

River Advisory Committee Pickpocket Dam Feasibility Study Update

March 21, 2024

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Agenda

- Review the study findings
- Questions and comments will be taken at the end of the presentation

Time	Item	Presenters
3:10	Presentation Kick Off	Paul Vlasich, PE Town Engineer & Project Manager
3:20	Presentation of Feasibility Study Update	Jacob San Antonio & Pete Walker, VHB
4:00	RAC Comments & Questions	
4:30	Public Comments & Questions	
5:00	RAC Other Business & Adjourn	Richard Huber River Advisory Committee Chair

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Project Funding



- NHDES & NOAA – New Hampshire Coastal Program – Coastal Resilience Grant
- NHDES – Clean Water State Revolving Fund – Planning Grant (ARPA Funds)

"This project was funded, in part, by NOAA's Office for Coastal Management under the Coastal Zone Management Act in conjunction with the New Hampshire Department of Environmental Services Coastal Program."

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Competing Issues and Priorities



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	Alt 1: Raise Dam		Alt 2: Spillway Replacement - Labyrinth		Alt 3: Auxiliary Spillway		Alt 4: Dam Removal
	Current	Future	Current	Future	Current	Future	
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Capital Replacement Costs	\$809,200	\$957,000	\$2,975,800	\$3,082,800	\$943,100	\$1,003,100	\$0
Operations and Maintenance	\$266,800	\$294,300	\$266,800	\$287,500	\$376,800	\$411,200	\$45,000
Total Present Cost	\$3,041,100	\$3,575,100	\$10,465,400	\$10,852,900	\$3,609,000	\$3,849,100	\$1,513,000

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Hydrologic Analysis

- Current Day Design Flood – 2.5 x 100 Year
- Future Rainfall
 - New Hampshire Coastal Flood Risk Summary
 - 15% Increase on best available rainfall data
 - 49% Increase of Design Flood
- NHDES rulemaking for Env – Wr 100-700
 - 1000 – Year – 13,900 cfs

Design Event	Flow(cfs)
Current Normal Flow	136
Current 2-year	504
Current 50-Year	3,030
Current 100-Year	3,980
Current 2.5 x 100-Year	9,940
Current 1,000-Year	13,900
Future 100-Year	5,940
Future 2.5 x 100-Year	14,900



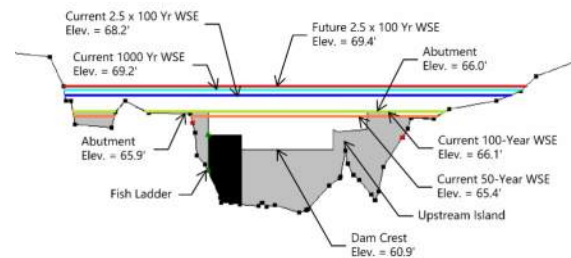
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Existing Conditions

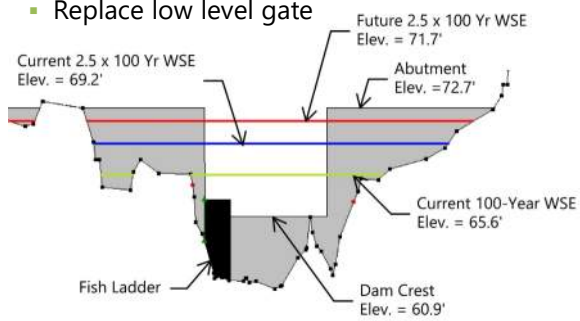
- Existing Abutment Elevation: 66.00
- Current dam consists of a spillway, earthen abutments, low level gate, fish weir and ladder
- Portion of existing crest is obstructed by a sediment island
- Low level gate inoperable
- Inspection = Fair Condition
- Does not pass design storm events, without manual operation with 1-foot of freeboard



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Alternative 1 – Raise Top of Dam

- Maintain existing spillway and fish ladder
- Raise top of dam to contain design storm with 1' of freeboard
- Left & right training walls extended
- Raise and extend earthen embankments
- Replace low level gate



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Existing



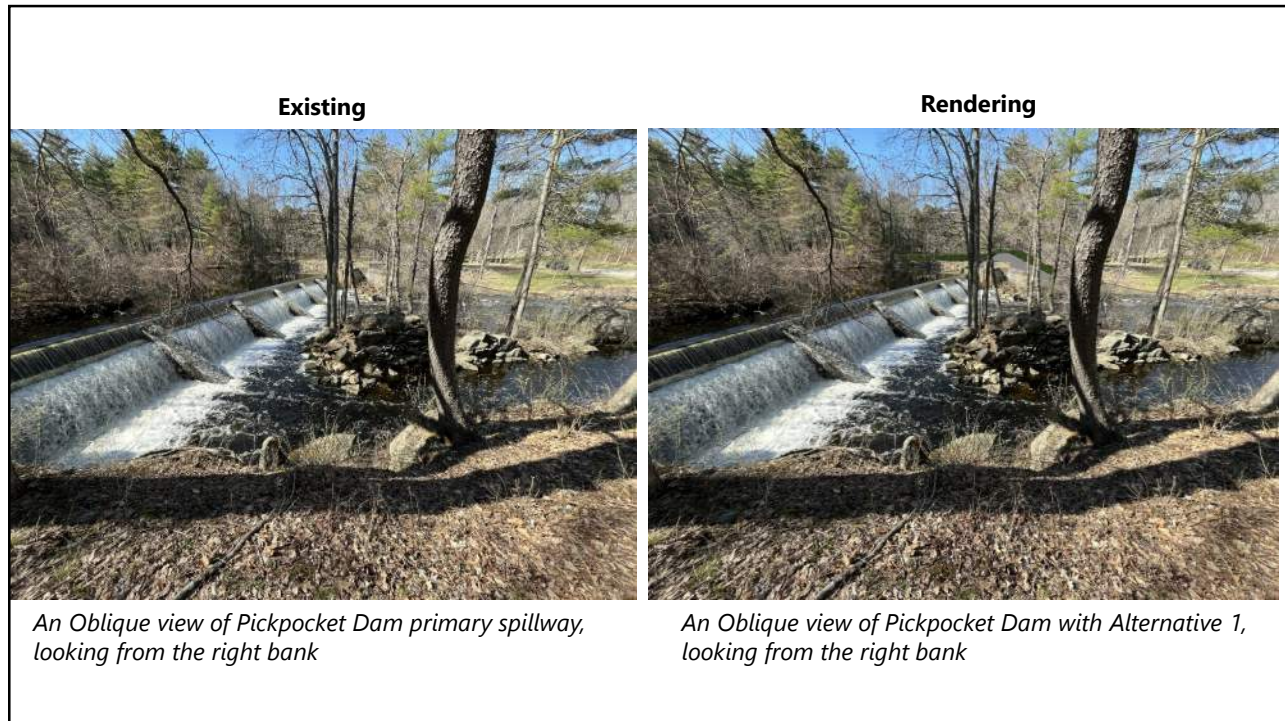
A view of Pickpocket Dam, looking upstream

Rendering



A view of Pickpocket Dam with Alternative 1, looking upstream

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Alternative 2 – Spillway Replacement

- Replace spillway with labyrinth spillway
- Maintain fish Ladder
- Increase height of left training wall
- Raise and extend earthen embankments



Design Storm	Peak Water Surface Elevation (ft)	Required Top of Dam Elevation (ft)
Current Dam (Current Rainfall)	68.2	66.0 (Ex. Top of Dam)
2.5 X 100 yr (Current Rainfall)	65.6	66.6
2.5 X 100 yr (Future Rainfall)	67.7	68.7

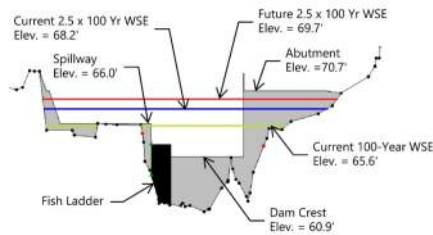
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Alternative 3 – Auxiliary Spillway

- Construct overflow auxiliary spillway through left abutment
 - Construct containment berm
 - Excavate exit channel
- Maintain existing spillway and fish ladder
- Increase height of right training wall
- Construct earthen embankments
- Replace low level gate



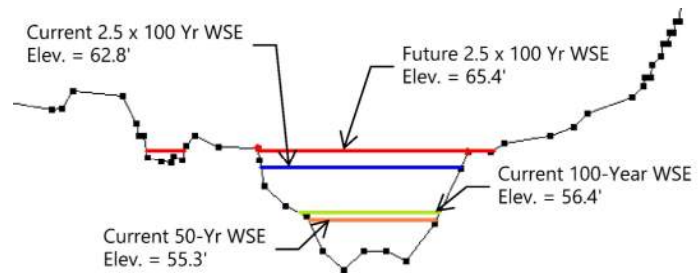
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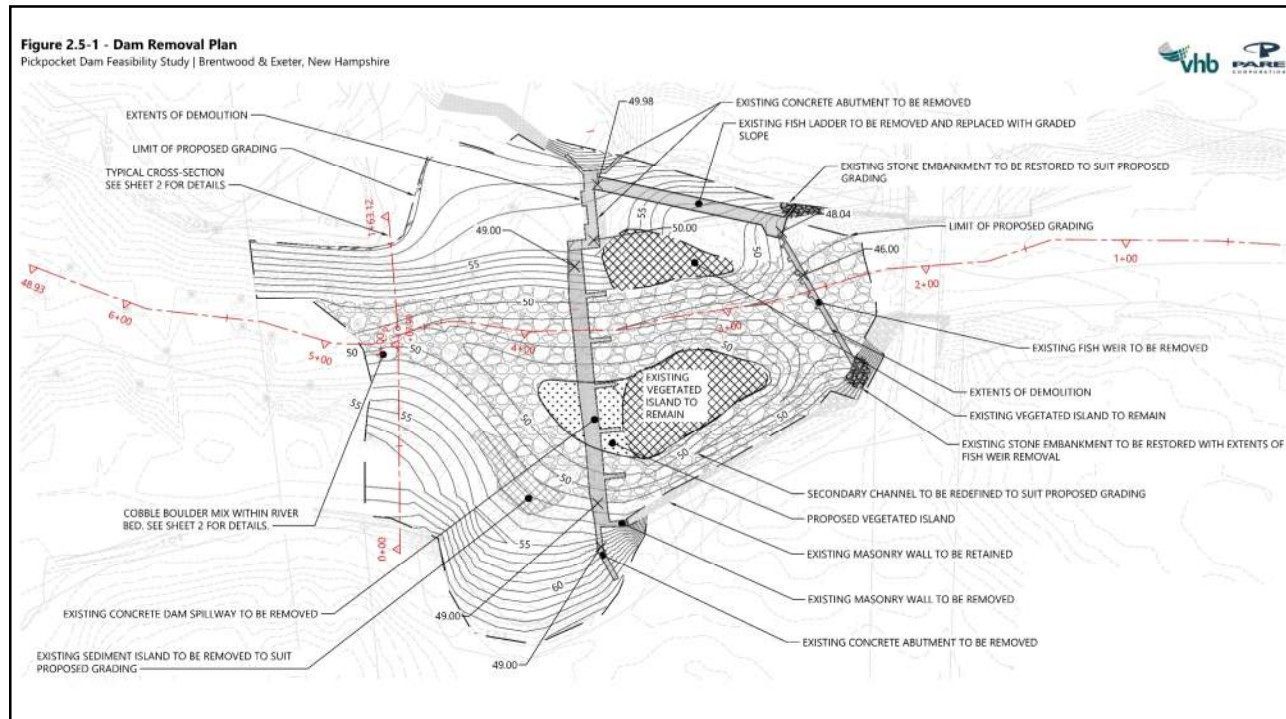
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Alternative 4 – Dam Removal

- Complete demolition and removal of dam, fish ladder, low level gate and associated appurtenances
- Preserve islands downstream of dam
- Reconstruct channel
- Upstream rehabilitation



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Existing



A view of Pickpocket Dam, looking upstream

Rendering



A view of Pickpocket Dam removed, looking upstream

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Existing



An Oblique view of Pickpocket Dam primary spillway, looking from the right bank

Rendering



An Oblique view of Pickpocket Dam removed, looking from the right bank

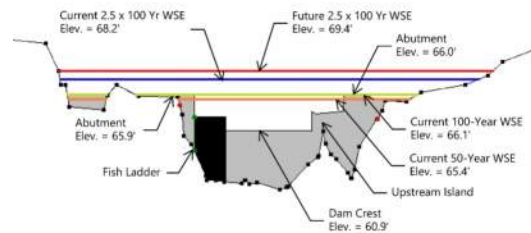
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Alternative 5 – No Action/Hazard Reduction

- Probable loss of human life
 - Water levels rising above 1st floor greater than 1 foot
- High Hazard – Current classification
 - In order to reduce hazard classification
 - Purchase impacted residential property (\$544,000)
 - Stabilize manufactured homes (\$80,000)
- Significant Hazard - Overtopping of NH Route 111 (Kingston Rd) – Class II roadway
 - Replace Kingston Road Bridge to reduce hazard classification. More expensive than dam modification.
 - \$1,300,000 to raise dam 2 feet
 - \$1,924,000 including property acquisition/stabilization
- Low Hazard – Existing dam does not meet low-hazard safety requirements

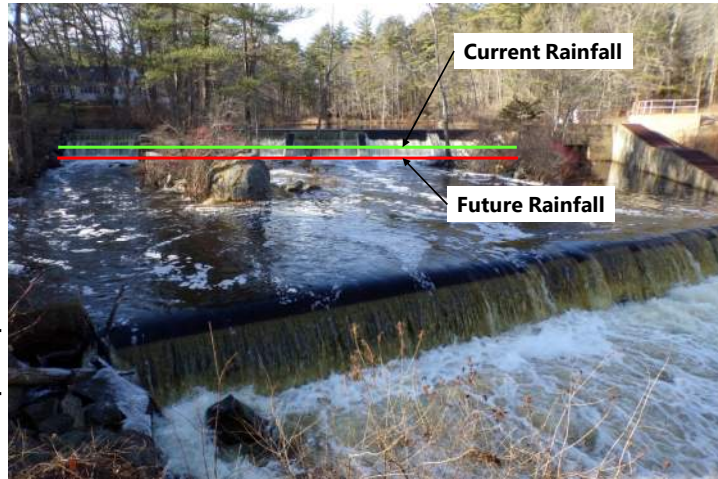


Hazard Class	Discharge Capacity Flood	Water Surface Elevations (Current/Future)	Freeboard (Current/Future)
Low	50-Yr	65.4/NA	0.6/NA
Significant	100-Yr	66.1/67.0	-0.1/-1.0
High	250% of the 100-Yr	68.2/69.4	-2.2/-3.4

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Alternative 6 – Lower Normal Pool

- Selective demolition of the spillway weir
- Replace low-level gate and fish ladder
- Reduced pool levels would have similar impacts as dam removal without the benefits
- Impact to existing recreation opportunities



Design Storm	Spillway Crest Elevation (ft)
Current Spillway	60.9
2.5 X 100 yr (Current Rainfall)	56.5
2.5 X 100 yr (Future Rainfall)	53.9

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Alternative Evaluation

- Alternatives Advanced
 - Alternative 1 – Raise Dam
 - Alternative 3 – Auxiliary Spillway
 - Alternative 4 – Remove Dam
- Alternatives Eliminated
 - Alternative 2 – Spillway Replacement (Labyrinth)
 - High costs & more difficult to maintain
 - Alternative 5 – No Action/Hazard Reduction
 - Hazard reduction does not address the inherent safety concerns
 - Alternative 6 – Lower Normal Pool Elevation
 - Negative impacts to environment and recreation

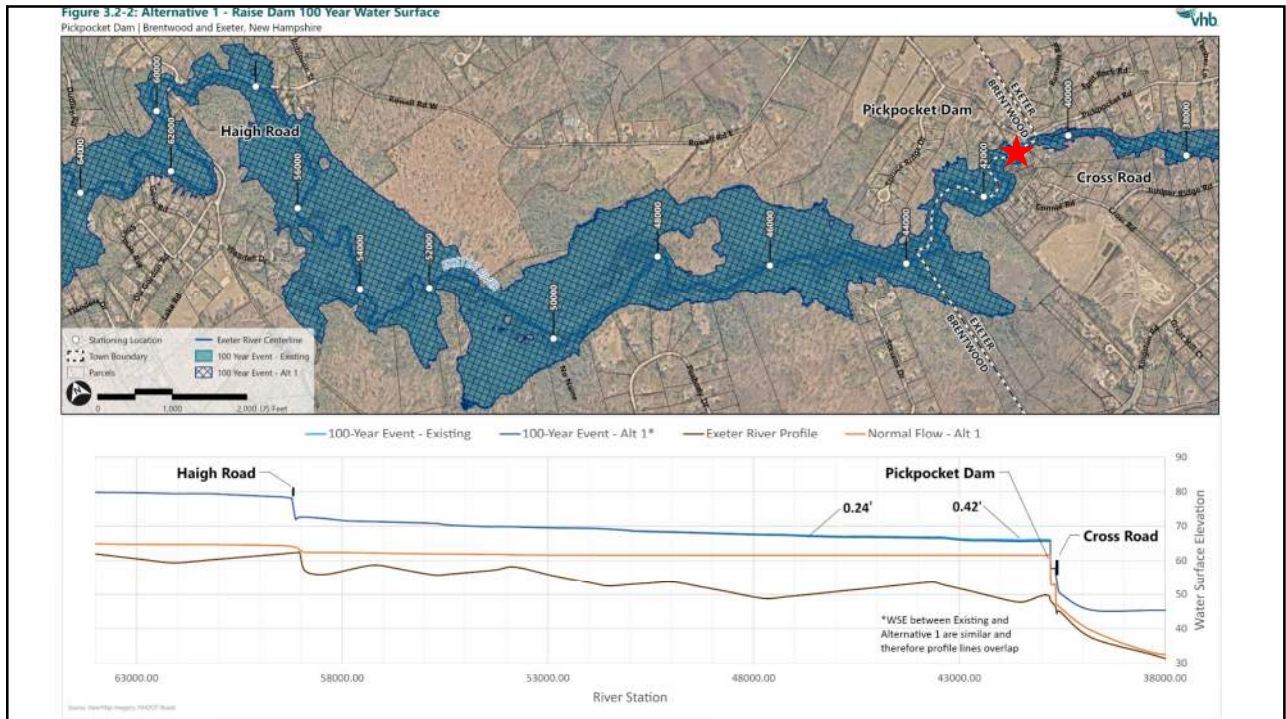


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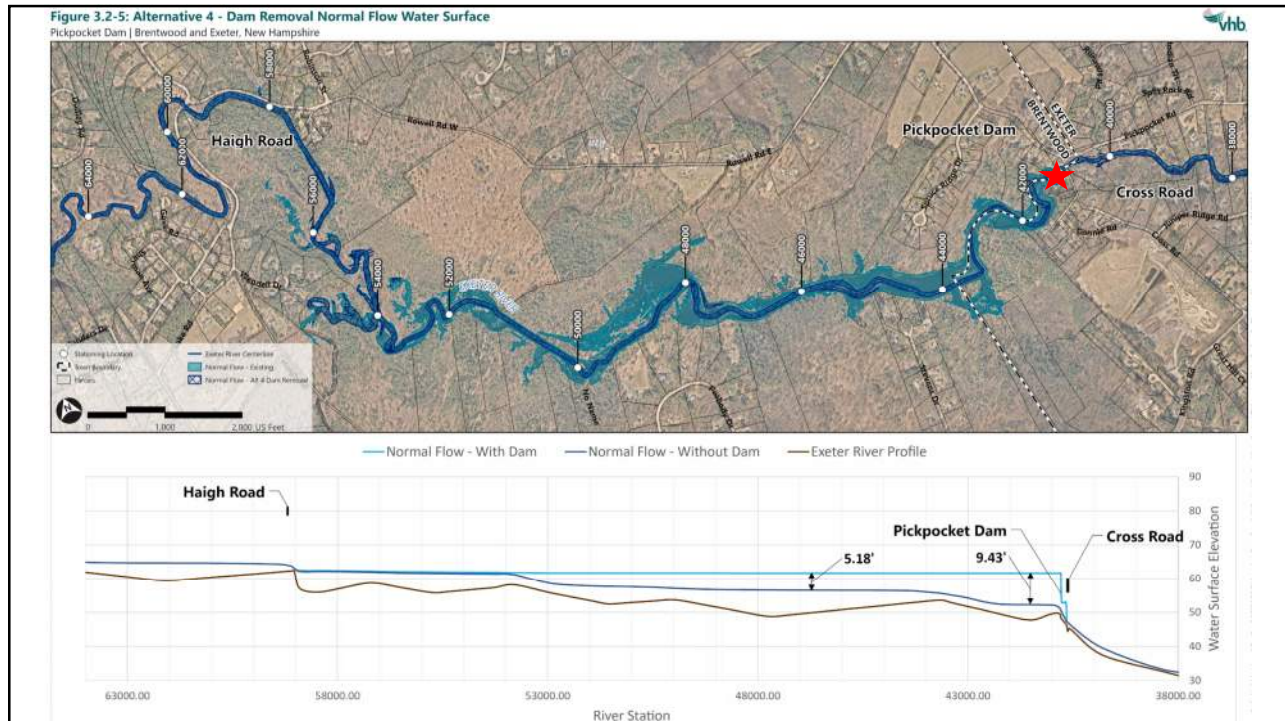


Impact Analysis

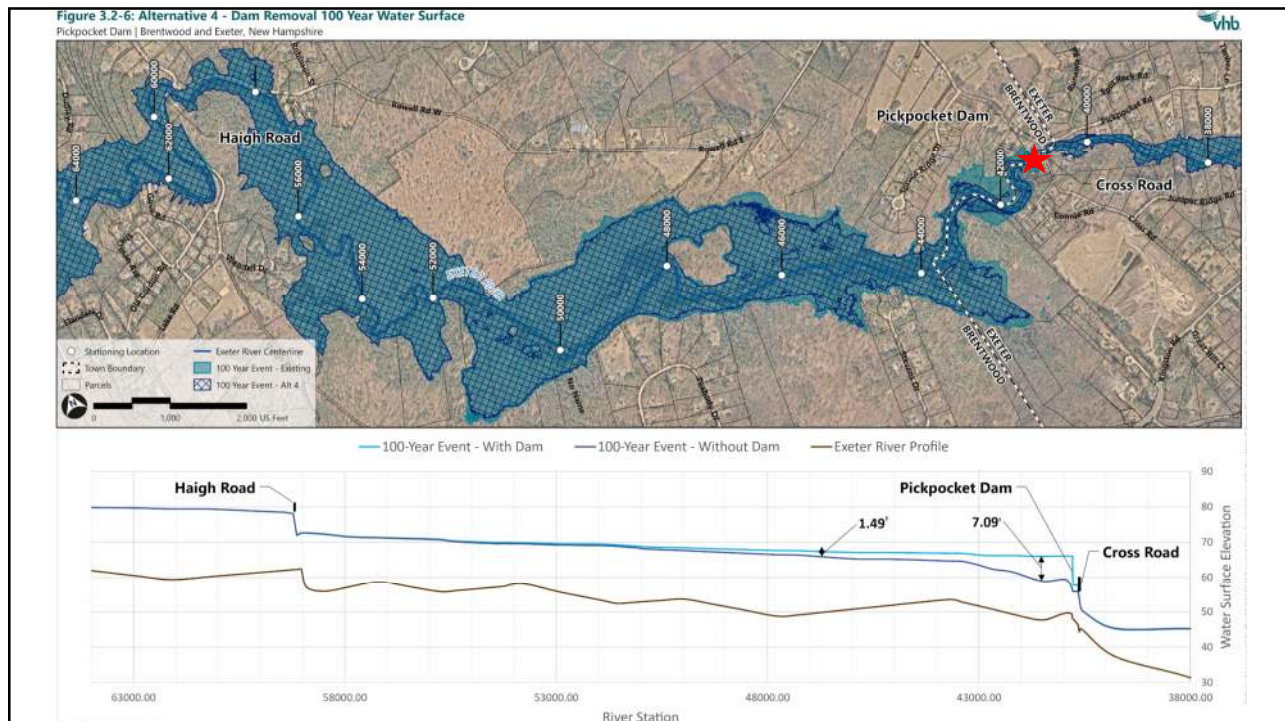
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Sediment Sampling Results

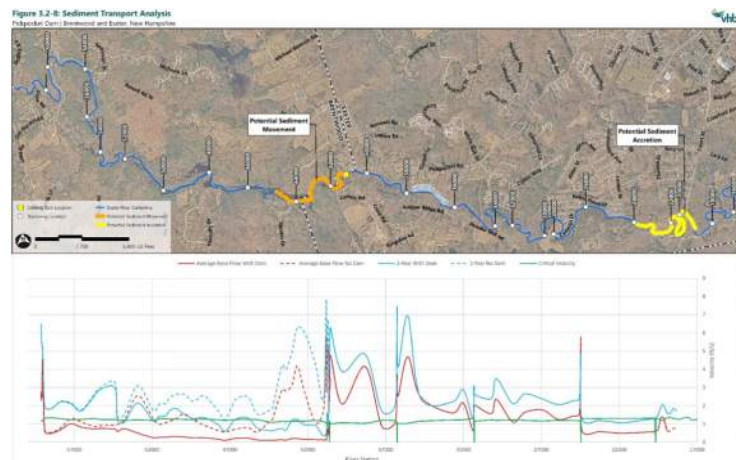
- No concentrations of pesticides or PCBs detected in sediment samples
- PAHs and metals detected in all sediment samples
- Arsenic the only contaminant detected in excess of the NHDES Env-Or 600 Soil Remediation Standards
 - Consistent with background, arsenic is a natural occurring component of sediment and bedrock in NH
- The ecological resource risk for contaminants
 - Low - Metals and PAHs in SED-1 through SED-5
 - Moderate - Arsenic in SED-2, SED-4, and SED-5
 - Moderate - PAHs in SED-3 and SED-4



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Sediment Transport

- 3 upstream sediment samples (SED-1, SED-2 & SED-5)
 - Mucky, Fine to very fine sand and silt with trace organic material
- Potential sediment movement 3,700' upstream of dam
- Potential sediment accretion in the Route 108/Court Street Bridge region
- Sediment removed near dam site under Dam Removal
- Controlled drawdown & seeding of exposed banks
- No sediment transport concerns for dam modification



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Sediment Probing Results

- Sediment probing investigation
- Depths range 0-2 feet in active conveyance portion of the channel
- Increasing depths towards banks
- Inoperable gate prohibited capturing depths at upstream face

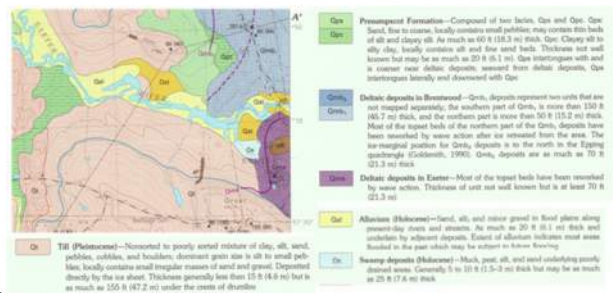
Figure 3.2-9 - Silt Depth
Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



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Infrastructure

- Dam modification: Increase in flood levels during design discharge
- Dam removal:
 - Decreased flood levels
 - No impact to bridges
 - Results show small increase in velocity
 - Potential erosion will be mitigated.
 - Induced Settlement
 - River drawdown resulting in groundwater changes
 - Increase effective stress could result in soil compression
 - Potential settlement of relatively loose soil layers
 - River Valley Slope Stability
 - Reduction in water level will increase total effective stresses
 - The unsaturated soil strengths are greater than saturated soil strengths
 - Minor increase in velocity - potential to impact slope stability
 - Slope protection evaluated during design phase



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Water Quality

- Class B Water: Downstream segment Impaired for Aquatic Life designated uses due to low DO concentration
- Dam In Conditions – Slow moving water result in:
 - Lower dissolved oxygen
 - Disruption to sediment transport process
 - Increased growth of algae & vegetation
 - Increased water temperature
- Dam removal would improve water quality upstream and downstream of dam
 - Improvement in upstream water quality will result in improvement to downstream water quality



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Fisheries & Fish Passage

- Diadromous fish rely on access to upstream freshwater river habitat
- Other fish species also present
- Dams are barriers to fish passage – Both Upstream and Downstream
- Dam Modification alternatives would retain the existing fish ladder
- Dam Removal
 - Barrier removal and reshaped channel would improve fish passage conditions
 - Would reconnect 14.1 river miles of stream habitat

Year	Pickpocket Fishway	Exeter Fishway	Exeter TC (Great dam)
2010	0	69	
2011	0	256	
2012	0	378	
2013	0	588	
2014	0	789	
2015	1,330	5,562	
2016	2,316 [^]	6,622 [^]	
2017	*** [^]		
2018	32 [^]		
2019	28 [^]		
2020	17 [^]		
2021	329		167,400 ^{^^}
2022	27		273,228 ^{^^}
2023	148		234,948 ^{^^}

*** - Sea lamprey inundation caused fish counter to false count

[^] - Great Dam removed in summer 2016, fish now enumerated at Pickpocket Dam

^{^^} - Fish now enumerated though Time Counts at former Great Dam site

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Natural Resources

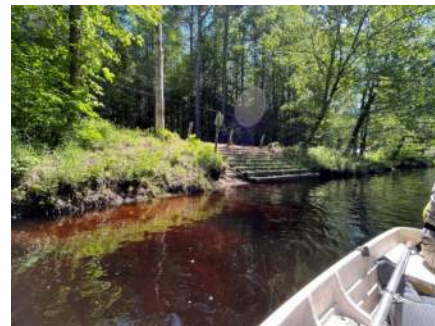
- **Dam Modification:**
 - Negligible change to existing wetlands, surrounding habitat and invasive species
- **Dam Removal:**
 - Would result in changes to habitat, wetlands, and natural communities, including:
 - Improve fish passage (existing fish ladder limits passage).
 - Improve water quality.
 - Restore "Natural Flow Regime" which drives riparian ecological diversity.
 - Would affect wetlands and floodplain forests that border the impoundment based on changing flood regimes
 - Primary change would be shift in wetland cover type, but loss of wetland at periphery may occur
 - Implement measures to limit spread of invasive species



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Recreation

- Boating, fishing, swimming, snowmobiling, skating and bird watching
- Cartop boat launch at Haigh Road
- Public land at Pickpocket Dam and Peabody Drive
- Conservation easement land surrounds the impoundment
- Dam Modification: No impact to recreation opportunities
- Dam Removal:
 - Loss of open water, narrower and shallower boating conditions
 - Increase in angling due to improvement in fish passage. Different angling locations.



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Public Involvement & Public Comment

Date	Item
March 28, 2011	Numerous presentations and discussions since receiving Letter of Deficiency from NHDES
April 22, 2021	Presentation on conceptual options to bring dam into compliance
May 18, 2023	Feasibility Study Update & NHDES Presentation on Dam Reclassification
Sept 21, 2023	Feasibility Study Update
Oct 2, 2023	Select Board Meeting: Feasibility Study Update & Review of NOAA Grant
Nov 29, 2023	Feasibility Study Update
Feb 20, 2024	Feasibility Study Draft Report available for 30-day public comment
Feb 27, 2024	Public Meeting: Presented on draft Feasibility Study & heard public comment & questions

- **Feasibility Study Public Comment Ends 3/21**
- **Certified abutter notices will be issued during permitting phase.**

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Cost Analysis

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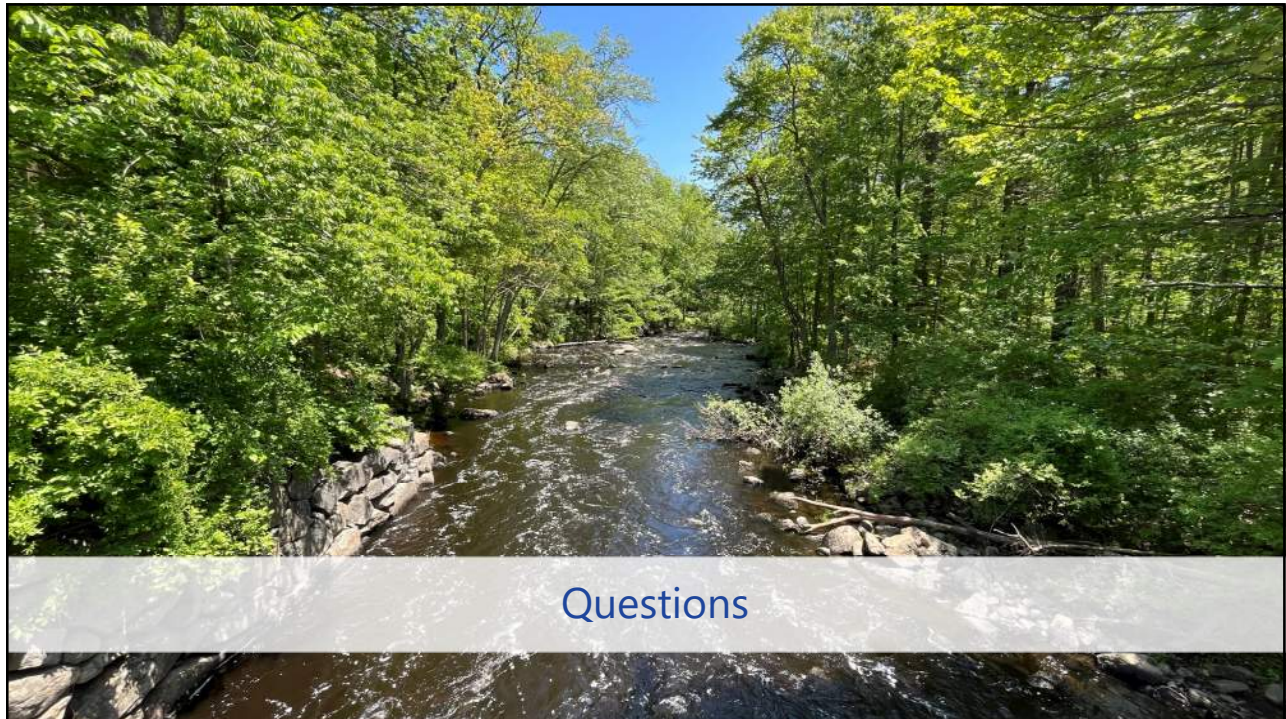
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Next Steps

- Public comment period ends today March 21st
 - Comments can also be submitted via email to pickpocketdam@exeternh.gov
- Project team will review public comment and the revise the report as necessary
- Issue final Feasibility Report by April 30th
- River Advisory Committee to make recommendation to Select Board on how to proceed
- Select Board to make final determination



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