Pickpocket Dam Feasibility Study Public Meeting

February 27, 2024

Agenda

Time	Item	Presenter
7:00	Welcome and Introductions	Theresa Walker Rockingham Planning Commission Planning Consultant & Exeter-Squamscott River Local Advisory Committee
7:05	Meeting Goals & Participant Roles	Theresa Walker
7:10	Exeter's Approach to the Study	Paul Vlasich, PE Town Engineer & Project Manager
7:20	Presentation: Project Background & Study Findings	Jacob San Antonio Chief Engineer, VHB
8:00	Presentation: Next Steps	Paul Vlasich, PE Town Engineer and Project Manager
8:10	Public Comments & Questions	Public, Town Officials, Agencies, Consultant Facilitated by Theresa Walker
9:30	ADJOURN	

Meeting Objectives & Participant Roles

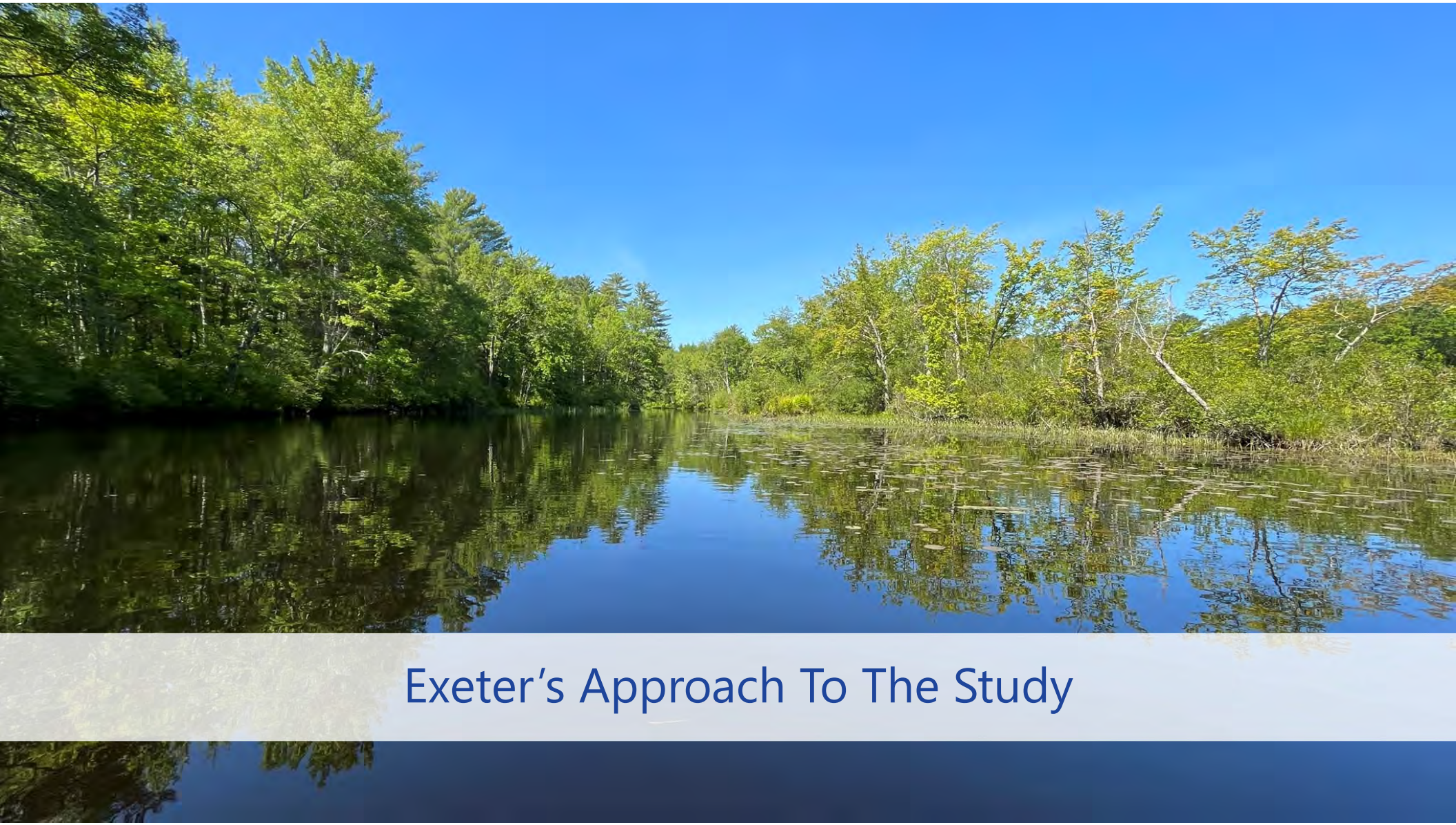
Meeting Objectives

- Review the study findings regarding the potential modification or removal of Pickpocket Dam
- Questions and comments will be taken at the end of the presentation
  - Public comment period closes March 21st
  - Forms are provided for written comment as an alternative to verbal comment
  - Comments can also be submitted via email to pickpocketdam@exeternh.gov
- Present the immediate next steps and process for making a decision
- Solicit questions and comments from the public

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."



Exeter's Approach To The Study

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 Pre-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

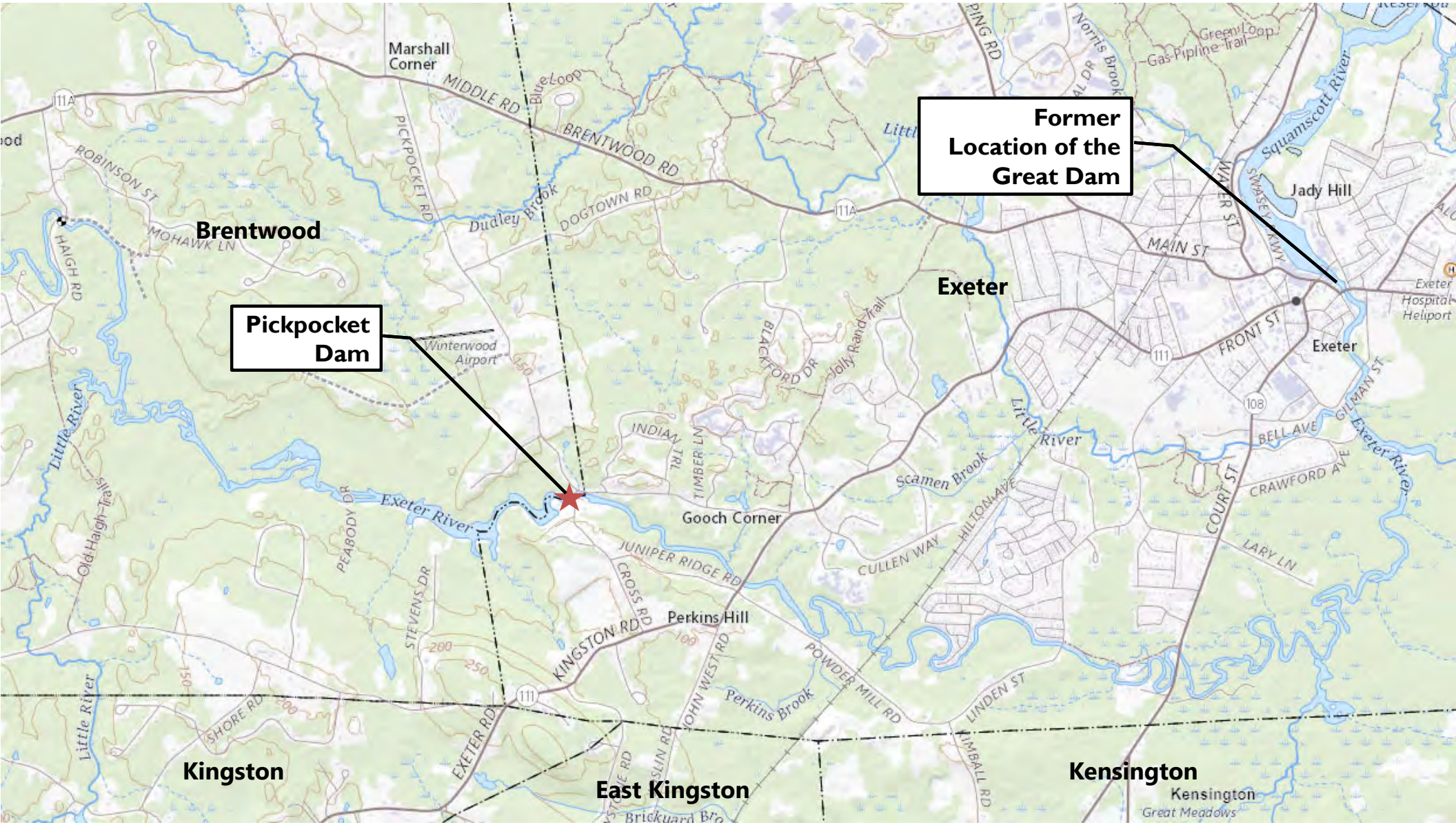
Feasability Study Scope	Funding Source
Task 1 - Data Collection	
1.1 Collect and Review Available Data	
1.2 Supplemental Dam/Topo Survey	
1.3 Project Area Bathymetric Survey	
1.4 Impoundment Bathymetry	
1.5 Existing Conditions Plan	
1.6 Impoundment Probing	
1.7 Dam Inspection & Assessment	
Task 2 - Alternatives 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	

Feasability 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

Competing Issues and Priorities


Former Location of the Great Dam
Pickpocket Dam
Brentwood
Exeter
Kingston
East Kingston
Kensington
Marshall Corner
Gooch Corner
Perkins Hill
Jady Hill
Winterwood Airport
Exeter River
Little River
Squamscott River
Perkins Brook
Seamen Brook
Dudley Brook
MIDDLE RD
BRENTWOOD RD
DOGTOWN RD
MAIN ST
FRONT ST
KINGSTON RD
EXETER RD
JUNIPER RIDGE RD
POWDER MILL RD
LINDEN ST
HILTON AVE
CULLEN WAY
COURT ST
CROSS RD
JOHN WEST RD
TIMBALL RD
SHORE RD
PEABODY DR
STEVENS DR
INDIAN TRL
TIMBER LN
BLACKFORD DR
Jolly Rand Trail
Old Haigh Trail
HAIGH RD
ROBINSON ST
MOHAWK LN
PICKPOCKET RD
Blue Loop
Green Loop
Gas Pipeline Trail
Norris Brook
WATER ST
SWASEY PKWY
BELL AVE
CRAWFORD AVE
GILMAN ST
LARY LN
Exeter Hospital Heliport
Great Meadows
111A
111
108

Height – 15 Feet

Length – 230 Feet

Main Spillway Length – 130 Feet


Earthen Embankment
Spillway
Training Weir
Low Level Gate
Fish Ladder
Earthen Embankment

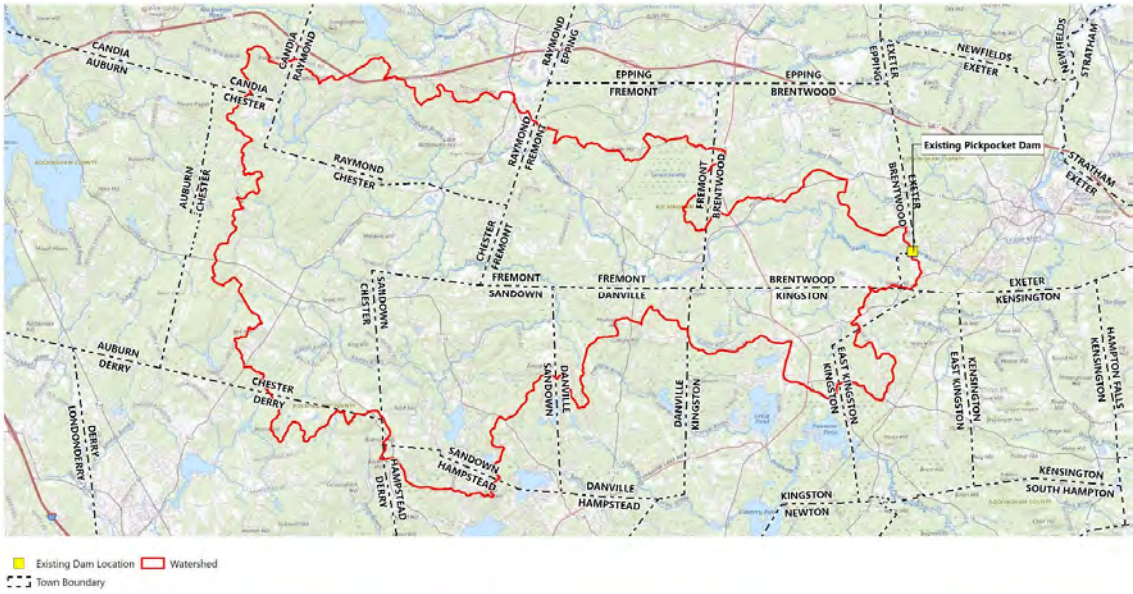
Existing Conditions

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 Future Rainfall – 15% Increase
    - 100 Year – 5,940 cfs
    - 5,940 cfs x 2.5 = 14,900 cfs
    - 49% Increase of Design Flood
  - NHDES rulemaking for Env – Wr 100-700
    - 1000 – Year – 13,900 cfs

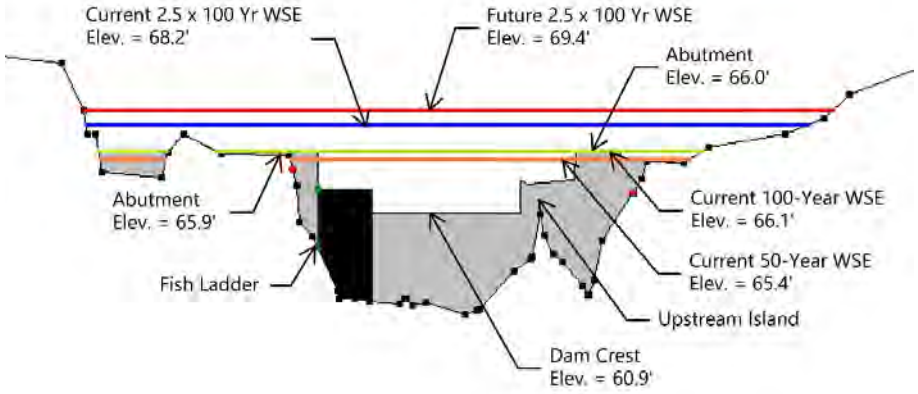
STEP 6 TABLE. APPROACH FOR CALCULATING PROJECTED EXTREME PRECIPITATION ESTIMATES BASED ON TOLERANCE FOR FLOOD RISK.

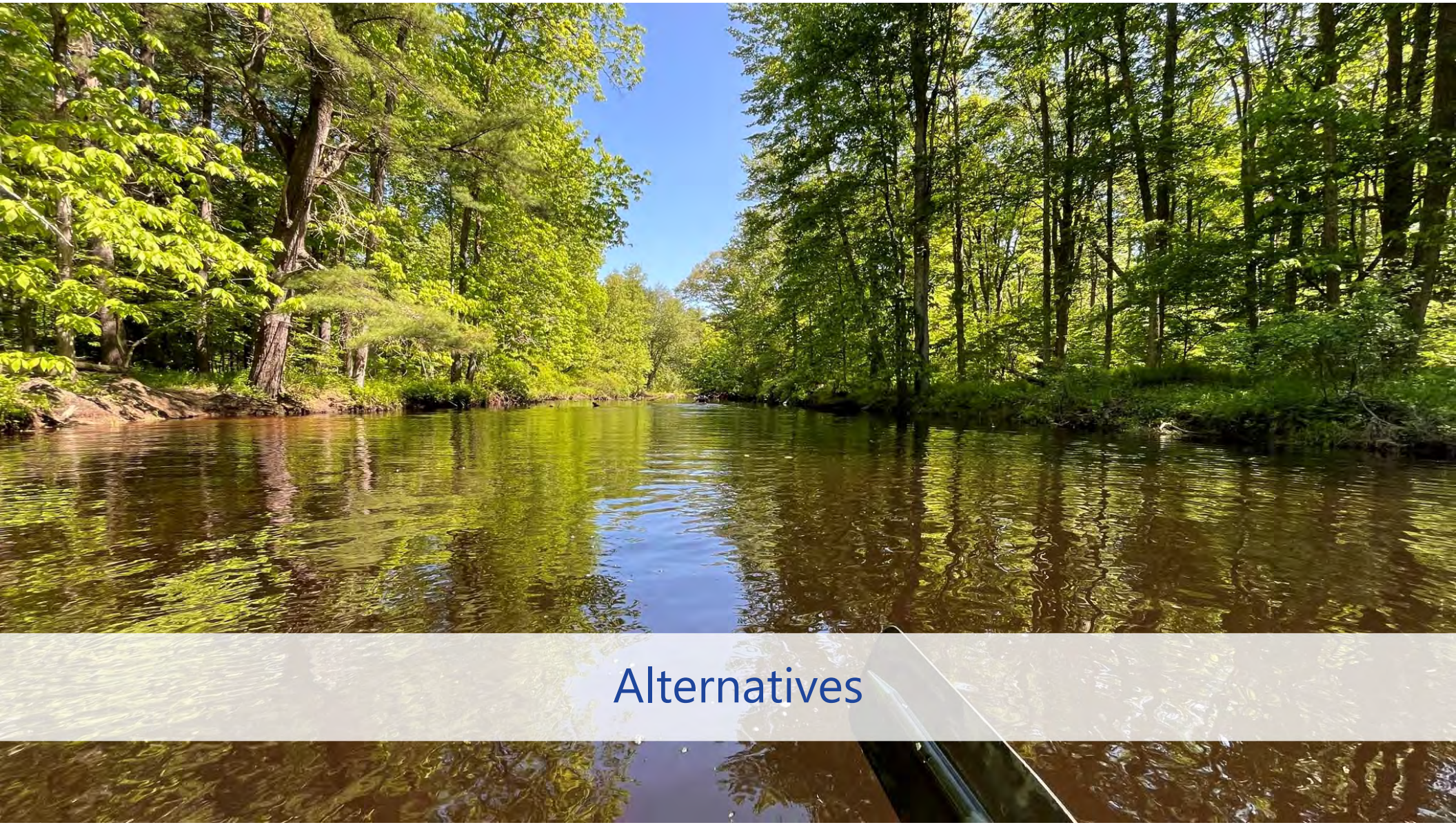
	HIGH TOLERANCE FOR FLOOD RISK	MEDIUM TOLERANCE FOR FLOOD RISK	LOW TOLERANCE FOR FLOOD RISK	VERY LOW TOLERANCE FOR FLOOD RISK
PROJECTED EXTREME PRECIPITATION ESTIMATE =	(Best available precipitation data) x (1.15)		(Best available precipitation data) x (>1.15)	



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
- Does not pass design storm events, without manual operation with 1-foot of freeboard





Alternatives

Preliminary Investigation
Dam Modification Alternatives

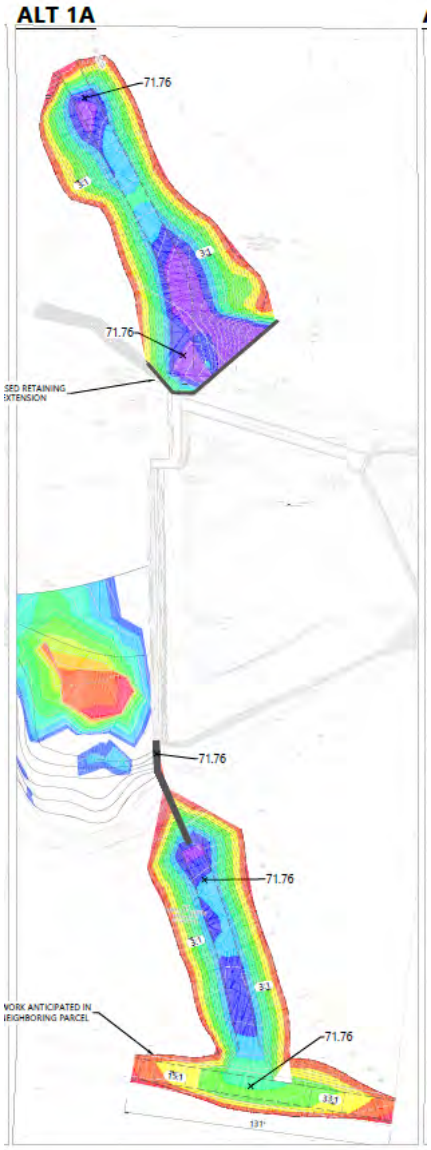
Alt 1: Increase abutment height to pass the design storm

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

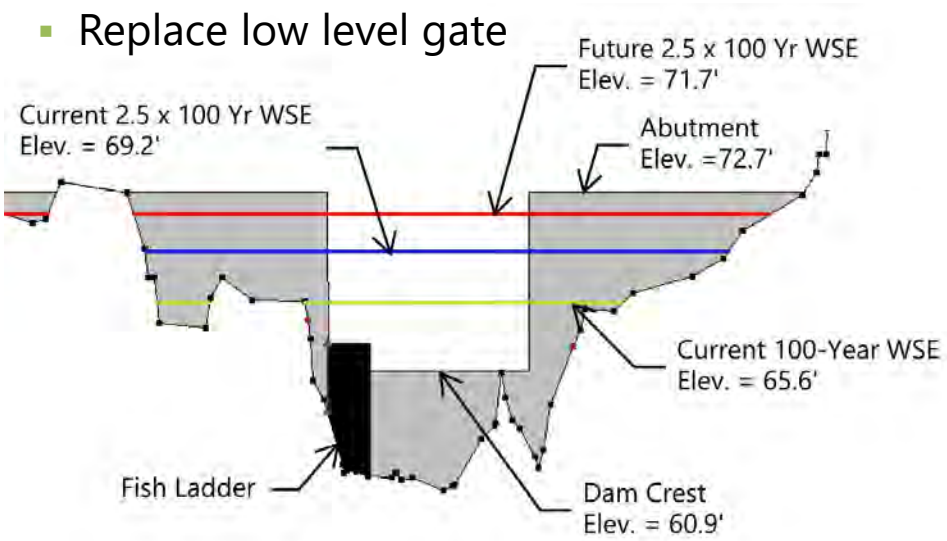


Final Dam Modification Alternatives

- Alternative 1: Raise Top of Dam
- Alternative 2: Spillway Replacement
- Alternative 3: Auxiliary Spillway
- Alternative 4: Dam Removal
- Alternative 5: No Action/Hazard Reduction
- Alternative 6: Lower Normal Pool Elevation

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

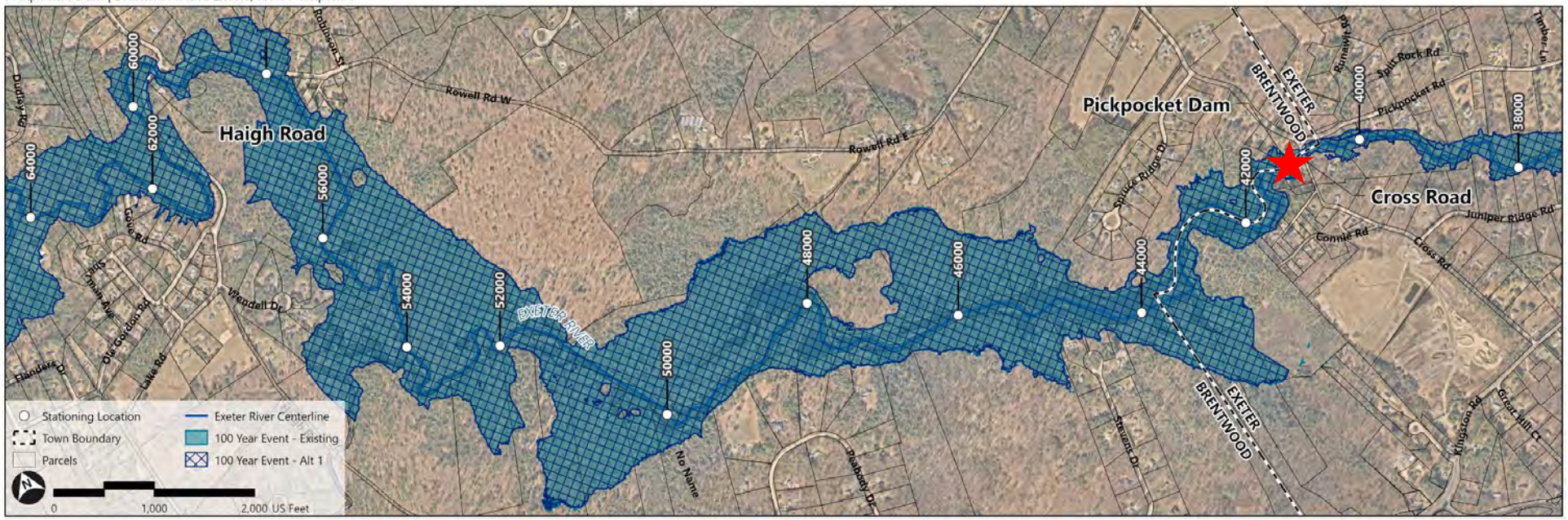
An Oblique view of Pickpocket Dam primary spillway, looking from the right bank

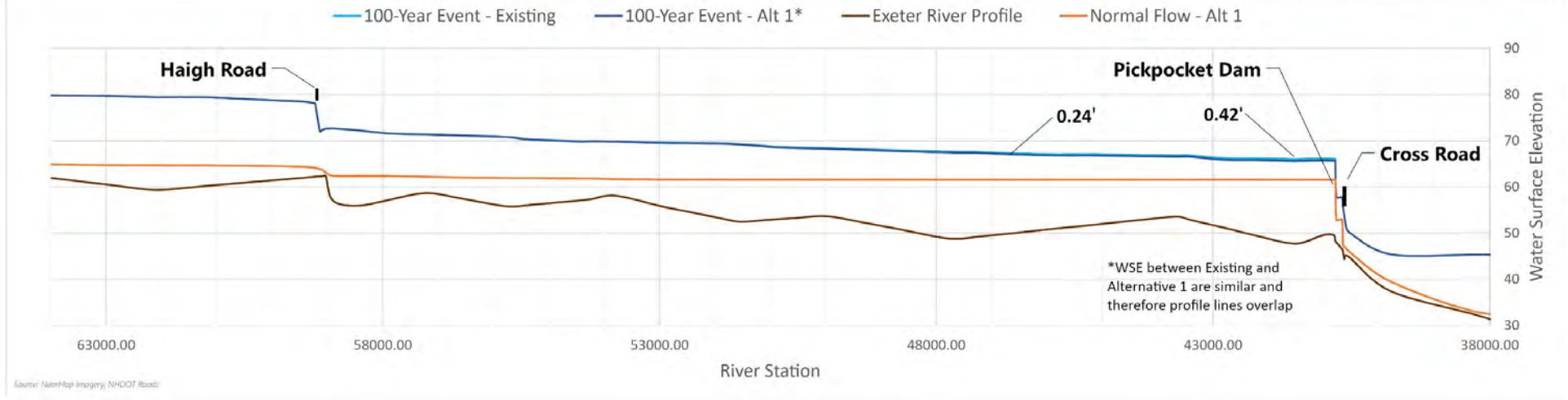
Rendering

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

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

Pickpocket Dam | Brentwood and Exeter, New Hampshire





Source: NatMap Imagery, NHDOT Roads

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

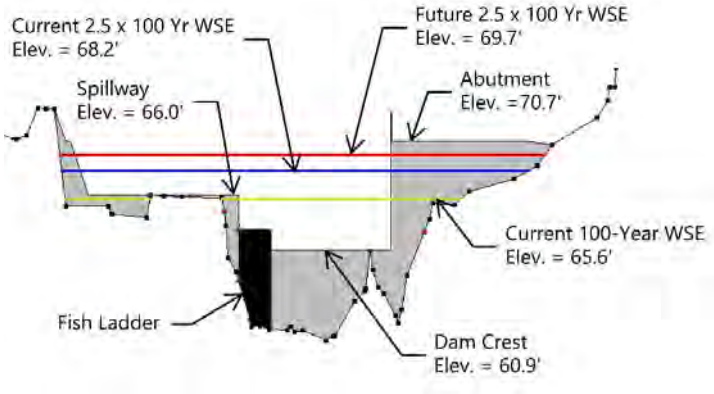
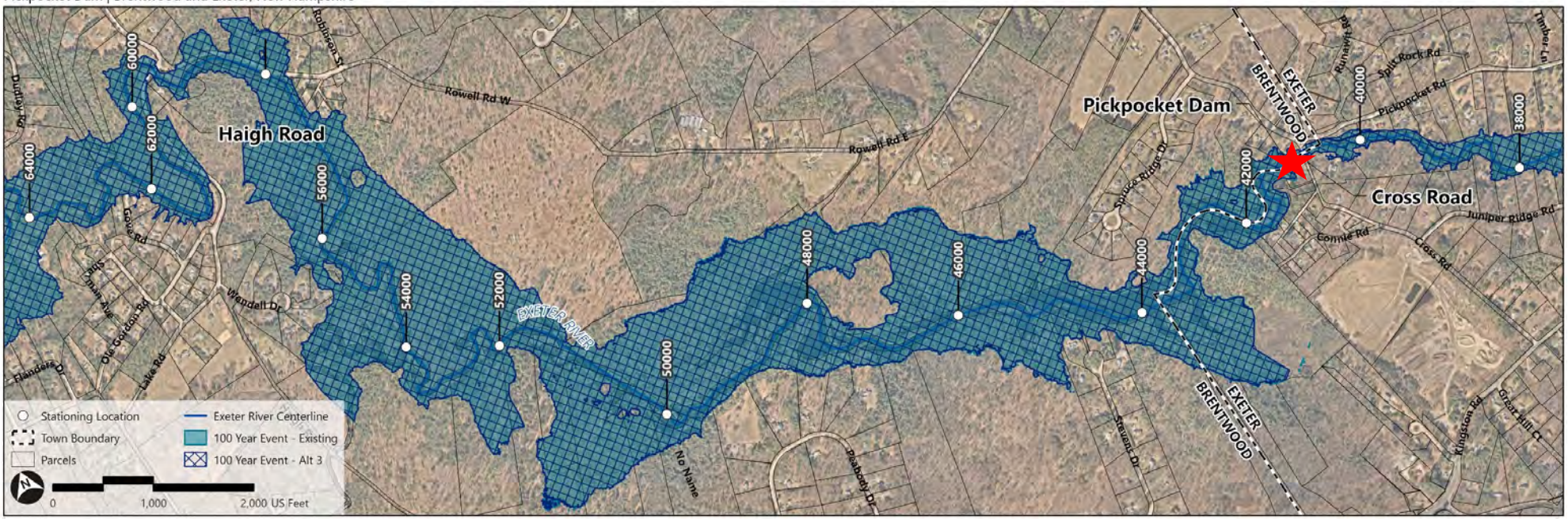
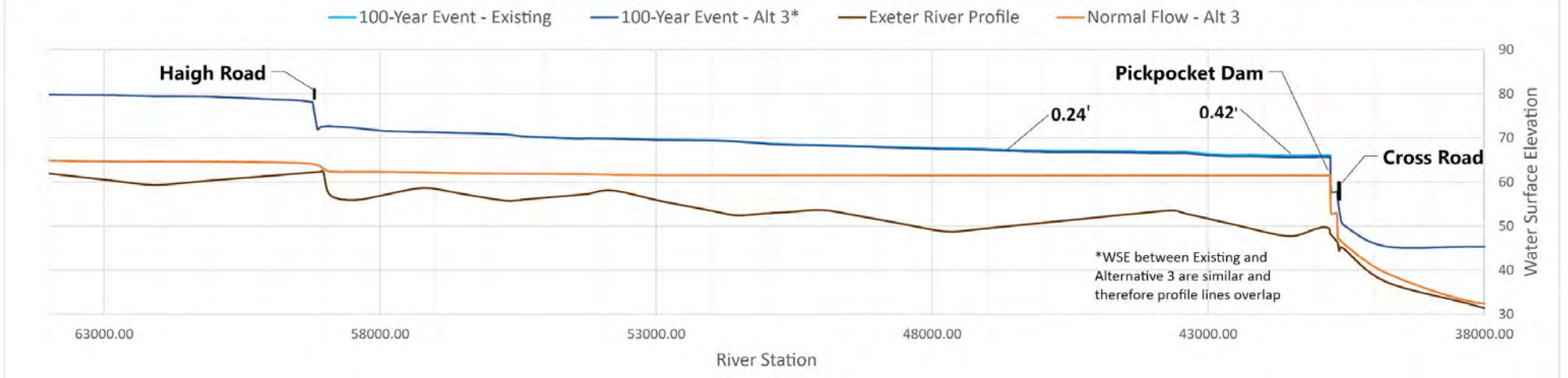


Figure 3.2-4: Alternative 3 - Auxiliary Spillway 100 Year Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire





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

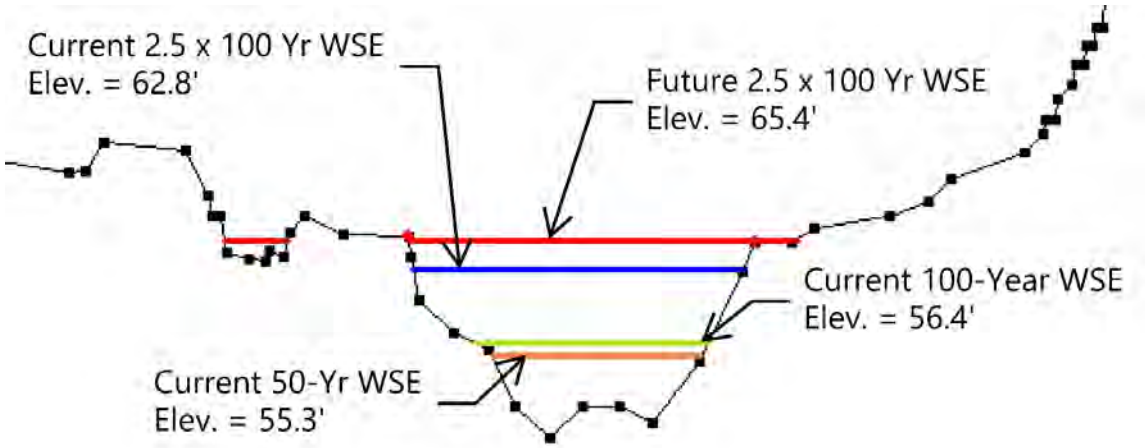
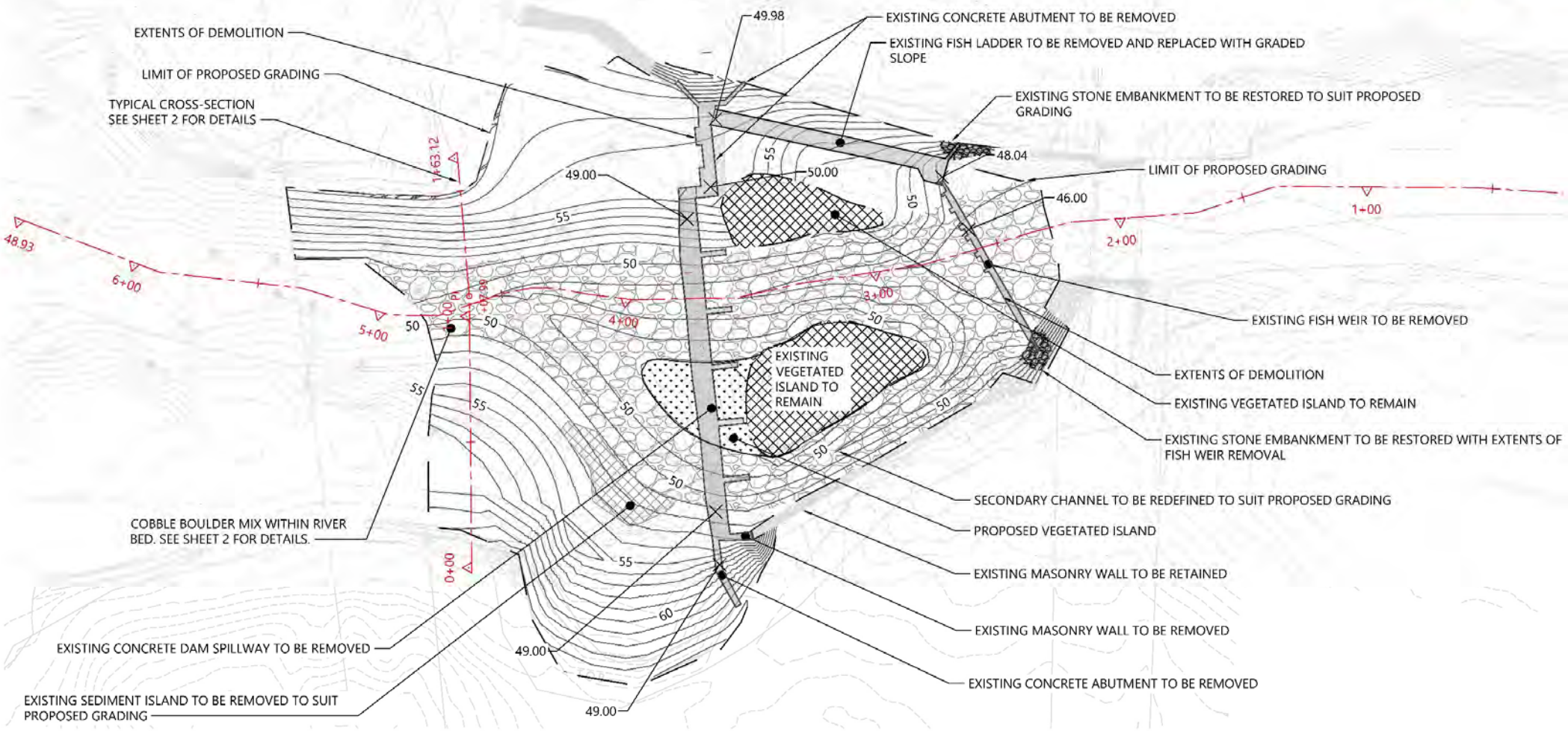


Figure 2.5-1 - Dam Removal Plan

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

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

Pickpocket Dam | Brentwood and Exeter, New Hampshire

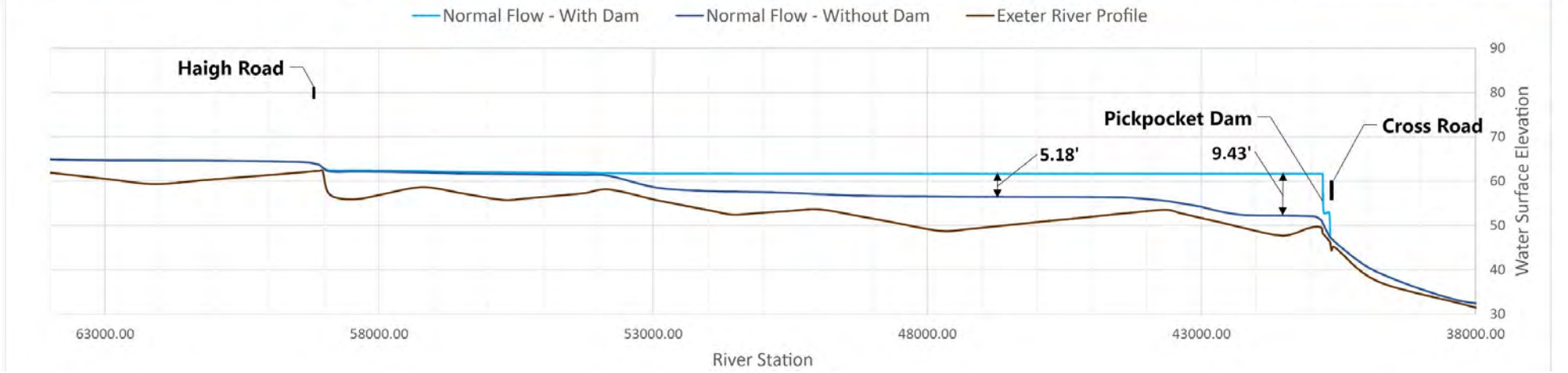
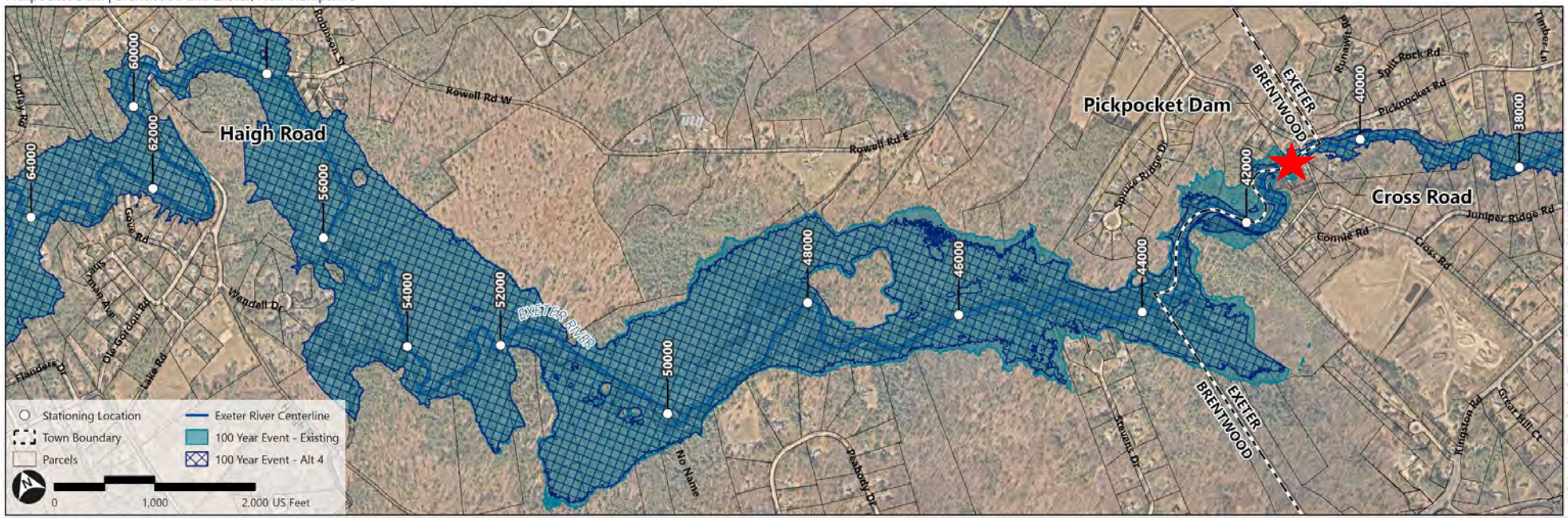
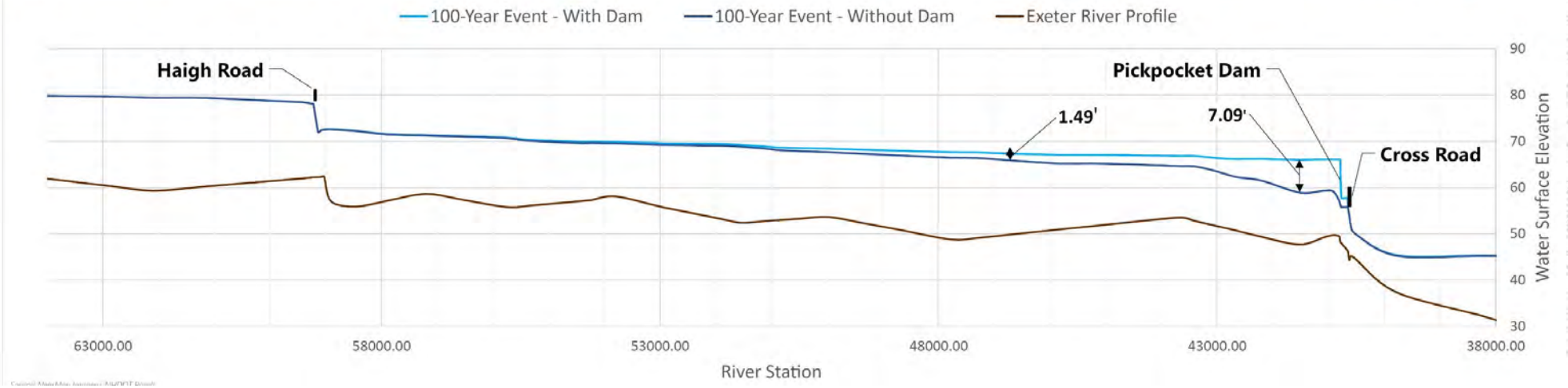


Figure 3.2-6: Alternative 4 - Dam Removal 100 Year Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire

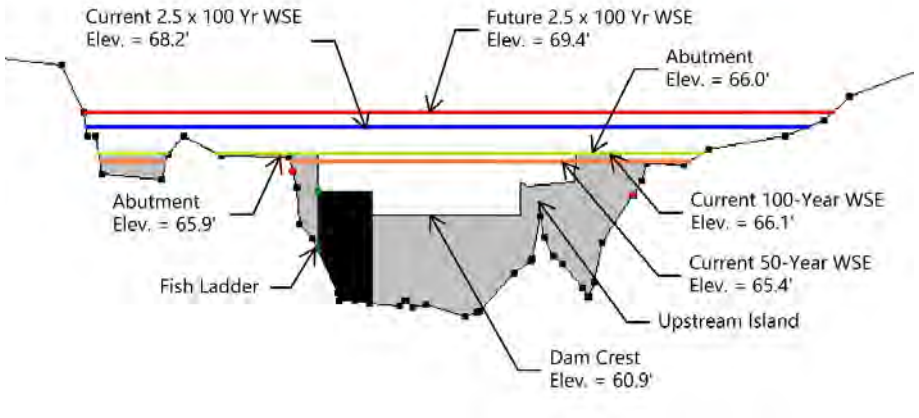




Alternative 5 – No Action/Hazard Reduction

- High Hazard - Maintain existing dam
  - Purchase impacted residential properties to reduce hazard classification
- Significant Hazard - Overtopping of NH Route 11 – Class II roadway
  - Replace Kingston Road Bridge to reduce hazard classification
- Low Hazard – Existing dam does not meet low-hazard safety requirements
- Replace low level gate

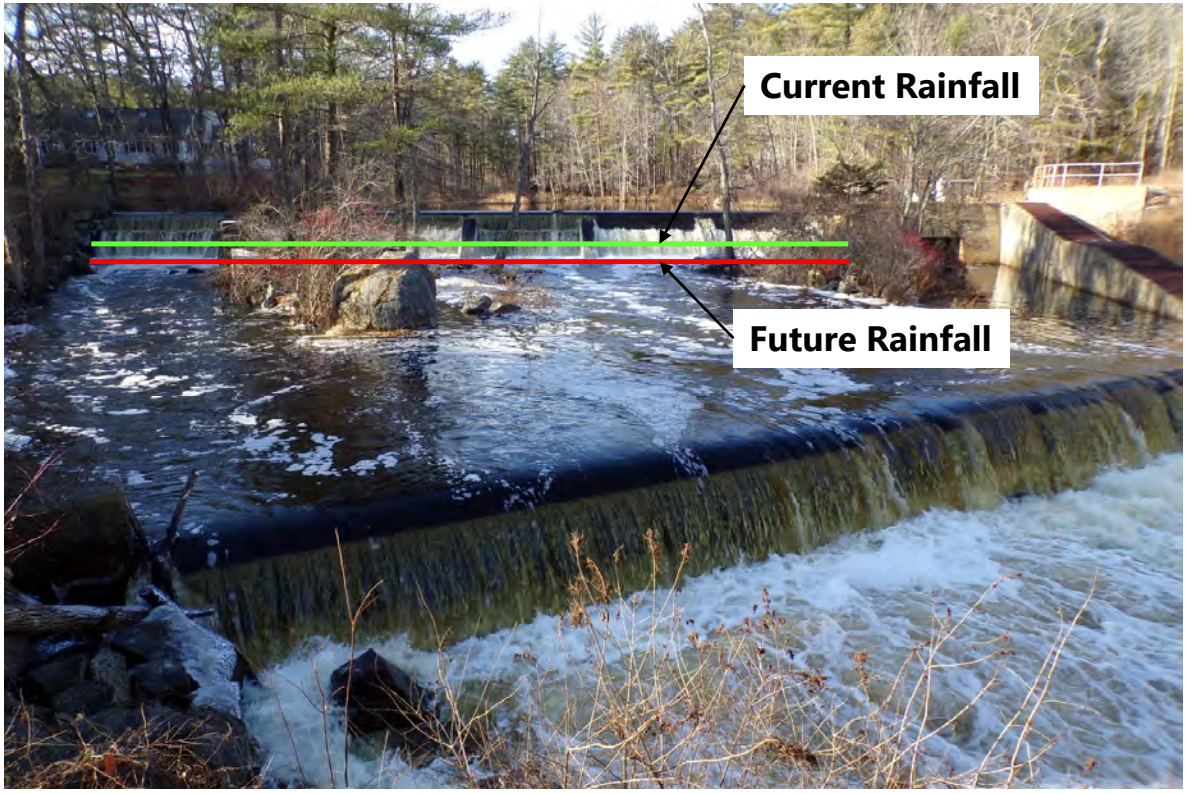
Hazard Class	Discharge Capacity Flood	Water Surface Elevations (Current/Future)	Freeboard (Current/Future)
Low	50-Year	65.4/NA	0.6/NA
Significant	100-year	66.1/67.0	-0.1/-1.0
High	250% of the 100-Year	68.2/69.4	-2.2/-3.4



Alternative 6 – Lower Normal Pool

- Selective demolition of the spillway weir
- Replace low-level gate
- Reduced pool levels would have negative environmental and recreation impacts

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

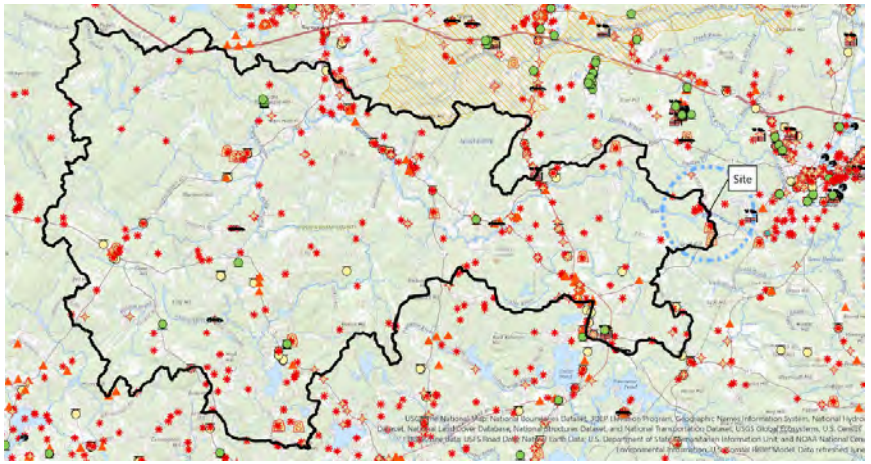
Impact Analysis

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
  - 3 upstream (SED-1, SED-2, SED-5)
  - 2 downstream (SED-3, SED-4)
- Probing investigation to determine sediment depth

Table 1 Summary of Environmental Database Search Results

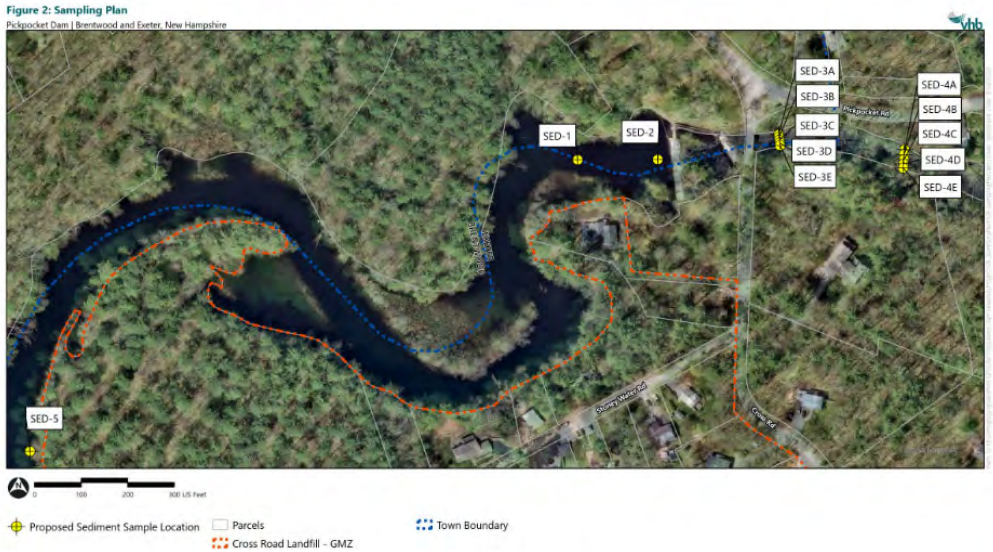
Type of Site	No. of Sites Located within the Dam Watershed
Aboveground Storage Tank (AST) Sites	12
Underground Storage Tank (UST) Sites	44
Remediation Sites	193
Hazardous Waste Generators	36
Solid Waste Facilities	16
NPDES Outfalls	0
Local Potential Contamination Sites	25
TOTAL:	326



- 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

Sediment Sampling Results

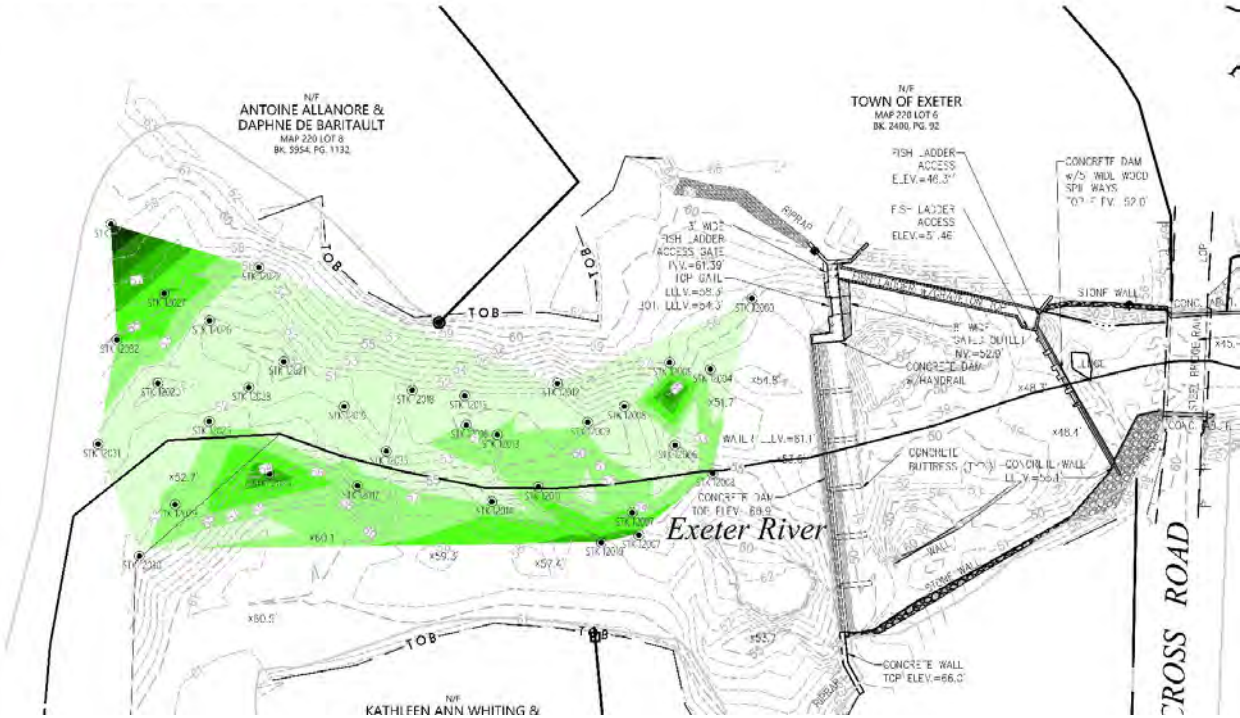
- No concentrations of pesticides or PCBs detected in sediment samples
- PAHs and metals detected in all sediment samples
- Arsenic the only contaminant detected in excess of the NHDES EV-600 Soil Remediation Standards
  - Consistent with background, arsenic is a natural occurring component of sediment 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



Sediment Probing Results

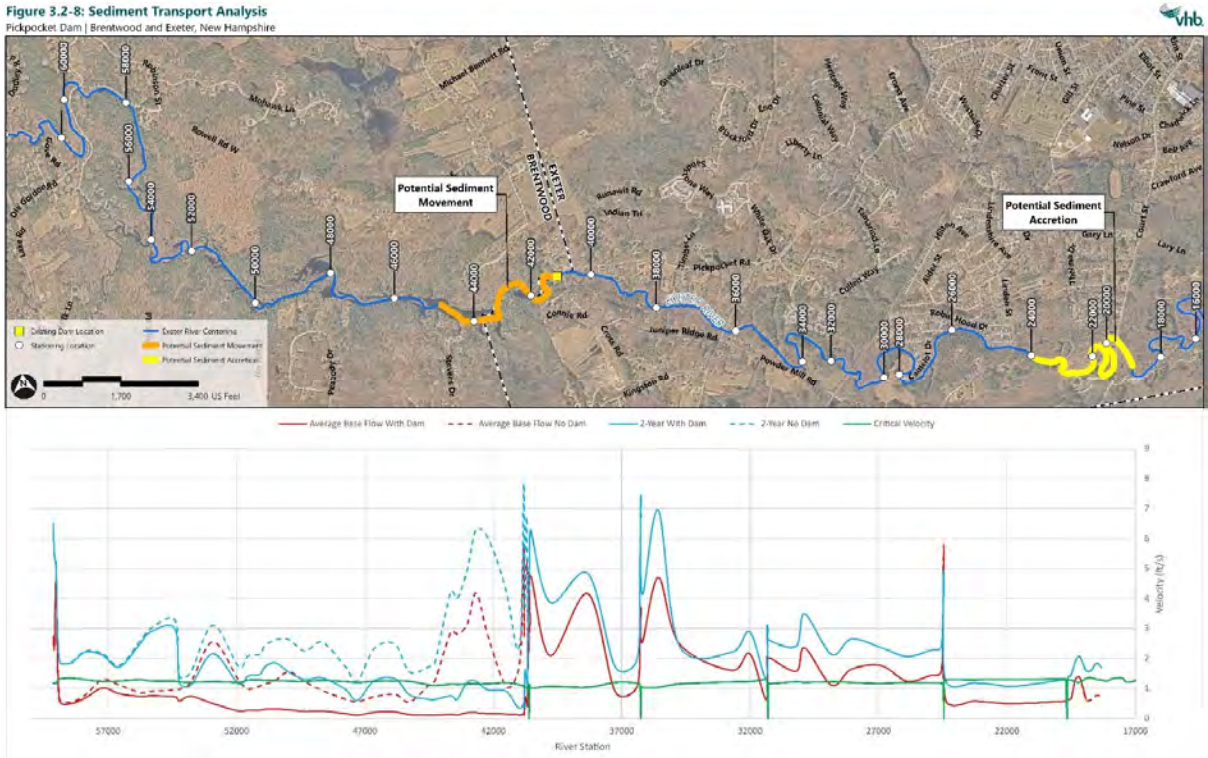
- Sediment probing investigation
- Depths range 0-2 feet in active conveyance portion of the channel
- Increasing depths towards banks
- Inoperable gate prohibited capturing depths at upstream face

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



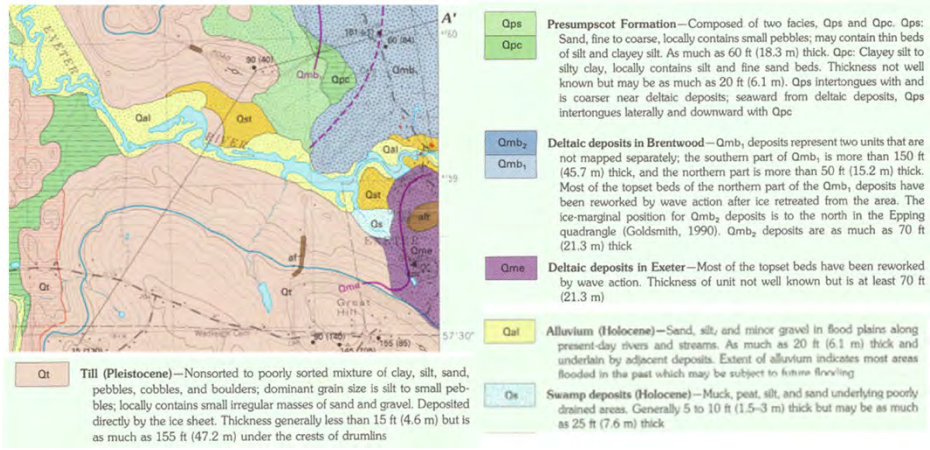
Sediment Transport

- 5 sediment samples locations (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



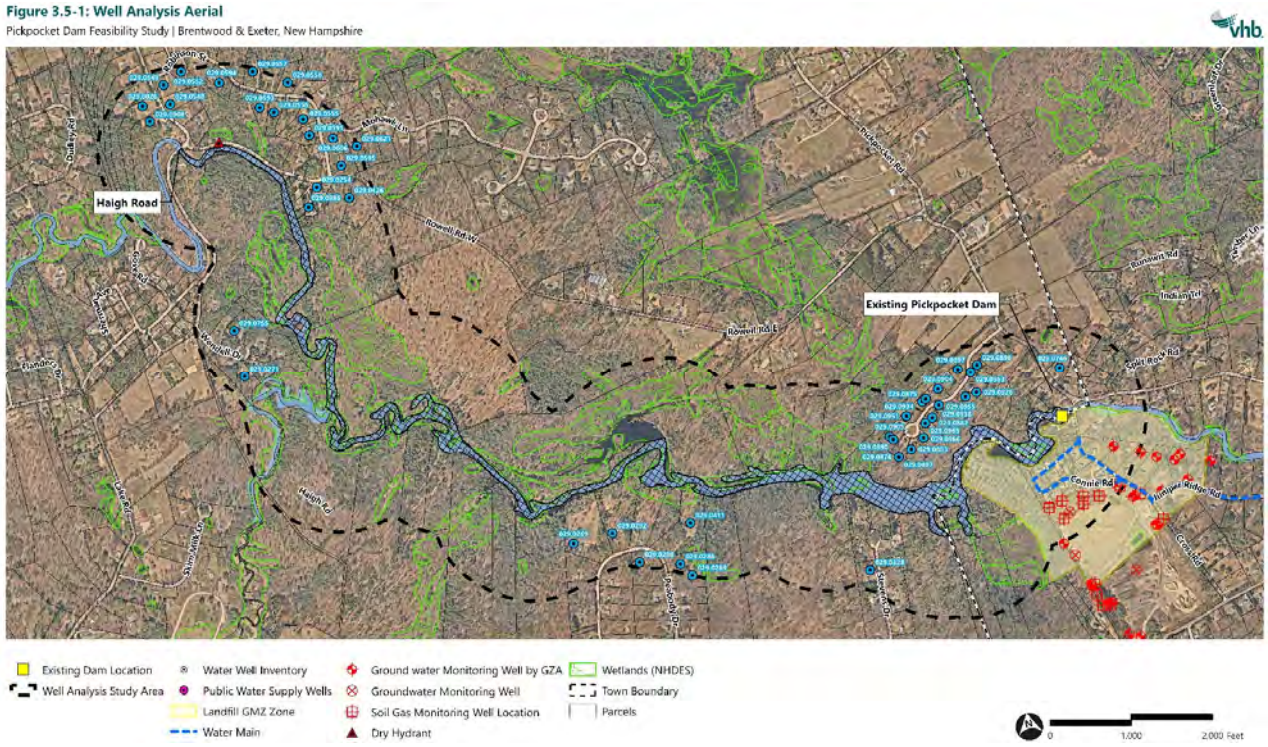
Infrastructure

- Dam modification: Increase in flood levels during design discharge
- Dam removal:
  - Decreased flood levels
  - 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
- 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

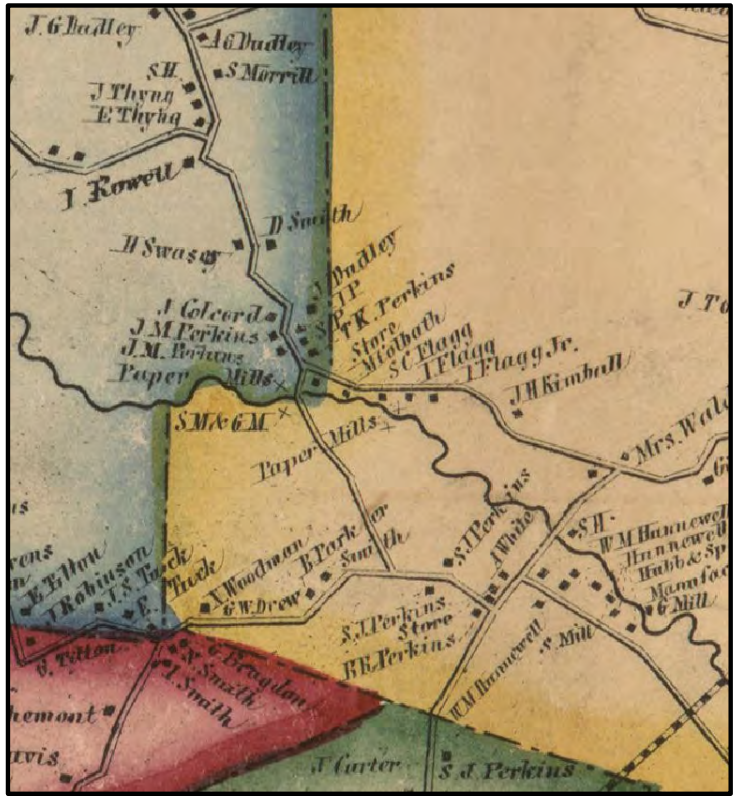


Water Quality

- Downstream segment impaired for aquatic life designated uses due to low DO concentration
- Dam In Conditions
  - Lower dissolved oxygen
  - Disruption to sediment transport process
  - Increased growth of algae & vegetation
  - Increased water temperature
- 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

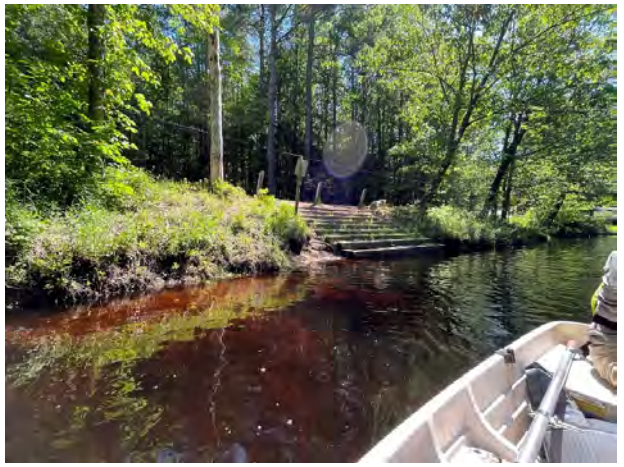
Cultural Resources

- Various mill operations near Pickpocket Falls since mid-17th century
- Current dam construction 1920 and modified in 1969
- NH Division of Historical Resources determination of eligibility
  - Criteria A: *"for its contribution to industry in Exeter, for its association with the modern conservation movement with the addition of the fish ladder in 1969, and as a dam that embodies the distinctive characteristics of its type, period, and method of construction".*
  - Criteria C: *"the characteristics of this dam type, run-of-the-river dam, are expressed in its earth embankment construction with a concrete spillway and end walls, and it retains a high degree of integrity."*
- Identified two archaeologically sensitive areas that are sensitive for Pre-Contact Native American cultural deposits



Recreation

- Boating, fishing, swimming, and bird watching
- Paddle boat launch at Haigh Road
- Public land at Pickpocket Dam and Peabody Drive
- Private land placed under conservation easement surrounds the impoundment
- Dam Modification: No impact to recreation opportunities
- Dam Removal:
  - Loss of open water
  - Increase in angling due to improvement in fish passage



Fisheries & Fish Passage

- Diadromous fish species rely on access to upstream freshwater river habitat
- Dam Modification alternatives would retain the existing fish ladder
- Dam Removal
  - 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

Natural Resources

- Dam Modification:
  - Negligible change to existing wetlands and surrounding habitat.
- Dam Removal:
  - Would result in changes to habitat, wetlands, and natural communities, including:
    - Improve fish passage (existing fish ladder has limited success).
    - Restore natural flow regime and riparian habitat to support more ecological diversity.
    - Could affect wetlands and floodplain forests that border the impoundment based on changing flood regimes that would create shifts in plant communities and hydrologic inputs.
    - Improve water quality.
  - Changes to the surrounding habitats would occur gradually allowing the natural communities and ecosystems as a whole time to adapt.

Cost Analysis

	Alt 1: Raise Dam		Alt 3: Auxiliary Spillway		Alt 4: Dam Removal
	Current	**Future**	**Current**	**Future**	
Initial Capital Cost	$1,964,100	$2,322,800	$2,289,100	$2,434,800	$1,468,000
Capital Replacement Costs	$809,200	$957,000	$943,100	$1,003,100	$0
Operations and Maintenance	$266,800	$294,300	$376,800	$411,200	$45,000
Total Present Cost	**$3,041,100**	**$3,575,100**	**$3,609,000**	**$3,849,100**	**$1,513,000**

Next Steps

Next Steps

- Public comment period ends 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

Discussion