



River Advisory Committee Pickpocket Dam Feasibility Study Update

Presented by
Jacob San Antonio

November 29, 2023



Project Funding



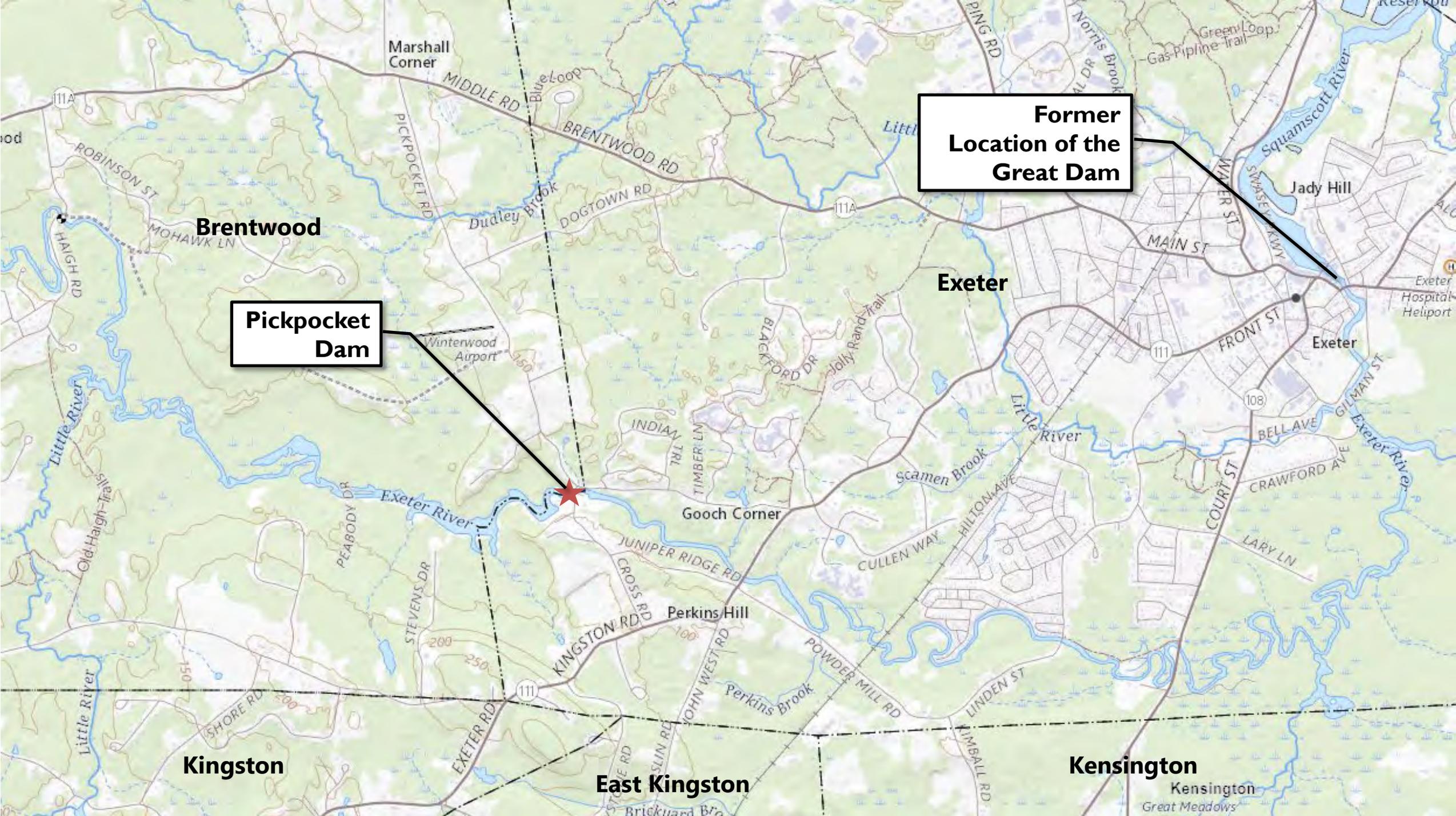
- NHDES & NOAA – New Hampshire Coastal Program – Coastal Resilience Grant
- NHDES – Clean Water State Revolving Fund – Planning Grant (ARPA Funds)

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.

Agenda

- Dam Overview
- Project Background
- Feasibility Study
 - Scope
 - Status
- NOAA Grant
 - Summary, Timeline, Project Design, Letters of Support
- Next Steps
- Questions





Pickpocket Dam

Former Location of the Great Dam

Brentwood

Exeter

Kingston

East Kingston

Kensington

Marshall Corner

MIDDLE RD

BRENTWOOD RD

DOG TOWN RD

Gooch Corner

Perkins Hill

Jady Hill

Exeter

Gooch Corner

Perkins Hill

Kensington
Great Meadows

EXETER RD

KINGSTON RD

Perkins Hill

POWDER MILL RD

LINDEN ST

COURT ST

CRAWFORD AVE

LARY LN

BELL AVE

GILMAN ST

FRONT ST

MAIN ST

WALTER ST

SWASEY AVE

GREEN LOOP

GAS PIPELINE TRAIL

NORTIS BROOK

PING RD

BLUE LOOP

DUDLEY BROOK

INDIAN TRAIL

TIMBER LN

BLACKFORD DR

JOLLY RAND TRAIL

SCAMEN BROOK

HILTON AVE

CULLEN WAY

JUNIPER RIDGE RD

CROSS RD

JOHN WEST RD

PERKINS BROOK

SHORE RD

PEABODY DR

STEVENS DR

WINTERWOOD AIRPORT

EXETER RIVER

LITTLE RIVER

ROBINSON ST

MOHAWK LN

HIGH RD

111A

108

150

200

250

300

400

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25500

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25700



Height – 15 Feet

Length – 230 Feet

Main Spillway Length – 130 Feet





Background

- March 2011 - NHDES issues Letter of Deficiency
 - June 2016 VHB under contract to conduct dam breach analysis
 - High Hazard: Showed impacts to first floor of one residential property with a foundation, and structural support for multiple mobile residential structures
 - Significant Hazard: Overtopping of Route 111 (Class II Roadway)
 - Analysis completed December 2016
- October 2017 - NHDES Provides Comments on Breach Analysis
 - Development of Emergency Action Plan, completed April 2020
 - Revised dam breach analysis submitted to NHDES January 2018
- March 2018 - Dam Bureau issues reclassification of Pickpocket Dam to High-Hazard
- July 2019 - Final Letter of Deficiency
 - June 1, 2022 - Application of plan to address dam deficiency
 - December 1, 2025 – Complete construction

Background

- April 2021 – Presented on preliminary investigation of rehabilitation alternatives
- Summer 2021 - Request for Action - Extension of time to develop rehabilitation alternatives
 - June 1, 2024 - Submit application to reconstruction the dam or a plan otherwise
 - December 1, 2027 - Complete Dam Modification
 - June 2021 Submitted Clean Water State Revolving Fund Grant Application
 - July 2021 Submitted Coastal Resilience Grant Application
- October 2022 – VHB under contract for Feasibility Study
- May 2023 – Update on Feasibility Study & NH Dam Bureau Presentation
- September 2023 - Update on Feasibility Study
 - Notification of NOAA's Restoring Fish Passage through Barrier Removal Grant
- October 2023 - Select Board Presentation

Feasibility Study Scope

Feasibility Study Scope	Funding Source
Task 1 - Data Collection 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	
Task 2 - Alternatives Identification and Conceptual Design 2.1 Alternatives Development 2.2 Cost Evaluations 2.3 Alternative Conceptual Sketches 2.4 Alternatives Screening	
Task 3 - Sediment Sampling 3.1 Sediment Sampling Plan 3.2 Sediment Evaluation 3.3 Sediment Transport Potential	
Task 4 - Hydrologic and Hydraulics Analysis 4.1 Hydrologic Study - Climate Change Evaluation 4.2 Hydraulic Study 4.3 Scour Analysis 4.4 FEMA Floodplain Analysis	
Task 5 - Cultural Resources 5.1 Request for Project Review 5.2 Additional Cultural Resource Studies	

Feasibility Study Scope	Funding Source
Task 6 - Impact Analysis 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	
Task 7 - Feasibility and Impact Analysis Report 7.1 Draft Report 7.1 Final Report 7.2 Alternatives Summary Table 7.3 Progress Reports	
Task 8 - Project Management and Coordination Meetings 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

Feasibility Study Schedule

		Partially Funded	2022		2023												2024					
			Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
			Task 1	Data Collection & Survey	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 2	Alternatives Identification and Conceptual Design	■	■																			
Task 3	Sediment Sampling	■																				
Task 4	Hydrologic and Hydraulic Analysis	■																				
Task 5	Cultural Resources																					
Task 6	Impact Analysis		■																			
Task 7	Feasibility and Impact Analysis Report	■	■							①												
Task 8	Project Management	■	■	■	★	■	■	■	■	★	■	■	■	■	■	■	■	■	■	■	■	■

June 1, 2024 - Submit application to reconstruction the dam or a plan otherwise.

December 1, 2027 - Complete Dam Modification

- Coastal Resilience Grant ■
- Stormwater Planning Grant ■
- Meetings ★
- Consultant Update ①
- Draft Final Report ②

Feasibility Study Status

- Data Collection and Survey - Completed
- Alternatives Identification and Conceptual Design - Underway
- Sediment Sampling - Completed
- Hydrology and Hydraulics Analysis - Underway
- Cultural Resources - Underway
- Impact Analysis - Underway
- Feasibility and Impact Analysis Report - Underway



Sediment Sampling Plan

- Purpose to determine proper sediment management protocols and assess the potential for adverse effects downstream
- Due Diligence Review
- 5 Sediment Sample locations

Table 2 Proposed Supplemental Sediment Sampling Scheme

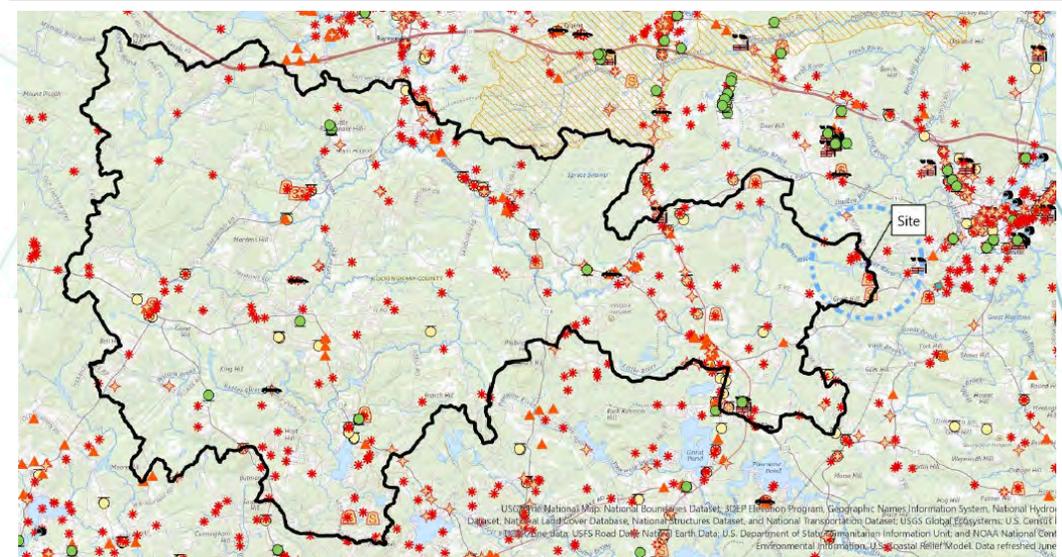
Sample ID(s)	Sample Location Description	Grain Size Analysis	Chemical Analysis	Rationale
SED-1	Upstream of Pickpocket Dam	1	1	Evaluate existing conditions upstream
SED-2 ¹				
SED-2MS; SED-2MSD; SED-2FD	Upstream of Pickpocket Dam	1	4 ²	Evaluate existing conditions upstream
SED-3 A-E SED-4 A-E	Downstream of Pickpocket Dam	2	2	Evaluate current downstream conditions
SED-5	Further upstream of Pickpocket Dam	1	1	Confirm sediment condition near previous 1,4-dioxane detection in surface water
EB-1 ²	Equipment blank	0	1	Equipment blank.
	Total:	5	9	

Notes:

- > VOCs including 1,4-Dioxane and MTBE via EPA method 8260
- > Priority Pollutant 13 (PP-13) metals
- > Iron
- > Manganese
- > Chloride
- > TKN
- > Polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270
- > Organochlorine pesticides by EPA method 8081
- > Polychlorinated biphenyl (PCBs) by EPA method 8082

Table 1 Summary of Environmental Database Search Results

Type of Site	No. of Sites Located within the Dam Watershed
Aboveground Storage Tank (AST) Sites	12
Underground Storage Tank (UST) Sites	44
Remediation Sites	193
Hazardous Waste Generators	36
Solid Waste Facilities	16
NPDES Outfalls	0
Local Potential Contamination Sites	25
TOTAL:	326

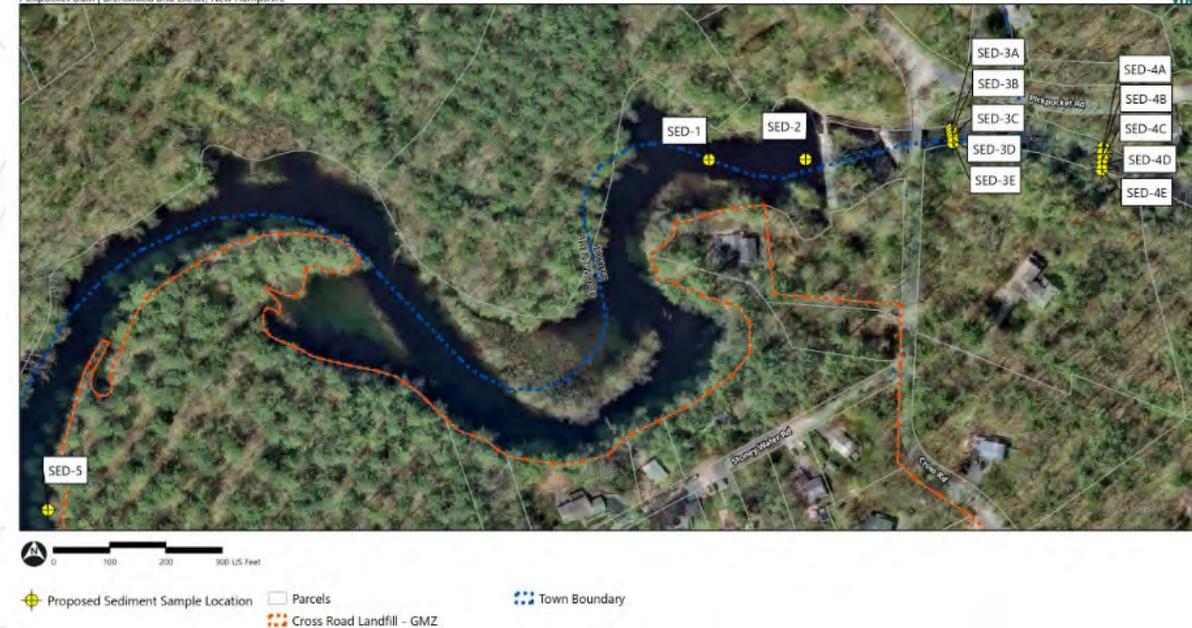


Sediment Sampling Results

- 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

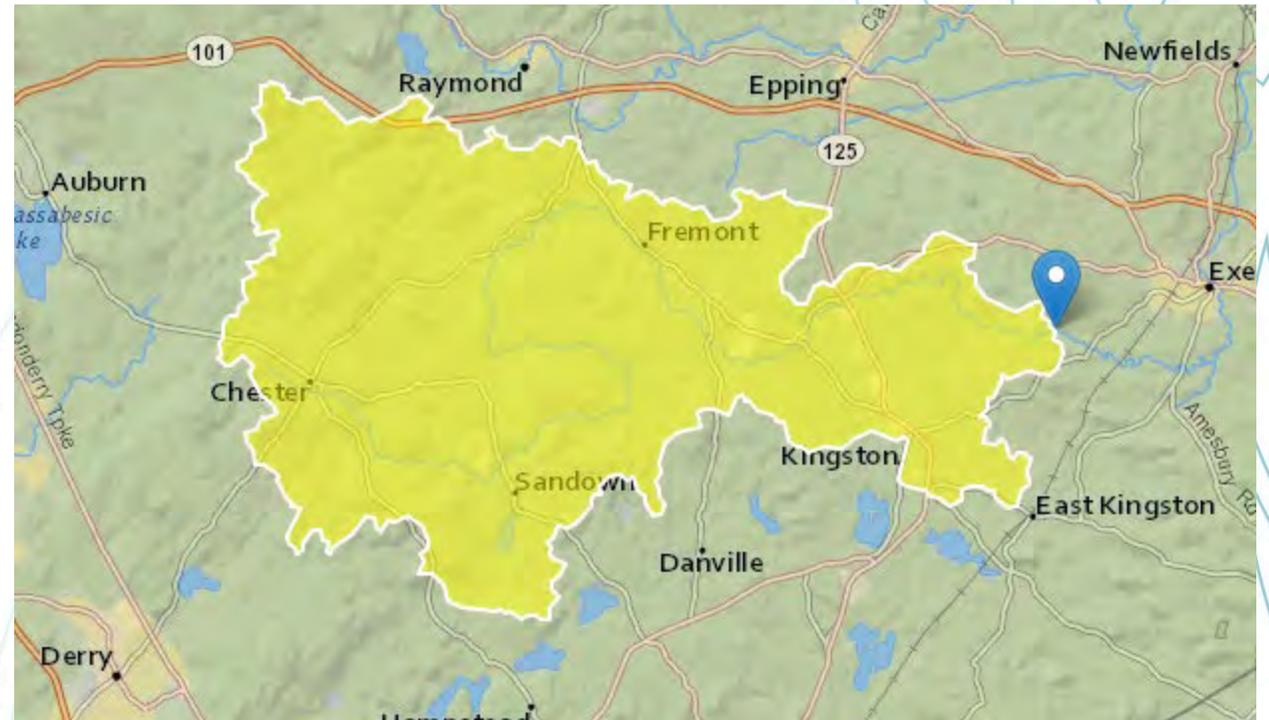


Hydrologic and Hydraulic Analysis

- Hydrologic Analysis - New Hampshire Coastal Flood Risk Summary
 - Current Day Design Flood – 2.5 x 100 Year
 - 100 Year – 3,980 cfs
 - 3,980 cfs x 2.5 = 10,000 cfs
 - Evaluated Climate Change – 15% Increase
 - 100 Year – 5,940 cfs
 - 5,940 cfs x 2.5 = 14,900 cfs
 - 49% Increase of Design Flood

STEP 6 TABLE. APPROACH FOR CALCULATING PROJECTED EXTREME PRECIPITATION ESTIMATES BASED ON TOLERANCE FOR FLOOD RISK.

	HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
PROJECTED EXTREME PRECIPITATION ESTIMATE =	(Best available precipitation data) x (1.15)		(Best available precipitation data) x (>1.15)	



Alternatives Development

- Dam Stabilization (stabilize abutments, rock anchors, overbank armoring, etc.)
- Dam Modification (partial removal, lowering spillway)
- Dam Modification (spillway extension/Raising abutments)
- Dam Reclassification (purchase downstream affected properties)
- Dam Removal and River Restoration



Preliminary Investigation Dam Modification Alternatives

Existing Conditions

Alt 1: Increase abutment height to pass the design storm

Alt 1a: Remove sediment island + above alterations

Alt 2: Add a second abutment to pass the design storm.

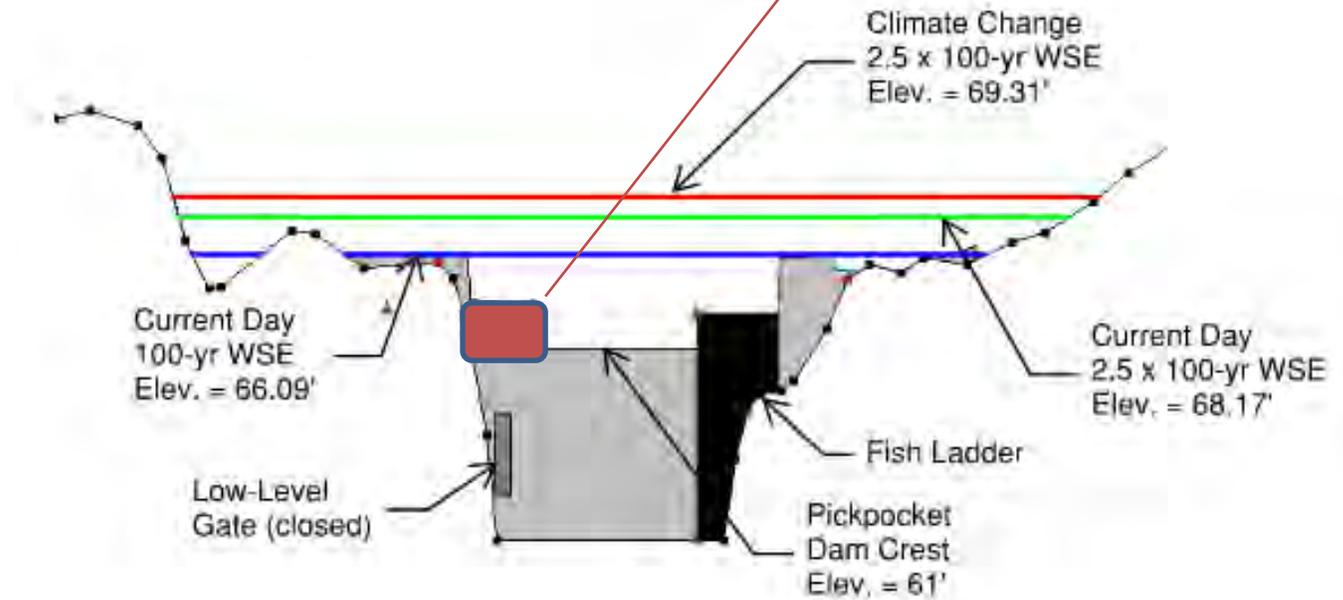
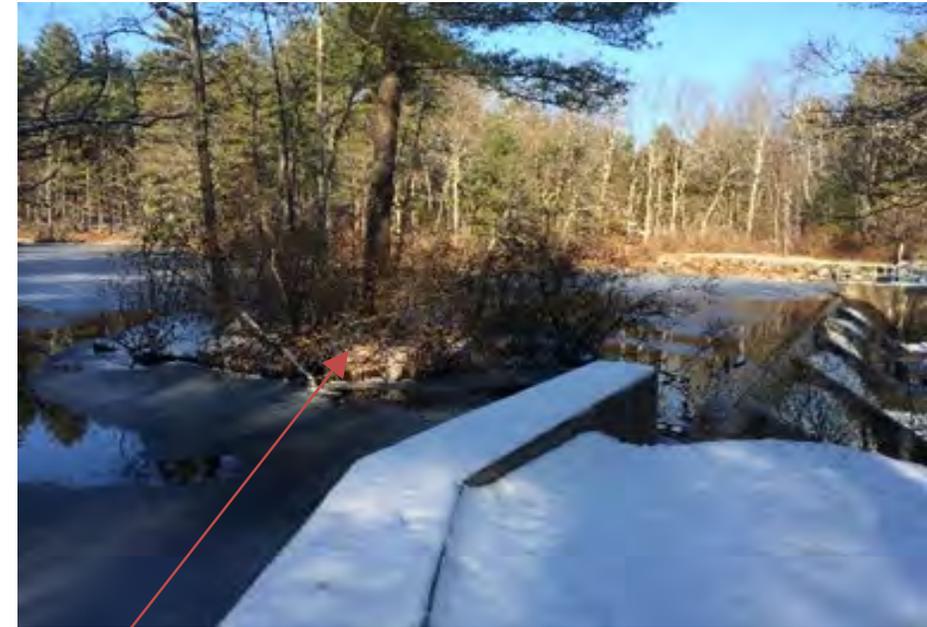
Alt 2a: Remove sediment island + above alterations

Alt 3: Remove the dam & fish weir



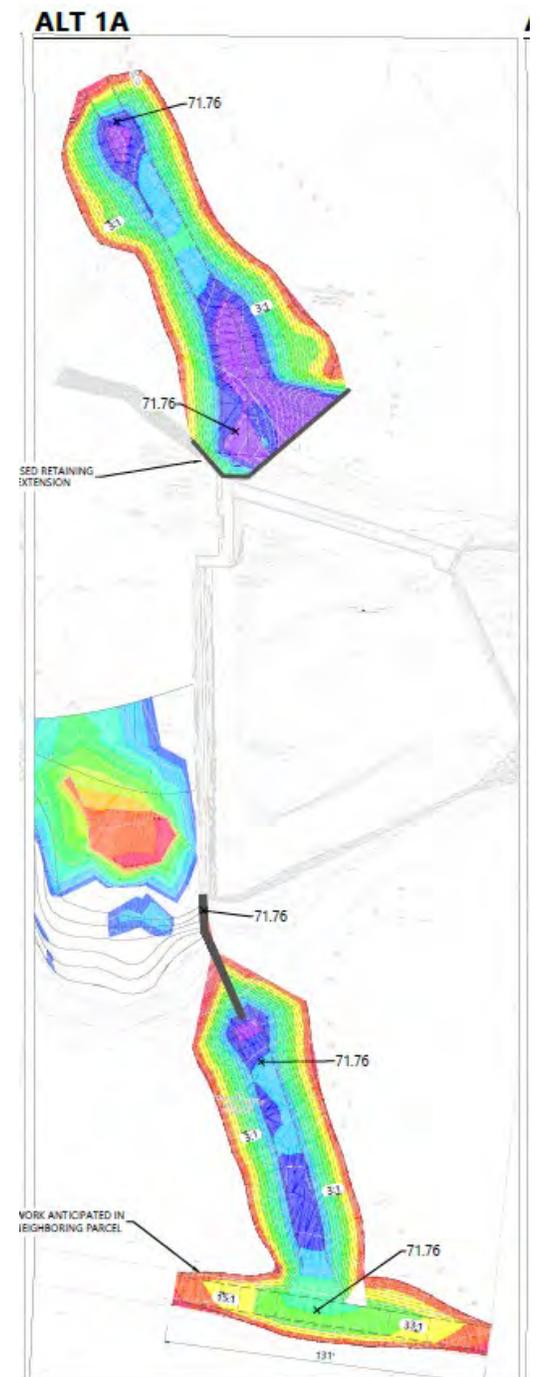
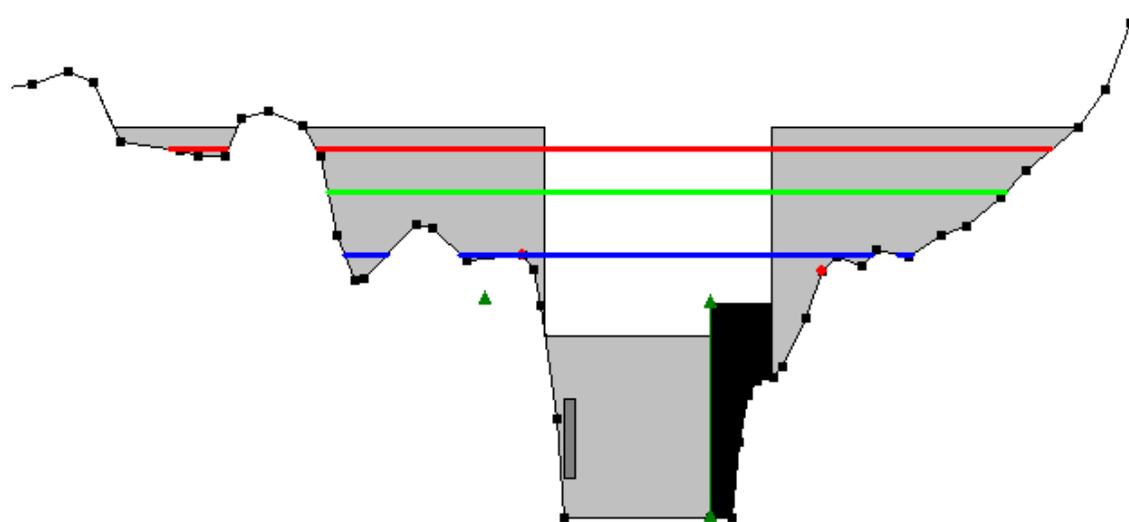
Existing Conditions

- Existing Abutment Elevation: 66.00
- Current dam consists of a crest, abutment, fish weir and ladder
- Portion of existing crest is obstructed by a sediment island



Alt 1A: Increase Abutment Height, and Remove Sediment Island

- Regulatory – Minimum Abutment Elevation: 69.33' (+**3.33**)
- Climate Change - Minimum Abutment Elevation: 71.76' (+**5.76**)
- Creates a decrease in the 100-yr flood elevation (-0.35)
- No change to crest elevation
- Impacts two abutting parcels, Requires raising driveway 0.6' R(3.1' CC)





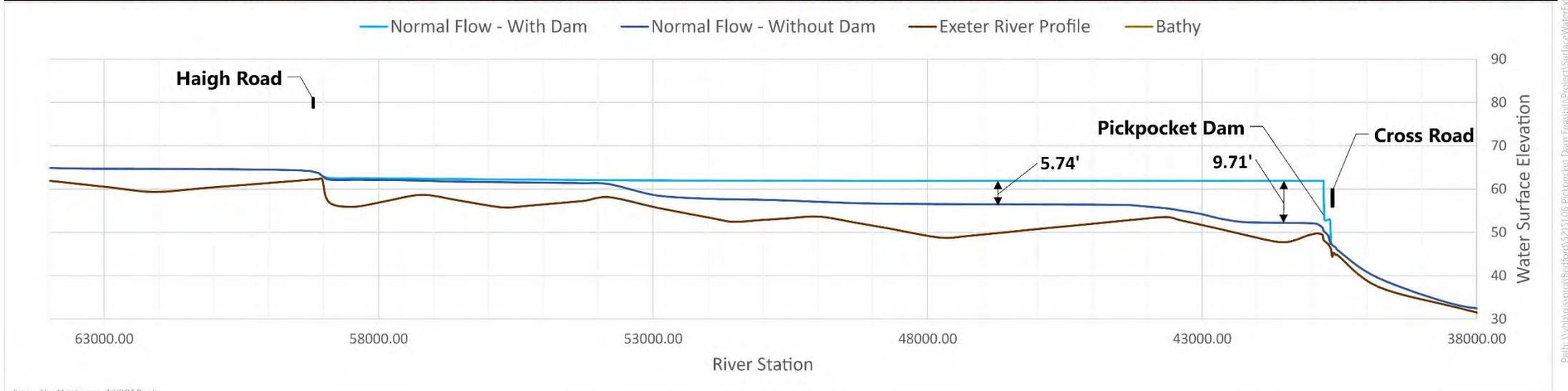
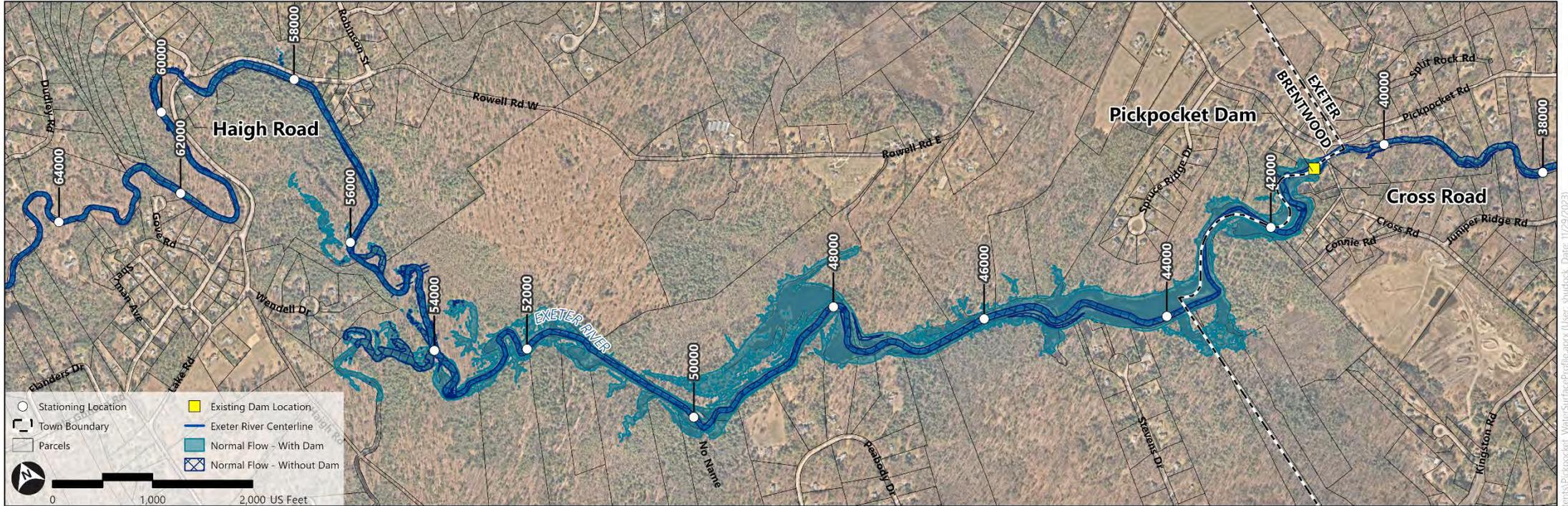
Summary of Dam Alternatives

- Alternatives 1, 1A, 2, 2A result in impacts to the abutting properties and raising driveway of southern residence

Alternative Description	Alternative	Regulatory Increase in Abutment Height (ft)	Climate Change Increase in Abutment Height (ft)	100-Yr Flood Elevation Change (ft)
Increase Abutment Height	Alt 1	+3.96	+6.27	+0.16
Increase Abutment Height and Remove Sediment Island	Alt 1A	+3.33	+5.76	-0.35
Add Second Abutment	Alt 2	+3.24	+5.17	+0.13
Add Second Abutment and Remove Sediment Island	Alt 2A	+2.85	+4.76	-0.35
Dam Removal	Alt 3			-7.87

Figure 1: Normal Flow Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire

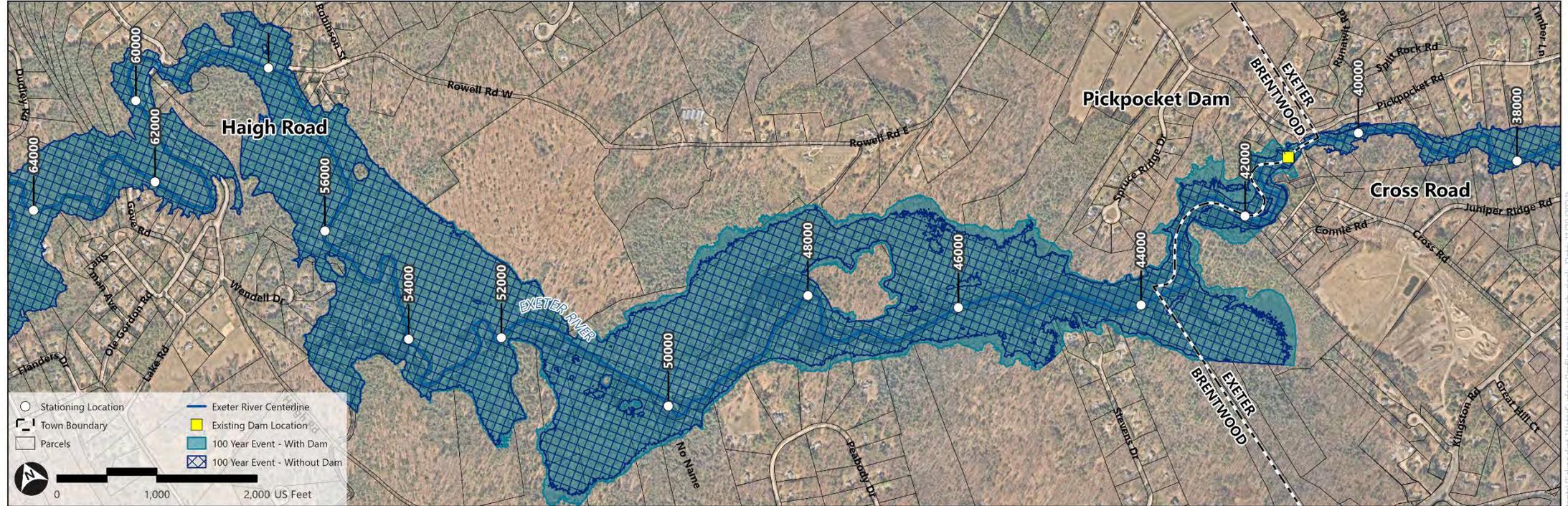


Source: NearMap Imagery; NHDOT Roads

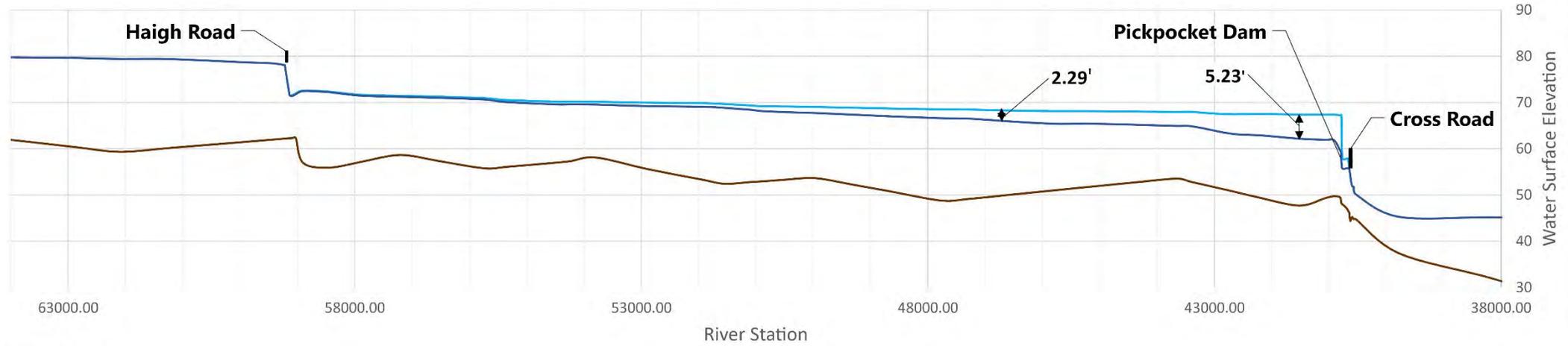
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Figure 2: 100 Year Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire



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

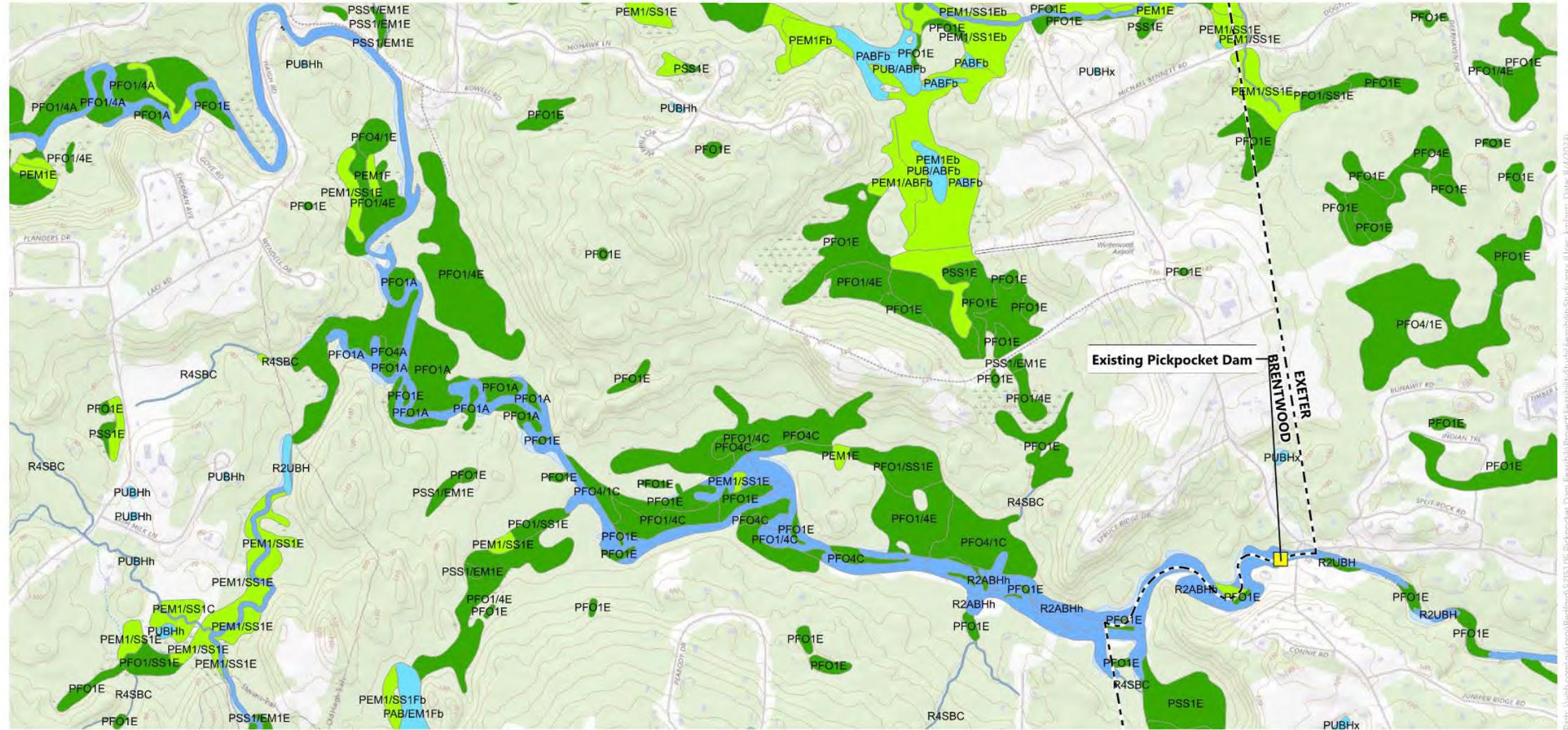


Source: NearMap Imagery, NHDOT Roads

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Figure 5: NWI Wetlands Map

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



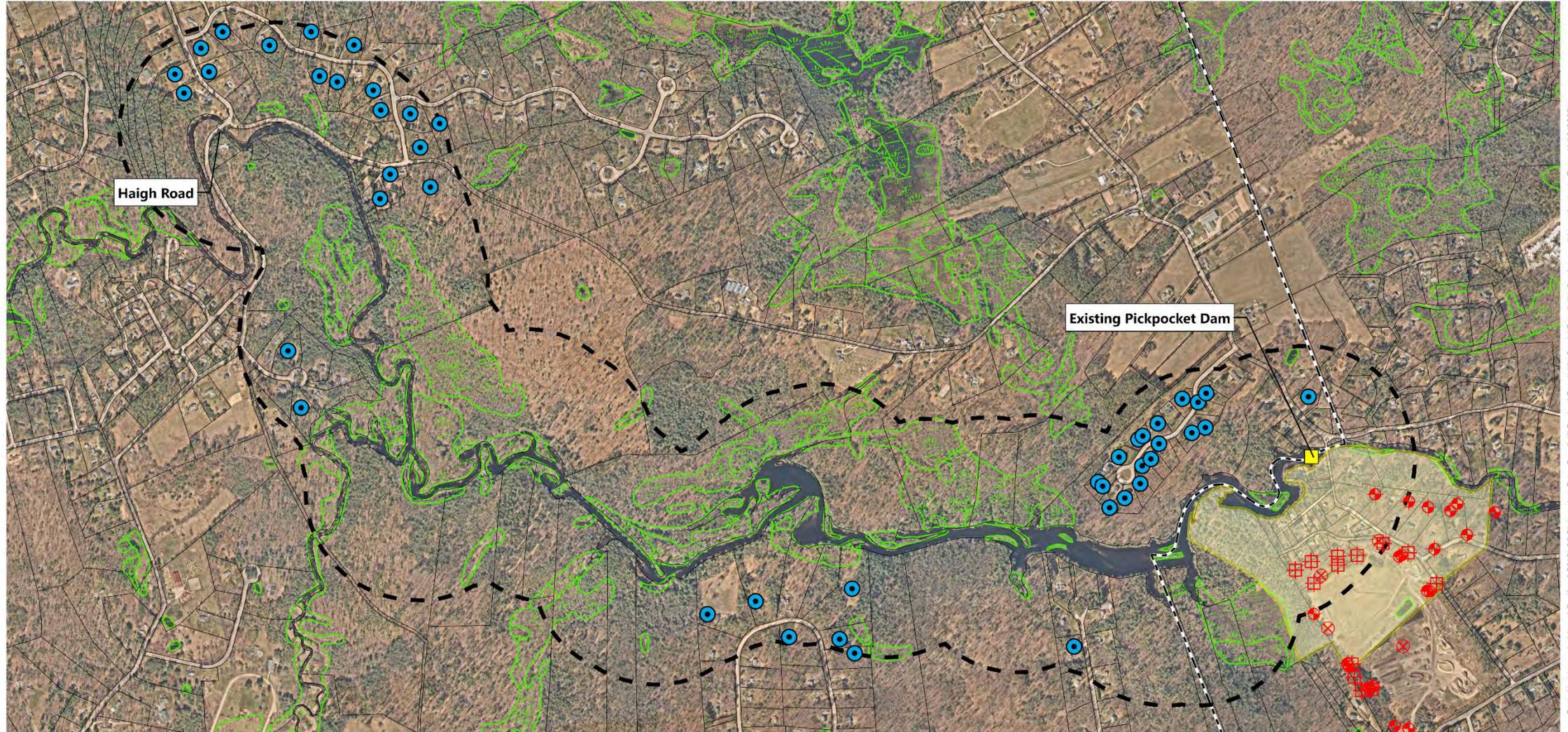
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- | | | |
|-----------------------|-----------------------------------|-----------------|
| Existing Dam Location | Estuarine and Marine Deepwater | Freshwater Pond |
| Town Boundary | Estuarine and Marine Wetland | Lake |
| | Freshwater Emergent Wetland | Other |
| | Freshwater Forested/Shrub Wetland | Riverine |

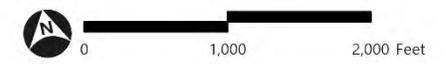


Figure 6: Well Analysis - Aerial Map

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



- Existing Dam Location
- Water Well Inventory
- + Ground water Monitoring Well by GZA
- Wetlands (NHDES)
- Well Analysis Study Area
- Public Water Supply Wells
- X Groundwater Monitoring Well
- Town Boundary
- Landfill GMZ Zone
- + Soil Gas Monitoring Well Location
- Parcels



Source: VHB, NHGRANT, NearMap

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NOAA Fisheries Grant



Restoring Fish Passage through Barrier Removal

Opportunity Number: NOAA-NMFS-HCPO-2023-2008056

- **Objective:** To support **fish passage** for native migratory and **sea-run fish in coastal ecosystems**, including the Great Lakes. Projects selected through this funding opportunity will result in the **removal of dams** and other in-stream barriers to fish passage. Target fish species under this funding opportunity are those native species that spend a portion of their lives in **rivers** and/or ponds and a portion in the **ocean**, estuaries or Great Lakes.
- **Additional emphasis:** Proposals that address community resilience
- **Eligibility:** institutions of higher education; non-profit and for-profit organizations; U.S. territories; and state, **local**, and Native American tribal governments.
- There is **no** non-federal matching or cost-sharing **requirement** for these funding opportunities.
- Applicants should anticipate the earliest start date for awards will be **July 1, 2024**.

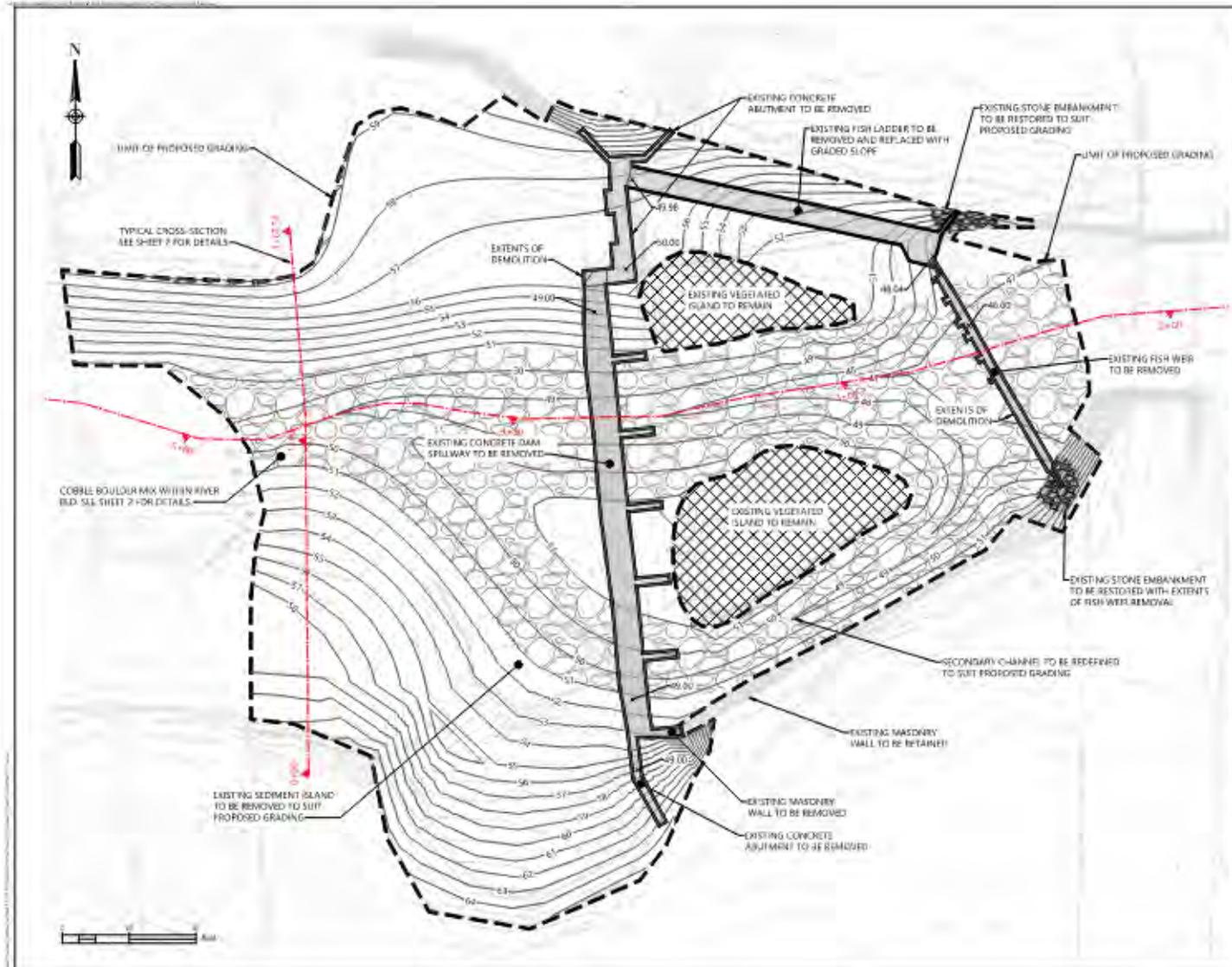
Competition	Anticipated Funding Level	Range of Funding
National Fish Passage	up to \$175M	<u>will not</u> accept proposals with a federal request for less than \$1M or more than \$20M over the award period, per proposal.

Grant Application Summary

Project Goals

- Advanced restoration efforts for diadromous fish populations by eliminating a barrier to upstream fish passage.
 - Pickpocket Dam is last barrier on the Exeter River within Exeter
- Improve the Exeter River's declining water quality and strengthen the Exeter River's natural ecosystem.
 - Dam removal has been identified as the most effective restoration method to restore aquatic species and habitat in the Pickpocket Dam impoundment.
- Increase the Exeter River's flood resilience and reduce vulnerability to the growing risk of fluvial flooding.
 - Lower the mapped FEMA Base Flood Elevations upstream of the dam by as much as 8-feet, tapering to no change approximately 4-miles upstream
- Increase public safety by eliminating unsafe dam infrastructure.

Project Design



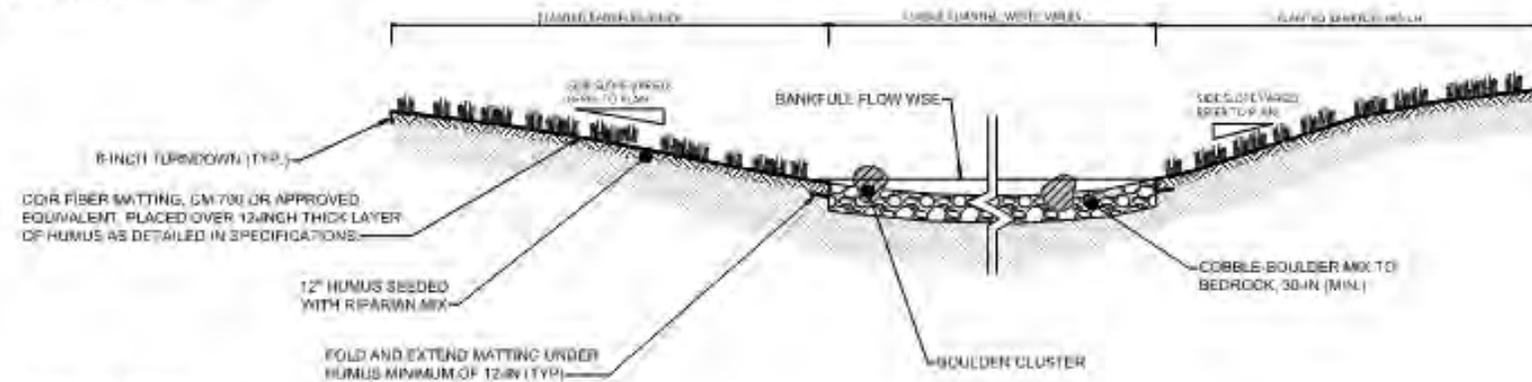
**PICKPOCKET DAM
REMOVAL**
SHEET 1 - PLAN

1" = 100'
DATE: 11/11/11

Typical Cross Section & Profile

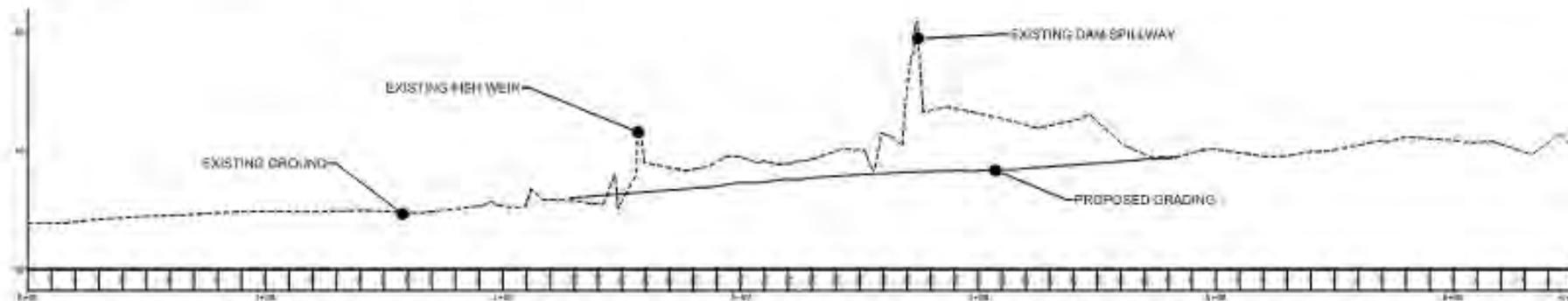
TYPICAL CROSS-SECTION

SCALE 1" = 5'



LONG-SECTION

SCALE 1" = 20'



Letters of Support



NHDES Dam Removal and River Restoration Program

“Removal of the dam will restore aquatic connectivity to an additional 6.2 mainstem river miles and 7.9 miles of tributaries adding to the restoration success already achieved from the removal of Exeter’s Great Dam in 2016. ”



Town of Exeter Conservation Commission

“...the presence of the Pickpocket Dam still serves as a barrier to fish and a negative influence on water quality within the Exeter river.”



NHDES Watershed Assistance Section and Clean Water State Revolving Fund Loan Program

“This project is another great example of collaboration with the multitude of local, state, and federal agencies to work collectively to meet a common environmental goal.”



NHDES Coastal Program (NHCP)

“If funded, this project will greatly benefit ongoing efforts to restore diadromous fish and improve water quality in the Great Bay Watershed, as well as reduce flood hazards in the Exeter community.”



Town of Exeter River Advisory Committee

“I am hopefully that even more Alewife fish will be able to spawn with this additional Pickpocket barrier removed.”

Letters of Support



Central New England Fish and Wildlife Conservation Office (FWCO)

"This project will support efforts to restore fish passage already made by NOAA with the removal of the Great Dam in 2016."



NH Fish and Game Department (NHFGD)

"While the NHFGD owns the associated fish ladder and weir and expends much time and money to assure fish passage is available for diadromous and resident fish species we are more interested in improving riverine processes, connectivity, and habitat for fish and wildlife."



Piscataqua Region Estuaries Partnership (PREP)

"A major head-of-tide dam, the Great Dam was successfully removed in 2016. Since then, migratory river herring, blueback herring (*Clupea aestivalis*) and alewife (*Clupea pseudoharengus*), have responded dramatically, with 2021 and 2022 having subsequent years of the highest returns ever recorded on the Exeter River since counts began in the 1970s."



The Nature Conservancy

"Removing the Pickpocket dam combined with a history of efforts to restore the ecological integrity of the Exeter River will increase resilience within the river and for the communities that live in and depend on a healthy Exeter River Watershed."



Town of Exeter Select Board

"The Select Board unanimously supports the removal of Pickpocket Dam, as the Town has successfully removed other dams in the plans. "

Timeline

	2024		2025				2026				2027				2028				2029			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Data Collection	█																					
Engineering Design, Permitting & Cultural Resources	█	█	█	█	█	█																
Bid Phase						█	█															
Construction Phase & Adaptive Management							█	█	█			█										
FEMA LOMR & Post Construction Monitoring									█	█	█	█					█					█

Next Steps

- Finalize alternatives with dam inspection now completed
- Finalize hydraulic analysis
- Cultural Resources - Underway
- Impact Analysis - Underway
- Feasibility and Impact Analysis Report – Draft due January 2024
- Public Meeting early February
- Final Report due April 2024
- NOAA Grant response anticipated March 2024, earliest funding July 2024

Task 6 - Impact Analysis

- 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

Discussion

