



## Appendix D - Germaine Consultation and Correspondence



**Boott Hydropower, LLC**

A Subsidiary of Enel Green Power North America, Inc.

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**Via Electronic Distribution**

May 7, 2019

Celeste Bernardo  
Superintendent of Lowell National Historical Park  
National Park Service  
67 Kirk Street  
Lowell, MA 01852

Re: Lowell Hydroelectric Project (FERC No. 2790-072);  
Consultation Regarding the Water Level and Flow Effects on Historic Resources Study

Dear Ms. Bernardo,

Boott Hydropower, LLC (Boott), a subsidiary of Enel Green Power North America, Inc. (Enel), is the Licensee and operator of the 22.4 megawatt (MW) Lowell Hydroelectric Project (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 (CFR) Part 5.

In accordance with the Commission's Study Plan Determination issued on March 13, 2019, Boott is initiating consultation with the National Park Service (NPS) regarding the locations of water level loggers (pressure transducers) to be placed within the Lowell canal system for the Water Level and Flow Effects on Historic Resources Study. As part of the study, Boott will temporarily install level loggers at up to ten locations within the canal system. At each location, Boott will install one primary and one backup level logger, for a total of twenty level loggers. The level loggers will record water elevations in 15-minute increments from May 2019 through May 2020. In addition to these loggers, water levels at the Pawtucket Dam and E.L. Field Powerhouse forebay are logged by the Project's control system

The information collected will be compared to Project operational and flow data for the period of record to assess how Project operations and flows into the canal system effect water levels, which in turn may affect historic resources and NPS operations. Boott will conduct the assessment of the data in the spring and summer of 2020.

As shown in Figure 1 provided as Attachment A, Boott is proposing ten strategic and representative locations to deploy the level loggers within the Lowell canal system. These level logger locations may be slightly revised based on site conditions encountered during deployment. As we are planning on deploying these loggers in the near term, Boott respectfully requests any comments regarding these proposed deployment locations within 15 days of this letter (i.e. by May 22, 2019). If we do not receive a response from your office, Boott will move forward with the temporary installation of the level loggers at the locations shown on the attached map.

On behalf of Boott, I appreciate the opportunity to consult with the NPS regarding this study. Please do not hesitate to contact me at (978) 935-6039 if you have any questions concerning this matter.

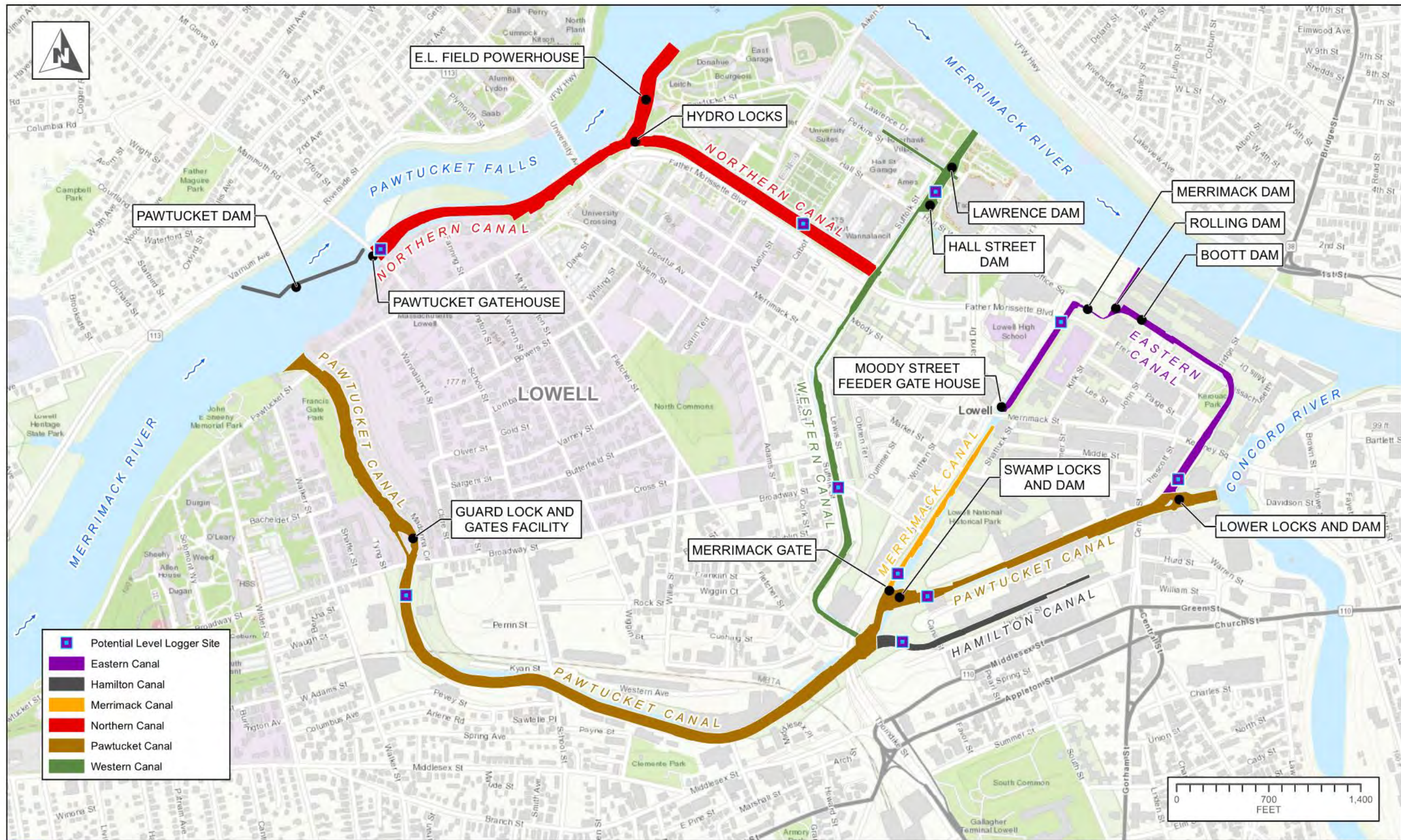
Sincerely,  
**Boott Hydropower, LLC**



Kevin M. Webb  
Hydro Licensing Manager

cc: K. Bose, FERC  
K. Mendik, NPS

Attachment A – Figure 1





**Via E-mail**

January 4, 2021

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)

Re: **Lowell Hydroelectric Project (FERC No. 2790-072)**  
**Water Level and Flow Effects on Historic Resources Study**

Dear Ms. Bernardo:

Boott Hydropower, LLC (Boott or Licensee) is the Licensee, owner, and operator of the 20-megawatt Lowell Hydroelectric Project (Project or Lowell Project) (FERC No. 2790). Boott operates the Project under a license issued by 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.

In support of Project relicensing, Boott is conducting a Water Level and Flow Effects on Historic Resources Study (Water Level and Flow Effects Study) as approved in the Commission's March 13, 2019 Study Plan Determination for the Project. In accordance with the Commission's June 12, 2020 Revised Process Plan and Schedule for the ILP, Boott intends to file a Water Level and Flow Effects Study Report with the Commission on February 25, 2021. At this time, Boott is consulting with the U.S. National Park Service (NPS) to identify certain historic canal structures within the Project boundary that have previously been affected by water levels or flow conditions.

**Background**

The NPS previously indicated that changing water levels and flows in the Project's canal system have the potential to adversely affect historic canal structures. To document water levels under a range of operating conditions, Boott deployed pressure transducers (level loggers) in the canal system to record water level fluctuations at 15-minute intervals. By letter dated May 5, 2019, Boott consulted with the NPS regarding the specific locations for level logger deployment. In June 2019, level loggers were deployed at 10 locations in the canal system. Data from the level loggers was downloaded on an approximately monthly basis.

On December 18, 2019, Boott held a Study Workshop to discuss the Water Level and Flow Effects Study; Recreation and Aesthetics Study; Historically Significant Waterpower Equipment Study; and the Resources, Ownership, Boundaries, and Land Rights Study. During

the workshop, the NPS clarified that their interest was related to the effects of the Pawtucket Dam pneumatic crest gate system that became operational in 2018. The NPS was concerned that the new pneumatic crest gate could increase flows to the downtown canal system and that higher flows could have the potential to adversely affect historic structures. During the December 18, 2019 Study Workshop, Boott explained that water levels in the downtown canal system are not affected by the crest gate and that any effects would be limited to structures along the Northern Canal and the Upper Pawtucket Canal (extending upstream from the Francis Gate and Guard Locks to the mainstem of the Merrimack River). Given that water levels in the downtown canal system are not affected by crest gate operations, the NPS agreed that the historic resources along the Northern Canal and Upper Pawtucket Canal should be the focus of the Water Level and Flow Effects Study. Therefore, the NPS and Boott agreed that Boott should relocate level loggers to the Upper Pawtucket Canal and Northern Canal and remove the remaining level loggers from the downtown canal system. Boott relocated the level loggers in March 2020 and recorded water level fluctuations in the Upper Pawtucket Canal and Northern Canal in 15-minute increments through late September 2020. During the March – September period, Boott recorded a wide range of flows in the Upper Pawtucket Canal and Northern Canal, including high flows during the spring freshet and low flows during the summer and early fall of 2020. Boott believes that this range of flows is appropriate to analyze potential Project-related water level and flow effects on historic structures in the Upper Pawtucket and Northern canals. Boott intends to utilize the level logger data from the March – September 2020 period, Project operation data, existing drawings, and field observations to assess potential effects.

### **Previously Documented Water Level and Flow Effects**

The approved Water Level and Flow Effects Study Plan directs Boott to conduct a site visit with the NPS to identify locations where changing water levels or flows have previously caused adverse effects to historic structures along the canal system. As proposed by Boott, the intention of this field visit was to collect additional information from NPS staff who may have observed or documented adverse effects associated with Project-related flows or water levels and to identify specific structures (or components of structures) that are of interest to the NPS. However, due to the ongoing COVID-19 pandemic, Boott is seeking alternatives to in-person meetings and field visits to protect health and safety of all parties.

Accordingly, this letter represents consultation with your office regarding previously documented issues related to Project-related flow effects or changing water levels along the canal system. Boott is seeking the NPS's assistance in identifying historic canal structures along the Upper Pawtucket and Northern Canals that have previously been affected by Project-related water levels or flows. Specifically, Boott is seeking any records of previous damage, maintenance, or repairs to structures along the Upper Pawtucket or Northern canals that have resulted from Project-related flows or water levels. Boott is also seeking the NPS's assistance in identifying any other known issues related to water levels and flow effects on specific structures along these canals. Documentation may include photographs, maps, maintenance records, or other files that would facilitate Boott's analysis of water level and flow effects on specific structures of interest to the NPS.

In order to facilitate the timely completion of the Water Level and Flow Effects Study, Boott respectfully asks that the NPS provide the requested information on or before January 15, 2021. Boott is also available to coordinate a conference call with the NPS if it would assist your office in responding to this request or in identifying the types of specific information relevant to this study.

Boott appreciates the assistance of the NPS in completing the Water Level and Flow Effects Study. Please do not hesitate to contact me at (978) 935-6039 or by email at [kwebb@centralriverspower.com](mailto:kwebb@centralriverspower.com) if you have any questions regarding this matter.

Sincerely,

**Boott Hydropower, LLC**

Kevin M. Webb  
Licensing Manager

Cc: C. Bruins (NPS)



IN REPLY REFER TO:

## United States Department of the Interior

NATIONAL PARK SERVICE  
Lowell National Historical Park  
67 Kirk Street  
Lowell, Massachusetts 01852-1029

February 3, 2021

Kevin M. Webb, Licensing Manager  
Central Rivers Power  
Boott Hydropower, LLC  
Subsidiary of Central Rivers Power US, LLC  
670 N. Commercial Street, Suite 204  
Manchester, NH 03102

**RE: REQUESTED INFORMATION in response to  
Central Rivers Power letter dated 01/20/2021 2019-2020**

**Lowell Hydroelectric Project (FERC No. 2790-072) Water Level and Flow Effects  
on Historic Resources Study**

Dear Mr. Webb:

We are in receipt of your January 20, 2021 letter regarding the Lowell Hydroelectric Project (FERC No. 2790-072) Water Level and Flow Effects on Historic Resources Study and Central Rivers Powers' request for "*records of previous damage, maintenance, or repairs to structures along the Upper Pawtucket or Northern canals that have resulted from Project-related flows or water levels.*"

Lowell National Historical Park reviewed your request and the historical structures located in proposed licensing area at the Northern Canal and Upper Pawtucket Canalway for adverse effects to historical structures that have resulted from the Lowell Hydroelectric Project (Project) and related flows or fluctuations in water levels and water level events.

Changes to the elevation of water or flow rates throughout the system directly affect the condition of historic resources as well as public recreational access to and within the canals. Abnormally high-water levels in the Northern Canal, for example, have caused damage to wooden structural elements of the Northern Canal Waste Gatehouse and structural undermining of the Great River Wall. A high-water backflow event in August 2018 at the Northern Canal Gatehouse (also known as Pawtucket Gatehouse) damaged existing lock chamber gates that had been secured in the closed position for safety.

The combination of high-water levels and debris movement have also resulted in impact damage at Guard Gate Complex (Francis Folly) at the upriver side of the Guard Gate Complex Sluice



Gatehouse (Guard Dam) exterior siding, windows and lower level access doorway and granite steps.

Conversely, extended drain downs and low water levels have caused damage to historic turbines and waterwheels made of wood and leather elsewhere in the system. There is also a correlation between water levels and flows and trash accumulation and vegetation growth previously documented in other sections of the canal way system.

### **Documented damage to Historical Structures by Water Level and Flow Effects – Pawtucket Canalway and Guard Gate Complex**

#### Upper Pawtucket Canal – Guard Gate Complex

The 1796 Pawtucket Canal was originally built as a transportation canal to circumvent the Pawtucket Falls of the Merrimack River in Lowell, Massachusetts. The Pawtucket Canal Guard Dam was designed to protect from flooding downstream into downtown Lowell. The first 1st dam on site was constructed in 1822; replaced after 1831 flooding; and raised higher in 1848 & rebuilt 1870. The Guard Gate Sluice Gatehouse incorporates hydraulic lift system developed by Eng. J. B. Francis. It is on the National Registry of Historical Buildings (LCS # 040588), Management Category A, must be preserved and maintained.

The park operates tour boats that travel through the complex locks as part of their presentation of the canal history, making the preservation, operation and interpretation of the complex essential to the operation of the park and integral to the cultural landscape of the Pawtucket Canalway.

High river water events and debris impacting the Guard Gate Sluice Gatehouse (Guard Dam) have caused damage to the upriver clapboard siding, mid-level windows and lower level access doorway and resulting in washout of existing granite steps. The Park is in the process of obtaining funding to perform a pre-design scoping report to be used in the preparation of contract documents for repairs and rehabilitation to the Guard Gate Sluice Gatehouse and the Lock House Gates and Lock Chamber.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Guard Gate Complex, "Binder1\_Francis Gate HAER Documents.pdf"
- B. Guard Gate Complex, "Guard Gate Sluice Gatehouse EX Photos.pdf"

### **Documented damage to Historical Structures by Water Level and Flow Effects – Northern Canal and Northern Canal Guard Gate and Northern Canal Waste Gate and Great Wall**

#### Northern Canal Guard Gate Complex

The Northern Canal Guard Gate Complex is a multi-component site, parts of which, in one form or another, have been continuously operating or in place since 1792. This site contains the guard sluice gates, their brick gate house, and a navigation lock, all part of the northern canal construction project of 1846-1847. The ten sluice gates were operated by a mechanical system that consisted of a turbine located in a chamber beneath the deck of the School Street Bridge. The complex serves as the entrance to the Northern Canal from the Merrimack River for water

flow to the Project and in prior years for NPS interpretative and educational boat tours. The Guard Gatehouse contains Chief Eng. J. B. Francis' control system: inward-flow turbine worked 20 large hoisting screws to raise/lower sluice gates in 1848. The turbine is still in place under the bridge, but the gates now operate electrically.

It is on the National Registry of Historical Buildings (LCS # 040593), Management Category A, must be preserved and maintained for its significance with industrial history.

The lock chamber gates were secured in place in the years leading up to a significant backflow water event, that pushed waters down the Northern Canal from the Project towards the Guard Gate Lock Chamber gates in August 2018 that resulted in damage to the gate ends where they overlap and preserve a water seal to the lock chamber. Since that event, the gates had been chained to secure and limit movement, but the seal was not intact due to timber damage. In Fall 2020, in coordination with NPS, the gates were removed to an off-site location for repairs and rehabilitation by CRP. CRP also removed a sunken barge and debris from the upriver side of the complex.

Historical gate construction document drawings were provided to CRP for repair and rehabilitation work on the gates. NPS continues to provide consultation to CRP, and their contractor, as the repairs and rehabilitation work progresses.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 1.pdf"
- B. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 2.pdf"
- C. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 3.pdf"
- D. Northern Canal Guard Gate, "Binder1-Northern Canal Lock Gates - EX Photos Fall 2020.pd

#### Northern Canal Waste Gate Gatehouse and Great Wall

The Northern Canal Waste Gate Gatehouse consists of a single-story, heavy-timber-framed building that measures approximately 70' by 15' in plan. The building was built circa 1872 atop a dam that was built circa 1847 and houses the canal gates, including the machinery that operates the Gatehouse gates. The Gatehouse straddles the top of the Great Wall. It is on the National Registry of Historical Buildings (LCS # 40602), Management Category A, must be preserved and maintained for its significance with industrial history.

This Gatehouse site, "which comprises the downstream end of the Great River Wall, originally included four waste gates and their manually powered operating machinery, along with a waste weir divided into multiple bays by cast iron standards. These works were completed in 1847 as part of the Great River Wall project. Major modification took place in 1872 when one of the scouring holes was converted into a wheel pit where a turbine was installed to power mechanical gate operating equipment which was added atop the original manually operated mechanisms. At the same time, a flat roofed heavy timber framed building was erected over the waste gates, and a hip roofed light timber framed building was built over the waste weir."

In 2017, NPS retained an architecture and engineering team from EYP, Inc. to perform a historic structure pre-design scoping report in order to prepare repair and rehabilitation contract documents for extensive damage to structural carrying timbers and foundation caused by years of high-water levels in the Northern Canalway that have undermined the timber carrying beams

through rot and also timber horizontal bending due to high water loading estimated as a condition occurring early 1990's up to installation of river bladder dam structure). EYP, Inc. developed a complete set of drawings and specifications and a Class-A government estimate of construction costs to repair the Gatehouse structure.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Northern Canal Waste Gate Gatehouse EX Photos, (FOLDER W/ field photographs from 2017).
- B. Northern Canal Waste Gate Gatehouse, "NPS LOWE - Northern Canal Waste Gatehouse Project Scoping Report 2017.pdf"
- C. Northern Canal Waste Gate Gatehouse, Construction Documents, NPS;
  1. "NCWG-2018-06-28 100% drawings.pdf"
  2. "NCWG-2018-06-28 100% specifications.pdf"
  3. "NPS Lowell - Northern Canal Waste Gatehouse - Class A Estimate 20180202.pdf"

The Study Summary for the Water Level and Flow Effects on Historic Resources states that the scope for study will include review of existing architectural and engineering documentation of the condition of the Great River Wall and various other historic structures. NPS has not studied the cumulative, long-term and potentially adverse effects of operating higher water levels and flows than the 1847 system was designed for in relation to the structural integrity of the Great River Wall. The details for this concern were filed in the April 9, 2020 NPS Comments on the Initial Study Report. In the study request and following filings, NPS requested a condition assessment of the Great River Wall by a structural engineer to understand the Project affects on the historic resource.

The Park also previously requested that future water levels and flows as a result of reasonably foreseeable changes to the Project operation, such as decommissioning certain facilities or modifying operations for fish passage, be evaluated for impacts to historic resources. These Project changes have not been evaluated by NPS and therefore, we do not have records to share out, but would like to see an evaluation in the study report.

On behalf of the Lowell National Historical Park, I would like to thank you for requesting the additional information that will assist in Central Rivers Powers' development of the Water Level and Flow Effects on Historic Resources Study section of the relicensing report.

If you have any questions on the provided information, please contact David Michael Lieb, Historical Architect at (978) 423-6185.

Sincerely,



Celeste Bernardo,  
Superintendent

cc: FERC, Secretary (e-filed)  
NPS, Brian Strack (via email)  
NPS, Jonathan Meade (via email)  
NPS, Kevin Mendik (via email)  
NPS, Duncan Hay (via email)  
NPS, Christine Bruins (via email)  
NPS, David Uschold (via email)  
DOI, Andrew Tittler (via email)  
USFWS, Kenneth Hogan (via email)  
MHC/SHPO, Brona Simon (via mail)  
DCR, Tom Walsh (via email)  
City of Lowell, Eileen Donoghue (via email)