

Presentation to

WSCAC Quinapoxet Dam Removal

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Todays presentation

- Project location and history of the Quinapoxet River Dam
- Rationale for removal of Quinapoxet Dam
- Dam Removal Design Components
 - Permitting
 - Water control
 - WQ and sediment control
 - River restoration components
- MCRT Access Request
- Schedule
- Examples of other successful dam removals

Project Location – Wachusett Reservoir, West Boylston, MA





- Quinapoxet Dam spillway was created ca. 1905 by excavating back the downstream river channel up to rock outcrop of present dam spillway location.
- Quini. Dam is very unique. It has practically no impoundment. The top of spillway is at approximately the grade of the original river bed. Virtually no impounded sediment.
- Downstream riverbed from Quini. Dam to the 3-arch bridge was lowered and overwidened to reduce velocities and allow accretion of sediment in that modified reach of river channel prior to entering Wachusett Reservoir



Unique Design of circular dam



Historic River Channel ca. 1902





Quinapoxet River Channel 1902 – 1904 (and today)





Quinapoxet Circular Dam 1905





Fish Passage issues ca. 1930s







Quabbin Aqueduct







Reservoir Design in the Victorian Era





Early 2000s, an operating band was set at 390' – 391. 5', subsequently modified to 389' to 391.5'.





Rationale for dam removal: Improvements in water quality monitoring



George C. Whipple, Sanitary Engineer at MIT, Director of Chestnut Hill Laboratory, Boston 1889-1897 – Father of water microscopy













Modern Water Monitoring and Treatment





Rational for Dam Removal: Condition of the spillway



3.7 Opinion of Probable Construction Costs

The conceptual cost estimate for the recommended studies and analyses above is approximately \$60,000 to \$120,000, while the estimated cost for repair / remedial items (including engineering) is approximately \$250,000 to \$500,000. It is assumed that annual maintenance-related items









- Removal of the dam spillway was determined by MWRA, DCR-DWSP and MA Dept. of Ecological Restoration (MA DER) to be warranted to restore fish passage (landlocked salmon and native brook trout) in the Quinapoxet River,
- Returning the river to a natural riverine hydrology aids in climate resiliance.

DER: "Quinapoxet River at this location has high potential for restoration."



Courtesy of Max Nyquist, Aquatic Biologist, DCR-DWSP





LL Salmon at Wachusett Reservoir



Project Team





... and Supporters











 Paramount in ach of Wachusett Rese facility and operat

PWS Name: MWRA PWS ID #6000000 Filtration Waiver Inspections Wachusett Reservoir ls is the protection akdale Shaft 1

• Key tasks in the dam removal work are

II. INSPECTION RESULTS FOR WACHUSETT RESERVOIR

A. SOURCE WATER QUALITY CONDITIONS

- <u>Coliform Bacteria</u> The system has demonstrated that the requirements of 310 CMR 22.20A(2)(a)(1) for fecal coliform bacteria have been met in at least 90 percent of the representative source water samples. The samples were taken immediately prior to the point of disinfection application and were representative of the prior six-month period during which water was served to the public.
- <u>Turbidity</u> The system has met the requirements of 310 CMR 22.20A(2)(a)(2) and (3) for turbidity levels in representative source water samples that were taken immediately prior to the point of disinfection application.



DESIGN CONTRACT



Regulatory Review and Permitting

- Local, State, and Federal jurisdiction over various aspects of the project.
- Key review and permitting completed:
 - MEPA -- Rec'd Waiver
 - West Boylston ConCom -- Rec'd OOC
 - Waterways/C. 91 -- Received
 - US ACOE 404 dredge and fill/NPDES General Construction Permit --Received
 - MA DEP 401 WQ Cert.-- Received
 - MA Endangered Species Review -- No ES issues
 - Dam Safety Ch. 253 -- Not required. Dam removal determined Nonjurisdictional
 - MA Historic Commission -- Received
 - Additional careful coordination with agencies, interest groups and community.



Design Components

- Structural and water quality protections determined and included as part of design:
 - Design
 - Permitting
 - Water Control Plan
 - Sediment Mgmt. Plan
 - Turbidity Monitoring Plan
 - Infrastructure Protection
 - (DMPs on Shaft 1 Facility)
 - Architectural Rendering
 - Construction Videography
 - Riverine restoration and post construction monitoring





Phase I. Cofferdam upstream river, removal of southern portion of dam to accommodate install bypass piping

Phase II. Water gravity bypass and limited groundwater pumping to dry out the work area. Culvert crossings over flow path for river and dam access. Demo of masonry weir, fish ladder, appurtenances and removal of existing islands.

Phase III. Installation of tailrace channel, riverine reconstruction, ADA fishing platform, floodplain bioengineering restorations



Dam Removal Water Control Examples designed by SLR



Housatonic River







Project overview





Design components





Restoration Plan

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- EROSION CONTROLS SHULL BE INSTALLED, REPAIRED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD OF THE PROJECT OR UNIT. THE SITE IS FULLY STABILIZED BY VEGETATION (SEED MIX). EROSION CONTROLS SHALL THEN BE REMOVED FROM THE SITE.
- A PROFESSIONAL WETLAND SCIENTIST OR ENGINEER SHALL BE ON SITE TO NOWTOR REMOVAL OF VEGETATION AND PLANTING OF PLOODPLAIN WEAS TO ENSURE COMPLIANCE WITH THE APPROVED PLANS.
- E LANDSCAPE CONTRACTOR SHALL PROVIDE A 6" MINIMUM DEPTH OF TOPSOL FOR ALL AREAS TO BE RESTORED PSOL SHALL BE IMPORTED TO THE SITE TOPSOL TO BE HAND-RAKED PRIOR TO SEEDING TO SCARIPY SOL.
- SEED MEK TO BE APPLIED AT RATE AND RATIO SPECIFIED BY HYDRO-SEEDING OR HAND SEWING, AND COVERED WITH LIGHT STRAW MULCH. AFTER SEEDING SOIL IS TO BE HAND-RAKED TO ENSURE SEED TO SOIL CONTACT.
- THE SOLS IN THE PROJECT AREA SHALL BE SEEDED WITH THE DESIGNATED SEED MEXES AS NOTED IN THE PLANT LIST, WITLAND SEED RIVES SPECIFIED BY NEW ENGLAND WETLAND PLANTS IV., 800 MAIN, ST., ANHERST, MA 01002, 1433 255-1525 OR APPROVED EQUIVALENT.
- WHERE JONSTRUCTION ACTIVITY IS COMPLETE, FOR AREAS TO BE PERMANENTLY VEGETATED, STARLIZE WITH PERMARATE SEEDING, VERITY SEEDING DATES WITH ENGINEES. IT ENGINEES DETEMINES THAT SEED ARD TOPSIG, CARROT RE APAUED DUE TO CLIMATE, THE CONTRACTOR SHALL WAT UNTE. THE NEXT RECOMMENDED SEEDING PERIOR.
- ALL PLANTINGS ARE TO BE PLANTED ONLY WFTER STABILIZATION OF CONTRIBUTING DRAINAGE AREAS.
- GROWING SEASON PLANTINGS (SEED MIXES AND TREES) SHALL BE LIMITED TO THE INSTALLATION PERIODS OF APRIL 15 XJINE 36, OR SEPTEMBER 1 DCTOBER 13, ORLY QUALITY NATIVE FLANTS PROM A BURGERY SHALL BE USED.
- DORMANT SEASON PLANTINGS (LIVE STAKES IN BOULDER REVETMENT, LIVE STAKES IN BOULDER SILL, LIVE STAKES IN PLOGDELAIN, HEOGE BRUES LATERING AND WILLOW FASCINES) SAAL BE LIMITED TO THE INSTALLATION PROICES OF NOVEMER 1 MARCH 31, BUT NOT WHILE THE GROUND IS FROZEN.
- 0. ALL WOODY PLANT NATERIAL SHALL BE PROVIDED IN CONTAINERS THAT ARE APPROPRIATELY SIZED FOR TH SPECIFIED PLANT, HERBACEOUS PLANT MATERIAL SHALL BE PLUOS AND CONTUNERIZED. WETLAND PLANTS SHALL HAVE BEEN GROWN IN A LOCAL/REGIONAL WIRSERY.
- ALL RAFE METERIALS SHALL CARRY A FULL SARVAGE GUARANTEE FOR A REDUCT OF ORE YEAR FOOD THE DATE OF ACCEPTANCE FOR THE TOWE AND SHOULD SHOULD BE OFFICIAL TO INCLORE FROM THE DATE OF REMOVE, AND REPLACEMENT OF ANY FAATS FOUND TO BE IN AN UNREAL THE CONDITION IN THE WITHAND SCIENTIST. ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L AND SCIENT ST'L SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L ALL REPLACEMENTS SHALL BE 'S' THE SARVAGE RIND AND SCIENT ST'L SARVAGE RIND AND SCIENT ST'L REPLACEMENTS SHALL REPLACEM
- HARIEMING SHALE BEON PHEOMETE Y NETR FAMILIE AND SHALL CONTINE HITL ACCEPTANCE IN THE WITLAND SCIENCES (ANNTHMENT SHALL INCLUDE WATERING, RANGENED HITL, ACCEPTANCE OF GUES REPLACEMENT OF SICK OF DOAD PLANES, RESETTING PLANES TO PROPE GRADE ON UPSKIFF (PLANE) POSITION, RESTORTION OF SUCKES, MAN CALL OTHES CARE RECEDED FOR PROPER GRADE ON UPSKIFF (PLANE) POSITION,
- 3. THE LANDSCAPE CONTRACTOR SHALL PROVIDE A 4" MIN. DEPTH OF SHREDDED MULCH OVER ALL AREAS TO BE TOP SOLLED AND SEEDED.
- 14. ALL PLANT MATERIAL IS SUBJECT TO INSPECTION AND APPROVAL BY WETLAND SCIENTIST OR ENGINEER PRIOR TO AND AFTER PLANTING.

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WHILAPTER RESTORATION

PLANTINGS ARE COMPLETE DENTISY AND TREAT INVASIV SPECIES ACCORDENCE TO INVASIVE SPECIES NANAGEMENTPLAN - TYP

- 15. PLANT SPECIES MAY BE ADJUSTED BASED ON AVAILABILITY AT TIME OF PLANTING. ALL PLANT MATERIAL SUBSTITUTIONS ARE SUBJECT TO REVIEW AND APPROVAL BY THE LANESCAPE ARCHITECT.
- CONTRACTOR TO INSTALL ANT-HERBINORE TREE PROTECTION FENCE AROUND ALL NEWLY PLANTED TREES. CONTRACTOR TO REMOVE TREE STAKES AND TREE PROTECTION FENCING AFTER ONE GROWING SEASON.
- CONTRACTOR TO INSTALL TEMPORARY EXCLUSION FENCE AROUND NEWLY RESTORED AREAS AT THE LOCATIONS SHOWN AND AS DIRECTED BY THE DWHER.

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1" = 40' MAY 24, 2023 4673-03 10 CF 29 SP-8



Bioengineering









Bioengineering





SOIL WRAPS WITH HEDGE BRUSH LAYERING NOT TO SCALE





Structures to counter attraction flow from the tailrace





ADA Accessible fishing platform





MCRT Access Request

- When: Periodic access November 2024 April 2025 .
- Environmental controls (silt fence and straw bales).
- Machine access temp gravel path for some dam demolition materials removal and river channel and bank reconstruction
- Selective tree/vegetation removal for access. Other trees protected.
- Site signage and cones/safety tape to alert public to access area for equipment
- Public notice of access days. Public access not impeded.
- Access area restored upon completion. Path to view area and informational Kiosk (DCR)





Example: Restored River @ Cotton Gin Dam, Bridgewater, MA







East Burke Dam, VT.







Early mobe items in spring 2024:

- Access roads
- Trailer
- Staging of materials (incl. bypass piping)
- Groundbreaking event June 17, 2024
- Fall 2024 more intense site work to support in-channel construction ops starting early November.