Draft Study Report

Bar Mills Hydroelectric Project

FERC No. 2194

Prepared for:

Brookfield White Pine Hydro LLC

Prepared by:

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EXECUTIVE SUMMARY

The purpose of this Draft Study Report (DSR) is to summarize baseline data at the Bar Mills Hydroelectric Project on geology and soils, water quality and quantity, fish and aquatics, wildlife and botanical resources, recreation, land use, aesthetics, and historical structures. Brookfield White Pine Hydro (BWPH) is proposing (proposed action) to surrender the Federal Energy Regulatory Commission (FERC) license at Bar Mills Hydroelectric Project on the Saco River, between Hollis and Buxton, Maine.

Information contained in this DSR will be used to inform development of a Decommissioning Plan in early 2026 which will provide additional details on decommissioning, including details on the removal of specific project features and proposed mitigation measures.

In response to public and agency comments received during study planning, this DSR provides information regarding both a partial and full spillway removal as possible alternatives to satisfy current license requirements for upstream and downstream migratory fish passage. Partial spillway removal refers to removal of the western half of the dam from the canal gates to the log sluice located in the middle of the dam. Full spillway removal refers to the removal of the entire spillway structure from the canal headgates to the old Fibre Mill foundation. Both alternatives include removal of the canal spillway adjacent to the headgate structure and construction of a flow diversion weir to a height that inflows will be excluded from the canal with the exception of extreme high flow events that would likely occur one to two times per year. BWPH does not intend to dredge or otherwise disturb sediments in the canal and if acceptable under MDEP and USACE permitting, fill portions of the canal with spillway demolition materials.

BWPH worked with the Towns to form a Decommissioning Committee (Committee) to review an initial draft of the DSR and to discuss issues of concern regarding decommissioning. A summary of the Committee process and discussions are provided in Appendix A of the DSR. BWPH will continue to work with Committee members and Town representatives to identify and evaluate post-removal fire suppression options, wells that could potentially be affected by lower water levels and alternative public access sites for flatwater boating opportunities. FERC processes applications to surrender licensed hydropower projects to ensure that safety and environmental concerns are addressed before allowing a project to be removed from federal jurisdiction. Results presented in this DSR, along with an Environmental Assessment (EA) that will be performed by FERC,

aid in the determination of conditions of an order approving license surrender. Below is an overview of the findings in this report.

Sediments - Subbottom profiling and probe interpretations below the water surface at and in the reach immediately upstream of the dam determined that little sediment exists and that preconstruction removal of sediments is likely unnecessary. A shoreline erosion study suggests sandy banks would quickly adjust to the new water elevation and revegetate rapidly. The presence of a cobble and bedrock dominated riverbed in the upper reach and downstream of the Bar Mills Dam indicates that the channel bed is relatively stable and the river will settle back into its historical, pre-dam channel form. Though BWPH has no plans to disturb the former Rogers Fibre Mill property, the DSR also examines sediments at and in the vicinity of the former mill for contaminants.

Water Quality - The Saco River at the Bar Mills Project is classified as Class A waters. The study report includes hydrology figures, water quality data, and provides a summary of water supply wells and dry hydrant information relevant to the proposed action.

Migratory Fish Passage - Modeling of the zone of passage for migratory fish species at the breached dam indicates that a partial breach or full removal of the spillway will provide similar depth and velocities relative to fish passage. It is recognized that under low river flow conditions water depth may be limiting to fish passing upstream, however, BWPH will have no control of water levels post-decommissioning.

Wetlands - Of the 20 wetlands investigated, 13 are expected to have no substantive change. The remaining seven wetlands are anticipated to remain hydric or saturated. While wetland area may change, either increasing or decreasing in area, the overall quality of wetlands is expected to remain the same, or in some cases, improve. Restoring the more natural hydrologic conditions supports the physical, chemical, and biological processes characteristic of higher quality wetlands. Following dam breach or full spillway removal, shoreline monitoring may be necessary for invasive botanical species.

Recreation - Monitoring conducted in 2023 at the Bar Mills impoundment boat launch and in 2024 at all the Bar Mills recreation sites found relatively low levels of recreational use. However, high water levels at the time of the surveys in 2023 may have impacted use levels. Water Levels – The largest impact to water levels will occur in the reach between the existing dam and the old railroad crossing located approximately 2,200 feet upstream where there is a bedrock ledge that will serve as a hydraulic control post-dam removal. Water levels in this reach are expected to be approximately 6 feet lower after dam

removal. Water levels upstream of the hydraulic control are anticipated to be reduced by approximately 2.5 feet. Based upon water level modeling, it is anticipated that the area between the hydraulic control and the existing dam will largely return to a riverine reach, following the historic main channel through the area currently occupied by the western portion of the spillway.

Historic Resources - BWPH will consult with Maine Historic Preservation Commission to develop any potential recommendations for protective or mitigative measures that may be necessary to address effects on the eight historical resources eligible for listing on the National Register of Historic Places, as applicable.

In summary, the DSR provides BWPH, regulating agencies, and the public, a collection of field and desktop data relative to the proposed surrender and decommissioning of the Bar Mills Project. The data and information herein will aid in the effects analysis and decision-making process for protection, mitigation and enhancement measures for the proposed actions that will be contained in the License Surrender Application and Decommissioning Plan.

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1.0 INTRODUCTION

The Bar Mills Project (Project) is a run-of-river facility located on the Saco River in Hollis, York County, Maine. It is downstream of the West Buxton Dam and upstream of the Skelton Dam (Figure 1-1). The Bar Mills Dam is one of six hydroelectric projects on the Saco River that are owned and operated by Brookfield White Pine Hydro (BWPH), LLC, a Brookfield Renewable company. BWPH holds a license to operate the Bar Mills Project issued by the FERC on August 26, 2008, which expires on July 31, 2048. On November 30, 2020, BWPH notified the Federal Energy Regulatory Commission (FERC) of its intent to surrender the FERC license (P-2194).

The FERC license requires run-of-river operations and seasonal minimum bypass and downstream flows from the Project, consistent with the 1997 Flow Agreement[1], and the FERC approved Minimum Flow Monitoring Plan (2011)[2]. The Project is also subject to the 2007 Saco River Fisheries Assessment Agreement[3], amended in 2019[4], which sets the operational date for upstream fish passage facilities at the Project (or an alternative developed in consultation with fisheries agencies) to be May 1, 2025. On November 30, 2020, in accordance with the fish passage alternative specified in the 2019 Amendment, BWPH filed a letter with FERC indicating its intent to surrender the license for the Bar Mills Project.

[1] The April 30, 1997 Instream Flow Agreement for Hydroelectric Projects on the Saco River was incorporated as appropriate into the individual project licenses for the Hiram, Bonny Eagle, and Skelton projects.
[2] FERC. 2011. Order Amending Flow Monitoring Plan. Issued January 4, 2011. Accession No.: 20110104-3002.
[3] FERC 2007. Order Modifying and Approving Fish Passage Assessment Report and Recommendations for Fish Passage and Fisheries Management. 120 FERC ¶ 62,050
[4] FERC 2019. Order Approving Revised Fish Passage Assessment and Fish Passage Installation Schedule. 168 FERC ¶ 62,035

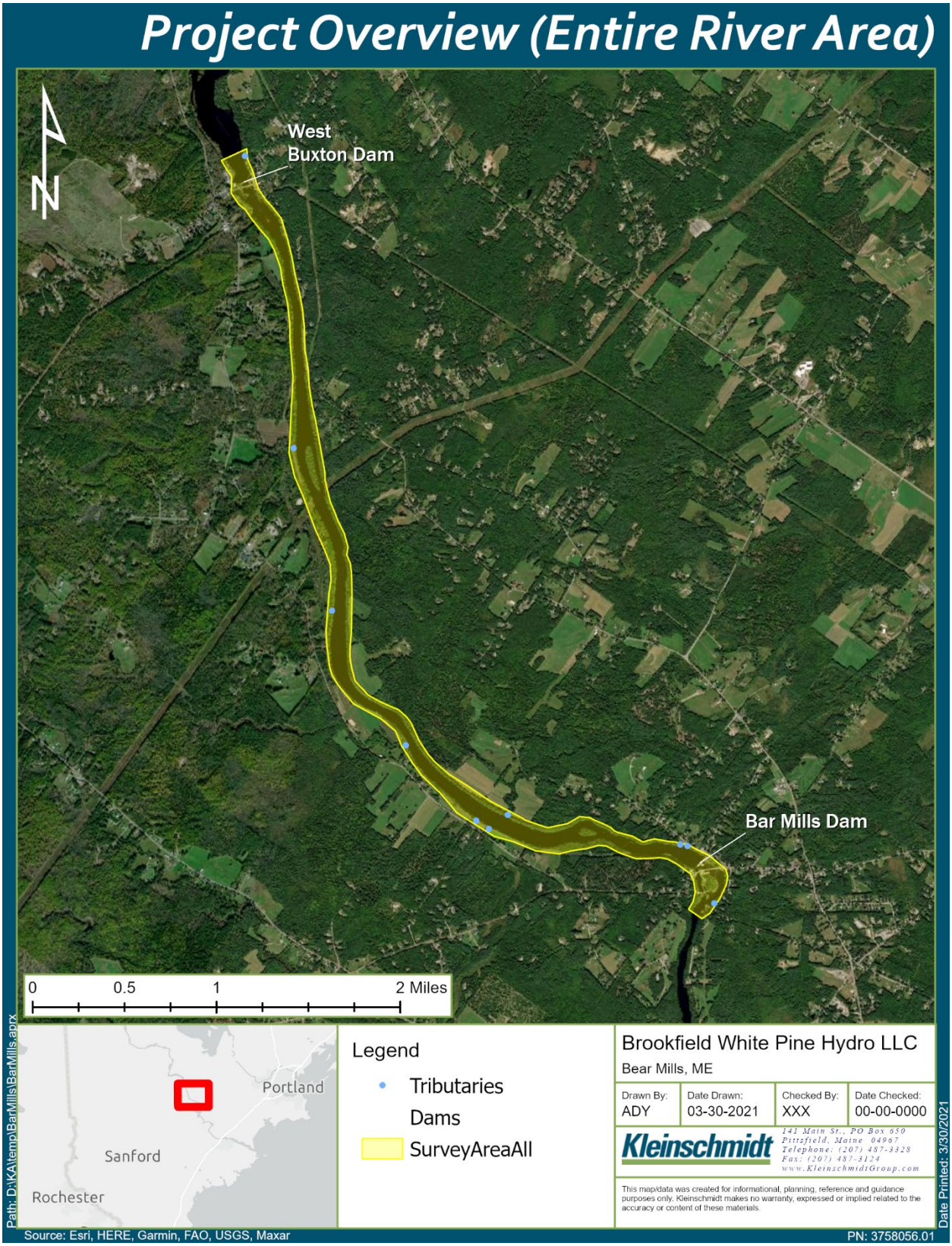


Figure 1-1 Bar Mills Project Overview

2.0 STUDY PLANNING PROCESS

Following consultation with the resource agencies on dam breach and removal options[5], BWPH issued a Preliminary Scoping Document (PSD) on August 1, 2022, describing the Project, and the proposed action for surrender of the FERC license and decommissioning of the project, including partial dam removal. Comments were requested to be submitted by September 1, 2022.

BWPH held a public informational meeting for the license surrender and decommissioning process, including presentation of plans for partial dam removal, for the Project at the Town of Buxton municipal office on August 2, 2022.

BWPH compiled a list of resource issues and studies to be conducted in 2022 and 2023, partially informed through public outreach, which was posted to the project website and distributed to stakeholders on December 5, 2022. BWPH requested that comments and additional study requests be submitted by January 6, 2023. Study requests received were used to inform development of the Proposed Study Plan.

BWPH issued a Draft Study Plan on May 31, 2023, to provide the federal and state agencies, stakeholders and the general public with a description of studies and methodologies that BWPH intended to conduct in support of the Application for License Surrender and Decommissioning Plant.

BWPH issued the Draft Study plan for 30-day agency and public comment and requested any comments be submitted in writing by June 30, 2023. A summary of comments on the Draft Study Plan was provided in Section 4.0 of the Final Study Plan, issued on August 28, 2023. BWPH also held a stakeholder and public meeting on June 14, 2023. Written questions were collected at the meeting, responded to at the meeting to the extent possible, and are summarized with responses in Appendix B of the Final Study Plan. Written comments were provided on the Draft Study Plan by:

- MDEP – June 28, 2023
- Town of Buxton, Board of Selectmen – June 29, 2023

[5] Meetings were held with the US Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Maine Department of Marine Resources (MDMR), and Maine Department of Inland Fisheries and Wildlife (MDIFW) on December 17, 2021 and May 19, 2022 to discuss fish passage outcomes for various breach alternatives.

- MDMR – June 30, 2023
- Town of Hollis, Office of the Selectboard – June 30, 2023

The final study plan was issued on August 28, 2023, which included a matrix of comments and BWPH responses. BWPH had intended to conduct proposed field studies during the summer and fall of 2023, with study results provided in a Draft Study Report to be issued for agency, stakeholder and public review in late 2023. However, abnormally high levels of precipitation in Maine and New England during the summer of 2023 resulting in river flows of six to eight times normal average (5,000-6,500 cfs vs. 800 cfs) making field and river access conditions unsafe. Therefore, BWPH postponed field dependent studies until 2024.

In response to feedback from the Towns of Hollis and Buxton during the study planning process, BWPH formed a Decommissioning Committee of ten representatives selected by the Towns to review a preliminary draft of the DSR, to identify primary issues of concern, and to form subcommittees to evaluate alternatives to address recreational access, water supply under lower water levels associated with groundwater wells and fire suppression, and other concerns identified by the committee members. A series of three meetings were held in August and September 2025, including a site visit. Summaries from the meetings are provided in Appendix A of this DSR. Coordination with the Decommissioning Committee will continue following agency and public distribution of the DSR for comment as BWPH begins to develop a Decommissioning Plan, which will include specific proposed protection, mitigation, and enhancement measures that are being considered (e.g., partial or full spillway removal). A draft of the Decommissioning Plan is anticipated to be distributed for public review and comment in early 2026.

BWPH will hold a public meeting on October 30, 2025 to present an overview of DSR results, process steps going forward, and to identify upcoming opportunities for public input over the course of the surrender and decommissioning process.

3.0 DRAFT STUDY REPORT

This Draft Study Report (DSR) includes the results of the Bar Mills Project studies conducted leading up to and during the 2024 season in support of the license surrender application. Resource areas for which studies were conducted included:

- Geology and Soils
- Water Quality and Quantity
- Fish and Aquatics
- Wildlife and Botanical Resources
- Recreation
- Land Use
- Aesthetics
- Historic Structures

Section 4.0 of this DSR includes a brief description of the Project facilities. Individual resource sections provide a description of the study objectives, methodologies, and results, as applicable.

The Project Scoping document, issued in August 2022, identified the proposed action for surrender of the FERC license and decommissioning of the project, including partial dam removal. Based on stakeholder feedback during the scoping and planning process, BWPH has expanded its evaluation of decommissioning alternatives to include the full removal of the spillway. This expanded alternative covers the section from the west side of the log sluice—including the sluice itself—to the abutment on the river side of the former mill intake. This would be in addition to the previously considered partial removal, which included only the western portion of the spillway from the canal to the log sluice. Both alternatives include removal of the canal spillway adjacent to the headgate structure and construction of a flow diversion weir to a height that inflows will be excluded from the canal with the exception of extreme high flow events that would likely occur one to two times per year. BWPH does not intend to dredge or otherwise disturb sediments in the canal and if acceptable under MDEP and USACE permitting, fill portions of the canal with spillway demolition materials.

4.0 PROJECT DESCRIPTION

The Bar Mills Project includes an existing concrete dam that spans the Saco River to the former mill intake structure[6], a granite headwork structure at the entrance to the intake canal, a canal that conveys flow to the powerhouse, a downstream fish passage facility, a powerhouse, appurtenant equipment, and an approximately 5.3-mile-long, 263-acre impoundment (Figure 4-1). A detailed description of the Bar Mills Project is contained in the Preliminary Scoping Document (BWPH 2022). The Bar Mills Project has two generating units with a total rated generating capacity of 4.0 megawatts and a maximum hydraulic capacity (total turbine capacity) of 3,120 cubic feet per second (cfs) (FPL Energy, 2003). The normal pond elevation of the dam is 148.5 feet (NGVD29). The project is not currently operating.

The Bar Mills Project is authorized by the FERC license for run of river operations. Generally, the Bar Mills impoundment levels will fluctuate once or twice daily up to 2-feet below normal full pond elevation of 148.5 ft (NGVD 29) to accommodate flow releases from the Bonny Eagle Project, located upstream of the Bar Mills Project. According to the Project license and Minimum Flow Monitoring Plan[7], the flow requirements at Bar Mills, which are determined by flow releases made at the upstream Bonny Eagle Project, are:

- from April 1 through June 30, the impoundment will be maintained within 1 foot of the full pond elevation (run of river); outflow approximately equal to inflow (run-of-river operations) and a minimum bypass reach flow of 100 cfs, or inflow, whichever is less, will be maintained;
- from July 1 through September 30, the impoundment will be maintained within 2 feet of the full pond elevation; a Project minimum flow of 400 cfs or inflow, whichever is less and a minimum bypass reach flow of 100 cfs, or inflow, whichever is less, will be maintained;
- from October 1 through October 31, the impoundment will be maintained within 2 feet of the full pond elevation and a Project minimum flow of 600 cfs or inflow, whichever is less and a minimum bypass reach flow of 100 cfs, or inflow, whichever is less, will be maintained;

[6] Because the concrete foundation of the demolished Roger Fiber Mill Building built adjacent to the east end of Bar Mills dam is a water retaining structure, FERC required that this structure be included within the project boundary and project drawings pursuant to Article 205 and 304, respectively, of the August 26, 2008 Order Issuing License. The adjacent property is owned by the Town of Buxton.
[7] Approved by FERC on January 4, 2011.

- from November 1 to November 15, the impoundment will be maintained within 2 feet of the full pond elevation; and a Project minimum flow of 600 cfs or inflow, whichever is less and a minimum bypass reach flow of 50 cfs, or inflow, whichever is less, will be maintained; and
- from November 16 through March 31, the impoundment will be maintained within 2 feet of the full pond elevation; and a Project minimum flow of 250 cfs or inflow, whichever is less and a minimum bypass reach flow of 50 cfs or inflow, whichever is less.

Minimum flows, other than those specifically required for the bypass reach, historically were generally conveyed through the powerhouse via generation. During time of unit outage, or during times of inflows in excess of station capacity, flows were conveyed to the bypass reach via the spillway.

Due to alkali-aggregate reaction (AAR) conditions observed in the powerhouse caused by construction materials utilized in the 1950s, prior to current ownership, Units 1 and 2 were considered out-of-service indefinitely as of May and December 2017, respectively. Since that time, all inflow to the Bar Mills Project has been passed via the spillway and bypass reach and the headpond has been maintained at 148.5 feet (NGVD) except for brief periods when flashboards are lowered in anticipation of high flow events.

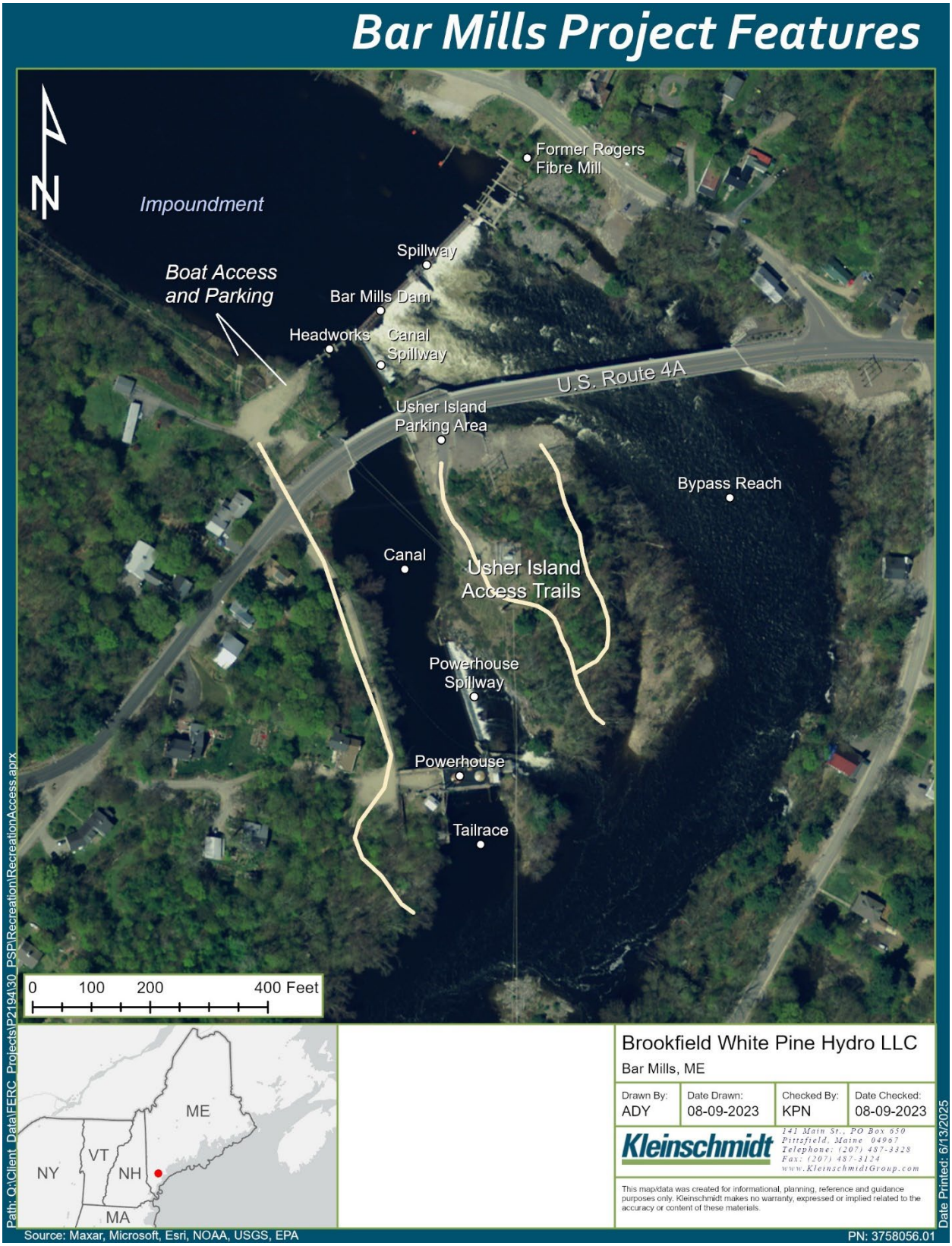


Figure 4-1 Bar Mills Project Features

5.0 GEOLOGY AND SOILS

5.1 Introduction

In response to stakeholder issues raised during scoping with regard to sediments behind Bar Mills Dam, potential for shoreline erosion, and requests for The Towns of Hollis and Buxton requested a Phase I Environmental Site Assessment (ESA), BWPH evaluated three primary aspects of ground disturbance and potential erosion and sediment issues:

- Risk assessment of BWPH properties and remaining structures
- Quantification and composition of sediment behind the Bar Mills Dam and the submerged timber crib dam immediately upstream and
- Identification of potential areas of shoreline bank erosion

Environmental Risk Assessment

For the risk assessment component of this study, BWPH contracted TRC Environmental Corporation (TRC) to conduct an environmental review to evaluate potential environmental concerns on the Bar Mills property (See *Bar Mills Decommissioning Planning Environmental Review* in Appendix B). In conducting this review, TRC used the general principles of a Phase I Environmental Site Assessment (Phase I ESA) as the basis for its review. Phase I ESAs are performed in accordance with the ASTM E 1527-21 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* and are typically conducted for the sale or transfer of ownership of property, which is not planned for the Bar Mills Project. The purpose of a Phase I ESA is to identify Recognized Environmental Conditions (RECs) at a subject property, as defined by the ASTM E 1527-21 Standard: *"(1) the presence of hazardous substances or petroleum products in, on or at the subject property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on or at the subject property under conditions that pose a material threat of a future release to the environment."*

Quantification and Composition of Sediments

BWPH collected detailed bathymetry data upstream of Bar Mills dam in 2021 to develop modeling of partial and full spillway removal conditions and potentially quantify potential

sedimentation in the reach upstream of Bar Mills dam. Because this information was insufficient to inform the extent of sedimentation upstream of the dam, BWPH conducted a stepwise approach to employ additional methodologies to characterize the extent of sedimentation and potential sediment sampling locations. This approach consisted of utilizing a boat outfitted with high resolution depth sounding equipment to conduct sonar based subbottom profiling of the approximately 2,200-foot-long reach extending upstream from the Bar Mills dam boater safety barrier to the first hydraulic control. Underwater imagery was collected from the dam by a dive contractor to qualitatively assess sedimentation in the area immediately upstream of the dam that could not be safely accessed by boat.

Shoreline Erosion

Potential for shoreline bank erosion along the impoundment was conducted through field surveys conducted by Kleinschmidt Associates in September 2024, in concert with wetlands, tributary access, and invasive species surveys. The report on study area, methods, and results of these field studies are contained in the report on *Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC NO. 2194* (Draft January 2025), which is contained in Appendix C of this DSR.

5.2 Environmental Risk Assessment

5.2.1 Background

Cumberland County Power and Light originally constructed the Bar Mills Project in 1919. The Project was completely rebuilt in the 1950's (the dam was rebuilt in 1949-50 and the powerhouse in 1955-56). The Project, as rebuilt, consists of the same primary structures that exist today: a concrete powerhouse, concrete and masonry canal walls, masonry headworks, and concrete dam with hinged steel flashboards. Downstream fish passage facilities were constructed in 1999-2000 and became operational in 2001. Due to alkali-aggregate reaction (AAR) issues which caused misalignment of the operating components of the generating units, among other issues, BWPH ceased operation of the units in 2017. Lands within the project boundary owned by BWPH include the land immediately adjacent to the powerhouse (access road and parking area), lands immediately adjacent to, within, and upstream of the canal and headworks (including the existing trailered boat launch) and Usher Island.

The former Rogers Fibre Mill at the east end of the Bar Mills dam is a United States Environmental Protection Agency (EPA) Superfund Site located on lands owned by the Town of Buxton which are adjacent to and downstream of the Bar Mills Dam. The EPA undertook remediation measures in the late 1990s, including an inventory, sampling and analysis of tanks, vats and/or drums stored onsite; overpacking and staging of any identified hazardous substances; demolition of the structurally unsafe contaminated building; removal of asbestos-contaminated materials; and disposal of any identified hazardous substances and contaminated materials at EPA-approved disposal facilities.

5.2.2 Goals and Objectives

The objective of the Phase I ESA based environmental due diligence assessment is to evaluate past land uses in areas of proposed ground disturbance during construction. The purpose of the study was to assess the potential for contaminated soils and sediments in the areas of construction disturbance to inform the scope of soil and sediment testing and removal and/or potential use of material for regrading the canal. The assessment was intended to identify potential environmental concerns associated with partial or full spillway removal activities and identify protection and/or mitigation measures to be included in the surrender application and decommissioning plan.

5.2.3 Study Area

The Phase 1A (see *Bar Mills Decommissioning Planning Environmental Review* in Appendix B) assessment reviewed what ground disturbing construction activities will be conducted to identify what impacts activities will have on the potential for the release of contaminants. BWPH is not proposing removal of any remnant structures on the property adjacent to the eastern terminus of the spillway. Ground disturbing activities are anticipated to be limited to the:

- All or a portion of the spillway
- All or a portion of the former timber crib dam (currently submerged upstream of the Bar Mills spillway)
- canal headworks and canal
- west shoreline access areas, including the existing boat launch

The property that is delineated on tax maps and survey mapping as owned by the Town of Buxton containing the former Rogers Fibre Mill site was reviewed for existing, publicly

available information regarding the potential for release of contaminants under the partial or full spillway removal scenarios (based on evaluation of hydraulic modelling and erosion potential).

Sediment sampling was anticipated to be conducted upstream of the Bar Mills dam between the dam and hydraulic control approximately 2,200 feet upstream and within the intake canal, depending on results of investigations to assess the location and extent of sedimentation in these areas (See Section 5.3).

5.2.4 Methods

BWPH conducted an environmental due diligence assessment (See Appendix B) in general conformance with the ASTM E 152—21 Standard in the areas where ground disturbing activities will occur to facilitate construction.

The following standard Phase I ESA tasks were conducted as part of the Phase I based due diligence evaluation:

- Perform a site and vicinity reconnaissance, primarily limited to proposed locations for ground/building disturbing construction activities;
- Conduct a historical source review, including review of current, readily available government regulatory databases provided by Environmental Data Resources (EDR) for the Project Area and provide a description of historical site conditions for areas that have the potential for the release of contaminants through ground disturbance, etc.;
- Conduct a review of environmental database and regulatory agency records; and
- Conduct a review of previous environmental reports/documentation.
- Identify the need and extent of sediment sampling for material that will be excavated during construction for contaminant testing.

The findings, opinions, conclusions, and any recommendations for further investigations were compiled which will be used to inform final design and construction planning and any enhancement and mitigation measures BWPH may include in the Surrender Application and Decommissioning Plan.

5.2.5 Results

TRC performed an environmental due diligence review (Appendix B) using the general principles of a Phase I ESA per ASTM Practice E1527-21 for the proposed decommissioning of the Bar Mills Project in Hollis and Buxton, York County, Maine. TRC also conducted field inspections of the former Rogers Fibre Mill site and the Bar Mills powerhouse structures.

Based on the documented asbestos-containing materials, volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), and heavy metals associated with the former mill, and potential petroleum impacts related to the property, TRC determined that it is possible that soil/sediments at and in the vicinity of the mill property have been impacted by these contaminants, including both surficial and shallow soils, as well as deeper soils on the property. This finding is classified as Recognized Environmental Conditions (RECs) for the former mill property that should be further evaluated prior to the disturbance of soil/sediment during the planned decommissioning project. Should the disturbance of soil on the former Rogers Fibre Mill property be required during the planned decommissioning project, the extent of the disturbances should be determined and evaluated prior to the project and/or minimized to the extent feasible during decommissioning of Bar Mills. However, BWPH has no plans to disturb the former mill property.

Portions of a former timber crib dam exist within a few hundred feet upstream of, and parallel with, the current dam and are anticipated to be removed during the planned decommissioning project. TRC determined that the potential exists for the timber used in the former dam to be treated with creosote, a wood preservative derived from the distillation of tar from wood or coal that has been used since the mid-1800s. This finding is considered a REC for the former dam that should be evaluated prior to the disturbance of the timber crib dam to ensure proper management and disposal during the planned decommissioning project.

TRC also evaluated the powerhouse structures with specific focus on the crane building that may be removed during the planned decommissioning project, which contains three motor-driven winch systems. Due to the vintage of one of the three motors (pre-1979) there is potential for presence of polychlorinated biphenyls (PCB). This was considered to be a negligible condition that should be further evaluated should the winch system or crane building be removed as part of the decommissioning.

5.3 Sediment Volume Assessment and Sampling

There was limited information available about the extent of sedimentation upstream of Bar Mills dam and canal headworks, upstream of the submerged timber crib dam, and within the canal, therefore BWPH conducted step-wise field investigations to assess the extent of sediments that may be removed as part of the partial or full spillway removal. BWPH's preliminary site restoration strategy involves the "beneficial use of dewatered excavated material as construction fill" in the decommissioned canal in accordance with Maine's Solid Waste Management Rules Chapter 418, Section 7.A. Therefore, based upon results of bathymetry data analysis, subbottom profiling, and underwater imagery, sediment sampling and testing was conducted along the shoreline margins immediately upstream of the dam and in the canal.

5.3.1 Background

BWPH collected detailed bathymetry data upstream of Bar Mills dam in 2021 to develop modeling of partial and full spillway removal conditions and potentially quantify potential sedimentation upstream of Bar Mills dam. Because this information did not provide information sufficient to inform the extent of sedimentation upstream of the dam, BWPH conducted additional methodologies to characterize the extent of sedimentation and potential sediment sampling locations.

5.3.2 Goals and Objectives

The goal of this study was to estimate the volume and extent of sediment upstream of structures proposed for removal (western portion of Bar Mills dam and submerged timber crib dam, upstream of the canal headgate structure) and within the canal. The objective was to use this data to inform the extent of sediment sampling for testing, including development of removal, treatment, and disposal plans associated with final construction design.

5.3.3 Study Area

Based upon hydraulic modeling of water depths developed from field collection of bathymetry data in 2021, it was determined that under partial and full spillway removal conditions, the presence of a hydraulic control approximately 2,200 feet upstream of the Bar Mills Dam is likely to limit the most significant change in water surface elevations to

the area between the dam and the hydraulic control (Photo 5-1), which was determined to be an appropriate area of study relative to sedimentation.

The area was surveyed utilizing a boat outfitted with high resolution depth sounding equipment to conduct sonar based subbottom profiling of the reach extending upstream from the Bar Mills dam boater safety barrier along 500 foot spaced tracks (Photo 5-2). Manual push probing was conducted in shallow locations (depths of less than 10 feet) as a ground truthing technique. Due to safety constraints, subbottom profiling could not be conducted in the area between the boater safety barrier and the dam but the barrier was slacked to maximize the profiling coverage area to within approximately 50-100 feet of the upstream face of the dam. Underwater imagery was collected from the dam to qualitatively assess the sedimentation immediately upstream of the dam.

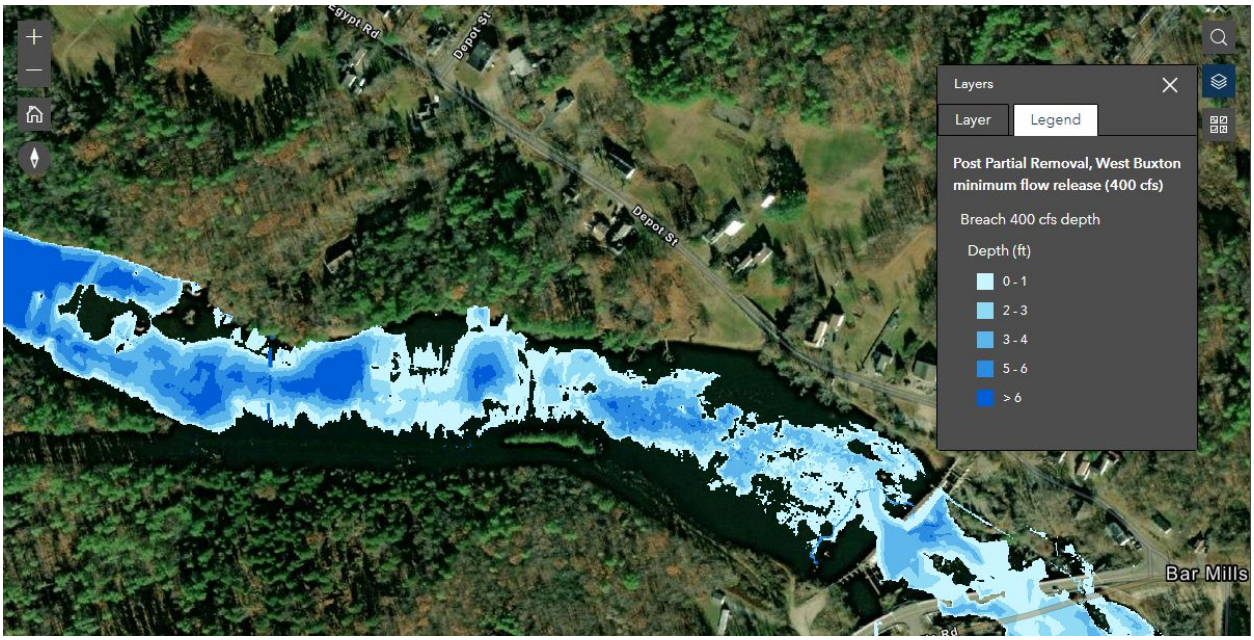


Photo 5-1 Reach Between Bar Mills Dam and Upstream Hydraulic Control

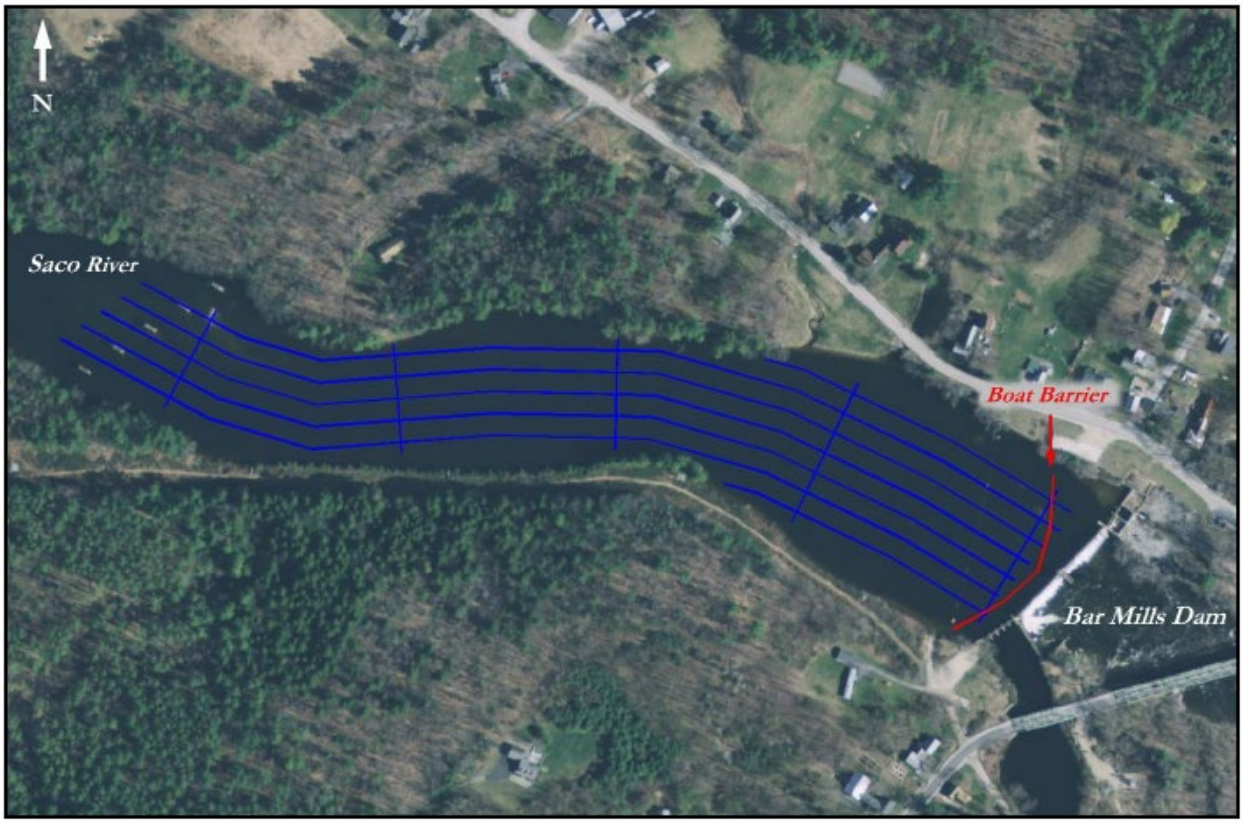


Photo 5-2 Subbottom Profiling Tracks

Underwater imagery immediately upstream of the face of Bar Mills dam showed that very little sediment is accumulated in this area, which is dominated by large boulders, cobble, and woody debris (Photo 5-3 and Photo 5-4). Due to the limited sedimentation found through subbottom profiling and underwater imagery at the face of the dam, TRC conducted limited sampling on the impoundment shoreline margins upstream of the dam, in the canal, and downstream of the former Fibre Mill intake structure (Figure 5-1). This included a sediment sample in the area near the entrance to the former penstocks of the mill dam in consideration of comments provided by the Town of Buxton in a letter dated July 11, 2024.

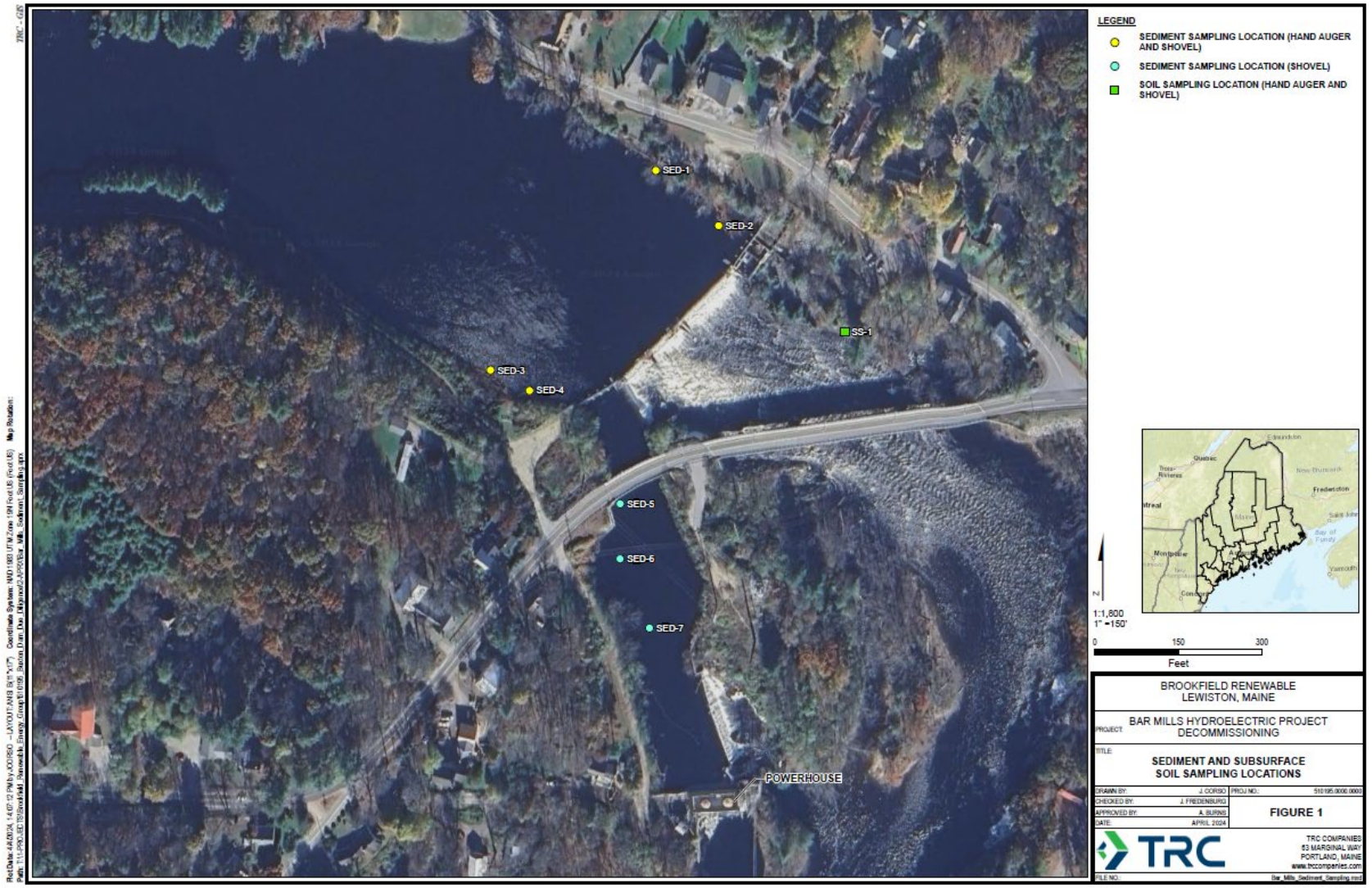


Figure 5-1 Sampling Locations

In addition to sediment and soil sampling and to address an issue raised by the Town of Buxton, TRC also reviewed historic documentation regarding the modified 12-inch diameter pipe and stream channel downstream of the remaining mill dam/foundation. The disposition of the pipe under post-surrender conditions is not a subject intended to be addressed as part of the DSR but will be addressed within the Decommissioning Plan, as appropriate. EPA correspondence confirms that the purpose of the pipe and stream channel was to increase dissolved oxygen (DO) in the channel, not to minimize migration of contamination from the tailrace (TRC 2025). Prior correspondence from EPA and USACE identifies that the selected alternative to removal of the contaminated sediment was to stabilize the contaminated area with rock to prevent migration to the Saco River and to separately "re-contour the channel in order to have a narrow stream of water to flow and improve the DO content." TRC (2025) concludes that if water levels are likely to drop below the level of the existing channel In the former tailrace area, the channel would likely no longer serve its intended purpose of providing flow for DO enhancement and would no longer be necessary. TRC concurs with the Town of Buxton's recommendation that BWPH present this information to EPA and MDEP to confirm flow through the pipe and engineered channel would not be necessary, post-partial or -full spillway removal. It is anticipated that further consultation with EPA and MDEP will occur as part of permit application development later in the decommissioning process.

5.3.4 Methodology

Sediment Quantity

In an initial phase to estimate the volume of sediment behind the Bar Mills Dam, a series of depth probes were completed in areas with anticipated sediment deposition, to the extent safe access allowed, as inferred from the longitudinal profiles of the bathymetry data collected in 2021. Along this reach BWPH conducted probing of the riverbed in a grid to classify substrate (sand, gravel, cobble, bedrock) and depth to refusal.

Surveying occurred under drawdown conditions and sediment depth was determined by driving a 1-inch steel rod to the point of refusal at selected locations in the impoundment.

The one-dimensional (1D model) and two-dimensional hydraulic model (2D model) developed for the Project used a surface that was developed using bathymetric data collected in 2021. The sediment depths from the probes were used to generate a new bathymetry of potential post-partial and -full spillway removal conditions by lowering the existing bathymetry by the depth of the sediment found in that area. A subset of these

samples had a sample collected to perform a grain size analysis to inform the particle size distribution. Results indicated limited sedimentation but could not sufficiently quantify sedimentation or extents so additional methods were considered for a more comprehensive assessment of sedimentation.

Subbottom Profiling

Because the modeling and depth probing could not sufficiently characterize sedimentation in the study area (from Bar Mills dam upstream to the remnant bridge piers, approximately 2,200 feet upstream of the dam), Ocean Surveys, Inc. (OSI) was contracted to conduct a subbottom profiling survey in June 2024. OSI utilized a dual frequency depth sounder (24 -200kHz), high-resolution Chirp (2-16kHz), and a lower frequency Boomer type (0.5-8kHz) subbottom profiler to acquire data (OSI 2024). The intent of deploying the three subbottom profilers was that the instruments would provide a broad range of energy and frequency to investigate the variable sequence of sediments expected in the survey area (OSI 2024).

Sediment and Soil Testing

Because minimal sedimentation was documented through subbottom profiling and probing in the reach upstream of the Bar Mills boater safety barrier, and underwater imagery at the face of the Bar Mills dam, TRC conducted limited sampling in the western and eastern impoundment shoreline margins upstream of the dam, at three locations in the canal, and downstream of the former Fibre Mill intake structure.

On July 18, 2024, following the lowering of the water level in the impoundment area upstream of the dam, TRC collected a total of four sediment samples from the western and eastern banks of the river upstream of the dam and one soil sample from the "island" downstream from and contiguous with the former Rogers Fibre Mill. On September 23, 2024, following the dewatering of the power canal, TRC collected an additional three surficial sediment samples from the intake canal (Figure 5-1).

Both the sediment and soil samples were collected using hand tools (a combination of hand auger and shovel) from depths ranging between 0 to 0.5 feet and 0 to 2 feet below ground surface (bgs). The samples were submitted to Alpha Analytical in Westborough, Massachusetts (a Pace Analytical Services company) for laboratory analysis of the following parameters based upon Maine Department of Environmental Protection (MDEP) standards (TRC 2025):

- Volatile organic compounds (VOCs) via EPA Method 8260C;
- Semi-volatile organic compounds (SVOCs) via EPA Method 8270C-Selective Ion
- Monitoring (SIM);
- Polychlorinated biphenyl (PCB) Aroclors via EPA Method 8082A;
- Total Petroleum Hydrocarbons via EPA Method 8015D(M);
- Priority Pollutant 13 Metals via EPA Method 6010B;
- Pesticides via EPA Method 8081B;
- Herbicides via EPA Method 8151A;
- Reactive Cyanide and Sulfur via EPA Method 7.3;
- Conductivity via EPA Method 120.1;
- Corrosivity via EPA Method 9045D;
- pH via EPA Method 9045;
- Ignitability via EPA Method 1030;
- Total Cyanide via EPA Method 9010; and
- Sulfate via EPA Method 9038.

As described in TRC ((2025) see Appendix E)Three of the seven sediment samples were analyzed for supplemental analytical parameters of:

- Hexavalent Chromium via EPA Method 7196A;
- Total organic carbon (TOC) via Lloyd Kahn Method; and
- Grain Size (Sieve) via ASTM Method D422.

In addition, each sample was submitted to TRC's Industrial Hygiene Laboratory in Windsor, Connecticut for analysis of asbestos via Polarized Light Microscopy (PLM). TRC did not analyze contaminants such as Dioxans/Furans and Per- and Polyfluoroalkyl

Substances (PFAS) because they are not known to be contaminants of concern for the operations at Project (TRC 2025).

5.3.5 Results

Detailed information regarding sampling and analytical results are contained in a memorandum from TRC titled *Preliminary Limited Sediment/Soil Characterization and Response to Town of Buxton July 11, 2024 Request Brookfield White Pine Hydro Bar Mills Dam – Saco River Buxton and Hollis, Maine*, dated January 7, 2025 (Appendix E of this DSR (TRC 2025)). A general summary is provided herein.

Sediment Quantity

Subbottom profiling and probe interpretations determined that the survey area investigated is underlain by surficial hardbottom (bedrock/glacial till) throughout the river, with the exception of small portions of sand/gravel and silt/clay along the western and eastern shorelines, respectively (OSI 2024). Results indicate that little sediment exists within the survey area and that preconstruction removal is likely unnecessary. Sixty-six push probes were conducted, of which fifty-four documented hardbottom, interpreted as bedrock or glacial till (OSI 2024). The remaining twelve probes were interpreted as gravel and sand or silt/clay and only appear on the western and eastern, respectively (OSI 2024). Detailed results of the profiling survey are contained in OSI's *Survey Report (OSI Report No. 24ES011) Subbottom Profiling Survey* (See Appendix D).

Due to access safety constraints, OSI was unable to access the area immediately upstream of the Bar Mills spillway. In order to characterize sediment accumulation and composition in this area, BPHA collected underwater video/imagery utilizing a pole mounted video camera to access the area at the upstream face of the dam. Imagery documented little to no sediment accumulation at the upstream face of the dam with primarily cobble/boulder substrate and woody debris (Photo 5-3 and Photo 5-4).

Photo 5-3 Underwater Imagery Immediately Upstream of Bar Mills Dam

Photo 5-4 Boulders and Debris Observed Underwater at the Upstream Face of Bar Mills Dam

Sediment Analysis

The sediment analytical results were compared to the EPA Region 3[8] Biological Technical Assistance Group (BTAG) Freshwater Sediment Screening Benchmarks (August 2006). These benchmarks are generally more stringent relative to MDEP recreator sediment scenarios. Based upon these comparisons, The following polycyclic aromatic hydrocarbons (PAHs) and metals were detected: Acenaphthene (SED-1), Benzo(a)anthracene (SED-1), Benzo(b)fluoranthene (SED-1 and SED-3), Acenaphthylene (SED-1), Indeno(1,2,3-cd)Pyrene (SED-1), Pyrene (SED-1), High Molecular Weight PAHs (SED-1 and SED-5), Low Molecular Weight PAHs (SED-1), and Selenium (All sediment samples) (TRC 2025).

The laboratory reporting limits (RLs) for the sediment samples were also compared to reporting limits established in the USACE *Regional Implementation Manual (RIM) for the Evaluation of Dredged Material Proposed for Disposal in New England Waters* (April 2004). Based upon comparison results TRC (2025) indicates that additional assessment work would be necessary associated with USACE permitting, which will occur later in the decommissioning process.

TRC (2025) indicates that sediment testing results found some Polycyclic Aromatic Hydrocarbons (PAH) and in anticipation that future water levels will be lowered following decommissioning of the Bar Mills Dam, the sampled areas of sediment will likely be exposed. TRC (2025) states that the sampling results, while limited in overall extent, suggest that human exposure is not likely to be a significant pathway of concern in the sampled areas. This includes the area sampled near the entrance to the former penstocks of the former mill intake.

Soil Analysis

Results of the preliminary limited soil sampling investigation do not indicate that soil sampled from the "island" downstream from and contiguous with the former Rogers Fibre Mill contain concentrations of the above-listed analytes at concentrations exceeding the

[8] EPA Region 1 has not established a set of sediment screening criterion for New England and promotes the use of the Region 3 BTAG benchmarks. The Region 3 BTAG benchmarks are generally among the more conservative screening values available. The sediment sampling for this project was intended as a preliminary screening-level evaluation; therefore, Region 3 BTAG benchmarks are appropriate.

MEDEP Remedial Action Guidelines (RAGs) for either the Residential, Commercial Worker, or Construction Worker exposure scenarios. Sampled soil did not contain detectable

amounts asbestos (TRC 2025). There were no exceedances of MEDEP RAGs. TRC (2025) notes that concentration of total chromium detected in sample SS-1 exceeds the Residential RAG for hexavalent chromium. Subsequent hexavalent chromium analysis was conducted for the soil sample (and certain sediment samples) which did not identify detectable concentrations of chromium in this valence state. However, cobble and boulder material used to stabilize the area prevented sampling below six inches so TRC (2025) is uncertain whether potentially impacted soils are present below the stabilizing material. The concentration of total chromium detected in the sample downstream from and contiguous with the former Rogers Fibre Mill exceeds the Residential RAG for hexavalent chromium; however, as subsequent hexavalent chromium analysis of the soil sample (and certain sediment samples) did not identify detectable concentrations of chromium in this valence state, the total chromium results were compared to the RAGs for the less toxic trivalent chromium.

TRC (2025) recommends development of a Sampling and Analysis Plan outlining activities and procedures for the sample collection work should additional sampling be required by MDEP/USACE as part of permitting. TRC (2025) also recommends that BWPH limit disturbance to soil and/or sediment outside the Project Site to the extent feasible during decommissioning through the use of physical barriers, such as matting or temporary access roads underlain by geotextile fabric. If soil disturbance cannot be avoided during decommissioning, it is recommended that soil in these areas be sampled to ensure worker health and safety during the project.

5.4 Shoreline Erosion

An erosion survey of the Project area was conducted in June 2002 associated with the FERC relicensing. This survey involved traversing the entire shoreline by boat, taking note of and photographing areas of erosion, and assessing causes of actively eroding shoreline sections. The results of the survey indicated that shoreline erosion is not prevalent in the Project area (FPLE Maine 2003). A few small, concentrated areas of erosion were observed along the impoundment during the survey; however, the primary cause of these small areas of erosion was determined to be a result of human foot traffic to access the river near homes. Project operations were not considered to be a potential cause of erosion primarily because shoreline areas that are not subject to heavy human use did not have

significant erosion except in localized areas where natural erosion would be expected (*i.e.,* very steep shoreline areas with non-cohesive soils) (FPLE Maine 2003). Natural erosion in areas of steep banks with non-cohesive soils were observed in a few small places but was limited to small areas at the upstream edge of the upper island and on exposed outer banks, which showed signs of minor slumping and tree toppling (FPLE Maine 2003).

Due to the dated existing information from the prior relicensing, potential for shoreline bank erosion along the impoundment was conducted through field surveys conducted by Kleinschmidt Associates in September 2024, in concert with wetlands, tributary access, and invasive species surveys. Bank Erosion Hazard Index (BEHI)[9] ratings scale classify much of the shoreline on the impoundment is at high risk of erosion. However, these conditions are expected to stabilize quickly once the spillway is partially or fully removed, with many of the sandy banks adjusting to the new water elevation and becoming vegetated rapidly. Due to the newly exposed sandy banks, there will be some movement of the finer material in the system; however, historically, this was a cobble/boulder-dominated stream, and the general channel form, shape, and extent are not anticipated to change substantially following the dam breach. The presence of a cobble and bedrock dominated riverbed in the upper reach and downstream of the Bar Mills Dam indicates that the channel bed is relatively stable and, once partial or full spillway removal occurs, the river will settle back into its historical, pre-dam channel form. Additional details describing the study area, methods, and results of the field study are contained in *Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC NO. 2194* (Draft January 2025), which is provided in Appendix C of this DSR.

5.5 References

FPL Energy Maine Hydro LLC (FPLE Maine). 2003. Bar Mills Hydroelectric Project, FERC No. 2194, Application for New License, Volume I – Application and Exhibits A, E, F, G and H and Appendix A.

OSI Inc. 2024. Survey Report (OSI Report No. 24ES011) Subbottom Profiling Survey.

TRC. 2025. Preliminary Limited Sediment/Soil Characterization and Response to Town of Buxton July 11, 2024 Request Brookfield White Pine Hydro Bar Mills Dam – Saco River Buxton and Hollis, Maine,

[9] BEHI methodology is a standard practice for this type of erosion evaluation. Additional details about BEHI rating are detailed in the report provided in Appendix B of the DSR.

6.0 WATER QUALITY AND QUANTITY

6.1 Introduction

The Bar Mills Project is operated in accordance with the 2008 license and the 1997 Saco River Instream Flow Agreement. Although the turbine units are not currently operated, run-of-river operations have been unchanged since water quality studies were conducted in support of the previous project relicensing. As such, compliance with and attainment of water quality standards would likewise be unchanged.

The Towns of Buxton and Hollis requested a study to determine whether dry hydrants on Depot Street in Buxton and Canal Road in Hollis will remain operational and whether the proposed diversion weir at the upstream end of the canal will allow sufficient water to keep the hydrant operational. The request also included submittal of a plan to the Towns for approval, to mitigate negative effects of water levels on the dry hydrants. BWPH's decommissioning proposal includes a diversion weir at the upstream end of the canal to prevent flow into the canal under normal river flow conditions, therefore, the proposed decommissioning will affect the dry hydrants on Canal Road. In 2024, BWPH informally met with the Hollis and Buxton fire departments during an impoundment drawdown in September 2024 to visually inspect the existing dry hydrant infrastructure. Both hydrants are anticipated to be adversely affected by permanently reduced water levels under a partial or full spillway removal condition. Based upon these observations, BWPH is currently assessing alternative infrastructure layouts to review with the towns in mid-2025.

BWPH contracted TRC to conduct an evaluation of wells in the vicinity of the Bar Mills Dam that may be affected by the dam's removal based upon publicly available well information. Due to limited availability of individual well details (discussed below), BWPH has initiated outreach to the Towns to determine an appropriate course of information gathering and coordination with landowners. BWPH continues to work with a subcommittee formed from the Decommissioning Committee, to plan and implement an outreach and survey for landowners adjacent to the Bar Mills river reach that could potentially be affected by lower water levels. Survey results are anticipated to be obtained during November – December 2025.

BWPH issued a Draft Study Plan on May 31, 2023, which included a Water Quality and Quantity Study to compile readily available existing water quality information at the project and within the Saco River. In comments submitted for the draft study plan, MDEP

requested that macroinvertebrate sampling be conducted before and after dam removal at the site previously monitored by MDEP. Macroinvertebrate sampling was conducted in 2024 at this requested location.

6.2 Background

Water quality classifications for the Saco River were established by the Maine Legislature (38 M.R.S.A. §467). The Saco River from the confluence with the Little Ossipee River to the Skelton Dam, which includes the Bar Mills Project area, is classified as Class A waters. Designated uses for Class A waters include drinking water supply after treatment, fishing, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and habitat for fish and other aquatic life. Class A waters must have a minimum DO concentration of 7 mg/L or 75 percent saturation, whichever is higher, except for October 1 to May 14 to ensure spawning and egg incubation of indigenous fish, the 7-day mean DO concentration may not be less than 9.5 mg/L and the one day minimum may not be less than 8 mg/L in identified salmonid spawning areas (MRS 2021). The Class A standard for *Escherichia coli* (*E. coli*) bacteria is to not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of samples in any 90-day interval.

The reach of the Saco River at the Bar Mills Project is designated in the draft 2024 Integrated Water Quality Report as Category 2: rivers and streams attaining some designated uses, no use is threatened, and insufficient data or no data and information is available to determine if the remaining uses are attained or threatened (MDEP 2024a).

6.3 Goals and Objectives

The goal of this study was to characterize water quality and quantity, including assessment of effects of post-partial and full spillway removal water level elevations, based on a summary of available relevant water quality data, publicly available water supply well and dry hydrant information, and hydraulic and hydrology modeling developed in 2021. A component of the study also included benthic macroinvertebrate sampling downstream of the Bar Mills dam at an historic MDEP sampling location in the bypassed reach.

6.4 Study Area

The study area includes the Bar Mills impoundment between the Bar Mills dam and West Buxton tailwater, the Bar Mills bypassed reach, and tailwater reach.

6.5 Methods

6.5.1 Post-Partial and Full Spillway Removal Water Level Assessment

BWPH completed a river elevation model of the reach from Bar Mills Dam to the upper limit of the existing impoundment just downstream of West Buxton. A 1-dimensional (1D) and 2-dimensional (2D) hydraulic model was developed using the state-of-the-art U.S. Army Corps of Engineers' HEC-RAS v6.1 software to simulate the water levels and depths for the existing conditions and post-partial and full spillway removal conditions. Each condition modeled three flows: 300 cubic feet per second (cfs), 400 cfs, and the annual median flow of 2,476 cfs. The 300 cfs flow is intended to represent the lowest summer flows and 400 cfs represents the typical low summer flow.

The following data sources were used to create the HEC-RAS models:

- Aerial Imagery – Environmental Systems Research Institute (ESRI) Aerial Color Imagery Server, accessed April 2020.
- Topographic Data – 2013 Maine Statewide 3 feet LiDAR survey obtained from the U.S. Geological Survey's National Map online data viewer.
- Bathymetric Data – Kleinschmidt Associates collected river bottom data for the river channel between Bar Mills to West Buxton Dam on April 26 through April 29, 2021, using an Acoustic Doppler Current Profiler (ADCP) with an echosounder. The precision or spacing of the data collected is approximately 2 foot spacing for the first 500 feet upstream of the dam and 50 foot spacing for the remainder of the river reach. Note that the proposed bathymetric conditions immediately adjacent to and under the existing concrete and timber crib dams were developed using engineering judgement.

In addition to using the model to characterize and compare pre- and post-partial and full spillway removal water level conditions, BWPH used the model output and historic hydrology data to evaluate potential impacts to reduction of available volume in water supply wells and the dry hydrants resulting from lower impoundment levels.

As part of the detailed design phase of the project, the HEC-RAS model will be used to determine potential velocity and flow issues associated with downstream infrastructure, namely, the Route 4A bridge piers.

6.5.2 Existing Water Quality Data Review

BWPH conducted a desktop search, compilation, and summary of existing baseline water quality data, including prior relicensing studies and any recent and ongoing water quality monitoring and data reported by the state, the SRCC, and any other relevant sources. These data and results were summarized relative to state standards for Class A waters.

6.5.3 Water Supply Wells and Dry Hydrants

BWPH contracted TRC to conduct an evaluation of wells in the vicinity of the Bar Mills Dam that may be affected by the dam's removal based on information obtained from the Maine Geological Survey's water well database; the EDR Radius Map Report; the Maine Geological Survey's Significant Sand and Gravel Aquifers map, Bar Mills Quadrangle, Maine; and 60% design drawings.

As previously noted, BWPH informally met with the municipal fire departments to visually observe the dry hydrants on Depot Street in Buxton and Canal Road in Hollis under drawdown conditions. BWPH is currently evaluating alternatives to modify and/or relocate the hydrant intakes, which will be further reviewed with the fire departments. BWPH has also initiated meetings with representatives for the Towns to further discuss the process for addressing the concerns with effects on the dry hydrants and local water supply wells. It is anticipated that this consultation will continue over the next few months.

6.5.4 Benthic Macroinvertebrate Study

BWPH conducted macroinvertebrate sampling in the Bar Mills bypassed reach in 2024 at Station 648 which was previously sampled in 2002. The sampling station was approximately 500 feet downstream of the dam. The sampling and analysis were conducted in accordance with MDEP "Methods for Biological Sampling and Analysis of Maine's Inland Waters" (MDEP 2014).

BWPH's consultant, Haley Ward, installed three replicate rock bag samplers. The samplers were deployed on August 6, 2024, and retrieved on September 3, 2024. Results, summarized below, were analyzed by Haley Ward and provided to MDEP for a water quality classification determination.

6.6 Results

6.6.1 Post-Partial and Full Breach Water Level Assessment

Based upon hydraulic modeling of water depths developed from field collection of bathymetry data in 2021, it is anticipated that under partial dam removal conditions, the presence of a hydraulic control approximately 2,200 feet upstream of the Bar Mills Dam is likely to limit the most significant change in water surface elevations to the area between the dam and the hydraulic control (Figure 6-1).

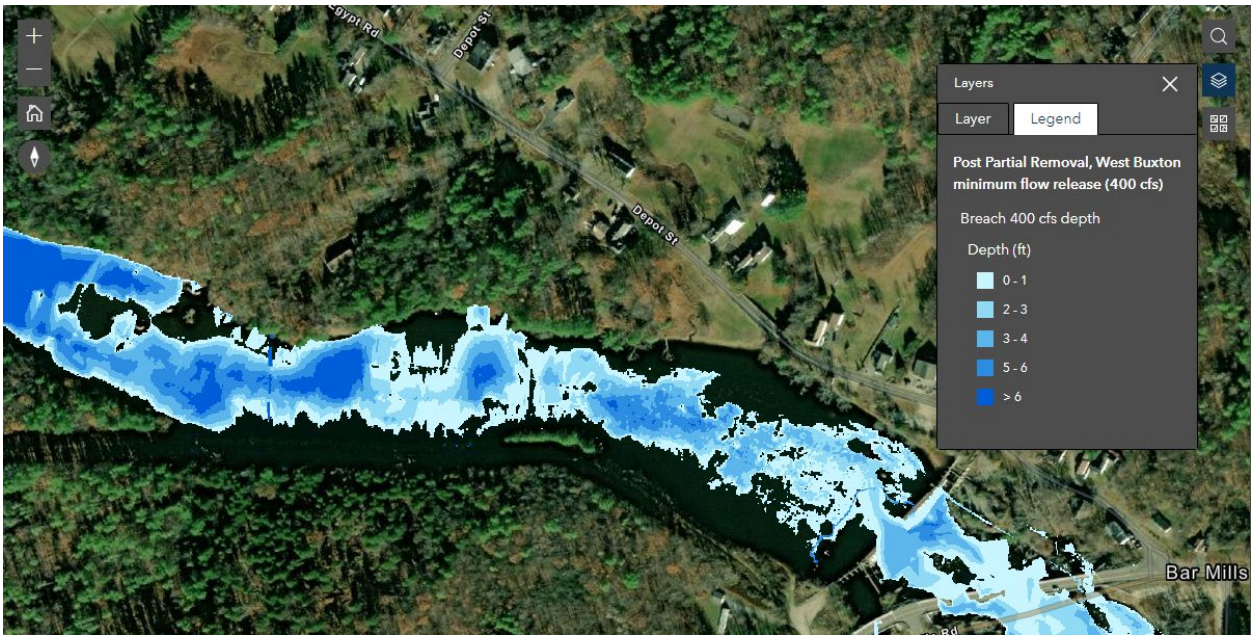


Figure 6-1 Reach Between Bar Mills Dam and Upstream Hydraulic Control at Modeled River Flow of 400 cfs Under Partial Spillway Removal

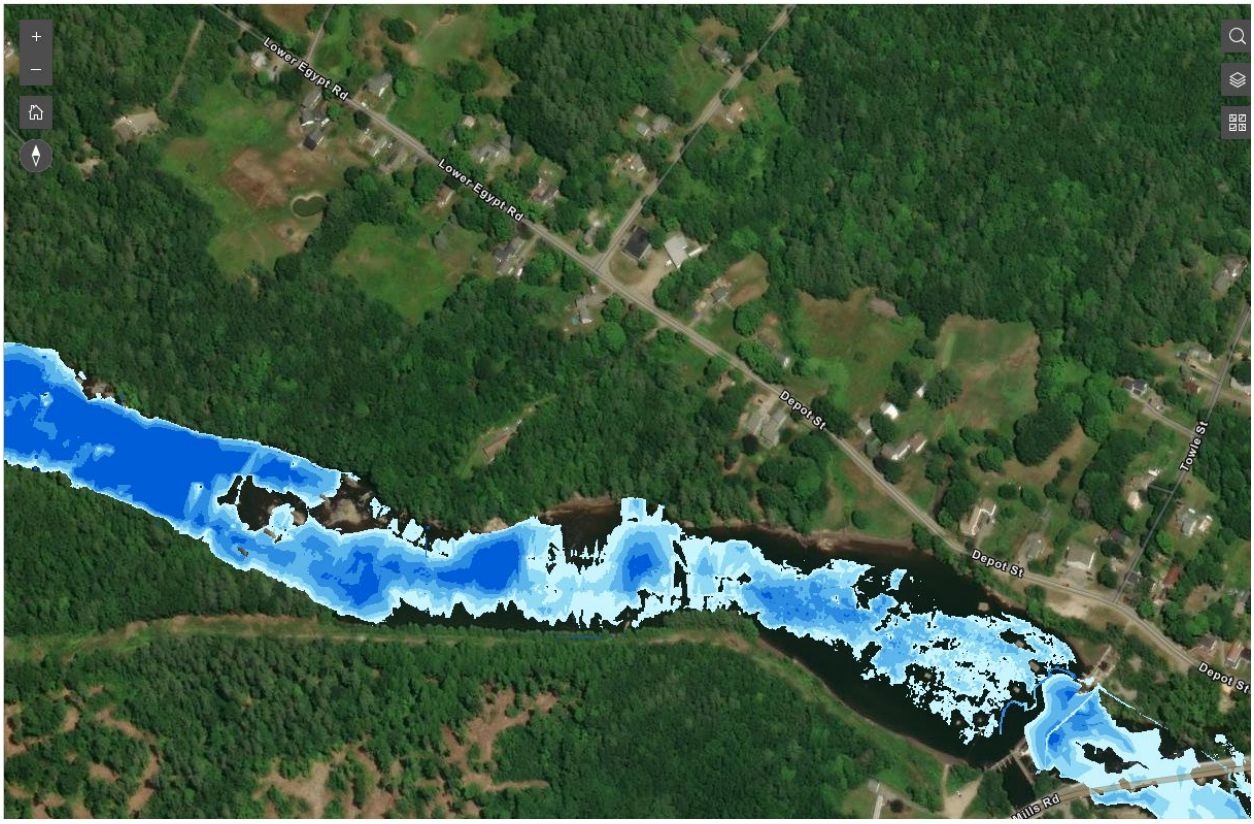


Figure 6-2 Reach Between Bar Mills Dam and Upstream Hydraulic Control at Modeled River Flow of 400 cfs Under Full Spillway Removal

Hydraulic modeling of water depths at 300 cubic feet per second (cfs), 400 cfs, and the annual median flow (50% exceedance) of 2,476 cfs determined the anticipated change in maximum and average water depths through the reach between Bar Mills dam and the remnant piers (hydraulic control). As previously noted, the 300 cfs flow is intended to represent the lowest typical summer flow and 400 cfs represents the typical low summer flow with minimum flows released from West Buxton, upstream. The modeled reduction in normal water levels in this reach averages to 7.7 feet across the three flow conditions and the average reduction in dept is 6.1 feet (Table 6-1, and Figure 6-4). Average and maximum water depths under 300, 400, and 2,476 cfs are presented in Table 6-1.

Table 6-1 Maximum and Average Water Depth for Average Mean, Lowest, and Typical Low Summer Flows Under Partial and Full Spillway Removal Conditions

Maximum Water Depth, BM Dam to Pier Remnants (ft)			
	300 cfs	400 cfs	2,476 cfs
Existing Conditions	17.5	18.1	19.2
Post Partial Removal	9.9	10	11.8
Post Full Spillway Removal	9.9	10.0	11.6
Change in Maximum Depth	7.6	8.1	7.4

Average Water Depth, BM Dam to Pier Remnants (ft)			
	300 cfs	400 cfs	2,476 cfs
Existing Conditions	8.3	8.4	9.3
Post Partial Removal	2.2	2.3	3.1
Post Full Spillway Removal	2.2	2.2	2.9
Change in Average Depth	6.1	6.1	6.2

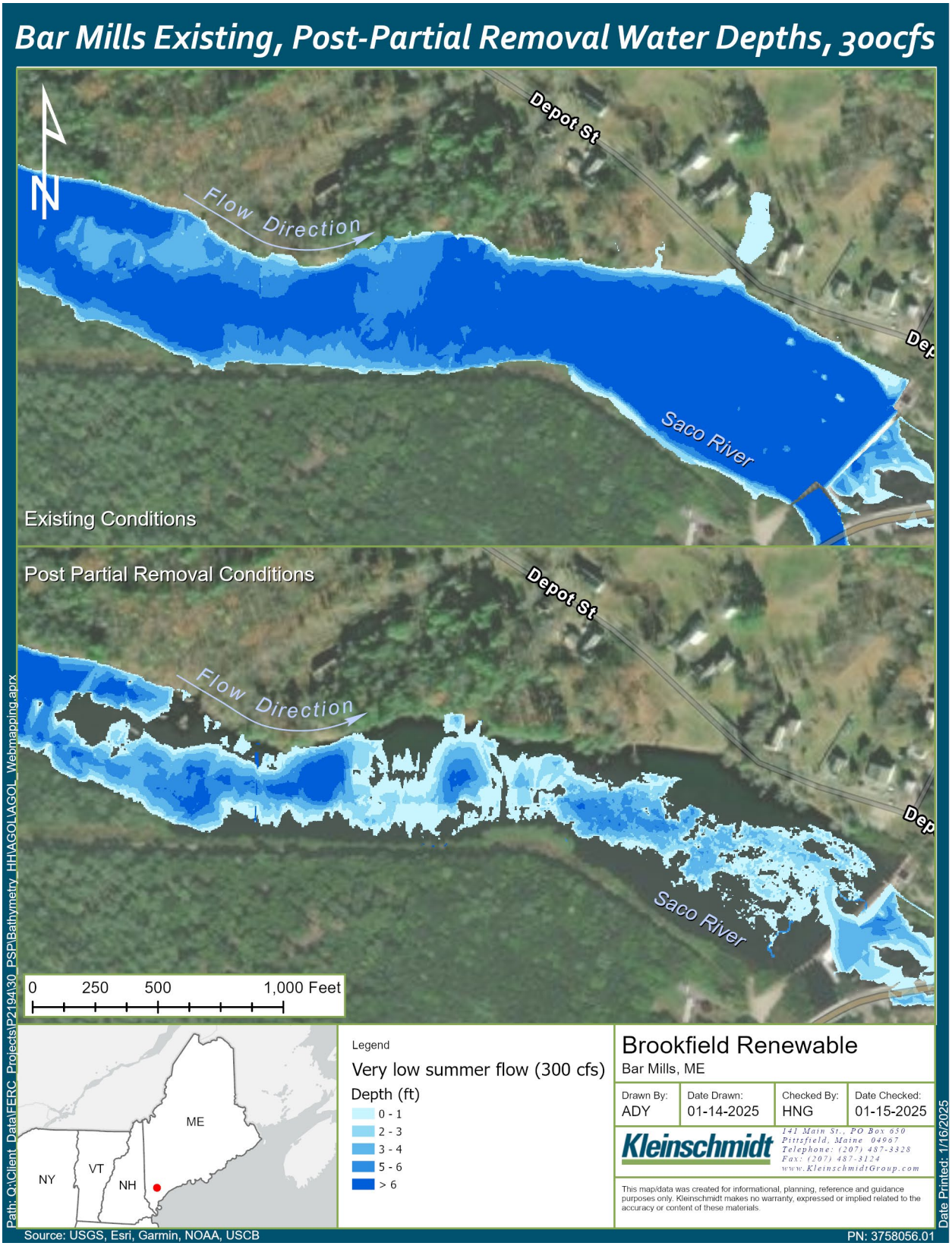


Figure 6-3 Hydraulic Modeling 300 cfs Existing and Partial Removal

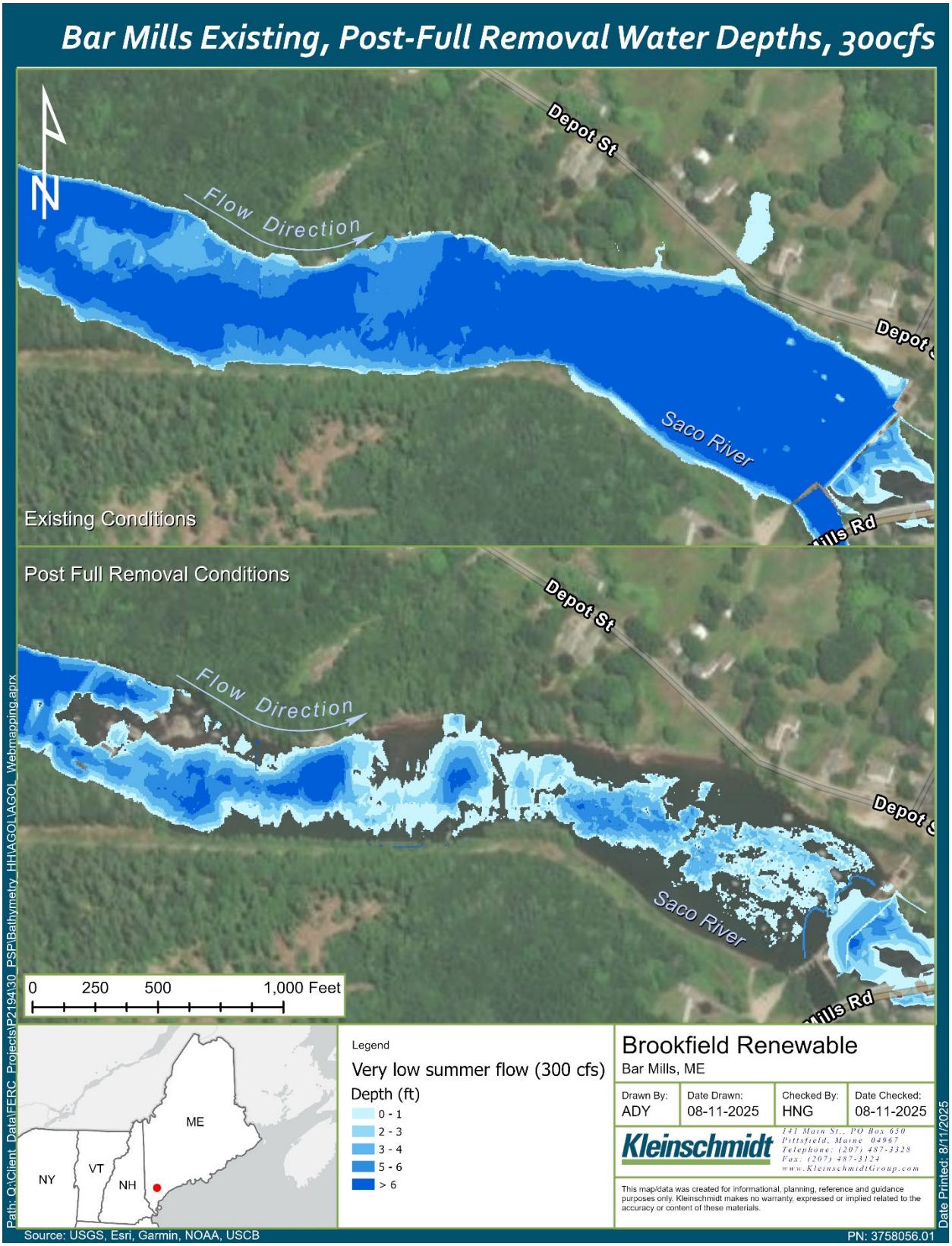


Figure 6-4 Hydraulic Modeling 300 cfs Existing and Full Spillway Removal

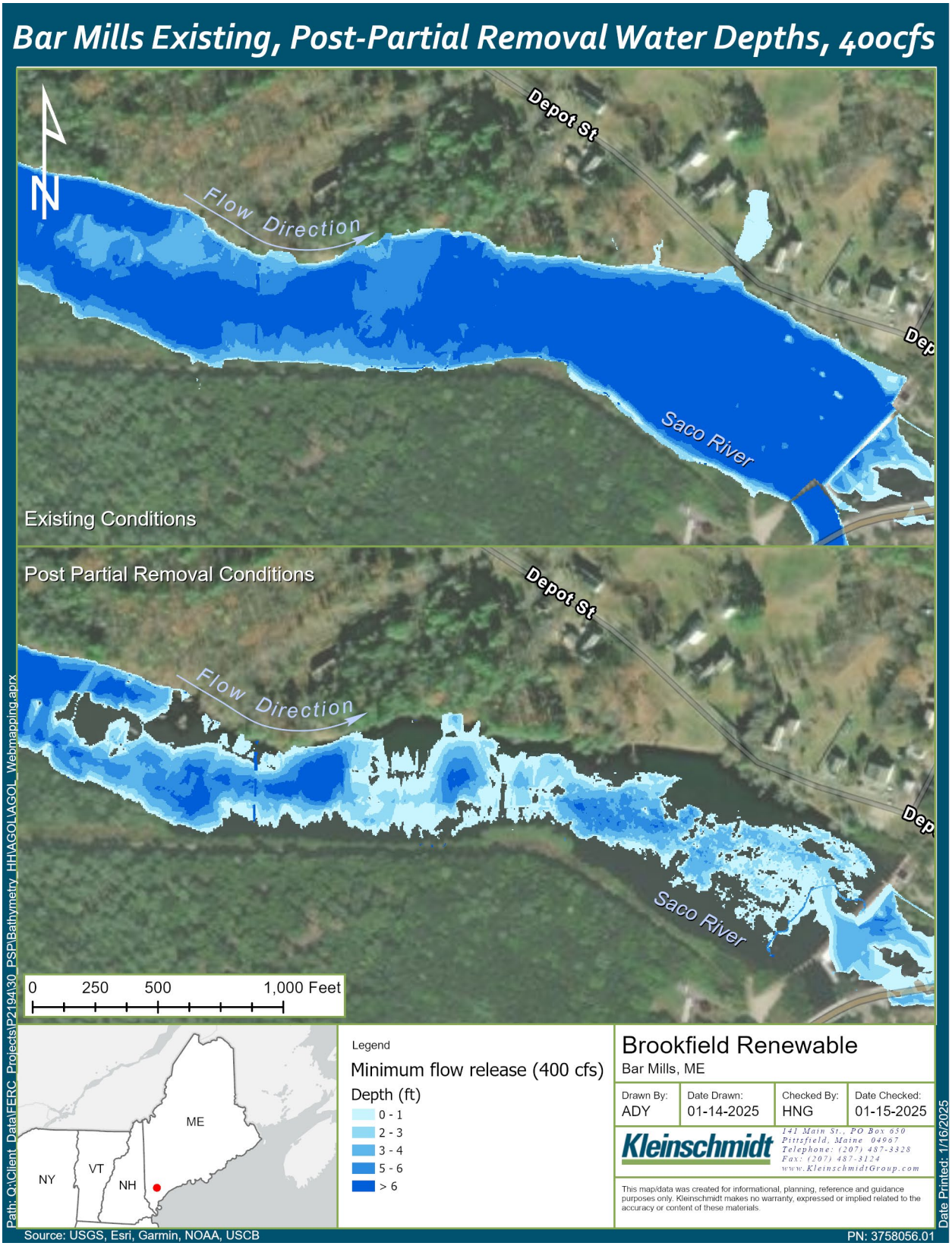


Figure 6-5 Hydraulic Modeling 400 cfs Existing and Partial Removal

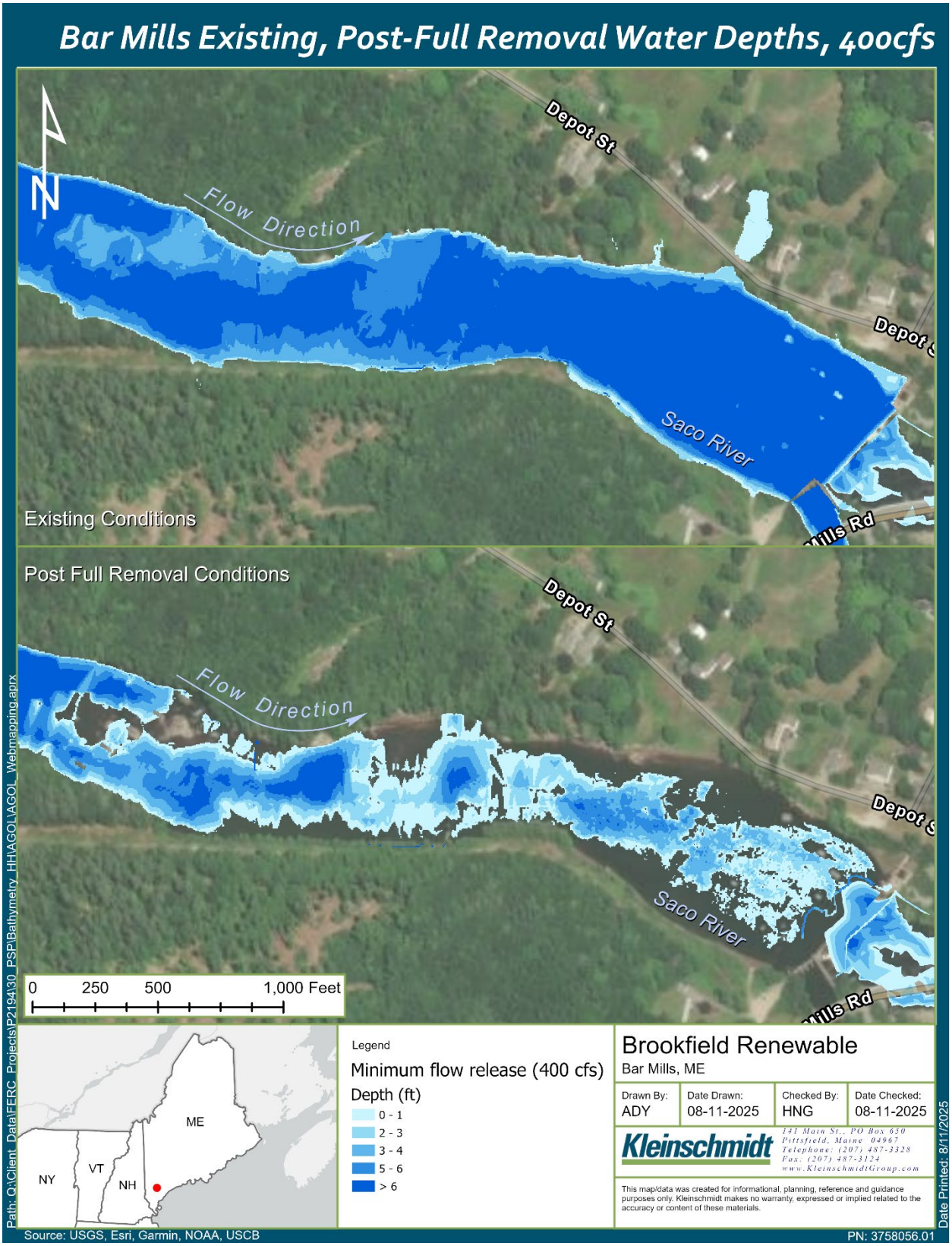


Figure 6-6 Hydraulic Modeling 400 cfs Existing and Full Spillway Removal

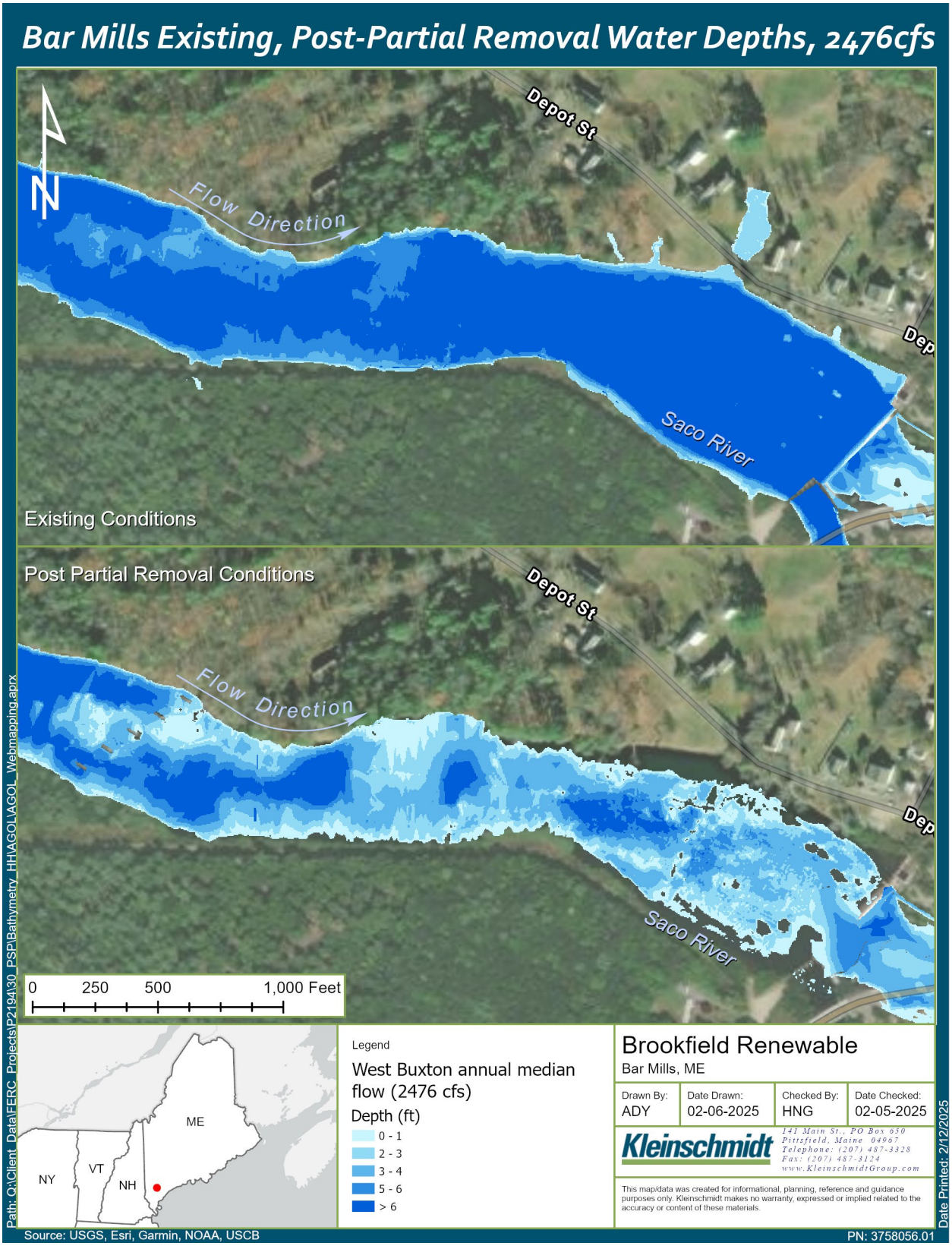


Figure 6-7 Hydraulic Modeling 2,476 cfs Existing and Partial Removal

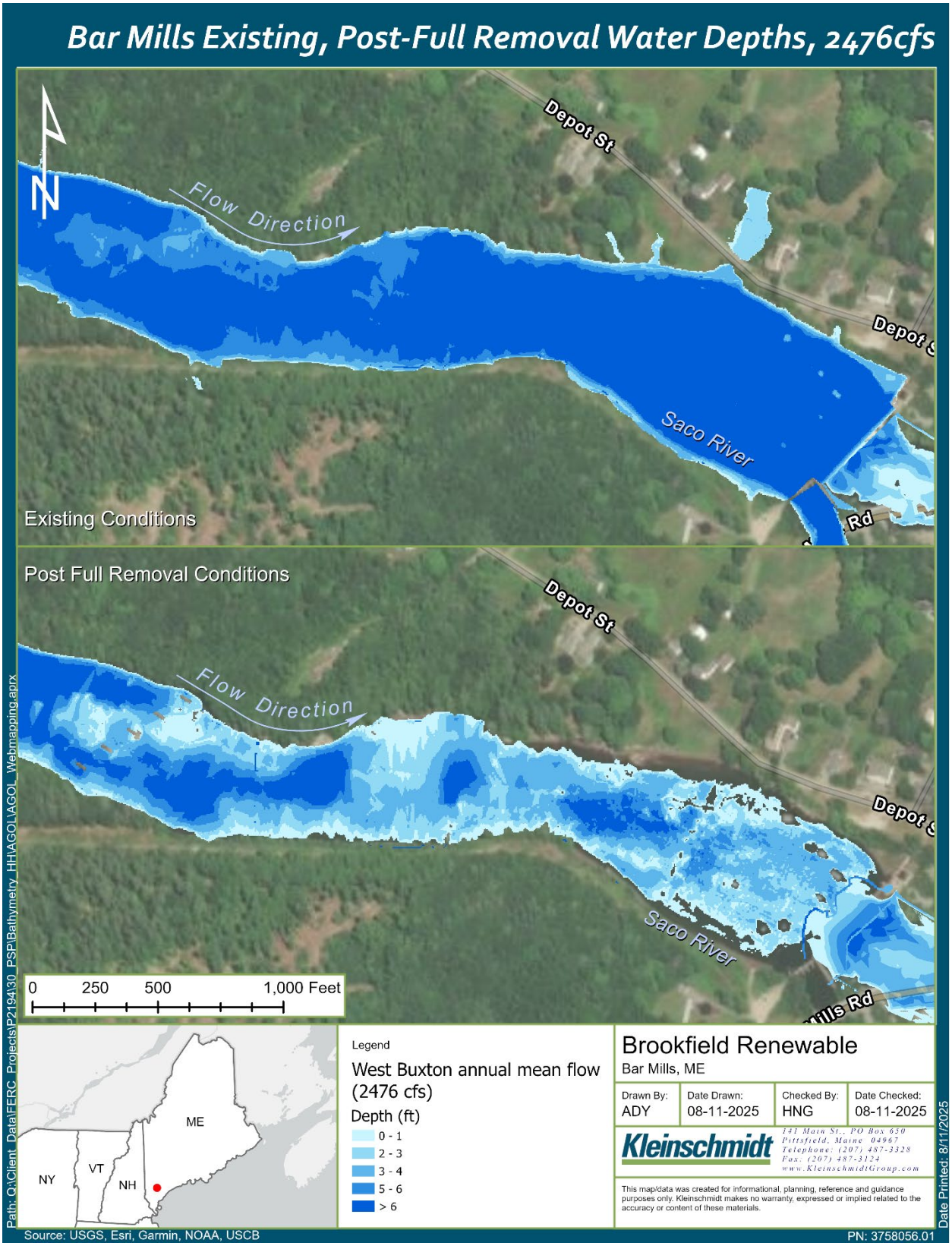


Figure 6-8 Hydraulic Modeling 2,476 cfs Existing and Full Spillway Removal

Modeling results for the reach upstream of the hydraulic control indicate that depths in the main channel under 400 cfs inflow conditions will generally range from 2-3 feet to greater than 6 feet (Figure 6-9).

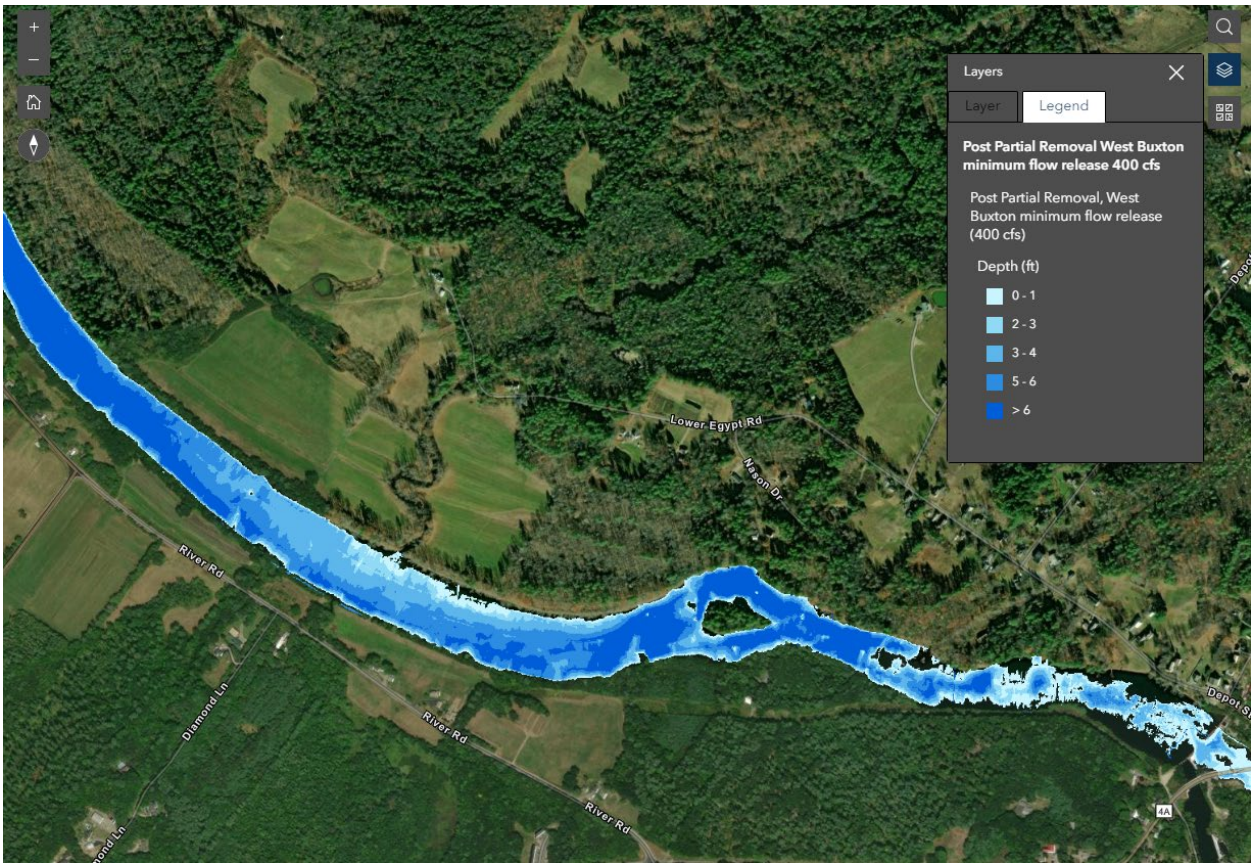


Figure 6-9 Reach Upstream of Mills Dam and Hydraulic Control at Modeled River Flow of 400 cfs Under Partial Removal Conditions

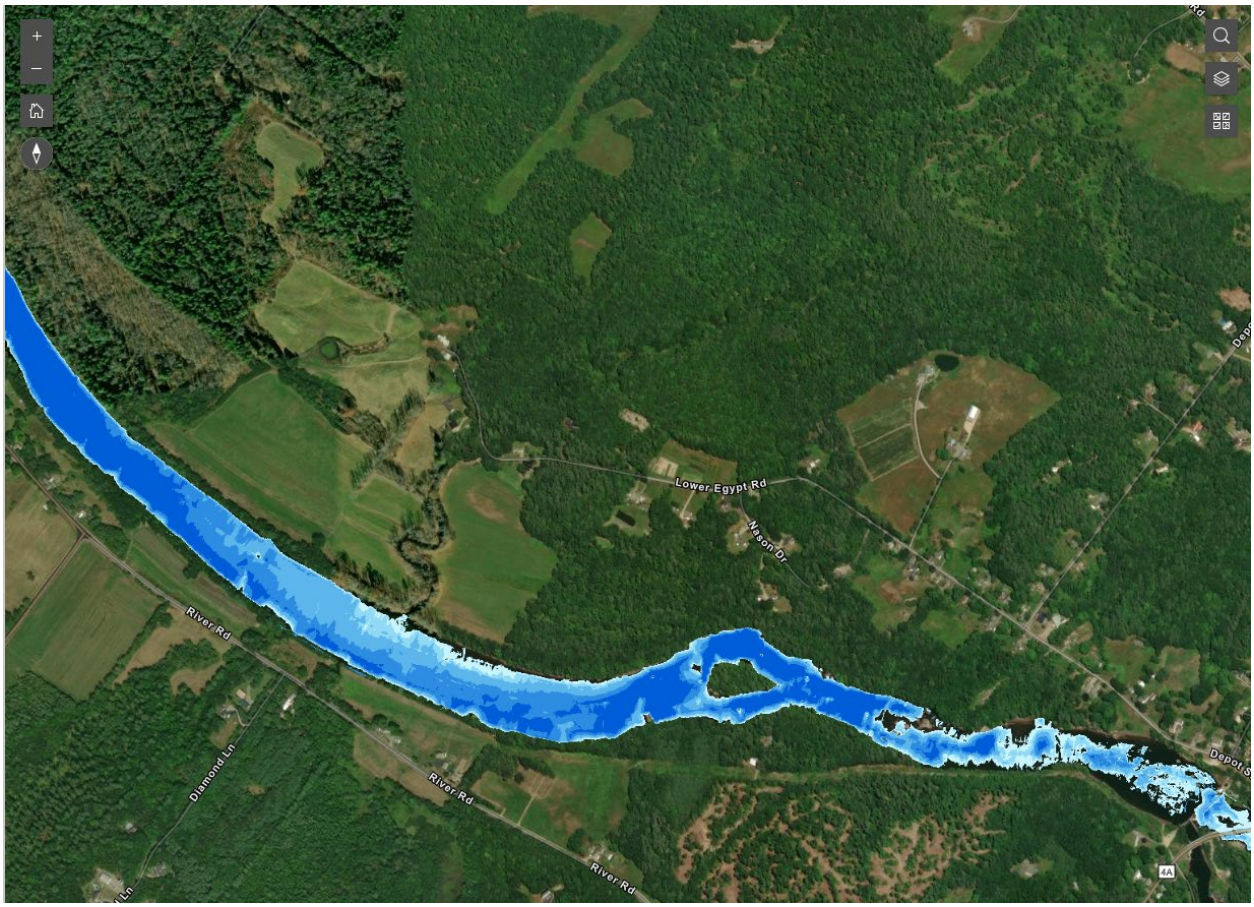


Figure 6-10 Reach Upstream of Mills Dam and Hydraulic Control at Modeled River Flow of 400 cfs Under Full Removal Conditions

6.6.2 Existing Water Quality Data

Several water quality monitoring studies have been completed in the Bar Mills Project vicinity since 2000. The results from these studies are summarized below.

2001 Bar Mills Relicensing Study

FPLE Maine collected ambient water quality data (temperature and DO) at four sites (upper impoundment, lower impoundment, tailrace, bypass reach) at the Bar Mills Project from August 26 to August 29, 2001, to support the FERC relicensing (Figure 6-11) (FPLE Maine 2003). Monitoring was completed in the morning (before 7 AM) and in the late afternoon (after 4 PM). Vertical profiles of the water temperature, DO concentration, and DO percent saturation at the upper and lower impoundment sites demonstrated that the impoundment did not stratify. In the impoundment, the water temperature ranged from

22.8°C to 24.4°C (73.0°F to 75.9°F), the DO concentration ranged from 8.0 mg/L to 8.8 mg/L, and the DO percent saturation ranged from 93.4 percent to 105.2 percent (Table 6-2, Table 6-3). In the bypass reach, the water temperature, DO concentration, and DO percent saturation ranged from 22.8°C to 24.9°C (73.0°F to 76.8°F), 8.1 mg/L to 9.1 mg/L, and 94.9 percent to 105.7 percent, respectively (Table 6-4). In the tailwater, the water temperature, DO concentration, and DO percent saturation ranged from 23.1°C to 24.3°C (73.6°F to 75.7°F), 8.3 mg/L to 8.5 mg/L, and 97.1 percent to 101.2 percent, respectively (Table 6-5). Results of the study and comments provided by the MDEP demonstrated that the Bar Mils Project waters met the designated Class A water quality standards (FPLE Maine 2003, MDEP 2008). "NS" in the referenced tables indicates that no sample was collected.

FPLE Maine collected benthic macroinvertebrate samples at the upper end of the Bar Mills Project impoundment (downstream of West Buxton dam) in August through September 2001 in support of the FERC relicensing (S-596 in Figure 6-11) (MDEP 2024b). Benthic macroinvertebrate sampling was completed in the Bar Mills bypass reach from July to August 2002 (S-648 in Figure 6-11) (MDEP 2024c). The results of macroinvertebrate sampling in the Bar Mills impoundment and bypass reach and comments provided by the MDEP indicated that Bar Mills Project waters were attaining their designated aquatic life standards for Class A waters (FPLE Maine 2003, MDEP 2008).

Table 6-2 Water Quality Data, August 26-29, 2001, Bar Mills Upper Impoundment.

Sample Dates:		8/26/2001			8/27/2001						8/28/2001						8/29/2001		
River Flow (CFS):		GENERATING, NO SPILL, 325 CFS			LEAKAGE, NOT GENERATING, 325 CFS						NO SPILL, SPILLING PM, NOT GENERATING, 350 CFS						LEAKAGE, GENERATING, 325 CFS		
Time: Weather/Temp.:		6:30 PM PARTLY CLOUDY, 80'S			5:30 AM HUMID, HIGH 60'S			6:00 PM OVERCAST, HUMID			6:30 AM PARTLY CLOUDY			5:30 PM PARTLY CLOUDY			6:30 AM CLEAR COOL		
Depth (Meters)	Sample Location	DO (mg/L)	Temp. (°C)	% Sat.	DO (mg/L)	Temp. (°C)	% Sat.	DO (mg/L)	Temp. (°C)	% Sat.	DO (mg/L)	Temp. (°C)	% Sat.	DO (mg/L)	Temp. (°C)	% Sat.	DO (mg/L)	Temp. (°C)	% Sat.
	1/4	8.4	24.2	99.8	8.3	23.0	96.8	8.8	23.8	104.9	8.0	22.9	93.4	8.4	23.9	99.6	8.1	23.1	94.8
Surface	1/2	8.4	24.3	99.7	8.3	23.1	96.8	8.8	23.8	105.1	8.0	22.9	93.5	8.4	23.9	99.5	8.1	23.1	94.9
	3/4	8.3	24.2	99.8	8.2	23.1	95.9	8.8	23.8	105.2	8.0	22.8	93.6	8.4	23.9	99.6	8.1	23.1	94.5
	1/4	8.3	24.1	99.6	8.2	23.1	96.1	8.8	23.7	104.1	8.0	23.0	93.8	8.3	23.9	99.6	8.1	23.1	94.3
1	1/2	8.3	24.2	99.6	8.3	23.1	96.8	8.7	23.8	105.1	8.1	23.0	93.9	8.3	23.8	99.4	8.1	23.1	94.3
	3/4	8.3	24.2	99.8	8.2	23.1	95.6	8.8	23.7	104.7	8.1	23.0	93.9	8.3	23.8	99.6	8.1	23.1	94.4
	1/4	8.3	24.1	99.4	8.2	23.1	95.5	8.7	23.7	102.7	8.0	23.0	93.8	8.3	23.8	99.4	8.1	23.1	94.4
2	1/2	8.3	24.2	99.4	8.2	23.2	95.6	8.7	23.7	102.5	8.0	23.0	93.8	8.3	23.8	99.4	8.1	23.1	94.3
	3/4	8.3	24.1	99.6	8.2	23.1	95.5	8.8	23.7	104.1	8.0	22.9	93.8	8.3	23.8	99.4	8.1	23.1	94.2
	1/4	8.3	24.1	99.4	8.2	23.1	95.5	8.7	23.7	102.4	8.0	23.0	93.7	8.3	23.8	99.2	8.1	23.1	94.3
3	1/2	8.3	24.1	99.2	8.2	23.2	95.6	8.7	23.7	102.4	8.0	23.0	93.8	8.3	23.8	99.3	8.1	23.1	94.2
	3/4	8.3	24.1	99.4	8.1	23.1	95.1	8.8	23.7	103.0	8.0	22.9	93.8	8.3	23.8	99.4	8.1	23.1	94.1
	1/4	8.3	24.0	99.2	8.2	23.1	95.5	8.6	23.6	101.8	8.0	23.0	93.7	8.3	23.7	99.0	8.1	23.1	94.3
4	1/2	8.3	24.0	99.1	8.0	23.2	93.8	8.6	23.6	101.4	8.0	23.0	93.8	8.3	23.7	99.1	8.0	23.1	93.7
	3/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1/4	8.3	24.0	99.1	8.1	32.1	94.8	8.6	23.5	101.1	8.0	22.9	93.6	8.3	23.7	99.0	8.1	23.1	94.3
5	1/2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	3/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Transect Location	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)
1/4	4	5	4.5	5	5	5	5	5	5	5	4.8	4.8
1/2	4	4	4	4	4	4	4	4	4	4	4	4
3/4	3	3	2.8	2.8	3	3	3	3	3	3	3	3

Table 6-3 Water Quality Data, August 26-29, 2001, Bar Mills Lower Impoundment.

Sample Dates:		8/26/2001			8/27/2001						8/28/2001						8/29/2001		
River Flow (CFS): Time: Weather/Temp.:		GENERATING, NO SPILL, 325 CFS 6:30 PM PARTLY CLOUDY, 80'S			LEAKAGE, NOT GENERATING, 325 CFS						NO SPILL, SPILLING PM, NOT GENERATING, 350 CFS						LEAKAGE, GENERATING, 325 CFS 6:30 AM CLEAR COOL		
					5:30 AM HUMID, HIGH 60'S			6:00 PM OVERCAST, HUMID			6:30 AM PARTLY CLOUDY			5:30 PM PARTLY CLOUDY					
Depth (Meters)	Sample Location	DO (mg/L)	Temp. (ºC)	% Sat.	DO (mg/L)	Temp. (ºC)	% Sat.	DO (mg/L)	Temp. (ºC)	% Sat.	DO (mg/L)	Temp. (ºC)	% Sat.	DO (mg/L)	Temp. (ºC)	% Sat.	DO. (mg/L)	Temp. (ºC)	% Sat.
	1/4	8.3	24.4	99.9	8.4	23.8	99.5	8.8	23.8	103.9	8.3	23.0	96.6	8.4	23.9	99.7	8.3	23.0	96.9
Surface	1/2	8.3	24.3	100.0	8.5	23.8	100.1	8.8	23.8	103.5	8.3	23.0	96.7	8.4	23.9	99.7	8.3	23.1	96.2
	3/4	8.3	23.3	99.9	8.4	23.8	99.8	8.7	23.7	103.1	8.3	23.0	96.7	8.4	23.9	99.8	8.3	23.1	96.8
	1/4	8.3	24.4	99.5	8.2	23.8	98.7	8.8	23.8	103.5	8.3	23.0	96.5	8.3	23.9	99.6	8.3	23.1	96.9
1	1/2	8.3	24.4	99.6	8.4	23.9	99.1	8.8	23.7	103.5	8.2	23.1	96.1	8.4	23.9	99.7	8.3	23.1	96.5
	3/4	8.3	24.4	99.1	8.3	23.9	99.4	8.7	23.7	103.0	8.3	23.1	96.2	8.4	23.9	99.7	8.3	23.1	96.6
	1/4	8.3	24.4	99.9	8.4	23.9	99.5	8.7	23.7	102.4	8.2	23.2	96.3	8.3	23.8	99.5	8.3	23.1	96.9
2	1/2	8.2	24.4	98.9	8.3	23.9	98.8	8.7	23.7	102.6	8.2	23.2	96.3	8.3	23.8	99.6	8.3	23.1	96.6
	3/4	8.3	24.4	99.5	8.4	23.9	99.3	8.7	23.7	102.8	8.3	23.2	96.4	8.3	23.8	99.7	8.2	23.1	96.2
	1/4	8.3	24.4	99.2	8.3	23.9	98.8	8.7	23.5	102.1	8.2	23.2	96.3	8.3	23.7	99.5	8.3	23.1	96.9
3	1/2	8.3	24.4	98.7	8.3	23.8	99.0	8.7	23.6	102.1	8.2	23.2	96.3	8.3	23.8	99.5	8.3	23.1	96.6
	3/4	8.2	24.4	98.5	8.4	23.8	99.4	8.7	23.6	102.1	8.2	23.2	96.3	8.3	23.8	99.5	8.2	23.1	96.2
	1/4	8.3	24.4	99.1	8.3	23.9	98.5	8.7	23.4	101.2	8.2	23.2	96.2	8.3	23.7	99.2	8.3	23.1	96.4
4	1/2	8.3	24.4	99.4	8.3	23.8	98.8	8.7	23.4	101.2	8.2	23.2	96.2	8.3	23.7	99.4	8.3	23.1	96.7
	3/4	8.3	24.4	99.0	8.3	23.8	99.3	8.7	23.5	101.5	8.2	23.2	96.1	8.3	23.7	99.4	8.2	23.1	96.3
	1/4	8.2	24.4	98.6	8.3	23.8	98.4	8.6	23.4	100.2	8.2	23.2	96.1	8.3	23.7	99.2	8.2	23.1	96.0
5	1/2	8.2	24.4	98.7	8.3	23.8	98.5	8.6	23.4	100.4	8.2	23.2	96.1	8.3	23.7	99.2	8.3	23.1	96.4
	3/4	8.2	24.4	98.7	8.3	23.8	99.1	8.6	23.4	100.5	8.2	23.2	96.1	8.3	23.7	99.4	8.3	23.1	96.4
	1/4	NS	NS	NS	8.3	23.8	98.2	NS	NS	NS	NS	NS	NS	8.3	23.7	99.1	8.2	23.1	95.5
6	1/2	8.1	24.4	97.2	8.3	23.8	98.5	8.6	23.3	100.3	8.2	23.2	96.1	8.3	23.6	99.1	8.2	23.1	96.4
	3/4	8.2	24.4	98.7	8.3	23.8	98.7	8.6	23.4	100.2	8.2	23.2	96.0	8.3	23.7	99.2	8.2	23.1	96.3
	1/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	8.3	23.6	99.1	8.2	23.1	95.2
7	1/2	NS	NS	NS	8.3	23.8	98.2	8.5	23.3	99.8	8.2	23.2	96.1	8.3	23.6	99.1	8.2	23.1	96.3
	3/4	8.2	24.4	98.5	8.3	23.8	98.4	8.6	23.3	100.0	8.2	23.2	96.0	8.3	23.6	99.2	8.2	23.1	96.3
	1/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
8	1/2	NS	NS	NS	8.2	23.8	97.7	8.4	23.2	99.6	8.2	23.2	96.0	8.3	23.6	99.0	8.2	23.1	96.1
	3/4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	8.3	23.6	99.0	8.2	23.1	96.1

Transect Location	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)	Secchi Disk Depth (m)	Total Depth (m)
1/4	5	5	5	5.2	5	5	5.2	5.3	5	6.4	5	6.5
1/2	5	5	5	7.5	5	7.4	5.2	7.4	5	7.5	5.5	7.4
3/4	5	6.6	5	6.6	5	6.3	5.2	6.7	5	7.4	5	7.3

Table 6-4 Water Quality Data, August 26-29, 2001, Bar Mills Bypass Reach.

Date	8/26/2001	8/27/2001	8/27/2001	8/28/2001		8/29/2001
Operations, River Flow (cfs)	No spill, generating, 325 cfs	Leakage, not generating, 325 cfs		No spill AM, spilling PM, not generating, 350 cfs		Leakage, generating, 325 cfs
Time:	7:00 PM	5:20 AM	7:00 PM	6:50 AM	6:15 PM	6:50 AM
Weather	Partly Cloudy, 80s	Humid, high 60s	Overcast, humid	Partly cloudy	Partly cloudy	Clear, cool
DO (mg/L)	8.1	8.2	8.6	8.8	8.7	9.1
Temp (°C)	24.9	22.8	24.0	22.9	23.7	22.9
DO % Saturation	98.1	94.9	103.8	102.1	102.7	105.7

Table 6-5 Water Quality Data, August 26-29, 2001, Bar Mills Tailwater.

Date	8/26/2001	8/27/2001	8/27/2001	8/28/2001		8/29/2001
Operations, River Flow (cfs)	No spill, generating, 325 cfs	Leakage, not generating, 325 cfs		No spill AM, spilling PM, not generating, 350 cfs		Leakage, generating, 325 cfs
Time:	5:45 PM	7:10 AM	7:00 PM	6:55 AM	6:25 PM	7:05 AM
Weather	Partly Cloudy, 80s	Humid, high 60s	Overcast, humid	Partly cloudy	Partly cloudy	Clear, cool
DO (mg/L)	8.3	8.3	8.4	8.4	8.5	8.5
Temp (°C)	24.3	23.6	23.8	23.1	24.1	23.2
DO % Saturation	99.5	97.1	100.1	97.6	101.2	99.3

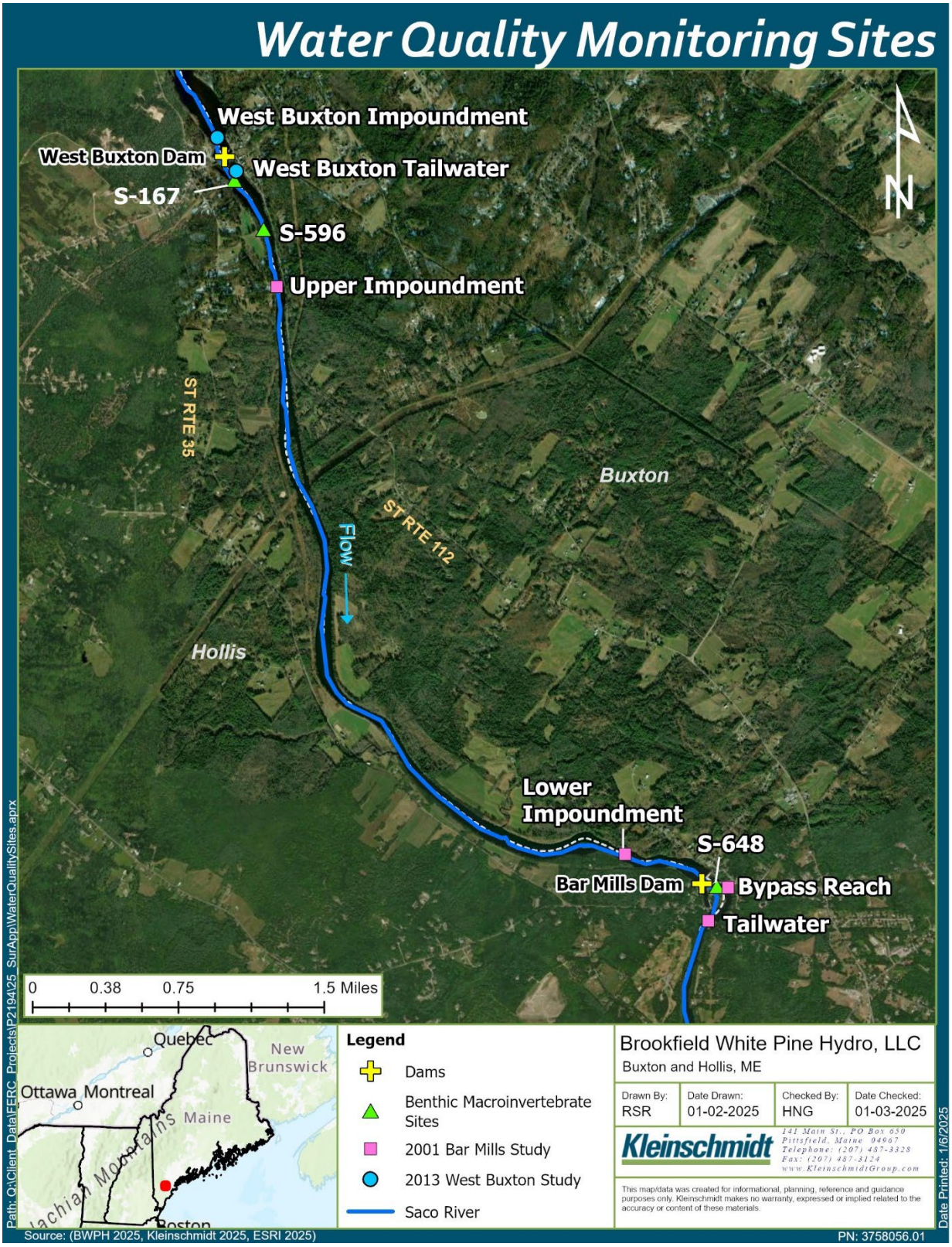


Figure 6-11 Water Quality Study Sampling Sites at the Bar Mills and West Buxton Projects.

2013 West Buxton Study

The licensee of the West Buxton Project (FERC No. 2531) completed water quality monitoring in 2013 in the West Buxton impoundment and tailrace (Figure 6-11) (BWHP 2015). The monitoring was conducted in support of the project relicensing and in accordance with MDEP sampling protocols. The Bar Mills Project impoundment extends upstream approximately 5 river miles to the downstream extent of the West Buxton Project.

Vertical profiles of water temperature and DO (concentration and percent saturation), a water transparency measurement, and water samples (analyzed for chlorophyll-a, total phosphorus, pH, color, total alkalinity) were collected two times per month from June to October 2013 at the deep spot in the impoundment. The vertical profiles demonstrated that the impoundment did not thermally stratify. The water temperature ranged from 12.7°C (54.9°F) to 25.9°C (78.6°F), the DO concentration ranged from 7.7 mg/L to 12.3 mg/L, and the DO percent saturation ranged from 93.8 percent to 115.6 percent demonstrating that DO was in attainment with the Class A standards. Chlorophyll-a (1.0 µg/L to 2.6 µg/L in 9 of 10 samples) and total phosphorus (9 µg/L to 18 µg/L) met draft nutrient criteria and demonstrated low productivity. The water transparency ranged from 2.1 m to 4.8 m, and pH ranged from 6.9 to 7.2.

In the West Buxton tailrace, sampling was conducted once per week in the morning and afternoon for 10 weeks between July 17 and September 18, 2013 (BWHP 2015). The water temperature ranged from 17.0°C (62.6°F) to 26.6°C (79.9°F), the DO concentration ranged from 8.2 mg/L to 10.2 mg/L, and the DO percent saturation ranged from 96.6 percent to 107.3 percent. Class A standards for DO were met on all sampling days.

Benthic macroinvertebrate community sampling was conducted downstream of the West Buxton tailrace (upper end of Bar Mills impoundment) from July 26 to August 23, 2013 (S-167 in Figure 6-11). Results from this sampling indicated that the macroinvertebrate community was diverse, abundant, and rich in taxa and that sensitive organisms accounted for a large portion of the community. MDEP evaluated the results of the macroinvertebrate samples collected in the West Buxton tailwater area with their linear discriminant model and determined that the aquatic community in the Saco River downstream of the West Buxton Project attained Class A standards (BWHP 2015, MDEP 2024d).

Saco River Corridor Commission

Water quality monitoring has been conducted by the Saco River Corridor Commission (SRCC) since 2001 at numerous (over 50) stations along the Saco River (SRCC 2024). The SRCC monitoring program collects surface water quality data once or twice per month from May to September or October at sites along the Saco River, the Ossipee River, the Little Ossipee River, and several smaller tributaries and ponds (SRCC 2024).

Turbidity, pH, conductivity, DO concentration, DO percent saturation, water temperature, and E-coli data from four sites at or near the Bar Mills Project are presented below (Figure 6-12, Table 6-6, 6-7, 6-8, and 6-9). Site S18 is located just upstream (approximately 200 feet) of the Bar Mills dam and powerhouse on river left near the site of the old Rogers Fibre Mill. Site S17 is approximately 6.5 river miles upstream of the Bar Mills Dam and approximately 500 feet upstream of the Bonny Eagle Project powerhouse. Site S19-U is approximately 1.3 river miles downstream of the Bar Mills dam in the Skelton Project impoundment, and Site S19-J is approximately 3.2 river miles downstream and just above the Skelton Project dam.

Since 2001, at Sites S18 just upstream of the Bar Mills dam and within the project boundary, approximately 98 percent and 99 percent of the DO concentration and percent saturation measurements exceeded the Class A standards of 7 mg/L and 75 percent saturation, respectively (Table 6-6). The median DO concentration and percent saturation from 2001 through July 2024 were 8.6 mg/L and 97.0 percent, respectively. The median and average pH (6.9) were consistent with levels observed in Class A waters (Table 6-6). Maximum water temperatures (approximately 23°C to 26°C) were observed in mid-July through August. Turbidity and conductivity levels were low.

At Site S17, 99 percent of the DO data exceeded the Class A standards (Table 6-7). At Site S19-U downstream of the Bar Mills dam, all of the DO data exceeded the standards (Table 6-8). All DO data, except for one DO concentration measurement (collected in July 2024), exceeded the standards at Site S19-J (Table 6-9).

Overall, pH, turbidity, and conductivity were similar among the sample sites within the Bar Mills Project vicinity (Table 6-6, 6-7, 6-8, and 6-9). Generally, pH ranged from approximately 6.0 to 9.0, turbidity ranged from approximately 1 NTU to 8 NTU, and conductivity ranged from approximately 20 µS/cm to 80 µS/cm. E. coli concentrations at all four sites were less than the Class A standard.

Table 6-6 Water quality data collected at Site S18 upstream of the Bar Mills Dam off Depot Street by SRCC, 2001-2024.

Date	pH	Turbidity (NTU)	Conductivity (µS/cm)	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	E. coli (CFUs/100 mL)
Aug-Oct 2001	6.6 - 7	0.8 - 1.1		7.4 - 9.6	84.9 - 88.4	11.1 - 22.5	54 - 87
April-Nov 2002	6.5 - 7.4	0.6 - 6.9		6.6 - 12.3	72.1 - 114.2	6.1 - 26.1	
April-Oct 2003	6.6 - 7.5	0.9 - 5.3		6.3 - 13.9	75.7 - 127	6.8 - 24.8	
April-Oct 2004	5.9 - 7.4	1 - 11.5		7.1 - 12.3	79.9 - 96.1	4.9 - 23	
April-Oct 2005	6.7 - 8.7	1 - 9.3		6.9 - 12	77.2 - 102.1	6 - 23	
April-Oct 2006	6.9 - 8	0.7 - 3.5		7 - 11.5	73.3 - 105.8	11.2 - 25.8	
May-Oct 2007	6.9 - 7.7	0.8 - 2.5		7 - 10.9	79.7 - 110.6	14.9 - 26	
May-Oct 2008	6.5 - 6.9	1 - 5.6		6.5 - 10.6	78.7 - 100.3	13.1 - 25.4	
May-Sept 2009	6.5 - 7.4	1.8 - 3	11.3 - 16.7	8.4 - 9.8	96.6 - 102.1	15.5 - 22.9	
May-Sept 2010	6.4 - 6.9	1.2 - 3.1	20.1 - 29.9	8 - 10.5	90.7 - 113	15.3 - 26.2	
May-Oct 2011	6.7 - 7.6	1 - 38.4	16.8 - 30.7	7.5 - 9.7	88.3 - 101.9	14.5 - 27	
May-Oct 2012	6.6 - 7.8	1.3 - 3.1	17 - 27	8 - 9.8	96.1 - 98.8	15 - 25.6	
May-Sept 2013	6.6 - 7.6	1.2 - 2	19 - 25.1	8.2 - 10.1	93.4 - 100.2	15 - 23	
May-Sept 2014	6.7 - 7	1.2 - 2.9	19.7 - 28.4	8.1 - 10.3	95.5 - 101	14.2 - 23.9	
May-Sept 2015	6.5 - 6.9	0.8 - 1.7	19.4 - 31	7.9 - 10.2	96 - 100.4	14.6 - 25.6	
May-Sept 2016	6.5 - 6.8	0.8 - 1.8	23.1 - 33.4	7.6 - 10.2	94.3 - 100	14.5 - 26.3	
May-Sept 2017	5.9 - 6.6	1.2 - 3.5	19.3 - 30.3	8.3 - 9.9	95.4 - 102.2	15.4 - 23.3	
May-Sept 2018	6.1 - 8.3	0.9 - 3.7	24 - 35.7	8 - 9.8	93.8 - 101.6	16 - 26.4	
May-Sept 2019	6.2 - 8.7	1.2 - 2.8	48.8 - 75.6	6.7 - 11.3	75.2 - 102.4	10.8 - 24.6	
May-Sept 2020	6.2 - 7.3	0.7 - 2	45.4 - 81	7.9 - 9.9	95.3 - 102	15.6 - 26.8	
May-Sept 2021	6.1 - 9.1	1.2 - 2.3	47.7 - 72.1	7.9 - 10.2	94.6 - 98.4	13.9 - 25.3	
May-Sept 2022	6.6 - 7	1.1 - 3.6	54.6 - 82.1	7.7 - 10.5	95.6 - 99.4	12.8 - 26.1	4.1 - 59.8
May-Sept 2023	6.7 - 7.1	1.5 - 6.2	36.1 - 59.7	8.1 - 10.9	93.0 - 104.0	13.4 - 23.4	2.0 - 139.1
May-July 2024	6.7 - 7.0	1.0 - 1.9	38.7 - 57.0	7.4 - 10.5	94.5 - 101.3	13.4 - 27.8	9.8 - 38.8
Median	6.9	1.5	28.8	8.6	97.0	20.6	27.4
Average	6.9	2.1	36.8	8.8	95.4	19.6	39.4

Table 6-7 Water quality data collected at Site S17 near Bonny Eagle Island by SRCC, 2001-2024.

Date	pH	Turbidity (NTU)	Conductivity (µS/cm)	DO (mg/L)	DO (% saturation	Water Temperature (°C)	E. coli (CFUs/100 mL)
Aug-Oct 2001	6.7 - 7	0.7 - 1.5		7.3 - 10	85.8 - 94.7	11.8 - 22.5	16 - 69
April-Oct 2002	6.6 - 7.6	0.6 - 1.8		7.2 - 11.3	83.6 - 103.9	8.2 - 24.9	
April-Oct 2003	6.5 - 7.2	0.8 - 4.8		7.1 - 12.6	85.0 - 111.9	6.8 - 25.8	
April-Oct 2004	5.9 - 7.1	0.8 - 1.5		7.1 - 12.1	84.3 - 118.9	4.5 - 24	
April-Oct 2005	6.6 - 7.2	1 - 4.3		7.6 - 11.6	88.6 - 98.8	5 - 23	
May-Oct 2006	6.8 - 8.7	0.7 - 3.1		6.9 - 10.7	73.1 - 102.5	13.3 - 25.7	
May-Oct 2007	6.9 - 7.9	0.7 - 2		7.5 - 11.3	83.9 - 111.5	15 - 25.7	
May-Oct 2008	6.5 - 7.9	1.1 - 2.6		6.5 - 10.8	79.7 - 102.9	13.1 - 25.5	
May-Sept 2009	6.4 - 7.6	1.1 - 4.2	9.5 - 17.1	8.2 - 9.8	96.8 - 100	15.9 - 22.9	
May-Sept 2010	6.5 - 7.7	1.2 - 2.7	19.7 - 29.4	8.2 - 10.2	98.8 - 104.3	15.5 - 25.2	
May-Oct 2011	6.9 - 7.6	1 - 35.8	16.6 - 31.2	7.9 - 9.6	94 - 100.5	14.4 - 26.2	
May-Oct 2012	6.7 - 7.3	1.6 - 3	16.8 - 26.9	7.8 - 9.7	93.4 - 99.3	15.4 - 25.6	
May-Sept 2013	6.8 - 8	1 - 2.2	10.3 - 23.7	8.2 - 10	94.5 - 100.3	15.2 - 23.4	
May-Sept 2014	6.9 - 7.4	1.3 - 2.5	19.9 - 26.3	8.4 - 10.2	98.4 - 101.5	14.5 - 23.6	
May-Sept 2015	6.5 - 7.1	0.9 - 1.9	19.3 - 29.3	8.1 - 10.5	98.1 - 101.4	14 - 25.7	9.8 - 34.5
May-Sept 2016	6.2 - 6.9	0.9 - 1.7	22 - 33.1	7.9 - 10.1	96.9 - 99.9	15 - 26.3	
May-Sept 2017	5.8 - 6.9	1.2 - 4.6	19 - 29.3	8 - 9.7	94 - 100.1	15.8 - 23.2	
May-Sept 2018	6.4 - 8.3	1 - 2.5	23.7 - 35.2	7.5 - 9.7	92.7 - 98.6	16.2 - 26.7	
May-Sept 2019	6.2 - 9.3	1.3 - 3	46 - 71	7.6 - 10.9	92.1 - 99.4	11.2 - 24.4	
May-Sept 2020	6.2 - 7.6	1 - 1.7	43.1 - 85.3	7.5 - 9.7	90.6 - 101.6	15.7 - 26.6	
May-Sept 2021	6.2 - 7.1	1.1 - 2.1	50.5 - 71.4	7.7 - 10.1	92.7 - 99.8	14.2 - 25.1	
May-Sept 2022	6.5 - 7	1.1 - 1.7	51.5 - 83.1	7.8 - 10.4	93.5 - 99.4	13.7 - 26.2	2 - 39.3
May-Sept 2023	6.5 - 7.4	1.5 - 5.2	35.1 - 58.6	8.3 - 10.4	96.1 - 99.7	13.3 - 22.9	3.1 - 184.2
May-July 2024	6.8 - 6.9	1.2 - 1.9	39.9 - 60.5	7.3 - 10.0	92.5 - 99.5	14.9 - 27.1	9.6 - 58.3
Median	6.9	1.4	29.0	8.6	96.8	20.7	17.3
Average	6.9	1.7	37.4	8.8	96.3	19.7	34.1

Table 6-8 Water quality data collected at Site S19-U in the Skelton Project impoundment by SRCC, 2018-2024.

Date	pH	Turbidity (NTU)	Conductivity (µS/cm)	DO (mg/L)	DO (% saturation)	Water Temperature (°C)	E. coli (CFUs/100 mL)
May-Sept 2018	6 - 8.1	1 - 2.6	24.2 - 35.9	8 - 10.2	98 - 101.8	16 - 26.7	13.4 - 307.6
May-Sept 2019	6.3 - 8.3	1.1 - 2.7	47.9 - 73.5	8.1 - 11.4	97.7 - 103.4	10.8 - 24.7	5.2 - 73.3
May-Sept 2020	6.2 - 7.1	0.9 - 1.7	45.7 - 81.6	7.9 - 10.2	97 - 101.7	15.5 - 26.6	11 - 62
May-Sept 2021	6 - 8.8	1.1 - 2.3	48.2 - 71.9	8.1 - 10.6	96.6 - 101.8	13.8 - 25.3	9.8 - 325.5
May-Sept 2022	6.6 - 7.2	1.1 - 1.9	54.9 - 84.6	7.7 - 10.7	96.2 - 101.3	13.1 - 26.3	2 - 83.3
May-Sept 2023	6.7 - 7.0	1.5 - 7.9	35.9 - 59.8	8.4 - 11.0	96.1 - 105.2	13.4 - 23.5	3.0 - 285.1
May-July 2024	6.8 - 7.0	0.9 - 2.0	38.9 - 57.2	7.6 - 10.7	97.8 - 103.4	13.4 - 28.1	11.0 - 51.2
Median	6.8	1.6	55.3	8.7	99.2	21.7	34.3
Average	6.9	1.8	54.8	8.9	99.6	21.1	53.7

Table 6-9 Water quality data collected at Site S19-J at the public boat launch upstream of the Skelton Project dam by SRCC, 2022-2024.

Date	pH	Turbidity (NTU)	Conductivity (µS/cm)	DO (mg/L)	DO (% saturation)	Water Temperature (°C)
May-Sept 2022	6.5 - 7.0	1.4 - 5.3	54.0 - 80.7	7.2 - 10.9	87.8 - 103.3	12.8 - 27.5
May-Sept 2023	6.6 - 7.4	1.6 - 6.6	34.6 - 54.3	7.7 - 10.8	92.6 - 105.3	14.3 - 24.4
May-July 2024	6.7-7.2	1.6-5.7	42.5-59.5	6.6-10.6	87.0-102.8	13.6-29.1
Median	6.8	2.0	54.0	8.5	97.9	21.7
Average	6.8	2.7	54.1	8.5	96.7	21.3

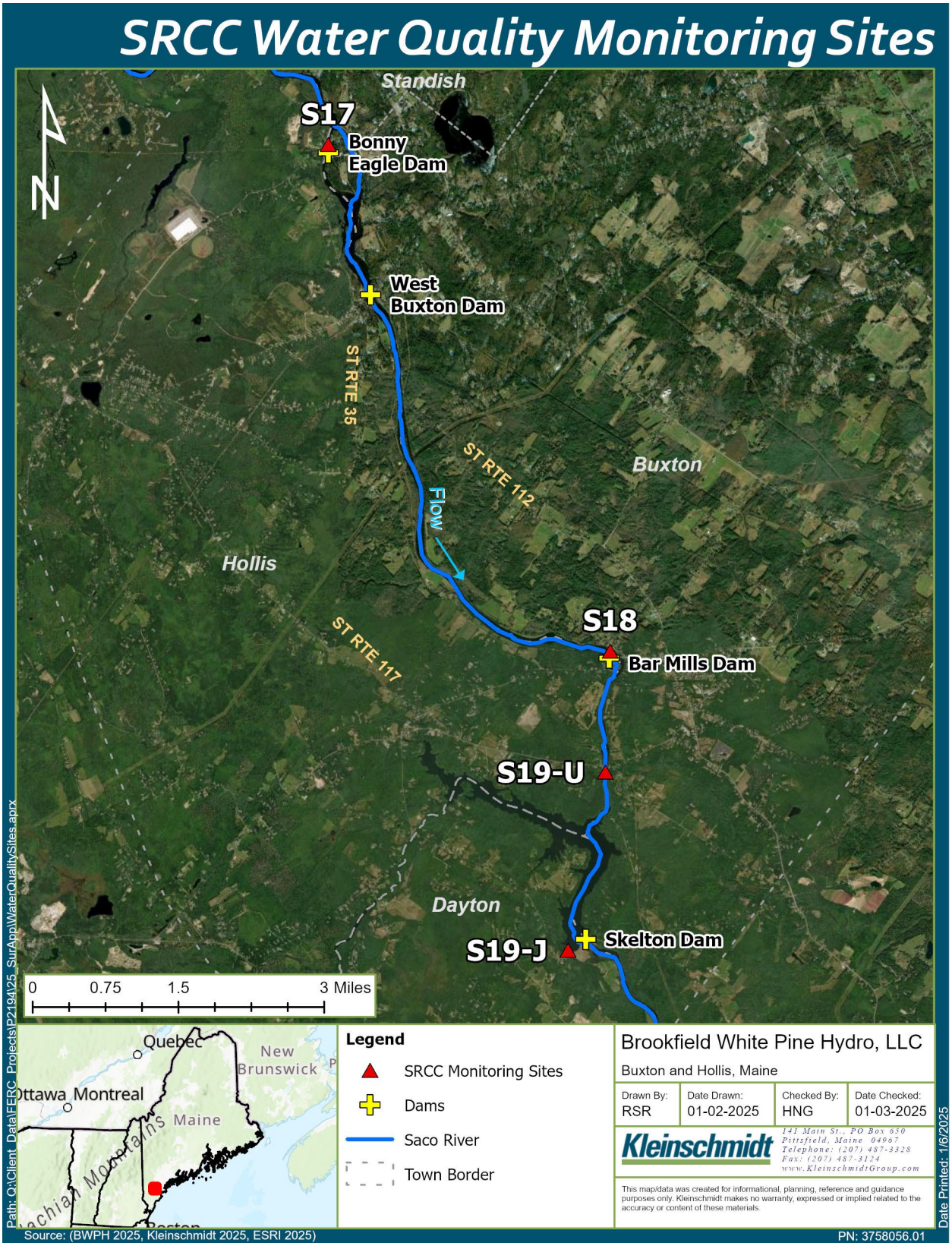


Figure 6-12 SRCC monitoring sites near the Bar Mills Project

Saco Estuary Project

Water quality monitoring was completed at 18 sites along the Saco River between North Conway, NH, and Biddeford, ME, by researchers from the University of New England between 2010 and 2012 (Zeeman and Spillane 2015). Overall, water quality was found to be good with low chlorophyll-a, nutrient, and E-coli levels. DO ranged between approximately 7 mg/L to 12 mg/L and 90 percent to 105 percent. The sample location figure contained in Zeeman and Spillane (2015) is not at a scale to identify exact locations, however Site 18 appears to be located near Bar Mills and is likely the same site historically sampled by MDEP (also identified as Site 18) just upstream (approximately 200 feet) of the Bar Mills dam and powerhouse on river left near the site of the old Rogers Fibre Mill.

6.6.3 Water Supply Wells and Dry Hydrants

TRC (2025b) notes that because the surface water of the impoundment and Saco River is hydraulically connected to the adjacent and underlying groundwater flow system, lower water levels in the impoundment and river will result in lower groundwater elevations near the former mill pond and return them to natural, pre-dam levels. TRC (2025b) identified that the greatest change in surface water elevation will be just immediately upstream from the Bar Mills dam with normal surface elevation reducing by approximately 18 feet, from a normal impoundment elevation of 148.5 feet above National Geodetic Vertical Datum (NGVD) to a few feet above the proposed new elevation of the stream channel of approximately 127.5 feet NGVD (Figure 6-13). The change in surface water elevation will be progressively less as discussed in Section 6.6.1, moving upstream from the dam and upstream of the hydraulic control in the area of the remnant bridge piers. Normal water levels (50% exceedance or 2,725 cfs) in the river upstream of the hydraulic control are anticipated to be reduced by approximately 2.5 feet following partial removal of the dam; however, the effects of the reduced water levels will be lessened due to the natural topography of the riverbed. Flow durations will not change as inflow to this segment of the river will not be affected by the partial removal or full removal of the of the spillway.

TRC (2025b) further states that the impact of dam decommissioning (i.e., lowering the Bar Mills impoundment water elevation) on groundwater elevations will be attenuated with distance from the mill pond laterally and with distance upstream from the dam. Six water supply wells were identified that have the greatest potential to be affected by permanently reduced impoundment levels, being within 650 feet of the impoundment

(Figure 6-13). TRC identified three ways in which a lower groundwater level resulting from lower impoundment elevation could affect wells:

- a drop in groundwater elevation would likely dewater a portion of the upper saturated thickness of the bedrock connected to the well
- lowered groundwater elevations could require pumps to be set at deeper elevations within the well
- lowering of the static head in the water supply wells would require that the pumps lift water a higher elevation - depending on the age and type of pump, this could lead to a reduced flow rate from the pump due to increased lift required

TRC's evaluation of known wells that could potentially be affected by a permanently lower impoundment water level identified a limited number (six individual wells). However, the extent of potential effects will not be known until completion of partial removal, at which time BWPH would need to assess potential need for mitigation measures. Additional details for TRC's evaluation are contained in TRC's (2025b) letter summary dated January 15, 2025 *Effects of Partial Dam Removal on Groundwater Levels* provided in Appendix F of this study report. Based upon Decommissioning Committee discussions, BWPH is coordinating Committee members to coordinate a well survey for landowners abutting the river reach from approximately the intake canal to Bar Mills dam. This information is intended to aid in evaluating potential risk of impacts on well based on technical data (e.g., type of well, depth, proximity to the river) and inform any potential mitigation plans. Rather than limiting the survey to the radius considered by TRC, the Committee determined it appropriate to survey landowners along the river corridor (Figure 6-15).

As previously noted, BWPH is currently evaluating alternatives to modify and/or relocate the dry hydrant intakes, which are currently being discussed with the municipal fire departments and will continue to be considered as the decommissioning process progresses. BWPH anticipates additional consultation with the Decommissioning Committee on these topics, along with recreational access as BWPH develops the formal Decommissioning Plan proposal.

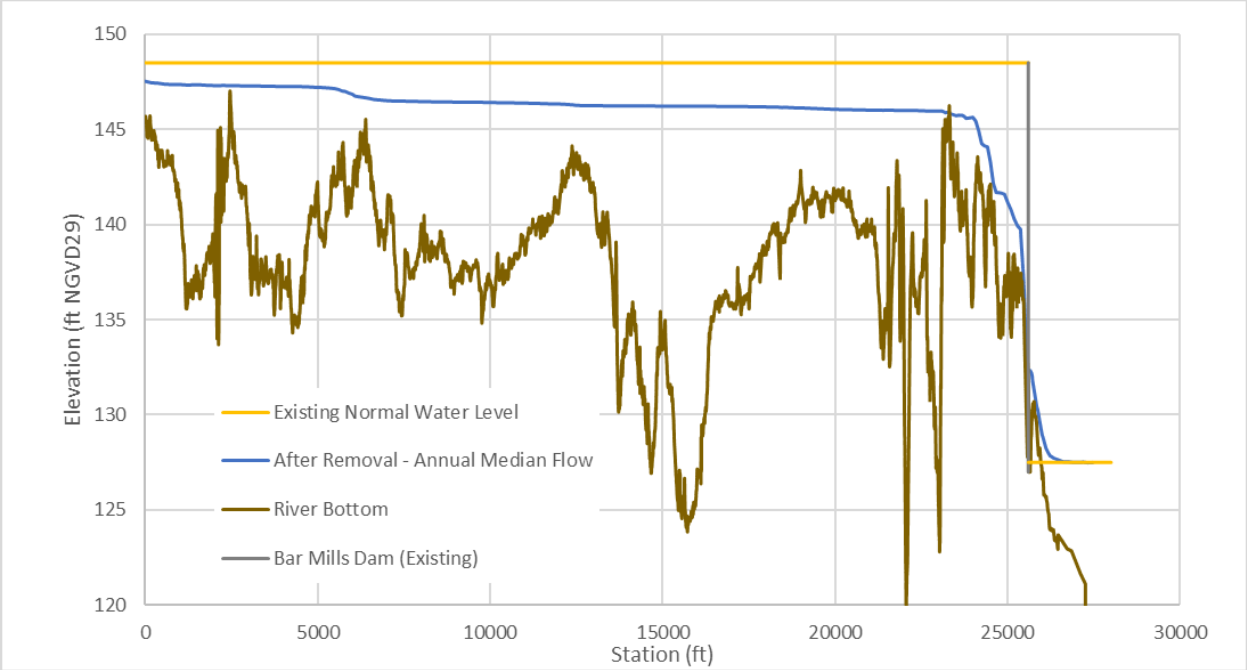


Figure 6-13 Upstream Water Levels[10]

[10] Station 0 is the upstream extent of the Bar Mills project boundary at the West Buxton tailwater.

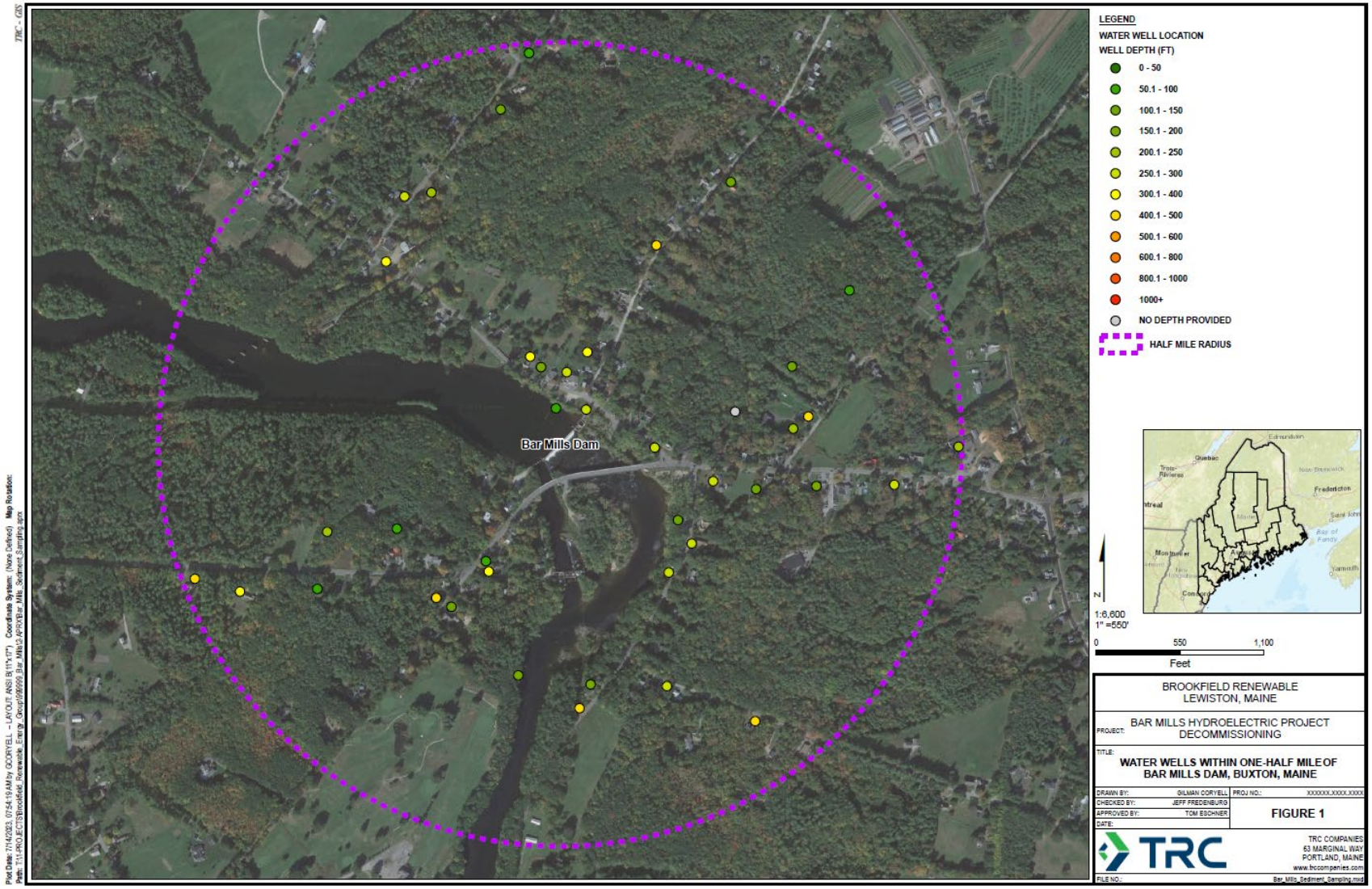
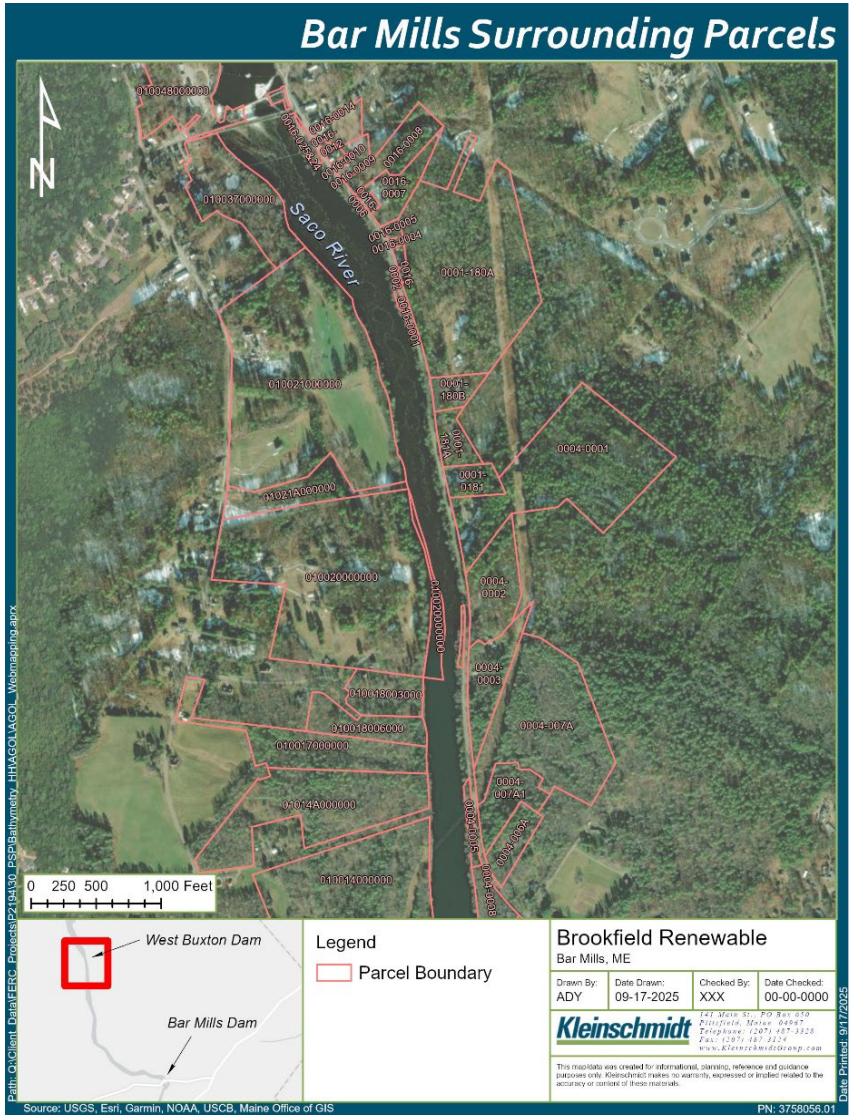


Figure 6-14 Water Wells Within One-Half Mile of Bar Mills Dam



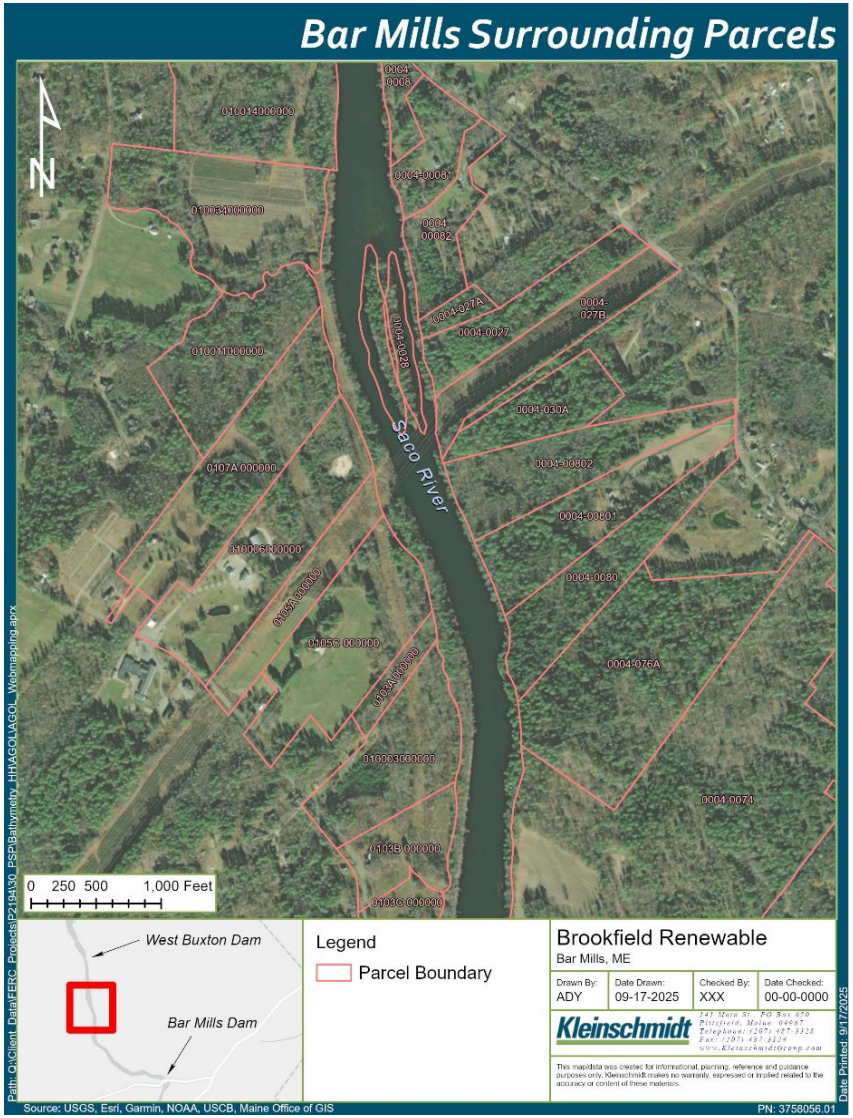
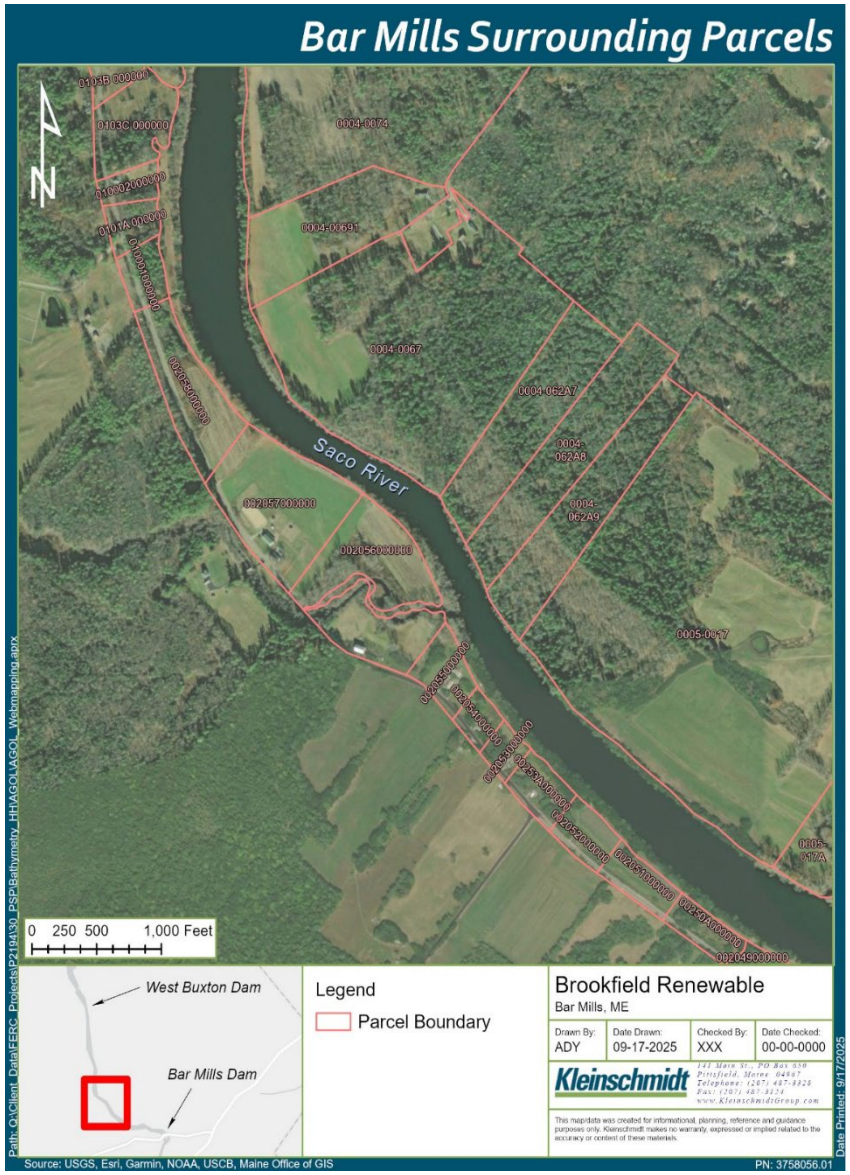
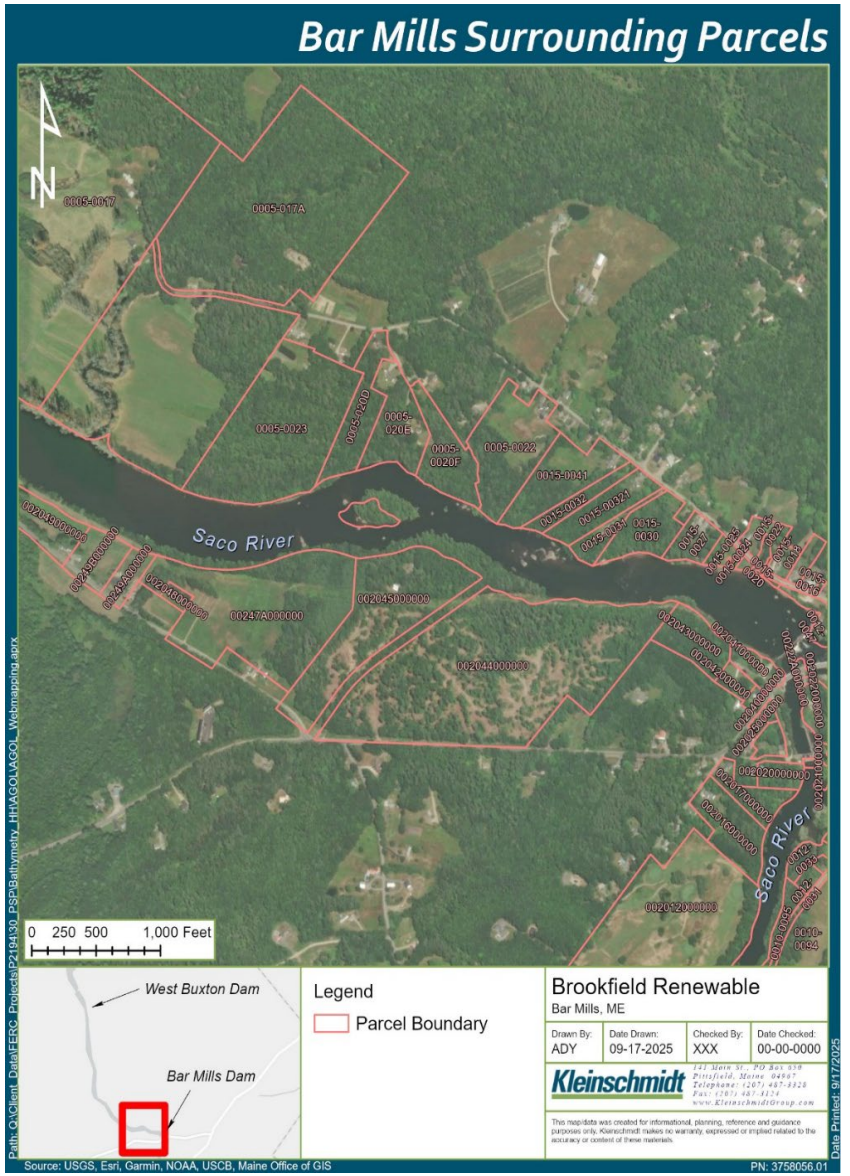
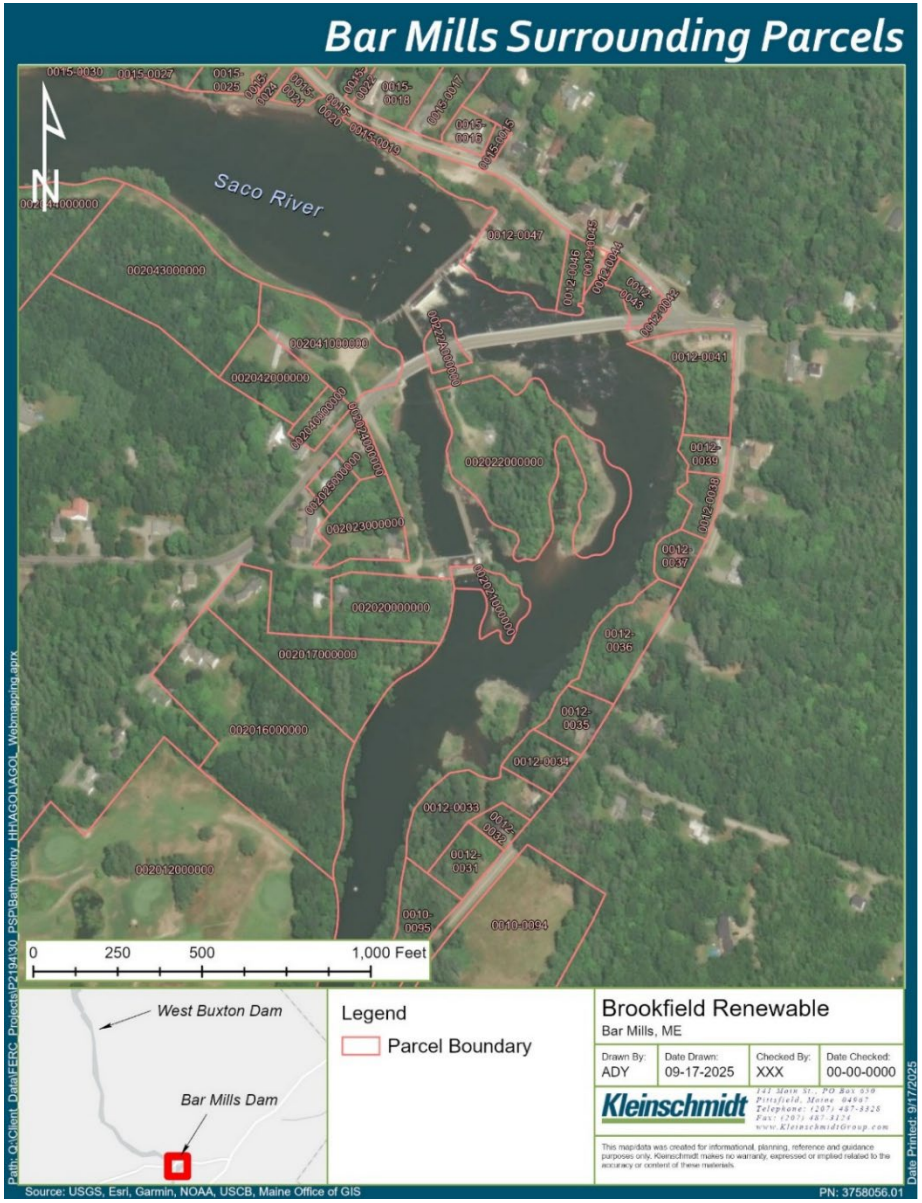


Figure 6-15 Bar Mills Surrounding Parcels





Bar Mills Surrounding Parcels Continued



Bar Mills Surrounding Parcels Continued

6.6.4 Benthic Macroinvertebrates

Results (see Table 6-10) indicate that total abundance was somewhat low, but richness was good (36 discreet taxa using MDEP counting rules) and Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) richness was 18, concluding that Class A standard is met. Results were submitted to MDEP for confirmation. MDEP provided an *Aquatic Life Classification Attainment Report* (Appendix G to this study report), with a determination that Class A was attained at Station 648, based primarily on Total Richness, EPT Richness and Mayflies as the 2 most dominant taxa.

Table 6-10 2024 Macroinvertebrate Data

Sample Log No.:	
Station No.:	**648**
Waterbody Name:	Saco River
Town:	Buxton
Date of Collection:	9/3/2024
Time of Collection:	
Sampled By:	Haley Ward
Subsample Factor:	1
Sampler Type:	RBG-Rock Bag

			Retrieval Depth Unit	**Depth 1**	**Depth 2**	**Depth 3**
	Taxon			**No. identified from sample**		
Maine Code	**Taxon Name**	**Stage**	**Comment**	**Rep 1**	**Rep 2**	**Rep 3**
09020603	*Polycentropodidae*		Immature		2	
09020402015	*Maccaffertium*		Immature	8	10	19
09020401001008	*Baetis intercalaris*			23	12	22
09020604016030	*Hydropsyche morosa*			4	1	
09020401007011	*Acerpenna pygmaea*			15	17	26
09020611064	*Lepidostoma*				1	
09020410035	*Ephemerella*				1	
09020402009	*Epeorus*			1	1	
09020604015	*Cheumatopsyche*				1	
09020601003003	*Chimarra obscura*			3	1	
09021012047	*Simulium*	PUPAE		7	1	
09021012047	*Simulium*			28	13	2
09020402015055	*Maccaffertium vicarium*					1

			Retrieval Depth Unit	Depth 1	Depth 2	Depth 3
	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3
09020401001012	*Baetis tricaudatus*			1		3
09020618078	*Oecetis*					3
09020209042121	*Acroneuria abnormis*			1	1	1
09020401010	*Procloeon*					1
09020401005	*Heterocloeon*			5		3
09020607026	*Hydroptila*					1
09010201003	*Gammarus*			1		3
09020603008	*Neureclipsis*			3	1	2
09020209042125	*Acroneuria lycorias*			2		4
09021011	*Chironomidae*	PUPAE		1		2
09020309	*Coenagrionidae*		Damaged			1
09020307043085	*Calopteryx aequabilis*					1
09020402011	*Leucrocuta*					1
09021104032	*Dineutus*			1		
09021011065113	*Tvetenia vitracies*			5	5	
09021011037057	*Cricotopus bicinctus*			2	2	
09021011037079	*Cricotopus sylvestris group*			5	1	1
09021011102185	*Polypedilum illinoense group*			1		
09021011041	*Eukiefferiella*			3		
09021011057105	*Rheocricotopus robacki*			1		
09021011076	*Tanytarsus*			1		
09021011050	*Orthocladius*			1		
09021011072	*Rheotanytarsus*			1	3	
09021011012	*Nilotanypus*			1		
09021011053	*Parametriocnemus*				1	

			Retrieval Depth Unit	Depth 1	Depth 2	Depth 3
	Taxon			No. identified from sample		
Maine Code	Taxon Name	Stage	Comment	Rep 1	Rep 2	Rep 3
09021011056	*Psectrocladius*				1	5
09021011001004	*Ablabesmyia mallochi*					1
			Total Benthos	**125**	**76**	**103**
			Total OTUs	**26**	**20**	**21**
			Total spp.			

6.7 References

Brookfield White Pine Hydro LLC. (BWHP). 2015. Bar Mills Hydroelectric Project, FERC No. 2531, Application for New License for Major Project – Existing Dam – Application and Exhibits A, B, C, D, E, F, G, and H.

Brookfield White Pine Hydro LLC. 2022. Bar Mills Hydroelectric Project, FERC No. 2194, Preliminary Scoping Document.

FPL Energy Maine Hydro LLC (FPLE Maine). 2003. Bar Mills Hydroelectric Project, FERC No. 2194, Application for New License, Volume I – Application and Exhibits A, E, F, G and H and Appendix A.

Maine Department of Environmental Protection (MDEP). 2014. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. Prepared by: Davies, S. P. and Tsomides, L. DEP LW0387-C2014. Latest Revision: April 2014. Available online: https://www.maine.gov/dep/water/monitoring/biomonitoring/materials/sop_stream_macro_methods_manual.pdf.

Maine Department of Environmental Protection (MDEP). 2008. Water Quality Certification. Bar Mills Hydroelectric Project. #L-20860-33-C-N.

Maine Department of Environmental Protection (MDEP). 2024a. 2024 Draft Integrated Water Quality Monitoring and Assessment Report. Available online: https://www1.maine.gov/dep/water/monitoring/305b/index.html. Accessed January 2, 2025.

Maine Department of Environmental Protection (MDEP). 2024b. Biomonitoring Stream and Wetland Sampling Data. Site 596. Available online: https://www.maine.gov/dep/gis/datamaps/lawb_biomonitoring/station_web/S-596M.htm. Accessed January 3, 2025.

Maine Department of Environmental Protection (MDEP). 2024c. Biomonitoring Stream and Wetland Sampling Data. Site 648. Available online: https://www.maine.gov/dep/gis/datamaps/lawb_biomonitoring/station_web/S-648M.htm. Accessed January 3, 2025.

Maine Department of Environmental Protection (MDEP). 2022d. Biomonitoring Stream and Wetland Sampling Data. Site 167. Available online: https://www.maine.gov/dep/gis/datamaps/lawb_biomonitoring/station_web/S-167M.htm. Accessed January 3, 2025.

Maine Revised Statutes (MRS). 2021. *38 MRSA §465. Title 38 Chapter 3 Subchapter 1 Article 4-A §465 Standards for Classification of Fresh Surface Waters*. [Online] URL: https://www.mainelegislature.org/legis/statutes/38/title38sec465.html. Accessed January 3, 2025.

Saco River Corridor Commission (SRCC). 2024. Water Quality Data. Available online: https://srcc-maine.org/water-quality-monitoring/water-quality-data/. Accessed January 2, 2025.

TRC. 2025b. January 15, 2025. Effects of Partial Dam Removal on Groundwater Levels.

Zeeman S.I., and T. Spillane. 2015. Chapter 10 Water Quality in the Saco River. Sustaining the Saco Estuary. Final Report 2015. Available online: https://umaine.edu/mitchellcenter/wp-content/uploads/sites/293/2015/11/Sustaining_the_Saco_Estuary_Final_Report_2015.pdf. Accessed January 3, 2025.

7.0 FISH AND AQUATICS

7.1 Introduction

The Bar Mills Project has significant operational challenges that have prevented the generating units from running for the last five years. These challenges are associated with unavoidable AAR conditions which occurred from certain aggregates used in the concrete for the powerhouse absorbed water and caused expansion and cracking over a period of many years. There is no long-term remedy for AAR at Bar Mills except full reconstruction.

In 2019, BWPH and resource agencies executed a revised Saco River Fish Passage Assessment Agreement (SRFAA) for migratory fish species, superseding the 2007 SRFAA. The 2019 Amendment replaced Section 5.3.b.1, including a provision for a "single permanent upstream anadromous fish passage facility at each of the Projects, or an alternative method agreed upon and approved by the Parties" with an implementation schedule of May 1, 2025, for the Bar Mills Project. Without an economically viable solution to return the generating units to an operable condition, BWPH determined that surrendering the FERC Project license and decommissioning the Project through a partial breach is the most viable solution in balancing operational, environmental, future dam safety needs, and meeting fish passage requirements under the SRFAA.

In order to assess the ability of partial and full spillway removal to meet migratory fish passage objectives, BWPH utilized hydraulic modeling to evaluate zone of passage criteria (water depths and velocities) for target species at a range of flows typically considered for fish passage design.

In consideration of the reduction in normal water surface elevations in the impoundment that would result from partial and full spillway removal, BWPH also conducted field studies to assess impacts to tributary access for resident fish species. The three perennial streams in the study area are Smith Brook, Crockett Brook, and Casper Brook.

7.2 Background

In support of the previous FERC relicensing, FPLE Maine conducted a fisheries resources survey and bass spawning survey and impoundment drawdown study, finding smallmouth bass and largemouth bass to be the most abundant warmwater species and that historic impoundment fluctuations were not adversely affecting smallmouth bass reproduction at the Project (FPLE Maine 2003).

As part of BWPH conceptual designs for partial and full spillway removal, BWPH considered criteria for zone of passage and velocities for both partial and full breach at a range of flows (5, 50, and 95% exceedance conditions[11]) for Atlantic salmon, American shad, blueback herring, alewife, and sea lamprey. Modeling results were presented to agencies in a meeting on December 12, 2021, and in a technical memo on February 23, 2022. BWPH is considering partial and full spillway removal utilizing nature-like fishway design criteria to provide volitional passage that will provide effective fish passage with a natural channel configuration that is preferable over a lift or ladder in this particular situation.

7.3 Goals and Objectives

The objective of this evaluation was to use HEC-RAS modeling developed to assess effects of partial dam removal on water levels, to evaluate effects on impoundment habitat and tributary access for resident fish species and zone of passage characteristics through the dam breach zone for migratory species based upon agency defined depth and velocity criteria for American shad, blueback herring, alewife, Atlantic salmon, American eel, and sea lamprey.

A secondary objective was to assess effects of permanent lower impoundment levels on tributary stream access for resident fish species, namely smallmouth bass which has been documented as the most abundant species in the Bar Mills impoundment.

7.4 Study Area

The study area relative to resident species tributary access was the current impoundment and confluence of primary tributaries with the impoundment, Smith Brook, Crockett Brook, and Casper Brook. The study area for zone of passage evaluation for migratory species is at and immediately upstream and downstream of the west half of the spillway that is proposed for removal.

[11] 5, 50, and 95% exceedance values are calculated to be 9,900 cfs, 2,725 cfs, and 762 cfs, respectively.

7.5 Methodology

7.5.1 Tributary Access For Resident Species

BWPH conducted a field assessment of zone of passage in water depth and velocities for tributaries to the Bar Mills impoundment. This assessment was completed through a site visit to primary tributaries to document if there are any obstacles that potentially restrict fish at modeled post-breach river depth. The tributaries examined included Smith Brook, Crockett Brook, and Casper Brook. These tributaries were visited, surveyed, and photo-documented during low-water (drawdown) conditions to determine if obstacles to access are present. To the extent feasible under drawdown conditions, substrate and aquatic habitat were characterized in the zone between normal impoundment elevation and post-partial removal elevation.

In comments on the draft study plan provided by the Town of Buxton (letter dated June 19, 2023) it was requested that Stony Brook be added to the zone of passage field assessment. While BWPH was not initially opposed to include Stony Brook in the study, in preparing for mobilization of the field effort, it was discovered that Stony Brook is not a tributary to the Bar Mills impoundment, but flows into the Saco River within the Skelton impoundment and therefore would not be affected by a reduction in the Bar Mills impoundment level.

7.5.2 Zone of Passage

An evaluation of zone of passage for depth and velocity in the vicinity of the spillway was completed as part of HEC-RAS modeling of post-breach conditions for partial and full spillway removal scenarios as summarized above and in the Scoping Document.

In evaluating removal options, BWPH utilized *Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes* (Turek et al. 2016) and 1D and 2D hydraulic modeling. The HEC-RAS depth and velocity results were reviewed for the 5%, 50% and 95% exceedance flows to evaluate the potential zone of passage for both American shad and Blueback herring, based upon minimum depth and maximum velocity criteria for these species. These fish have some of the strictest velocity and depth passage criteria compared to species such as Atlantic salmon.

7.6 Results

7.6.1 Tributary Access For Resident Species

During the 2024 field study, the three primary tributary streams had either stagnant water (Crockett and Casper brooks) or flowing water (Smith Brook) in the thalweg during the survey at the drawn down water elevation. Water in Crockett Brook and Casper Brook was stagnant for a distance of over 150 feet upstream from their confluence with the Saco River. The drawn down impoundment elevation reduced water depth and exposed shoreline banks at all three tributary confluences. The confluence of Crockett and Casper brooks with the Saco River remained at approximately 1 foot of depth at the drawn down impoundment elevation. Smith Brook had a continuous thalweg of flowing water with depths ranging from 0.5 to 1 foot (Kleinschmidt 2025). Field staff noted that water flowing from Smith Brook was significantly colder than the Saco River under the observed conditions, and that the tributary confluence area contained a mix of substrates including sand, silt, and gravel. Because smallmouth bass have been reported to spawning in water depths in the range of 0.8 feet to 12 feet (VFWD 2017), it is not anticipated that tributary depths at the confluence of the Saco River will adversely affect the ability of smallmouth bass to access these tributaries. Further, the minimum suitable zone of passage (ZOP) is defined as a water depth that is equivalent to two-thirds of the body thickness (e.g., the distance from the top of the dorsal musculature to the underside of a fish or body depth) of the largest target fish that are likely to move through the reach. This criterion is suitable for fish passage and movements in a natural channel (Bovee 1982). Based upon proportional measurement for bass in Smith (1985) a standard body length for bass of 71.5 millimeters (mm) equates to a body depth of 29 mm; a ratio of 0.41. The "preferred" length for adult smallmouth and largemouth bass identified in VFWD (2017) is 14 and 15 inches, respectively. Bass with an average length of 14.5 inches would be expected to have a body depth of approximately 5.9 inches, requiring a ZOP of 3.9 inches. Therefore, observed depths of tributary mouths would be well above the minimum necessary for smallmouth and largemouth bass.

Surveys did not and were not intended to assess levels of potential incising to be expected.

Additional details of the field evaluation, including photos are provided in Kleinschmidt (2025) *Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC NO. 2194*, which is provided in Appendix C of this DSR.

7.6.2 Zone of Passage

The HEC-RAS depth and velocity results data were reviewed to evaluate the potential zone of passage for American shad, Blueback herring, and alewife. These fish have some of the strictest velocity and depth passage criteria compared to species such as Atlantic Salmon (Table 7-1).

Table 7-1 *Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes* (Turek, J., A. Haro, and B. Towler 2016) for Bar Mills Target Species

Species	Minimum Depth (ft)	Maximum Velocity (fps)
American Shad	**2.25**	**8.25**
Blueback Herring	**1**	**6**
Alewife	**1**	**6**
Atlantic Salmon	**2.25**	**13.75**
American eel	**1.25 – 2.0**	**0.75 – 1.0**
Sea Lamprey	**0.75**	**6**

HEC-RAS results demonstrate that modeled conditions for 5% exceedance (low flow conditions – 762 cfs) provide a wide zone of suitable depths for upstream passage (Figure 7-1) under both partial and full spillway removal conditions and at 95% exceedance (high flow conditions – 9,900 cfs), flow velocities in the target criteria range exist over a wide zone (Figure 7-5). Modeling of velocities through the area proposed for removal are generally in the 3-5 feet per second (fps) at the 5% exceedance flow, with a portion of the area increasing to 8 fps or greater at the 50% exceedance flow (Figure 7-3), and approximately 30% of the area being 8 fps or greater at the 95% exceedance. Historic river flow data indicates that flow in excess of or equal to 95% exceedance and less than or equal to 5% exceedance occurs only about 4 days each within the passage season.

The USGS Conte Anadromous Fish Lab in Turners Falls, MA produced a sprint speed calculator based on swim flume tests with various alosine and other freshwater species, including American shad, alewife, blueback herring, walleye and white sucker (Haro 2004). The model developed criteria for fish passage structures, culverts, and breached dams.

Haro et al. (2004) used these data to estimate maximum distance traversed, taking into account effects of flow velocity, body length, and water temperature. Divergent effects of temperature and nonuniform length and other factors account for variability in performance, so these values are considered approximations and not absolute values. For purposes of this exercise, ambient water temperatures were assumed based on the period that each species would be experiencing its peak migration and left the default fish lengths as-is in the model as they appear reasonable for such fish in Maine populations. Based upon both partial and full spillway removal design and modeling information, a linear upstream sprint distance of approximately 21.5 feet (6.5 meters) was assumed, which is the estimated horizontal width of the base of the spillway, and a velocity of 8 feet per second (approximately 2.5 meters per second).

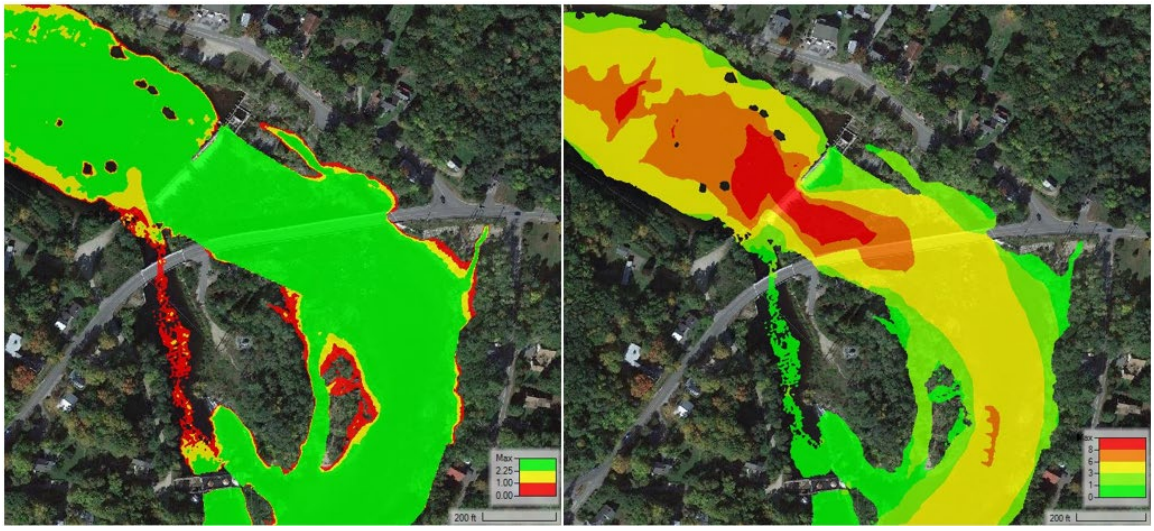


Figure 7-1 Water Depths and Velocities Partial Spillway Removal at 9,900 cfs (5% Exceedance)

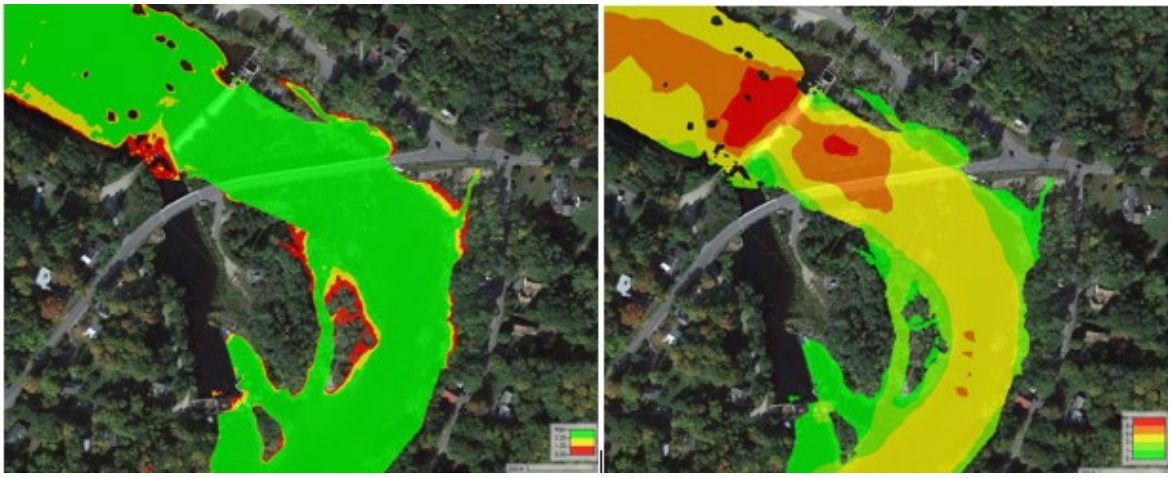


Figure 7-2 Water Depths and Velocities Full Spillway Removal at 9,900 cfs (5% Exceedance)

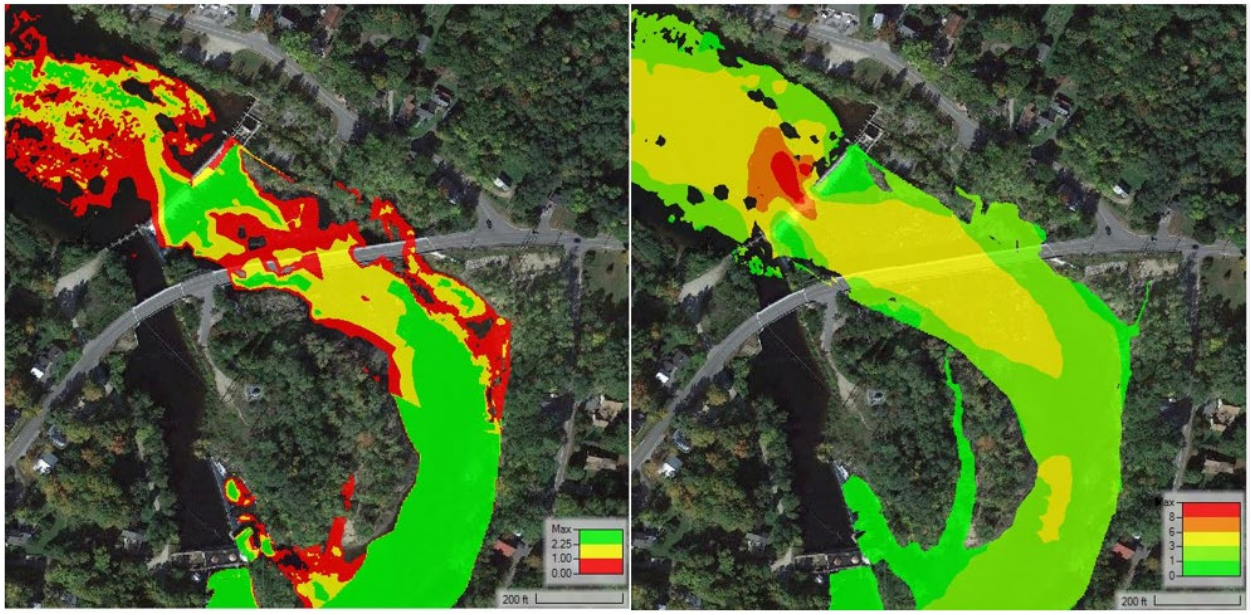


Figure 7-3 Water Depths and Velocities Partial Spillway Removal at 2,725 cfs (50% Exceedance)

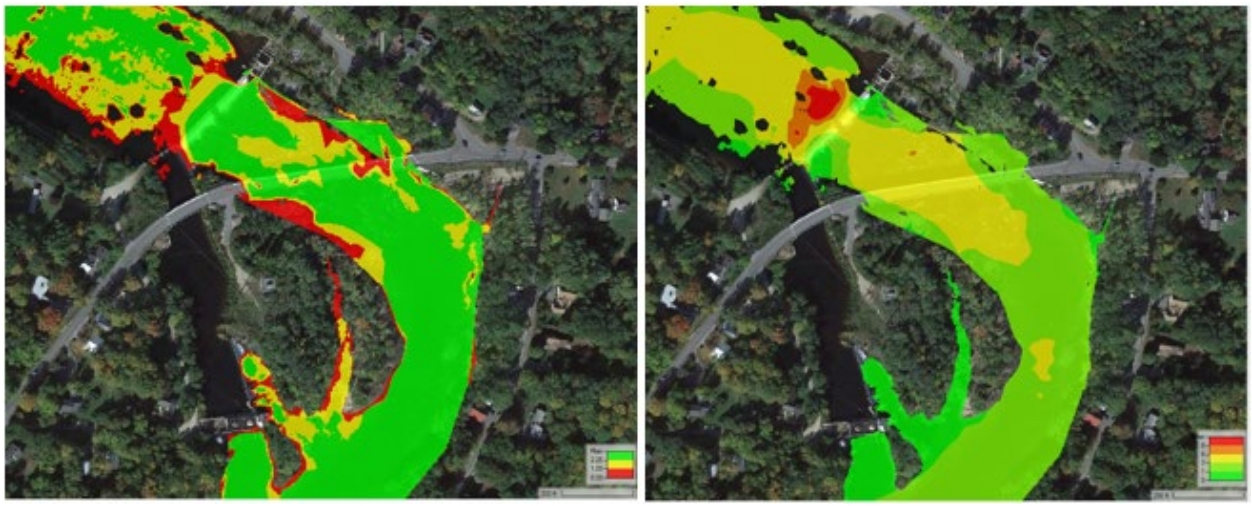


Figure 7-4 Water Depths and Velocities Full Spillway Removal at 2,725 cfs (50% Exceedance)

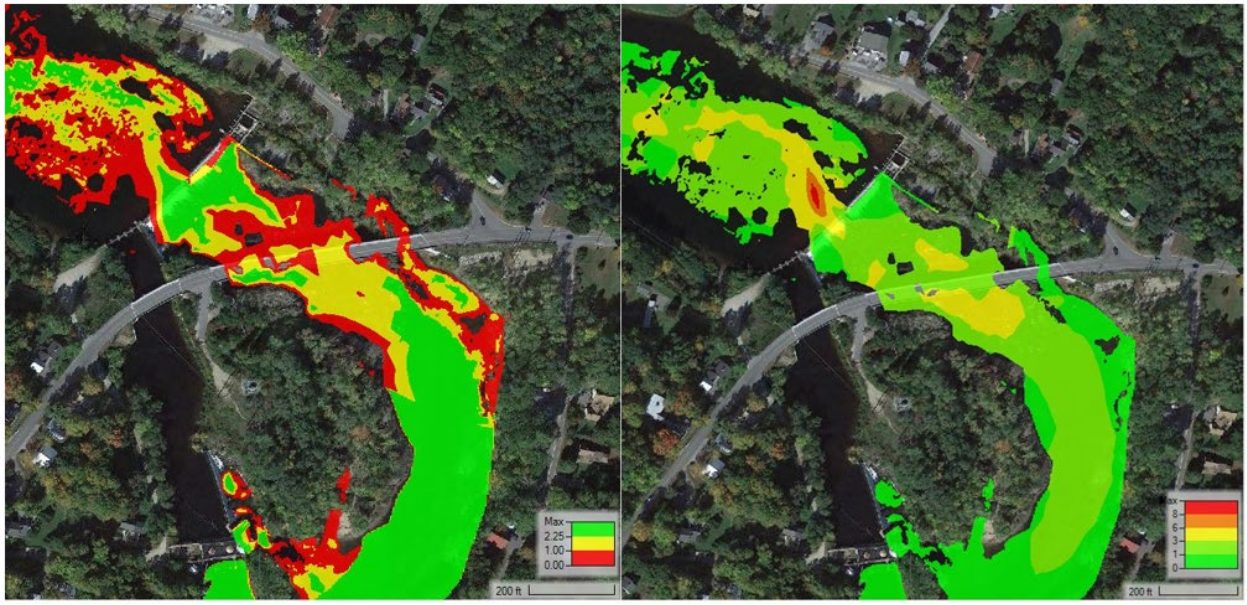


Figure 7-5 Water Depths and Velocities Partial Spillway Removal at 762 cfs (95% Exceedance)

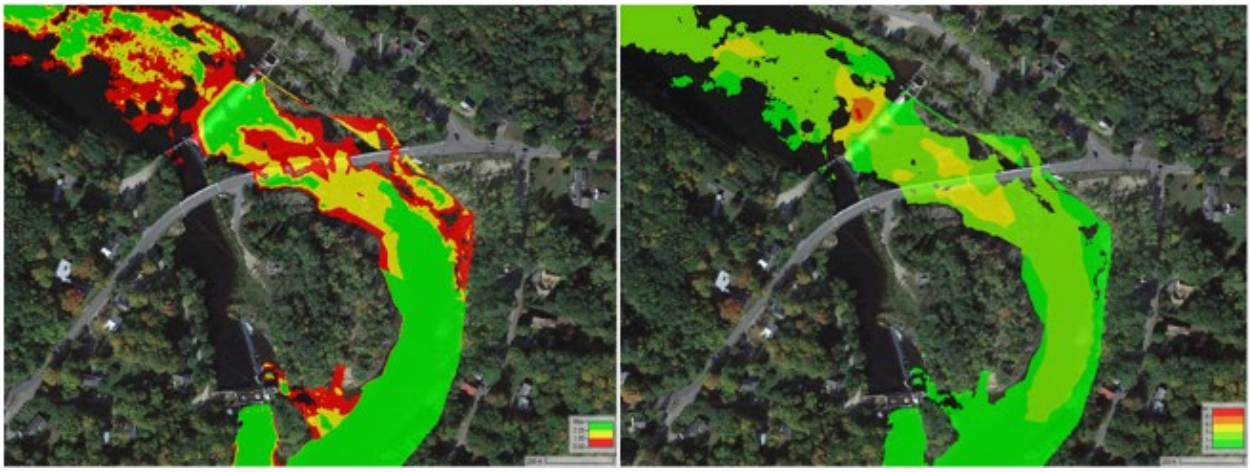


Figure 7-6 Water Depths and Velocities Full Spillway Removal at 762 cfs (95% Exceedance)

American Shad

Upstream migrating adult American shad would likely peak at the site during late May through late June. The Haro *et al*. (2004) model predicts that between 0.886 (88.6%) to 0.96 (96%) of American shad can pass at this velocity and at a sprint distance of 10 or 5 meters, respectively. This can be thought of as similar to a fishway "effectiveness" rating. Interpolation to 6.5 meters distance (the 21.5 foot reach through the former spillway section) indicates that the partial and full spillway removal alternatives would be expected to be about 90% effective at passing shad upstream. Lowering the velocity incrementally predicts slight increases in effectiveness at this sprint distance.

Blueback Herring

Upstream migrating adult blueback herring would likely pass Bar Mills throughout June. The Haro *et al*. (2004) model predicts that between 49.5% to 78% of blueback herring would pass successfully at this velocity at a sprint distance of 10 or 5 meters, respectively. Interpolation to 6.5 meters distance (the 21.5 foot reach through the former spillway section) indicates that the partial and full spillway removal alternatives would be expected to be about 65% effective at passing blueback herring upstream. Lowering the velocity incrementally predicts rapid increases in effectiveness at this sprint distance.

Alewife

Upstream migrating adult alewife would likely peak at Bar Mills during mid-May through mid-June. The Haro *et al*. (2004) model predicts that between 20.3% to 53.1 % of alewife would pass successfully at this velocity at a sprint distance of 10 or 5 meters, respectively. Interpolation to 6.5 meters distance (the 21.5 foot reach through the former spillway section) indicates that the partial and full spillway removal alternatives would be expected to be about 37% effective at passing alewife upstream. Lowering the velocity incrementally predicts gradual increases in effectiveness at this sprint distance. Note however that to achieve at least approximately 80% effectiveness the water velocity would need to be reduced to about 3.5 feet per second for this sprinting distance.

Atlantic salmon

Adult upstream passage would be from mid-May potentially until early July, a second wave could theoretically be in early fall (late September through late October). Given the strong swimming capabilities for Atlantic salmon, it is not anticipated that modeled velocities over the range of flows evaluated would pose a difficulty for upstream passage.

American eel

Upstream migrating American eel would likely be either elvers or yellow eel lifestages, and would likely move past Bar Mills between April/May (elvers) or June-August (yellow eel). Specific sprinting speed data for these lifestages American eel are unavailable, however it is unlikely that anything higher than about 0.5 feet per second would be pasasable (*Gail Wipplehauser, personal communication*). It is likely that these lifestages will seek alternate passage routes after failing to pass the breach.

Sea Lamprey

Ascends swift water by repeatedly anchoring to substrates and then worming body upstream, and re-anchoring to substrates and then worming body upstream, and re-anchoring. According lifecycle information available from the Massachusetts Division of Fisheries and Wildlife**, adult sea lamprey migrate from the ocean to freshwater rivers and streams to spawn in May and June and die after spawning. Because sea lamprey are capable of moving upstream in swift water and with no documented maximum velocity threshold, it is not anticipated that velocity during spring flow conditions will be an issue for upstream migrants. Table 7-2 provides a summary of the above described sprint speed assessment.

Table 7-2 Migratory Species Passage Probability for Bar Mills Partial Breach Conditions

Species	Primary migration Season	Water Temperature	Probability @ 15 ft (~5 m)	Probability @ 30 ft (~10 m)	Notes
American shad	Late May-late June	20.8 ° C	96%	89%	
Blueback herring	June	20.0 ° C	78%	50%	
Alewife	Mid-May-mid June	12.0 ° C	53%	20%	
Atlantic salmon*	May-June/Sept-Oct	20-22 ° C	n/a	n/a	No lab data but are known strong swimmers.
American eel*	June-August	20-22 ° C	n/a	n/a	Likely that eel will seek alternate passage routes.
Sea Lamprey*, **	May-June	10-15 ° C	n/a	n/a	Ascends swift water by repeatedly anchoring to substrates and then worming body upstream, and re-anchoring.

*data not available, ** source: https://www.mass.gov/info-details/sea-lamprey

7.7 References

Bovee, K.D. 1982. A guide to stream habitat analysis using the instream flow incremental methodology. Instream Flow Information Paper 12, USDI Fish and Wildlife Services, Office of Biology Services: Washington DC.

Haro, A., Castro-Santos, T., Noreika, J., and Odeh, M. 2004. Swimming performance of upstream migrant fishes in open-channel flow: a new approach to predicting passage through velocity barriers. S.O. Conte Anadromous Fish Research Center, US Geological Survey, Biological Resources Discipline, Leetown Science Center, Turners Falls, MA 01376, USA.

Kleinschmidt. 2025. Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC NO. 2194.

Turek, J., A. Haro, and B. Towler. 2016. Federal Interagency Nature-like Fishway Passage Design Guidelines for Atlantic Coast Diadromous Fishes.

Smith, C. Lavett. 1985. The Inland Fishes of New York State. The New York State Department of Environmental Conservation. 1985.

Vermont Fish & Wildlife Department. 2017. Statewide Management Plan for Largemouth and Smallmouth Bass.

8.0 WILDLIFE AND BOTANICAL RESOURCES

As outlined in the study plan, a Wetland, Botanical Resources, and Shoreline Erosion study was conducted, which included:

- Characterizing existing wildlife, botanical, and wetland resources, including invasive botanical species to the extent they have the potential to occur, and evaluate the effects of lowered water levels upstream of Bar Mills Dam on these resources.
- Determining areas of the shoreline along the Bar Mills impoundment that may have higher erosion potential in the post-partial removal condition that could warrant enhancement or mitigation measures to be incorporated into the Surrender Application and Decommissioning Plan.

Field studies were conducted on July 16, 17, and 18, 2024. Prior to the field studies, the Bar Mills impoundment was drawn down 5 feet from its normal impoundment level to the approximate anticipated post-breach water level.

Due to the extensive nature of data collected and subsequent mapping and analysis for wetlands, shoreline erosion, tributary connectivity, invasive species surveys, a separate study report was developed: *Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC NO. 2194* (Draft January 2025), and is provided in Appendix B of this DSR. An overview summary of results for shoreline erosion is provided Section 5.0 (above), tributary access in Section 7.0 (above). An overview summary of wetlands and botanical invasive species is provided below.

8.1 Wetlands

Excluding the Saco River itself, which is considered a riverine wetland, the study area contains approximately 76 acres of wetland habitat including palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine unconsolidated bottom (PUB) wetlands (Table 8-1). Figure 2-1 through Figure 2-4 of the report in Appendix C of this DSR show the locations of verified wetlands and watercourses within and directly adjacent to the Bar Mills impoundment.

Table 8-1 Field Verified Wetlands Occurring within the Study Area

Wetland Type	Approximate Area (Acres)	Percent of Total Wetlands
Palustrine Emergent	15	20
Palustrine Scrub-Shrub	6	7
Palustrine Forested	54	72
Palustrine Unconsolidated Bottom	1	1
Total	**76**	**100**

Important functions of these wetlands include flood storage, wildlife habitat, and sediment and toxicant retention. It is anticipated that most wetlands will not be adversely affected by post-breach water elevations. While the primary hydrologic inputs for emergent wetlands along river shorelines are inundation from the river or stream, water wicking through exposed alluvial sand and silt are expected to keep the upper layers of the wetland saturated. The exposure of new substrate will likely enable emergent species to germinate from existing seed banks or to spread vegetatively. It is anticipated that these wetlands will either expand or shift towards the new water elevation.

The larger wetland complexes were generally found either at elevations several feet higher than the existing, normal Bar Mills impoundment level or in the floodplain. These wetlands are primarily fed by hydrologic inputs from the contributing watershed or are only affected by river water levels during seasonal flooding events. One freshwater pond (PUB; Wetland S) adjacent to the lower impoundment is influenced by the full pond levels. At post-breach water elevations, much of the standing water in the pond receded. However, the wetland continued to receive hydrologic input from higher in the watershed, likely keeping the soils hydric.

As summarized in Table 2-2 of Appendix C, 13 of the 20 wetlands that were investigated are expected to have no substantive change because they occur fed by hydrologic inputs from the watershed and occur several feet higher than the existing impoundment elevation. Of those, five may be affected by water levels on during flood conditions.

The remaining seven wetlands, representing approximately 1.4 acres are anticipated to remain hydric or saturated due to wicking of water through exposed alluvial sand and silt and are likely to shift toward the new river elevation under partial and full spillway removal

scenarios. The exposure of new substrate will likely allow emergent species to germinate from existing seed banks and open up space for other wetland species to spread vegetatively.

One wetland located approximately 500 feet upstream of the spillway on the eastern shore (Wetland S) is likely to transition from a palustrine unconsolidated bottom to a palustrine emergent wetland. While wetland area may change--either increasing or decreasing—the overall quality of this wetland is expected to improve as restoring the more natural hydrologic conditions supports the physical, chemical, and biological processes characteristic of higher quality wetlands.

8.2 Invasive Botanical Species

BWPH documented 15 invasive botanical species throughout the study area (See Appendix C for mapped locations). Upstream of the Bar Mills Dam, most invasive species were found at trace amounts with low coverage. Downstream of the Bar Mills Dam, invasive species were found at moderate to high densities along the shore and on the island (See Appendix). The most common invasives were woody shrubs, including autumn olive (*Elaeagnus umbellata*), glossy buckthorn (*Frangula alnus*), and Morrow's honeysuckle (*Lonicera morrowii*), with lower densities of multiflora rose (*Rosa multiflora*) and Japanese barberry (*Berberis thunbergia*). Oriental bittersweet (*Celastrus orbiculatus*), a woody vine species, was prevalent as well.

Japanese knotweed (*Fallopia japonica*) was also observed in the study area, appearing in trace amounts upstream of the Bar Mills Dam but forming dense thickets along the shoreline downstream of the dam. Although this species can be found in wetlands, it typically thrives in upland areas and at higher elevations along shorelines.

Curly pondweed (*Potamogeton crispus*), an aquatic invasive species, was observed in trace amounts at the lower end of the impoundment. This species was found as individual stems along the water's edge, with no other aquatic plant species found concurrently. The stems were hand-pulled by the field crew during the survey.

It is unlikely that the woody invasive species will revegetate the newly exposed shores at high densities. Although woody invasive species thrive in disturbed areas, many typically prefer drier environments (Native Plant Trust, 2024). The newly exposed shorelines will likely support herbaceous species. The only invasive species that could potentially colonize newly exposed areas is reed canary grass. This herbaceous species thrives in

wetlands and can spread rapidly. However, reed canary grass was only found in two areas at trace levels. Japanese knotweed was also observed at trace levels above the dam but in dense thickets along the shoreline downstream of the dam. While this species can be found in wetlands, it usually occurs in upland and at higher elevations along shorelines. However, this species is highly aggressive and may take advantage of newly opened habitat, following the dam breach, the shoreline should be monitored for invasive botanical infestations while they are still relatively easy to treat and manage.

8.3 References

Native Plant Trust. 2024. Go Botany. Available at https://gobotany.nativeplanttrust.org/ , Accessed December 24, 2024.

9.0 RECREATION STUDY

9.1 Introduction

BWPH currently provides recreational opportunities at the Bar Mills Project in accordance with the conditions of the existing FERC license. These recreation facilities will remain available for public use after the Bar Mills Project is decommissioned. Following decommissioning, the reduced water levels are likely to reduce accessibility by motorized watercraft to the impoundment. As a result, BWPH currently plans to revert the existing trailered boat launch to a hand-carry facility to accommodate canoe and kayak access. Working with the Decommissioning Committee and the Town of Hollis, BWPH is exploring potential alternative public access points upstream of the old railroad crossing that could provide hand-carry boat access to flatwater paddling opportunities. Access to upstream portions of the Saco River will continue to be available from the upstream West Buxton Project (FERC No. 2531), though this is a different segment of the river from the reach between Bar Mills and West Buxton.

The Town of Buxton requested a study of modifying the existing boat launch to provide hand-carry canoe and kayak access. A list of future maintenance, schedules and costs was requested for "upkeep" of existing recreation facilities that are currently part of the project. The Final Study Plan (August 2023) included a recreation study that would assess recreational use and needs to inform future operation and maintenance of existing recreational facilities associated with the Bar Mills Project and to inform potential modifications to convert the existing boat launch to a hand carry access facility. Proposed modifications to revert the motorized boat launch assess to hand carry access will be developed in preparation of the Application for License Surrender and Decommissioning Plan.

9.2 Background

BWPH currently provides the following recreation sites at the Bar Mills Project: impoundment boat launch and parking area, canoe portage, tailwater canoe access, and Usher Island parking area and trails (Figure 9-1). At the impoundment boat launch, there is parking available for 4 single vehicles, 2 trailered vehicles, and one ADA space for a trailered vehicle (NextEra Energy 2010). At Usher Island, there is parking available for 2 single vehicles.

At the West Buxton Project, BWPH provides an impoundment boat launch with parking for 2 single vehicles, 2 trailered vehicles, and 1 ADA space (Figure 9-2), a tailwater put-in, and tailwater angler access. The boat launch is located on the West Buxton impoundments, approximately six miles upstream of Bar Mills boat launch. There is an angler access trail with parking for 3 single vehicles (BWPH 2023). On the east side of the river, there is a canoe portage and tailrace access site with parking for 2 single vehicles (BWPH 2018). Due to downstream hydraulic controls, the tailwater facilities are not anticipated to be affected by lower water levels upstream of Bar Mills.

9.3 Goals and Objectives

The goal of the study was to summarize existing recreation use at the Bar Mills Project. The objectives were to:

- Summarize recent recreational use data (e.g., number of vehicles and people on site, recreation activities) to inform any potential enhancement measures potentially needed to maintain the usability of the existing trailered boat launch after it is reverted to hand carry access.
- Assess crowding and condition of existing recreational facilities that will continue to be maintained after surrender and decommissioning of the Bar Mills Project.

9.4 Study Area

The study area included the existing recreational sites at the Bar Mills Project and the West Buxton Project (Figure 9-1, Figure 9-2). This does not include private docks or stairways, which are not owned or maintained by BWPH or considered formal recreation amenities under the FERC license.

Figure 9-1 Recreation Sites at the Bar Mill Project.

Figure 9-2 Recreation Sites at the West Buxton Project.

9.5 Methodology

9.5.1 2023

Between July 1 and September 3, 2023, BWPH collected spot counts and visitor surveys at the Bar Mills impoundment boat launch on a mix of weekdays, weekends, and holidays between 8 AM and 7 PM. The study schedule is shown in Table 9-1. Two spot counts were collected each day at the beginning and end of a four-hour shift, and surveys were conducted during the remainder of the shift. During each spot count, the field clerk recorded the date, time, weather, number of vehicles with and without trailers parked in the parking lot, and the number of individuals that could be seen boating, fishing, walking/hiking/running, picnicking, sightseeing or other activity from the parking area. Although significant levels of tubing occur downstream of the Bar Mills dam, this type of use was not monitored because this area would not be affected by partial or full spillway removal because minimum flow releases from upstream facilities would continue to provide existing flow conditions in the reach.

The visitor survey collected information on group size, length of stay on site, recreation activities, ratings of crowdedness and site condition, site recommendations, and visits during the non-recreation season (September through May).

Table 9-1 2023 Spot Count and Survey Schedule

Date	Time of Spot Counts	Day Type
Saturday, July 1, 2023	14:55, 19:00	Holiday (July 4th Weekend)
Wednesday, July 5, 2023	13:25, 17:21	Weekday
Friday, July 14, 2023	09:30, 13:30	Weekday
Saturday, July 15, 2023	12:20, 16:13	Weekend
Tuesday, July 18, 2023	10:50, 14:50	Weekday
Sunday, July 23, 2023	8:35, 12:40	Weekend
Thursday, August 3, 2023	14:38, 18:38	Weekday
Sunday, August 6, 2023	9:00, 12:50	Weekend
Monday, August 7, 2023	13:50, 17:45	Weekday
Friday, August 18, 2023	8:03, 12:03	Weekday
Wednesday, August 23, 2023	13:51, 17:50	Weekday
Saturday, August 26, 2023	9:24, 13:24	Weekend
Sunday, September 3, 2023	7:30, 11:30	Holiday (Labor Day Weekend)

9.5.2 2024

Between May 15 and September 15, 2024, BWPH completed spot counts at the Bar Mills Project recreation sites and the West Buxton Project recreation sites. The spot counts were completed on randomly selected holidays, weekdays, and weekends between 7 AM and 6 PM. During each spot count, the field clerk recorded the date, time, weather, number of vehicles with and without trailers parked in the parking lots, and the number of individuals recreating that could be seen from the parking area.

9.6 Results

9.6.1 2023 Spot Counts

A total of 13 vehicles were observed during the spot counts conducted between July 1 and September 3, 2023, at the Bar Mills impoundment boat launch; none of the vehicles had a boat trailer (Table 9-2). A total of 9 people were observed during the spot counts; 2 people were walking/hiking/running, 2 people were swimming, and 5 people were doing other activities. Zero people were seen boating, fishing, picnicking, or sightseeing.

The average number of vehicles ranged from 0.25 vehicles on weekdays to 0.63 vehicles on holidays. Based on the 4 single parking spaces available, the parking was well under utilized and ranged from 6 percent occupied on weekdays to 16 percent on holidays (Table 9-3).

Members of the Decommissioning Committee indicated that the high river flows experienced in 2023 likely affected recreational activity, particularly boating. As a result, the recreational use data recorded during the spot surveys are likely not representative of typical use levels.

Table 9-2 Number of Vehicles by Day Type at the Bar Mills Impoundment Boat Launch

Day Type	# Vehicles Without Trailer	# Vehicles With Trailer	Total # Vehicles
Weekday	7	0	7
Weekend	5	0	5
Holiday	1	0	1
Total	**13**	**0**	**13**

Table 9-3 Parking Utilization by Day Type at the Bar Mills Impoundment Boat Launch

Day Type	Average # Vehicles	Parking Utilization (Percent)
Weekday	0.25	6%
Weekend	0.50	13%
Holiday	0.63	16%
Total	**0.50**	**13%**

9.6.2 2023 Visitor Survey

Throughout the 2023 study season, 18 visitor surveys were completed. The group sizes of the 18 survey respondents ranged from 1 to 3 people with an average of 1.8 people.

All survey respondents that provided a zip code (17 of the 18 respondents) resided within approximately 20 miles of the Bar Mills Project. Most respondents (12 respondents, 70.6 percent) were from Buxton, Maine, 2 respondents were from Hollis, Maine (11.8 percent), 2 respondents were from Scarborough, Maine (11.8 percent), and 1 respondent (6 percent) was from West Newfield, Maine. Three respondents stated they own a permanent home on the impoundment.

The recreation activities participated in by the respondents are shown in Table 9-4. Swimming was the most common activity with 11 respondents (61 percent) stating they participated in that activity. Other popular activities were canoeing/kayaking and sightseeing. Other reported activities were boating, fishing, relaxing, tubing, wading, and walking.

All survey respondents rated the crowdedness at the impoundment boat launch between light and moderate; 15 of the respondents (83 percent) gave a rating of light (Table 9-5). The average rating was 1.2. All respondents rated the condition of the site between good and excellent with an average rating of 3.9 (Table 9-6).

Table 9-4 Recreation Activities Participated in at the Bar Mills Impoundment Boat Launch in 2023.

Activity	Count	Percent*
Swimming	11	61%
Sightseeing	6	33%
Canoeing/Kayaking	5	28%

Activity	Count	Percent*
Fishing	2	11%
Boating	1	6%
Relaxing	1	6%
Tubing	1	6%
Wading	1	6%
Walking	1	6%
Total	29	

*Total percentage does not equal 100% because respondents could select more than one activity.

Table 9-5 Crowdedness Ratings at the Bar Mills Impoundment Boat Launch

Crowding Rating	Count	Percent
1 Light	15	83%
2	2	11%
3 Moderate	1	6%
4	0	0%
5 Heavy	0	0%
Total	18	100

Table 9-6 Site Condition Rating at the Bar Mills Impoundment Boat Launch

Condition Rating	Count	Percent
1 Poor	0	0%
2	0	0%
3 Good	7	39%
4	6	33%
5 Excellent	5	28%
Total	18	100

Five of the 18 survey respondents indicated that they visit the impoundment boat launch site between September and May. The months visited were September, October, April, and May; one respondent reported visiting in February.

Three individuals responded that there were additional facilities or improvements needed at impoundment boat launch. One respondent said to unlock boat launch, and two respondents recommended a bathroom. Three respondents provided additional comments. The comments were: "We really like having this launch available" (this respondent's primary activity was canoeing), "Buxton doesn't have much available, I hope you keep the boat launch available," and "want site to stay quiet."

9.6.3 2024 Spot Counts

During the spot counts completed during the 2024 recreation season, a total of 21 vehicles were observed at the Bar Mills impoundment boat launch parking area and 12 vehicles were observed at the Usher Island parking area (Table 9-7). Of the 33 total vehicles, 25 did not have trailers and 8 did have trailers. Most vehicles at both recreation sites were seen on weekends. Parking at the Bar Mills impoundment boat launch and at Usher Island was underutilized (Table 9-8) with ample parking available.

During the spot counts, a total of 8 vehicles were seen at the West Buxton recreation sites; 6 were at the impoundment boat launch, 2 at the canoe portage/tailrace access, and 0 were at the angler access trail (Table 9-7). Parking was well under capacity at the West Buxton recreation sites (Table 9-8).

A total of 28 people were observed at the Bar Mills recreation sites participating in boating, fishing, walking/running, picnicking, sightseeing, and swimming (Table 9-9). Seven people were seen at the West Buxton recreation sites participating in boating and fishing.

Table 9-7 Number of Vehicles by Day Type at the Bar Mills and West Buxton Recreation Site Parking Areas.

Site	Day Type	Number of Vehicles Without Trailers	Number of Vehicles With Trailers	Total Number of Vehicles
Bar Mills Boat Launch Parking Area	Weekday	5	1	6
	Weekend	8	3	11
	Holiday	3	1	4
	Total	*16*	*5*	*21*
Bar Mills Usher Island Parking Area	Weekday	1	1	2
	Weekend	7	2	9
	Holiday	1	0	1
	Total	*9*	*3*	*12*
Bar Mills Total		**25**	**8**	**33**
West Buxton Angler Access Trail Parking Area	Weekday	0	0	0
	Holiday	0	0	0
	Total	*0*	*0*	*0*
West Buxton Boat Launch Parking Area	Weekday	2	4	6
	Holiday	0	0	0
	Total	*2*	*4*	*6*
	Weekday	1	1	2

Site	Day Type	Number of Vehicles Without Trailers	Number of Vehicles With Trailers	Total Number of Vehicles
West Buxton Canoe Portage/Tailrace Access Parking Area	Holiday	0	0	0
	Total	*1*	*1*	*2*
West Buxton Total		**3**	**5**	**8**

Table 9-8 Parking Utilization by Day Type at the Bar Mills and West Buxton Recreation Sites.

Day Type	Count (# days)	Average Number of Vehicles Without Trailers	Parking Utilization (Percent)	Average Number of Vehicles With Trailers	Parking Utilization (Percent)
Bar Mills Boat Launch Parking Area					
Weekday	5	1.0	25%	0.2	10%
Weekend	8	1.0	25%	0.4	19%
Holiday	1	3.0	75%	1.0	50%
Total	14	1.1	29%	0.4	18%
Bar Mills Usher Island Parking Area					
Weekday	5	0.4	20	NA	NA
Weekend	8	1.1	56		
Holiday	1	1.0	50		
Total	14	0.9	43		
West Buxton Boat Launch Parking Area					
Weekday	9	0.22	11%	0.44	22%
Holiday	2	0.0	0%	0.0	0%
Total	11	0.18	9%	0.36	18%
West Buxton Canoe Portage/Tailrace Access Parking Area					
Weekday	9	0.22	11%	NA	NA
Holiday	2	0	0%		
Total	11	0.18	9%		

Table 9-9 Number of respondents participating in recreation activities at the Bar Mills and West Buxton Recreation Sites during the 2024 spot counts.

Site	Boat*	Fish	Walk/Run	Picnic	Sightsee	Swim	Total
Bar Mills Boat Launch Parking Area	5	2	6	2	4	0	19
Bar Mills Usher Island Parking Area	0	3	0	2	1	3	9
Bar Mills Total	**5**	**5**	**6**	**4**	**5**	**3**	**28**
West Buxton Angler Access Trail Parking Area	0	0	0	0	0	0	0
West Buxton Boat Launch Parking Area	1	4	0	0	0	0	5
West Buxton Canoe Portage/Tailrace Access Parking Area	0	2	0	0	0	0	2
West Buxton Total	**1**	**6**	**0**	**0**	**0**	**0**	**7**

*Note- the type of boating was not specified

Recreation use monitoring completed in 2023 at the Bar Mills impoundment boat launch and in 2024 at Bar Mills recreation sites and West Buxton recreation sites demonstrated that use levels were low and under capacity. The spot counts and survey results did not indicate that motor boating was a common activity. This suggests that reverting the current boat launch to a hand-carry only launch will not have a significant effect on recreation use of the Bar Mills impoundment boat launch. Access to the other Bar Mills recreation sites and the West Buxton recreation sites will likely remain unchanged after the dam decommissioning.

Due to the reduction in water level at the Bar Mills boat launch under post-partial or full spillway removal conditions, BWPH anticipates a need to extend the launch to provide access to the newly established normal water level. Decommissioning Committee members have indicated that an extension of the existing boat launch would not provide access to still water and therefore would not provide opportunities for flatwater paddling. Soft sediments in the area may also make it difficult for ingress and egress. As noted above, BWPH is working with the Committee and the Town of Hollis to explore potential access and fire suppression alternatives. It is anticipated that preliminary designs will be developed as part of the Application for License Surrender and Decommissioning Plan and that final designs and modifications would be implemented after or as part of the

partial or full spillway removal. BWPH acknowledges that the Towns and representatives of the Towns on the Decommissioning Committee do not feel extending the boat launch will sufficiently address recreational access concerns or fire suppression concerns.

9.7 References

Brookfield White Pine Hydro LLC (BWPH). 2018. Final Recreation Management Plan. Accession number 20181116-5219. Available online: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20181116-5219&optimized=false.

Brookfield White Pine Hydro LLC (BWPH). 2023. Angler Access Trail As-Built Drawing. January 13, 2023. Accession number 20230113-5084. Available online: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20100105-5029&optimized=false.

NextEra Energy. 2010. Bar Mill Project Recreation Plan Facility Enhancements (FERC 2194). Accession number 20100105-5029. Available online: https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20100105-5029&optimized=false.

10.0 LAND USE

10.1 Introduction

The Project Boundary encompasses lands and waters necessary for the operation of the hydro facility this includes lands and flowage rights up to El. 148.5 ft MSL around the impoundment that may or may not be owned by BWPH, as well as several BWPH-owned parcels containing the powerhouse, recreation sites, and appurtenant facilities. Under partial or full spillway removal conditions, permanent impoundment water levels will be reduced, extending the shoreland zone toward the original historic river channel creating additional lands between the current project boundary and the new shoreline elevation.

10.2 Background

Upon license surrender, the FERC Project Boundary will no longer exist, and the lands within the former Project Boundary not owned by BWPH will no longer be encumbered by eminent domain rights under the FERC license. Lands and structures owned by BWPH (i.e., the powerhouse, canal, and remaining dam structure) will remain retained and maintained by the Company.

Additionally, a new normal waterline for the Saco River will be established following the partial or full spillway removal, creating additional acreage for landowners adjacent to the former impoundment. These lands would previously have been subject to BWPH's flowage rights, but would become part of the adjacent landowner's property, at least up to the bank of the Saco River, following the Project decommissioning.

10.3 Goals and Objectives

The objectives of this evaluation was to use HEC-RAS modeling to quantify additional shoreline lands under modeled water level and river flow conditions for partial or full spillway removal conditions to quantify the change in lands that would previously have been subject to BWPH's flowage rights which will become part of the adjacent landowner's property.

10.4 Study Area

The study area includes existing lands within the project boundary along the impoundment (Figure 10-1 and Figure 10-2).

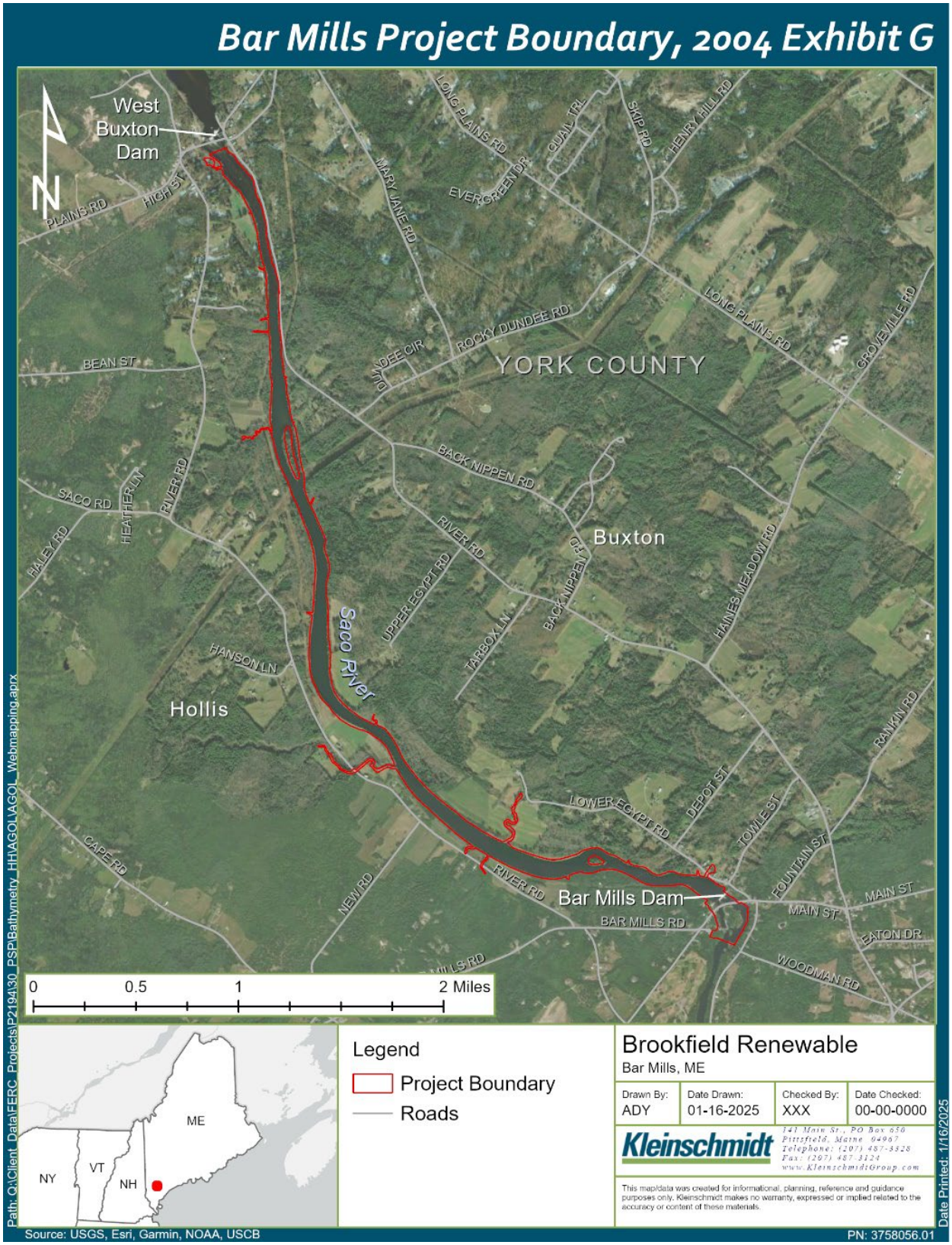


Figure 10-1 Overall Project Boundary for Bar Mils

10.5 Methodology

A modeled assessment of potential additional shoreline lands under the post-breach condition was conducted comparing acreage of shoreland within the current project boundary to acreage of shoreland under a new permanent water level under post-partial breach conditions.

10.6 Results

Based upon HEC-RAS model results, shoreland acreage under post-partial and full spillway removal conditions were approximated with GIS mapping software.

Of the approximately 20-25 acres of land within the project boundary under existing conditions, approximately 7 acres are attributed to lands adjacent to the boat launch, canal, surrounding the powerhouse and tailwater area, and Usher Island. Under the annual median flow condition (50% exceedance) of 2,467 cfs an estimated additional 26.42 acres of land would be created at the lower water level (Table 10-1 and 10-2). At the minimum river flow from releases at West Buxton (typically occurring during summer months) of 400 cfs, approximately 35.3 additional acres of shoreland would be created.

Table 10-1 Acres of Exposed Impoundment Shoreline within the Project Boundary Line, Buxton

	300 cfs	400 cfs	2,476 cfs
Existing Conditions	9.57	9.43	7.93
Post Partial Removal	29.05	27.46	13.06
Total Increase in Acreage	19.48	18.03	19.48

Table 10-2 Acres of Exposed Impoundment Shoreline within the Project Boundary Line, Hollis

	300 cfs	400 cfs	2,476 cfs
Existing Conditions	14.88	14.74	13.37
Post Partial Removal	33.42	32.01	20.31
Total Increase in Acreage	18.54	17.27	6.94

Figures 10-2 through 10-3 illustrate the anticipated change in shoreline boundaries a 300, 400, and 2,476 cfs based upon modeled post-partial removal conditions in the vicinity upstream of the dam, extending to the former bridge piers. Full removal conditions are

not presented due to the limited additional area anticipated to become dewatered immediately upstream of the spillway along the eastern shoreline.

Due to the hydraulic control located approximately 2,200 feet upstream of the Bar Mills dam, water levels upstream of the control are anticipated to be reduced by approximately 2.5 feet. Therefore, the majority of additional lands will occur along the reach between the dam and the hydraulic control with limited margins of additional lands created upstream of the hydraulic control.

Maine common law stipulates that conveyance of land ownership on non-tidal rivers or streams are to the "thread" of the water body, defined as a line "equally distant" from streambank at the ordinary water level (Hermansen 2018). It is anticipated that the new normal waterline that will be established along the impoundment will create additional acreage for landowners between the new former impoundment elevation under partial spillway removal. This would be similar to that of full spillway removal, with exception of the upstream area adjacent to the eastern spillway which is likely to become somewhat more dewatered under full removal as that with partial removal. The quantity of additional acreage will seasonally vary depending on riverflow. These lands that would previously have been subject to BWPH's flowage rights would instead become part of the adjacent landowner's property, held at least up to the bank of the Saco River, following the Project decommissioning.

10.7 References

Knud E. Hermansen & Donald R. Richards, Maine Principles of Ownership Along Water Bodies, 47 Me. L. Rev. 35 (2018)

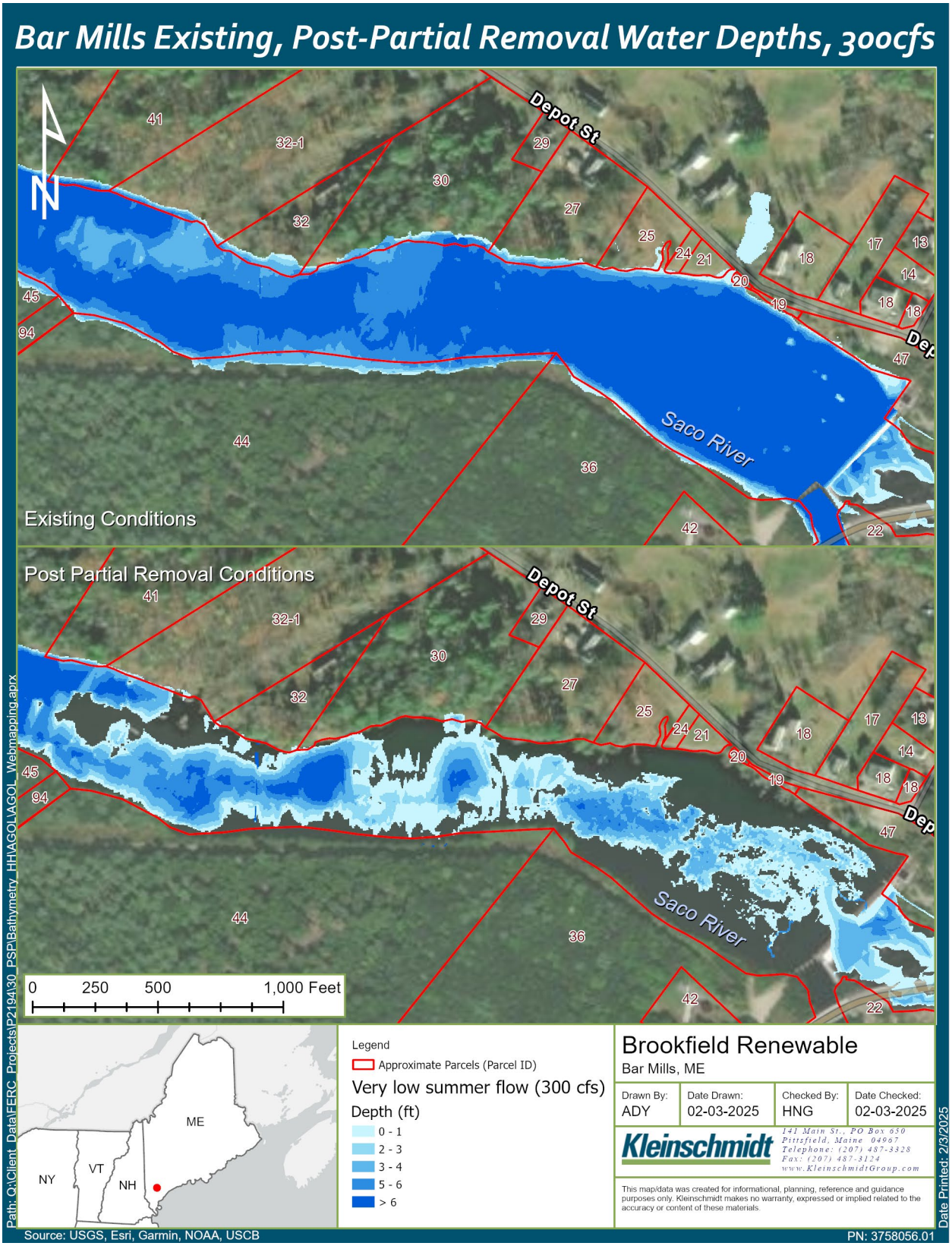


Figure 10-2 Dewatered Shoreland at 300 cfs Under Partial Removal Conditions

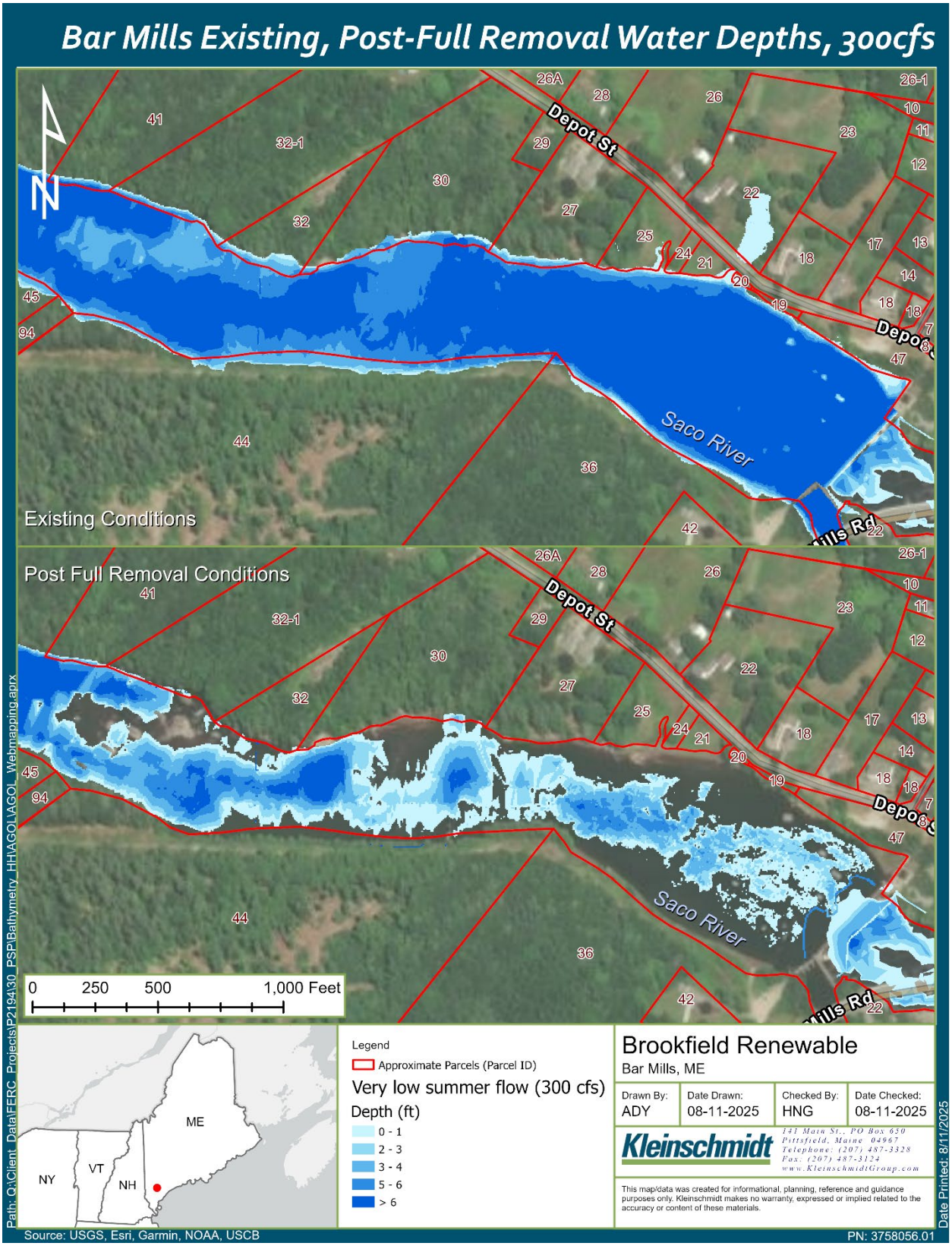


Figure 10-3 Dewatered Shoreland at 300 cfs Under Full Spillway Removal Conditions

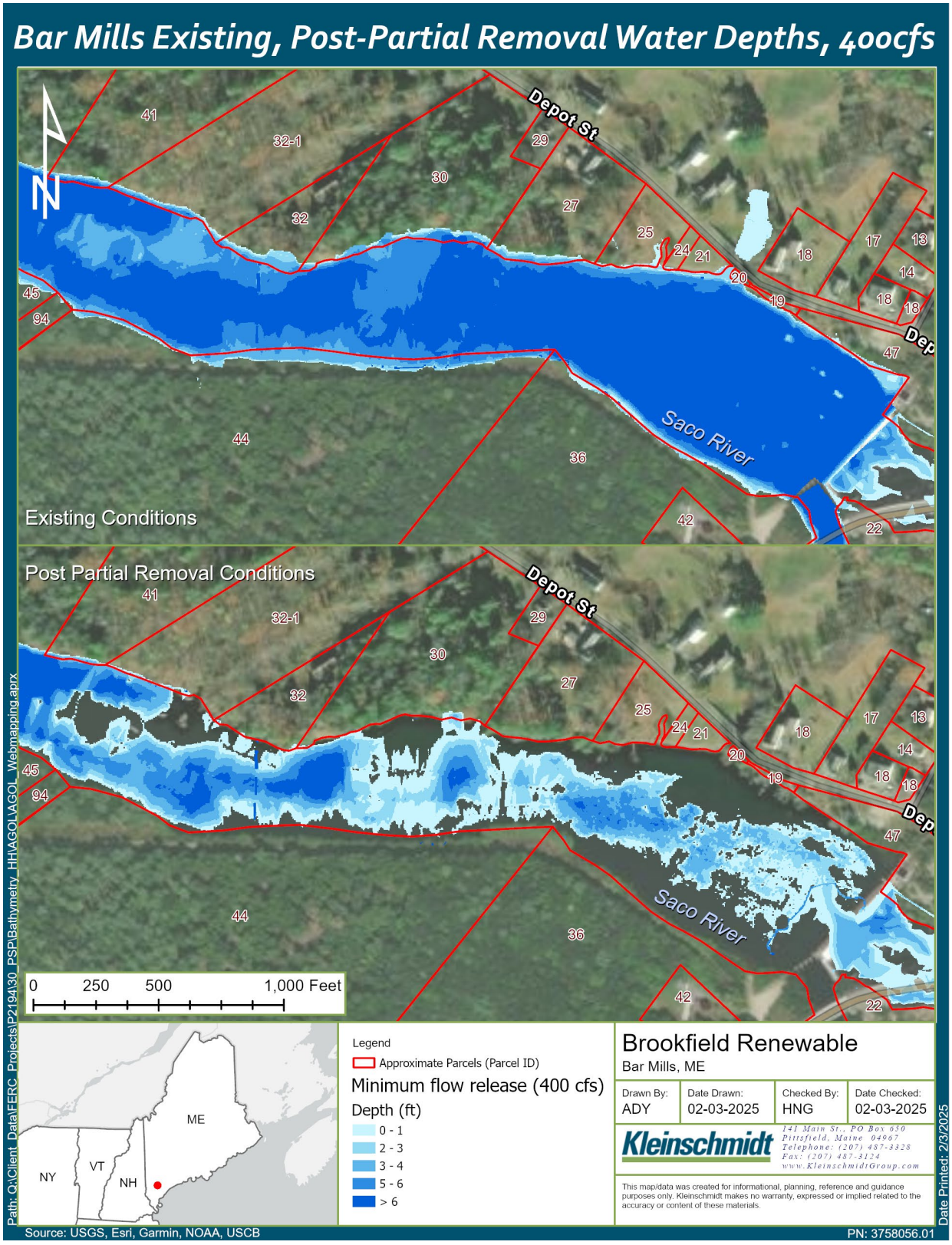


Figure 10-4 Dewatered Shoreland at 400 cfs Under Partial Spillway Removal Conditions

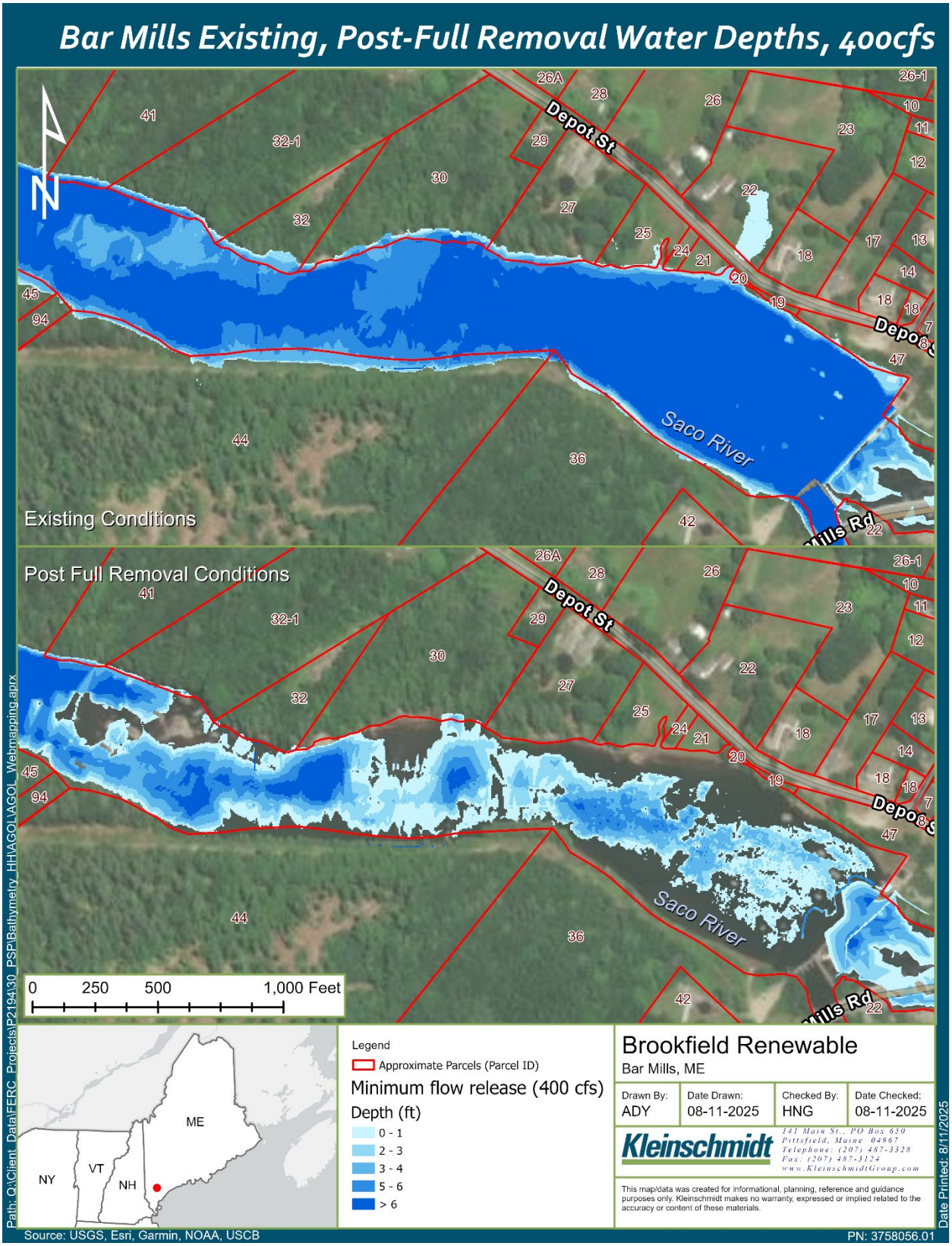


Figure 10-5 Dewatered Shoreland at 400 cfs Under Full Spillway Removal Conditions

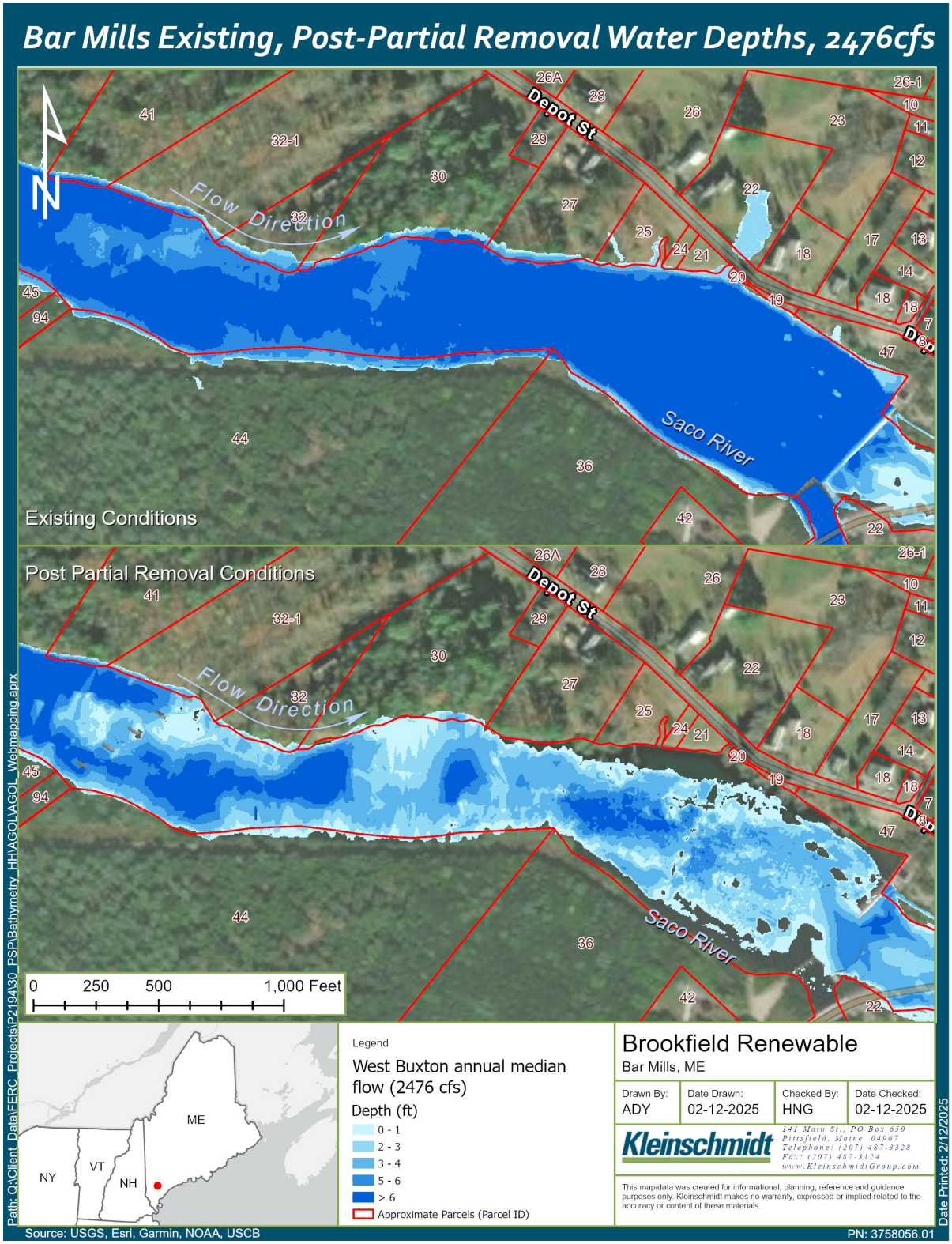


Figure 10-6 Dewatered Shoreland at 2,476 cfs Under Partial Spillway Removal Conditions

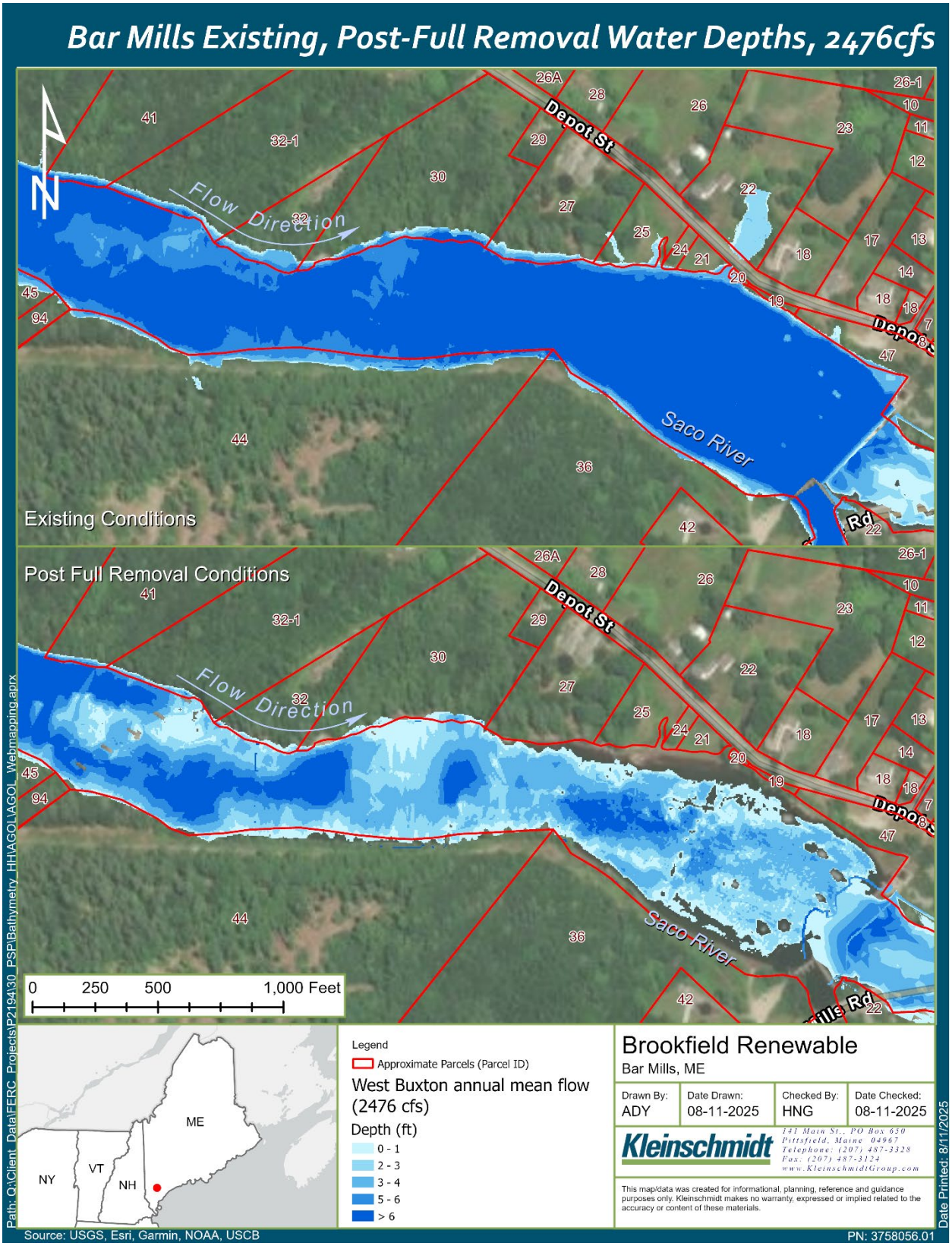


Figure 10-7 Dewatered Shoreland at 2,476 cfs Under Partial Spillway Removal Conditions

11.0 AESTHETICS

11.1 Introduction

The aesthetics of the Project area under the post-breach condition are of concern to local property owners and to the communities of Hollis and Buxton.

Partial spillway removal would return this section of the Saco River to a more natural free flowing condition and remove portions of structures currently spanning the width of the river. Full spillway removal would remove the existing dam up to the abutments on either side of the river channel.

11.2 Background

The Saco River Corridor Act (38 M.R.S. § 951) established the Saco River Corridor and the Commission (38 M.R.S. § 954). The Act found the Saco River and "adjacent lands possess outstanding scenic and aesthetic qualities.". The purpose of the Act includes preservation of the scenic character along the Saco River, from Saco Bay to the border of New Hampshire, under the authority of the corridor Commission.

BWPH is considering two alternatives. One is removal of the west portion of the spillway, canal gate structure, and draining, grading, and seeding the canal, which will result in natural river flow through the removed portion of the dam. The second alternative is the same as the first but also includes removal of the former log sluice and eastern portion of the spill way up to the retaining wall adjacent to the former mill foundation.

11.3 Goals and Objectives

The goal of the study is to develop a graphical rendering of post-breach conditions based upon HEC-RAS modeling described in Section 6.5.1 to assess pre-and post-breach aesthetic conditions in the viewshed. Development of post-partial and full spillway removal renderings will provide a depiction of the viewshed resulting from the partial dam removal.

11.4 Study Area

The study area includes the project intake canal, canal gate structure and canal spillway, and main dam and spillways. An aesthetic evaluation of the powerhouse was not conducted because BWPH does not intend to remove the structure.

11.5 Methodology

In order to assess pre-, post-partial, and full spillway removal, aesthetic conditions in the viewshed BWPH developed renderings for three vantagepoints where the general public has visual access to the Bar Mills dam, the public boat launch and the Bar Mills Bridge (Route 4A). The existing views were modified utilizing photo manipulation software coupled with water level modeling results developed to estimate water depths under post-breach conditions. The photo renderings below were designed to mimic the anticipated summer flow post breach but are only anticipated to provide a general characterization of potential post removal conditions.

11.6 Results

Based upon water level modeling, it is anticipated that the lower impoundment will largely return to a riverine reach, following the historic main channel through the area would be previously occupied by the western portion of the spillway. As discussed in Kleinschmidt (2025) shoreline conditions of the newly exposed banks stabilize quickly once the dam is partially removed, with many of the sandy banks adjusting to the new water elevation and becoming vegetated rapidly. Due to the newly exposed sandy banks, there will be some movement of finer material but with the river historically being cobble/boulder-dominated, the general channel form, shape, and extent are not anticipated to change substantially following the dam breach. Current conditions and renderings of post partial and full removal of the spillway were developed for vantage points for an aerial view, the Bar Mills Bridge, the boat launch, and the intake canal. shown in Photo 11-4 through Photo 11-10. Renderings approximate anticipated transition to permanent lower water levels under both scenarios.

An additional rendering was also developed looking down the power canal towards the powerhouse as compared to current conditions under dewatering, Photo 11-12. The primary differences illustrate a permanently dewatered condition for the canal and removal of the transmission tower and crane structure on the powerhouse.

Photo 11-1 Existing Aerial View of Bar Mills Dam

Photo 11-2 Post-Partial Breach Aerial View of Bar Mills Dam

Photo 11-3 Post-Full Spillway Removal Aerial View of Bar Mills Dam

Photo 11-4 Existing View of Bar Mills Dam from Bar Mills Bridge

Photo 11-5 Post-Partial Breach View of Bar Mills Dam from Bar Mills Bridge

Photo 11-6 Post-Full Spillway Removal View of Bar Mills Dam from Bar Mills Bridge

Photo 11-7 Existing View of Bar Mills Dam from Boat Launch

Photo 11-8 Post-Partial Breach View of Bar Mills Dam from Boat Launch

Photo 11-9 Post-Full Spillway Removal View of Bar Mills Dam from Boat Launch

Photo 11-10 Existing View of Bar Mills Dam from Canal

Photo 11-11 Post-Breach and Full Spillway Removal View of Bar Mills Dam from Canal

Photo 11-12 Existing and Rendering of Power Canal

11.7 References

Kleinschmidt. 2025. Wetland, Botanical, and Shoreline Erosion Study Bar Mills Project FERC No. 2194 (Draft July 2025)

12.0 HISTORIC STRUCTURES SURVEY

By letter dated June 21, 2023, the Maine Historic Preservation Commission (MHPC) recommended that BWPH conduct an architectural survey of structures within the area of potential effect (APE). MHPC further recommended that the APE be defined in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and that the APE must include lands enclosed by the project boundary and lands or properties outside the project boundary that may be affected by project construction and operation.

MHPC requires that architectural surveys be conducted by an historic preservation consultant that MHPC has determined to be qualified for such survey. BWPH contracted TRC to conduct the survey, which was completed in October 2025. Survey documentation confirmed that eight structures previously found to be eligible for listing on the National Register of Historic Places (NRPH) within the MHPC approved APE are eligible. The eight had previously been identified as eligible for listing in the National Register of Historic Places and were the subject of TRC's 2024 survey. Four are associated with the West Buxton hydro facility. Two are the Bar Mills Historic District and former bridge piers, which are not maintained by BWPH. The Bar Mills facility - Bar Mills Hydroelectric Plant and dam are two of the eight structures and BWPH will continue to be responsible for maintenance to the extent portions of the overall dam structures would remain. One additional feature was also determined eligible and potentially affected by the surrender and partial removal of the Bar Mills dam. Survey documentation was provided to MHPC for approval and concurrence. In a response date June 2, 2025 (Appendix H) MHPC concurred with eligibility of the facilities for listing on the National Register of Historic Places and recommended that FERC seek ways to avoid, minimize, or mitigate any adverse effects on these structures. BWPH will further consult with MHPC to develop any potential recommendations for protective or mitigative measures that may be necessary to address effects on these resources, as applicable.

APPENDIX A

TOWN DECOMMISSIONING COMMITTEE SUMMARY

APPENDIX B

BAR MILLS DECOMMISSIONING PLANNING ENVIRONMENTAL REVIEW

APPENDIX C

WETLAND, BOTANICAL, AND SHORELINE EROSION STUDY

APPENDIX D

OSI'S SURVEY REPORT SUBBOTTOM PROFILING

APPENDIX E

TRC MEMO TITLED PRELIMINARY LIMITED SEDIMENT/SOIL CHARACTERIZATION

APPENDIX F

TRC LETTER, EFFECTS OF PARTIAL DAM REMOVAL ON GROUNDWATER LEVELS

APPENDIX G

AQUATIC LIFE CLASSIFICATION ATTAINMENT REPORT

APPENDIX H

SHPO CONSULTATION