\$433,117.34</b>





# Resident Engineer and Inspection Services

- Provide site coverage during all construction activities
- Coordinate construction with operations and the public
- Generate and manage project punchlist
- Prepare daily, weekly and monthly reports
- Review and approve monthly invoices
- Confirm compliance with prevailing wage rates
- Ensure work is completed per contract documents
- Ensure project documentation is provided and accurate
- Assist in change order and claim management



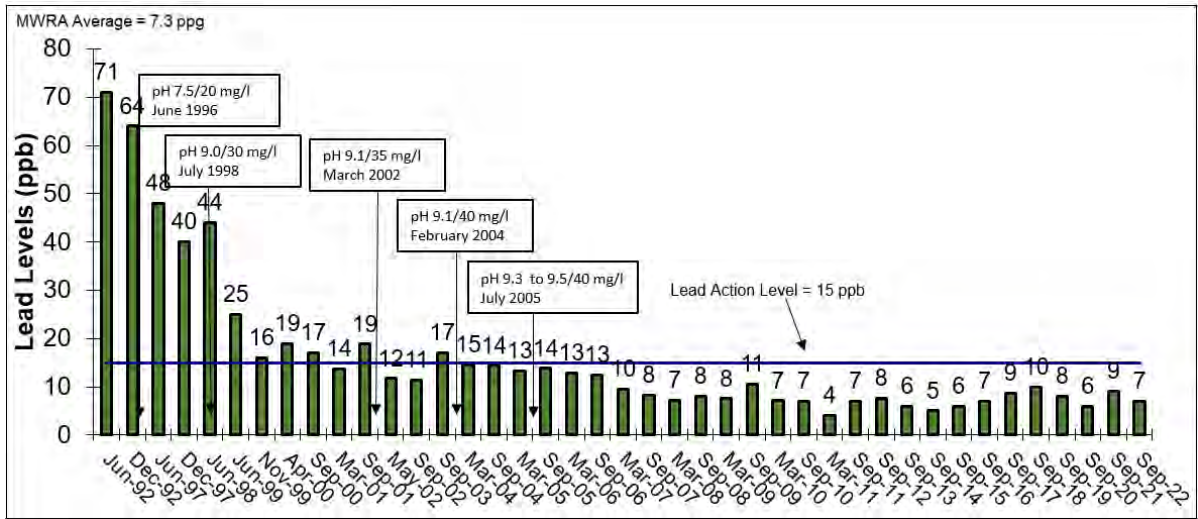
*John J. Carroll Water Treatment Plant  
Corrosion Control Optimization Efforts*

September 13, 2023



# Current Corrosion Control Status

- Current corrosion control includes pH and alkalinity adjustment
- 90% reduction in lead levels since mid-1990's



90<sup>th</sup> Percentile Lead in MWRA Fully Served Communities



## New Regulation Revisions

- Compliance with new Lead and Copper Rule Revisions required by October 2024
- New trigger level of 10 ppb (compared to current 15 ppb action level)
- May be tough to achieve with new sampling methods
  - 5<sup>th</sup> liter more representative of water in lead service line
- Annual Community Lead and Copper Rule sampling occurring this month



# John J. Carroll Water Treatment Plant Corrosion Control Optimization Study



- Evaluating potential treatment alternatives to meet current and future requirements
- MWRA staff constructed 6 pipe rigs with Lead Service Lines collected from Boston homes
- Expert panel assembled to assist with evaluation





# Corrosion Control Optimization Study

Data	Parameter	Rig 1				Rig 2				Rig 3				Rig 4				Rig 5				Rig 6							
		a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d	a	b	c	d				
12/15/2022 - 06/08/2023	Visual with stable trendline	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Number of spikes ( $\leq 1$ )	Y	N	N	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Correlation coefficient $\leq 0.5$	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
	Zero in 95% CI of slope	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Highlight pipe that met the criteria		Y			Y	Y				Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
<b>Rig Ready For Next Phase</b>		NO				NO				YES				YES				YES				YES							

- Statistical evaluation of data shows four pipe rigs are acclimatized
- Experimental Protocol
  - Rigs 3-6: Phosphate doses of 1, 2, and 3 mg/l and one control (Carroll Treatment Plant Finished Water)
  - Rig 1: Pipes removed for scale analysis
  - Rig 2: Duplicate of lowest dose, 1 mg/l



# Corrosion Control Optimization Study

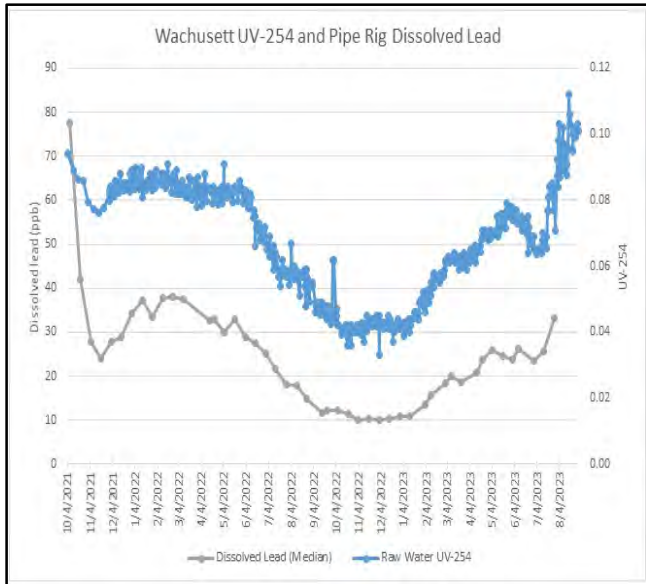
- Schedule:

Phase	Duration
Construction	March, 2021 to September 2021
Acclimation	October 2021 to July 2023
Experimental	August 2023 to TBD (August 2024 or later)

- Study will also evaluate impacts of phosphate addition on:
  - Distribution system biofilm
  - Delivered water quality
  - Change in taste or appearance
  - Impact on local wastewater treatment plants/MWRA emergency open reservoirs and partially served communities



# Acclimation Findings



- Study data appears to correlate lead levels with raw water organic matter (measured by UV254)
- Current UV254 levels are high:
  - Decreased transfers from Quabbin Reservoir as a result of summer wet weather
  - Potential for Trigger or Action Level exceedances in communities samples



## MWRA's Proactive Steps to Reduce LCRR Exceedances

- Lead Service Line Replacement Loans
  - In March 2016, BOD established \$100 million in low interest loans for lead service line replacement
  - To date, \$36 million in loans have been distributed to 15 member communities
  - Continued and increased community interest due to impending regulatory changes



# Lead and Copper Rule Updates

- EPA anticipated to issue additional rule changes this fall
- Changes could include the following:
  - Sampling protocols
  - Reduction of lead Action Level
  - Mandate for replacement of lead service lines
- Possible changes could result in:
  - More communities exceeding the Action Level / required to issue public notification within 24 hours
  - Mandate for MWRA to complete a corrosion control study
  - Increased speed of lead service line replacements





*Memorandum of Agreement with  
US Army Corps of Engineers and the  
Massachusetts Historical Commission for the  
Removal of the Quinapoxet River Dam*

September 13, 2023



# Project Location







# Project Background

- 250-foot long, 18-foot high structure and fish ladder
- Removal of dam and fish ladder will restore the Quinapoxet River to its natural conditions
- Open 35 miles of coldwater fish habitat
- Add new ADA accessible pathway and fishing platform



Quinapoxet River  
Dam



Fish Ladder



Upstream Channel



# Army Corps of Engineering Permitting and MOA

- US Army Corps of Engineers Clean Water Act Section 404 permitting required
- Federal permitting process calls for review by the Massachusetts Historical Commission
- USACE and MHC determined removal will have “adverse effect” on the dam, which is eligible for listing on the National Register of Historic Places
- Therefore, a Memorandum of Agreement must be executed between MWRA/USACE/MHC outlining mitigation measures



- Mitigation – MHC Inventory Forms
  - Document and record information on historic resources
  - Already been submitted and accepted by MHC
- Stipulations
  - Unanticipated Discoveries
  - Three year duration
  - Dispute Resolution
  - Amendments

**FORM F – STRUCTURE**

MASSACHUSETTS HISTORICAL COMMISSION  
MASSACHUSETTS ARCHIVES BUILDING  
220 MORRISSEY BOULEVARD  
BOSTON, MASSACHUSETTS 02125

Assessor's Sheet: USGS Quad: A5047 E5047  
Map: 120 Station: C-07 UWB5 050

Town/City: West Boylston  
Place (neighborhood or village):

Address or Location: Quinapoxet River near River Road

Name: Quinapoxet River Circular Control Dam

Ownership:  Public  Private

Type of Structure (check one):  
 wall or ship  pier  
 canal  pre-detonation  
 dam  tower  
 dam  small  
 gate  wall  
 levee  windmill  
 lighthouse  
 other (specify):

Date of Construction: 1900

Source: Metropolitan Water & Sewerage Board 5<sup>th</sup> Annual Report

Architect, Engineer or Designer:  
Borus, Salomone & Pratt, Boston

Materials: Concrete, granite

Alterations (with dates):  
Some listing of the structure alterations added ca. 1930, as part of the construction of the aqueduct outlet works; concrete fish ladder added ca. 1930.

Condition: Good

Moved:  no  yes Date:

Accuracy: N/A

Setting:  
The dam is located on the Quinapoxet River in a wooded area near River Road, in the Massachusetts Water Resources Authority's Chalkstone Transfer Facility, at the outlet of the Quabbin Aqueduct Shaft T, south of Oakdale Village, on the west side of the Wachusett Reservoir.

Recorded by: Marguerite Carnes  
Organization: Archaeological and Historical Services, Inc., Shore, CT RECEIVED  
Date (month - year): April 2021 JUL 19 2021  
MASS. HIST. COM. DIV.

011 Follow Massachusetts Historical Commission Survey Manual instructions for completing this form.



Photograph

Date from north-west corner of River Quinapoxet River, looking north-west



Location Map



## Next Steps

- Wrapping up permitting – Chapter 91 License and Section 404 Permit
- Construction contract procurement process
  - Advertisement on 8/12
  - Prebid site visit on 8/24
  - Provided responses to bidders questions on 9/8
  - Bids are due 9/15
- Goal is to have a recommendation for contract award at the October Board meeting





# River Restoration Examples



Holmes Dam Removal, Town Brook, Plymouth



Marland Dam, Shawsheen River, Andover