DRAFT TECHNICAL REPORT
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Pickpocket Dam Feasibility Study

Exeter, New Hampshire

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Acronyms

AUID	Assessment Unit Identification
bgs	Below Ground Surface
cfs	Cubic Feet per Second
CN	Curve Numbers
CRREL	Cord Regions Research and Engineering Laboratory
DEM	Digital Elevation Model
Dkey	Determination Key
DO	Dissolved Oxygen
EFH	Essential Fish Habitat
EMC	Exeter Manufacturing Company
EMD	Environmental Monitoring Database
EOC	Emergency Operations Center
EPA	United States Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
fps	Feet per Second
GIS	Geographic Information System
GMZ	Groundwater Management Zone
gpm	Gallons per Minute
GPS	Global Positioning System
HEC-HMS	Hydrologic Engineering Center, Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center, River Analysis System
HQ	Hazard Quotient
HQ-PEC	HQ calculated with a PEC
HQ-TEC	HQ calculated with a TEC
IPaC	Information for Planning and Consultation
LCHIP	Land and Community Heritage Investment Program
LOD	Letter of Deficiency
LOMR	Letter of Map Revision
MBTA	Migratory Bird Treaty Act (1918)
mg/kg	Milligrams per Kilogram
NFIP	National Flood Insurance Program
NHB	New Hampshire Natural Heritage Bureau
NHDES	New Hampshire Department of Environmental Services
NHDHR	New Hampshire Division of Historical Resources
NHDOT	New Hampshire Department of Transportation

NHFGD	New Hampshire Fish and Game Department
NHFGD WAP	NHFGD Wildlife Action Plan
NHGS	New Hampshire Geological Survey
NHPA	National Historic Preservation Act (1966)
NIST	National Institute of Standards and Technology
NLEB	Northern Long-Eared Bat
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
OMP	Operation and Maintenance Plan
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyls
PEC	Probable Effect Concentrations
PP-13	Priority Pollutant 13
RCMP	Risk Characterization and Management Policy
RMPP	Rivers Management and Protection Program
RTE	Rare, Threatened, and Endangered
RTK	Real-Time Kinematic Positioning
SAP	Sampling and Analysis Plan
Sas	Sensitive Areas
SIA	Society for Industrial Archeology
SRS	Soil Remediation Standards
sVOCs	Semi-Volatile Organic Compounds
SWP	Small Whorled Pogonia
Tc	Times of Concentration
TEC	Threshold Effect Concentrations
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOCs	Volatile Organic Compounds
WSE	Water Surface Elevations

Executive Summary

The Pickpocket Dam (Dam #029.07) is located on the Exeter River on the boundary between the towns of Exeter and Brentwood in New Hampshire. The dam is solely owned by the Town of Exeter. The first recorded structure at Pickpocket Falls dates back to 1652. The current dam was built in 1920 and generated power for mills. This dam is a 'run-of-river' dam, meaning that it allows all of the natural river flow to pass over the dam spillway at roughly the same rate as the natural flow of the river.

The dam was recently reclassified as a "High-Hazard" structure. The dam does not meet the current NHDES safety standards which require "High-Hazard" dams to pass 2.5 x the 100-year storm event with one foot of freeboard between the water surface and the top of the dam abutments without manual operations.

This Feasibility Study evaluates various alternatives to modify or remove the dam to bring the dam into compliance with the NHDES safety standards.

The evaluation included collecting additional data on the dam including ground and bathymetric survey to update an existing hydraulic model. Additionally, an inspection of the dam was performed and found that the dam and fish ladder are in fair condition, however the low-level gate is inoperable due to rot and leakage is present on the downstream face of the dam.

The hydrologic analysis was updated to reflect current NOAA Atlas 14 rainfall values. However, given the changes in weather patterns in recent years, it is recommended for future rainfall events to be taken into consideration to safeguard the public and reduce the need for a potential costly secondary modification in the future. The projected extreme precipitation estimate recommended is a 15% increase from the best available rainfall data.

Additionally, regulations periodically go through rulemaking process to ensure they reflect current information. During the preparation of this document NHDES started the process of rulemaking for proposed changes to Env-Wr 100-700. With the proposed rule change the "high-hazard" dams shall pass the 1000-year design event with one foot of freeboard and without manual operations.

Descriptions of Alternatives

During the early phases of the Feasibility Study, five alternatives were developed that investigated the hydraulic impacts from adjusting the dam's abutment and removal of an island that has formed just upstream from the spillway on river right, looking downstream, to assess bringing the dam into compliance. Alternative 1 evaluated increasing the abutment height and Alternative 2 evaluated adding a secondary abutment. Both alternatives also included evaluating the removal of the island upstream from the spillway (Alternative 1A and 2A). Alternative 3 - Dam Removal was also considered. As the Feasibility Study progressed Alternative 1 was refined and carried forward to further conceptual design as Alternative 1 – Raise Top of Dam, discussed below. Similarly, Alternative 2 was also further progressed, and to simplify the design was transitioned so that the second-tier abutment was only on one side of the dam. This option was progressed further in the evaluation as Alternative 3 - Auxiliary Spillway. Alternative 3 – Dam

Removal of the preliminary investigation was also further progressed and discussed further as Alternative 4 – Dam Removal.

The project team developed a set of six alternatives to address the deficiencies of the Pickpocket Dam.

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

Based on an initial analysis that considered cost, constructability, and compliance with regulatory requirements, three alternatives were eliminated from further evaluation. Alternative 2 – Spillway Replacement (Labyrinth) was eliminated from further consideration primarily due to the intensive costs associated with this alternative. Alternative 5, which proposed no action or hazard reduction, was dismissed as it doesn't resolve safety issues with the dam. Further, it could lead to financial and legal ramifications, including enforcement action from the New Hampshire Department of Environmental Services and the Department of Justice. Alternative 6, which proposed lowering the normal pool elevations, detrimental environmental impacts, such as increased water temperatures and decreased oxygen levels, without offering the ecological benefits of a full dam removal. Additionally, this strategy could adversely affect recreational use due to degraded water quality and reduced surface area, thereby making it a less preferred and potentially non-permittable approach.

The three alternatives were determined to have merit and were therefore advanced for detailed study and are outlined below.

Alternative 1 – Raise Top of Dam

Alternative 1 would include maintaining the existing spillway discharge structure and raising the top of the dam elevation such that the design storm is contained with 1 foot of freeboard remaining. Both the left and right training walls at the spillway would be extended to meet the required top of walls. To prevent overtopping of the abutments beyond the limits of the existing dam, earthen embankments would be constructed to impound high water during design storm events. The dam's low-level gate would need to be repaired as part of this alternative, but there would be no other impacts to the dam's appurtenances.

Alternative 3 – Auxiliary Spillway

Alternative 3 includes meeting regulatory spillway design flood requirements by constructing an auxiliary spillway through the left abutment. The elevation of the auxiliary spillway would be set at the top of the existing dam elevation. To prevent overtopping of the right abutment, an earthen embankment would be constructed to impound high water during design storm events. The dam's low-level gate would need to be repaired as part of this alternative, but there would be no other impacts to the dam's appurtenances.

Alternative 4 – Dam Removal

Alternative 4 would include the complete removal of the dam and its appurtenances including the low-level gate, fish ladder and fish weir. The islands downstream of the dam would be retained and repurposed to help recreate the geomorphology of the natural river. The river channel would be reconstructed through the former dam location, design to simulate the geomorphology of a natural river. Planting of the former underwater areas will be necessary to stabilize the new stream banks and reintroduce appropriate native vegetation to reduce erosion and improve habitat diversity. This would include bank plantings/seeding from the current dam site to approximately 2.5 miles upstream.

Summary of Alternative Costs

Table ES-1 Summary of Alternative Costs

	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**

Impacts and Benefits

The alternatives carried through the study were evaluated, both quantitatively and qualitatively, to determine the impact to hydraulics and sediment transport, infrastructure, water supplies, cultural resources, recreation, water quality, and natural resources. For each Alternative, the magnitude of change compared to existing conditions decreases with increasing distance upstream from the dam.

Alternatives 1 – Raise Dam and Alternative 3 – Auxiliary Spillway yield similar outcomes with little to no change in the impoundment up to the 100-year storm event flow condition. For storms greater than the 100-year event, there would be a slight increase in the water surface elevation upstream from the dam. Because of the similarity to existing conditions, the dam modification alternatives will not have a noticeable impact on the existing state of the Exeter River or impoundment. Under Alternative 4 – Dam Removal, some accumulated sediment behind the dam could become mobile due to the small increases in velocity and transported downstream. It was found that sediment depths range from 0-2 feet deep near the channel thalweg and with greater depths closer to the banks of the impoundment. With dam removal, the sediment in the main channel area would be predominately removed as part channel regrading activities. Following removal the newly exposed banks that would have previously been underwater with the deeper soft sediment depths would be vegetated to stabilize in place reduce the potential for erosion. Sediment transported from the former impoundment area was found to likely deposit at region upstream of the Route 108/Court Street Bridge, but with proper stabilization of the new river banks following dam removal a large volume of sediment deposition and no negative impact is expected.

Infrastructure

Alternative 4 – Dam Removal, provides a reduction of the water surface elevation at all evaluated storm events and therefore decreases the flood risk to adjacent public infrastructure. However, the magnitude of change in the river, as compared to existing conditions, decreases with increasing storm event recurrence interval.

Whereas the dam modification alternatives do not improve the flood risk for storm events smaller than the 100-year storm event and increases water surface elevations upstream for storms greater than the 100-year storm event.

The change in water elevations and flow characteristics following dam removal will impact slopes adjacent to the river valley in two ways. Firstly, reducing the impoundment elevation will reduce groundwater within the adjacent slopes, improving soil resistance and therefore slope stability, since unsaturated soil strengths are greater than saturated soil strength. Though this process would occur gradually to maintain short-term stability. Secondly, the altered flow could increase the potential for scour at the base of embankment slopes, potentially decreasing slope stability. Countermeasures such as vegetation can be used to ensure long-term stability and prevent potential impact on homes along the Exeter River.

Water Supply

The known water supply wells in this area rely on water from the deep bedrock aquifer, where a lowering of the overburden groundwater table would not impact the availability water in the bedrock aquifer, which is recharged from the larger watershed through a network of fractures. The removal of the dam will not affect groundwater levels in the bedrock aquifer that supplies wells within the study area. Additionally, metering water out of the impoundment for water supply was found to provide a minimal amount of additional water to provide a viable backup source of drinking water.

Cultural Resources

Upon review, the NHDHR DOE committee recommended the Dam eligible for the National Register due to its historical and architectural significance. Additionally, a Phase IA archaeological sensitivity assessment for Pickpocket Dam identified two archaeologically sensitive areas for Pre-Contact Native American cultural deposits and several Post-Contact Euro-American resources.

The Pickpocket Dam might be adversely affected by Alternatives 1 – Raise Dam and Alternative 3 – Auxiliary Spillway both of which involves modifying the dam, potentially compromising its architectural and historical integrity. Alternative 4 – Dam Removal, would lead to an adverse effect on the eligible resource and possible impacts on archaeological resources due to exposure of submerged sites. As part of the permitting process, for all the Alternatives, the Town will work with NHDHR to reduce the potential for an adverse effect under Section 106.

Recreation

The Pickpocket Dam impoundment predominately serves recreational purposes like fishing, boating, and bird watching. The impoundment is mostly accessible by boat and there are three public access points available by foot. The land surrounding the impoundment is primarily private land that has been placed under conservation easement. Under the dam modification alternatives, there would be no changes to the current recreational activities. Under Alternative 4

– Dam Removal, there would be a loss of open water boating however, a potential increase in angling due to the improvement of fish passage within the river.

Fisheries & Fish Passage

The Exeter River, home to several ecologically important native diadromous fish species, serves as a habitat for spawning and nursery life cycle functions. The fish ladder at Pickpocket Dam allows for some upstream passage of diadromous fish to reach spawning and nursery habitat, however fish ladders have limited success and need to be maintained. Under Alternative 1 – Raise Dam and Alternative 3 – Auxiliary Spillway, the current condition of fish passage would remain the same. Under Alternative 4 – Dam Removal, fish passage would be enhanced with the restoration of the dam site to a natural river state.

Natural Resources

Alternatives 1 – Raise Dam and Alternative 3 – Auxiliary Spillway would have negligible impact on existing wetlands. On the other hand, Alternative 4 – Dam Removal would lead to changes in habitat, wetlands, rare species, and natural communities. However, it was found that any one change would not create a detrimental effect to natural resources surrounding the Pickpocket Dam impoundment since the benefit of dam removal would likely offset the impact from any one change. Additionally, the Pickpocket Dam reduces the natural fluctuation of river flows, also reduces the river valley ecological diversity. Allowing for more natural variation in water flows would diversify the adjacent areas and provide opportunities for more plant and animal species to utilize the riparian and floodplain habitat within the study area.

Conclusion

In conclusion, this feasibility study demonstrates that the modification or removal of the dam is both technically and financially feasible. The resultant choice of alternative hinges on the importance assigned to preserving the current recreational opportunities, existing habitats and species, versus bringing the Exeter River back to its natural state and improving fish passage and long-term water quality in the process.

1

Background

1.1 Introduction

The Pickpocket Dam (Dam #029.07) is located on the Exeter River at the municipal boundary of the Towns of Exeter and Brentwood, New Hampshire as shown on **Figure 1.1-1**. However, the dam itself is solely owned by the Town of Exeter. A dam has been at Pickpocket Falls since 1652, when a sawmill was originally constructed. The current Dam was built in 1920 and was used to generate power for mills, additional information about the history of the dam is provided in **Section 1.2.1**. In 1981 it was acquired by the Town of Exeter from Milliken Industrials. The Pickpocket Dam is a run-of-river dam on the Exeter River where it flows through the Town of Exeter prior to its discharge into the Great Bay approximately 15 miles downstream. The dam forms a 3.5-mile impoundment, impacting the river flow to just downstream of Haigh Rd in Brentwood, NH.

In accordance with RSA 482:12 and Env-Wr 302.02, the NH Department of Environmental Services (NHDES) Dam Bureau performed a dam inspection of the Pickpocket Dam on September 10, 2010. Based on the results of the inspection, in addition to subsequent analysis, NHDES issued a Letter of Deficiency (LOD) for the Pickpocket Dam on March 28, 2011, identifying deficiencies and remedial measures that NHDES requires. The LOD required that the Town of Exeter perform a breach analysis for the Pickpocket Dam in accordance with NHDES Env-Wr 500 and report the results to the Dam Bureau.

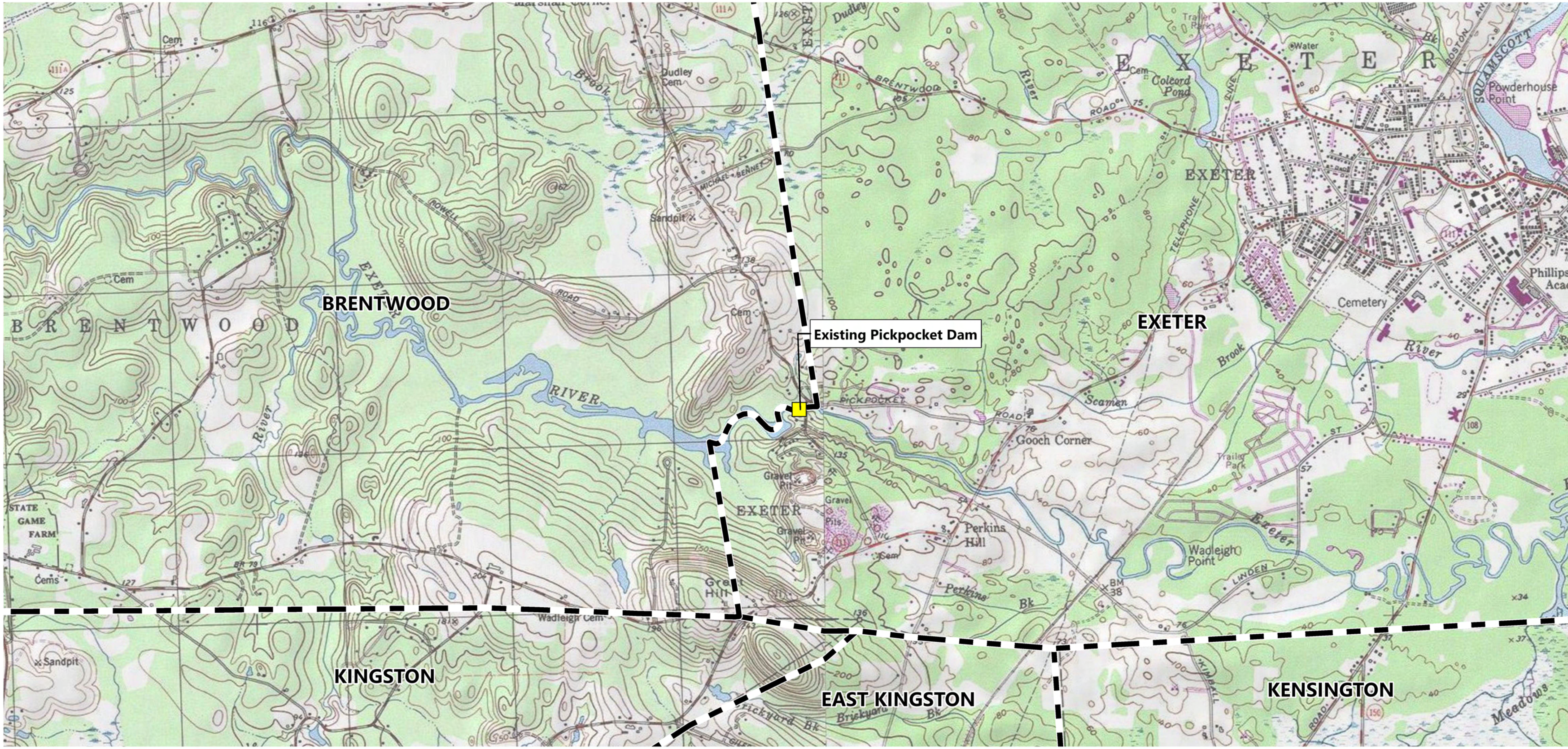
The Breach Analysis, completed in December 2016, showed impacts to the first floor of one residential property with a foundation, and structural support for multiple mobile residential structures. These impacts would result in the reclassification of the dam to a "High-Hazard" structure. The analysis also showed overtopping of NH Route 111, a Class II roadway in the Town of Exeter; this impact would result in the reclassification of the dam to a "Significant- Hazard." NHDES provided comments on the Breach Analysis in October 2017, after resubmission, NHDES revised the classification of Pickpocket Dam to "High-Hazard" in March 2018. The final LOD followed in July of 2019. All LODs described above are provided in **Appendix A**.

The LOD required the Town to provide an application to address the dam's deficiencies by June 1, 2022, and complete construction of the plan by December 1, 2025. In the summer of 2021, a request for action was granted to extend the time to develop rehabilitation alternatives. The revised dates for the application to address the dam's deficiencies and complete construction were pushed to June 1, 2024, and December 1, 2027, respectively. In July of 2021, the Town applied to the Clean Water State Revolving Fund Grant and the Coastal Resilience Grant to assist in funding a Feasibility Study to evaluate options to address the Dam's deficiencies. Both grant applications were successful, and the Feasibility Study commenced in October 2022.

Per Env-Wr 303.11(a)(3) a High-Hazard dam must pass 2.5 times the 100-year flood with one foot of freeboard and without manual operations of any dam features, such as the low-level gate. This regulation, rooted in public safety, is the driver of this study.

Figure 1.1-1: Site Location Map

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Existing Dam Location

Town Boundary

0 2,000 4,000 Feet

Source: VHB, NHGRANIT, NearMap

1.2 Purpose and Scope of this Study

The Town of Exeter has studied options for addressing the Pickpocket Dam safety issue for several years. This current study seeks to develop new information on the options of modifying or removing the dam as a means of eliminating the safety concern and bringing the dam into regulatory compliance. The objectives and issues explored within this study are as follows:

- Determine options to modify/upgrade the Dam to maintain the impoundment while allowing the required design storm to pass over the dam with 1-foot of freeboard.
- Determine the feasibility of re-classification of the dam to limit the required modifications.
- Determine the feasibility of removing the Pickpocket Dam from the Exeter River.
- Determine the impacts and benefits of modifying or removing the Pickpocket Dam on community issues and resources such as:
  - Flooding and Sediment Transport Effects, including the expected change in flooding conditions and the river’s ability to carry sediment both above and below the dam site under the various alternatives including removal and modification options;
  - Natural Resources, such as the potential effect on fish passage and in stream aquatic habitat, wetlands and floodplain forests along the impoundment, wildlife habitat, and rare species;
  - Cultural Resources, such as the historic character of the dam and its surroundings;
  - Recreational and Social Resources, including boating and other uses of the impoundment, and visual and aesthetic values and impacts;
  - Water Resources, such as the availability of water for public and private drinking water and the quality of the water in the river; and
  - Public and Private Infrastructure, including the possible effects on bridges, roadways, foundations, and other structures located in or near the river.
- Compare the impacts, benefits, and costs of options to bring the Dam into compliance.
- Provide this analysis in a comprehensible format so that the Town of Exeter can make an informed decision about the best course of action to address the dam safety issues, hydraulic effects and public and private infrastructure.

1.2.1 History and Uses of the Dam

The Pickpocket Dam was built in 1920 at Pickpocket Falls on the Exeter River between Exeter and Brentwood, New Hampshire to create an impoundment for the Exeter Manufacturing Company. The Pickpocket Falls location was the site of industrial mill operations as early as the 17th century, continuing into the 20th century. Today, the dam is used for recreation (paddling and swimming) in the impoundment above, although public access is very limited. According to local histories, various mill operations have been located at or near Pickpocket Falls since the mid-17th century. In April 1652, Reverend Samuel Dudley and John Legat were given a grant by the town of Exeter for land around Pickpocket or King’s Falls to “take timber for their mill from the commons there,” in exchange for a yearly fee of five pounds, (Bell, 1888). Around 1809, the Exeter Cotton Manufacturing Company established an 8,000-spindle cotton cloth mill at the site. Around 1820, a card clothing factory was added. The mill changed hands, first coming under the ownership of Nathaniel Gilman Jr. around 1830 and then John Perkins in 1840, before burning down in 1847, (Bell 326-327, 1888; Exeter, 1847). Around 1851, Willard Russell, Jacob Colcord, and Joshua Getchell rebuilt the Pickpocket mill site and "adapted it to the manufacture of paper," operating as the Union Paper Mills, (Bell, 327, 1888; Tardiff, 1986; Exeter, 1892). By 1883, the property on either side of the Exeter River on the east and west sides of Cross Road came under the ownership of Isaac Bradford, who had been the agent for the Union Paper Mills, (Rockingham, 1883). In 1885, Bradford sold the property to Jerome B. Gould and William R. Smith, who operated the site as a box factory as well as a lumber and sawmill, (Rockingham, 1885; Exeter 1888; Exeter 1890). Gould and Smith mortgaged the property in 1886 to the Portsmouth Savings Bank but in 1906 evidently defaulted on the mortgage, (Rockingham, 1906). It is unclear whether the box factory and lumber and sawmill were still in operation by 1906. A 1902 survey of the Exeter River by the United States Geological Survey noted the Pickpocket site as one of two "unutilized" falls with a "dam and available fall of 10 or 15 feet" under the ownership of the Portsmouth Savings Bank, (USGS, 1902).

While the Portsmouth Savings Bank put the property up for auction in 1906, it was not until August 1919 that the site was sold to the Exeter Manufacturing Company (EMC), (Exeter, 1906; Rockingham, 1919). Initially formed in 1827, EMC was the most prominent cotton textile manufacturer in Exeter and was one of the three largest industrial firms in NH. In addition to the company's primary production complex in downtown Exeter along the Squamscott River, EMC acquired mills and water rights between Pittsfield and Exeter throughout the 19th century including the Rockingham Factory Dam near present-day Route 111 in 1867 and the Pittsfield Mills in 1895(Walsh and Benjamin-Ma, 2011). In December of that year, EMC engaged the L.H. Shattuck Company of Manchester, NH to construct a new "concrete dam 123 feet wide and 12.95 feet in height" at the Pickpocket site (Exeter, 1919). The dam, completed in March 1920, served to "conserve the water supply" and allow EMC to use the impoundment as a storage basin to aid in their mill operations downstream (Exeter, 1920).

In February 1966, the dam site came under the ownership of South Carolina-based Milliken Industrials, Inc. as part of a town-wide transfer of EMC-owned properties when Milliken purchased EMC, (Rockingham, 1966; Tardiff, 26, 1986). In June 1981, Milliken granted permission to the NH Fish and Game Department (NHFGD) to "construct, maintain, and have exclusive control" of a fish ladder at Pickpocket Dam, (Rockingham 1968). Similar in design to the fish ladder constructed at the Exeter Great Dam in 1968, the fish ladder at Pickpocket Dam was finished in late 1969 and allowed diadromous fish to pass over the dam to native spawning areas upstream, (Walsh and Benjamin-Ma, 2011; Valley News, 1969). The construction of the fish ladder was part of a regional effort under the Anadromous Fish Act wherein the NHFGD and U.S. Fish and Wildlife Service jointly installed fish ladders in coastal areas to "open up over 40 miles of the Exeter River and its tributaries to sea-run fishes," (Valley News, 1969). In 1981, Milliken sold the mill complex downstream at the Great Dam to the Nike Company, and donated properties and the water flowage rights at and between both the Great Dam and Pickpocket Dam to the Town of Exeter, (Walsh and Benjamin-Ma, 2011; Exeter 1982; Rockingham 1981). The dam rights and privileges, water rights, and flowage rights held by the Town allow it to reasonably operate the Dam and regulate the level of the upstream impoundment. Since then, the Town of Exeter has maintained the property.

1.2.2 Description of the Dam and Appurtenances

The Pickpocket Dam is a "run-of-the-river" dam, meaning that it allows all of the natural river flow to pass over the dam spillway at roughly the same rate as the natural flow of the river (as opposed to a flood control dam). Pickpocket Dam is an earth embankment dam with a concrete spillway and end walls and was last repaired/rebuilt in 1969.

The Pickpocket Dam is approximately 230-foot with a maximum structural height of approximately 15 feet as shown on **Figure 1.2-1**. Pictures of the dam and the associated appurtenances are shown on **Figure 1.2-2** through **Figure 1.2-6**. The dam spans the river in a north-south direction. The dam consists of four components:

- Spillway with low level gate;
- Earthen embankment;
- Gated and stop logged Outlet Training Weir
- Fish Ladder.

The spillway structure for the dam is an approximately 130-foot-wide reinforced concrete buttress type dam. The spillway consists of a reinforced concrete weir supported by reinforced concrete buttresses spaced approximately 22 feet on center downstream of the crest. Flow over the spillway discharges into a stone apron and stilling basin before discharging over a second concrete downstream weir with four 5-foot wide timber stoplog bays and then beneath the bridge carrying Cross Road.

The gated outlet is located at the left end of the dam and consists of an 8-foot wide by 4-foot-tall conduit thru the non-overflow section controlled by a downward operating slide gate. The gate operator consists of rack and pinion type operators with timber gate stems. The gate structure was previously used to control the impoundment levels as the low-level outlet and the downstream area during fish ladder operation. The gate is currently not utilized, the stems are rotted and inoperable with leakage present through the downstream face. Flows from the low-level outlet enter the stilling pool area and outlet to the downstream channel over the second weir.

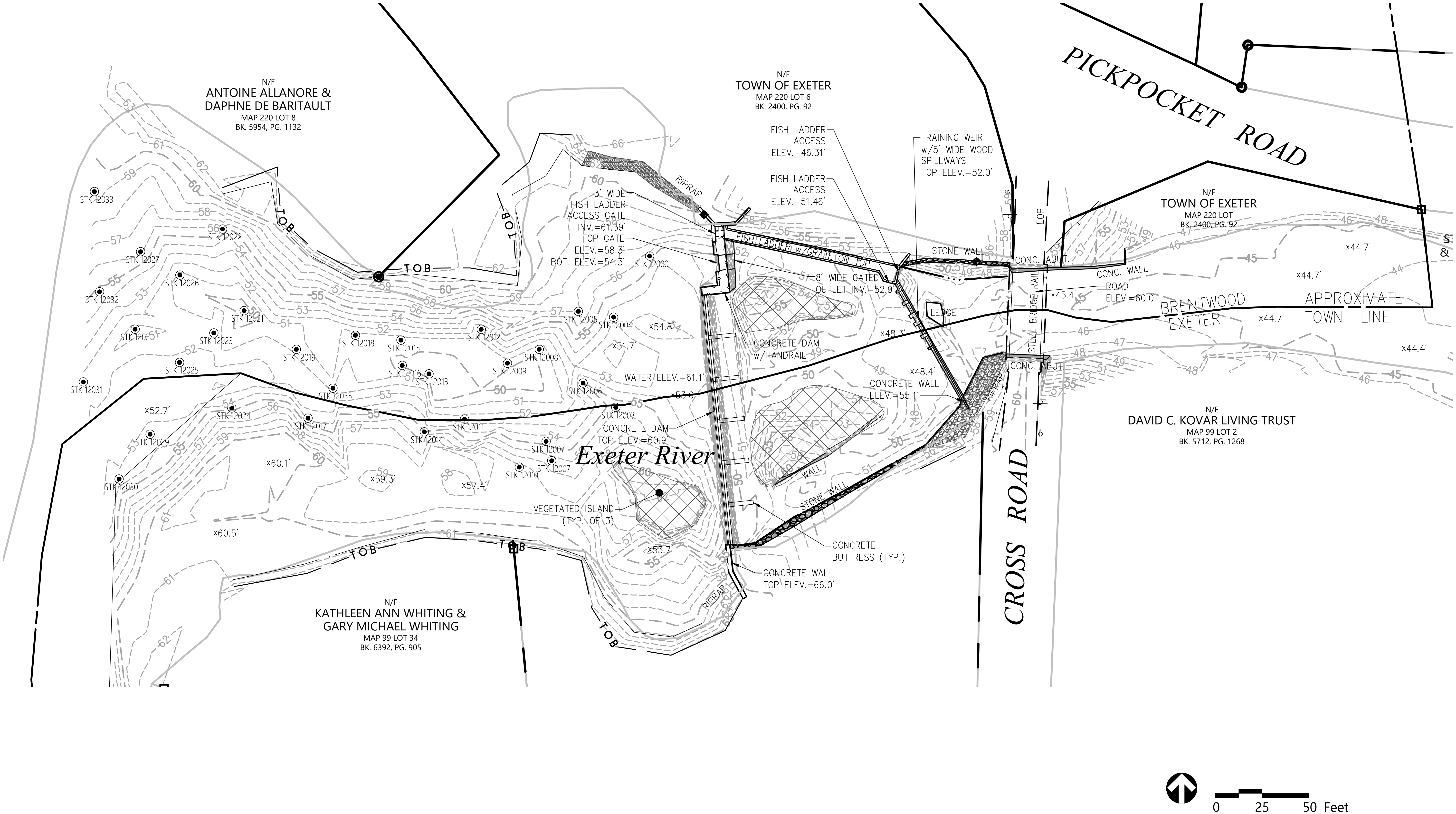
An approximately 95-foot long Denil (baffle) fishway passes thru the left end of the non-overflow section at the left end of the dam. A 3-foot wide timber stoplog bay is located at the upstream end of the fish ladder. The fish ladder structure discharges downstream of the lower weir.

The dam generally functions as a "run-of-the-river" dam; however, given the relatively narrow non-overflow sections at the gate headwall and fish ladder, attenuation of flows may occur during lower flows when the impoundment surface elevation is below the spillway.

There is an island located immediately upstream of the dam on river-right which limits the active conveyance over the dam. Based on site survey, shown on **Figure 1.2-1**, conveyance across approximately 35 linear feet along the dam may be limited by the island during low flow conditions; however, during elevated conditions when the island is submerged, hydraulic impacts are diminished.

Figure 1.2-1 - Existing Base Plan

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



1/19/2024

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Figure 1.2-2: Site Photograph

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

A view of the Pickpocket Dam, looking upstream from Cross Road Bridge

Figure 1.2-3: Pickpocket Dam

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

High-level view of Pickpocket Dam looking upstream from right bank at Cross Road

Side view of Pickpocket Dam and spillway looking north, from right bank

Figure 1.2-4: Pickpocket Dam Gate

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

View of the low-level gate entrance of Pickpocket Dam

View of the low-level gate outlet of Pickpocket Dam

Figure 1.2-5: Exeter River Downstream of Pickpocket Dam

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

View of the Pickpocket Dam and fish ladder looking downstream from left embankment

View of Pickpocket Dam looking upstream

Figure 1.2-6: Pickpocket Dam Impoundment

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

View of Pickpocket Dam looking upstream at the impoundment

View of Pickpocket Dam looking downstream

Figure 1.2-7: Pickpocket Dam Fish Ladder

Pickpocket Dam Feasibility Study Photos | Brentwood & Exeter, New Hampshire

View of the fish ladder looking upstream at Pickpocket Dam to the west.

View of the fish ladder downstream of Pickpocket Dam at training weir.

1.2.3 Operations and Maintenance

The Town of Exeter is responsible for operations and maintenance (O&M) at the dam. Operations at the dam include the operation/exercising of the gate. Maintenance activities at the dam include cutting of vegetation along and around the abutments.

The operation of the low-level gate is governed by an Operation and Maintenance Plan (OMP) prepared by the Town, last revised on August 4, 2014. A copy of the Plan is included in **Appendix B** of this report. The low-level gate is not operated during the summer but had been kept in working order to be manually opened during emergencies in the winter and spring. This past summer the low-level gate did become inoperable due to rot. All trees, brush and logs are removed as necessary throughout the year. The dam is checked every few hours during large flood events. If an incident were to occur, the response will be managed through the Town of Exeter's Emergency Operations Center (EOC). The EOC is a division of the Exeter Fire Department with the Fire Chief serving as the EOC director.

NHFGD installed and operates the fish ladder to help diadromous fish reach spawning and nursery habitat; however, the fish ladder has low counts for upstream fish passage. NHFGD adjusts the stop logs as necessary during migration season based on river flows.

1.3 General Elevations (feet)

Elevations are based upon a survey completed by VHB in October 2016 and May 2023. Elevations reference the NAVD88 vertical datum.

- Top of Dam
  - Left abutment: 65.9 ft ±
  - Right Abutment: 66.0 ft ±
- Normal Pool (Spillway Crest): 60.9 ft ±
- Maximum Pool: 66.0 ft ±

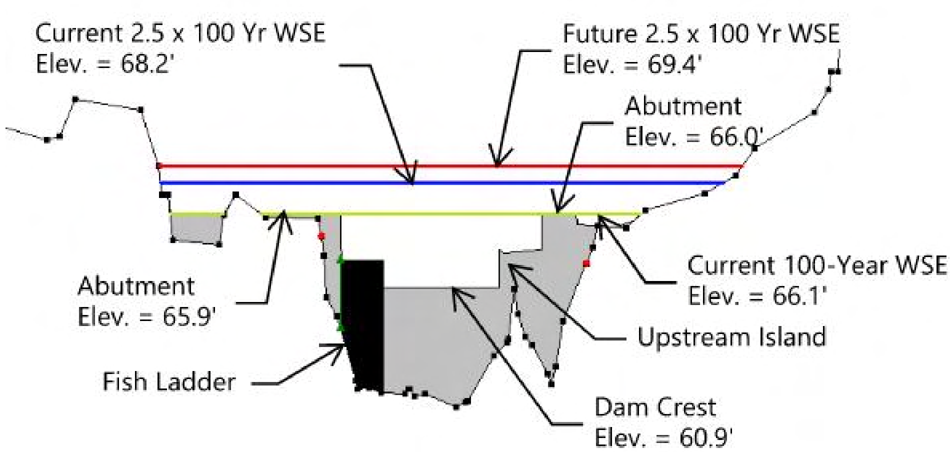


Figure 1.3-1: Pickpocket Dam Cross Section

1.3.1 Primary Spillway

- Type: Broad Crested Weir (Buttress type dam)
- Width: 130 ft ±
- Spillway Crest Elevation: 60.9 ft ±

1.3.2 Low-Level Outlet

- Type: Gate Controlled Structure
- Conduit: 8-Foot-Wide Concrete Opening
- Gate Invert:
  - In: 54.3 ft ±
  - Out: 52.9 ft ±
- Outlet Control Gate approximately 4-foot tall by 8-foot wide

1.3.3 Fish Ladder

- Type: Denil (Baffle)
- Width: 4.3 feet
- Access Stoplog Gate Width: 3 feet
- Length: 95 feet
- Invert:
  - In: 61.4 ft ±
  - Out: 46.3 ft ±

1.3.4 Downstream Secondary Weir

- Type: Timber Stoplog Controlled Concrete Weir Structure
- Width: 76 ft ±
- Crest Elevation: 55.1 ft ±
- Stoplog Gates Width: 5.5-Foot
- Stoplog Elevations:
  - Top: 52.0 ft ±
  - Invert: unknown

1.4 Visual Inspection/Evaluation

Pickpocket Dam was most recently inspected on November 24, 2023. At the time of the inspection, temperatures were near 38°F with clear skies. Photographs to document the current condition of the dam were taken during the inspection and are presented in the Visual Inspection Report, provided in **Appendix C**. Underwater areas were not inspected as part of the field activities.

In general, the overall condition of the Pickpocket Dam was found to be in fair condition**.** The following provides a general summary of observed conditions; refer to the Visual Inspection Report in **Appendix C** for additional information.

- Left Abutment/Embankment: Some areas of deferred vegetation maintenance including weeds and brush along the upstream and downstream side. Crest is well maintained grass.
- Non-Overflow Section: Concrete in good condition; no deficiencies observed.
- Fish Ladder: Contains hairline cracks in the fish ladder walls. Scour along flow lines and concrete weathering typical of the concrete age.
- Gated Outlet: Stems are rotted; inoperable given condition of timber elements. Leakage present through downstream face.
- Spillway: Inspection limited by flow. Flow appears even across the crest. Minor debris present on top of weir.

1.5 Exeter River and its Watershed

The Exeter River rises from several headwater streams and spring-fed ponds in Chester, Derry, and Hampstead, NH, and flows approximately 33 miles through the Towns of Sandown, Danville, Raymond, Fremont, and Brentwood to downtown Exeter where discharges to the Squamscott River as it becomes tidal and is a primary tributary to Great Bay. Pickpocket Dam is located 7.28 river miles upstream from downtown Exeter and the site of the former Great Dam.

Together, the Exeter and Squamscott Rivers drain approximately 128 square miles, including broad wetlands, forested riverbanks and gently flowing waters. Its watershed above the Pickpocket Dam covers approximately 74 square miles in Rockingham County, as shown on **Figure 1.5-1**, including portions of the towns of Brentwood, Chester, Danville, East Kingston, Fremont, Kingston, Raymond and Sandown. The watershed above the Pickpocket Dam also includes small portions of three additional towns (Candia, Derry, Hampstead). The landcover within the watershed consists predominately of forested, agricultural, and residential. The watershed is hilly with a well-defined river channel and bordering wetlands. The Exeter River maintains a sinuous and meandering pattern with an average slope of 0.07% upstream of the dam and 0.09 % downstream of the dam. However, the slope of the river at the dam is closer to 1%. The river depth upstream of the dam ranges from 0.7 feet to 14.2 feet.

The watershed features a number of tributary streams above the Pickpocket Dam including Wilson Brook, Towle Brook, Wason Brook, Fordway Brook, Little River (Brentwood/Kingston), and several unnamed streams and brooks. Phillips Pond (Sandown) is the largest pond in the watershed at 95 acres. The upper reaches of the watershed (including Chester, Raymond, Sandown and Danville) are characterized by scattered farms and single-family residences. In the lower reaches of the river between Fremont and Exeter, urban development becomes more prominent, including industrial and commercial land use in addition to residential development.

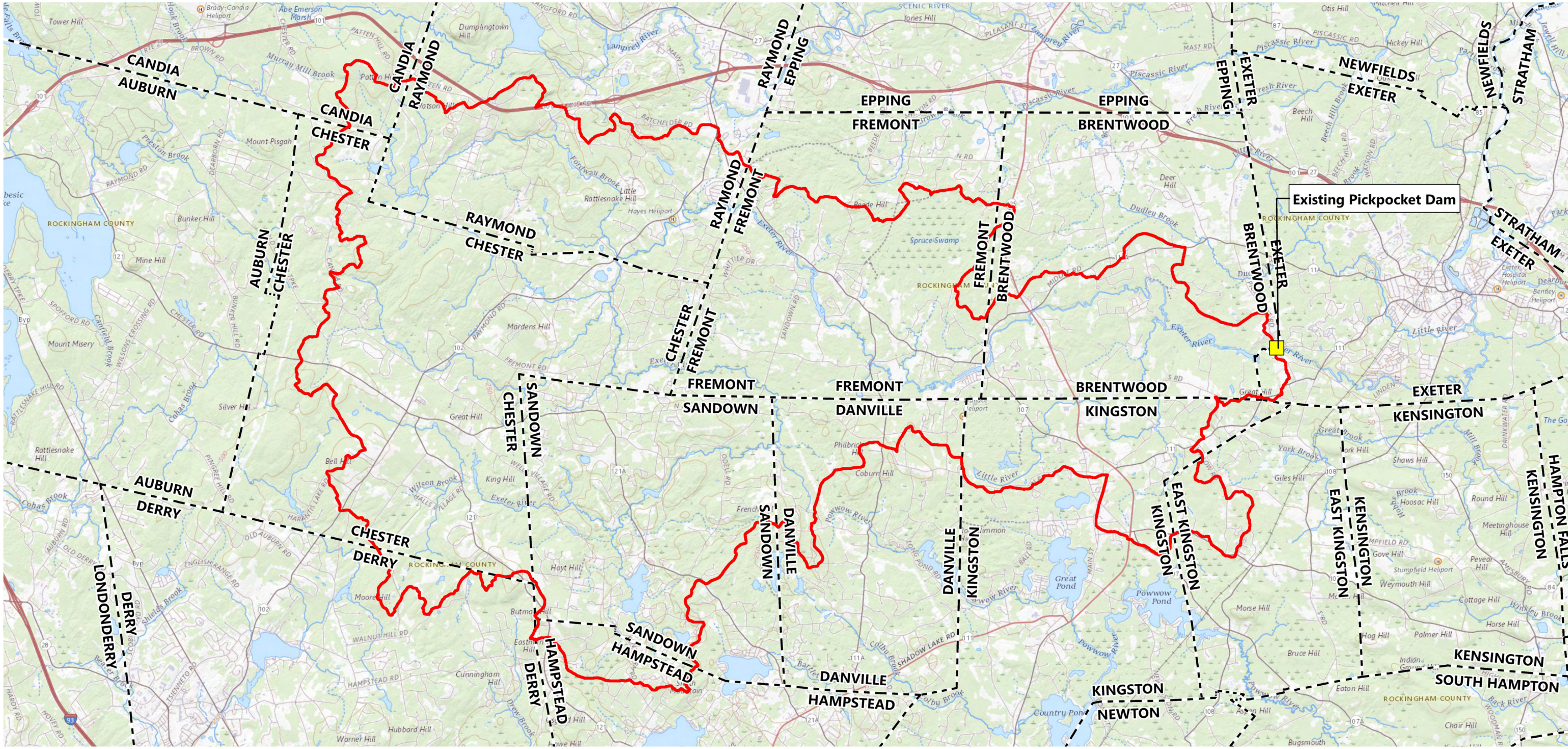
The Exeter River is a tributary to the Great Bay Estuary, a 6,000-acre drowned river valley estuarine system receiving freshwater input from a 1,000 square mile drainage area via seven major river systems. Great Bay is an estuary of national importance as recognized by the U.S Environmental Protection Agency’s (EPA) National Estuary Program, the National Oceanic and Atmospheric Administration’s (NOAA) National Estuarine Research Reserve network and the U.S. Fish and Wildlife Service’s (USFWS) Refuge System. Overall, the anadromous fishery in the Exeter

River is one component of a critical regional resource that supports the larger Little/Great Bay estuary and the Gulf of Maine as a whole.

Population growth in Rockingham County has been very high over the last several decades. In 1960, the US Census population was 98,065. By 2020, Rockingham County population had more than tripled to 314,176 residents. The river's importance is made evident by the fact that the Exeter River is recognized as a "designated river" under the NHDES Rivers Management and Protection Act (RSA 483). The river system plays an essential role in maintaining the overall health of the Great Bay National Estuarine Reserve, is home to a number of rare and endangered species and is an important scenic resource, (NHDES. 2023). For these reasons, the rivers have been recognized not only by the NH Rivers Management and Protection Program (RMPP) but also as part of the NH Resource Protection Project. The upper 33.3 miles of the Exeter River, from its headwaters to its confluence with Great Brook in Exeter, were designated into the RMPP in 1995, while the remaining 2.2 miles of the lower Exeter and the 6.3-mile Squamscott River were added in 2011. These designations carry specific regulatory protections under RSA 483:9-a and RSA 483:9-b which include limitations on the construction of new dams and on certain channel alterations. Other regulations include protection of in-stream flows and water quality. An Exeter-Squamscott River Watershed Management Plan Update was developed by the Exeter-Squamscott River Local Advisory Committee in December 2012 (NHDES, 2012). Selected goals from this plan included improving water quality, maintaining stream channel integrity to minimize flooding and erosion, and promoting important historic, cultural, and recreational resources in the watershed.

Figure 1.5-1: Watershed Map

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Existing Dam Location
Watershed
Town Boundary

0 8,000 16,000 Feet

Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibility\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/20/2024)

1.6 Public Process

The Exeter River Advisory Committee is an 11-member committee charged with providing advice to the Board of Selectmen in all matters relating to the management of the Exeter River, its tributaries, and watershed. Meetings of the Committee are held in the Town Offices and meeting times are publicly posted so that members of the public can attend if desired.

During this study, several status update presentations have been given during the Committee's regular scheduled meetings, including the following:

› April 22, 2021: Presented high level conceptual options to address the dam's deficiencies.

› May 18, 2023: Presented the status of the Feasibility Study to satisfy the requirements of the Coastal Resilience Grant. NHDES presented on the reclassification of the dam.

› September 21, 2023: Presented the status of the Feasibility Study but also on the availability of a new grant. On July 31, 2023, NOAA released the "Restoring Fish Passage through Barrier Removal Grants". The funding will support projects that reopen migratory pathways and restore access to healthy habitat for fish. Funding will be used to implement locally led removals of dams and other in-stream barriers. The Advisory Board agreed to apply for the Grant. On October 2, 2023, the project summary, current analysis and the Grant were presented to the Town of Exeter Select Board who voted to authorize pursuing the Grant.

› November 29, 2023: Presented the status of the Feasibility Study and also responded to questions from the public relating to the study.

1.7 Preliminary Alternatives

During the early phases of the Feasibility Study, five alternatives were developed that investigated the hydraulic impacts from adjusting the dam's abutment and removal of an island that has formed just upstream from the spillway on river right, looking downstream, to assess bringing the dam into compliance. These alternatives included the following:

› Alternative 1 – Increase Abutment Height

› Alternative 1A – Increase Abutment Height & Remove Upstream Island

› Alternative 2 – Add Second Tier Abutment

› Alternative 2A – Add Second Tier Abutment & Remove Upstream Island

› Alternative 3 – Dam Removal

Alternatives 1 and 2 maintained the primary spillway and fish ladder, as it is today, but helped determine the magnitude the abutments and soil embankments would need to be raised to pass the hydraulic design storm, discussed further in the next section. Therefore, for preliminary Alternatives 1, 1A, 2, and 2A, the hydraulic results showed that under normal flow conditions, the modified dam had similar hydraulic results that showed no change from existing conditions. As the Feasibility Study progressed, Alternative 1 was refined, and carried forward to further the conceptual design and evaluate impacts as discussed further in **Section 2** under Alternative 1 – Raise Top of Dam. Alternative 2 was also further progressed, and to simplify the design was transitioned so that the second-tier abutment was only on one side of the dam. This option is presented further in **Section 2** under Alternative 3-Auxillary Spillway. Alternative 3 was also further progressed and discussed further as Alternative 4 – Dam Removal.

1.8 Hydrology and Hydraulics

A hydraulic model of the Exeter River, both upstream and downstream of the Pickpocket Dam was used to evaluate the changes in water depth, width, and velocity for the various alternatives. The model was prepared using the U.S. Army Corps of Engineer's (USACE) Hydrologic Engineering Center, River Analysis System (HEC-RAS) program, Version 5.0.7, which performs hydraulic calculations in natural and man-made channels and performs flow routing computations. The model can simulate depths and velocities for a single reach, a branched system, or a full network of channels. A watershed model or "rainfall runoff model" used information on the physical characteristics of the watershed combined with rainfall data to develop stream flows or discharges.

1.8.1 Data Collection

Survey data at Pickpocket Dam was collected by VHB in 2016, 2022, and 2023. The collected survey data included dam geometry and inverts, fish weir geometry and elevations, 1-foot contour data adjacent to and 200-feet downstream of the dam, and Cross Road bridge geometry, inverts, and elevations. Between the Fall 2022 and Spring of 2023, a boundary survey was completed to document the property boundaries within 500-feet upstream and downstream of the dam. Record plans and deeds were obtained for the dam site and abutting properties. Publicly available Geographic Information System (GIS) Parcel information from the Towns of Exeter and Brentwood was used to supplement the record plans and deeds. After the completion of the document research, field efforts were started to locate existing corner monuments and other evidence of property lines such as iron pipes, fences, and walls. The recovered property corners and evidence of property lines was compared against the document research. The information was reconciled and compiled to develop a final Existing Conditions Plan, shown on **Figure 1.2-1**.

Additionally, a detailed bathymetric survey upstream and downstream of the Pickpocket Dam was completed between December 2022 and May 2023. The detailed bathymetric survey 300-feet upstream of the Pickpocket Dam spillway, 12 cross sections within the impoundment upstream of the dam and the thalweg of the stream at 200-foot intervals was collected via boat utilizing real-time kinematic positioning (RTK), dual frequency Global Positioning System (GPS) survey methods. For the detailed bathymetry in the immediate vicinity of the dam, spot elevations were collected in a grid pattern utilizing both RTK, dual frequency GPS and conventional survey methods. The data was post-processed to produce 1-foot contour intervals. The survey data described above was reconciled and compiled to develop a final Existing Conditions Plan, shown on **Figure 1.2-1**.

Using the NH GRANIT Geographic Information System (GIS) Clearinghouse, VHB obtained LiDAR data collected by the U.S. Geological Survey (USGS) in winter and spring of 2011. VHB used the LiDAR data to develop a digital elevation model (DEM) for use in developing the overbanks of the cross sections for use in the hydraulic model.

Additionally, VHB collected relevant information from the following sources to develop the hydraulic model:

› NHDES Dam Bureau File for Pickpocket Dam #029.07 provided historic data including inspections, photographs, construction plans for repair, letters of deficiency, and other relevant correspondence.

- The 2013 rainfall-runoff model developed using the USACE Hydrologic Engineering Center, Hydrologic Modeling System (HEC-HMS) software, Version 3.5, and accompanying report from Weston & Sampson was used to develop runoff hydrographs for inputs in the hydraulic model. VHB reviewed model inputs, watershed based hydrologic parameters, and outlet configurations to confirm model applicability for this study. The revisions to the model are described in more detail below under **Section 1.8.2.**
- The hydraulic model developed to support the previous breach analysis was used as the basis for the hydraulic evaluation in this study. That model was prepared using two National Flood Insurance Program (NFIP) flood insurance studies and associated hydraulic models. Upstream of Pickpocket Dam, the effective study form May 2005 (modelling completed in April 1998) was used, and from Pickpocket Dam and below a preliminary study from February 2016, and later refined as part of a Letter of Map Revision (LOMR), completed in 2018 following the removal of the Great Dam in Exeter, was used.

1.8.2 Hydrologic Analysis

Weston & Sampson performed a hydrologic analysis of the Exeter River Watershed (which includes the Pickpocket Dam) in 2013 to estimate storm event based peak flows to be used as part of the Great Dam Removal Feasibility Study. The hydrologic analysis was conducted in accordance with NHDES Env-Wr 403.05 - "Hydrologic Investigations" guidance.

The rainfall-runoff model was developed within HEC-HMS, Version 4.10, which utilized the SCS curve number method to estimate runoff hydrographs resulting from storm event-based precipitation. Model watershed input parameters include drainage area, development and land use characteristics, hydrologic soil groups, Natural Resource Conservation Service (NRCS) runoff coefficient (curve number), initial abstraction, and times of concentration. VHB reviewed the model inputs to identify any necessary updates or changes that should be included since the model's development, including:

- Updating model precipitation totals and distribution curves using the NOAA Atlas 14 Point Precipitation Frequency Estimates, as shown in **Table 1.8-1**. NOAA Atlas 14 estimates a 100-year, 24-hour precipitation total of 8.4 inches.
- VHB used the specified hyetograph method to define the depth and distribution for the 100-year storm, which differs from the frequency-based hypothetical storm method used in the original Weston & Sampson model. The frequency storm method applies an area correction factor to reduce point estimate precipitation estimates for large watershed areas. This analysis evaluated reduced watershed sizes for the Pickpocket Dam as compared to the contributing area to the Great Dam. Based on guidance from NHDES Dam Bureau staff that the analysis should provide a conservative estimate for peak flows in evaluating risk potential, and advised to use NOAA Atlas 14 data and distributions, VHB selected the specified hyetograph method for this analysis.
- Subwatershed Times of Concentration (Tc) and associated lag times calculated in accordance with NRCS National Engineering Handbook, Part 630 Hydrology, Chapter 15 watershed lag method based on calculated flow times for sheet and overland flow using site topographic and land cover data from the original model were used in the analysis.
- Weighted Runoff Curve Numbers (CN), which are used to characterize runoff properties for specific land use and soil conditions, calculated in accordance with TR-55 methodologies for each subwatershed during the original model were used in this analysis.

VHB estimated the “sunny day”, or normal flow based on the annual daily mean flow for the Exeter River at Pickpocket Dam. VHB obtained flow statistics available from USGS National Water Information System: Web Interface’s Exeter River at Haigh Road station gage (01073587) and scaled the flows based on the contributing watershed size of the gaged location and the subject location. The analysis of 19 years of complete annual record data resulted in an estimated normal flow of 136 cubic feet per second (cfs).

1.8.2.1 Future Rainfall Recommendation

Shifts in weather patterns, widely noted in recent years, will continue to lead to more intense and frequent extreme weather events, such as heavy rainfall.

Considering future rainfall events in the dam alternative analysis will help protect the Town, its residents, the general public, and will guard against evolving regulations that account for the frequent extreme weather events. It is entirely foreseeable that regulatory standards for dams in the State will be updated in the future to reflect the need for designdams to handle more frequent and intense storm events. These updates will likely necessitate more rigorous design requirements and resilience measures for structures like dams to maintain consistent safety levels. Designing a dam with consideration for future rainfall scenarios from the outset could prevent the need for retroactive modifications to comply with revised regulations. As outlined in **Section 2.8** below, dam modification costs are very high. It is more cost-effective to anticipate and integrate climate adaptations into the dam now, rather than bearing the substantial expense of a secondary dam modification project in the future.

During the preparation of this document. NHDES started the process of rulemaking for proposed changes to Env-Wr 100-700. The proposed regulation changes that impact Pickpocket Dam include modifications to the design discharge requirements for existing high hazard dams and adds a requirement for dam removal projects that, upon request by the department, hydrologic and hydraulic analyses be provided to demonstrate that any remaining components of the dam structure no longer qualify as a jurisdictional dam. With the proposed rule change, the high hazard dams shall pass the 1000-year design event with one foot of freeboard and without manual operations. We have included this proposed 100-year design event in the design event flow summary table below.

In November 2018, NHDES convened a steering committee comprised of representatives from various state agencies to oversee and contribute to the development of the NH Flood Risk Summary which provides step-by-step guidance to incorporate coastal flood risk projections into infrastructure projects. Per the NH Coastal Flood Risk Summary – Part II: Guidance for Using Scientific Projections, the projected extreme precipitation estimate is a 15% increase on the best available precipitation data. The 24-hour rainfall depths were multiplied by 1.15 to estimate the future increase in rainfall depths, as detailed in **Table 1.8-1** below. The rainfall data was updated in the project HEC-HMS hydrologic model for the Exeter River which resulted in a 49% increase of the design flood peak flow. **Table 1.8-2** below provides a summary of the HEC-HMS peak flow calculations.

Table 1.8-1. 24-Hour Design Rainfall Depths by Recurrence Interval

Recurrence Interval (years)	Current Rainfall Depth (in)	Future Rainfall Depth (in)
1	2.7	3.0
2	3.3	3.8
5	4.4	5.0
10	5.3	6.1
25	6.5	7.5
50	7.4	8.5
100	8.4	9.6
1000	13.3	15.3

Source: NOAA Atlas 14

Table 1.8-2. Pickpocket Dam Design Event Flows

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 1000-Year	13,900
Future 100-Year	5,940
Future 2.5 x 100-Year	14,900

1.8.3 Hydraulic Analysis

VHB developed a hydraulic model using the USACE's HEC-RAS program software to analyze water surface elevations (WSE) and velocities upstream and downstream of Pickpocket Dam, focusing on the main stem of the Exeter River. As described above, the hydraulic model developed to support the earlier breach analysis was used as the basis for the hydraulic evaluation in this study. The geometry of the cross sections within HEC-RAS model was modified with the survey data collected as part of this Study. This was accomplished by modifying the project digital terrain model by replacing the area of the channel with the updated channel bathymetry by interpolating the river profile and cross-sectional data collected during the survey phase of the project, this is commonly referred to as "burning the in channel." **Figure 1.8-1** displays the locations of the model cross sections.

Figure 1.8-1: HEC-RAS Model Cross Sections

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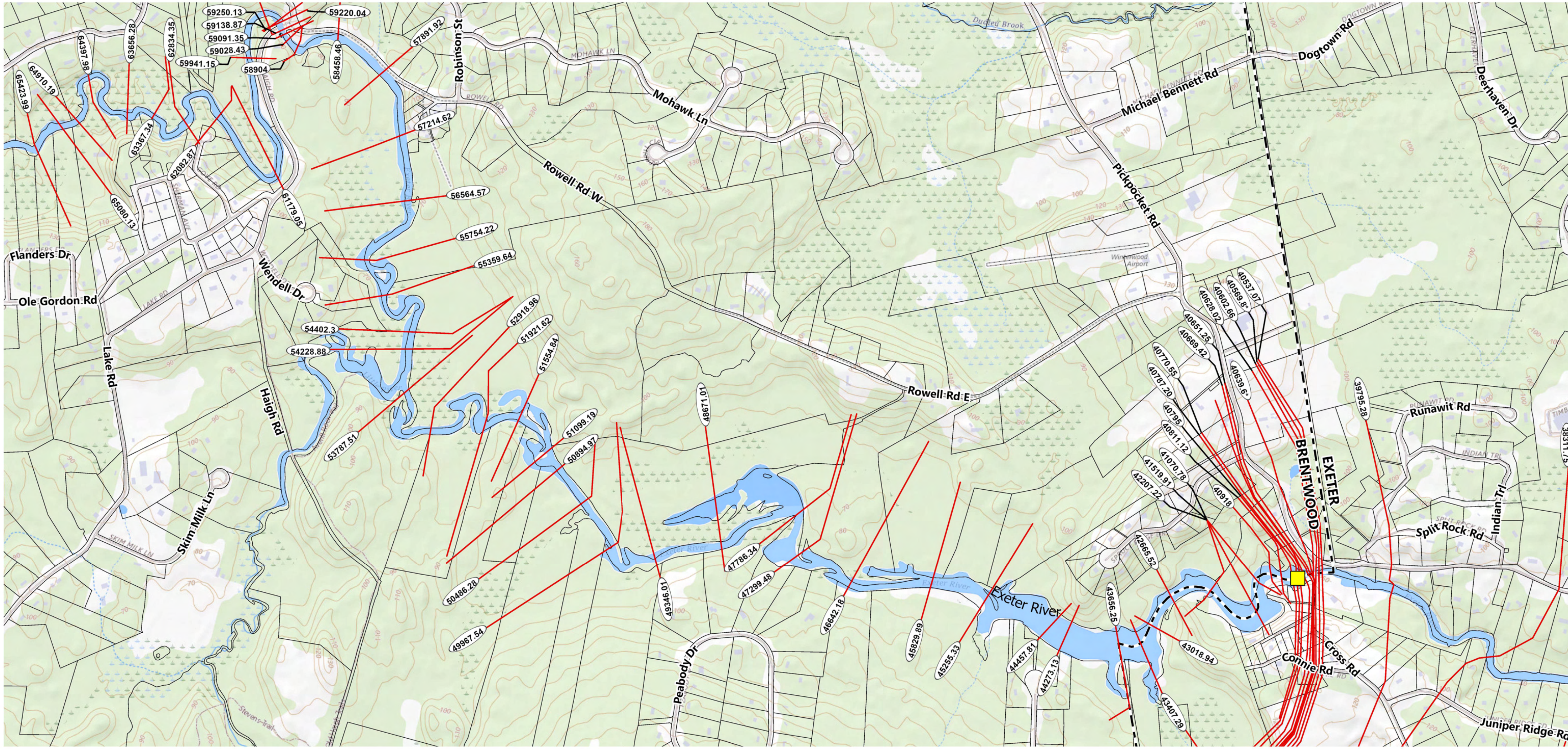

Existing Dam Location

Town Boundary

Parcels

Waterbody (NHD)

Cross Sections

0 1,000 2,000 Feet

Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibility\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/19/2024)

2

Alternatives Considered

2.1 Introduction

The key element of this Feasibility Study is to define a range of alternatives for consideration by the Town and community. Based on coordination with the Town of Exeter, State and federal environmental agencies, and the River Advisory Committee, several alternatives were developed for this study. These alternatives were developed based on refinement of the preliminary alternatives discussed in Section 1.7 above. The study provides a discussion of the costs associated with each of these alternatives, and later sections provide an assessment of the impacts and benefits of the three alternatives that were moved forward for more detailed evaluation. The alternatives listed below are discussed in this section;

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

2.1.1 Conceptual Design Assumptions

As indicated by the completed hydrologic and hydraulic models, the island upstream of the right end of the spillway reduces the discharge capacity during spillway design flood events; as such, for the purposes of this analysis, it was presumed that the upstream island is removed as part of each of the alternatives.

For the purposes of the conceptual design, it has been assumed that no changes to the low-level gate/fish ladder headwall will occur aside from gate replacement to restore gate operability.

For each alternative identified, two design flow event scenarios are considered. As per Env-Wr 303.11 (a)(3), High hazard potential dams are required to pass 250% of the 100-year storm event. No guidance for considering impacts of future rainfall distribution is provided in the regulations. However, given the anticipated design life for a rehabilitated structure, future climate informed decision making for spillway design structures is recommended. As such, alternatives consider design requirements for both current and future rainfall depths using the current discharge capacity requirements.

An initial proposal by NHDES was to modify the current discharge capacity requirements for existing high hazard dams is in the rule making process. Therefore, we also evaluated the proposed design discharge capacity requirements for existing high hazard dams, the 1000-year flood event. The calculated design flow for the 1000-year flood event is greater than 250% of the 100-year flood based on current rainfall, and less than 250% of the 100-year flood based on future rainfall. The evaluation below for each alternative brackets the potential change in the required discharge capacity if the proposed rule changes are approved.

2.2 Alternative 1 – Raise Top of Dam

Alternative 1 includes meeting regulatory spillway design flood requirements by maintaining the existing spillway discharges structures in the current geometry and meeting spillway design flood requirements by raising the top of the dam elevation such that the design storm is contained with 1 foot of freeboard remaining. Based upon completed hydrologic analysis, the required top of dam elevation for the cases considered are summarized in **Table 2.2-1** below.,

Table 2.2-1. Alt. 1 Required Top of Dam Elevations

Design Storm	Peak Water Surface Elevation (ft)	Required Top of Dam Elevation (ft)
Current Dam(Current Rainfall)	68.2	66.0 (Existing Top of Dam)[1]
2.5 X 100 yr (Current Rainfall)	69.2	70.2
2.5 X 100 yr (Future Rainfall)	71.7	72.7

1. Existing top of dam is non-compliant with the required top of dam elevation.

Conceptually, as shown on **Figure 2.2-1 and Figure 2.2-3**, this alternative would include the following activities:

› Increase Height of Existing Training Walls: Provide structural extensions of the left and right training walls at the spillway to meet the required top of dam elevation. In addition to raising the top of the walls, additional stabilization to maintain the structural integrity of the existing walls will be required.

› Construct Earthen Embankment: To prevent overtopping of the abutments beyond the limits of the existing dam, earthen embankments would be constructed to impound high water during design storm events. **Table 2.2-2** below summarizes the required length and maximum height from existing ground to the top of the embankment for both the right and left embankment for current and future rainfall.

Figure 2.2-1 Raise Top of Dam Concept Drawing

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

General Notes

1. THE EXISTING CONDITIONS SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY VANASSE HANGEN BRUSTLIN, INC IN OCTOBER 2016, AND MAY 2023.
2. NO LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN ON THIS PLAN. NO INVESTIGATION NOR RESEARCH OF UNDERGROUND UTILITIES HAS BEEN PERFORMED.
3. HORIZONTAL DATUM IS N.A.D. 1983 (2011).
4. CONTOURS AND SPOT ELEVATIONS SHOWN ARE BASED UPON N.A.V.D. 1988 (GEOID 12A).
5. PROPERTY LINES SHOWN WERE COMPILED FROM RECORD INFORMATION OBTAINED FROM R.C.R.D. AND G.I.S. INFORMATION OBTAINED FROM TOWN ASSESSOR DATA.

Plan References

1. PLAN OF LAND ENTITLED, "PICKPOCKET LAND OF MILLIKEN INDUSTRIALS INC." EXETER & BRENTWOOD, NH. DATED AUGUST, 1967 AND RECORDED AT R.C.R.D AS PLAN D-1388.
2. PLAN OF LAND ENTITLED, "CONSERVATION EASEMENT PLAN FOR JANE S. STORM", BRENTWOOD, NH. DATED JULY, 2003 AND RECORDED AR R.C.R.D AS PLAN C-33127.
3. PLAN OF LAND ENTITLED, "PLAT OF LAND FOR ARDEE, INC.", EXETER, NH. DATED MAY, 1982 AND RECORDED AT R.C.R.D AS PLAN C-11155.
4. PLAN OF LAND ENTITLED, "SUBDIVISION OF LAND FOR MARK BREWER", EXETER, NH. DATED AUGUST, 1977 AND RECORDED AT R.C.R.D. AS PLAN D-7441.

1/17/2024

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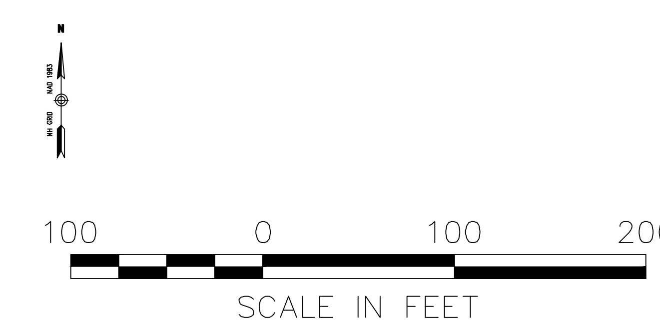

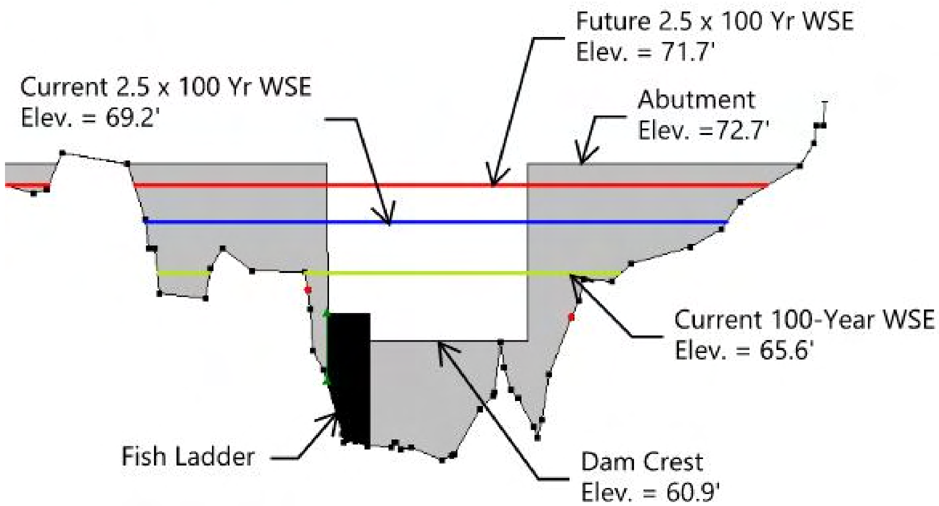

Figure 2.2-2: Alternative 1 - Raise Top of Dam Concept Cross Section

Table 2.2-2. Alt. 1 Required Embankment Geometry

Design Storm	Left Embankment		Right Embankment	
	Length (ft)	Max Height (ft)	Length (ft)	Max Height (ft)
Current Rainfall	240	4.2	175	4.2
Future Rainfall	270	6.7	195	6.7

Prior to embankment construction, the existing ground surface would be cleared to a minimum of 20 feet beyond the limits of the proposed footprint. The existing subgrade would be excavated to a suitable bearing surface sufficient to meet settlement and seepage design requirements. The proposed embankment would be constructed in compacted lifts of a well graded, low permeability fill material suitable for dam embankment construction; requirements for seepage control would be determined during final design phases.

The final embankment cross section is anticipated to include a top width of 6 feet with 2.5H:1V side slopes (or flatter for maintenance purposes). Given embankment exposure and short-term hydraulic loading, it is not anticipated that hard armoring would be required; as such, the surfaces would be loamed and seeded with grass. Visual simulations were developed and are displayed on **Figure 2.2-3** to show how the concept design could look once the top of dam is raised.

› Under this alternative, there is no change to the spillway crest elevation or the top of the headwall at the fish ladder / low level outlet gate. As such, WSEs would only be impacted during storm events in excess of the current capacity of the dam.

› The conceptual design remains within the limits of Town of Exeter property at the left end of the dam. However, raising the dam to the required height results in the embankment crossing into 23 Cross Road on the right abutment. While the limits of work would not impact infrastructure on the 23 Cross Road parcel, an easement or land taking would be required to support embankment installation in this area.

Raising the top of dam elevation results in induced flooding to areas upstream of the dam during storm events that would overtop the dam under existing conditions. The Town would be required to purchase and obtain additional property rights and/or flowage rights from the landowner abutting the Exeter River to support this alternative. In particular, induced flooding into the basement of the residential structure at 23 Cross Road during the design storm event is anticipated to occur under this alternative.

Figure 2.2-3 Alternative 1 – Raise Top of Dam Visual Simulations

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

A view of Pickpocket Dam, looking upstream

A view of Pickpocket Dam with Alternative 1, looking upstream

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

An oblique view of Pickpocket Dam primary spillway with Alternative 1, looking from the right bank

2.3 Alternative 2 – Spillway Replacement

Alternative 2 includes meeting regulatory spillway design flood requirements by replacing the spillway with a labyrinth spillway. A labyrinth spillway is a nonlinear arrangement of the spillway weir control structure intended to increase the total flow length available for discharge capacity while maintaining similar spillway footprint width.

Given site constraints and design recommendations for labyrinth spillway compression ratios, a total weir length of 600 feet was conceptually designed for this site. Given flood routings, required top of dam elevations were then determined for the design storms considered such that the design storm is contained with 1-foot of freeboard remaining. Based upon completed hydrologic analysis, the required top of dam elevation for the cases considered are summarized in **Table 2.3-1** below.

Table 2.3-1. Alt. 2 Required Top of Dam Elevations

Design Storm	Peak Water Surface Elevation (ft)	Required Top of Dam Elevation (ft)
Current Dam (Current Rainfall)	68.2	66.0(Existing Top of Dam)[1]
2.5 X 100 yr (Current Rainfall)	65.6	66.6
2.5 X 100 yr (Future Rainfall)	67.7	68.7

1. Existing top of dam is non-compliant with the required top of dam elevation

Conceptually, as shown on **Figure 2.3-1**, this alternative would include the following activities:

- Increase Height of Left Training Wall: Provide structural extensions of the left training wall at the spillway to meet the required top of dam elevation. Under the current rainfall scenario, the top of the training wall could be raised through the addition of a curb or scour stone step behind the wall given the limited flow depth. However, under the future rainfall case, this would include a structural extension of the wall.
- Construct Earthen Embankment: To prevent overtopping of the abutments beyond the limits of the existing dam, earthen embankments would be constructed to impound high water during design storm events.

Table 2.3-2. Alt. 2 Required Embankment Geometry

Design Storm	Left Embankment		Right Embankment	
	Length (ft)	Max Height (ft)	Length (ft)	Max Height (ft)
Current Rainfall	210	0.6	100	0.6
Future Rainfall	230	2.7	145	2.7

Construction methodology would be like that presented in Alternative 1.

The final embankment cross section is anticipated to include a top width of 6 feet with 2.5H:1V side slopes (or flatter for maintenance purposes). Given embankment exposure and short-term hydraulic loading, it is not anticipated that hard armoring would be required; as such, the surfaces would be loamed and seeded with grass. Alternative approaches such as structural parapet walls could also be considered in lieu of earthen embankments.

Figure 2.3-1 Spillway Replacement Concept Drawing

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

General Notes

1. THE EXISTING CONDITIONS SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY VANASSE HANGEN BRUSTLIN, INC IN OCTOBER 2016, AND MAY 2023.
2. NO LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN ON THIS PLAN. NO INVESTIGATION NOR RESEARCH OF UNDERGROUND UTILITIES HAS BEEN PERFORMED.
3. HORIZONTAL DATUM IS N.A.D. 1983 (2011).
4. CONTOURS AND SPOT ELEVATIONS SHOWN ARE BASED UPON N.A.V.D. 1988 (GEOID 12A).
5. PROPERTY LINES SHOWN WERE COMPILED FROM RECORD INFORMATION OBTAINED FROM R.C.R.D. AND G.I.S. INFORMATION OBTAINED FROM TOWN ASSESSOR DATA.

Plan References

1. PLAN OF LAND ENTITLED, "PICKPOCKET LAND OF MILLIKEN INDUSTRIALS INC." EXETER & BRENTWOOD, NH. DATED AUGUST, 1967 AND RECORDED AT R.C.R.D AS PLAN D-1388.
2. PLAN OF LAND ENTITLED, "CONSERVATION EASEMENT PLAN FOR JANE S. STORM", BRENTWOOD, NH. DATED JULY, 2003 AND RECORDED AR R.C.R.D AS PLAN C-33127.
3. PLAN OF LAND ENTITLED, "PLAT OF LAND FOR ARDEE, INC.", EXETER, NH. DATED MAY, 1982 AND RECORDED AT R.C.R.D AS PLAN C-11155.
4. PLAN OF LAND ENTITLED, "SUBDIVISION OF LAND FOR MARK BREWER", EXETER, NH. DATED AUGUST, 1977 AND RECORDED AT R.C.R.D. AS PLAN D-7441.

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- Demolish the existing spillway structure and right training walls in their entirety. Expose suitable subgrade and construct a reinforced concrete slab and apron. Form and construct a six-cycle labyrinth with 26-foot-wide cycle widths with 55-foot sidewall lengths and 5-foot apex width.
- As part of this alternative, given the increased discharge capacity at lower impoundment elevations, the island upstream of the right end of the spillway would need to be altered or removed in its entirely to allow for an average upstream channel approach depth of approximately 7 feet to provide for sufficient flow capacity to reach the weir.

The conceptual design remains within the limits of Town of Exeter property; no easements or land takings for construction are required. The proposed geometry decreases flood elevations for all storm events considered; therefore, induced flooding upstream of the dam is not expected. **Figure 2.3-2** below is picture that shows an example of a Labyrinth Spillway.

Figure 2.3-2: Example Picture of Labyrinth Spillway

2.4 Alternative 3 – Auxiliary Spillway

Alternative 3 includes meeting regulatory spillway design flood requirements by constructing an auxiliary overflow section through the left abutment. The control elevation for auxiliary spillway would be set at the top of the existing dam elevation.

Given site constraints, a 165-foot-wide auxiliary spillway was conceptually designed for this site. Given flood routings, required top of dam elevations were then determined for the design storms considered such that the design storm is contained with 1 foot of freeboard remaining. Based upon completed hydrologic analysis, the required top of dam elevation for the cases considered are:

Table 2.4-1. Alt. 3 Required Top of Dam Elevations

Design Storm	Peak Water Surface Elevation (ft)	Required Top of Dam Elevation (ft)
Current Dam (Current Rainfall)	68.2	66.0 (Existing Top of Dam)[1]
2.5 X 100 yr (Current Rainfall)	68.2	69.2
2.5 X 100 yr (Future Rainfall)	69.7	70.7

1. Existing top of dam is non-compliant with the required top of dam elevation

Conceptually, as shown on **Figure 2.4-1,** this alternative would include the following activities:

› Increase Height of Right Training Wall: Provide structural extensions of the right training wall at the spillway to meet the required top of dam elevation. This would include a structural extension of the wall and structural stabilization of the wall section.

› Construct Earthen Embankment: To prevent overtopping of the right abutment, an earthen embankment would be constructed to impound high water during design storm events.

Table 2.4-2. Alt. 3 Required Embankment Geometry

Design Storm	Right Embankment	
	Length (ft)	Max Height (ft)
Current Rainfall	170	3.2
Future Rainfall	185	4.7

Construction methodology would be like that presented in Alternative 1.

The final embankment cross section is anticipated to include a top width of 6 feet with 2.5H:1V side slopes (or flatter for maintenance purposes). Given embankment exposure and short-term hydraulic loading, it is not anticipated that hard armoring would be required; as such, the surfaces would be loamed and seeded with grass. Alternative approaches such as structural parapet walls could also be considered in lieu of earthen embankments.

› Construct the overflow auxiliary spillway section. Components associated with the auxiliary spillway include:
  - Clear the left abutment areas to the limits of the proposed overflow spillway.
  - Excavate the left cut slope and left abutment area as required to provide an entrance channel meeting design requirements.

Figure 2.4-1 Auxiliary Spillway Concept Drawing

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

General Notes

1. THE EXISTING CONDITIONS SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY VANASSE HANGEN BRUSTLIN, INC IN OCTOBER 2016, AND MAY 2023.
2. NO LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN ON THIS PLAN. NO INVESTIGATION NOR RESEARCH OF UNDERGROUND UTILITIES HAS BEEN PERFORMED.
3. HORIZONTAL DATUM IS N.A.D. 1983 (2011).
4. CONTOURS AND SPOT ELEVATIONS SHOWN ARE BASED UPON N.A.V.D. 1988 (GEOID 12A).
5. PROPERTY LINES SHOWN WERE COMPILED FROM RECORD INFORMATION OBTAINED FROM R.C.R.D. AND G.I.S. INFORMATION OBTAINED FROM TOWN ASSESSOR DATA.

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1. PLAN OF LAND ENTITLED, "PICKPOCKET LAND OF MILLIKEN INDUSTRIALS INC." EXETER & BRENTWOOD, NH. DATED AUGUST, 1967 AND RECORDED AT R.C.R.D AS PLAN D-1388.
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4. PLAN OF LAND ENTITLED, "SUBDIVISION OF LAND FOR MARK BREWER", EXETER, NH. DATED AUGUST, 1977 AND RECORDED AT R.C.R.D. AS PLAN D-7441.

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- Construct a control section. The control section would be designed to set the elevation at which the spillway would be engaged at the top of the current dam El. 66.0. The control section would likely take the form of a reinforced concrete gravity wall excavated and found upon bedrock to mitigate the formation of a headcut or undermining of the control section.
- Construct a containment berm along the left side of the channel beyond the hillside at the left abutment; the berm would likely include a retaining wall at the downstream terminus to avoid encroachment on the roadway right of way.
- Excavate an exit channel designed to convey flow back towards the downstream channel upstream of Cross Road.

The conceptual design remains within the limits of Town of Exeter property; no land takings for construction are required. However, temporary easements for construction and maintenance easements will be required at the right abutment. **Figure 2.4-2** below shows the conceptual cross section of Alternative 3 with the estimated flood elevations. The proposed geometry increases flood elevations for all storm events which are predicted to overtop the existing dam abutments and would result in no impacts to the normal pool or flood elevations for storms that do not currently overtop the abutments.

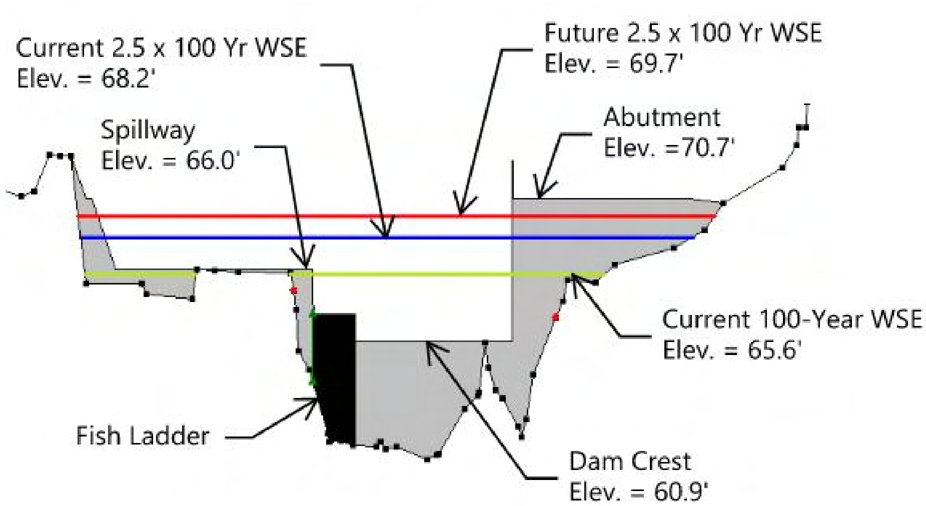

Figure 2.4-2: Alternative 3 - Auxiliary Spillway Concept Cross Section

2.5 Alternative 4 – Dam Removal

Alternative 4 would remove the dam and its associated features from the river. Conceptually, as shown on **Figure 2.5-1**, this alternative would include the following activities:

- Dam Removal: Complete demolition and removal of the primary spillway structure, abutments, sluice gate and the fish ladder. The lower weir would also be removed.
- Island Preservation: The islands downstream of the dam would be retained and repurposed to help recreate the geomorphology of a natural river. The island upstream of the dam will be removed as part of the reconstruction of the channel.
- Channel Reconstruction: The river channel would be reconstructed through the former dam location, with a conceptual design to simulate the geomorphology of a natural river with a channel slope of approximately 1-percent, consistent with the macro-scale longitudinal profile of the Exeter River in this location. The channel configuration will include a V-shaped channel with a bankfull width of approximately 72 feet to allow for sufficient depths during low flow as shown on **Figure 2.5-2**. As shown on **Figure 2.5-1**, the design would include grading a side channel around the south side of the existing island. Reshaping of the streambed or placement of stable streambed materials may be required to control the risk of erosion or to create conditions favorable to aquatic habitat or upstream fish passage once flow is returned to the full channel. While it is not anticipated that substantial grading would be required within the immediate vicinity of the dam, the amount and character of grading and channel stability structures (if needed) would be determined during the final design and permitting process if the dam removal alternative is selected. Areas beyond the limits of the channel disturbed by construction equipment would be restored to provide floodplain and habitat in the vicinity of the former dam. Visual simulations were developed and are displayed on **Figure 2.5-3** to show how the concept design could look in the vicinity of the former dam.
- Upstream Rehabilitation: The natural flow of the river will be restored, and during the final design planting of the former under water areas will be necessary to stabilize the new stream banks, reintroduce appropriate native vegetation to reduce erosion, and improve habitat diversity. This would include bank plantings/seeding from the current dam site to approximately 2.5 miles upstream.

Figure 2.5-1 - Dam Removal Plan

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

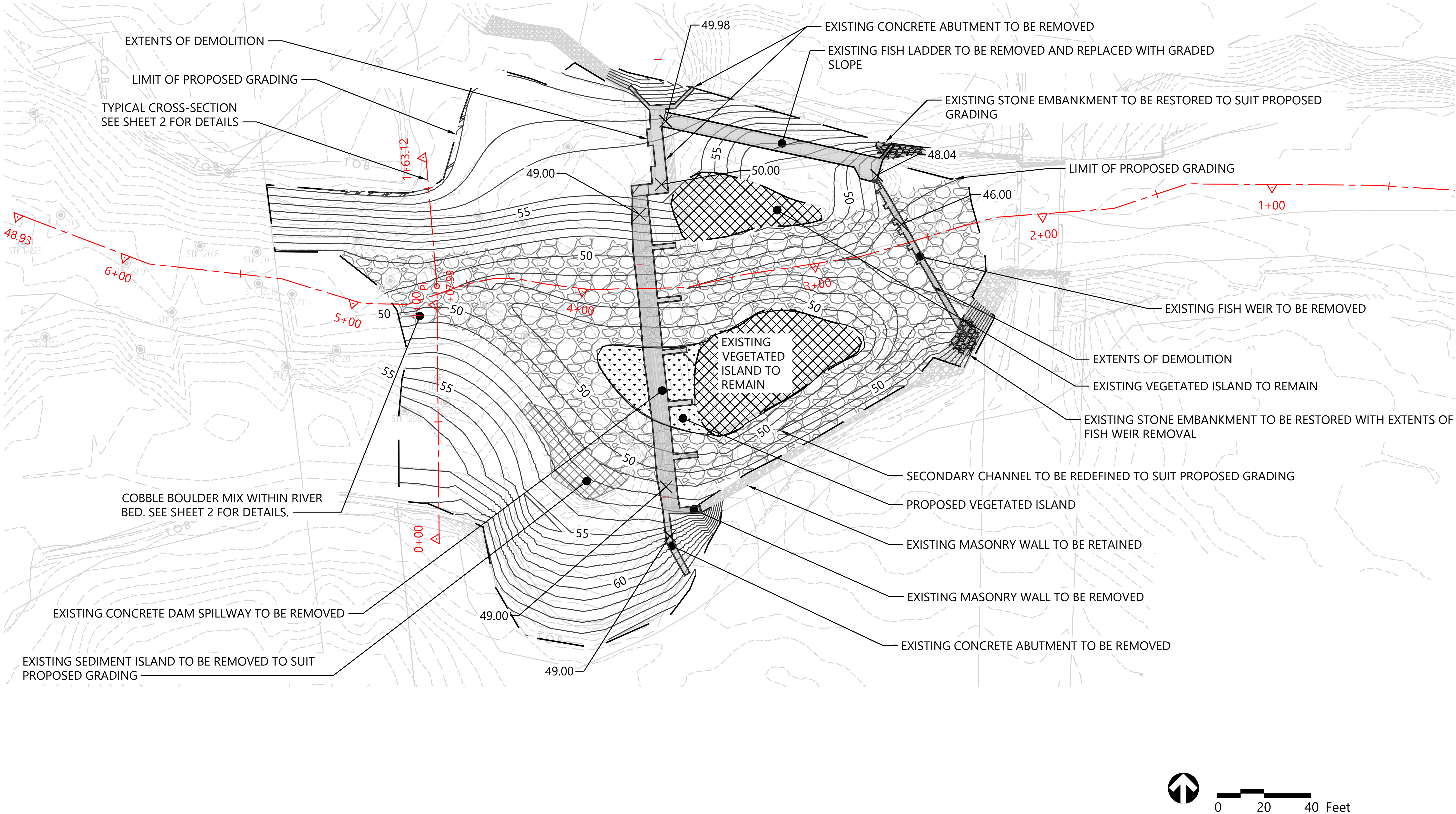

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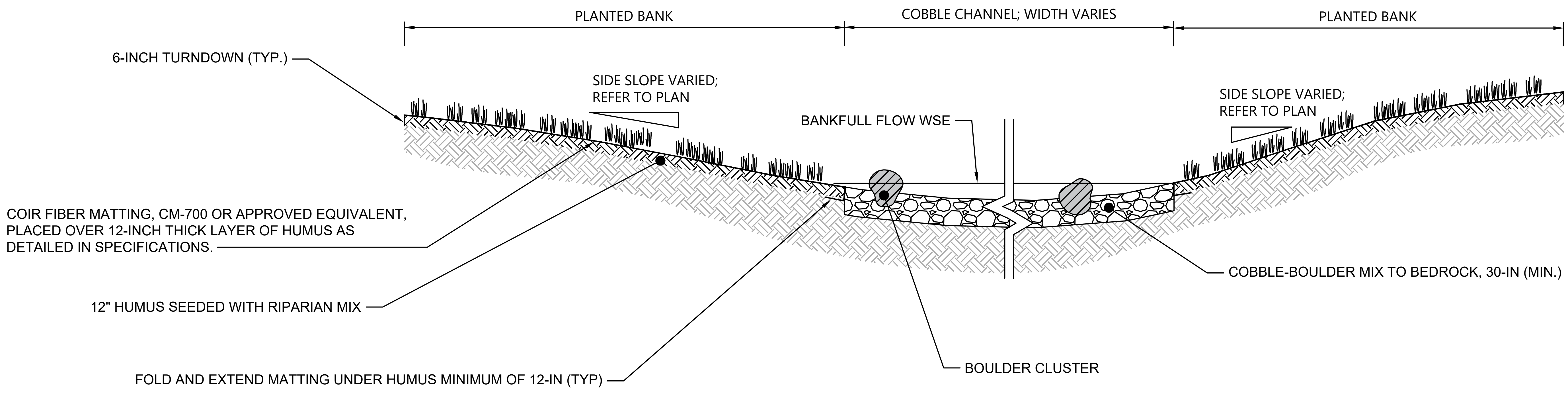
Figure 2.5-2 - Dam Removal Details Concept Drawing

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

TYPICAL CROSS-SECTION

SCALE 1" = 20'



LONG SECTION

SCALE 1" = 40' H; 1" = 8' V

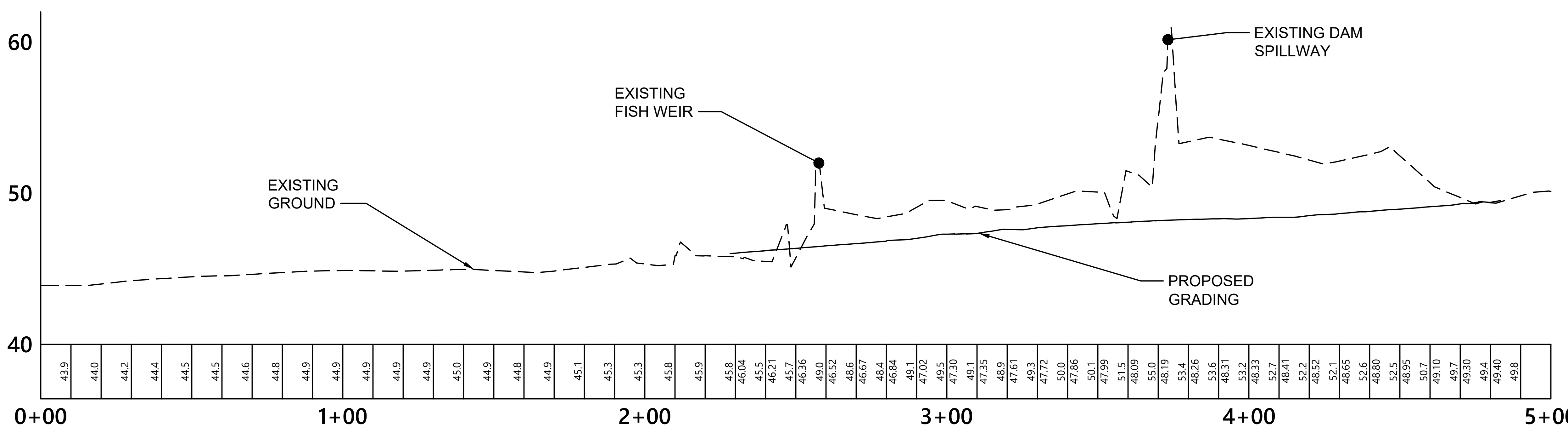


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Figure 2.5-3: Alternative 4 – Dam Removal Visual Simulations

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

A view of Pickpocket Dam, looking upstream

A view of Pickpocket Dam removed, looking upstream

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

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

2.6 Alternative 5 – No Action/Hazard Reduction

Alternative 5 involves maintaining the dam as it is today and take actions necessary to reduce the potential hazards and re-classify the dam. Pickpocket Dam is currently classified as a high-hazard dam. The hazard classification is primarily driven by potential impacts to the first floor of one residential property with a foundation, and secondarily for potential impacts to the structural support for multiple mobile residential structures during a dam breach during the 100-year flood event. If the impacted residential properties were purchased by the Town, it would reduce the potential threat to life and property. Notwithstanding the potential purchase of these properties, the dam breach analysis also showed overtopping of NH Route 111, a Class II roadway, accordingly, the dam would still be classified as a significant-hazard. The dam in its current state cannot pass the required discharge capacity with one foot of freeboard (required for significant-hazard dams). To alleviate impacts to NH Route 111, the Town would be required to replace the Kingston Road Bridge to further reduce the hazard class. NH Route 111 was Even if the hazard class is able to be reduced to a low hazard, the dam in its current condition does not pass the current or potential future discharge capacity for low-hazard dams with the required 1-foot of freeboard, as required by NHDES' Dam Bureau rules.

Table 2.6-1. Hazard Classification Summary

Hazard Class	Discharge Capacity Flood	Water Surface Elevations (Current/Future)	Freeboard (Current/Future)
Low	50-Year	65.4/NA[1]	0.6/NA[1]
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

1. Future 50-year storm event was not analyzed.

As modifications to the dam are required regardless of the hazard classification to meet the discharge capacity requirements, this alternative was not further evaluated.

2.7 Alternative 6 – Lower Normal Pool Elevation

Alternative formulation included the potential to lower the permanent/normal pool elevation. This alternative would include selective demolition of the spillway weir to such an elevation that the dam would meet regulatory design requirements without modifying other portions of the dam. The **Table 2.7-1** presents required elevations based on completed hydrologic studies.

Table 2.7-1. Alt. 6 Required Spillway Crest Elevation

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

Under the current rainfall case, the normal pool elevation would need to be lowered 4.4 feet; the resulting impoundment would be significantly smaller than the current impoundment with a maximum depth of 3 feet in the area of the dam. Under the future rainfall case, the impoundment would be effectively drained.

The lower pool levels result in shallower water levels which promote increases in water temperatures and decreases in dissolved oxygen (DO). A pool lowering would also have extensive environmental impacts without the ecological benefits that would be provided by a completed dam removal program. Pool lowering would also significantly impact the recreational benefit created by the impoundment.

Given these facts, lowering the normal pool is not recommended, and likely would not be permittable. As such, Alternative 6 was not considered further.

2.8 Cost Estimates

This section details the cost estimates for each of the viable alternatives considered and breaks down the costs by aspects of the proposed work. The tables below provide two cost cases for Alternatives 1, 2, and 3. The cases account for the costs to account for current and future rainfall depths to allow for a climate informed decision. Alternatives 5 and 6 were determined as not viable options, so cost estimates were not determined.

2.8.1 Design, Permitting and Construction

To allow for comparison of the direct economic costs of the alternatives, preliminary Opinions of Probable Cost were prepared in 2024 dollars. The estimates are based on preliminary conceptual engineering only. Therefore, while they are considered accurate and appropriate for a Feasibility Study of this type, the actual cost associated with any of the alternatives may change as additional engineering is completed on the selected alternative. Nevertheless, the cost estimates are considered a reliable way of assessing the relative economic impact of each option.

The cost estimates provided in **Table 2.8-1** are an initial investment associated with the design, permitting and construction of each alternative. Details of the construction cost estimates are provided in **Appendix D.**

Table 2.8-1. Preliminary Opinion of Construction Phase Costs, by Alternative

	Alt 1: Raise Dam		Alt 2: Spillway Replacement		Alt 3: Auxiliary Spillway		Alt 4: Dam Removal
	Current	**Future**	**Current**	**Future**	**Current**	**Future**	
Construction Components							
Erosion & Sediment Control	$13,400	$13,400	$13,400	$13,400	$14,750	$14,750	$27,500
Control of Water	$154,600	$154,600	$304,600	$304,600	$154,600	$154,600	$115,000
Raise Dam	$281,500	$389,000	$136,000	$224,500	$89,000	$164,500	N/A
Replace Training Walls	$536,500	$621,000	$1,042,000	$1,094,500	$297,500	$297,000	N/A
Labyrinth Spillway	N/A	N/A	$2,304,400	$2,301,900	N/A	N/A	N/A
Auxiliary Spillway	N/A	N/A	N/A	N/A	$544,500	$544,500	N/A
New Abutment Earthen Dam	N/A	N/A	N/A	N/A	$59,850	$61,900	N/A
Replace Low Level Gate	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	N/A
Dam Removal	N/A	N/A	N/A	N/A	N/A	N/A	$470,500
Restoration	N/A	N/A	N/A	N/A	N/A	N/A	$115,000
General Items							
Mobilization & Demobilization	$152,000	$181,000	$574,000	$595,000	$178,000	$190,000	$107,800
35% Const. Contingency	$349,000	$415,000	$1,320,000	$1,368,000	$409,000	$436,000	$293,000
Construction Cost w/Contg.	**$1,511,000**	**$1,798,000**	**$5,718,000**	**$5,926,000**	**$1,771,000**	**$1,888,000**	**$1,129,000**
Engineering & Permitting	$292,000	$335,000	$923,000	$954,000	$331,000	$348,000	$226,000
Construction Phase Services	$151,100	$179,800	$571,800	$592,600	$177,100	$188,800	$113,000
ROW/Flowage Rights Costs	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Total Construction Phase Cost	**$1,964,100**	**$2,322,800**	**$7,222,800**	**$7,482,600**	**$2,289,100**	**$2,434,800**	**$1,468,000**

The estimate is based on preliminary conceptual engineering, and were based on the following data and assumptions:

- An understanding of the dam and surroundings based on field survey, data collection, field visits and measurements.
- Preliminary conceptual design elements for Alternatives 1, 2, 3, and 4.
- Costs for similar projects in NH and other states
- Commercial estimating databases such as RS Means, Site Work & Landscape Cost Data, 2024 Edition
- Recent vendor quotes for similar items

2.8.2 Operations, Maintenance and Capital Replacement Costs

Construction costs, or initial capital investment, can be thought of as one-time expenditures, incurred during the initial stages of a project. However, a true estimate of the cost of an alternative must consider costs associated with its operation, maintenance and capital replacement. An analysis was conducted to estimate the total cost of each of these items over a period of 30 years to develop a better understanding of the true costs of each alternative. These types of costs, when considered with the initial construction cost of a project are often called "Life Cycle Costs."

The National Institute of Standards and Technology (NIST) Life Cycle Cost Manual Handbook 135 with the 2022 Supplement was used to determine the life cycle costs for the proposed alternatives. At this level of study, a simple method was utilized to developed the present value (PV) cost that accounts for initial investment, capital replacement, energy, and operation, maintenance, and repair. **Table 2.8-2** summarizes this analysis.

O&M costs for the dam structure consists of gate operation/exercising, mowing and vegetation maintenance, debris removal, and other miscellaneous items. O&M includes routine activities but does not account for intermittent repairs or other minor repairs to address identified deficiencies.

The present value cost for each alternative was determined based on a 30-year analysis period, considering initial capital costs, assumed design life, and yearly O&M costs. Capital replacement costs were determined based on the assumed remaining design life at the end of the 30-year analysis period.

Table 2.8-2. Life Cycle Cost Analysis

	Alt 1: Raise Dam		Alt 2: Spillway Replacement		Alt 3: Auxiliary Spillway		Alt 4: Dam Removal
	Current	Future	Current	Future	Current	Future	
Initial Capital Investment							
Discount Factor	1	1	1	1	1	1	1
Initial Capital Cost (ICC)	$1,964,100	$2,322,800	$7,222,800	$7,482,600	$2,289,100	$2,434,800	$1,468,000
Capital Replacement Cost							
Assumed Design Life (years)	30	30	30	30	30	30	N/A
Assumed ICC Cost Percentage	100%	100%	100%	100%	100%	100%	0%
Discount Factor[1]	0.412	0.412	0.412	0.412	0.412	0.412	N/A
PV Replacement Cost	$809,200	$957,000	$2,975,800	$3,082,800	$943,100	$1,003,100	$0
Operations & Maintenance							
Annual O&M Costs[2]	$13,613	$15,016	$13,613	$14,666	$19,226	$20,980	$45,000[3]
Discount Factor[4]	19.6	19.6	19.6	19.6	19.6	19.6	N/A
PV O&M Cost (30 years)	$266,800	$294,300	$266,800	$287,500	$376,800	$411,200	$45,000
Total Present Value Cost	**$3,040,100**	**$3,574,100**	**$10,465,400**	**$10,852,900**	**$3,609,000**	**$3,849,100**	**$1,513,000**

1. Discount factor taken from 2022 supplement to NIST LCC Table A-1. Assumes a 3% discount rate for 30 years to estimate a single present value of future replacement.

2. Annual operation and maintenance costs.

3. One time cost for 3 years of post-removal monitoring, no annual costs as there will be none following a dam removal.

4. Discount factor taken from 2022 supplement to NIST Table A-2. Assumes a 3% discount rate for 30 years to calculate a present value for the annually recurring O&M costs.

2.9 Alternatives Brought Forward for Further Analysis

As described above, a total of six preliminary alternatives were developed for this study. **Table 2.9-1** provides a summary of the key features of these alternatives. The following alternatives were eliminated from future detailed evaluation in **Section 3**.

Alternative 2 – Spillway Replacement (Labyrinth) was eliminated from further consideration primarily due to the intensive costs associated with this alternative. As shown in **Table 2.8-1** above, the cost of the Labyrinth Spillway is considerably more than the other alternatives. Additionally, labyrinth spillways are more complex structures and therefore more difficult to maintain.

Alternative 5 – No Action/Hazard Reduction was eliminated from further consideration because it fails to address the dam safety deficiencies associated with the dam. A "No Action" approach would fail to comply with the outstanding NHDES LOD resulting in financial penalties, injunctive relief and potential legal enforcement action brought by NHDES and the New Hampshire Department of Justice. A "Hazard Reduction" approach does not address the inherent safety concerns associated with the downstream structures.

Alternative 6 – Lower Normal Pool Elevations, as described above under **Section 2.7,** was eliminated from further investigation because it could result in detrimental environmental impacts, such as increased water temperatures and decreased oxygen levels, without offering the ecological benefits of a full dam removal. Additionally, this strategy could adversely affect recreational use due to degraded water quality and reduced surface area, thereby making it a less preferred and potentially non-permittable approach.

Alternatives 1 - Raise Dam, Alternative 3 - Auxiliary Spillway and Alternative 4 – Dam Removal were selected for further detailed analysis and discussion in **Section 3**, including consideration of impacts and benefits on the river, hydraulics, natural resources, cultural resources, water quality and supply, as well as other issues.

Table 2.9-1. Summary of Alternatives Considered

Alternative	Main Features	Life Cycle Cost (Future Condition)	Pass 2.5 x 100-Year with 1 ft of Freeboard?	Improve Fish Passage?	Require a NHDES Dam Waiver?	Recommended for Further Analysis?
Alternative 1 – Raise Top of Dam	Raise Dam by increasing height of training walls and earthen embankment	$3,574,100	Yes	No	No	Yes
Alternative 2 – Spillway Replacement	Replace spillway with labyrinth spillway. Increase height of training walls and earthen embankment	$10,852,900	Yes	No	No	No
Alternative 3 – Auxiliary Spillway	Add auxiliary spillway to the left. Increase height of training walls and earthen embankment	$3,849,100	Yes	No	No	Yes
Alternative 4 – Dam Removal	Remove the dam entirely	$1,513,000	Yes	Yes	No	Yes
Alternative 5 – No Action/Hazard Reduction	Maintain status quo	N/A	No	N/A	Yes	No
Alternative 6 – Lower Normal Pool Elevation	Selective demolition to spillway weir	Not Determined	Yes	No	No	No

3

Evaluation of Alternatives

3.1 Introduction

A variety of alternatives have been developed to address the goals of this project. This Section includes information relative to the evaluation of each of the alternatives brought forward from **Section 2**, including discussion of existing environmental conditions, method of analysis, and major conclusions:

- Alternative 1 – Raise Dam
- Alternative 3 – Auxiliary Spillway
- Alternative 4 – Dam Removal

The specifics of each of these alternatives are presented in **Section 2**.

The alternatives analysis includes consideration of environmental and cultural resources as well as analysis of the engineering constraints and project operations associated with each alternative. Although this Feasibility Study provides a full analysis of these constraints, it is important to note that each alternative has been designed only to a conceptual level. The conceptual design would be advanced to a final design once an alternative is selected. Quantitative analysis is presented where possible, while some analyses are of a more qualitative nature.

The main difference among alternatives relates to their potential effects on the size and depth of the dam impoundment. In examining the range of alternatives, it should be noted that they can be classified in one of two ways:

- Alternative 1 & 3 – Dam Modification would maintain the impoundment. During events that overtop the dam spillway, Alternative 3 – Auxiliary Spillway would provide flood depths less than existing conditions while Alternative 1 – Raise Dam would provide flood depths similar to existing conditions.
- Alternative 4 – Dam Removal would reduce the depth of water upstream of the dam for all flow events.

Thus, much of the discussion below is presented with this distinction among the alternatives in mind. These two cases are sometimes referred to as the “dam in” and “dam out” scenarios.

The discussion below begins with a description of the hydrological and hydraulic analysis of the river as well as the fluvial geomorphic setting of the river. Once these analyses are understood, their results can be extrapolated to determine effects on environmental and cultural resources.

3.2 Hydraulic Findings and Sediment Transport

3.2.1 General Hydraulic Findings

Several hydraulic parameters were calculated by the HEC-RAS model at each cross section for a range of flow conditions. The hydraulic parameters included water level, channel depth, channel and overbank velocities, channel, and overbank shear stresses, wetted top width, cross sectional area and slope of the energy grade line. Calculations for the reach upstream of the dam included total surface area and volume. All of these parameters are important for understanding the potential effects of dam removal or modification. Velocity, for example, is important for understanding streambank erosion and sediment transport over time and during major storm events. These analyses can also tell us about how conditions for fish passage would change. And changes in total surface area and volume may similarly be important for understanding impacts to wetlands and anadromous fish spawning habitat.

Figures 3.2-1 through **3.2-6** show the aerial extent of the flooding and a profile view of the surface water elevation in the Exeter River for Alternatives 1 - Raise Dam, Alternative 3 - Auxiliary Spillway and Alternative 4 – Dam Removal compared to existing conditions for both normal flow and 100-year flow conditions. Additionally, **Tables 3.2-1 and 3.2-2** summarize the predicted changes in the impoundment surface area and depth, respectively, under Alternative 1 - Raise Dam, 3 - Auxiliary Spillway and 4 – Dam Removal.

Under Alternative 1 - Raise Dam, there would be a small change to the impoundments surface area and depth compared to existing conditions for all flow conditions. **Figure 3.2-1** and **Figure 3.2-2** display the change in water surface extents and depth compared to existing conditions. The maximum change percentage for impoundment surface area and depth for Alternative 1 are 1.8% and 4.8%, respectively. This alternative would not have any significant change to the hydraulic characteristics of the dam or its operation. Normal pool elevation and associated surface area are expected to remain consistent with the existing structure as represented by the existing conditions.

Under Alternative 3 - Auxiliary Spillway, there would be little to no change to the impoundments surface area and depth compared to existing conditions for storm events that do not overtop the spillway. For the same storm events that do overtop the spillway the impoundment surface area and depth would be less than that of the existing conditions. **Figure 3.2-3** and **Figure 3.2-4** display the change in water surface extents and depth compared to existing conditions.

Under Alternative 4 – Dam Removal, the impoundment would return to natural river flows under normal conditions as shown on **Figure 3.2-5 and 3.2-6**. The removal of Pickpocket Dam would see the existing hydraulic control of the riverine impoundment, the crest of the dam's spillway at Elev. 60.9 feet, replaced by a reconstructed river channel with its thalweg at Elev. 48.2 at the location of the existing dam. This 12.7-foot drop in the hydraulic control of the Exeter River would be accompanied by a reduction in the impounded volume. As shown in **Tables 3.2-1**and **3.2-2**, during the normal flow conditions, the impoundment surface area would be expected to decrease from 96 acres to 26 acres if the dam were removed.

During flood flows greater than the 25-year storm event, the dam does not have significant hydraulic control on the impoundment. Additionally, the Cross Road bridge, immediately downstream of the dam, also doesn't have significant hydraulic control on the impoundment.

Therefore, reductions in the impoundment's size, as a result of dam removal, are expected to progressively decrease as river flows increase.

Table 3.2-1 Impoundment Surface Area by Alternative

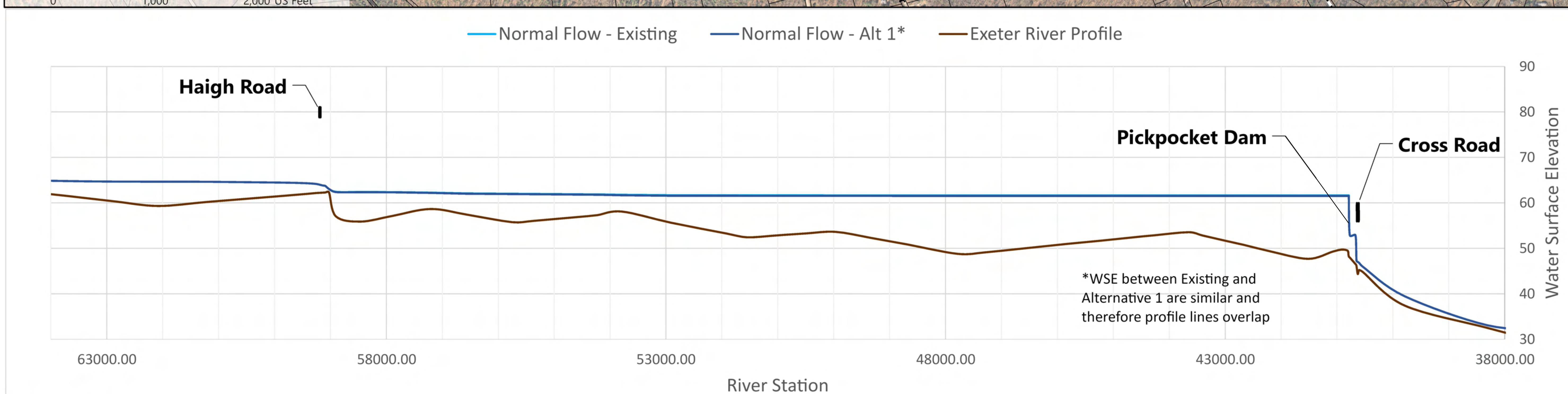
Flow Condition	Impoundment Surface Area				Percent Change Relative to Existing Condition		
	Existing Condition (ac)	Alt 1 Raise Dam (ac)	Alt 3 Auxiliary Spillway (ac)	Alt 4 Dam Removal (ac)	Alt 1 Raise Dam	Alt 3 Auxiliary Spillway	Alt 4 Dam Removal
Normal Flow	85	85	85	26	0.0%	0.0%	-73%
2-Yr	142	142	142	88	0.0%	0.0%	-40%
50-Yr	319	320	320	273	0.4%	0.4%	-14%
100-Yr	336	338	338	302	0.7%	0.6%	-10%
Future 100-Yr	364	368	366	347	1.2%	0.5%	-5%
2.5 x100-Yr	402	409	404	396	1.8%	0.5%	-2%
Future 2 .5 x 100-Yr	433	441	434	430	1.8%	0.4%	-1%

Table 3.2-2 Impoundment Depth by Alternative

Flow Condition	Impoundment Depth				Percent Change Relative to Existing Condition		
	Existing Condition (ft)	Alt 1 Raise Dam (ft)	Alt 3 Auxiliary Spillway (ft)	Alt 4 Dam Removal (ft)	Alt 1 Raise Dam	Alt 3 Auxiliary Spillway	Alt 4 Dam Removal
Normal Flow	3.0	3.0	3.0	2.1	0.0%	0.0%	-29.2%
2-Yr	3.1	3.0	3.0	2.5	-2.2%	-2.2%	-16.7%
50-Yr	4.5	4.3	4.3	4.0	-4.4%	-4.4%	-7.0%
100-Yr	4.9	4.9	4.9	4.4	-0.4%	-0.4%	-10.2%
Future 100-Yr	6.1	6.1	6.1	5.6	0.0%	0.7%	-8.2%
2.5 x100-Yr	8.0	8.3	8.0	7.8	3.2%	-0.6%	-6.0%
Future 2 .5 x 100-Yr	10.3	10.5	10.2	10.2	2.0%	-0.9%	-2.9%

Figure 3.2-1: Alternative 1 - Raise Dam Normal Flow Water Surface

Pickpocket Dam | Brentwood and Exeter, New Hampshire



Source: NearMap Imagery, NHDOT Roads

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\SurfaceWaterExtents\Pickpocket_WaterSurfaceProfile.aprx (User: bmiller, Date: 2/20/2024)

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

Pickpocket Dam | Brentwood and Exeter, New Hampshire

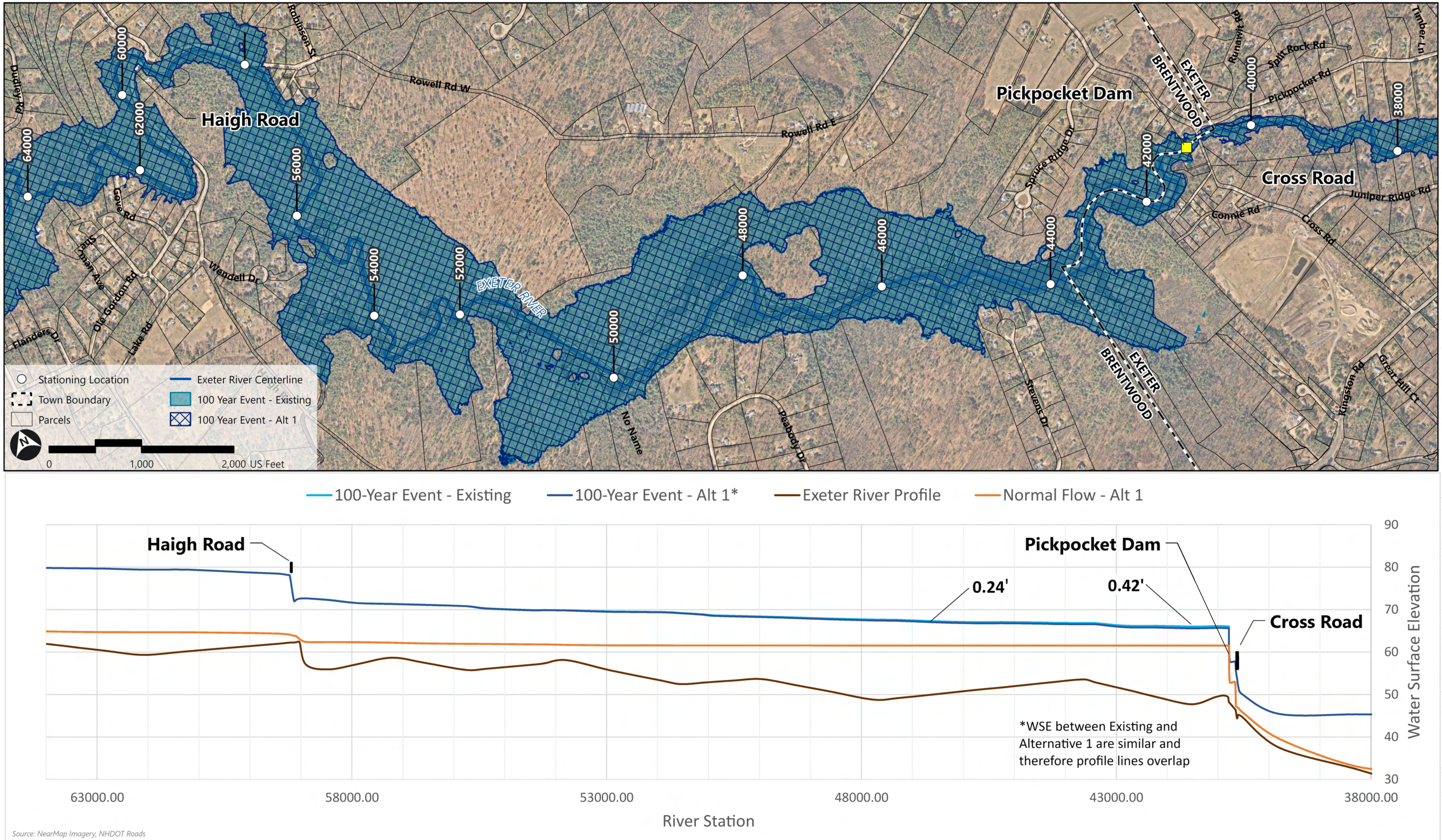
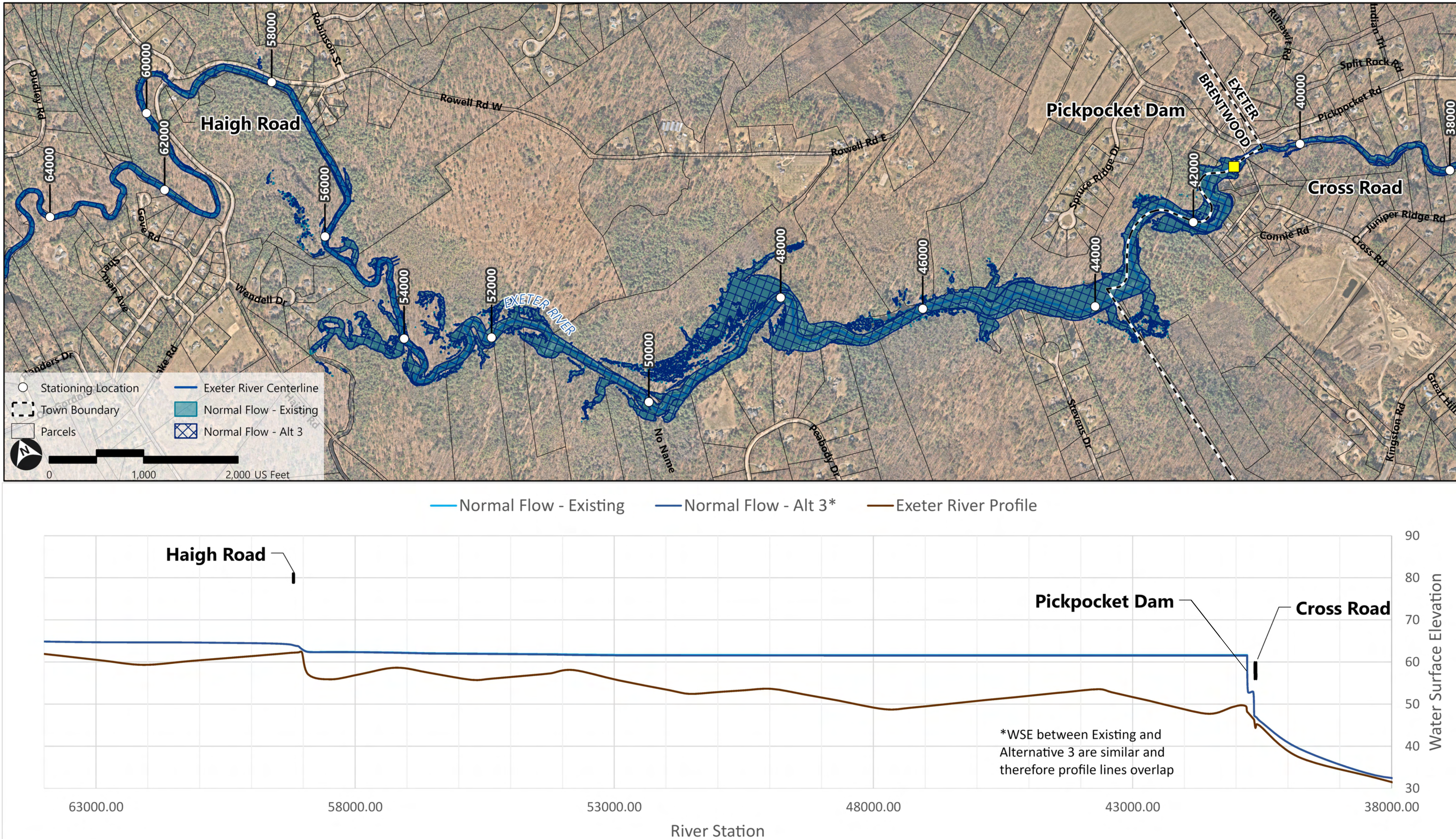


Figure 3.2-3: Alternative 3 - Auxiliary Spillway Normal Flow Water Surface

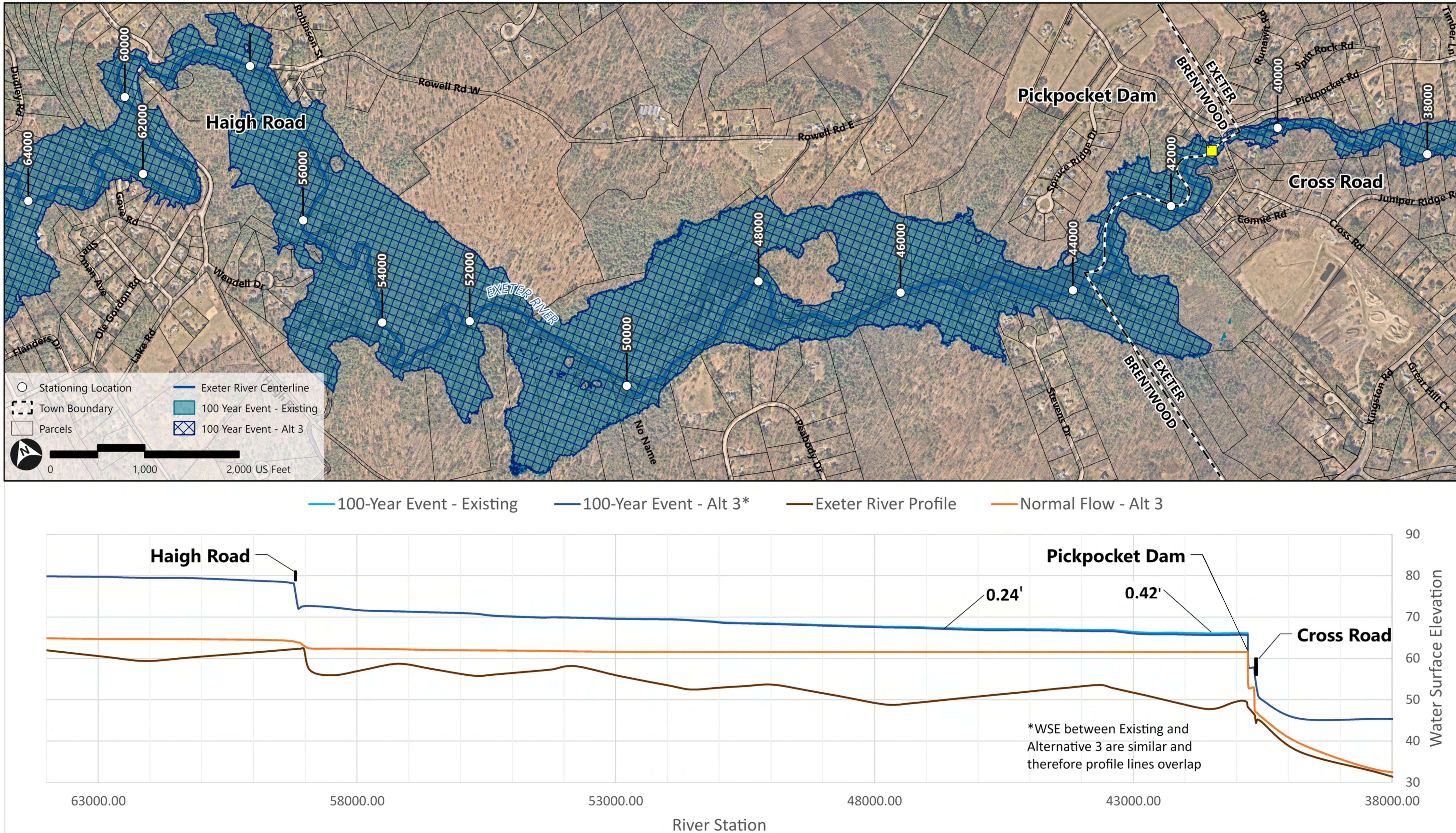
Pickpocket Dam | Brentwood and Exeter, New Hampshire



Source: NearMap Imagery, NHDOT Roads

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

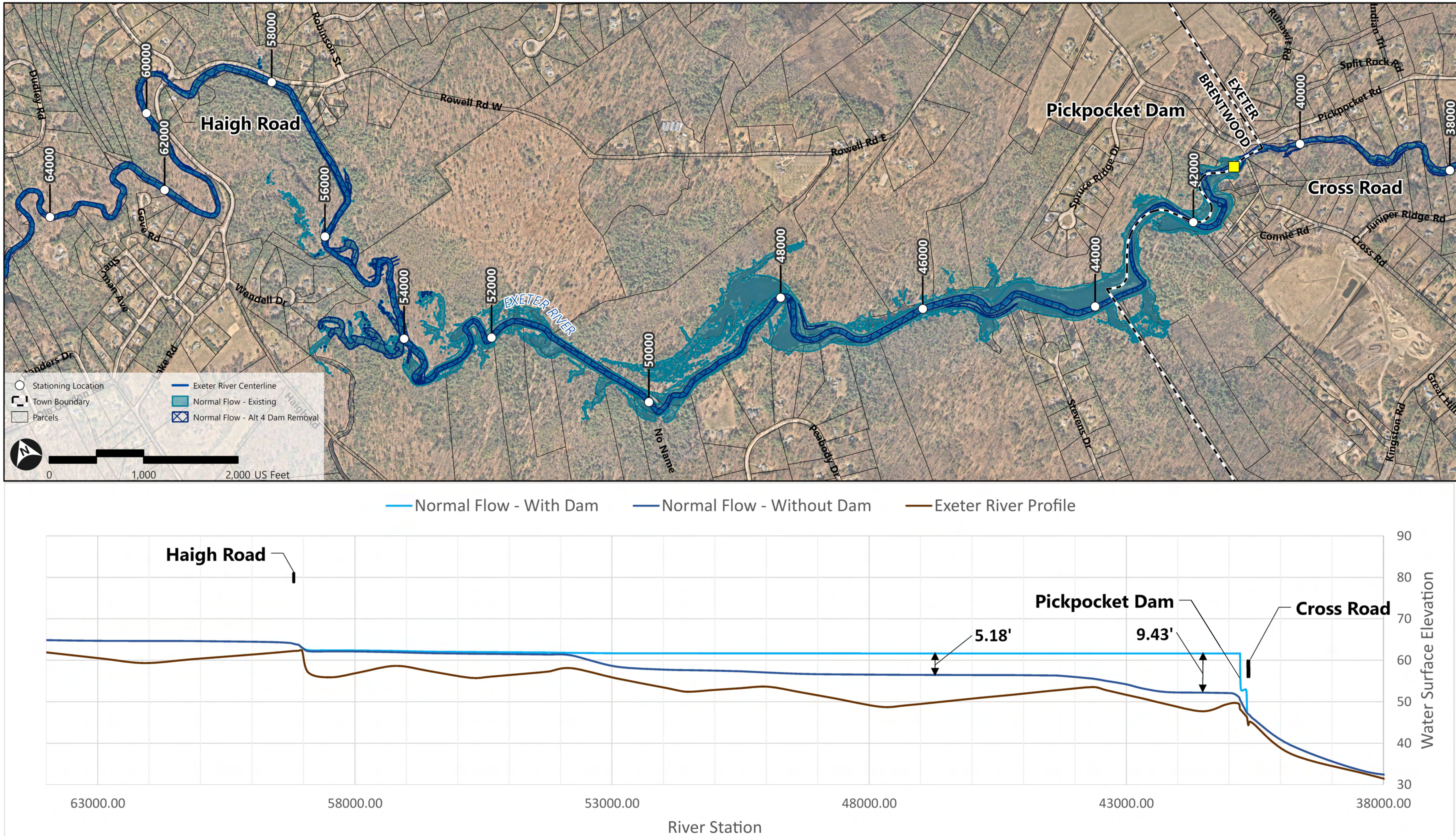
Pickpocket Dam | Brentwood and Exeter, New Hampshire



Source: NearMap Imagery, NHDOT Roads

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

Pickpocket Dam | Brentwood and Exeter, New Hampshire

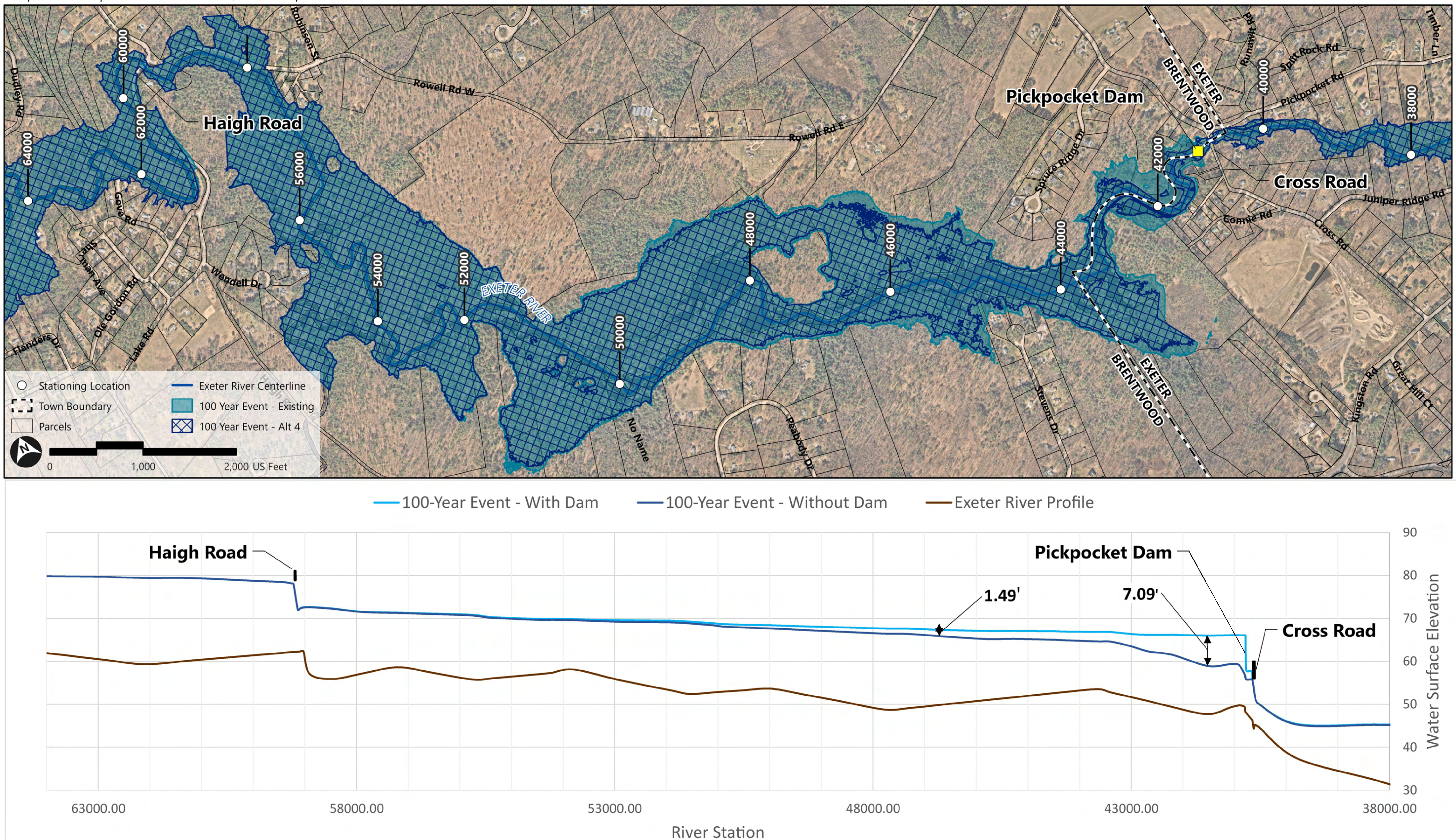


Source: NearMap Imagery, NHDOT Roads

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\SurfaceWaterExtents\Pickpocket_WaterSurfaceProfile.aprx (User: bmiller, Date: 2/20/2024)

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

Pickpocket Dam | Brentwood and Exeter, New Hampshire



Source: NearMap Imagery, NHDOT Roads

3.2.2 Predicted Changes at Specific Reaches

Like many run-of-river dams, the Pickpocket Dam impounds the Exeter River for 3.5 miles upstream to the Haigh Road bridge. The removal or modification of the Pickpocket Dam will impact water levels, velocities and other characteristics for the full length of the impoundment. The hydraulic impacts of the dam removal or dam modification are predicted to be greatest immediately upstream of the dam and diminish moving away from the dam. However, different reaches of the Exeter River will experience these changes differently. Using the results from the HEC-RAS model, four reaches were identified that summarize the magnitude of the changes seen along the River as a result of the alternatives. **Tables 3.2-3 through 3.2-6** summarize the changes for each representative reach, the values represent the average of the characteristic of the river along the specific reach.

3.2.2.1 Pickpocket Dam to 2,900 FT Upstream (XS 40770.55 – XS 43656.25)

This reach includes some of the deepest, slowest waters within the river. In contrast to the short rocky channel downstream of Pickpocket Dam, the reach of the Exeter River immediately upstream of the dam, is predicted to experience changes in both river depths and velocities if the dam were removed. Under the "dam in" alternatives, the impoundment at this reach would have minimal differences in depth and velocities compared to existing conditions.

This reach contains a relatively wide channel with a width of 261-feet during normal flow conditions. The impoundment is generally contained to the channel area, with limited areas of surface water expanding into adjacent riparian area. As shown in **Table 3.2-3,** there is a modest but not extensive floodplain, in comparison to the upstream reaches, indicated by a river width of 525-feet during the 100-year flood, a widening of 101%. This reach is relatively deep with an average depth of 4.7 feet and average maximum depths approximately 10.8 feet under normal flow. The maximum depth within this research is 14.0 feet in the immediate dam area. This reach is also quite slow-moving, flowing at approximately 0.1 feet per second (fps) during normal flow and 3.1 fps during the 100-year flood event.

These characteristics are predicted to change for all flow conditions under Alternative 4 - Dam Removal. During the normal flow condition, for example, the predicted average depth would drop 3.4 feet, from 4.7 feet to 1.3 feet. The maximum depth would drop 8.3 feet, from 10.8 feet to 2.5 feet. There would be little to no changes under normal flows for any of the "dam-in" alternatives. The magnitude of these changes associated with dam removal is expected to decrease as discharge rates increase.

Velocities would increase if the dam were to be removed as shown in **Table 3.2-3**, during normal flow velocity is predicted to increase from 0.1 fps to 2.9 fps if the dam were to be removed. Increases in velocity are also expected for flood conditions, typified by increases of about 126% during the 100-year flood for Alternative 4 – Dam Removal. There is little to no change in velocity under normal flow conditions for the "dam-in" alternatives.

3.2.2.2 2,900 FT to 9,200 FT Upstream of Dam (XS 43656.25– XS 49967.54)

This reach includes some of the widest areas of the impoundment and largest areas of open water that inundates the adjacent aquatic bed. For example, at River Station 48000, there is a large area of open water that extends approximately 2000 feet parallel on the north side of the river as shown on **Figure 3.2-5**. Under Alternative 4 – Dam Removal, this reach would experience changes in river depth, width and velocity and these areas of open water would recede into the river channel.

The channel width within this section is generally 269-feet wide but with areas of open water adjacent to the main channel during normal flow conditions. As shown in **Table 3.2-4**, there is a wide floodplain indicated by a river width of 1,179-feet during the 100-year flood, a widening of 338%. This reach has a similar depth to that of the downstream reach with an average depth of 3.3 feet and an average maximum depth of 10.4 feet under normal flow. This reach is also slow-moving, flowing at 0.20 fps during normal flow and 3.3 fps during the 100-year flood event.

These characteristics are predicted to change for flow conditions under Alternative 4 - Dam Removal. During normal flow conditions, the average maximum depth would drop 5.1 feet from 10.4 to 5.3 feet. However, the average depth across the channel has a more moderate drop of 0.8 feet from 3.3 feet to 2.5 feet. There would be little to no changes under normal flows for any of the “dam-in” alternatives. However, the magnitude of these changes associated with the dam removal are expected to decrease as discharge rates increase.

Velocities would moderately increase if the dam were to be removed as shown in **Table 3.2-4**, during normal flow velocity is predicted to increase from 0.20 fps to 0.90 fps if the dam were to be removed. Increases in velocity are also expected for flood conditions, typified by increases of about 27% during the 100-year flood for Alternative 4 – Dam Removal. There is little to no change in velocity under normal flow conditions for the “dam-in” alternatives.

3.2.2.3 9,200 FT to 13,000 FT Upstream of Dam (XS 49967.54 – XS 53787.51)

Further up the Exeter River, similar characteristics to the downstream reach described above but the channel is narrower and shallower. Under Alternative 4 – Dam Removal, this reach would experience changes in river depth, width and velocity and these areas of open water would recede into the river channel. However, the magnitude of the changes decreases rapidly moving upstream through this reach, in comparison to the other reaches where the changes stay relatively constant.

The channel width within this section is generally 171-feet wide but with areas of open water adjacent to the main channel during normal flow conditions. As shown in **Table 3.2-5**, there is a wide floodplain indicated by a river width of 1,206-feet during the 100-year flood, a widening of 605%. This reach has a slightly shallower depth to that of the downstream reach with an average depth of 2.7 feet an average maximum depth of 7.6 feet under normal flow. This reach is also slow-moving, flowing at 0.40 fps during normal flow and 3.8 fps during the 100-year flood event.

These characteristics are predicted to change for all flow conditions under Alternative 4 - Dam Removal. During normal flow conditions, the maximum depth would drop approximately 3.5 feet from 7.6 to 4.1 feet. However, the average depth across the channel has a more moderate drop of 0.7 feet from 2.8 feet to 2.1 feet. There would be little to no changes under normal flows for any of the “dam-in” alternatives. The magnitude of these changes associated with the dam removal is expected to decrease as discharge rates increase.

Additionally, velocities would increase if the dam were to be removed. As shown in **Table 3.2-5**, normal flow velocity is predicted to increase from 0.40 fps to 1.4 fps if the dam were to be removed. Increases in velocity are not expected for flood conditions, with a decrease in velocity of 3.8 fps to 3.6 fps during 100-year flood. As shown in **Table 3.2-5**, the other flood events see a small increase in velocity for Alternative 4 – Dam Removal. There is little to no change in velocity under normal flow conditions for the “dam-in” alternatives.

3.2.2.4 13,000 FT to 18,300 FT Upstream of Dam (XS 53787.51 - XS 59138.87 Haigh Road)

Further up the Exeter River, the reach extending to Haigh Road experiences only minor changes relative to existing conditions. This section of the Exeter River looks and functions like a typical river not under the influence of a dam. Under Alternative 4 – Dam Removal, this reach would experience minor changes in river depth, width, and velocity. The Little River's confluence with the Exeter River is located just upstream of River Station 53787.51 and would experience similar changes to that of the Exeter River at this location.

The channel width within this section is generally 103-feet wide but with small areas of open water adjacent to the main channel during normal flow conditions. As shown in **Table 3.2-6**, there is a moderately wide floodplain indicated by a river width of 869-feet during the 100-year flood, a widening of 744%. This reach has much shallower depths to that of the downstream reach, with an average depth of 2.2 feet an average maximum depth of 4.2 feet under normal flow. This reach is relatively fast moving in comparison, flowing at 1.4 fps during normal flow and 6.0 fps during the 100-year flood event.

These characteristics are predicted to stay relatively the same for all flow conditions under Alternative 4 - Dam Removal. During normal flow conditions, the maximum depth would drop 0.3 feet from 4.2 feet to 3.9 feet. The average depth across the channel has a more moderate drop of 0.1 feet from 2.2 feet to 2.1 feet. There would be little to no changes under normal flows for any of the "dam-in" alternatives. The magnitude of these changes associated with the dam removal is expected to decrease as discharge rates increase. Velocities are estimated to stay the same if the dam were to be removed or modified as shown in **Table 3.2-6**, during normal flow velocity is predicted to increase from 1.4 fps to 1.5 fps if the dam were to be removed. Only small increases in velocity are also expected for flood conditions, typified by increases of about 3.3% during the 100-year flood for Alternative 4 – Dam Removal. There is little to no change in velocity under normal flow conditions for the "dam-in" alternatives.

Table 3.2-3. Hydraulic Model Results – Pickpocket Dam to 2,900 FT Upstream of Dam (XS 40770.55 – XS 43656.25)

	Existing Condition				Alternative 1 Raise Dam				Alternative 3 Auxiliary Spillway				Alternative 4 Dam Removal			
River Flow	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)
Normal Flow	10.8	4.7	260.5	0.1	10.7	4.6	254.3	0.2	10.7	4.6	254.3	0.2	2.5	1.3	44.8	2.9
2-Yr	11.8	4.9	347.3	0.7	11.5	4.8	318.1	0.8	11.5	4.8	318.1	0.8	4.6	2.4	77.0	4.5
50-Yr	14.7	6.2	524.9	2.7	14.3	5.9	504.6	2.9	14.3	5.9	504.9	2.9	9.3	4.3	311.7	6.7
100-Yr	15.4	6.5	550.1	3.1	15.0	6.4	534.0	3.3	15.0	6.3	538.6	3.2	10.3	4.9	346.4	7.0
100-Yr x 2.5	18.0	7.8	638.4	5.9	18.8	8.3	666.8	5.5	18.0	7.8	643.0	5.9	15.3	7.1	522.1	8.2
Future 100-Yr	16.4	7.0	588.3	4.1	16.4	7.0	587.5	4.1	16.2	6.8	585.0	4.2	12.7	5.4	450.9	7.0
Future 100-Yr x 2.5	19.6	8.7	699.1	7.7	21.4	9.4	776.1	6.6	19.8	8.8	708.7	7.6	18.1	8.4	611.3	9.3

Table 3.2-4. Hydraulic Model Results – 2,900 FT to 9,200 FT Upstream of Dam (XS 43656.25 – XS 49967.54)

	Existing Condition				Alternative 1 Raise Dam				Alternative 3 Auxiliary Spillway				Alternative 4 Dam Removal			
River Flow	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)
Normal Flow	10.4	3.3	268.7	0.2	10.3	3.6	246.7	0.2	10.3	3.6	246.7	0.2	5.3	2.5	65.4	0.9
2-Yr	11.5	3.3	413.6	1.1	11.2	3.3	382.8	1.2	11.2	3.3	382.8	1.2	8.7	3.3	180.2	2.0
50-Yr	15.4	4.2	1111.3	3.1	15.1	4.1	1072.2	3.3	15.1	4.1	1,072.2	3.3	14.0	3.7	891.2	4.0
100-Yr	16.2	4.7	1179.8	3.3	16.0	4.6	1159.0	3.4	16.0	4.6	1,159.0	3.4	14.8	4.0	1020.1	4.2
100-Yr x 2.5	20.5	7.5	1498.1	4.7	20.8	7.7	1516.6	4.5	20.5	7.5	1,498.3	4.7	20.1	7.2	1456.7	4.9
Future 100-Yr	17.8	5.8	1291.1	3.9	17.8	5.8	1290.8	3.9	17.7	5.8	1283.8	4.0	16.8	5.1	1223.8	4.5
Future 100-Yr x 2.5	23.5	9.8	1628.3	5.2	24.0	10.2	1645.7	4.9	23.5	9.8	1,628.9	5.1	23.5	9.8	1625.3	5.2

Table 3.2-5. Hydraulic Model Results – 9,200 FT to 13,000 FT Upstream of Dam (XS 49967.54– XS 53787.51)

	Existing Condition				Alternative 1 Raise Dam				Alternative 3 Auxiliary Spillway				Alternative 4 Dam Removal			
River Flow	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)
Normal Flow	7.6	2.7	170.9	0.4	7.5	2.7	164.9	0.4	7.5	2.7	164.9	0.4	4.1	2.1	51.8	1.4
2-Yr	9.7	2.7	400.5	1.6	9.5	2.7	385.8	1.7	9.5	2.7	385.8	1.7	8.1	2.7	250.3	2.2
50-Yr	14.3	4.3	1201.0	3.6	14.2	4.3	1184.7	3.7	14.2	4.3	1,184.7	3.7	13.9	4.2	1042.2	3.9
100-Yr	15.3	4.7	1205.8	3.8	15.2	4.7	1196.4	3.9	15.2	4.7	1,196.4	3.9	14.6	4.5	1224.3	3.6
100-Yr x 2.5	19.6	8.0	1551.2	5.0	19.8	8.2	1562.0	4.8	19.6	8.0	1,551.9	5.0	19.4	7.9	1436.4	5.1
Future 100-Yr	17.0	6.0	1321.4	4.3	17.0	5.9	1321.3	4.3	17.0	5.9	1,320.5	4.3	16.4	5.7	1302.2	4.6
Future 100-Yr x 2.5	22.5	10.0	1565.7	5.4	22.9	10.3	1575.6	5.2	22.5	10.0	1,566.4	5.4	22.5	10.0	1564.4	5.4

Table 3.2-6. Hydraulic Model Results – 13,000 FT to 18,300 FT Upstream of Dam (XS 53787.51

	Existing Condition				Alternative 1 Raise Dam				Alternative 3 Auxiliary Spillway				Alternative 4 Dam Removal			
River Flow	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)	Max. Depth (ft)	Avg. Depth (ft)	Top Width (ft)	Avg. Velocity (ft/s)
Normal Flow	4.2	2.2	103.3	1.4	4.2	2.2	101.8	1.4	4.2	2.2	101.8	1.4	4.0	2.1	81.5	1.5
2-Yr	7.2	2.3	346.7	3.0	7.2	2.3	342.0	3.0	7.2	2.3	342.0	3.0	7.1	2.3	331.2	3.1
50-Yr	12.3	4.8	829.4	5.7	12.3	4.8	826.3	5.7	12.3	4.8	826.3	5.7	12.2	4.7	818.9	5.8
100-Yr	13.1	5.2	869.2	6.0	13.1	5.1	868.1	6.1	13.1	5.1	868.1	6.1	13.0	5.1	863.7	6.2
100-Yr x 2.5	17.8	7.9	1052.8	10.4	17.9	8.0	1054.9	8.1	17.8	7.9	1,052.8	8.1	17.7	7.9	1050.3	8.2
Future 100-Yr	14.9	6.4	551.7	6.9	14.9	6.3	943.8	6.9	14.9	6.3	942.7	6.9	14.8	6.2	937.7	7.0
Future 100-Yr x 2.5	20.5	9.8	1137.7	9.0	20.9	10.0	1141.4	8.9	20.7	9.8	1137.8	9.0	20.7	9.8	1137.5	9.0

3.2.3 Predicted Changes in Sediment Transport

Sediment transport is a naturally occurring, continuous process in all rivers. Typically, rivers are in dynamic equilibrium between sediment deposition and scour, usually resulting in a stable channel configuration. Local changes in this equilibrium can result from, among other things, high flow events, erosion from adjacent upland sources, or changes to the hydraulic characteristics of a river reach due to new or modified infrastructure (e.g., a bridge or culvert). Changes in land use and increases in impervious cover associated with increased urbanization in a watershed can affect how quickly stormwater runs off within the watershed, which can also affect stream equilibrium.

Just as rivers move sediment in addition to water, dams impound sediment just as they impound water. Thus, it can be assumed that some amount of sediment migration would accompany dam removal. There are only minor sediment transport concerns for the dam modification alternatives related to repair of the low level gate.

A sieve analysis was completed for the five sediment samples. Three discrete samples were taken upstream of the impoundment (SED -1, SED-2 and SED-5) and two composite samples were taken downstream of the training weir (SED-1 and SED-2). The locations of the samples are shown on **Figure 3.2-7**. The sieve analysis showed that the sediment upstream of the dam is relatively uniform silt and/or find sand size particles. As detailed out in **Table 3.2-7** below, this is consistent with the field observations which also noted the presences of trace organic material with the samples being described as "mucky". The sieve analysis showed that the sediment downstream of the dam is granules with sand. The field observations noted the river downstream of the dam was very rock with surficial sediment. The field observations and detailed sieve analysis is located in **Appendix E**.

Table 3.2-7. Sediment Sampling Descriptions

Sample ID	Location	Sediment Type	Sediment Description
SED-1	75' U.S. of Dam	Mucky Soil	Fine to very fine sand and silt, no rocks, trace organic material
SED-2	225' U.S. of Dam	Mucky Soil	Fine to very fine brown sand with some silt, some organics
SED-3	75' D.S. of Dam	Rocky with minimal surficial sediment	Generally medium to find sand with little silt, small rounded rocks, trace organics, low density
SED-4	250' D.S. of Dam	Rocky with minimal surficial sediment	Coarse to medium sand, some rounded gravel, trace silt, no organics low density
SED-5	1,550' U.S of Dam	Mucky Soil	Fine to very fine sand and silt, trace organic material

The sediment transport potential for the removal of the dam was analyzed using the HEC-18 guidance to evaluate the particle stability of the sediment in the impoundment as a function of critical velocity. Which is the velocity required to initiate the movement of a sediment particle from the bed of the river. Critical velocity is calculated using the particle size and average flow depth in the channel. The HEC-RAS hydraulic model was used to estimate the average flow

Figure 3.2-7: Sediment Sampling Plan

Pickpocket Dam | Brentwood and Exeter, New Hampshire

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\SIR_SamplingPlan\SIR_SamplingPlan.aprx (User: bmiller, Date: 2/20/2024)

N 0 100 200 300 US Feet

Sediment Sample Locations

Source: NearMap Imagery, NHDOT Roads

depth in the channel and the sieve analysis was used to determine the particle size. **Table 3.2-8** below summarizes the grain size distribution of the samples.

Table 3.2-8. Soil Samples Sieve Analysis Results

	SED 5	SED 1	SED 2	SED 3	SED 4
Approx. River XS Location	**43020**	**40918**	**40795**	**40570**	**39796**
Grain Size (mm)	**308-23**	**304-23**	**305-23**	**306-23**	**307-23**
D_5	-	-	-	0.12	0.18
D_{10}	-	-	-	0.26	0.39
D_{15}	-	-	-	0.43	0.57
D_{20}	-	-	-	0.62	0.81
D_{30}	-	-	-	1.18	1.47
D_{40}	-	-	-	2.15	2.53
D_{50}	-	-	0.09	3.72	4.05
D_{60}	-	-	0.15	5.80	6.17
D_{80}	0.14	0.24	0.30	11.34	11.94
D_{85}	0.18	0.31	0.35	13.39	14.11
D_{90}	0.24	0.40	0.41	16.09	16.98
D_{95}	0.57	0.71	0.59	20.25	21.58

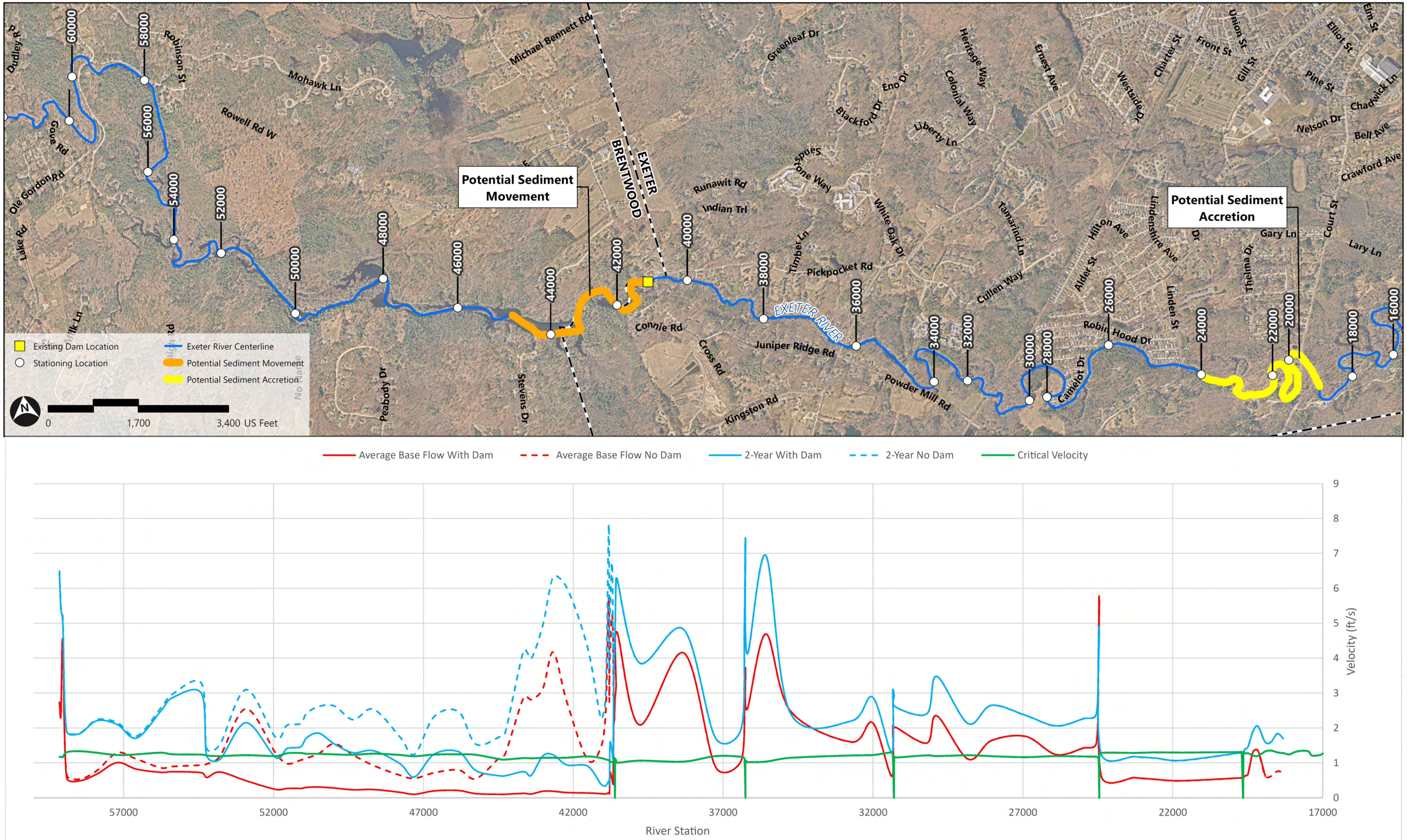
The 2-year storm, a surrogate for bank full conditions, and normal flow conditions were analyzed in both the existing hydraulic model and the hydraulic model with the dam and fish weir removed. Although samples SED-1 and SED-2 were taken within a hundred feet upstream of the dam and sample SED-5 was taken 2,500 feet upstream of the dam, the particle sizes were assumed to be similar throughout the entire impoundment. The channel velocity and hydraulic depth were used to calculate the critical velocity at each cross section based on the D50 for each sample. The soil for SED-5 and SED-1 was too fine to determine a D50. The remaining upstream sample, SED-2, has a D50 below the minimum allowable for the method. HEC-18 guidance recommends 0.2 millimeters as the lower limit for determining critical velocity, as particle below that size have cohesive properties. Therefore, 0.2 millimeters was used to determine the critical velocity for samples SED-1, SED-2 and SED-5. The critical velocity for the D80 particle size was also calculated to further evaluate the potential for sediment transport.

VHB evaluated the critical velocities calculated for the sediment samples and compared those to the velocity estimates in the channel based on the existing conditions and dam removal (Alternative 4) hydraulic models. The results shown that some sediment movement is expected following a dam removal. As shown in **Figure 3.2-8**, the velocity in the river starts to increase around River Station 50,000 (approximately 2 miles above the dam) for average base flow conditions and returns to existing velocities near River Station 40,000 by the Cross Road Bridge just downstream of the dam. Under the 2-year storm event, velocities increased near River Station 57,500 (3.5 miles above the dam), just downstream of the Haigh Road bridge crossing, and return to existing velocities near the Cross Road Bridge.

Figure 3.2-8 display the comparison between the critical velocity and channel velocity for normal flow conditions and bank full conditions, respectively. The channel velocities begin to consistently exceed the estimated critical velocity of the sediment particles near River Station 44450, approximately 3,700 feet upstream of the Pickpocket Dam. From this location to the

Figure 3.2-8: Sediment Transport Analysis

Pickpocket Dam | Brentwood and Exeter, New Hampshire



Pickpocket Dam, potential sediment transport is expected. Based on the comparison between the channel velocities and estimated critical velocities, it is anticipated that there will be potential sediment accretion in the region upstream of the Route 108/Court Street Bridge at River Station 19655.36. This is where the calculated critical velocity exceeds the velocity of the Exeter River. The design phase of Alternative 4 – Dam Removal would include a more detailed analysis of the sediment volumes within the impoundment and a strategy to mitigate any negative impacts from sediment transport.

On April 26th, 2023, VHB conducted a sediment probing investigation in the immediate impoundment area of the dam to gain an understanding of the sediment profile. The investigation involved determining both the top surface elevation of the sediment layer and the bottom elevation of the sediment where denser material or bedrock was encountered by hand probing. However, the WSE was unable to be lowered due to the inoperable low-level gate to safely collect depth measurements immediately upstream of the spillway.

The sediment transport potential is also dependent on the volume of sediment in the impoundment. As shown on **Figure 3.2-9**, depths are predominantly less than 1 foot with small pockets of depths up to 3 feet within the lowest areas of the channel. The edges of the impoundment, especially the southern edge, had higher amounts of sediment compared to the main channel, and the shallow waters prohibited the collection of sediment depths in those areas. However, as shown on **Figure 3.2-9**, sediment depths are trending towards depths as deep as 6 feet within the edges of the impoundment. It is expected that sediment would deposit at greater depths within the slower moving water beyond the main channel area.

The sediment profile within the immediate impoundment areas tells us that the sediment accumulation is predominantly within the edges of the impoundment and not in the channel. With this distribution of sediment, the main river channel, which is often the area of highest flow velocity, could potentially be scoured relatively quickly if the dam is removed. The active restoration of the Exeter River channel upstream of the dam removal site would involve channel shaping approximately 500 feet upstream of the location of the dam to stabilize the channel and remove approximately 1,750 cubic yards of sediment that has built up behind the dam. This would minimize potential sediment impacts downstream, as well as improve the stability and ecological integrity of the upstream area following dam removal.

Since the bulk of the sediment is located at the edges in slower moving water, it may erode more gradually due to lower flow velocities if not stabilized with vegetation. This situation could lead to a longer-term but smaller scale release of sediment downstream, potentially extending the period of elevated sediment loads in the water but reducing the intensity of the peak sediment concentration. This slower release might reduce the immediate downstream impacts, such as sudden changes in water quality and provide more time for downstream areas to adjust to the new sediment regime. It is likely that some sediment will remain at these edges and contribute to the formation of new riparian or floodplain habitats. Following the Great Dam removal, immediately after the impoundment was drawn down, the newly exposed sediment was seeded with native vegetation to restrict invasive species growth and the stabilize the sediment in place and new stream bank in-place

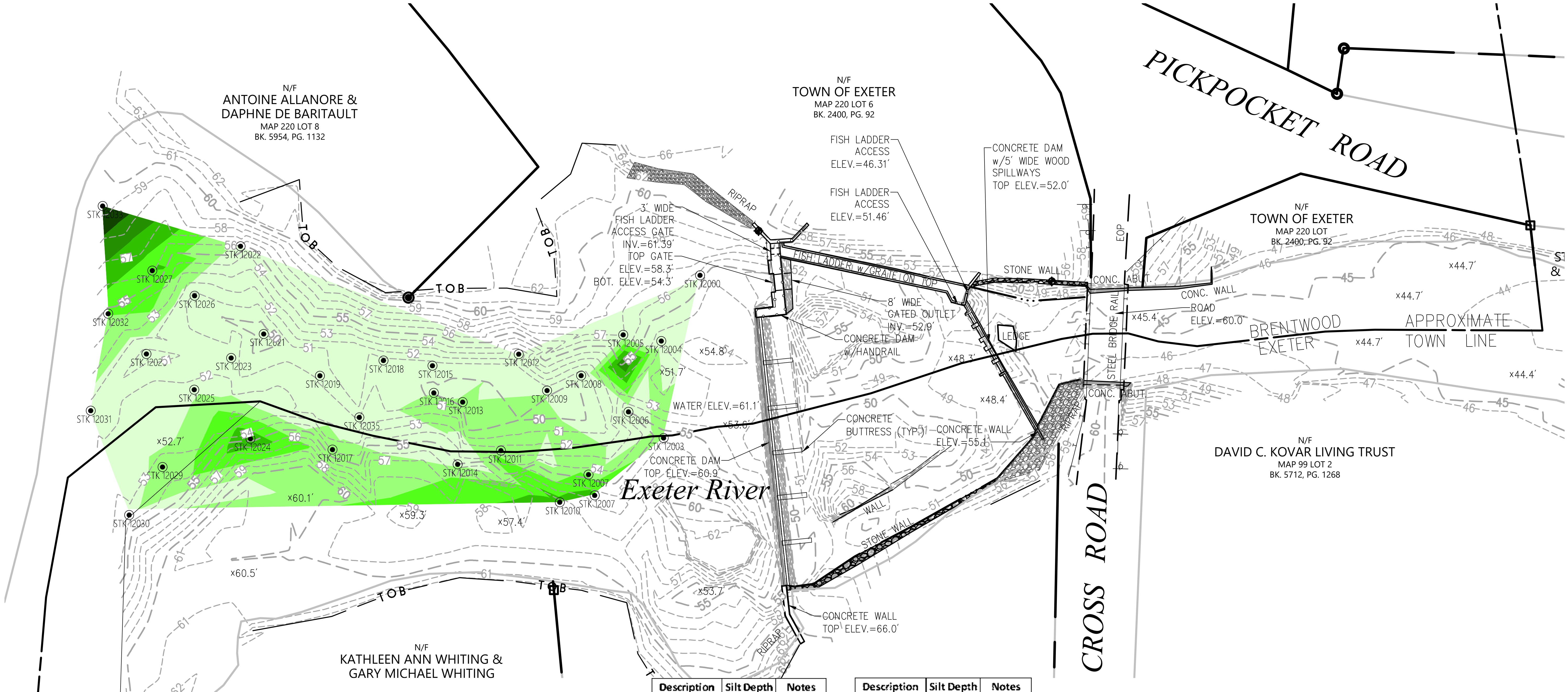
3.3 Sediment Quality

The due-diligence review of the project area found numerous regulated storage tanks and hazardous waste generator sites located within the watershed of the dam (i.e., area of interest).

However, of the 193 remediation sites identified, at least 177 of the sites have been closed or are associated with database listings that require no further response actions. Further review of available database records for the remaining 16 remediation sites indicate that associated release(s) are unlikely to impact sediment quality at the Pickpocket Dam given their proximity to the dam and nature of the release. Two solid waste facilities are located within 1 mile of the project area, the Cross Road Landfill (approximately 900 feet from the Site) and Exeter Transfer Station (approximately 2,500 feet from the Site). No documented releases or violations are documented at the Exeter Transfer Station and therefore this facility is unlikely to impact sediments within the impoundment. Post closure monitoring activities are ongoing for the Cross Road Landfill, a Solid Waste Facility, which is discussed in more detail in the Sediment Sampling and Analysis Plan (SAP).

Figure 3.2-9 - Silt Depth

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Description	Silt Depth	Notes
STK 12000	0.6	
STK 12003	1.3	
STK 12004	1.0	
STK 12005	0.1	ROCK
STK 12006	0.2	ROCK
STK 12007	3.3	
STK 12008	0.0	ROCK
STK 12009	0.9	
STK 12010	3.4	
STK 12011	1.0	
STK 12012	0.9	
STK 12013	1.3	
STK 12014	0.6	
STK 12015	0.0	ROCK
STK 12016	1.2	
STK 12017	1.4	
STK 12018	0.0	ROCK

Description	Silt Depth	Notes
STK 12019	0.0	ROCK
STK 12020	0.7	
STK 12021	0.2	
STK 12022	0.6	
STK 12023	0.1	
STK 12024	3.6	
STK 12025	0.7	
STK 12026	0.5	
STK 12027	2.3	
STK 12028	0.2	
STK 12029	0.9	
STK 12030	1.0	
STK 12031	0.3	
STK 12032	2.1	
STK 12033	6.1	
STK 12035	0.3	

Silt Depth

Min. Elev.	Max. Elev.	Color
0	1.00	
1.00	2.00	
2.00	3.00	
3.00	4.00	
4.00	5.00	
5.00	6.00	
6.00	7.00	

1/19/2024

\\vhb\gbl\proj\Bedford\52151.06 Pickpocket Dam Feasibili\cad\ev\planmisc\52151.06_Sed_Bedrock_Probes.dwg

Sediment sampling of the Exeter River in the vicinity of Pickpocket Dam was completed in accordance with the procedures outlined in a March 2023 Sediment SAP, approved by NHDES. Three discrete grab samples were collected upstream and two composite sediment samples were collected downstream. All sediment samples were collected manually with hand tools such as a hand auger.

The three discrete sediment samples identified as SED-1, SED-2 and SED-5 were collected upstream from a small, motorized boat. The hand auger was manually advanced through the soft sediments until refusal was encountered and the sample was then retrieved from the auger. The two downstream samples identified as SED-3 and SED-4 were composited from five sediment cores (identified as A through E) collected across the river from the top one-foot interval of sediment. Once collected, the core sample(s) were visually observed for sediment texture, color, and debris content. All core samples for a given location were transferred to a clean, stainless-steel bowl and mixed either to homogenize the discrete sediment sample location (i.e., SED-1, SED-2 and SED-5), or to composite discrete sample locations (i.e., SED-3 and SED-4). The homogenized sediment material was then immediately transferred into clean, unused, laboratory-supplied sample containers. The containers were packed in coolers with bagged ice and delivered directly to the analytical laboratory under standard chain-of-custody protocols. All equipment that came into direct contact with the sediment was properly decontaminated between sample locations using Alconox® and water. The field sampling activities were documented using field data sheets provided as **Appendix E**. The sediment sample locations are depicted in **Figure 3.2-7**.

The five sediment samples as well as one field duplicate collected at SED-2 were submitted for laboratory analysis of Priority Pollutant 13 (PP-13) metals as well as manganese and iron, pesticides, Polychlorinated Biphenyls (PCBs), semi-volatile organic compounds (sVOCs), and grain size via ASTM D422 and D7928. Additionally, based on the findings of the due diligence review documented in the March 2023 Sediment SAP, SED-1 was submitted for laboratory analysis of volatile organic compounds (VOCs) due to the proximity to the Groundwater Management Zone (GMZ) associated with the Cross Road Landfill (NHDES Site #198401081). A summary of the sediment analytical results is provided in **Table 1** of **Appendix E**. The laboratory analytical report is provided as **Appendix E.**

3.3.1 Sediment Analytical Results

3.3.1.1 Ecological Screening Assessment

The sediment analytical results were compared to the NHDES recommended Threshold Effect Concentrations (TEC) and Probable Effect Concentrations (PEC) to evaluate whether the sediment quality may pose a risk to aquatic and benthic organisms. As noted in the NHDES guidance:

- TECs represent the estimated chemical concentration threshold below which adverse effects on ecological receptors are unlikely; and
- PECs represent the estimated chemical concentration threshold above which adverse effects on ecological receptors are likely.

TEC and PEC thresholds for freshwater sediments were considered in this analysis. The NHDES recommended screening thresholds were obtained from NHDES (2016)[1].

Following NHDES guidance, Hazard Quotients (HQ) were calculated for all detected constituents in each sample by dividing the constituent concentration by the screening threshold value (i.e., either the TEC or PEC). An HQ calculated with a TEC (HQ-TEC) of 1 or greater indicates the possibility that exposure to the sediment may adversely affect ecological receptors. An HQ calculated with a PEC (HQ-PEC) of 1 or greater indicates the likelihood that exposure to the sediment will adversely affect ecological receptors. Based on the calculated HQs, each constituent was assigned a risk classification as follows:

- HQ-TEC<1 was qualified as low risk;
- HQ-TEC>1 was qualified as moderate risk; and
- HQ-PEC>1 was qualified as high risk.

The calculated HQs, assigned risk classifications for freshwater screening thresholds, and the ecological screening results are provided in **Table 2** of **Appendix E**. The ecological risk was determined to be low for all detected concentrations of metals and Polycyclic aromatic hydrocarbons (PAH) in the sediment samples with the exception of arsenic in SED-2 FD, SED-4, and SED-5 as well as five PAHs in SED-3 and SED-4. No concentrations of VOCs, polychlorinated biphenyls (PCB), or pesticides were detected in sediment samples in excess of the laboratory detection limit.

These screening results suggest that sediments downstream are impacted with concentrations of five PAHs identified as benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene, phenanthrene, and pyrene that have a moderate potential to adversely affect ecological receptors. Sediments both upstream and downstream are impacted with concentrations of arsenic that have a moderate to low potential to impact ecological receptors. PAHs and metals are commonly found in urban environments and may be the result of anthropogenic or naturally occurring non-point sources.

3.3.1.2 Human Health Screening Assessment

Sediments that would be excavated as part of Alternative 4 – Dam Removal, would become classified as soils and are the subject to review in accordance with NHDES Contaminated Sites Risk Characterization and Management Policy (RCMP). The RCMP provides a process to determine if detected contaminant concentrations constitute a direct contact risk to humans or a potential risk to groundwater quality. Therefore, to preliminarily assess the sediment quality conditions at Pickpocket Dam relative to these risks, the sediment analytical results were compared to the current RCMP Method 1 Soil Category S-1 Direct Contact Risk-based Concentrations or Soil Remediation Standards (SRS).[2] The results of this comparison are detailed in **Table 3** of **Appendix E**.

No concentrations of contaminants in sediment were detected in excess of the SRS with the exception of arsenic, which was detected in SED-2 FD and SED-5 at 12.4 milligrams per kilogram

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1 NHDES Memorandum from Matt Wood to Gregg Comstock, PE entitled *"Updated TEC and PEC sediment thresholds"* dated January 8, 2016.

2 The NHDES S-1 standards are based upon sensitive uses of property and accessible soils, either currently or in the reasonably foreseeable future, and are equivalent to the Soil Remediation Standards (SRSs) established in the New Hampshire Code of Administrative Rules Chapter Env-Or 600, Contaminated Site Management.

(mg/kg) and 19.9 mg/kg, respectively. The SRS for arsenic (i.e., 11 mg/kg) is based on typical background concentrations found in soils in the State of NH (SHA, 1998). However, it is not uncommon to identify naturally-occurring arsenic greater than the arsenic SRS, particularly in southeastern NH.

3.3.2 Findings

A summary of the findings of the sediment sampling activities and sediment analytical results completed in accordance with the March 2023 Sediment SAP is provided below:

- On April 18, 2023, VHB completed the sediment sampling at Pickpocket Dam in accordance with the procedures outlined in the March 2023 Sediment SAP.
- Five sediment samples were collected during the sediment sampling event, including three discrete upstream samples identified as SED-1, SED-2, and SED-5 as well as two composite downstream samples identified as SED-3 and SED-4. Additionally, one field duplicate sample was submitted for SED-2 (i.e., SED2 FD) for quality control purposes.
- The five sediment samples and one field duplicate sediment sample were submitted for laboratory analysis of PP-13 metals, manganese, iron, pesticides, PCBs, and sVOCs. Additionally, SED-1 was also submitted for laboratory analysis of VOCs due to the proximity of the GMZ associated with the Cross Road Landfill.
- Based on the sediment analytical results, only metals and PAHs were detected in sediment samples both upstream and downstream of Pickpocket Dam. Based on the risk classification resulting from the NHDES TECs and PECs HQ calculation, the concentrations of PAHs detected in sediment samples downstream have a moderate potential to adversely impact ecological receptors; however, concentrations of PAHs upstream have a low potential to impact ecological receptors. Concentrations of arsenic both upstream and downstream have a moderate potential to impact ecological receptors. However, based on the distribution and concentrations of arsenic detected in the sediment samples, the concentrations of arsenic identified are likely naturally occurring. The levels of PAHs detected are typical of urban/suburban areas.
- No concentrations of contaminants were detected in excess of the SRS within the sediment samples with the exception of arsenic detected in SED-2 FD (12.4 mg/kg) and SED-5 (13.9 mg/kg), which were both collected upstream of Pickpocket Dam. Concentrations of arsenic for all sediment samples ranged between 4.69 to 13.9 mg/kg with the mean concentrations of arsenic calculated at 9.88 mg/kg. Based on the narrow range of arsenic concentrations reported just above and below the SRS, the detections appear to be indicative of a naturally occurring background conditions. Nevertheless, the concentrations of arsenic exceeding the SRS generally suggest additional assessment and/or risk mitigation may be warranted should excavation/dredging of sediment be proposed as a selected alternative.
- Overall, the ecological screening and human health screening results indicate that low levels of PAHs and arsenic are present in sediments both downstream and upstream of Pickpocket Dam and are not considered harmful to the ecosystem or human health.

3.4 Infrastructure

Within the immediate vicinity of the Pickpocket Dam there are multiple private residences, roads, and one bridge. There are no known stormwater outfalls along the impoundment, however there is one culvert under Rowell Road at the top of the impoundment that will not be impacted under any alternative. The Cross Road Bridge is approximately 160 feet downstream of the dam. The impoundment ends at the Haigh Road Neither bridges will be impacted under any alternative. As mentioned above, Pickpocket Dam is a run-of-river dam, meaning the flow of water in the river downstream of the dam is the same as the flow of the water upstream of the dam. Under each alternative, the hydraulic function of the Cross Road bridge will not be impacted under normal flow conditions. The HEC-RAS hydraulic model was used to determine if the Cross Road bridge impacts the impoundment during the larger storm events. To do this, Cross Road was completely removed from the model, and it was found that there was little to no change in the upstream WSEs for any of the alternatives.

Alternative 1 – Raise Dam and Alternative 3 – Auxiliary Spillway will result in a slight increase in flood levels upstream of the dam and therefore will increase the flood risk in the dam vicinity. Alternative 4 – Dam Removal will decrease flood levels upstream of the dam. Therefore, there is no expected increase in flooding risk under Alternative 4 – Dam Removal.

Rowell Road W and Juniper Lane are inside the floodplain of the 100-year storm event but also at the top of the impoundment and will not experience an increase in flood risk as a result of any of the Alternatives.

3.4.1 Induced Settlement

The removal of the Pickpocket Dam will result in changing water levels that have the potential to impact surrounding infrastructure. Currently, the Exeter River elevation is at or around the normal pool elevation (Elev. 60.9). It is expected that the river elevation will be reduced to between Elevations 53 and 50 (representing a 7.9 to 10.9-feet reduction in water level). Given groundwater hydrology, it can be assumed that the groundwater levels surrounding the river will likewise respond to removal of the dam, with the depth of groundwater retreat decaying with distance from the river.

With the drawdown of the river and resulting groundwater changes, the effective stress in the surrounding soils will increase. This increase in effective stress could also result in soil compression, which may result in settlements of relatively loose soil layers. The degree of potential settlement may be influenced by a variety of factors including geologic history of the location, in-situ densities, soil type, time rate of drawdown, and actual depth of groundwater drawdown.

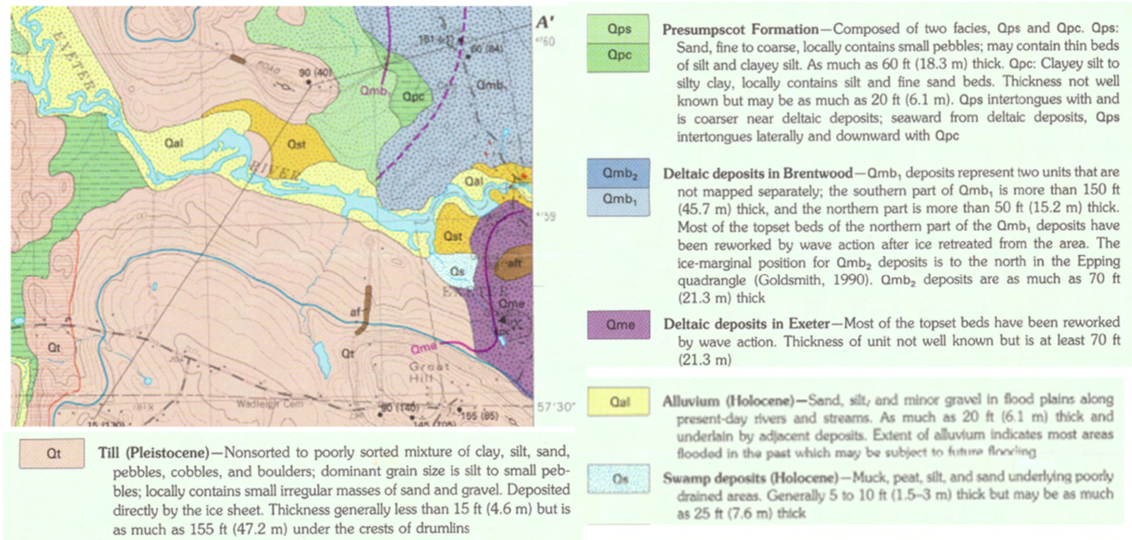


Figure 3.4-1: Geologic Mapping Near Pickpocket Dam

Based upon available geologic mapping, surficial deposits in the area of the dam and impoundment include alluvium in the vicinity of the existing impoundment/historic river valley with locations of stream-terrace deposits along portions of the valley banks. Development in the project area is predominantly located atop the valley side slopes with areas of deltaic deposit and till bounding the southern side of the valley and deltaic deposits, Presumpscot Formation, and till to the north.

Geologic history of Glaciomarine deposits typically provide compact stratums which are not as susceptible to induced settlement resulting from groundwater drawdown. This includes Presumpscot Formation and deltaic deposits in the project locus. However, the potentially looser natures of alluvium and stream-terrace deposits may influence susceptibility to settlement within these deposits.

As part of a dam removal design program, site specific explorations and assessment would be completed for infrastructure potentially founded upon alluvium and stream terrace deposits prior to commencing any construction.

3.4.2 River Valley Slope Stability

The change in water elevations and flow characteristics have two impacts to slopes immediately adjacent to the river valley.

First, the lowering of the impoundment elevation will reduce groundwater elevations within the adjacent slopes. This reduction in water level will increase the total effective stresses within the slope section. In addition to increased stresses, the change will also result in the development of unsaturated soil strength parameters. Typically, for soil types anticipated within the project locus, unsaturated soil strengths are greater than saturated soil strength; as such, reducing the river and groundwater elevation is anticipated to result in improvements to overall slope stability conditions. However, it is recommended that initial pond drawdown be completed in a gradual manner so as to allow groundwater levels within the valley slopes to respond adequately to prevent short term slope stability concerns. The low level gate would need to be temporarily repaired to control the drawdown.

Second, the changed flow regime increases the potential for scour at the base of embankment slopes. Extent of scour is a function of geomorphology of the stream channel as well as the proximity of the future stream channel to the toe of the valley slopes. Should the toe of a slope be eroded during high flow events within a restored river channel, the erosion and associated loss of soil within the passive section of the slope failure wedge will lead to an overall decrease in the stability of the slope. In general, the hydraulic results show low velocities that would be generally stable when vegetated. In cases where geomorphic and hydraulic modeling suggests the potential for scour near the toe of valley slopes, final design should evaluate long term stability of the slope and implement scour and erosion countermeasures, such as early vegetation following impoundment drawdown, to ensure long term stability and that homes along the Exeter River are not impacted.

3.5 Water Supplies

VHB completed an on-site reconnaissance and consulted various online databases and resources to form a conceptual hydrogeologic model of groundwater aquifers and the interaction between the surface water impoundment and groundwater, and to inventory water supplies in or adjacent to the Pickpocket Dam impoundment. The databases used include NHDOT OneStop Data Mapper, NH GRANIT View, NH Coastal Viewer, and the National Water Information System, as well as previous studies completed by VHB in the vicinity (VHB, 2013) and the Exeter and Brentwood Departments of Public Works.

In summary of **Section 3.5** below, the water supply wells in this area rely on water from the deep bedrock aquifer, where a lowering of the overburden groundwater table would not impact the availability water in the bedrock aquifer, which is recharged from the larger watershed through a network of fractures. The removal of the dam will not affect groundwater levels in the bedrock aquifer that supplies wells within the Study Area.

3.5.1 Surface Water Withdrawals

VHB did not identify any registered surface water users within the impoundment of the Pickpocket Dam. The Town of Exeter water system is served in part by an intake on the eastern bank of the Exeter River, located several miles downstream of the Pickpocket Dam, across from Gilman Park. This water intake was improved as part of the Great Dam removal project, where the intake was lowered approximately 2-feet, to allow the water intake to function during low flows with the reduction in river water levels following removal of the great dam. VHB's 2013 Feasibility Study for the Great Dam also identified use of the Exeter River for heating systems, cooling, irrigation, and dry fire hydrants upstream of the Great Dam. The majority of these withdrawals have since been discontinued. The remaining surface withdrawals are not anticipated to be impacted by any of the alternatives since the existing dam operates as a run-of the river, which will continue with any of the modification alternatives evaluated. River flows and depths are not anticipated to change downstream.

Questions have also been raised on whether the dam's impoundment water storage capacity could be used to provide additional water for the Town's intake at the pump house across from Gilman Park. The pump at the Town's pump house has a capacity of approximately 1050 gallons per minute (gpm), which equates to 2.34 cfs. Assuming the Town can draw 5 percent of the instream flow for water supply, this would equate to an instream flow rate of 46 cfs. At 46 cfs the impoundment would drain in less than 24 hours, so the Pickpocket impoundment would not provide a viable backup source of drinking water supply.

VHB also completed a site reconnaissance to observe for the presence of obvious intake structures with the impoundment above the Pickpocket Dam. VHB identified a dry hydrant located along Rowell Road, just east of its intersection with Haigh Road. The depth of the intake and usage is unknown at this time. The alternatives are not likely to impact the hydrant's usage, pending verification of the depth of the intake relative to the proposed water level lowering under the dam removal alternative. However, the hydrant is located upstream of the bathymetric highpoint at River Station 56000, where water surface modeling shows no impact to water levels if the dam were to be removed (refer to **Figure 3.2-5** and **Figure 3.2-6**).

3.5.2 Wells

VHB defined a Well Analysis Study Area (also referred to as the Well Study Area) using a 1,000-foot buffer from the edge of the existing impoundment, which represents a conservative inferred zone of groundwater influence from the impoundment. Locations of water supply wells mapped within the Well Study Area are depicted on **Figures 3.5-1** through **3.5-3**. Existing groundwater conditions within the Well Study Area were inferred from surficial and bedrock geologic mapping and available well reports as described in the following sections.

3.5.2.1 Surficial Geology and Overburden Aquifer

Surficial geology around the impoundment consists largely of alluvium, containing sand, silt, and gravel in flood plains along present-day rivers and streams (NHGS, 2005). The alluvium is as much as 20 feet thick and underlain by adjacent deposits. Localized areas of stream terrace deposits consist of sand, pebbly sand, gravel, and minor silt on terraces cut into former glaciomarine deposits. Adjacent deposits consist of glaciomarine deposits consisting of deltaic deposits in Brentwood and the Presumpscot Formation (clayey silt facies and sandy facies), glacial till, and freshwater wetland deposits.

The Exeter River impoundment intersects stratified drift aquifers at its most upstream end in Brentwood and most downstream end, near the Pickpocket Dam (USGS, 1992). The NHDES OneStop Data mapper classifies the aquifer near the Pickpocket dam as a GA2 High Yield Stratified Drift Aquifer, which is applied to groundwater within high-yield stratified drift aquifers identified for potential use as a public water supply (NHDES, 2016). The stratified drift aquifers have transmissivities of less than 2,000 square feet per day, although a portion of the GA2 aquifer near the dam has values between 2,000 and 4,000 square feet per day (NH Coastal Viewer, 2023). The remaining middle section of the impoundment is mapped as glacio-estuarine silts and clays that may include some areas locally overlain by thinly saturated sand and gravel. No transmissivity value is given for these silts and clays, indicating that these materials likely would not yield a productive overburden aquifer (USGS, 1992).

According to the NHDES water well inventory, no nearby water supply wells are installed in overburden materials[3] and all documented wells in the Well Study Area are installed in bedrock. Well logs indicate that overburden thicknesses range from 5.5 feet below ground surface (bgs) to

[3] Well ID 29.0269 is listed as "drilled in gravel" however the depth to bedrock is reported as 9 feet bgs with a total well depth of 240 feet. VHB confirmed with the well log that this is in fact a bedrock well.

76 feet bgs (see more information in **Sections 3.5.2.4**). The water well inventory was initiated in 1984 and it is unknown if it captures any water wells installed prior to 1984. Consistent with the surficial geology mapping, overburden materials as reported in well logs generally consist of sand, clay, gravel, till, or a combination thereof.

A GMZ exists around the closed Cross Road Landfill and Stump Dump, which is located to the south of the existing Pickpocket dam. A network of overburden monitoring wells is located around the landfill (see **Figure 3.5-1**). According to the most recent monitoring report by GZA (February 2023), overburden geology in this area consists of up to 99 feet “of glacial outwash sand and gravel overlying a thin (about 4 feet thick) discontinuous layer of glacial till” (GZA, 2023). To the east of the landfill, between 10 and 31 feet of primarily fine sand glacial outwash deposits were encountered. Groundwater levels in the overburden monitoring wells range from approximately 2 feet bgs to 50 feet bgs in the GMZ, with groundwater flowing radially away from the landfill to the north toward the Exeter River. The GMZ overlaps with the southern portion of the GA2 Stratified Aquifer discussed above, likely precluding this aquifer from serving as a viable public or private water supply source due to groundwater impacts from the landfill.

3.5.2.2 Bedrock Geology and Aquifer

According to the NH Geological Study (NHGS 1997) and as depicted on **Figure 3.5-3**, bedrock geology in the Well Study Area consists of the following:

- Phyllite of the Eliot Formation (map code Soe), described as gray to green phyllite, calcareous quartzite, quartz-mica schist, and well-bedded calc-silicate.
- Diorite of the Exeter Diorite formation (map code De9), described as pyroxene and pyroxene-hornblende diorite and gabbro, along with minor granodiorite and granite. This formation includes associated intrusive rocks of southeastern NH.
- Metamorphic rock of the Kittery Formation (map code Sok), described as tan, graded-bedded, calcareous metasandstone and purple and green phyllite. This formation grades into the Eliot Formation but facing direction is uncertain.

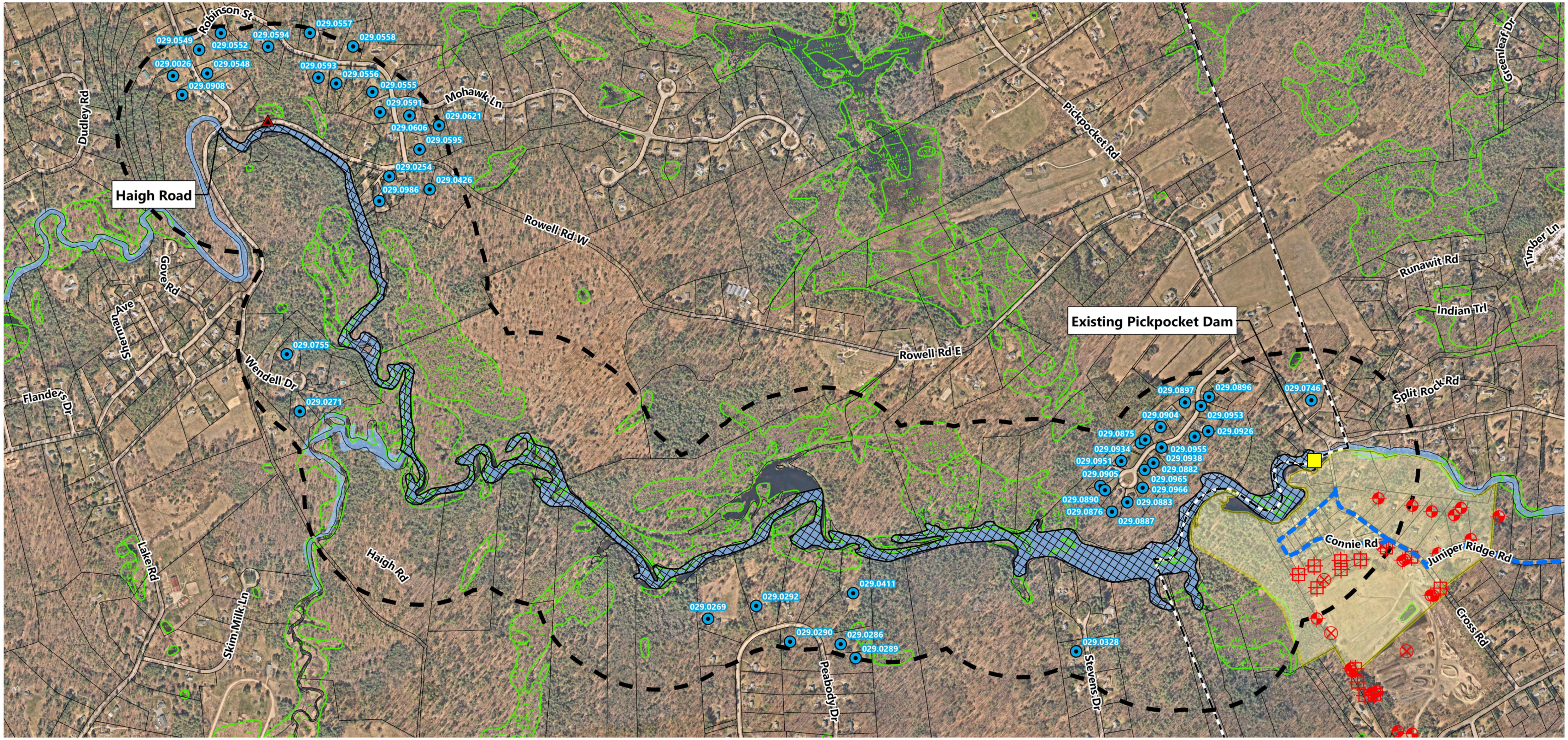
Flow of water in bedrock aquifers is controlled by networks of interconnected fractures within the rock. Based on the water supply well logs in the area, the bedrock aquifer is the main source of drinking water around the impoundment.

3.5.2.3 Municipal/Public Wells

VHB reviewed information available online for municipal and public wells and water systems within and adjacent to the Well Study Area to characterize public water supplies and to evaluate potential impacts of the project. No public water supply wells are mapped or known to be located within the Well Study Area. According to the Municipal Water System Distribution Map for the Town of Exeter, a municipal water service distribution line extends along Juniper Ridge Road to Cross Road, to the south of the Pickpocket dam in the area of the GMZ associated with the Cross Road Landfill. The Town of Brentwood reported that no municipal distribution systems are located within the Well Study Area.

Figure 3.5-1: Well Analysis Aerial

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Existing Dam Location

Well Analysis Study Area

Water Well Inventory

Public Water Supply Wells

Landfill GMZ Zone

Water Main

Ground water Monitoring Well by GZA

Groundwater Monitoring Well

Soil Gas Monitoring Well Location

Dry Hydrant

Wetlands (NHDES)

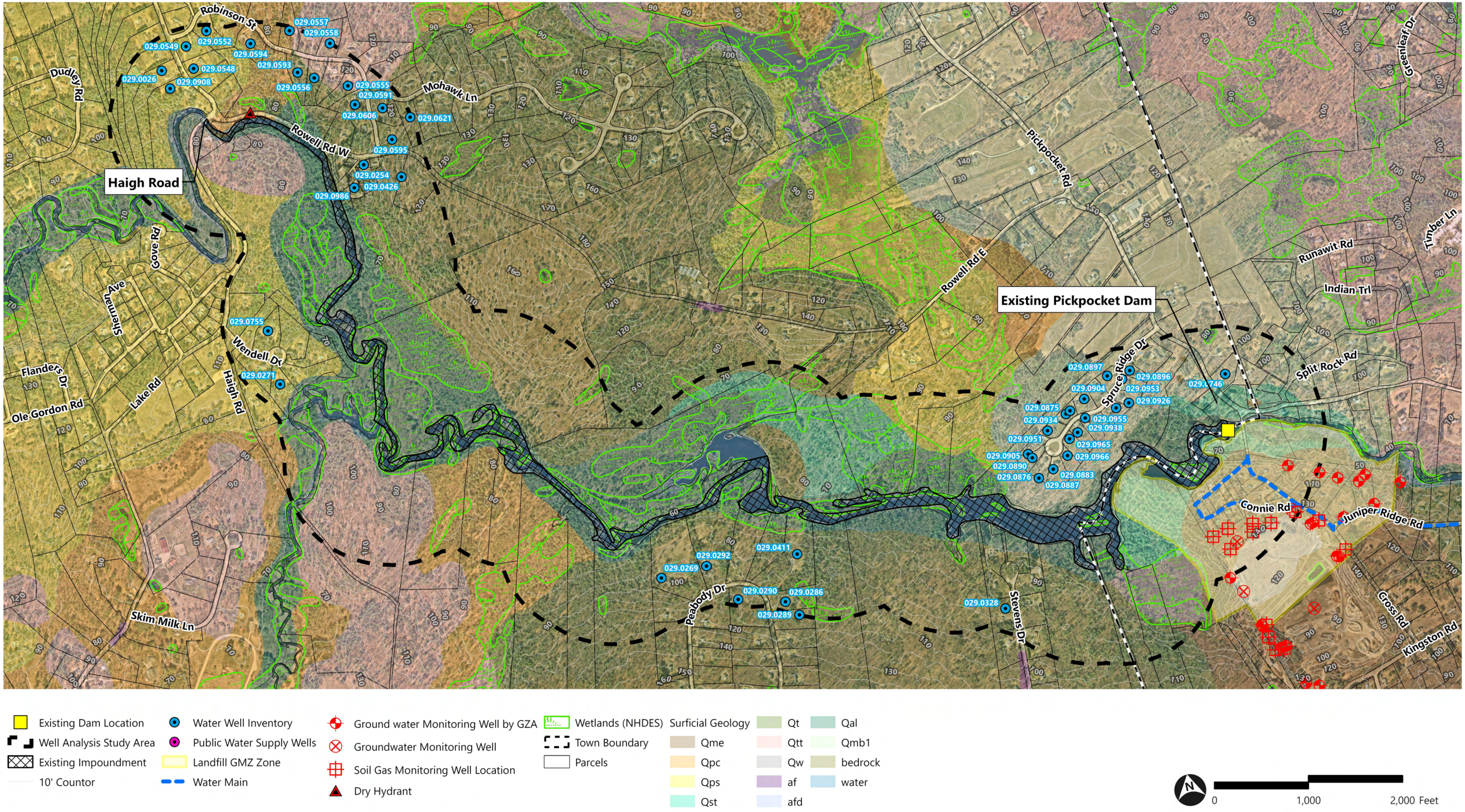
Town Boundary

Parcels

Source: VHB, NHGRANIT, NearMap

Figure 3.5-2: Well Analysis - Surficial Geology

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire

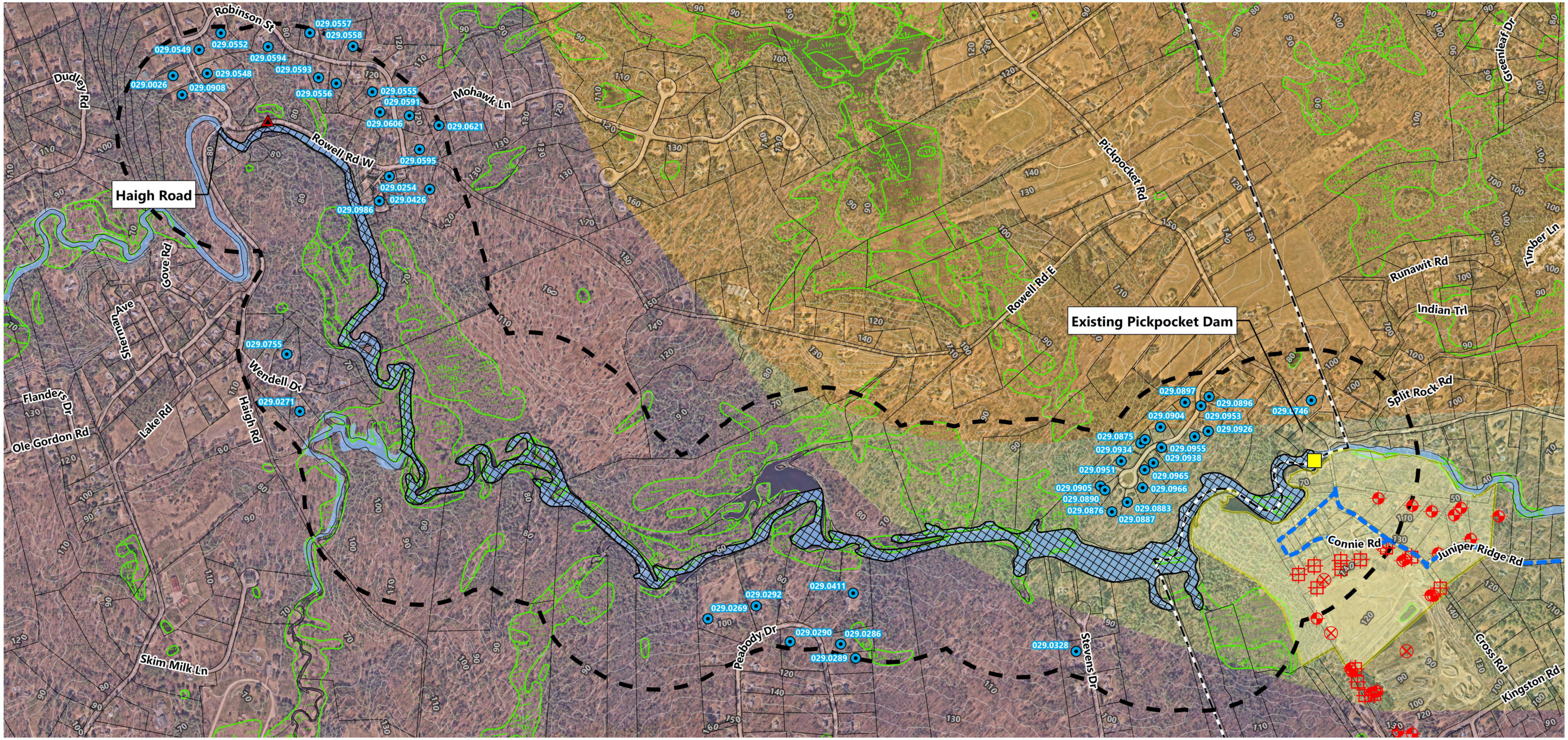


Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/19/2024)

Figure 3.5-3: Well Analysis - Bedrock Geology

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Existing Dam Location
Well Analysis Study Area
Existing Impoundment
10' Countor
Water Well Inventory
Public Water Supply Wells
Landfill GMZ Zone
Water Main
Ground water Monitoring Well by GZA
Groundwater Monitoring Well
Soil Gas Monitoring Well Location
Dry Hydrant
Waterbody (NHD)
Wetlands (NHDES)
Parcels
Town Boundary

Bedrock Geology
De9
SOe
SOk

0 1,000 2,000 Feet

Source: VHB, NHGRANIT, NearMap

3.5.2.4 Private Wells

Because municipal distribution systems do not supply drinking water within the Well Study Area, water users rely on private water supply sources. VHB reviewed well inventory data provided by NHDES OneStop, and several wells are mapped near the upstream end of the impoundment, south of the middle of the impoundment, and north of the downstream end of the impoundment (refer to **Figure 3.5-1**). In total, approximately 50 domestic wells are mapped in the Well Study Area, all of which are reportedly installed in bedrock. VHB reviewed available construction details for these wells, which are summarized in **Table 3.5-1** below. In summary, wells in the Well Study Area are installed in bedrock to depths ranging from 120 feet bgs to 700 feet bgs, with reported yields ranging from 0 to 100 gpm.

The mapped well locations appear to be associated with residences. VHB notes that some residences or buildings do not have associated mapped wells due to an incomplete inventory, however, it is likely that these homes are also served by individual private bedrock wells based on the characteristics of nearby wells.

Table 3.5-1 Well Construction Information: Private/Domestic Wells Within Study Area

Well ID	Overburden Description	Depth to Bedrock (ft bgs)	Total Well Depth (ft bgs)	Yield (gpm)
29.0026	Sand	76	255	20
29.0254	Clay	12	700	1
29.0269*	Gravel/till	9	240	30
29.0271	Sand, Clay	62	160	12
29.0286	Till/Clay	5.5	140	15
29.0289	Clay	10	280	5.5
29.029	Clay	10	130	50
29.0292	Gravel	6	255	6.5
29.0328	Till	25	245	50
29.0411	Sand/Gravel	8	160	30
29.0426	Clay	15	200	8
29.0548	Sand	65	305	10
29.0549	Sand	60	405	15
29.0552	Till	60	305	10
29.0555	Clay	10	255	15
29.0556	Clay	19	305	25
29.0557	Clay	16	405	10
29.0558	Clay	8	305	10
29.0591	Clay	10	405	8
29.0593	Till	10	255	100
29.0594	Sand	20	505	5
29.0595	Clay	16	305	30
29.0606	Clay	19	605	5
29.0621	Clay	15	505	12
29.0746	Gravel	10	120	20
29.0755	Clay	46	145	20

Well ID	Overburden Description	Depth to Bedrock (ft bgs)	Total Well Depth (ft bgs)	Yield (gpm)
29.0875	Sand/Gravel	64	440	0
29.0876	Sand, Till,	57	440	1
29.0877	Gravel/Till	55	280	50
29.0882	Sand/Clay/Silt	35	340	20
29.0883	Gravel	32	280	60
29.0887	Sand, Till,	57	440	1
29.0888	Gravel/Till	55	280	50
29.0889	Sand/Gravel	64	440	0
29.089	Till, Gravel	38	440	0.75
29.0896	Sand/Gravel	67	300	100
29.0897	Sand/Gravel	61	400	30
29.0904	Sand/Gravel	60	438	60
29.0905	Clay/Silt, Till	43	540	6
29.0908			540	30
29.0926	Sand	50	240	60
29.0934	Sand/ Till	34	610	10
29.0936	Sand/Clay/Silt	63	340	15
29.0938	Sand/Clay/Silt	27	400	6
29.0951	Sand/Till	34	610	10
29.0953	Sand/Clay/Silt	63	340	15
29.0955	Sand/Clay/Silt	27	400	6
29.0965	Clay/Silt	28	340	60
29.0966	Clay/Silt	30	300	60
29.0986	Till, Clay/Silt	20	200	30
Minimum		**5.5**	**120**	**0**
Average		**34**	**345**	**24**
Maximum		**76**	**700**	**100**

Notes:

1 Source = NHDES Water Well Inventory

2 * NHDES Attribute Table Lists this well as a gravel well. VHB obtained the well driller's log and confirmed that it is a bedrock well.

3.5.3 Conceptual Hydrogeologic Model and Water Supply Conclusions

Using the above identified resources, as well as existing geologic information, maps, and well drilling logs, VHB developed the following conceptual hydrogeological model of the Well Study Area.

There are no known surface water supply intakes on the impoundment, other than a dry hydrant located beyond the upstream extent of water-level drawdown associated with dam removal, due to a bathymetric high point. Stratified overburden aquifers are mapped at the upstream and downstream ends of the impoundment. However, VHB's review of well logs for the Well Study Area indicates that all documented water supply wells are installed at least 120 feet into bedrock, and therefore the bedrock aquifer is the main source of drinking water around the impoundment.

The bedrock aquifer is recharged with water from precipitation and snowmelt where the surficial materials are thinner and bedrock is exposed, or where overburden materials are more permeable. The bedrock aquifer is not likely to be recharged by the river as the river serves as a discharge point for the watershed. In general, groundwater flows from the higher-elevation recharge zones through the bedrock towards the low elevations around the impoundment. VHB used this conceptual model to evaluate the potential for modification or removal of the dam to result impact the yield of private wells (no public wells are mapped with the Well Study Area).

Of the alternatives evaluated, dam removal would result in a lowering of the surface water level, which would result in lowering of the overburden groundwater table closer to the impoundment. Under normal flow conditions, Alternative 4 would result in impoundment water level lowering of 9.7 feet at the Pickpocket dam near Cross Road, with the amount of lowering decreasing with distance upstream (refer to **Figure 3.2-6**). A bathymetric highpoint exists at River Station 56000 which serves as a physical barrier to flows; upstream of this point, the dam removal alternative does not impact water levels.

According to surficial geologic mapping (USGS, 1992), the majority of the surficial geology around the impoundment consists of Glacio-estuarine silts and clays or till-covered bedrock. The stratified drift aquifer to the west/upstream end of the impoundment is classified as overlying glacioestuarine silts and clays. In areas where low permeable materials like till, silts, and clays mantle bedrock, the bedrock aquifer is hydrogeologically isolated from the overburden groundwater water and a change in the impoundment water levels would not impact the water levels or yields in the bedrock wells. To the north and south of the Pickpocket Dam where the Exeter River and impoundment intersect the GA2 Stratified Drift Aquifer, the overburden and bedrock aquifers may be hydrogeologically connected. However, the water supply wells in this area rely on water from the deep bedrock aquifer, where a lowering of the overburden groundwater table would not impact the availability water in the bedrock aquifer, which is recharged from the larger watershed through a network of fractures.

In summary, VHB concludes that removal of the dam will not affect groundwater levels in the bedrock aquifer that supplies the Study Area wells. Thus, the water supplies that have been documented within the Well Study Area will not be affected by the Project. More information regarding the dry hydrant should be obtained to evaluate potential impacts to its use. Nonetheless, the hydrant is located upstream of the bathymetric highpoint at River Station 56000, where no impact to water levels would occur if the dam were removed. Therefore, removal of the dam is not likely to impact the use of the hydrant.

3.6 Water Quality

The Exeter River has been classified as a Class B waterbody by the state legislature, meaning water quality should meet designated uses which support fishing, swimming, and other recreational purposes, and for use as a water supply with adequate water quality treatment. The river segment immediately downstream of the Pickpocket Dam with a NHDES Assessment Unit Identification number (AUID) NHRIV600030805-02 extends approximately 5.4 miles downstream from the dam.

3.6.1 Existing Conditions

According to the NHDES 2020/2022 Section 303(d) Surface Water Quality List, this segment is listed as impaired for aquatic life designated uses due to low DO concentrations. This impairment is based on field measurements recorded at a location just downstream of the dam for several sampling events in July and August of 2016 which were below the state DO water quality standards. These same low DO levels were not detected in additional sampling events conducted in 2017, 2018, and 2019, which appears to be the last year this station was sampled. DO saturation levels are also listed as marginal based on the data collected in 2016. NHDES collected this water quality data as part of their ambient water quality data assessment program where water quality data is collected at various locations throughout the state each year.

The upstream river segment, which NHDES describes as a 20-acre impoundment (AUID NHLAK600030805-01), is not listed as water quality impaired. However, this status may be due to the lack of sufficient data to determine whether a water quality impairment exists. The limited water quality data and particularly DO data that exists is only for several weeks in September and early October of 2005 and again in 2019 according to the NHDES Environmental Monitoring Database (EMD). DO data were not available for the same 2016 time period when low DO levels were recorded downstream, however, the October 2005 data also revealed relatively low DO levels in the impoundment. The 2005 data is now too old to be used in determining current water quality impairment status according to NHDES' protocols but suggests the upstream impoundment may also experience occasional low DO levels and may have contributed to the low downstream DO levels in 2016.

Lakes, ponds, and impounded waters are typically more prone to low DO conditions due to the oxygen demand caused by decomposition of organic material in the bottom waters, these waters tend to be warmer and warmer water have lower DO saturation thresholds and there is less opportunity for aeration and oxygen exchange in slow moving waters as compared to free-flowing waters with riffles and falls. Dams cause changes in the natural flow regimes of rivers, which can result in a disruption of the natural sediment transport processes leading to either sediment accumulation or sediment deficit downstream. This can affect water turbidity or cloudiness. Also, the associated impoundment tends to have slower water flow and are more likely to heat up, leading to thermal stratification of water layers. The warmer, slow-moving water can promote growth of certain types of algae and microbes, potentially resulting in algal blooms and decreased oxygen levels, which can harm fish and other aquatic species. The dam can also change the downstream water temperature and chemistry, impacting aquatic habitats and the species composition.

Groundwater and Exeter River water has been monitored for contaminants associated with the Cross Road Landfill since the early 1990s (GZA, 2023). The monitoring network in the most recent Annual Summary Report by GZA (February 2023) includes groundwater data from two bedrock wells, two overburden wells, and two groundwater seeps that would travel to the River upstream of the Pickpocket dam. VHB's review focuses on data from these monitoring locations because water levels in the river downstream of the dam will be unaffected by Alternative 4.

According to the Annual Summary Report (GZA, 2023), contaminants with concentrations that exceeded the NH Ambient Groundwater Quality Standards (AGQS) in one or more of the six groundwater monitoring locations listed above include arsenic, manganese, chromium, lead, and 1,4-Dioxane. An AGQS does not exist for iron, but concentrations exceeded the Secondary Maximum Concentration Limit (SMCL). Concentrations of arsenic, manganese, and iron in groundwater and surface water also exceed the water and fish ingestion standards listed in the NH Water Quality Criteria for Toxic Substances (WQCTS). Surface water concentrations downstream of the landfill tend to be higher than those upstream of the landfill. Concentrations of iron, manganese, and arsenic exceed the WQCTS in a sampling location to the northwest of the landfill, which is anticipated to be outside the influence of landfill-related metals loading. This suggests that background water quality of the Exeter River has elevated metals concentrations resulting from factors other than the landfill.

3.6.2 Discussion of Potential Effects

Under the "Dam In" Alternatives the water quality of the river would remain the same with continued potential for low DO conditions, elevated water temperatures and increased algae and aquatic plant growth within the impoundment. The current water quality impairments listed in the state's 303(d) list would remain unchanged.

Under Alternative 4 – Dam Removal the removal of the dam facilitates the flushing out of accumulated sediments, improving water clarity and reducing contamination levels. The removal of the Pickpocket Dam would expect to improve the DO conditions by returning the impounded river segment to free-flowing condition and reducing, if not eliminating, the various causes for low DO levels in the upstream segment. For example, with the reduced surface water size, increased travel time and reduced solar thermal inputs will help to lower water temperatures, would improve DO conditions. The removal also allows for the reestablishment of transport of organic materials and nutrients downstream which leads to revitalization of downstream ecosystems. A more free-flowing riverine environment would also reduce the amount of algae and aquatic plant biomass generated on an annual basis compared to the existing impoundment.

In the short term, following the removal of the dam, there can be a temporary decrease in water quality due to the disturbance and release of accumulated sediment. However, management and mitigation measures during dam removal can address these issues to minimize the negative impacts. Strategies such as stage removal, dredging, constructing sediment traps and barriers, and employing a monitoring and adaptive management program can help reduce the negative impacts caused by sediment transport after the removal of the dam. However, as described under **Section 3.3**, the upstream sediment quality results indicate that low levels of PAHs and arsenic are present in sediments both downstream and upstream of Pickpocket Dam (see **Section 3.3** for more information). This reduces the risk of potential contamination downstream.

Under normal flow conditions, Alternative 4 would result in lowering the impoundment water level by approximately 9.7 feet at the Pickpocket dam near Cross Road and thus a lower groundwater discharge elevation (refer to **Figure 3.2-5**). VHB reviewed available groundwater elevation and contaminant data for the Cross Road Landfill Groundwater Management Zone (GMZ) to analyze the potential effects of contamination to the Exeter River due to the dam removal.

VHB analyzed the projected change, due to Alternative 4, to the local hydraulic gradient in the water table from the closest well in the GMZ (RFW-4) to the edge of the Exeter River, upstream of the dam. The current hydraulic gradient is approximately 1.49%, as calculated from RFW-4 to the edge of the River, over a distance of approximately 695 feet. Upon removal of the dam and the resulting lowering of the impoundment water level by approximately 9.7 feet, the hydraulic gradient would increase to approximately 2.81%. The projected hydraulic gradient is calculated under normal flow conditions, however river water levels would fluctuate upwards in higher flow conditions in Alternative 4 because the river would no longer be impounded.

No groundwater quality data are available between RFW-4 and the river to determine if groundwater downgradient of RFW-4 is contaminated above the NH AGQS. Removal of the dam via Alternative 4 is anticipated to have a minor influence on the water table and seepage rate from beneath the landfill. According to the Annual Summary Report (GZA, 2023), groundwater historically flows radially from the landfill to northwest, north, northeast, and east within the shallow overburden materials. The steepening of the hydraulic gradient may cause more groundwater from the landfill to reach the river upstream of the current dam versus downstream of the dam, without changing the total amount of discharge. While the localized seepage rate and distribution of contaminated groundwater may change, the lowering of the impoundment is not anticipated to increase overall landfill-related contaminant loading to the Exeter River.

3.7 Riverine Ice

The US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) maintains an Ice Jam Database which was used to investigate the occurrence of ice jams along the Exeter River.

The database produced two results. The first ice jam was recorded in Brentwood on February 4th, 1999. No location was listed but the data point coordinates point to Haigh Road as the location of the ice jam. The water discharge of this ice jam was estimated at 380 cfs. A second ice jam was recorded in Brentwood at Haigh Road on February 29th, 2000. The discharge was recorded at 570 cfs but there are no known damages from the ice jam.

There are no other known ice jam locations along the Exeter River. For all the alternatives evaluated, the impact area ended below Haigh Road so it is not anticipated that ice jams at Haigh Road would change. Further with the dam-in alternatives, the impoundment elevation would not change and would not change the overall ice flows. With the dam removal alternative, the impoundment would become free flowing which would reduce the formation of ice. As the dam is a run-of-the river dam, flows downstream of the dam would remain the same and no change in potential ice jam locations would be expected.

3.8 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. In the Section 106 process, the lead federal agency involved in the undertaking identifies the historic properties, the effects on properties listed or eligible for inclusion on the National Register of Historic Places (NR) and determines the appropriate mitigation for any adverse effects. These determinations are made in consultation with NHDHR and other consulting parties.

3.8.1 Historic Structures (Aboveground)

VHB conducted a search for aboveground resources greater than fifty years old within and adjacent to the project area, and identified two resources:

- Pickpocket Dam: built in 1920 and modified in 1969 with the addition of a fish ladder.
- Bridge # 044/057: built circa 1930 by the Town of Exeter and determined not eligible by NHDHR on 2/11/2022.

The eligibility of the Pickpocket Dam had not been previously determined, and VHB therefore prepared an Individual Inventory Form, provided in **Appendix F**, for this resource and submitted it to NHDHR to make a determination on the eligibility (DOE) of the dam based on information contained in the Inventory Form. The NHDHR DOE committee reviewed the dam on January 23, 2024 and has recommended the dam as eligible for the National Register under Criteria A and C "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". According to the NHDHR DOE committee, "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.

3.8.2 Archaeological Resources

Independent Archaeological Consulting, LLC conducted a Phase IA archaeological sensitivity assessment of the Pickpocket Dam removal feasibility study area in Exeter (Rockingham County), NH in November 2023. The objective of the Phase IA sensitivity assessment was to evaluate the archaeological sensitivity for both Pre-Contact Native American and Post-Contact Euro-American cultural resources within a survey area.

Independent Archaeological Consulting identified two archaeologically sensitive areas (Sas), that are sensitive for Pre-Contact Native American cultural deposits based on well drained soils, level topography, proximity to the Exeter River, and the distribution of known Pre-Contact archaeological sites. Historical review, map review, and walkover survey confirmed the survey area encompasses multiple Post-Contact Euro-American resources as well. This includes sites on the northern and southern sides of the river.

Independent Archaeological Consulting recommends a Phase IB Intensive Archaeological Investigation to determine the extent of the Pre- and Post-Contact archaeological resources within each SA.

3.8.3 Discussion of Potential Effects

Because NHDHR has recommended the Pickpocket Dam as eligible for listing on the National Register under Criteria A and C, adverse effects may be anticipated.

Alternatives 1 – Raise Dam and Alternative – 3 Auxiliary Spillway propose work that modifies the dam to address regulatory deficiencies. Alternative 1 – Raise Dam maintains the existing spillway discharge structures and meets spillway design flood requirements by raising the top of the dam elevation. This alternative would provide structural extensions of the left and right training walls at the spillway to meet the required top of dam elevation. Additional stabilization to maintain the structural integrity of the existing walls will also be required. In addition, earthen embankments would be constructed to impound high water during design storm events. Under Alternative 3, an auxiliary overflow section would be constructed through the left abutment. This alternative would require structural extensions of the right training wall at the spillway, as well as structural stabilization of the wall section. To prevent overtopping of the right abutment, an earthen embankment would also be constructed to impound high water during design storm events. The characteristics that define the dam as eligible for the National Register may be affected by Alternatives 1 and 3, particularly under Criterion C, as a dam that embodies the distinctive characteristics of its type, period, and method of construction. While the dam would remain in place, the modification to the structural design of the eligible dam may be deemed an adverse effect under Section 106. As part of the permitting process, the Town will work with NHDHR to reduce the potential for an adverse effect.

Alternative 4 – Dam Removal would completely remove the dam and its associated features from the river, including complete demolition and removal of the spillway structure, abutments, sluice gate, fish ladder, and lower weir. The islands downstream of the dam would be retained and repurposed to help recreate the geomorphology of a natural river. The island upstream of the dam will be removed as part of the reconstruction of the channel. The river channel would be reconstructed through the former dam location, designed to simulate the geomorphology of a natural river. The removal of the dam would result in a substantial adverse effect to this eligible resource under Section 106.

Dam removal may cause potential impacts to archaeological resources due to changes in sediment transport (erosion and aggradation) near potential archaeological sites along the Exeter River. In addition, removal of the dam may expose previously submerged sites, making any potential sites below the current waterline vulnerable to degradation. As discussed above, a Phase IB intensive archaeological investigation of sensitive areas is recommended prior to potential dam removal where reactive meander bends may affect Pre-Contact or Post-Contact archaeological resources. Following dam removal, an inspection of presently submerged terrain features exposed by the river restoration is also recommended.

3.9 Recreation and Conservation Lands

The Pickpocket Dam impoundment currently serves recreational purposes, including fishing, kayaking, canoeing, boating and bird watching. The river reach downstream from the dam and the Cross Road bridge is a popular fishing spot. On May 30, 2023, VHB Environmental Staff boated the entire length of the impoundment to experience and better appreciate the recreational value of the area. At the dam the impoundment depth is approximately 12.0 feet and reduces to 1.5 feet at Haigh Road. In the lower impoundment areas, there is a considerable amount of open water with sediment islands. These islands are typically formed due to variable water flow rates that transport sediment within the impoundment, with slower flow rates enabling sediment to settle rather than be carried away. There are other islands in the impoundment, which may be remnants of land features that were present before the area was flooded, reflecting the original geomorphology prior to impoundment. There are areas of shallow water which reflect parts of the former floodplain that have been inundated, where the land gently dips below the water surface, forming shallow pools or marshy areas within the impoundment. The upper impoundment area resembles a more natural river system since the WSE is less impacted by the dam. Overall, there is approximately 85 acres of impoundment area that is available for canoeing, kayaking and fishing.

The impoundment is primarily accessed by boat and there are limited public access points available by foot. The land surrounding the impoundment is primarily private land that has been placed under conservation easement. There is one publicly owned Conservation easement off Peabody Drive in the central impoundment area. There is one area of canoe and kayak launch stairs along Rowell Road West near the Haigh Road Bridge. The land just upstream from Pickpocket Dam on both the north and south ends is owned by the Town of Exeter. There is a small gravel area at the intersection of Pickpocket and Cross road at the dam that appears to be mainly used for parking. This allows easy access to the impoundment from the north side of the dam. There is no NHFGD or official canoe/kayak lunch at Pickpocket Dam. There were no other observed formal recreation access spots along the impoundment. Many of the residences along the impoundment have canoe and kayak launches, chairs, and loungers by the banks of the river. Adjacent lands are actively managed and publicly accessible. Therefore, it is likely that shoreline areas receive variable levels of disturbance resulting from public use. This aligns with the handful of rope swings and make-shift gathering spots identified along the more remote sections of the impoundment during the field visit. The Town of Brentwood holds an annual “Fall Paddle” along the impounded portion of the river with a barbecue lunch after the paddle.

As shown on **Figure 3.9-1**, the land adjacent to the impoundment is largely land that has been placed in Conservation Easement. The managing agencies vary between the Town of Brentwood, the USDA, the NRCS, the Southeast Land Trust, The Nature Conservancy, Rockingham County Conservation District, and the Town of Exeter. Outside of the NRCS, USDA and Town land, the land is privately owned.

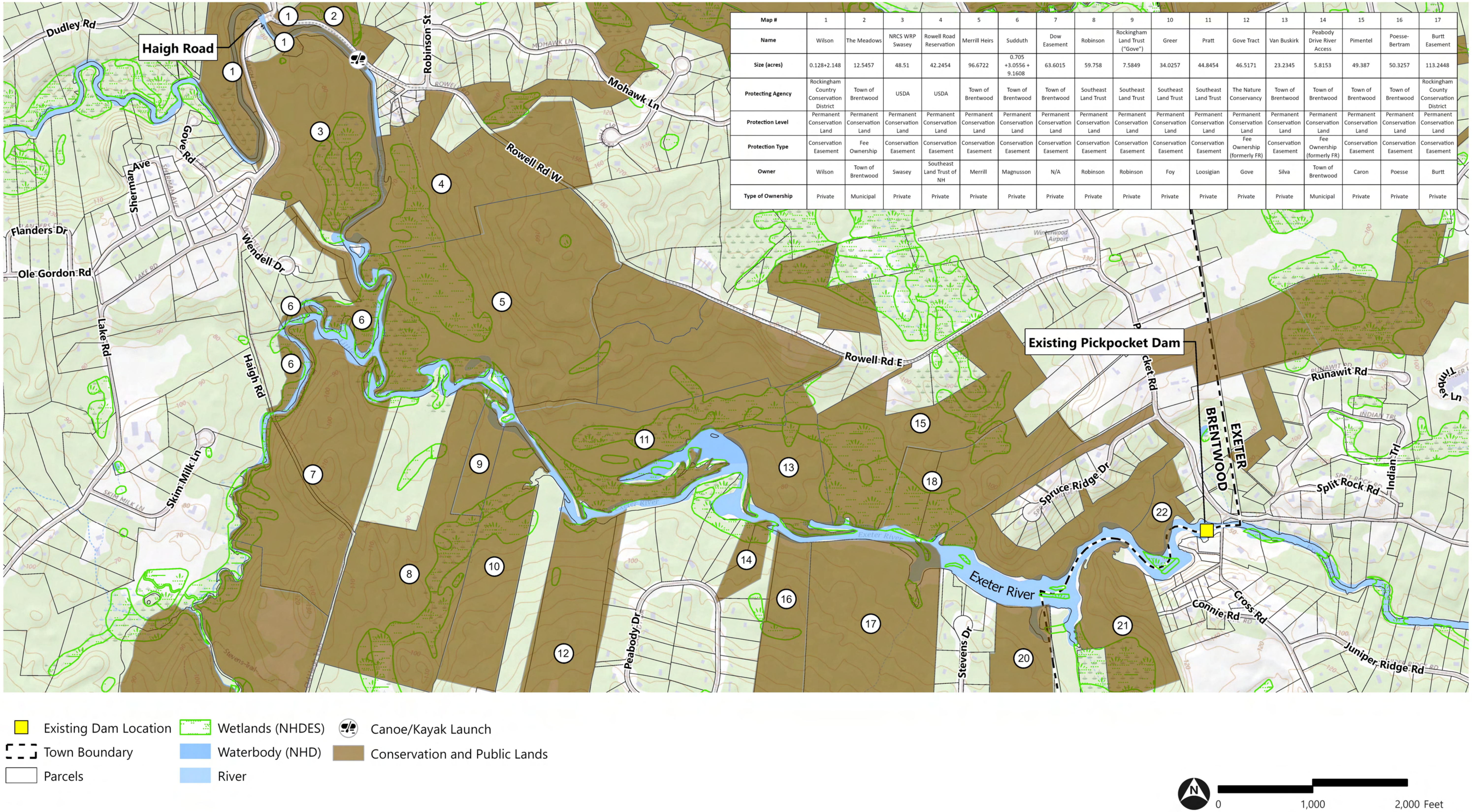
3.9.1 Discussion of Potential Effects

Under the Dam In Alternatives – the WSE variation in the impoundment is ±0.3 feet under normal flows, the current recreation opportunities will largely remain unchanged under the dam in alternatives.

Under Alternative 4 – Dam Removal, there would be an improvement in the fish passage within the river. Enhanced habitat connectivity is expected to result from the dam removal, creating cooler and faster flowing water conditions that may enhance opportunities for cold water fishing. As these activities contribute to improved sport fish populations in the area, increases in angling may result. Fish species composition in the immediate vicinity of the Pickpocket Dam is expected to shift from, but not eliminate, warm water species such as smallmouth bass (*Micropterus dolomieu*) and sunfish (*Centrarchidae* spp.) to diadromous and riverine species such as alewife and blueback herring (*Alosa pseudoharengus; Alosa aestivalis*), American shad (*Alosa sapidissima*), and chub (*Squalius cephalus*).

Figure 3.9-1: Recreational Resources in Study Area

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Map #	1	2	3	4	5	6	7	8
Name	Wilson	The Meadows	NRCS WRP Swasey	Rowell Road Reservation	Merrill Heirs	Sudduth	Dow Easement	Robinson
Size (acres)	0.128+2.148	12.5457	48.51	42.2454	96.6722	0.705 +3.0556 + 9.1608	63.6015	59.758
Protecting Agency	Rockingham Country Conservation District	Town of Brentwood	USDA	USDA	Town of Brentwood	Town of Brentwood	Town of Brentwood	Southeast Land Trust
Protection Level	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land
Protection Type	Conservation Easement	Fee Ownership	Conservation Easement	Conservation Easement	Conservation Easement	Conservation Easement	Conservation Easement	Conservation Easement
Owner	Wilson	Town of Brentwood	Swasey	Southeast Land Trust of NH	Merrill	Magnusson	N/A	Robinson
Type of Ownership	Private	Municipal	Private	Private	Private	Private	Private	Private

Map #	9	10	11	12	13	14	15	16	17
Name	Rockingham Land Trust ("Gove")	Greer	Pratt	Gove Tract	Van Buskirk	Peabody Drive River Access	Pimentel	Poesse-Bertram	Burtt Easement
Size (acres)	7.5849	34.0257	44.8454	46.5171	23.2345	5.8153	49.387	50.3257	113.2448
Protecting Agency	Southeast Land Trust	Southeast Land Trust	Southeast Land Trust	The Nature Conservancy	Town of Brentwood	Town of Brentwood	Town of Brentwood	Town of Brentwood	Rockingham County Conservation District
Protection Level	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land	Permanent Conservation Land
Protection Type	Conservation Easement	Conservation Easement	Conservation Easement	Fee Ownership (formerly FR)	Conservation Easement	Fee Ownership (formerly FR)	Conservation Easement	Conservation Easement	Conservation Easement
Owner	Robinson	Foy	Loosigian	Gove	Silva	Town of Brentwood	Caron	Poesse	Burtt
Type of Ownership	Private	Private	Private	Private	Private	Municipal	Private	Private	Private

Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/19/2024)

Enhanced habitat connectivity resulting from dam removal may lead to additional positive impacts to local fish and wildlife populations and increased opportunities for angling both upstream and downstream of the Dam. NHDES has already reported that the 2016 removal of the Great Dam east of the Pickpocket impoundment has resulted in higher numbers of fish in the river. Therefore, it is reasonable to assume that the removal of the Pickpocket Dam would have similar impacts.

The river channel opening could lead to the spawning migration particularly of American shad and river herring which in turn could benefit various aquatic predator species such as bass and redfin pickerel (*Esox americanus americanus*), and avian predators such as belted kingfisher (*Megaceryle alcyon*), osprey (*Pandion haliaetus*), great blue heron (*Ardea herodias*) and bald eagle (*Haliaeetus leucocephalus*). American shad historically were harvested in late spring during the adult upstream spawning run. Dam removal may simultaneously promote improved access for shad to riverine spawning habitat, and the currently impounded river reach would likely become more suitable for shad spawning and juvenile rearing. Over time this may promote increases in shad abundance that can provide a potential future fishery. Lastly, cooler, and faster flowing water may provide more insect forage for all game fish species thereby enhancing opportunities for cold-water trout fishing for trout species.

Alternative 4 – Dam Removal will change the extents and elevation (depth) of the water surface of the Exeter River upstream of the impoundment. Based on the results of the HEC-RAS model, the open water would be reduced with a dam removal and the water surface would extend just within the main channel as shown in **Figure 3.2-6**. This would result in a habitat change from open water to more aquatic bed and emergent marsh habitat. While the habitat transition would likely benefit biodiversity, the recreational experience may differ. The water depth in the impoundment would not support motorized or non-motorized boating, except for shallow draft kayaks and canoes. Though there would be an improvement in the fish passage within the river, there would be a decrease in the abundance of recreational fishing locations. Birdwatching as a form of recreation would not be negatively affected, as the expected wetland habitats are home to numerous species of birds.

3.10 Fisheries and Fish Passage

3.10.1 Existing Conditions

The Exeter River provides habitat for numerous ecologically important native diadromous fish species including the anadromous alewife, blueback herring, and rainbow smelt (*Osmerus mordax*) and the catadromous American eel (*Anguilla rostrata*) (Eipper, et al., 1982). Anadromous fish species such as shad and sea lamprey spawn in fresh water and then migrate to the sea to grow to maturity. These species rely on gaining access to upstream freshwater river habitat for spawning and nursery life cycle functions annually during the spring and early summer. Catadromous species spawn in the ocean and migrate to estuarine and freshwater rivers and rely on the river to provide nursery habitat. Eels live in the fresh and brackish water system for upwards of 20 to 30+ years before returning to the ocean to spawn. These two groups are referred to collectively as diadromous species.

Most upstream migration of these species occurs during spring with the peak migration typically during May (Bigelow and Schroeder, 1953). These species generally must be able to freely pass between the marine and freshwater ecosystem to complete their life cycles. NHFGD has been actively working to restore both river herring and shad in the Exeter River since the late 1960s with the goal of establishing self-sustaining populations. Utilized methods include stocking gravid adults and eggs above barriers into prime spawning and rearing habitat and providing upstream fish passage from the head-of-tide during spring months only. Other entities, such as NOAA, have also been involved in various fish restoration efforts including but not limited to initiatives to restore rivers, install fishways, and remove dams.

According to the NHFGD Fish Stocking Interactive Mapper, the Exeter River on both sides of the dam is annually stocked with trout, including eastern brook trout (*Salvelinus fontinalis*) and brown trout (*Salmo trutta*). Less eastern brook trout are stocked upstream of the dam within the existing impoundment than downstream since this species prefers flowing riverine habitats.

The fish ladder at Pickpocket Dam allows for some upstream passage of diadromous fish to reach spawning and nursery habitat, however fish ladders have limited success and need to be maintained. However, there are not specific passage facilities for American eels from the tidal portion of the river, Squamscott River, to the Exeter River upstream. The fish ladder is not designed to provide downstream passage for emigrating diadromous fish. By enhancing the upstream fish passage at Pickpocket Dam diadromous fish can freely access miles of spawning and nursery habitat on the Exeter River. NHFGD count the fish returns in the Exeter River, prior to the removal of the Great Dam in 2016 fish returns were counted at the Great Dam Fish Way. Starting in 2015, fish counts were also conducted at the Pickpocket Dam. The table below summarizes the counts. The counts show a large increase of fish at the former Great Dam site following removal and low counts at the fishway at Pickpocket.

Table 3.10-1 NHFGD Pickpocket Dam Fish Counts

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

The Exeter River watershed is home to ten fish species of "special conservation concern" as identified in the *New Hampshire Wildlife Action Plan,* Revised Edition, dated 2015 by the NHFGD (NHFGD WAP). Note that the NHFGD updates this WAP every ten years, the next version is anticipated to be released in 2025. These include both diadromous and freshwater species: American eel, alewife, blueback herring, sea lamprey (*Petromyzon marinus*), American shad, rainbow smelt, bridle shiner (*Notropis bifrenatus*), redfin pickerel, banded sunfish, and swamp darter (*Theostoma fusiforme*). A designation of “special concern” indicates that the species has the potential to become threatened if no conservation actions are taken. There is an ongoing anadromous fish restoration effort for river herring and shad, and the river serves as a spawning area and juvenile habitat for alewife, blueback herring, sea lamprey, American eel, rainbow smelt, and American shad. The NHFGD WAP states that “when the opportunity presents itself, dam removals provide the best long-term solution to reconnecting diadromous fish with their historical freshwater spawning habitat.”

Based on a review of the NOAA Essential Fish Habitat (EFH) Mapper for the New England / Mid-Atlantic Region, the Exeter River within and immediately downstream of the study area is not listed as EFH for any species.

Anadromous species rely on gaining access to upstream habitat for spawning, and nursery life cycle functions during the spring and summer. The catadromous American eel relies on the river to provide habitat for juvenile eels growing to maturity and feeding up to approximately 25 years, until at maturity they undertake a seaward migration to spawn. Under existing conditions, Pickpocket Dam has a denil fish ladder to facilitate the migration. The fish ladder was operational in 1970. The fish ladder system was designed based on the existing headwater and tailwater elevation and hydrologic conditions at the site.

3.10.2 Fish Passage Characteristics of the Project Alternatives

Aspects of each alternative that could affect fish passage are summarized below (see **Section 2** for additional details about each alternative).

› Alternatives 1 and 3

These alternatives would retain the existing fish ladder and not change the inlet or outlet elevations, or the normal pool elevation of the impoundment thereby allowing it to be functionally unchanged. Fish approaching the Exeter River from downstream would experience the same fish passage conditions as at present. For purposes of this analysis, it was assumed that non-flood event hydraulics below the dam would be like those under existing conditions, as the river channel and fish ladder entrance geometry will not be altered.

› Alternative 4 – Dam Removal

This alternative involves the removal of the entire upper dam, fish ladder and lower dam. In addition, the river channel upstream and downstream of the dam would be reshaped by removing accumulated sediment and submerged debris, as well as a nature-like stable streambed with a slope creating conditions favorable to upstream fish passage. This alternative would change river elevations and hydraulics upstream from the existing dam. From a fish passage perspective, only Alternative 4 would alter the stream channel and passage characteristics at the dam improving fish passage migration. The river will be restored to match the slope of the river profile downstream of the current dam. Maximum river slopes will be approximately 1 percent. Channel configuration will include a V-shaped channel to allow for sufficient depths during low flow and include boulder clusters to allow resting places for fish. The Pickpocket Dam is the last barrier on the Exeter River within Exeter and will continue the work of fully restoring the river following the successful removal of the

Great Dam in 2016. It will further the goal of enhancing the diadromous fish run, by helping them as they travel from the marine environment of the Gulf of Maine (via the Great Bay Estuary) to the freshwater spawning and nursery habitat present in the Exeter River system. Its removal would open as much as 14.1 river miles of stream habitat.

3.11 Wildlife and Natural Communities

This section describes the ecological resources present along the Exeter, Little, and Squamscott Rivers and the connectivity between these rivers and the forested and floodplain shoreline adjacent to them. Information in this discussion is based on limited field review of the project area, review of existing published information such as the NHFGD WAP, and existing published information from state and federal resource agencies such the NH Natural Heritage Bureau (NHB), the NHFGD, USFWS, and the University of New Hampshire.

3.11.1 Habitat Types

The Exeter River corridor provides various landscapes including large undeveloped blocks of habitat directly adjacent to the Exeter River or its tributaries and is affected by periodic flooding. Flooding represents a crucial factor in determining community dynamics in floodplain areas. The disturbance created by flooding creates structural diversity in the habitat and tends to create a diversity of niches which can be exploited by a rich faunal community.

A variety of wildlife species can be found within these landscapes, including species dependent upon wetland/aquatic habitats and those that use these communities opportunistically. The use by other species can be inferred by the presence of specific habitat types. **Figure 3.11-1** shows the NHFGD WAP Habitat types. NHFGD's WAP uses available data with GIS analysis of landscape characteristics to rank habitat throughout the state in terms of its condition and ability to provide valuable resources to local wildlife. **Figure 3.11-1** shows that nearly the entire study area adjacent to the Pickpocket Dam impoundment comprises wildlife habitat that is the highest ranked habitat in NH, or the highest ranked habitat in the region.

The Exeter River and its habitats are also identified with species of concern in NH. Fish species and habitat are described in **Section 3.10** of this Feasibility Study above. The data represents habitats directly adjacent to the impoundment. The area adjacent to the river is dominated by Appalachian Oak-Pine Forest. However, a substantial amount of floodplain forest is also located along the river.

The following includes descriptions of the habitat type and incorporates both observed species and inferred species occurring in the various communities in the study area.

3.11.1.1 Appalachian Oak-Pine Forest

The Appalachian oak-pine forest within the project reach is typically characterized by upland, drier soil forest. Vegetation includes oak (*Quercus* spp.), white pine (*Pinus strobus*), shagbark and pignut hickories (*Carya ovata; Carya glabra*), black birch (*Betula nigra*), and aspen (*Populus* spp.). The understory can sometimes be dominated by mountain laurel (*Kalmia latifolia*) shrubs (Clyde, 2009). Appalachian oak-pine forest is the dominant habitat type adjacent to the Exeter River, specifically the southern and western reaches of the river. Many species use this forest type for part of, or their entire life cycle. Appalachian oak-pine forest is home to species such as, American woodcock (*Scolopax minor*), Canada warbler (*Cardellina canadensis*), Cooper's hawk

(*Accipiter cooperii*), ruffed grouse (*Bonasa umbellus*), wild turkey (*Meleagris gallopavo*), white-tailed deer (*Odocoileus virginianus*), chipmunk (*Tamias* spp.), and squirrels (*Sciuridae* spp.). The hard mast produced by the oak and hickory within this forest type provides food for the aforementioned species, as well as nesting habitat for birds. Floodplain Forest

Floodplain forests occur in low laying reaches along the Exeter River and are prone to flooding. It is typical to find vernal pools, oxbows, open meadow and/or dense shrub thickets within the floodplains. Floodplains are important to water quality, as well as erosion and sediment control. Large undeveloped blocks of habitat are present surrounding the Pickpocket Dam impoundment. These blocks lie directly adjacent to the Exeter River or its tributaries and are affected by periodic flooding. Flooding represents an important factor in determining community dynamics in floodplain areas. The disturbance created by flooding creates structural diversity in the habitat and tends to create a diversity of niches which can be exploited by a rich faunal community.

Typically, vegetation in the floodplain forest consists of silver and red maple (*Acer saccharinum; Acer rubrum*), with some black ash (*Fraxinus nigra*), and ironwood (*Carpinus caroliniana*) among thick shrubs and occasionally wildflower and fern ground cover (Clyde, 2009).

The floodplain is an important breeding habitat for many species of birds, such as warblers (Parulidae spp.) and veery (*Catharus fuscescens*). A few of the species found in the floodplain forest include, American black duck (*Anas rubripes*), Baltimore oriole (*Icterus galbula*), belted kingfisher, Jefferson/blue-spotted salamander complex (*Ambystoma* spp.), North American river otter (*Lontra canadensis*), and wood turtle (*Glyptemys insculpta*). The Blanding's turtle (*Emydoidea blandingii*), which is identified as a state endangered species, also occupies the floodplain forest.

3.11.1.2 Grassland

This habitat type includes both pastures and mowed fields with well drained soils. Structural diversity is characteristically low in this habitat with the mowing diminishing both the cover and wildlife food value. Nonetheless, the edge created between this and other habitats, particularly forested areas, is very valuable. Grasslands were historically created by beaver activity and Native Americans. Ponds created above beaver dams became grassy meadows as water drained and Native Americans burned the land for improved agricultural purpose. More recently the grasslands are mostly agricultural areas. Species typical of this habitat and its edge include red-tailed hawk (*Buteo jamaicensis*), American robin (*Turdus migratorius*), American goldfinch (*Spinus tristis),* wood turtle, woodchuck (*Marmota monax*), meadow vole (*Microtus pennsylvanicus*), red fox (*Vulpes vulpes*), and eastern coyote (*Canis latrans*) (Clyde, 2009). White-tailed deer may also be observed feeding in the open fields during warm summer evenings. In NH, grasslands also serve as primary breeding and nesting grounds for several bird species of conservation concern including northern harrier (*Circus cyaneus*), upland sandpiper (*Bartramia longicauda*), grasshopper sparrow (*Ammodramus savannarum*), horned lark (*Eremophila alpestris*), vesper sparrow (*Pooectes gramineus*), and eastern meadowlark (*Sturnella magna*). In addition, the value of some grassland habitats is increasingly recognized for pollinators like the monarch butterfly (*Danaus plexippus*) and bumble bees (*Bombus* spp.).

Figure 3.11-1: Habitat Land Cover

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- Existing Dam Location
- Town Boundary

HabitatLandCover

- Appalachian oak-pine
- Developed Impervious
- Developed or Barren land
- Floodplain forest
- Grassland
- Hemlock-hardwood-pine
- Open water
- Peatland
- Sand/Gravel
- Temperate swamp
- Wet meadow/shrub wetland

0 1,000 2,000 Feet

Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibility\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/19/2024)

3.11.1.3 Hemlock-Hardwood-Pine Forest

Hemlock-Hardwood Pine Forest is comprised mostly of eastern hemlock (*Tsuga canadensis*), white pine, American beech (*Fagus grandifolia*), and various species of oak. It is a dominant habitat type in NH and considered a transitional forest to Appalachian oak-pine (Clyde, 2009). The understory commonly has smaller trees or shrubs including witch hazel (*Hamamelis* spp.), black birch, and Canada mayflower (*Maianthemum canadense*).

This habitat type is dominant west of the Pickpocket Dam along the southern edge of the river corridor. Traveling south to Great Brook, Great Meadow and west to NH 108, pockets of hemlock-hardwood pine occur. These locations represent this habitat type as transition habitat between the Exeter River and Appalachian oak-pine forest.

Many species that use this type of habitat require large spans of un-fragmented forest (Clyde, 2009). Typical species are wood turtle, purple finch (*Haemorhous purpureus*), American woodcock, Blackburnian warbler (*Setophaga fusca*), barred owl (*Strix varia*), broad-winged hawk (*Buteo platypterus*), eastern red bat (*Lasiurus borealis*), fisher (*Martes pennanti*), American black bear (*Ursus americanus*), white-tailed deer, and wild turkey. In addition, the hard mast produced specifically by American beech is heavily utilized by various wildlife in the Fall and is considered a vital food source for American black bear.

3.11.1.4 Marsh/Wet Meadow Shrub Swamp

Like forested wetlands, this habitat is frequently flooded by an adjacent stream or runoff from surrounding uplands. Scrub-shrub swamps in the study area are dominated by species such as highbush blueberry (*Vaccinium corymbosum*), willow (*Salix* spp.), alder (*Alnus* spp.), dogwood (*Cornus* spp.) and northern arrowwood (*Viburnum recognitum*). Structural diversity is low because of the lack of multiple vegetation layers. Nonetheless there is typically dense shrub growth, along with dense herbaceous growth in spots.

Amphibians and reptiles commonly found in shrub swamps include species such as spring peeper (*Pseudacris crucifer*) and wood frog (*Lithobates sylvaticus*), while the presence of open water enhances the attraction for species such as common snapping turtles (*Chelydra serpentina*) and painted turtle (*Chrysemys picta*). Scrub-shrub swamps also provide habitat for spotted turtles (*Clemmys guttata*) and the state-endangered Blanding's turtle especially if the area is part of a larger wetland complex. Bird species commonly found in this habitat include American woodcock, song sparrow (*Melospiza melodia*), alder flycatcher (*Empidonax aluorum*), and tree swallow (*Iridoprocne bicolor*). Mammalian species include white-footed mouse (*Peromyscus leucopus*), meadow jumping mouse (*Zapus hudsonius*), and raccoon (*Procyon lotor*).

Species found in marshes include mallard (*Anas platyrhynchos*), American bittern (*Botaurus lentiginosus*), great blue heron, red-winged blackbird (*Agelaius phoeniceus*), muskrat (*Ondatra zibethicus*), and snapping turtle. During the dry summer months, meadow vole, meadow jumping mouse, and American kestrel (*Falco sparverius*) will be observed in shallow freshwater marshes or emergent marshes.

The occurrence of wildlife species and habitat use in the study area are heavily influenced by the geographic location of the habitats and surrounding land uses. The study area is in coastal NH with the large Great Bay estuary to the north.

Relative to bird species, the position of the study area near the Great Bay Estuary increases the seasonal variability in both species' diversity and numbers. During the Spring and Fall migration periods, habitats in the area serve as resting or stopover areas for neotropical migrants as they move north or south. During the breeding season (spring and early-summer), bird species diversity and numbers are more directly related to the specific types of habitats present and their size and biological carrying capacity (i.e., quality). Although influenced by anthropogenic factors such as bird feeders, avian species diversity in winter is uniquely affected by the climatic characteristics of the study area's coastal location. Coastal temperatures tend to be more moderate in the winter, and the presence of open water adjacent to the shore attracts a wide variety of overwintering waterfowl species and predators.

3.11.2 Wetland Wildlife Species

Wetlands are a particularly important habitat for wildlife (see **Section 3.12**). All amphibians require freshwater or wet areas for breeding, so their occurrence is dependent on wetlands. Described below are the major wetland types found in the study area along with representative species of each.

3.11.2.1 Forested Wetlands (Forested Swamps)

Forested wetlands in the study area are typically dominated by red maples with varying amounts of swamp white oak, hemlock, and white pine intermixed. The typical interspersion of water and trees creates high structural diversity that enhances this habitat's value for wildlife. Common species include a variety of amphibians such as spring peeper, gray treefrog (*Hyla versicolor*), wood frog, bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), mole salamanders (*Ambystoma* spp.), and reptiles including eastern ribbon snake (*Thamnophis sauritus*), ringneck snake (*Diadophis punctatus*), painted turtle, and snapping turtle.

The avian community found in area swamps typically comprises facultative species, those which are found in upland forests as well, e.g., black-capped chickadee (*Poecile atricapillus*), gray catbird (*Dumetella carolinensis*), ovenbird (*Seiurus aurocapillus*), wood thrush (*Hylocichla mustelina*), American robin, and blue jay (*Cyanocitta stelleri*). Other bird species such as waterfowl appear to be attracted to this habitat because of the presence of water, e.g., wood duck (*Aix sponsa*), American black duck, and mallard. Among raptors, red-shouldered hawks (*Buteo lineatus*) are probably the most characteristic of forested wetlands where they nest and hunt. Characteristic mammalian species include beaver (*Castor canadensis*), raccoon, mink (*Lutreola* ssp.), woodland jumping mouse, and white-footed mouse.

3.11.2.2 Scrub-Shrub Swamp

Scrub-shrub swamps in the study area are dominated by species such as highbush blueberry, willow, alder, dogwood, and northern arrowwood. Structural diversity is low because of the lack of multiple vegetation layers. Nonetheless there is typically dense shrub growth, along with dense herbaceous growth in spots. Seasonally this habitat (like forested wetlands) is frequently flooded by an adjacent stream or runoff from surrounding uplands. Amphibians and reptiles commonly found in shrub swamps include spring peepers and wood frogs, while the presence of open water enhances the attraction for snapping turtles and painted turtles. Bird species commonly found in this habitat include American woodcock, song sparrow, alder flycatcher, and tree swallow. Mammalian species include white-footed mouse, meadow jumping mouse, and raccoon.

3.11.2.3 Emergent Marsh

Species found in marshes include mallard, sora rail (*Porzana carolina*), American bittern, great blue heron, red-winged blackbird, muskrat, foraging white-tailed deer, and snapping turtle. During the dry summer months, meadow vole, meadow jumping mouse, and American kestrel might be observed in shallow freshwater marshes and sedge meadows.

3.11.3 Potential Effects on Habitat and Wildlife

Implementation of either the Dam Modification (Alternatives 1 and 3) or Dam Removal (Alternative 4) would not result in any substantial direct negative impacts to habitat and wildlife populations. The largest threat to wildlife habitat in the northeast is the excessive fragmentation of undisturbed blocks of land associated with increased urbanization, which is not a significant consideration when weighing the anticipated impacts from the project.

Minor indirect effects could occur based on changing flood regimes or hydrology of wetlands adjacent to the impoundment which could create shifts in plant communities. (See **Section 3.12** for more discussion.) Whatever minor indirect impacts may occur would likely be offset by beneficial impacts. Changes to the fish populations and species assemblages within the river would likely benefit wetland-dependent species such as otter, osprey, and kingfisher by providing a larger and more diverse forage base.

3.11.3.1 Appalachian Oak-Pine Forest, Hemlock- Hardwood Pine Forest & Grassland

The Appalachian oak-pine forest and hemlock-hardwood pine forest are upland, dry forested areas. Removal or modifications to the Pickpocket Dam would have negligible impacts on locations of Appalachian oak-pine forest, hemlock-hardwood pine forest or grasslands. Under normal flow these habitats are not impacted by the flows of the Exeter River.

The change in flow generated by the removal or modification of the dam would not adversely impact the wildlife within this community. The overlapping locations of Appalachian oak-pine and hemlock-hardwood pine forest with floodplain forest, directly adjacent to the Exeter River, are the only locations where a minimal impact to the upland forest would occur.

3.11.3.2 Marsh/Wet Meadow Shrub Swamp

Marsh/wet meadow shrub swamp would not be greatly impacted by removal or modifications to the dam. Some marsh/wet meadow areas would be altered by lowering the surface water elevations within the Exeter River, which would affect the adjacent wetlands.

Additionally, the removal of the dam would decrease the availability of open water habitat for waterfowl. Opportunistic use of the river by animals such as deer and raccoon, which are utilizing the adjacent upland forests and grasslands, is not expected to change significantly. Upstream, the drawdown resulting from the dam removal or modification may provide some level of benefit to upland wildlife species due to exposed shoreline areas undergoing ecological succession. In summary, it is expected that the overall effects of this alternative on wildlife would be minor and would be offset by the benefits of restoring upstream migration to anadromous fish species.

3.12 Wetlands

This section describes some of the specific wetland resources present along the Exeter River within the study area including their connectivity to the adjacent river, describes the ecological effects that dams have on wetlands in general terms, and discusses potential impacts and benefits to the natural resources that would result from Alternative 4 - Dam Removal. For the purposes of this discussion, the "study area" runs along the length of the impoundment from the dam to Haigh Road and extends perpendicular to the impoundment to approximately the 100-year floodplain.

Information in this analysis is based on a limited field review of the study area and review of existing published information such as USFWS National Wetlands Inventory (NWI). Refer to **Figure 3.12-1**. Reconnaissance level field surveys were performed by boat in spring of 2023 to review habitat features along the Exeter River within the study area. These observations focused on the Exeter River Reservoir impoundment upstream of the Cross Road bridge.

3.12.1 Existing Conditions

Wetland systems bordering the currently impounded Exeter River are predominantly forested. According to NWI data, the following Cowardin cover classes are present:

- Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded/Saturated (PFO1E);
- Palustrine, Forested, Needle-Leaved Evergreen, Seasonally Flooded (PFO4C);
- Palustrine, Forested, Broad-Leaved Deciduous, Needle-Leaved Evergreen, Seasonally Flooded (PFO1/4C);
- Palustrine, Forested, Broad-Leaved Deciduous, Temporarily Flooded (PFO1A);
- Palustrine, Scrub-Shrub, Broad-Leaved Deciduous, Seasonally Flooded/Saturated (PSS1E);
- Palustrine, Emergent, Persistent, Seasonally Flooded/Saturated (PEM1E);
- Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded (R2UBHh) above the dam;
- Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded (R2UBH) below the dam;
- Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded, Diked/Impounded (R2ABHh);
- Riverine, Intermittent, Streambed, Seasonally Flooded (R4SBC); and
- Combinations of these classifications (e.g., PFO1/SS1E).

It should be noted that at the time of this assessment, no field verification of the NWI data (i.e., classifications or wetland boundaries) was performed. Although NWI data is a good starting point, actual/field delineated wetland boundaries and classifications may differ (often the wetland boundaries are larger than represented in NWI mapping) due to the coarse scale at which the mapping was prepared based primarily on aerial photo interpretation.

Wetlands are currently defined by the USACE as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that during normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions." Wetlands are delineated based on three main parameters: hydric soil, indicators of wetland hydrology, and a dominance of hydrophytic vegetation.

The impounded Exeter River is mainly open water with an unconsolidated bottom and few occurrences of aquatic beds. Unconsolidated bottom is indicative of small substrate particle sizes, minimal or absence of vegetation, and consistent inundation. The aquatic bed riverine systems are depicted along the riverbanks in the river bends or protrusions where water flow velocities are reduced, allowing aquatic vegetation to establish and persist without being washed away. These communities may include emergent and floating-leaved and submerged herbaceous species and often, but not always, have shallow water depths typically ranging from six inches to three feet. These communities may contain species such as pickerelweed (*Pontedaria cordata*), arrowhead (*Sagittaria latifolia*), and pond lily (*Nymphea ordorata*).

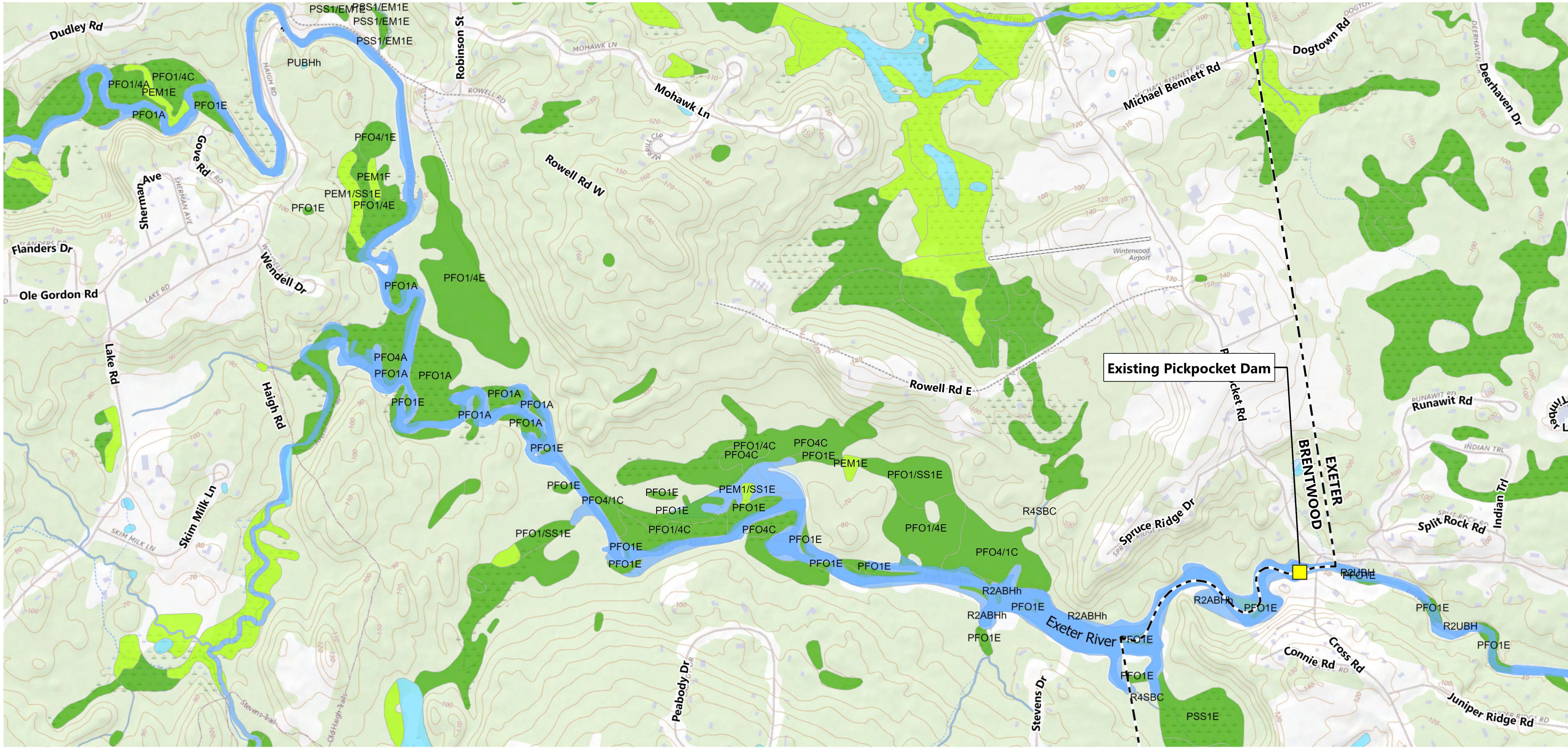
Beyond the riverbanks, there are numerous forested wetlands with intermixed pockets of scrub-shrub and emergent wetland types. These forested wetlands are located within and extend beyond the VHB modeled 100-year floodplain boundaries (which is more accurate on a site-specific basis than the FEMA data). The portions of these adjacent wetland systems may receive occasional direct overflows from the impounded Exeter River, as well as more consistent groundwater influence extending out from the impoundment. It is also possible that some of these wetlands (or portions of the wetlands) may be influenced by groundwater that is not related to or influenced by the existing impoundment.

The crest of the Pickpocket Dam spillway sets a minimum elevation of 60.9 feet NAVD88 below which the Exeter River water level cannot normally drop below upstream of the dam unless a controlled drawdown is undertaken using the outlet gates. This reduces the water level variability upstream compared to natural river systems and maintains increased impounded water beyond the river channel.

According to the USDA NRCS Web Soil Survey data, many of the NWI-mapped wetlands are underlain by poorly drained soils, including Scitico silt loam (0 to 5 percent slopes) and Lim-Pootatuck complex. Some additional soil types upstream of the dam include (but are not limited to) Hinckley loamy sand (3 to 8 and 8 to 15 percent slopes), Hoosic gravelly fine sandy loam (3 to 8 and 8 to 15 percent slopes), Unadilla very fine sandy loam (3 to 8 percent slopes), and Walpole very fine sandy loam (3 to 8 percent slopes) very stony. It should be noted that the USDA NRCS soil mapping has its limitations. Although this data is a good reference, actual site-specific soil types may differ due to the coarse scale at which the mapping was prepared; most of the soil surveys were conducted at a 1:20,000 scale. Major changes to soil types and characteristics are not anticipated to result from this project.

Figure 3.12-1: Wetlands

Pickpocket Dam Feasibility Study | Brentwood & Exeter, New Hampshire



Existing Dam Location

Town Boundary

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

Source: VHB, NHGRANIT, NearMap

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibility\Project\FeasibilityStudy\FeasibilityStudy.aprx (User: bmiller, Date: 2/19/2024)

3.12.2 Potential Dam Removal Impacts

This discussion primarily focuses on the dam removal alternative (Alternative 4). The dam modification alternatives are not discussed in detail here as the change in upstream WSEs resulting from work and improvements to the existing dam would be negligible (with changes in average depth ranging from 1/10 or 2/10 of a foot based on hydraulic modeling). Consequently, the dam modification conditions should be comparable to the existing conditions. However, some of the general dam removal effects detailed herein may occur with the dam modification alternatives to a much smaller degree along the impoundment and bordering wetland peripheries.

According to *The Natural Flow Regime, A Paradigm for River Conservation and Restoration* by Poff et. al. (dated December 1997), it is generally accepted that the ecology of riparian systems benefits from a natural flow regime. Alteration to the natural flow regime can occur by reducing or increasing flows, altering seasonality of flows, changing the frequency, duration, magnitude, timing, predictability, and variability of flow events, altering surface and subsurface water levels, and changing the rate of rise or fall of water levels. Alteration of the natural flow regimes of rivers is recognized as a factor that can impact biological diversity and ecological function in aquatic ecosystems, including floodplains and their associated wetlands.

The natural pre-dam construction flow regime and water level variability throughout the year (i.e., wet and dry seasons) of the Exeter River would be restored with Alternative 4. The Pickpocket Dam, which reduces the natural fluctuation of river flows, also reduces the river valley ecological diversity. The plants and animals that currently inhabit and transit the study area are adapted to the impoundment's existing conditions and infrequent water level fluctuations. Allowing for more natural variation in water flows would diversify the adjacent areas and provide opportunities for more plant and animal species to utilize the riparian and floodplain habitat within the study area.

Hydraulic modeling of Alternative 4 indicates that the 100–year storm event WSE would drop by about 7.1 feet upstream of the dam. The anticipated drop in 100-year storm event elevation tapers off to approximately 1.5 feet about 6,000 feet upstream of the existing dam location and approximately <1 foot about 12,000 feet upstream of the existing dam location. Beyond that distance, many of the same areas at the upstream end of the impounded river segment toward Haigh Road would be subject to similar 100-year flood flow extents both with and without the dam in place (refer to **Figure 3.2-6**).

The presence of the dam reduces the lower river stages and converts more habitat area to permanently flooded wetlands. If the dam is removed, that lateral extent of subsurface groundwater influence into the adjacent wetland systems would be reduced, along with the frequency and extent of surface overflows during the 100-year storm event and other smaller storm or high flow events. Consequently, the reduced hydrologic inputs into the adjacent wetland systems could gradually result in a change in wetland classification, creating more habitat diversity. For example, existing aquatic bed and marsh communities near and along the riverbanks would likely transition into emergent and scrub-shrub wetlands within the drained impoundment areas.

Regardless of wetland classification, vegetative communities may shift toward drier facultative and facultative upland species through ecological succession, as there would be less hydrology to sustain the more hydrophytic facultative wetland and obligate plants. This would be especially true along the wetland edges farthest away from the river. Any changes in the surrounding habitats as a result of Alternative 4 would occur gradually, allowing the natural communities and ecosystem as a whole time to adapt. The existing wetlands may experience some marginal area reductions along their peripheries, but large wetland losses are not anticipated.

With existing conditions, the impoundment surface area during normal flows is approximately 85 acres, which would decrease by approximately 73% with Alternative 4 to approximately 26 acres. Refer to **Table 3.2-1** for more information regarding impoundment surface areas. With this, we estimate that 73% of the NWI-mapped wetlands within this area could see ecological effects over time.

Under existing conditions, the impoundment surface area during the 100-year flood is approximately 336 acres, which would decrease by approximately 10% under Alternative 4 to approximately 302 acres. With this, we could estimate that 10% of the NWI-mapped wetlands within this area could see ecological effects over time. Since the area of NWI-mapped wetlands within the existing 100-year floodplain is approximately 208 acres, this would equate to approximately 21 acres of wetland.

The drained impoundment areas resulting from dam removal would convert some currently inundated areas to aquatic bed, emergent marsh, and/or scrub-shrub wetland habitats, especially near the riverbanks. Water-tolerant plant communities that currently border the impoundment will gradually colonize the newly exposed ground within the drained areas. This reduction of wetland area along the existing peripheries would be offset by the development of new riparian habitats along the Exeter River.

At this Feasibility Study level, the ecological significance of a restored natural flow regime cannot be precisely quantified. However, to supplement the preceding discussion, the following incorporates some data from the hydraulic analysis. Refer to the Hydraulic Model Results Tables (**Tables 3.2-3** through **3.2-6**) for detailed information referenced for the discussion below, along with the corresponding discussion of predicted changes in **Section 3.2.2** of this Feasibility Study above. This model divided the Exeter River into four reaches between the existing dam and Haigh Road. The information below is organized by these reaches to assess potential wetland changes.

<u>Reach 1 - Pickpocket Dam to 2,900 FT Upstream (XS 40770.55 – XS 43656.25)</u>
Given the proximity of this reach to the dam, more impounded water is present that would recede into the river channel with Alternative 4 compared to the upstream reaches.

- During normal flow conditions, the existing average water depth within this reach is 4.7 feet with an average inundated width of 260.5 feet, which would decrease with Alternative 4 to 1.3 feet and 44.8 feet, respectively. *Reductions: 3.4 feet in average depth and 215.7 feet in average inundated width.*
- During the 2-year storm event (Q2 or bankfull) flows, the existing average water depth within this reach is 4.9 feet with an average inundated width of 347.3 feet, which would decrease with Alternative 4 to 2.4 feet and 77.0 feet, respectively. *Reductions: 2.5 feet in average depth and 272.9 feet in average inundated width.*
- During the 100-year storm event (Q100) flows, the existing average water depth within this reach is 6.5 feet with an average inundated width of 550.1 feet, which would decrease with Alternative 4 to 4.9 feet and 346.4 feet, respectively. *Reductions: 1.6 feet in average depth and 203.7 feet in average inundated width.*

There are a few NWI-mapped wetlands within this reach, including a small emergent/forested wetland complex within the riverbend in the middle of this reach and a large scrub-shrub/forested wetland complex south of the impoundment at the upstream limit of this reach. These wetlands would be impacted through the change in hydrology following dam removal. During normal flow conditions at cross section 43407.29 that passes through the scrub-shrub/forested wetland complex, the existing inundated width is 537.9 feet, and the Alternative 4 inundated width is 42.9 feet. This approximate 495-foot inundated width reduction (from both the northern and southern sides of the existing impoundment) would likely affect the hydrology within the wetland system and may eventually cause the wetland to shrink. One notable change would be the loss of the existing open water channel extending into the northern end of this wetland. NWI mapping also shows an intermittent stream that provides an alternate source of surface wetland hydrology flowing north to south into this depressional wetland, which would continue to provide some level of wetland hydrology in this system.

<u>Reach 2 - 2,900 FT to 9,200 FT Upstream of Dam (XS 43656.25– XS 49967.54)</u>
Given the prevalence of open water and aquatic bed habitat within this reach at existing conditions, more open water is present that would recede into the river channel with Alternative 4 compared to the upstream reaches.

- During normal flow conditions, the existing average water depth within this reach is 3.3 feet with an average inundated width of 268.7 feet, which would decrease with Alternative 4 to 2.5 feet and 65.4 feet, respectively. *Reductions: 0.8 feet in average depth and 203.3 feet in average inundated width.*
- During bankfull flows, the existing average water depth within this reach is 3.3 feet with an average inundated width of 413.6 feet. With Alternative 4, the average water depth would be maintained at 3.3 feet, while the average inundated width would decrease to 180.2 feet. *Reductions: 0 feet in average depth and 233.4 feet in average inundated width.*
- During 100-year flows, the existing average water depth within this reach is 4.7 feet with an average inundated width of 1,179.8 feet, which would decrease with Alternative 4 to 4.0 feet and 1,020.1 feet, respectively. *Reductions: 0.7 feet in average depth and 139.7 feet in average inundated width.*

There are many NWI-mapped wetlands within this reach, most notably a large, forested wetland complex north of the impoundment within eastern/downstream portion of this reach and a forested/aquatic bed/open water wetland complex north of the impoundment within the western/upstream portion of this reach. Below is some detail of specific cross sections that pass through each of these areas.

- Cross section 46642.18 passes through the large, forested wetland complex. During normal flow conditions, the existing inundated width is 210.3 feet, and the Alternative 4 inundated width is 57.2 feet, which is a reduction of approximately 153.1 feet.
- Cross section 48671.01 passes through the forested/aquatic bed/open water wetland complex. During normal flow conditions, the existing inundated width is 307.8 feet, and the Alternative 4 inundated width is 49.5 feet, which is a reduction of approximately 258.3 feet. This wetland complex with shallow open water and aquatic bed habitat north of the Peabody Drive loop along the northern bank of the Exeter River would lose the existing open water and aquatic bed habitat due to receding water and reduced flooding frequency and would shift to scrub-shrub and emergent wetland habitat over time with Alternative 4.

<u>Reach 3 - 9,200 FT to 13,000 FT Upstream of Dam (XS 49967.54 – XS 53787.51)</u>

Minimal wetland community type changes would be expected within this reach with Alternative 4 compared to the existing conditions, especially moving upstream within this reach farther away from the influence of the dam.

- During normal flow conditions, the existing average water depth within this reach is 2.7 feet with an average inundated width of 170.9 feet, which would decrease with Alternative 4 to 2.1 feet and 51.8 feet, respectively. *Reductions: 0.7 feet in average depth and 118.7 feet in average inundated width.*
- During bankfull flows, the existing average water depth within this reach is 2.7 feet with an average inundated width of 400.5 feet. With Alternative 4, the average water depth would be maintained at 2.7 feet, while the average inundated width would decrease to 250.3 feet. *Reductions: 0 feet in average depth and 150.2 feet in average inundated width.*
- During 100-year flows, the existing average water depth within this reach is 4.8 feet with an average inundated width of 1,205.8 feet. With Alternative 4, the average water depth would decrease to 4.5 feet, while the average inundated width would increase to 1,224.3 feet. *Reduction of 0.3 feet in average depth and increase of 18.5 feet in average inundated width.*

Cross section 51554.84 passes through the center of this reach and includes the existing impoundment and some bordering wetland areas. This cross section also overlaps the NHB-mapped red maple floodplain forest natural community. Refer to **Section 3.14.1.1** of this Feasibility Study below for more information about that community. During normal flow conditions, the existing inundated width is 297.1 feet, and the Alternative 4 inundated width is 53.4 feet, which is a reduction of approximately 243.7 feet.

Reach 4 - 13,000 FT to 18,300 FT Upstream of Dam (XS 53787.51 - XS 59138.87 Haigh Road)
Many of the existing characteristics of this reach would persist with Alternative 4. The Exeter River in this reach looks and functions like a typical river, without much influence from the existing dam.

- During normal flow conditions, the existing average water depth within this reach is 2.2 feet with an average inundated width of 103.3, which would decrease with Alternative 4 to 2.1 feet and 81.5 feet, respectively. *Reductions: 0.1 feet in average depth and 21.8 feet in average inundated width.*
- During bankfull flows, the existing average water depth within this reach is 2.3feet with an average inundated width of 346.7 feet. With Alternative 4, the average water depth would be maintained at 2.3 feet, while the average inundated width would decrease to 331.2 feet. *Reductions: 0 feet in average depth and 15.5 feet in average inundated width.*
- During 100-year flows, the existing average water depth within this reach is 5.2 feet with an average inundated width of 869.4 feet, which would decrease with Alternative 4 to 5.1 feet and 863.7 feet, respectively. *Reductions: 0.1 feet in average depth and 5.7 feet in average inundated width.*

NWI-mapped wetlands within this reach are mainly within the southern/downstream portion, including some bordering forested wetlands and a forested/emergent wetland complex. Note that the cross sections detailed below also overlap the NHB-mapped red maple floodplain forest natural community. Refer to **Section 3.14.1.1** of this Feasibility Study below for more information about that community.

- Cross section 55359.64 passes through some bordering forested wetlands. During normal flow conditions, the existing inundated width is 48.2 feet, and the Alternative 4 inundated width is 46.6 feet, which is a reduction of approximately 1.6 feet.

- Cross section 56564.57 passes through the forested/emergent wetland complex. During normal flow conditions, the existing inundated width is 133.3 feet, and the Alternative 4 inundated width is 83.9 feet, which is a reduction of approximately 49.4 feet.

The modeled change in average water depths during normal flow conditions within this wide flat reach is minor, with an average reduction of approximately 0.1 feet.

3.13 Invasive Species

The following is a discussion of invasive plant species, known and potential existing invasive plant species populations within the study area, and potential project effects on those populations.

An invasive plant species is one that is not native to the region and is likely to cause harm to the environment, economy, or human health. Invasive plants have several traits that allow them to spread quickly and become widespread: lack of natural predators in their new environment, high production of fruits or seeds, rapid growth rates, and tolerance of a range of conditions. Invasive plants can change how natural systems look and function, suppress native plant regeneration, change availability of insects for nesting songbirds, harbor higher densities of ticks that transmit Lyme disease, and choke freshwater wetlands, affecting habitat for wildlife and other aquatic organisms.

The economic and environmental impacts of invasive plants are so great that many states, including New Hampshire, maintain a list of "prohibited' plant species that are "illegal to collect, transport, sell, distribute, propagate, or transplant." The New Hampshire Department of Agriculture, Markets and Food (New Hampshire Department of Agriculture) oversees the State's efforts to monitor, manage, and control invasive plants.

We have identified the following invasive species to be present around the dam based on previous site visits: purple loosestrife (*Lythrum salicaria*), oriental bittersweet (*Celastrus orbiculatus*), common reed (*Phragmites australis*), and Japanese knotweed (*Reynoutria japonica*). Additionally, we know that the following species are present within the study area based on the recorded sighting descriptions within NHB DataCheck Results Letter for this project (NHB23-3590): Morrow's honeysuckle (*Lonicera morrowii*), Japanese barberry (*Berberis thunbergii*), and multiflora rose (*Rosa multiflora*).

The dam modification alternatives would likely have limited to no impact on the prevalence or spread of invasive plant species within the study area, as the post-construction water levels within the upstream impoundment would not change substantially relative to the existing conditions. On the other hand, Alternative 4 would reduce the size of the existing impoundment, exposing previously submerged unvegetated substrate resembling mudflats. These mudflats typically become fully vegetated within the first growing season as water-tolerant plant communities that currently border the impoundment will gradually colonize the drained areas and newly exposed ground. Invasive species often colonize more readily than native species, and their proximity to the river corridor could provide more opportunity for seed dispersal. This is reflected in the NHFGD Invasive Plant Management Priority Areas layer (available through the online GRANIT View Mapper) which depicts the Exeter River as a high management priority in contrast to the surrounding areas. Thus, depending on the seed bank within the underlying soils, it could be expected that exposing previously inundated soils could result in colonization of these areas by invasive plants and increased rate of potential downstream seed transport.

While the management of invasive plant species should be addressed further in the development of Alternative 4, it is important to understand that it is not reasonable to expect the complete control or eradication of invasive species. Rather, the goal should be limiting the spread of these plants to allow a diversity of native plant species to become well established.

Four common methods have been used to control and reduce the spread and presence of invasive species within wetland communities. The first three methods include chemical, mechanical, and environmental control. The fourth method, biological control, is more complicated to implement as it usually involves the use of herbivorous insects to reduce specific invasive species.

Herbicides can be effective and have been used to control invasive species in New Hampshire marshes, but their use may not be the preferred choice, especially where wetlands intersect residential neighborhoods and developed areas. Two broad-spectrum herbicides, glyphosate and imazapyr, are currently considered safe to use in an aquatic environment, although recent data indicates potential adverse effects on amphibian populations, suggesting that this method be implemented strategically.

Mechanical removal involves the cutting, plowing, or grading of the impacted habitat. It is generally the most practical and effective in areas with small pockets of invasive species. Mechanical removal is common but requires an investment in labor. Additionally, its short-term effectiveness has not always met expectations and it often requires maintenance. Mechanical treatments can be most effectively used following an herbicide treatment to remove dead stems and promote native plant growth. This also aids in the identification of new invasive growth for subsequent herbicide spot treatments.

Environmental control involves decreasing the vitality of the invasive populations by manipulating certain elements of the surrounding environment such as soil moisture (e.g., temporary flooding) and pH, or the amount of sunlight through the overstory. This has proven to be effective in controlling invasive populations, but it should be used in combination with other techniques to improve its effectiveness.

Biological control is achieved using herbivorous insects and can be an efficient, sustainable, and cost-effective strategy to reduce invasive species to a level where it is not dominant within a wetland system. The insects remain in the wetland system indefinitely making long-term control possible. In North America, the only known application of biological invasive plant control is with two species of beetle and one species of weevil that consume purple loosestrife. Sites in New Hampshire have seen success from this approach, as the insects were proven "safe" in our natural environment and their populations naturally fluctuate along with the prevalence or scarcity of purple loosestrife (NHDES Purple Loosestrife Environmental Fact Sheet, 2019).

Invasive species management both within the vicinity of the proposed work and upstream into the drained impoundment, would likely be incorporated into the project. This would be especially applicable to the Alternative 4 that would expose the most currently inundated areas.

3.14 Rare Species and Natural Communities

The following is a discussion of rare, threatened, or endangered (RTE) species identified within the vicinity of the study area. Resources used include the NHB DataCheck tool and the USFWS Information for Planning and Consultation (IPaC) system.

3.14.1 State-Listed Resources

A search for the occurrences of RTE plant, animal, or exemplary natural communities within the study area was completed in consultation with NHB. The NHB DataCheck Results Letter (NHB23-3590), dated December 21, 2023, indicated that as of that date, the following natural communities and vertebrate species may exist within the study area (refer to **Appendix G**). A preliminary discussion of potential impacts is included where appropriate.

3.14.1.1 Exemplary Natural Communities

The NHB DataCheck Results Letter identified the potential presence of the red maple floodplain forest and swamp white oak basin swamp natural communities within the study area, as detailed below. When the project proceeds to permitting, consultation with the NHB will be required to review project details and obtain recommendations to minimize potential adverse impacts to the identified natural communities that may result primarily from hydrology alterations.

Red Maple Floodplain Forest

Red maple dominated floodplain forest communities occur on low floodplains of minor rivers and along tributaries of major rivers. According to the community description in the NHB DataCheck Results Letter, the dominant species is red maple with other observed tree species including shagbark hickory, northern red oak (*Quercus rubra*), swamp white oak (*Quercus bicolor*), and American elm (*Ulmus americana*) on the lower terraces and eastern white pine, black cherry (*Prunus serotina*), and eastern hemlock on the higher terraces. Some common herbaceous and shrub species observed include poison-ivy (*Toxicodendron radicans*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), white wood-aster (*Eurybia divaricata*), forked rosette-panic grass (*Dichanthelium dichotomum*), greater bladder sedge (*Carex intumescens*), white-edged sedge (*Carex debilis var. rudgei*), American hog-peanut (*Amphicarpaea bracteata*), small-spiked false nettle (*Boehmeria cylindrica*), winterberry (*Ilex verticillata*), buttonbush (*Cephalanthus occidentalis*), and species of dogwood. Multiple invasive species were also observed, including Morrow's honeysuckle, Japanese barberry, and multiflora rose. The community description in the NHB DataCheck Results Letter seems consistent with the community description in the *Natural Communities of New Hampshire*, Second Edition, dated 2012 by Daniel D. Sperduto and William F. Nichols.

Recorded occurrences of this natural community are mapped along the upstream western-most limits of the study area, near the top of the impoundment. Threats to this community include changes to river hydrology, land conversion and fragmentation, introduction of invasive species, and increased input of nutrients and pollutants. The upper reaches of the impoundment influenced by the existing Pickpocket Dam provide suitable hydrology to support this natural floodplain community.

The dam modification alternatives would likely have limited to no impact on this natural community as the post-construction hydraulic modeling indicates that hydrological input from the river would not change substantially from the existing conditions. Alternative 4, on the other hand, may have some impact on this community. As detailed in **Section 3.21.2** of this Feasibility Study above, the change in average water depths during normal flow conditions near this natural community would be a small fraction of a foot. Among the HEC-RAS model cross sections that pass through this natural community, the following are detailed in **Section 3.121.2** (specifically regarding inundated width): 51554.84, 55359.64, and 56564.57. Refer to **Figure 1.8-1** for the cross sections. With Alternative 4, the current impounded portions of the river would recede into the central natural river channel, causing the periphery of this community to progressively dry out. This community type would likely shrink and concentrate around the Exeter River channel but would be expected to persist post-dam removal.

Swamp White Oak Basin Swamp

The *swamp white oak basin swamp* communities are typically found within depressions and low-lying areas with silty soils. According to the *Natural Communities of New Hampshire*, the primary differences of this community from floodplain forests are the isolation from riverine flooding, presence of low to moderate hummocks, moderate to abundant amounts of peat moss (*Sphagnum* sp.), the lack of several floodplain plant associates, and the presence of typical basin swamp species (e.g., cinnamon fern and highbush blueberry). The community description in the NHB DataCheck Results Letter lists the following dominant observed species: swamp white oak, red maple, northern arrowwood, highbush blueberry, winterberry, peat moss, fringed sedge (*Carex crinita*), and marsh fern (*Thelypteris palustris*).

The recorded occurrence of this natural community is mapped northeast of the Pickpocket Dam away from the Exeter River. The main threats to this community include hydrology changes either through damming or increasing drainage. Substantial increases in nutrients and pollutants from stormwater runoff could also have a deleterious effect on this community.

It is unlikely that this natural community would be present within a floodplain along a river and, therefore, is expected to be absent from the study area.

3.14.1.2 Vertebrate Species

The NHB DataCheck Results Letter identified the potential presence of the state-threatened bridle shiner and state-threatened spotted turtle within and near the study area, as detailed below. When the project proceeds to permitting, consultation with the NHFGD will be required pursuant to NH Administrative Rule Fis 1004 to review project details and obtain recommendations to minimize potential adverse impacts to the identified vertebrate species that may result primarily from hydrology alterations.

Bridle Shiner

According to the NHFGD WAP, bridle shiners depend on dense communities of submerged aquatic vegetation which may be found within the backwaters of larger rivers and in slow flowing streams. Recorded occurrences of this species are mapped near the Pickpocket Dam and extend upstream into the Exeter River impoundment within the extensive vegetated backwaters. There are also mapped occurrences within the Exeter River downstream of the dam. One of the main threats to this species includes water level fluctuations. The NHFGD WAP also notes that this species has a short life span of only one to two years which makes it difficult for the population to recover from the loss of even a single year class.

With Alternative 4, the current impounded portions of the river would recede into the central natural river channel, reducing the area of available habitat for this species within the study area. However, dam removal would provide easier access for this species to freely move upstream and downstream. The removal of this existing fish passage barrier would be an overall benefit to this species. It is also worth noting that the NHB DataCheck Results Letter descriptions from 2021 state that dam removal (separate from the dam removal being considered for this project) has improved habitat for this species.

Spotted Turtle

According to the NHFGD WAP, spotted turtles utilize a large matrix of upland and wetland habitats and only tolerate limited development and human disturbance. Aquatic and wetland habitats used by this species include forested and shrub wetlands, marshes, fens, wet meadows, vernal pools, ponds, and shallow slow-moving streams and rivers. Due to their late age of maturity and low fecundity, spotted turtle populations are slow to compensate for any increases in mortality. Fecundity is defined as the ability to produce offspring. Animals with low fecundity may produce fewer offspring and/or require more energy to care for their offspring.

Recorded occurrences of this species are mapped far north of the Exeter River. Although those records are not close to the study area, the absence of direct sightings within the study area does not imply that this species is absent, and suitable habitat for the spotted turtle may occur within the study area.

This species is particularly vulnerable to rapid development, which is not a component of this project, and its utilization of diverse habitat matrices would improve its resilience regardless of the alternative selected. The dam modification alternatives would likely have limited to no impact on this species (if present within the study area) as the post-construction hydrology would not change substantially from the existing conditions. With Alternative 4, the current impounded portions of the river would recede into the central natural river channel, reducing the area of open water and shrinking the bordering wetlands as their periphery would likely become drier over time. Despite the habitat alterations expected to result from dam removal, that alternative would restore the Exeter River and the surrounding areas to a more natural ecological state (pre-dam construction) and any amphibian and reptile species present within the study area would adapt to the change in their environment.

3.14.2 Federally Listed Species

The study area was reviewed for the presence of federally listed or proposed, threatened, or endangered species, designated critical habitat, or other natural resources concerning the USFWS IPaC System. Results dated December 14, 2023, indicate the potential presence of the federally endangered northern long-eared bat (*Myotis septentrionalis*), the federally threatened small whorled pogonia (*Isotria medeoloides*), and the federal candidate monarch butterfly within the vicinity of the study area (refer to **Appendix G**).

3.14.2.1 Northern Long-Eared Bat (NLEB)

The proposed project is located within the federally protected range of the NLEB, which is a federally endangered species. Tree clearing activities are one of the largest threats to the NLEB. Although this project is in the preliminary planning phase, tree clearing (if required) should be minimal and limited to the area immediately surrounding the existing dam.

Consultation for this species was drafted in the beta version of IPaC using the NLEB Rangewide Determination Key (DKey) as a test; a formal consultation will be required during future project permitting. The DKey resulted in a preliminary determination of *no effect* since the study area does not intersect an area where NLEB is likely to occur based on the information available to USFWS at that time.

3.14.2.2 Small Whorled Pogonia (SWP)

The proposed study area is densely forested which provides potentially suitable habitat for the SWP. According to the USFWS Maine Field Office Threatened and Endangered Species Small Whorled Pogonia Fact Sheet, this perennial orchid grows in a variety of upland, mid-successional, forested habitats and prefers areas with forest canopy openings with sparce ground cover. It likes acidic soils with a thick layer of dead leaves and often grows on slopes near small streams. Based on this habitat description and the high prevalence of wetlands surrounding the Exeter River impoundment, suitable habitat for this species may be largely absent from the study area. Nevertheless, Alternative 4 would alter the hydrology of the surrounding areas beyond the existing impoundment that could yield indirect impacts to this species if present within the forested areas within the outer study area limits.

Consultation for this species was drafted in the beta version of IPaC using the Northeast Endangered Species DKey as a test; a formal consultation will be required during future project permitting. The DKey resulted in a preliminary determination of *may affect* since the study area intersects a SWP area of interest. Consequently, a survey of the proposed impacted areas by a qualified surveyor may be required. A "qualified surveyor" in this context is someone who the USFWS deems capable of successfully identifying this species. The USFWS often maintains lists of vetted and approved SWP surveyors.

3.14.2.3 Monarch Butterfly

The monarch butterfly is a candidate species but is not listed as threatened or endangered. Therefore, conservation measures are not required but should be implemented when feasible to demonstrate environmental stewardship. This species can be found anywhere where nectar producing plants are present, especially in open fields or meadows. Monarch butterflies will only breed in places with milkweed since that is the primary food source for their larva. Due to the lack of observed milkweed and dense forested land within the study area, we do not believe that suitable habitat for this species exists within the study area. The candidate status of this species does not provide protection under the ESA, and no further coordination with the USFWS is required. The status of this species will need to be reassessed during future project permitting.

3.14.3 Other Species

Although not included in the NHB DataCheck Results Letter or the USFWS IPaC Species List, observations of additional state and federally protected species have been documented within the overall river corridor. According to NHDES Environmental Fact Sheet titled *The Exeter and Squamscott Rivers*, these species may include the state-endangered Blanding's turtle, state endangered brook floater (*Alasmidonta varicosa*), and state and federally endangered shortnose sturgeon (*Acipenser brevirostrum*), although shortnose sturgeon are unlikely to be found in this reach of the Exeter River. If any additional listed species are observed or encountered within the project area, they would be reported to the appropriate agencies, such as the NHFGD, and incorporated into the project consultations during permitting.

3.14.4 Migratory Birds

Along with those species identified to be protected under the ESA, most bird species native to the United States are Federally Protected under the Migratory Bird Treaty Act of 1918 (MBTA) and the Bald and Golden Eagle Protection Act (Eagle Act) of 1940. It has been reported that the pied-billed grebe (*Podilymbus podiceps*) and bald eagle (state-listed threatened and species of concern, respectively), are two of many species that utilize the resources provided by the Exeter River and its corridor for food and habitat. Likely, the dam modification alternatives would have limited, to no impact on these species (if present within the study area) as the post-construction hydrology would not change substantially from the existing conditions. Conversely, as previously mentioned in this study, it is likely that Alternative 4 would provide numerous positive impacts on these species by the change in post-construction hydrology providing increased prey availability and habitat resources.

However, regardless of the selected alternative, the project is likely to provide temporary indirect impacts to migratory bird species and eagles near the study area through project disturbance and potential temporary displacement. Any activity resulting in a regulatory “take” of migratory birds, including eagles, is prohibited in accordance with Section 9 of the ESA, unless permitted by the USFWS. As defined in the ESA, the term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. To meet the additional responsibilities outlined by the Eagle Act and MBTA, these species' status in conjunction with anticipated project impacts will need to be reassessed during future project permitting. With this, consultation with NHFGD and USFWS may be warranted and a survey of the proposed impacted areas by a qualified surveyor may be required.

4

Conclusion and Potential Grant Funding Opportunities

This Feasibility Study demonstrates that the modification or removal of the dam is both technically and financially feasible. Under both Alternative 1 – Raise Dam and Alternative 3 – Auxiliary Spillway there would not be any noticeable change from existing conditions under normal flows. Under these two "dam-in" alternatives the existing recreation opportunities, wetland habitat and species would be preserved. But these Alternatives would not improve fish passage or the long-term water quality of the Exeter River. Under Alternative 4 – Dam Removal, fish passage and the long-term water quality of the river would be improved from existing conditions. While there are expected changes of various degrees to the adjacent wetlands and habitat, it is generally accepted that the ecology of riparian systems benefits from a natural flow regime. The dam removal would not impact any of the existing water wells within the Study Area, as they are all known to rely on water from the deep bedrock aquifer. Additionally, the impoundment would not provide a viable backup source of drinking water supply.

Table 4.0-1 Below summarizes the total initial capital cost but also the total present cost, which considers replacement and operation and maintenance costs. Alternative 1 – Raise Dam and Alternative 3 – Auxiliary Spillway both have present costs under future conditions of $3,575,100 and $3,849,100, respectively. Whereas Alternative 4 – Dam Removal has a present cost of $1,513,000.

Table 4.0-1 Summary of Alternative Costs

	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**

There are both private and public grant and loan funds are available to offset the costs of the project and the available programs are discussed below.

It is unlikely that any of the funding sources below would cover 100% of the cost of Alternatives 1 and 3. However, there is one funding opportunity that would cover 100% of the cost of Alternative 4.

All the grant programs discussed here are competitive, and many require matching funds in some way. The most successful approach would seek awards under multiple grant programs. Further, it is very important to understand that many of these programs are in flux due to the status of state and federal budgets. Grant opportunities have generally become more constrained in the last few years, but opportunities still exist. While the discussion below is comprehensive, there may be other grant opportunities that are not listed here.

4.1 Dam Modification Funding Opportunities

4.1.1 Federal Emergency Management Agency – National Dam Safety Program

The Federal Emergency Management Agency (FEMA) Provides grants to State Dam Safety Agencies and to the rehabilitation or removal of eligible dams and other improvements to reduce the public safety risks associated with them. This year, The Rehabilitation of High Hazard Potential Dams (HHDP) program is funding approximately $185 million and another $26 million through the National Dam Safety State Assistance Program. These grants are aimed at protecting communities and the environment from flooding, disaster costs, and aiding in the resilience to combating climate change. Grants through the Rehabilitation of High Hazard Potential Dams program are available to non-federal governments and nonprofits for the technical expertise, planning, design, and construction needed to rehabilitate eligible, non-federal high hazard potential dams. A grant under the (HHDP) program shall not exceed the lesser of 12.5 % of the total amount of funds made available; or $7,500,000. There is also a non-federal cost share requirement of not less than 35 %, which may be in-kind. The National Dam Safety State Assistance Grant Program is available for any state or territory with an enacted dam safety program. These grants ensure dam safety and protect human life and property by establishing and maintaining effective state programs. Eligible applicants would be a state administrative agency or an equivalent state agency. Each eligible state or territory may submit only one grant application. The amount of funds allocated to a State under this program may not exceed the amount of funds committed by the State to implement dam safety activities. This year funding opportunity opens Nov. 6 and the deadline to apply is Feb. 29, 2024.

4.1.2 National Preservation Loan Fund - National Trust for Historic Preservation

The National Preservation Loan Fund provides funding for establishing or expanding local and statewide preservation revolving funds, acquiring and/or rehabilitating historic buildings, sites, structures and districts, and preserving National Historic Landmarks. Eligible applicants are tax exempt nonprofit organizations; local, state, or regional governments; and for-profit organizations. Preference is given to nonprofit and public sector organizations. Eligible properties are local, state, or nationally designated historic resources; contributing resources in a certified local, state or national historic district; resources eligible for listing on a local, state, or national register; or locally recognized historic resources. Eligible projects involve the acquisition, stabilization, rehabilitation and/or restoration of historic properties in conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. The loan amount is based on the type of project and use of funds, with a maximum loan amount of $50,000 and loan terms range from one to seven years. Grants under National Trust Preservation Funds (NTPF) generally start at $2,500 and range up to $5,000. The selection process is very competitive. The review process is generally completed within ten weeks of the application deadline, and applicants are notified via email once the review process is complete. The current applicable annual grant opportunity for this project would be the Johanna Favrot Fund for Historic Preservation, which aims to save historic sites and foster both the preservation and appreciation of national diverse cultural heritage. Application deadlines appear to be in March yearly for this opportunity, with a funding award ranging from $2,500 to $15,000. Eligible projects include restoration and rehabilitation of historic sites.

4.1.3 New Hampshire Land and Community Heritage Investment Program

The Land and Community Heritage Investment Program (LCHIP) was established to conserve and preserve NH's most important natural, cultural, and historical resources for the primary purposes of protecting and ensuring the perpetual contribution of these resources to the state's economy, environment, and overall quality of life. LCHIP makes matching grants to municipalities and publicly supported nonprofit corporations for the protection, restoration or rehabilitation of natural, cultural, or historic resources including archaeological sites, historic properties including buildings and structures, and historic and cultural lands and features. Matching funds are required, and the amount of matching funds must be equal to the LCHIP grant award amount. In 2023, LCHIP provided $3.7 million in matching funds to 25 projects. Rehabilitation of a historic dam would be an eligible project to apply for LCHIP funding if its historic character is preserved. LCHIP awarded grants may not exceed 50% of the project's total project cost, awards for acquisition or rehabilitation projects must be between $10,000 and $500,000, awards for Preservation Plans must be between $5,000 and $25,000, and awards for block grants are given at the discretion of the Board.

4.1.4 Society for Industrial Archeology - Industrial Heritage Preservation Grants Program

The Society for Industrial Archeology (SIA) offers Industrial Heritage Preservation Grants from $1,000 to $3,000 for the study, documentation, recordation, and/or preservation of significant historic industrial sites, structures, and objects. Grants are open to qualified individuals, independent scholars, nonprofit organizations and academic institutions. Grant applicants must sponsor at least half the cost of a project through in-kind or cash expenditures. Grant recipients must agree to prepare a written summary of their project suitable for publication in either the SIA Newsletter and/or for Industrial Archeology, the Society's scholarly journal. For this project, the Eric DeLony Industrial Heritage Preservation Grant Fund would be applicable, with a yearly application deadline of March 1st and a funding award ranging from $1,000 to $3,000. The focus of this grant highlights preservation of historic industrial sites and structures.

4.2 Potential Funding for Dam Removal

There are many sources of potential funding for dam removal; too many to list in detail. Those discussed below are most applicable to this project and most have provided funding for previous projects in NH.

4.2.1 National Oceanic and Atmospheric Administration

On July 31st, 2023, NOAA released the "Restoring Fish Passage through Barrier Removal Grants". The funding will support projects that reopen migratory pathways and restore access to healthy habitat for fish. Award amounts range from $1 million to $20 million over the award year period. Funding will be used to implement locally-led removals of dams and other in-stream barriers. Since the analysis of the Feasibility Study has shown that dam removal is a potential option to address the deficiencies associated with the reclassification of Pickpocket dam to a "High-Hazard" Dam. To take advantage of the funding opportunity, the Grant was presented to the Exeter River Advisory Board on September 21, 2023, during the status update on the Pickpocket Dam Feasibility Study. The Advisory Board agreed to apply for the Grant. On October 2, 2023, the project summary, current analysis and the Grant were presented to the Town of Exeter Select Board who voted that removal of the Pickpocket dam was the Town's preferred alternative and therefore authorized the pursuit of the Grant. Notice of the Grant recipients are expected July 2024., if selected the grant will cover 100% of the construction related costs including engineering, design, permitting, and post construction activities.

4.2.2 National Oceanic and Atmospheric Administration Habitat Conservation Grants, Northeast Region

Through the Community-based Restoration Program, NOAA awards millions of dollars each year to national and regional partners and local grass roots organizations. Under competitive processes, projects are selected for funding based on technical merit, level of community involvement, cost-effectiveness and ecological benefits. Over the past decade, NOAA's Restoration Center has funded dozens of fish passage projects in the northeast. NOAA funds restoration projects that use a habitat-based approach to foster fish species recovery and increase fish production. Projects are funded primarily through cooperative agreements. Approximately $1-25 million dollar awards could potentially be available over the next three years to maintain selected projects, dependent upon the level of funding made available by Congress. There is no statutory matching requirement for this funding, but NOAA considers matching contributions in its evaluation of grant applications.

4.2.3 Natural Resource Conservation Service - Environmental Quality Incentives Program

The federal 2018 Farm Bill was enacted on December 20, 2018, and typically includes funding for environmental conservation and restoration projects. While Environmental Quality Incentives Program (EQIP) is a possible source of funding for dam removal projects, the program has limits on what entities are eligible for grants. NRCS may enter into EQIP contracts with water management entities when they are supporting a water conservation or irrigation efficiency project. The NRCS defines eligible water management entities as state irrigation districts, ground water management districts, acequias, land grant-merced or similar, that have jurisdiction or responsibilities related to water delivery or management to eligible lands. The 2018 Farm Bill requires a national 10 percent of mandatory program funding be targeted towards source water protection. States will identify priority Source Water Protection Areas and may offer increased incentives and higher payment rates for practices that address water quality and/or water quantity. EQIP is a voluntary program that provides financial and technical assistance to landowners for projects that improve water quality among other priorities. The EQIP program provides for a maximum grant of $350,000 and has no match requirement.

4.2.4 NH Charitable Foundation - Community Grants Program

The Community Grants Program is a broad, competitive program that responds to community needs within NH. While preference is given to operational support of community-based organizations, the Community Grant Program will consider project-specific proposals. However, in order to be eligible, applicants must be tax exempt under Section 501 (c)(3) of the Internal Revenue Code. Also, unrestricted grants are not available to municipal, county, or state government. Public (state or municipal) agencies are eligible to apply, but an organization may receive only one grant per year through the Community Grants Program. In 2023, this program was updated to offer a single, one-year, Unrestricted Grant program with awards up to $20,000. There will be no Express Grants or multi-year Unrestricted grants awarded in 2023, which suggests that this alteration would continue through 2024. The deadline appears to be in September yearly for this opportunity.

4.2.5 NH Department of Environmental Services Aquatic Resource Mitigation Fund

The Aquatic Resource Mitigation (ARM) Fund offers an alternative to permittee-responsible mitigation when there are unavoidable impacts to streams and wetlands. The ARM Fund's goal is to provide sustainable compensatory mitigation meeting the federal goal of “no net loss” of functions and values of aquatic resources by supporting restoration, enhancement, establishment and, under certain circumstances, preservation activities that are ecologically important and will effectively sustain aquatic resource functions in the watershed for the long term. NHDES will be issuing a Request for Proposals at the end of February 2024 where $4.5 million will become available for grants. Past awards have been as high as $2 Million per New Hampshire service area (nine major river basins). State governments, city or township governments are eligible to apply for the ARM Fund.

4.2.6 NH Department of Environmental Services Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) loan program provides communities with reduced-cost financing for a wide range of stormwater infrastructure projects that demonstrate or promote a water quality benefit. The CWSRF loan program provides below-market loan rates with no closing costs or origination fees, and no prepayment penalties. The final design, permitting, and construction would all fall under the "Stormwater Infrastructure" category. Any additional assessments (cultural resources, geotechnical, etc.) would qualify for a “Stormwater Planning” loan. The stormwater planning loan is offering $100,000 in principal forgiveness for stormwater planning evaluations or assessments. The CWSRF loan amount may be greater than $100,000, depending upon the estimated cost for the project but only up to $100,000 per project will be forgiven.

4.2.7 NH Department of Environmental Services Watershed Assistance Grants

The NHDES Watershed Assistance Section offers competitive grants to address nonpoint source pollution including changes in river flows or other impairments caused by dams. Grants may be available to assist with engineering and permitting for dam removal and deconstruction costs.

Dam construction, repair or modification projects do not meet the eligibility criteria for this program. This is a federal funding source which requires non-federal matching funds for all projects and must equal at least 40% of the overall project budget, and indirect costs are not allowed to exceed 10%. Approximately $500,000 will be available for Watershed Assistance Grant projects during the 2023 fiscal year. Grant awards through this program typically range from $25,000 to $150,000, but final award levels are based on the annual amount of funding available through the program. Projects must implement existing watershed-based plans that meet the EPA Watershed Plan Elements (a) through (i) criteria or implement an EPA and NHDES approved alternative plan. Although there is no minimum or maximum limit on project budgets and grant requests, NHDES typically selects five to eight projects each year. The last cycle of grant applications was due by September 15, 2023. There may be future opportunities to apply to this grant in the coming year, Prospective grantees should contact Watershed Assistance Section staff before applying to discuss project eligibility, current grant requirements, funding levels, and grant proposal schedules. Funding for the Watershed Assistance Grants program is provided through Clean Water Act Section 319 funds from the EPA.

4.2.8 NH Fish and Game Department Fish Habitat Program

The NHFGD Fish Habitat Program has funded several previous dam removal projects. A review of 2023 annual report from the program indicates that the U.S. Fish and Wildlife Service provided $5.8 million for 95 on-the-ground conservation projects across 24 states. Partners provided a 5.7-to-1 funding match with an additional $33.3 million supporting projects that will address outdated or obsolete dams, culverts, levees and other barriers fragmenting our nation's rivers and streams. There is no match requirement, and these funds qualify as non-federal match for other grant programs. No date is listed currently for applications.

4.2.9 State Conservation Committee - Conservation "Moose Plate" Grant

The State Conservation Committee Conservation Grant Program is funded through the purchase of conservation license plates, known as "Moose Plates." The State of New Hampshire dedicates all funds raised through the purchase of Moose Plates to the promotion, protection and investment in NH's natural, historical and cultural resources. Applications are typically due on September 10th of each year in which funds are available, with awards announced in December. Municipalities are eligible applicants. In 2023, the program awarded $670,656 in grant funds to 24 projects throughout NH that will protect, restore, and enhance NH's natural resources. The upcoming 2025 Grant Program application and instructions will be posted by July 1, 2024, with grant proposals due in September 2024.

4.2.10 Trout Unlimited, Embrace a Stream Grant Program

Embrace-A-Stream is the recent grant program for funding Trout Unlimited's grassroots conservation efforts. Trout Unlimited funds local efforts to accomplish on-the-ground restoration of marine, estuarine, and freshwater habitats. Although all types of habitat improvement activities are eligible for funding, there is special emphasis involving fish passage projects, such as culvert removals and dam removals. Trout Unlimited local chapters and councils, as well as organizations working in partnership with Trout Unlimited local chapters and councils, are eligible for funding. Embrace-a-Stream is a matching grant program. Typical Embrace-A-Stream grants annually award more than $100,000 ranging from $1,000 to $10,000. In 2022, a total of $86,000 was awarded to 13 chapters and councils, helping restore stream habitat, improving fish passage, and protecting water quality in 19 different states from coast to coast. Grants were last awarded at the CX3 Spokane Embrace a Stream Banquet on September 30, 2023. A grant opportunity for 2024 has yet to be posted but is expected.

4.2.11 US Fish and Wildlife Service Fisheries and Habitat Restoration Grants

The USFWS has several grant programs which could be applied to dam removal. USFWS has a history of working in partnership with private landowners, conservation organizations, and state and federal agencies, to prioritize and provide funding for the removal or renovation of selected barriers in stream systems throughout New England. USFWS administers several grant programs, several of which could be applied to the dam removal. A few of the more promising programs would be:

- National Fish Passage Program
    - The purpose of this program is to restore aquatic ecosystems and address outdated, unsafe, or obsolete dams fragmenting our nation's rivers and streams.
- National Fish Habitat Partnership
- Partners for Fish and Wildlife Program
- This program highlights and aims to address the need to restore and conserve fish and wildlife habitat through fostering connectivity and restoration of habitats and advance ecosystem health and resilience. Estimated total funding for 2022-2023 was $15,000,000 with a maximum individual award amount of $75,000. Coastal Impact Assistance Program
    - This program involves conserving and maintaining habitats while preserving connectivity.
- National Coastal Wetland Conservation Grant
    - This grant provides up to $1 million annually to coastal and Great Lakes states, and U.S. territories in an effort to restore, enhance, and protect coastal wetland ecosystems and their associated uplands.

Each of these USFWS-administered programs has different application and match requirements. USFWS may offer assistance in identifying the most appropriate program(s) for the selected project and may assist in the development of a grant application.

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Glossary

Abutments

The part of a structure (e.g. a dam or a bridge) that directly receives thrust or pressure and supports the remaining portions of the structure.

Aggradation

The accumulation of sediment in rivers and nearby landforms. Aggradation occurs when sediment supply exceeds the ability of a river to transport the sediment.

Anadromous

Fish that spend all or part of their adult life in salt water and migrate to freshwater streams and rivers to spawn.

Aquatic Bed

Wetland and deepwater habitats dominated by plants growing principally on, or below, the surface of the water for most of the growing season in most years.

Aquifer

An underground porous, water-bearing geological formation.

Bathymetry

The measurement of water depth at various places in a body of water.

Buttress Dam

A dam with a solid, water-tight upstream side that is supported at intervals on the downstream side by a serios of buttresses or supports.

Catadromous

Catadromous fish migrate between the sea and fresh water. These species live in freshwater but migrate to the sea to spawn. See also diadromous and anadromous.

Confluence

The place at which two streams flow together to form one larger stream.

Deltaic

Pertaining to or like a delta. Sedimentary type deposits in a delta.

Denil-style

A style of *fish ladder* with a series of sloped ramps with inset baffle structures that act like a set of rapids with a wide range of water speeds that allows many fish species to successfully ascend over obstructions.

Diadromous

Refers to both species which live in the sea but migrate to freshwater to spawn (i.e., anadromous) as well as those species which live in freshwater but migrate to the sea to spawn (i.e., catadromous).

Emergent

Rooted below a body of water or in an area that is periodically submerged but extending above.

Fish Ladder

A sluice-like structure on a dam that enables fish to pass above the dam by swimming up a series of relatively low submerged steps over the dam spillway.

Floodplain

Land immediately adjoining a stream which is inundated when the discharge exceeds the conveyance of the normal channel. The "100-year Floodplain" is the portion of the floodplain which can be expected to flood once in every 100 years.

Fluvial Geomorphology

The study of rivers and streams and the processes that form them.

Freeboard

In dam design, a margin of safety added to account for waves, debris, miscalculations, or lack of data; the vertical distance between a stated water level and the top of a dam.

Geospatial

Having to do with entities or events that can be described in a geographic fashion; mapped information is geospatial data.

GIS (Geographic Information System)

A computer-based mapping and information management system tied to geographic data.

Glacioestuarine

Typically consist of clays and silts; deltaic deposits generally include silts interbedded with scattered coarser material, including sand and gravel.

Glaciomarine

Typically consist of high latitude, deep-ocean sediment which originated in glaciated land areas and has been transported to the oceans by glaciers or icebergs.

Headcut

A type of erosional feature seen in flowing waters where a deep incision of the streambed forms, lowering the streambed and usually causing the riverbanks to erode and collapse. A headcut migrates upstream; its uppermost point is called a *nickpoint*.

HEC-RAS (Hydraulic Engineering Center – River Analysis System)

A computer program that models the hydraulics of water flow through natural rivers and other channels developed in 1995 by the USACE in order to manage the rivers, harbors, and other public works under their jurisdiction.

Hyetograph

A tool that graphically depicts the distribution of rainfall intensity over time.

High-Hazard Potential Dam

A classification standard for any dam whose failure or mis-operation will cause loss of human life.

Hydrology

The study of a watershed's behavior during and after a rainstorm. A hydrologic analysis determines the amount of rainfall that will stay within a watershed - absorbed by the soil, trapped in puddles, etc. - and the rate at which the remaining amount of rainfall will reach the stream.

Hydraulics

The study of floodwaters moving through the stream and the floodplain. A hydraulic study produces determinations of flood elevations, velocities and floodplain widths at each cross section for a range of flood flow frequencies. These elevations are the primary source of data used by engineers to map the floodplain.

Impounding

To collect and confine (water) in or as if in a reservoir.

Impoundment

A body of water formed by impounding.

Labyrinth Spillway

A nonlinear arrangement of the spillway weir control structure intended to increase the total flow length available for discharge capacity while maintaining similar spillway footprint width.

LiDAR

Light Detection and Ranging. A method of detecting distant objects and determining their position, velocity, or other characteristics by analysis of pulsed laser light reflected from their surfaces. LiDAR operates on the same principles as radar and sonar.

Low Hazard Dam

Those dams where failure or mis-operation results in no probable loss of human life or low economic and/or environmental losses. In NH, this term has a regulatory meaning which is defined in NH Administrative Rule Env-Wr 101.07. Low hazard dams are sometimes called "Class A" structures in NH laws and regulations.

Nickpoint

The top of a *headcut*, usually characterized by an unnatural grade change which is the result of erosion.

Palustrine

Inland, nontidal wetlands characterized by the presence of trees, shrubs, and emergent vegetation (vegetation that is rooted below water but grows above the surface). Palustrine wetlands range from permanently saturated or flooded land to land that is wet only seasonally.

Parapet

A barrier that is an upward extension of a wall at the edge of a terrace, walkway, roof, or other structure.

PEC/Probable Effects Concentration

The level of a concentration in the media (surface water, sediment, soil) to which a plant or animal is directly exposed that is likely to cause an adverse effect.

Presumpscot Formation

A late Pleistocene glacial deposit of predominantly submarine clays.

Reach

A portion of a river defined by one or more features, landmarks, of characteristics.

Riffle

A short, relatively shallow and coarse-bedded length of stream, where the stream flows at higher velocity and higher turbulence that it normally does compared to a pool.

Riparian

The interface between land and a river or stream.

Riverine

Relating to, formed by, or resembling a river. Relating to a system of inland wetlands and deep-water habitats associated with nontidal flowing water, characterized by the absence of trees, shrubs, or emergent vegetation.

Run of the River

Used to describe dams that allow all of the natural river flow to pass over the dam in a relatively a consistent and steady flow, vs. other dams which may divert, store, or release water flow for various reasons.

Scour

Erosion of streambed or bank material caused by flowing water, usually localized.

SCS Curve Number Method

Method of estimating rainfall excess from rainfall; for a single storm, the ratio of actual soil retention after runoff begins to potential maximum retention is equal to the ratio of direct runoff to available runoff.

Sieve Analysis

Method used to determine the particle size distribution of a granular material.

Significant-Hazard Dam

Those dams where downstream flooding would likely result in disruption of access to critical facilities, damage to public and private facilities, and require difficult mitigation efforts.

Sluice Gate

A type of gate to manage the water flow and water level, which can also remain open to form an open, free flowing channel.

Spillway

The crest of a dam or a passage for surplus water to run over or around a dam.

Stoplog Bay

An area that has been de-watered by stoplogs, which are sliding-type gates that, when stacked to reach the desired height, act as a temporary closure for openings on various structures.

Stop-logged Outlet

An opening in the stoplogs structure through which water can be discharged.

Stilling Basin

A basin-like structure that is used to absorb or dissipate the energy from spillway discharge.

Subwatershed

A small watershed that nests inside of a larger watershed.

Surficial

Relating to or occurring on or near a surface.

TEC/Threshold Effects Concentration

A concentration in media (surface water, sediment, soil) to which a plant or animal is exposed, above which some effect (or response) will be produced and below which it will not.

Thalweg

The line defining the lowest points along the length of a riverbed or the portion of a stream channel that contains the deepest flow.

Thermal Stratification

The thermal stratification of lakes refers to a change in the temperature at different depths in the lake and is due to the change in water's density with temperature.

Tributary

A stream that flows into a larger stream or body of water at a *confluence*.

Training Wall

A wall built to confine or guide the flow of water.

Training Weir

A low barrier across the width of a river to direct the passage of fish.

Watershed

A land area that drains into a lake, stream or river. Also called "basins," watersheds vary in size. Larger ones can be divided into sub-watersheds.

Weir

A low barrier across the width of a river that alters the flow characteristics of water and usually results in a change in the height of the river level.

A

NHDES Letters of Deficiency

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

Town of Exeter
Ms. Jennifer Perry, P.E., Director
Public Works Dept.
10 Front Street
Exeter, NH 03833

March 28, 2011
Letter of Deficiency
DSP#11-026

RE: Pickpocket Dam #029.07, Brentwood

NEW STATUTORY PENALTY PROVISIONS
PLEASE READ CAREFULLY

Dear Director Perry:

The Department of Environmental Services, Dam Bureau (DES) is responsible for ensuring the safety of dams in New Hampshire through its dam safety program. One of the many tools that helps us to reach this goal is our dam inspection program.

In accordance with RSA 482:12 and Env-Wr 302.02, an inspection of the subject dam was conducted on September 9, 2010. Based upon the results of that inspection, as well as upon additional investigation or analysis that may have been conducted, DES is issuing this Letter of Deficiency (LOD) to advise you that the following items constitute deficiencies that DES believes can be remedied in accordance with the deadlines indicated:

By June 1, 2011:

1. Prepare and return the enclosed Operations, Maintenance, and Response (OMR) form;

2. Remove the minor debris from the spillway (Photos E and K);

By December 31, 2011:

3. Remove the trees and brush from both abutments within 15 feet of the ends of the dam, within 15 feet of the toe of the embankments, and on the dam embankment. Once removed, stabilize any disturbed areas with loam and seed to promote the growth of a hearty, grassed embankment (Photos A-D, F-H, I, and J); and

By December 31, 2012:

4. Report back to the Dam Bureau with the results of a breach analysis in accordance with the criteria in Env-Wr 500. Retain a qualified consultant to perform the breach analysis model, which quantifies the hazard posed by the dam to the downstream reach, specifically the areas around Sir Lancelot Drive and Camelot Drive.

   In accordance with Env-Wr 500, the breach analysis should include a "sunny-day" breach, as well as a breach routed with the 100-year flood event. If the dam poses risk to the downstream reach, such that it would inundate the living space of an occupied property by an increment of one or more feet above the sill of that occupied structure, it would meet the criteria of Env-Wr 101.09, and would qualify the dam to be reclassified as a "High-Hazard" structure.
   In the event that the dam is reclassified to "High Hazard", additional requirements will likely be requested, including preparation of and Emergency Action Plan (EAP), and Hydraulic & Hydrologic (H&H) analysis of the spillway to pass 2.5 times the 100-year storm event.

Our intent in issuing this LOD is to make you aware of items that require your attention to ensure the continued safe operation of your dam. It is our hope that, through the return of the attached form and correction of the identified deficiencies, you will develop and maintain a commitment to keeping a safe and well-maintained dam.

Please note that effective January 1, 2009, significant changes to the penalty provisions of New Hampshire's dam safety statute (RSA 482) became effective. These changes require DES to commence proceedings to levy fines of up to $2,000 per violation per day against a dam owner who does not respond within 45 days of receipt of a written order, directive, or any notice of needed maintenance, repair, or reconstruction issued by DES. To avoid proceedings under this provision, you **must respond** to this LOD. We believe the easiest way to respond is to sign and return the attached "Intent to Complete Repairs" form, either agreeing to correct the identified deficiencies by the dates indicated OR by proposing amendments to the listed work items or dates, which you may do by writing directly on the form. DES will evaluate and respond to any reasonable requests for proposed amendments in a timely manner. We have enclosed a self addressed stamped envelope for you to return this form. You may also scan and e-mail the completed form to damsafety@des.nh.gov or fax it to (603) 271-6120. **If you fail to return this form within 45 days or fail to otherwise respond in writing within 45 days indicating your intent to remedy the identified deficiencies, you will not have the benefit of the compliance deadlines indicated on the form and DES will commence a proceeding under RSA 482:89 to seek administrative fines for the identified deficiencies.** Please note that responding as required does not preclude DES from pursuing other appropriate action for the identified deficiencies, in accordance with the DES Compliance Assurance Response Policy, available on-line at http://des.nh.gov/organization/commissioner/legal/carp/index.htm.

If you have any questions or comments regarding this LOD or would like to be present at future inspections, please contact Brian Desfosses, P.E. at 271-4162 or write to the address for the Water Division listed on the bottom of the previous page.

Sincerely,

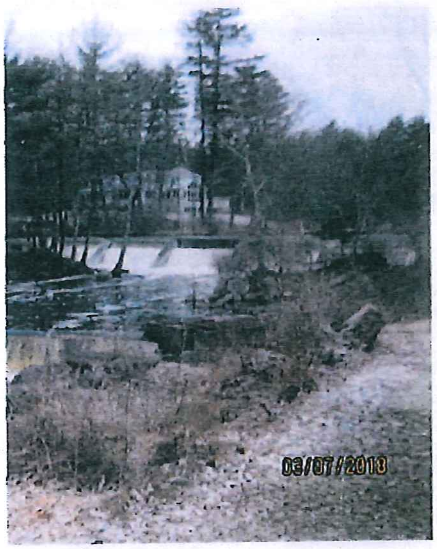
Steve N. Doyon, P.E., Administrator
Dam Safety and Inspection

Attachments: Dam Report, Photos, Plan View Drawing, OMR form, DB8, DB13
cc: DES Legal Unit
Town of Brentwood

Certified # 7007 3020 0000 5339 1919

SND/BAD/was/h:/damfiles/02907/LOD/20110328 02907

Dam# D029007, Pickpocket Dam, Brentwood, Inspected: 03/07/18



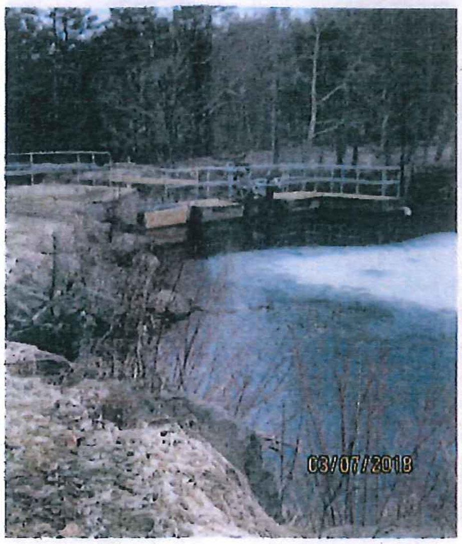
A

B

C

D

Dam# D029007, Pickpocket Dam, Brentwood, Inspected: 03/07/18



E

F

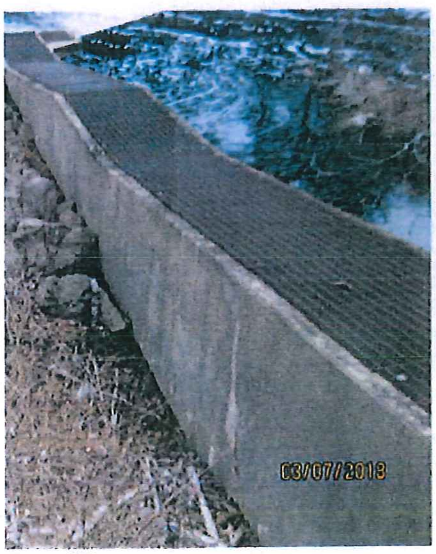
G

H

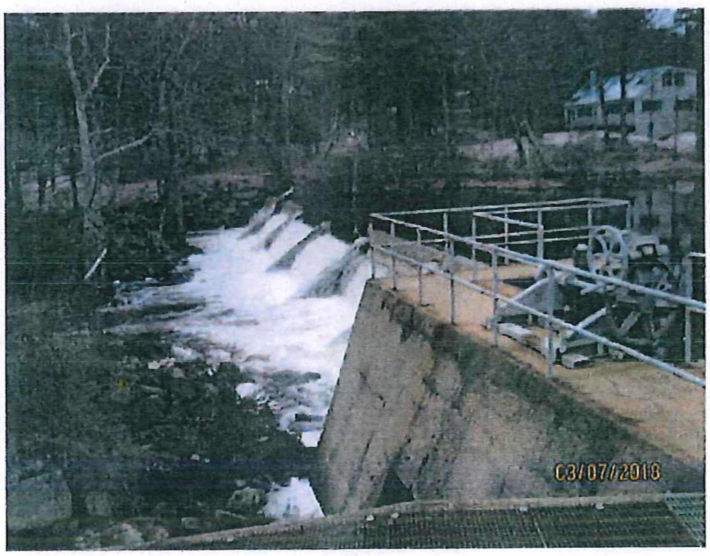
Dam# D029007, Pickpocket Dam, Brentwood, Inspected: 03/07/18

I

J

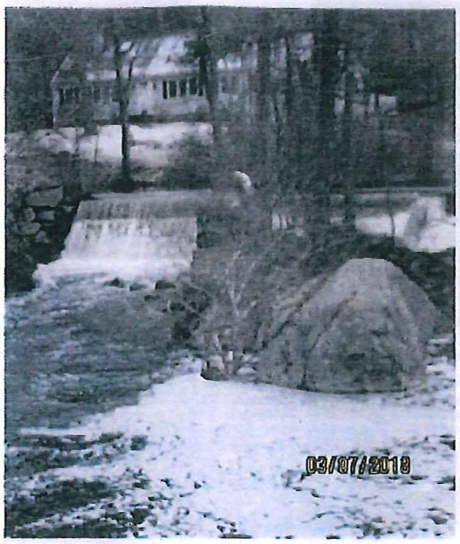


K



L

Dam# D029007, Pickpocket Dam, Brentwood, Inspected: 03/07/18



M

N

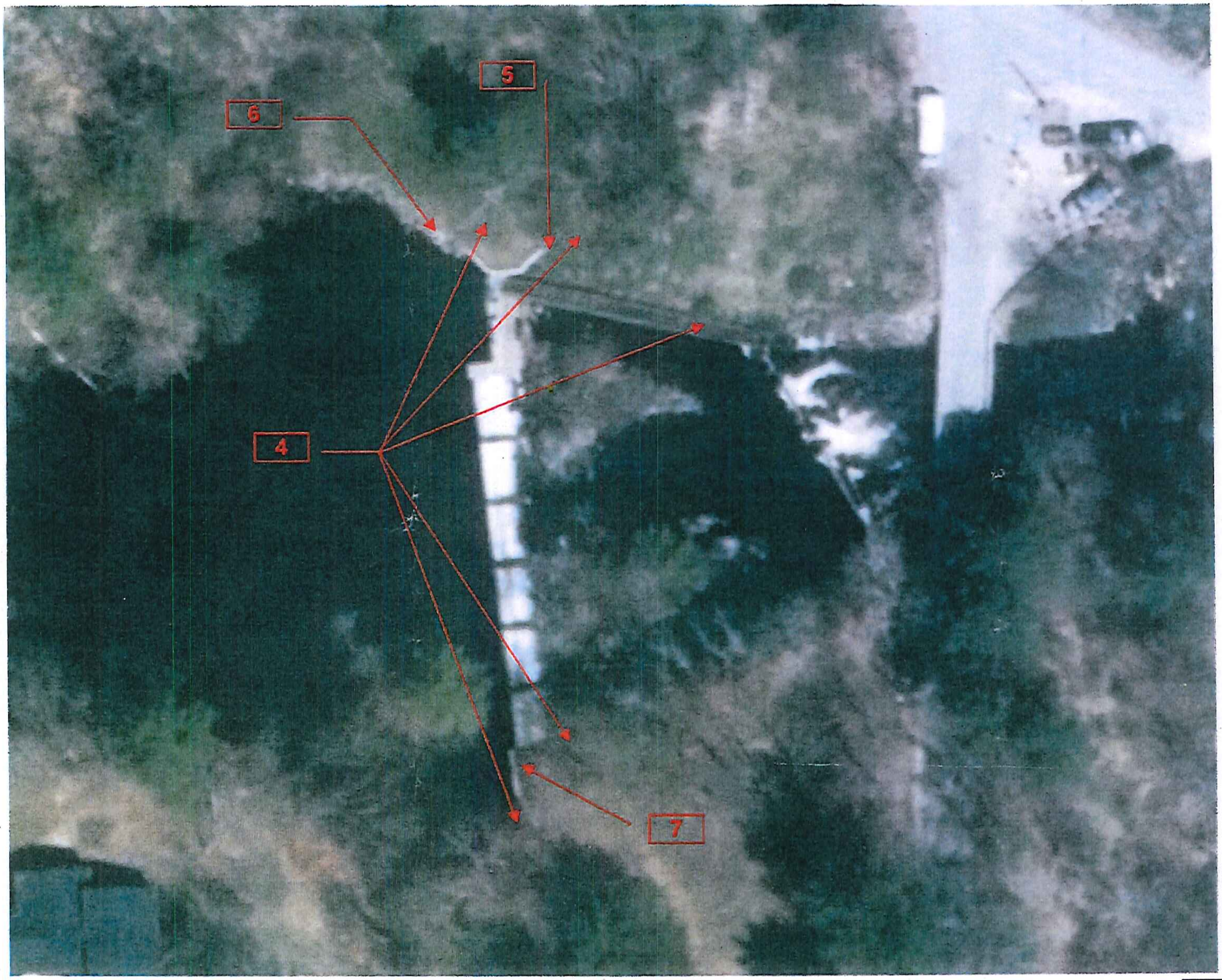
O

P

D029007 Pickpocket Dam - Inspected 03/07/2018

All references of left and right are facing in the downstream direction

Left



No Scale

Right

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

Ms. Jennifer Perry
Town of Exeter Public Works
13 Newfields Road
Exeter, NH 03833

July 25, 2019
Letter of Deficiency
DSP #19-016

RE: Pickpocket Dam #D029007, Brentwood

Dear Ms. Perry:

The New Hampshire Department of Environmental Services, Dam Bureau (NHDES) is responsible for ensuring the safety of dams in New Hampshire through its dam safety program. In accordance with RSA 482:12 and Env-Wr 302.02, inspections of the subject dam were conducted on March 7, 2018 and July 1, 2019. Based upon the results of these inspections, NHDES is issuing this Letter of Deficiency (LOD) to advise you that it believes the following deficiencies can be remedied in accordance with the deadlines indicated:

By October 1, 2019:

1. Remove the log from the spillway. (Photos: L, O & P).
2. Repair the sinkhole on the left embankment crest. (Photo: F).
3. Update the Operations, Maintenance and Response form (OMR) form included the following items, at a minimum;
   a. High hazard classification;
   b. Downstream area description; and
   c. Observation and recording of seepage in the old mill foundation and adjacent to the fish ladder.
4. Remove the trees and brush from the crest, upstream and downstream portions of the embankment, within 15 feet of the spillway abutment walls and within 15 feet of the toe of the embankments. (Photos: B - E, G – N).
5. Repair the erosion and loss of material adjacent to left downstream spillway abutment wall on the left embankment section. (Photo: G).
6. Repair the erosion and loss of material, likely due to foot traffic, left of upstream wing wall on the left embankment section. (Photo: H).
7. Repair the erosion and loss of material adjacent to end of the right spillway abutment wall on the right embankment section. (Photos: N & O).

By January 1, 2020:

8. As required by RSA 482:11-a and in accordance with Env-Wr-500, the owner shall develop and Emergency Action Plan (EAP).

By June 1, 2020:

9. Engage the services of a consultant qualified in dam-related work to complete an engineering evaluation or analysis of, at a minimum, the items noted below and submit a report to NHDES. The report should include all investigation findings and include

recommendations and a schedule for reconstruction, as warranted, to make the dam compliant with the current standards for high hazard dams. In order to insure that the selected consultant meets the requirements of Env-Wr 403.03(a)(1). NHDES recommends that you submit the resume of your proposed engineering consultant for review in accordance with Env-Wr 403.03 (a)(1) prior to contracting services.

a. NHDES has reviewed the December 30, 2016 (Revised: December 15, 2017) VHB Dam Breach Analysis memo received by NHDES by e-mail dated January 26, 2018. NHDES met with VHB and Mr. Paul Vlasich on June 27, 2019. Many of the comments from the DRAFT February 2018 LOD have been addressed and removed from this revised LOD. NHDES has the following comments which should reviewed and addressed by your engineering consultant:
    i. The HEC-HMS model used for the dam breach evaluation was a portion of the model used to evaluate the downstream Exeter Great Dam D082001and was reviewed and revised by the consultant using Atlas 14 rainfall and distribution and is suitable for use in the dam breach analysis;
    ii. Inundation maps;
        1. Layout of maps is difficult to use;
        2. Sunny day inundation limits difficult to see through100-yr shading;
        3. Edge of 100-yr breach inundation limits not distinct;
        4. Potential high or significant hazard impacts;
            a. No elevation information, contours, etc. included on maps or tables for residence located northeast of Powder Mill Road and shown surrounded but not flooded by the 100-yr inundation breach limits on Maps 2-4 and 2-5. This residence is located within the FEMA floodway and 100-yr flood hazard zone;
            b. Residence/building at Green Gate Hall is shown on the edge of the 100-yr inundation breach limits on Map 2-11. This structure is partially located within the FEMA floodway and 100-yr flood hazard zone;
            c. No elevation information included on maps or tables for residence located north of the Exeter River and west of Court Street and shown surround and possibly flooded by the 100-yr inundation breach limits on Map 2-10. This residence is located within the FEMA floodway and 100-yr flood hazard zone; and
            d. No elevation information included on maps or tables for residence located south of the Exeter River and west of Court Street and shown flooded by the 100-yr inundation breach limits on Map 2-10. This residence is located within the FEMA floodway and 100-yr flood hazard zone.

b. The hydrologic model referred to in item 9 a.i. indicates that the dam does not have sufficient discharge capacity to pass the runoff generated by the 2.5 x 100-year event required for a high hazard dam [Env-Wr 303.11 (a)(3)]. As such, a more detailed assessment of the watershed hydrology will likely be required for use in designing reconstruction of the dam to pass this event with a minimum of one foot of remaining freeboard and without manual operations.

By June 1, 2022:

10. Submit an application for reconstruction of the dam, or a plan to otherwise comply with Env-Wr 303.12. Permits from other programs, including NHDES' Wetlands Program may be required.

By December 1, 2025:

11. Complete the reconstruction of the dam.

As part of the most recent inspection, NHDES completed detailed assessments related to the hydrology of the contributing watershed and the hydraulic capacity of your dam. Further, we performed a review of the areas downstream of the dam in order to reassess the dam's current hazard classification. The observations and recommendations in this LOD include the findings related to these more detailed analyses.

Please note that under New Hampshire's state statute RSA 482:89, NHDES may commence proceedings to levy fines of up to $2,000 per violation per day against a dam owner who does not respond within 45 days of receipt of a written order, directive, or any notice of needed maintenance, repair, or reconstruction issued by NHDES. To avoid proceedings under this provision, you **must respond** to this LOD. If you fail to return this form within 45 days or fail to otherwise respond in writing within 45 days indicating your intent to remedy the identified deficiencies, you will not have the benefit of the compliance deadlines indicated on the form and NHDES will commence a proceeding under RSA 482:89 to seek administrative fines for the identified deficiencies. Please note that responding as required does not preclude NHDES from pursuing other appropriate action for the identified deficiencies, in accordance with NHDES Compliance Assurance Response Policy, available on-line at http://des.nh.gov/organization/commissioner/legal/carp/index.htm.

We believe the easiest way to respond is to sign and return the attached "Intent to Complete Repairs" form, either agreeing to correct the identified deficiencies by the dates indicated OR by proposing amendments to the listed work items or dates, which you may do by writing directly on the form. NHDES will evaluate and respond to any reasonable requests for proposed amendments in a timely manner. We have enclosed a self-addressed stamped envelope for you to return this form. You may also scan and e-mail the completed form to damsafety@des.nh.gov or fax it to (603) 271-6120.

Our intent in issuing this LOD is to make you aware of items that require your attention to ensure the continued safe operation of your dam. It is our hope that, through the return of the attached form and correction of the identified deficiencies, you will develop and maintain a commitment to keeping a safe and well-maintained dam.

If you have any questions or comments regarding this LOD or would like to be present at future inspections, please contact Jim Weber, P.E. at 271-8699 or me at 271-3406 or write to the address for the Water Division listed on the bottom of the cover page.

Sincerely,

Steve N. Doyon, PE
Administrator
Dam Safety & Inspection Section

Attachments: Photos, Aerial, Copy of 2014 OMR, Blank OMR form, DB8, DB13
cc: NHDES Legal Unit
Town of Brentwood

Certified #7016 1970 0000 4865 8413
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The State of New Hampshire
Department of Environmental Services

Robert R. Scott, Commissioner

July 25, 2019
Letter of Compliance
For
Letter of Deficiency
DSP #11-026

Ms. Jennifer Perry, Director
Public Works Department
Town of Exeter
13 Newfields Road
Exeter, NH 03833

Re: Pickpocket Dam #D029007 in Brentwood
Letter of Deficiency (LOD) DAM #D029007
Issued on March 28, 2011

Dear Director Perry:

Based on a file review and a scheduled inspection conducted on March 7, 2018 of the above referenced dam, the New Hampshire Department of Environmental Services, Dam Bureau (NHDES) has determined that the deficiencies noted in the referenced LOD have been corrected. Enclosed is a copy for your reference.

We appreciate your cooperation in resolving the identified deficiencies.

If you have any questions or comments, please contact Jim Weber, P.E. at 271-8699 or me at 271-3406, or write to the Water Division at the address listed below.

Sincerely,

Steve N. Doyon, P.E.
Administrator
Dam Safety & Inspection Section

Enclosure: Copy of March 28, 2011 LOD
cc: NHDES Legal Unit
Town of Brentwood
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EXETER PUBLIC WORKS DEPARTMENT

13 NEWFIELDS ROAD • EXETER, NH • 03833-4540 • (603) 773-6157 •FAX (603) 772-1355
www.exeternh.gov

July 13, 2021

Steve N. Doyon, P.E., Chief Dam Safety Engineer
NHDES - Dam Bureau
Dam Safety & Inspection Section
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

RE: Pickpocket Dam #D029007, Exeter & Brentwood
Letter of Deficiency DSP #19-016
Time Extension Request

Dear Steve:

The Town of Exeter, NH, has engaged with Vanasse Hangen Brustlin, Inc. (VHB) to provide technical and engineering expertise with respect to the Pickpocket Dam and the Letter of Deficiency referenced above. We have been making progress and to date the following tasks have been completed and addressed:

By October 1, 2019:
Items #1, 2, 4 through 7 – Completed minor fixes.
Item #3 – Updated the Operations, Maintenance and Response form.

By January 1, 2020:
Item #8 – Developed the Emergency Action Plan (EAP)

By June 1, 2020:
Item #9a – Engaged a qualified consultant and updated the dam breach analysis to include the department's comments.
Item #9b – The runoff from the 2.5 x 100-year storm event was generated and confirmed that the existing dam configuration does not pass this flow within the regulatory requirements. These findings were reported to the Dam Safety Bureau at a May 18, 2021 video conferencing meeting.

Additionally, the Town has secured partial funding for an alternatives study on how to fix or modify the dam. To date, several hydraulic scenarios have been reviewed preliminarily. Additional funds are needed to complete a full alternatives analysis or feasibility study; these funds have been requested in the Town's Capital Improvement Program and will be presented to the voters in March 2022.

The Town respectfully requests deadline extensions for the following two items in the Letter of Deficiency:

> Item #10 – Submit an application for reconstruction of the dam, or a plan to otherwise comply with Env-Wr 303.12. The Town requests a 2 year extension of the current deadline from **June 1, 2022** to **June 1, 2024**.
>
> Item #11 – Complete the reconstruction of the dam. Similarly, the Town requests a 2 year extension of the current deadline from **December 1, 2025** to **December 1, 2027**.

If you have any questions or would like to further discuss the specifics of this request or the Town's work to date, please don't hesitate to contact us.

Thank you in advance for your consideration,

Jennifer R. Perry, P.E.
Public Works Director

cc: Russell Dean, Town Manager
Paul Vlasich, P.E., Town Engineer
Jacob San Antonio, P.E., Managing Director, VHB

The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

August 25, 2021
Letter of Closure
For
Letter of Deficiency
DSP #19-016

Ms. Jennifer Perry
Public Works Director
Town of Exeter Public Works
13 Newfields Road
Exeter, NH 03833

RE: Pickpocket Dam #D029007 in Brentwood
Letter of Deficiency (LOD) DAM #D029007
Issued on July 25, 2019

Dear Ms. Perry:

Based on a file review and a scheduled inspection conducted on September 30, 2020, of the above referenced dam, the New Hampshire Department of Environmental Services, Dam Bureau (NHDES) has officially closed the July 2019 LOD. Please refer to the Request for Action enclosed that incorporates any deficiencies that may relate to the July 2019 LOD, as well as the new deficiencies that were found as the result of this most recent file review and site assessment.

If you have any questions or comments, please contact Jim Weber, P.E. at 271-8699 or me at 271-3406, or write to the Water Division at the address listed below.

Sincerely,

Steve N. Doyon, P.E.
Chief Dam Safety Engineer
Dam Safety & Inspection Section

Enclosure: Copy of July 25, 2019 LOD
cc: NHDES Legal Unit
Town of Brentwood
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The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

RECEIVED SEP 01 2021

August 25, 2021

Ms. Jennifer Perry – Public Works Director
Town of Exeter Public Works
13 Newfields Rd
Exeter, NH 03822

RE: **Request for Action**: Pickpocket Dam, D029007, High, Brentwood

Dear Ms. Perry:

The New Hampshire Department of Environmental Services, Dam Bureau (NHDES) is responsible for ensuring the safety of dams in New Hampshire through its dam safety program. In accordance with RSA 482:12 and Env-Wr 302.02, an inspection of the subject dam was conducted on September 30, 2020. Based upon the results of the inspection, NHDES is issuing this Request for Action to advise you of the observations and related recommendations made by our dam safety engineer.

You should implement the following recommendations, as they are aimed at improving the condition and longevity of the dam and ensuring that it meets New Hampshire's current dam safety standards. We've suggested dates by which the items could be completed; however, these are provided as a guide and you should schedule activities as your resources allow. If the condition of the dam has changed since the inspection, or if you have any other questions related to the dam, please contact the dam safety engineer named at the close of this letter.

Items 1- 9 from the 2019 Letter of Deficiency have been complied with and the town has requested additional time to complete engineering studies and explore rehabilitation alternatives.

Suggested completion date: June 1, 2024

1. Submit an application for reconstruction of the dam, or a plan to otherwise comply with Env-Wr 303.12. Permits from other programs, including NHDES' Wetlands Program may be required.

Suggested completion date: December 1, 2027

2. Complete the reconstruction or removal of the dam in accordance with plans and specifications approved by relevant environmental permitting authorities.

On a continuing basis:

a. Clear debris (rocks, leaves, limbs, etc.) from the spillway to allow for unrestricted flow; and
b. Routine brush and tree removal from the dam embankment and within 15-ft of the embankments.

Hazard Classification: High

The 2017 breach analysis provided by the owners engineering consultant indicates that a failure of the dam would impact the foundations for several ground supported manufactured homes and would flood the residence at 95 Kingston Rd by more than 1-ft.

Condition Assessment Rating: Poor

Under the criteria NHDES uses to rate the condition of a dam, a dam with a Poor condition assessment rating is one with types and/or quantities of deficiencies that are considered significant and/or that affect the safe operation of the dam. These may include, but may not be limited to, such things as insufficient discharge capacity (w/o manual operations) to pass the assigned design storm event without overtopping, new or developing structural deficiencies that are deemed to require timely evaluation by a qualified engineering consultant, significant seepage/leakage issues that are both as yet uninvestigated and/or other indications that suggest a direct detrimental relationship to some structural component of the dam or overall dam stability.

Should you consider performing modifications to spillways or other outlet works, regardless if such recommendations are included above, then a more in-depth analysis of the dam related to its contributing watershed, structural characteristics and hazard classification should be completed to ensure that any modifications proposed meet the design requirements consistent with current dam safety regulations. In addition, should you consider performing work that otherwise meets the definition of "reconstruction" (see below), please contact the Dam Bureau for guidance.

RSA 482:2X. "Reconstruction" means:
(a) A change in the height, length, or discharge capacity of the structure;
(b) Restoring a breached dam or one in ruins;
(c) Modification of flashboards which either increases their height or increases the headwater elevation at which the flashboards will fail; or
(d) A change in the structural configuration of a dam

You are urged to implement the recommendations listed above by the dates suggested or another schedule that aligns with your resources, and to commit to regular maintenance and monitoring of your dam. Additional information specific to dams and dam-related topics may be viewed at the NHDES website (des.nh.gov) by selecting the Water then Dams links.

If you have any questions or comments, please contact Jim Weber, P.E. at (603) 271-8699 or me at (603) 271-3406. You may also contact us via email at james.r.weber@des.nh.gov or steve.n.doyon@des.nh.gov. Regular mail may be sent to the Water Division at the address listed on the bottom of the previous page.

Sincerely,

Steve N. Doyon, P.E.
Chief Dam Safety Engineer
Dam Safety & Inspection Section

Enclosures: Photos, Copy of 2019 OMR, Blank OMR form
cc: Town of Brentwood
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B

Pickpocket Dam O&M Plan

7121
9/2/1.

Operation Maintenance and Response Information

For information or questions, please contact the dam owner using the information below or the NH Dept. of Environmental Services at (603) 271-3406.

1. Dam and Owner/Operator Information

Dam Name: **PICKPOCKET DAM**
City/Town: **BRENTWOOD**

NH Dam Inv # & Hazard Classification: **029.07, L**
Downstream Watercourse: **EXETER RIVER**

Dam Owner
Name: **TOWN OF EXETER PUBLIC WORKS**
Address 13 Newfields Road
City/Town/Zip Exeter NH 03833
Telephone 773-6159 Cell
E-mail

Emergency Contact (Dam incidents or flooding)
Name Jay Perkins Hwy Supt
Address 13 Newfields Road
City/Town/Zip Exeter NH 03833
Telephone 773-6163 Cell 512-1974
E-mail jPerkins@exeternh.gov

2. Dam Information

Height(ft): **15** Length(ft): **230** Pond Size(ac): **22**
Normal Storage Capacity(ac-ft): **75** Drainage Area(sq mi): **86**

Outlet Works – Describe the dam's discharge features, and then include specific information on each below (sizes, dimensions, inverts, etc…).
130 FT SPILLWAY
Spillway(s) 6 X 6 wood gate Other
Gate(s) Other
Stoplog Bay(s) Other

Description of the Area Downstream of the Dam (Include information on such things as roadways, dams, bridges or property that may be in danger of flooding due to high water events, dam failure or dam operations and, if known, the flow rates at which areas begin to be impacted. Also include information on any minimum flow needs downstream.) PickPocket Bridge, Linden St Bridge
Both Bridges have not been overtoped in the Past.

3. Operations and Maintenance Information

Normal Reservoir Management Procedures (How is the impoundment level managed throughout the course of a calendar year? How do you achieve this?)
Summer We do not operate the maintenance gate.
Fall
Winter We do keep gate in working order to be
Spring Opened in emergencys.

Normal Maintenance and Monitoring Procedures (What types of and at what frequency is routine maintenance and monitoring performed at the dam?) we remove all trees, brush and logs as nessary. In heavy rain events, the dam is on our dept watch list and checked every few hours. Once a year we greese, clean dam gate gears.

4. Incident Management and Response Information

Flood or Dam Incident Response Procedures (Describe the procedures employed to manage the dam in times of stress. Monitoring frequencies, operational protocols, and notification of local emergency response officials and affected downstream parties should be explained. Include the names and contact information of key parties and officials, including the local emergency management director, fire/police departments and downstream parties who might be impacted by the flood or dam incident. A cohesive communications plan is important and should result in a product that allows the timely exchange of accurate information.) When response Plan is required the Towns Emergency Operations Center (EOC) will be in Operation. As such, the response will be managed through the EOC. The EOC will continually monitor river elevations through reports from the field. The EOC will utilize weather forcast in determining the appropriate response.

Contact: EOC director
Name Brian Comeau Fire Chief
Address 10 Front St Exeter NH
City/Town/Zip
Telephone 773-6181 Cell 772-1212
E-mail bcomeau@exeternh.gov

Contact:
Name Scott Lebeau
Address 13 Newfields Road
City/Town/Zip Exeter NH 03833
Telephone 773-6157 Cell 944-3238
E-mail

Contact:
Name Jay Perkins
Address 13 Newfields Rd
City/Town/Zip Exeter NH 03833
Telephone 773-6157 Cell 512-1974
E-mail JPerkins@exeternh.gov

Contact:
Name Jennifer Perry
Address 13 Newfields Road
City/Town/Zip Exeter NH 03833
Telephone 773-6157 Cell 770-6882
E-mail JPerry@exeternh.gov

Please correct any of the information in BOLD text in sections 1 and 2 on page 1.

Please use the reverse side of this sheet to include additional contacts or information that relates to the operation, maintenance or emergency response for this dam that you believe is important for response officials or abutters to know. (DES 01/25/2007)

PICKPOCKET DAM OPERATING PROCEDURE
DAM #029.07, EXETER, NH

I Seasonal and Emergency Operation

1. The water level shall be maintained at the top of the concrete spillway. No specific seasonal operational adjustment to the water level is required.

2. The Exeter Highway Superintendent is authorized to control the gate to regulate the water level as may be necessary.

II Maintenance Program

1. The Highway Superintendent shall visually inspect the dam on a weekly basis, on his routine visits to the Cross Road Transfer Station. The dam shall be checked for vandalism, floating debris, structural integrity and general condition to identify any required maintenance.

2. The Highway Superintendent shall make an annual in depth inspection during the month of August to access the periodic maintenance requirements.

Maintenance shall include but not limited to the following:

a. Removal of tree and brush growth from earthen embankments and abutments.

b. Inspect, repair and lubricate the gate mechanism.

c. Operate the gate mechanism to verify that it is operable.

d. Replace any deteriorated wood.

e. Assure that all keys are properly identified and locks are operative.

f. Repair any erosion identified, with suitable material and seed.

g. Repair any spalled or eroded concrete.

h. Paint metal as may be required.

i. Document the inspection and work referred each year in the highway log book.

III Emergency Contact

1. Highway Superintendent Robert Tucker
   Tel: (603) 773-6157
   Public Works Department
   10 Front Street
   Exeter, NH 03833

2. Exeter, NH Dispatch
   Tel: (603) 772-1212
   Day or Night

IV Items to Consider

1. The Town of Exeter will accommodate the NH Fish and Game Department in their management, operation and repair of the fish ladder, for the mutual benefit of all.

2. A complete breach of this dam is not considered to be life threatening to the down stream area of the Exeter River.

3. Any requirement to lower the water level should be coordinated with the NH Fish and Game Department.

John H. Sowerby, Engineering Technician
January 12, 1999

C

Dam Inspection Report

Pickpocket Dam

Visual Inspection Report

Brentwood, New Hampshire

NID NH00294 | NH Dam #029.07

Date: November 28, 2023

TABLE OF CONTENTS

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FIGURES

APPENDICES

1.0 DESCRIPTION OF PROJECT

1.1 General

1.1.1 Authority

The Town of Exeter, New Hampshire has retained Pare Corporation of Foxboro, Massachusetts, working under subcontract to VHB, Inc., to perform a visual inspection and develop a report of conditions for Pickpocket Dam on the Exeter River in Brentwood and Exeter, New Hampshire. This inspection and report were performed in general accordance with the New Hampshire Department of Environmental Services Env-Wr 100-700 Dam Rules.

1.1.2 Purpose of Work

The purpose of this investigation was to inspect and document the present condition of the dam and appurtenant structures in accordance with current dam safety regulations to provide information that will assist in both prioritizing dam repair needs and planning/conducting maintenance and operation.

The investigation was divided into three parts: 1) obtain and review available files including reports, investigations, and data pertaining to the dam and appurtenant structures; 2) perform a visual inspection of the site; and 3) prepare and submit a final report presenting the evaluation of the structure.

1.1.3 Common Dam Safety Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided in Appendix C. Many of these terms may be included in this report. The terms are presented under common categories associated with dams which include: 1) orientation; 2) dam components; 3) hazard classification; 4) general; and 5) condition rating.

1.2 Description of Project

1.2.1 Location

The Pickpocket Dam is located in the Towns of Brentwood and Exeter New Hampshire, approximately 160 feet west of the Cross Road Bridge which is immediately downstream. The dam impounds water along the Exeter River. The dam is located at the eastern side of the impoundment near coordinates 42.96979°N/71.00116°W as shown on Figure 1: Locus Plan and Figure 2: Aerial Plan.

The dam is accessible from vegetated areas at both the left and right abutments. There is street parking in the area at the dam along the edge of Cross Road and at the intersection of Cross and Pickpocket Roads. To reach from dam from NH Route 101, take Exit 9 towards Exeter and take a left on Epping Road (Route 27 East). Follow Epping Road east (2 Miles) toward Route 111 West (Winter Street). Take the left onto Winter Street and Follow Route 111 (1.4 Miles) which changes from Winter Street to Front Street and Kingston Road. Turn right onto

Pickpocket Road. Follow Pickpocket Road (0.8 Miles) to the Intersection with Cross Road. Pickpocket Dam is off the right side of the bridge at Cross Road as you take the left onto Cross Road.

1.2.2 Owner/Caretaker

The dam is currently owned and operated by the Town of Exeter. Maintenance of the structure is primarily completed by the Town of Exeter Department of Public Works.

1.2.3 Purpose of the Dam

The dam currently impounds water for recreational purposes. The dam was gifted to the town circa 1980 by Milliken Industries, Inc. The impoundment currently supports limited recreation (paddling and swimming) , although public access is very limited, and supports adjacent environmental resource areas.

1.2.4 Description of the Dam and Appurtenances

The Pickpocket Dam is a run-of-the river-dam with earthen abutments, a concrete spillway, a low-level outlet, and a fish ladder. The dam is approximately 230 feet in total length, of which approximately 130 feet is an uncontrolled concrete primary spillway. The Pickpocket Dam has a maximum structural height of approximately 15 feet. There are three components that allow discharge at the structure: 1) primary spillway; 2) gated and stop log controlled low-level outlet; and 3) fish ladder.

The primary spillway is an approximately 130-foot wide reinforced concrete, counterfort/buttress type spillway. The primary spillway consists of a reinforced concrete weir supported by reinforced concrete counterforts/buttresses spaced approximately 22 feet on center downstream of the crest. Flow over the spillway discharges into a stone lined plunge pool before discharging over a second concrete weir with (4) 5-foot wide timber stoplog bays located approximately 100 feet downstream and then beneath the bridge carrying Cross Road. This secondary weir is in place to prevent fish from continuing up-river beyond the downstream fishway entrance.

The gated low-level outlet is located at the left end of the spillway system and consists of an 8-foot wide by 4-foot high gate controlled bay. The 3-foot wide timber stoplog controlled fish ladder bay is located to the left of the low-level outlet. The low-level outlet gates are controlled by rack and pinion type operators with timber gate stems. The gate structure was previously used to control the impoundment levels as the low-level outlet and the downstream area during fish ladder operation. Flows from the low-level outlet enter the stone plunge pool area and outlet to the downstream channel over the second weir where the concrete fish ladder structure outlet and foundations are located.

An approximately 95-foot long Denil (baffle) fishway is located left of the low level outlet..

1.2.5 Operations and Maintenance

The Town of Exeter is responsible for operations and maintenance at the dam. Operable components at the dam include the low-level outlet gate and the fish ladder stoplogs. Maintenance activities at the dam include cutting of vegetation along at the abutments.

The operation of the low-level gate is governed by an Operations and Maintenance Plan (OMP) prepared by the Town. The gate is kept closed on a normal basis to maintain water levels at the top of the concrete spillway. The Exeter Highway Superintendent is authorized to control the gate to regulate the water level as may be necessary. The dam is monitored and operated in accordance with the Pickpocket Dam Operations and Maintenance Manual procedures.

New Hampshire Fish and Game Department (NHFGD) installed and operates the fish ladder to help diadromous fish reach spawning and nursery habitat. NHFGD adjusts the stop logs as necessary during migration season based on river flows.

1.2.6 Hazard Potential Classification

In October of 2019, The New Hampshire Department of Environmental Services (NHDES) reclassified the Pickpocket Dam as a High hazard potential dam. In accordance with current classification procedures under State of New Hampshire Dam Rules, Pickpocket Dam is currently classified as a **High** hazard potential dam.

1.2.7 Discharges at the Dam Site

No records of discharges at the dam site were made available during the preparation of this report.

1.2.8 General Elevations (feet)

Elevations are based upon a survey completed by VHB in October 2016 and May 2023. Elevations reference the NAVD88 vertical datum.

A. Top of Dam	
i. Left abutment:	65.9 ft ±
ii. Right Abutment:	66.0 ft ±
B. Normal Pool (Spillway Crest)	60.9 ft ±
C. Maximum Pool	66.0 ft ±

1.2.9 Primary Spillway

A. Type	Uncontrolled Broad Crested Weir (Buttress type dam)
B. Width	130 ft ±
C. Spillway Crest Elevation	60.9 ft ±

1.2.10 Low-Level Outlet

A. Type	Gate Controlled Structure
B. Conduit	8-Foot Wide, 4-Foot Tall Concrete Opening
C. Gate Invert	
i. In	54.3 ft ±
ii. Out	52.9 ft ±
D. Outlet Control	Gate approximately 4-foot tall by 8-foot wide

1.2.11 Fish Ladder

A.	Type	Denil (Baffle)
B.	Width	4 feet
C.	Access Stoplog Gate Width	3-Foot
	Invert	
	i. Upstream	61.4 ft ±
	ii. Downstream	46.31 ±

1.2.12 Downstream Secondary Weir

D.	Type	Timber Stoplog Controlled Concrete Weir Structure
E.	Width	76 ft ±
F.	Crest Elevation	55.1 ft ±
G.	Stoplog Gates Width	5.5-Foot
	Top Stoplog Elevation	52.0 ft ±
	Bottom Stoplog Elevation	unknown

1.2.13 Construction Records

Correspondence indicated that the original dam, Pickpocket Privilege, was constructed in 1920. No additional construction documents were available for review.

The Pickpocket Dam was last repaired/reconstructed in 1969. Partial 1968 design plans are available in the NHDES Dam Bureau record for the dam; a complete set of plans was not located during the preparation of this report; however, correspondences from 1996 suggest that a complete plan set was available at that time.

Although Pickpocket Dam is in noted in fair condition, a Letter of Deficiency was issued by the New Hampshire Department of Environmental Services Dam Bureau. The dam was reclassified as a High Hazard Dam in 2019 and does not meet the dam safety requirements to pass 2.5 times the 100-year flow with 1-foot of freeboard[1].

1.2.14 Operations Records

No operations records are available or known to exist for this structure.

[1] Note pending rule changes will require that High Hazard potential dams pass the 1,000-year event.

2.0 INSPECTION

2.1 Visual Inspection

Pickpocket Dam was inspected on November 28, 2023. At the time of the inspection, temperatures were near 38°F with clear skies. Photographs to document the current condition of the dam were taken during the inspection and are included in Appendix A. Underwater areas were not inspected as part of the field activity.

2.1.1 General Findings

In general, the overall condition of the Pickpocket Dam was found to be **Fair.** The specific observations are identified in more detail in the sections below.

2.1.2 Embankment

The following was noted along the embankments left and right of the spillway structure. abutment.

Embankment Left of the Spillway

- The crest of the embankment left of the spillway is generally level and supports well-maintained grass cover.
- Two informal drainage paths are present on the downstream side of the left embankment abutment. One being parallel to the downstream bridge, and the other parallel to the fish ladder. The valleys are generally stable with no significant erosion noted.
- Trees and brush were present along the downstream side of the embankment at the abutment left of the fish ladder.
- Brush growth with small tree development was present on the upstream side of the left embankment between the downstream training wall and abutment.
- The downstream stone wall left of the fish ladder is in disrepair and overgrown with vines and small brush.
- Erosion is present along the shoulder of the left embankment and the downstream stone wall.
- Vertical and horizontal irregularities are typical throughout the left abutment.
- The upstream riprap slope of the left abutment has woody brush and vegetation growth choking the riprap voids on the slope.

Embankment Right of the Spillway

- A portion of the embankment and abutment right of the spillway extends towards the grassed area of the front yard of a residential home.
- The upstream side of the right embankment has a well-maintained grass cover.
- Minor erosion of soil was noted from behind the right upstream concrete training wall.
- The downstream side of the right embankment and abutment is overgrown with brush and trees down towards the bridge abutment and secondary weir.
- The downstream right abutment stone training wall has vegetation growth present. The wall is somewhat misaligned.

2.1.3 Primary Spillway

For the purposes of the report, inspection of the spillway was segmented between distinct components including the spillway crest wall, buttress supports, training walls, and the low-level outlet structure. Flow over the spillway at the time of the inspection limited access for inspection. The following was noted in visible and accessible areas and as viewed through flowing water.

Spillway Crest Concrete Wall:

- Minor timber log debris was present along the upstream approach of the spillway wall; debris does not appear to currently pose a risk to performance of the spillway.
- No cracking was apparent along the downstream face of the spillway, but the presence of flowing water prevented a detailed viewing of the concrete.
- The general alignment and character of flow over the spillway and energy dissipation in the immediate downstream area appeared uniform.

Spillway Concrete Buttress Supports

- The downstream concrete spillway buttresses appear to have minimal scour along the apparent normal tailwater waterline, but the presence of flowing water prevented a detailed viewing of the concrete.

Training Walls

- The upstream right training wall has minor scour present along the joint between the wall and the downstream side of the spillway crest.
- Significant vegetation and brush growth is present just upstream of the right concrete training wall.
- The downstream right training wall is dry set stone. Voids are present within the stone joints with vegetation and tree growth present along the top of the wall.
- The left training wall abuts the fish ladder and low-level outlet structure and had a minor crack at the joint between the wall and low-level outlet structure concrete,
- The upstream left training wall area consists of a stone riprap slope that ties into the concrete training wall.
- The downstream left training wall extends from the edge of the fish ladder. The groin between the fish ladder and the training wall has overgrowth of brush and vegetation.
- The original railing along the top of the left training wall was replaced by a new steel railing that was drilled and anchored to the top of the wall. The current railing appears in generally good condition.

Low-level Outlet Structure and Gate

- The paint on the steel railing is chipped in many locations with signs of exposed corrosion.
- Minor vegetation growth is present on the downstream face of the concrete above the low-level outlet opening.

- The channels anchoring the low-level outlet gate/operator to the concrete structure are rusted and bent.
- Severely deteriorated timber gate stems appear to render the low-level outlet inoperable.
- The gate structure itself is misaligned and leaking with heavy leakage observed on the left side of the gate.
- The approach and discharge areas appeared clear of debris.

2.1.4 Fish Ladder

- Vertical cracking with efflorescent staining was present along the fish ladder walls.
- Minor scour was present along the waterline of the right side of the fish ladder near the low-level outlet discharge area.
- Minor leaf debris was present at the approach to the stop logs at the upstream side of the fish ladder.
- Fish ladder stoplog level is set higher than overflow spillway elevation at the time of the inspection.
- Minor vegetation growth is present along the left side of the fish ladder at the left spillway training wall.
- Concrete scour with minor deterioration was present on the right side of the downstream end of the fish ladder.
- Downstream left side of fish ladder has stone riprap, vegetation, and orange water staining present adjacent to what appears to be an abandoned building foundation.

2.1.5 Downstream Area

The water immediately downstream of the Pickpocket Dam is pooled upstream of a secondary concrete weir. It is presumed that this weir is in place to prevent upstream fish passage beyond the fish ladder entrance. Inspection of the downstream weir was beyond the scope of the inspection.

Immediately downstream of the spillway is gravel plunge pool lined with boulders and bedrock and two island areas that split the flow path prior to the second weir. The downstream islands are densely vegetated with trees and woody brush with boulders present. Water flows from the plunge pool and passes over the secondary weir and under Cross Road in a bedrock and boulder lined channel approximately 60 feet downstream of the secondary weir. Water flows under the Cross Road Bridge then continues along the Exter River downstream.

2.1.6 Reservoir Area

The dam is located at the eastern end of the impoundment. The dam impounds the Exeter River and is generally considered run-of-the-river dam with ponded water that extends more than 1 mile upstream of the dam.

The perimeter of the impoundment is generally un-developed along the immediate shoreline with few residential properties around the impoundment. Pickpocket Road borders the impoundment to the north. Slopes are generally flat surrounding the impoundment area on the left/north side and slope considerably up on the right/south side.

2.2 Caretaker Interview

No caretaker was available or present during the inspection. Information provided by the Owner r has been incorporated by reference within this report.

2.3 Operation and Maintenance Procedures

There was no formal operations and maintenance manual for the dam available at the time of the inspection.

2.3.1 Operational Procedures

Operable components include the gate at the low-level outlet and the fish ladder stoplogs. The gate currently appears inoperable due to the condition of the gate stem. There is leakage through the base of the left side of the gate. The fish ladder structure does not appear to have significant capacity to be considered as an operational outlet to the dam; stoplogs may be adjusted as necessary to support fish migration.

2.3.2 Maintenance of Dam and Operating Facilities

Maintenance activities at the dam appear to include cutting of vegetation along the abutments and clearing debris from the spillway/low-level outlet approach and discharge areas.

Note that current changes to the rules governing dam operation will state required maintenance items that shall be completed for High Hazard Potential Dams.

3.0 ASSESSMENTS

3.1 Assessments

In general, the overall condition of the Pickpocket Dam is **Fair** with the following deficiencies identified:

TABLE 3.1: Deficiency Summary

Deficiency Number	***Description***
1	Right and left abutments/embankments have developed unwanted vegetation growth along the upstream and downstream areas.
2	The low-level gate outlet has rotted timber stems with rusted steel rack and pinion operators, rendering the gate inoperable. The low-level gate appears to be misaligned with leakage occurring along the left edge of the gate. The paint on the steel rail is chipped in many locations with signs of exposed corrosion.
3	Minor seepage present along the left edge of the fish ladder concrete within the groin of the left abutment. Additional potential seepage areas were observed near the abandoned stone foundation on the downstream left side of the dam.
4	Significant vegetation and brush growth is present just upstream of the right concrete training wall. The downstream right training wall is dry set stone with voids present within the stone joints with vegetation and tree growth present along the top of the wall.
5	The New Hampshire Department of Environmental Services Dam Bureau reclassified the dam to a High Hazard Dam in 2019 and it does not meet the dam safety requirements to pass 2.5 times the 100-year flow with 1-foot of freeboard.

The dam was inspected on September 9, 2010 by NHDES, which resulted in the issuance of a Letter of Deficiency (LOD) issued on March 28, 2011. The following provides a summary of the LOD and their current status based upon the current inspection.

TABLE 3.2: LOD Summary

Deficiency Number	***Description***	
1	OMR Form Required	Complete
2	Remove Spillway Debris	Debris removed; monitoring ongoing
3	Remove Tree and Brush from Embankments	Majority of vegetation has been cut; some additional clearing recommended
5	Complete dam breach analysis	Completed; dam reclassified to High hazard potential

3.2 Hydraulic/Hydrologic Data

Pickpocket Dam is a **High** hazard structure and in accordance with current state dam safety regulations, the spillway design flood (SDF) for the site is to pass 2.5 times the 100-year flow with 1-foot of freeboard. A detailed hydraulic and hydrologic analysis was completed for the dam and was presented in a September 2023 River Advisory Committee Feasibility Update. According to the presentation, H&H analysis was completed for both current rainfall data and climate change informed rainfall data. The following table summarizes the results of the H&H analysis.

TABLE 3.3: H&H Analysis Results – 2.5x100-yr			
Scenario	***Design Flow (cfs)***	***Peak Routed Elevation (ft)***	***Overtopping Depth (ft)***
Current Rainfall	9,942	68.75	2.75
Future Rainfall	14,850	72.75	6.75

Given the calculated peak water surface elevations, the dam does not have the capacity to accommodate the spillway design flood event, regardless of rainfall data set utilized. As such, modification to the dam is required to meet design requirements.

Note that pending changes to the rules that govern dam operation (Env-WR 100-700) are currently being considered. Within these changes High Hazard potential dams will be required to pass flows associated with the 1000-year storm event.

3.3 Structural and Seepage Stability

A structural stability analysis has not been performed for the dam.

3.3.1 Structural Stability of Dam

In general, the concrete dam features appear to be stable with no indications of instability or displacements. However, stone masonry walls sections along the downstream right side of the spillway channel and left of the spillway display some indication of movement and potential instability.

3.3.2 Seepage Stability

No formal seepage analyses have been completed for this structure. Seepage and orange staining were observed along the downstream side of the dam left of the fish ladder as well as within the historic foundation downstream of the left abutment. Current flow rates is low and does not suggest immediate concerns.

Pickpocket Dam
Brentwood-Exeter, NH

FIGURES

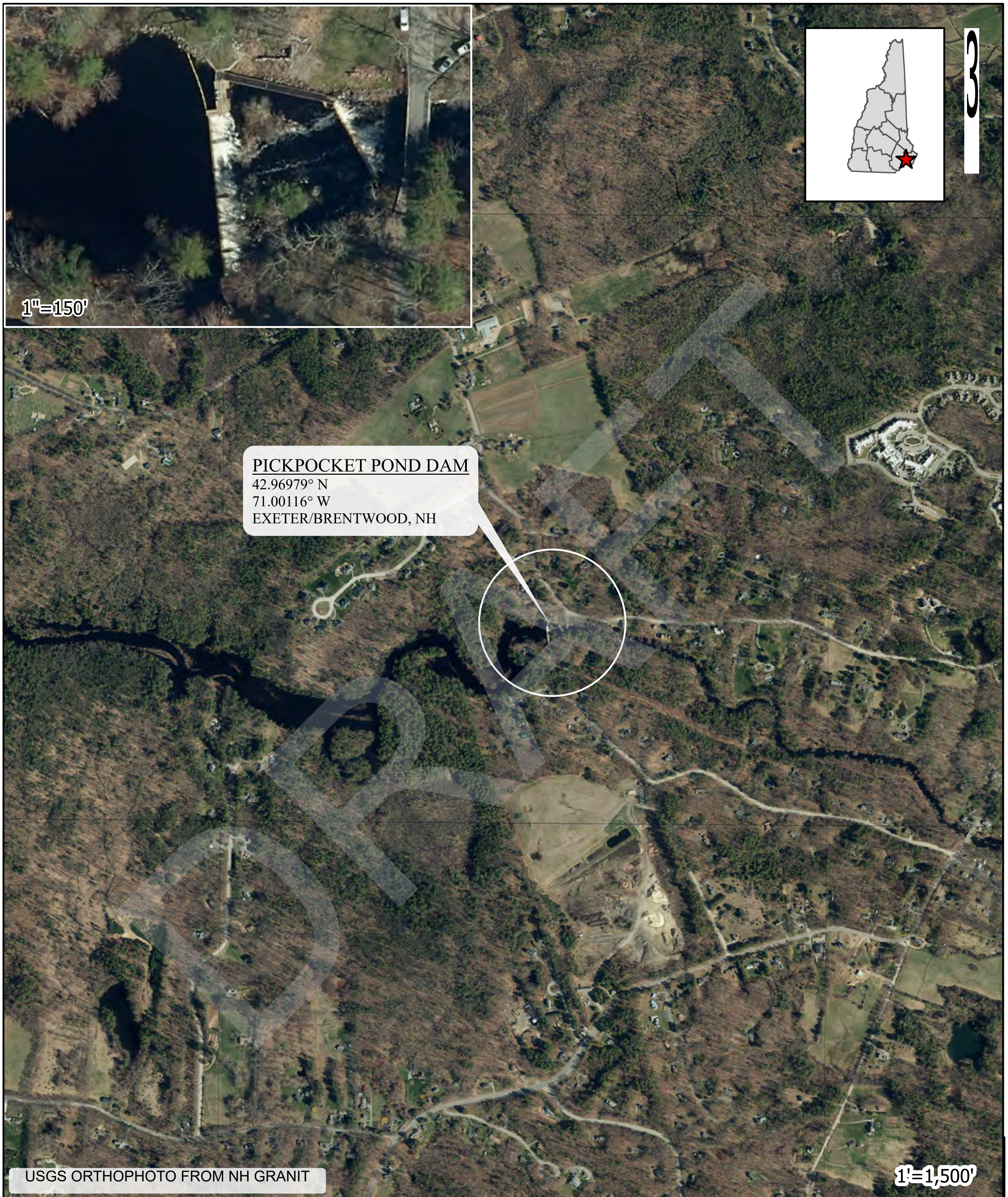
PICKPOCKET POND DAM

NH00294 | NH DAM #029.07
EXETER/BRENTWOOD, NH

LOCUS PLAN

FEBRUARY 2024

FIGURE 1



PARE CORPORATION

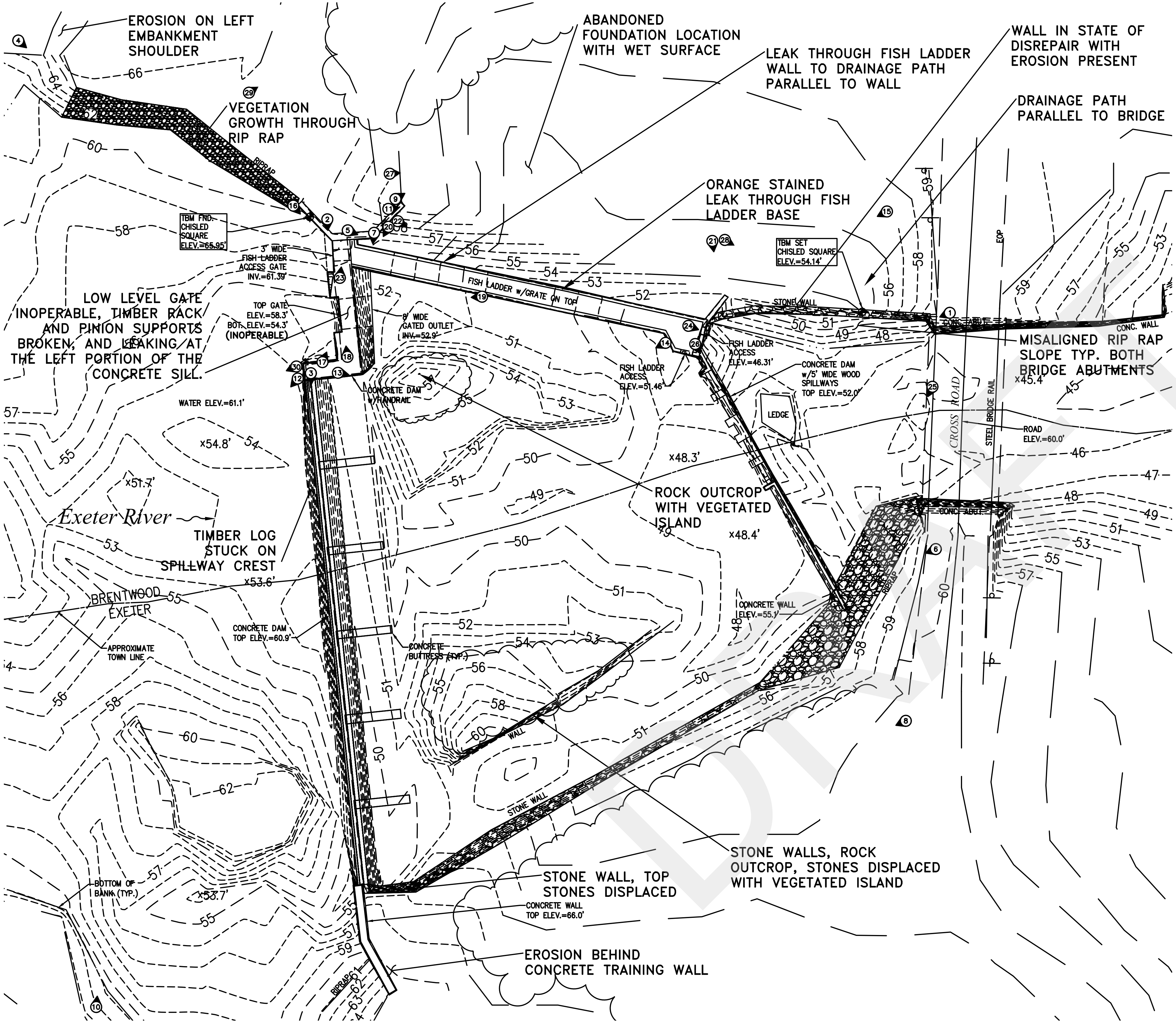
PICKPOCKET POND DAM

NH00294 | NH DAM #029.07
EXETER/BRENTWOOD, NH

AERIAL PLAN

FEBRUARY 2024

FIGURE 2



SITE SKETCH

SCALE: 1"=30'

NOTES AND LEGEND

1. PLAN DEVELOPED FROM A SURVEY PLAN PREPARED BY VHB, INC. DATED DECEMBER 18, 2019 AND NOTES TAKEN DURING THE INSPECTION. INFORMATION IS PROVEDED FOR REFERENCE PURPOSES ONLY.

2. ELEVATIONS REFERENCE THE NAVD 88 VERTICAL DATUM.

   SPOT ELEVATION AS DETERMINED BY VHB, INC. REFERENCING EITHER BM 1, BM 2, OR BM 3.

   DENOTES APPROXIMATE LOCATION AND DIRECTION OF PHOTOGRAPH.

PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
508-543-1755

SCALE ADJUSTMENT GUIDE
0" 1"
BAR IS ONE INCH ON ORIGINAL DRAWING.

PICKPOCKET DAM
DAM #029.07
EXETER/BRENTWOOD, NEW HAMPSHIRE
OWNER: TOWN OF EXETER

REVISIONS:

PROJECT NO.:	23194.00
DATE:	NOVEMBER 2023
SCALE:	AS NOTED
DESIGNED BY:	PM
CHECKED BY:	ARO
DRAWN BY:	PM
APPROVED BY:	ARO

SITE SKETCH

FIGURE NO.: 3

Y:\JOBS\23 Jobs\23194.00 VHB-Pickpocket Dam Feasibility Study-NH\DWGs\Pickpocket Dam Sketch PM 2-13-24.dwg

Pickpocket Dam
Brentwood-Exeter, NH

DRAFT

APPENDIX A

INSPECTION PHOTOGRAPHS

Photo No. 1.: Overview of the dam from the left bank of the downstream channel

Photo No. 2.: Overview of the fishway entrance (1), low-level outlet entrance (2), and primary spillway (3) from the left training wall.

Photo No. 3.: View of the primary spillway crest. Note the timber log debris (arrow) on the crest.

Photo No. 4.: View of the embankment left of the spillway.

Photo No. 5.: Minor leakage between the left downstream slope and fish ladder.

Photo No. 6.: Right side of the downstream channel wall and embankment right of the spillway from downstream bridge. Note the vegetated island within the downstream channel.

Photo No. 7.: Overview of the downstream side of the low-level outlet discharge (arrow) and the spillway.

Photo No. 8.: Right abutment from the downstream access road looking upstream.

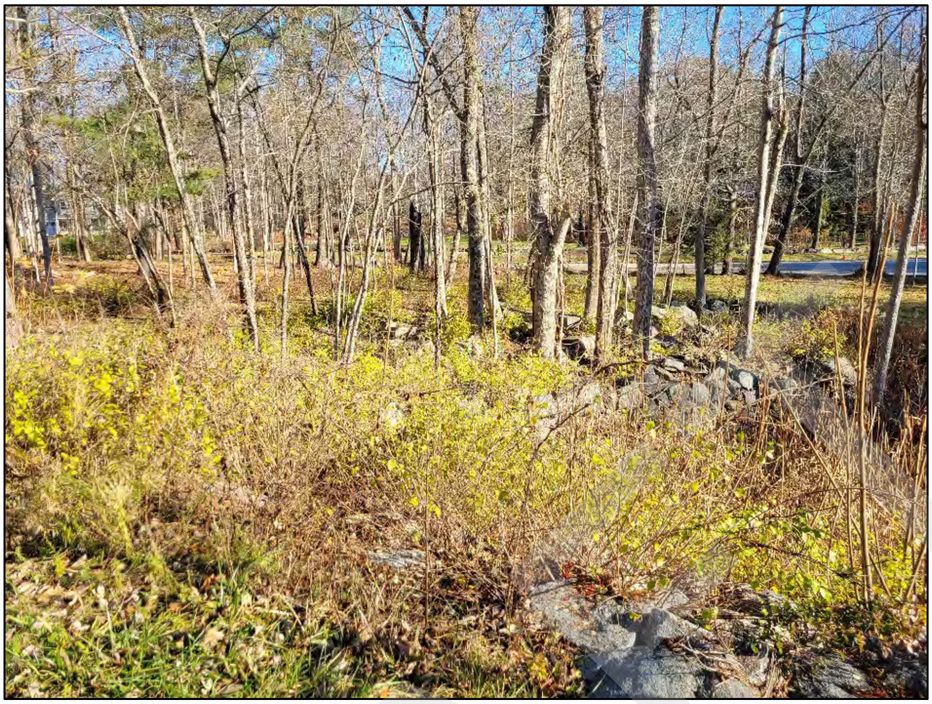


Photo No. 9.: Left downstream slope and location of abandoned stone foundation.

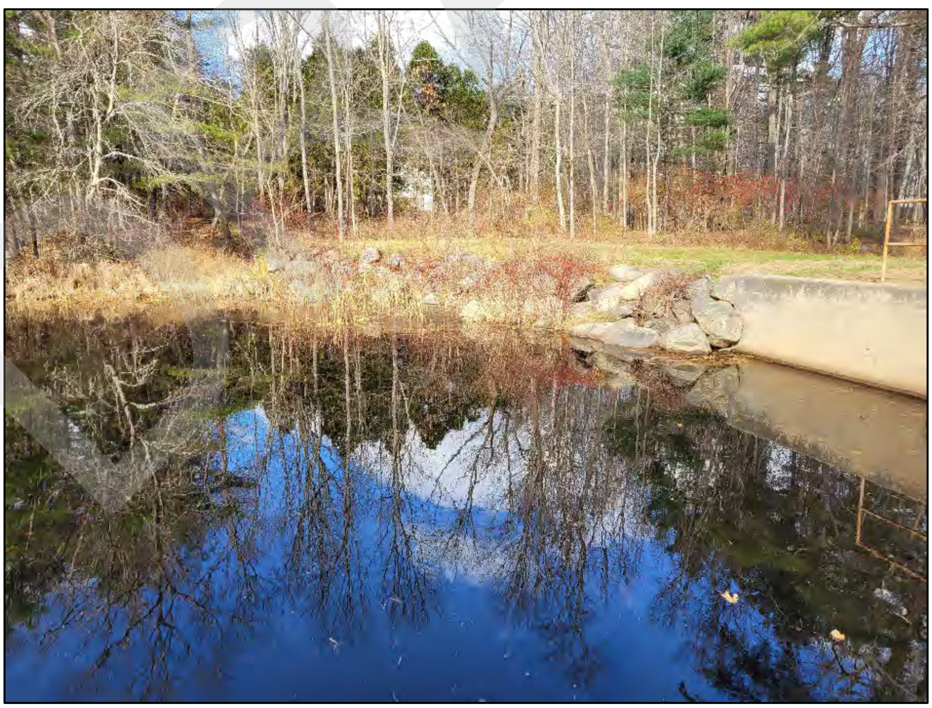


Photo No. 10.: Upstream riprap at left abutment/embankment. Note vegetation growth within the riprap on the slope at the abutment.

Photo No. 11.: Downstream slope from the edge of left training wall. Note the vegetation growth within the rip rap and abandoned stone foundation.

Photo No. 12.: Upstream area at right abutment of dam.

Photo No. 13.: Downstream stone and vegetation area between LLO and spillway crest.

Photo No. 14.: Downstream discharge area for the low-level outlet and primary spillway from the end of the fish ladder.

Photo No. 15.: Downstream area for the embankment left of the spillway near abandoned stone foundation.

Photo No. 16.: Upstream stoplogs and stoplog slots for fish ladder. Stoplogs are fitted with lifting hooks for removal.

Photo No. 17.: View of the low-level outlet operator/approach. The gate is inoperable due to deteriorated timber stems (circled).

Photo No. 18.: A bent channel support (circled) for the low-level outlet gate and gears for the stems are corroded.

Photo No. 19.: Discharge for the low-level outlet from downstream channel. The gate is leaking from the left side of the structure.

Photo No. 20.: Upstream portion of the concrete fish ladder from the left downstream training wall.

Photo No. 21.: Downstream end of fish ladder and secondary weir in the downstream channel.

Photo No. 22.: Fish ladder looking downstream from left training wall of the spillway. Note cracks (arrows) with efflorescent staining along the walls.

Photo No. 23.: Upstream stoplogs and stoplog slots for fish ladder. Stoplogs have lifting hooks for removal. Note steel grating must be removed to adjust stoplogs

Photo No. 24.: Downstream entrance to the fish ladder.


Photo No. 25.: Downstream Cross Rd. Bridge and weir just upstream of the bridge abutment.


Photo No. 26.: Close up of the downstream weir crest.

Photo No. 27.: The remnants of an old stone foundation left of the fishway. Wet areas inside the foundation were noted.

Photo No. 28.: Cross Road bridge downstream of dam from left downstream area.

Photo No. 29.: Pathway/access point along the downstream left slope going towards Pickpocket Road near the left abutment crest.

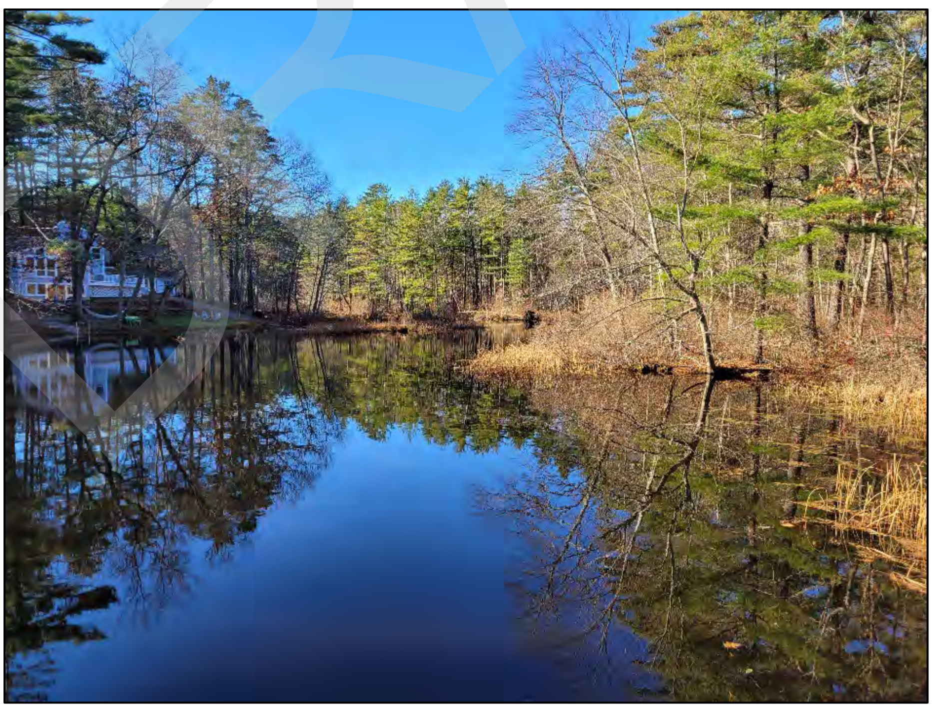


Photo No. 30.: View of the impoundment created by the dam looking upstream.

Pickpocket Dam
Brentwood-Exeter, NH

APPENDIX B

PREVIOUS REPORTS AND REFERENCES

REFERENCES AND RESOURCES

The following reports were referenced during the preparation of this report. Additional reports, documents, and correspondences are available within the NHDES records that are not presented below:

1. "Pickpocket Dam Operating Procedure, Dam #029.07", January 1999
2. Partial Images of 1969 Design Plans, Edward C. Jordan
3. "Letter of Deficiency", March 28, 2011
4. Dam Inspection Forms/Reports (Various Dates predating 2000)

The following were referenced during the completion of the visual inspection and preparation of this report and the development of the recommendations presented herein:

1. "Design of Small Dams", United States Department of the Interior Bureau of Reclamation, 1987.
2. "ER 110-2-106 - Recommended Guidelines for Safety Inspection of Dams", Department of the Army, September 26, 1979.
3. "Guidelines for Reporting the Performance of Dams" National Performance of Dams Program, August 1994.

The following provides an abbreviated list of resources for dam owners to locate additional information pertaining to dam safety, regulations, maintenance, operations, and other information relevant to the ownership responsibilities associated with their dam.

1. NHDES Dam Bureau Website: https://www.des.nh.gov/organization/divisions/water/dam/index.htm
2. "Dam Owner's Guide To Plant Impact On Earthen Dams" *FEMA L-263,September 2005*
3. "Technical Manual for Dam Owners: Impacts of Plants on Earthen Dams" *FEMA 534, September 2005*
4. "Dam Safety: An Owners Guidance Manual" *FEMA 145,December 1986*
5. Association of Dam Safety Officials – Website: www.asdso.org/
6. "Dam Ownership – Responsibility and Liability", ASDSO

Pickpocket Dam
Brentwood-Exeter, NH

APPENDIX C

COMMON DAM SAFETY DEFINITIONS

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to State of New Hampshire Env-Wr 100-700 Dam Rules, or other reference published by FERC, Dept. of the Interior Bureau of Reclamation, or FEMA.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate therefrom, including but not be limited to, spillways; reservoirs and their rims; low level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

Hazard Classification

High Hazard – means a dam where failure or misoperation will result in probable loss of human life.

Significant Hazard – means a dam where failure or misoperation results in no probable loss of human life but can cause major economic loss to structures or property, structural damage to a class I or class II road which could render the road impassable or otherwise interrupt public safety services, or major environmental or public health losses.

Low Hazard – means a dam where failure or misoperation results in no probable loss of human life, low economic losses, structural damage to a town or city road or private road accessing property other than the dam owner's which could render the road impassable or otherwise interrupt public safety services, the release of liquid industrial, agricultural, or commercial wastes, septage, or contaminated sediment if the storage capacity is less than 2 acre-feet and is located more than 250 feet from a water body or water course, Reversible environmental losses to environmentally-sensitive sites.

General

EAP – Emergency Action Plan – Shall mean a predetermined (and properly documented) plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam failure.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

Height of Dam– means the vertical distance from the lowest point of natural ground on the downstream side of the dam to the highest part of the dam which would impound water.

Hydraulic Height – means the height to which water rises behind a dam and the difference between the lowest point in the original streambed at the axis of the dam and the maximum controllable water surface.

Maximum Water Storage Elevation – means the maximum elevation of water surface which can be contained by the dam without overtopping the embankment section.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Maximum Storage Capacity – The volume of water contained in the impoundment at maximum water storage elevation.

Normal Storage Capacity – The volume of water contained in the impoundment at normal water storage elevation.

Condition Rating

Unsafe – Means the condition of a regulated dam, as determined by the Director, is such that an unreasonable risk of failure exists that will result in a probable loss of human life or major economic loss. Among the conditions that would result in this determination are: excessive vegetation that does not allow the Director to perform a complete visual inspection of a dam, excessive seepage or piping, significant erosion problems, inadequate spillway capacity, inadequate capacity and/or condition of control structure(s) or serious structural deficiencies, including movement of the structure or major cracking.

Poor – A component that has deteriorated beyond a maintenance issue and requires repair.; the component no longer functions as it was originally intended.

Fair – Means a component that requires maintenance

Good – Meeting minimum guidelines where no irregularities are observed, and the component appears to be maintained properly.

Pickpocket Dam
Brentwood-Exeter, NH

APPENDIX D

VISUAL DAM INSPECTION LIMITATIONS

VISUAL DAM INSPECTION LIMITATIONS

Visual Inspection

1. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of this report.

2. In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection, along with data available to the inspection team.

3. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.

4. It is critical to note that the condition of the dam is evolutionary in nature and depends on numerous and constantly changing internal and external conditions. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Use of Report

5. The applicability of environmental permits needs to be determined prior to undertaking maintenance activities that may occur within resource areas under the jurisdiction of any regulatory agency.

6. This report has been prepared for the exclusive use of the Town of Exeter, NH for specific application to the referenced dam site in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made.

7. This report has been prepared for this project by Pare. This report is for preliminary evaluation purposes only and is not necessarily sufficient to support design of repairs or recommendations or to prepare an accurate bid.

D

Cost Estimates

PARE CORPORATION

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost - Summary	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY: ARO	DATE: January 2024

	(Current) Alt 1: Raise Dam	(Current) Alt 2: Spillway Replacement	(Current) Alt 3: Auxiliary Spillway	(Future) Alt 1: Raise Dam	(Future) Alt 2: Spillway Replacement	(Future) Alt 3: Auxiliary Spillway
OPINION OF CONSTRUCTION COST	**$ 1,162,000**	**$ 4,398,400**	**$ 1,362,200**	**$ 1,383,000**	**$ 4,557,900**	**$ 1,451,750**
35% Design Contingency	**$ 349,000**	**$ 1,320,000**	**$ 409,000**	**$ 415,000**	**$ 1,368,000**	**$ 436,000**
OPINION OF CONSTRUCTION COST with Contingency	**$ 1,511,000**	**$ 5,718,000**	**$ 1,771,000**	**$ 1,798,000**	**$ 5,926,000**	**$ 1,888,000**
Engineering, Design, & Permitting	$ 242,000	$ 873,000	$ 281,000	$ 285,000	$ 904,000	$ 298,000
Construction Phase Services	$ 211,100	$ 631,800	$ -	$ 239,800	$ 652,600	$ 248,800
CONCEPTUAL OPINION OF PROJECT COST	**$ 1,964,100**	**$ 7,222,800**	**$ 2,289,100**	**$ 2,322,800**	**$ 7,482,600**	**$ 2,434,800**
30-Year Analysis Life Cycle Cost	**$ 3,040,126**	**$ 10,465,411**	**$ 3,609,044**	**$ 3,574,115**	**$ 10,852,877**	**$ 3,849,152**

Pickpocket Dam

Exeter, NH

Life Cycle Costs - 30 Year Analysis Period

	(Current) Alt 1: Raise Dam	(Current) Alt 2: Spillway Replacement	(Current) Alt 3: Auxiliary Spillway	(Future) Alt 1: Raise Dam	(Future) Alt 2: Spillway Replacement	(Future) Alt 3: Auxiliary Spillway
Initial Capital Investment						
Discount Factor	1	1	1	1	1	1
Initial Capital Cost	$1,964,100	$7,222,800	$2,289,100	$2,322,800	$7,482,600	$2,434,800
Capital Replacement Cost						
Assumed Design Life (yrs)	30	30	30	30	30	30
Assumed Cost Percentage	100%	100%	100%	100%	100%	100%
Discount Factor	0.412	0.412	0.412	0.412	0.412	0.412
Operations & Maintenance						
O&M Costs	$13,613	$13,613	$19,226	$15,016	$14,666	$20,980
Discount Factor	19.6	19.6	19.6	19.6	19.6	19.6
Total Present Cost	**$ 3,040,126**	**$ 10,465,411**	**$ 3,609,044**	**$ 3,574,115**	**$ 10,852,877**	**$ 3,849,152**

Notes:

1. Discount factors taken from 2019 supplement to NIST LCC Tables A-1 and A-2

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (O&M Costs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

O&M Costs

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Current Dam						
Mowing	15.2	MSF	$ 3.70	$ 56.24	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	423	SY	$ 7.50	$ 3,172.50	RS Means 311413231430 - Round Up	For clearing of current trees, every two years
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 11,228.74**		
Rehab Option #1: Raise Dam (Current)						
Mowing	57.6	MSF	$ 3.70	$ 213.12	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	720	SY	$ 7.50	$ 5,400.00	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 13,613.12**		
Rehab Option #2: Spillway Replacement (Current)						
Mowing	57.6	MSF	$ 3.70	$ 213.12	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	720	SY	$ 7.50	$ 5,400.00	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 13,613.12**		
Rehab Option #3: Auxiliary Spillway (Current)						
Mowing	115.2	MSF	$ 3.70	$ 426.24	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	1440	SY	$ 7.50	$ 10,800.00	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 19,226.24**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (O&M Costs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

O&M Costs

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Rehab Option #1: Raise Dam (Future)						
Mowing	72	MSF	$ 3.70	$ 266.40	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	900	SY	$ 7.50	$ 6,750.00	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 15,016.40**		
Rehab Option #2: Spillway Replacement (Future)						
Mowing	68.4	MSF	$ 3.70	$ 253.08	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	855	SY	$ 7.50	$ 6,412.50	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 14,665.58**		
Rehab Option #3: Auxiliary Spillway (Future)						
Mowing	133.2	MSF	$ 3.70	$ 492.84	RS Means 320190194200	2x per year, MSF = 1000SF
Clear, Grub, & Strip	1665	SY	$ 7.50	$ 12,487.50	RS Means 311413231430 - Round Up	For clearing of current trees, every two years, assume 5% of embankment area
Dam inspection	0.5	CT	$ 6,000.00	$ 3,000.00	Engineers Judgment	Once every two years for high hazard dams per NH Law
Misc Maintenance/Concrete Patching	2	DAY	$ 1,500.00	$ 3,000.00	Engineers Judgment	Assume 2 mandays per year, and $1000 materials and Equipment Rental
Gate Operation	2	DAY	$ 1,000.00	$ 2,000.00	Engineers Judgment	Assume 1manday twice a year
Total				**$ 20,980.34**		

Structural Rehabilitation - Design Option 1: Raise Top of Dam | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	100	LF	$ 6.50	$ 650.00	Engineers Judgment	Assumed
Silt Fence	100	LF	$ 2.50	$ 250.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 13,400.00**		
Control of Water						
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 154,600.00**		
Raise Dam						
Clear, Grub, & Strip	3200	SY	$ 7.50	$ 24,000.00	RS Means 311413231430 - Round Up	For Left and Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	1700	CY	$ 50.00	$ 85,000.00	RS Means Section 3123	Assume uniform 7' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	5100	TN	$ 15.00	$ 76,500.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	3200	SY	$ 30.00	$ 96,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 281,500.00**		
Replace Left and Right Training Walls						
Excavation	1300	CY	$ 10.00	$ 13,000.00	RS Means 312316130620 increased to $10/CY	Assume Bottom of wall is El 50.0, 20.5-foot high wall on both sides, Dimensions from CRSI 2008 14-30, Area multiplied by 1.5 to account for 1:1 slope
Subgrade Prep	2	DAY	$ 3,500.00	$ 7,000.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	240	CY	$ 1,750.00	$ 420,000.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	1300	CY	$ 50.00	$ 65,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	2100	TN	$ 15.00	$ 31,500.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 536,500.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Current Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 1: Raise Top of Dam | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, 1 day crane, $500/day fo
Subtotal				**$ 24,000.00**		
SUBTOTAL				$ 1,010,000.00		
Mob, Demob, General Reqmnts				$ 152,000.00		15%
OPINION OF CONSTRUCTION COST				**$ 1,162,000.00**		
Design Contingency				**$ 349,000.00**		30%
OPINION OF CONSTRUCTION COST with Contingency				**$ 1,511,000.00**		
Engineering Technical Assistance				$ 227,000.00	15% of Construction Costs	
Permitting				$ 15,000.00		
Real Property / Land Rights				$ 10,000.00		Right Abutment Easement, Land-taking
Project Administration Costs				$ 50,000.00		
Construction Engineering Costs Services				$ 151,100.00	10% of Construction Costs	
CONCEPTUAL OPINION OF PROJECT COST				**$ 1,964,100.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Current Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 2: Spillway Replacement (Labyrinth Spillway) | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	100	LF	$ 6.50	$ 650.00	Engineers Judgment	Assumed
Silt Fence	100	LF	$ 2.50	$ 250.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 13,400.00**		
Control of Water						
Diversion Structure	1	LS	$ 150,000.00	$ 150,000.00	RS Means 312319201120	For Right Abutment DS wall
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 304,600.00**		
Raise Dam						
Clear, Grub, & Strip	3200	SY	$ 7.50	$ 24,000.00	RS Means 311413231430 - Round Up	For Left and Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	200	CY	$ 50.00	$ 10,000.00	RS Means Section 3123	Assume uniform 0.7' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	400	TN	$ 15.00	$ 6,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	3200	SY	$ 30.00	$ 96,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 136,000.00**		
Replace Left and Right Training Walls						
Excavation	3600	CY	$ 10.00	$ 36,000.00	RS Means 312316130620 increased to $10/CY	Excavate to El 50
Subgrade Prep	2	DAY	$ 3,500.00	$ 7,000.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	420	CY	$ 1,750.00	$ 735,000.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	3600	CY	$ 50.00	$ 180,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	5600	TN	$ 15.00	$ 84,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 1,042,000.00**		

PARE CORPORATION	PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
	SUBJECT: Conceptual Design Level Opinion of Probable Cost (Current Elevs)	
	COMPUTATIONS BY: VFD	DATE: January 2024
	CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 2: Spillway Replacement (Labyrinth Spillway) | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Labyrinth Spillway						
Excavation	1000	CY	$ 10.00	$ 10,000.00	RS Means 312316130620 increased to $10/CY	Excavate for downstream island
Demolition	160	LF	$ 60.00	$ 9,600.00	RS Means 024113900700	
Subgrade Prep	12.5	DAY	$ 5,000.00	$ 62,500.00	Engineers Judgment	Assume 1000SF per day
Slab Concrete	1160	CY	$ 1,250.00	$ 1,450,000.00	Engineers Judgment	Assume 2' slab, assume 12,500 sf
Labyrinth Section	300	CY	$ 2,250.00	$ 675,000.00	Engineers Judgment	Assume 8 foot high, 18-inch thick walls
Pump Truck	37	DAY	$ 2,900.00	$ 107,300.00	Assume 4 pours for underpinning, RS Means 015433102120, 4-man crew at 1200/day, mobilization/incidental costs per day	Assume 4 trucks per day, 10CY per truck
Subtotal				**$ 2,304,400.00**		
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, 1 day crane $500/day for
Subtotal				**$ 24,000.00**		
			SUBTOTAL	$ 3,824,400.00		
			Mob, Demob, General Reqmnts	$ 574,000.00		15%
			OPINION OF CONSTRUCTION COST	**$ 4,398,400.00**		
			Design Contingency	**$ 1,320,000.00**		30%
			OPINION OF CONSTRUCTION COST with Contingency	**$ 5,718,000.00**		
			Engineering Technical Assistance	$ 858,000.00	15% of Construction Costs	
			Permitting	$ 15,000.00		
			Real Property / Land Rights	$ 10,000.00		Right Abutment Easement, Land-taking
			Project Administration Costs	$ 50,000.00		
			Construction Engineering Costs Services	$ 571,800.00	10% of Construction Costs	
			CONCEPTUAL OPINION OF PROJECT COST	**$ 7,222,800.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Current Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 3: Auxiliary Spillway | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	250	LF	$ 6.50	$ 1,625.00	Engineers Judgment	Assumed
Silt Fence	250	LF	$ 2.50	$ 625.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 14,750.00**		
Control of Water						
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 154,600.00**		
Raise Dam/Right Abutment						
Clear, Grub, & Strip	1400	SY	$ 7.50	$ 10,500.00	RS Means 311413231430 - Round Up	For Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	400	CY	$ 50.00	$ 20,000.00	RS Means Section 3123	Assume uniform 3.2' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	1100	TN	$ 15.00	$ 16,500.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	1400	SY	$ 30.00	$ 42,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 89,000.00**		
Replace Right Training Wall						
Excavation	1000	CY	$ 10.00	$ 10,000.00	RS Means 312316130620 increased to $10/CY	Assume Bottom of wall is El 50.0, 21-foot high wall on both sides, Dimensions from CRSI 2008 14-30, Area multiplied by 1.5 to account for 1:1 slope
Subgrade Prep	1	DAY	$ 3,500.00	$ 3,500.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	120	CY	$ 1,750.00	$ 210,000.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	1000	CY	$ 50.00	$ 50,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	1600	TN	$ 15.00	$ 24,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 297,500.00**		
Auxiliary Spillway						
Clear, Grub, & Strip	5000	SY	$ 7.50	$ 37,500.00	RS Means 311413231430 - Round Up	
Excavation for Control Section	2400	CY	$ 10.00	$ 24,000.00	RS Means 312316130620 increased to $10/CY	Assume bedrock at El.50, 16' concrete gravity wall control section, multiplied by 2 to account for sloped excavations
Install Fill at Control Section	2400	CY	$ 50.00	$ 120,000.00	RS Means Section 3123	Assume stockpile from excavation used
Control Section Concrete	84	CY	$ 1,750.00	$ 147,000.00	Engineers Judgment	

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Current Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 3: Auxiliary Spillway | Current Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Excavation	1600	CY	$ 10.00	$ 16,000.00	RS Means 312316130620 increased to $10/CY	Assume uniform excavation at area indicated of 5
Rough Grading	1	LS	$ 50,000.00	$ 50,000.00	Engineers Judgment	
Install Loam and Seed	5000	SY	$ 30.00	$ 150,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 544,500.00**		
New Left Abutment Earthen Dam						
Clear, Grub, & Strip	0	SY	$ 7.50	$ -	RS Means 311413231430 - Round Up	Included in Auxiliary Spillway clearing above
Install Fill to Raise Dam	200	CY	$ 50.00	$ 10,000.00	RS Means Section 3123	Assume uniform existing grade at 68' +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	400	TN	$ 15.00	$ 6,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	220	SY	$ 30.00	$ 6,600.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subgrade Prep	1	DAY	$ 3,500.00	$ 3,500.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	15	CY	$ 2,250.00	$ 33,750.00	Engineers Judgment	
Subtotal				**$ 59,850.00**		
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, $500/day for incidentals
Subtotal				**$ 24,000.00**		
			SUBTOTAL	$ 1,184,200.00		
			Mob, Demob, General Reqmnts	$ 178,000.00		15%
			OPINION OF CONSTRUCTION COST	**$ 1,362,200.00**		
			Design Contingency	**$ 409,000.00**		30%
			OPINION OF CONSTRUCTION COST with Contingency	**$ 1,771,000.00**		
			Engineering Technical Assistance	$ 266,000.00	15% of Construction Costs	
			Permitting	$ 15,000.00		
			Real Property / Land Rights	$ 10,000.00		Right Abutment Easement, Land-taking
			Project Administration Costs	$ 50,000.00		
			Construction Engineering Costs Services	$ 177,100.00	10% of Construction Costs	
			CONCEPTUAL OPINION OF PROJECT COST	**$ 2,289,100.00**		

Structural Rehabilitation - Design Option 1: Raise Top of Dam | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	100	LF	$ 6.50	$ 650.00	Engineers Judgment	Assumed
Silt Fence	100	LF	$ 2.50	$ 250.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 13,400.00**		
Control of Water						
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 154,600.00**		
Raise Dam						
Clear, Grub, & Strip	4000	SY	$ 7.50	$ 30,000.00	RS Means 311413231430 - Round Up	For Left and Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	2500	CY	$ 50.00	$ 125,000.00	RS Means Section 3123	Assume uniform 7' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	7600	TN	$ 15.00	$ 114,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	4000	SY	$ 30.00	$ 120,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 389,000.00**		
Replace Left and Right Training Walls						
Excavation	1900	CY	$ 10.00	$ 19,000.00	RS Means 312316130620 increased to $10/CY	Assume Bottom of wall is El 50.0, 23.5-foot high wall on both sides, Dimensions from CRSI 2008 14-30, Area multiplied by 1.5 to account for 1:1 slope
Subgrade Prep	2	DAY	$ 3,500.00	$ 7,000.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	260	CY	$ 1,750.00	$ 455,000.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	1900	CY	$ 50.00	$ 95,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	3000	TN	$ 15.00	$ 45,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 621,000.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Future Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 1: Raise Top of Dam | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, 1 day crane, $500/day fo
Subtotal				**$ 24,000.00**		
			SUBTOTAL	$ 1,202,000.00		
			Mob, Demob, General Reqmnts	$ 181,000.00		15%
			OPINION OF CONSTRUCTION COST	**$ 1,383,000.00**		
			Design Contingency	**$ 415,000.00**		30%
			OPINION OF CONSTRUCTION COST with Contingency	**$ 1,798,000.00**		
			Engineering Technical Assistance	$ 270,000.00	15% of Construction Costs	
			Permitting	$ 15,000.00		
			Real Property / Land Rights	$ 10,000.00		Right Abutment Easement, Land-taking
			Project Administration Costs	$ 50,000.00		
			Construction Engineering Costs Services	$ 179,800.00	10% of Construction Costs	
			CONCEPTUAL OPINION OF PROJECT COST	**$ 2,322,800.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00	
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Future Elevs)		
COMPUTATIONS BY: VFD		DATE: January 2024
CHECK BY:		DATE: January 2024

Structural Rehabilitation - Design Option 2: Spillway Replacement (Labyrinth Spillway) | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	100	LF	$ 6.50	$ 650.00	Engineers Judgment	Assumed
Silt Fence	100	LF	$ 2.50	$ 250.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 13,400.00**		
Control of Water						
Diversion Structure	1	LS	$ 150,000.00	$ 150,000.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 304,600.00**		
Raise Dam						
Clear, Grub, & Strip	3800	SY	$ 7.50	$ 28,500.00	RS Means 311413231430 - Round Up	For Left and Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	1100	CY	$ 50.00	$ 55,000.00	RS Means Section 3123	Assume uniform 3.5' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	1800	TN	$ 15.00	$ 27,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	3800	SY	$ 30.00	$ 114,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 224,500.00**		
Replace Left and Right Training Walls						
Excavation	3600	CY	$ 10.00	$ 36,000.00	RS Means 312316130620 increased to $10/CY	Excavate to El 50
Subgrade Prep	2	DAY	$ 3,500.00	$ 7,000.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	450	CY	$ 1,750.00	$ 787,500.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	3600	CY	$ 50.00	$ 180,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	5600	TN	$ 15.00	$ 84,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 1,094,500.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Future Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 2: Spillway Replacement (Labyrinth Spillway) | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Labyrinth Spillway						
Excavation	1000	CY	$ 10.00	$ 10,000.00	RS Means 312316130620 increased to $10/CY	Excavate for downstream island
Demolition	160	LF	$ 60.00	$ 9,600.00	RS Means 024113900700	
Subgrade Prep	12	DAY	$ 5,000.00	$ 60,000.00	Engineers Judgment	Assume 1000SF per day
Slab Concrete	1160	CY	$ 1,250.00	$ 1,450,000.00	Engineers Judgment	Assume 2' slab, assume 12,500 sf
Labyrinth Section	300	CY	$ 2,250.00	$ 675,000.00	Engineers Judgment	Assume 8 foot high, 18-inch thick walls
Pump Truck	37	DAY	$ 2,900.00	$ 107,300.00	Assume 4 pours for underpinning, RS Means 015433102120, 4-man crew at 1200/day, mobilization/incidental costs per day	Assume 4 trucks per day, 10CY per truck
Subtotal				**$ 2,301,900.00**		
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, 1 day crane $500/day for
Subtotal				**$ 24,000.00**		
SUBTOTAL				$ 3,962,900.00		
Mob, Demob, General Reqmnts				$ 595,000.00		15%
OPINION OF CONSTRUCTION COST				**$ 4,557,900.00**		
Design Contingency				**$ 1,368,000.00**		30%
OPINION OF CONSTRUCTION COST with Contingency				**$ 5,926,000.00**		
Engineering Technical Assistance				$ 889,000.00	15% of Construction Costs	
Permitting				$ 15,000.00		
Real Property / Land Rights				$ 10,000.00		Right Abutment Easement, Land-taking
Project Administration Costs				$ 50,000.00		
Construction Engineering Costs Services				$ 592,600.00	10% of Construction Costs	
CONCEPTUAL OPINION OF PROJECT COST				**$ 7,482,600.00**		

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Future Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 3: Auxiliary Spillway | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Erosion Controls						
Straw bales	250	LF	$ 6.50	$ 1,625.00	Engineers Judgment	Assumed
Silt Fence	250	LF	$ 2.50	$ 625.00	RS Means 312514161000	Assumed
Turbidity Barrier	250	LF	$ 50.00	$ 12,500.00	Engineers Judgment	Assumed
Subtotal				**$ 14,750.00**		
Control of Water						
Cofferdam Structure	1680	SF	$ 40.00	$ 67,200.00	RS Means 315216100020	For Right Abutment Embankment Fill placement at dike. 80 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For Right Abutment Embankment Fill placement at dike.
Cofferdam Structure	2100	SF	$ 40.00	$ 84,000.00	RS Means 315216100020	For LLO Replacement. 100 feet long, assume termination depth at EL 45.0
Dewatering System	5	DAY	$ 340.00	$ 1,700.00	RS Means 312319201120	For LLO Replacement
Subtotal				**$ 154,600.00**		
Raise Dam/Right Abutment						
Clear, Grub, & Strip	2400	SY	$ 7.50	$ 18,000.00	RS Means 311413231430 - Round Up	For Right Embankment Raise, and 20 feet beyond limits
Install Fill to Raise Dam	800	CY	$ 50.00	$ 40,000.00	RS Means Section 3123	Assume uniform 5' raise on existing grade +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	2300	TN	$ 15.00	$ 34,500.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	2400	SY	$ 30.00	$ 72,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 164,500.00**		
Replace Right Training Wall						
Excavation	1000	CY	$ 10.00	$ 10,000.00	RS Means 312316130620 increased to $10/CY	Assume Bottom of wall is El 50.0, 21-foot high wall on both sides, Dimensions from CRSI 2008 14-30, Area multiplied by 1.5 to account for 1:1 slope
Subgrade Prep	1	DAY	$ 3,500.00	$ 3,500.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	120	CY	$ 1,750.00	$ 210,000.00	Engineers Judgment	Multiplied by 70% to take account for sloped sections
Install Fill behind Retaining Wall	1000	CY	$ 50.00	$ 50,000.00	RS Means Section 3123	Embankment Fill above, not included, calculated to assumed existing grade at EL 66.0
Imported Fill behind Retaining Wall	1600	TN	$ 15.00	$ 24,000.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	0	SY	$ 30.00	$ -	RS Means 312323157070	Included in Raise Dam item above
Subtotal				**$ 297,500.00**		
Auxiliary Spillway						
Clear, Grub, & Strip	5000	SY	$ 7.50	$ 37,500.00	RS Means 311413231430 - Round Up	
Excavation for Control Section	2400	CY	$ 10.00	$ 24,000.00	RS Means 312316130620 increased to $10/CY	Assume bedrock at El.50, 16' concrete gravity wall control section, multiplied by 2 to account for sloped excavations
Install Fill at Control Section	2400	CY	$ 50.00	$ 120,000.00	RS Means Section 3123	Assume stockpile from excavation used
Control Section Concrete	84	CY	$ 1,750.00	$ 147,000.00	Engineers Judgment	

PROJECT : Pickpocket Dam - Exeter, NH	PROJECT NUMBER: 23194.00
SUBJECT: Conceptual Design Level Opinion of Probable Cost (Future Elevs)	
COMPUTATIONS BY: VFD	DATE: January 2024
CHECK BY:	DATE: January 2024

Structural Rehabilitation - Design Option 3: Auxiliary Spillway | Future Rainfall

Item	Quantity	Unit	Unit Price	Total	Source	Notes
Excavation	1600	CY	$ 10.00	$ 16,000.00	RS Means 312316130620 increased to $10/CY	Assume uniform excavation at area indicated of 5
Rough Grading	1	LS	$ 50,000.00	$ 50,000.00	Engineers Judgment	
Install Loam and Seed	5000	SY	$ 30.00	$ 150,000.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subtotal				**$ 544,500.00**		
New Left Abutment Earthen Dam						
Clear, Grub, & Strip	0	SY	$ 7.50	$ -	RS Means 311413231430 - Round Up	Included in Auxiliary Spillway clearing above
Install Fill to Raise Dam	400	CY	$ 50.00	$ 20,000.00	RS Means Section 3123	Assume uniform existing grade at 68' +10% contingency, multiplied by 0.5 to account for slopes
Imported Fill to Raise Dam	700	TN	$ 15.00	$ 10,500.00	Engineers Judgment	Assume all imported soils
Install Loam and Seed	180	SY	$ 30.00	$ 5,400.00	RS Means 312323157070	Assume stockpile and reuse from initial excavation
Subgrade Prep	1	DAY	$ 3,500.00	$ 3,500.00	Engineers Judgment	Assume 1 day per retaining wall, 3-man crew at $1000/day, $500/day for material and equipment
Retaining Wall Concrete	10	CY	$ 2,250.00	$ 22,500.00	Engineers Judgment	
Subtotal				**$ 61,900.00**		
Replace LLO Gate						
Furnish Mid Level Gate	1	LS	$ 16,000.00	$ 16,000.00	WHIPPS Quotation 12/14/23	Budgetary, Non-Self Contained, Stainless Steel, 15ft Max Head
Install Mid Level Gate	1	LS	$ 8,000.00	$ 8,000.00	Engineers Judgment	Assume 2-man crew at $1000/day, $500/day for incidentals
Subtotal				**$ 24,000.00**		
			SUBTOTAL	$ 1,261,750.00		
			Mob, Demob, General Reqmnts	$ 190,000.00		15%
			OPINION OF CONSTRUCTION COST	**$ 1,451,750.00**		
			Design Contingency	**$ 436,000.00**		30%
			OPINION OF CONSTRUCTION COST with Contingency	**$ 1,888,000.00**		
			Engineering Technical Assistance	$ 283,000.00	15% of Construction Costs	
			Permitting	$ 15,000.00		
			Real Property / Land Rights	$ 10,000.00		Right Abutment Easement, Land-taking
			Project Administration Costs	$ 50,000.00		
			Construction Engineering Costs Services	$ 188,800.00	10% of Construction Costs	
			CONCEPTUAL OPINION OF PROJECT COST	**$ 2,434,800.00**		

CONCEPTUAL COST ESTIMATE - Alt. 4 Dam Removal

Item	Quantity	Unit	Unit Price	Total
Erosion & Sediment Control				
Turbidity Barriers	250	LF	$ 50.00	$ 12,500.00
Hay Blaes/Silt Fence	1000	LF	$ 10.00	$ 10,000.00
Maintenance	1	LS	$ 5,000.00	$ 5,000.00
Subtotal				**$ 27,500.00**
Control of Water				
Engineering Design	1	LS	$ 15,000.00	$ 10,000.00
Cofferdam / Diversions	1	LS	$ 100,000.00	$ 100,000.00
Dewatering	1	LS	$ 5,000.00	$ 5,000.00
Subtotal				**$ 115,000.00**
Dam Removal				
Dam Spillway Removal	350	CY	$ 300.00	$ 105,000.00
Abutments Removal	200	CY	$ 300.00	$ 60,000.00
Fish Ladder Removal	135	CY	$ 300.00	$ 40,500.00
Fish Wier Removal	50	CY	$ 300.00	$ 15,000.00
Sediment Removal (inc. island)	1750	CY	$ 100.00	$ 175,000.00
Stream Bed Construction	1000	CY	$ 75.00	$ 75,000.00
Subtotal				**$ 470,500.00**
Restoration				
Seeding of dewatered impoundment banks	1	LS	$ 20,000.00	$ 20,000.00
Section 106 Stipulations	1	LS	$ 45,000.00	$ 45,000.00
Bank Plantings/Seeding	1	LS	$ 50,000.00	$ 50,000.00
Subtotal				**$ 115,000.00**
Mobilization, Demobilization & General Requirements				
Mobilization	1	LS	$ 45,000.00	$ 45,000.00
Demobilization	1	LS	$ 22,000.00	$ 22,000.00
General Requirements	1	LS	$ 40,800.00	$ 40,800.00
Subtotal				**$ 107,800.00**
			CONSTRUCTION COST SUBTOTAL	**$ 836,000.00**
35% Construction Contingency	1	LS	$ 293,000.00	$ 293,000.00
			CONSTRUCTION COST GRAND TOTAL	**$ 1,129,000.00**
Engineering Design Costs				
Engineering, Design, and Permitting	1	LS	$ 226,000.00	$ 226,000.00
Construction Phase Services Budget	1	LS	$ 113,000.00	$ 113,000.00
Post-Construction Monitoring and Reporting (3 - years)	3	Year	$ 15,000.00	$ 45,000.00
Subtotal				**$ 384,000.00**
			ENGINEERING & CONSTRUCTION COST GRAND TOTAL	**$ 1,513,000.00**

E

Sediment Sampling and Analysis

Memorandum

To: NHDES

Date: June 7, 2023
Project #: 52151.06

From: Paige Cochrane, VHB
Katherine Kudzma, VHB

Re: Summary of Sediment Sampling and Analysis
Pickpocket Dam
Exeter, New Hampshire

VHB has prepared this memorandum to summarize the results of the sediment sampling conducted on behalf of the town of Exeter, New Hampshire (the Client) as part of a Feasibility Study (the Study) to evaluate existing sediment conditions within Pickpocket Dam, also identified as New Hampshire Department of Environmental Services (NHDES) Dam 029.7, located off Cross Road in Brentwood and Exeter, New Hampshire and hereinafter referred to as the "Site" as depicted in **Figure 1**. The sediment sampling outlined in this memorandum was conducted in accordance with the Sediment Sampling Analysis Plan (SAP) prepared for Pickpocket Dam by VHB in March 2023.

Summary of Sediment Sampling Activities

On April 18, 2023, Paige Cochrane and Eric Sirkovich of VHB mobilized to the Site to collect sediment samples upstream and downstream of Pickpocket Dam. Three discrete grab samples were collected upstream and two composite sediment samples were collected downstream. All sediment samples were collected manually with hand tools such as a hand auger.

The three discrete sediment samples identified as SED-1, SED-2 and SED-5 were collected upstream from a small, motorized boat. The hand auger was manually advanced through the soft sediments until refusal was encountered and the sample was then retrieved from the auger. The two downstream samples identified as SED-3 and SED-4 were composited from five sediment cores (identified as A through E) collected across the river from the top one-foot interval of sediment. Once collected, the core sample(s) were visually observed for sediment texture, color, and debris content. All core samples for a given location were transferred to a clean, stainless-steel bowl and mixed either to homogenize the discrete sediment sample location (i.e., SED-1, SED-2 and SED-5), or to composite discrete sample locations (i.e., SED-3 and SED-4). The homogenized sediment material was then immediately transferred into clean, unused, laboratory-supplied sample containers. The containers were packed in coolers with bagged ice and delivered directly to the analytical laboratory under standard chain-of-custody protocols. All equipment that came into direct contact with the sediment was properly decontaminated between sample locations using Alconox® and water. The field sampling activities were documented using field data sheets provided as **Attachment A**. The sediment sample locations are depicted in **Figure 2**.

The five sediment samples as well as one field duplicate collected at SED-2 were submitted to Phoenix Environmental Laboratories, Inc. of Manchester, Connecticut (Phoenix) for laboratory analysis of priority pollutant 13 (PP-13) metals as well as manganese and iron, pesticides, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (sVOCs) and grain size via ASTM D422 and D7928. Additionally, based on the findings of the due diligence review documented in the March 2023 Sediment SAP, SED-1 was submitted for laboratory analysis of volatile organic compounds (VOCs) due to the proximity to the groundwater management zone (GMZ) associated with the Cross Road Landfill (NHDES Site #198401081). A summary of the sediment analytical results is provided in **Table 1**. The laboratory analytical report is provided as **Attachment B**.

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Sediment Analytical Results

Ecological Screening Assessment

The sediment analytical results were compered to the NHDES recommended threshold effect concentrations (TECs) and probable effect concentrations (PECs) to evaluate whether the sediment quality may pose a risk to aquatic and benthic organisms. As noted in the NHDES guidance:

› TECs represent the estimated chemical concentration threshold below which adverse effects on ecological receptors are unlikely; and
› PECs represent the estimated chemical concentration threshold above which adverse effects on ecological receptors is likely.

TEC and PEC thresholds for freshwater sediments were considered in this analysis. The NHDES recommended screening thresholds were obtained from NHDES (2016).[1]

Following NHDES guidance, hazard quotients (HQs) were calculated for all detected constituents in each sample by dividing the constituent concentration by the screening threshold value (i.e., either the TEC or PEC). A HQ calculated with a TEC (HQ-TEC) of 1 or greater indicates the possibility that exposure to the sediment may adversely affect ecological receptors. An HQ calculated with a PEC (HQ-PEC) of 1 or greater indicates the likelihood that exposure to the sediment will adversely affect ecological receptors. Based on the calculated HQs, each constituent was assigned a risk classification as follows:

› HQ-TEC<1 was qualified as low risk;
› HQ-TEC>1 was qualified as moderate risk; and
› HQ-PEC>1 was qualified as high risk.

The calculated HQs, assigned risk classifications for fresh water screening thresholds, and the ecological screening results are provided in **Table 2**. The ecological risk was determined to be low for all detected concentrations of metals and PAHs in the sediment samples with the exception of arsenic in SED-2 FD, SED-4, and SED-5 as well as five PAHs in SED-3 and SED-4. No concentrations of VOCs, PCBs, or pesticides were detected in sediment samples in excess of the laboratory detection limit.

These screening results suggest that sediments downstream are impacted with concentrations of five PAHs identified as benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene, phenanthrene, and pyrene that have a moderate potential to adversely effect ecological receptors. Sediments both upstream and downstream are impacted with concentrations of

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1 NHDES Memorandum from Matt Wood to Gregg Comstock, PE entitled *"Updated TEC and PEC sediment thresholds"* dated January 8, 2016.

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arsenic that have a moderate to low potential to impact ecological receptors. PAHs and metals are commonly found in urban environments and may be the result of anthropogenic or naturally occurring non-point sources.

Human Health Screening Assessment

If sediments are removed as part of a restorative alternative, sediments would become classified as soils and are the subject to review in accordance with NHDES Contaminated Sites Risk Characterization and Management Policy (RCMP). The RCMP provides a process to determine if detected contaminant concentrations constitute a direct contact risk to humans or a potential risk to groundwater quality. Therefore, to preliminarily assess the sediment quality conditions at Pickpocket Dam relative to these risks, the sediment analytical results were compared to the current RCMP Method 1 Soil Category S-1 Direct Contact Risk-based Concentrations or Soil Remediation Standards (SRS).[2] The results of this comparison are detailed in **Table 3**.

No concentrations of contaminants in sediment were detected in excess of the SRS with the exception of arsenic, which was detected in SED-2 FD and SED-5 at 12.4 milligrams per kilogram (mg/kg) and 19.9 mg/kg, respectively. The SRS for arsenic (i.e., 11 mg/kg) is based on typical background concentrations found in soils in the State of New Hampshire (SHA, 1998). However, it is not uncommon to identify naturally-occurring arsenic greater than the arsenic SRS, particularly in southeastern New Hampshire.

Findings

A summary of the findings of the sediment sampling activities and sediment analytical results completed in accordance with the March 2023 Sediment SAP is provided below:

- On April 18, 2023, VHB completed the sediment sampling at Pickpocket Dam in accordance with the procedures outlined in the March 2023 Sediment SAP.
- Five (5) sediment samples were collected during the sediment sampling event, including three discrete upstream samples identified as SED-1, SED-2, and SED-5 as well as two composite downstream samples identified as SED-3 and SED-4. Additionally, one field duplicate sample was submitted for SED-2 (i.e., SED-2 FD) for quality control purposes.
- The five sediment samples and one field duplicate sediment sample were submitted for laboratory analysis of PP-13 metals, manganese, iron, pesticides, PCBs, and sVOCs. Additionally, SED-1 was also submitted for laboratory analysis of VOCs due to the proximity of the GMZ associated with the Cross Road Landfill.
- Based on the sediment analytical results, only metals and PAHs were detected in sediment samples both upstream and downstream of Pickpocket Dam. Based on the risk classification resulting from the NHDES TECs

2 The NHDES S-1 standards are based upon sensitive uses of property and accessible soils, either currently or in the reasonably foreseeable future, and are equivalent to the Soil Remediation Standards (SRSs) established in the New Hampshire Code of Administrative Rules Chapter Env-Or 600, Contaminated Site Management.

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and PECs HQ calculation, the concentrations of PAHs detected in sediment samples downstream have a moderate potential to adversely impact ecological receptors; however, concentrations of PAHs upstream have a low potential to impact ecological receptors. Concentrations of arsenic both upstream and downstream have a moderate potential to impact ecological receptors; however, based on the distribution and concentrations of arsenic detected in the sediment samples, the concentrations of arsenic identified are likely naturally-occurring. The levels of PAHs detected are typical of urban/suburban areas.

- No concentrations of contaminants were detected in excess of the SRS within the sediment samples with the exception of arsenic detected in SED-2 FD (12.4 mg/kg) and SED-5 (13.9 mg/kg), which were both collected upstream of Pickpocket Dam. Concentrations of arsenic for all sediment samples ranged between 4.69 to 13.9 mg/kg with the mean concentrations of arsenic calculated at 9.88 mg/kg. Based on the narrow range of arsenic concentrations reported just above and below the SRS, the detections appear to be indicative of a naturally occurring background conditions. Nevertheless, the concentrations of arsenic exceeding the SRS generally suggest additional assessment and/or risk mitigation may be warranted should excavation/dredging of sediment be proposed as a selected alternative.
- Overall, the ecological screening and human health screening results indicate that low levels of PAHs and arsenic are present in sediments both downstream and upstream of Pickpocket Dam.

Attachments:

Table 1 – Summary of Sediment Analytical Results

Table 2 – Sediment Risk Assessment Summary Table

Table 3 – Sediment Human Health Assessment Table

Figure 1 – Site Location and Local Area Map

Figure 2 - Sediment Sample Plan

Attachment A – Sediment Sampling Data Sheets

Attachment B – Laboratory Analytical Report

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Table 1
Summary of Sediment Analytical Results
Pickpocket Dam
Exeter, New Hampshire

LABORATORY IDENTIFICATION COLLECTION DATE CLIENT ID	Units	CN87690 04/18/2023 SED-1		CN87691 04/18/2023 SED-2		CN87692 04/18/2023 SED-2 FD		CN87693 04/18/2023 SED-3		CN87694 04/18/2023 SED-4		CN87695 04/18/2023 SED-5	
		Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Miscellaneous/Inorganics													
Chloride	mg/kg	< 147	147	< 156	156	< 152	152	< 57	57	< 61	61	< 139	139
Nitrogen Tot Kjeldahl	mg/Kg	**2880**	413	**3470**	438	**3370**	425	**401**	163	**447**	197	**2110**	441
Percent Solid	%	**34**		**32**		**33**		**88**		**82**		**36**	
Metals Total													
Antimony	mg/Kg	< 3.3	3.3	< 3.6	3.6	< 3.1	3.1	< 1.2	1.2	< 1.1	1.1	< 3.3	3.3
Arsenic	mg/Kg	**9.64**	0.67	**7.92**	0.73	**12.4**	0.62	**4.69**	0.24	**10.7**	0.22	**13.9**	0.65
Beryllium	mg/Kg	**0.6**	0.27	**0.56**	0.29	**0.59**	0.25	**0.18**	0.1	**0.31**	0.09	**0.7**	0.26
Cadmium	mg/Kg	**0.49**	0.33	**0.44**	0.36	**0.6**	0.31	**0.16**	0.12	**0.28**	0.11	**0.47**	0.33
Chromium	mg/Kg	**23.8**	0.33	**23.3**	0.36	**23.1**	0.31	**21.6**	0.12	**35.5**	0.11	**24.1**	0.33
Copper	mg/kg	**8.5**	0.7	**8.7**	0.7	**9.2**	0.6	**5.3**	0.2	**6.9**	0.2	**8.9**	0.7
Iron	mg/Kg	**15000**	50	**11700**	55	**12500**	46	**10700**	18	**20300**	17	**13600**	49
Lead	mg/Kg	**29**	0.33	**32.2**	0.36	**33.3**	0.31	**10.9**	0.12	**9.41**	0.11	**31.3**	0.33
Manganese	mg/Kg	**496**	3.3	**341**	3.6	**396**	3.1	**577**	12	**713**	11	**379**	3.3
Mercury	mg/Kg	< 0.07	0.07	< 0.08	0.08	< 0.07	0.07	< 0.03	0.03	< 0.03	0.03	< 0.06	0.06
Nickel	mg/Kg	**14.9**	0.33	**13.6**	0.36	**14.3**	0.31	**12.3**	0.12	**13.3**	0.11	**14.7**	0.33
Selenium	mg/Kg	< 1.3	1.3	< 1.5	1.5	< 1.2	1.2	< 0.5	0.5	< 0.4	0.4	< 1.3	1.3
Silver	mg/Kg	< 0.33	0.33	< 0.36	0.36	< 0.31	0.31	< 0.12	0.12	< 0.11	0.11	< 0.33	0.33
Thallium	mg/Kg	< 3.0	3	< 3.3	3.3	< 2.8	2.8	< 1.1	1.1	< 1.0	1	< 2.9	2.9
Zinc	mg/Kg	**70**	0.7	**62**	0.7	**72.4**	0.6	**28.4**	0.2	**43.9**	0.2	**61.1**	0.7
Oxygenates & Dioxane - SW8260C (OXY)													
1,4-Dioxane	mg/kg	< 0.29	0.29	-	-	-	-	-	-	-	-	-	-
Di-isopropyl ether	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Diethyl ether	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Ethyl tert-butyl ether	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
tert-amyl methyl ether	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Pesticides - SW8081B													
4,4' -DDD	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
4,4' -DDE	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
4,4' -DDT	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
a-BHC	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Alachlor	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Aldrin	mg/kg	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
b-BHC	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Chlordane	mg/kg	< 0.14	0.14	< 0.1	0.1	< 0.15	0.15	< 0.037	0.037	< 0.039	0.039	< 0.14	0.14
d-BHC	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Dieldrin	mg/kg	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
Endosulfan I	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endosulfan II	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endosulfan sulfate	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin aldehyde	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin ketone	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
g-BHC	mg/kg	< 0.0057	0.0057	< 0.0041	0.0041	< 0.0061	0.0061	< 0.0015	0.0015	< 0.0016	0.0016	< 0.0055	0.0055
Heptachlor	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Heptachlor epoxide	mg/kg	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Hexachlorobenzene	mg/kg	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
Methoxychlor	mg/kg	< 0.14	0.14	< 0.1	0.1	< 0.15	0.15	< 0.037	0.037	< 0.039	0.039	< 0.14	0.14
Toxaphene	mg/kg	< 0.57	0.57	< 0.41	0.41	< 0.61	0.61	< 0.15	0.15	< 0.16	0.16	< 0.55	0.55
Polychlorinated Biphenyls - SW8082A													
PCB-1016	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1221	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1232	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1242	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1248	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1254	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1260	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1262	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1268	mg/kg	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
Semivolatiles - SW8270D													
1,1-Biphenyl	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2,4,5-Tetrachlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2,4-Trichlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2-Dichlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2-Diphenylhydrazine	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
1,3-Dichlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,4-Dichlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,2'-Oxybis(1-Chloropropane)	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4,5-Trichlorophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4,6-Trichlorophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dichlorophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dimethylphenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dinitrophenol	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
2,4-Dinitrotoluene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,6-Dinitrotoluene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Chloronaphthalene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Chlorophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Methylnaphthalene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Methylphenol (o-cresol)	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Nitroaniline	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
2-Nitrophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
3&4-Methylphenol (m&p-cresol)	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
3,3'-Dichlorobenzidine	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
3-Nitroaniline	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4,6-Dinitro-2-methylphenol	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4-Bromophenyl phenyl ether	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4-Chloro-3-methylphenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Chloroaniline	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Chlorophenyl phenyl ether	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Nitroaniline	mg/kg	< 2.7	2.7	< 3.3	3.3	< 3.4	3.4	< 0.6	0.6	< 0.63	0.63	< 3	3
4-Nitrophenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acenaphthene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acenaphthylene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acetophenone	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Aniline	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Anthracene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benz(a)anthracene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzidine	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(a)pyrene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	**0.27**	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(b)fluoranthene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	**0.29**	0.26	**0.3**	0.28	< 1.3	1.3
Benzo(ghi)perylene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(k)fluoranthene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3

Table 1
Summary of Sediment Analytical Results
Pickpocket Dam
Exeter, New Hampshire

LABORATORY IDENTIFICATION COLLECTION DATE CLIENT ID	Units	CN87690 04/18/2023 SED-1		CN87691 04/18/2023 SED-2		CN87692 04/18/2023 SED-2 FD		CN87693 04/18/2023 SED-3		CN87694 04/18/2023 SED-4		CN87695 04/18/2023 SED-5	
		Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Benzoic acid	mg/kg	< 3.4	3.4	**5.3**	4.2	< 4.3	4.3	< 0.75	0.75	< 0.79	0.79	< 3.7	3.7
Benzyl butyl phthalate	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Bis(2-chloroethoxy)methane	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Bis(2-chloroethyl)ether	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Bis(2-ethylhexyl)phthalate	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Carbazole	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Chrysene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Di-n-butylphthalate	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Di-n-octylphthalate	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dibenz(a,h)anthracene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dibenzofuran	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Diethyl phthalate	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dimethylphthalate	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Fluoranthene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	**0.44**	0.26	**0.35**	0.28	< 1.3	1.3
Fluorene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachlorobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachlorobutadiene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachlorocyclopentadiene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachloroethane	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Isophorone	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
N-Nitrosodi-n-propylamine	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
N-Nitrosodimethylamine	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
N-Nitrosodiphenylamine	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Naphthalene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Nitrobenzene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Pentachloronitrobenzene	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Pentachlorophenol	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Phenanthrene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	**0.32**	0.26	< 0.28	0.28	< 1.3	1.3
Phenol	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Pyrene	mg/kg	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	**0.34**	0.26	**0.36**	0.28	< 1.3	1.3
Pyridine	mg/kg	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Volatiles - SW8260C													
1,1,1,2-Tetrachloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloropropene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichlorobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
2-Hexanone	mg/kg	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
2-Isopropyltoluene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	< 0.29	0.29	-	-	-	-	-	-	-	-	-	-
Acrylonitrile	mg/kg	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Benzene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Carbon Disulfide	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
m&p-Xylene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Methyl Ethyl Ketone	mg/kg	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
Methyl t-butyl ether (MTBE)	mg/kg	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Methylene chloride	mg/kg	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
o-Xylene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
p-Isopropyltoluene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
tert-Butylbenzene	mg/kg	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Tetrahydrofuran (THF)	mg/kg	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Total Xylenes	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,4-dichloro-2-butene	mg/kg	< 1.8	1.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Trichlorotrifluoroethane	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-

Notes:
mg/kg = milligram per kilogram
< = below laboratory reporting limit depicted to the right
Bolded values are detections above the laboratory reporting limit.

Table 2
Sediment Risk Assessment Summary Table
Pickpocket Dam
Exeter, New Hampshire

Client Id	Units	NHDES - FRESHWATER		SED-1			SED-2					SED-2 FD				
Lab Sample Id				CN87690			CN87691					CN87692				
Collection Date				04/18/2023			04/18/2023					04/18/2023				
SCREENING CRTIERIA		TEC	PEC	RISK-FRESH	RESULTS		HQ-TEC	HQ-PEC	RISK-FRESH	RESULTS		HQ-TEC	HQ-PEC	RISK-FRESH	RESULTS	
					RESULT	DL				RESULT	DL				RESULT	DL
Metals Total																
Arsenic	mg/Kg	9.79	33	Low	9.64	0.67	0.809	0.240	Low	7.92	0.73	1.267	0.376	Mod	12.4	0.62
Cadmium	mg/Kg	0.99	4.98	Low	0.49	0.33	0.444	0.088	Low	0.44	0.36	0.606	0.120	Low	0.6	0.31
Chromium	mg/Kg	43.4	111	Low	23.8	0.33	0.537	0.210	Low	23.3	0.36	0.532	0.208	Low	23.1	0.31
Copper	mg/kg	31.6	149	Low	8.5	0.7	0.275	0.058	Low	8.7	0.7	0.291	0.062	Low	9.2	0.6
Lead	mg/Kg	35.8	128	Low	29	0.33	0.899	0.252	Low	32.2	0.36	0.930	0.260	Low	33.3	0.31
Nickel	mg/Kg	22.7	48.6	Low	14.9	0.33	0.599	0.280	Low	13.6	0.36	0.630	0.294	Low	14.3	0.31
Zinc	mg/Kg	121	459	Low	70	0.7	0.512	0.135	Low	62	0.7	0.598	0.158	Low	72.4	0.6
Semivolatiles - SW8270D																
Benzo(a)pyrene	mg/kg	0.15	1.45	-	< 1.2	1.2	-	-	-	< 1.5	1.5	-	-	-	< 1.5	1.5
Benzo(b)fluoranthene	mg/kg	0.0272	13.4	-	< 1.2	1.2	-	-	-	< 1.5	1.5	-	-	-	< 1.5	1.5
Fluoranthene	mg/kg	0.423	2.23	-	< 1.2	1.2	-	-	-	< 1.5	1.5	-	-	-	< 1.5	1.5
Phenanthrene	mg/kg	0.204	1.17	-	< 1.2	1.2	-	-	-	< 1.5	1.5	-	-	-	< 1.5	1.5
Pyrene	mg/kg	0.195	1.52	-	< 1.2	1.2	-	-	-	< 1.5	1.5	-	-	-	< 1.5	1.5

Client Id	SED-3					SED-4					SED-5				
Lab Sample Id	CN87693					CN87694					CN87695				
Collection Date	04/18/2023					04/18/2023					04/18/2023				
SCREENING CRTIERIA	HQ-TEC	HQ-PEC	RISK-FRESH	RESULTS		HQ-TEC	HQ-PEC	RISK-FRESH	RESULTS		HQ-TEC	HQ-PEC	RISK-FRESH	RESULTS	
				RESULT	DL				RESULT	DL				RESULT	DL
Metals Total															
Arsenic	0.479	0.142	Low	4.69	0.24	1.093	0.324	Mod	10.7	0.22	1.420	0.421	Mod	13.9	0.65
Cadmium	0.162	0.032	Low	0.16	0.12	0.283	0.056	Low	0.28	0.11	0.475	0.094	Low	0.47	0.33
Chromium	0.498	0.195	Low	21.6	0.12	0.818	0.320	Low	35.5	0.11	0.555	0.217	Low	24.1	0.33
Copper	0.168	0.036	Low	5.3	0.2	0.218	0.046	Low	6.9	0.2	0.282	0.060	Low	8.9	0.7
Lead	0.304	0.085	Low	10.9	0.12	0.263	0.074	Low	9.41	0.11	0.874	0.245	Low	31.3	0.33
Nickel	0.542	0.253	Low	12.3	0.12	0.586	0.274	Low	13.3	0.11	0.648	0.302	Low	14.7	0.33
Zinc	0.235	0.062	Low	28.4	0.2	0.363	0.096	Low	43.9	0.2	0.505	0.133	Low	61.1	0.7
Semivolatiles - SW8270D															
Benzo(a)pyrene	1.800	0.186	Mod	0.27	0.26				< 0.28	0.28	-	-		< 1.3	1.3
Benzo(b)fluoranthene	10.662	0.022	Mod	0.29	0.26	11.029	0.022	Mod	0.3	0.28	-	-		< 1.3	1.3
Fluoranthene	1.040	0.197	Mod	0.44	0.26	0.827	0.157	Low	0.35	0.28	-	-		< 1.3	1.3
Phenanthrene	1.569	0.274	Mod	0.32	0.26				< 0.28	0.28	-	-		< 1.3	1.3
Pyrene	1.744	0.224	Mod	0.34	0.26	1.846	0.237	Mod	0.36	0.28	-	-		< 1.3	1.3

Table Notes:

1.) All concentrations are expressed in micrograms per kilogram (mg/kg); only analytes detected in at least one sample are shown in the table.

2.) "<" indicates target analyte not detected at a concentration greater than the detection limit (DL) shown to the right of the sample

3.) "J" indicates an estimated concentration.

4.) New Hampshire Department of Environmental Services (NHDES) freshwater and marine screening thresholds were obtain from from a Draft NHDES Memorandum dated January 8, 2016.

"TEC" indicates threshold effect concentration; and

"PEC" indicates probable effect concentration.

Table 3
Sediment Human Health Assessment Table
Pickpocket Dam
Exeter, New Hampshire

LABORATORY IDENTIFICATION	Units	NHDES SRS	CN87690		CN87691		CN87692		CN87693		CN87694		CN87695	
COLLECTION DATE			04/18/2023		04/18/2023		04/18/2023		04/18/2023		04/18/2023		04/18/2023	
CLIENT ID			SED-1		SED-2		SED-2 FD		SED-3		SED-4		SED-5	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Miscellaneous/Inorganics														
Chloride	mg/kg	NE	< 147	147	< 156	156	< 152	152	< 57	57	< 61	61	< 139	139
Nitrogen Tot Kjeldahl	mg/Kg	NE	2880	413	3470	438	3370	425	401	163	447	197	2110	441
Percent Solid	%	NS	34		32		33		88		82		36	
Metals Total														
Antimony	mg/Kg	9	< 3.3	3.3	< 3.6	3.6	< 3.1	3.1	< 1.2	1.2	< 1.1	1.1	< 3.3	3.3
Arsenic	mg/Kg	11	9.64	0.67	7.92	0.73	**12.4**	0.62	4.69	0.24	10.7	0.22	**13.9**	0.65
Beryllium	mg/Kg	12	0.6	0.27	0.56	0.29	0.59	0.25	0.18	0.1	0.31	0.09	0.7	0.26
Cadmium	mg/Kg	33	0.49	0.33	0.44	0.36	0.6	0.31	0.16	0.12	0.28	0.11	0.47	0.33
Chromium	mg/Kg	NE	23.8	0.33	23.3	0.36	23.1	0.31	21.6	0.12	35.5	0.11	24.1	0.33
Copper	mg/Kg	NE	8.5	0.7	8.7	0.7	9.2	0.6	5.3	0.2	6.9	0.2	8.9	0.7
Iron	mg/Kg	NE	15000	50	11700	55	12500	46	10700	18	20300	17	13600	49
Lead	mg/Kg	400	29	0.33	32.2	0.36	33.3	0.31	10.9	0.12	9.41	0.11	31.3	0.33
Manganese	mg/Kg	1,000	496	3.3	341	3.6	396	3.1	577	12	713	11	379	3.3
Mercury	mg/Kg	7	< 0.07	0.07	< 0.08	0.08	< 0.07	0.07	< 0.03	0.03	< 0.03	0.03	< 0.06	0.06
Nickel	mg/Kg	400	14.9	0.33	13.6	0.36	14.3	0.31	12.3	0.12	13.3	0.11	14.7	0.33
Selenium	mg/Kg	180	< 1.3	1.3	< 1.5	1.5	< 1.2	1.2	< 0.5	0.5	< 0.4	0.4	< 1.3	1.3
Silver	mg/Kg	89	< 0.33	0.33	< 0.36	0.36	< 0.31	0.31	< 0.12	0.12	< 0.11	0.11	< 0.33	0.33
Thallium	mg/Kg	10	< 3.0	3	< 3.3	3.3	< 2.8	2.8	< 1.1	1.1	< 1.0	1	< 2.9	2.9
Zinc	mg/Kg	1,000	70	0.7	62	0.7	72.4	0.6	28.4	0.2	43.9	0.2	61.1	0.7
Oxygenates & Dioxane - SW8260C (OXY)														
1,4-Dioxane	mg/kg	5	< 0.29	0.29	-	-	-	-	-	-	-	-	-	-
Di-isopropyl ether	mg/kg	10	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Diethyl ether	mg/kg	3,900	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Ethyl tert-butyl ether	mg/kg	0.7	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
tert-amyl methyl ether	mg/kg	3	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Pesticides - SW8081B														
4,4' -DDD	mg/kg	6,000	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
4,4' -DDE	mg/kg	4,000	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
4,4' -DDT	mg/kg	4,000	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
a-BHC	mg/kg	60	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Alachlor	mg/kg	200	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Aldrin	mg/kg	90	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
b-BHC	mg/kg	60	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Chlordane	mg/kg	4,000	< 0.14	0.14	< 0.1	0.1	< 0.15	0.15	< 0.037	0.037	< 0.039	0.039	< 0.14	0.14
d-BHC	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Dieldrin	mg/kg	60	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
Endosulfan I	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endosulfan II	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endosulfan sulfate	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin	mg/kg	8,000	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin aldehyde	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Endrin ketone	mg/kg	NE	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
g-BHC	mg/kg	90	< 0.0057	0.0057	< 0.0041	0.0041	< 0.0061	0.0061	< 0.0015	0.0015	< 0.0016	0.0016	< 0.0055	0.0055
Heptachlor	mg/kg	200	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Heptachlor epoxide	mg/kg	100	< 0.028	0.028	< 0.02	0.02	< 0.03	0.03	< 0.0074	0.0074	< 0.0079	0.0079	< 0.027	0.027
Hexachlorobenzene	mg/kg	NE	< 0.014	0.014	< 0.01	0.01	< 0.015	0.015	< 0.0037	0.0037	< 0.0039	0.0039	< 0.014	0.014
Methoxychlor	mg/kg	130,000	< 0.14	0.14	< 0.1	0.1	< 0.15	0.15	< 0.037	0.037	< 0.039	0.039	< 0.14	0.14
Toxaphene	mg/kg	1,000	< 0.57	0.57	< 0.41	0.41	< 0.61	0.61	< 0.15	0.15	< 0.16	0.16	< 0.55	0.55
Polychlorinated Biphenyls - SW8082A														
PCB-1016	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1221	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1232	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1242	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1248	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1254	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1260	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1262	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
PCB-1268	mg/kg	NE	< 0.71	0.71	< 0.51	0.51	< 0.76	0.76	< 0.37	0.37	< 0.39	0.39	< 0.69	0.69
Semivolatiles - SW8270D														
1,1-Biphenyl	mg/kg	125	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2,4,5-Tetrachlorobenzene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
1,2,4-Trichlorobenzene	mg/kg	19,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
1,2-Dichlorobenzene	mg/kg	88,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
1,2-Diphenylhydrazine	mg/kg	1,000	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
1,3-Dichlorobenzene	mg/kg	150,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
1,4-Dichlorobenzene	mg/kg	7,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
2,2'-Oxybis(1-Chloropropane)	mg/kg	5,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4,5-Trichlorophenol	mg/kg	24,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4,6-Trichlorophenol	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dichlorophenol	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dimethylphenol	mg/kg	4,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,4-Dinitrophenol	mg/kg	700	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
2,4-Dinitrotoluene	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2,6-Dinitrotoluene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Chloronaphthalene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Chlorophenol	mg/kg	2,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Methylnaphthalene	mg/kg	96,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Methylphenol (o-cresol)	mg/kg	900	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
2-Nitroaniline	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
2-Nitrophenol	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
3&4-Methylphenol (m&p-cresol)	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
3,3'-Dichlorobenzidine	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
3-Nitroaniline	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4,6-Dinitro-2-methylphenol	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4-Bromophenyl phenyl ether	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
4-Chloro-3-methylphenol	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Chloroaniline	mg/kg	1,300	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Chlorophenyl phenyl ether	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
4-Nitroaniline	mg/kg	NE	< 2.7	2.7	< 3.3	3.3	< 3.4	3.4	< 0.6	0.6	< 0.63	0.63	< 3	3
4-Nitrophenol	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acenaphthene	mg/kg	340,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acenaphthylene	mg/kg	490,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Acetophenone	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Aniline	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Anthracene	mg/kg	1,000,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benz(a)anthracene	mg/kg	1,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzidine	mg/kg	10	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(a)pyrene	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	0.27	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(b)fluoranthene	mg/kg	1,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	0.29	0.26	0.3	0.28	< 1.3	1.3
Benzo(ghi)perylene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzo(k)fluoranthene	mg/kg	12,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Benzoic acid	mg/kg	350,000	< 3.4	3.4	5.3	4.2	< 4.3	4.3	< 0.75	0.75	< 0.79	0.79	< 3.7	3.7
Benzyl butyl phthalate	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Bis(2-chloroethoxy)methane	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Bis(2-chloroethyl)ether	mg/kg	700	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Bis(2-ethylhexyl)phthalate	mg/kg	72,000	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9

Table 3
Sediment Human Health Assessment Table
Pickpocket Dam
Exeter, New Hampshire

LABORATORY IDENTIFICATION	Units	NHDES SRS	CN87690		CN87691		CN87692		CN87693		CN87694		CN87695	
COLLECTION DATE			04/18/2023		04/18/2023		04/18/2023		04/18/2023		04/18/2023		04/18/2023	
CLIENT ID			SED-1		SED-2		SED-2 FD		SED-3		SED-4		SED-5	
			Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
Carbazole	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Chrysene	mg/kg	120,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Di-n-butylphthalate	mg/kg	2,600,000	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Di-n-octylphthalate	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dibenz(a,h)anthracene	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dibenzofuran	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Diethyl phthalate	mg/kg	1,000,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Dimethylphthalate	mg/kg	700,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Fluoranthene	mg/kg	960,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	0.44	0.26	0.35	0.28	< 1.3	1.3
Fluorene	mg/kg	77,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachlorobenzene	mg/kg	800	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachlorobutadiene	mg/kg	17,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
Hexachlorocyclopentadiene	mg/kg	200,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Hexachloroethane	mg/kg	700	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Indeno(1,2,3-cd)pyrene	mg/kg	1,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Isophorone	mg/kg	1,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
N-Nitrosodi-n-propylamine	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
N-Nitrosodimethylamine	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
N-Nitrosodiphenylamine	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Naphthalene	mg/kg	5,000	**< 1.2**	**1.2**	**< 1.5**	**1.5**	**< 1.5**	**1.5**	**< 0.26**	**0.26**	**< 0.28**	**0.28**	**< 1.3**	**1.3**
Nitrobenzene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Pentachloronitrobenzene	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Pentachlorophenol	mg/kg	3,000	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Phenanthrene	mg/kg	NE	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	0.32	0.26	< 0.28	0.28	< 1.3	1.3
Phenol	mg/kg	56,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	< 0.26	0.26	< 0.28	0.28	< 1.3	1.3
Pyrene	mg/kg	720,000	< 1.2	1.2	< 1.5	1.5	< 1.5	1.5	0.34	0.26	0.36	0.28	< 1.3	1.3
Pyridine	mg/kg	NE	< 1.7	1.7	< 2.1	2.1	< 2.1	2.1	< 0.38	0.38	< 0.4	0.4	< 1.9	1.9
Volatiles - SW8260C														
1,1,1,2-Tetrachloroethane	mg/kg	800	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	78,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	4,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	3,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	14,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,1-Dichloropropene	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichlorobenzene	mg/kg	NE	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	100	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	19,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	mg/kg	130,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	100	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2-Dibromoethane	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	88,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	96,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	150,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	7,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	15,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
2-Hexanone	mg/kg	NE	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
2-Isopropyltoluene	mg/kg	NE	< 0.91	0.91	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	680,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	29,000	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	75,000	< 0.29	0.29	-	-	-	-	-	-	-	-	-	-
Acrylonitrile	mg/kg	500	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Benzene	mg/kg	300	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	NE	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	100	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	300	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Carbon Disulfide	mg/kg	460,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	mg/kg	12,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	6,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	3,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	3,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	2,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	mg/kg	1,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	1,000,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	120,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	17,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	330,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
m&p-Xylene	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Methyl Ethyl Ketone	mg/kg	51,000	< 0.073	0.073	-	-	-	-	-	-	-	-	-	-
Methyl t-butyl ether (MTBE)	mg/kg	200	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Methylene chloride	mg/kg	100	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
n-Butylbenzene	mg/kg	110,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
n-Propylbenzene	mg/kg	85,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	5,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
o-Xylene	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
p-Isopropyltoluene	mg/kg	NE	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	mg/kg	130,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	17,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
tert-Butylbenzene	mg/kg	100,000	**< 0.91**	**0.91**	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	2,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Tetrahydrofuran (THF)	mg/kg	NE	< 0.029	0.029	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	100,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Total Xylenes	mg/kg	500,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	9,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
trans-1,4-dichloro-2-butene	mg/kg	NE	< 1.8	1.8	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	800	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	1,000,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Trichlorotrifluoroethane	mg/kg	NE	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	mg/kg	1,000	< 0.015	0.015	-	-	-	-	-	-	-	-	-	-

Notes
mg/Kg = milligram per kilogram
NE = No Standard Established
< = Not detected above the laboratory detection limit depicted to the right of the symbol.
Bolded is a detection limit above the NHDES SRS
Bolded, shaded, and underlined is a result detected above the NHDES SRS
NHDES SRS = New Hampshire Department of Environmental Services Soil Remediation Standards per 600 Env-Or-600
- Denotes analysis was not run for this sample

Figure 1: Site Location and Local Area Map

Pickpocket Dam | Brentwood and Exeter, New Hampshire

0 2,500 5,000 7,500 US Feet

Source: USGS Topo Map

Figure 2: Sediment Sampling Plan

Pickpocket Dam | Brentwood and Exeter, New Hampshire

Source: NearMap Imagery, NHDOT Roads

Path: \\vhb.com\gis\proj\Bedford\52151.06 Pickpocket Dam Feasibili\Project\SIR_SamplingPlan\SIR_SamplingPlan.aprx (User: pcochrane, Date: 6/9/2023)

Field Notes

Date: April 18, 2023 **Notes Taken By:** Paige Cochrane

Place: Exeter, NH

Project No.: 52151.06 **Re:** SED-1

Field Sampling Data Sheet

General Information:

Date and Time: 4/18/2023	VHB Project #: 52151.06
Location (Town/City): Exeter, NH	Project Name: Pickpocket Dam
Field Sampler: Paige Cochrane	Project Manager: Jacob San Antonio
Photo #(s) and Direction: Yes	

Weather Conditions:

Current Weather and Temperature: 55 F, Clear
Weather within previous 72 hrs: Rainy and overcast

Sample Information:

Sample ID #: SED-1
Sample Location (GPS Coordinates or field ties): Upstream of Pickpocket Dam
Water Depth: 2.5 feet
Probing Depth: Until refusal

Field Notes

Sediment Type: Mucky soil
Sediment Description: Fine to very fine sand and silt, no rocks, trace organic material, “mucky”
Sample Type (composite, grab, etc.): Grab
Approx. Length of Sediment Core: Auger
Depth of penetration of the core into the sediment / amount of sediment recovery: N/A

Additional Comments / Observations:

Sample time: 10:05

- Sediment sample collected with hand auger off side of boat. Sediment sample was homogenized in a steel bowl. Prior to be deposited in the steel bowl, the bowl was cleaned with Alconox.

Field Notes

Date: April 18, 2023 **Notes Taken By:** Paige Cochrane

Place: Exeter, NH

Project No.: 52151.06 **Re:** SED-2

Field Sampling Data Sheet

General Information:

Date and Time: 4/18/2023	VHB Project #: 52151.06
Location (Town/City): Exeter, NH	Project Name: Pickpocket Dam
Field Sampler: Paige Cochrane	Project Manager: Jacob San Antonio
Photo #(s) and Direction: Yes	

Weather Conditions:

Current Weather and Temperature: 55 F, Sunny
Weather within previous 72 hrs: Rainy and overcast

Sample Information:

Sample ID #: SED-2
Sample Location (GPS Coordinates or field ties): Upstream of Pickpocket Dam
Water Depth: 6.6 feet
Probing Depth: Until refusal

Field Notes

Sediment Type: Mucky soil
Sediment Description: Fine to very fine brown sand with some silt, some organics, mucky
Sample Type (composite, grab, etc.): Grab
Approx. Length of Sediment Core: Auger
Depth of penetration of the core into the sediment / amount of sediment recovery: N/A

Additional Comments / Observations:

Sampling began at 9:45 am, finished at 9:50 am

Sediment sample collected with hand auger off boat near impounded sand. VHB collected enough sample volume for MS/D sample to be submitted. Sediment sample was homogenized in a steel bowl. Prior to be deposited in the steel bowl, the bowl was cleaned with Alconox.

Field Notes

Date:	April 18, 2023	**Notes Taken By:**	Eric Sirkovich
Place:	Exeter, NH		
Project No.:	52151.06	**Re:**	SED-3

Field Sampling Data Sheet

General Information:

Date and Time: 4/18/2023; 11:40	VHB Project #: 52151.06
Location (Town/City): Exeter, NH	Project Name: Pickpocket Dam
Field Sampler: Paige Cochrane	Project Manager: Jacob San Antonio
Photo #(s) and Direction: Yes	

Weather Conditions:

Current Weather and Temperature: 55 F, Clear
Weather within previous 72 hrs: Rainy and overcast

Sample Information:

Sample ID #: SED-3 A-E
Sample Location (GPS Coordinates or field ties): Downstream of Pickpocket Dam
Water Depth: Less than 3 feet and variable
Probing Depth: 1 foot

Sediment Type: River very rocky with minimal surficial sediment
Sediment Description: See below
Sample Type (composite, grab, etc.): Composite
Approx. Length of Sediment Core: Auger
Depth of penetration of the core into the sediment / amount of sediment recovery: N/A

Additional Comments / Observations:

Sample time: 11:40

3A: Coarse to medium sand and rounded small rocks, trace silt, no organics, low density

3B: Medium sand, little to some silt, some small rounded rocks, some organics, low density

3C: Fine to very fine sand and silt, some rounded rocks, some organics, low density; sample preserved for VOCs 3D: Medium sand and rounded gravel, little silt, trace organics, low density

3E: Medium to coarse sand and rounded gravel, low density

No odor in any sample. Trace glass throughout samples.

Discrete sediment samples were homogenized in a steel bowl. Prior to be deposited in the steel bowl, the bowl was cleaned with Alconox.

Field Notes

Date:	April 18, 2023	**Notes Taken By:**	Paige Cochrane
Place:	Exeter, NH		
Project No.:	52151.06	**Re:**	SED-4

Field Sampling Data Sheet

General Information:

Date and Time: 4/18/2023	VHB Project #: 52151.06
Location (Town/City): Exeter, NH	Project Name: Pickpocket Dam
Field Sampler: Paige Cochrane	Project Manager: Jacob San Antonio
Photo #(s) and Direction: Yes	

Weather Conditions:

Current Weather and Temperature: 55 F, Clear
Weather within previous 72 hrs: Rainy

Sample Information:

Sample ID #: SED-4
Sample Location (GPS Coordinates or field ties): Downstream of Pickpocket Dam
Water Depth: Less than 3 feet and variable
Probing Depth: 1 foot

Field Notes

Sediment Type: Rocky with minimal sediment at the surface. Water flowing
Sediment Description: See below
Sample Type (composite, grab, etc.): Composite (A-E)
Approx. Length of Sediment Core: Auger to 1 foot per SAP
Depth of penetration of the core into the sediment / amount of sediment recovery: 1 foot

Additional Comments / Observations:

Sample Time: 12:30

4A: Coarse to medium sand and rounded gravel, some rounded rocks, low density; sample preserved for VOCs

4B: Coarse to medium sand, some rounded gravel, trace silt, no organics, low density

4C: Same as 4B

4D: Same as 4B

4E: Coarse to medium sand and gravel, no organics

Discrete sediment samples were homogenized in a steel bowl. Prior to be deposited in the steel bowl, the bowl was cleaned with Alconox.

Field Notes

Date: April 18, 2023 **Notes Taken By:** Paige Cochrane

Place: Exeter, NH

Project No.: 52151.06 **Re:** SED-5

Field Sampling Data Sheet

General Information:

Date and Time: 4/18/2023; 9:00	VHB Project #: 52151.06
Location (Town/City): Exeter, NH	Project Name: Pickpocket Dam
Field Sampler: Paige Cochrane	Project Manager: Jacob San Antonio
Photo #(s) and Direction: Yes	

Weather Conditions:

Current Weather and Temperature: 55 F, Clear
Weather within previous 72 hrs: Rainy and overcast

Sample Information:

Sample ID #: SED-5
Sample Location (GPS Coordinates or field ties): Upstream of Pickpocket Dam
Water Depth: 7.5 feet
Probing Depth: Until refusal

Field Notes

Sediment Type: Mucky soil
Sediment Description: Fine to very fine and silt, some to trace organics, mucky
Sample Type (composite, grab, etc.): Grab
Approx. Length of Sediment Core: N/A to Ponar sampler
Depth of penetration of the core into the sediment / amount of sediment recovery: N/A

Additional Comments / Observations:

- Sample Time: 9:00
-
- VHB attempted to collect sample with Ponar Sampler but was unable to collect.
- VHB collected sample with auger and contained within a steel bowl that was transferred to plastic bag. Auger and bowl rinsed after sampling.
- Discrete sediment samples were homogenized in a steel bowl. Prior to be deposited in the steel bowl, the bowl was cleaned with Alconox.

PHOENIX Environmental Laboratories, Inc.

Thursday, May 18, 2023

Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Project ID: PICKPOCKET DAM
SDG ID: GCN87690
Sample ID#s: CN87690 - CN87695

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

Enclosed are revised Analysis Report pages. Please replace and discard the original pages. If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

PHOENIX
Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Sample Id Cross Reference

May 18, 2023

SDG I.D.: GCN87690

Project ID: PICKPOCKET DAM

Client Id	Lab Id	Matrix
SED-1	CN87690	SEDIMENT
SED-2	CN87691	SEDIMENT
SED-2 FD	CN87692	SEDIMENT
SED-3	CN87693	SEDIMENT
SED-4	CN87694	SEDIMENT
SED-5	CN87695	SEDIMENT

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	10:05
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87690

Project ID: PICKPOCKET DAM
Client ID: SED-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.33	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	9.64	0.67	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.60	0.27	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.49	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	23.8	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	8.5	0.7	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	15000	50	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.07	0.07	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	496	3.3	mg/Kg	10	04/22/23	CPP	SW6010D	
Nickel	14.9	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	29.0	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 3.3	3.3	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 1.3	1.3	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 3.0	3.0	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	70.0	0.7	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	34		%		04/20/23	CV	SW846-%Solid	
Chloride	< 147	147	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	2880	413	mg/Kg	1	04/28/23	KDB	E351.1	1
Field Extraction	Completed				04/18/23		SW5035A	1
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for PCB	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for Pesticide	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for SVOA	Completed				04/20/23	S/MO/M	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	
Sieve Test	Completed	0	%		04/28/23	*	ASTM C136, C117	

Ver 2

Project ID: PICKPOCKET DAM

Client ID: SED-1

Phoenix I.D.: CN87690

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Polychlorinated Biphenyls								
PCB-1016	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1221	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1232	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1242	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1248	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1254	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1260	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1262	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1268	ND	0.71	mg/Kg	5	04/27/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	66		%	5	04/27/23	SC	30 - 150 %	
% DCBP (Confirmation)	69		%	5	04/27/23	SC	30 - 150 %	
% TCMX	73		%	5	04/27/23	SC	30 - 150 %	
% TCMX (Confirmation)	77		%	5	04/27/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
4,4' -DDE	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
4,4' -DDT	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
a-BHC	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Alachlor	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	1
Aldrin	ND	0.014	mg/Kg	2	04/28/23	AW	SW8081B	
b-BHC	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Chlordane	ND	0.14	mg/Kg	2	04/28/23	AW	SW8081B	
d-BHC	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Dieldrin	ND	0.014	mg/Kg	2	04/28/23	AW	SW8081B	
Endosulfan I	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Endosulfan II	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Endosulfan sulfate	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Endrin	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Endrin aldehyde	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Endrin ketone	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
g-BHC	ND	0.0057	mg/Kg	2	04/28/23	AW	SW8081B	
Heptachlor	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Heptachlor epoxide	ND	0.028	mg/Kg	2	04/28/23	AW	SW8081B	
Hexachlorobenzene	ND	0.014	mg/Kg	2	04/28/23	AW	SW8081B	1
Methoxychlor	ND	0.14	mg/Kg	2	04/28/23	AW	SW8081B	
Toxaphene	ND	0.57	mg/Kg	2	04/28/23	AW	SW8081B	
QA/QC Surrogates								
% DCBP	67		%	2	04/28/23	AW	30 - 150 %	
% DCBP (Confirmation)	93		%	2	04/28/23	AW	30 - 150 %	
% TCMX	67		%	2	04/28/23	AW	30 - 150 %	
% TCMX (Confirmation)	105		%	2	04/28/23	AW	30 - 150 %	
Volatiles								
1,1,1,2-Tetrachloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,1,1-Trichloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,1,2,2-Tetrachloroethane	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	

Ver 2

Project ID: PICKPOCKET DAM
Client ID: SED-1

Phoenix I.D.: CN87690

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,1,2-Trichloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,1-Dichloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,1-Dichloroethene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,1-Dichloropropene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,2,3-Trichlorobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2,3-Trichloropropane	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2,4-Trichlorobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2,4-Trimethylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2-Dibromo-3-chloropropane	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2-Dibromoethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,2-Dichlorobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,2-Dichloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,2-Dichloropropane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,3,5-Trimethylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,3-Dichlorobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
1,3-Dichloropropane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
1,4-Dichlorobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
2,2-Dichloropropane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
2-Chlorotoluene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
2-Hexanone	ND	L 0.073	mg/Kg	1	05/17/23	JLI	SW8260C	
2-Isopropyltoluene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	[1]
4-Chlorotoluene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
4-Methyl-2-pentanone	ND	L 0.073	mg/Kg	1	05/17/23	JLI	SW8260C	
Acetone	ND	L 0.29	mg/Kg	1	05/17/23	JLI	SW8260C	
Acrylonitrile	ND	L 0.029	mg/Kg	1	05/17/23	JLI	SW8260C	
Benzene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Bromobenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
Bromochloromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Bromodichloromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Bromoform	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Bromomethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Carbon Disulfide	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Carbon tetrachloride	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Chlorobenzene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Chloroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Chloroform	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Chloromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
cis-1,2-Dichloroethene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
cis-1,3-Dichloropropene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Dibromochloromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Dibromomethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Dichlorodifluoromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Ethylbenzene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Hexachlorobutadiene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
Isopropylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
m&p-Xylene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Methyl Ethyl Ketone	ND	L 0.073	mg/Kg	1	05/17/23	JLI	SW8260C	
Methyl t-butyl ether (MTBE)	ND	L 0.029	mg/Kg	1	05/17/23	JLI	SW8260C	
Methylene chloride	ND	L 0.029	mg/Kg	1	05/17/23	JLI	SW8260C	

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Naphthalene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
n-Butylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
n-Propylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
o-Xylene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
p-Isopropyltoluene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
sec-Butylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
Styrene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
tert-Butylbenzene	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C	
Tetrachloroethene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Tetrahydrofuran (THF)	ND	L 0.029	mg/Kg	1	05/17/23	JLI	SW8260C	
Toluene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Total Xylenes	ND	0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
trans-1,2-Dichloroethene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
trans-1,3-Dichloropropene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
trans-1,4-dichloro-2-butene	ND	1.8	mg/Kg	50	05/17/23	JLI	SW8260C	
Trichloroethene	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Trichlorofluoromethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Trichlorotrifluoroethane	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
Vinyl chloride	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C	
QA/QC Surrogates								
% 1,2-dichlorobenzene-d4	92		%	1	05/17/23	JLI	70 - 130 %	
% Bromofluorobenzene	80		%	1	05/17/23	JLI	70 - 130 %	
% Dibromofluoromethane	93		%	1	05/17/23	JLI	70 - 130 %	
% Toluene-d8	96		%	1	05/17/23	JLI	70 - 130 %	
% 1,2-dichlorobenzene-d4 (50x)	99		%	50	05/17/23	JLI	70 - 130 %	
% Bromofluorobenzene (50x)	95		%	50	05/17/23	JLI	70 - 130 %	
% Dibromofluoromethane (50x)	90		%	50	05/17/23	JLI	70 - 130 %	
% Toluene-d8 (50x)	100		%	50	05/17/23	JLI	70 - 130 %	

Oxygenates & Dioxane

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,4-Dioxane	ND	L 0.29	mg/Kg	1	05/17/23	JLI	SW8260C (OXY)	
Diethyl ether	ND	0.91	mg/Kg	50	05/17/23	JLI	SW8260C (OXY)	
Di-isopropyl ether	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C (OXY)	1
Ethyl tert-butyl ether	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C (OXY)	1
tert-amyl methyl ether	ND	L 0.015	mg/Kg	1	05/17/23	JLI	SW8260C (OXY)	1

Semivolatiles

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,1-Biphenyl	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4-Trichlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
1,2-Dichlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
1,2-Diphenylhydrazine	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D	
1,3-Dichlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
1,4-Dichlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
2,2'-Oxybis(1-Chloropropane)	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	1
2,4,5-Trichlorophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
2,4,6-Trichlorophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dichlorophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dimethylphenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dinitrophenol	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-1

Phoenix I.D.: CN87690

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2,4-Dinitrotoluene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2,6-Dinitrotoluene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2-Chloronaphthalene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2-Chlorophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2-Methylnaphthalene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2-Methylphenol (o-cresol)	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
2-Nitroaniline	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
2-Nitrophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
3,3'-Dichlorobenzidine	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
3-Nitroaniline	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
4,6-Dinitro-2-methylphenol	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
4-Bromophenyl phenyl ether	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
4-Chloro-3-methylphenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
4-Chloroaniline	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
4-Chlorophenyl phenyl ether	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
4-Nitroaniline	ND	2.7	mg/Kg	1	04/21/23	AW	SW8270D
4-Nitrophenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Acenaphthene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Acenaphthylene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Acetophenone	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Aniline	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Anthracene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benz(a)anthracene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzidine	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzo(a)pyrene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzo(b)fluoranthene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzo(ghi)perylene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzo(k)fluoranthene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Benzoic acid	ND	3.4	mg/Kg	1	04/21/23	AW	SW8270D
Benzyl butyl phthalate	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Bis(2-chloroethoxy)methane	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Bis(2-chloroethyl)ether	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Bis(2-ethylhexyl)phthalate	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Carbazole	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Chrysene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Dibenz(a,h)anthracene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Dibenzofuran	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Diethyl phthalate	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Dimethylphthalate	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Di-n-butylphthalate	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Di-n-octylphthalate	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Fluoranthene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Fluorene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobutadiene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorocyclopentadiene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Hexachloroethane	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Indeno(1,2,3-cd)pyrene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Isophorone	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Naphthalene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Nitrobenzene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodimethylamine	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodi-n-propylamine	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodiphenylamine	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Pentachloronitrobenzene	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Pentachlorophenol	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
Phenanthrene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Phenol	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Pyrene	ND	1.2	mg/Kg	1	04/21/23	AW	SW8270D
Pyridine	ND	1.7	mg/Kg	1	04/21/23	AW	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	68		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorobiphenyl	55		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorophenol	46		%	1	04/21/23	AW	30 - 130 %
% Nitrobenzene-d5	65		%	1	04/21/23	AW	30 - 130 %
% Phenol-d5	62		%	1	04/21/23	AW	30 - 130 %
% Terphenyl-d14	35		%	1	04/21/23	AW	30 - 130 %

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

Volatile Comment:
L flag signifies that this sample was not collected in accordance with EPA method 5035. NELAC requires the laboratory to qualify the volatile soil data as biased low.

Volatile Comment:
There was a suppression of the last internal standard in the low level analysis, all affected compounds are reported from the methanol preserved high level analysis which did not exhibit this interference.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

May 18, 2023

Reviewed and Released by: Greg Lawrence, Assistant Lab Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	9:50
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87691

Project ID: PICKPOCKET DAM
Client ID: SED-2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.36	0.36	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	7.92	0.73	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.56	0.29	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.44	0.36	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	23.3	0.36	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	8.7	0.7	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	11700	55	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.08	0.08	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	341	3.6	mg/Kg	10	04/22/23	CPP	SW6010D	
Nickel	13.6	0.36	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	32.2	0.36	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 3.6	3.6	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 1.5	1.5	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 3.3	3.3	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	62.0	0.7	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	32		%		04/20/23	CV	SW846-%Solid	
Chloride	< 156	156	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	3470	438	mg/Kg	1	04/28/23	KDB	E351.1	1
Client MS/MSD	Completed				04/25/23			
Soil Extraction for PCB	Completed				04/25/23	C/MO	SW3545A	
Soil Extraction for Pesticide	Completed				04/25/23	C/MO	SW3545A	
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for SVOA	Completed				04/20/23	S/MO/M	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	
Sieve Test	Completed	0	%		04/28/23	*	ASTM C136, C117	

Ver 2

Project ID: PICKPOCKET DAM
Client ID: SED-2

Phoenix I.D.: CN87691

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Polychlorinated Biphenyls								
PCB-1016	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1221	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1232	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1242	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1248	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1254	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1260	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1262	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1268	ND	0.51	mg/Kg	5	04/27/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	59		%	5	04/27/23	SC	30 - 150 %	
% DCBP (Confirmation)	58		%	5	04/27/23	SC	30 - 150 %	
% TCMX	54		%	5	04/27/23	SC	30 - 150 %	
% TCMX (Confirmation)	60		%	5	04/27/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
4,4' -DDE	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
4,4' -DDT	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
a-BHC	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Alachlor	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	1
Aldrin	ND	0.01	mg/Kg	2	04/27/23	KCA	SW8081B	
b-BHC	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Chlordane	ND	0.1	mg/Kg	2	04/27/23	KCA	SW8081B	
d-BHC	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Dieldrin	ND	0.01	mg/Kg	2	04/27/23	KCA	SW8081B	
Endosulfan I	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Endosulfan II	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Endosulfan sulfate	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Endrin	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Endrin aldehyde	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Endrin ketone	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
g-BHC	ND	0.0041	mg/Kg	2	04/27/23	KCA	SW8081B	
Heptachlor	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Heptachlor epoxide	ND	0.02	mg/Kg	2	04/27/23	KCA	SW8081B	
Hexachlorobenzene	ND	0.01	mg/Kg	2	04/27/23	KCA	SW8081B	1
Methoxychlor	ND	0.1	mg/Kg	2	04/27/23	KCA	SW8081B	
Toxaphene	ND	0.41	mg/Kg	2	04/27/23	KCA	SW8081B	
QA/QC Surrogates								
% DCBP	58		%	2	04/27/23	KCA	30 - 150 %	
% DCBP (Confirmation)	70		%	2	04/27/23	KCA	30 - 150 %	
% TCMX	56		%	2	04/27/23	KCA	30 - 150 %	
% TCMX (Confirmation)	69		%	2	04/27/23	KCA	30 - 150 %	
Semivolatiles								
1,1-Biphenyl	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4-Trichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-2

Phoenix I.D.: CN87691

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,2-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2-Diphenylhydrazine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
1,3-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,4-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,2'-Oxybis(1-Chloropropane)	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	1
2,4,5-Trichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4,6-Trichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dimethylphenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dinitrophenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dinitrotoluene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,6-Dinitrotoluene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Chloronaphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Chlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Methylnaphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Methylphenol (o-cresol)	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Nitroaniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
2-Nitrophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
3&4-Methylphenol (m&p-cresol)	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
3,3'-Dichlorobenzidine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
3-Nitroaniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4,6-Dinitro-2-methylphenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4-Bromophenyl phenyl ether	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chloro-3-methylphenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chloroaniline	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chlorophenyl phenyl ether	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Nitroaniline	ND	3.3	mg/Kg	1	04/21/23	AW	SW8270D	
4-Nitrophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acenaphthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acenaphthylene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acetophenone	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Aniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benz(a)anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzidine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(a)pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(b)fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(ghi)perylene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(k)fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzoic acid	5.3	4.2	mg/Kg	1	04/21/23	AW	SW8270D	
Benzyl butyl phthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-chloroethoxy)methane	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-chloroethyl)ether	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-ethylhexyl)phthalate	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Carbazole	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Chrysene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Dibenz(a,h)anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Dibenzofuran	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Diethyl phthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-2

Phoenix I.D.: CN87691

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Dimethylphthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Di-n-butylphthalate	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Di-n-octylphthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Fluorene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobutadiene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorocyclopentadiene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachloroethane	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Indeno(1,2,3-cd)pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Isophorone	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Naphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Nitrobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodimethylamine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodi-n-propylamine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodiphenylamine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Pentachloronitrobenzene	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Pentachlorophenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Phenanthrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Phenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Pyridine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	74		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorobiphenyl	67		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorophenol	67		%	1	04/21/23	AW	30 - 130 %
% Nitrobenzene-d5	68		%	1	04/21/23	AW	30 - 130 %
% Phenol-d5	70		%	1	04/21/23	AW	30 - 130 %
% Terphenyl-d14	53		%	1	04/21/23	AW	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
May 18, 2023
Reviewed and Released by: Greg Lawrence, Assistant Lab Director

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	9:50
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87692

Project ID: PICKPOCKET DAM
Client ID: SED-2 FD

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.31	0.31	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	12.4	0.62	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.59	0.25	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.60	0.31	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	23.1	0.31	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	9.2	0.6	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	12500	46	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.07	0.07	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	396	3.1	mg/Kg	10	04/22/23	CPP	SW6010D	
Nickel	14.3	0.31	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	33.3	0.31	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 3.1	3.1	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 1.2	1.2	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 2.8	2.8	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	72.4	0.6	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	33		%		04/20/23	CV	SW846-%Solid	
Chloride	< 152	152	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	3370	425	mg/Kg	1	04/28/23	KDB	E351.1	1
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for PCB	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for Pesticide	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for SVOA	Completed				04/20/23	S/MO/M	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	

Polychlorinated Biphenyls

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1016	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A
PCB-1221	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
PCB-1232	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1242	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1248	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1254	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1260	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1262	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1268	ND	0.76	mg/Kg	5	04/27/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	61		%	5	04/27/23	SC	30 - 150 %	
% DCBP (Confirmation)	67		%	5	04/27/23	SC	30 - 150 %	
% TCMX	66		%	5	04/27/23	SC	30 - 150 %	
% TCMX (Confirmation)	73		%	5	04/27/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDE	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDT	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
a-BHC	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Alachlor	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	1
Aldrin	ND	0.015	mg/Kg	2	04/29/23	AW	SW8081B	
b-BHC	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Chlordane	ND	0.15	mg/Kg	2	04/29/23	AW	SW8081B	
d-BHC	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Dieldrin	ND	0.015	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan I	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan II	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan sulfate	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin aldehyde	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin ketone	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
g-BHC	ND	0.0061	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor epoxide	ND	0.03	mg/Kg	2	04/29/23	AW	SW8081B	
Hexachlorobenzene	ND	0.015	mg/Kg	2	04/29/23	AW	SW8081B	1
Methoxychlor	ND	0.15	mg/Kg	2	04/29/23	AW	SW8081B	
Toxaphene	ND	0.61	mg/Kg	2	04/29/23	AW	SW8081B	
QA/QC Surrogates								
% DCBP	60		%	2	04/29/23	AW	30 - 150 %	
% DCBP (Confirmation)	75		%	2	04/29/23	AW	30 - 150 %	
% TCMX	59		%	2	04/29/23	AW	30 - 150 %	
% TCMX (Confirmation)	70		%	2	04/29/23	AW	30 - 150 %	
Semivolatiles								
1,1-Biphenyl	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2,4-Trichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,2-Diphenylhydrazine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
1,3-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
1,4-Dichlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-2 FD

Phoenix I.D.: CN87692

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
2,2'-Oxybis(1-Chloropropane)	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	1
2,4,5-Trichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4,6-Trichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dichlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dimethylphenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dinitrophenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
2,4-Dinitrotoluene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2,6-Dinitrotoluene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Chloronaphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Chlorophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Methylnaphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Methylphenol (o-cresol)	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
2-Nitroaniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
2-Nitrophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
3&4-Methylphenol (m&p-cresol)	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
3,3'-Dichlorobenzidine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
3-Nitroaniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4,6-Dinitro-2-methylphenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4-Bromophenyl phenyl ether	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chloro-3-methylphenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chloroaniline	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Chlorophenyl phenyl ether	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
4-Nitroaniline	ND	3.4	mg/Kg	1	04/21/23	AW	SW8270D	
4-Nitrophenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acenaphthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acenaphthylene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Acetophenone	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Aniline	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benz(a)anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzidine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(a)pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(b)fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(ghi)perylene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzo(k)fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Benzoic acid	ND	4.3	mg/Kg	1	04/21/23	AW	SW8270D	
Benzyl butyl phthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-chloroethoxy)methane	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-chloroethyl)ether	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Bis(2-ethylhexyl)phthalate	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Carbazole	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Chrysene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Dibenz(a,h)anthracene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Dibenzofuran	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Diethyl phthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Dimethylphthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Di-n-butylphthalate	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D	
Di-n-octylphthalate	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	
Fluoranthene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D	

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Fluorene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorobutadiene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachlorocyclopentadiene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Hexachloroethane	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Indeno(1,2,3-cd)pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Isophorone	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Naphthalene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Nitrobenzene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodimethylamine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodi-n-propylamine	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
N-Nitrosodiphenylamine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Pentachloronitrobenzene	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Pentachlorophenol	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
Phenanthrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Phenol	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Pyrene	ND	1.5	mg/Kg	1	04/21/23	AW	SW8270D
Pyridine	ND	2.1	mg/Kg	1	04/21/23	AW	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	74		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorobiphenyl	63		%	1	04/21/23	AW	30 - 130 %
% 2-Fluorophenol	49		%	1	04/21/23	AW	30 - 130 %
% Nitrobenzene-d5	72		%	1	04/21/23	AW	30 - 130 %
% Phenol-d5	67		%	1	04/21/23	AW	30 - 130 %
% Terphenyl-d14	44		%	1	04/21/23	AW	30 - 130 %

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

Phyllis Shiller, Laboratory Director
May 18, 2023
Reviewed and Released by: Greg Lawrence, Assistant Lab Director

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	11:40
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87693

Project ID: PICKPOCKET DAM
Client ID: SED-3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.12	0.12	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	4.69	0.24	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.18	0.10	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.16	0.12	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	21.6	0.12	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	5.3	0.2	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	10700	18	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.03	0.03	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	577	12	mg/Kg	100	04/25/23	CPP	SW6010D	
Nickel	12.3	0.12	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	10.9	0.12	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 1.2	1.2	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 0.5	0.5	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 1.1	1.1	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	28.4	0.2	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	88		%		04/20/23	CV	SW846-%Solid	
Chloride	< 57	57	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	401	163	mg/Kg	1	04/28/23	KDB	E351.1	1
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for PCB	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for Pesticide	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for SVOA	Completed				04/24/23	R/MO	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	
Sieve Test	Completed	0	%		04/28/23	*	ASTM C136, C117	

Polychlorinated Biphenyls

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1016	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A

Project ID: PICKPOCKET DAM
Client ID: SED-3

Phoenix I.D.: CN87693

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
PCB-1221	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1232	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1242	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1248	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1254	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1260	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1262	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
PCB-1268	ND	0.37	mg/Kg	10	04/27/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	66		%	10	04/27/23	SC	30 - 150 %	
% DCBP (Confirmation)	67		%	10	04/27/23	SC	30 - 150 %	
% TCMX	67		%	10	04/27/23	SC	30 - 150 %	
% TCMX (Confirmation)	70		%	10	04/27/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDE	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDT	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
a-BHC	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Alachlor	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	1
Aldrin	ND	0.0037	mg/Kg	2	04/29/23	AW	SW8081B	
b-BHC	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Chlordane	ND	0.037	mg/Kg	2	04/29/23	AW	SW8081B	
d-BHC	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Dieldrin	ND	0.0037	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan I	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan II	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan sulfate	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin aldehyde	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin ketone	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
g-BHC	ND	0.0015	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor epoxide	ND	0.0074	mg/Kg	2	04/29/23	AW	SW8081B	
Hexachlorobenzene	ND	0.0037	mg/Kg	2	04/29/23	AW	SW8081B	1
Methoxychlor	ND	0.037	mg/Kg	2	04/29/23	AW	SW8081B	
Toxaphene	ND	0.15	mg/Kg	2	04/29/23	AW	SW8081B	
QA/QC Surrogates								
% DCBP	59		%	2	04/29/23	AW	30 - 150 %	
% DCBP (Confirmation)	53		%	2	04/29/23	AW	30 - 150 %	
% TCMX	59		%	2	04/29/23	AW	30 - 150 %	
% TCMX (Confirmation)	65		%	2	04/29/23	AW	30 - 150 %	
Semivolatiles								
1,1-Biphenyl	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2,4-Trichlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2-Dichlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2-Diphenylhydrazine	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
1,3-Dichlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-3

Phoenix I.D.: CN87693

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,4-Dichlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,2'-Oxybis(1-Chloropropane)	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	1
2,4,5-Trichlorophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4,6-Trichlorophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dichlorophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dimethylphenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dinitrophenol	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dinitrotoluene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2,6-Dinitrotoluene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Chloronaphthalene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Chlorophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Methylnaphthalene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Methylphenol (o-cresol)	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Nitroaniline	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Nitrophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
3&4-Methylphenol (m&p-cresol)	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
3,3'-Dichlorobenzidine	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
3-Nitroaniline	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
4,6-Dinitro-2-methylphenol	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Bromophenyl phenyl ether	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chloro-3-methylphenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chloroaniline	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chlorophenyl phenyl ether	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Nitroaniline	ND	0.6	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Nitrophenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Acenaphthene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Acenaphthylene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Acetophenone	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Aniline	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
Anthracene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benz(a)anthracene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzidine	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(a)pyrene	0.27	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(b)fluoranthene	0.29	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(ghi)perylene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(k)fluoranthene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzoic acid	ND	0.75	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzyl butyl phthalate	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-chloroethoxy)methane	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-ethylhexyl)phthalate	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
Carbazole	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
Chrysene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Dibenz(a,h)anthracene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Dibenzofuran	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Diethyl phthalate	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Dimethylphthalate	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	
Di-n-butylphthalate	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D	
Di-n-octylphthalate	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D	

Project ID: PICKPOCKET DAM

Client ID: SED-3

Phoenix I.D.: CN87693

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Fluoranthene	0.44	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Fluorene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorobutadiene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorocyclopentadiene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachloroethane	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Indeno(1,2,3-cd)pyrene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Isophorone	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Naphthalene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Nitrobenzene	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodimethylamine	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodi-n-propylamine	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodiphenylamine	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D
Pentachloronitrobenzene	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D
Pentachlorophenol	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D
Phenanthrene	0.32	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Phenol	ND	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Pyrene	0.34	0.26	mg/Kg	1	04/24/23	KCA	SW8270D
Pyridine	ND	0.38	mg/Kg	1	04/24/23	KCA	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	85		%	1	04/24/23	KCA	30 - 130 %
% 2-Fluorobiphenyl	77		%	1	04/24/23	KCA	30 - 130 %
% 2-Fluorophenol	76		%	1	04/24/23	KCA	30 - 130 %
% Nitrobenzene-d5	76		%	1	04/24/23	KCA	30 - 130 %
% Phenol-d5	84		%	1	04/24/23	KCA	30 - 130 %
% Terphenyl-d14	69		%	1	04/24/23	KCA	30 - 130 %

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

May 18, 2023

Reviewed and Released by: Greg Lawrence, Assistant Lab Director

Ver 2

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	12:30
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87694

Project ID: PICKPOCKET DAM
Client ID: SED-4

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.11	0.11	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	10.7	0.22	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.31	0.09	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.28	0.11	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	35.5	0.11	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	6.9	0.2	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	20300	17	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.03	0.03	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	713	11	mg/Kg	100	04/25/23	CPP	SW6010D	
Nickel	13.3	0.11	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	9.41	0.11	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 1.1	1.1	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 0.4	0.4	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 1.0	1.0	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	43.9	0.2	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	82		%		04/20/23	CV	SW846-%Solid	
Chloride	< 61	61	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	447	197	mg/Kg	1	04/28/23	KDB	E351.1	1
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for PCB	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for Pesticide	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for SVOA	Completed				04/24/23	R/MO	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	
Sieve Test	Completed	0	%		04/28/23	*	ASTM C136, C117	

Polychlorinated Biphenyls

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1016	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A

Ver 2

Project ID: PICKPOCKET DAM
Client ID: SED-4

Phoenix I.D.: CN87694

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
PCB-1221	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1232	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1242	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1248	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1254	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1260	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1262	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
PCB-1268	ND	0.39	mg/Kg	10	04/28/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	71		%	10	04/28/23	SC	30 - 150 %	
% DCBP (Confirmation)	87		%	10	04/28/23	SC	30 - 150 %	
% TCMX	79		%	10	04/28/23	SC	30 - 150 %	
% TCMX (Confirmation)	83		%	10	04/28/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDE	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDT	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
a-BHC	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Alachlor	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	1
Aldrin	ND	0.0039	mg/Kg	2	04/29/23	AW	SW8081B	
b-BHC	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Chlordane	ND	0.039	mg/Kg	2	04/29/23	AW	SW8081B	
d-BHC	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Dieldrin	ND	0.0039	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan I	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan II	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan sulfate	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin aldehyde	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin ketone	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
g-BHC	ND	0.0016	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor epoxide	ND	0.0079	mg/Kg	2	04/29/23	AW	SW8081B	
Hexachlorobenzene	ND	0.0039	mg/Kg	2	04/29/23	AW	SW8081B	1
Methoxychlor	ND	0.039	mg/Kg	2	04/29/23	AW	SW8081B	
Toxaphene	ND	0.16	mg/Kg	2	04/29/23	AW	SW8081B	
QA/QC Surrogates								
% DCBP	72		%	2	04/29/23	AW	30 - 150 %	
% DCBP (Confirmation)	63		%	2	04/29/23	AW	30 - 150 %	
% TCMX	74		%	2	04/29/23	AW	30 - 150 %	
% TCMX (Confirmation)	78		%	2	04/29/23	AW	30 - 150 %	
Semivolatiles								
1,1-Biphenyl	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
1,2,4-Trichlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
1,2-Dichlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
1,2-Diphenylhydrazine	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
1,3-Dichlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	

Ver 2

Project ID: PICKPOCKET DAM
Client ID: SED-4

Phoenix I.D.: CN87694

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,4-Dichlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,2'-Oxybis(1-Chloropropane)	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	1
2,4,5-Trichlorophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,4,6-Trichlorophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,4-Dichlorophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,4-Dimethylphenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,4-Dinitrophenol	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
2,4-Dinitrotoluene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2,6-Dinitrotoluene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Chloronaphthalene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Chlorophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Methylnaphthalene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Methylphenol (o-cresol)	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Nitroaniline	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
2-Nitrophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
3&4-Methylphenol (m&p-cresol)	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
3,3'-Dichlorobenzidine	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
3-Nitroaniline	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
4,6-Dinitro-2-methylphenol	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Bromophenyl phenyl ether	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Chloro-3-methylphenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Chloroaniline	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Chlorophenyl phenyl ether	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Nitroaniline	ND	0.63	mg/Kg	1	04/25/23	KCA	SW8270D	
4-Nitrophenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Acenaphthene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Acenaphthylene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Acetophenone	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Aniline	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
Anthracene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benz(a)anthracene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzidine	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzo(a)pyrene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzo(b)fluoranthene	0.3	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzo(ghi)perylene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzo(k)fluoranthene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzoic acid	ND	0.79	mg/Kg	1	04/25/23	KCA	SW8270D	
Benzyl butyl phthalate	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Bis(2-chloroethoxy)methane	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Bis(2-chloroethyl)ether	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
Bis(2-ethylhexyl)phthalate	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
Carbazole	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
Chrysene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Dibenz(a,h)anthracene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Dibenzofuran	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Diethyl phthalate	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Dimethylphthalate	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	
Di-n-butylphthalate	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D	
Di-n-octylphthalate	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-4

Phoenix I.D.: CN87694

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Fluoranthene	0.35	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Fluorene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Hexachlorobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Hexachlorobutadiene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Hexachlorocyclopentadiene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Hexachloroethane	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Indeno(1,2,3-cd)pyrene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Isophorone	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Naphthalene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Nitrobenzene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
N-Nitrosodimethylamine	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D
N-Nitrosodi-n-propylamine	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
N-Nitrosodiphenylamine	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D
Pentachloronitrobenzene	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D
Pentachlorophenol	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D
Phenanthrene	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Phenol	ND	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Pyrene	0.36	0.28	mg/Kg	1	04/25/23	KCA	SW8270D
Pyridine	ND	0.4	mg/Kg	1	04/25/23	KCA	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	94		%	1	04/25/23	KCA	30 - 130 %
% 2-Fluorobiphenyl	86		%	1	04/25/23	KCA	30 - 130 %
% 2-Fluorophenol	81		%	1	04/25/23	KCA	30 - 130 %
% Nitrobenzene-d5	83		%	1	04/25/23	KCA	30 - 130 %
% Phenol-d5	90		%	1	04/25/23	KCA	30 - 130 %
% Terphenyl-d14	75		%	1	04/25/23	KCA	30 - 130 %

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
May 18, 2023
Reviewed and Released by: Greg Lawrence, Assistant Lab Director

Ver 2

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

Analysis Report

May 18, 2023

FOR: Attn: Paige Cochrane
Vanasse Hangen Brustlin, Inc.
101 Walnut Street
P.O. Box 9151
Watertown, MA 02471-9151

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:		04/18/23	9:00
Location Code:	VHB-MA	Received by:	CP	04/20/23	15:15
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN87690
Phoenix ID: CN87695

Project ID: PICKPOCKET DAM
Client ID: SED-5

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Silver	< 0.33	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Arsenic	13.9	0.65	mg/Kg	1	04/22/23	CPP	SW6010D	
Beryllium	0.70	0.26	mg/Kg	1	04/22/23	CPP	SW6010D	
Cadmium	0.47	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Chromium	24.1	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Copper	8.9	0.7	mg/kg	1	04/22/23	CPP	SW6010D	
Iron	13600	49	mg/Kg	10	04/22/23	CPP	SW6010D	
Mercury	< 0.06	0.06	mg/Kg	2	04/24/23	PM	SW7471B	
Manganese	379	3.3	mg/Kg	10	04/22/23	CPP	SW6010D	
Nickel	14.7	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Lead	31.3	0.33	mg/Kg	1	04/22/23	CPP	SW6010D	
Antimony	< 3.3	3.3	mg/Kg	1	04/22/23	CPP	SW6010D	
Selenium	< 1.3	1.3	mg/Kg	1	04/22/23	CPP	SW6010D	
Thallium	< 2.9	2.9	mg/Kg	1	04/22/23	CPP	SW6010D	
Zinc	61.1	0.7	mg/Kg	1	04/22/23	CPP	SW6010D	
Percent Solid	36		%		04/20/23	CV	SW846-%Solid	
Chloride	< 139	139	mg/kg	10	04/30/23	BS/EG	SW9056A	
Nitrogen Tot Kjeldahl	2110	441	mg/Kg	1	04/28/23	KDB	E351.1	1
Mercury Digestion	Completed				04/21/23	AL/AL	SW7471B	
Soil Extraction for PCB	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for Pesticide	Completed				04/26/23	B/MO/F	SW3546	
Soil Extraction for SVOA	Completed				04/24/23	R/MO	SW3546	
Total Metals Digest	Completed				04/20/23	B/P	SW3050B	
Sieve Test	Completed	0	%		04/28/23	*	ASTM C136, C117	

Polychlorinated Biphenyls

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1016	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A

Ver 2

Project ID: PICKPOCKET DAM
Client ID: SED-5

Phoenix I.D.: CN87695

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
PCB-1221	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1232	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1242	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1248	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1254	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1260	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1262	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
PCB-1268	ND	0.69	mg/Kg	5	04/27/23	SC	SW8082A	
QA/QC Surrogates								
% DCBP	73		%	5	04/27/23	SC	30 - 150 %	
% DCBP (Confirmation)	76		%	5	04/27/23	SC	30 - 150 %	
% TCMX	81		%	5	04/27/23	SC	30 - 150 %	
% TCMX (Confirmation)	88		%	5	04/27/23	SC	30 - 150 %	
Pesticides								
4,4' -DDD	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDE	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
4,4' -DDT	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
a-BHC	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Alachlor	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	1
Aldrin	ND	0.014	mg/Kg	2	04/29/23	AW	SW8081B	
b-BHC	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Chlordane	ND	0.14	mg/Kg	2	04/29/23	AW	SW8081B	
d-BHC	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Dieldrin	ND	0.014	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan I	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan II	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Endosulfan sulfate	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin aldehyde	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Endrin ketone	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
g-BHC	ND	0.0055	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Heptachlor epoxide	ND	0.027	mg/Kg	2	04/29/23	AW	SW8081B	
Hexachlorobenzene	ND	0.014	mg/Kg	2	04/29/23	AW	SW8081B	1
Methoxychlor	ND	0.14	mg/Kg	2	04/29/23	AW	SW8081B	
Toxaphene	ND	0.55	mg/Kg	2	04/29/23	AW	SW8081B	
QA/QC Surrogates								
% DCBP	73		%	2	04/29/23	AW	30 - 150 %	
% DCBP (Confirmation)	86		%	2	04/29/23	AW	30 - 150 %	
% TCMX	73		%	2	04/29/23	AW	30 - 150 %	
% TCMX (Confirmation)	101		%	2	04/29/23	AW	30 - 150 %	
Semivolatiles								
1,1-Biphenyl	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2,4,5-Tetrachlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2,4-Trichlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2-Dichlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
1,2-Diphenylhydrazine	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
1,3-Dichlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-5

Phoenix I.D.: CN87695

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
1,4-Dichlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,2'-Oxybis(1-Chloropropane)	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	1
2,4,5-Trichlorophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4,6-Trichlorophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dichlorophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dimethylphenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dinitrophenol	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
2,4-Dinitrotoluene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2,6-Dinitrotoluene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Chloronaphthalene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Chlorophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Methylnaphthalene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Methylphenol (o-cresol)	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Nitroaniline	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
2-Nitrophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
3&4-Methylphenol (m&p-cresol)	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
3,3'-Dichlorobenzidine	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
3-Nitroaniline	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
4,6-Dinitro-2-methylphenol	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Bromophenyl phenyl ether	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chloro-3-methylphenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chloroaniline	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Chlorophenyl phenyl ether	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Nitroaniline	ND	3	mg/Kg	1	04/24/23	KCA	SW8270D	
4-Nitrophenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Acenaphthene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Acenaphthylene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Acetophenone	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Aniline	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
Anthracene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benz(a)anthracene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzidine	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(a)pyrene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(b)fluoranthene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(ghi)perylene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzo(k)fluoranthene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzoic acid	ND	3.7	mg/Kg	1	04/24/23	KCA	SW8270D	
Benzyl butyl phthalate	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-chloroethoxy)methane	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-chloroethyl)ether	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
Bis(2-ethylhexyl)phthalate	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
Carbazole	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
Chrysene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Dibenz(a,h)anthracene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Dibenzofuran	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Diethyl phthalate	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Dimethylphthalate	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	
Di-n-butylphthalate	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D	
Di-n-octylphthalate	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D	

Project ID: PICKPOCKET DAM
Client ID: SED-5

Phoenix I.D.: CN87695

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Fluoranthene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Fluorene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorobutadiene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachlorocyclopentadiene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Hexachloroethane	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Indeno(1,2,3-cd)pyrene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Isophorone	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Naphthalene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Nitrobenzene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodimethylamine	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodi-n-propylamine	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
N-Nitrosodiphenylamine	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D
Pentachloronitrobenzene	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D
Pentachlorophenol	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D
Phenanthrene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Phenol	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Pyrene	ND	1.3	mg/Kg	1	04/24/23	KCA	SW8270D
Pyridine	ND	1.9	mg/Kg	1	04/24/23	KCA	SW8270D
QA/QC Surrogates							
% 2,4,6-Tribromophenol	83		%	1	04/24/23	KCA	30 - 130 %
% 2-Fluorobiphenyl	72		%	1	04/24/23	KCA	30 - 130 %
% 2-Fluorophenol	74		%	1	04/24/23	KCA	30 - 130 %
% Nitrobenzene-d5	71		%	1	04/24/23	KCA	30 - 130 %
% Phenol-d5	81		%	1	04/24/23	KCA	30 - 130 %
% Terphenyl-d14	69		%	1	04/24/23	KCA	30 - 130 %

1 = This parameter is not certified by the primary accrediting authority (NY NELAC) for this matrix. NY NELAC does not offer certification for all parameters at this time.

RL/PQL=Reporting/Practical Quantitation Level (Equivalent to NELAC LOQ, Limit of Quantitation) ND=Not Detected at RL/PQL
BRL=Below Reporting Level L=Biased Low
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
May 18, 2023
Reviewed and Released by: Greg Lawrence, Assistant Lab Director

Ver 2

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

QA/QC Report

May 18, 2023

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 673934 (mg/kg), QC Sample No: CN87691 2X (CN87690, CN87691, CN87692, CN87693, CN87694, CN87695)													
Mercury - Soil	BRL	0.03	<0.08	<0.08	NC	125	103	19.3	86.4	85.1	1.5	70 - 130	30

Comment:

Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.

QA/QC Batch 673803 (mg/kg), QC Sample No: CN87691 (CN87690, CN87691, CN87692, CN87693, CN87694, CN87695)

ICP Metals - Soil

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
Antimony	BRL	3.3	<3.6	<3.7	NC	102	106	3.8	80.4	79.4	1.3	75 - 125	35
Arsenic	BRL	0.67	7.92	8.65	8.80	98.2	97.5	0.7	95.1	98.6	3.6	75 - 125	35
Beryllium	BRL	0.27	0.56	0.52	NC	99.2	103	3.8	96.4	100	3.7	75 - 125	35
Cadmium	BRL	0.33	0.44	0.47	NC	99.3	108	8.4	95.3	99.2	4.0	75 - 125	35
Chromium	BRL	0.33	23.3	22.6	3.10	97.9	100	2.1	94.1	97.9	4.0	75 - 125	35
Copper	BRL	0.67	8.7	8.73	0.30	93.6	95.6	2.1	92.9	96.8	4.1	75 - 125	35
Iron	BRL	5.0	11700	11500	1.70	95.5	91.0	4.8	NC	NC	NC	75 - 125	35
Lead	BRL	0.33	32.2	30.5	5.40	91.0	89.7	1.4	93.3	97.5	4.4	75 - 125	35
Manganese	BRL	0.33	341	338	0.90	101	98.2	2.8	94.2	106	11.8	75 - 125	35
Nickel	BRL	0.33	13.6	13.4	1.50	96.7	103	6.3	94.3	98.6	4.5	75 - 125	35
Selenium	BRL	1.3	<1.5	<1.5	NC	92.8	95.0	2.3	90.5	92.9	2.6	75 - 125	35
Silver	BRL	0.33	<0.36	<0.37	NC	97.3	94.7	2.7	93.5	97.4	4.1	75 - 125	35
Thallium	BRL	3.0	<3.3	<3.3	NC	92.7	98.0	5.6	90.6	94.9	4.6	75 - 125	35
Zinc	BRL	0.67	62.0	62.0	0	99.6	96.8	2.9	90.8	95.9	5.5	75 - 125	35

Comment:

Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

PHOENIX
Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

NY # 11301

QA/QC Report

May 18, 2023

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 675590 (mg/L), QC Sample No: CN87691 (CN87690, CN87691, CN87692, CN87693, CN87694, CN87695)													
Chloride	BRL	5.0	73.3	<156	NC				99.2			90 - 110	20
QA/QC Batch 674856 (mg/Kg), QC Sample No: CN87691 17.5X (CN87690, CN87691, CN87692, CN87693, CN87694, CN87695)													
Nitrogen Tot Kjeldahl	BRL	3.51	3470	3430	1.20	99.9			101			75 - 125	30

Comment:

TKN is reported as Organic Nitrogen in the Blank, LCS, DUP and MS.

Additional criteria: LCS acceptance range for waters is 85-115% and for soils is 75-125%. MS acceptance range is 75-125%.

PHOENIX

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ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

QA/QC Report

May 18, 2023

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 674561 (mg/Kg), QC Sample No: CN87698 2X (CN87690, CN87692, CN87693, CN87694, CN87695)										
Polychlorinated Biphenyls - Sediment										
PCB-1016	ND	0.033	83	81	2.4	88	92	4.4	40 - 140	30
PCB-1221	ND	0.033							40 - 140	30
PCB-1232	ND	0.033							40 - 140	30
PCB-1242	ND	0.033							40 - 140	30
PCB-1248	ND	0.033							40 - 140	30
PCB-1254	ND	0.033							40 - 140	30
PCB-1260	ND	0.033	99	98	1.0	102	102	0.0	40 - 140	30
PCB-1262	ND	0.033							40 - 140	30
PCB-1268	ND	0.033							40 - 140	30
% DCBP (Surrogate Rec)	83	%	96	95	1.0	90	92	2.2	30 - 150	30
% DCBP (Surrogate Rec) (Confirm	78	%	92	93	1.1	87	90	3.4	30 - 150	30
% TCMX (Surrogate Rec)	71	%	80	77	3.8	80	82	2.5	30 - 150	30
% TCMX (Surrogate Rec) (Confirm	74	%	87	84	3.5	85	86	1.2	30 - 150	30
QA/QC Batch 674463 (mg/Kg), QC Sample No: CN89272 2X (CN87691)										
Polychlorinated Biphenyls - Sediment										
PCB-1016	ND	0.033	72	78	8.0	61	68	10.9	40 - 140	30
PCB-1221	ND	0.033							40 - 140	30
PCB-1232	ND	0.033							40 - 140	30
PCB-1242	ND	0.033							40 - 140	30
PCB-1248	ND	0.033							40 - 140	30
PCB-1254	ND	0.033							40 - 140	30
PCB-1260	ND	0.033	73	79	7.9	62	67	7.8	40 - 140	30
PCB-1262	ND	0.033							40 - 140	30
PCB-1268	ND	0.033							40 - 140	30
% DCBP (Surrogate Rec)	72	%	69	73	5.6	53	61	14.0	30 - 150	30
% DCBP (Surrogate Rec) (Confirm	68	%	70	70	0.0	50	57	13.1	30 - 150	30
% TCMX (Surrogate Rec)	68	%	64	70	9.0	56	64	13.3	30 - 150	30
% TCMX (Surrogate Rec) (Confirm	69	%	65	68	4.5	56	65	14.9	30 - 150	30
QA/QC Batch 674562 (mg/Kg), QC Sample No: CN87698 2X (CN87690, CN87692, CN87693, CN87694, CN87695)										
Pesticides - Sediment										
4,4' -DDD	ND	0.0017	108	95	12.8	88	95	7.7	40 - 140	30
4,4' -DDE	ND	0.0017	97	90	7.5	77	84	8.7	40 - 140	30
4,4' -DDT	ND	0.0017	97	90	7.5	78	83	6.2	40 - 140	30
a-BHC	ND	0.001	86	79	8.5	61	68	10.9	40 - 140	30
Alachlor	ND	0.0033	NA	NA	NC	NA	NA	NC	40 - 140	30
Aldrin	ND	0.001	94	84	11.2	66	73	10.1	40 - 140	30
b-BHC	ND	0.001	85	81	4.8	70	77	9.5	40 - 140	30
Chlordane	ND	0.033	102	93	9.2	81	86	6.0	40 - 140	30
d-BHC	ND	0.0033	54	46	16.0	41	45	9.3	40 - 140	30
Dieldrin	ND	0.001	97	90	7.5	75	82	8.9	40 - 140	30

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Endosulfan I	ND	0.0033	90	89	1.1	70	72	2.8	40 - 140	30	
Endosulfan II	ND	0.0033	100	97	3.0	79	87	9.6	40 - 140	30	
Endosulfan sulfate	ND	0.0033	95	90	5.4	76	81	6.4	40 - 140	30	
Endrin	ND	0.0033	97	90	7.5	76	81	6.4	40 - 140	30	
Endrin aldehyde	ND	0.0033	95	88	7.7	69	69	0.0	40 - 140	30	
Endrin ketone	ND	0.0033	96	89	7.6	76	82	7.6	40 - 140	30	
g-BHC	ND	0.001	85	77	9.9	67	68	1.5	40 - 140	30	
Heptachlor	ND	0.0033	87	80	8.4	63	70	10.5	40 - 140	30	
Heptachlor epoxide	ND	0.0033	90	83	8.1	68	77	12.4	40 - 140	30	
Hexachlorobenzene	ND	0.0033	54	46	16.0	39	43	9.8	40 - 140	30	
Methoxychlor	ND	0.0033	93	87	6.7	78	82	5.0	40 - 140	30	
Toxaphene	ND	0.13	NA	NA	NC	NA	NA	NC	40 - 140	30	
% DCBP	73	%	79	73	7.9	65	69	6.0	30 - 150	30	
% DCBP (Confirmation)	80	%	85	76	11.2	69	73	5.6	30 - 150	30	
% TCMX	70	%	80	73	9.2	60	64	6.5	30 - 150	30	
% TCMX (Confirmation)	73	%	86	76	12.3	63	67	6.2	30 - 150	30	

QA/QC Batch 674465 (mg/Kg), QC Sample No: CN89272 2X (CN87691)

Pesticides - Sediment

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
4,4' -DDD	ND	0.0017	68	62	9.2	74	65	12.9	40 - 140	30	
4,4' -DDE	ND	0.0017	63	58	8.3	94	73	25.1	40 - 140	30	
4,4' -DDT	ND	0.0017	62	56	10.2	67	64	4.6	40 - 140	30	
a-BHC	ND	0.001	59	55	7.0	52	48	8.0	40 - 140	30	
Alachlor	ND	0.0033	NA	NA	NC	NA	NA	NC	40 - 140	30	
Aldrin	ND	0.001	61	56	8.5	57	87	41.7	40 - 140	30	r
b-BHC	ND	0.001	56	51	9.3	62	66	6.3	40 - 140	30	
Chlordane	ND	0.033	63	57	10.0	94	97	3.1	40 - 140	30	
d-BHC	ND	0.0033	36	35	2.8	30	43	35.6	40 - 140	30	l,r
Dieldrin	ND	0.001	62	58	6.7	58	63	8.3	40 - 140	30	
Endosulfan I	ND	0.0033	60	57	5.1	71	44	47.0	40 - 140	30	r
Endosulfan II	ND	0.0033	66	60	9.5	64	64	0.0	40 - 140	30	
Endosulfan sulfate	ND	0.0033	63	56	11.8	54	49	9.7	40 - 140	30	
Endrin	ND	0.0033	63	59	6.6	50	56	11.3	40 - 140	30	
Endrin aldehyde	ND	0.0033	61	55	10.3	86	86	0.0	40 - 140	30	
Endrin ketone	ND	0.0033	66	57	14.6	56	51	9.3	40 - 140	30	
g-BHC	ND	0.001	56	52	7.4	59	57	3.4	40 - 140	30	
Heptachlor	ND	0.0033	60	56	6.9	50	85	51.9	40 - 140	30	r
Heptachlor epoxide	ND	0.0033	60	56	6.9	79	71	10.7	40 - 140	30	
Hexachlorobenzene	ND	0.0033	39	35	10.8	33	31	6.3	40 - 140	30	l
Methoxychlor	ND	0.0033	65	57	13.1	63	51	21.1	40 - 140	30	
Toxaphene	ND	0.13	NA	NA	NC	NA	NA	NC	40 - 140	30	
% DCBP	63	%	59	52	12.6	47	64	30.6	30 - 150	30	r
% DCBP (Confirmation)	78	%	67	61	9.4	69	64	7.5	30 - 150	30	
% TCMX	60	%	58	56	3.5	51	48	6.1	30 - 150	30	
% TCMX (Confirmation)	64	%	62	61	1.6	69	62	10.7	30 - 150	30	

QA/QC Batch 673828 (mg/Kg), QC Sample No: CN87691 (CN87690, CN87691, CN87692)

Semivolatiles - Sediment

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
1,1-Biphenyl	ND	0.23	57	65	13.1	67	64	4.6	40 - 140	30
1,2,4,5-Tetrachlorobenzene	ND	0.23	57	62	8.4	67	65	3.0	40 - 140	30
1,2,4-Trichlorobenzene	ND	0.23	59	65	9.7	66	65	1.5	40 - 140	30
1,2-Dichlorobenzene	ND	0.18	57	64	11.6	56	58	3.5	40 - 140	30
1,2-Diphenylhydrazine	ND	0.23	59	65	9.7	70	66	5.9	40 - 140	30
1,3-Dichlorobenzene	ND	0.23	55	62	12.0	56	57	1.8	40 - 140	30

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
1,4-Dichlorobenzene	ND	0.23	53	61	14.0	55	56	1.8	40 - 140	30	
2,2'-Oxybis(1-Chloropropane)	ND	0.23	52	59	12.6	56	58	3.5	40 - 140	30	
2,4,5-Trichlorophenol	ND	0.23	68	75	9.8	85	83	2.4	40 - 140	30	
2,4,6-Trichlorophenol	ND	0.13	67	74	9.9	86	82	4.8	30 - 130	30	
2,4-Dichlorophenol	ND	0.13	66	72	8.7	78	75	3.9	30 - 130	30	
2,4-Dimethylphenol	ND	0.23	68	75	9.8	85	83	2.4	30 - 130	30	
2,4-Dinitrophenol	ND	0.23	16	11	37.0	70	71	1.4	30 - 130	30	l,r
2,4-Dinitrotoluene	ND	0.13	61	67	9.4	71	68	4.3	30 - 130	30	
2,6-Dinitrotoluene	ND	0.13	66	74	11.4	79	76	3.9	40 - 140	30	
2-Chloronaphthalene	ND	0.23	59	66	11.2	71	66	7.3	40 - 140	30	
2-Chlorophenol	ND	0.23	62	70	12.1	67	69	2.9	30 - 130	30	
2-Methylnaphthalene	ND	0.23	62	67	7.8	72	69	4.3	40 - 140	30	
2-Methylphenol (o-cresol)	ND	0.23	61	70	13.7	72	75	4.1	40 - 140	30	
2-Nitroaniline	ND	0.33	95	101	6.1	96	92	4.3	40 - 140	30	
2-Nitrophenol	ND	0.23	67	77	13.9	77	75	2.6	40 - 140	30	
3&4-Methylphenol (m&p-cresol)	ND	0.23	58	67	14.4	67	68	1.5	30 - 130	30	
3,3'-Dichlorobenzidine	ND	0.13	72	77	6.7	82	72	13.0	40 - 140	30	
3-Nitroaniline	ND	0.33	84	92	9.1	88	82	7.1	40 - 140	30	
4,6-Dinitro-2-methylphenol	ND	0.23	28	17	48.9	69	68	1.5	30 - 130	30	l,r
4-Bromophenyl phenyl ether	ND	0.23	61	68	10.9	66	63	4.7	40 - 140	30	
4-Chloro-3-methylphenol	ND	0.23	71	77	8.1	85	83	2.4	30 - 130	30	
4-Chloroaniline	ND	0.23	65	67	3.0	64	57	11.6	40 - 140	30	
4-Chlorophenyl phenyl ether	ND	0.23	59	63	6.6	66	66	0.0	40 - 140	30	
4-Nitroaniline	ND	0.23	70	75	6.9	82	79	3.7	40 - 140	30	
4-Nitrophenol	ND	0.23	69	73	5.6	84	87	3.5	30 - 130	30	
Acenaphthene	ND	0.23	61	66	7.9	69	66	4.4	30 - 130	30	
Acenaphthylene	ND	0.13	57	63	10.0	65	61	6.3	40 - 140	30	
Acetophenone	ND	0.23	55	64	15.1	62	65	4.7	40 - 140	30	
Aniline	ND	0.33	58	67	14.4	52	47	10.1	40 - 140	30	
Anthracene	ND	0.23	62	68	9.2	69	68	1.5	40 - 140	30	
Benz(a)anthracene	ND	0.23	65	70	7.4	73	70	4.2	40 - 140	30	
Benzidine	ND	0.33	<10	<10	NC	<10	<10	NC	40 - 140	30	l,m
Benzo(a)pyrene	ND	0.13	66	72	8.7	81	76	6.4	40 - 140	30	
Benzo(b)fluoranthene	ND	0.16	59	63	6.6	70	66	5.9	40 - 140	30	
Benzo(ghi)perylene	ND	0.23	68	76	11.1	75	69	8.3	40 - 140	30	
Benzo(k)fluoranthene	ND	0.23	57	60	5.1	64	64	0.0	40 - 140	30	
Benzoic Acid	ND	0.67	11	<10	NC	104	98	5.9	30 - 130	30	l
Benzyl butyl phthalate	ND	0.23	65	70	7.4	78	75	3.9	40 - 140	30	
Bis(2-chloroethoxy)methane	ND	0.23	59	64	8.1	68	68	0.0	40 - 140	30	
Bis(2-chloroethyl)ether	ND	0.13	54	60	10.5	58	58	0.0	40 - 140	30	
Bis(2-ethylhexyl)phthalate	ND	0.23	67	71	5.8	78	75	3.9	40 - 140	30	
Carbazole	ND	0.23	67	72	7.2	66	63	4.7	40 - 140	30	
Chrysene	ND	0.23	65	70	7.4	73	69	5.6	40 - 140	30	
Dibenz(a,h)anthracene	ND	0.13	68	73	7.1	72	69	4.3	40 - 140	30	
Dibenzofuran	ND	0.23	61	66	7.9	73	72	1.4	40 - 140	30	
Diethyl phthalate	ND	0.23	62	68	9.2	71	69	2.9	40 - 140	30	
Dimethylphthalate	ND	0.23	61	68	10.9	73	72	1.4	40 - 140	30	
Di-n-butylphthalate	ND	0.67	63	68	7.6	60	59	1.7	40 - 140	30	
Di-n-octylphthalate	ND	0.23	67	74	9.9	65	62	4.7	40 - 140	30	
Fluoranthene	ND	0.23	60	66	9.5	57	57	0.0	40 - 140	30	
Fluorene	ND	0.23	62	68	9.2	71	71	0.0	40 - 140	30	
Hexachlorobenzene	ND	0.13	63	68	7.6	67	65	3.0	40 - 140	30	
Hexachlorobutadiene	ND	0.23	62	65	4.7	65	62	4.7	40 - 140	30	

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
Hexachlorocyclopentadiene	ND	0.23	42	44	4.7	<10	<10	NC	40 - 140	30	m
Hexachloroethane	ND	0.13	55	62	12.0	49	45	8.5	40 - 140	30	
Indeno(1,2,3-cd)pyrene	ND	0.23	67	77	13.9	72	67	7.2	40 - 140	30	
Isophorone	ND	0.13	55	59	7.0	63	62	1.6	40 - 140	30	
Naphthalene	ND	0.23	59	65	9.7	66	65	1.5	40 - 140	30	
Nitrobenzene	ND	0.13	58	67	14.4	64	66	3.1	40 - 140	30	
N-Nitrosodimethylamine	ND	0.23	43	49	13.0	30	27	10.5	40 - 140	30	m
N-Nitrosodi-n-propylamine	ND	0.13	54	62	13.8	60	62	3.3	40 - 140	30	
N-Nitrosodiphenylamine	ND	0.13	60	66	9.5	67	63	6.2	40 - 140	30	
Pentachloronitrobenzene	ND	0.23	59	64	8.1	66	66	0.0	40 - 140	30	
Pentachlorophenol	ND	0.23	59	60	1.7	74	73	1.4	30 - 130	30	
Phenanthrene	ND	0.13	60	66	9.5	68	68	0.0	40 - 140	30	
Phenol	ND	0.23	61	72	16.5	69	71	2.9	30 - 130	30	
Pyrene	ND	0.23	60	64	6.5	55	54	1.8	30 - 130	30	
Pyridine	ND	0.23	39	44	12.0	25	22	12.8	40 - 140	30	l,m
% 2,4,6-Tribromophenol	80	%	61	68	10.9	75	74	1.3	30 - 130	30	
% 2-Fluorobiphenyl	71	%	57	62	8.4	67	64	4.6	30 - 130	30	
% 2-Fluorophenol	73	%	57	65	13.1	61	60	1.7	30 - 130	30	
% Nitrobenzene-d5	69	%	56	62	10.2	61	65	6.3	30 - 130	30	
% Phenol-d5	75	%	60	69	14.0	68	66	3.0	30 - 130	30	
% Terphenyl-d14	64	%	52	53	1.9	49	49	0.0	30 - 130	30	

Comment:

Additional 8270 criteria: 20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

QA/QC Batch 674242 (mg/Kg), QC Sample No: CN87704 (CN87693, CN87694, CN87695)

Semivolatiles - Sediment

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
1,1-Biphenyl	ND	0.23	76	81	6.4	77	83	7.5	40 - 140	30	
1,2,4,5-Tetrachlorobenzene	ND	0.23	75	79	5.2	78	83	6.2	40 - 140	30	
1,2,4-Trichlorobenzene	ND	0.23	68	72	5.7	76	80	5.1	40 - 140	30	
1,2-Dichlorobenzene	ND	0.18	59	63	6.6	69	73	5.6	40 - 140	30	
1,2-Diphenylhydrazine	ND	0.23	83	86	3.6	77	82	6.3	40 - 140	30	
1,3-Dichlorobenzene	ND	0.23	57	62	8.4	69	72	4.3	40 - 140	30	
1,4-Dichlorobenzene	ND	0.23	56	60	6.9	67	70	4.4	40 - 140	30	
2,2'-Oxybis(1-Chloropropane)	ND	0.23	60	64	6.5	70	73	4.2	40 - 140	30	
2,4,5-Trichlorophenol	ND	0.23	100	102	2.0	96	103	7.0	40 - 140	30	
2,4,6-Trichlorophenol	ND	0.13	93	97	4.2	91	98	7.4	30 - 130	30	
2,4-Dichlorophenol	ND	0.13	85	92	7.9	88	95	7.7	30 - 130	30	
2,4-Dimethylphenol	ND	0.23	87	93	6.7	92	102	10.3	30 - 130	30	
2,4-Dinitrophenol	ND	0.23	88	94	6.6	76	81	6.4	30 - 130	30	
2,4-Dinitrotoluene	ND	0.13	94	97	3.1	89	95	6.5	30 - 130	30	
2,6-Dinitrotoluene	ND	0.13	94	99	5.2	87	97	10.9	40 - 140	30	
2-Chloronaphthalene	ND	0.23	76	81	6.4	78	84	7.4	40 - 140	30	
2-Chlorophenol	ND	0.23	73	78	6.6	82	86	4.8	30 - 130	30	
2-Methylnaphthalene	ND	0.23	77	82	6.3	83	88	5.8	40 - 140	30	
2-Methylphenol (o-cresol)	ND	0.23	77	85	9.9	88	92	4.4	40 - 140	30	
2-Nitroaniline	ND	0.33	98	99	1.0	83	100	18.6	40 - 140	30	
2-Nitrophenol	ND	0.23	71	76	6.8	77	84	8.7	40 - 140	30	
3&4-Methylphenol (m&p-cresol)	ND	0.23	78	85	8.6	85	92	7.9	30 - 130	30	
3,3'-Dichlorobenzidine	ND	0.13	45	51	12.5	22	38	53.3	40 - 140	30	m,r
3-Nitroaniline	ND	0.33	37	41	10.3	32	37	14.5	40 - 140	30	l,m
4,6-Dinitro-2-methylphenol	ND	0.23	92	98	6.3	82	89	8.2	30 - 130	30	
4-Bromophenyl phenyl ether	ND	0.23	90	92	2.2	83	88	5.8	40 - 140	30	

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
4-Chloro-3-methylphenol	ND	0.23	96	99	3.1	90	98	8.5	30 - 130	30	
4-Chloroaniline	ND	0.23	14	16	13.3	28	22	24.0	40 - 140	30	l,m
4-Chlorophenyl phenyl ether	ND	0.23	83	89	7.0	81	87	7.1	40 - 140	30	
4-Nitroaniline	ND	0.23	93	94	1.1	88	95	7.7	40 - 140	30	
4-Nitrophenol	ND	0.23	119	122	2.5	111	123	10.3	30 - 130	30	
Acenaphthene	ND	0.23	82	85	3.6	79	88	10.8	30 - 130	30	
Acenaphthylene	ND	0.13	78	81	3.8	78	82	5.0	40 - 140	30	
Acetophenone	ND	0.23	67	71	5.8	74	79	6.5	40 - 140	30	
Aniline	ND	0.33	69	78	12.2	82	81	1.2	40 - 140	30	
Anthracene	ND	0.23	92	93	1.1	84	92	9.1	40 - 140	30	
Benz(a)anthracene	ND	0.23	92	92	0.0	81	95	15.9	40 - 140	30	
Benzidine	ND	0.33	<10	<10	NC	<10	<10	NC	40 - 140	30	l,m
Benzo(a)pyrene	ND	0.13	101	103	2.0	98	104	5.9	40 - 140	30	
Benzo(b)fluoranthene	ND	0.16	95	95	0.0	95	98	3.1	40 - 140	30	
Benzo(ghi)perylene	ND	0.23	99	101	2.0	78	83	6.2	40 - 140	30	
Benzo(k)fluoranthene	ND	0.23	89	92	3.3	82	91	10.4	40 - 140	30	
Benzoic Acid	ND	0.67	113	114	0.9	96	105	9.0	30 - 130	30	
Benzyl butyl phthalate	ND	0.23	93	94	1.1	88	96	8.7	40 - 140	30	
Bis(2-chloroethoxy)methane	ND	0.23	73	78	6.6	76	82	7.6	40 - 140	30	
Bis(2-chloroethyl)ether	ND	0.13	61	66	7.9	72	74	2.7	40 - 140	30	
Bis(2-ethylhexyl)phthalate	ND	0.23	96	96	0.0	84	91	8.0	40 - 140	30	
Carbazole	ND	0.23	94	94	0.0	86	95	9.9	40 - 140	30	
Chrysene	ND	0.23	95	96	1.0	84	93	10.2	40 - 140	30	
Dibenz(a,h)anthracene	ND	0.13	99	99	0.0	81	86	6.0	40 - 140	30	
Dibenzofuran	ND	0.23	83	86	3.6	82	90	9.3	40 - 140	30	
Diethyl phthalate	ND	0.23	88	93	5.5	83	90	8.1	40 - 140	30	
Dimethylphthalate	ND	0.23	86	89	3.4	79	87	9.6	40 - 140	30	
Di-n-butylphthalate	ND	0.67	92	93	1.1	81	88	8.3	40 - 140	30	
Di-n-octylphthalate	ND	0.23	100	104	3.9	85	92	7.9	40 - 140	30	
Fluoranthene	ND	0.23	94	93	1.1	75	95	23.5	40 - 140	30	
Fluorene	ND	0.23	88	90	2.2	85	95	11.1	40 - 140	30	
Hexachlorobenzene	ND	0.13	89	91	2.2	83	91	9.2	40 - 140	30	
Hexachlorobutadiene	ND	0.23	69	73	5.6	76	82	7.6	40 - 140	30	
Hexachlorocyclopentadiene	ND	0.23	73	81	10.4	66	62	6.3	40 - 140	30	
Hexachloroethane	ND	0.13	56	60	6.9	69	71	2.9	40 - 140	30	
Indeno(1,2,3-cd)pyrene	ND	0.23	99	100	1.0	83	86	3.6	40 - 140	30	
Isophorone	ND	0.13	68	72	5.7	71	76	6.8	40 - 140	30	
Naphthalene	ND	0.23	70	76	8.2	80	83	3.7	40 - 140	30	
Nitrobenzene	ND	0.13	67	72	7.2	76	81	6.4	40 - 140	30	
N-Nitrosodimethylamine	ND	0.23	52	57	9.2	45	46	2.2	40 - 140	30	
N-Nitrosodi-n-propylamine	ND	0.13	67	72	7.2	73	77	5.3	40 - 140	30	
N-Nitrosodiphenylamine	ND	0.13	87	90	3.4	80	87	8.4	40 - 140	30	
Pentachloronitrobenzene	ND	0.23	87	89	2.3	80	86	7.2	40 - 140	30	
Pentachlorophenol	ND	0.23	107	107	0.0	102	114	11.1	30 - 130	30	
Phenanthrene	ND	0.13	89	91	2.2	80	95	17.1	40 - 140	30	
Phenol	ND	0.23	73	79	7.9	78	84	7.4	30 - 130	30	
Pyrene	ND	0.23	94	91	3.2	74	92	21.7	30 - 130	30	
Pyridine	ND	0.23	52	65	22.2	49	51	4.0	40 - 140	30	
% 2,4,6-Tribromophenol	81	%	80	81	1.2	77	83	7.5	30 - 130	30	
% 2-Fluorobiphenyl	79	%	75	78	3.9	74	79	6.5	30 - 130	30	
% 2-Fluorophenol	72	%	65	71	8.8	73	77	5.3	30 - 130	30	
% Nitrobenzene-d5	70	%	63	67	6.2	71	75	5.5	30 - 130	30	
% Phenol-d5	77	%	73	78	6.6	78	83	6.2	30 - 130	30	

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
% Terphenyl-d14	76	%	80	75	6.5	65	72	10.2	30 - 130	30	

Comment:

Additional 8270 criteria: 20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

QA/QC Batch 678174 (mg/Kg), QC Sample No: CO01061 (CN87690)

Volatiles - Sediment (Low Level)

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
1,1,1,2-Tetrachloroethane	ND	0.005	108	104	3.8	95	98	3.1	70 - 130	30	
1,1,1-Trichloroethane	ND	0.005	109	106	2.8	100	103	3.0	70 - 130	30	
1,1,2-Trichloroethane	ND	0.005	103	99	4.0	95	94	1.1	70 - 130	30	
1,1-Dichloroethane	ND	0.005	108	104	3.8	103	105	1.9	70 - 130	30	
1,1-Dichloroethene	ND	0.005	113	109	3.6	105	109	3.7	70 - 130	30	
1,1-Dichloropropene	ND	0.005	109	104	4.7	97	100	3.0	70 - 130	30	
1,2-Dibromoethane	ND	0.005	107	102	4.8	98	98	0.0	70 - 130	30	
1,2-Dichloroethane	ND	0.005	108	102	5.7	101	103	2.0	70 - 130	30	
1,2-Dichloropropane	ND	0.005	102	98	4.0	95	97	2.1	70 - 130	30	
1,3-Dichloropropane	ND	0.005	108	102	5.7	101	103	2.0	70 - 130	30	
1,4-dioxane	ND	0.1	106	117	9.9	107	150	33.5	70 - 130	30	m,r
2,2-Dichloropropane	ND	0.005	108	103	4.7	98	101	3.0	70 - 130	30	
2-Hexanone	ND	0.025	99	94	5.2	78	71	9.4	70 - 130	30	
4-Methyl-2-pentanone	ND	0.025	99	95	4.1	88	83	5.8	70 - 130	30	
Acetone	ND	0.01	108	103	4.7	95	90	5.4	70 - 130	30	
Acrylonitrile	ND	0.005	101	98	3.0	92	90	2.2	70 - 130	30	
Benzene	ND	0.001	104	100	3.9	95	98	3.1	70 - 130	30	
Bromochloromethane	ND	0.005	110	107	2.8	102	105	2.9	70 - 130	30	
Bromodichloromethane	ND	0.005	104	99	4.9	93	95	2.1	70 - 130	30	
Bromoform	ND	0.005	101	98	3.0	84	85	1.2	70 - 130	30	
Bromomethane	ND	0.005	119	113	5.2	116	120	3.4	70 - 130	30	
Carbon Disulfide	ND	0.005	106	102	3.8	94	97	3.1	70 - 130	30	
Carbon tetrachloride	ND	0.005	112	108	3.6	98	101	3.0	70 - 130	30	
Chlorobenzene	ND	0.005	106	102	3.8	93	95	2.1	70 - 130	30	
Chloroethane	ND	0.005	106	100	5.8	96	105	9.0	70 - 130	30	
Chloroform	ND	0.005	109	105	3.7	102	105	2.9	70 - 130	30	
Chloromethane	ND	0.005	105	104	1.0	99	102	3.0	70 - 130	30	
cis-1,2-Dichloroethene	ND	0.005	109	105	3.7	100	103	3.0	70 - 130	30	
cis-1,3-Dichloropropene	ND	0.005	104	100	3.9	93	95	2.1	70 - 130	30	
Dibromochloromethane	ND	0.003	105	101	3.9	93	95	2.1	70 - 130	30	
Dibromomethane	ND	0.005	107	102	4.8	98	99	1.0	70 - 130	30	
Dichlorodifluoromethane	ND	0.005	122	116	5.0	111	114	2.7	70 - 130	30	
Di-isopropyl ether	ND	0.005	104	100	3.9	102	104	1.9	70 - 130	30	
Ethyl tert-butyl ether	ND	0.005	105	102	2.9	102	104	1.9	70 - 130	30	
Ethylbenzene	ND	0.001	104	100	3.9	89	91	2.2	70 - 130	30	
m&p-Xylene	ND	0.002	106	101	4.8	87	88	1.1	70 - 130	30	
Methyl ethyl ketone	ND	0.005	102	99	3.0	92	88	4.4	70 - 130	30	
Methyl t-butyl ether (MTBE)	ND	0.001	103	100	3.0	108	108	0.0	70 - 130	30	
Methylene chloride	ND	0.005	103	99	4.0	99	103	4.0	70 - 130	30	
o-Xylene	ND	0.002	103	99	4.0	86	87	1.2	70 - 130	30	
Styrene	ND	0.005	98	94	4.2	79	80	1.3	70 - 130	30	
tert-amyl methyl ether	ND	0.005	100	96	4.1	96	97	1.0	70 - 130	30	
Tetrachloroethene	ND	0.005	102	98	4.0	87	88	1.1	70 - 130	30	
Tetrahydrofuran (THF)	ND	0.005	102	99	3.0	100	98	2.0	70 - 130	30	
Toluene	ND	0.001	103	98	5.0	91	93	2.2	70 - 130	30	
trans-1,2-Dichloroethene	ND	0.005	110	105	4.7	101	103	2.0	70 - 130	30	

QA/QC Data

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
trans-1,3-Dichloropropene	ND	0.005	104	100	3.9	93	94	1.1	70 - 130	30
Trichloroethene	ND	0.005	105	102	2.9	94	96	2.1	70 - 130	30
Trichlorofluoromethane	ND	0.005	119	114	4.3	112	116	3.5	70 - 130	30
Trichlorotrifluoroethane	ND	0.005	106	101	4.8	97	101	4.0	70 - 130	30
Vinyl chloride	ND	0.005	109	105	3.7	103	106	2.9	70 - 130	30
% 1,2-dichlorobenzene-d4	99	%	99	99	0.0	99	98	1.0	70 - 130	30
% Bromofluorobenzene	97	%	101	100	1.0	96	95	1.0	70 - 130	30
% Dibromofluoromethane	94	%	99	99	0.0	99	98	1.0	70 - 130	30
% Toluene-d8	99	%	99	98	1.0	99	98	1.0	70 - 130	30

Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 678174H (mg/Kg), QC Sample No: CO01061 50X (CN87690 (50X))

Volatiles - Sediment (High Level)

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
1,1,2,2-Tetrachloroethane	ND	0.25	101	99	2.0	101	104	2.9	70 - 130	30
1,2,3-Trichlorobenzene	ND	0.25	108	110	1.8	106	115	8.1	70 - 130	30
1,2,3-Trichloropropane	ND	0.25	97	97	0.0	99	105	5.9	70 - 130	30
1,2,4-Trichlorobenzene	ND	0.25	111	109	1.8	112	117	4.4	70 - 130	30
1,2,4-Trimethylbenzene	ND	0.25	106	107	0.9	109	111	1.8	70 - 130	30
1,2-Dibromo-3-chloropropane	ND	0.25	95	91	4.3	89	97	8.6	70 - 130	30
1,2-Dichlorobenzene	ND	0.25	104	103	1.0	105	106	0.9	70 - 130	30
1,3,5-Trimethylbenzene	ND	0.25	109	110	0.9	112	114	1.8	70 - 130	30
1,3-Dichlorobenzene	ND	0.25	107	107	0.0	108	110	1.8	70 - 130	30
1,4-Dichlorobenzene	ND	0.25	107	107	0.0	109	110	0.9	70 - 130	30
2-Chlorotoluene	ND	0.25	109	110	0.9	111	113	1.8	70 - 130	30
2-Isopropyltoluene	ND	0.25	107	108	0.9	109	111	1.8	70 - 130	30
4-Chlorotoluene	ND	0.25	109	111	1.8	112	113	0.9	70 - 130	30
Bromobenzene	ND	0.25	105	105	0.0	105	107	1.9	70 - 130	30
Diethyl ether	ND	0.25	82	71	14.4	84	79	6.1	70 - 130	30
Hexachlorobutadiene	ND	0.25	107	108	0.9	106	109	2.8	70 - 130	30
Isopropylbenzene	ND	0.25	108	110	1.8	110	112	1.8	70 - 130	30
Naphthalene	ND	0.25	110	111	0.9	107	120	11.5	70 - 130	30
n-Butylbenzene	ND	0.25	116	117	0.9	119	122	2.5	70 - 130	30
n-Propylbenzene	ND	0.25	109	111	1.8	111	113	1.8	70 - 130	30
p-Isopropyltoluene	ND	0.25	113	114	0.9	114	117	2.6	70 - 130	30
sec-Butylbenzene	ND	0.25	111	113	1.8	113	115	1.8	70 - 130	30
tert-Butylbenzene	ND	0.25	108	110	1.8	109	112	2.7	70 - 130	30
trans-1,4-dichloro-2-butene	ND	0.25	96	94	2.1	96	100	4.1	70 - 130	30
% 1,2-dichlorobenzene-d4	99	%	99	99	0.0	99	100	1.0	70 - 130	30
% Bromofluorobenzene	97	%	100	100	0.0	99	99	0.0	70 - 130	30
% Dibromofluoromethane	91	%	96	95	1.0	94	95	1.1	70 - 130	30
% Toluene-d8	99	%	98	98	0.0	98	98	0.0	70 - 130	30

Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

l = This parameter is outside laboratory LCS/LCSD specified recovery limits.
m = This parameter is outside laboratory MS/MSD specified recovery limits.
r = This parameter is outside laboratory RPD specified recovery limits.

QA/QC Data

SDG I.D.: GCN87690

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
May 18, 2023

Criteria: None

State: NH

Sample Criteria Exceedances Report

GCN87690 - VHB-MA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Comments

May 18, 2023 SDG I.D.: GCN87690

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

PEST Narration

AU-ECD4 04/27/23-1: CN87691

The following Continuing Calibration compounds did not meet % deviation criteria:
Samples: CN87691
Preceding CC 427B020 - Endrin 25%H (20%)
Succeeding CC 427B033 - None.

AU-ECD4 04/28/23-1: CN87690, CN87692, CN87693, CN87694, CN87695

The following Continuing Calibration compounds did not meet % deviation criteria:
Samples: CN87690
Preceding CC 428B033 - Endrin aldehyde 22%L (20%), Endrin Ketone 25%L (20%), Methoxychlor 30%L (20%)
Succeeding CC 428B047 - Methoxychlor 25%L (20%)
A low "1A" standard was run after the samples to demonstrate capability to detect any compounds outside of the CC acceptance criteria. All reported samples were ND for the affected compounds.
Samples: CN87692, CN87693, CN87694, CN87695
Preceding CC 428B047 - Methoxychlor 25%L (20%)
Succeeding CC 428B060 - 4,4'-DDD 23%L (20%), 4,4'-DDT 23%L (20%), Endrin aldehyde 22%L (20%), Methoxychlor 28%L (20%)
A low "1A" standard was run after the samples to demonstrate capability to detect any compounds outside of the CC acceptance criteria. All reported samples were ND for the affected compounds.

SVOA Narration

CHEM29 04/20/23-1: CN87690, CN87691, CN87692

For 8270 full list, the DDT breakdown and pentachlorophenol & benzidine peak tailing were evaluated in the DFTPP tune and were found to be in control.
For 8270 BN list, benzidine peak tailing was evaluated in the DFTPP tune and was found to be in control.

The following Initial Calibration compounds did not meet recommended response factors: 2-Nitrophenol 0.059 (0.1), Hexachlorobenzene 0.081 (0.1)
The following Initial Calibration compounds did not meet minimum response factors: None.

The following Continuing Calibration compounds did not meet recommended response factors: 2-Nitrophenol 0.070 (0.1), Hexachlorobenzene 0.083 (0.1)
The following Continuing Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

CHEM36 04/24/23-1: CN87693, CN87694, CN87695

The following Initial Calibration compounds did not meet recommended response factors: 2-Nitrophenol 0.069 (0.1), Hexachlorobenzene 0.087 (0.1)
The following Initial Calibration compounds did not meet minimum response factors: None.

The following Continuing Calibration compounds did not meet recommended response factors: 2-Nitrophenol 0.069 (0.1), Hexachlorobenzene 0.087 (0.1)
The following Continuing Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

VOA Narration

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

May 18, 2023 SDG I.D.: GCN87690

CHEM03 05/16/23-2: CN87690

The following Initial Calibration compounds did not meet RSD% criteria: Chloroethane 22% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.
The following Initial Calibration compounds did not meet recommended response factors: Tetrachloroethene 0.163 (0.2)
The following Initial Calibration compounds did not meet minimum response factors: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

Cooler: Yes ☒ No ☐
Coolant: IPK ☒ ICE ☐ No ☐

PHOENIX Environmental Laboratories, Inc.

CT/MA/RI CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Temp 1.2 °C Pg of

Data Delivery/Contact Options:
☐ Fax:
☐ Phone:
☒ Email: pcochrane@vhb.com

Customer: VHB
Address: 101 Walnut Street, Watertown, MA

Project: Pickpocket Dam
Report to: Paige Cochrane
Invoice to: 52851.06
Quote #: VH04062 3RM

Project P.O.:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: [signature] Date: 4/18/23

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ________ (Other)

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	*MS/MSD (May be billable at analysis unit rate)	Grain Size D422	PP-13 + Fe	Manganese	Chloride	TKN	8270	Pesticides 8081	PCBs 8082	GL Amber 8 oz	Soil VOA Vials [X] methanol [X] H2O		1-G Bag
87690	SED-1	SE	4/18/23	10:05		X	X	X	X	X	X	X	X	1	3		1
87691	SED-2	↓	↓	9:50		X	X	X	X	X	X	X	X	2	3		1
~~87692~~	SED-2 MS/MD	↓	↓	9:50	X		X	X	X	X	X	X	X	1	3		
~~87693~~	SED-2 FD	↓	↓	9:50			X	X	X	X	X	X	X	1	3	87692	
~~87694~~	SED-3	↓	↓	11:40		X	X	X	X	X	X	X	X	1	3	87693	1
~~87695~~	SED-4	↓	↓	12:30		X	X	X	X	X	X	X	X	1	3	87694	1
~~87696~~	SED-5	↓	↓	9:00		X	X	X	X	X	X	X	X	1	3	87695	1
	EB-1	L	↓	11:00										1		87696	

Other bottle columns (not filled): GL Soil container ( )oz; GL Soil container ( )oz; 40 ml VOA Vial [ ] As is [ ] HCl; GL Amber 1000ml [ ] As is [ ] H2SO4; PL As is [ ] 250ml [ ] 500ml [ ] 1000ml; PL H2SO4 [ ] 250ml [ ] 500ml; PL HNO3 250ml; PL NaOH 250ml; Bacteria Bottle w/thio; Bacteria Bottle as is

Relinquished by:	Accepted by:	Date:	Time:
[signature]	[signature]	4/20/23	11:30
[signature]	[signature]	4/20/23	15:15

Comments, Special Requirements or Regulations:
EB-1 on hold

Turnaround Time:
☐ 1 Day*
☐ 2 Days*
☐ 3 Days*
☐ 4 Days*
☐ 5 Days*
☒ Standard
☐ Other ________

RI
☐ RES DEC
☐ I/C DEC
☐ GA Leachability
☐ GB Leachability
☐ GA-GW Objectives
☐ GB-GW Objectives
☐ Other

CT
☐ RCP Cert
☐ GWPC
☐ SWPC
☐ GA PMC
☐ GB PMC
☐ SWPC
☐ RES DEC
☐ I/C DEC

MA
☐ MCP Certification
☐ GW-1 ☐ RCS-1 / RCGW-1
☐ GW-2 ☐ RCS-2 / RCGW-2
☐ GW-3 ☐ ________
☐ S-1
☐ S-2
☐ S-3
☐ SW Protection

Data Format
☒ Excel
☒ PDF
☐ GIS/Key
☐ EQuIS
☐ Other

Data Package
☐ Tier II Checklist*
☐ Full Data Package*
☐ Phoenix Std
☐ Other

MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

* SURCHARGES MAY APPLY

State where samples were collected: NH

* SURCHARGE APPLIES

Form PEL126 Rev. 1/23

GRAIN SIZE DISTRIBUTION TEST DATA

4/28/2023

Client: : Phoenix Environmental Laboratories, Inc Date: 04/28/2023
Project: : GCN 87690
Project Number: : GCN 87690
Location: Onsite
Depth: N/A **Sample Number:** 304-23
Material Description: Marine Sediments
Liquid Limit: N/A **Plastic Limit:** N/A
USCS Classification: N/A **AASHTO Classification:** N/A
Test Date: 04/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87690)
Tested by: IC **Checked by:** HC
Test Date: 04/28/2023 **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87690)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 338.90
Tare Wt. = 0.00

Minus #200 from wash = 64.6%

Specimen Weights
Dry specimen+tare (gms.) = 957.90
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
3/4"	0.00	100.0	0.0
1/4"	9.90	99.0	1.0
#4	12.70	98.7	1.3
#10	19.90	97.9	2.1
#40	89.50	90.7	9.3
#60	187.70	80.4	19.6
#100	264.90	72.3	27.7
#200	336.80	64.8	35.2

Pan + tare = 0 Tare = 0 Loss during sieving = 0.2%
Total loss (wash+pan/specimen) = 64.6%

Tri State Materials Testing Lab

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.3	1.3	0.8	7.2	25.9	33.9			64.8

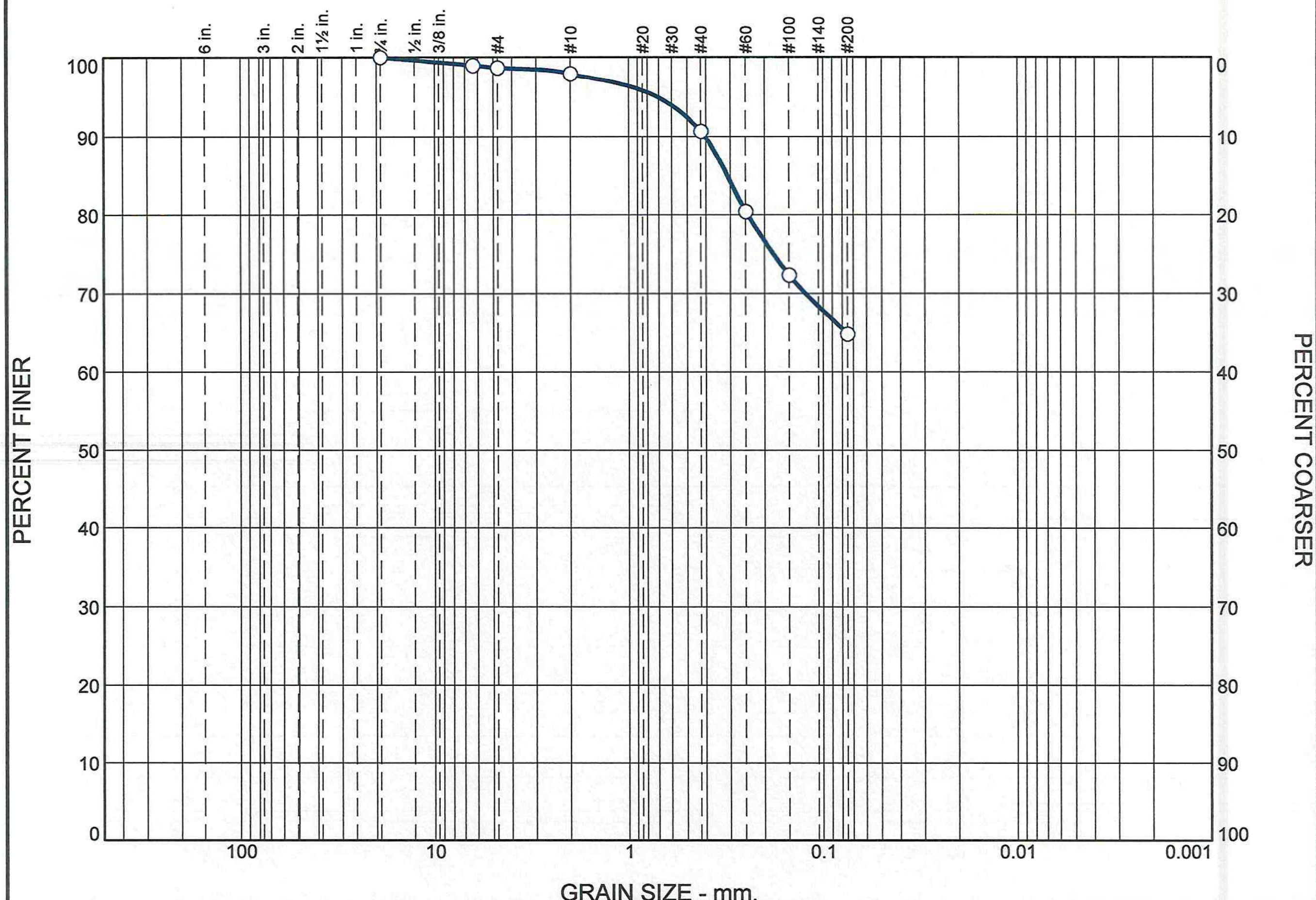
Distribution Data

Val	Diameter (mm.)
D_5	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	
D_{60}	
D_{80}	0.2443
D_{85}	0.3128
D_{90}	0.4047
D_{95}	0.7107

Fineness Modulus

0.57

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	1.3	0.8	7.2	25.9	64.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	N/A	N/A	0.3128							

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
o Marine Sediments	04/28/2023	N/A	

Project No. : GCN 87690 **Client:** : Phoenix Environmental Laboratories, Inc Date: 04/28/2023

Project: : GCN 87690

o **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 304-23

Remarks:

o ASTM C 117, ASTM C 136 (Sample ID= CN 87690)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

GRAIN SIZE DISTRIBUTION TEST DATA

4/28/2023

Client: : Phoenix Environmental Laboratories, Inc Date: 04/28/2023
Project: : GCN 87690
Project Number: : GCN 87690
Location: Onsite
Depth: N/A **Sample Number:** 305-23
Material Description: Marine Sediments
Liquid Limit: N/A **Plastic Limit:** N/A
USCS Classification: N/A **AASHTO Classification:** N/A
Test Date: 04/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87691)
Tested by: IC **Checked by:** HC
Test Date: 04/28/2023 **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87691)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 367.40
Tare Wt. = 0.00

Minus #200 from wash = 46.3%

Specimen Weights
Dry specimen+tare (gms.) = 684.00
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
#4	0.00	100.0	0.0
#10	3.00	99.6	0.4
#40	65.00	90.5	9.5
#60	178.30	73.9	26.1
#100	269.40	60.6	39.4
#200	365.60	46.5	53.5

Pan + tare = 0 Tare = 0 Loss during sieving = 0.3%
Total loss (wash+pan/specimen) = 46.3%

Tri State Materials Testing Lab

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.4	9.1	44.0	53.5			46.5

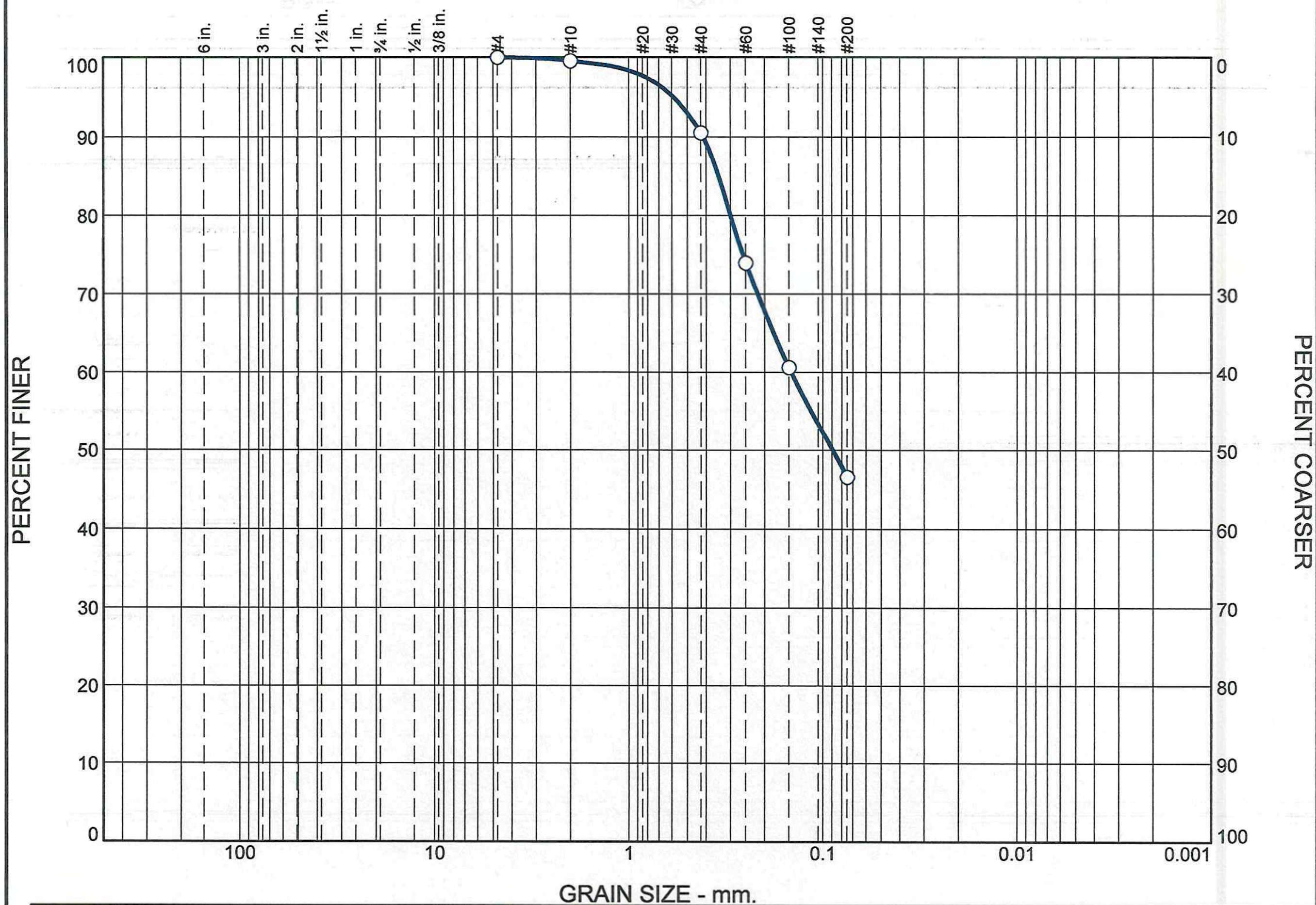
Distribution Data

Val	Diameter (mm.)
D_5	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	0.0893
D_{60}	0.1460
D_{80}	0.3000
D_{85}	0.3457
D_{90}	0.4139
D_{95}	0.5906

Fineness Modulus

0.66

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.4	9.1	44.0	46.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	N/A	N/A	0.3457	0.1460	0.0893					

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
o Marine Sediments	04/28/2023	N/A	

Project No. : GCN 87690 **Client:** : Phoenix Environmental Laboratories, Inc Date: 04/28/2023

Project: : GCN 87690

o **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 305-23

Remarks:
o ASTM C 117, ASTM C 136 (Sample ID= CN 87691)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

GRAIN SIZE DISTRIBUTION TEST DATA

4/28/2023

Client: : Phoenix Environmental Laboratories, Inc   Date: 04/28/2023
Project: : GCN 87690
Project Number: : GCN 87690
Location: Onsite
Depth: N/A   **Sample Number:** 306-23
Material Description: Marine Sediments
Liquid Limit: N/A   **Plastic Limit:** N/A
USCS Classification: SP   **AASHTO Classification:** N/A
Test Date: 04/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87693)
Tested by: IC   **Checked by:** HC
Test Date: 04/28/2023   **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87693)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 2716.60
Tare Wt. = 0.00

Minus #200 from wash = 3.0%

Specimen Weights
Dry specimen+tare (gms.) = 2799.60
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
1 1/4"	0.00	100.0	0.0
3/4"	171.60	93.9	6.1
1/4"	1052.40	62.4	37.6
#4	1257.30	55.1	44.9
#10	1714.60	38.8	61.2
#40	2380.00	15.0	85.0
#60	2532.70	9.5	90.5
#100	2627.10	6.2	93.8
#200	2714.30	3.0	97.0

Pan + tare = 0   Tare = 0   Loss during sieving = 0.1%
Total loss (wash+pan/specimen) = 3.0%

Tri State Materials Testing Lab

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.1	38.8	44.9	16.3	23.8	12.0	52.1			3.0

Distribution Data

Val	Diameter (mm.)
D_5	0.1187
D_{10}	0.2640
D_{15}	0.4254
D_{20}	0.6151
D_{30}	1.1835
D_{40}	2.1505
D_{50}	3.7221
D_{60}	5.8022
D_{80}	11.3414
D_{85}	13.3923
D_{90}	16.0880
D_{95}	20.2531

Fineness Modulus

4.68

Coefficient of Uniformity (C_u)

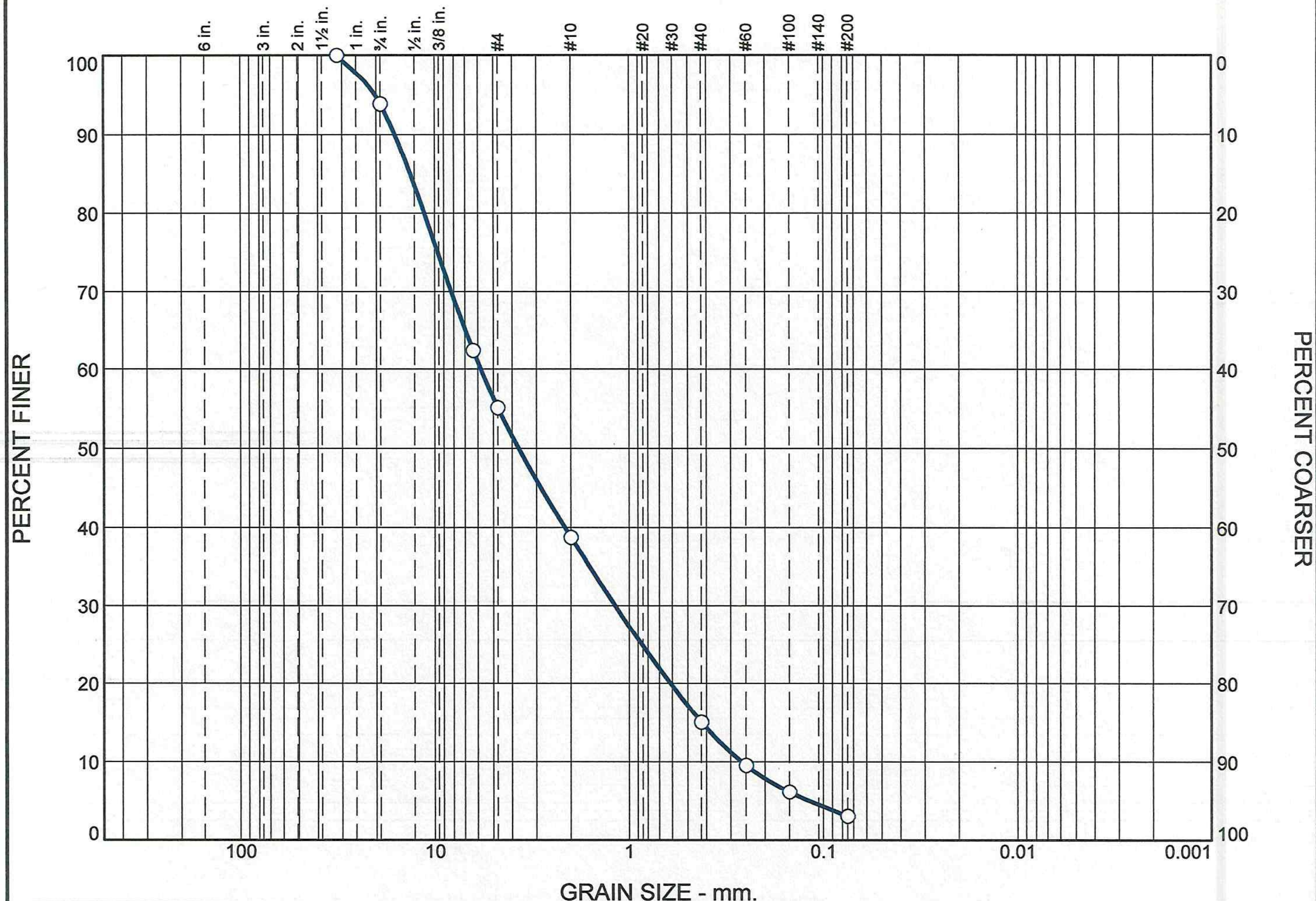
21.98

Coefficient of Concavity (C_c)

0.91

Tri State Materials Testing Lab

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	6.1	38.8	16.3	23.8	12.0	3.0	

╳	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	N/A	N/A	13.3923	5.8022	3.7221	1.1835	0.4254	0.2640	0.91	21.98

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Marine Sediments	04/28/2023	SP	

Project No. : GCN 87690 **Client:** : Phoenix Environmental Laboratories, Inc Date: 04/28/2023

Project: : GCN 87690

○ **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 306-23

Remarks:

○ASTM C 117, ASTM C 136 (Sample ID= CN 87693)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

GRAIN SIZE DISTRIBUTION TEST DATA

4/28/2023

Client: : Phoenix Environmental Laboratories, Inc

Date: 04/28/2023

Project: : GCN 87690

Project Number: : GCN 87690

Location: Onsite

Depth: N/A

Sample Number: 307-23

Material Description: Marine Sediments

Liquid Limit: N/A

Plastic Limit: N/A

USCS Classification: SP

AASHTO Classification: N/A

Test Date: 04/28/2023

Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87694)

Tested by: IC

Checked by: HC

Test Date: 04/28/2023 **Technician:** IC

Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87694)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 4291.00
Tare Wt. = 0.00

Minus #200 from wash = 2.0%

Specimen Weights
Dry specimen+tare (gms.) = 4380.20
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
1 1/4"	0.00	100.0	0.0
3/4"	320.30	92.7	7.3
1/4"	1718.40	60.8	39.2
#4	2031.80	53.6	46.4
#10	2825.40	35.5	64.5
#40	3893.90	11.1	88.9
#60	4089.50	6.6	93.4
#100	4187.50	4.4	95.6
#200	4288.40	2.1	97.9

Pan + tare = 0 Tare = 0 Loss during sieving = 0.1%

Total loss (wash+pan/specimen) = 2.0%

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	7.3	39.1	46.4	18.1	24.4	9.0	51.5			2.1

Distribution Data

Val	Diameter (mm.)
D_{5}	0.1765
D_{10}	0.3850
D_{15}	0.5741
D_{20}	0.8075
D_{30}	1.4739
D_{40}	2.5287
D_{50}	4.0471
D_{60}	6.1691
D_{80}	11.9399
D_{85}	14.1084
D_{90}	16.9792
D_{95}	21.5832

Fineness Modulus

4.88

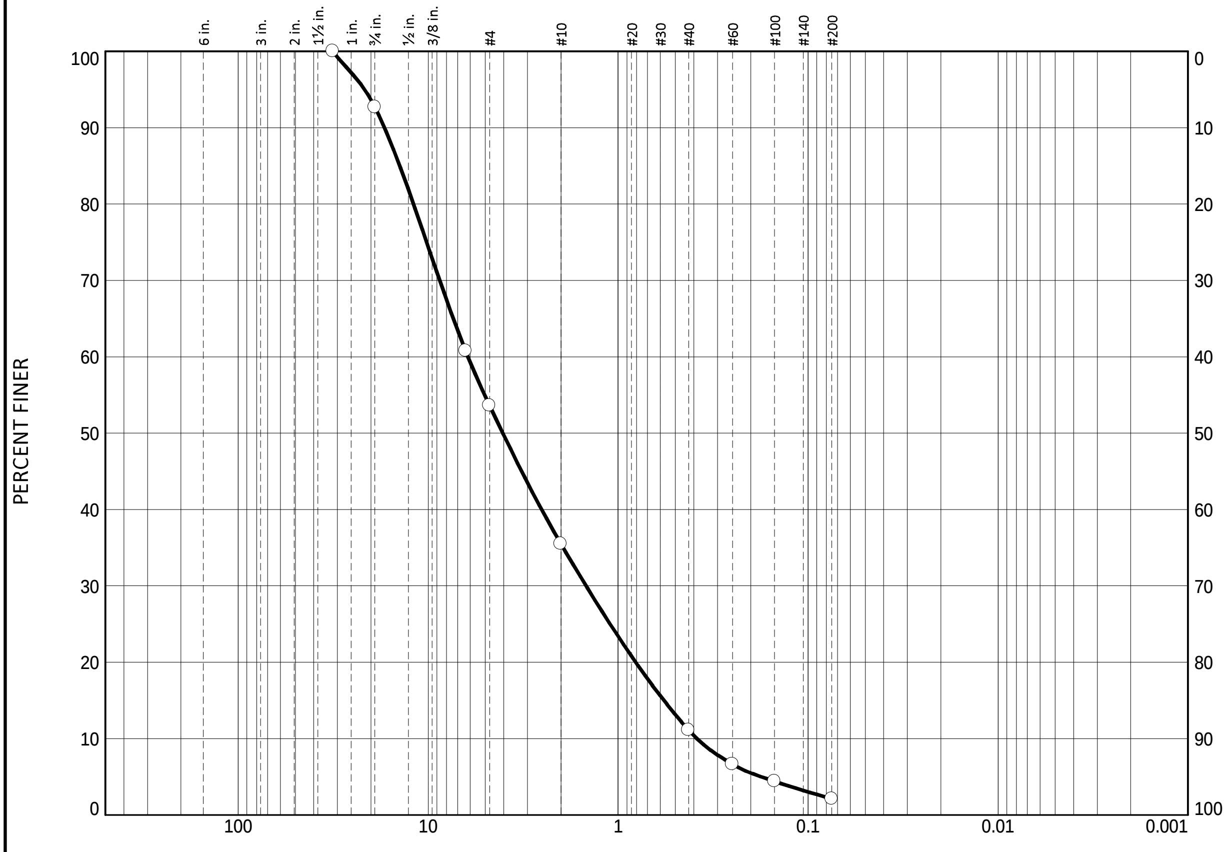
Coefficient of Uniformity (C_u)

16.02

Coefficient of Concavity (C_c)

0.91

Particle Size Distribution Report



	% +3"	% Gravel Coarse	% Gravel Fine	% Sand Coarse	% Sand Medium	% Sand Fine	% Fines Silt	% Fines Clay
○	0.0	7.3	39.1	18.1	24.4	9.0	2.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	N/A	N/A	14.1084	6.1691	4.0471	1.4739	0.5741	0.3850	0.91	16.02

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Marine Sediments	04/28/2023	SP	

Project No. : GCN 87690 Client: : Phoenix Environmental Laboratories, Inc Date: 04/28/2023

Project: : GCN 87690

○ Source of Sample: Onsite Depth: N/A Sample Number: 307-23

Remarks:

○ASTM C 117, ASTM C 136 (Sample ID= CN 87694)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC Checked By: HC

GRAIN SIZE DISTRIBUTION TEST DATA

Client: : Phoenix Environmental Laboratories, Inc   Date: 04/28/2023
Project: : GCN 87690
Project Number: : GCN 87690
Location: Onsite
Depth: N/A   **Sample Number:** 308-23
Material Description: Marine Sediments
Liquid Limit: N/A   **Plastic Limit:** N/A
USCS Classification: N/A   **AASHTO Classification:** N/A
Test Date: 04/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87695)
Tested by: IC   **Checked by:** HC
Test Date: 04/28/2023   **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 87695)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 175.00
Tare Wt. = 0.00

Minus #200 from wash = 64.7%

Specimen Weights
Dry specimen+tare (gms.) = 496.20
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
3/4'	0.00	100.0	0.0
1/4"	3.80	99.2	0.8
#4	4.80	99.0	1.0
#10	7.90	98.4	1.6
#40	30.80	93.8	6.2
#60	47.20	90.5	9.5
#100	91.70	81.5	18.5
#200	173.90	65.0	35.0

Pan + tare = 0   Tare = 0   Loss during sieving = 0.2%
Total loss (wash+pan/specimen) = 64.7%

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.0	1.0	0.6	4.6	28.8	34.0			65.0

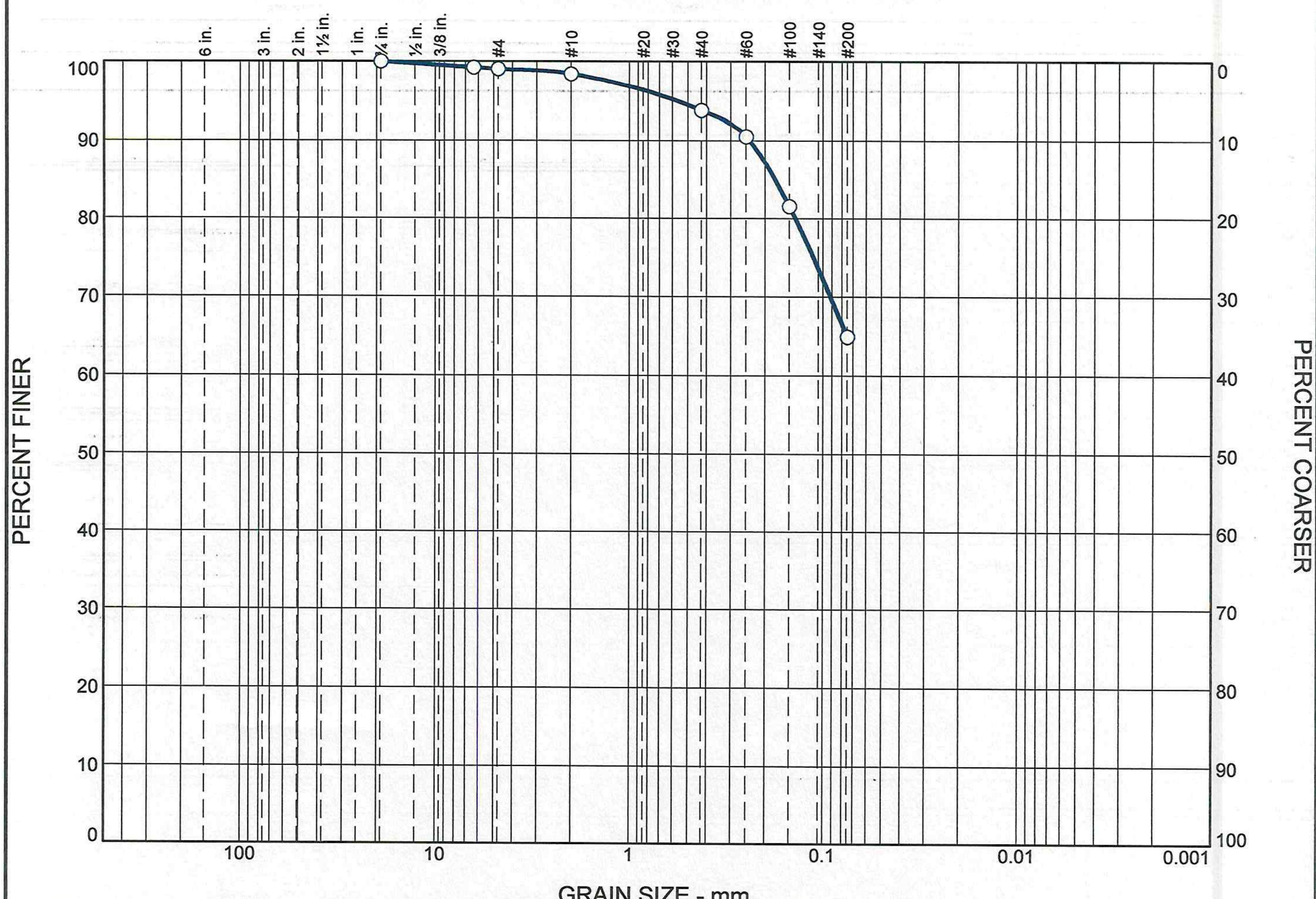
Distribution Data

Val	Diameter (mm.)
D_5	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	
D_{60}	
D_{80}	0.1397
D_{85}	0.1782
D_{90}	0.2404
D_{95}	0.5653

Fineness Modulus

0.37

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.0	0.6	4.6	28.8	65.0	

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	N/A	N/A	0.1782							

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Marine Sediments	04/28/2023	N/A	

Project No. : GCN 87690 **Client:** : Phoenix Environmental Laboratories, Inc Date: 04/28/2023

Project: : GCN 87690

○ **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 308-23

Remarks:
○ASTM C 117, ASTM C 136 (Sample ID= CN 87695)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

304-308-23

Cooler: Yes ☐ No ☐
Coolant: IPK ☐ ICE ☐ No ☐
Temp °C Pg of

PHOENIX Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Contact Options:
☐ Fax: 860-645-0823
☐ Phone: 800-827-5426
☐ Email: HelenG@PhoenixLabs.com

Customer: Tri State Materials Testing Lab
Address: 60 Woodland Rd
Berlin, CT
(203) 949-7733

Project #: GCN87690
Report to: HelenG@PhoenixLabs.com / Helen Geoghegan
Invoice to: AccountsPayable@PhoenixLabs.com
Quote# :

Project P.O: GCN87690

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature ______ Date: ______

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe
OIL=Oil **B**=Bulk **L**=Liquid

Analysis Request

Phoenix Sample ID	Sample Comment	Sample Matrix	Date Sampled	Time Sampled	Sieve/Hydrometer ASTM D422 & D7928	Gallon Zip Lock Baggie
CN87690		SED	4/18/2023	10:05 AM	x	1
CN87691		SED	4/18/2023	9:50 AM	x	1
CN87693		SED	4/18/2023	11:40 AM	x	1
CN87694		SED	4/18/2023	12:30 PM	x	1
CN87695		SED	4/18/2023	9:00 AM	x	1

Relinquished by:	Accepted by:	Date:	Time:
Lori Bailey		4-24-23	

Turnaround:
☐ 1 Day
☐ 2 Days
☐ 3 Days
☐ 5 Days
☐ 10 Days
☒ Standard
☐ Other____

Report Type:
☒ Standard PDF
☐ Full Data Package
☐ NJ Reduced Deliverable
☐ NJ Full Deliverable
☐ NY ASP B

EDD Format:
☐ Excel
☐ GIS/Key
☐ EQuIS
☐ NJ Hazsite EDD
☐ NY EZ EDD (ASP)
☐ Other:______

State Criteria:

Comments, Special Requirements or Regulations:

Please send notice as soon as possible not exceeding 24 hours of obtaining valid data, of the results of all drinking water samples that exceed any EPA or Department-established maximum contaminant level, maximum residual disinfectant level or reportable concentration.
Please notify Phoenix Environmental Laboratories, Inc. immediately and prior to conducting analysis if certification is not held for the analyses requested.

What State were samples collected? MA

F

Cultural Resource Documentation

Name, Location, Ownership

Historic name Pickpocket Dam
Street and number Cross Road
City or town Exeter
County Rockingham
Current owner Town of Exeter

Function or Use

Current use(s) Dam

Historic use(s) Dam

Architectural Information

Style Other
Architect/builder L.H. Shattuck Company
Source *Exeter News-Letter,* Dec 26, 1919
Construction date 1920
Source *Exeter News-Letter*
Alterations, with dates Fish ladder, 1969
(*Nashua Telegraph,* Aug 20, 1969)

Moved? no ☒ yes ☐ date:

Exterior Features

Foundation n/a
Cladding n/a
Roof material n/a
Chimney material n/a
Type of roof n/a
Chimney location n/a
Number of stories n/a
Entry location n/a
Windows n/a
Replacement? no ☐ yes ☐ date:

Site Features

Setting Waterfront
Outbuildings n/a

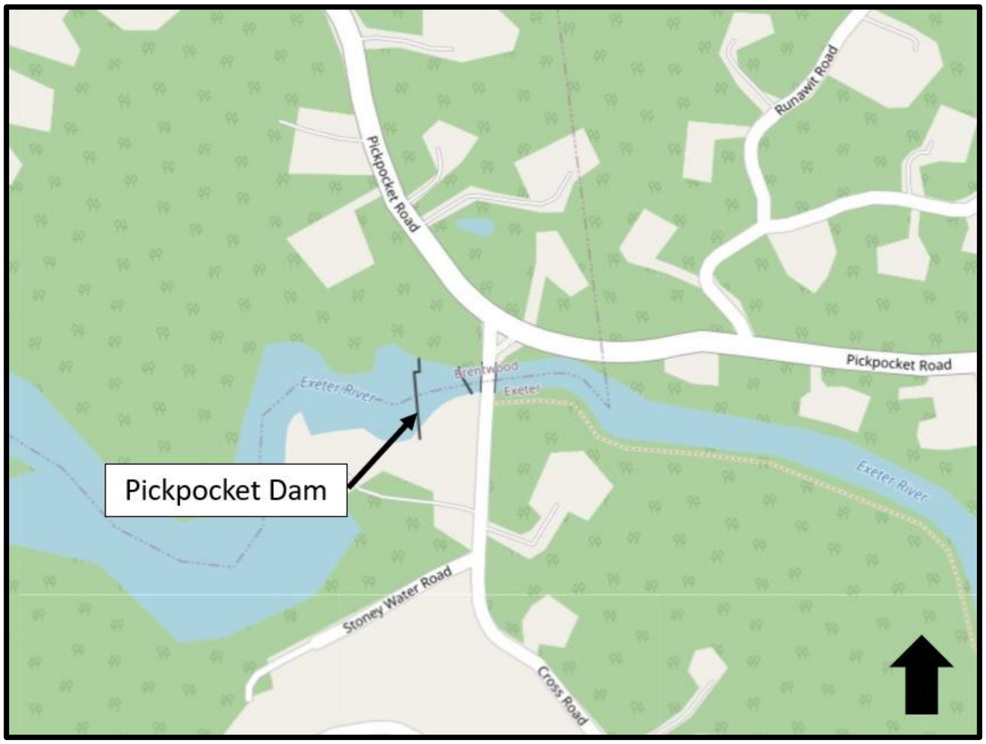
Photo #1 Direction: NW
Date Dec. 15, 2023

Landscape features Pond, river, or stream; foundation
Tax Map 99-35 (Exeter); 220-6 (Brentwood)
Acreage n/a
State Plane Feet (NAD83) E 1162342.1 / N 171910.7

Form prepared by

Name Devon King, Sarah Graulty, Quinn Stuart
Organization VHB
Date of Survey December 2023

LOCATION MAP:



PROPERTY MAP AND PHOTO KEY:

See page 12.

Historical Background and Role in the Town or City's Development:

Introduction

The Pickpocket Dam (Dam ID # NH00294) is a run-of-the-river, earth embankment dam with a concrete spillway and end walls. The dam was built in 1920 at Pickpocket Falls on the Exeter River between Exeter and Brentwood, New Hampshire to create an impoundment for the Exeter Manufacturing Company. The Pickpocket Falls location was the site of industrial mill operations as early as the 17th century, continuing into the 20th century.

Environmental Context

The Exeter River rises from a group of spring-fed ponds in Chester, New Hampshire and flows approximately 33 miles through the Towns of Sandown, Raymond, Fremont and Brentwood to downtown Exeter where it changes its name to the Squamscott River and becomes a tidal river and a primary tributary to Great Bay. Pickpocket Dam is located approximately 7.8 river miles above the former Great Dam in downtown Exeter.

The river's importance is made evident by the fact that the Exeter River was nominated as a "designated river" under NH Statute RSA 483:10 by the communities through which it flows. The Legislature approved the nomination for the portion of the river from its headwaters in Chester to the river's confluence with Great Brook in 1995. The river system plays an essential role in maintaining the overall health of the Great Bay National Estuarine Reserve, is home to a number of rare and endangered species, and is an important scenic resource. For these reasons, the rivers have been recognized not only by the New Hampshire Rivers Management and Protection Program (RMPP), but also as part of the New Hampshire Resource Protection Project. The upper 33.3 miles of the Exeter River, from its headwaters to its confluence with Great Brook in Exeter, were designated into the RMPP in 1995, while the remaining 2.2 miles of the lower Exeter and the 6.3-mile Squamscott River were added in 2011.

Historical Background

According to local histories, various mill operations have been located at or near Pickpocket Falls since the mid-17th century. In April 1652, Reverend Samuel Dudley and John Legat were given a grant by the town of Exeter for land around Pickpocket or King's Falls to "take timber for their mill from the commons there," in exchange for a yearly fee of five pounds.[1] Around 1809, the Exeter Cotton Manufacturing Company established an 8,000-spindle cotton cloth mill at the site. Around 1820, a card clothing factory was added. The mill changed hands, first coming under the ownership of Nathaniel Gilman Jr. around 1830 and then John Perkins in 1840, before burning down in 1847.[2] Around 1851, Willard Russell, Jacob Colcord, and Joshua Getchell rebuilt the Pickpocket mill site and "adapted it to the manufacture of paper," operating as the Union Paper Mills[3] (Figure 1). By 1883, the property on either side of the Exeter River on the east and west sides of Cross Road came under the ownership of Isaac Bradford, who had been the agent for the Union Paper Mills.[4] In 1885, Bradford sold the property to Jerome B. Gould and William R. Smith, who operated the site as a box factory as well as a lumber and saw mill[5] (Figures 2-3). Gould and Smith mortgaged the property in 1886 to the Portsmouth Savings Bank but in 1906 evidently defaulted on the mortgage.[6] It is unclear whether the box factory and lumber and saw mill were still in operation by 1906. Available newspaper accounts suggest Gould and Smith dissolved their partnership in June 1887, but that Smith maintained operations until at least 1889.[7] In 1899, an article in the *Exeter*

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[1] Bell, Charles Henry, *History of the Town of Exeter, New Hampshire* (Boston: J.E. Farwell and Company, 1888), 321. https://archive.org/details/historyoftownofe00bellrich, accessed December 2023.
[2] Bell, 326-327; *Exeter News-Letter and Rockingham Advertiser*, report on fire at Union Paper Mills, May 17, 1847, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.
[3] Bell, 327; Tardiff, Olive, *The Exeter-Squamscott: River of Many Uses* (Rye, NH: CGC, 1986), 28. Retrieved from Exeter Public Library, December 2023; *Exeter News-Letter,* "Death of America's Oldest Paper Maker," December 23, 1892, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.
[4] Rockingham County Registry of Deeds (RCRD), 489:342 (1883).
[5] RCRD, 501:175 (1885); *Exeter News-Letter,* "Our Daughter Brentwood: Her Manufactories and Farms," October 12, 1888, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023; *Exeter News-Letter,* "Railroad Question: A Feasible Route that Would Benefit Several Isolated Towns," August 1, 1890, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.
[6] RCRD, 618:450 (1906).
[7] *Exeter News-Letter,* Legal Notices, July 1, 1887, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023; *Exeter News-Letter,* October 12, 1888.

News-Letter noted that the "old mills" at Pickpocket were being disassembled and the lumber used elsewhere.[8] A 1902 survey of the Exeter River by the United States Geological Survey noted the Pickpocket site as one of two "unutilized" falls with a "dam and available fall of 10 or 15 feet" under the ownership of the Portsmouth Savings Bank.[9]

While the Portsmouth Savings Bank put the property up for auction in 1906, it was not until August 1919 that the site was sold to the Exeter Manufacturing Company (EMC).[10] Initially formed in 1827, EMC was the most prominent cotton textile manufacturer in Exeter and was one of the three largest industrial firms in New Hampshire. In addition to the company's primary production complex in downtown Exeter along the Squamscott River, EMC acquired mills and water rights between Pittsfield and Exeter throughout the 19th century including the Rockingham Factory Dam near present-day Route 111 in 1867 and the Pittsfield Mills in 1895.[11] In December of that year, EMC engaged the L.H. Shattuck Company of Manchester, NH to construct a new "concrete dam 123 feet wide and 12.95 feet in height" at the Pickpocket site.[12] The dam, completed in March 1920, served to "conserve the water supply" and allow EMC to use the impoundment as a storage basin to aid in their mill operations downstream.[13] In February 1966, the dam site came under the ownership of South Carolina-based Milliken Industrials, Inc. as part of a town-wide transfer of EMC-owned properties when Milliken purchased EMC.[14] In June 1981, Milliken granted permission to the New Hampshire Fish and Game Department (NHFGD) to "construct, maintain, and have exclusive control" of a fish ladder at Pickpocket Dam.[15] Similar in design to the fish ladder constructed at the Exeter Great Dam in 1968, the fish ladder at Pickpocket Dam was finished in late 1969 and allowed diadromous fish to pass over the dam to native spawning areas upstream.[16] The construction of the fish ladder was part of a regional effort under the Anadromous Fish Act wherein the NHFGD and U.S. Fish and Wildlife Service jointly installed fish ladders in coastal areas to "open up over 40 miles of the Exeter River and its tributaries to sea-run fishes."[17] In 1981, Milliken sold the mill complex downstream at the Great Dam to the Nike Company, and donated properties and the water flowage rights at and between both the Great Dam and Pickpocket Dam to the Town of Exeter.[18] Since then, the Town of Exeter has maintained the property for public recreational use.

L.H. Shattuck Company, Inc.

The L.H. Shattuck Company, Inc. was established in 1918 by Louis Herbert Shattuck (1874-1919).[19] Born in Andover, Massachusetts, Shattuck studied law at the Massachusetts Institute of Technology (MIT). After graduating from MIT, he worked for the Norcross Brothers contracting firm of Worcester, MA before establishing his own building and contracting firm in Boston. In 1917, he bought out the J.H. Mendell Company of Manchester, NH, establishing the contracting and building firm L.H. Shattuck Company, Inc. Ahead of the United States' entry into World War I, Shattuck established a shipyard in Newington, NH. The Shattuck Shipyards produced about 14 Ferris-type wooden steamships between 1918 and 1919 for use by the U.S. Navy during the War. In the Winter of 1919, Louis H. Shattuck fell ill, and in July of that year died of lung cancer in Manchester.[20] The Shattuck Shipyards, where production had already dropped precipitously following the end of the War, was purchased by the Boston-based Atlantic Chemical Dye Stuff Corporation in November

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[8] *Exeter News-Letter,* "The County News: Brentwood," March 24, 1899, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.
[9] USGS 1902, pg. 81
[10] *Exeter News-Letter,* "Mortgagee's Sale," August 24, 1906, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.; Rockingham County Registry of Deeds, August 5, 1919; 733:184
[11] Walsh, Rita and Nicole Benjamin-Ma, "Great Dam," NHDHR Individual Inventory Form, Inventory #EXE0043, November 2011.
[12] *Exeter News-Letter,* "The Year's Building Operations in Exeter," December 26, 1919, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed January 2024.
[13] *Exeter News-Letter*, "Town Affairs," March 3, 1920, retrieved from Exeter Public Library, Community History Archive, https://exeter.advantage-preservation.com/, accessed December 2023.
[14] RCRD, 1810/223 (1966); Tardiff, 26.
[15] RCRD, 1971:310 (1968).
[16] Nicole's form; *Valley News*, "Fish and Game News," West Lebanon, NH, August 9, 1969, https://www.newspapers.com/image/833105218, accessed January 2024.
[17] *Valley News*, August 9, 1969
[18] Walsh and Benjamin-Ma; Exeter Town Representatives, "Town of Exeter. Annual reports of the selectmen and treasurer, the town manager, and all other officers and committees, for the financial year ending December 31, 1981" (Exeter, NH: Exeter Newsletter Company, 1982), 18. https://scholars.unh.edu/exeter_nh_reports/93, accessed December 2023; Rockingham County Registry of Deeds, October 20, 1981, 2400:92
[19] FindaGrave, "Louis Herbert Shattuck (1874-1919)," Memorial ID: 98228175, https://www.findagrave.com/memorial/98228175/louis-herbert-shattuck, accessed January 2024.
[20] Smith, James, "A Look Back at Shattuck Shipyard," *Foster's Daily Democrat*, October 13, 2019, https://www.fosters.com/story/entertainment/local/2019/10/13/at-athenaeum-look-back-at-shattuck-shipyard/2542527007/, accessed January 2024.

1919 and the shipbuilding arm of L.H. Shattuck Company was shuttered by January 1920.[21] The primary contracting and building firm continued operations well into the 20th century.

In addition to the Pickpocket Dam, L.H. Shattuck Company, Inc. is credited with numerous infrastructure and construction projects across New Hampshire. The company's infrastructure and engineering work included the foundation and approach work for the original Memorial Bridge spanning the Piscataqua River between Portsmouth, NH and Kittery, ME; the Seaver Reservoir Dam in Harrisville, NH (part of the larger Minnewawa Hydroelectric Project) in 1924; and the Amoskeag Bridge over the Merrimac River in Manchester, NH (constructed 1921, replaced ca. 1970).[22] Their contracting and general construction work included the Langdell and Merrill Hall dormitories and Wetherall Dining Hall at Phillips Exeter Academy (NHDHR Inventory #EXEPEAD) completed in 1933, and additions to the Portsmouth Hospital in 1934.[23]

Applicable NHDHR Historic Contexts (please list names from appendix C):

400. Locally capitalized textile mills in NH, 1720-1920.
800. Water supply, distribution and treatment in New Hampshire, 1850-present.

Architectural Description and Comparative Evaluation:

Description

The Pickpocket Dam is located in the Exeter River at Pickpocket Falls near the intersection of Pickpocket Road and Cross Road southwest of downtown Exeter (Photos 1-11). The dam, built in 1920, is an earth embankment dam with a concrete spillway and end walls and was last modified in 1969 with the addition of a fish ladder. The Pickpocket Dam is a "run-of-the-river" dam, meaning that it allows all of the natural river flow to pass over the dam spillway at roughly the same rate as the natural flow of the river. This type of dam is opposed to other dam types which can divert, store, or release water flow for various reasons. Today, the dam structure includes an inefficient fish ladder along the left abutment, a lower training weir, and a 4-foot by 6-foot low level outlet (Photos 5, 8-10). It is 15 feet high (from dam toe to top of abutments), 230 feet in total length, and the main spillway length is approximately 130 feet. The ogee-style spillway, with its crest at an elevation of 60.9 feet NAVD88 spans the river in a north-south direction. A small island is located immediately upstream of the dam on river-right (Photos 3-4). Due to the dam's current condition, it was classified by New Hampshire Department of Environmental Services (NHDES) as a "High-Hazard Dam".

The concrete and steel denil-style fish ladder is located on the north side of the river with its upstream end at the north end of the dam (Photos 5, 8-10). The fish ladder was installed by the NHFGD in 1969 in an effort to restore upstream passage for diadromous fish. The fish ladder is approximately 95 feet long by 4.3 feet wide, with a 3-foot by 4.75-foot fish trap/counter at its top. The top surface of the fish trap is just below the north abutment at an elevation of approximately 63.58 feet NAVD88. The downstream fish ladder gate invert sits at an elevation of 46.31 feet NAVD88 and the upstream fish ladder gate invert at the top of the dam sits at approximately 61.39. The ladder structure is set at a pitch of approximately 15.8 percent from top to bottom. A 72-foot-long concrete weir structure with wood spillways is located at the lower end of the ladder to guide migrating fish into the ladder (Photos 2, 5, 10). The top of the weir is at approximately 52 feet NAVD88, or approximately 5 feet above the streambed on its downstream face. The NHFGD installed and operates the fish ladder, and adjusts the stop logs as necessary during migration season based on river flow. The goal of the fish ladder is to help diadromous fish reach spawning and nursery habitat; however, the fish ladder has been proven inefficient at allowing upstream fish passage.

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[21] Ibid; *Portsmouth Herald*, "Shattuck Company Ship Business is Nearly Would Up," January 3, 1920, https://www.newspapers.com/image/56536130, accessed January 2024.
[22] *Boston Globe*, "Contract Awarded for the Amoskeag Bridge," July 19, 1921, https://www.newspapers.com/image/430268000, accessed January 2024; *The Portsmouth Herald,* "Excavating for Bridge Approach, " March 7, 1922, https://www.newspapers.com/image/56610222, accessed January 2024.; *The Portsmouth Herald*, "Maine Approach to Memorial Bridge to be Settled Soon," April 11, 1922, https://www.newspapers.com/image/56620610, accessed January 2024.; U.S. Army Corps of Engineers (USACE), *Seaver Reservoir Dam: Phase I Inspection Report, National Dam Inspection Program*, USACE, New England Division (Waltham, MA.), July 1979, page 1-1, https://apps.dtic.mil/sti/tr/pdf/ADA156149.pdf, accessed January 2024.
[23] *The Boston Globe,* "Phillips Exeter Awards Dormitories Contract," October 23, 1931, https://www.newspapers.com/image/431101937, accessed January 2024; *The Portsmouth Herald,* ""Walls of New Dormitory Now Rising," July 20, 1933, https://www.newspapers.com/image/56554765, accessed January 2024; *The Portsmouth Herald,* "New Maternity Building Now Taking Form," August 16, 1934, https://www.newspapers.com/image/11143461, accessed January 2024; Svenson, Alicia and Lisa Howe, "Phillips Exeter Academy Historic District," NHDHR Area Form #EXE-PEAD, December 2016.

The Pickpocket Dam includes a low-level outlet with a sluice gate at its north end. The low-level gate is used to discharge water from the impoundment area to downstream of the dam. As designed, this gate can be manually opened and closed depending on flow conditions and the need to access the dam for inspection and maintenance. The wood supports of the low-level gate are rotted and the gate is no longer operable and is leaking. The gate is kept closed on a normal basis to maintain water levels at the top of the concrete spillway but is kept in working order to be opened in emergencies.

Site

The Pickpocket Dam site straddles the border of Exeter and Brentwood and is just upstream of the Cross Road Bridge. Close to the dam, the north and south banks of the Exeter River contain wooded and grass areas that were the sites of mills in the 18th and 19th centuries. Remnants of foundations of these mills are present along the north bank of the Exeter River near the dam and fish ladder (Photo 11). A dry-laid, rough-cut granite stone retaining wall runs along the north bank of the Exeter River roughly between the upper exit structure of the fish passage and the north abutment of the Cross Road Bridge. Rubble stone riprap extends approximately 50 feet west along the north shore of the river from the upper exit structure and upper gate the impoundment’s north boundary. A rubble stone wall extends along the south shore of the Exeter River between the Cross Road bridge and the dam. A concrete retaining wall extends approximately 30 feet south from the dam.

Comparative Evaluation

According to the NHDES Dam Bureau database, there are 2,600 active dams in the state of New Hampshire. The dam database lists 15 active dams in Exeter and eight in Brentwood. Six active dams are listed on the Exeter River.

The Oyster River Dam at Mill Pond (DUR0018), commonly known as the Mill Pond Dam, is comparable to the Pickpocket Dam because of its date of construction in the early 20th century; its former industrial use; and its pastoral setting. The Mill Pond Dam is located on the Oyster River as it flows through the Town of Durham prior to its discharge into the Great Bay (Photo 12). The Mill Pond Dam was listed on the New Hampshire State Register of Historic Places in 2014 under State Register Criteria A and C for its associations with local history and for its engineering significance as an Ambursen-type dam. The dam was erected in 1913 to replace a series of earlier timber dams dating back to the mid-seventeenth century. The dam is the oldest of seven Ambursen-type dams known to be extant in New Hampshire as of 2020. It is notable that unlike the Mill Pond Dam, Pickpocket Dam is not an Ambursen-type dam nor is the design of the Pickpocket Dam unique or rare.

National or State Register Criteria Statement of Significance:

The Pickpocket Dam is not individually eligible for listing in the National Register of Historic Places.

Criterion A: While the Pickpocket Dam is associated with the manufacturing industry in Exeter and Brentwood in the 20th century, it is not individually significant to the historic context of textile manufacture or water supply. While the dam itself remains on site, the mill context within which the dam developed is no longer legible in this area. Although the impoundment continues to function as a reservoir, the ability for the property to convey its association with an industrial context has predominantly been lost. Therefore, the Pickpocket Dam is not considered eligible for the National Register under Criterion A.

Criterion B: The Pickpocket Dam is not eligible for listing under Criterion B. Research conducted has not identified any connection between the property and historically significant individuals.

Criterion C: The Pickpocket Dam is not eligible for listing under Criterion C as it does not embody distinctive characteristics of a type, period, or a method of construction, nor does it represent the work of a master or exhibit high artistic values. Therefore, the dam is not eligible for listing on the National Register.

Criterion D: The Pickpocket Dam was not evaluated under Criterion D.

Period of Significance:

N/A

Statement of Integrity:

Despite modifications related to the addition of the fish ladder in 1969, the Pickpocket Dam remains relatively intact and continues to convey its general appearance and original purpose as a dam. The dam retains integrity of location, design, materials, and workmanship as an intact run-of-the-river, earth embankment dam with a concrete spillway and end walls located on the Exeter River. However, the Pickpocket Dam's integrity of setting, feeling, and association are compromised. The dam's former association with textile manufacturing and industrial water retention and supply is no longer legible on this site. The industrial setting is absent, giving way to a rural, pastoral feeling in the Pickpocket Dam area.

Boundary Description and Justification:

The historic resource includes the Pickpocket Dam and its immediate surroundings on the riverbank, as well as the Exeter River Reservoir impoundment. The boundary encompasses the land on either side of the dam, based on the legally recorded lot lines shown on Exeter and Brentwood tax maps. Brentwood Map 220 / Parcel 6 (on the north side of the Exeter River) and Exeter Map 99 / Parcel 35 (on the south side of the river) are owned by the Town of Exeter, along with the dam structure.

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______. “Walls of New Dormitory Now Rising.” July 20, 1933. https://www.newspapers.com/image/56554765. Accessed January 2024.

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Valley News. "Fish and Game News." West Lebanon, NH, August 9, 1969. https://www.newspapers.com/image/833105218. Accessed January 2024.

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Surveyor's Evaluation:

NR listed:	individual	____	NR eligible:		NR Criteria:	A	____
	within district	____	individual	____		B	____
			within district	____		C	____
Integrity:	yes	____	not eligible	X		D	____
	no	X	more info needed	____		E	____

FIGURES

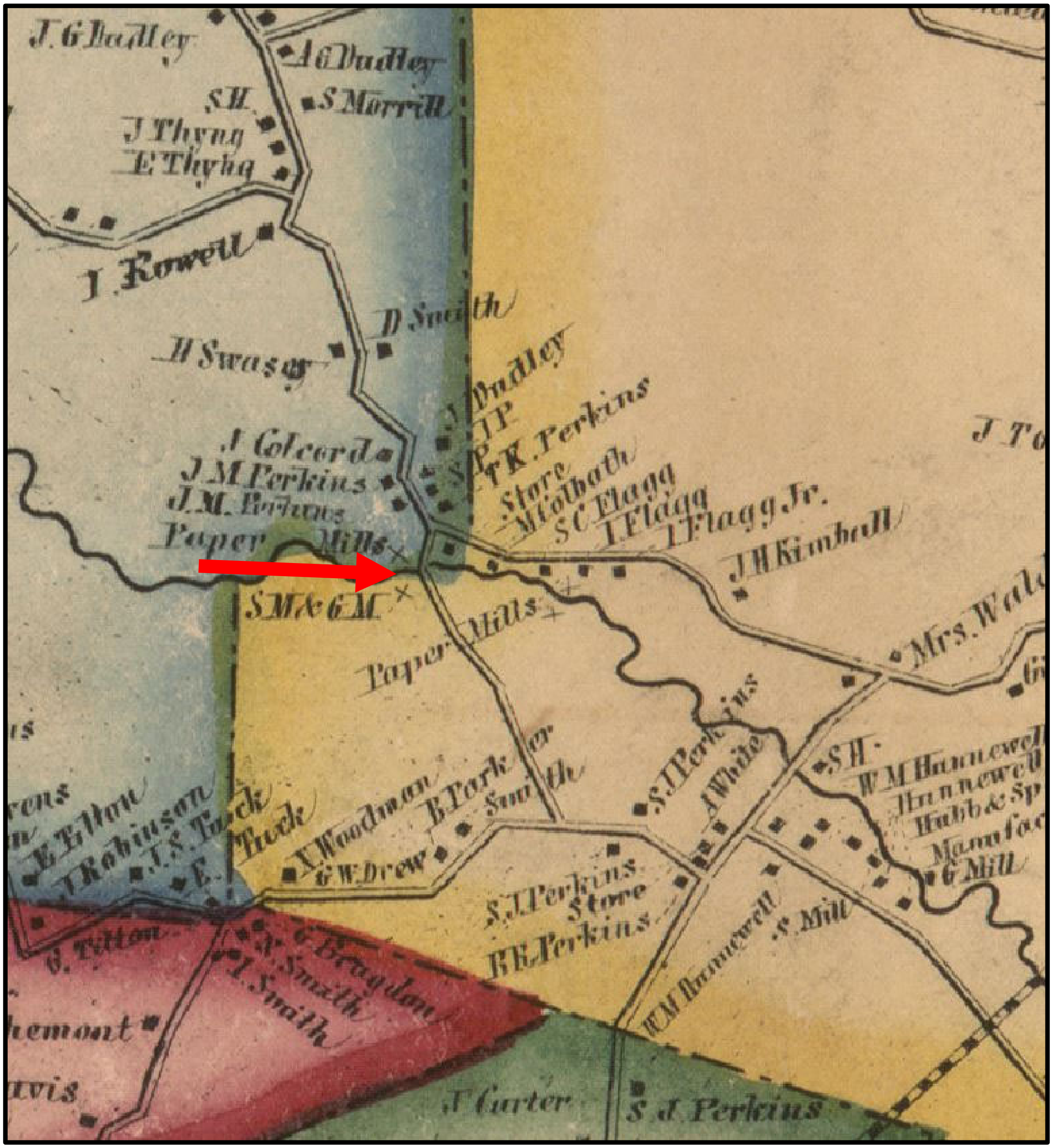


Figure 1. Detail, *Map of Hillsborough County, New Hampshire*, 1857. Arrow indicates the approximate location of the Pickpocket Dam (Source: Chace, 1857).

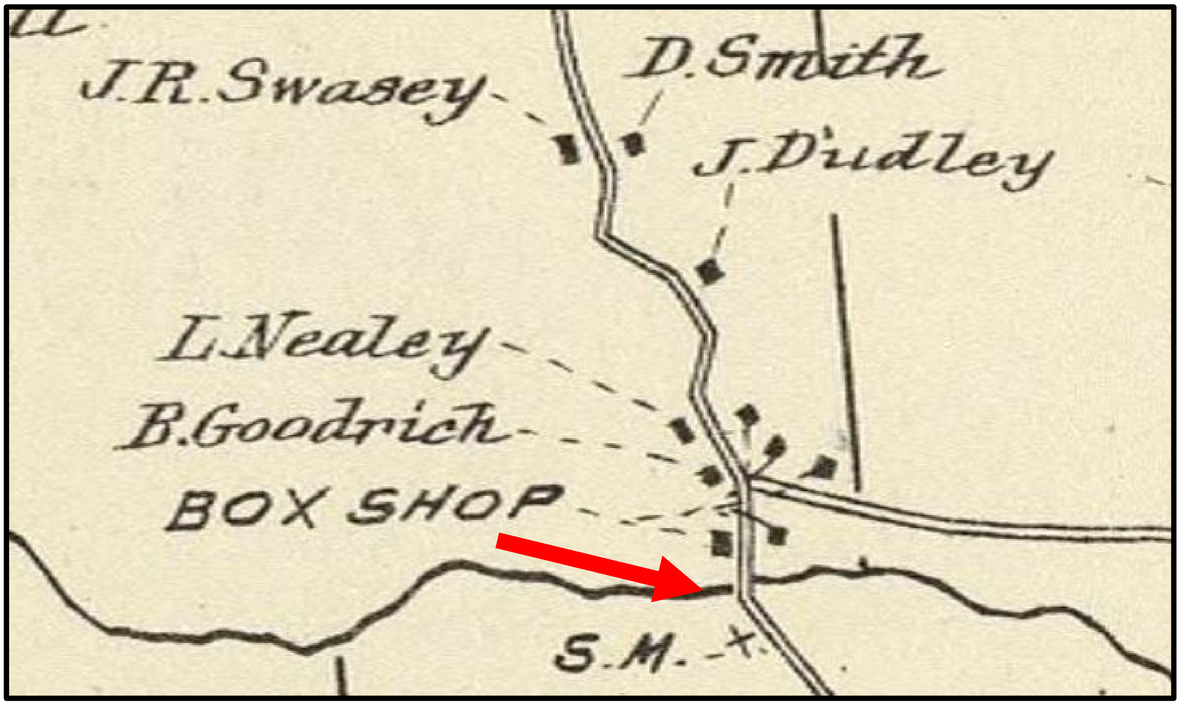


Figure 2. Detail, map of “Brentwood, Rockingham County”, 1892. Arrow indicates the approximate location of the Pickpocket Dam (Source: D. H. Hurd and Company, 1892).

Figure 3. Detail, map of “Exeter, Rockingham County”, 1892. Arrow indicates the approximate location of the Pickpocket Dam (Source: D. H. Hurd and Company, 1892).

SKETCH MAP & PHOTO KEY

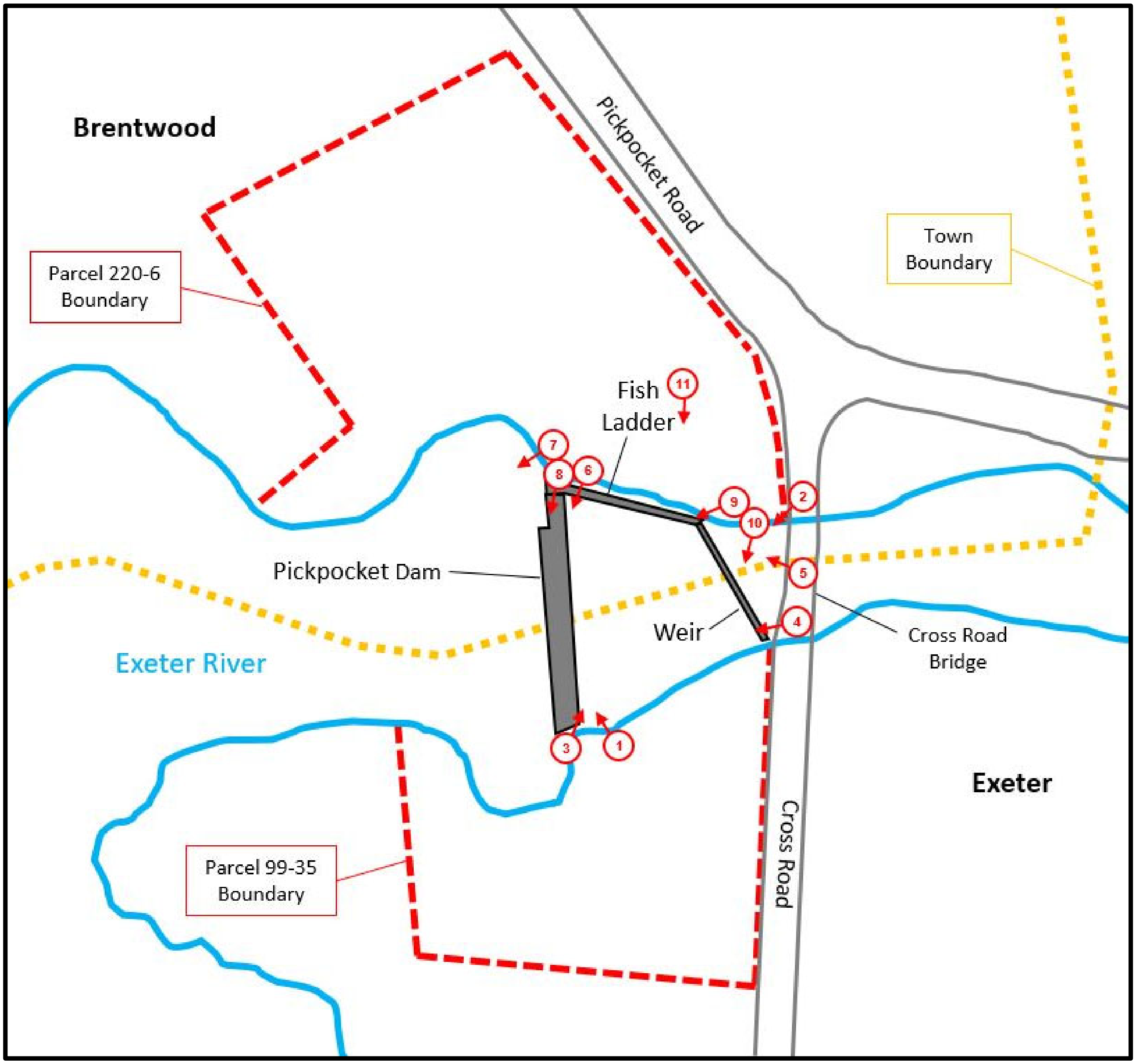


Photo 2 View southwest toward Pickpocket Dam and weir. Fish Ladder is partially visible to the right (north) in image. (Photo: VHB, December 2023.)

Photo 3 View north-northeast toward Pickpocket Dam. (Photo: VHB, December 2023.)

Photo 4 View west toward Pickpocket Dam. (Photo: VHB, December 2023.)

Photo 5 View northwest toward Pickpocket Dam, fish ladder, and weir. (Photo: VHB, December 2023.)

Photo 6 View south-southwest toward Pickpocket Dam. (Photo: VHB, December 2023.)

Photo 7 View west toward Exeter Reservoir impoundment above Pickpocket Dam. (Photo: VHB, December 2023.)

Photo 8 View south toward dam mechanicals and Pickpocket Dam. (Photo: VHB, December 2023.)

Photo 9 View west-southwest toward fish ladder. (Photo: VHB, December 2023.)

Photo 10 View south toward weir and base of fish ladder. (Photo: VHB, December 2023.)

Photo 11 View south toward Pickpocket Dam site across possible mill foundation remnants (date unknown). (Photo: VHB, December 2023.)

Photo 12 Mill Pond Dam, Durham, view south from the north bank of the Mill Pond. (Photo: VHB, June 2022.)

NEW HAMPSHIRE DIVISION OF
HISTORICAL RESOURCES
Department of Natural and Cultural Resources
172 Pembroke Road, Concord, NH 03301
603-271-3483
TDD Access Relay NH 1-800-735-2964
www.nh.gov/nhdhr
preservation@dncr.nh.gov

February 1, 2024

Sarah Graulty
Vanasse Hangen Brustlin Inc
101 Walnut Street
Watertown, MA 02472

Re: Technical Review, Pickpocket Dam

Dear Sarah:

Thank you for requesting a determination of National Register eligibility for the properties listed below. As requested, the Division of Historical Resources' Determination of Eligibility Committee has reviewed the *DHR inventory form* prepared by VHB; based on the information available, the DOE Committee's evaluation of National Register eligibility is:

TOWN/CITY	PROPERTY	DETERMINATION
Exeter	Pickpocket Dam, Cross Road, EXE0056	Eligible

Copies of the DHR evaluation forms are attached for your use. The inventory data and the evaluations will also be added to the statewide survey database for historic properties in New Hampshire.

Please contact Megan Rupnik at Megan.R.Rupnik@dncr.nh.gov if you have questions.

Sincerely,

Liz Schneible
Program Specialist

Enclosure

cc: Ben Wilson, Director / SHPO

New Hampshire Division of Historical Resources

Determination of Eligibility (DOE) — Inventory #: EXE0056

DOE Review Date: 1/24/2024 **Date Received:** 1/17/2024 **Final DOE Approved:** Yes

Property Name: Pickpocket Dam

Area:
Address: Cross Road
Town: Exeter
County: Rockingham

Reviewed For:

DOE Program(s):
Other

Determination of Eligibility:

National Register eligible, individually			**Integrity:** Yes		**Level:** Local
Criteria:	A: Yes	B:	C: Yes	D:	E:

Areas of Significance(s):
Conservation
Engineering
Industry

Period of Significance: 1920 to 1974

Boundary:
The boundary encompasses the land on either side of the dam, based on the lot lines shown on Exeter and Brentwood tax maps. Brentwood Map 220 /Parcel 6 (on the north side of the Exeter River) and Exeter Map 99 / Parcel 35 (on the south side of the river) are owned by the Town of Exeter, along with the dam structure.

Statement of Significance:
The Pickpocket Dam is eligible under Criteria A and C 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. 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.

Comments:

Follow Up:
Notify appropriate parties

G

Natural Resource Agency Coordination

To: Nicole Martin, VHB, Inc.
2 Bedford Farms Drive Suite 200
Bedford, NH 03110
nmartin@vhb.com

From: NHB Review
NH Natural Heritage Bureau
Main Contact: Ashley Litwinenko - nhbreview@dncr.nh.gov

cc: NHFG Review

Date: 12/21/2023 (valid until 12/21/2024)
Re: DataCheck Review by NH Natural Heritage Bureau and NH Fish & Game
Permits: OTHER - Feasibility Study Project Planning

NHB ID: NHB23-3590

Town: Exeter
Location: Exeter River & Reservoir

Project Description: The Town of Exeter is considering alternatives to address the deficient and high hazard Pickpocket Dam on the Exeter River. Some of the alternatives include dam modification and dam removal. The species identified on this report will help inform upcoming project planning as part of the Feasibility Study. The project area drawn on the map accounts for the potential dam removal alternative and extends far upstream of the dam to capture the impounded area.

Next Steps for Applicant:

NHB's database has been searched for records of rare species and exemplary natural communities. Please carefully read the comments and consultation requirements below.

NHB Comments: Please send NHB proposed plans including information about proposed changes to hydrology.

NHFG Comments: Please refer to NHFG consultation requirements below.

NHB Consultation

If this NHB DataCheck letter includes records of rare plants and/or natural communities/systems, please contact NHB and provide any requested supplementary materials by emailing nhbreview@dncr.nh.gov.

If this NHB DataCheck letter DOES NOT include any records of rare plants and/or natural communities/systems, no further consultation with NHB is required.

NH Fish and Game Department Consultation

If this NHB DataCheck letter DOES NOT include ANY wildlife species records, then, based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

If this NHB DataCheck letter includes a record for a threatened (T) or endangered (E) wildlife species, consultation with the New Hampshire Fish and Game Department under Fis 1004 may be required. To review the Fis 1000 rules (effective February 3, 2022), please go to https://www.wildlife.nh.gov/wildlife-and-habitat/nongame-and-endangered-species/environmental-review. All requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent by mail, and **must include the NHB DataCheck results letter number and "Fis 1004 consultation request" in the subject line**.

If the NHB DataCheck response letter does not include a threatened or endangered wildlife species but includes other wildlife species (e.g., Species of Special Concern), consultation under Fis 1004 is not required; however, some species are protected under other state laws or rules, so coordination with NH Fish & Game is highly recommended or may be required for certain permits. While some permitting processes are exempt from required consultation under Fis 1004 (e.g., *statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule*), coordination with NH Fish & Game may still be required under the rules governing those specific permitting processes, and it is recommended you contact the applicable permitting agency. For projects not requiring consultation under Fis 1004, but where additional coordination with NH Fish and Game is requested, please email NHFGreview@wildlife.nh.gov, and include the NHB DataCheck results letter number and "review request" in the email subject line.
Contact NH Fish & Game at (603) 271-0467 with questions.

NHB Database Records:
The following record(s) have been documented in the vicinity of the proposed project.
Please see the map and detailed information about the record(s) on the following pages.

Natural Community	State[1]	Federal	Notes
Red maple floodplain forest	--	--	Threats are primarily changes to the hydrology of the river, land conversion and fragmentation, introduction of invasive species, and increased input of nutrients and pollutants.
Swamp white oak basin swamp*	--	--	Threats to this community include changes to the wetland's hydrology either through damming or increasing drainage. Significant increases in nutrients and pollutants from stormwater runoff could also have a deleterious effect on the wetland.

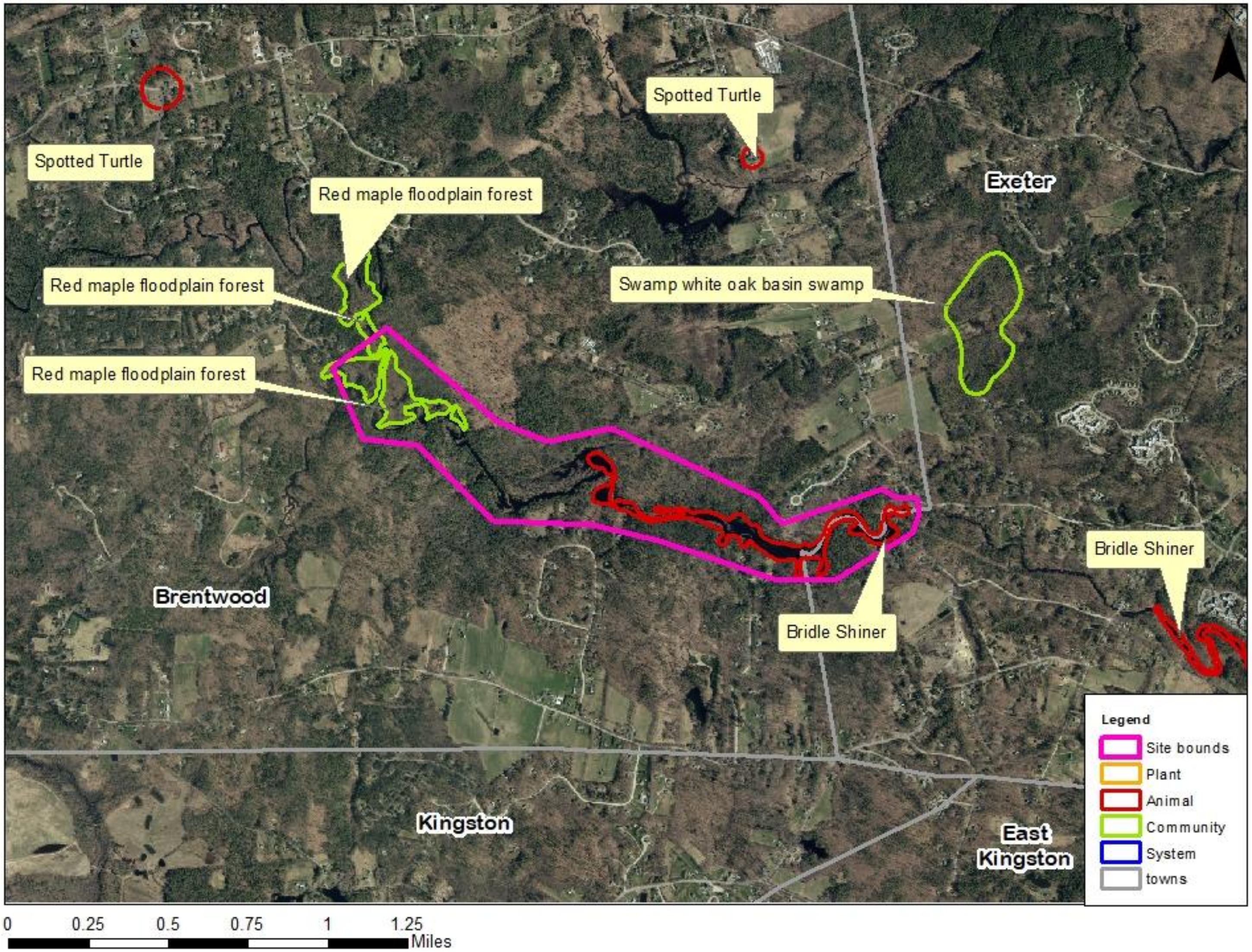
Vertebrate species	State[1]	Federal	Notes
Bridle Shiner (*Notropis bifrenatus*)	T	--	Contact the NH Fish & Game Dept (see above).
Spotted Turtle (*Clemmys guttata*)	T	--	Contact the NH Fish & Game Dept (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list.
An asterisk (*) indicates that the most recent report for that occurrence was 20 or more years ago.

For all animal reviews, refer to 'IMPORTANT: NHFG Consultation' section above.

Disclaimer: NHB's database can only tell you of known occurrences that have been reported to NHFG/NHB. Known occurrences are based on information gathered by qualified biologists or members of the public, reported to our offices, and verified by NHB/NHFG.
However, many areas have never been surveyed, or have only been surveyed for certain species.
NHB recommends surveys to determine what species/natural communities are present onsite.

NHB23-3590


Spotted Turtle
Spotted Turtle
Red maple floodplain forest
Red maple floodplain forest
Red maple floodplain forest
Swamp white oak basin swamp
Exeter
Brentwood
Bridle Shiner
Bridle Shiner
Kingston
East Kingston
Legend
Site bounds
Plant
Animal
Community
System
towns
0 0.25 0.5 0.75 1 1.25
Miles

NHB23-3590 EOCODE: CP00000054*029*NH

New Hampshire Natural Heritage Bureau - Community Record

Red maple floodplain forest

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2022: red maple (*Acer rubrum*) is dominant in the canopy, with other tree species including black cherry (*Prunus serotina*), shagbark hickory (*Carya ovata*), and hemlock (*Tsuga canadensis*). Poison-ivy (*Toxicodendron radicans*) is common. sensitive fern (*Onoclea sensibilis*) is the most abundant herb, with numerous other species including white wood-aster (*Eurybia divaricata*), forked rosette-panicgrass (*Dichanthelium dichotomum*), greater bladder sedge (*Carex intumescens*), white-edged sedge (*Carex debilis* var. *rudgei*), American hog-peanut (*Amphicarpaea bracteata*), and small-spiked false nettle (*Boehmeria cylindrica*). There are multiple invasive species, particularly Morrow's honeysuckle (*Lonicera morrowii*). Japanese barberry (*Berberis thunbergii*) and multiflora rose (*Rosa multiflora*) are also present. 1998: Both low and high terrace floodplains occurred along this stretch of river. A fairly extensive high terrace forest (OPs 2, 4) occurred upslope from patches of lower terrace floodplain forest (OPs 1, 4) and thicket (OP 3). Low terraces were dominated by *Acer rubrum* (red maple), *Carya ovata* (shagbark hickory), *Quercus rubra* (red oak), and *Quercus bicolor* (swamp white oak), while higher terraces had red maple, *Pinus strobus* (white pine) and *Prunus serotina* (black cherry) in the overstory. *Onoclea sensibilis* (sensitive fern) was the dominant understory species in the low terraces. Thicket/meadow species included *Solidago rugosa* (rough goldenrod), *Carex stricta* (tussock sedge), *Vitis labrusca* (fox grape), *Apios americana* (groundnut), *Viburnum dentatum* var. *lucidum* (northern arrow-wood), and *Cornus amomum* (silky dogwood). High terrace floodplains were flat terraces with 0.5 meter deep slough channels winding throughout the forest floor. A mix of low terrace and upland tree species were in the closed forest canopy, with a similar mix of wetland and upland herbs and ferns. Red maple and oak were dominant, with *Thelypteris noveboracensis* (New York fern), *Thelypteris simulata* (Massachusetts fern), *Osmunda cinnamomea* (cinnamon fern), sensitive fern and *Uvularia sessilifolia* (sessile-leaved bellwort) dominant in the understory. Soils were dark throughout, with a silty component, except in OP 4, where coarse sand was the primary texture. 1997: This small floodplain patch was characterized by a partially open canopy forest of *Acer rubrum* (red maple), *Carpinus caroliniana* var. *virginiana* (musclewood), *Carya ovata* (shagbark hickory), *Prunus serotina* (black cherry), and *Ulmus americana* (American elm). Abundant shrub species included *Ilex verticillata* (winterberry), *Toxicodendron radicans* (climbing poison ivy), *Cephalanthus occidentalis* (buttonbush), and *Cornus*

	sericea (red osier dogwood) among others. The community exhibits high herb species richness, with the layer dominated by *Solidago rugosa* (rough goldenrod), *Eupatorium dubium* (three-nerved Joe-Pye weed), *Thalictrum pubescens* (tall meadow-rue), *Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), and *Carex stricta* (tussock sedge).
General Area:	2022: Surrounding upland forest is primarily managed ***hemlock - beech - oak - pine forest***. The larger landscape includes a significant amount of rural residential development. 1997: Soils were wet to hydric and fine textured. Standing, and rivulets of flowing, water permeated throughout the low floodplain terrace. Upstream and downstream meanders and back sloughs are perhaps similar and may add considerably to the overall acreage of nearby floodplains of this type. There is considerable forest cover around this small floodplain patch. Both upland forest and flat forested wetlands lie north and east, between the river and Rowell Road. The abundant, small meandering peninsulas in this stretch of the river probably support similar patches of species rich, forested wetlands that seem transitional between floodplain and forested wetland/swamp.
General Comments:	1997: This floodplain forest is probably typical of small meanders of *Acer rubrum* floodplain on medium sized coastal rivers. More research on floodplains in this area needed.
Management Comments:	1998: Encroachment from development is a threat. 1997: Alert owners to floodplain occurrence.

Location

Survey Site Name: Exeter River
Managed By: NRCS_WRP_Swasey

County: Rockingham
Town(s): Brentwood
Size: 37.0 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2022: Park at corner of Rowell Road and Robinson Street, Brentwood. Hike south on unofficial trail through SELT property to river. 1998: Take Rte. 11A east from Brentwood. Turn south on Haigh Road and then east on Rowell Road. Park in woods beyond houses and hike south to Exeter River. At low water, park along Rowell Road, just east of Haigh Road Bridge. Cross river and hike downstream (south) of river's edge. At high water, follow Haigh Road to new development. Hike north along river.

Dates documented

First reported: 1997-08-15 Last reported: 2022-07-18

NHB23-3590 EOCODE: CP00000160*007*NH

New Hampshire Natural Heritage Bureau - Community Record

Swamp white oak basin swamp

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Not ranked (need more information)
State:	Not listed	State:	Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank: --

Detailed Description: 1996: Characteristic species include *Quercus bicolor* (swamp white oak), *Acer rubrum* (red maple), *Viburnum dentatum* var. *lucidum* (northern arrow-wood), *Vaccinium corymbosum* (highbush blueberry), *Ilex verticillata* (winterberry), Sphagnum, *Carex crinita* (drooping sedge), and *Thelypteris palustris* (marsh fern). Community is fairly homogenous with some mesic oak-pine uplands along edges and perhaps intrusions into swamp.
General Area: 1996: Basin swamp high in the watershed on silt loams. Slightly higher ground with mesic oak, pine, red maple forest.
General Comments: --
Management Comments: --

Location

Survey Site Name: Pickpocket Road
Managed By: Swazey Land

County: Rockingham
Town(s): Exeter
Size: 41.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: From downtown Exeter, go west on Rte. 111A (Brentwood Rd.) ca. 2 miles. Veer left on Michael Bennet Rd. Park at pulloff on Michael Bennet Road (Dogtown Road) 0.5 mile west of junction with Route 111A. Site is east of Pickpocket Road; south of Michael Bennet Road.

Dates documented

First reported: 1996-08-29 Last reported: 1996-08-29

NHB23-3590 EOCODE: CP00000160*007*NH

NHB23-3590 EOCODE: AFCJB28180*037*NH

New Hampshire Natural Heritage Bureau - Animal Record

Bridle Shiner (*Notropis bifrenatus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Rare or uncommon
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2017: Area 14345: Healthy population in extensive vegetated backwaters upstream of the Pickpocket Dam. Upstream extent of habitat was not delineated.
General Area: 2017: Area 14345: Wetland vegetation in impounded portion of river.
General Comments: 2017: Area 14345: Population is vulnerable to potential water level fluctuations at dam.
Management Comments: --

Location

Survey Site Name: Exeter River, Pickpocket Dam
Managed By:

County: Rockingham
Town(s): Brentwood
Size: 29.3 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2017: Area 14345: Exeter River upstream of Pickpocket Dam, Brentwood.

Dates documented

First reported: 2017-10-18 Last reported: 2017-10-18

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

NHB23-3590 EOCODE: AFCJB28180*052*NH

New Hampshire Natural Heritage Bureau - Animal Record

Bridle Shiner (*Notropis bifrenatus*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Rare or uncommon
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Good quality, condition and landscape context ('B' on a scale of A-D).
Comments on Rank: --

Detailed Description: 2021: Species found in suitable habitat throughout entire reach. Good long term viability due to dam removal.
General Area: 2021: Downstream of Route 111 bridge to baseball fields near town center. Dam removal has improved habitat.
General Comments: --
Management Comments: --

Location

Survey Site Name: Exeter River, between Route 111 and Exeter town center
Managed By:

County: Rockingham
Town(s): Exeter
Size: 61.0 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2021: Exeter River, between Route 111 and Exeter town center

Dates documented

First reported: 2021-07-21 Last reported: 2021-07-21

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

NHB23-3590 EOCODE: ARAAD02010*121*NH

New Hampshire Natural Heritage Bureau - Animal Record

Spotted Turtle (*Clemmys guttata*)

Legal Status		**Conservation Status**	
Federal:	Not listed	Global:	Demonstrably widespread, abundant, and secure
State:	Listed Threatened	State:	Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2019: Area 14357: 1 adult observed, sex unknown. 2007: Area 12225: 1 adult male observed.
General Area: 2019: Area 14357: Large grassy area, numerous deciduous and evergreen trees, shrubs, brush piles, natural pool. 2007: Area 12225: Roadside.
General Comments: --
Management Comments: --

Location

Survey Site Name: Dudley Brook
Managed By:

County: Rockingham
Town(s): Brentwood
Size: 9.6 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2019: Area 14357: 229 Pickpocket Road, Brentwood. 2007: Area 12225: In the middle of Middle Road (Rt 111A), 0.2 miles east of intersection with Prescott Road, near a cemetery.

Dates documented

First reported: 2007-05-29 Last reported: 2019-05-19

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: December 14, 2023
Project Code: 2024-0026515
Project Name: Pickpocket Dam

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2024-0026515
Project Name: Pickpocket Dam
Project Type: Dam - Removal
Project Description: The Town of Exeter is considering alternatives to address the deficient and high hazard Pickpocket Dam on the Exeter River. Some of the alternatives include dam modification and dam removal. The species identified on this report will help inform upcoming project planning as part of the Feasibility Study. The project area drawn on the map accounts for the potential dam removal alternative and extends far upstream of the dam to capture the impounded area.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.972559149999995,-71.02570671700602,14z

Counties: Rockingham County, New Hampshire

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: VHB, Inc.
Name: Nicole Martin
Address: 2 Bedford Farms Drive
Address Line 2: Suite 200
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