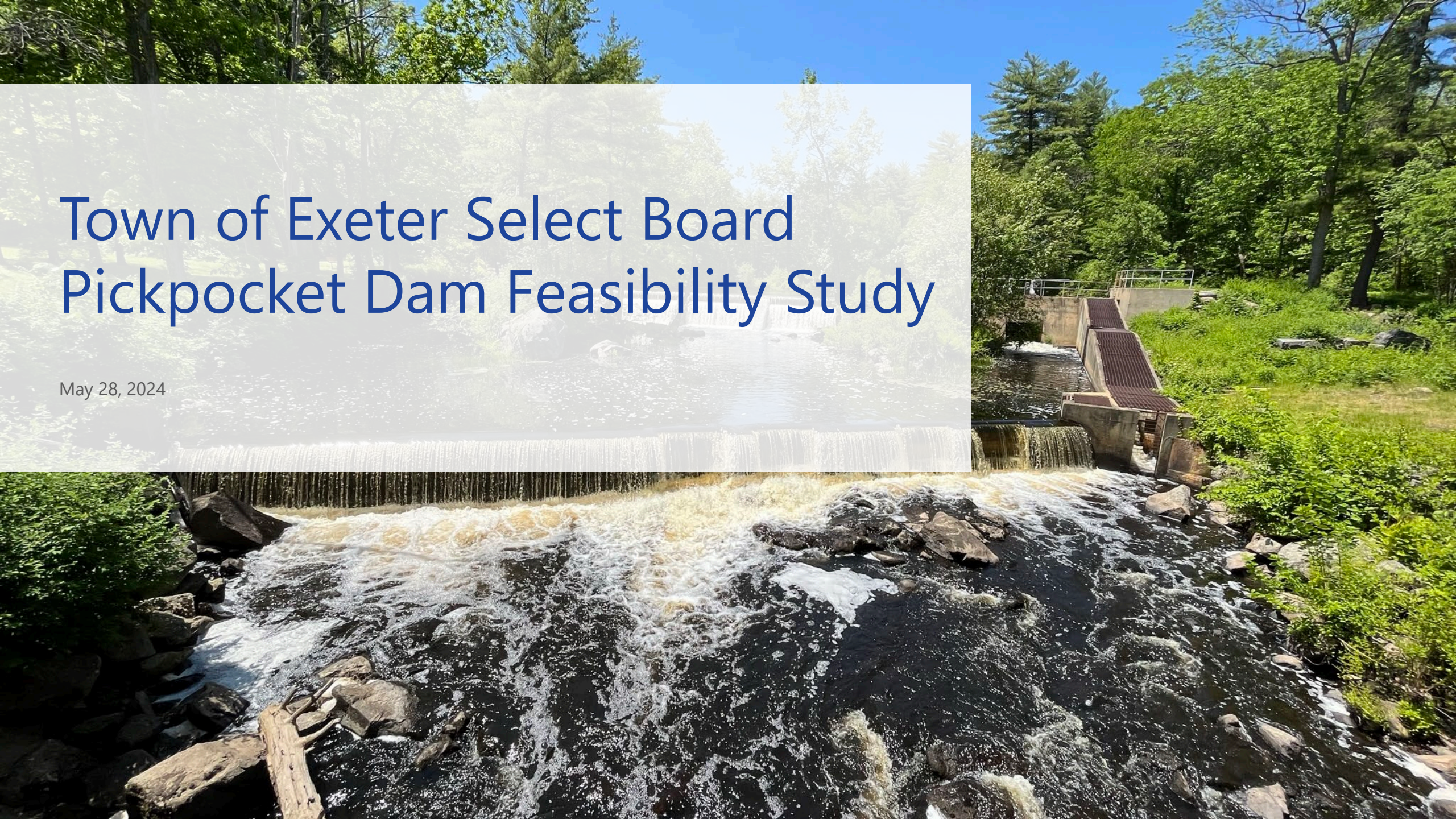


# Town of Exeter Select Board Pickpocket Dam Feasibility Study

May 28, 2024





# 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."*



# Competing Issues and Priorities



Recreation



Flooding



Water  
Quality



Fisheries



Water  
Supply



Cost



Maintenance



Industry



Historic



Structures



# Feasibility Study Scope

Feasability Study Scope	Funding Source
<b>Task 1 - Data Collection</b>	
1.1 Collect and Review Available Data	
1.2 Supplemental Dam/Topo Survey	
1.3 Project Area Bathymetric Survey	
1.4 Impoundment Bathymetry	
1.5 Existing Conditions Plan	
1.6 Impoundment Probing	
1.7 Dam Inspection & Assessment	
<b>Task 2 - Alternatives Identification and Conceptual Design</b>	
2.1 Alternatives Development	
2.2 Cost Evaluations	
2.3 Alternative Conceptual Sketches	
2.4 Alternatives Screening	
<b>Task 3 - Sediment Sampling</b>	
3.1 Sediment Sampling Plan	
3.2 Sediment Evaluation	
3.3 Sediment Transport Potential	
<b>Task 4 - Hydrologic and Hydraulics Analysis</b>	
4.1 Hydrologic Study - Climate Change Evaluation	
4.2 Hydraulic Study	
4.3 Scour Analysis	
4.4 FEMA Floodplain Analysis	
<b>Task 5 - Cultural Resources</b>	
5.1 Request for Project Review	
5.2 Additional Cultural Resource Studies	

Feasability Study Scope	Funding Source
<b>Task 6 - Impact Analysis</b>	
6.1 Rare Species	
6.2 Fish Passage	
6.3 Wetland Impact Analysis	
6.4 Recreational Usage	
6.5 Invasive Species	
6.6 Riverine Ice Coordination	
6.7 Water Supplies	
6.8 Water Quality	
6.9 Infrastructure	
6.10 Visual Simulations	
<b>Task 7 - Feasibility and Impact Analysis Report</b>	
7.1 Draft Report	
7.1 Final Report	
7.2 Alternatives Summary Table	
7.3 Progress Reports	
<b>Task 8 - Project Management and Coordination Meetings</b>	
8.1 Project Management	
8.2 Project Team Meetings	
8.3 Project Partner Meetings	
8.4 Resource Agency Meetings	
8.5 Public Information Meetings	
8.6 Grant Coordination	

 Coastal Resilience Grant  
 Stormwater Planning Grant - Clean Water State Revolving Fund





Earthen  
Embankment

Spillway

Low Level  
Gate

Fish Ladder

Earthen  
Embankment

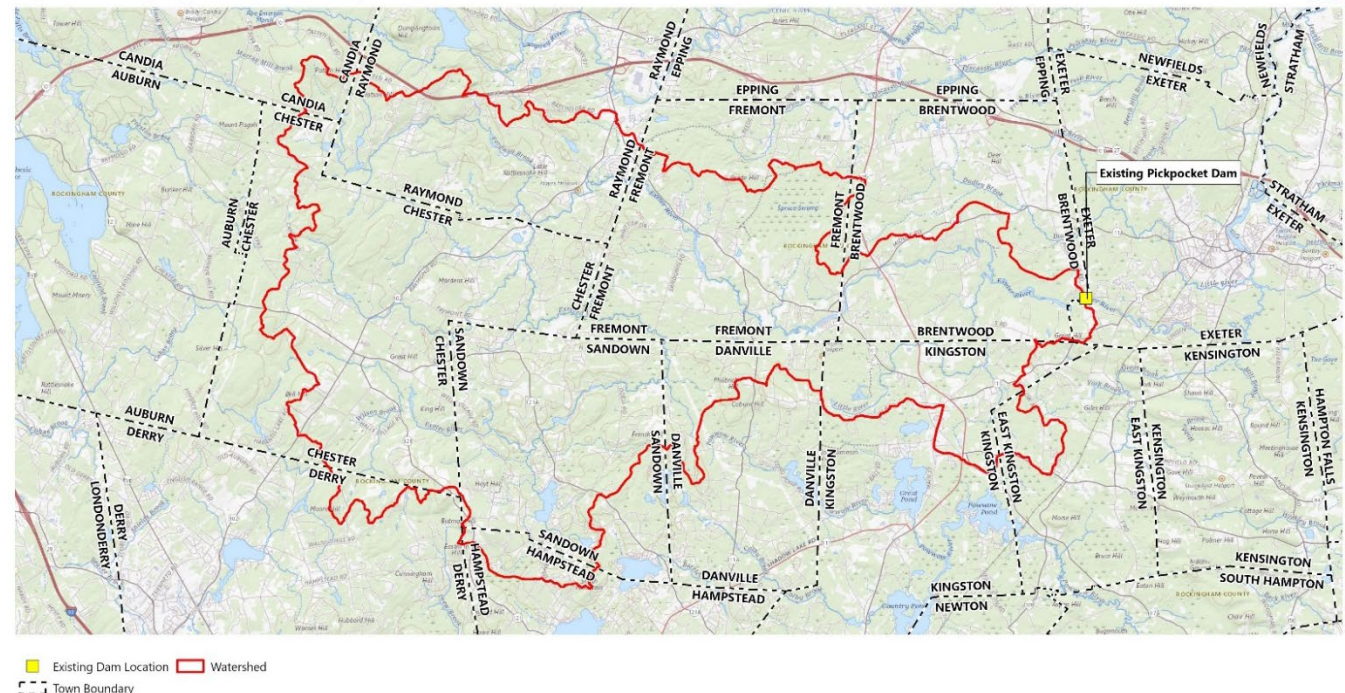
Training Weir



# 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



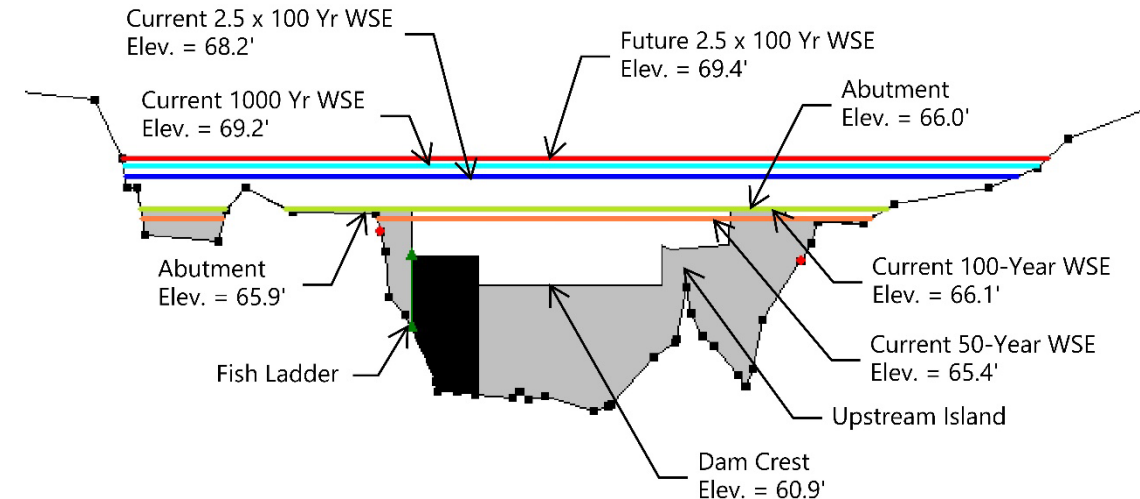






# Existing Conditions

- Existing Abutment Elevation: 66.0
- 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





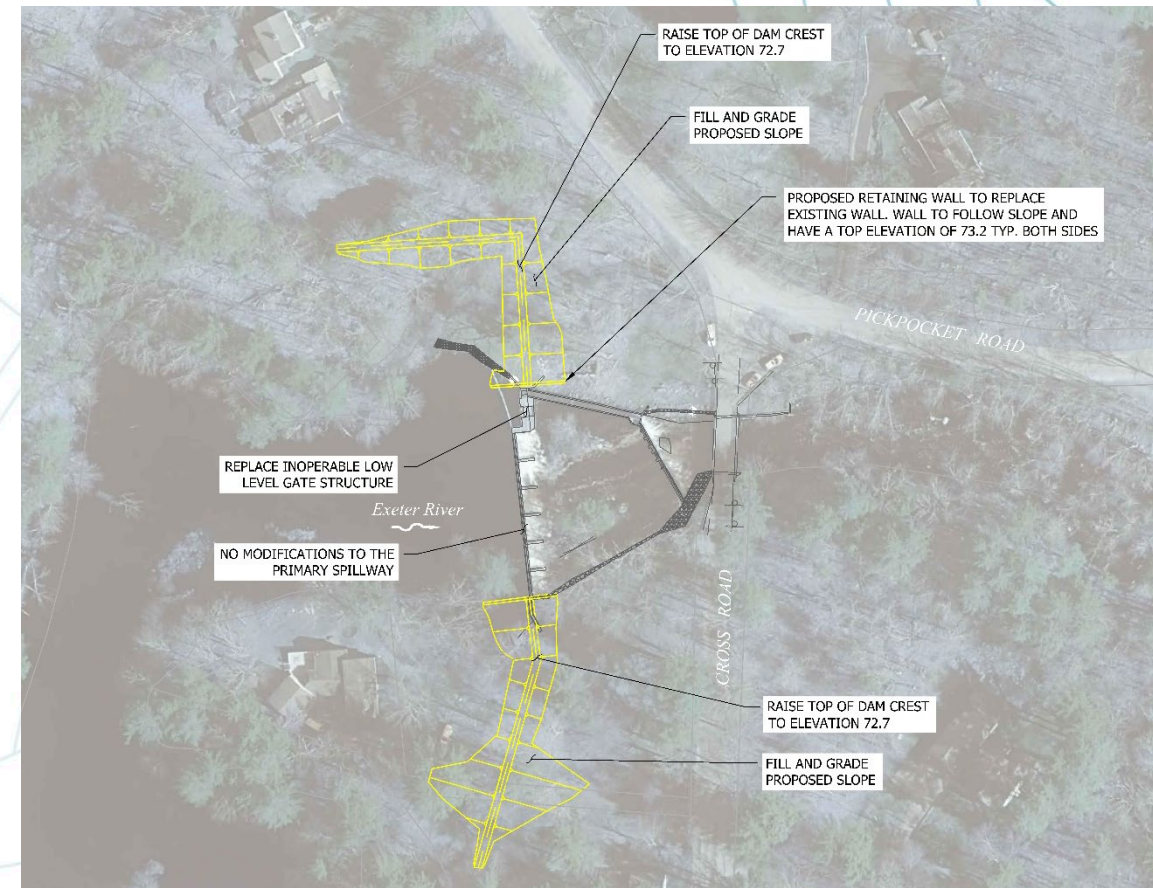
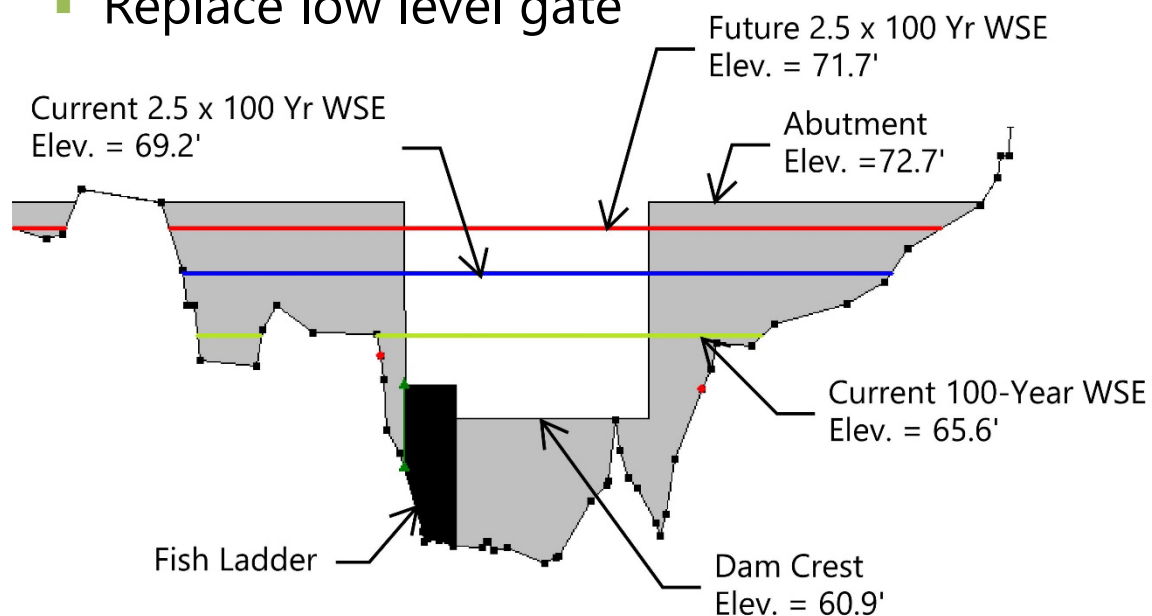


# Alternatives



# Alternative 1 – Raise Top of Dam

- Maintain existing spillway discharge structure
- 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





## Existing



*A view of Pickpocket Dam, looking upstream*

## Rendering



*A view of Pickpocket Dam with Alternative 1, looking upstream*



## Existing



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

## Rendering



*An Oblique view of Pickpocket Dam with Alternative 1, looking from the right bank*

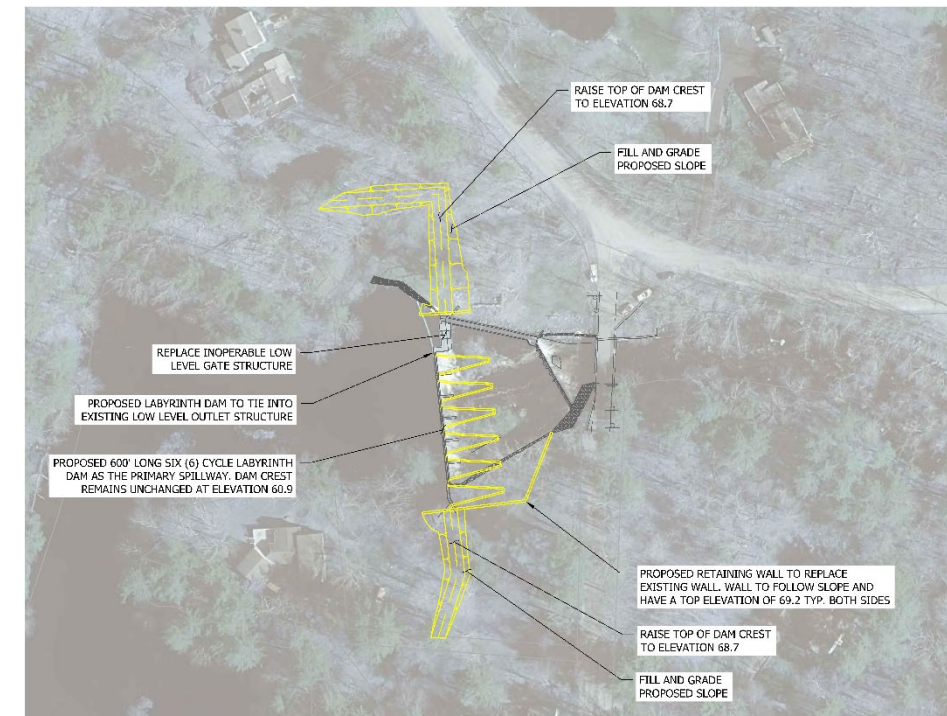


# Alternative 2 – Spillway Replacement

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



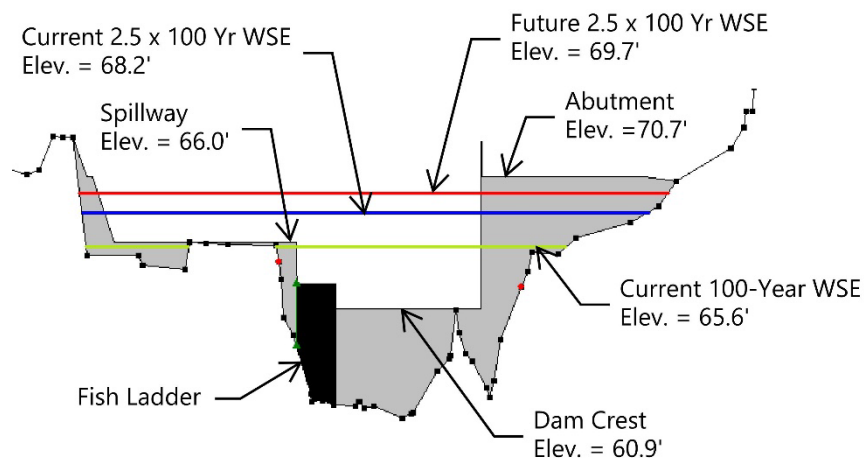
Design Storm	Peak Water Surface Elevation (ft)	Required Top of Dam Elevation (ft)
Current Dam (Current Rainfall)	68.2	66.0 (Ex. Top of Dam)
2.5 X 100 yr (Current Rainfall)	65.6	66.6
2.5 X 100 yr (Future Rainfall)	67.7	68.7





# Alternative 3 – Auxiliary Spillway

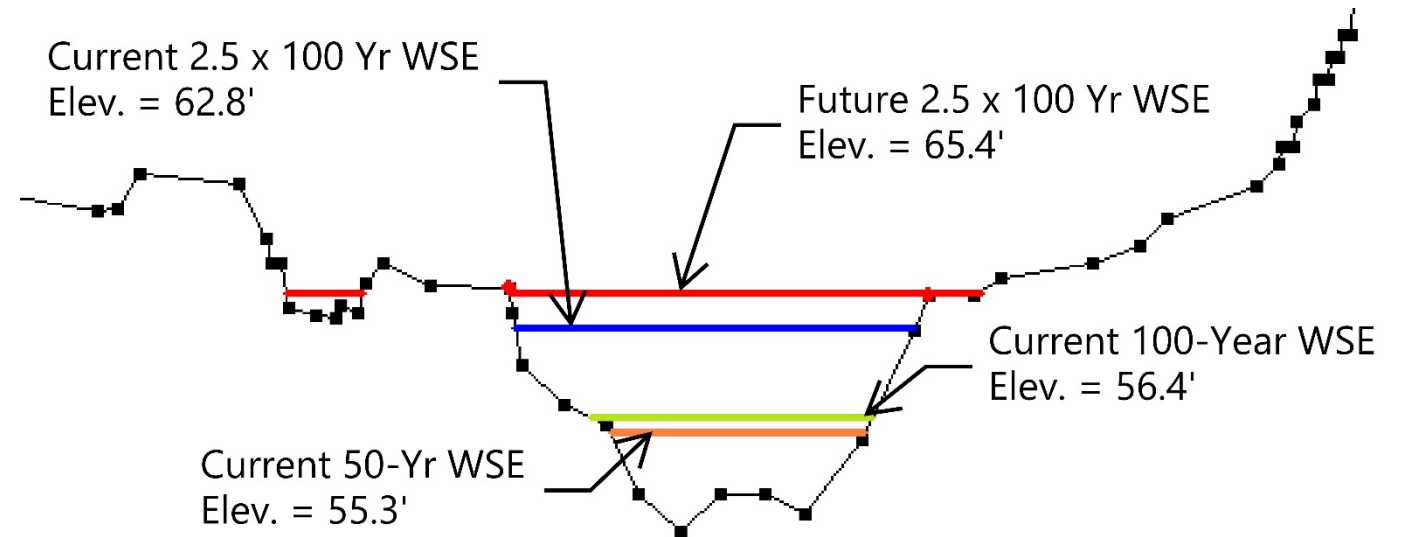
- Construct overflow auxiliary spillway through left abutment
  - Construct containment berm
  - Excavate exit channel
- Maintain existing spillway discharge structure
- Increase height of right training wall
- Construct earthen embankments
- Replace low level gate





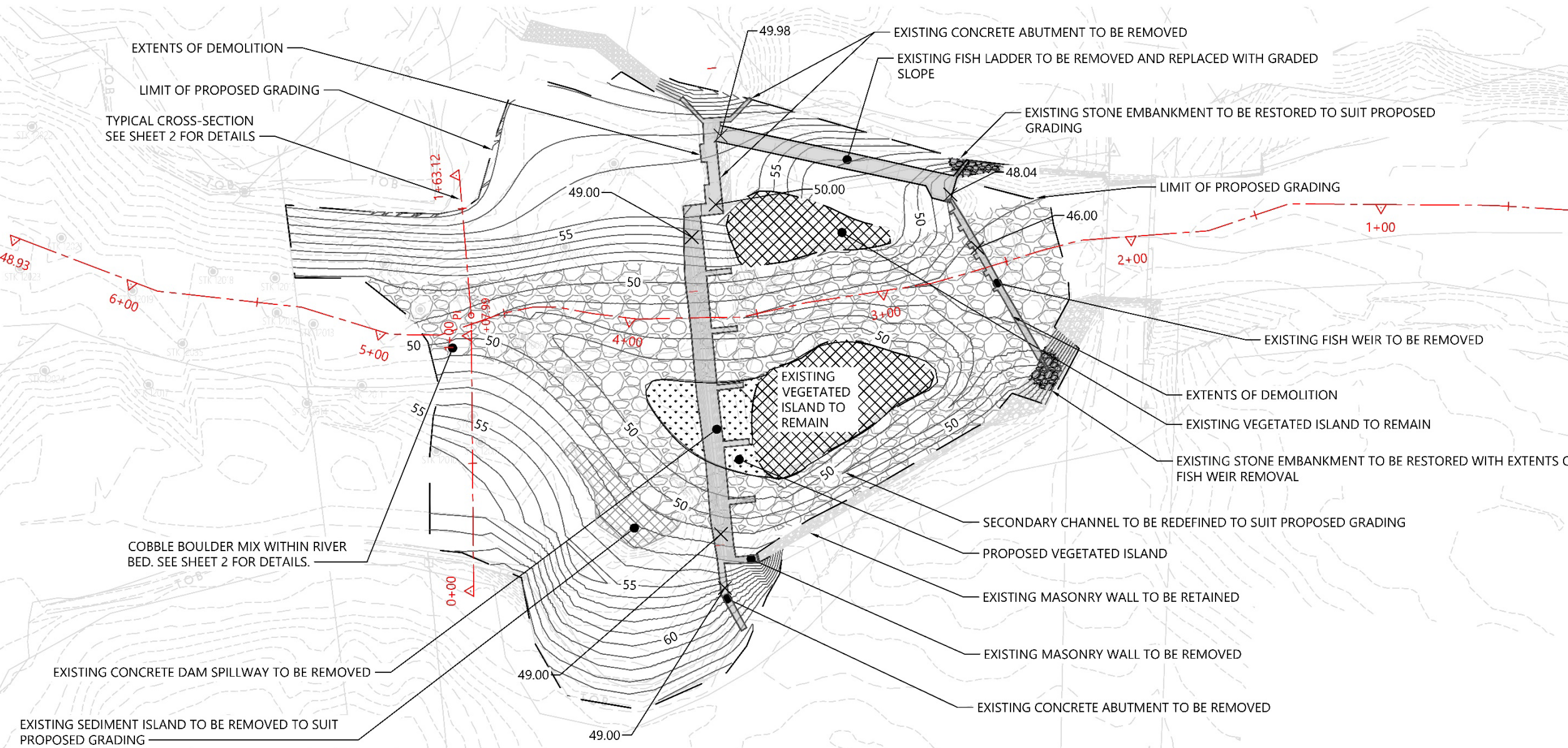
# Alternative 4 – Dam Removal

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





**Figure 2.5-1 - Dam Removal Plan**  
Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire





## Existing



*A view of Pickpocket Dam, looking upstream*

## Rendering



*A view of Pickpocket Dam removed, looking upstream*



## Existing



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

## Rendering

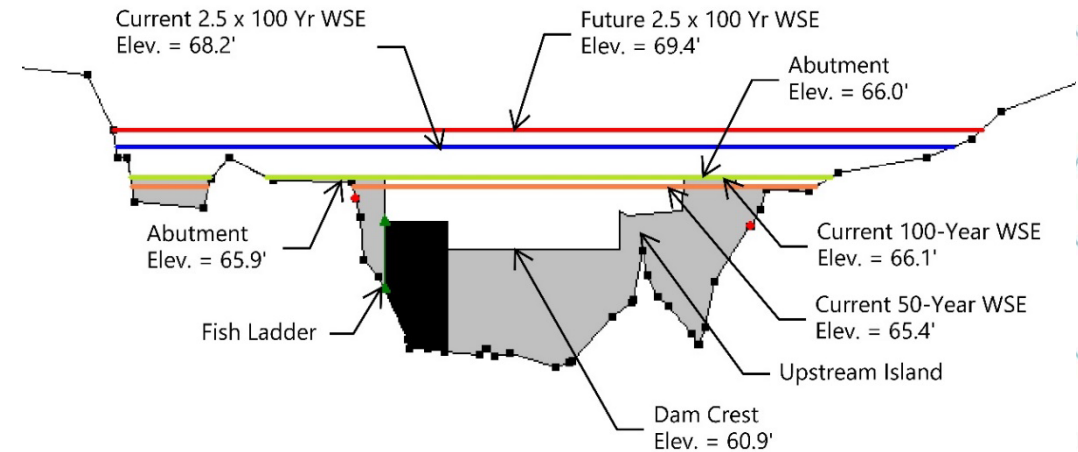


*An Oblique view of Pickpocket Dam removed, looking from the right bank*



# Alternative 5 – No Action/Hazard Reduction

- Probable loss of human life
  - Water levels rising above 1<sup>st</sup> floor greater than 1 foot
- High Hazard - Maintain existing dam
  - 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
  - \$2,024,200 to raise dam 2 feet including life cycle costs
  - \$2,648,200 including property acquisition/stabilization
- Low Hazard – Existing dam does not meet low-hazard safety requirements



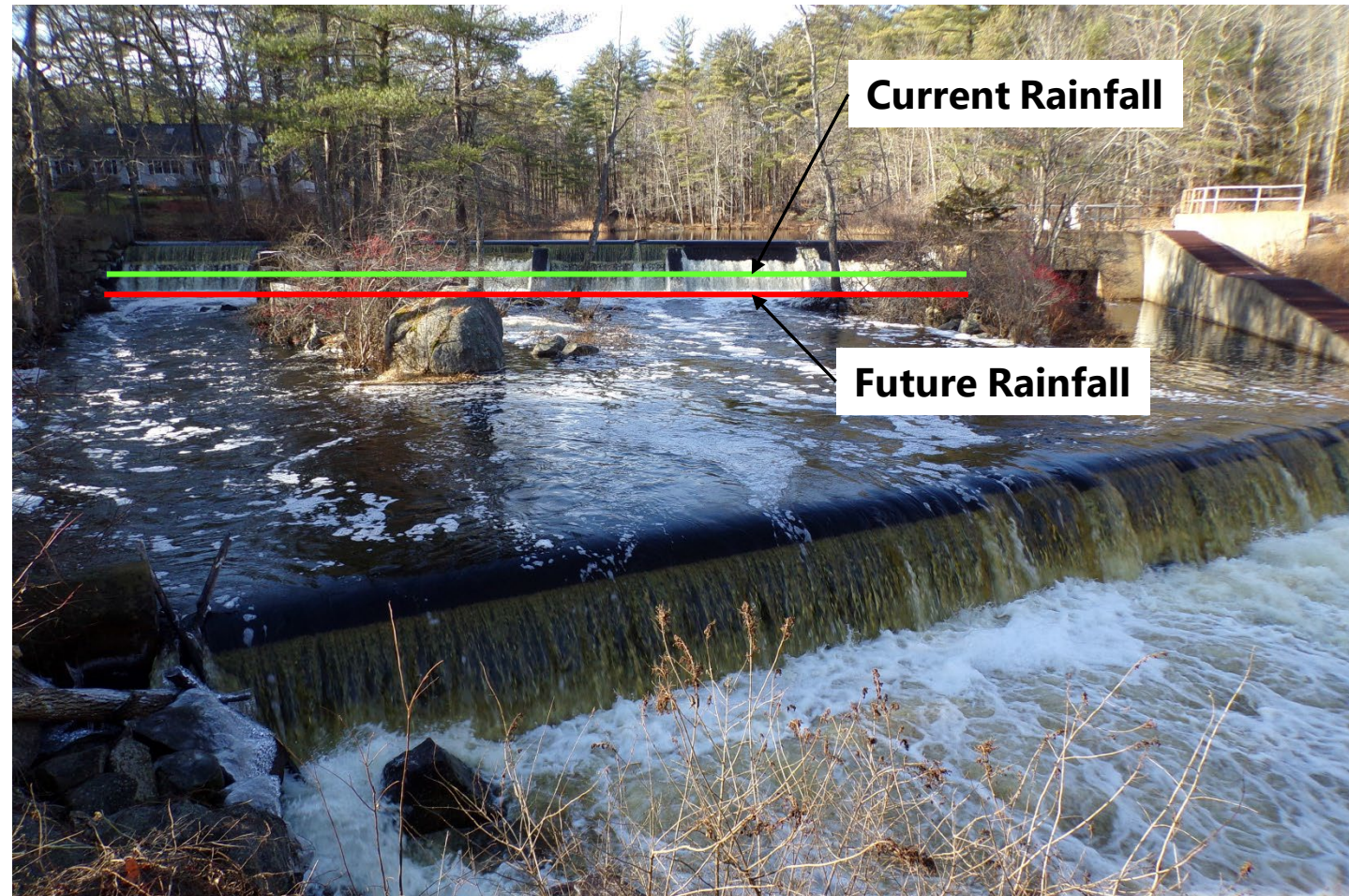
Hazard Class	Discharge Capacity Flood	Water Surface Elevations (Current/Future)	Freeboard (Current/Future)
Low	50-Yr	65.4/NA	0.6/NA
Significant	100-Yr	66.1/67.0	-0.1/-1.0
High	250% of the 100-Yr	68.2/69.4	-2.2/-3.4



# 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

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





# 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





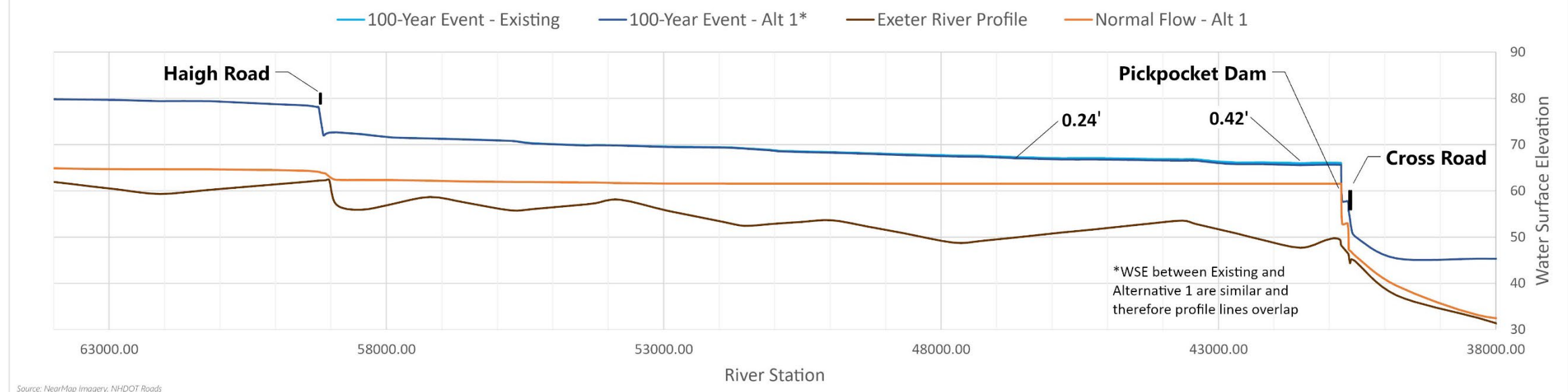
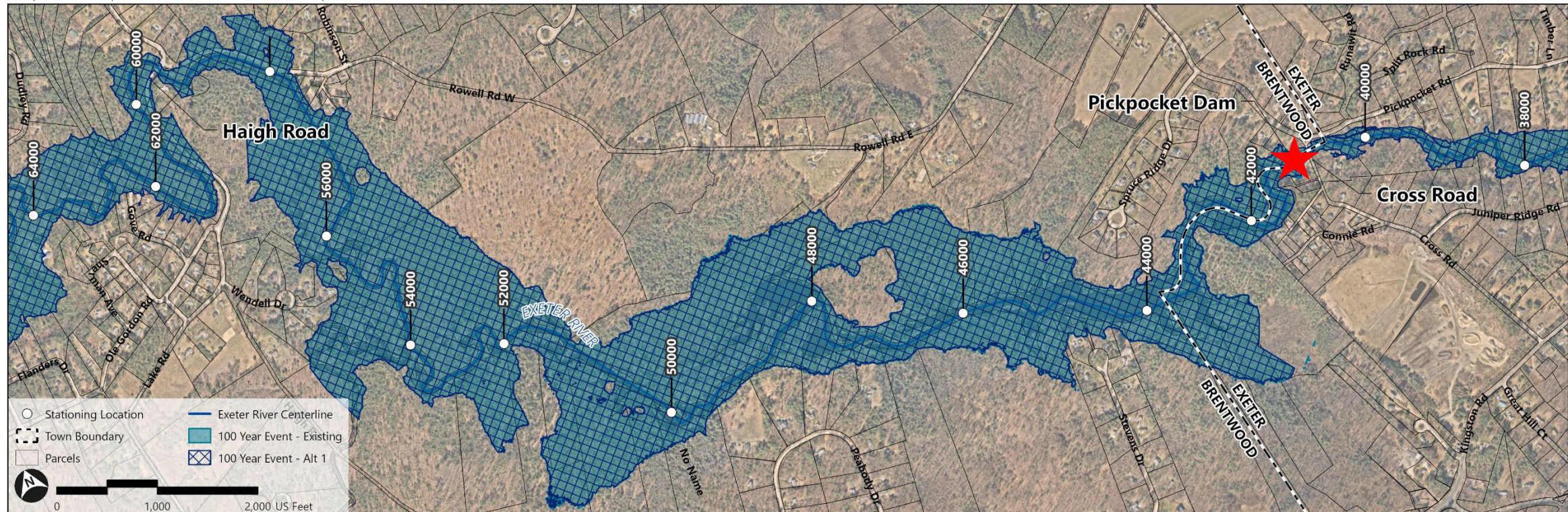


# Impact Analysis



**Figure 3.2-2: Alternative 1 - Raise Dam 100 Year Water Surface**

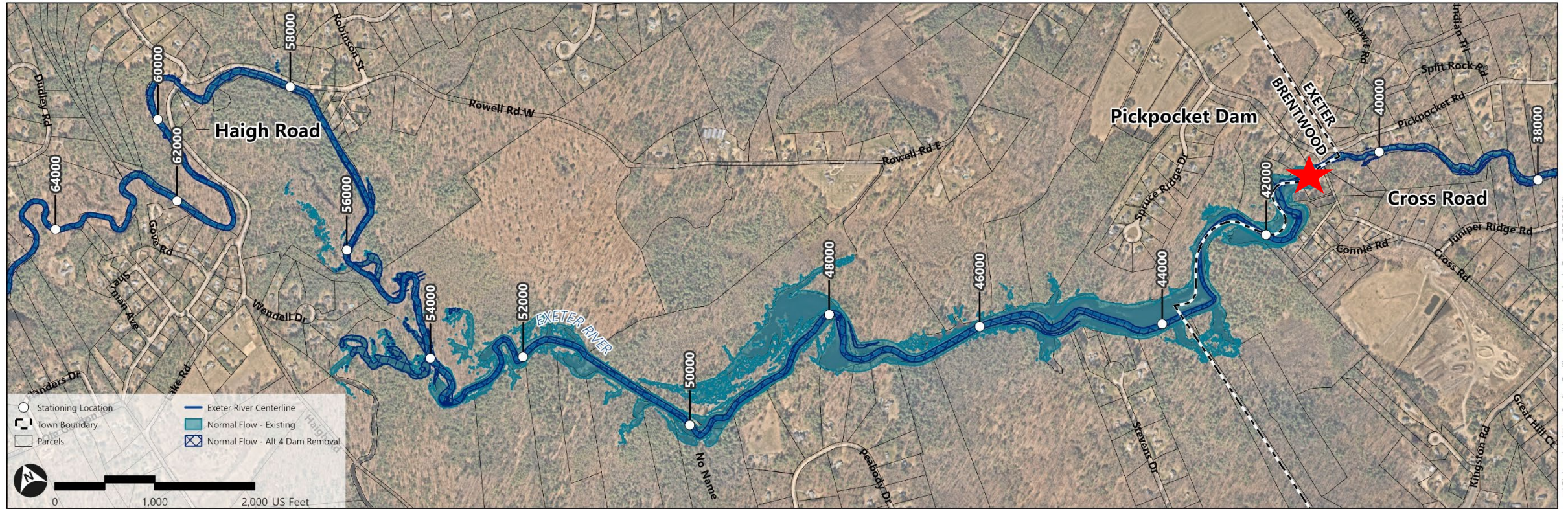
Pickpocket Dam | Brentwood and Exeter, New Hampshire





**Figure 3.2-5: Alternative 4 - Dam Removal Normal Flow Water Surface**

Pickpocket Dam | Brentwood and Exeter, New Hampshire



Normal Flow - With Dam    Normal Flow - Without Dam    Exeter River Profile

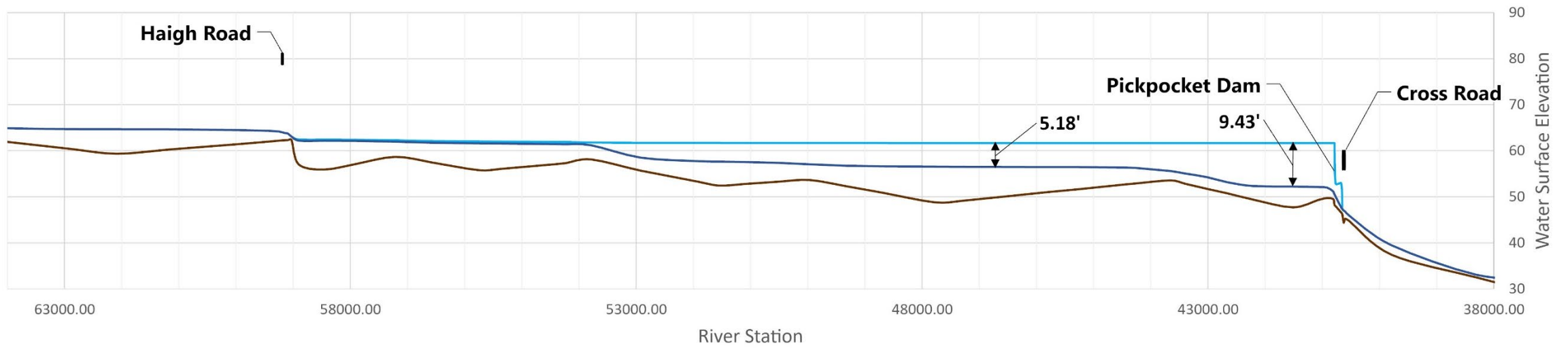
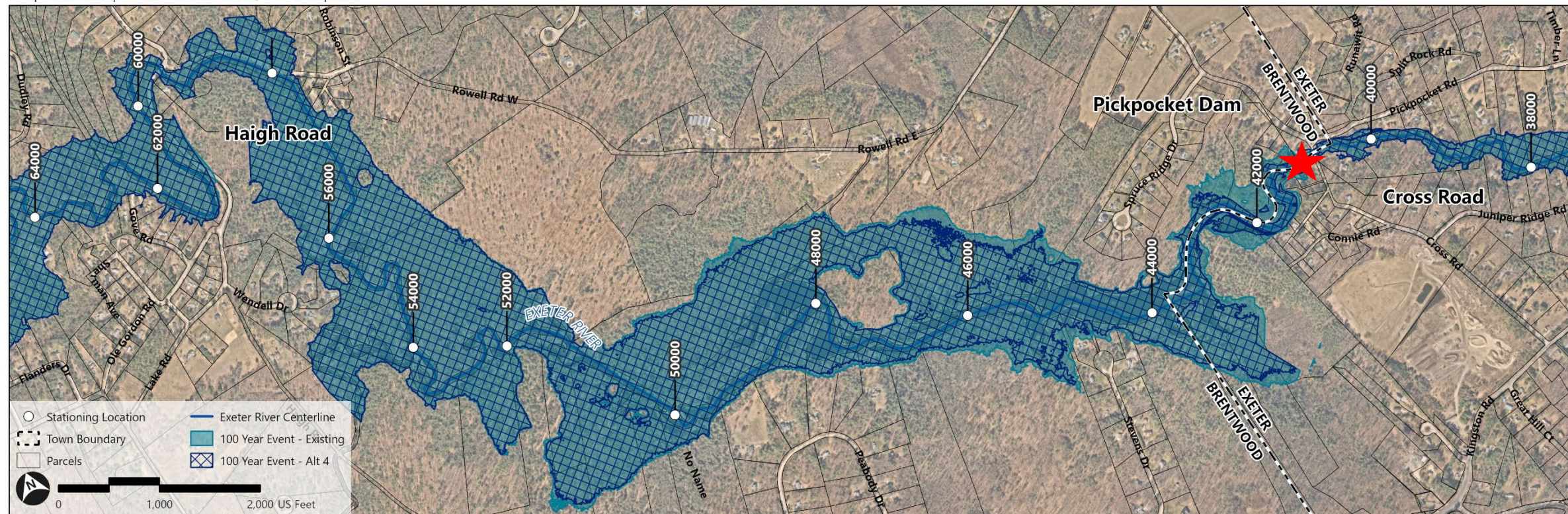


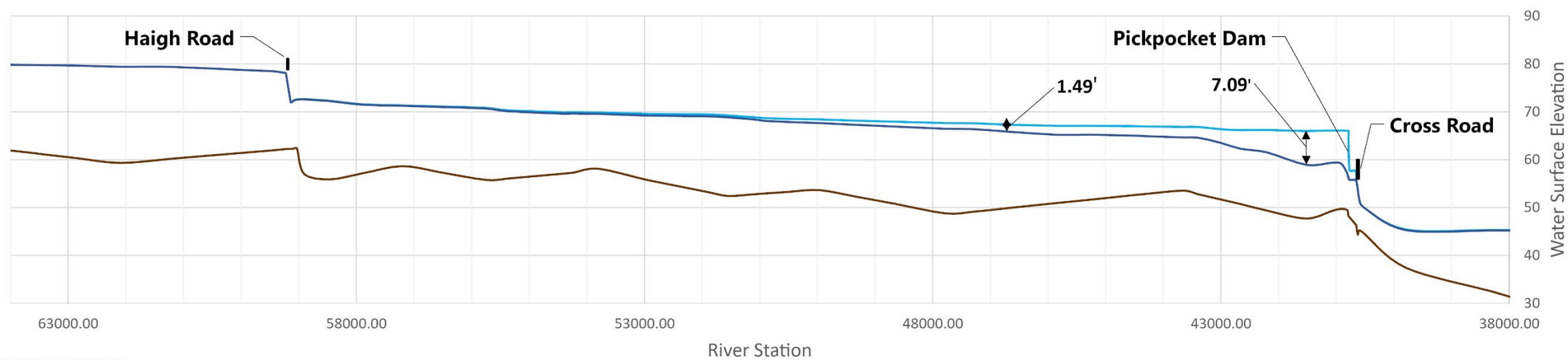


Figure 3.2-6: Alternative 4 - Dam Removal 100 Year Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire



100-Year Event - With Dam    100-Year Event - Without Dam    Exeter River Profile





# 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 EV-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

Figure 2: Sampling Plan

Pickpocket Dam | Brentwood and Exeter, New Hampshire

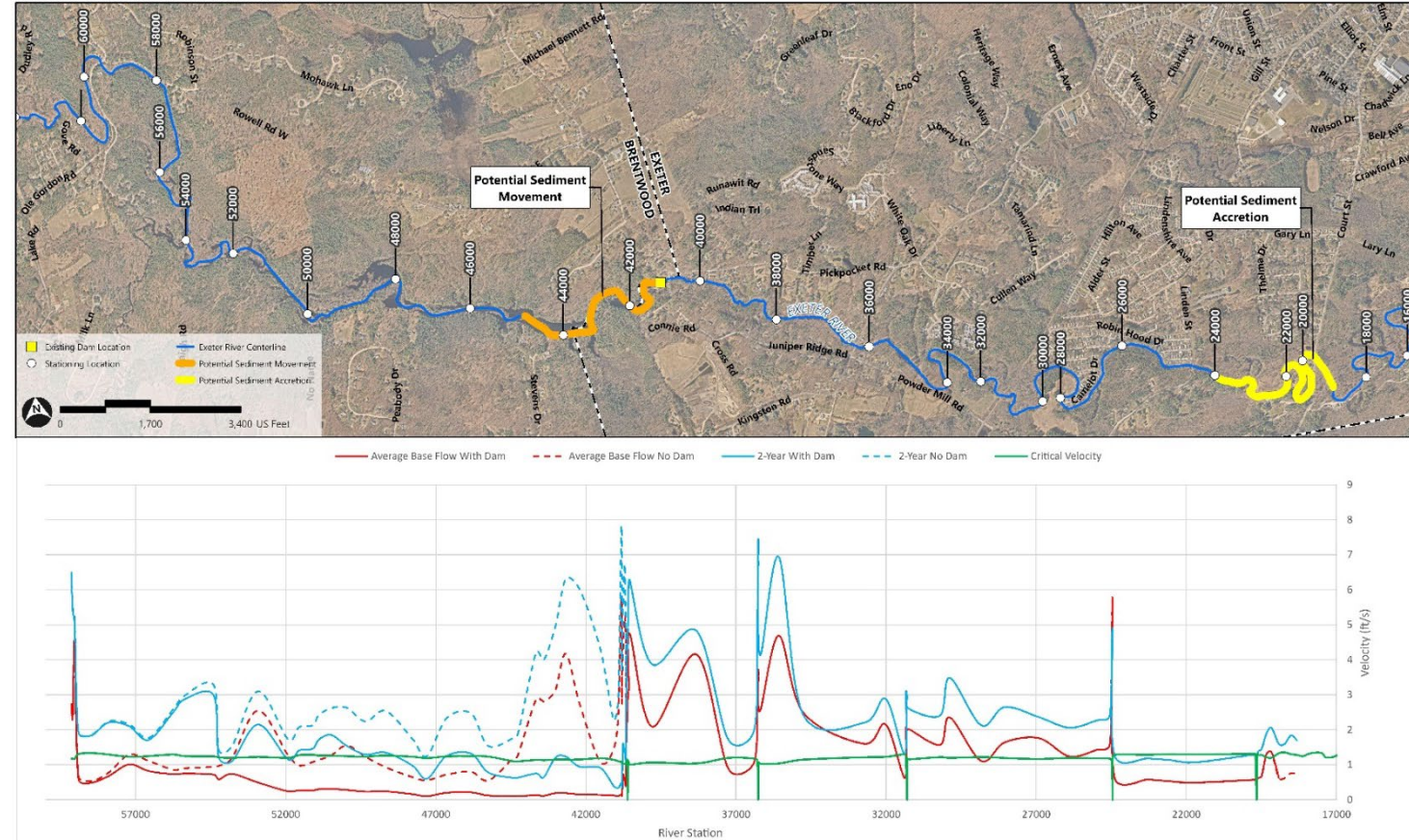




# Sediment Transport

- 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

Figure 3.2-8: Sediment Transport Analysis  
Pickpocket Dam | Brentwood and Exeter, New Hampshire

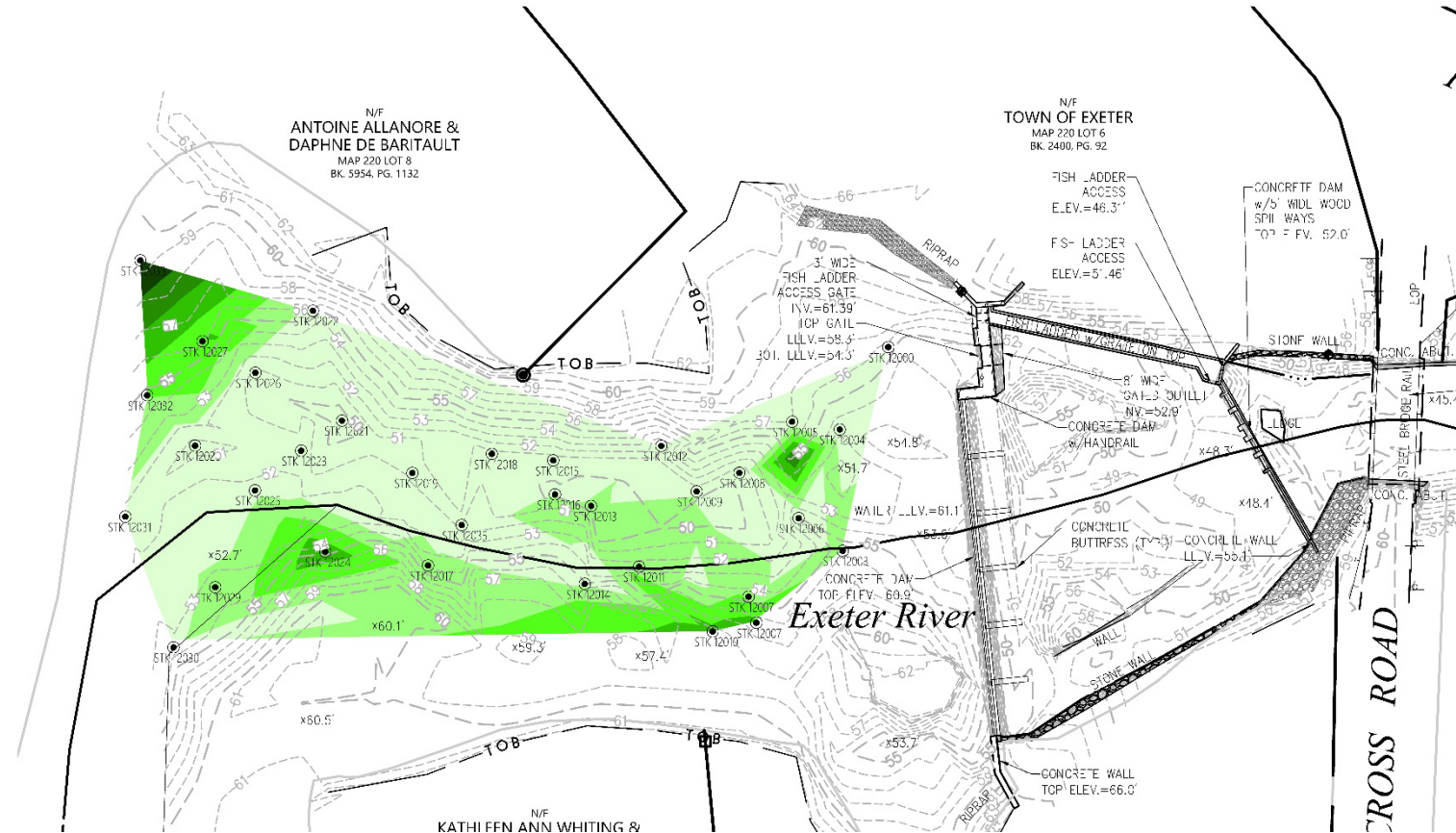




# Sediment Probing Results

- 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

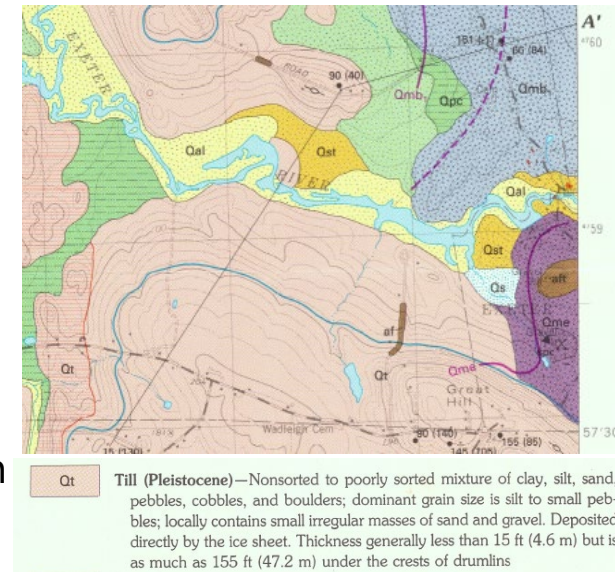
**Figure 3.2-9 - Silt Depth**  
Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire





# Infrastructure

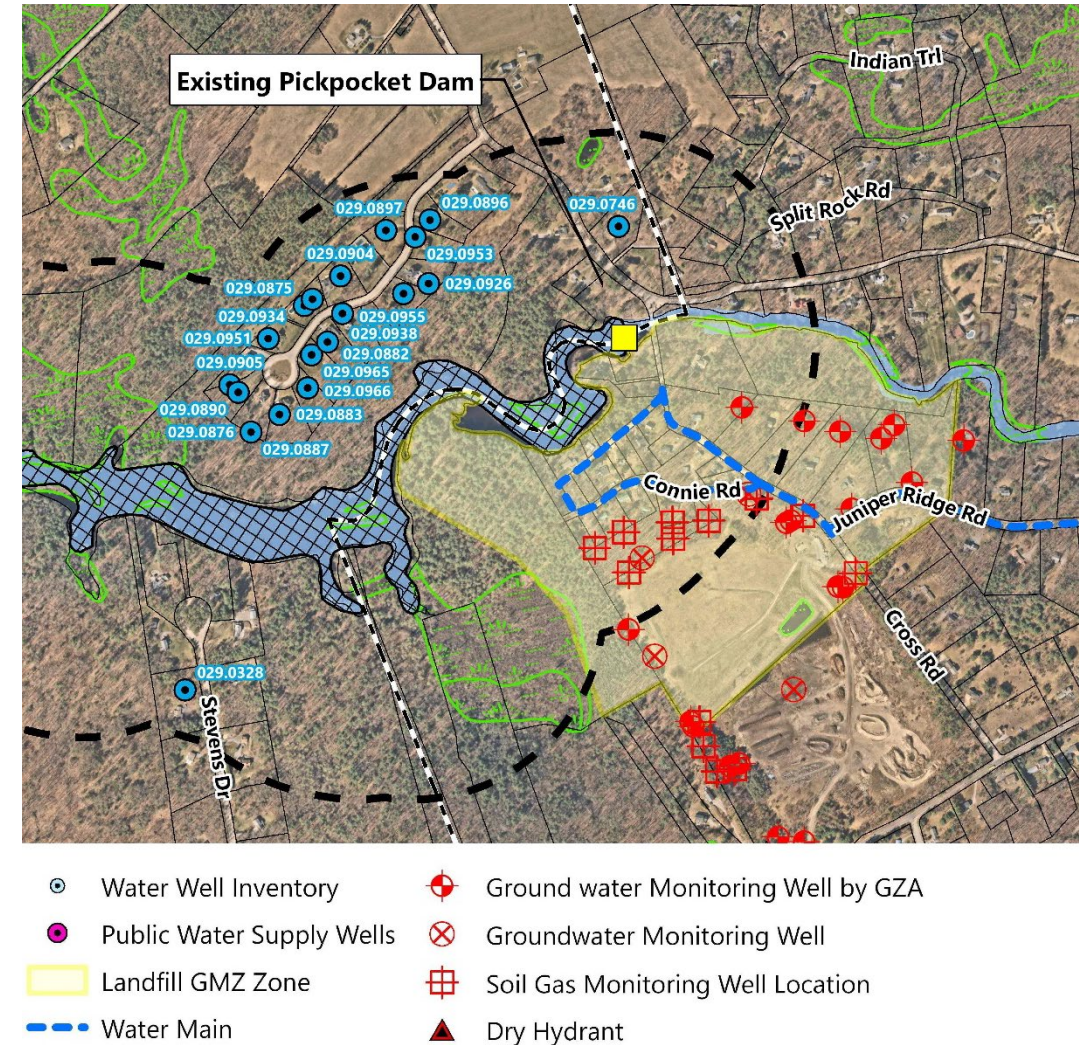
- Dam modification: Increase in flood levels during design discharge
- Dam removal:
  - Decreased flood levels
  - No impact to bridges
  - Results show small increase in velocity
    - Potential erosion will be mitigated
  - Induced Settlement
    - River drawdown resulting in groundwater changes
    - 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





# Water Supplies

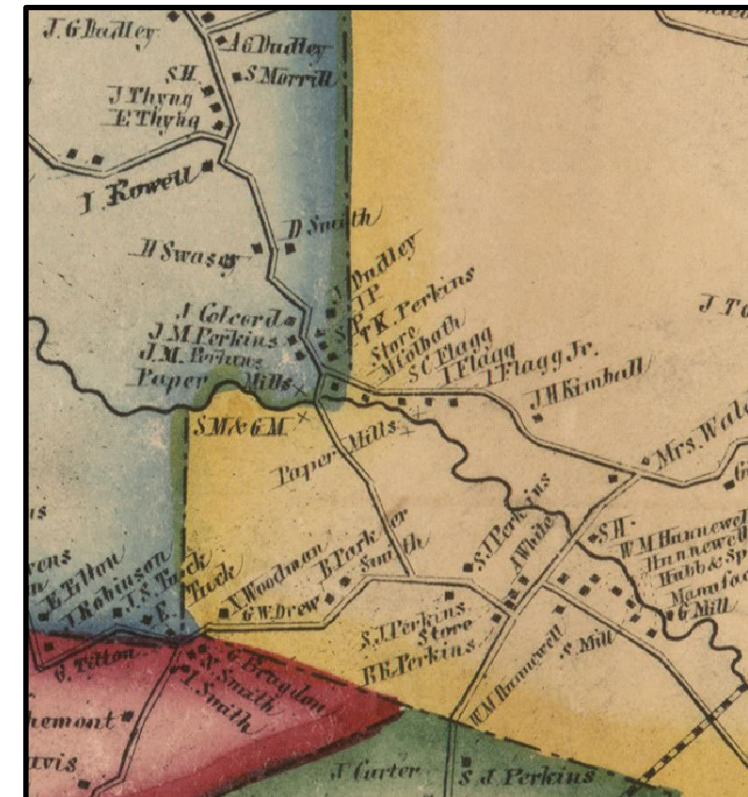
- Evaluated wells within 1000' buffer
- Impoundment not connected to deep bedrock aquifer
- Drinking water and geothermal wells rely on water from deep bedrock aquifer
  - No wells are installed in overburden aquifer
- Impoundment would drain too quickly to be used as a viable backup source of drinking water supply
- Cross Road Landfill groundwater contamination
  - Dam removal may steepen groundwater hydraulic gradient towards upstream of dam
  - No increase in overall landfill related contaminant loading to Exeter River





# Cultural Resources

- Various mill operations near Pickpocket Falls since mid-17<sup>th</sup> century
- Current dam: Construction 1920 and modified with fish ladder in 1969
- NH Division of Historical Resources determined that the Pickpocket Dam is Eligible for Listing on the National Register
- Identified two archaeologically sensitive areas that are sensitive for Pre-Contact Native American cultural deposits; Numerous Post-Contact sites also present
- “Adverse Effects” under both dam modification and removal
- Further review under Section 106 of the National Historic Preservation Act





# Water Quality

- Class B: Downstream segment Impaired for Aquatic Life designated used 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





# Fisheries & Fish Passage

- Diadromous fish species 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
  - Barrier removal and reshaped channel would improve fish passage conditions
  - Would reconnect 14.1 river miles of stream habitat
  - May 2024 Alewife reported at Pickpocket Ladder
- Dam Removal



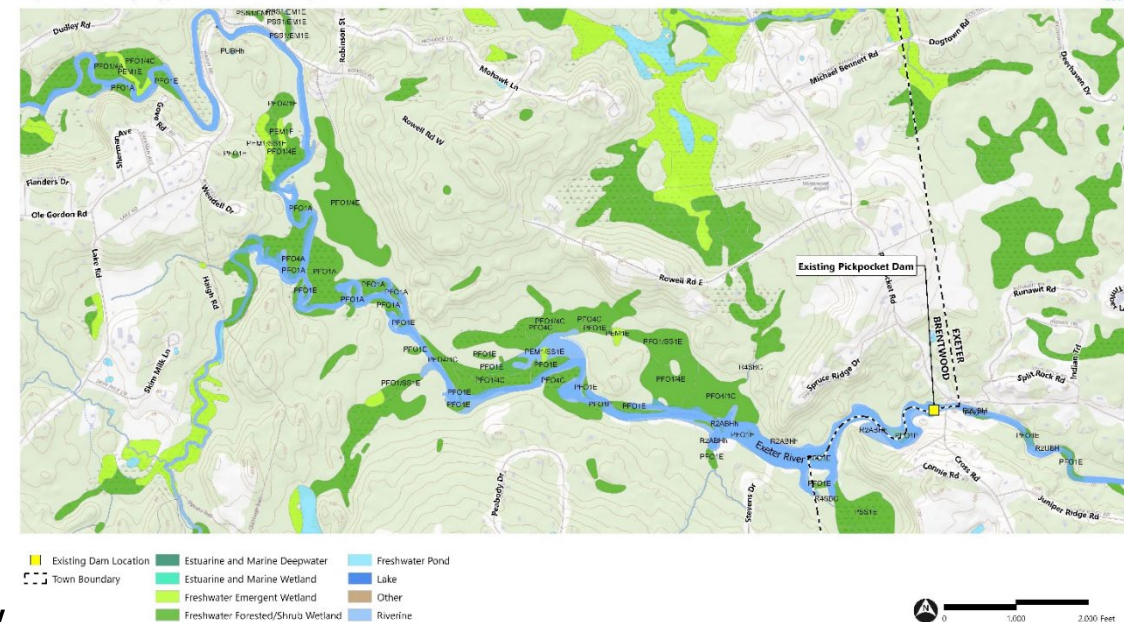


# Natural Resources

- 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

Figure 3.12-1: Wetlands

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire





# 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.

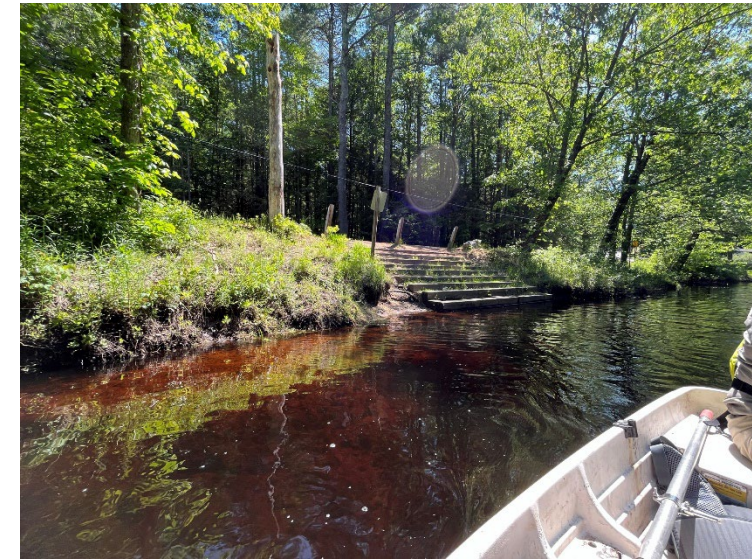
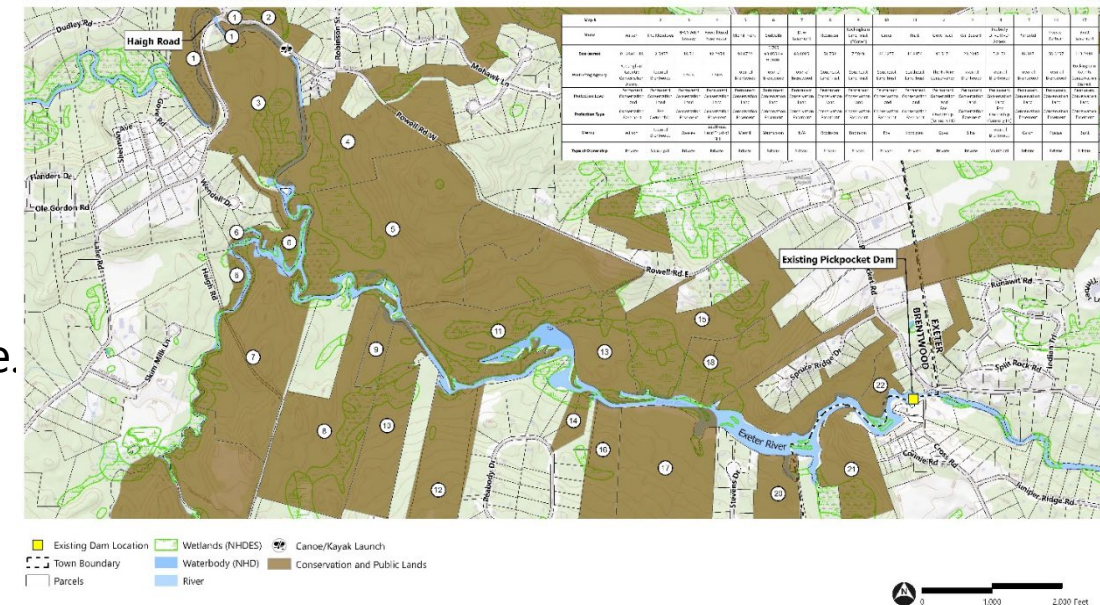


Figure 3.9-1: Recreational Resources in Study Area  
Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire





# Cost Analysis

	Alt 1: Raise Dam		Alt 2: Spillway Replacement - Labyrinth		Alt 3: Auxiliary Spillway		Alt 4: Dam Removal
	Current	Future	Current	Future	Current	Future	
<b>Initial Capital Cost</b>	\$2,090,200	\$2,365,200	\$7,132,600	\$7,410,900	\$2,153,300	\$2,252,200	\$1,468,000
<b>Capital Replacement Costs</b>	\$861,200	\$974,500	\$2,978,600	\$3,053,300	\$887,200	\$927,900	\$0
<b>Operations and Maintenance</b>	\$315,000	\$332,200	\$222,200	\$273,700	\$311,600	\$335,600	\$45,000
<b>Total Present Cost</b>	<b>\$3,266,400</b>	<b>\$3,671,900</b>	<b>\$10,293,500</b>	<b>\$10,737,900</b>	<b>\$3,352,100</b>	<b>\$3,515,700</b>	<b>\$1,513,000</b>





## Public Involvement and Permitting



# Public Involvement

Time	Item
<b>March 28, 2011</b>	Numerous presentations and discussions since receiving Letter of Deficiency from NHDES
<b>April 22, 2021</b>	Presentation on conceptual options to bring dam into compliance
<b>May 18, 2023</b>	Feasibility Study Update & NHDES Presentation on Dam Reclassification
<b>Sept 21, 2023</b>	Feasibility Study Update
<b>Oct 2, 2023</b>	Select Board Meeting: Feasibility Study Update & Review of NOAA Grant
<b>Nov 29, 2023</b>	Feasibility Study Update
<b>Feb 20, 2024</b>	Feasibility Study Draft Report available for 30-day public comment
<b>Feb 27, 2024</b>	Public Meeting: Presented on draft Feasibility Study & heard public comment & questions
<b>March 21, 2024</b>	Feasibility Study Update and Feasibility Study Public Comment Period Ends
<b>April 30, 2024</b>	Feasibility Study Completed
<b>May 9, 2024</b>	Feasibility Study Update



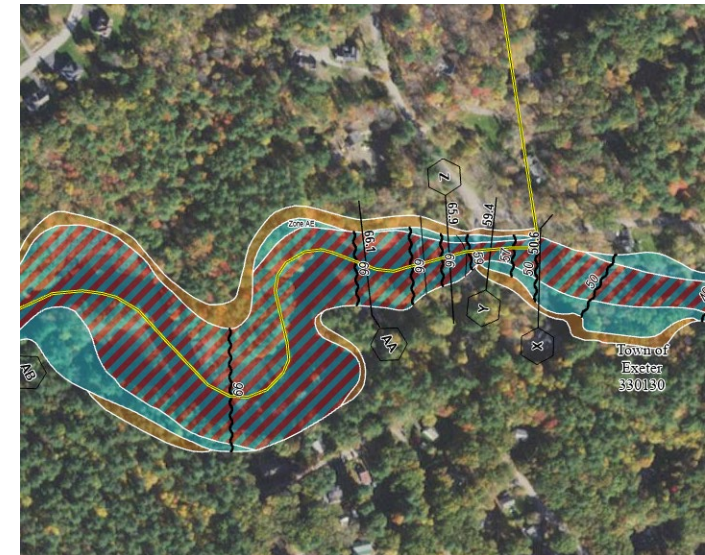
# Environmental Permitting

- **NHDES Wetlands Permit (NH RSA 482-A)**
  - Required for impacts below top of bank or within wetlands
  - Abutter notifications – Direct Abutters
  - Submissions through Exeter and Brentwood Town Clerks
  - Coordination:
    - NH Natural Heritage Bureau (T&E Plant Species)
    - NH Fish and Game (T&E Animal Species)
    - Conservation Commissions
    - Exeter-Squamscott River Local Advisory Committee
- **US Army Corps of Engineers (Section 404 Clean Water Act)**
  - Required for impacts below ordinary high water and within wetlands
  - Possibly authorized through the NH General Permit (NAE-2022-00849)
  - Coordination:
    - USFWS
    - NH State Historic Preservation Office (NHDHR)



# Additional Permitting

- **NHDES Water Quality Certification (CWA Section 401)**
  - Triggered by USACE Permit
- **NHDES – Shoreland Water Quality Protection Act (RSA 483-B)**
  - Upland construction, excavation, or filling activities within the 250 ft of river
  - Includes review of stormwater and clearing
- **NHDES - Alteration of Terrain (NH RSA 485-A:17)**
  - Project may qualify for a General Permit by Rule under Env-Wq 1503.03(g)
- **NHDES Dam Bureau Safety Review (RSA 482)**
  - Dam Modification: Env-Wr 400, RSA 482:9 and 482:29
  - Dam Removal Attachment to Wetlands Permit Application
- **FEMA - No Rise Certification**
  - Triggered by impacts to the regulatory floodway to verify the project would not raise base flood elevation





# Cultural Resources

- **Section 106 of the National Historic Preservation Act** of 1966 (NHPA):  
*Federal agencies must consider the effects on historic properties for projects they carry out, assist, fund, permit, license, or approve.*
- Assignment of a **Lead Federal Agency** – likely the Army Corps of Engineers
- **Process:**
  - **Initiate** via *Request for Project Review* to **NH Division of Historic Resources (SHPO)**
  - **Identify** Historic Properties (In Progress)
    - Pickpocket Dam is **Eligible for Listing** on the National Register of Historic Places
    - Phase IA Archaeological Study found two Sensitive Areas; Phase IB recommended
  - **Assess** Adverse Effects (Effect Memo)
  - **Resolve** Adverse Effects (Memorandum of Agreement with mitigation)
- **Consulting Parties** may include SHPO, Tribes, local agencies, community groups, and others.



# Public Comments and Responses



- Final Feasibility Study provides response to comments in Appendix H
  - Response to verbal comments grouped by subject to provide detailed response
  - Individual responses to written comments

## Response to Verbal Comments

The Town of Exeter welcomes and appreciates the active participation and valuable insights shared by the community-at-large through public comments. To address the wide range of verbal comments and concerns made at various public meetings, we have grouped similar comments and questions into several categories. Please note that a unified response has been provided for each category, capturing common concerns and ideas. This approach ensures that we comprehensively address all shared perspectives. Even though individual replies are not provided for the verbal comments, every comment has been thoroughly reviewed and is being taken into account in the Town's decision-making process. Additionally, some comments have also been submitted in writing. All written comments have specific written responses found in Appendix H of the final Pickpocket Dam Feasibility Study.

### 1) Why has there been a lack of communication, transparency, abutter notification and stakeholder coordination as part of the Feasibility Study? And why hasn't the Pickpocket Dam been awarded the same level of public involvement as the Great Dam?

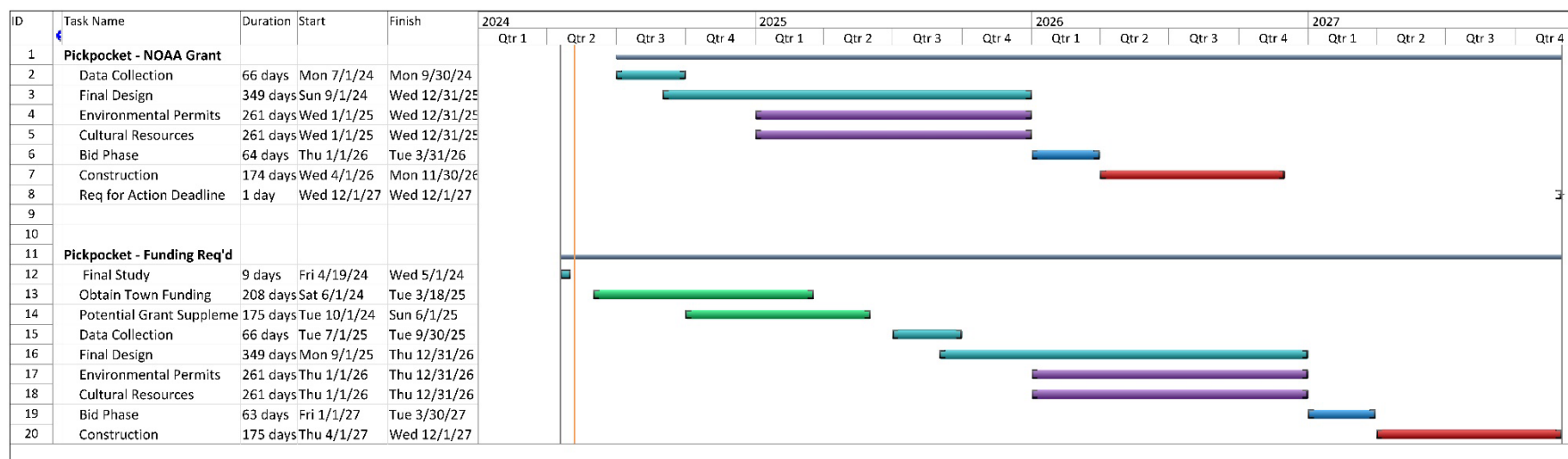
We acknowledge concerns regarding the project's schedule and perceived lack of transparency and communication regarding this project. The Town has been, and remains, committed to taking into account all public input as part of the feasibility study process to ultimately come into compliance the NHDES rules and regulations. To-date, all public meetings, presentations, and project documents specific to Pickpocket Dam have been made available on back to 2018. The Town will continue to post updates on its website.

Comment #	Date	Commenter	Comment	Response
C35.1	2/28/2024	Mark Rieder	I oppose the actions taken by the Town of Exeter Select Board, which allowed the River Advisory Committee (RAC) of the Town of Exeter to apply for a NOAA Grant to remove the Pickpocket Dam completely in order to improve fish passage on the Exeter River. The RAC did not engage or contact or inform stakeholders or property owners or the community about this NOAA grant, and applied for \$2MM to remove the dam entirely without talking with Exeter or Brentwood residents beforehand. This process of changing our town without engaging a full conversation on the impacts to the environment, the loss of this historical piece of Exeter, loss of recreational activity, the loss of wetlands, wildlife, and more is UNACCEPTABLE.	The geothermal wells based on the public records were evaluated and found to also be connected to the deep bedrock aquifer. The removal of the dam will not affect groundwater levels in the deep bedrock aquifer and therefore there will be no impact to the geothermal well water supply. Additionally, it was found that the geothermal systems are "open loop" and any water drawn from the aquifer is also injected back into the aquifer. A more detailed discussion of the impact of dam removal on water supplies is provided in Section 3.5 of the Feasibility Study.
C35.2	2/28/2024	Mark Rieder	The Exeter River has been a reservoir within Brentwood and Exeter for over 100 years. The Pickpocket Dam dates back to the 1600's and has been a low-risk dam until recently when the rainfall numbers changed due to the impact of climate change. The members of the Friends of Exeter River (which includes Brentwood residents) agree that this process needs to be SLOWED DOWN and reviewed with ALL stakeholders prior to any decisions being made on dam removal. After all, I believe the town line of Exeter and Brentwood runs down the middle of the existing dam, does it not?	Yes. As described in Section 3.13 of the Feasibility Study, the detailed design of the dam removal alternative would include seeding the newly exposed land with native and appropriate species for land located in both Towns. Additional measures at the dam site may also be considered. These measures will help to limit the spread of invasives into the newly exposed land. There is currently no plan to address invasive species for the dam modification alternatives.
C35.3	2/28/2024	Mark Edison	In October, the River Advisory Committee posted a long list of questions during its meeting – these questions were on a piece of paper that ran floor to ceiling practically, and yet none of these questions have been answered due to limited time and another group meeting which followed this RAC meeting (they "needed the room".) Why aren't there multiple meetings scheduled in the town hall as there were for the community impact discussions re: the Great Dam?	VHB performed an analysis of potential changes in river characteristics along the entire length of the river for each alternative identified in the Feasibility Study. This includes the section of the Exeter River along Stoney Water Road. The flow rates used to meet dam safety requirements, are different than what is used to evaluate erosion and sediment transport. It is industry standard to evaluate erosion and sediment transport for the bankfull flow, the 2-year storm is typically used as an approximation of bankfull flow and is used to estimate sediment transport as bankfull flow is considered to channel forming flow.
C35.4	2/29/2024	Robert Span	The Town of Exeter River Advisory Committee sought approval for the NOAA grant to have money in place to remove the structure BEFORE VHB of Bedford engineers had completed the study of the Pickpocket Dam, and whether it could be modified to meet state requirements OR whether the dam should be removed. There are FEMA grants available to modify and repair dams, vs. complete removal. This covert action on the part of the Town of Exeter is unfair to hundreds of taxpayers, abutters, and their friends and family who enjoy the river, the dam, and all that it brings to this community. No abutters to this day had been contacted by the Town of Exeter on this issue. I personally delivered notice to many abutters. The lack of transparency about the Pickpocket Dam is beyond reprehensible.	The Pickpocket Dam reduces water quality in the impoundment created by the dam. Impounded waters are typically prone to low DO conditions due to the oxygen demand caused by decomposition of organic material in the bottom waters. Additionally, impounded waters are warmer and therefore have lower DO saturation thresholds, with less opportunity for aeration and oxygen exchange in slow moving waters as compared to free-flowing waters with riffles. For example, with the reduced surface water size, decreased residence time and reduced solar



# Project Schedule & Funding

	Dam Removal NOAA Grant Successful	Dam Removal NOAA Grant Unsuccessful	Dam Modification
<b>Funding Secured</b>	Spring 2024	Spring 2025	Spring 2025
<b>Begin Design Phase</b>	Summer 2024	Summer 2025	Summer 2025
<b>Begin Permitting Phase</b>	Winter 2025	Winter 2026	Winter 2026
<b>Begin Construction</b>	Summer 2026	Summer 2027	Summer 2027
<b>Construction Complete</b>	Fall 2026	Fall 2027	Fall 2027







# Questions