



# Whitewater Boating and Access Study

Lowell Hydroelectric Project (FERC No. 2790)

January 20, 2023

Prepared by:



Prepared for:

Boott Hydropower, LLC  
Manchester, New Hampshire

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## List of Acronyms

AW	American Whitewater
Boott	Boott Hydropower, LLC (or Licensee)
CRC	Campus Recreation Center
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
COVID-19	Coronavirus Disease 2019
FERC	Federal Energy Regulatory Commission (or Commission)
ILP	Integrated Licensing Process
LNHP	Lowell National Historical Park
MADCR	Massachusetts Department of Conservation and Recreation
MASS DOT	Massachusetts Department of Transportation
NGVD 29	National Geodetic Vertical Datum 1929
NHDES	New Hampshire Department of Environmental Services
NOI	Notice of Intent
NPS	National Park Service
PPE	Personal Protective Equipment
Project	Lowell Hydroelectric Project (or Lowell Project)
RM	river mile
ROR	run-of-river
Safety Plan	Whitewater Boating and Access Study Safety Plan
SPD	Study Plan Determination
UMASS	University of Massachusetts Lowell
USGS	U.S. Geological Survey

# 1 Introduction and Background

## 1.1 Introduction

Boott Hydropower, LLC (Boott or Licensee) is the Licensee, owner, and operator of the 20.2-megawatt Lowell Hydroelectric Project (Project or Lowell Project) (FERC No. 2790). Boott operates and maintains the Project under a license from the Federal Energy Regulatory Commission (FERC or Commission). The Project's existing license expires on April 30, 2023. Boott is pursuing a new license for the Project using the Commission's Integrated Licensing Process (ILP) as defined in 18 Code of Federal Regulations (C.F.R.) Part 5.

The Project is located along the Merrimack River in Middlesex County, Massachusetts and in Hillsborough County, New Hampshire. On April 30, 2018, Boott initiated the ILP by filing a Pre-Application Document and Notice of Intent with the Commission. In accordance with 18 C.F.R. § 5.15, Boott has conducted studies consistent with the study plan and schedule approved in the Commission's March 13, 2019 Study Plan Determination (SPD).

In accordance with the Commission's SPD, Boott has prepared this Updated Whitewater Boating and Access Study Report. This report describes the methods and results of the approved Whitewater Boating and Access Study conducted to date.

## 1.2 Background

At the normal pond elevation of 92.2 feet National Geodetic Vertical Datum of 1929 (NGVD 29) (crest of the pneumatic flashboards), the surface area of the impoundment encompasses an area of approximately 1,236 acres. The gross storage capacity between the normal surface elevation of 92.2 feet and the minimum pond level of 87.2 feet (at spillway crest) is approximately 6,180 acre-feet. The Project operates in a run-of-river (ROR) mode using automatic pond level control and has no usable storage capacity. The plant has a total hydraulic capacity of up to 6,600 cubic feet per second (cfs) (hydraulic capacity of the E.L. Field Powerhouse units). The Project is not able to store flows for whitewater releases and, therefore, any flows below 6,600 cfs directed to the station will impact generation.

Pursuant to existing License Article 38 and the FERC-approved Recreation Plan, Boott maintains the E. L Field Powerhouse Visitor Center. The Visitor Center is the Project's only FERC-approved recreation facility. Non-Project related recreational facilities and opportunities in the Project's vicinity include the Depot Street Boat Ramp, Greely Boat Ramp, Lowell National Historical Park (LNHP), Lowell Heritage State Park, Merrill Park, Moore's Falls Conservation Area, and the Rourke Brothers Boat Ramp. Boating in the Project vicinity includes canoeing, kayaking, rowing, and motorboating. The river provides quickwater and flatwater experiences for canoeists and kayakers and is one of

the largest water bodies in the region for motor boating. Local watershed organizations sponsor a variety of paddling trips on the Merrimack River and its tributaries throughout the spring, summer, and fall for beginner and intermediate paddlers (New Hampshire Department of Environmental Service [NHDES] 2019). American Whitewater (AW) reports that whitewater and flatwater paddling are popular recreational activities in the Merrimack Valley. For whitewater boaters, the Winnepesaukee, Pemigewasset, Merrimack, and Concord rivers offer downriver paddling and playboating opportunities when flows are sufficient, generally during the spring runoff and during periodic high-water events (AW 2021). There is a 2.2-mile run on the Concord River through downtown Lowell with a difficulty of Class III and Class IV rapids under normal flows. The whitewater section has four named rapids, and numerous surfing and play spots (AW 2022). Upstream of the northern extent of the Project impoundment is a whitewater kayak course located in Manchester, New Hampshire. There are also Class I-II+ rapids located between Amoskeag Falls to Goffs Falls (City of Manchester 2022).

## 2 Study Goals and Objectives

In accordance with the Commission's March 13, 2019 SPD, the goal of this study is to assess the Project's bypass reach for whitewater boating and access. The objectives of the study are as follows:

- Assess a range of flows on whitewater boating opportunities in the Project's bypass reach;
- Assess the frequency, timing, duration, and predictability of paddling flows under current and proposed Project operations;
- Define the need for put-in and take-out points for boaters; and
- Assess the flow information needs for whitewater boating and the current and potential flow information distribution system.

## 3 Study Area

In accordance with the Commission's SPD, the general study area for the Whitewater Boating and Access Study includes the Project's bypass reach extending downstream from the Pawtucket Dam approximately 3,500 feet to the confluence with the E.L. Field Powerhouse tailrace.

## 4 Methodology

The methods established for this study are based on the guidance provided in *Flows and Recreation: A Guide to Studies for River Professionals* (Whittaker et al., 2005). Consistent with the Whittaker et al. (2005) methodology, the Whitewater Boating and



Access Study was performed in a stepwise approach, which included each of the activities described below.

## 4.1 Study Planning and Preparation

Primary planning and preparation activities for the Whitewater Boating and Access Study were: (1) literature review; (2) formation of a Study Working Group and identification of volunteers to participate in whitewater flow release evaluations; (3) identification of appropriate put-in and take-out locations for on-water evaluations; (4) development of a safety plan; (5) determine method for verifying flows in the Project's bypass reach; and (6) development of survey forms to be used in the execution of the flow evaluations. In accordance with the SPD, Boott initiated and completed all primary planning and preparation activities for the Whitewater Boating and Access Study.

### 4.1.1 Formation of a Study Working Group and Identification of Volunteer Boaters for Whitewater Release Evaluations

Boott conducted a review of any existing online information and anecdotal evidence regarding whitewater conditions. On July 24, 2019, Boott invited representatives from AW, National Park Service (NPS), the City of Lowell, Massachusetts Department of Conservation and Recreation (MADCR), whitewater outfitters, and other interested stakeholders to form the Study Working Group and to participate in a Study Working Group meeting at the Project. Correspondence between Boott and interested stakeholders is provided in Appendix A.

### 4.1.2 Identification of River Access Locations, Boating Feasibility, and Selection of Study Flows

Boott met with the Study Working Group on August 8, 2019 at the Project to coordinate study planning, identify potential put-in and take-out locations, discuss safety concerns, and identify potential volunteers to participate in whitewater flow releases. Stakeholders that attended the site visit included AW, NPS, City of Lowell Parks Department, City of Lowell Emergency Management, Lowell Parks and Conservation Trust, and Zoar Outdoor.

This Study Working Group meeting identified a need to visually document a range of flows in the Project's bypass reach to assist participant selection of flows for the whitewater flow releases. Since the Study Working Group participants had limited experience boating the bypass reach, participants could not make informed choices on which flows would be appropriate for boating.

Accordingly, On October 28, 2019, Boott distributed a Whitewater Flow Documentation Plan to the Study Working Group that described the methods and approach for (a) documenting the range of flow conditions in the bypass reach, and (b) consulting with the Study Working Group to identify flows suitable for this study. Boott requested the Study

Working Group provide comments by November 11, 2019. Boott appreciates the productive comments provided by the Study Working Group on the Whitewater Flow Documentation Plan. Boott modified the Whitewater Flow Documentation Plan based on comments from stakeholders, and distributed revisions to the Study Working Group on January 15, 2020.

In the Whitewater Flow Documentation Plan, Boott proposed to document flows in the bypass reach using cellular-enabled trail cameras and to provide the Study Working Group with a summary report that presents photographs of the bypass reach under various flow conditions. Boott deployed the cellular-enabled trail cameras March of 2020, and the cameras remained installed through May 15, 2020. The cameras recorded photos on an hourly basis during daylight hours. The resulting photographs were date- and time-stamped.

### 4.1.3 Development of a Safety Plan

The Whitewater Boating and Access Study Safety Plan (Safety Plan) is intended to provide guidelines and protocols for protecting the safety of volunteer study participants boating the Project's bypass reach during whitewater flow releases. This Safety Plan also provides procedures for emergency situations and guidance for communicating with study participants, Project staff, and emergency responders. The Safety Plan was developed in consultation the Study Working Group and distributed to stakeholders on September 10, 2020. The Safety Plan was revised and distributed in advance of the study again on November 17, 2022. The revised Safety Plan is appended to this report as Appendix B.

The volunteer boaters for the whitewater release evaluations will be experienced and have the skills necessary to boat the reach. AW and the whitewater boaters will have the responsibility for determining who is qualified to participate in the evaluations. Participants may also be required to sign a liability waiver prior to taking part in on-water evaluations. Boott developed the Safety Plan and will require that all study participants review and adhere to its requirements and applicable Boott safety policies. This will include, among other items, that participants be equipped with standard safety gear as required by the "Safety Code of American Whitewater."

Additionally, as a condition to participation in the whitewater flow releases, Boott requires volunteers to review the Safety Plan and understand the safety measures, guidance, and requirements herein. Boott notes that the Safety Plan includes details about Personal Protective Equipment (PPE) that participants are responsible for providing, as well as mandatory pre-fieldwork Coronavirus Disease 2019 (COVID-19) screening requirements.

### 4.1.4 Flow Verification Method

There is an active, existing United States Geological Survey (USGS) gage installed approximately 2.1 miles downstream of the Pawtucket Dam (USGS No. 01100000,

*Merrimack River BL Concord River at Lowell, MA*). There is also an existing USGS gage installed on the Concord River (USGS No. 01099500, *Concord R Below R Meadow Brook, at Lowell, MA*). Flows from the USGS Gage No. 01099500 will be subtracted from the flows at USGS Gage No. 01100000 to account for flows entering the Merrimack River from the Concord River. Real-time data from the existing USGS gages is available online through the USGS website. Boott will use Project operations data in combination with USGS real-time flow information to verify the whitewater release flows in the bypass reach during this study. During the flow evaluation portions of this study, information on real-time flow conditions in the bypass reach will be made available by Boott to the Study Working Group and other whitewater boating participants.

## 4.2 Selection of Whitewater Flows

Boott consulted with the Study Working Group to identify appropriate study flows based on the feasibility assessment, visual inspection of the survey reach, and participants' previous whitewater boating experience. Boott coordinated with AW to monitor site conditions and flow conditions to schedule the whitewater flow releases. Boott anticipated up to three flows would be studied to afford participants the opportunity to boat each flow multiple times and evaluate different lines through various portions of the study reach. Pre, post, and comparative surveys were completed by participants during this portion of the study.

### 4.2.1 Development of Survey Forms

Boott developed the following Whitewater Release Study forms:

- A Pre-Run Information Form to be completed prior to the start of the study runs to determine each boater's experience level and preferred watercraft of the participants;
- A Single Flow Evaluation Form to be completed after each run to evaluate each boater's experience at that flow; and
- A Comparative Flow Evaluation Form, to be completed after all of the runs have been completed, to compare each of the flows that the boater participated in.

The Whitewater Release Study Forms were developed in consultation AW and approved by FERC in the SPD. They were distributed to AW on May 14, 2020. The Whitewater Release Study Forms are appended to the report as Appendix C.

## 4.3 Whitewater Recreational Access Evaluation

Pursuant to Whittaker et al. (2005), an on-site group discussion was held following completion of the study runs, in which boaters discussed their experiences at each flow, identified safety issues, and summarized opinions about the feasibility of boating, types of opportunities, and possible flow ranges. For this study report, Boott conducted an evaluation of prospective whitewater recreational access to the bypass reach including

factors such as public interest and safety, the feasibility of potential access areas, and how any potential improvements may affect aesthetic and historic resources.

## 5 Study Results

### 5.1 Literature Review

The Merrimack River drops 269 vertical feet over its long track to the Atlantic Ocean, dropping greater than 30 feet at Pawtucket Falls in the Project's bypassed reach. The Merrimack River then sharply turns southeast toward the confluence with the Concord River (Malone 2009). The topography of the City of Lowell is a combination of floodplain and gently undulating upland. The general study area for the Whitewater Boating and Access Study includes the Project's bypass reach extending downstream from the Pawtucket Dam approximately 3,500 feet to the confluence with the E.L. Field Powerhouse tailrace.

There is little documented information regarding whitewater opportunities or utilization in this reach. However, in comments filed on the Draft License Application on February 25, 2021, AW reports when there is spillage over the Pawtucket Dam, whitewater boating in the Project's bypassed reach is enjoyed by AW members. In addition, high flow conditions in the Project's tailrace provides sufficient flows to create hydraulics that are utilized by whitewater boaters for playboating. Playboating is a style of whitewater boating that is frequently enjoyed by whitewater boaters where suitable hydraulic conditions are present (AW 2021).

Boott filed with the Commission the Updated Recreation and Aesthetics Study Report on November 1, 2021. As part of the study, Boott consulted with NPS, MADCR, and AW to identify locations to conduct personal interviews and field reconnaissance. Included in the study was an informal non-Project whitewater takeout location downstream from the Project and along the riverfront behind Edward A. LeLacheur Park. While no personal interviews were conducted at the whitewater takeout location due to a lack of encountered recreationists, the results of the online survey indicated interest in whitewater activity at the Project. Respondents noted the Project's proximity to the popular whitewater rapids on the Concord River, therefore suggesting the Project's bypassed reach would also be utilized if the conditions were right. However, respondents noted that the site has public safety and access considerations.

A literature review was performed to summarize existing information pertaining to whitewater recreation opportunities in the region. Boott reviewed the American Whitewater Database (AW 2022) and identified approximately 52 documented whitewater opportunities within 60 miles of the Project, ranging in skill level. Table 5-1 below summarizes these opportunities.

**Table 5-1 Documented Whitewater Opportunities Within 60 Miles of the Lowell Hydroelectric Project**

River Name	Site Name	Whitewater Boating Class	Approx. Length (River Miles)
Concord River	Concord City of Lowell to Merrimack River	III+(IV)	2.2
Charles River	Waltham Wave	II	0.1
Monatiquot River	Shaw's to Weymouth Landing	II-III	3.9
Clear River	Harrisville to Nasonville	I-II	6.6
Quinapoxet River	Canada Mills to Wachusett Reservoir (The Mighty Quinn)	II-III	2.9
Millers River	Upper (South Royalston to Athol)	III	7.0
Millers River	Lower (Erving to Millers Falls)	II-III(IV)	2.2
Lawrence Brook	Doane Falls	V+	0.3
Ware River	Gilbertville	II-III	3.3
Connecticut River	Turners Falls Dam Bypass Reach	II-III	3.3
Blackstone River	Blackstone Gorge	III	0.8
Three Mile River	Cohannet Bridge to Bird Sanctuary	I-II	0.2
Quaboag River	Lucy Stone Park in Warren to Route 67	II-III	5.3
North River	Nottingham to South Lee	II	3.8
Kennebunk River	Route 1 Ledge	III+	0.4
Mousam River	Rte. 1 to Water St.	II-III	0.6
Little River	US202 to Lord Road	I-II	4.2
Little River	Stackpole Bridge to Hubbard Road	I-II	5.2

River Name	Site Name	Whitewater Boating Class	Approx. Length (River Miles)
Isinglass River	Isinglass Falls	IV	0.1
Cocheco River	Watson Rd to Whittier St	II(IV)	2.0
Great Works	Brattle Street to Leighs Mill Pond	IV-V	0.7
Lamprey	Upper Lamprey	IV	3.9
Suncook River	Suncook dam to Center Barnstead	I-II	2.2
Suncook River	Pittsfield to North Chichester	I-II+(III)	3
Little Suncook River	Northwood to Gossville	III+(IV)	3.3
Lamprey River	Upper Lamprey	IV	3.9
Winnepesaukee River	Tilton Road to Riverfront Park	I-II	2
Winnepesaukee River	Steven's mill dam to Odell Park (Bottom Winni) (Bottom Winni)	II	0.6
Soucook River	Near Concord, NH	I-II	11.9
Merrimack River	Amoskeag Falls to Goffs Falls (Crack Pipe, 293 Wave) (Manchester Run)	I-II+(III)	5.1
Souhegan River	Indian Ledges	I-II(III)	11.2
Souhegan River	Greenville to NH Rt. 101 Bridge	II-III	5.6
Blackwater River	Route 127 to Snyder's Mill	II-IV	1.9
Warner River	Melvin Mills to Warner	IV	5.4
Contoocook	Henniker (class II section)	II(III)	2.1
Contoocook	Hillsborough to Henniker (Freight Train Section)	III-IV	3.0
Contoocook River	Jaffrey to Peterborough	II	6.3

River Name	Site Name	Whitewater Boating Class	Approx. Length (River Miles)
Piscataquog, North Branch	Lake Horace to Everett Reservoir	II-III+(IV)	6.9
Piscataquog, South Branch	New Boston to Goffstown	I-II	5.2
Piscataquog, South Branch	Francetown to New Boston	II-III(IV)	7.7
Cold River	South Acworth to Vilas Pool	II	6.0
Cold River	Vilas Pool to Alstead	III-IV	0.8
Ashuelot River	Lower Ash (Ashuelot to Hinsdale)	II-IV	3.7
Ashuelot River	Upper Ash (Marlow to Gilsum Gorge)	III-IV	5.6
Ashuelot River	Middle Ash (Gilsum Gorge to Shaws Corner)	II	4
Ashuelot, S. Branch	Troy to Webb	III-IV	2.6
Otter Brook	East Sullivan to Otterbrook Park	III-IV	3.3
Minnewawa River	Marlborough recycling center to Otter Brook	II-IV	4.4
Stony Brook	Old Temple Road to Forest Road	IV-V	4.2
Souhegan River	NH Rte. 101 Bridge to Wilton (Trash Dump rapids)	III	1.3
Locke Brook	Pine Campground to Davis Road	IV	1.1
Nashua	C-Hole Park & Play	II-III	NA

Source: AW 2022

## 5.2 Identification of River Access Locations and Boating Feasibility

As noted, Boott met with the Study Working Group on August 8, 2019 at the Project to coordinate study planning, identify potential put-in and take-out locations, discuss safety concerns, and identify potential volunteers to participate in the whitewater releases.

Stakeholders who attended included AW, NPS, City of Lowell Parks Department, City of Lowell Emergency Management, Lowell Parks and Conservation Trust, and Zoar Outdoor. Boott also met with AW in September 2020 at the site to revisit the potential put-in and take-out locations and discuss safety concerns in anticipation of conducting the study in October of 2020.

These two site visits identified a whitewater staging area, a put-in location, and a take-out location. The staging area, used for parking and study preparation, is located at the Blacksmith's Shop site above the Pawtucket Dam and Pawtucket Gatehouse (Figure 5-1; Photo 5-1). This area is owned by MADCR and is under easement to Boott. As shown in Figure 5-1, a put-in location below the Pawtucket Dam was identified and is accessible from the Northern Canal Walkway Island (Photo 5-2). The take-out location is the informal non-Project river access location<sup>1</sup> downstream from the Project along the riverfront near Edward A. LeLacheur Park (Figure 5-1; Photo 5-3). At each potential access location, Boott and AW performed shoreline and safety evaluations, including evaluations of the slope of the shoreline, road access, vegetation growth and clearing requirements, and other access benefits and constraints. In anticipation of the study being conducted in October 2020, Boott performed a site review of the put-in and take-out locations in the fall of 2020. The site review identified the need for a cleanup to clear safety hazards including overgrowth and debris. Photographs 5-2 and 5-3 were captured after these areas were cleared. An additional site review and cleanup of these put-in and take-out locations was completed as needed on November 18, 2022, prior to the study whitewater releases.

Given the portage length ( $\pm$  0.9 mile), number of participants, car traffic, and other safety concerns, Boott and AW agreed it would be best to shuttle boaters by vehicle from the take-out to the put-in locations.

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<sup>1</sup> This parcel of land is owned by UMASS Lowell, according to the City of Lowell land property database as of the writing of this report (City of Lowell 2023).





*Photo 5-1 Whitewater Staging Area Above the Pawtucket Dam*

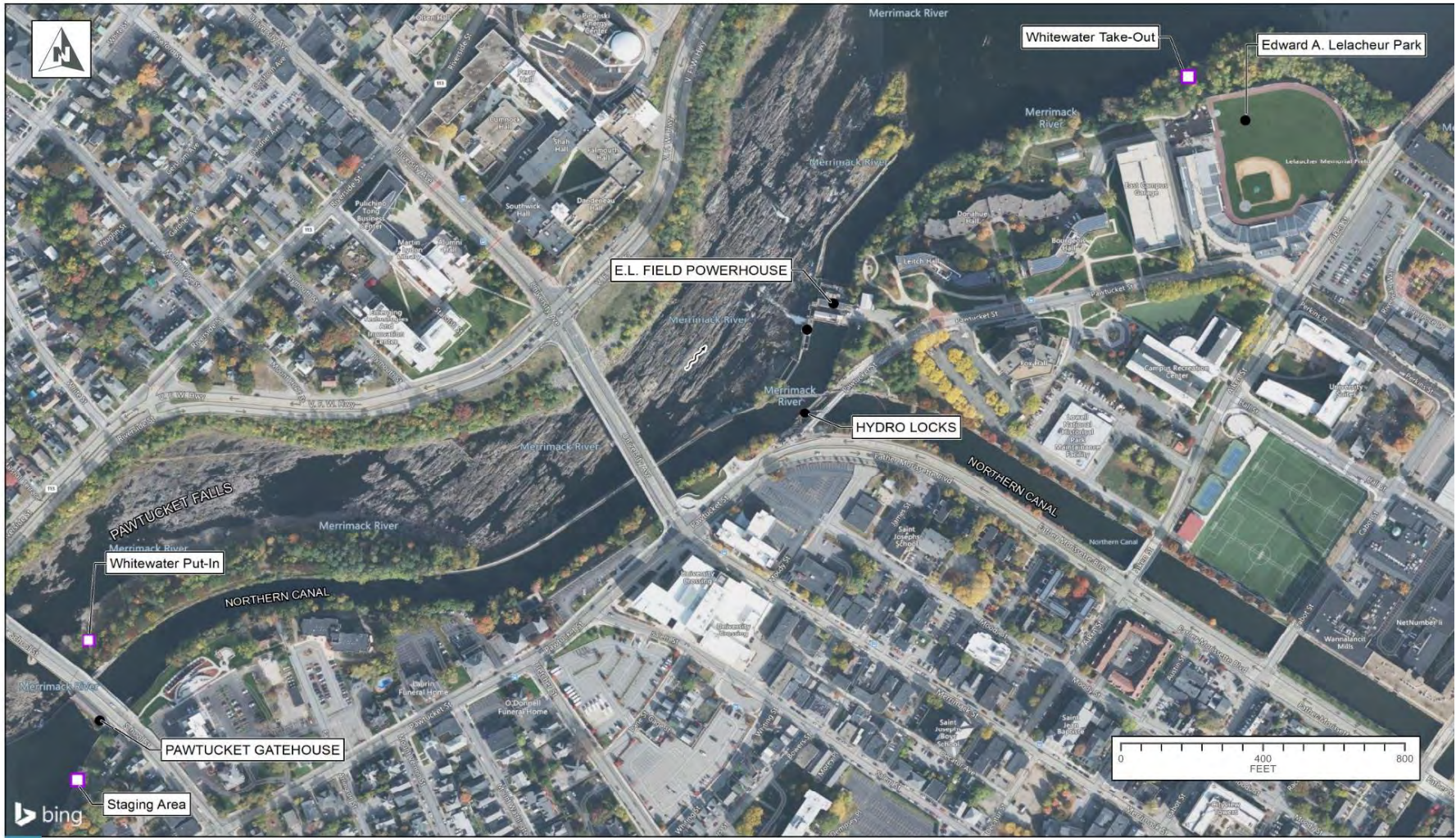


*Photo 5-2 Whitewater Put-In Access Location Below Pawtucket Dam*



*Photo 5-3 Whitewater Take-Out River Access Point Downstream from Project*

Figure 5-1 Identified Put-In/Take-Out Locations



As previously reported to the Commission, during a field reconnaissance of the Project bypassed reach in late May 2021, Boott discovered a line of rebar projecting from the bedrock which would pose a serious hazard to whitewater boaters. Boott felt that it would not be prudent to proceed with the study until the rebar hazard was mitigated. To that end, once river flows dropped sufficiently to allow safe access into the Project's bypassed reach, Boott hired a contractor to cut the rebar to bedrock level to eliminate the potential hazard to the extent possible. The contractor was able to remove the majority of the rebar that had been identified in the bypassed reach. There are a few remaining bars that were submerged in a pool under the 500 cfs fish passage flow at the time of the work, which could not be removed. The revised Safety Plan was updated with this information and boaters were informed of the remaining rebar locations prior to participating in the whitewater releases.

### 5.3 Selection of Study Flows and Flow Verification

On September 2, 2020 the Whitewater Flow Documentation Report was distributed to stakeholders for review and comment (Appendix D). To document the whitewater conditions in the bypass reach under various flows, Boott deployed four cellular-enabled trail cameras to capture time- and date-stamped images of the bypass reach on an hourly basis during daylight hours. The camera locations were identified in consultation with the Study Working Group, with specific input from AW. Boott provided documentation of bypass flows between 1,681 cfs to 21,672 cfs.

After review of the Whitewater Flow Documentation Report and consultation with stakeholders, the Study Working Group selected bypass flows ranging from 2,500 cfs to 8,600 cfs. However, the Project is ROR with no usable storage capacity and has a total hydraulic capacity of up to 6,600 cfs (hydraulic capacity of the E.L. Field Powerhouse units). Since the Project is not able to store flows for whitewater releases, any flows below 6,600 cfs directed to the station will impact generation. Given this, the Study Working Group determined the ideal Merrimack River flow range to perform the study is approximately 8,000 cfs to 10,000 cfs, assuming the Project is operating at maximum capacity.

As shown below in Table 5-2, the Project experiences average Merrimack River flows within this range in early to late spring, and during the recreation season (May-October), May, June, July, and October have at least a 10% exceedance of these flows.

**Table 5-2 Lowell Project Hydrologic Data (1987-2016)**

Month	Minimum (cfs)	90% Exceedance (cfs)	Average (cfs)	10% Exceedance (cfs)	Maximum (cfs)
January	916	3,462	7,651	12,834	39,710
February	1,478	3,272	6,813	11,415	39,180
March	1,914	4,508	11,484	21,355	50,220

Month	Minimum (cfs)	90% Exceedance (cfs)	Average (cfs)	10% Exceedance (cfs)	Maximum (cfs)
April	2,765	6,558	17,901	31,178	78,890
May	2,034	4,112	10,749	18,657	88,410
June	874	2,279	6,768	13,286	44,660
July	670	1,325	4,207	9,270	29,820
August	569	1,121	3,526	6,852	30,030
September	460	1,008	3,162	6,025	32,264
October	787	1,676	5,938	12,706	50,150
November	1,345	2,888	7,978	14,747	30,990
December	1,839	3,472	9,141	17,243	34,810
<b>Annual</b>	<b>460</b>	<b>1,723</b>	<b>7,941</b>	<b>17,059</b>	<b>88,410</b>

Note: Project hydrology was determined by subtracting flows from USGS Gage No. 01099500 (*Concord R Below R Meadow Brook, at Lowell, MA*) from USGS Gage No. 01100000 (*Merrimack River BL Concord River at Lowell, MA*).

In early November 2022, Boott and the Study Working Group coordinated to identify a date to conduct the Whitewater Boating and Access Study with the understanding that given that the Project was offline<sup>2</sup>, the study would be performed under two flow conditions. The first flow is the available run-of-river flow, and the second flow is an increased flow with limited duration provided by lowering of one of the Pawtucket Dam crest gates. Based on river and anticipated precipitation, Boott and the Study Working Group determined that the predicted flows for November 19, 2022 were within the desired range to perform the field activities.

Results from the two whitewater flow releases are discussed below. After the releases, the flows were verified as per the flow verification method established in Section 4.1.4. Boott provided the first flow of approximately 5,750 cubic feet per second (cfs) at approximately 11:15 AM. For the second flow, a Boott operator lowered one of the Pawtucket Dam crest gates at approximately 1:00 PM. Flows for this second run started at approximately 5,250 cfs and then rose to approximately 6,700 cfs by the end of the run.

<sup>2</sup> On September 2, 2022 Boott notified the Commission that the Project was offline and filed an incident report on September 19, 2022.

## 5.4 Whitewater Releases and Survey Data Analysis

Extensive coordination was required in the planning of the on-water boating component of the Whitewater Boating and Access Study. Due to the COVID-19 pandemic, efforts to conduct the on-water assessment in early- to mid-2020 were postponed. The boating assessment was scheduled but postponed twice due to low flows or operational constraints (October 17, 2020 and May 15, 2021). Correspondence regarding these scheduled attempts and cancellations can be found in Appendix A. Additionally, as noted in Section 5.2, Boott discovered a line of rebar projecting from the bedrock during a field reconnaissance in the Project bypass reach in late May 2021. This rebar would pose a serious hazard to whitewater boaters, and Boott determined it was not prudent to perform the study until the rebar was removed. The rebar was removed in the fall of 2022 when flows allowed for safe removal.

The on-water boating assessment was performed on November 19, 2022, between 9:30 am and 3:00 pm and assessed flows of 5,750 cfs and 6,700 cfs. Participants convened at the University of Massachusetts Lowell (UMASS) Campus Recreation Center (CRC) for a health and safety meeting and study overview. Study participants included intermediate and advanced level boaters, generally corresponding to Class III-IV whitewater experience. Boott identified field safety protocols and procedures, and all participants were required to adhere to the requirements throughout the field study. As noted above, Boott had developed and consulted with the Study Working Group regarding the pre-run, post-run, and comparative survey forms. The boating participants completed evaluation forms following each of the whitewater boating runs to evaluate the reach with respect to:

- Estimate of the number of rapids, play spots, and unintended hits, stops, boat drags, and portages encountered on each run;
- Evaluation of features such as navigability, technicality, hydraulics, play areas, size/difficulty of rapids, overall whitewater challenge, crowding, access, shuttles, number of rapids, length of runs, and safety;
- Estimate of acceptable and optimal flow ranges for different types of whitewater boating opportunities (e.g., different skill levels, boat types, or types of boating);
- Qualitative description and estimate of likely demand for boating opportunities;
- Evaluation of existing and potential put-in and take-out locations;
- Comparability to similar rivers in the region; and
- Identify safety concerns related to flows, access, and river features.

All boating participants completed the pre-run, post-run, and a comparative analysis survey. All participants also participated in a focus group discussion following completion of the two whitewater releases.

## 5.4.1 Participant Pre-Run Information

Prior to assessing the study flows, all nine boating participants completed a Pre-Run Survey. Three participants identified their skill levels as intermediate and were comfortable running Class III whitewater, and of the three, a participant noted they are comfortable with some Class IV whitewater. Six participants identified their skill level as advanced and were comfortable with Class IV whitewater. All participants stated that a hard-shell kayak would be suitable for the bypassed reach, and two participants indicated other boat types could likely be used (i.e., open canoe with flotation, cataraft, inflatable kayak, and self-bailing raft).

All participants provided their home zip code, the results of which are provided in Table 5-3 along with estimated<sup>3</sup> distances traveled, indicating all participants traveled from outside of Lowell to participate in the study.

**Table 5-3 Participant Home Zip Codes and Estimated Distance Traveled**

Home Zip Code	Location	Estimated Distance (Miles)
01810	Andover, MA	13
01776	Sudbury, MA	28
01930	Gloucester, MA	50
02114	Boston, MA	32
01370	Shelburne Falls, MA	90
05246	East Dummerston, VT	90
01748	Hopkinton, MA	40
02144	West Somerville, MA	30

Participants reported whitewater boating experience between 3 to 35 years, with a mean of 15 years. Participants reported spending between 2 to 12 days boating each month. One participant specified they boat about 12 days per month from September through

<sup>3</sup> Estimated distances traveled were generated by Boott based on the reported home zip code.



April, and 4 days per month in the summer when flows are low. Similarly, another boater noted they boat about 6-10 days per month during the summer and 1-3 days per month during the winter.

Seven participants indicated they have not previously participated in a whitewater boating study for a hydroelectric project. One reported they participated in a whitewater study for the relicensing of a plant in Skowhegan, Maine in 1994 (presumably the Weston Project P-2325), and another boater noted their participation in the Mongaup Relicensing (Rio Project P-9690; Mongaup Falls Project P-10481; and Swinging Bridge Project P-10482), the Bear Swamp Project relicensing (P-2669), the West Canada Creek Project relicensing (P-2701), and one relicensing on the Connecticut River.

All nine<sup>4</sup> participants had not previously boated the Lowell bypassed reach. Therefore, all participants had a chance to view the bypassed reach prior to the study. At approximately 10:30 AM, participants left UMASS Lowell and were shuttled to University Avenue Bridge to scout the bypassed reach from the bridge. While scouting from the bridge, boaters noted potential whitewater features and Boott pointed out the potential hazards identified to participants in study materials and during the health and safety meeting.

## 5.4.2 Bypassed Reach Flow Assessment

For both flows, all participants put-in at the Northern Canal Walkway Island, and all participants exited the bypassed reach at the take-out below Edward A. LeLacheur Park. Participant assessments of the individual flows are summarized below. The first flow was estimated at 6,600 cfs (and later verified at 5,750 cfs) and the second flow was estimated at 8,000 cfs (and later verified at 6,700). To distinguish between the different boating experiences of the two flows, participants were asked to complete a post-run survey for each flow. Therefore, eighteen post-run surveys were completed. Photo 5-4 below shows the boaters at the Staging Area above the Pawtucket Dam prior to the first flow release.

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<sup>4</sup> One boater reported they boated the Project bypassed reach about 8 days, multiple times each day at flows from 500 to 2,000 cfs. However, in their response they also provided this [link](#) to AW's description of the 2.2-mile run on the Concord River located south of the Project. It is assumed this is an error as the link provided is for a separate run not included in this study, and additionally the participant later reported they boated the reach zero times.



*Photo 5-4 Study Participants at the Staging Area above the Pawtucket Dam*

#### 5.4.2.1 First Flow (5,750 cfs)

At approximately 11:15 AM, all boaters entered the water via the put-in at the Northern Canal Walkway Island. Approximately five boaters boated upstream from the put-in location to also boat the reach under the School Street Bridge before continuing downriver. Photo 5-5 shows the bypassed reach upstream from University Avenue Bridge at approximately 5,750 cfs.

Of the seven participants who used hard-shell kayaks, six encountered at least one hit, stop, drag, or portage. One participant using the cataraft reported zero hits and the other cataraft boater reported two. Most participants reported experiencing 2-4 rapids and 3 play spots, but one reported as many as ten play spots. One participant reported zero rapids, and another reported zero play spots.



***Photo 5-5 View of the Upper Bypassed Reach for the First Flow at Approximately 5,750 CFS***

The participants evaluated the suitability of the flow for whitewater boating for various characteristics, with two stating they would definitely return in the future if this flow was available. Most participants preferred a higher flow than 5,750 cfs. Acceptability scores for characteristics of the upper reach at 5,750 cfs are presented in Table 5-4, with participants generally reporting the characteristics as acceptable or totally acceptable at this flow.

Eight participants indicated the minimum skill level necessary to successfully run the bypassed reach at 5,750 cfs was intermediate, and another noted only novice level skill necessary. Three participants did not identify any safety issues and the other participants noted that the sharp shale rocks and metal debris in the bypassed reach were potential hazards. One participant noted the rocks were fairly sharp so they were worried about the danger of swimming rapids and recirculation (i.e., trapping a boater), and another noted the crossflows could be difficult.

**Table 5-4 Acceptability Scores for Characteristics of the Bypassed Reach at 5,750 CFS**

Month	Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable
Navigability	0	0	0	6	3
Challenging Technical Boating	0	0	2	4	3
Powerful Hydraulics	0	0	2	5	1
Whitewater "Play Areas"	0	0	2	4	3
Size/Difficulty of Rapids	0	0	4	4	1
Overall Whitewater	0	0	0	7	2
Challenge	0	0	1	7	1
Safety	0	0	5	3	1

Note: One participant did not provide a response for the 'powerful hydraulics' prompt.

#### 5.4.2.2 Second Flow (6,700 cfs)

At approximately 1:00 PM, all boaters entered the water via the put-in at the Northern Canal Walkway Island. Flows for this second run started at approximately 5,250 cfs and then rose to approximately 6,700 cfs by the end of the run.

Of the seven participants who used hard-shell kayaks, four encountered at least one hit, stop, drag, or portage; both cataraft boaters also reported encountering at least one hit, stop, drag, or portage. The participants reported experiencing 2-3 rapids and around 3 play spots. When evaluating the number of play spots, one of the participants did not experience any play spots, while another participant experienced more than ten.

The participants evaluated the suitability of the flow for whitewater boating for various characteristics, with four stating they would definitely return in the future if this flow was available. Most participants preferred this flow over the first provided flow. Acceptability scores for characteristics of the upper reach at 6,700 cfs are presented in Table 5-5, with participants generally reporting the characteristics as acceptable or totally acceptable at this flow.

Eight participants indicated the minimum skill level necessary to successfully run the bypassed reach at 6,700 cfs was intermediate, and another noted only novice level skill necessary. Six participants did not identify any safety issues and the other participants all noted that the sharp rocks and metal debris in the bypassed reach were potential hazards. Two participants noted the proximity to Boston, where they resided, would draw them back.

**Table 5-5 Acceptability Scores for Characteristics of the Bypassed Reach at 6,700 CFS**

Characteristic	Totally Unacceptable	Unacceptable	Neutral	Acceptable	Totally Acceptable
Navigability	0	0	0	3	6
Challenging Technical Boating	0	0	1	3	5
Powerful Hydraulics	0	0	1	3	5
Whitewater "Play Areas"	0	0	3	3	3
Size/Difficulty of Rapids	0	0	1	4	4
Overall Whitewater	0	0	1	3	5
Challenge	0	0	1	4	4
Safety	0	0	3	4	2

### 5.4.3 Comparative Flow Assessment

All nine study participants completed a comparative flow assessment to compare the overall satisfaction and experience of the study flows. Two participants used a cataraft for both flows and all other participants used hard-shell kayak. Three participants identified their skill levels as intermediate and were comfortable running Class III whitewater, and of the three, a participant noted they are comfortable with some Class IV whitewater. Six participants identified their skill level as advanced and were comfortable with Class IV whitewater. None of the participants had boated the Lowell bypassed reach before.

On a scale of 1 to 5, with 1 being not important and 5 being very important, participants evaluated the importance of the different characteristics related to their overall satisfaction of the bypassed reach (Table 5-6). Participants also evaluated the two study flows based on their skill level and craft used (Table 5-7). The participants noted that the first flow 5,750 cfs was acceptable as the minimum flow needed to boat the bypassed reach.

The optimal range of flows for the lower reach varied depending on the participant’s skill level and craft. For most participants the optimal range of flows started at 6,000 cfs and went to 10,000 as the highest safe flow, with one participant also noting 15,000 cfs would be safe while providing a high challenge.

In general, the participants found the take-out facility acceptable and in good condition, and the put-in at the Northern Canal Walkway Island was acceptable or marginal and could be improved with parking, stairs, and a better path.

Boaters compared the Project’s bypassed reach to the reaches found on the Concord River; Weston Project/Kennebec River; Winnepesaukee; and Turners Falls/Connecticut River.

**Table 5-6 Importance of Factors to Overall Whitewater Satisfaction at the Project**

Factor	(1) Not Important	(2)	(3) Somewhat Important	(4)	(5) Very Important
Navigability	0	0	1	2	5
Challenging Technical Boating	0	1	2	3	3
Powerful Hydraulics	1	0	4	3	1
Whitewater “Play Areas”	0	0	2	4	3
Size/Difficulty of Rapids	0	0	2	5	2
Overall Whitewater Challenge	0	0	1	5	3
Safety	0	0	3	2	4
Crowding	0	4	1	3	1

Factor	(1) Not Important	(2)	(3) Somewhat Important	(4)	(5) Very Important
Long-run(s)	0	2	5	2	0
Short-run(s)	1	2	6	0	0
Low Number of Portages	1	1	2	2	3
High Number of Rapids	0	1	3	3	2
Low Number of Rapids	5	3	1	0	0
Easy Access	0	1	1	7	0
Easy Shuttle	0	1	4	4	0

Note: One participant did not provide a response for the 'navigability' prompt.

**Table 5-7 Acceptability of Study Flows at the Project**

Flow	Totally Unacceptable	Unacceptable	Marginal	Acceptable	Totally Acceptable
First Flow (5,750 cfs)	1	0	1	4	1
Second Flow (6,700 cfs)	1	0	1	0	5

Note: Two participants did not answer this question.

#### 5.4.4 Focused Group Discussion

Boott moderated a focus group discussion at UMASS CRC after the comparative assessment of the two study flows. Focus group participants included the nine boater participants, as well as the two spectators.

Participants agreed that new boaters should scout the reach from the University Ave. Bridge before putting in given the potential hazards, as there was consensus that this could be Class III whitewater rapids requiring at least an intermediate skill level. Boaters noted in general they preferred the second flow (later verified at 6,700 cfs) and would come back to boat at that flow. The boaters reported there was a noticeable difference between the two flows, with the second flow being more fluid, challenging, and enjoyable. The river left line was noted to be particularly fun and had an enjoyable wave and other features. The boaters agreed that the second flow wasn't necessarily more

difficult than the first flow, but that the two different flows presented different challenges. The weirs and sharp bedrock were less of a concern at the second flow. Boaters also observed debris in the bypassed reach, particularly a piece of crushed mechanical equipment embedded in bedrock on river left of the lower bypassed reach that could pose a hazard.

Study participants stated that the put-in and take-out locations could be improved with stairs and debris/vegetation clearing. Boott explained that the Northern Canal Island and Walkway are owned by MADCR and managed by the NPS, so any proposed improvements or modifications to that put-in would need those agency approvals. Additionally, Boott explained that the NPS allows public access to the Northern Canal Walkway is only during the recreation season from May 15 - October 15 from 9 AM to 5 PM. Furthermore, by agreement with Boott the walkway is only opened to the public when flows in the Merrimack River are less than 3,500 cfs, due to the potential public safety risk that would occur if the Project's surge suppression gate failed to open upon unit trip during higher flow conditions. When it is outside the recreation season or when flows in the Merrimack River are over 3,500 cfs, NPS does not unlock the entry gate on the School Street Bridge. Boott further explained the details of the agreement with the NPS and the operational and safety concerns with providing increased access to the Northern Canal Walkway, which are detailed in the Recreation and Aesthetics Study Report filed with FERC on May 31, 2022.

If Boott were to provide special access for whitewater boaters to the put-in via the Northern Canal Walkway Island, it would need to request from and coordinate with NPS and MADCR. For scheduled whitewater releases this coordination would likely not be a problem in most situations. However, unscheduled, ad hoc access is less feasible, because leaving the walkway access gates open would defeat the existing public safety measures described above. . Providing a separate gate and stairway to allow access to the put-in area only presents a number of challenges, including potential impacts to the historic stone masonry training wall downstream of the Northern Canal Gatehouse, and likely requiring permission from the Massachusetts Department of Transportation (MA DOT) to allow installation of a new gate and stairway off of the School Street Bridge.

The group also discussed put-in access alternatives that would not require access via the Northern Canal Walkway . Boaters indicated they observed an access point on river left that was used by pedestrians to access the bypassed reach via a gap in the fence along VFW Highway, although this was clearly trespassing and not safe. It was noted that a former boater of this bypassed reach reportedly parked at a nearby restaurant and accessed the bypassed reach at this point. The issues identified with providing access on river left are: 1) there is no public parking; and 2) it is immediately adjacent to the VFW Highway, a four-laned highway owned by MA DOT and would require rights-of-way and agency approvals. Boott also summarized the Study Working Group's prior discussions regarding developing a walkway down to the Merrimack River adjacent to the Pawtucket Dam fish ladder, but this also offers no parking opportunity on the VFW Highway. However, it would be possible for boaters to park at the Blacksmith's Shop,



which would require walking across the School Street bridge, then up the walkway along the VFW Highway to the put in point, a total distance of approximately 1,200 feet. Similarly, a separate staircase from the School Street Bridge down to the bypassed reach would require modification of a bridge owned by MASS DOT. Boott will coordinate with the AW, NPS, the MADCR and the City of Lowell to determine the feasibility of providing freer access to the Project bypass reach at the locations discussed above.

Study participants noted there are hydraulic features below the tailrace that boaters have reportedly used for playboating when the Project is generating. The participants did not know the flow that is used but know the high flow conditions created from the Project's generation and release at the tailrace create the ideal hydraulics. This area can be accessed from the take-out location since boaters will often put-in and take-out at the same place if needed. Study participants noted that a play feature could be installed below the tailrace and would allow Boott to generate as usual. Participants from Boston reiterated that whitewater releases or the play feature could be popular among Boston boaters given the proximity. One of the study spectators who works at UMASS noted that additional sources of funding could include the City of Lowell or UMASS. UMASS currently has popular programs that get students and others out on the water, but these programs do not presently provide access to waters adjacent to the campus. Boott is not willing to consider this due to the likely substantial cost of construction and the potential impact on Project generation caused by the backwatering effect of the structure.

Boott noted if they were to provide scheduled whitewater releases they would provide the releases by reducing generation or shutting down the powerhouse. Boaters noted that Boott should not schedule any releases on the same days as releases on the Deerfield River (32 days a year). Participants asked if there were any concerns with whitewater releases during the fish passage season, which generally runs from late April through mid-July. Boott clarified that during settlement discussions with the fishery agencies, Boott inquired whether the agencies would have any concerns if whitewater releases were provided during the fish passage season, and the agencies did not express any concerns. A boater noted it is helpful to have flow information publicly available if Boott does not intend on providing specific controlled releases.

The Study Working Group originally decided flow ranges from 2,500 to 8,000 in the bypassed reach were optimal to perform the study for three flows. Study participants noted that while they preferred the second flow, they would want to boat the bypassed reach at a lower flow to complete their assessment. The study participants agreed they would need to boat the bypassed reach at a lower flow (around 2,500 cfs). Due to the weather, participants agreed that the low flow run was likely to happen in early spring of 2023.

## 6 Analysis and Discussion

Boott conducted a Whitewater Boating and Access Study at the Project to evaluate the feasibility of whitewater boating in the 3,500-foot-long stretch of the Merrimack River

between the Project's Pawtucket Dam and the confluence below the powerhouse. To support this evaluation, Boott followed the *Whittaker et al.* (2005) methodology and conducted a step-wise study.

In accordance with the SPD, Boott completed all primary planning and preparation activities for the Whitewater Boating and Access Study. Primary planning and preparation activities for the Whitewater Boating and Access Study were: (1) Literature Review; (2) formation of a Study Working Group and identification of volunteers to participate in whitewater release evaluations; (3) identification of appropriate put-in and take-out locations for on-water evaluations; (4) development of a safety plan; (5) determination of method for verifying flows in the Project's bypass reach; and (6) development of survey forms to be used in the execution of the flow evaluations.

The literature review documented there are 52 whitewater opportunities within 60 miles and there are little documented whitewater opportunities in the immediate Project area with the exception of a reach on the Concord River. The flow analysis analyzed and reviewed hydrology information as it relates to whitewater and any operational constraints and safety concerns. After review of the Whitewater Flow Documentation Report and consultation with stakeholders, the Study Working Group decided to focus on bypass flows ranging from 2,500 cfs to 8,600 cfs. Assuming the Project is reaching its maximum hydraulic capacity of 6,600 cfs, the ideal Merrimack River flow range to perform the study was approximately 8,000 cfs to 10,000 cfs. It was found that the Project experiences average Merrimack River flows within this range in early to late spring, and during the recreation season (May-October), May, June, July, and October have at least a 10% exceedance of these flows.

Based on results from the on-water assessment conducted on November 19, 2022, participants indicated that the whitewater experience in the Lowell bypassed reach would be ideal for intermediate boaters (at least Class III whitewater) depending on craft used and location within the reach. Overall, participants the bypassed reach to be fun at the 6,700 cfs flow and indicated they would probably or definitely return in the future if this flow was available. Safety concerns highlighted were the weirs and the sharp shale bedrock with the potential to overturn boats or trapping a boater via recirculation. Although the put-in and take-out locations were rated as generally acceptable, the put-in is located in a restricted area and would only be available to boaters from May 15 – October 15 when flows in the Merrimack River are less than 3,500 cfs. Other put-in options were discussed and their difficulties were identified.

The Study participants agreed they would need to boat the bypassed reach at a lower flow (around 2,500 cfs in the bypassed reach). Due to the weather, participants agreed that the low flow run was likely to happen in early spring of 2023.

## 7 Agency Correspondence

A summary of correspondence and consultation related to the Whitewater Boating and Access Study is presented in Table 7-1. Appendix A provides copies of relevant correspondence.

**Table 7-1 Summary of Consultation and Correspondence**

Date	From	To	Subject
July 24, 2019	HDR, Boott	AW, NPS, MADCR	Invitation to Participate In Study Working Group
July 31, 2019	American Whitewater	HDR and Boott	Logistics regarding Whitewater Boating Study
July 31, 2019	HDR, Boott	American Whitewater	Logistics regarding Whitewater Boating Study
August 2, 2019	Boott	NPS, Lowell Land Trust, Lowell Fire Department	Logistics regarding Study Working Group Site Visit
October 28, 2019	HDR and Boott	Study Working Group	Whitewater Flow Documentation Plan
November 12, 2019	AW	HDR and Boott	Comments on the Whitewater Flow Documentation Plan
May 8, 2020	HDR	AW	Logistics on the Whitewater Boating Study
May 14, 2020	HDR	AW	Redistribution of Whitewater Boating Study Documents
July 29, 2020	AW	HDR, Boott	Logistics on the Whitewater Boating Study
July 31, 2020	HDR, Boott	AW	Logistics on the Whitewater Boating Study
August 21, 2020	HDR, Boott	AW	Distribution of Whitewater Flow Documentation Report
October 13, 2020	NPS	HDR, Boott	Whitewater Boating and Access Study implementation
October 13, 2020	HDR, Boott	NPS, Lowell Trust, Zoar Outdoor	Whitewater Boating and Access Study implementation
October 26, 2020	HDR, Boott	AW	Whitewater Boating and Access Study implementation
October 26, 2020	AW	HDR, Boott	Whitewater Boating and Access Study implementation
April 19, 2021	AW	Boott, HDR	Whitewater Boating and Access Study implementation
April 20, 2021	AW	Boott, HDR	Whitewater Boating and Access Study implementation
May 10, 2021	AW	Boott	Whitewater Boating and Access Study implementation
May 13, 2021	Boott	AW	Whitewater Boating and Access Study implementation
April 11, 2022	AW	Boott	Whitewater Boating and Access Study implementation

Date	From	To	Subject
April 11, 2022	Boott	AW	Whitewater Boating and Access Study implementation
November 15, 2022	AW	Boott and Study Participants	Whitewater Boating and Access Study implementation
November 17, 2022	Boott	AW and Study Participants	Whitewater Boating and Access Study implementation
November 21, 2022	AW	Boott	Whitewater Boating and Access Study Followup

## 8 Variances from FERC-Approved Study Plan

The Whitewater Boating and Access Study has experienced delays in completion but otherwise has been conducted in full conformance with the Commission’s SPD. As noted above, Boott will coordinate with AW in to implement a third test flow of approximately 2,500 cfs during the spring of 2023.

## 9 Literature Cited

American Whitewater (AW). 2021. American Whitewater Comments on Draft License Application for the Lowell Hydroelectric Project (FERC Project P-2790). Filed with the Federal Energy Regulatory Commission.

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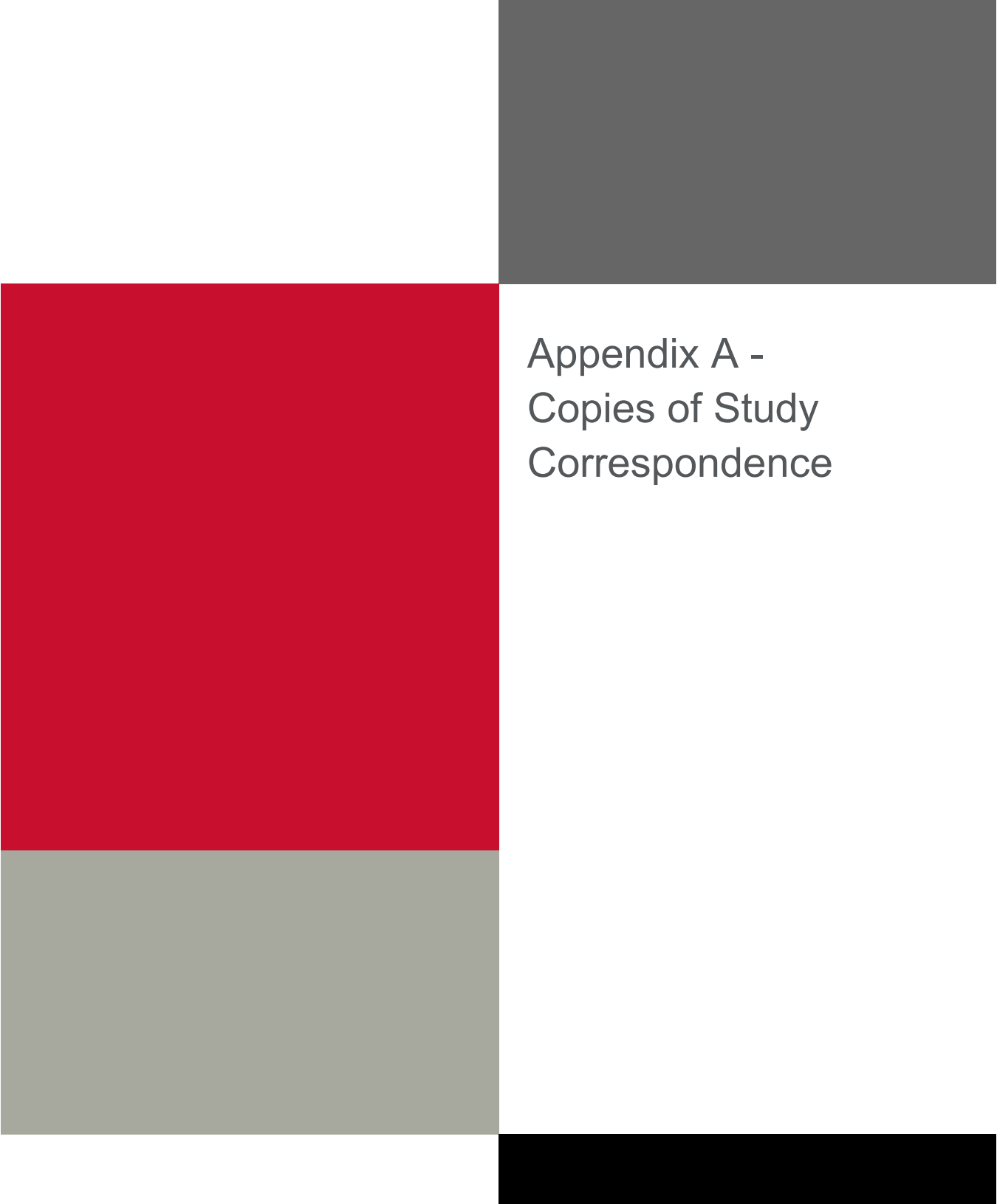
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## Appendix A - Copies of Study Correspondence

## Iffert, Kelsey

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**From:** Quiggle, Robert  
**Sent:** Wednesday, July 24, 2019 10:21 AM  
**To:** Bob Nasdor (bob@americanwhitewater.org); celeste\_bernardo@nps.gov; steve.carlin@state.ma.us  
**Cc:** Christine\_bruins@nps.gov; Anderson, Elise (EGP North America); 'Kevin.Webb@enel.com'; MacVane, Kelly; Scott, Kelsey; Gibson, Jim  
**Subject:** Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study  
**Attachments:** 20190724 Lowell Whitewater Boating Study Working Group Invite.pdf

Dear Stakeholders:

Boott Hydropower, LLC, a subsidiary of Enel Green Power North America, is pursuing a new license from the Federal Energy Regulatory Commission (FERC) for the Lowell Hydroelectric Project (FERC No. 2790) (Project) located along the Merrimack River in Middlesex County, Massachusetts, and in Hillsborough County, New Hampshire. In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study in the Project's bypassed reach located in the City of Lowell. On behalf of Boott, we are inviting your participation in an upcoming Whitewater Boating and Access Study Working Group site visit to the Project on August 8, 2019. The site visit is an important component of the study and will be an opportunity to discuss study logistics, volunteer participation, safety, boater access, boatability, flows in the bypassed reach, and survey instruments. Additional details regarding the August 8, 2019 site visit are presented in the attached letter.

Should you have any questions regarding the upcoming site visit, please contact Mr. Kevin Webb, Enel Hydro Licensing Manager, at 978-935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
Robert.Quiggle@hdrinc.com

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)



**Boott Hydropower, LLC**

A Subsidiary of Enel Green Power North America, Inc.

100 Brickstone Square, Suite 300 – Andover, MA 01810 – USA  
T +1 978 681 1900 – F +1 978 681 7727

*Via Email and Post*

July 24, 2019

Mr. Robert Nasdor  
NE Stewardship Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

Ms. Celeste Bernardo  
Superintendent  
Lowell National Historic Park  
US National Park Service  
67 Kirk Street  
Lowell, MA 01852  
[celeste\\_bernardo@nps.gov](mailto:celeste_bernardo@nps.gov)

Mr. Steve Carlin  
Park Supervisor  
Lowell Heritage State Park  
Massachusetts Department of Conservation & Recreation  
160 Pawtucket Blvd.  
Lowell, MA 01854  
[steve.carlin@state.ma.us](mailto:steve.carlin@state.ma.us)

Mr. George Rose  
Deputy Director  
Office of Emergency Management  
The City of Lowell Fire Department  
JFK Civic Center  
99 Moody Street  
Lowell, MA 01852

**Re: Lowell Hydroelectric Project (FERC No. 2790-072);  
Whitewater Boating and Access Study**

Dear Stakeholders:

Boott Hydropower, LLC (Boott), a subsidiary of Enel Green Power North America, Inc. (Enel), is the Licensee and owner of the 22.4 megawatt Lowell Hydroelectric Project (FERC No. 2790) (Project or Lowell Project). The Lowell Project is located on the Merrimack River in Middlesex County, Massachusetts, and in Hillsborough County, New Hampshire. The existing license for the Project was issued by the Federal Energy Regulatory Commission (FERC or Commission) with an effective date of May 1, 1973. The existing license expires on April 30, 2023. Accordingly, Boott is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations Part 5.

In accordance with the ILP, Boott developed a Pre-Application Document (PAD) and Notice of Intent (NOI) which were filed with the Commission on April 30, 2018 to initiate the formal relicensing process. By letter dated August 8, 2018, American Whitewater (AW) provided comments on the PAD and NOI and requested that Boott undertake a controlled flow release whitewater study in support of Project relicensing. Pursuant

to the requirements of the ILP, Boott developed a Proposed Study Plan (PSP) that was filed with the Commission on September 28, 2018. In the PSP, Boott proposed a Whitewater Boating and Access Study to assess the Project's bypass reach for whitewater boating and boater accessibility. A revised Whitewater Boating and Access Study plan was filed in Boott's January 28, 2019 Revised Study Plan (RSP) for Project relicensing. As described in the RSP, Boott proposed to conduct a Whitewater Boating and Access Study based on the guidance provided in *Flows and Recreation: A Guide to Studies for River Professionals*<sup>1</sup>. FERC issued the Study Plan Determination (SPD) for the Project on March 13, 2019. The Commission's SPD approved the Whitewater Boating and Access Study plan without modifications.

As described in the approved Whitewater Boating and Access Study plan, Boott has proposed to form a Whitewater Boating and Access Study Working Group (Working Group) to assist in study planning and coordination and to identify volunteer boaters to participate in this study. As an initial step in the planning process, Boott is inviting potentially interested stakeholders to participate in a Working Group site visit at the Project to discuss the study schedule and logistics, volunteer participation, general safety, flow releases, and the survey forms included as appendices D, E, and F of the RSP. During this site visit, the Working Group will also conduct a reconnaissance of the Project's bypass reach to identify site-specific safety concerns and access areas.

**Boott invites stakeholders to participate in a Working Group site visit at the Project on August 8, 2019 from 9:00 AM until 12:00 PM.** Please notify the undersigned at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com) if you intend to participate in the Working Group site visit or if you would like to suggest a different date and/or time. Parties interested in participating should meet at the Project's E.L. Field Powerhouse located at 145 Pawtucket Street, Lowell, Massachusetts 01854. Please wear sturdy footwear; no sandals, open-toed shoes, or shorts.

At this time, Boott is not aware of other stakeholders or organizations with an interest in participating in the Working Group. If your office knows of any additional stakeholders or organizations who should be invited to participate, Boott respectfully requests that you notify the undersigned via email at your earliest convenience so that they can be invited to participate in the site visit.

On behalf of Boott, I appreciate the opportunity to consult with you, and we look forward to meeting with you in August to discuss the upcoming Whitewater Boating and Access Study. Please do not hesitate to contact me at (978) 935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com) if you have any questions concerning this study or Project relicensing.

Sincerely,  
**Boott Hydropower, LLC**



Kevin M. Webb  
Hydro Licensing Manager

Cc: E. Anderson (Enel)  
Christine Bruins (NPS)  
R. Quiggle (HDR)

---

<sup>1</sup> Whittaker. (2005). *Flows and Recreation: A Guide to Studies for River Professionals*. Washington, DC: Hydropower Reform Coalition and National Park Service - Hydropower Recreation Assistance.



## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Wednesday, July 31, 2019 11:24 AM  
**To:** Bob Nasdor; Webb, Kevin (EGP North America)  
**Cc:** Anderson, Elise (EGP North America); Scott, Kelsey  
**Subject:** RE: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Thanks, Bob. We are continuing to do outreach to the invited participants, and we will let you know when we have a response.

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
Robert.Quiggle@hdrinc.com

[hdrinc.com/follow-us](https://www.hdrinc.com/follow-us)

---

**From:** Bob Nasdor [mailto:[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)]  
**Sent:** Wednesday, July 31, 2019 6:48 AM  
**To:** Webb, Kevin (EGP North America) <[kevin.webb@enel.com](mailto:kevin.webb@enel.com)>; Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Cc:** Anderson, Elise (EGP North America) <[elise.anderson@enel.com](mailto:elise.anderson@enel.com)>  
**Subject:** Re: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

We need to firm up whether this is happening on the 8th by Friday or wise postpone the meeting to another week.

Robert Nasdor  
American Whitewater  
Northeast Stewardship & Legal Director  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
617-584-4566  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

---

**From:** Webb, Kevin (EGP North America) <[Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com)>  
**Sent:** Friday, July 26, 2019 9:58:18 AM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Bob Nasdor <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Cc:** Anderson, Elise (EGP North America) <[elise.anderson@enel.com](mailto:elise.anderson@enel.com)>  
**Subject:** RE: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Thanks Rob. Either of those days would work for me.

---

**From:** Quiggle, Robert [mailto:[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)]  
**Sent:** Friday, July 26, 2019 9:52 AM  
**To:** Bob Nasdor

**Cc:** Webb, Kevin (EGP North America); Anderson, Elise (EGP North America)

**Subject:** RE: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Bob:

I haven't had any additional feedback, but I will let you know when we hear back from the group. Copying Kevin and Elise with Enel here so that they can stay in the loop for planning purposes.

Thanks,

**Robert Quiggle**, RPA

*Regulatory and Environmental Section Manager*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

---

**From:** Bob Nasdor [<mailto:bob@americanwhitewater.org>]

**Sent:** Thursday, July 25, 2019 7:51 AM

**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>

**Subject:** Re: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Any feedback from others on the meeting? My first choice would be on the 9th, second choice on the afternoon of the 8th. Thanks

Bob

Robert Nasdor  
American Whitewater  
Northeast Stewardship & Legal Director  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
617-584-4566  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

---

**From:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>

**Sent:** Wednesday, July 24, 2019 1:03:16 PM

**To:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>

**Subject:** RE: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

No problem, Bob. See you next month

**Robert Quiggle**, RPA

*Regulatory and Environmental Section Manager*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

**From:** Bob Nasdor | AW [<mailto:bob@americanwhitewater.org>]  
**Sent:** Wednesday, July 24, 2019 12:58 PM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Subject:** Re: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Oops. Wrong year. 2020. That should work for me.

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

On Wed, Jul 24, 2019 at 12:42 PM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

Bob:

You may be looking at the wrong month (maybe June?); August 8 is a Thursday.

I think this will be a good opportunity for everyone to really have a look at the reach together and work out some of the logistics. Looking forward to meeting with you at Lowell.

Thanks,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

**From:** Bob Nasdor | AW [<mailto:bob@americanwhitewater.org>]  
**Sent:** Wednesday, July 24, 2019 12:37 PM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Subject:** Re: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Hi Rob,

Thanks for sending this. Looking forward to the meeting. This is scheduled for Saturday, August 8th? I would have no objections to this taking place on Friday August 7th if that's better for others.

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

On Wed, Jul 24, 2019 at 10:20 AM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

Dear Stakeholders:

Boott Hydropower, LLC, a subsidiary of Enel Green Power North America, is pursuing a new license from the Federal Energy Regulatory Commission (FERC) for the Lowell Hydroelectric Project (FERC No. 2790) (Project) located along the Merrimack River in Middlesex County, Massachusetts, and in Hillsborough County, New Hampshire. In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study in the Project's bypassed reach located in the City of Lowell. On behalf of Boott, we are inviting your participation in an upcoming Whitewater Boating and Access Study Working Group site visit to the Project on August 8, 2019. The site visit is an important component of the study and will be an opportunity to discuss study logistics, volunteer participation, safety, boater access, boatability, flows in the bypassed reach, and survey instruments. Additional details regarding the August 8, 2019 site visit are presented in the attached letter.

Should you have any questions regarding the upcoming site visit, please contact Mr. Kevin Webb, Enel Hydro Licensing Manager, at 978-935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Friday, August 2, 2019 2:11 PM  
**To:** Bob Nasdor (bob@americanwhitewater.org); celeste\_bernardo@nps.gov; steve.carlin@state.ma.us; jcalvin@lowelllandtrust.org; Christine\_bruins@nps.gov  
**Cc:** Anderson, Elise (EGP North America); 'Kevin.Webb@enel.com'; Battaglia, Brett; Scott, Kelsey; Gibson, Jim; Jones, Scott  
**Subject:** RE: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Dear Stakeholders:

Based on feedback from American Whitewater and the National Park Service, we are confirming the Whitewater Boating and Access Study Working Group site visit at the Lowell Hydroelectric Project on August 8, 2019. Participants indicated that an afternoon meeting would be best; accordingly, we are inviting interested stakeholders to **meet at 12 PM on Thursday, August 8, 2019 at the E.L. Field Powerhouse** located at 145 Pawtucket Street, Lowell, Massachusetts 01854. We expect the site visit will last about three hours. As a reminder, please wear sturdy footwear; no sandals, open-toed shoes, or shorts. Should you have any questions about the site visit, please contact me at the phone number or email address below, or contact Mr. Kevin Webb, Enel Hydro Licensing Manager, at 978-935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
Robert.Quiggle@hdrinc.com

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

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**From:** Quiggle, Robert  
**Sent:** Wednesday, July 24, 2019 10:21 AM  
**To:** Bob Nasdor (bob@americanwhitewater.org) ; 'celeste\_bernardo@nps.gov' ; 'steve.carlin@state.ma.us'  
**Cc:** 'Christine\_bruins@nps.gov' ; Anderson, Elise (EGP North America) ; 'Kevin.Webb@enel.com' ; MacVane, Kelly ; Scott, Kelsey ; Gibson, James (Jim.Gibson@hdrinc.com)  
**Subject:** Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study

Dear Stakeholders:

Boott Hydropower, LLC, a subsidiary of Enel Green Power North America, is pursuing a new license from the Federal Energy Regulatory Commission (FERC) for the Lowell Hydroelectric Project (FERC No. 2790) (Project) located along the Merrimack River in Middlesex County, Massachusetts, and in Hillsborough County, New Hampshire. In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study in the Project's bypassed reach located in the City of Lowell. On behalf of Boott, we are inviting your participation in an upcoming Whitewater Boating and Access Study Working Group site visit to the Project on August 8, 2019. The site visit is an important component of the study and will be an opportunity to discuss study logistics,

volunteer participation, safety, boater access, boatability, flows in the bypassed reach, and survey instruments. Additional details regarding the August 8, 2019 site visit are presented in the attached letter.

Should you have any questions regarding the upcoming site visit, please contact Mr. Kevin Webb, Enel Hydro Licensing Manager, at 978-935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
**D** 315.414.2216 **M** 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Monday, October 28, 2019 3:25 PM  
**To:** Bob Nasdor (bob@americanwhitewater.org); celeste\_bernardo@nps.gov; Bruins, Christine; Cooksey, William (DCR); John Aziz; Hoffmann, Peter (DCR); 'bruce@zoaroutdoor.com'; kevin@zoaroutdoor.com; Rose, George; CMcCall@lowellma.gov  
**Cc:** 'Kevin.Webb@enel.com'; Anderson, Elise (EGP North America); Scott, Kelsey  
**Subject:** Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study  
**Attachments:** 20191028 Lowell Whitewater Flow Documentation Plan.pdf  
**Follow Up Flag:** Follow up  
**Flag Status:** Completed

### Working Group Participants:

Boott Hydropower, LLC (Boott) is pursuing a new license from the Federal Energy Regulatory Commission (FERC) for the continued operation of the Lowell Hydroelectric Project (FERC No. 2790)(Project) located along the Merrimack River. In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study as approved in FERC's March 13, 2019 Study Plan Determination for the Project. Pursuant to the approved study plan, Boott met with the Whitewater Boating and Access Study Working Group (Working Group) at the Project on August 8, 2019 to coordinate study planning, identify potential volunteers to participate in controlled flow releases, and to identify potential put-in and take-out locations.

During the August 8, 2019, meeting and site visit, the Working Group indicated a need to visually document a range of flows in the Project's bypass reach in order to assist the participants in identifying which flows to select for the controlled flow releases. Accordingly, Boott has developed the attached Whitewater Flow Documentation Plan that describes the methods for documenting a range of flow conditions in the bypass reach and consulting with the Working Group to identify the appropriate flows for the controlled flow releases.

In order to facilitate implementation of the Whitewater Flow Documentation Plan, Boott is seeking your written (email) concurrence with the proposed plan by November 11, 2019. If you have questions or need additional information, please contact Kevin Webb, Boott Hydro Licensing Manager, at (978) 935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
Robert.Quiggle@hdrinc.com

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)



**Boott Hydropower, LLC**

A Subsidiary of Enel Green Power North America, Inc.

100 Brickstone Square, Suite 300 – Andover, MA 01810 – USA  
T +1 978 681 1900 – F +1 978 681 7727

*Via Email Distribution*

October 28, 2019

**To: Whitewater Boating and Access Working Group**

**Re: Lowell Hydroelectric Project (FERC No. 2790-072);  
Whitewater Boating and Access Study  
Whitewater Flow Documentation Plan**

Dear Whitewater Boating and Access Working Group:

Boott Hydropower, LLC (Boott), a subsidiary of Enel Green Power North America, Inc., is the Licensee and owner of the 20.2 megawatt Lowell Hydroelectric Project (FERC No. 2790) (Project). The Project is located on the Merrimack River in Middlesex County, Massachusetts, and in Hillsborough County, New Hampshire. The existing license for the Project was issued by the Federal Energy Regulatory Commission (FERC or Commission) with an effective date of May 1, 1973. The existing license expires on April 30, 2023. Accordingly, Boott is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process, as described at 18 Code of Federal Regulations Part 5.

In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study as approved in the Commission's March 13, 2019 Study Plan Determination for the Project. Pursuant to the approved study plan, Boott met with the Whitewater Boating and Access Study Working Group (Working Group) at the Project on August 8, 2019 to coordinate study planning, identify potential volunteers to participate in controlled flow releases, and to identify potential put-in and take-out locations. During the August 8, 2019, meeting and site visit, the Working Group indicated a need to visually document a range of flows in the Project's bypass reach in order to assist the participants in identifying which flows to select for the controlled flow releases. Since the Working Group participants have had limited experience boating the bypass reach, participants could not make informed choices on which flows would be appropriate for boating. Accordingly, Boott has developed the enclosed Whitewater Flow Documentation Plan that describes the methods for documenting a range of flow conditions in the bypass reach and consulting with the Working Group to identify the appropriate flows for the controlled flow releases.

Boott is proposing to document flows in the bypass reach using cellular-enabled trail cameras and to provide the Working Group with a summary report that presents photographs of the bypass reach under various flow conditions. To capture a wide range of flow conditions, Boott is proposing to deploy cellular-enabled trail cameras from approximately December 1, 2019 through May 15, 2020. The cameras will record photos on an hourly basis during daylight hours, and the photographs will be date- and time-stamped. In the summary report, Boott will present representative photographs at approximately 500 cubic feet-per-second (cfs) intervals (e.g., 500 cfs, 1,000 cfs, 1,500 cfs, etc.) along with the corresponding river flow data.

As described in the enclosed plan, Boott will consult with the Working Group based on the Whitewater Flow Documentation Report to determine the appropriate flows for the controlled flow releases. To facilitate the flow documentation and consultation, Boott anticipates conducting the controlled flow releases once the Working Group has had the opportunity to review the Whitewater Flow Documentation Report and after fish passage operations at the Project end around July 15, 2020. The timing of the controlled flow releases will be dependent on available flows in the Merrimack River.

At this time, Boott is seeking your concurrence regarding the Whitewater Flow Documentation Plan and the general schedule for documenting flows and conducting the controlled flow releases. To facilitate timely deployment of the trail cameras, Boott respectfully requests your written (email) concurrence on or



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before November 11, 2019. Please send correspondence to the undersigned at the email address provided below.

On behalf of Boott, I look forward to continued discussions and consultation with the Working Group regarding this study. Please do not hesitate to contact me at (978) 935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com) if you have any questions concerning this study or Project relicensing.

Sincerely,  
**Boott Hydropower, LLC**



Kevin M. Webb  
Hydro Licensing Manager

Encls.

Cc: E. Anderson (Boott)  
R. Quiggle (HDR)

**Lowell Hydroelectric Project (FERC No. 2790- 072)  
Whitewater Boating and Access Study Working Group**

**Email Distribution List**

---

Mr. Robert Nasdor  
NE Stewardship Director  
American Whitewater  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

Ms. Celeste Bernardo  
Superintendent  
Lowell National Historic Park  
US National Park Service  
[celeste\\_bernardo@nps.gov](mailto:celeste_bernardo@nps.gov)

Ms. Christine Bruins  
Community Planner  
Lowell National Historic Park  
US National Park Service  
[christine\\_bruins@nps.gov](mailto:christine_bruins@nps.gov)

Mr. William Cooksey  
Massachusetts Department of Conservation and Recreation  
Program Manager  
[william.cooksey@state.ma.us](mailto:william.cooksey@state.ma.us)

Mr. John Aziz  
Massachusetts Department of Conservation and Recreation  
Forest and Park Supervisor  
[John.Aziz@mass.gov](mailto:John.Aziz@mass.gov)

Mr. Peter Hoffmann  
Massachusetts Department of Conservation and Recreation  
Forest and Park Regional Coordinator  
[peter.hoffmann@state.ma.us](mailto:peter.hoffmann@state.ma.us)

Mr. Bruce Lessels  
President  
Zoar Outdoor  
[bruce@zoaroutdoor.com](mailto:bruce@zoaroutdoor.com)

Mr. Kevin McMillan  
Director of Guided Programs  
Zoar Outdoor  
[kevin@zoaroutdoor.com](mailto:kevin@zoaroutdoor.com)

Mr. George Rose  
Deputy Director  
Office of Emergency Management  
City of Lowell Fire Department  
[GRose@lowellma.gov](mailto:GRose@lowellma.gov)

Ms. Christine McCall  
Senior Planner  
City of Lowell Dept. of Planning and Development  
[CMcCall@lowellma.gov](mailto:CMcCall@lowellma.gov)



# Whitewater Flow Documentation Plan

Lowell Hydroelectric Project  
(FERC No. 2790)

October 2019

Prepared by:



Prepared for:

Boott Hydropower, LLC  
Andover, Massachusetts



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- 1 Introduction and Background ..... 1
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- 3 Consultation with Working Group ..... **Error! Bookmark not defined.**

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## List of Acronyms

Boott	Boott Hydropower, LLC
CFR	Code of Federal Regulations
cfs	cubic feet-per-second
FERC	Federal Energy Regulatory Commission (or Commission)
ILP	Integrated Licensing Process
MW	megawatt
NPS	National Park Service
Project	Lowell Hydroelectric Project (or Lowell Project)
RSP	Revised Study Plan
SPD	Study Plan Determination
Study	Whitewater Boating and Access Study
USGS	U.S. Geological Survey
Working Group	Whitewater Boating and Access Study Working Group

# 1 Introduction and Background

Boott Hydropower, LLC (Boott), a subsidiary of Enel Green Power North America, Inc., is the Licensee and operator of the 20.2 megawatt (MW) Lowell Hydroelectric Project (FERC Project No. 2790) (Project or Lowell Project). The Project is located along the Merrimack River in Middlesex County, Massachusetts and in Hillsborough County, New Hampshire. Boott owns and operates the Project as an independent power producer.

The existing license for the Project was issued by the Federal Energy Regulatory Commission (FERC or Commission) with an effective date of May 1, 1973. The existing license expires on April 30, 2023. Accordingly, Boott is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5. As proposed in Boott's January 28, 2019 Revised Study Plan (RSP) and approved in the Commission's March 13, 2019 Study Plan Determination (SPD), Boott will conduct a Whitewater Boating and Access Study (Study) in support of Project relicensing.

## 1.1 Whitewater Boating and Access Study Overview

The Lowell Project is a run-of-river hydropower plant. When river flows exceed the hydraulic capacity of the two generating units located at the E.L. Field Powerhouse (combined capacity of approximately 8,000 cubic feet per second [cfs]), excess flows (up to approximately 2,000 cfs) are routed through the downtown Lowell canal system and through the canal units. When inflows exceed the 10,000 cfs capacity of the generating units and canals, all excess flows are passed over the Pawtucket Dam spillway into the bypass reach. The Project has the potential to affect whitewater boating opportunities in the bypass reach when flows are less than 10,000 cfs.

As described in the approved Revised Study Plan, the goal of the Study is to assess the Project's bypass reach for whitewater boating and access opportunities. The objectives of the study are as follows:

- Assess a range of flows suitable for whitewater boating opportunities in the Project's bypass reach;
- Assess the frequency, timing, duration, and predictability of paddling flows under current and proposed Project operations;
- Define potential locations for put-in and take-out points for boaters; and,
- Assess the flow information needs for whitewater boating and the current and potential flow information distribution system.

In accordance with the approved study plan, Boott met with the Whitewater Boating and Access Study Working Group (Working Group) at the Project on August 8, 2019 to coordinate study planning, identify potential volunteers to participate in controlled flow releases, and to identify potential put-in and take-out locations.

During the August 8, 2019, meeting and site visit, the Working Group indicated a need to visually document a range of flows in the Project's bypass reach in order to assist the participants in identifying which flows to select for the controlled flow releases. Since the Working Group participants had limited experience boating the bypass reach, participants could not make informed choices on which flows would be appropriate for boating. Accordingly, Boott has developed this Whitewater Flow Documentation Plan that describes the methods for documenting a range of flow conditions in the bypass reach and consulting with the Working Group to identify the appropriate flows for the controlled flow releases.

## 2 Methodology

To document the whitewater conditions in the bypass reach under various flows, Boott proposes to deploy cellular-enabled trail cameras to capture time- and date-stamped images of the bypass reach on an hourly basis during daylight hours.

In general, the average flows at the Project from June through February are within the operating range of the Project's E.L. Field Powerhouse and the units along the downtown canal system; however, seasonal high water events (in excess of 10,000 cfs) do occasionally occur in the late fall. Boott also maintains flows in the canal system to facilitate National Park Service (NPS) boat tours from May 15 through October 15, annually<sup>1</sup>. Therefore, to capture flows in the bypass reach during months where higher flows typically occur (March through May), and to document a broad range of flow conditions, Boott is proposing to deploy cellular-enabled trail cameras from approximately December 1, 2019 through May 15, 2020.

Boott will deploy cellular-enabled trail cameras at four locations along the bypass reach to capture images of different sections of the reach under the various flows conditions. As shown below in Figure 2-1, Boott is proposing to deploy cameras at the following four locations:

- The Fish Ladder at the Pawtucket Dam;
- A location along the bypass reach located upstream from the University Avenue Bridge;
- A location along the bypass reach located downstream from the University Avenue Bridge; and
- The E.L. Field Powerhouse.

To verify the flows represented by the photographs, Boott will use Project operations data in combination with U.S. Geological Survey (USGS) information. There is an

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<sup>1</sup> Although there is no formal flow requirement for the canal system, Boott maintains an operating agreement with the NPS to allow tour boat operations to navigate the canal system. Boott maintains canal water levels within appropriate limits during the May 15 to October 15 tour boat operating season. Operations are maintained through a series of locks and gatehouses along the Canal System



existing USGS gage installed approximately 2.1 miles downstream from the Pawtucket Dam (USGS No. 01100000, Merrimack River BL Concord River at Lowell, MA). There is also an existing USGS gage installed on the Concord River (USGS No. 01099500, Concord R below R Meadow Brook, at Lowell, MA). Flows from the USGS Gage No. 01099500 will be subtracted from the flows at USGS Gage No. 01100000 to calculate flows at the Project. Flows in the bypass can be estimated by applying the weir formula to the depth of flow over each crest gate zone (plus any flow provided via the fish ladder). Bypass flows can also be estimated by subtracting the sum of flow at the E.L. Field Powerhouse and through the canal system from the inflow calculated from the USGS gages as described above.

### 3 Consultation with Working Group

Boott will prepare a summary Whitewater Flow Documentation Report that provides photographic documentation of a range of flows in the Project's bypass reach. Boott anticipates providing images and verified flows in intervals of approximately 500 cfs (e.g., 500 cfs, 1,000 cfs, 1,500 cfs, etc.). Boott also intends to provide images of verified flows at the lowest and highest flows observed from December 1 through May 15. Once the Working Group has had the opportunity to review the Whitewater Flow Documentation Report, Boott anticipates conducting the controlled flow releases after fish passage operations end around July 15, 2020, to avoid any interference with fish passage studies scheduled for the Spring/Summer 2020 fish passage season.

Based on the information presented in the Whitewater Flow Documentation Report, Boott will consult with the Working Group to select the controlled releases to be provided during the Study in 2020. The timing of the controlled flow releases will be dependent on available flows in the Merrimack River. Each of the controlled releases will be provided for approximately 3 hours. This will afford participants the opportunity to boat the reach and make multiple passes at each flow so that participants are able to evaluate different lines through various portions of the study reach. Pre, post, and comparative surveys will be provided to controlled flow release participants for their completion during this portion of the study (draft pre, post, and comparative surveys can be found in Appendices D through F of the RSP).

Lowell Hydroelectric Project  
Whitewater Flow Documentation Plan

Figure 2-1. Locations of Cellular-Enabled Cameras



## Iffert, Kelsey

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Tuesday, November 12, 2019 10:17 AM  
**To:** Quiggle, Robert  
**Cc:** celeste\_bernardo@nps.gov; Bruins, Christine; Cooksey, William (DCR); John Aziz; Hoffmann, Peter (DCR); bruce@zoaroutdoor.com; kevin@zoaroutdoor.com; Rose, George; CMcCall@lowellma.gov; Kevin.Webb@enel.com; Anderson, Elise (EGP North America); Scott, Kelsey; Joe t  
**Subject:** Re: Lowell Hydroelectric Project (FERC No. 2790-072) -- Whitewater Boating and Access Study  
**Attachments:** Lowell Whitewater Boating Study Documentation Plan Comments.pdf  
**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Dear Rob,

Thank you for the opportunity to comment on the implementation plan for the whitewater boating study. Attached are our comments.

Best regards,  
Bob

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

On Mon, Oct 28, 2019 at 3:24 PM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

### Working Group Participants:

Boott Hydropower, LLC (Boott) is pursuing a new license from the Federal Energy Regulatory Commission (FERC) for the continued operation of the Lowell Hydroelectric Project (FERC No. 2790)(Project) located along the Merrimack River. In support of Project relicensing, Boott is conducting a Whitewater Boating and Access Study as approved in FERC's March 13, 2019 Study Plan Determination for the Project. Pursuant to the approved study plan, Boott met with the Whitewater Boating and Access Study Working Group (Working Group) at the Project on August 8, 2019 to coordinate study planning, identify potential volunteers to participate in controlled flow releases, and to identify potential put-in and take-out locations.

During the August 8, 2019, meeting and site visit, the Working Group indicated a need to visually document a range of flows in the Project's bypass reach in order to assist the participants in identifying which flows to select for the

controlled flow releases. Accordingly, Boott has developed the attached Whitewater Flow Documentation Plan that describes the methods for documenting a range of flow conditions in the bypass reach and consulting with the Working Group to identify the appropriate flows for the controlled flow releases.

In order to facilitate implementation of the Whitewater Flow Documentation Plan, Boott is seeking your written (email) concurrence with the proposed plan by November 11, 2019. If you have questions or need additional information, please contact Kevin Webb, Boott Hydro Licensing Manager, at (978) 935-6039 or via email at [Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com).

Thank you,

Robert Quiggle, RPA

*Regulatory and Environmental Section Manager*

HDR

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)



To: Enel Green  
From: American Whitewater  
Date: November 8, 2019  
Re: Lowell Hydroelectric Project (FERC No. 2790-072);  
Whitewater Boating and Access Study  
Whitewater Flow Documentation Plan

---

Thank you for sharing the Whitewater Flow Documentation Plan with the Whitewater Boating and Access Study Group. We appreciate your effort to develop a plan with stakeholders that will help inform the relicensing process for the Lowell Hydroelectric Project.

The purpose of the Whitewater Flow Documentation Plan is to identify a range of flows that may be evaluated during the on-water controlled flow study of the bypassed reach between the Pawtucket Dam and the Field powerhouse. This determination is being made as part of the Level II assessment following the Wittaker protocols for whitewater boating assessments.

As we have discussed, while there is some history of whitewater boating in the bypassed reach during spill events, we do not have specific information on the minimum acceptable and optimal flows for a quality whitewater boating experience. We believe that the placement of cameras at key observation points along the bypassed reach will help in the identification of target flows.

Generally speaking, we agree with the approach described in the Whitewater Flow Documentation Plan; however, we have some concerns about several of the proposed camera locations. We agree that the fish ladder camera location would be useful to show the impact of spill on fish passage facilities. It would be helpful if you could clarify the spill location in relation to the passage facilities. We would also like to better understand the impact of spill on passage under current conditions.

Below the Pawtucket Dam, the bypassed reach consists of pools, riffles and other substrates, Under different flow conditions, these features produce hydraulic features that will be evaluated during the on-water evaluation. Camera locations that show the emergence or inundation of these features will be the basis for identifying the target flows. Consequently, key observation points should be selected on this basis.

We are concerned that the proposed locations upstream and downstream of the University Avenue Bridge as well as the location at the Field Powerhouse are similar in that they appear to be pools rather than varying substrates. We would suggest adjusting these locations in order to more clearly allow for an assessment of navigability and hydraulic features at shallow areas as well such as the location between the cameras upstream and downstream of the University Avenue Bridge.

With regard to the Field Powerhouse location, it is unclear how flows from the powerhouse spillway impact on the presence of whitewater boating features in the bypassed reach. Please clarify how these flows will be documented. Similarly, we are interested in knowing how generation flows at the Field Powerhouse impact on the presence of whitewater boating features in and below the powerhouse tailrace.

While camera locations are certainly a useful way to document the impact of various flows in the bypass reach, we might also want to consider using drone footage and personal observation to better understand the impact of these flows. While we can estimate flows in the bypassed reach subtracting the Concord flows from the Merrimack, that information doesn't tell us the flow in the bypassed reach that varies depending on whether the various powerhouses are operating a full capacity and whether there is spill from the powerhouse spillways. It would be helpful if you would provide periodic real-time information on flows from the Pawtucket Dam into the bypassed reach so that we can personally observe the impact of spill at various flows.

We appreciate the opportunity to work with you to make this a successful study.

## Iffert, Kelsey

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Wednesday, May 13, 2020 1:24 PM  
**To:** Quiggle, Robert  
**Cc:** Kevin Webb; Scott, Kelsey  
**Subject:** Re: Lowell Hydroelectric Project Whitewater Boating Study

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Rob,

I'm available for a call this week to discuss the whitewater boating study tomorrow (other than mid-day) or Friday morning. Thanks for reaching out.

Bob



Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

On Fri, May 8, 2020 at 10:32 AM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

Bob:

I hope this note finds you well and that you're staying safe. I wanted to check in with you regarding the Lowell Whitewater Boating and Access Study to see if you had availability for a conference call next week. We'd like to setup a call to discuss the study preparation and logistics with American Whitewater. We'd like to keep the study planning moving so that we are able to conduct the controlled flow releases later this year.

Please let me know if there is a good time to setup a call and I will send around an Outlook invite. Looking forward to talking with you.

Thanks,

**Robert Quiggle**, RPA

*Regulatory and Environmental Section Manager*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)



## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Thursday, May 14, 2020 3:58 PM  
**To:** Kevin Webb; Bob Nasdor | AW  
**Cc:** Scott, Kelsey  
**Subject:** RE: Lowell Hydroelectric Project Whitewater Boating Study  
**Attachments:** Lowell Whitewater Boating Study Survey Forms.pdf

Bob:

In advance of our call tomorrow, I wanted to send along the Whitewater Boating Flow Study survey forms that were included in the Revised Study Plan for the Lowell Hydroelectric Project. During the Initial Study Report Meeting in March, you mentioned that there may be some additional edits that AW would like to discuss. We'd be happy to talk through those some of those edits with you on Friday.

Thanks,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

---

**From:** Kevin Webb [mailto:kwebb@centralriverspower.com]  
**Sent:** Wednesday, May 13, 2020 1:56 PM  
**To:** Bob Nasdor | AW <bob@americanwhitewater.org>; Quiggle, Robert <Robert.Quiggle@hdrinc.com>  
**Cc:** Scott, Kelsey <Kelsey.Scott@hdrinc.com>  
**Subject:** RE: Lowell Hydroelectric Project Whitewater Boating Study

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Friday would work better for me.

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Wednesday, May 13, 2020 1:24 PM  
**To:** Quiggle, Robert <Robert.Quiggle@hdrinc.com>  
**Cc:** Kevin Webb <kwebb@centralriverspower.com>; Scott, Kelsey <Kelsey.Scott@hdrinc.com>  
**Subject:** Re: Lowell Hydroelectric Project Whitewater Boating Study

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. =====

Hi Rob,

I'm available for a call this week to discuss the whitewater boating study tomorrow (other than mid-day) or Friday morning. Thanks for reaching out.

Bob



Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

On Fri, May 8, 2020 at 10:32 AM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

Bob:

I hope this note finds you well and that you're staying safe. I wanted to check in with you regarding the Lowell Whitewater Boating and Access Study to see if you had availability for a conference call next week. We'd like to setup a call to discuss the study preparation and logistics with American Whitewater. We'd like to keep the study planning moving so that we are able to conduct the controlled flow releases later this year.

Please let me know if there is a good time to setup a call and I will send around an Outlook invite. Looking forward to talking with you.

Thanks,

**Robert Quiggle**, RPA

*Regulatory and Environmental Section Manager*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311

## Appendix D. Pre-Run Survey Form



**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Pre-Run Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Affiliation:** \_\_\_\_\_  
**Home Zip Code:** \_\_\_\_\_  
**E-Mail Address:** \_\_\_\_\_

- 1) What whitewater crafts do you think are appropriate for this reach? (*Please choose all that apply*)
  - a. Hard shell kayak / C1
  - b. Inflatable kayak
  - c. Open canoe with flotation
  - d. Cataract (include length)
  - e. Self-bailing raft (include length)
  - f. Stand-up paddleboard
  - g. Other (please list)
  
- 2) What is your skill level?
  - a. Novice (comfortable running Class II whitewater)
  - b. Intermediate (comfortable running Class III whitewater)
  - c. Advanced (comfortable running Class IV whitewater)
  - d. Expert (comfortable running Class V whitewater)
  
- 3) How many years have you been whitewater boating?
  
- 4) Over the past 3 years, approximately how many days per month did you whitewater boat?

- 5) Have you ever participated in a whitewater boating study associated with the relicensing of a hydroelectric project?
- a. Yes No
  - b. If yes, when, and for which project(s)?
- 6) How many times have you boated this reach before today?
- a. If you have boated this reach before, what were the flows?
    - i. Approximately: cfs to: cfs
    - ii. What type of craft did you use? (*Please choose all that apply*)
      - 1. Hard shell kayak / C1
      - 2. Inflatable kayak
      - 3. Open canoe with flotation
      - 4. Cataract (include length)
      - 5. Self-bailing raft (include length)
      - 6. Stand-up paddleboard
      - 7. Other (please list)

***Thank You for Your Participation***

## Appendix E. Post-Run Survey Form





**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Post-Run Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Date of Run:** \_\_\_\_\_

**Flow:** \_\_\_\_\_ **cfs**

- 1) What type of craft did you use for this run?
  - a. Hard shell kayak / C1
  - b. Inflatable kayak
  - c. Open canoe with flotation
  - d. Cataraft (include length)
  - e. Self-bailing raft (include length)
  - f. Stand-up paddleboard
  - g. Other (please list)

2) Please identify the put-in and take-out locations you used for this run.

Put-in location: \_\_\_\_\_ Time: \_\_\_\_\_

Take-out location: \_\_\_\_\_ Time: \_\_\_\_\_

- 3) Please estimate the number of unintended hits, stops, boat drags, and portages you had on this run:
  - a. I accidentally hit rocks or other obstacles (but did not stop) about \_\_\_\_\_ times.
  - b. I was stopped after hitting rocks or other obstacles about \_\_\_\_\_ times (but did not have to get out of my boat to continue downstream).
  - c. I had to get out to drag or pull my boat off rocks or other obstacles about \_\_\_\_\_ times.
  - d. I had to portage around rapids or sections about \_\_\_\_\_ times.

4) How many rapids and play spots did you experience at this flow?

a. \_Rapids Play Spots

5) Please evaluate the availability of the following factors at this flow.

	<b>Totally Unacceptable</b>	<b>Unacceptable</b>	<b>Neutral</b>	<b>Acceptable</b>	<b>Totally Acceptable</b>
<b>Navigability</b>	1	2	3	4	5
<b>Challenging Technical Boating</b>	1	2	3	4	5
<b>Powerful Hydraulics</b>	1	2	3	4	5
<b>Whitewater "Play Areas"</b>	1	2	3	4	5
<b>Size/Difficulty of Rapids</b>	1	2	3	4	5
<b>Overall Whitewater</b>	1	2	3	4	5
<b>Challenge</b>	1	2	3	4	5
<b>Safety</b>	1	2	3	4	5

6) At this flow, what minimum skill level would a paddler need to be to safely paddle this reach?

- a. Beginner
- b. Novice
- c. Intermediate
- d. Advanced
- e. Expert

7) Are you likely to return for future boating if this flow were to be provided or available?

- a. Definitely no
- b. Possibly
- c. Probably
- e. Definitely yes

- 8) Was this flow optimal, or would you prefer a flow that was higher or lower than this flow?
- a. Much lower
  - b. Lower
  - c. About the same (this flow was optimal)
  - d. Higher
  - e. Much higher

9) If you feel qualified to offer an opinion of the desirability of this run at this flow using different types of crafts, please respond to the following statements.

<b>This run at this flow would work well for:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
Hard shell kayaks / C1	1	2	3	4	5
Inflatable kayaks	1	2	3	4	5
Open canoes with floatation	1	2	3	4	5
Catarafts	1	2	3	4	5
Self-bailing rafts	1	2	3	4	5
Stand-up paddleboards	1	2	3	4	5
Other (Please specify):	1	2	3	4	5

10) Did you observe or experience any significant safety issues on your run (e.g., swims, pins, wrapped boats, constructed or natural river features, etc.)? Please explain.

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11) Please use the space below to provide any other comments about your boating experience at this flow.

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***Thank You for Your Participation***

# Appendix F. Flow Comparison Survey Form



**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Comparison Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

- 1) Craft used?
  - a. Hard shell kayak / C1
  - b. Inflatable kayak
  - c. Open canoe with flotation
  - d. Cataract (include length)
  - e. Self-bailing raft (include length)
  - f. Stand-up paddleboard
  - g. Other (please list)
  
- 2) What is your skill level?
  - a. Novice (comfortable running Class II whitewater)
  - b. Intermediate (comfortable running Class III whitewater)
  - c. Advanced (comfortable running Class IV whitewater)
  - d. Expert (comfortable running Class V whitewater)

3) Which study dates/flows did you participate in? Please select from the list below.

Study Flows	Study Date	Participated	Did Not Participate
cfs			
cfs			
cfs			

4) Approximately how many times have you boated this reach before this study?

- 5) A number of factors can affect your satisfaction with a whitewater trip. How important are each of these factors to you?

	<b>Not Important</b>		<b>Somewhat Important</b>		<b>Very Important</b>
<b>Navigability</b>	1	2	3	4	5
<b>Challenging Technical Boating</b>	1	2	3	4	5
<b>Powerful Hydraulics</b>	1	2	3	4	5
<b>Whitewater "Play Areas"</b>	1	2	3	4	5
<b>Size/Difficulty of Rapids</b>	1	2	3	4	5
<b>Overall Whitewater Challenge</b>	1	2	3	4	5
<b>Safety</b>	1	2	3	4	5
<b>Crowding</b>	1	2	3	4	5
<b>Long Run(s)</b>	1	2	3	4	5
<b>Short Run(s)</b>	1	2	3	4	5
<b>Low Number of Portages</b>	1	2	3	4	5
<b>High Number of Rapids</b>	1	2	3	4	5
<b>Low Number of Rapids</b>	1	2	3	4	5
<b>Easy Access</b>	1	2	3	4	5
<b>Easy Shuttles</b>	1	2	3	4	5

- 6) Please evaluate the study flows for your craft and skill level. In making your evaluations, please consider all the flow-dependent characteristics that contribute to a high-quality trip (*note, please evaluate only the study flows that you participated in*).

	<b>cfs</b>	<b>cfs</b>	<b>cfs</b>
<b>Totally Acceptable</b>	5	5	5
<b>Acceptable</b>	4	4	4
<b>Marginal</b>	3	3	3
<b>Unacceptable</b>	2	2	2
<b>Totally Unacceptable</b>	1	1	1



- 7) Which of the following best describes your desired paddling experience (s) for this reach  
(Note, you may select more than one):

Type of Experience	Description	Desired Experience	
<b>Technical</b>	I am interested in “technical” whitewater trips at relatively low flows	Yes	No
<b>Standard</b>	I am interested in “standard” whitewater trips at relatively moderate flows	Yes	No
<b>High Challenge</b>	I am interested in “high challenge” whitewater trips at relatively high flows	Yes	No

- 8) Based on the boating trips that you participated in for this study, please specify the flow(s) that, in your opinion, provide the following for your desired experience(s) (note you can specify flows that you have not seen, but which you think would provide the following for your desired experience[s]). Please list craft, desired experience (from Question 7), and related acceptable flow. If providing input on more than one craft or type of experience, please use the back of this form.

a. What is the minimum flow needed to boat this reach in your craft?

iii. Craft: Experience: Flow: \_\_\_\_\_ cfs

b. Based on your skill level, factors that affect your satisfaction with a whitewater trip, and the flow-dependent characteristics of this reach, what is the minimum acceptable flow for this reach (the lowest flow at which you would return to paddle it)?

iv. Craft: Experience: Flow: \_\_\_\_\_ cfs

c. What is the optimal range of flows that provides the best whitewater characteristics for this run?

v. Craft: Experience: Flow: cfs to: \_\_\_\_\_ cfs

d. What is the highest safe flow for your craft and skill level?

vi. Craft: Experience: Flow: \_\_\_\_\_ cfs

- 9) Please evaluate the acceptability of current river access for your craft and skill level, assuming that no shuttle(s) are available:

	Put In	Take Out
<b>Totally Acceptable</b>	5	5
<b>Acceptable</b>	4	4
<b>Marginal</b>	3	3
<b>Unacceptable</b>	2	2
<b>Totally Unacceptable</b>	1	1

- 10) Where would you prefer to put in to and take out of this reach if suitable parking and river access were available at that location, and what type of access facilities would facilitate a high-quality paddling experience?

a. Put In Location: \_\_\_\_\_ Facilities: \_\_\_\_\_

b. Take Out Location: \_\_\_\_\_ Facilities: \_\_\_\_\_

- 11) In your experience, what whitewater reaches in the region do you find similar to this one at your optimum flow for this reach? Also, please select how often you boat these reaches.

b. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+

c. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+

d. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+

***Thank You for Your Participation***

## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Friday, July 31, 2020 9:29 AM  
**To:** Bob Nasdor | AW  
**Cc:** Kevin Webb; Richard Malloy; Scott, Kelsey  
**Subject:** RE: Lowell/Merrimack Whitewtater Study

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Bob: Good to hear from you. Let me know what would work for your schedule, and I'll try to set up a call to catch up on study plans next week. FYI, we are going through the photos from the flow documentation study now (more than 3,500) and will be putting together a report to send to you soon.

Thanks,

**Robert Quiggle**, RPA  
*Regulatory and Environmental Section Manager*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

---

**From:** Bob Nasdor | AW [mailto:[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)]  
**Sent:** Wednesday, July 29, 2020 11:46 AM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Subject:** Lowell/Merrimack Whitewtater Study

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Rob,  
We should schedule a call to set a date and discuss logistics for the whitewater boating study. Also, I would like to get the images of the different flow levels that you all collected so we can identify a flow range for the study.  
Thanks.

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater

## Iffert, Kelsey

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Wednesday, September 2, 2020 10:23 AM  
**To:** Scott, Kelsey  
**Cc:** Quiggle, Robert; Joe t  
**Subject:** Re: Lowell Whitewater Flow Documentation Plan

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

IHi Scott,  
Tuesday morning or anytime Friday would work for me. Thursday might also be possible if those times don't work. I've included Joe on the email as I'm sure he would like to participate.

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Wed, Sep 2, 2020 at 10:10 AM Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)> wrote:

Hi Bob –

Are you available later next week to discuss the Lowell Whitewater Flow Documentation Report? I can set up a meeting to discuss your review of the photos.

**Kelsey Scott, MS**

**D** 315.414.2206 **M** 315.706.5176  
[kelsey.scott@hdrinc.com](mailto:kelsey.scott@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

---

**From:** Scott, Kelsey  
**Sent:** Friday, August 21, 2020 3:44 PM  
**To:** '[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)' <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>

**Cc:** Quiggle, Robert <[robert.quiggle@hdrinc.com](mailto:robert.quiggle@hdrinc.com)>; Kevin Webb - CRP <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>

**Subject:** Lowell Whitewater Flow Documentation Plan

Bob –

I've attached the Whitewater Flow Documentation Report for your review. Let us know once you've had a chance to review the photographs and we can touch base on next steps for the Whitewater Boating and Access Study at Lowell.

Thank You –

**Kelsey Scott, MS**

*Assistant Regulatory Specialist*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, NY 13212

**D** 315.414.2206 **M** 315.706.5176  
[kelsey.scott@hdrinc.com](mailto:kelsey.scott@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

## Iffert, Kelsey

---

**From:** Bruins, Christine A <Christine\_Bruins@nps.gov>  
**Sent:** Tuesday, October 13, 2020 10:43 AM  
**To:** brian@zoaroutdoor.com  
**Cc:** Kevin Webb; Quiggle, Robert; Scott, Kelsey  
**Subject:** Fw: [EXTERNAL] Merrimack Test Release

**CAUTION:** [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Brian, Sorry for a delayed response- I was out at a cabin in the woods without access to the internet all last week...

Kevin Webb, Relicensing Manager at Central Rivers Power and the consultants for the Whitewater Study are cc'd to this message. Kevin, Rob, or Kelsey - could you please provide use with the next steps and dates for the Whitewater Study activities? I had marked in my calendar that there would be some on-site activities this weekend? Is that still the case?

### **Christine Bruins | Community Planner**

Lowell National Historical Park  
978.275.1726 (office) | 978.954.1011 (cell)

---

**From:** Brian @Zoar <brian@zoaroutdoor.com>  
**Sent:** Saturday, October 3, 2020 10:37 AM  
**To:** Bruins, Christine A <Christine\_Bruins@nps.gov>  
**Subject:** [EXTERNAL] Merrimack Test Release

**This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.**

Christine, Jane Calvin passed your email along to me about the Boating Study on the Merrimack. Zoar Outdoor is planning on sending at least 1 raft and kayaker. Once they are determined, please let me know the put-in location, start time, and any other important details.

Thanks

### **Brian Pytko | Rafting Department Manager**



800-532-7483 ext. 1010

[www.zoaroutdoor.com](http://www.zoaroutdoor.com)

[www.kayaklesson.com](http://www.kayaklesson.com)

[Make an Impact](#)

[Instagram](#) | [Facebook](#) | [Youtube](#)

## Iffert, Kelsey

---

**From:** Bruins, Christine A <Christine\_Bruins@nps.gov>  
**Sent:** Tuesday, October 13, 2020 4:22 PM  
**To:** Scott, Kelsey; brian@zoaroutdoor.com; jcalvin@lowelllandtrust.org  
**Cc:** Kevin Webb; Quiggle, Robert  
**Subject:** Re: [EXTERNAL] Merrimack Test Release

**CAUTION:** [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thanks!

### Christine Bruins | Community Planner

Lowell National Historical Park  
978.275.1726 (office) | 978.954.1011 (cell)

---

**From:** Scott, Kelsey <Kelsey.Scott@hdrinc.com>  
**Sent:** Tuesday, October 13, 2020 4:17 PM  
**To:** Bruins, Christine A <Christine\_Bruins@nps.gov>; brian@zoaroutdoor.com <brian@zoaroutdoor.com>; jcalvin@lowelllandtrust.org <jcalvin@lowelllandtrust.org>  
**Cc:** Kevin Webb <kwebb@centralriverspower.com>; Quiggle, Robert <Robert.Quiggle@hdrinc.com>  
**Subject:** RE: [EXTERNAL] Merrimack Test Release

Hi Christine, Brian, and Jane –

As of this afternoon, the site-activities scheduled for this weekend have been cancelled. We determined that the flows in the Merrimack River are too low to conduct the study.

<https://water.weather.gov/ahps2/hydrograph.php?gage=LOWM3&wfo=box>

We will keep you updated as the study is rescheduled. Thank you.

#### **Kelsey Scott, MS**

##### **HDR**

1304 Buckley Road, Suite 202  
Syracuse, NY 13212

**D** 315.414.2206 **M** 315.706.5176  
[kelsey.scott@hdrinc.com](mailto:kelsey.scott@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

---

**From:** Bruins, Christine A <Christine\_Bruins@nps.gov>  
**Sent:** Tuesday, October 13, 2020 10:43 AM  
**To:** brian@zoaroutdoor.com  
**Cc:** Kevin Webb <kwebb@centralriverspower.com>; Quiggle, Robert <Robert.Quiggle@hdrinc.com>; Scott, Kelsey <Kelsey.Scott@hdrinc.com>  
**Subject:** Fw: [EXTERNAL] Merrimack Test Release

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Kevin Webb, Relicensing Manager at Central Rivers Power and the consultants for the Whitewater Study are cc'd to this message. Kevin, Rob, or Kelsey - could you please provide use with the next steps and dates for the

Whitewater Study activities? I had marked in my calendar that there would be some on-site activities this weekend? Is that still the case?

**Christine Bruins | Community Planner**

Lowell National Historical Park  
978.275.1726 (office) | 978.954.1011 (cell)

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**From:** Brian @Zoar <brian@zoaroutdoor.com>  
**Sent:** Saturday, October 3, 2020 10:37 AM  
**To:** Bruins, Christine A <Christine\_Bruins@nps.gov>  
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**Brian Pytko | Rafting Department Manager**



800-532-7483 ext. 1010

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-----  
More local adventures:

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[www.catamountski.com](http://www.catamountski.com)



## Iffert, Kelsey

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Monday, October 26, 2020 3:35 PM  
**To:** Kevin Webb  
**Cc:** Quiggle, Robert; Scott, Kelsey; Richard Malloy  
**Subject:** Re: Lowell Whitewater Boating and Access Study weekly eval

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I'm reading it the same way. I'll check with Joe about Veterans Day. It would be good to have the extra option. Otherwise we would be looking at the Nov 7/8 weekend. I'll follow up after I speak to Joe.

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Mon, Oct 26, 2020 at 3:29 PM Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)> wrote:

Thanks Rob. I agree that the coming week is looking like a wash. I am open to doing this on Veteran's Day, unless of course we can't get enough paddlers.

Kevin

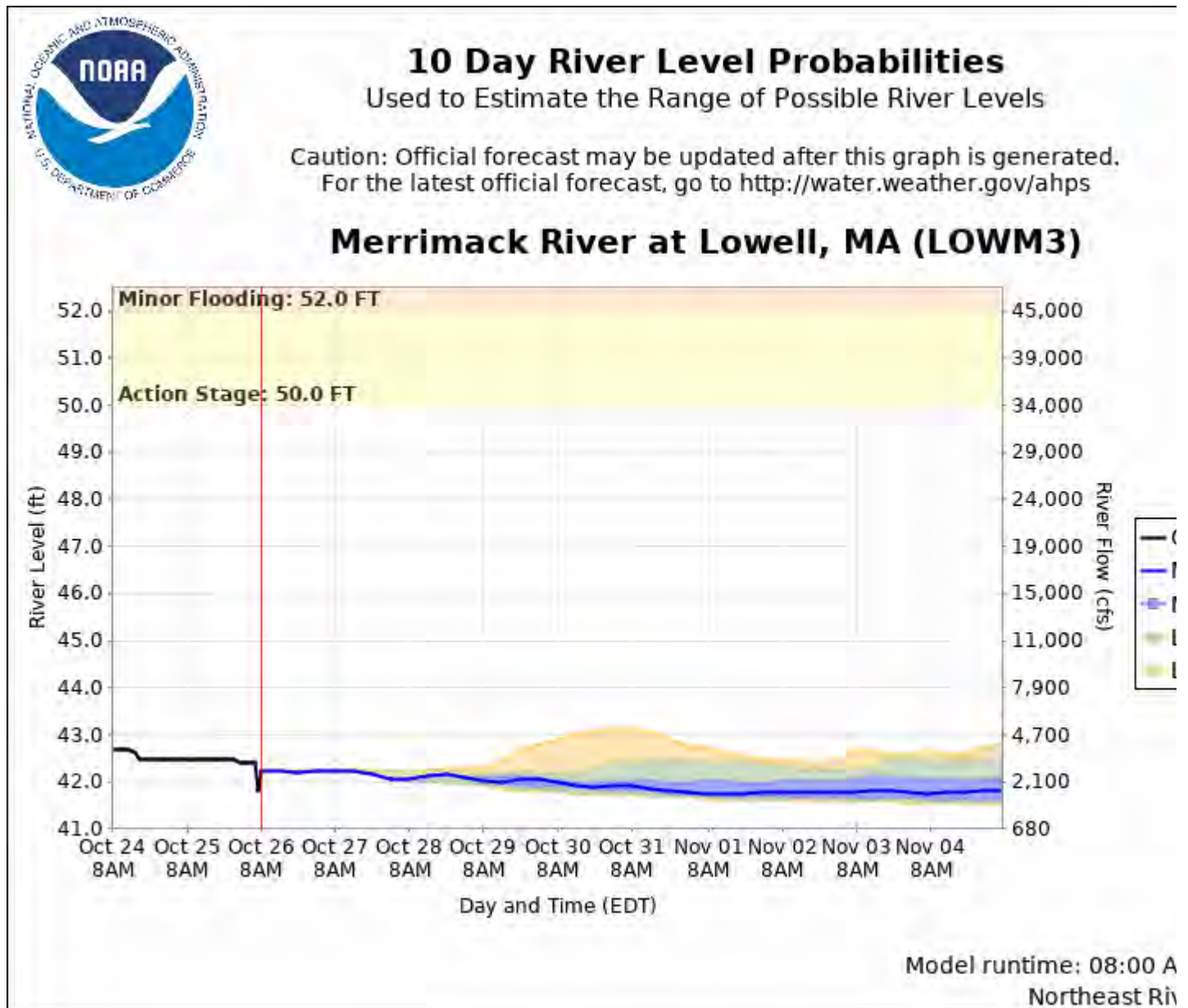
---

**From:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Sent:** Monday, October 26, 2020 3:24 PM  
**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>; Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)>  
**Cc:** Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>  
**Subject:** RE: Lowell Whitewater Boating and Access Study weekly eval

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I can try and find another time tomorrow, or maybe we can sort this out via email. The flow forecast for the next 10 days shows flows dropping all week to a low of about 2,100 cfs on Sunday. I am guessing that this will not be sufficient for the study, seeing as how we've postponed it at higher flows. If we're all in agreement that these flow conditions won't support the whitewater boating flows, we might want to skip the call this week and pick it up again on November 3<sup>rd</sup>.

One other scheduling element might be worth considering. November 11 is Veterans Day, and it falls on a Wednesday this year. I know that a lot of organizations have the day off; would it be worth adding that to the list of potential dates for the study? Might not be as good as a weekend, but if the water is there and folks have availability, it might be something to consider.



Thanks,

**Robert Quiggle**, RPA

Syracuse Office Principal

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

---

**From:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>  
**Sent:** Monday, October 26, 2020 3:13 PM  
**To:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>; Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)>  
**Cc:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>  
**Subject:** RE: Lowell Whitewater Boating and Access Study weekly eval

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We could do after say 1:00 PM.

---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, October 26, 2020 3:07 PM  
**To:** Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)>  
**Cc:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>  
**Subject:** Re: Lowell Whitewater Boating and Access Study weekly eval

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Can we pick another time for this meeting? I'm tied up from 2 to about 4:30. Early afternoon should work for me. I can also step out of my meeting Wednesday for a short call.

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater

65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Thu, Oct 22, 2020 at 1:00 PM Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)> wrote:

Lowell Whitewater Boating and Access Study — weekly evaluation of flows at Lowell to make go/no go determinations.

## Iffert, Kelsey

---

**From:** Kevin Webb <kwebb@centralriverspower.com>  
**Sent:** Wednesday, April 21, 2021 10:38 AM  
**To:** Bob Nasdor | AW; Quiggle, Robert  
**Cc:** Joe t; Richard Malloy; Scott, Kelsey; Curtis Mooney  
**Subject:** RE: Lowell Whitewater Boating Study

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Thanks Bob. I can confirm that what you state below is consistent with our discussion yesterday.

Thanks  
Kevin

Kevin Webb  
Licensing Manager



**Central Rivers Power**

670 N Commercial Street, Suite 204 | Manchester, NH 03101  
C: 978.935.6039  
[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Wednesday, April 21, 2021 10:27 AM  
**To:** Quiggle, Robert <Robert.Quiggle@hdrinc.com>  
**Cc:** Kevin Webb <kwebb@centralriverspower.com>; Joe t <wemustriseabove@gmail.com>; Richard Malloy <RMalloy@centralriverspower.com>; Scott, Kelsey <Kelsey.Scott@hdrinc.com>  
**Subject:** Re: Lowell Whitewater Boating Study

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Dear Kevin,

I'm confirming our conversation yesterday regarding scheduling the on-water portion of the whitewater boating study in the Lowell bypassed reach. As we discussed, while flows for the upcoming weekend are suitable for the controlled-flow study, CRP is unable to schedule the study for this coming weekend 4/24-4/25 or the following weekend 5/2-5/3 due to its priority in completing and filing its Final License Application for the project. The timing is unfortunate due to the current availability of flows for the on-water portion of the study. We will continue to monitor the flow forecast for another opportunity, but I remain concerned about when another opportunity will occur. We agreed CRP is required to complete the study as part of its FERC relicensing of the project and will need to amend its Final License Application when the study is complete to address project impacts on recreation use in the project boundary. I look forward to working with you to complete this study at the earliest possible time.

Yours truly,  
Bob

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Tue, Apr 20, 2021 at 8:42 AM Bob Nasdor <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)> wrote:

Flows are still looking strong for this weekend. I would like to make a tentative call on proceeding. Are folks free to chat this morning?

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, April 19, 2021 12:24:18 PM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Cc:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Joe t <[wemustriseabove@gmail.com](mailto:wemustriseabove@gmail.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>; Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)>  
**Subject:** Re: Lowell Whitewater Boating Study

Thanks Rob. I got my second shot yesterday. No reactions so far. For what it's worth, I was originally scheduled for my shot Saturday but was able to easily move it to Sunday when I thought we were going to do the Missisquoi study this weekend. Maybe you can try to move your a day or so. I don't think we can wait until Thursday though to start putting things in place, so we should figure this out asap.

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Mon, Apr 19, 2021 at 12:03 PM Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)> wrote:

Bob:

I wanted to recirculate the survey forms and the safety plan that we developed for this study and that we distributed last year. I would recommend that we setup a go/no-go call for Thursday afternoon so that we can evaluate the flows.

We may also have some logistical issues with this weekend. Both Kelsey and I are needed to support this study, and we are both receiving our second dose of the COVID vaccine at the end of this week. Depending on the potential side effects, we may not be able to travel on Friday for a Saturday flow release. In any case, we should know more by Thursday afternoon.

If Thursday works for you, I'll send around an Outlook invite.

Thanks,

**Robert Quiggle**, RPA

*Syracuse Office Principal*

**HDR**

1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, April 19, 2021 8:31 AM

**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>

**Cc:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Joe t <[wemustriseabove@gmail.com](mailto:wemustriseabove@gmail.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>

**Subject:** Re: Lowell Whitewater Boating Study

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That sounds perfect. The variable is the Wednesday rain that looks a little heavier up north. Hopefully we can pull this off just using the Field powerhouse. Should we proceed with the tentative assumption that this is a go and notify volunteers, agencies, and public safety? You should also be prepared for the beach put-in and take-out cleanup. Do you have an invitation ready for our volunteers that includes the logistics, Covid protocols, and pre-run survey? I have a list of names that I can forward it to and can also provide you with the contact list.

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater

65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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On Mon, Apr 19, 2021 at 8:20 AM Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)> wrote:

Thanks Bob. The NOAA forecast is showing 9,300 cfs Wednesday AM, backing out the Concord that would put us between 8,000 and 8,500 inflow at Pawtucket Dam. Let's check back in on Wednesday and see what the forecast shows into the weekend.

Kevin

---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>

**Sent:** Monday, April 19, 2021 8:00 AM

**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Joe t <[wemustriseabove@gmail.com](mailto:wemustriseabove@gmail.com)>

**Subject:** Lowell Whitewater Boating Study

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Good morning. I'm looking at the flow and weather forecast for this week, and from what I can see, all signs point toward ideal conditions for the whitewater boating study on Saturday. Flows are currently in our target range but dropping slightly and we have some rain forecast for mid-week. We should schedule a call for tomorrow to finalize the plan for moving forward and then confirm that we are a go for lift off on Thursday if everyone agrees. What are you all seeing?

Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater

65 Blueberry Hill Lane  
Sudbury, MA 01776

[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

617-584-4566

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## Iffert, Kelsey

---

**From:** Quiggle, Robert  
**Sent:** Monday, April 19, 2021 12:04 PM  
**To:** Bob Nasdor | AW; Kevin Webb  
**Cc:** Joe t; Richard Malloy; Scott, Kelsey  
**Subject:** RE: Lowell Whitewater Boating Study  
**Attachments:** 20201009 Lowell Whitewater Safety Plan.pdf; Whitewater Study Survey Forms.pdf

Bob:

I wanted to recirculate the survey forms and the safety plan that we developed for this study and that we distributed last year. I would recommend that we setup a go/no-go call for Thursday afternoon so that we can evaluate the flows.

We may also have some logistical issues with this weekend. Both Kelsey and I are needed to support this study, and we are both receiving our second dose of the COVID vaccine at the end of this week. Depending on the potential side effects, we may not be able to travel on Friday for a Saturday flow release. In any case, we should know more by Thursday afternoon.

If Thursday works for you, I'll send around an Outlook invite.

Thanks,

**Robert Quiggle**, RPA  
*Syracuse Office Principal*

**HDR**  
1304 Buckley Road, Suite 202  
Syracuse, New York 13212-4311  
D 315.414.2216 M 724.989.1579  
[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)

[hdrinc.com/follow-us](https://hdrinc.com/follow-us)

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**Sent:** Monday, April 19, 2021 8:31 AM  
**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>  
**Cc:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Joe t <[wemustriseabove@gmail.com](mailto:wemustriseabove@gmail.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>  
**Subject:** Re: Lowell Whitewater Boating Study

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Bob Nasdor  
Northeast Stewardship & Legal Director



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[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

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Kevin

---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, April 19, 2021 8:00 AM  
**To:** Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>; Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Joe t <[wemustriseabove@gmail.com](mailto:wemustriseabove@gmail.com)>  
**Subject:** Lowell Whitewater Boating Study

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Bob Nasdor  
Northeast Stewardship & Legal Director



American Whitewater

65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

Join American Whitewater!

**From:** Kevin Webb  
**Sent:** Thursday, May 13, 2021 8:10 AM  
**To:** Bob Nasdor <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>; Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Cc:** Scott, Kelsey <[Kelsey.Scott@hdrinc.com](mailto:Kelsey.Scott@hdrinc.com)>; Richard Malloy <[RMalloy@centralriverspower.com](mailto:RMalloy@centralriverspower.com)>  
**Subject:** RE: Flow Study

Bob:

I hate to say it but we're running into staffing issues this weekend. Under these flow conditions we need 2 operators to back down the flow through the E.L. Field powerhouse – one at the powerhouse and another at the Northern Canal Gatehouse to close the canal headgates as the canal flow decreases. Otherwise the canal level will rapidly exceed its maximum allowed level. Unfortunately we have only one operator available this weekend. I see no option but to cancel. I am as disappointed as you undoubtedly are because it looked like we'd be able to nail both of our whitewater studies in rapid succession. We'll keep trying.

Call me if you want to discuss.

Kevin

---

**From:** Bob Nasdor <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Thursday, May 13, 2021 7:30 AM  
**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>; Quiggle, Robert <[Robert.Quiggle@hdrinc.com](mailto:Robert.Quiggle@hdrinc.com)>  
**Subject:** Flow Study

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Can we talk this am to confirm we are a go? Need to confirm with my volunteers.

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

## Iffert, Kelsey

---

**From:** Kevin Webb <kwebb@centralriverspower.com>  
**Sent:** Monday, April 11, 2022 10:17 AM  
**To:** Bob Nasdor  
**Cc:** Richard Malloy; Iffert, Kelsey  
**Subject:** RE: Lowell Whitewater Study

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Yes, let's do Bob. My schedule is fairly open this week, Thursday is wide open at this point. Let me know what works for you.

Kevin

---

**From:** Bob Nasdor <bob@americanwhitewater.org>  
**Sent:** Monday, April 11, 2022 9:59 AM  
**To:** Kevin Webb <kwebb@centralriverspower.com>  
**Subject:** Lowell Whitewater Study

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. =====

Kevin,  
Let's set up a meeting to talk about the whitewater study. Thanks

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

## Iffert, Kelsey

---

**From:** Kevin Webb <kwebb@centralriverspower.com>  
**Sent:** Monday, April 11, 2022 10:17 AM  
**To:** Bob Nasdor  
**Cc:** Richard Malloy; Iffert, Kelsey  
**Subject:** RE: Lowell Whitewater Study

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Yes, let's do Bob. My schedule is fairly open this week, Thursday is wide open at this point. Let me know what works for you.

Kevin

---

**From:** Bob Nasdor <bob@americanwhitewater.org>  
**Sent:** Monday, April 11, 2022 9:59 AM  
**To:** Kevin Webb <kwebb@centralriverspower.com>  
**Subject:** Lowell Whitewater Study

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. =====

Kevin,  
Let's set up a meeting to talk about the whitewater study. Thanks

Bob

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566

## Iffert, Kelsey

---

**From:** Bob Nasdor | AW <bob@americanwhitewater.org>  
**Sent:** Tuesday, November 15, 2022 10:39 AM  
**To:** Bob Nasdor; cheremsha@hotmail.com; grinnelli@gmail.com; emixvt@gmail.com; a.aleksashenko@gmail.com; peedeekayak@sbcglobal.net; gpiette21@gmail.com; cocoschachtl@gmail.com; petermurray00@gmail.com; greenj314@gmail.com; amyelem@aol.com; sweetwerke@gmail.com; Stephen Glidden; jaymichaud9@gmail.com; stefanlocher6@gmail.com; movari@gmail.com; Bill Hearn; burkley.niall@gmail.com; Ann Gillard; Jeremy Laucks-Blackfly Canoes  
**Cc:** Kevin Webb; Gibson, Jim; Iffert, Kelsey  
**Subject:** Merrimack River Boating Study, Saturday 11/19

**CAUTION: [EXTERNAL]** This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Thank you all for your interest in the whitewater boating study on the Merrimack River in Lowell. Based on your responses, we are planning to conduct the study on Saturday, November 19th. The study is being conducted as part of the FERC relicensing of the Lowell Hydroelectric Project. The study will be conducted on the reach below the Partucket Dam. The purpose of the study is to evaluate the whitewater boating potential of this part of the Merrimack River and will help in the development of license conditions for the hydroelectric project. Participants need to have prior experience with and be comfortable paddling Class III whitewater and have appropriate gear for cold weather paddling. You will be receiving an email with the details for the study in the next several days. We look forward to seeing you on the river on Saturday.

Best regards,  
Bob



Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566



## Iffert, Kelsey

---

**From:** Iffert, Kelsey  
**Sent:** Thursday, November 17, 2022 1:58 PM  
**To:** Bob Nasdor; cheremsha@hotmail.com; grinnelli@gmail.com; emixvt@gmail.com; a.aleksashenko@gmail.com; peedeekayak@sbcglobal.net; gpiette21@gmail.com; cocoschachtl@gmail.com; petermurray00@gmail.com; greenj314@gmail.com; amyelem@aol.com; sweetwerke@gmail.com; Stephen Glidden; jaymichaud9@gmail.com; stefanlocher6@gmail.com; movari@gmail.com; Bill Hearn; burkley.niall@gmail.com; Ann Gillard; Jeremy Laucks-Blackfly Canoes; 'jschalebaum1982@gmail.com'  
**Cc:** Kevin Webb; Richard Malloy; Skip Medford; Gibson, Jim  
**Subject:** Lowell Hydroelectric Project - Whitewater Boating and Access Study  
**Attachments:** HDR Boott\_Release\_of\_Liability-2022.pdf; Lowell Whitewater Study\_Agenda Maps.pdf; 20221115 Lowell Whitewater Safety Plan.pdf; Lowell Pre-Run Survey Form.docx

Lowell Whitewater Boaters:

Thank you for your interest in participating in the Whitewater Boating and Access Study for the Lowell Hydroelectric Project (P-2790), owned and operated by Boott Hydropower, LLC (Boott). The study will kick-off with a safety meeting at [322 Aiken Ave, Lowell, MA 01854](#) starting around 9:30 AM on Saturday November 19, 2022. Facilities will be accessible as early as 8:40 AM. A study agenda with approximate timing, logistics, and maps for the study is attached. Logistical specifics and items of note are included below:

- Participants need to have prior experience with and be comfortable paddling Class III whitewater and have appropriate gear for cold weather paddling, and need to be 18 years or older. Boott and HDR will rely on the whitewater paddler participants to collectively determine which participants are qualified to paddle the Lowell bypass under the conditions existing at the time of the study.
- All participants must review the attached Whitewater Boating and Access Study Safety Plan.
- All participants must complete the attached pre-run survey form and study waiver; it is helpful that these are completed in advance of the study. Participants can email the completed forms to me ([Kelsey.iffert@hdrinc.com](mailto:Kelsey.iffert@hdrinc.com)) or bring them to the site. The pre-run survey form can be completed in Word. The waiver must be printed and completed with a hand signature.
- Please arrive at **UMASS Lowell Campus Recreation Center** roundabout ([322 Aiken Ave, Lowell, MA 01854](#)) to unload your boat onto the cargo van. The roundabout can be accessed from Pawtucket Street opposite Bourgeois Hall.
- Vehicle parking is then available at the East Campus Parking Garage ([47 Pawtucket St, Lowell, MA 01854](#)). Upon entry, note to the attendant (if present) you are here for the whitewater study. If needed, metered street parking is available or at the nearby Campus Recreation Sports Complex ([225 Aiken St, Lowell, MA 01854](#)).
- The study will kick-off in the UMass Lowell Campus Recreation Center ([322 Aiken Ave, Lowell, MA 01854](#)) Conference Room. Please access the facilities from the Pawtucket Street entrance (located across from the parking garage).
- Participant and boat transportation via shuttle bus and cargo van are available from the take-out to put-in locations.
- Maps are attached to the agenda identifying study facilities and approximate locations of identified potential hazards. Please review beforehand and be aware of the potential hazards.
- Water & snacks (granola bars, chips, donuts, etc) will be available throughout the day in the Campus Recreation Center. Lunch sandwiches and dessert cookies from Purple Carrot will be provided at noon.
- Locker rooms, lockers, and restrooms are available at the Campus Recreation Center.
- The study will conclude with a focus group discussion at the Campus Recreation Center.

Please do not hesitate to reach out to myself or Kevin Webb with Boott, at (978) 935-6039 or [kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com) if you have any questions.

**Kelsey Scott Iffert, MS**

*Environmental/Regulatory Section Lead*

**HDR**

231 Salina Meadows Parkway, Suite 210

Syracuse, NY 13212

M 315.706.5176

[kelsey.iffert@hdrinc.com](mailto:kelsey.iffert@hdrinc.com)

[hdrinc.com/follow-us](http://hdrinc.com/follow-us)

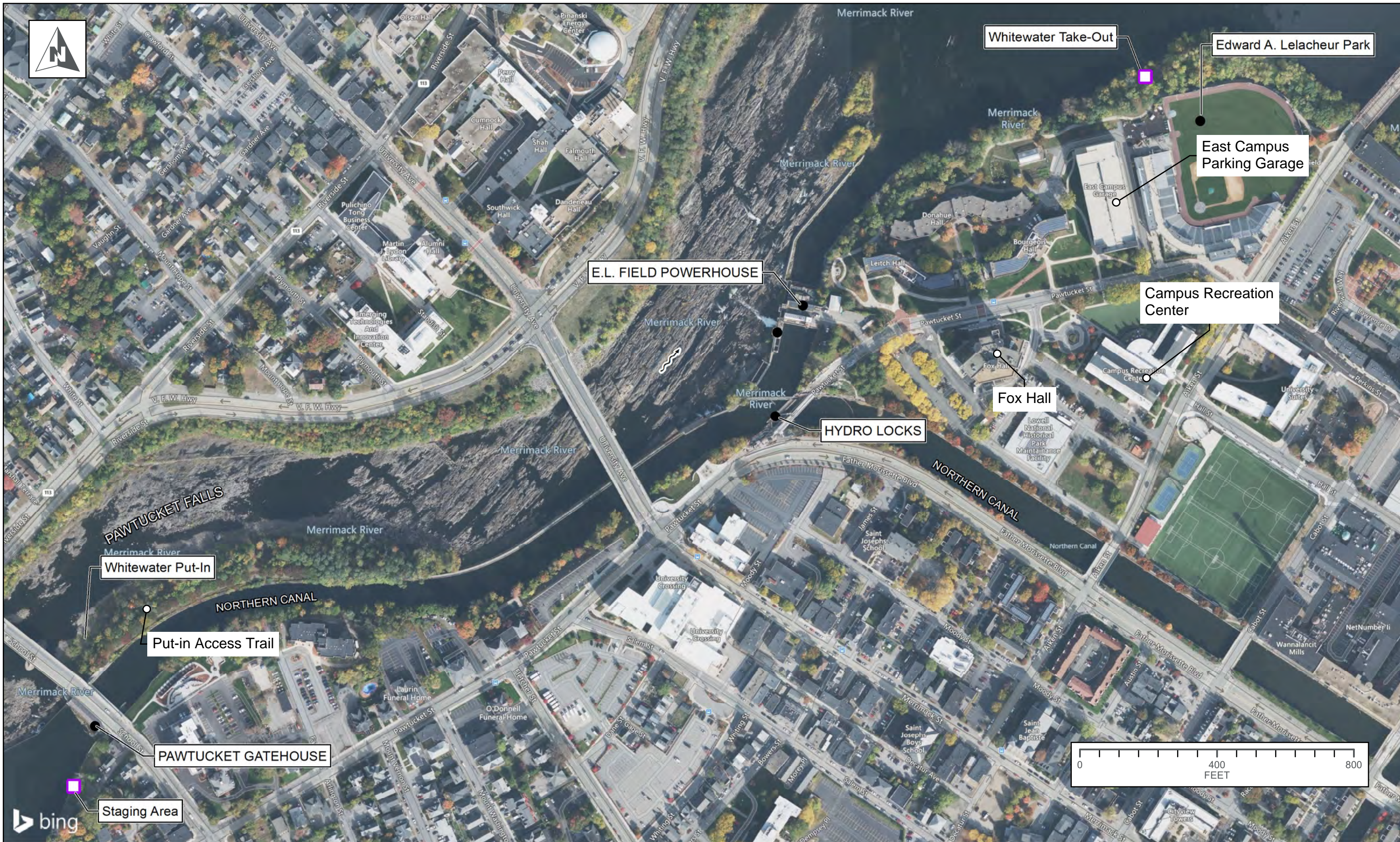
## Lowell Hydroelectric Project Whitewater Boating and Access Study

November 19, 2022

Time	Task
As early as 8:30 – 9:30 AM	<ul style="list-style-type: none"><li>• Pull up to the roundabout at the UMass Lowell Campus Recreation Center (CRC) (<a href="#">322 Aiken Ave, Lowell, MA 01854</a>) to unload boats. The roundabout can be accessed from Pawtucket Street opposite Bourgeois Hall.</li><li>• Parking is available at the East Campus Parking Garage (<a href="#">47 Pawtucket St, Lowell, MA 01854</a>) and inform attendant (if present) that you are here for the whitewater study. If needed, metered parking is available off of Hall Street at <a href="#">225 Aiken St, Lowell, MA 01854</a>.</li><li>• Walk to the CRC and use the north entrance off roundabout (Pawtucket Street Entrance).</li><li>• We are meeting in the CRC Conference Room and kicking off the study with a safety meeting ~9:30.</li></ul>
9:30 AM – 10:30 AM	<ul style="list-style-type: none"><li>• Sign in/Waiver</li><li>• Study kickoff and safety debrief</li><li>• Pre-study assessment forms</li><li>• Scout from University Bridge</li><li>• Shuttle to Staging Area above the dam</li></ul>
10:30 AM – 12:00 PM	<ul style="list-style-type: none"><li>• First Flow with Crest Gate Up</li></ul>
12:00 PM – 1:00 PM	<ul style="list-style-type: none"><li>• Walk/Shuttle to CRC</li><li>• Post flow assessment form</li><li>• Flow transition</li><li>• Lunch</li></ul>
1:00 PM – 2:15 PM	<ul style="list-style-type: none"><li>• Second Flow with Crest Gate Down</li></ul>
2:15 PM – 2:30 PM	<ul style="list-style-type: none"><li>• Shuttle/Walk back to CRC</li></ul>
2:30 PM – 3:30 (ish) PM	<ul style="list-style-type: none"><li>• Post flow assessment form</li><li>• Comparative assessment form</li><li>• Group discussion</li><li>• Finish study</li></ul>

## NOTES:

- Participants need to have prior experience with and be comfortable paddling Class III whitewater and have appropriate gear for cold weather paddling, and need to be 18 years or older. Boott and HDR will rely on the whitewater paddler participants to collectively determine which participants are qualified to paddle the Lowell bypass under the conditions existing at the time of the study.
- Please do not show up at the Project's E.L. Field Powerhouse; facilities are down and access will be denied.
- Locker rooms with programmable locks and bathrooms will be provided at the CRC.
- Water & snacks (granola bars, chips, donuts, etc) will be available throughout the day in the CRC.
- Breakfast items (pastries, coffee, tea, etc) can be purchased at the University Dining Commons at Fox Hall ([100 Pawtucket St, Lowell, MA 01854](#)) (opens at 8 am).
- Sandwich lunches and dessert cookies will be delivered from the Purple Carrot (vegetarian options available) at noon.
- All participants must review the Whitewater Boating and Access Study Safety Plan and sign the provided waiver.
- Participants are required to complete the pre-study assessment form, post-flow assessment form for the two flows, and a comparative assessment form. All forms will be completed at the CRC and a group discussion will be held after all flows at the CRC.
- Transportation between put-in and take-out will be available. Please note that crossing the street is required at times.
- For safety and access permission reasons, participants are asked to only put-in at the designated put-in (at the Northern Canal Island) and take-out (beach area behind Edward A. LeLacheur Park). Please review the attached maps for noted access points and potential hazards identified in the bypassed reach.



bing

**HR** BOOTT HYDRO, LLC.

**WHITewater BOATING AND ACCESS STUDY**  
**LOWELL HYDROELECTRIC PROJECT**  
**FERC NO. 2790**

# POTENTIAL HAZARDS MAP



REBAR

WEIR

WEIR

WEIR

## ASSUMPTION OF RISK WAIVERS

### **READ CAREFULLY – Waiver and Release of Liability**

**Please sign on the other side**

In consideration of HDR ENGINEERING, INC. and its affiliated, associated or related companies or subsidiaries (“HDR”), and BOOTT HYDROPOWER, LLC conducting a Whitewater Study allowing for whitewater boating in the bypass reach of the Lowell Hydroelectric Project, I agree as follows:

As a result of the inherent risk in this activity, I know I may die, get hurt, and/or damage my belongings. If any of these occur, I understand that neither I nor any parent, guardian, descendant and/or heir, successors and/or assigns, administrators, conservators, and/or personal representatives can make a claim, sue, or expect HDR or BOOTT HYDROPOWER, LLC, their owners, shareholders, officers, agents, employees, subsidiaries, affiliated companies and/or associates (hereinafter referred collectively as RELEASEES), to be legally responsible or pay for any damages.

**ACKNOWLEDGMENT AND ACCEPTANCE OF RISK:** I, the undersigned, hereby acknowledge that I have voluntarily chosen to participate in this whitewater boating event. Certain risks are inherent in any recreational activity and cannot be eliminated, altered, or controlled, and these risks that contribute to the unique character of the activity can also be the cause of injury, illness, death, and damages. I know and fully understand that a whitewater boating trip, whether on a raft, oar boat, kayak or any other type of vessel, is an outdoor adventure activity in a riverine environment with inherent risks and hazards where serious accidents can occur, participants can die, sustain injuries and property damage. Also, I understand that boating within an urban area may provide additional hazards beyond those typical of boating within a rural area and recognize that the risks associated with whitewater boating are greatly increased due to this setting. I acknowledge and willingly assume all risks and hazards in whitewater boating and river-related activities from the pre-embarkation rendezvous until the conclusion of the study, including, but not limited to: (1) loss of control of the watercraft, fall in, out, or about the watercraft, collision with other participants, equipment, other watercraft, rocks, bridge structures, weirs, trees, debris, remnant construction materials within the river, and any other portion of the interior of the watercraft, and any other man-made or natural obstacles, whether obvious or not (2) judgment, decision making, and conduct of the other participants or study coordinators (3) submersion in water, drowning (4) encounters with animals, wildlife and insects (5) exposure to urban and riverine environments, extreme temperatures, and inclement weather, inaccessible riverine areas, traffic, rocky terrain, including travel by foot or vehicle in any way related to this activity (6) assistance in lifting and/or carrying equipment (7) rescue related injuries, and (8) unavailability of immediate and appropriate medical attention in case of injury. I understand and acknowledge that the above list is not complete or exhaustive and that other risks, known or unknown, anticipated or unanticipated may also exist and result in injury, illness, disease, death or damage. My participation in this study is purely voluntary and I elect to do so at my own risk.

**RELEASE:** In consideration for RELEASEES allowing me to participate in this study, I voluntarily agree to release, discharge, and hold harmless RELEASEES for any and all claims of liability to the fullest extent authorized by law arising out of their negligence, fault, recklessness, or any other act or omission which causes the undersigned illness, injury, disease, death and damages of any nature in any way connected with my participation in this activity. I also agree to release and discharge RELEASEES from any act of omission or negligence in rendering or failing to render any type of rescue, emergency, or medical services. In signing this document, I fully recognize and understand that if I am hurt, die, or my property

is damaged, I am giving up my right to make any claim or file a lawsuit against RELEASEES, even if they negligently or by some act or omission cause personal injury or damage property. I further agree to hold harmless, defend, and indemnify RELEASEES from all defense costs, including, but not limited to, attorney's fees incurred in connection with claims for bodily injury, wrongful death, or property damage sustained, or which I may have caused to spectators or other third parties, whether negligent or not, in the course of my participation in this activity. No participant under the age of 18 is permitted to participate in this activity. Should emergency medical services become necessary for the undersigned participant, the expenses are the sole responsibility of the participant and not that of RELEASEES. Personal medical and travel insurance is strongly advised for all participants.

RELEASEES reserve the right to accept or deny service to any person. I hereby agree to follow all rules, regulations, and instructions of RELEASEES while participating in this study. I also certify that I am physically and mentally capable of participating in these activities. I hereby represent that I have informed RELEASEES of any pertinent medical conditions that may affect my participation in this activity. I hereby agree that RELEASEES may use film or photographic records of this activity and that such records may become part of the public record. The venue of any dispute that may arise out of this agreement or otherwise between the parties to which RELEASEES are a party shall be the State of Nebraska.

**I HAVE READ THIS DOCUMENT IN ITS ENTIRETY.** I understand that I am assuming all the risks inherent in this whitewater boating activity and study. I understand that it is a release of any and all claims. I understand that this is the entire agreement between the undersigned, HDR, BOOTT HYDROPOWER, LLC, and any and all RELEASEES as previously listed and that it cannot be modified or changed in any way by the representations or statements by HDR or BOOTT HYDROPOWER, LLC, and all RELEASEES or by the undersigned. I voluntarily sign my name as evidence of my acceptance of all provisions in this release and I agree to be bound by them.

By signing this Agreement, I acknowledge and agree that I have fully read and understand this Agreement and that I have been given the opportunity to consult with my attorney before executing this Agreement.

\_\_\_\_\_  
Signature of Whitewater Boater

\_\_\_\_\_  
Print Name of Whitewater Boater

\_\_\_\_\_  
Age of Whitewater Boater

\_\_\_\_\_  
Date

**END OF AGREEMENT**



## Iffert, Kelsey

---

**From:** Kevin Webb <kwebb@centralriverspower.com>  
**Sent:** Monday, November 21, 2022 3:57 PM  
**To:** Gibson, Jim; Iffert, Kelsey; Richard Malloy  
**Subject:** FW: Merrimack Flows

**CAUTION:** [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

---

**From:** Kevin Webb  
**Sent:** Monday, November 21, 2022 3:09 PM  
**To:** 'Bob Nasdor | AW' <bob@americanwhitewater.org>  
**Subject:** RE: Merrimack Flows

We've been a bit puzzled by that as well. With Boott down we should be seeing relatively stable flows the Hunt's Falls gage. Everything from Amoskeag on up is ROR, so it's possible that the fluctuations are coming from tribs, e.g. the Nashua.

I also meant to include – screen shot below is from Google Earth virtual 3D, showing the School St. bridge and steps down to the Northern Canal Walkway. Alternative route looks a bit challenging!



---

**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, November 21, 2022 3:01 PM  
**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>  
**Subject:** Re: Merrimack Flows

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. =====

Thanks Kevin. I was looking back over the past few months and saw some significant fluctuations. This wasn't an issue over the weekend but I was curious whether there was another project that factored into fluctuations.

Bob Nasdor  
Northeast Stewardship & Legal Director  
American Whitewater  
65 Blueberry Hill Lane

Sudbury, MA 01776  
[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)  
617-584-4566



On Mon, Nov 21, 2022 at 2:55 PM Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)> wrote:

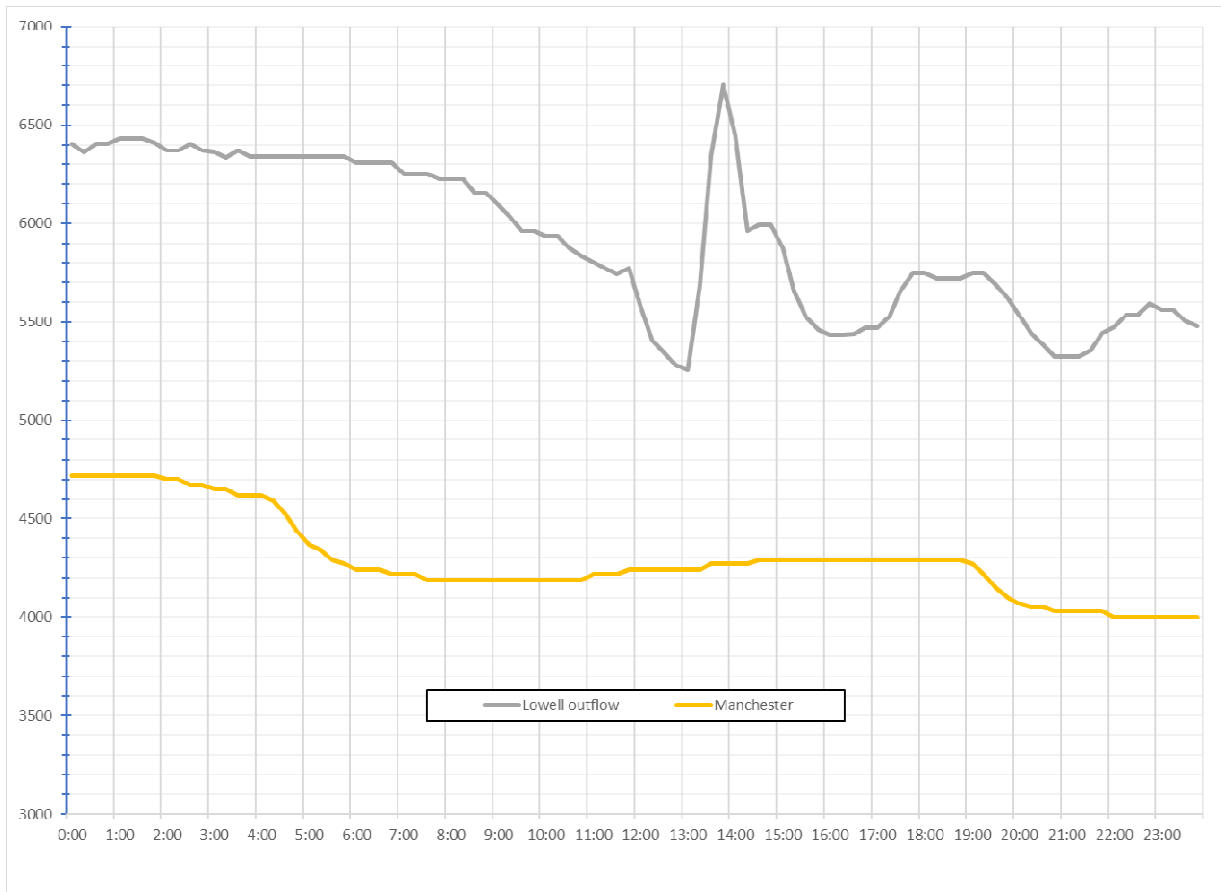
Thanks Bob. I was amazed how well everything worked out, and we now have 2 solid data points to work with. We'll have to keep our eyes on the gage to plan for the low-flow event, but based on the reaction from the boaters to trying it this year in cold conditions it looks like we may have to do this as a follow-up next year.

We can try to estimate how long we could augment flows within the 6-ich band allowed under the settlement. This would depend on the ratio of inflow to augmented flow. This will take some time so I'll have to get back to you on that later.

Regarding flows and possibility of upstream fluctuations, things look fairly stable but we did have falling inflow from Manchester throughout the day – see graph below showing our outflow (USGS Lowell minus Concord) and the Manchester (Goff's Falls) gage. After 4:00 AM there was a drop-off in flow out of Manchester which showed up in Lowell around the time that we were heading up for the first run, which started around 11:15 according to the time stamp on my photos. The first run flow was around 5,750 to 5,800 cfs. The flow bottomed out at 5,253 cfs at 1:00 around the time that Andrew started dropping the crest gate, and reached a peak of 6,700 cfs at 1:45, so flow went up 1,450 cfs with the crest gate dropped but we started from a much lower flow than anticipated. I have shots of the first boaters going under the University Ave bridge at 1:06.

Let me know if you have any questions. Thanks again for helping to make this a successful 2/3 study!

Kevin



**From:** Bob Nasdor | AW <[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)>  
**Sent:** Monday, November 21, 2022 8:36 AM  
**To:** Kevin Webb <[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)>  
**Subject:** Merrimack Flows

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe. =====

Hi Kevin,

Thanks for all you did this past weekend to make the boating study happen. I think we got some important information, but I'm also looking forward to getting some low boatqable flow information sometime in the future. I'm starting to look at the hydrograph, but had a couple of questions for you. It looked like the gage spiked around 1500 in the afternoon when you dropped the gate. Can you calculate the amount of time that you could augment flows before you reach the bottom of your flexibility under your settlement? I think it was around 6 inches. The other question I had was about some of the spikes on the gage. It doesn't look entirely natural. Is someone [eaking upstream or do these reflect

a lake drawdown somewhere? I want to get a better sense of when flows are available. Certainly seems like we are generally talking about spring and later fall unless the 2500 cfs flow is usable. I should probably also take another trip out there to see if there could be another way to access the bypass or whether we are strictly talking about scheduled releases and getting NPS to open the gate.

Thanks

Bob Nasdor

Northeast Stewardship & Legal Director

American Whitewater


65 Blueberry Hill Lane

Sudbury, MA 01776

[bob@americanwhitewater.org](mailto:bob@americanwhitewater.org)

617-584-4566





## Appendix B - Whitewater Boating and Access Study Safety Plan



# Whitewater Boating and Access Study Safety Plan

Lowell Hydroelectric Project

(FERC No. 2790)

September 2020

Revised November 2022

Prepared by:



Prepared for:

Boott Hydropower, LLC



**Central Rivers Power**

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## List of Acronyms

Boott	Boott Hydropower, LLC
CFR	Code of Federal Regulations
cfs	cubic feet-per-second
FERC	Federal Energy Regulatory Commission (or Commission)
ILP	Integrated Licensing Process
MW	megawatt
NPS	National Park Service
Project	Lowell Hydroelectric Project (or Lowell Project)
RSP	Revised Study Plan
SPD	Study Plan Determination
Study	Whitewater Boating and Access Study
USGS	U.S. Geological Survey
Working Group	Whitewater Boating and Access Study Working Group

# 1 Introduction and Background

Boott Hydropower, LLC (Boott), is the Licensee and operator of the 20.2 megawatt (MW) Lowell Hydroelectric Project (FERC Project No. 2790) (Project or Lowell Project). The Project is located along the Merrimack River in Middlesex County, Massachusetts and in Hillsborough County, New Hampshire.

The existing license for the Project was issued by the Federal Energy Regulatory Commission (FERC or Commission) with an effective date of May 1, 1973. The existing license expires on April 30, 2023. Accordingly, Boott is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5. As proposed in Boott's January 28, 2019 Revised Study Plan (RSP) and approved in the Commission's March 13, 2019 Study Plan Determination (SPD), Boott will conduct a Whitewater Boating and Access Study (Whitewater Study) in support of Project relicensing.

This Whitewater Boating and Access Study Safety Plan (Safety Plan) is intended to provide guidelines and protocols for protecting the safety of volunteer study participants boating the Project's bypass reach during controlled flow releases. This Safety Plan also provides procedures for emergency situations and guidance for communicating with study participants, Project staff, and emergency responders. The Safety Plan was developed in consultation with American Whitewater (AW), the City of Lowell (City), National Park Service (NPS), Zoar Outdoor (Zoar), and the Massachusetts Department of Conservation and Recreation (MADCR) (collectively, the "Whitewater Boating and Access Study Working Group" or "Working Group").

***As a condition to participation in the controlled flow releases, Boott requires volunteers to review this Safety Plan and understand the safety measures, guidance, and requirements herein. Boott notes that this Safety Plan includes details about Personal Protective Equipment (PPE) that participants are responsible for providing, as well as mandatory pre-fieldwork COVID-19 self-screening requirements. Persons who do not have the required PPE or who do not self-evaluate for signs or symptoms of COVID-19 prior to attending will not be allowed to participate in the Whitewater Study.***

## 1.1 Whitewater Boating and Access Study Overview

The Lowell Project is a run-of-river hydropower plant. When river flows exceed the hydraulic capacity of the two generating units located at the E.L. Field Powerhouse (combined capacity of approximately 6,600 cubic feet per second [cfs]), excess flows (up to approximately 2,000 cfs) are routed through the downtown Lowell canal system and through the canal units. When inflows exceed the 8,600 cfs capacity of the generating units and canals, all excess flows are passed over the Pawtucket Dam spillway into the bypass reach. The Project has the potential to affect whitewater boating opportunities in the bypass reach when flows are less than 8,600 cfs.

As described in the approved RSP, the goal of the study is to assess the Project's bypass reach for whitewater boating and access opportunities. The objectives of the study are as follows:

- Assess a range of flows suitable for whitewater boating opportunities in the Project's bypass reach;
- Assess the frequency, timing, duration, and predictability of paddling flows under current and proposed Project operations;
- Define potential locations for put-in and take-out points for boaters; and,
- Assess the flow information needs for whitewater boating and the current and potential flow information distribution system.

The approved study plan includes three primary tasks:

- **Task 1: Study Planning and Preparation** – The Study Planning and Preparation task includes (1) formation of the Working Group and identification of volunteers to participate in controlled flow release evaluations; (2) identification of appropriate put-in and take-out locations for on-water evaluations; (3) development of a Safety Plan; (4) determination of a method for verifying flows in the Project's bypass reach; and (5) development of survey forms to be used in the execution of the flow evaluations.
- **Task 2: Controlled Whitewater Releases** – In consultation with the Working Group, Boott will schedule controlled flow releases from the Project's Pawtucket Dam. Each flow release is expected to last approximately three hours, and volunteer boaters will have the opportunity to boat the Project's bypass reach and to make multiple passes at each flow to evaluate lines through sections of the study reach. Pre, post, and comparative surveys will be provided to controlled flow release participants for their completion during this portion of the study.

Following completion of the controlled flow releases, Boott will conduct an on-site meeting to discuss the results of the study and summarize opinions about the feasibility or quality of different types of boating opportunities at different flows.

- **Task 3: Whitewater Recreational Access** – Based on the results of the Recreation and Aesthetics Study, and in consultation with the Working Group, Boott will conduct an evaluation of prospective whitewater recreational access to the bypass reach.

This Safety Plan has been developed pursuant to Task 1 of the approved Whitewater Boating and Access Study Plan to provide appropriate safety measures and emergency protocols for the controlled flow releases (Task 2). Boott will require that all volunteer boaters participating in the controlled flow releases review and adhere to the Safety Plan requirements and applicable Boott safety policies.

## 2 Safety Code of American Whitewater

Boott's Safety Plan adopts the Safety Code of American Whitewater (AW 2005) (Safety Code). The Safety Code includes guidelines for Personal Preparedness and Responsibility, Boat and Equipment Preparedness, Group Preparedness and Responsibility, and Guidelines for River Rescue. Guidance from the Safety Code is presented in the following sections. ***As a precursor to participating in the controlled flow releases, volunteer boaters will review the Safety Code in its entirety on the AW Website at [www.americanwhitewater.org](http://www.americanwhitewater.org).***

As noted in the Safety Code, the code "is only a collection of guidelines; attempts to minimize risks should be flexible, not constrained by a rigid set of rules. Varying conditions and group goals may combine with unpredictable circumstances to require alternate procedures" (AW 2005). If conditions require modifications to this Safety Plan, Boott, the Working Group, and study participants, will document and review those modifications prior to boating the controlled flow releases.

While it is appropriate to develop and review safety guidance for whitewater boating, all parties recognize that whitewater boating has inherent risks that cannot be completely avoided or mitigated. As such, volunteer boaters participating in the controlled flow releases do so at their own risk and in recognition of the inherent dangers such activities pose.

### 2.1 Personal Preparedness and Responsibility

1. **Be a competent swimmer**, with the ability to handle yourself underwater.
2. **Wear a life jacket.** A snugly-fitting vest-type life preserver offers back and shoulder protection as well as the flotation needed to swim safely in whitewater.
3. **Wear a solid, correctly-fitted helmet** when upsets are likely. This is essential in kayaks or covered canoes, and recommended for open canoeists using thigh straps and rafters running steep drops.
4. **Do not boat out of control.** Your skills should be sufficient to stop or reach shore before reaching danger. Do not enter a rapid unless you are reasonably sure that you can run it safely or swim it without injury.
5. **Whitewater rivers contain many hazards which are not always easily recognized. The following are the most frequent killers.**
  - I. **High Water.** A river's speed and power increase tremendously as the flow increases, raising the difficulty of most rapids. Rescue becomes progressively harder as the water rises, adding to the danger. Floating debris and strainers can make even an easy rapid quite hazardous. It is often misleading to judge the river level at the put-in, since a small rise in a wide, shallow place will be multiplied many times where the river narrows. Use reliable gage information whenever

possible, and be aware that sun on snowpack, hard rain, and upstream dam releases may greatly increase the flow.

- II. **Cold.** Cold drains your strength and robs you of the ability to make sound decisions on matters affecting your survival. Cold-water immersion, because of the initial shock and the rapid heat loss which follows, is especially dangerous. Dress appropriately for bad weather or sudden immersion in the water. When the water temperature is less than 50° Fahrenheit, a wetsuit or drysuit is essential for protection if you swim. Next best is wool or pile clothing under a waterproof shell. In this case, you should also carry waterproof matches and a change of clothing in a waterproof bag. If, after prolonged exposure, a person experiences uncontrollable shaking, loss of coordination, or difficulty speaking, he or she is hypothermic, and needs your assistance.
  - III. **Strainers.** Brush, fallen trees, bridge pilings, undercut rocks or anything else which allows river current to sweep through can pin boats and boaters against the obstacle. Water pressure on anything trapped this way can be overwhelming. Rescue is often extremely difficult. Pinning may occur in fast current, with little or no whitewater to warn of the danger.
  - IV. **Dams, weirs, ledges, reversals, holes, and hydraulics.** When water drops over an obstacle, it curls back on itself, forming a strong upstream current which may be capable of holding a boat or swimmer. Some holes make for excellent sport. Others are proven killers. Paddlers who cannot recognize the difference should avoid all but the smallest holes. Hydraulics around man-made dams must be treated with utmost respect regardless of their height or the level of the river. Despite their seemingly benign appearance, they can create an almost escape-proof trap. The swimmer's only exit from the "drowning machine" is to dive below the surface when the downstream current is flowing beneath the reversal.
6. **Broaching.** When a boat is pushed sideways against a rock by strong current, it may collapse and wrap. This is especially dangerous to kayak and decked canoe paddlers; these boats will collapse and the combination of indestructible hulls and tight outfitting may create a deadly trap. Even without entrapment, releasing pinned boats can be extremely time-consuming and dangerous. To avoid pinning, throw your weight downstream towards the rock. This allows the current to slide harmlessly underneath the hull.
  7. **Boating alone is discouraged.** The minimum party is three people or two craft.
  8. **Have a frank knowledge of your boating ability,** and don't attempt rivers or rapids which lie beyond that ability.
  9. **Be in good physical and mental condition,** consistent with the difficulties which may be expected. Make adjustments for loss of skills due to age, health, fitness. Any health limitations must be explained to your fellow paddlers prior to starting the trip.

10. **Be practiced in self-rescue**, including escape from an overturned craft. The Eskimo roll is strongly recommended for decked boaters who run rapids Class IV or greater, or who paddle in cold environmental conditions.
11. **Be trained in rescue skills, CPR, and first aid** with special emphasis on recognizing and treating hypothermia. It may save your friend's life.
12. **Carry equipment needed for unexpected emergencies**, including footwear which will protect your feet when walking out, a throw rope, knife, whistle, and waterproof matches. If you wear eyeglasses, tie them on and carry a spare pair on long trips. Bring cloth repair tape on short runs, and a full repair kit on isolated rivers. Do not wear bulky jackets, ponchos, heavy boots, or anything else which could reduce your ability to survive a swim.
13. Despite the mutually supportive group structure described in this code, **individual paddlers are ultimately responsible for their own safety, and must assume sole responsibility for the following decisions:**
  - I. The decision to participate on any trip. This includes an evaluation of the expected difficulty of the rapids under the conditions existing at the time of the put-in.
  - II. The selection of appropriate equipment, including a boat design suited to their skills and the appropriate rescue and survival gear.
  - III. The decision to scout any rapid, and to run or portage according to their best judgment. Other members of the group may offer advice, but paddlers should resist pressure from anyone to paddle beyond their skills. It is also their responsibility to decide whether to pass up any walk-out or take-out opportunity.
  - IV. All trip participants should consistently evaluate their own and their group's safety, voicing their concerns when appropriate and following what they believe to be the best course of action. Paddlers are encouraged to speak with anyone whose actions on the water are dangerous, whether they are a part of your group or not.

## 2.2 Boat and Equipment Preparedness

1. **Test new and different equipment** under familiar conditions before relying on it for difficult runs. This is especially true when adopting a new boat design or outfitting system. Low-volume craft may present additional hazards to inexperienced or poorly conditioned paddlers.
2. **Be sure your boat and gear are in good repair** before starting a trip. The more isolated and difficult the run, the more rigorous this inspection should be.
3. **Install flotation bags** in non-inflatable craft, securely fixed in each end, designed to displace as much water as possible. Inflatable boats should have multiple air chambers and be test-inflated before launching.

4. **Have strong, properly sized paddles or oars** for controlling your craft. Carry sufficient spares for the length and difficulty of the trip.
5. **Outfit your boat safely.** The ability to exit your boat quickly is an essential component of safety in rapids. It is your responsibility to see that there is absolutely nothing to cause entrapment when coming free of an upset craft. This includes:
  - I. Spray covers which won't release reliably or which release prematurely.
  - II. Boat outfitting too tight to allow a fast exit, especially in low volume kayaks or decked canoes. This includes low-hung thwarts in canoes lacking adequate clearance for your feet and kayak footbraces which fail or allow your feet to become wedged under them.
  - III. Inadequately supported decks which collapse on a paddler's legs when a decked boat is pinned by water pressure or inadequate clearance with the deck because of your size or build.
  - IV. Loose ropes which cause entanglement. Beware of any length of loose line attached to a whitewater boat. All items must be tied tightly, and excess line eliminated; painters, throw lines, and safety rope systems must be completely and effectively stored. Do not knot the end of a rope, as it can get caught in cracks between rocks.
6. **Provide ropes** which permit you to hold on to your craft so that it may be rescued. The following methods are recommended:
  - I. Kayaks and covered canoes should have grab loops of ¼-inch + rope or equivalent webbing sized to admit a normal-sized hand. Stern painters are permissible if properly secured.
  - II. Open canoes should have securely anchored bow and stern painters consisting of 8 – 10 feet of ¼-inch + line. These must be secured in such a way that they are readily accessible, but cannot come loose accidentally. Grab loops are acceptable, but are more difficult to reach after an upset.
  - III. Rafts and dories may have taut perimeter lines threaded through the loops provided. Footholds should be designed so that a paddler's feet cannot be forced through them, causing entrapment. Flip lines should be carefully and reliably stowed.
7. **Know your craft's carrying capacity**, and how added loads affect boat handling in whitewater. Most rafts have a minimum crew size which can be added to on day trips or in easy rapids. Carrying more than two paddlers in an open canoe when running rapids is not recommended.
8. **Car-top racks** must be strong and attach positively to the vehicle. Lash your boat to each crossbar, then tie the ends of the boats directly to the bumpers for added security. This arrangement should survive all but the most violent vehicle accident.



## 2.3 Group Preparedness and Responsibility

1. **Organization.** A river trip should be regarded as a common adventure by all participants, except on instructional or commercially guided trips as defined below. Participants share the responsibility for the conduct of the trip, and each participant is individually responsible for judging his or her own capabilities and for his or her own safety as the trip progresses. Participants are encouraged (but are not obligated) to offer advice and guidance for the independent consideration and judgment of others.
2. **River Conditions.** The group should have a reasonable knowledge of the difficulty of the run. Participants should evaluate this information and adjust their plans accordingly. If the run is exploratory or no one is familiar with the river, maps and guidebooks, if available, should be examined. The group should secure accurate flow information; the more difficult the run, the more important this will be. Be aware of possible changes in river level and how this will affect the difficulty of the run. If the trip involves tidal stretches, secure appropriate information on tides.
3. **Group equipment should be suited to the difficulty of the river.** The group should always have a throw-line available, and one line per boat is recommended on difficult runs. The list may include: carabiners, prussic loops, first aid kit, flashlight, folding saw, fire starter, guidebooks, maps, food, extra clothing, and any other rescue or survival items suggested by conditions. Each item is not required on every run, and this list is not meant to be a substitute for good judgment.
4. **Keep the group compact,** but maintain sufficient spacing to avoid collisions. If the group is large, consider dividing into smaller groups or using the “buddy system” as an additional safeguard. Space yourselves closely enough to permit good communication, but not so close as to interfere with one another in rapids.
  - I. **A point paddler** sets the pace. When in front, do not get in over your head. Never run drops when you cannot see a clear route to the bottom or, for advanced paddlers, a sure route to the next eddy. When in doubt, stop and scout.
  - II. **Keep track of all group members.** Each boat keeps the one behind it in sight, stopping if necessary. Know how many people are in your group and take headcounts regularly. No one should paddle ahead or walk out without first informing the group. Paddlers requiring additional support should stay at the center of a group, and not allow themselves to lag behind in the more difficult rapids. If the group is large and contains a wide range of abilities, a “sweep boat” may be designated to bring up the rear.
  - III. **Courtesy.** On heavily used rivers, do not cut in front of a boater running a drop. Always look upstream before leaving eddies to run or play. Never enter a crowded drop or eddy when no room for you exists. Passing other groups in a rapid may be hazardous; it's often safer to wait upstream until the group ahead has passed.

5. **Float Plan.** If the trip is into a wilderness area or for an extended period, plans should be filed with a responsible person who will contact the authorities if you are overdue. It may be wise to establish checkpoints along the way where civilization could be contacted if necessary. Knowing the location of possible help and planning escape routes can speed rescue.
6. **Drugs.** The use of alcohol or mind-altering drugs before or during river trips is not recommended. It dulls reflexes, reduces decision-making ability, and may interfere with important survival reflexes.
7. **Instructional or commercially guided trips.** In contrast to the common adventure trip format, in these trip formats, a boating instructor or commercial guide assumes some of the responsibilities normally exercised by the group as a whole, as appropriate under the circumstances. These formats recognize that instructional or commercially guided trips may involve participants who lack significant experience in whitewater. However, as a participant acquires experience in whitewater, he or she takes on increasing responsibility for his or her own safety, in accordance with what he or she knows or should know as a result of that increased experience. Also, as in all trip formats, every participant must realize and assume the risks associated with the serious hazards of whitewater rivers.
8. It is advisable for instructors and commercial guides or their employers to acquire trip or personal liability insurance:
  - I. An “instructional trip” is characterized by a clear teacher/pupil relationship, where the primary purpose of the trip is to teach boating skills, and which is conducted for a fee.
  - II. A “commercially guided trip” is characterized by a licensed, professional guide conducting trips for a fee.

## 2.4 Guidelines for River Rescue

1. **Recover from an upset with an Eskimo roll** whenever possible. Evacuate your boat immediately if there is imminent danger of being trapped against rocks, brush, or any other kind of strainer.
2. **If you swim, hold on to your boat.** It has much flotation and is easy for rescuers to spot. Get to the upstream end so that you cannot be crushed between a rock and your boat by the force of the current. Persons with good balance may be able to climb on top of a swamped kayak or flipped raft and paddle to shore.
3. **Release your craft if this will improve your chances,** especially if the water is cold or dangerous rapids lie ahead. Actively attempt self-rescue whenever possible by swimming for safety. Be prepared to assist others who may come to your aid.
  - I. When swimming in shallow or obstructed rapids, lie on your back with feet held high and pointed downstream. Do not attempt to stand in fast moving water; if your foot wedges on the bottom, fast water will push you under and keep you

there. Get to slow or very shallow water before attempting to stand or walk. Look ahead! Avoid possible pinning situations including undercut rocks, strainers, downed trees, holes, and other dangers by swimming away from them.

- II. If the rapids are deep and powerful, roll over onto your stomach and swim aggressively for shore. Watch for eddies and slackwater and use them to get out of the current. Strong swimmers can affect a powerful upstream ferry and get to shore fast. If the shores are obstructed with strainers or undercut rocks, however, it is safer to “ride the rapid out” until a safer escape can be found.
4. **If others spill and swim, go after the boaters first.** Rescue boats and equipment only if this can be done safely. While participants are encouraged (but not obligated) to assist one another to the best of their ability, they should do so only if they can, in their judgment, do so safely. The first duty of a rescuer is not to compound the problem by becoming another victim.
5. **The use of rescue lines requires training;** uninformed use may cause injury. Never tie yourself into either end of a line without a reliable quick-release system. Have a knife handy to deal with unexpected entanglement. Learn to place set lines effectively, to throw accurately, to belay effectively, and to properly handle a rope thrown to you.
6. **When reviving a drowning victim,** be aware that cold water may greatly extend survival time underwater. Victims of hypothermia may have depressed vital signs so they look and feel dead. Don't give up; continue CPR for as long as possible without compromising safety.

### 3 Safety, First Aid, and Rescue Equipment

For this study, volunteer boaters participating in the controlled flow releases are required to have the following PPE, regardless of skill level or experience:

- **Personal Floatation Device:** All study participants are required to wear a Type III or V personal floatation device when boating or within 10 feet of the water.
- **Helmet:** All study participants must wear a properly fitted whitewater helmet when boating.
- **Whistle:** All study participants must carry a whistle to alert other participants or spotters of an emergency situation or to signal distress.

As noted in the Safety Code, ***it is the responsibility of the study participants to have the PPE, first aid, rescue, and other safety equipment that they determine to be appropriate.*** Participants should consider (both individually and as a group) the equipment that may be appropriate for weather conditions, flows, watercraft, and skill levels. Other appropriate PPE, first aid, rescue, and safety equipment may include (but is not limited to), wetsuits, drysuits, spraycovers, extra oars/paddles, gloves, throw ropes,

rescue knives, floatation, first aid kits, and an extra set of dry clothes. It is the responsibility of study participants to have the PPE, safety, first aid, and rescue equipment available for the controlled flow releases and to be familiar with proper use of any such equipment.

## 4 Alcohol and Drug Policy

For the safety of all participants, and consistent with the Safety Code, the use of alcohol or drugs is prohibited during the controlled flow releases. Whitewater rafting requires exceptional physical exertion and risk of injury or death from whitewater rafting can be mitigated by excluding those under the influence of alcohol or drugs. As noted in the Safety Code, the use of alcohol or drug, dulls reflexes, reduces decision-making ability, and may interfere with important survival reflexes. ***Persons who appear visibly intoxicated will not be allowed to participate in the study.***

## 5 Safety Issues

Each volunteer boater is responsible for understanding the safety issues associated with participation in the study. In addition to the safety guidance discussed in the Safety Code, volunteer boaters should be aware of these safety issues that may be encountered during the study:

- **Protruding rebar** submerged in a pool below the fish ladder and in the elevated bedrock downstream of the University Avenue bridge that could not be removed. The majority of rebar in the bypass reach has been cut to bedrock level, however additional bars may be present in addition to locations listed above.
- **Strainers and obstructions** along the Project's bypass reach that present potential pinning scenarios for boats and boaters, including downed trees, rocks/boulders, and bridge pilings.
- **Potential foot entrapments** that could result from dangling feet over or near the bottom of the river or attempting to stand in the current.
- **Weather related illness**, such as hypothermia or dehydration.
- **Severe or sudden weather events** (i.e., thunderstorms, heavy rainfall, etc.).
- **Sudden rapid flow releases** that may occur if the powerhouse is tripped offline (due to a lightning strike or equipment failure) or if water is released through the surge gate located upstream from the Projects E.L. Field Powerhouse.
- **Advice/encouragement from the general public** to attempt rivers or rapids which lie beyond the volunteer boater's ability.

- **Sudden changes in physical health or mental condition** of volunteer boater on the day of the study.
- **Unexpected emergency situations** (i.e. medical/health emergency, boating collisions, severe weather, etc.).

## 6 Safety Measures

Boott, the Working Group, and study participants will all have responsibilities to support safe boating during the controlled flow releases. The following safety measures will be implemented for this study:

- Volunteer boaters will be experienced and will have the skills necessary to boat the Project's bypass reach. AW will be responsible for selecting volunteers to participate in the controlled flow releases.
- The minimum age for participating in the controlled flow releases is 18. All participants will sign a waiver prior to boating the controlled flow releases. Individuals who do not sign the waiver will not be allowed to participate in the Whitewater Study.
- All study participants must adhere to the COVID-19 Protocols described in Section 7 of this Safety Plan. Boott reserves the right to remove any participant who does not adhere to the COVID-19 Protocols from the Whitewater Study.
- All study participants will be required to provide contact information for themselves and an emergency contact. Study participants will have the option to disclose medical conditions/disabilities that could be relevant to potential medical treatment/care (i.e., allergies to certain medications, asthma, etc.).
- Boott will maintain contact information for the City's fire department. The point of contact (POC) for the fire department shall be Phillip Charron, Fire Chief, 978-674-4588.
- At least 48 hours prior to boating the controlled flow releases, Boott will contact the City's fire department and any other contact designated by the City to make them aware of the timing and expected schedule for the controlled flow releases. If the fire department's POC has concerns regarding the timing or schedule for controlled flow releases, Boott will consult the working group to address any concerns. If the concerns cannot be addressed to the satisfaction of the fire department's POC, Boott reserves the right to postpone the study.
- Prior to boating the controlled flow releases, all study participants will participate in a daily "tailgate" safety discussion. During the tailgate discussion, Boott will summarize the safety plan, including the procedures for emergencies. The tailgate discussion will be an opportunity for the Working Group to provide any additional or updated

safety information to study participants, and for the volunteer boaters participating in the controlled flow releases to discuss conditions and any additional safety measures, recommendations, or guidance. Boott will document any new or modified safety measures, recommendations or guidance in the Safety Plan Addendum provided in Appendix A to this Safety Plan.

- Prior to boating the controlled flow releases, all study participants will participate in an equipment check to be sure that gear is in proper functioning condition, all loads are secured so as not to break free and cause harm to fellow study participants, and that required PPE (i.e., vest, helmet, and whistle) are not damaged in a way that would inhibit them from working properly.
- Study participants will sign in/out on a daily basis and Boott will record the names of individual volunteer boaters as they put-in and take-out their craft.
- During the controlled flow releases, Boott will place “spotters” at two locations identified in the field in consultation with the Working Group. The spotters will observe boaters during the controlled flow releases and will be prepared to call emergency services (911) if there is an observed accident, injury, pinning, or other emergency.
- Boott, the Working Group, and study participants will continually evaluate boating safety and will speak with anyone whose actions on the water are dangerous.
- Study participants will make the decision to scout any rapid, and to run or portage according to their best judgment. Do not enter a rapid unless you are reasonably sure that you can run it safely or swim it without injury. Consistent with the Safety Code, it is the responsibility of individual study participants to decide whether to pass up any walk-out or take-out opportunity.
- A “sweep boat” will be designated for each controlled flow release to ensure all study participants have safely exited the water.
- Any study participant should call 911 to report life-threatening or medical emergencies (i.e., chest pains) during the controlled flow releases. When calling 911, briefly describe the incident you are reporting to the dispatcher, remain calm, speak clearly, and stay on the line.
- If a safety incident occurs during the controlled flow releases, and a rescue is required, Boott will notify Project operations staff. If the flow in the bypass reach can safely be reduced to facilitate rescue, Project staff will reduce the flow as quickly as possible.
- Boott reserves the right to remove any participant from the Whitewater Study who does not follow the safety measures or is acting in an unsafe manner.

## 7 COVID-19 Protocols

Coronavirus Disease 2019 (COVID-19) is a new disease that presents hazards that must be considered and addressed as part of this Whitewater Study. Massachusetts Governor Charlie Baker declared a State of Emergency to Respond to COVID-19 on March 10, 2020, and the World Health Organization designated COVID-19 as a pandemic on March 11, 2020. On March 13, 2020, the President of the United States declared the COVID-19 pandemic a national emergency.

The Commonwealth of Massachusetts remains under an emergency declaration and has promulgated regulations and guidance to reduce the spread of COVID-19. The Commonwealth's regulations and guidance related to COVID-19 are available at <https://www.mass.gov/info-details/covid-19-updates-and-information>.

***Boott notes that the Commonwealth's regulations and guidance are subject to change, and study participants must review the guidance and recommendations prior to arriving at the Project. It is the responsibility of each study participant to review and comply with the Commonwealth's regulations and guidance regarding COVID-19.***

Spread of COVID-19 between humans most likely occurs when a person is within six feet of an infected person. Sources of exposure to COVID-19 include droplets of respiratory secretions produced when an infected person coughs or sneezes; these droplets are believed to enter the mouths and noses of people nearby and can be inhaled into the nose and lungs. Exposure can also occur by touching surfaces/objects contaminated with the virus (SARS-COV-2) that causes the disease and then touching the mouth, nose, or possibly the eyes. Activities that involve close (within six feet) contact with infected people or other sources of the virus, social conditions (i.e., high population density, frequent person-to-person contact, large group gatherings), or travel to areas highly affected by COVID-19 are risk factors for exposure to the virus. (OSHA 2020)

Hazards associated with exposure to the virus include developing COVID-19 illness, which has a wide range of symptoms ranging from mild to severe illness, and, in some cases, death. Symptoms may appear 2-14 days after exposure to the virus. People at higher risk for severe illness include older adults, people with severe underlying medical conditions (i.e., heart or lung disease, liver disease), people with asthma, and/or people that are immunocompromised.

Study participants are required to self-evaluate for signs or symptoms of COVID-19 prior to attending. Any study participant experiencing COVID-19 symptoms must not report to the Project. A list of common COVID-19 symptoms is provided below.

- Fever (over 100.4 degrees Fahrenheit) or chills
- Cough
- Shortness of breath or difficulty breathing
- Fatigue

- Muscle or body aches
- Headache
- New loss of taste or smell
- Sore throat
- Congestion or runny nose
- Nausea or vomiting
- Diarrhea

## 8 Contact Information

Contact information for emergency services, law enforcement, and Boott personnel are provided below. ***In the event of a life-threatening or medical emergency, call 911.***

City of Lowell Fire Department  
Phillip Charron  
Fire Chief  
99 Moody Street  
Lowell, MA 01852  
(978) 458-4588

City of Lowell Police Department  
Barry Golner  
Interim Superintendent of Police  
50 Arcand Drive  
Lowell, MA 01852  
(978) 937-3200

National Park Service  
Julie Galonska  
Lowell National Historical Park Superintendent  
67 Kirk Street  
Lowell, MA 01852  
978-970-5000

Lowell General Hospital  
295 Varnum Avenue  
Lowell, MA 01854  
(978) 937-6000

Kevin Webb  
Boot Hydropower, LLC  
670 N. Commercial Street, Suite 204  
Manchester, NH 03101  
(978) 935-6039  
[kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com)



## 9 References Cited

American Whitewater. 2005. Safety Code of American Whitewater. Available at: <https://www.americanwhitewater.org/content/Wiki/safety:start>. Accessed September 8, 2020.


Centers for Disease Control and Prevention (CDC). 2020. Coronavirus Disease 2019 (COVID-19). Symptoms. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. Accessed June 1, 2020.

Occupational Health and Safety (OSHA). 2020. COVID-19. Available at: <https://www.osha.gov/SLTC/covid-19/>. Accessed May 28, 2020.



**Appendix A**  
**Safety Plan Addendum**





## Appendix C - Whitewater Flow Release Study Forms

**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Pre-Run Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Affiliation:** \_\_\_\_\_

**Home Zip Code:** \_\_\_\_\_

**E-Mail Address:** \_\_\_\_\_

- 1) What whitewater crafts do you think are appropriate for this reach? (*Please choose all that apply*)
  - a. Hard shell kayak / C1
  - b. Inflatable kayak
  - c. Open canoe with flotation
  - d. Cataraft (include length)
  - e. Self-bailing raft (include length)
  - f. Stand-up paddleboard
  - g. Other (please list)
  
- 2) What is your skill level?
  - a. Novice (comfortable running Class II whitewater)
  - b. Intermediate (comfortable running Class III whitewater)
  - c. Advanced (comfortable running Class IV whitewater)
  - d. Expert (comfortable running Class V whitewater)
  
- 3) How many years have you been whitewater boating?
  
- 4) Over the past 3 years, approximately how many days per month did you whitewater boat?

- 5) Have you ever participated in a whitewater boating study associated with the relicensing of a hydroelectric project?
- a. \_Yes No
  - b. If yes, when, and for which project(s)?
- 6) How many times have you boated this reach before today?
- a. If you have boated this reach before, what were the flows?
    - i. Approximately: cfs to: cfs
    - ii. What type of craft did you use? (*Please choose all that apply*)
      - 1. Hard shell kayak / C1
      - 2. Inflatable kayak
      - 3. Open canoe with flotation
      - 4. Cataraft (include length)
      - 5. Self-bailing raft (include length)
      - 6. Stand-up paddleboard
      - 7. Other (please list)

***Thank You for Your Participation***





**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Post-Run Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Date of Run:** \_\_\_\_\_

**Flow:** \_\_\_\_\_ **cfs**

1) What type of craft did you use for this run?

- a. Hard shell kayak / C1
- b. Inflatable kayak
- c. Open canoe with flotation
- d. Cataract (include length)
- e. Self-bailing raft (include length)
- f. Stand-up paddleboard
- g. Other (please list)

2) Please identify the put-in and take-out locations you used for this run.

Put-in location: \_\_\_\_\_ Time: \_\_\_\_\_

Take-out location: \_\_\_\_\_ Time: \_\_\_\_\_

3) Please estimate the number of unintended hits, stops, boat drags, and portages you had on this run:

- a. I accidentally hit rocks or other obstacles (but did not stop) about \_\_\_\_\_ times.
- b. I was stopped after hitting rocks or other obstacles about \_\_\_\_\_ times (but did not have to get out of my boat to continue downstream).
- c. I had to get out to drag or pull my boat off rocks or other obstacles about \_\_\_\_\_ times.
- d. I had to portage around rapids or sections about \_\_\_\_\_ times.

4) How many rapids and play spots did you experience at this flow?

a. \_Rapids Play Spots

5) Please evaluate the availability of the following factors at this flow.

	<b>Totally Unacceptable</b>	<b>Unacceptable</b>	<b>Neutral</b>	<b>Acceptable</b>	<b>Totally Acceptable</b>
<b>Navigability</b>	1	2	3	4	5
<b>Challenging Technical Boating</b>	1	2	3	4	5
<b>Powerful Hydraulics</b>	1	2	3	4	5
<b>Whitewater "Play Areas"</b>	1	2	3	4	5
<b>Size/Difficulty of Rapids</b>	1	2	3	4	5
<b>Overall Whitewater</b>	1	2	3	4	5
<b>Challenge</b>	1	2	3	4	5
<b>Safety</b>	1	2	3	4	5

6) At this flow, what minimum skill level would a paddler need to be to safely paddle this reach?

- a. Beginner
- b. Novice
- c. Intermediate
- d. Advanced
- e. Expert

7) Are you likely to return for future boating if this flow were to be provided or available?

- a. Definitely no
- b. Possibly
- c. Probably
- e. Definitely yes

- 8) Was this flow optimal, or would you prefer a flow that was higher or lower than this flow?
- a. Much lower
  - b. Lower
  - c. About the same (this flow was optimal)
  - d. Higher
  - e. Much higher

9) If you feel qualified to offer an opinion of the desirability of this run at this flow using different types of crafts, please respond to the following statements.

<b>This run at this flow would work well for:</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>No Opinion</b>	<b>Agree</b>	<b>Strongly Agree</b>
Hard shell kayaks / C1	1	2	3	4	5
Inflatable kayaks	1	2	3	4	5
Open canoes with floatation	1	2	3	4	5
Cataracts	1	2	3	4	5
Self-bailing rafts	1	2	3	4	5
Stand-up paddleboards	1	2	3	4	5
Other (Please specify):	1	2	3	4	5

10) Did you observe or experience any significant safety issues on your run (e.g., swims, pins, wrapped boats, constructed or natural river features, etc.)? Please explain.

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11) Please use the space below to provide any other comments about your boating experience at this flow.

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***Thank You for Your Participation***



**Lowell Hydroelectric Project (FERC No. 2790)**  
**FERC Relicensing**  
**Whitewater Boating Flow Comparison Survey**

*Lowell Hydroelectric Project Bypass Reach*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

- 1) Craft used?
  - a. Hard shell kayak / C1
  - b. Inflatable kayak
  - c. Open canoe with flotation
  - d. Cataract (include length)
  - e. Self-bailing raft (include length)
  - f. Stand-up paddleboard
  - g. Other (please list)
  
- 2) What is your skill level?
  - a. Novice (comfortable running Class II whitewater)
  - b. Intermediate (comfortable running Class III whitewater)
  - c. Advanced (comfortable running Class IV whitewater)
  - d. Expert (comfortable running Class V whitewater)

3) Which study dates/flows did you participate in? Please select from the list below.

<b>Study Flows</b>	<b>Study Date</b>	<b>Participated</b>	<b>Did Not Participate</b>
<b>cfs</b>			
<b>cfs</b>			
<b>cfs</b>			

4) Approximately how many times have you boated this reach before this study?

- 5) A number of factors can affect your satisfaction with a whitewater trip. How important are each of these factors to you?

	<b>Not Important</b>		<b>Somewhat Important</b>		<b>Very Important</b>
<b>Navigability</b>	1	2	3	4	5
<b>Challenging Technical Boating</b>	1	2	3	4	5
<b>Powerful Hydraulics</b>	1	2	3	4	5
<b>Whitewater "Play Areas"</b>	1	2	3	4	5
<b>Size/Difficulty of Rapids</b>	1	2	3	4	5
<b>Overall Whitewater Challenge</b>	1	2	3	4	5
<b>Safety</b>	1	2	3	4	5
<b>Crowding</b>	1	2	3	4	5
<b>Long Run(s)</b>	1	2	3	4	5
<b>Short Run(s)</b>	1	2	3	4	5
<b>Low Number of Portages</b>	1	2	3	4	5
<b>High Number of Rapids</b>	1	2	3	4	5
<b>Low Number of Rapids</b>	1	2	3	4	5
<b>Easy Access</b>	1	2	3	4	5
<b>Easy Shuttles</b>	1	2	3	4	5

- 6) Please evaluate the study flows for your craft and skill level. In making your evaluations, please consider all the flow-dependent characteristics that contribute to a high-quality trip (*note, please evaluate only the study flows that you participated in*).

	<b>cfs</b>	<b>cfs</b>	<b>cfs</b>
<b>Totally Acceptable</b>	5	5	5
<b>Acceptable</b>	4	4	4
<b>Marginal</b>	3	3	3
<b>Unacceptable</b>	2	2	2
<b>Totally Unacceptable</b>	1	1	1

7) Which of the following best describes your desired paddling experience (s) for this reach  
*(Note, you may select more than one):*

Type of Experience	Description	Desired Experience	
<b>Technical</b>	I am interested in “technical” whitewater trips at relatively low flows	Yes	No
<b>Standard</b>	I am interested in “standard” whitewater trips at relatively moderate flows	Yes	No
<b>High Challenge</b>	I am interested in “high challenge” whitewater trips at relatively high flows	Yes	No

8) Based on the boating trips that you participated in for this study, please specify the flow(s) that, in your opinion, provide the following for your desired experience(s) *(note you can specify flows that you have not seen, but which you think would provide the following for your desired experience[s])*. Please list craft, desired experience (from Question 7), and related acceptable flow. If providing input on more than one craft or type of experience, please use the back of this form.

a. What is the minimum flow needed to boat this reach in your craft?

iii. Craft: Experience: Flow: \_\_\_\_\_ cfs

b. Based on your skill level, factors that affect your satisfaction with a whitewater trip, and the flow-dependent characteristics of this reach, what is the minimum acceptable flow for this reach (the lowest flow at which you would return to paddle it)?

iv. Craft: Experience: Flow: \_\_\_\_\_ cfs

c. What is the optimal range of flows that provides the best whitewater characteristics for this run?

v. Craft: Experience: Flow: cfs to: \_\_\_\_\_ cfs

d. What is the highest safe flow for your craft and skill level?

vi. Craft: Experience: Flow: \_\_\_\_\_ cfs



- 9) Please evaluate the acceptability of current river access for your craft and skill level, assuming that no shuttle(s) are available:

	Put In	Take Out
<b>Totally Acceptable</b>	5	5
<b>Acceptable</b>	4	4
<b>Marginal</b>	3	3
<b>Unacceptable</b>	2	2
<b>Totally Unacceptable</b>	1	1

- 10) Where would you prefer to put in to and take out of this reach if suitable parking and river access were available at that location, and what type of access facilities would facilitate a high-quality paddling experience?

a. Put In Location: \_\_\_\_\_ Facilities: \_\_\_\_\_

b. Take Out Location: \_\_\_\_\_ Facilities: \_\_\_\_\_

- 11) In your experience, what whitewater reaches in the region do you find similar to this one at your optimum flow for this reach? Also, please select how often you boat these reaches.

b. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+


c. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+

d. Whitewater reach name or description: \_\_\_\_\_

i. Trips per Year: 0-3 4-8 9-15 15+

***Thank You for Your Participation***



# Appendix D - Whitewater Flow Documentation Report



# Whitewater Flow Documentation Report

Lowell Hydroelectric Project  
(FERC No. 2790)

August 21, 2020

Prepared by:



Prepared for:

Boott Hydropower, LLC

Manchester, New Hampshire



**Central Rivers Power**



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## Appendices

Appendix A Whitewater Photographs

## List of Acronyms

AW	American Whitewater
Boott	Boott Hydropower, LLC
cfs	cubic feet-per-second
FERC	Federal Energy Regulatory Commission (or Commission)
Project	Lowell Hydroelectric Project (or Lowell Project)
RSP	Revised Study Plan
Study	Whitewater Boating and Access Study
USGS	U.S. Geological Survey
Working Group	Whitewater Boating and Access Study Working Group

# 1 Introduction and Background

Boott Hydropower, LLC (Boott), a subsidiary of Enel Green Power North America, Inc., is the Licensee and operator of the 20.2-megawatt Lowell Hydroelectric Project (Federal Energy Regulatory Commission [FERC or Commission] Project No. 2790) (Project or Lowell Project). The Project is located along the Merrimack River in Middlesex County, Massachusetts and in Hillsborough County, New Hampshire. Boott owns and operates the Project as an independent power producer.

The existing license for the Project was issued by the Commission with an effective date of May 1, 1973. The existing license expires on April 30, 2023. Accordingly, Boott is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process, as described at 18 Code of Federal Regulations Part 5. As proposed in Boott's January 28, 2019 Revised Study Plan (RSP) and approved in the Commission's March 13, 2019 Study Plan Determination, Boott is conducting a Whitewater Boating and Access Study (Study) in support of Project relicensing.

## 1.1 Whitewater Boating and Access Study Overview

The Lowell Project is a run-of-river hydropower plant. When river flows exceed the hydraulic capacity of the two generating units located at the E.L. Field Powerhouse (combined capacity of approximately 8,000 cubic feet per second [cfs]), excess flows (up to approximately 2,000 cfs) are routed through the downtown Lowell canal system and through the canal units. When inflows exceed the 10,000 cfs capacity of the generating units and canals, all excess flows are passed over the Pawtucket Dam spillway into the bypass reach. The Project has the potential to affect whitewater boating opportunities in the bypass reach when flows are less than 10,000 cfs.

As described in the approved study plan, the goal of the Study is to assess the Project's bypass reach for whitewater boating and access opportunities. The objectives of the Study are as follows:

- Assess a range of flows suitable for whitewater boating opportunities in the Project's bypass reach;
- Assess the frequency, timing, duration, and predictability of paddling flows under current and proposed Project operations;
- Define potential locations for put-in and take-out points for boaters; and,
- Assess the flow information needs for whitewater boating, and the current and potential flow information distribution system.

In accordance with the approved study plan, Boott met with the Whitewater Boating and Access Study Working Group (Working Group)<sup>1</sup> at the Project on August 8, 2019 to coordinate study planning, identify potential volunteers to participate in controlled flow releases, and to identify potential put-in and take-out locations.

During the August 8, 2019, meeting and site visit, the Working Group indicated a need to visually document a range of flows in the Project's bypass reach in order to assist the participants in identifying which flows to select for the controlled flow releases. Since the Working Group participants had limited experience boating the bypass reach, participants could not make informed choices on which flows would be appropriate for boating. Accordingly, Boott developed a Whitewater Flow Documentation Plan that describes the methods for documenting a range of flow conditions in the bypass reach, and consulting with the Working Group to identify the appropriate flows for the controlled flow releases. The Whitewater Flow Documentation Plan was distributed to the Working Group on January 15, 2020, and Boott consulted with the Working Group regarding the study methodology. Boott appreciates the productive comments provided by the Working Group on the Whitewater Flow Documentation Plan.

To document the whitewater conditions in the bypass reach under various flows, Boott deployed four cellular-enabled trail cameras to capture time- and date-stamped images of the bypass reach on an hourly basis during daylight hours. The camera locations were identified in consultation with the Working Group, with specific input from AW. As shown below in Figure 1-1, cameras were deployed at the following four locations:

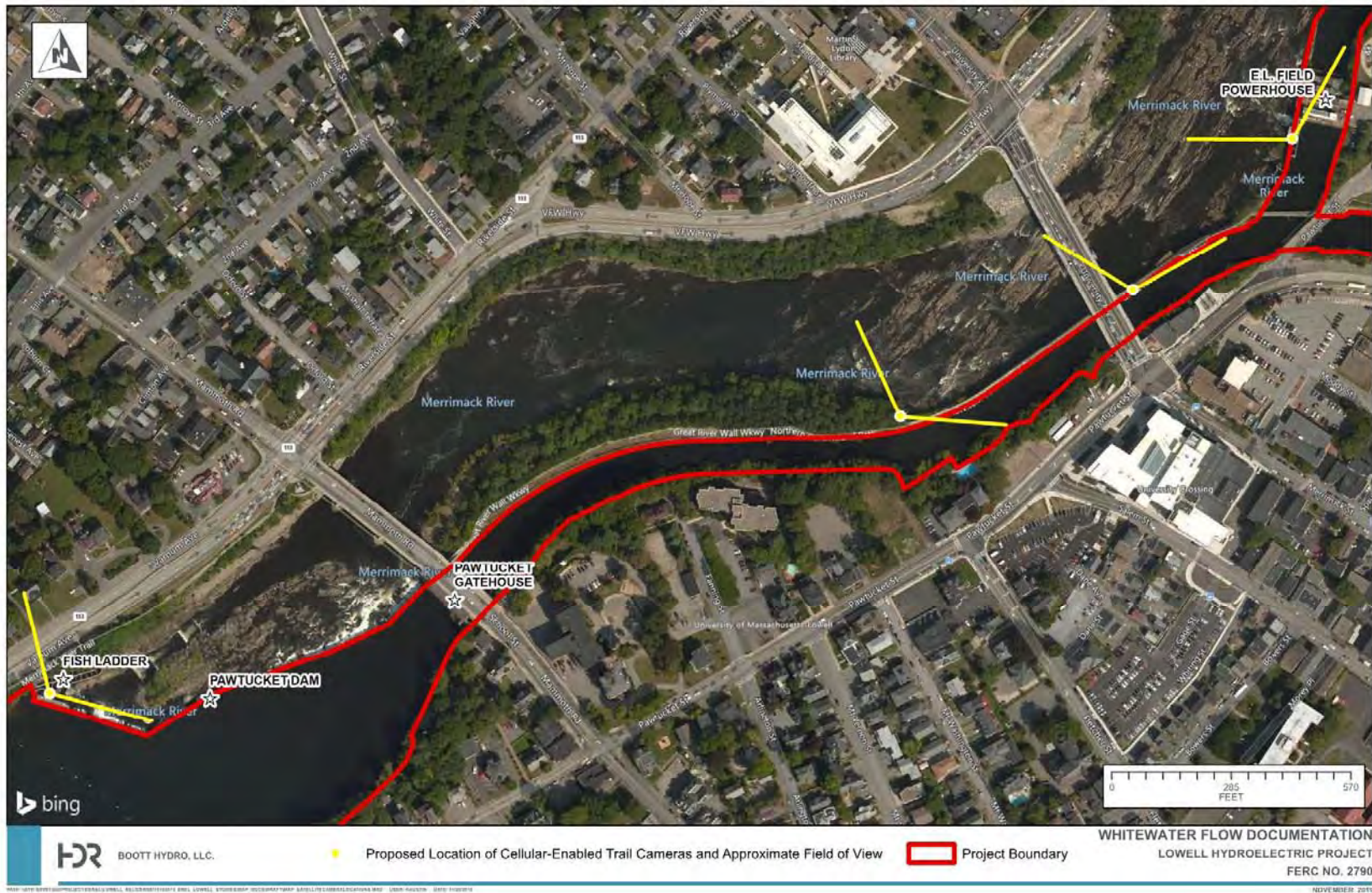
- The Fish Ladder at the Pawtucket Dam;
- A location along the bypass reach located upstream from the University Avenue Bridge;
- A location along the bypass reach located downstream from the University Avenue Bridge; and
- The E.L. Field Powerhouse.

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<sup>1</sup> The Working Group includes American Whitewater (AW), the National Park Service, City of Lowell, Massachusetts Department of Conservation and Recreation, and Zoar Outdoor.



Figure 1-1. Locations of Cellular-Enabled Cameras



Trail cameras were deployed on March 10, 2020 and were removed on May 25, 2020. Boott conducted routine maintenance of the cameras during this period, including regular replacement of camera batteries.



To verify the flows represented by the photographs, Boott used Project operations data in combination with U.S. Geological Survey (USGS) gage information. There is an existing USGS gage installed approximately 2.1 miles downstream from the Pawtucket Dam (USGS No. 01100000, Merrimack River BL Concord River at Lowell, MA). There is also an existing USGS gage installed on the Concord River (USGS No. 01099500, Concord R below R Meadow Brook, at Lowell, MA). Flows from the USGS Gage No. 01099500 were subtracted from the flows at USGS Gage No. 01100000 to calculate flows at the Project. Flows in the bypass were estimated by subtracting the sum of flow at the E.L. Field Powerhouse and through the canal system from the inflow calculated from the USGS gages as described above.

## 2 Study Results

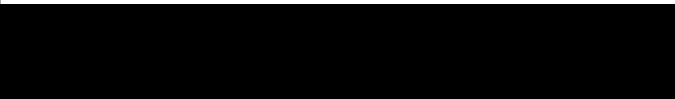
The cameras captured a wide range of flows in the bypass reach during that period, from approximately 500 cfs to flows in excess of 21,000 cfs. Appendix A provides photographic documentation of flows in the Project's bypass reach. For purposes of this study, Boott has provided documentation of flows between 1,681 cfs to 21,672 cfs. Where possible, Boott has provided documentation in approximately 500 cfs increments; however, due to the nature of flows in the bypass reach, and occasional technical issues with the cameras, the increments are not always consistent. As provided in Appendix A, this range of flows was ultimately selected from twenty-three days at various times throughout daylight hours.

## 3 Consultation with Working Group

Once the Working Group has had the opportunity to review the information provided, Boott anticipates consulting with the Working Group to select the controlled releases to be provided during the Study. The timing of the controlled flow releases will be dependent on available flows in the Merrimack River. Each of the controlled releases will be provided for approximately 3 hours. This will afford participants the opportunity to boat the reach and make multiple passes at each flow so that participants are able to evaluate different lines through various portions of the study reach. Pre, post, and comparative surveys will be provided to controlled flow release participants for their completion during this portion of the study (draft pre, post, and comparative surveys can be found in Appendices D through F of the RSP).



# Appendix A Whitewater Photographs





# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 5/11/2020

AVG. BYPASS FLOW: 1,681 cubic feet per second (cfs)

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 01" CAMERA 01 045°F 07°C 05/11/2020 05:00:01

Camera 1 - 05:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 081°F 27°C 05/11/2020 10:00:01

Camera 2 - 10:00



CREATIVE XP N42° 39' 06" W071° 19' 23" CAMERA 03 066°F 18°C 05/11/2020 08:00:01

Camera 3 - 08:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 079°F 26°C 05/11/2020 11:00:01

Camera 4 - 11:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 5/10/2020

AVG. BYPASS FLOW: 1,958 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 01" CAMERA 01 041F 05C 05/10/2020 06:00:02

Camera 1 - 06:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 045F 07C 05/10/2020 07:00:01

Camera 2 - 07:00



CREATIVE XP N42° 39' 06" W071° 19' 23" CAMERA 03 035F 01C 05/10/2020 06:00:01

Camera 3 - 06:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 039F 03C 05/10/2020 06:00:01

Camera 4 - 06:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 05/09/2020

AVG. BYPASS FLOW: 2,442 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 01" CAMERA 01 036 F 01 C 05/09/2020 07:00:01

Camera 1 - 07:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 034 F 01 C 05/09/2020 08:00:02

Camera 2 - 08:00



CREATIVE XP N42° 39' 06" W071° 19' 23" CAMERA 03 044 F 06 C 05/09/2020 10:00:00

Camera 3 - 10:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 049 F 09 C 05/09/2020 11:00:01

Camera 4 - 11:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 03/19/2020

AVG. BYPASS FLOW: 2,804 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 57" W071° 19' 59" CAMERA 01 033F 00C 03/19/2020 08:00:01

Camera 1 - 08:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 034F 01C 03/19/2020 09:00:02

Camera 2 - 09:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 048F 08C 03/19/2020 14:00:01

Camera 3 - 14:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 045F 07C 03/19/2020 11:00:01

Camera 4 - 11:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/26/2020

AVG. BYPASS FLOW: 3,088 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 044F 06C 04/26/2020 05:00:01

Camera 1 - 05:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 057F 13C 04/26/2020 15:00:01

Camera 2 - 15:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 044F 06C 04/26/2020 05:00:01

Camera 3 - 05:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 052F 11C 04/26/2020 17:00:00

Camera 4 - 17:00





# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 5/8/2020

AVG. BYPASS FLOW: 3,549 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 01" CAMERA 01 072F 22C 05/08/2020 10:00:01

Camera 1 - 10:00 -



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 070F 21C 05/08/2020 10:00:02

Camera 2 - 10:00 -



CREATIVE XP N42° 39' 06" W071° 19' 23" CAMERA 03 061F 16C 05/08/2020 10:00:01

Camera 3 - 10:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 064F 17C 05/08/2020 10:00:01

Camera 4 - 10:00 -



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 3/18/2020

AVG. BYPASS FLOW: 4,148 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 57" W071° 19' 59" CAMERA 01 065F 18C 03/18/2020 11:00:02

Camera 1 - 11:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 044F 06C 03/18/2020 11:00:02

Camera 2 - 11:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 053F 11C 03/18/2020 11:00:01

Camera 3 - 11:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 061F 16C 03/18/2020 11:00:00

Camera 4 - 11:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/24/2020

AVG. BYPASS FLOW: 5,037 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 050F 10C 04/24/2020 13:00:01

Camera 1 - 13:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 053F 11C 04/24/2020 13:00:02

Camera 2 - 13:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 055F 12C 04/24/2020 13:00:01

Camera 3 - 13:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 056F 13C 04/24/2020 13:00:01

Camera 4 - 13:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 05/07/2020

AVG. BYPASS FLOW: 5,680 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42°38'54" W071°20'01" CAMERA 01 073F 22C 05/07/2020 15:00:01

Camera 1 - 15:00



CREATIVE XP N42°39'01" W071°19'34" CAMERA 02 069F 20C 05/07/2020 15:00:02

Camera 2 - 15:00



CREATIVE XP N42°39'06" W071°19'23" CAMERA 03 070F 21C 05/07/2020 16:00:02

Camera 3 - 16:00



CREATIVE XP N42°39'08" W071°19'21" CAMERA 04 073F 22C 05/07/2020 17:00:01

Camera 4 - 17:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/22/2020

AVG. BYPASS FLOW: 5,878 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 053F 11C 04/22/2020 14:00:01

Camera 1 - 14:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 047F 08C 04/22/2020 14:00:01

Camera 2 - 14:00



CREATIVE XP N42° 39' 08" W071° 19' 22" CAMERA 03 047F 08C 04/22/2020 14:00:00

Camera 3 - 14:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 050F 10C 04/22/2020 14:00:01

Camera 4 - 14:00



**WHITEWATER FLOW PHOTO DOCUMENTATION**

**DATE: 4/21/2020**

**AVG. BYPASS FLOW: 6,431 cfs**

**PROJECT NAME: Lowell Hydroelectric Project**

**PROJECT NO: 2790**



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 054F 12C 04/21/2020 15:00:02

**Camera 1 - 15:00**



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 056F 13C 04/21/2020 15:00:01

**Camera 2 - 15:00**



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 056F 13C 04/21/2020 15:00:01

**Camera 3 - 15:00**



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 056F 13C 04/21/2020 15:00:02

**Camera 4 - 15:00**



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/9/2020

AVG. BYPASS FLOW: 8,022 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42°38'54" W071°20'00" CAMERA 01 053°F 11°C 04/09/2020 12:05:53

Camera 1 - 12:05



CREATIVE XP N42°39'01" W071°19'34" CAMERA 02 049°F 09°C 04/09/2020 13:39:54

Camera 2 - 13:39



CREATIVE XP N42°39'06" W071°19'22" CAMERA 03 054°F 12°C 04/09/2020 09:51:13

Camera 3 - 9:51



CREATIVE XP N42°39'06" W071°19'21" CAMERA 04 056°F 13°C 04/09/2020 09:26:06

Camera 4 - 9:25



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/20/2020

AVG. BYPASS FLOW: 8,221

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 062°F 16°C C:04/20/2020 15:00:01

Camera 1 - 15:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 056°F 13°C C:04/20/2020 11:00:02

Camera 2 - 11:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 061°F 16°C C:04/20/2020 13:00:01

Camera 3 - 13:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 071°F 21°C C:04/20/2020 14:00:02

Camera 4 - 14:00





# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/10/2020

AVG. BYPASS FLOW: 8,988

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 057F 13C 04/10/2020 13:00:02

Camera 1 - 13:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 055F 12C 04/10/2020 13:00:02

Camera 2 - 13:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 044F 06C 04/10/2020 16:00:01

Camera 3 - 16:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 046F 07C 04/10/2020 15:00:02

Camera 4 - 15:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 04/19/2020

AVG. BYPASS FLOW: 9,429 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 064F 17C C 04/19/2020 10:00:01

Camera 1 - 10:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 069F 20C C 04/19/2020 11:00:02

Camera 2 - 11:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 059F 15C C 04/19/2020 11:00:01

Camera 3 - 11:00



CREATIVE XP N42° 39' 06" W071° 19' 21" CAMERA 04 054F 12C C 04/19/2020 08:00:01

Camera 4 - 8:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/13/2020

AVG. BYPASS FLOW: 10,106 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 062F 16C 04/13/2020 13:00:01

Camera 1 - 13:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 064F 17C 04/13/2020 15:00:01

Camera 2 - 15:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 064F 17C 04/13/2020 14:00:01

Camera 3 - 14:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 064F 17C 04/13/2020 17:00:01

Camera 4 - 17:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 05/05/2020

AVG. BYPASS FLOW: 10,951 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 01" CAMERA 01 066F 18C 05/05/2020 13:00:23

Camera 1 - 13:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 063F 17C 05/05/2020 12:00:02

Camera 2 - 12:00



CREATIVE XP N42° 39' 06" W071° 19' 23" CAMERA 03 057F 13C 05/05/2020 11:36:29

Camera 3 - 11:36



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 048F 09C 05/05/2020 05:00:01

Camera 4 - 5:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/12/2020

AVG. BYPASS FLOW: 12,555 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 069F 20C 04/12/2020 11:00:03

Camera 1 - 11:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 070F 21C 04/12/2020 09:00:04

Camera 2 - 9:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 066F 18C 04/12/2020 13:00:01

Camera 3 - 13:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 074F 23C 04/12/2020 16:00:02

Camera 4 - 16:00



**WHITEWATER FLOW PHOTO DOCUMENTATION**

**DATE: 4/14/2020**

**AVG. BYPASS FLOW: 13,277 cfs**

**PROJECT NAME: Lowell Hydroelectric Project**

**PROJECT NO: 2790**



CREATIVE XP N42°38'54" W071°20'00" CAMERA 01 067F 19C 04/14/2020 13:00:02

**Camera 1 - 13:00**



CREATIVE XP N42°39'01" W071°19'34" CAMERA 02 065F 18C 04/14/2020 11:00:02

**Camera 2 - 11:00**



CREATIVE XP N42°39'06" W071°19'22" CAMERA 03 056F 13C 04/14/2020 09:00:01

**Camera 3 - 9:00**



CREATIVE XP N42°38'08" W071°19'21" CAMERA 04 053F 11C 04/14/2020 07:00:01

**Camera 4 - 7:00**



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/11/2020

AVG. BYPASS FLOW: 14,360 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 063F 17C 04/11/2020 10:00:01

Camera 1 - 10:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 058F 14C 04/11/2020 12:00:06

Camera 2 - 12:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 043F 06C 04/11/2020 09:00:01

Camera 3 - 09:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 047F 08C 04/11/2020 08:00:01

Camera 4 - 08:00



# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/16/2020

AVG. BYPASS FLOW: 19,732 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 053F 11C 04/16/2020 17:00:01

Camera 1 - 17:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 052F 11C 04/16/2020 11:00:02

Camera 2 - 11:00



CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 053F 11C 04/16/2020 15:00:01

Camera 3 - 15:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 046F 08C 04/16/2020 11:00:02

Camera 4 - 11:00





# WHITEWATER FLOW PHOTO DOCUMENTATION

DATE: 4/15/2020

AVG. BYPASS FLOW: 20,427 cfs

PROJECT NAME: Lowell Hydroelectric Project

PROJECT NO: 2790



CREATIVE XP N42° 38' 54" W071° 20' 00" CAMERA 01 062F 16C 04/15/2020 13:00:01

Camera 1 - 13:00



CREATIVE XP N42° 39' 01" W071° 19' 34" CAMERA 02 044F 06C 04/15/2020 06:00:01

Camera 2 - 6:00





CREATIVE XP N42° 39' 06" W071° 19' 22" CAMERA 03 052F 11C 04/15/2020 09:00:02

Camera 3 - 9:00



CREATIVE XP N42° 39' 08" W071° 19' 21" CAMERA 04 044F 06C 04/15/2020 06:00:01

Camera 4 - 6:00

	<b>WHITEWATER FLOW PHOTO DOCUMENTATION</b>	
	DATE: 05/03/2020	AVG. BYPASS FLOW: 21,627 cfs
PROJECT NAME: Lowell Hydroelectric Project	PROJECT NO: 2790	
<p>No photo available for Camera 1 on this date.</p>		
Camera 1	Camera 2 - 14:00	
<p>No photo available for Camera 3 on this date.</p>		
Camera 3	Camera 4 - 13:00	