WESTON HYDROELECTRIC PROJECT (FERC NO. P-2325)

SECTION 401 WATER QUALITY CERTIFICATION

VOLUME 3

(APPENDIX 2)

APPLICATION FOR A DEPARTMENT OF THE ARMY PERMIT (ENG FORM 4345) WESTON HYDROELECTRIC PROJECT (FERC NO. 2325) – UPSTREAM FISH PASSAGE FACILITY – JULY 13, 2021



Providing practical solutions to complex problems affecting energy, water, and the environment

July 13, 2021

VIA EMAIL

Ms. LeeAnn Neal U.S. Army Corps of Engineers New England District Maine Project Office 442 Civic Center Drive Augusta, ME 04330

Application for Department of the Army Permit (ENG Form 4345) and Alternatives Analysis - Weston Hydroelectric Project (FERC No. 2325) Upstream Fish Lift Facility

Dear Ms. Neal:

On behalf of Brookfield White Pine Hydro, LLC (BWPH), owner, operator, and licensee of the Weston Hydroelectric Project (FERC No. 2325) (Project), Kleinschmidt Associates (Kleinschmidt) submits to the U.S. Army Corps of Engineers (USACE) the enclosed Application for the Department of the Army Permit (ENG Form 4345) and an Alternatives Analysis for the construction of an upstream fish lift facility at the Project. The Project is located on the Kennebec River in the Town of Skowhegan, Somerset County, Maine.

Project Background

The 14.75-megawatt (MW) Weston Project is operated as a run-of-river facility and is located at river mile 82 of the Kennebec River. The Weston Project includes a 930-acre impoundment, two dams, and a powerhouse. The two dams are constructed on the north and south channels of the Kennebec River where the river is divided by Weston Island. U.S. Route 2 crosses the island, spanning the South Channel impoundment above South Channel Dam and the North Channel bypass section located below the North Channel Dam. The South Channel Dam is a concrete gravity and buttress dam 51-feet-high, with a crest elevation of 156.0 feet. The dam extends about 391.5 feet between abutment walls from the island to the south riverbank and consists of five sections: a 125-foot-long powerhouse/intake section; a 33-foot-long concrete spillway section; a 24-foot-long sluice section; a 188-foot-long stanchion section with five bays; and a 21.5-foot-long concrete non-overflow section. The powerhouse/intake section of the dam, located adjacent to the north abutment and integral to the Project dam, includes the headworks and four intake bays, one for each of the four turbine generator units.

In accordance with the Project's 1997 Federal Energy Regulatory Commission (FERC) license and Water Quality Certificate (WQC), an upstream fish passage facility is required to operate at the Project. On September 16, 1998, the FERC issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement). The 1998 Settlement and corresponding 1998 Water Quality Certificate (WQC) # L-19751-33-A-M amended the Project's 1997 FERC license to include permanent upstream fish passage requirements (Condition D and F). Both the Settlement and WQC stipulate that installation of permanent upstream fish passage at the Project would be required within two years after either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC No. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

Since the 1998 Settlement, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), BWPH consulted with fisheries agencies and subsequently filed with the FERC a 2013 Interim Species Protection Plan (Interim SPP) for Atlantic Salmon. On May 19, 2016, FERC amended the Weston License to include the Interim SPP that requires an upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC extended the required operational date for the upstream fish passage to May 31, 2022.

Because the Interim SPP expired on December 31, 2019, BWPH filed a Biological Assessment for Atlantic salmon for the SPP with FERC on May 31, 2021, to consult with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA) including construction activities associated with development of the upstream fish passage facility.¹

In accordance with the SPP, Interim SPP, FERC license, and WQC, BWPH proposes to construct a permanent upstream fish lift facility at the Weston Project to provide passage for upstream migration of salmon and other anadromous species. The proposed facility has been designed in consultation with the NMFS, U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MIFW) (design consultation for supporting studies and the conceptual 30%, 60%. 90% design efforts are provided herein).

¹ Brookfield White Pine Hydro LLC, et. al. submits Lower Kennebec Species Protection Plan and Draft Biological Assessment for the Lockwood, Hydro-Kennebec and Weston Projects under P-2574, et. al. FERC Accession No: 20210601-5152. Online: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15804246

BWPH is submitting for USACE review an Application for the Department of the Army Permit (ENG Form 4345) and corresponding Additional Information Report as well as an Alternatives Analysis as required under Section 404(b)(1) of the Clean Water Act. Additionally enclosed you will find a copy of BWPH's Maine Department of Environmental Protection Permit Application filed with the State of Maine on February 16, 2021. Should you have any questions upon review, please contact Katie Sellers Reynolds of Kleinschmidt Associates at 207.416.1218 or Katie.Sellers@kleinschmidtgroup.com, or Kelly Maloney of Brookfield at 207.755.5606 or Kelly.Maloney@brookfieldrenewable.com.

Sincerely,

KLEINSCHMIDT ASSOCIATES

That Auth Reynolds

Katie Sellers Reynolds Regulatory Coordinator

cc: Kelly Maloney, BWPH Nate Baker, BWPH Uriah Forest-Bulley, Kleinschmidt Dan Tierney, NOAA Matt Buhyoff, NOAA

Enclosures:

- 1. Application for Department of the Army Permit (Eng. Form 4345)
- 2. Additional Information Report
- 3. Alternatives Analysis
- 4. Access Permission Statement
- 5. Maine Department of Environmental Protection Permit Application (Enclosed Separately)

\\kleinschmidtusa.com\Condor\Jobs\3758\051\Docs\Permitting \USACE\Weston USACE Cover Letter July 2021.docx APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (ENG. FORM 4345)

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)					
1. APPLICATION NO. 2. FIELD OFFICE CODE			3. DATE RECEIVED	4. DATE APP	LICATION COMPLETE
	(ITEMS BELOW TO BE	FILLED BY AP	PLICANT)		
5. APPLICANT'S NAME		8. AUTHORIZ	ED AGENT'S NAME AN	D TITLE (ager	nt is not required)
First - Kelly Middle - O.	Last - Maloney	_{First -} Katie	Middle -	E La	ast - Sellers
Company - Brookfield White Pine	Hydro LLC.	Company - K	leinschmidt Asso	ociates	Reynolds
E-mail Address - Kelly.Maloney@Bro	okfieldrewable.com	E-mail Address - Katie.Sellers@Kleinschmidtgroup.com			
6. APPLICANT'S ADDRESS:		9. AGENT'S ADDRESS:			
Address- 150 Main St		Address- 6	Fundy Rd, Suite	500	
City - Lewiston State - ME	Zip - 04240Country - USA	City - Falmo	outh State - M	E Zip - C)4105Country - USA
7. APPLICANT'S PHONE NOs. w/AREA COD	E	10. AGENTS PHONE NOS. w/AREA CODE			
a. Residence b. Business B. 207-755-560	с. Fax 6 С. 207-755-5655	a. Residence	b. Business B. 207-416	5-1218	c. Fax
	STATEMENT OF	AUTHORIZATI	ON		
11. I hereby authorize, <u>Katie Sellers Reynolds</u> to act in my behalf as my ag supplemental information in support of this permit application.			rocessing of this applicat	ion and to furn	ish, upon request,
SIGNATURE OF APPLICA			July 12, 2021 DATE		
NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY					
Weston Hydroelectric Project (FERC No. 2325) - Upstream Fish Lift Facility					
13. NAME OF WATERBODY, IF KNOWN (if a	14. PROJECT	STREET ADDRESS (if	applicable)		
Kennebec River	Address M	ill Street			
15. LOCATION OF PROJECT		Ska	whagan		
Latitude: N 44.76284 Longit	ude: ₩ -69.71918	City - SKO	whegan s	tate- ME	Zip- 04976
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)					
State Tax Parcel ID Map-Lot 26-1 Municipality Skowhegan, Maine					
Section - Township -) -		
ENG FORM 4345, FEB 2019	PREVIOUS ED	ITIONS ARE O	BSOLETE.		Page 1 of 3

Form Approved -OMB No. 0710-0003

Expires: 02-28-2022

17. DIRECTIONS TO THE SITE

Take exit 133 off of U.S Route 95 for State Route 201 North. Continue on State Route 201 North for 14.4 miles before turning right onto Mechanic Street. Mechanic street turns into French Street before turning into Mill Street.

18. NATURE OF ACTIVITY (Description of project, include all features) The goal of this project is to provide agency approved upstream passage for Atlantic salmon and other anadromous fish species at the Weston Hydroelectric Project (FERC No. 2325). The proposed fish passage facility will include a fish lift with integrated attraction water system (AWS) spillway. The proposed fish lift and AWS spillway are to be located between the powerhouse and log sluice on the south channel dam.

Construction of the facility will take place in the waterway and will include temporary fill, permanent fill, and permanent excavation below the Ordinary High Water line (OHW) of the Kennebec River.

Please see the enclosed Additional Information Report for further information.

19. Project Purpose (Describe the reason or purpose of the project, see instructions) The Weston Project does not presently have an upstream fish passage facility. Upstream passage of Atlantic salmon and other anadromous fish species in the lower Kennebec River is currently accomplished by trapping fish at the downstream Lockwood Hydroelectric Project (FERC No. 2574) and transporting them via truck upstream of the Weston Project to spawning habitat located in the Sandy River.

In accordance with a 2016 Interim Species Protection Plan (ISPP), the 1997 FERC license and Water Quality Certification, and 1998 Lower Kennebec River Comprehensive Settlement Agreement, BWPH proposes to construct a permanent upstream fish passage facility at the Weston Hydroelectric Project. This facility will lift fish in a hopper from downstream of the dam and release them into the impoundment to provide for continued upstream migration.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

The fish lift and AWS spillway will require some modifications to the existing dam structure and the placement of additional materials and structures in the waterway (both temporary and permanent).

Please see the enclosed Additional Information Report for further information.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards Type Amount in Cubic Yards Type Amount in Cubic Yards

See enclosed Additional Information Report

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres N/A

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Contractor designed dewatering structures will be installed around the tailrace and upstream project areas. See the Additional Information report for details on turbidity and silt curtains as well as dewatering pumps that will be utilized throughout the construction work.

Overall, the proposed fish lift constitutes mitigation for fish passage/ habitat enhancement within the Kennebec River

24. Is Any Portion of the Work Already Complete? Yes X No IF YES, DESCRIBE THE COMPLETED WORK				
25. Addresses of Adjoining Property Owners, Lessees, E	tc., Whose Property Adjoir	s the Waterbody (if more th	an can be entered here, please atta	ch a supplemental list).
a. Address-	Dement for list of all a	u:		
See Additional Information	Report for list of abu	tting property owners	5. Zin	
City -	State -		Zip -	
b. Address-				
City -	State -		Zip -	
c. Address-				
City -	State -		Zip -	
d. Address-				
City -	State -		Zip -	
e. Address-				
City -	State -		Zip -	
26. List of Other Certificates or Approvals/Denials receive	d from other Federal, State	e, or Local Agencies for V	Vork Described in This App	lication.
AGENCY TYPE APPROVAL*	NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
••••••••••••••••••••••••••••••••••••••				
 Would include but is not restricted to zoning, building, at 27. Application is hereby made for permit or permits to au 	thorize the work described	in this application. I certi	fy that this information in th	is application is
complete and accurate. I further certify that I possess the applicant.	authority to undertake the	work described herein or	am acting as the duly auth	orized agent of the
Kells Malories	July 12, 2021	That !!	whe Reynolds	July 12 2021
SIGNATURE OF APPLICANT	DATE	SIGNATUR	E OF AGENT	<u>July 12, 2021</u> DATE
The Application must be signed by the person who authorized agent if the statement in block 11 has be	desires to undertake th een filled out and signed	e proposed activity (ap d.	oplicant) or it may be sig	ned by a duly
18 U.S.C. Section 1001 provides that: Whoever in	any manner within the i	urisdiction of any depa	artment or agency of the	United States
knowingly and willfully falsifies, conceals, or covers	up any trick, scheme, o	or disguises a material	fact or makes any false	, fictitious or fraudulent
statements or representations or makes or uses an statements or entry, shall be fined not more than \$	y false writing or docum 10,000 or imprisoned no	ent knowing same to o t more than five vears	contain any false, fictitio or both.	us or fraudulent

ENG FORM 4345, FEB 2019

ADDITIONAL INFORMATION REPORT

US ARMY CORPS OF ENGINEERS ADDITIONAL INFORMATION REPORT

WESTON HYDROELECTRIC PROJECT FERC No. 2325

UPSTREAM FISH LIFT FACILITY

Prepared for: Brookfield White Pine Hydro, LLC

Prepared by: Kleinschmidt Associates

July 2021



Kleinschmidtgroup.com

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- Appendix B Upstream Fish Lift Design Drawings
- Appendix C Fish Lift Operations and Maintenance Plan
- Appendix D USFWS Consultation
- Appendix E Historical and Tribal Consultation
- Appendix F 2016 FERC License Amendment

EXECUTIVE SUMMARY

Brookfield White Pine Hydro, LLC (BWPH) herein applies to the U.S. Army Corps of Engineers (USACE) for a Department of the Army Permit Application (ENG Form 4345) and associated Additional Information Report for the proposed installation of an upstream fish lift facility at the Weston Hydroelectric Project (FERC No. 2325) (Project).

The Weston Project is located at river mile 82 of the Kennebec River in the town of Skowhegan, Maine. The proposed upstream fish passage facility will be constructed on the South Chanel Dam between the existing log sluice and powerhouse. The facility will consist of a fish lift, auxiliary water system (AWS), and exit pipe into the headpond upstream of the South Channel Dam. The facility will be operated from May 1 to October 31 annually and is designed to pass migratory species native to the Kennebec River, including the endangered Atlantic salmon.

The requirement for fish passage at the Weston Project is predicated on a number of regulatory requirements:

- 1998 Lower Kennebec River Comprehensive Settlement Accord, Kennebec Hydro Developers Group Agreement (1998 KHDG Agreement), the terms of which were incorporated into the Project Water Quality Certification (WQC) and the Project license which stipulated the installation of permanent upstream fish passage at the Project predicated on biological triggers.
- May 19, 2016 FERC Order Amending License which approved an Interim Species Protection Plan (ISPP), developed in consultation with the agencies and filed with the Commission on February 21, 2013, and the terms and conditions of a July 22, 2013 Biological Opinion issued by the National Marine Fisheries Service (NMFS) both of which included provisions for permanent fish passage at the Weston Project.
- On July 13, 2020, FERC extended the operational date for the fish lift facility to May 31, 2022.

Brookfield installed an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the downstream Lockwood Hydroelectric Project (FERC No. 2574) in 2006. Upstream fish passage past the Weston Project is presently provided by this trap and truck program where migrants are transported from the downstream Lockwood Project upstream to spawning habitat in the Sandy River (beyond the Weston Project). In accordance with the FERC license (which approved the ISPP), and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Weston Project to provide passage for upstream migration of Atlantic salmon and other anadromous species. The proposed facility has been designed in consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MIFW) to determine appropriate fish passage technology and location for this Project.

Fishway construction work is scheduled to begin in June 2022.

1.0 WESTON HYDROELECTRIC PROJECT DESCRIPTION

1.1 **Project Facilities**

The 14.75-megawatt (MW) Weston Hydroelectric Project (FERC No. 2325) owned and operated by Brookfield White Pine Hydro, LLC (BWPH), is a run-of-river facility and is located at river mile 82 of the Kennebec River in Skowhegan, Maine (Figure 1 and Figure 2). The Weston Project includes a 930-acre impoundment, two dams, and one powerhouse. The two dams are constructed on the north and south channels of the Kennebec River where the river is divided by Weston Island.

The North Channel dam is a concrete gravity and buttress dam. The dam extends from the north bank of the Kennebec River to Weston Island, in a broad V-shape, following the high ledge of a natural falls. The South Channel dam is a concrete gravity and buttress dam that extends between abutment walls from the island to the south riverbank. The powerhouse/intake section is integral to the Project dam and includes the headworks and four intake bays, one for each of the four turbine-generator units. The Project provides downstream fish passage but does not provide upstream fish passage.

1.2 **Project Operations**

The Project operates as a run-of-river facility with a continuous minimum flow of 1,947 cfs, or inflow, whichever is less as measured by the Project's tailrace immediately downstream of the Weston Dam, for the protection and enhancement of water quality and aquatic resources.

Brookfield maintains the impoundment water surface elevation, as measured immediately upstream of the dam, to within 1 foot of the full pond elevation of 156.0 feet mean sea level (msl) during normal operations.

Scheduled maintenance or inspection drawdowns below the 1-foot restriction do not occur from ice-out through and including July 31 unless the Maine Department of Inland Fisheries and Wildlife (MIFW) is consulted at least two weeks prior to the drawdown and the need from the drawdown is documented.

Weston Project Features







Figure 2 Weston Project Location (Topographic Map)

2.0 PROPOSED UPSTREAM FISH LIFT FACILITY

2.1 Existing Upstream Passage

The Weston Project does not presently provide upstream fish passage. Brookfield presently operates an interim trap, lift, and transfer facility for American shad, river herring (alewife and blueback herring), and Atlantic salmon at the downstream Lockwood Hydroelectric Project (FERC No. 2574). Upstream fish passage past the Weston Project is presently provided by this trap and truck program where migrants are transported from the downstream Lockwood Project upstream to spawning habitat in the Sandy River (beyond the Weston Project).

2.2 Proposed Upstream Fish Passage Facility

BWPH proposes to construct a fish lift system with integrated Attraction Water System (AWS) spillway to provide for permanent upstream fish passage. The fish lift and AWS spillway will be located between the powerhouse and the log sluice on the south channel dam (Figure 3 and Figure 4). The total system will be approximately 30-feet-wide by 70-feet-high. An approximate 15-foot-long section of the south channel dam will be removed down to elevation 144 feet to make space for installation of the AWS spillway. Minor bedrock excavation will additionally be required for installation of the fishway entrance.

The fish lift structure itself with have a 10-foot entrance width where the fish will swim into and stay in a hopper with a volume of 490 cubic feet. The fish lift facility will provide a total attraction flow of up to 304 cubic feet per second (cfs) and will have a cycle time of 15 minutes. The attraction flow will be provided via the isolation gate with a wedge wire screen that has 0.25-inch slot widths. Migrating fish will swim into the hopper, which will lift fish from an elevation of 123-feet to an elevation of 145-feet where they will swim out the approximately 215-foot-long by 20-inch smooth fiberglass pipe to an elevation of 159-feet and exit into the headpond at elevation 156-feet to continue their migration upstream. The exit pipe has a maximum of 5% slope. Flows through the exit pipe will not be continuous. A total of 490 cubic feet (3,665 gallons) of water will be passed through the exit pipe over approximately 30 seconds, with instantaneous flows ranging from 10 to 40 cfs. An additional 600 gallons will discharge through the exit pipe for approximately 30 seconds from an auxiliary tank following the hopper discharge.

The fish lift is expected to help facilitate the passage of 11,300 Atlantic salmon, 106,000 American shad, 51,000 alewives, and 922,000 blueback herring, per NOAA's design memorandum. All flow and velocity calculations were based on these species and numbers. The fish lift will be operational from May 1st to October 31st, annually.

The facility has been designed in full consultation with the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), Maine Department of Marine Resources (MDMR), and Maine Department of Inland Fisheries and Wildlife (MIFW) to determine the appropriate fish passage technology for the Weston Project and to finalize all aspects of design. Design consultation for supporting studies, and the conceptual 30%, 60%, and 90% design efforts are provided within Appendix A.



Figure 3 Proposed Fish Lift

Weston Project Area





2.3 Regulatory Background

In accordance with the Project's 1997 Federal Energy Regulatory Commission (FERC) license and Water Quality Certificate (WQC), an upstream fish passage facility is required to operate at the Project. On September 16, 1998, the FERC issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement). The 1998 Settlement and corresponding 1998 Water Quality Certificate (WQC) # L-19751-33-A-M amended the Project's 1997 FERC license to include permanent upstream fish passage requirements (Condition D and F). Both the Settlement and WQC stipulate that installation of permanent upstream fish passage at the Project would be required within two years after either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC No. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

Since the 1998 Settlement, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), BWPH consulted with fisheries agencies and subsequently filed with the FERC a 2013 Interim Species Protection Plan (Interim SPP) for Atlantic Salmon. On May 19, 2016, FERC amended the Weston License to include the Interim SPP that requires an upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC extended the required operational date for the upstream fish passage to May 31, 2022. Additionally, BWPH filed an updated Biological Assessment (BA) for construction of the Weston upstream fish lift facility as well as for Brookfield's other upstream fish passage facilities planned for construction (Lockwood). The BA was filed with FERC on May 31, 2021 and will update Endangered Species Act Section 7(o)(2) consultation for the proposed facility.

In accordance with the FERC license and WQC, Brookfield proposes to construct an approximately 530-ft-long vertical slot upstream fish passage facility at the Lockwood Project bypass reach to provide volitional passage for upstream migration of salmon and other anadromous species. The facility has been designed in full consultation with NMFS, USFWS, MDMR, and MDIFW to determine the appropriate fish passage technology and location for the Weston Project and to finalize all aspects of design. Design consultation

for supporting studies, and the conceptual 30%, 60%, and 90% design consultation is provided in Appendix A.

3.0 EXISTING ENVIRONMENT

3.1 Kennebec River Basin

The Weston Project is located in downtown Skowhegan, Maine at river mile 82 of the Kennebec River (Figure 5).

The Kennebec River basin is the largest of the watersheds that comprise the Merrymeeting Bay Salmon Habitat Recovery Unit (SHRU). The Kennebec River watershed covers an area of 5,910 square miles, approximately 1/5 of the state of Maine, and flows 138 miles from Moosehead Lake to Merrymeeting Bay where it joins the Androscoggin River. The Kennebec watershed is bordered on the west by the Androscoggin River Basin, on the north and east by the Penobscot River Basin, and by coastal streams and the Gulf of Maine on the south.

The Kennebec River's mainstem originates at the outlet of Moosehead Lake and flows generally southward through the towns and cities of Bingham, Solon, Anson, Madison, Norridgewock, Skowhegan, Waterville, and Augusta. The river transitions from a high gradient cold-water river from upstream of Indian Pond to Madison, to a warmwater river from Skowhegan to Augusta. A 24-mile-long, mostly freshwater tidal segment of the river exists downstream from Augusta, and slightly brackish conditions exist periodically in Merrymeeting Bay.

The Kennebec River basin has been extensively developed for over a century for industrial use, including driving of logs and pulp, mills, and hydroelectric power production. The Lockwood Project (FERC Project No. 2574), located at river mile 63, is the lowermost dam and hydroelectric plant on the mainstem river. Other mainstem projects upstream of Lockwood include Hydro-Kennebec (FERC Project No. 2611), Shawmut (FERC Project No. 2322), Weston (FERC Project No. 2325), Abenaki (FERC Project No. 2364), Anson (FERC Project No. 2365), Williams (FERC Project No. 2335), Wyman (FERC Project No. 2329), and Harris (FERC Project No. 2142) (Figure 6). The Fort Halifax Project (FERC No. 2552), which was removed in 2008, was formerly located near the mouth of the tributary Sebasticook River, only about 0.5 miles downstream of Lockwood. Edwards dam (FERC Project No. 2389), which was removed in 1999, was located about 18 miles downstream of Lockwood on the main stem.



Figure 5 Kennebec River Watershed and Weston Project Location

3.2 Proposed Project Area

The fish lift is proposed to be constructed/ installed in the river on the bedrock and integral to the south channel dam between the existing powerhouse and log sluiceway. The proposed construction project will primarily occur within the riverway itself with an access and laydown area established on the river side of Mill Street. The proposed project area resides in an urbanized area but is mostly isolated from public access. The in-river portion of the proposed work area is located from the shoreline to the powerhouse below south channel dam as well as a small portion of above the dam between the log sluice and powerhouse. The lay down area and access area will be located directly off of Mill Street and along the river's shoreline. BWPH will utilize an existing gravel parking area as a laydown area as seen in the image below (Figure 6).

The bank of the Kennebec River in the proposed project area is relatively steep and well defined within a small area of fragmented forest made up of early successional/young forest/shrub lands cover type, characteristic of previously disturbed sites. The proposed project area (both in-river and shoreline areas) has been previously disturbed by prior construction efforts that have taken place to repair and maintain the Weston dam.



Figure 6 Construction Laydown and Access

3.3 Critical Habitat

The Weston Project lies within the designated critical habitat of the Merrymeeting Bay SHRU for Atlantic Salmon. The Kennebec River, in the vicinity of the Weston Project, serves as migration habitat for adults returning to freshwater to spawn and for smolts and kelts returning to the ocean.

Provided that BWPH's upstream fish passage program presently bypasses the Weston Project via the trap and truck program (transports fish from Lockwood Dam to the Sandy River), only downstream migrating Atlantic salmon smolts and kelts occur within the Weston Project area.



Photo 1 Looking Upstream at Southern Channel Dam



Photo 2 Looking Downstream from Dam



Photo 3 Proposed Access Road Area During 1954 Dam Repair Work

4.0 CONSTRUCTION ACTIVITIES

The proposed fishway will be built on the west side of the Kennebec River, within the Weston Project south channel spillway.

BWPH plans to begin construction in June 2022, commencing with the construction of the access road. Construction is anticipated to take approximately 33 months to complete.

4.1 Construction Overview

To allow for fish passage system construction, in-river bedrock removal will occur and a small portion of the south concrete spillway will be removed. The fish lift and attraction flow channel will be installed downstream of the spillway.

A contractor designed temporary cofferdam system will be constructed around the inriver work area to provide a de-watered workspace. For safety during cofferdam construction and removal, the Project headpond will be lowered 1.5 feet. A turbidity curtain will be placed around the cofferdam system and an upland silt fence system will be installed around the project access and laydown area. Pumps will be utilized during construction to control water in the construction area and a dewatering siltation basin will be utilized to prevent the potential transport of sediment upon discharge of water into the river.

Fishway construction work is scheduled to begin in June 2022.

4.2 Construction Activities

4.2.1 Mobilization, Laydown Area and Access Road Construction

The initial phase of construction will involve materials delivery, lowering of the impoundment, and construction of the access road and temporary cofferdam system (see Erosion Control & Dewatering Plan Drawing G-006, project Drawings, Appendix B).

Construction activities will include the construction of a temporary access road adjacent to Mill Street in Skowhegan. This will involve some tree removal (less than 0.5 acres) and grading. The upland access area will be surrounded with a silt fence system. The access road will lead into the work area below the South Channel Dam.

A temporary contractor designed bulkhead cofferdam will be constructed on the downstream side of the access road and around the fish lift construction area in the

tailrace. A small temporary contractor designed bulkhead cofferdam will also be constructed in the headpond, upstream of the fish lift work area. All work will occur in the dry and within cofferdam areas. Turbidity curtain systems will be placed around the cofferdams. Dewatering pumps will be used to pump water out of the work area. These pumps will utilize crushed stone and filter fabric to ensure sediment laden waters are not pumped back into the river system.

For safety during cofferdam construction, the Project impoundment will be lowered 1.5 feet. The impoundment drawdown will not exceed a rate of approximately 1-inch per hour. When downstream flow regulation is necessary to raise the impoundment level after construction of the cofferdam, Brookfield will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment.

4.2.2 Demolition and Bedrock Removal

Once the cofferdam structures are set up and the work area is dry, some bedrock and a small portion of the existing South Channel Dam will need to be removed to prepare the area for the installation of the fish lift (see Demolition & Excavation Plan Drawing C-101, project Drawings, Appendix B).

- In-river bedrock excavation will occur in the proposed fishway footprint. This area will be excavated to various slopes and elevations, in order to prepare the bedrock surface for the fish lift. Bedrock material will be removed from the river. Blasting is not anticipated to be utilized for the removal of bedrock for this project (should blasting be required, a Blasting Plan will be developed in consultation with the NMFS).
- A portion of the south channel dam concrete spillway will be removed, in order for the fishway exit pipe to be installed.
- Excavated materials may be temporarily stored on site before being transported off site and disposed of in accordance with local, state, and federal regulations.

4.2.3 Fishway Construction

The fish lift structure will be constructed between the existing powerhouse and log sluice on the south channel dam. The fish lift will include an AWS auxiliary spillway, a fish hopper, entrance and upstream screens, and an exit pipe (see drawing package in Appendix B, for full details). The lift will measure approximately 141.5 feet long by 31 feet wide. Concrete fill will comprise the fish lift super structure.

4.2.4 Site Restoration and Demobilization

Once construction is completed the work area will be cleaned up inclusive of removing all components of the temporary cofferdam and temporary gravel access road. The temporary fill materials will be placed on top of a fabric to separate fill from existing materials. This will ensure that all temporary fills are removed upon completion of the work. Once cofferdam structures are removed, Brookfield will pass 15 cfs over the new concrete structures as appropriate to lower pH levels prior to fish passage use. All access areas and laydown areas will then be returned to their prior condition and reseeded and replanted, as necessary.

4.3 Waterway Impacts

Table 1 outlines the proposed project's temporary and permanent fill quantities as well as proposed excavation quantities. Design Drawings included in Appendix B visually depict these impacts.

Project Component	Temporary Fill (SF/LF/CY)	Excavated Fill (SF/CY)	Permanent Impact (SF/CY)	Impact Area
Access Road	11,100 ft ² / 830 y ³			Tailrace
Bedrock Removal		2,740 ft ² / 800 y ³		Tailrace
Concrete Spillway Section Removal		360 ft ² / 170 y ³		Dam
Cofferdam	480 Length Feet / 4,910 y ³			Tailrace
Fish Lift			3,440 ft ² / 2,320 y ³	Tailrace

 Table 1
 Excavation and Fill Quantities in Waters of the United States

4.4 **Construction Schedule**

The schedule outlined in Table 2 is subject to change pending approvals from permitting entities. Schedule updates will be communicated with permitting entities as appropriate.

Construction Phase	Construction Schedule
Contractor Mobilization and Access Road	June 2022
Construction (upland ground disturbance	
only; no in water work; less than 1 month	
to complete)	
Construct Temporary In-Water Access	July 15, 2022 – September 30, 2022 and
and Water Control Structures (target start	November 8, 2022 – March 8, 2023
of installation and work within in water	
work windows: July 15 to September 30	
and November 8 to April 9; 6 months to	
complete)	
Demolition and Bedrock Removal (in the	April 2023 – June 2023
dry; 2 months to complete)	
Fish Lift Construction (in the dry; 9	July 2023 – April 2024
months)	
Remove Temporary Access and Water	July 15, 2024 – September 30, 2024 and
Control Structures, Contractor	November 8, 2024 – March 8, 2025
Demobilization (target removal within in	
water work windows: July 15 to	
September 30 and November 8 to April 9;	
6 months to complete)	
Fishway Commissioning	May 2025

Table 2Construction Schedule

4.5 Equipment to be Used

Best Management Practices (BMPs) will be implemented before and during Project construction to limit any temporary adverse impacts to water quality, soil stability, and the natural environment. Temporary erosion and sedimentation controls will be installed including a silt fence around the work and laydown area, designated construction entrances and exits will be established. A turbidity curtain will be employed around the temporary cofferdam. A temporary, bulkhead will be installed to facilitate dewatering of the project area to enable subgrade preparation and fill placement to occur in the dry. Pumps will be utilized as required to dewater the work area (or in localized areas as the work progresses). Trenches, sumps, and sump pumps will be installed as required to contain and control seepage or surface water and prevent ponding of water atop the work area. Water will be pumped to sediment containment bag(s) prior to being returned to the bypass reach, downstream of the work area.

Equipment used for in-river bedrock excavation and movement of permanent fill will be determined by the contractor, but will likely include hydraulic excavator(s), hoe ram(s), excavator mounted and handheld equipment, diamond saws and or diamond wires for concrete removal at the spillway, and other small/support equipment.

5.0 PROJECT DESIGN DRAWINGS

Please see Appendix B for the Weston Hydroelectric Project Upstream Fish Lift Design Drawings. A Fish Lift Operations and Maintenance Plan is included in Appendix C.
6.0 FISH AND WILDLIFE RESOURCES

6.1 Fish Resources

6.1.1 Overview

The Kennebec River supports approximately 50 species of freshwater and diadromous fish species. This includes cold and warm water angling opportunities for wild and stocked brook trout, landlocked salmon, brown trout, rainbow trout, and smallmouth bass. The lower Kennebec River, supports runs of diadromous fish species, including American shad, blueback herring, alewives, Atlantic salmon, and American eel, as discussed below. Atlantic and shortnose sturgeon also occur in the lower Kennebec River, but no further upstream than the downstream Lockwood dam; thus, no sturgeon are found in the Weston Project area.

One federally endangered fish species, the Atlantic salmon (*Salmo salar*), has the potential to occur within the proposed project area as identified by the USFWS Information for Planning and Consultation (IPaC) report completed on November 24, 2020 (Appendix D). The Atlantic Salmon Gulf of Maine distinct population segment (DPS) is listed as endangered under the Federal Endangered Species Act (ESA). The Kennebec River is identified as Critical Habitat for the Atlantic Salmon Gulf of Maine DPS and Atlantic salmon present in the Kennebec River are listed under the ESA.

Upstream fish passage for Atlantic salmon, American shad, blueback herring, and sea-run alewife in the lower Kennebec River is currently provided through trap-and-truck operations at the downstream Lockwood Project fish lift facility in Waterville, Maine. Fish are trucked to the Sandy River, approximately 10 miles upstream of the Weston Project. As such, none of these species are anticipated to be affected by construction activities for the upstream fish lift as they are trucked past the Weston dam. Only downstream migrating smolt and kelt, as well as other diadromous species, could be affected by the proposed construction project.

BWPH is currently completing Section 7 Endangered Species Act (ESA) consultation for construction activity with the NMFS and FERC.

6.1.2 Impacts Mitigation

Throughout construction, prescribed minimum flows will be maintained downstream of the dam via spill through the north spillway. Spillage from the north spillway will provide downstream fish passage opportunities throughout the construction process. Construction activities and operation of the new upstream fishway will not change the normal pond elevation or downstream minimum flows and thus are not anticipated to have a negative effect on existing aquatic habitat with the exception of permanent fills that will occupy these habitats. The project will in fact enhance downstream minimum flows and potentially downstream passage via the provision of fish lift attraction flows. Overall, the proposed project is viewed as a mitigation measure as it will provide permanent upstream fish passage past the Weston dam.

Construction of the fish lift will take place within the waterbody, for a limited duration. Temporary effects will mostly be associated with the cofferdam construction and removal, as all other in-river work will occur behind the cofferdam. Some noise may be associated with construction and excavation, though it will be somewhat buffered by the cofferdam. Proposed construction activities are not anticipated to negatively affect water quality as sediment and erosion control BMP's will be implemented during project construction to limit any temporary adverse impacts to water quality (sedimentation inputs).

No in water work will commence until the downstream smolt season has passed and will be completed within the proposed work windows. Atlantic salmon presently only occur in the Project area as smolts and kelts during the downstream migration season. As such, the project is not anticipated to negatively affect Atlantic salmon or other diadromous species.

Overall, the intent of this project is to provide volitional upstream fish passage for Atlantic salmon and other migratory species. Operation of the new upstream fish lift will not change the normal pond elevation or minimum flows and thus will have minimal effect on the existing aquatic habitat.

Brookfield filed a Biological Assessment for Atlantic salmon for the SPP with FERC on May 31, 2021, to consult with the NMFS under Section 7 of the Endangered Species Act (ESA) including construction activities associated with development of the upstream fish passage facility.¹

¹ Brookfield White Pine Hydro LLC, et. al. submits Lower Kennebec Species Protection Plan and Draft Biological Assessment for the Lockwood, Hydro-Kennebec and Weston Projects under P-2574, et. al. FERC Accession No: 20210601-5152. Online: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15804246

6.2 Wildlife Resources

6.2.1 Overview

The Weston Project is located in downtown Skowhegan. The area surrounding the Project on both sides of the Kennebec River is a combination of commercial, industrial, and residential lands. Common wildlife species likely to inhabit the area include squirrel, deer, skunk, raccoon, muskrat, mice, etc. and various bird species. The Project boundary encompasses only a small area of fragmented forest habitat outside of the wetted portions of the Project impoundment and tailwater areas.

Wildlife species likely to inhabit the area are mostly rodent-type mammals (squirrel, rat, skunk, raccoon, muskrat, mice, etc.) and various bird species. One federally threatened wildlife species, the Northern long-eared bat (*Myotis septentrionalis*), may have potential to occur in the proposed project area as identified by the USFWS IPaC report completed on November 24, 2020 (Appendix D). The Northern long-eared bat is also identified as an endangered species by the State of Maine. There is no USFWS designated critical habitat for the Northern long-eared bat in the proposed project area.

The bald eagle, protected by the Bald and Golden Eagle Protection Act, transiently occurs within the proposed project area. Per a review of the Maine Bald Eagle Nest Locations and Buffer Zone Map,² there are no bald eagle nests identified within or adjacent to the proposed project area.

6.2.2 Impacts Mitigation

There is a possibility that project construction may temporarily impact NLEB feeding patterns and disturb transient bald eagles. Tree removal will be conducted pursuant to the 4(d) rule for NLEB. Provided the temporary nature and short timeline associated with this project, project impacts are expected to be temporary and short in duration.

² https://www.arcgis.com/apps/webappviewer/index.html?id=796b7baa18de43b49f911fe82dc4a0f1

7.0 HISTORICAL/ARCHAEOLOGICAL RESOURCES

BWPH initiated consultation with the Maine Historic Preservation Commission (MHPC) State Historic Preservation Officer (SHPO) via letter regarding the construction of the upstream fish lift at Weston. This consultation was sent to the MHPC and to Maine's five federally recognized tribes on October 22, 2020. Follow-up email consultation was sent to MHPC to update the MHPC on the projects updated access road location on December 17, 2020. MHPC determination of no adverse effect was received on December 28, 2020. Record of SHPO and Tribal consultation and responses can be found in Appendix E.

8.0 **PROJECT AREA ABUTTERS**

Project area abutters are listed within Table 3 and identified in Figure 7.

Map-						
Lot	Grantee	Co-Grantee	Mailing	City	State	ZIP
26-27	14 CEDAR STREET LLC		P O BOX 275	AUGUSTA	ME	04332
26-31	BOLDUC, GERALD P		15 ASTER TERR	KEY WEST	FL	33040
26-						
187	COOKE, JASON		185 KELLY RD	CORNVILLE	ME	04976
			8 NOTTINGHAM			
26-22	DESISLES, KENNETH M		WY	SOMERSET	NJ	08873
26-						
190	DICKEY, GALAN I		25 LAWTON ST	SKOWHEGAN	ME	04976
26-			693 BIGELOW			
188	EARLE, MICHAEL L	EARLE, IDA M	HILL RD	SKOWHEGAN	ME	04976
26-		SNOWDEN,				
21A	HALLOWELL, KEITH B	REGINA K	17 CEDAR ST	SKOWHEGAN	ME	04976
26-28	HENRY, BRANDON M		16 CEDAR ST	SKOWHEGAN	ME	04976
			C/0 MARK &			
26-33	HORN ME LLC		LINDA HORN	EDMONDS	WA	98026
26-23	KNOWLTON, DALE P		188 MIDDLE RD	SKOWHEGAN	ME	04976
26-			40 NORTH			
192A	LAM PROPERTIES LLC		BABCOCK RD	CORNVILLE	ME	04976
	MAINE CENTRAL	C/O PAN AM	1700 IRON	NORTH		
26-12	RAILROAD CO	RAILWAYS	HORSE PARK	BILLERICA	MA	01862
			10 MOUNT			
26-9	MCMAHON, RICHARD		VISTA DR	SIDNEY	ME	04330
	NEW BALANCE		ATTN: TAX			
26-32	ATHLETIC SHOE INC		DEPT	BOSTON	MA	02135
		TOTH,	20 WATERVILLE			
26-26	PARTRIDGE, CHAD	MARSHA	RD	SKOWHEGAN	ME	04976
			3261			
26-11	RODRIGUE, JOSEPH C		BROADWAY	BANGOR	ME	04401
26-		SOIKUM,				
192	SOIKUM, THAWEESUK	WIPARVON	105 WATER ST	SKOWHEGAN	ME	04976
		TALBOT,	8 MT PLEASANT			
26-5	TALBOT, JOHN R	BETH L	AVE	SKOWHEGAN	ME	04976
	Town of Skowhegan:					
	Code Enforcement and					
	Planning Office: Bryan					
	Beliveau		225 Water Street	Skowhegan	ME	04976
26-						
12A	TURCOTTE, SHANE L		9 GOODWIN ST	NEWPORT	ME	04953
	WINCHESTER, RICHARD		4 FRENCH ST,			
26-10	H JR		APT 2	SKOWHEGAN	ME	04976

Table 3Project Areas Abutters List

Map- Lot	Grantee	Co-Grantee	Mailing	City	State	ZIP
			366 CANAAN			
26-21	ZARTMAN, DUANE		RD	SKOWHEGAN	ME	4976



Figure 7 Skowhegan Tax Map Abutters³

Source: Skowhegan Parcel Viewer (cgis-solutions.com)

³ 300 ft buffer of parcel 26-1

APPENDIX A

FISH LIFT DESIGN CONSULTATION

Weston Fish Passage Design Agency Consultation Timeline

Description	Dates
Preliminary Design Consultations	
Allen email prelim design 2-24-20	2/24/2020
Weston agency comment tracker	2/24/2020
Prelim Design Agency Meeting	3/27/2020
30% Design Consultations	
30% design submittal	6/23/2020
Lockwood and Weston Fish Passage Agency Meeting	7/23/2020
60% Design Consultations	
60 % design submittal	10/23/2020
60% design review meeting	11/10/2020
Sojkowski email response	11/30/2020
Final (90%) Design Consultations	
Final design submittal	2/4/2021
Final design review meeting	2/9/2021

From: Gregory Allen <gallen@aldenlab.com>

Date: Mon, Feb 24, 2020 at 4:51 PM

Subject: RE: [EXTERNAL] Re: Weston Conceptual & Lockwood Fish Passage Alternatives Meeting To: Wippelhauser, Gail <<u>Gail.Wippelhauser@maine.gov</u>>, Bentivoglio, Antonio <<u>antonio_bentivoglio@fws.gov</u>>, Baker, Nathan <<u>Nathan.Baker@brookfieldrenewable.com</u>> Cc: Mitchell, Gerry <<u>Gerry.Mitchell@brookfieldrenewable.com</u>>, Maloney, Kelly <<u>Kelly.Maloney@brookfieldrenewable.com</u>>, Seyfried, Jason <<u>Jason.Seyfried@brookfieldrenewable.com</u>>, Dill, Richard <<u>Richard.Dill@brookfieldrenewable.com</u>>, Pocquette, Kayla <<u>Kayla.Pocquette@brookfieldrenewable.com</u>>, Brown, Adam <<u>Adam.Brown@brookfieldrenewable.com</u>>, Christman, Paul <<u>Paul.Christman@maine.gov</u>>, Bryan Sojkowski <<u>bryan_sojkowski@fws.gov</u>>, Seiders, Dwayne J <<u>Dwayne.J.Seiders@maine.gov</u>>, Matt Buhyoff - NOAA Federal <<u>matt.buhyoff@noaa.gov</u>>, Reny, Melissa <<u>Melissa.Reny@brookfieldrenewable.com</u>>, Donald Dow - NOAA Affiliate <donald.dow@noaa.gov>, Anna Harris <anna harris@fws.gov>

Good afternoon,

Thank you for your comments regarding the proposed preliminary design for Weston. I have organized comments in the attached spreadsheet from the email string below. We have also included a few responses to comments in the spreadsheet. Please review and I will follow up with suggested times for a meeting in the next few weeks to discuss. Let me know if there are any days you are not available for a meeting.

Thank you,

Greg

Gregory Allen, P.E. (508) 829-6000 ext. 6409

From: Wippelhauser, Gail [mailto:<u>Gail.Wippelhauser@maine.gov]</u>
Sent: Friday, December 27, 2019 11:27 AM
To: Bentivoglio, Antonio; Baker, Nathan
Cc: Mitchell, Gerry; Gregory Allen; Maloney, Kelly; Seyfried, Jason; Dill, Richard; Pocquette, Kayla; Brown, Adam; Christman, Paul; Bryan Sojkowski; Seiders, Dwayne J; Matt Buhyoff - NOAA Federal; Reny, Melissa; Donald Dow - NOAA Affiliate; Anna Harris
Subject: RE: [EXTERNAL] Re: Weston Conceptual & Lockwood Fish Passage Alternatives Meeting

I realize that we are discussing upstream passage designs, but I don't want to forget downstream passage which is just as important.

On the basis of 3 years of downstream smolt studies:

56-67% exited via the south channel, the rest via the north channel.

31% passed through the turbines, 43% via the bypass, 24% via spill, 2% unknown

Unadjusted (for delays \geq 24h) turbine survival (98.5. 96.6, 100), bypass survival (96.2, 86.7. 98), and spill survival (100, 87.2),

Total station survival adjusted for delays \geq 24hrs was 0.864 and 0.660 (only calculated for two years).

On the basis of 2 years of downstream silver eel studies:

In the first study when releases were above the north-south channel split, 68% exited via the south channel and all went through the turbines, the rest via the north channel. Overall survival was 87.5%. For the two releases (n=24), median residence times (h) were 56 and 161 h mean were 68 and 135.

In the second study when releases were above the south channel dam, 88% exited through the turbines, 7% via the log sluice, and 5% via unknown route. Overall survivals were 95% and 90% (n=60). For the 3 releases, median residence times were 0.1, 0.7, and 1.3 h and mean were 3.7, 7.4, 10.2 h).

The use of attraction water as an alternate downstream bypass facility might greatly improve DS passage efficiency.

I suggest the training wall be modeled.

Gail Wippelhauser, Ph. D. Marine Resources Scientist Maine Department of Marine Resources #172 State House Station Augusta, ME 04333

Phone: 207-624-6349

email: gail.wippelhauser@maine.gov

From: Bentivoglio, Antonio <<u>antonio bentivoglio@fws.gov</u>>
Sent: Thursday, December 19, 2019 7:51 AM
To: Baker, Nathan <<u>Nathan.Baker@brookfieldrenewable.com</u>>
Cc: Mitchell, Gerry <<u>Gerry.Mitchell@brookfieldrenewable.com</u>>; Gregory Allen <<u>gallen@aldenlab.com</u>>;
Maloney, Kelly <<u>Kelly.Maloney@brookfieldrenewable.com</u>>; Seyfried, Jason
<Jason.Seyfried@brookfieldrenewable.com>; Suffried, Jason
<Jason.Seyfried@brookfieldrenewable.com>; Dill, Richard <<u>Richard.Dill@brookfieldrenewable.com</u>>;
Pocquette, Kayla <<u>Kayla.Pocquette@brookfieldrenewable.com</u>>; Brown, Adam
<<u>Adam.Brown@brookfieldrenewable.com</u>>; Wippelhauser, Gail <<u>Gail.Wippelhauser@maine.gov</u>>; Christman, Paul <<u>Paul.Christman@maine.gov</u>>; Bryan Sojkowski <<u>bryan_sojkowski@fws.gov</u>>; Seiders, Dwayne J<<<u>Dwayne.J.Seiders@maine.gov</u>>; Matt Buhyoff - NOAA Federal <<u>matt.buhyoff@noaa.gov</u>>; Reny, Melissa
<<u>Melissa.Reny@brookfieldrenewable.com</u>>; Donald Dow - NOAA Affiliate <<u>donald.dow@noaa.gov</u>>; Anna
Harris <<u>anna_harris@fws.gov</u>>

Subject: Re: [EXTERNAL] Re: Weston Conceptual & Lockwood Fish Passage Alternatives Meeting

EXTERNAL: This email originated from outside of the State of Maine Mail System. Do not click links or open attachments unless you recognize the sender and know the content is safe.

All,

below is a summary of our comments on the drawings:

1. We would like Brookfield to consider a different approach to supplying the attraction water. As shown in the conceptual design, the attraction water falls through a wedge wire screen, the remaining flow is utilized as a downstream bypass conduit. Given that the log sluice is currently utilized as a downstream bypass and has a large hydraulic capacity, we do not see the need to incorporate another one. Instead, please consider dropping the water directly into a dissipation chamber (as shown in the attached PDF). Doing this will increase the volume of the attraction water pit, make the sparger and wedge wire unnecessary, and provide more room for the turbulence of the flow to dissipate prior to going through the hopper area.

2. Integrating the above recommendation would require downstream migrating fish to be excluded from entering the system. This could be done via 3/8" punch plate. A dual screen, similar to the one incorporated at Hydro Kennebec would simplify cleaning of the screen.

3. The recommendations above would allow the entrance channel to become wider than shown on the conceptual design plans. This fishway is in the middle of two very large false attraction flows (e.g., powerhouse, log sluice) and therefore we believe warrants an entrance that is as large as possible. Removing the downstream bypass and wedge wire screen portion of the proposed design would allow for a wider entrance (also shown in attached PDF).

4. USFWS recommends that the local hydraulics in the vicinity of the proposed entrance flow and log sluice flow is carefully considered. The concern is that the high velocities from the log sluice (likely on the order of 20+ ft/s) will create a shear plane adjacent to the slower moving entrance flow (4-6 ft/s) and hinder the effectiveness of the entrance jet by pulling it into the log sluice flow. A training wall may be necessary, similar to the one incorporated at the Shawmut tailrace fishway to ensure that the entrance jet extends into the tailrace as far as possible.

Thanks for the opportunity to review the conceptual design plans and we look forward to working with you as this design progresses.

Bryan and Antonio

On Wed, Dec 18, 2019 at 10:58 AM Baker, Nathan <<u>Nathan.Baker@brookfieldrenewable.com</u>> wrote:

If we could have comments by end of December that would work for us. Thank you.

Nathan Baker

Project Manager

Brookfield Renewable

28 Weston St, Skowhegan, Maine 04976

C 207.616.8886

nathan.baker@brookfieldrenewable.com

From: Bentivoglio, Antonio <<u>antonio_bentivoglio@fws.gov</u>> Sent: Wednesday, December 18, 2019 8:24 AM To: Mitchell, Gerry <<u>Gerry.Mitchell@brookfieldrenewable.com</u>> Cc: Gregory Allen <<u>gallen@aldenlab.com</u>>; Maloney, Kelly <<u>Kelly.Maloney@brookfieldrenewable.com</u>>; Seyfried, Jason <<u>Jason.Seyfried@brookfieldrenewable.com</u>>; Dill, Richard <<u>Richard.Dill@brookfieldrenewable.com</u>>; Pocquette, Kayla <<u>Kayla.Pocquette@brookfieldrenewable.com</u>>; Brown, Adam <<u>Adam.Brown@brookfieldrenewable.com</u>>; Wippelhauser, Gail <<u>Gail.Wippelhauser@maine.gov</u>>; Paul Christman <<u>paul.christman@maine.gov</u>>; Bryan Sojkowski <<u>bryan_sojkowski@fws.gov</u>>; Seiders, Dwayne J <<u>Dwayne.J.Seiders@maine.gov</u>>; Matt Buhyoff - NOAA Federal <<u>matt.buhyoff@noaa.gov</u>>; Reny, Melissa <<u>Melissa.Reny@brookfieldrenewable.com</u>>; Baker, Nathan <<u>Nathan.Baker@brookfieldrenewable.com</u>>; Donald Dow - NOAA Affiliate <<u>donald.dow@noaa.gov</u>>; Anna Harris <<u>anna_harris@fws.gov</u>> Subject: Re: [EXTERNAL] Re: Weston Conceptual & Lockwood Fish Passage Alternatives Meeting

Gerry, when do you want comments by?

On Tue, Dec 17, 2019 at 3:42 PM Donald Dow - NOAA Federal <<u>donald.dow@noaa.gov</u>> wrote:

Gerry -

Thank you for the opportunity to review the Weston Concept Design. I have two comments/considerations

1. I seem to recall that initially we were going to have the entrance next to the log sluice, I do not fully recall placing the attraction water system in that location. Please advise

2. We are going to have to have further discussion between now and the 30% design on the location at which we will be dumping fish into the headpond. This is a very important discussion as it could lead to the lack of constructability of the facility.

These comments only represent NMFS and not the Design Review Team.

Regards,

Don

On Mon, Oct 7, 2019 at 1:38 PM Mitchell, Gerry <<u>Gerry.Mitchell@brookfieldrenewable.com</u>> wrote:

We have added the latest conceptual design for Weston, we would like to go over this also.

Please see the attached updated review of fish passage alternatives for the Lockwood bypass spillway. Hope to see you all at the Lockwood Power house or at least on the call. Let me know if you have any questions Thanks Gerry --Donald A. Dow III, PE Hydro/Fish Passage Engineer Protected Resources Division Greater Atlantic Regional Fisheries Office (formerly Northeast Regional Office) National Oceanic and Atmospheric Administration National Marine Fisheries Service Maine Field Station 17 Godfrey Drive, Suite 1 Orono, ME 04473 Office: 207-866-8563 Cell: 207-416-7510 Donald.Dow@noaa.gov --Antonio

Antonio Bentivoglio

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Gregory Allen, P.E. Director, Environmental and Engineering Services ALDEN Solving flow problems since 1894 30 Shrewsbury St., Holden, MA 01520-1843 Office Phone (508) 829-6000 ext. 6409 gallen@aldenlab.com

Weston Fish Passage Project Preliminary Design Consultations

Item	Agency	Date Received	From	Comment	Response
				1. I seem to recall that initially we were going to have the entrance next to the log sluice, I do not fully recall	
1	NMFS	12/17/2019	Don Dow	placing the attraction water system in that location. Please advise	
				2. We are going to have to have further discussion between now and the 30% design on the location at which we	
				will be dumping fish into the headpond. This is a very important discussion as it could lead to the lack of	
2	NMFS	12/17/2019	Don Dow	constructability of the facility.	
				1. We would like Brookfield to consider a different approach to supplying the attraction water. As shown in the	
				conceptual design, the attraction water falls through a wedge wire screen, the remaining flow is utilized as a	
				downstream bypass conduit. Given that the log sluice is currently utilized as a downstream bypass and has a large	The primary purpose for the proposed AW
				hydraulic capacity, we do not see the need to incorporate another one. Instead, please consider dropping the	attraction water to the fish lift channel via
				water directly into a dissipation chamber (as shown in the attached PDF). Doing this will increase the volume of	arrangement limits the impacts to the dan
			Antonio	the attraction water pit, make the sparger and wedge wire unnecessary, and provide more room for the	installed upstream of the dam. A seconda
3	FWS	12/19/2019	Bentivoglio	turbulence of the flow to dissipate prior to going through the hopper area.	spillway for downstream passage.
					A new intake would require approximately
					through-screen velocity of 1 ft/sec, assum
					would require a new intake structure 20 ft
				2. Integrating the above recommendation would require downstream migrating fish to be excluded from entering	existing turbine intakes. We do not recom
			Antonio	the system. This could be done via 3/8" punch plate. A dual screen, similar to the one incorporated at Hydro	We recommend a traditional style intake v
4	FWS	12/19/2019	Bentivoglio	Kennebec would simplify cleaning of the screen.	rake for cleaning.
				3. The recommendations above would allow the entrance channel to become wider than shown on the	
				conceptual design plans. This fishway is in the middle of two very large false attraction nows (e.g., powerhouse,	
			Antonio	burg sidice) and therefore we believe warrants an entrance that is as large as possible. Removing the downstream	
5	E/W/S	12/10/2010	Bentivoglio	bypass and wedge whe screen portion of the proposed design would allow for a wider entrance (also shown in	
5	1005	12/15/2015	Dentivogilo		
				4. USFWS recommends that the local hydraulics in the vicinity of the proposed entrance flow and log sluice flow is	
				carefully considered. The concern is that the high velocities from the log sluice (likely on the order of 20+ ft/s) will	
				create a shear plane adjacent to the slower moving entrance flow (4-6 ft/s) and hinder the effectiveness of the	
			Antonio	entrance jet by pulling it into the log sluice flow. A training wall may be necessary, similar to the one incorporated	
6	FWS	12/19/2019	Bentivoglio	at the Shawmut tailrace fishway to ensure that the entrance jet extends into the tailrace as far as possible.	
				In addition to my comments, I am in support of the FWS request. This request will strike out my concern about	
7	NMFS	12/19/2019	Don Dow	the location of the AWS relative to the log sluice and the lift entrance. Thank you.	
				I realize that we are discussing upstream passage designs, but I don't want to forget downstream passage which is	
				just as important.	
				On the basis of 3 years of downstream smolt studies:	
				56-67% exited via the south channel, the rest via the north channel.	
				31% passed through the turbines, 43% via the bypass, 24% via spill, 2% unknown	
				Unadjusted (for delays >24h) turbine survival (98.5. 96.6, 100), bypass survival (96.2, 86.7. 98), and spill survival	
				(100, 87.2),	
				Total station survival adjusted for delays > 24hrs was 0.864 and 0.660 (only calculated for two years).	
				On the basis of 2 years of downstream silver eel studies:	
				In the first study when releases were above the north-south channel split, 68% exited via the south channel and al	
				went through the turbines, the rest via the north channel. Overall survival was 87.5%. For the two releases (n=24),	
				median residence times (h) were 56 and 161 h mean were 68 and 135.	
				In the second study when releases were above the south channel dam, 88% exited through the turbines, 7% via	
				Ithe log silice, and 5% via unknown route. Overall survivals were 95% and 90% (n=60). For the 3 releases, median	Alden agrees that an AWS intake similar to
				residence umes were 0.1, 0.7, and 1.3 n and mean were3.7, 7.4, 10.2 n).	uownstream passage survival. The propos
			Cail	officiency	geometry that has been shown to enhance
<u> </u>		12/27/2010	Ulinnolhouser	lendency.	smolts. In addition, the proposed intake c
8	MDMR	12/2//2019	wippeinauser	i suggest the training wan be modeled.	structure in the impoundment.

	Response from:
S intake and spillway configuration is to provide a high velocity wedgewire screen. The proposed and the need for a large intake structure ry benefit is the opportunity to use the AWS	Alden
608 square feet of screening area, to provide a ng a 50% open area, per FWS 2019 criteria. This wide by 30 ft deep. This is similar in size to the mend perforated plate, as it is difficult to clean. with either bar racks or wedgewire and a trash	Alden
the conceptual design has potential to improve ed conceptual design includes an NU/Alden weir downstream passage effectiveness for salmon oncept would not require a new large intake	Alden



Meeting Notes Lockwood and Weston Fish Passage Meeting Friday, March 27, 2020 9:00 AM – 12:00 PM

Attendees:

Gail Wippelhauser, (MEDMR) Donald Dow (NOAA) Matt Buhyoff (NOAA) Jason Seiders (IF&W) Bryan Sojkowski, (USFWS) Antonio, Bentivoglio (USFWS) Kelly Maloney (Brookfield) Richard Dill (Brookfield) Nathan Baker (Brookfield) Gerry Mitchell (Brookfield) Adam Brown (Brookfield) Jason Seyfried (Brookfield) Kayla Pocquette (Brookfield) Gregory Allen (Alden) Ben Mater (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/ teleconference on March 27, 2020. The two primary topics included a review of computational fluid dynamic (CFD) modeling of the proposed vertical slot fish ladder at Lockwood and a discussion of comments received from resource agencies for the Weston conceptual fish lift design.

Lockwood CFD Study Review

Ben Mater presented the CFD results of the fish ladder entrance conditions at Lockwood.

Comments and Discussion:

Bryan – prefers side wall diffusers rather than a floor diffuser. Bottom diffusers create flow problems at fishway entrances if not designed properly and can be more difficult to maintain.

Don – Is not as concerned with maximizing flow out the fishway entrance because the fishway is in the bypass reach and not competing with flow from an adjacent powerhouse. At 40% flow exceedance and lower river flows, the fishway is the primary flow in the bypass channel.



Greg – flow through the floor diffuser is adjustable with a slide gate.

Gail – expressed concerns with herring reaching the fishway for the 10% flow condition. Fish may not make it past the bridge.

Antonio – mentioned that the 10% river exceedance flow condition is a very high flow and fish may not be moving upstream in the bypass reach at this condition.

Gail – Expressed concerns with herring reaching the entrance for Alternative 2 for the 25% river exceedance flow condition. Velocities around 7 ft/sec are too high in her opinion and extend too far downstream.

Greg – mentioned the high ledge "shelf" can be excavated to reduce the velocities. This would provide greater area just downstream of the fish ladder entrance and reduce velocities.

Richard – mentioned the entrance gate can be adjusted to reduce the velocity at the entrance if needed to alleviate Gail's concerns.

The overall consensus of the group was to move forward with Alternative 2.

Lockwood Action Items

Resource agencies will provide any additional comments within 1 week (April 3).

Weston Discussion

Conceptual design drawings were presented to resource agencies for comment on October 11, 2019 at a meeting at Lockwood Station. Brookfield received comments from NMFS on Dec 17 & 19, FWS on Dec 19 and MEDMR on Dec 27, 2019 (see attached).

Bryan – described the conceptual sketch that was attached to FWS's comments showing all the attraction water flow being routed through the fish lift. He indicated he would like to see more flow allocated to the fish lift.

Greg – provided an overview of the proposed design that includes an Alden weir, horizontal wedgewire screen and spillway. The primary purpose for the proposed AWS intake and spillway configuration is to provide attraction water to the fish lift channel via a high velocity wedgewire screen. The proposed arrangement limits the impacts to the dam and the need for a large intake structure installed upstream of the dam. A secondary benefit is the opportunity to use the AWS spillway for downstream passage. He explained that if we allocate all of the AWS flow to the fish lift, then that would require a new standalone intake that is roughly 30 ft deep and 20 ft wide. This new intake is on the scale of one of the existing turbine intake bays. An intake of this size is needed to prevent fish impingement by maintaining through screen velocity to less than 1 ft/sec per FWS criteria.



Don – Mentioned he would like to see more flow allocated to the fish lift, rather than the AWS spillway, but acknowledged there is little space to work with.

Greg – explained that Alden will investigate designs to maximize the flow out the entrance. The overall width of the fish lift could be increased by 2 ft, thereby reducing the AWS spillway width by 2 ft.

The group agreed with the proposed AWS intake and spillway concept, assuming that flow to the fish lift entrance will be maximized.

Fish Lift Entrance Configuration

Bryan – mentioned his concerns with the fish lift entrance adjacent to the high velocity discharge from the log sluice are alleviated with the separation of the entrance from the log sluice, due to the AWS spillway located between them.

Gail – mentioned that her comment regarding modeling a training wall was only relevant if the entrance was moved adjacent to the log sluice (per FWS comments).

Bryan – concurred that modeling is not requested, assuming the entrance is not moved to be adjacent to the log sluice discharge.

<u>Exit Pipe</u>

Don – expressed concerns with the exit pipe discharge location. He would like assurance that fish do not fall back down the log sluice.

Greg – explained the exit pipe location is about 18.5 ft from the log sluice and asked for guidance on how far away it should be located. No guidance was provided.

Greg – explained that he would estimate velocity contours away from the log sluice entrance and use that information to make a judgement on where the exit pipe should be located. He asked if there is guidance on acceptable velocities in the impoundment where the fish would be discharged. No guidance was provided.

Weston Action Items

• Alden to revise the fish lift design by increasing the width by at least 2 ft and maximize the amount of flow discharged from the fish entrance.

Gregory Allen

From:	Gregory Allen
Sent:	Tuesday, June 23, 2020 2:31 PM
То:	'Bryan Sojkowski'; 'Pocquette, Kayla'; 'Reny, Melissa'; 'Matt Buhyoff - NOAA Federal';
	'Donald Dow - NOAA Affiliate'; 'Mitchell, Gerry'; 'Wippelhauser, Gail'; 'Seyfried, Jason';
	'Dill, Richard'; 'Brown, Adam'; 'Anna Harris'; 'Baker, Nathan'; 'Maloney, Kelly'; 'Seiders,
	Dwayne J'; 'Christman, Paul'
Cc:	Amy Mengert; Mark Graeser
Subject:	Weston 30% design submittal
Attachments:	Weston Fish Lift 30% Submittal.pdf

Good afternoon,

I hope everyone is doing well.

I have attached the 30% design drawings for the Weston fish passage project. Please review and let us know if you have any comments. We would like to plan a meeting within the next few weeks to go over the design. I'll send out a separate email to schedule the meeting.

Thank you, Greg



Gregory Allen, P.E. Director, Environmental and Engineering Services ALDEN Solving flow problems since 1894 30 Shrewsbury St., Holden, MA 01520 (508) 829-6000 ext. 6409 gallen@aldenlab.com | www.aldenlab.com



Meeting Notes Lockwood and Weston 30% Design Submittal Review Meeting Thursday, July 23, 2020 10:00 AM – 12:00 PM

Attendees:

Gail Wippelhauser, (MEDMR) Donald Dow (NOAA) Jason Seiders (IF&W) Bryan Sojkowski, (USFWS) Antonio, Bentivoglio (USFWS) Kelly Maloney (Brookfield) Richard Dill (Brookfield) Nathan Baker (Brookfield) Gerry Mitchell (Brookfield) Jason Seyfried (Brookfield) Gregory Allen (Alden) Steve Amaral (Alden) Amy Mengert (Alden) Abbie Knaub (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/teleconference on July 23, 2020. The primary topic was the review of the recently submitted 30% design drawings for each project. Each drawing set was presented, questions, concerns and answers followed.

Lockwood 30% Design Drawing Review

The 30% design submittal was transmitted to resource agencies for comment on July 10, 2020.

Greg Allen presented the 30% design drawings for Lockwood.

Comments and Discussion:

Bryan – asked how much flow can be pulled off from the attraction flow channel to supply the fish ladder floor diffuser?

Greg – explained that the supplemental attraction water system is designed to provide up to 100 cfs through the fish ladder floor diffuser to supplement the fish ladder flow for attraction.



Bryan – requested that this be clarified in the design drawing notes.

Greg – explained that additional survey data was gathered at the site yesterday (July 22, 2020). Information collected includes the as-built lengths of the existing spillways, bathymetry data upstream of the dam between the rock island and shore and bathymetry data in the tailrace upstream of the Route 201 Bridge. This information is needed to inform the design and for a flood impact study.

Don – Will fish be attracted to entrance of fish passage with attraction channel not adjacent to entrance?

Greg – explained that the configuration was developed based on CFD results. The CFD results showed high velocities and shallow depth leading up to the AWS channel which would be difficult and impede ability of herring and shad to navigate.

Gail – asked where could salmon go besides fishway?

Don – if salmon missed the entrance they may be able to reach the AWS channel. No problem if salmon do get into the AWS channel, they should be able to all the way up (to the head pond).

Bryan – states preference for wood baffles for the vertical slot ladder instead of concrete because of easier modification despite higher maintenance and shorter lasting.

Greg – explained that concrete is preferable because it is more durable and will last longer. The baffles have a unique geometry and should not require any adjustments.

Don – asked how the intake screen in the AWS channel would be cleaned.

Greg – explained that intake flow to the floor diffuser would be temporarily stopped and any debris impinged on the screen would then be sweep down the AWS channel.

Don – Is the intent of 10-ft wide channel to be used for DS passage as well?

Greg – replied yes it could be, would be safe, but need to take a closer look at the end and plunge pool depth.

Don – replied that fish will get into it anyway, so need to look at plunge pool.

Greg – explained the AWS channel system design and operation. Alden is using CFD as a tool to design the AWS system from the intake screen to the floor diffuser. The CFD results will be used to optimize the design so that there is even flow distribution through the wedgewire intake screen and at the fish ladder floor diffuser. The CFD model will also be used to confirm flow capacity and to size the AWS flow control gate.



A flood impact study is also underway so that the project does not impact the 100 yr flood elevation. This study will inform the design of the crest gates. Preliminary results indicate the crest gates will need to be larger than shown on the 30% design drawings.

Greg – mentioned the trash rack for the fishway and AWS channel would be 8 to 12 inches.

Bryan – mentioned they typically recommend at least 12 inches.

Don – suggests 16 inches and will get back to Greg.

Don – explained that the new crest gates could be used as first line of defense for controlling head pond levels/ high river flows, do we want that?

Greg – mentioned that the crest gate is also intended to enhance attraction to fishway entrance which would be a benefit.

Antonio – mentioned passing of dam by non-native species is a concern to be addressed.

Several agree this is a concern.

Kelly – mentioned bypassing dams/volitional fishway will give all fish access all the way to the Sandy.

Jason Seiders – mentioned that this needs to be addressed sooner than later, has observed invasive species – northern pike and white catfish – downstream below Benton Falls, above old Fort Halifax in the Sabasticook. Native bullheads would be impacted.



Weston 30% Design Drawing Review

The 30% design submittal was transmitted to resource agencies for comment on June 23, 2020.

Greg Allen presented the 30% drawings for Weston.

Comments and Discussion:

Greg – explained that additional survey data collection is underway today. Information being collected includes bathymetry in the tailrace in the vicinity of the proposed fish lift as well as the shallow areas near shore. This information is needed to inform the design and site access.

Greg – explained that the fish lift design was modified to increase the structures width providing an additional 2 ft in width for the entrance gate (now 10 ft wide) and the fish lift flume (now 14 ft wide). These changes were implemented in response to comments received at the last meeting.

Bryan – asked why no staging pool?

Greg – explained that the area between the Vee gate and the entrance gate will serve as the staging pool.

Bryan – said that he thinks that is sufficient.

Greg – explained that the entrance hinged gate is much larger than that designed for the Shawmut project due to the wider fluctuation in tailwater elevation, which is about 8 feet.

Don – mentioned because of holding pool size, 15 min cycle time for the fish lift will be critical. He asked if there are cutouts in the flow dissipation baffles for men to access both sides?

Amy – mentioned we can make it removable.

Greg – explained the hopper design is similar to Shawmut, but wider to maximize attraction water discharge through the fish lift.

Don and Bryan – mentioned that they were pleased with the 30% design submittals.

Gregory Allen

From:	Seyfried, Jason <jason.seyfried@brookfieldrenewable.com> on behalf of Seyfried, Jason</jason.seyfried@brookfieldrenewable.com>
Sent:	Thursday, November 05, 2020 2:50 PM
To:	Mitchell, Gerry; Baker, Nathan; Maloney, Kelly; Pocquette, Kayla; Reny, Melissa; Brown, Adam; bryan_sojkowski@fws.gov; matt.buhyoff@noaa.gov; Donald.Dow@noaa.gov; Antonio_Bentivoglio@fws.gov; anna_harris@fws.gov; Gail.Wippelhauser@maine.gov; paul.christman@maine.gov; Dwayne.J.Seiders@maine.gov; Dill, Richard
Cc:	Gregory Allen
Subject:	Lockwood and Weston 60% Design Drawings

Good afternoon, I'm emailing the Lockwood and Weston 60% design drawings in preparation for our Microsoft Teams review meeting next Tuesday, November 10th at 9:00a.m. Please let me know if you have any questions or issues with the links.

Lockwood link - https://we.tl/t-A727b3W5N3

Weston link - <u>https://we.tl/t-0gpUpg9o5C</u> (also distributed to you on Oct. 23rd)

Talk to you then, thank you.

Jay Seyfried Compliance Specialist

Brookfield Renewable 150 Main Street, Lewiston, Maine, 04240 Office (207) 755-5615 Mobile (207) 312-8323 jason.seyfried@brookfieldrenewable.com www.brookfieldrenewable.com



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Meeting Notes Lockwood and Weston 60% Design Submittal Review Meeting Tuesday, November 10, 2020 9:00 – 11:30 AM

Attendees:

Gail Wippelhauser, (MEDMR) Donald Dow (NOAA) Matt Buhyoff (NOAA) Jason Seiders (IF&W) Bryan Sojkowski, (USFWS) Kelly Maloney (Brookfield) Adam Brown (Brookfield) Nathan Baker (Brookfield) Gerry Mitchell (Brookfield) Jason Seyfried (Brookfield) Kayla Paquette (Brookfield) Melissa Reny (Brookfield) Gregory Allen (Alden) William Lewis (Alden) Amy Mengert (Alden) Abbie Knaub (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/teleconference on November 10, 2020. The primary topic was the review of the recently submitted 60% design drawings for each project. Each drawing set was presented, questions, concerns and answers followed.

Lockwood 60% Design Drawing Review

The 60% design submittal was transmitted to resource agencies for comment on November 5, 2020.

Greg Allen presented the 60% design drawings for Lockwood. The 60% design drawing set consisted of 64 sheets and each sheet was presented for discussion during the meeting.

Page Turn Drawing Review

Sheets 1 to 5 - no comments



Question – any change to the length of the entrance or angle?

Greg – responded that no changes have been made to the entrance configuration. The entrance configuration is based on CFD modeling of the entrance conditions completed in the spring. The turning pool near the bridge was moved so that the fish ladder is further away from the bridge. This required moving two pools to the impoundment adding approximately 30 ft of length into the impoundment.

Sheet 7 & 8 – No comments

Sheet 9

Comment – fish will need to be evacuated from pools between the fish ladder and shore, is that happening?

Greg – explained that fill will be added so that there are no isolated pools between the fish ladder and shore. Water will drain from this area to the tailwater.

Sheet 10 thru 16 - no comments

Sheet 17

Question – has analysis been done to determine submergence on the entrance gate?

Greg – explained that hydraulic calculations have been completed showing at least 3 ft of water depth over entrance gate. Greg will follow up and submit more information on entrance gate hydraulics.

Sheet 18 – no comments

Sheet 19

Greg – explained that Alden conducted a CFD analysis of the AWS intake and flow conveyance to the floor diffuser. The results of the CFD showed good flow distribution through the floor diffuser. The CFD results also showed good flow distribution through the AWS intake screen. Design changes were implemented to the flow conveyance conduit and turning vanes to optimize the flow distribution. Greg offered to share the CFD results to the group in a follow up email.

Question – are the turning vanes standard timber or something else.

Greg – explained that the turning vanes are concrete, 12 inches thick.

Question – what is the target velocity through the floor diffuser?

Greg – explained that the floor diffuser was designed for a 0.5 ft/sec velocity.

Sheet 20 thru 28 - no comments

Sheet 29

Question – are you comfortable with getting enough flow through the AWS flow control gate to provide 100 cfs to the floor diffuser?

Greg – responded that based on hydraulic calculations and subsequent CFD analysis the AWS flow control gate would be about 50% open to provide 100 cfs. The weir crest elevation downstream of the intake is critical to provide the required head to attain 100 cfs. We are confident with the current design providing at least 100 cfs capacity to the fish ladder floor diffuser.

Question – what is proposed for a screen?

Greg – explained that the AWS intake screen will be a wedgewire type screen with 0.25 inch clear opening. A wedgewire screen should be easier to maintain than perforated plate. The screen would be cleaned by shutting off the AWS flow control gate and allowing flow to sweep debris off the screen.

Comment – I don't like the idea of having to shut down the flow to clean the screen. Leaves are a big problem.

Greg – explained that there is a good sweeping flow past the screen to carry debris away. CFD analysis showed good flow distribution across the screen as well.

Comment – stop logs in the AWS channel should not be used to vary flow on a weekly basis.

Greg – explained that stop logs provide the head required to provide flow to the fish ladder floor diffuser. The flow to the floor diffuser is controlled with the AWS flow control gate downstream of the intake screen and not the stop logs.

Sheet 30 thru 40 – no comments

Sheet 41

Comment – access needs to be provided through the baffle located below the floor diffuser grating. Access needs to be big enough for equipment like ladders.



Greg – agreed, and will address to be sure there is access through the baffle.

Question – Are you comfortable with turning vanes being concrete, because they can't be changed?

Greg – replied that he's comfortable with concrete. The concrete turning vanes will last longer than wood or steel. One issue at fish ladders is a poorly designed floor diffuser, which we want to avoid. The turning vanes were designed with the aid of CFD modeling to provide good flow distribution at the floor diffuser.

Sheet 42 - no comments

Sheet 43

Question - how will the screens be raised and lowered?

Greg – explained that the screens would be permanently installed. They are large screens and wouldn't be easily removed. A hoist could be set up to pull them out, but the intent would be to have them stay in.

A couple seasons of experience will give us a better idea of maintenance requirements, but flow sweeping by AWS intake screen should keep it clear. The screen may need to be manually cleaned once a season.

Question – what if we get a couple seasons in and it is getting too clogged with leaves, how big of a problem would it be to go back in and add a hoist or other cleaning system?

Greg – replied that a cleaning system could be added. An air burst cleaning system is also a possibility.

Sheet 44 - no comments

Sheet 45

Question – Will there be access when spilling on north side of fishway?

Greg – responded, yes the top of walls are designed above the 50-year flood elevation and a pedestrian bridge is planned to access the fishway.

Comment – The turn pool being moved upstream. We just had a river herring telemetry study done for a vertical slot fish ladder on the Merrimac River that found that 24% of fish made it to first turn pool and then backed out. At the Brunswick fish ladder modifications were made to the upper pool to remove eddies. I'm thinking about ways



we can integrate easily added panels in case there is a problem here. We don't want pockets of eddies that turn fish around.

Greg – commented that he's been thinking about this issue as well. He reviewed similar issues at a vertical slot fish ladder on the Richelieu River in Quebec. That fishway was designed with smaller than standard pool dimensions, so maybe we have lower velocity and less turbulence, but it is still something to think about.

Sheet 46 thru 51 – no comments

Sheet 52

Question – will the gate be automated?

Greg - replied yes.

Sheet 53 thru 64 – no comments

End of page turn drawing review for Lockwood

Comments and Discussion:

Comment – good design

No red flags.

Question – Do we know the velocity at fishway entrance?

Greg – responded, yes the velocity is controlled by the automated entrance flap gate.

Question - What is velocity at individual slots of the fish ladder?

Greg – responded that the baffle design of the vertical slot fish ladder is based on US Fish and Wildlife Service guidelines. Alden's CFD analysis shows velocity through the vertical slot to be less than 6 feet per second.

Question – How does entrance velocity here compare with velocity at fish lift?

Greg – responded that the velocity should be the same; 4-6 feet/second controlled by the automated entrance gate.



Weston 60% Design Drawing Review

The 60% design submittal was transmitted to resource agencies for comment on October 23, 2020.

Greg Allen presented the 60% design drawings for Weston. The 60% design drawing set consisted of 65 sheets and each sheet was presented for discussion during the meeting.

Page Turn Drawing Review

Sheets 1 to 14 - no comments

Sheet 15

Question - How accessible are the access ports to the exit pipe?

Greg – replied that Alden is working on the design to provide access to the ports.

William – added that providing access is challenging, but we are working on a design that will provide good access to everything.

Don – commented that he doesn't love the exit pipe but doesn't see another option.

Greg – explained that the timing of the release of water from the tank is key, to be sure all fish are flushed from the exit pipe.

Don – commented that some time could go by before you realize fish may be stuck in the pipe. What if we moved the hopper higher with a steeper slide down?

Greg – responded that in his opinion the exit pipe is already fairly steep at 5%. There is a concern that going steeper will create a situation where water is moving faster than the fish.

Sheet 16 thru 50 – No comments

Sheet 51

Question – are you using the AWS spillway for downstream fish passage?

Greg – replied that the AWS spillway could be used for downstream fish passage.

Sheet 52 thru 63 – No comments



Question – Why do we need this orifice weir panel?

Greg – replied that the orifice panel is intended to reduce air entrainment. Using the overflow weir just upstream of the orifice panel will allow us to dial in the flow rate for the fish lift. Flow over the weir will then be forced through submerged the openings to reduce air entrainment.

Don – commented that it comes down to our level of confidence in getting the air out of the water. It worked at Milford. Is there an equation that led you to this orifice panel?

Greg – replied that the orifice panel was designed to provide an open area of about 50% with submerged openings.

Don – commented that he likes that this is being addressed now.

Sheet 65 - No comments

End of page turn drawing review for Weston

Comments and Discussion:

Don – commented, great job. Only concern left is the exit pipe and I don't have an answer for that.

Greg – commented to please let him know if anyone has any other comments soon, as we would like to continue to move ahead toward 90% design.

Don – responded we'll get any additional comments to you in the next week or so after he talks with Bryan.

Action items

Greg – will send out the CFD results of the Lockwood AWS flow conveyance system and the hydraulic conditions for the fish ladder entrance.

Gregory Allen

From:	Sojkowski, Bryan <bryan_sojkowski@fws.gov> on behalf of Sojkowski, Bryan</bryan_sojkowski@fws.gov>
Sent:	Monday, November 30, 2020 9:34 AM
То:	Gregory Allen
Cc:	Rosset, Julianne
Subject:	Re: [EXTERNAL] Lockwood 60% design follow up information

Good Morning Greg,

Apologies for not sending an email out in regards to Lockwood & Weston, I unfortunately had a loss in the family so was out most of last week. I do not see any red flags at this point for either project and am good moving forward towards the 90%. Thanks for all your time and effort on these designs, talk soon.

From: Gregory Allen <gallen@aldenlab.com>
Sent: Thursday, November 19, 2020 1:45 PM
To: Bentivoglio, Antonio <antonio_bentivoglio@fws.gov>
Cc: Rosset, Julianne <julianne_rosset@fws.gov>; Sojkowski, Bryan <Bryan_Sojkowski@fws.gov>
Subject: RE: [EXTERNAL] Lockwood 60% design follow up information

Will do,

Gregory Allen, P.E. (508) 829-6000 ext. 6409

From: Bentivoglio, Antonio [mailto:antonio bentivoglio@fws.gov]
Sent: Thursday, November 19, 2020 12:47 PM
To: Gregory Allen
Cc: Rosset, Julianne; Sojkowski, Bryan
Subject: Re: [EXTERNAL] Lockwood 60% design follow up information

Greg,

can you take me off this list but add Julianne Rosset. Thanks. Between Julianne and Bryan they will have it covered.

Cheers.

Antonio

From: Gregory Allen <<u>gallen@aldenlab.com</u>>

Sent: Thursday, November 19, 2020 10:13 AM

To: Mitchell, Gerry <<u>Gerry.Mitchell@brookfieldrenewable.com</u>>; Baker, Nathan

<<u>Nathan.Baker@brookfieldrenewable.com</u>>; Maloney, Kelly <<u>Kelly.Maloney@brookfieldrenewable.com</u>>; Pocquette, Kayla <<u>Kayla.Pocquette@brookfieldrenewable.com</u>>; Reny, Melissa <<u>Melissa.Reny@brookfieldrenewable.com</u>>; Brown, Adam <<u>Adam.Brown@brookfieldrenewable.com</u>>; Sojkowski, Bryan <<u>Bryan_Sojkowski@fws.gov</u>>; matt.buhyoff <matt.buhyoff@noaa.gov>; donald.dow@noaa.gov <donald.dow@noaa.gov>; Bentivoglio, Antonio

<a href="https://www.gov/sitestation.com/www.gov/sitestati

<Gail.Wippelhauser@maine.gov>: Paul Christman <Paul.Christman@maine.gov>: Dwavne.J.Seiders@maine.gov

<Dwayne.J.Seiders@maine.gov>; Seyfried, Jason <Jason.Seyfried@brookfieldrenewable.com>

Cc: Ben Mater <<u>bmater@aldenlab.com</u>>; Mark Graeser <<u>mgraeser@aldenlab.com</u>>; Amy Mengert <amengert@aldenlab.com>

Subject: [EXTERNAL] Lockwood 60% design follow up information

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

Good morning All,

As a follow up to our meeting last week for Lockwood and Weston I have attached hydraulic information for the Lockwood entrance conditions and a CFD analysis of the AWS flow conveyance to the floor diffuser. Note that the CFD was completed to aid in the design process to optimize the AWS intake screen, forebay geometry, AWS flow control gate and geometry leading to the floor diffuser.

Let me know if you have any questions regarding this information.

Also, please let us know if there are any additional comments regarding the 60% design submittals for Weston and Lockwood as we are moving ahead to develop the 90% design.

Thank you, Greg



Gregory Allen, P.E. Director, Environmental and Engineering Services ALDEN Solving flow problems since 1894 30 Shrewsbury St., Holden, MA 01520 (508) 829-6000 ext. 6409 gallen@aldenlab.com | www.aldenlab.com

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Gregory Allen

From:	Gregory Allen
Sent:	Thursday, February 04, 2021 7:21 PM
То:	'matt.buhyoff@noaa.gov'; 'donald.dow@noaa.gov'; 'gail.wippelhauser@maine.gov';
	'dwayne.j.seiders@maine.gov'; 'paul.christman@maine.gov';
	'bryan_sojkowski@fws.gov'; 'julianne_rosset@fws.gov'
Cc:	'Baker, Nathan'; 'Mitchell, Gerry'; 'Maloney, Kelly'; 'Pocquette, Kayla'; 'Brown, Adam';
	'Dill, Richard'; 'Seyfried, Jason'
Subject:	RE: Weston design drawings

Good evening,

Please see the link below to download the final design drawings for Weston. The file size is about 15 MBs. Let me know if anyone has trouble with the link. https://we.tl/t-fzhyOefyMq

Thank you and I'm looking forward to our meeting next week, Greg

Gregory Allen, P.E. (508) 829-6000 ext. 6409

From: Gregory Allen [mailto:gallen@aldenlab.com]

Sent: Wednesday, February 03, 2021 4:23 PM

To: 'matt.buhyoff@noaa.gov'; 'donald.dow@noaa.gov'; 'gail.wippelhauser@maine.gov'; 'dwayne.j.seiders@maine.gov'; 'paul.christman@maine.gov'; 'bryan_sojkowski@fws.gov'; 'julianne_rosset@fws.gov' Cc: 'Baker, Nathan'; 'Mitchell, Gerry'; 'Maloney, Kelly'; 'Pocquette, Kayla'; 'Brown, Adam'; 'Dill, Richard'; 'Seyfried, Jason' Subject: Lockwood design drawings

Good afternoon Everyone,

Please see the link below to download the final design drawings for Lockwood. The file size is about 30 MB and let me know if anyone has trouble accessing the file.

Lockwood design drawings: <u>https://we.tl/t-zfmyV2V4vZ</u>

Please review in preparation for our planned meeting next Tuesday, February 9. I will send a separate email for the Weston design drawings.

Thank you, Greg
Gregory Allen, P.E. Director, Environmental and Engineering Services ALDEN Solving flow problems since 1894 30 Shrewsbury St., Holden, MA 01520 (508) 829-6000 ext. 6409 gallen@aldenlab.com | www.aldenlab.com



Meeting Notes Lockwood and Weston Fish Passage Meeting Tuesday, February 9, 2021 9:00 AM – 11:00 AM

Attendees:

Gail Wippelhauser, (MEDMR) Kathy Howatt (MEDEP) Chris Sferra (MEDEP) Donald Dow (NOAA) Bryan Sojkowski, (USFWS) Julianne Rosett (USFWS) Corbin Hilling (USFWS) Kelly Maloney (Brookfield) Kayla Pocquette (Brookfield) Gerry Mitchell (Brookfield) Nathan Baker (Brookfield) Jason Seyfried (Brookfield) Richard Dill (Brookfield) Adam Brown (Brookfield) Gregory Allen (Alden) Amy Mengert (Alden) William Lewis (Alden) Jenna Rackovan (Alden)

A meeting was held with resource agencies for the Lockwood and Weston fish passage projects via webcast/ teleconference on February 9, 2021. The primary topic was to discuss the final design drawings for each project.

Lockwood Final Design Drawing Review

The final design drawings were transmitted to resource agencies for comment on February 3, 2021.

Greg Allen presented an overview of the drawings for the Lockwood fish passage facilities, specifically pointing out the changes since the 60% design.

Comments and Discussion:

• Don- complimented Alden on a good well done drawing package



- Sheet 8 the plan shows a different crest gate arrangement and the addition of a concrete flood wall between the shore and the fishway replacing the existing spillway in this area. Flood modeling showed an issue with allowing flood flows to pass between the fishway and shore. The flood wall prevents flood flows from this area and necessitates the need for more crest gate length (142 ft) for the project to pass flood flows. The fishway also now has a walkway with hand rails on both walls.
 - Gail- Do you need to build a new spillway in the pointed shape instead of across? Do you still leave the original spillway in place? Greg responded, no, the existing spillway will need to be removed entirely at the crest gate location.
- Bryan Sojkowski The Lowell vertical slot fish ladder at 180degree turn pool was found to lose a little over 20% of the herring, meaning they fell back. We need to be cautious on the 180 degree turn. The Brunswick vertical slot fish ladder installed a wooden training wall at the turning pool and a similar modification was installed for the Vernon ladder.
 - In between stub wall and center wall (where there is a dead area), would we need to block it off?
 - Lowell meets the FWS criteria (16 inch slot width at Lowell), however, FWS is finding more issues at turn pools causing delays at fish ladders which creates increase risk of fish falling back.
 - Bryan has no recommendations, just wanted to bring it up for discussion with the group.
 - Greg the design includes stop log slots at the mid-point of the 180 degree bend to provide a means to install flow modifications, if the turning pool is found to be an issue. Greg mentioned a CFD study of a vertical slot fishway in Canada investigating a 180 degree turning pool hydraulics. Greg will send that study to those that are interested.
 - Gail Whippelhauser asked if the Lowell fish ladder had similar data for shad or if it was just river herring? – Bryan responded that it was only data for river herring.
- Greg pointed out the height of the fish ladder walls (tall). There will be more shadows rather than direct sunlight within the ladder.
 - Don at what flows will allow the wall to over top?
 - Above the 50yr flood (Don was ok with that)
 - What point does the baffles over top?
 - Amy mentioned there is about 2 ft of freeboard above the top of the fish ladder baffles for the design high fish ladder flow condition.
- AWS Screen the screen is wedge wire with a clear opening of 0.25 inches
 - o The screen is flush and smooth



- Maintenance would require the channel be drained and the screens lifted with a jib crane for repairs or service.
- Don at Hydro Kennebec they don't have to close down the attraction water system. They pick up one screen and pressure wash it while the other one is in place
- Greg to clean the proposed AWS screen at Lockwood, the AWS flow to the floor diffuser would be shut down so that there is 100% sweeping flow along the AWS screen face to clean it.
- Gerry Mitchell Biggest debris issues would be late in the season with the oak leaves but he thinks it will be okay.
- Don what is the alternative if sweeping velocity is not enough to clean it off?
 - Greg cleaning systems such as air bursts, but should see it action before determining what issues may occur and what would be the best solutions
 - Don just be aware this could be an issue
- Bryan If you shut off flow and only have sweeping velocity, what would the velocity be?
 - In excess of 2 ft/s
- Bar rack for AWS channel (16 inch clear horizontal spacing and 3 ft 7 inch vertical)
 - o Bryan S. thinks this makes sense
 - Don that would allow any salmon to go through
- Bar rack for fish ladder (16 inch horizontal clear spacing and 2 ft 11 inch vertical)
 - Does Hydro Kennebec have multiple horizontal supports? They are pretty sure it does
- Grating at floor diffuser
 - Don asked about the spacing
 - Amy responded grating is 1 inch by 4 inches.
 - o Don worried about Alewives getting their noses into it
 - Could always change if it is an issue
- Walkways
 - Bryan- What type of access into the fishway?
 - Need ladders
 - Don- Would need to go through tie off procedures
- Bryan asked Don if he was worried about salmon going through the bar rack with 16 inch clear horizontal and ~ 3 ft vertical spacing.
 - Salmon will go through it
 - o Shad may be hesitant
 - Don we can always make adjustments
- Bryan what is proposed for post construction studies? Will it include all species?



- Gail will include all species since it will be a permanent upstream fish passage per 1998 Settlement Agreement.
- Kelley Maloney yes, but some species may be easier than others. We have to wait until we have a certain number of salmon through before we can study them.
- Only video counts (if we decide to add them), no actual counts since it is a volitional passage
 - Will know based on counts further upstream (HK) but there are no counting facilities there either
- o Julianne Rosset Are there no counts on the system currently
 - Kelly responded that there is a trap and truck facility at Lockwood currently (only place to get counts)

Weston Final Design Drawing Review

The final design drawings were transmitted to resource agencies for comment on February 4, 2021.

Greg Allen presented an overview of the drawings for the Weston fish passage facilities, specifically pointing out the changes since the 60% design.

Comments and Discussion

- Don still has two concerns
 - the distance between entrance gate and hopper (wish there was more space)
 - the discharge pipe not happy with everything the fish have to go through to get out
 - however, he does not have a better solution
 - Greg the exit pipe layout has changed since the 60% design drawings. It used to run parallel to the electrical enclosure and then made (2) 90 degree turns. We removed those bends and made it straight which is better hydraulically and better for the fish.
- Bryan What will access to the entrance channel be?
 - o Stairs down to platform closer to the hinged entrance gate
- Bryan The hopper will releases flow. Is there a supplemental water source as well, if necessary?
 - Yes, from a 600 gal tank above exit transition flume this will help to flush out any stragglers within the exit pipe.



- o Is there a certain amount of free board?
 - The conditions in the pipe vary as the hopper and supplemental tank drain.
- Will the supplemental tank be automated? Could be a potential mode of failure, so is there a plan B to flush if the tank fails?
 - The tank is automated and timed with the fish lift cycle
 - It's designed similar to the Scotland fish lift setup, in Connecticut
 - During startup via trial and error the timing of the supplemental tank discharge was determined
 - Consider how to supply water manually if there is a failure
 - Richard Dill the controls could be set up to cause an alarm if there is no water in the tank and it would be good idea to have a manual water supply
 - Make sure there is an alarm set up for when a lift cycle is missed or when there is not water in the supplemental tank

Schedule

- Shawmut have Army Corp permit and ready to go but depends on the outcome of relicensing
 - 2024 is a good guess if they get there license in 2022
- Lockwood and Weston supposed to be built by May 2022
 - Initiate construction by May 2021
 - Greg can send Issued for Construction drawings to Bryan and Don. These IFC drawings would be completed once a contractor has been selected and any changes necessitated from the bid phase are incorporated.
 - Don will look through everything again and send any final comments by the end of the month

APPENDIX B

UPSTREAM FISH LIFT DESIGN DRAWINGS

WESTON FISH LIFT PASSAGE DESIGN



PREPARED FOR

BROOKFIELD WHITE PINE HYDRO, LLC

PREPARED BY





ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com DATE: 1/7/2021	M. GRAESER REVISED BY	VERIFY SCAL DAR IS ONE INCH ON DRIEDNUNG F NOT ONE INCH ON TH SHET, ADJUST SCALE ACCORDINGLY	WESTON FISH LIFT PASSAGE DES BROOKFIELD WHITE PINE HYDRO,
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LOCATION MAP SCALE: NTS

SIGN COVER MAP, LOCATION MAPS, AND VICINITY MAPS COVER MAP, LOCATION MAPS, AND VICINITY MAPS COVER MAP, LOCATION MAPS, AND DESIGNER: M. GRAESER APPROVED BY: M. GRAESER SHEET: 1 OF 15 DRAWING: G-001

		DRAWING LIST
SHEET	DRAWING	DESCRIPTION
GENERAL		
1	G-001	COVER MAP, LOCATION MAPS, AND VICINITY MAPS
2	G-002	DRAWING LIST
3	G-003	GENERAL NOTES AND ABBREVIATIONS
4	G-004	EXISTING CONDITIONS OVERALL SITE PLAN
5	G-005	SITE ACCESS, CONSTRUCTION LIMITS, AND SURVEY CONTROL
6	G-006	STAGING AREAS, EROSION CONTROL, & DEWATERING PLAN
7	G-007	EROSION CONTROL & DEWATERING DETAILS
CIVIL		
8	C-100	OVERALL SITE PLAN
9	C-101	DEMOLITION & ROCK EXCAVATION PLAN
10	C-102	DEMOLITION SECTIONS
11	C-103	ROCK EXCAVATION SECTIONS
12	C-104	AWS INTAKE AND FISH LIFT GENERAL ARRANGEMENT PLAN
13	C-105	FISH LIFT GENERAL ARRANGEMENT SECTION
14	C-106	AWS INTAKE GENERAL ARRANGEMENT SECTION
15	C-107	PIPING PLAN AND PROFILE

REFERENCE DRAWINGS:

REFERENCE DRAWING 160-0103 160-0105 160-0106

160-0190 160-0439 160-0504 NORTH CHANNEL DAM ELEVATIONS AND SECTIONS SOUTH CHANNEL STRUCTURES - ELEV SECTIONS POWERHOUSE AND INTAKE PLAN AND SECTIONS

DRAWING NAME

TRASH RAKE & TRASH DISPOSAL SYSTEM PRELIMINARY LAYOUT PRELIMINARY PLAN OF POWER STATION & DAM FALL PROTECTION PLAN & DETAILS



ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	PERMITTING SET NOT FOR CONSTRUCTION DATE: 1/7/2021	1/7/2021 REVISION	PERMITTING SET DESCRIPTION OF ISSUE / REVISION	M. GRAESER REVISED BY		VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY		WESTON FISH LIFT PASSAG	.GE I HYD
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PROJECT: 3173WESTFISH
DRAWN BY: M. ATWELL
DESIGNER: M. GRAESER
APPROVED BY: M. GRAESER
SHEET: 2 OF 15
DRAWING: G-002
DRAWN BY: M. ATV DESIGNER: M. GRAE APPROVED BY: M. GRAE SHEET: 2 OF 1 DRAWING: G-0

GENERAL NOTES:

- 1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR ACCURATE. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING THE WORK. SHOULD THE CONTRACTOR IDENTIFY ANY UTILITIES, STRUCTURES OR FEATURES NOT SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY
- 2. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE UTILITY OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES. ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE
- 3. REMOVE, REPLACE OR RELOCATE ALL OVERHEAD INTERFERENCE WHICH MAY AFFECT OPERATION DURING CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD. OR UNDERGROUND POWER, GAS OR OTHER UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.
- 4. COORDINATE UNDERGROUND UTILITY MARKING WITH THE EXISTING UTILITIES BY CONTACTING DIGSAFE AT 1-888-344-7233 OR 811. DIGSAFE MUST BE CONTACTED A MINIMUM OF 72 HOURS PRIOR TO CONSTRUCTION OR GROUND DISTURBANCE.
- 5. THE CONTRACTOR SHALL REVIEW THE SITE TO DETERMINE EXISTING CONDITIONS. ANYTHING NOT SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA, UNLESS RECOMMENDED BY THE ENGINEER AND APPROVED BY THE OWNER
- 6. CONTACT THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS ARISING DURING THE CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.
- 7. PRESERVE ALL SURVEY MARKERS AND MONUMENTATION WHEREVER POSSIBLE. THOSE REQUIRING REMOVAL SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE LOCAL, STATE, OR FEDERAL GOVERNING AUTHORITY.
- 8. ALL DRAWINGS AND DETAILS INCLUDED IN THE CONTRACT DOCUMENTS SHALL FULLY APPLY TO THE WORK WHETHER SPECIFICALLY REFERENCED OR NOT
- 9. LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY, EASEMENTS, AND DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES OUTSIDE THE DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.
- 10.RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REFER TO RECLAMATION OF DISTURBED AREAS IN SPECIFICATIONS.
- 11. THE CONTRACTOR SHALL REPLACE ALL ROADS, STABILIZED EARTH, FENCES, AND DRIVEWAYS, ETC., WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION
- 12. SHORING REQUIRED FOR THE STABILITY OF THE UNCOMPLETED STRUCTURE OR FOR INSTALLATION OR MODIFICATION OF STRUCTURAL MEMBERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY
- 13. DIMENSIONS OF VALVES, FITTINGS AND OTHER EQUIPMENT MAY VARY DEPENDING UPON MANUFACTURER. CONTRACTOR SHALL REVIEW SHOP DRAWINGS BEFORE SETTING BASES, SUPPORTS, ETC.

14. EXISTING FENCING DISTURBED OR REMOVED SHALL BE REPLACED IN-KIND.

- 15.IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A SECURE PROJECT SITE. BROOKFIELD WHITE PINE HYDRO, LLC. WILL NOT BE RESPONSIBLE FOR STOLEN OR VANDALIZED PROPERTY.
- 16. AT THE CLOSE OF EACH WORKING SHIFT, WHERE THE NEXT SHIFT WILL NOT IMMEDIATELY FOLLOW, PROTECT AND SECURE OPEN EXCAVATION.

17. VERTICAL DATUM IS BASED ON NGVD29.

18. UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED AREAS SHALL BE STABILIZED WITH A SEED MIX CONTAINING ONLY PLANT SPECIES NATIVE TO NEW ENGLAND. THE INTRODUCTION OR SPREAD OF INVASIVE PLANT SPECIES IN DISTURBED AREAS SHALL BE CONTROLLED. IN AREAS OF AUTHORIZED TEMPORARY DISTURBANCE, IF TREES ARE CUT THEY SHALL BE CUT AT GROUND LEVEL AND NOT UPROOTED IN ORDER TO PREVENT DISRUPTION TO THE SOIL STRUCTURE AND TO ALLOW STUMP SPROUTS TO REVEGETATE THE WORK AREA. UNLESS OTHERWISE AUTHORIZED, AREAS WHERE PERMANENT DISTURBANCE IS NOT AUTHORIZED SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND ELEVATION, WHICH UNDER NO CIRCUMSTANCE SHALL BE HIGHER THAN THE PRE-CONSTRUCTION ELEVATION. ORIGINAL CONDITIONS MEANS CAREFUL PROTECTION AND/OR REMOVAL OF EXISTING SOIL AND VEGETATION, AND REPLACEMENT BACK TO THE ORIGINAL LOCATIONS SUCH THAT THE ORIGINAL SOIL LAYERING AND VEGETATION SCHEMES ARE APPROXIMATELY THE SAME, UNLESS OTHERWISE AUTHORIZED.



ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST. HOLDEN. MA 01520	P
30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	N

FISH PASSAGE NOTES: 1. POWERHOUSE

6075 CFS CAPACITY

2. RIVER FLOW

DESIGN LOW AVERAGE DESIGN HIGH 10 YEAR 50 YEAR 100 YEAR	2500 CFS (95% EXCEEDANCE) 6100 CFS (50% EXCEEDANCE) 20300 CFS (5% EXCEEDANCE) 86,700 CFS 124,800 CFS 142 400 CFS
100 YEAR	142,400 CFS

3. WATER LEVELS

HEAD POND ELEV	ATIONS
DESIGN LOW	155.5 FT
NORMAL	156 FT
DESIGN HIGH	156.5 FT
10 YEAR	159 FT
50 YEAR	165 FT
100 YEAR	169.5 FT

TAILWATER ELEVATIONS DESIGN LOW 121.3 FT (95% EXCEEDANCE) NORMAI 123 0 FT 129 FT (5% EXCEEDANCE) DESIGN HIGH 10 YEAR 139 FT 50 YEAR 144.5 FT **100 YEAR** 147.6 FT

4. TARGET SPECIES AND FISHWAY DESIGN POPULATIONS (NOAA DESIGN MEMORANDUM 2016)

ATLANTIC SALMON:	11,300
AMERICAN SHAD:	106,000
ALEWIVES:	51,000
BLUEBACK HERRING	922,000

5. FISH PASSAGE FACILITIES WILL BE OPERATIONAL FROM MAY 1ST TO OCT 31ST

6. FISHWAY ENTRANCE

6 INCH HEAD DROP HINGED FLAP GATE TO MAINTAIN TARGET HEAD DROP AND VELOCITY INVERT FL 115 FT 10 FT ENTRANCE WIDTH

7. FISHWAY ATTRACTION WATER SYSTEM

OTAL ATTRACTION FLOW	304 CFS (5% STATION CAPACITY)
SH LIFT ENTRNACE	UP TO 220 CFS
WS AUXILIARY SPILLWAY	UP TO 300 CFS
WS INTAKE SCREEN WEDGE WIRE	0.25 INCH SLOT WIDTH

8. FISH LIFT DESIGN FEATURES

Α

FISH LIFT CYCLE TIME 15 MIN TWO SIDED BRAIL, 9.5 DEGREE SLOPE, SMOOTH ALUMINUM W/ 50% POROSITY HOPPER VOLUME 490 CUFT ADJUSTABLE V-TRAP OPENING BETWEEN 1 AND 3 FT EXIT FLUME 20 INCH SMOOTH FIBERGLASS PIPE, 5% SLOPE

PERMITTING SET				VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING	VERIFY SCALE BAR IS ONE INCH ON DRIGINAL DRAWING	WESTON FISH LIFT PASSAGE DESIGN	GENERAL NOTES AND ABBREVIATIONS
DATE: 1///2021	1/7/2021	PERMITTING SET	M. GRAESER	IF NOT ONE INCH ON THE SHEET, ADJUST SCALES ACCORDINGLY		BROOKI IEED WHITE I INE ITT DRO, EEC	
	REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY				

LEDEND & SYMBOLS

------------------ APPROXIMATE PROPERTY LINE EASEMENT LINE – NHW– NORMAL HIGH WATER LINE ------ 100 FP ------- 100 YEAR FLOOD PLAIN ORDINARY HIGH WATER TURBIDITY CURTAIN COFFERDAM / BULKHEAD / DEWATERING STRUCTURE CONSTRUCTION LIMITS



FLOW

UNDISTURBED SOIL

FLOW FILL

CONCRETE

GRATING

BEDROCK

CONCRETE DEMOLITION

EXCAVATE BEDROCK

GRAVEL

DRAWING:		G	-003
SHEET:	3	OF	15
APPROVED E	3Y:	M. G	RAESER
DESIGNER:		M. G	RAESER
DRAWN BY:		М.	ATWELL
PROJECT:	31	173WI	ESTFISH



		PROJECT:	3173W	ESTFISH
ESIGN		DRAWN BY:	М.	ATWELL
		DESIGNER:	M. G	RAESER
	EXISTING CONDITIONS OVERALL SITE	APPROVED	BY: M. G	RAESER
	PLAN [SHEET:	4 OF	15
O, LLC	, LLC			
		DRAWING:	G	6-004



NOTES:

- 1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
- 2. COFFERDAMS AND WET ROADS DEPICTED ON THIS DRAWING ARE NOT MANDATED BY THE OWNER. COFFERDAMS AND WET ROADS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE AREAS, LOCATIONS, AND VOLUMES DEPICTED ARE FOR PERMITTING PURPOSES. IF THE CONTRACTOR REQUIRES COFFERDAMS AND WET ROADS NOT DEPICTED ON THIS DRAWING, THE OWNER MAY NEED TO APPLY FOR OR AMEND APPLICABLE PERMITS BEFORE WORK CAN BE STARTED.

LEGEND:

—— онш ——	ORDINARY HIGH WATER
— тс— тс—	TURBIDITY CURTAIN
	COFFERDAM/BULKHEAD/DEWATERING STRUCTURE
$\sim\sim\sim$	TREE LINE
<u> </u>	PROPERTY LINES
	EASEMENT LINES
	CONSTRUCTION LIMITS

SURVEY CONTROL TABLE				
POINT #	DESCRIPTION	ELEVATION	NORTHING	EASTING
1	BRASS DISK LABEL "SURVEY MARKER CMP CO."	169.56	703978.28	3069095.21
2	BRASS DISK LABEL "W111"	164.88	703741.08	3069410.64
2	BIAGO DIOR EADEL WITH	104.00	700741.00	0000410.04

		PROJECT:	3173WB	STFISH
		DRAWN BY:	М.	ATWELL
ESIGN		DESIGNER:	M. G	RAESER
	SITE ACCESS, CONSTRUCTION LIMITS, F	APPROVED	BY: M. GI	RAESER
	AND SURVEY CONTROL	SHEET:	5 OF	15
O, LLC				
		DRAWING:	G	-005



NOTES:

- 1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
- 2. SEE DRAWING G-007 FOR TYPICAL EROSION CONTROL AND DEWATERING DETAILS.
- 3. COFFERDAMS AND WET ROADS DEPICTED ON THIS DRAWING ARE NOT MANDATED BY THE OWNER. COFFERDAMS AND WET ROADS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE AREAS, LOCATIONS, AND VOLUMES DEPICTED ARE FOR PERMITTING PURPOSES. IF THE CONTRACTOR REQUIRES COFFERDAMS AND WET ROADS NOT DEPICTED ON THIS DRAWING, THE OWNER MAY NEED TO APPLY FOR OR AMEND APPLICABLE PERMITS BEFORE WORK CAN BE STARTED.
- 4. UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED AREAS SHALL BE STABILIZED WITH A SEED MIX CONTAINING ONLY PLANT SPECIES NATIVE TO NEW ENGLAND. THE INTRODUCTION OR SPREAD OF INVASIVE PLANT SPECIES IN DISTURBED AREAS SHALL BE CONTROLLED. IN AREAS OF AUTHORIZED TEMPORARY DISTURBANCE, IF TREES ARE CUT THEY SHALL BE CUT AT GROUND LEVEL AND NOT UPROOTED IN ORDER TO PREVENT DISRUPTION TO THE SOIL STRUCTURE AND TO ALLOW STUMP SPROUTS TO REVEGETATE THE WORK AREA, UNLESS OTHERWISE AUTHORIZED SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND ELEVATION, WHICH UNDER NO CIRCUMSTANCE SHALL BE HIGHER THAN THE PRE-CONSTRUCTION ELEVATION. ORIGINAL CONDITIONS MEANS CAREFUL PROTECTION AND/OR REMOVAL OF EXISTING SOIL AND VEGETATION, AND REPLACEMENT BACK TO THE ORIGINAL LOCATIONS SUCH THAT THE ORIGINAL SOL LAYERING AND VEGETATION SCHEMES ARE APPROXIMATELY THE SAME, UNLESS OTHERWISE AUTHORIZED.
- 5. QUANTITIES ARE ONLY PROVIDED FOR PERMITTING PURPOSES.

LEGEND:

	- SILT FENCE
—— онw ——	ORDINARY HIGH WATER
— тс— тс—	- TURBIDITY CURTAIN
	- COFFERDAM/BULKHEAD/DEWATERING STRUCTURE
NHW	- NORMAL HIGH WATER LINE
$\sim \sim \sim$	TREE LINE
<u> </u>	PROPERTY LINES
	EASEMENT LINES

QUANTITIES (NOTES 3 AND 5)			
ITEM	UNIT	QUANTITY	
TEMPORARY DEWATERED AREA TRAILRACE	SF	52,820	
COFFERDAM LENGTH TRAILRACE	LF	480	
TEMPORARY FILL FOR COFFERDAM TRAILRACE	CY	4,910	
ACCESS ROAD AREA	SF	11,100	
ACCESS ROAD VOLUME	CY	830	
TEMPORARY DEWATERED AREA HEADPOND	SF	870	
COFFERDAM LENGTH HEADPOND	LF	90	
TEMPORARY FILL FOR COFFERDAM HEADPOND	CY	760	

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DATE: 1/7/2021

/7/2021

REVISION

PERMITTING SET

DESCRIPTION OF ISSUE / REVISION

BROOKFIELD WHITE PINE HYDRO

NOT ONE INCH ON T

M. GRAESER

SOIL EROSION & SEDIMENT CONTROL NOTES:

- 1. SEDIMENTATION/SETTLING BASIN: SEDIMENT LADEN WATER SHALL NOT BE RELEASED INTO ANY WATERWAY. CONTRACTOR SHALL PROVIDE APPROPRIATE SIZED SEDIMENTATION BASIN, WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES FOR ALL DEWATERING OR WATER DIVERSION ACTIVITIES.
- 2. SILT FENCE: IF NEEDED TO CONTROL WATER CONTAMINATION. PROVIDE SILT FENCE CONFORMING TO THE FOLOWING:
 - EQUIVALENT OPENING SIZE OF A US STANDARD SIEVE SIZED 40 (MAX), 70 (MIN).
 - MULLEN BURST STRENGTH 200 PSI.
 - GRAB STRENGTH 120 LBS MIN.
 - SPUN-BONDED NYLON FABRIC REINFORCED WITH
 POLYESTER NETTING, OR POLYPROPYLENE FABRIC WITH 2"
 x 4" 12 GA WOVEN WIRE BACKING FENCE.
- SEDIMENTATION/SETTLING BASINS OR WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES ON SHORE SHALL HAVE A VEGETATIVE BUFFER FOR THE DISCHARGE. BASINS NEED TO BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF THE WAY OF LAYDOWN AND CONSTRUCTION ACTIVITIES.

		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
SIGN		DESIGNER:	M. GRAESER
	ERUSION CONTROL & DEWATERING	APPROVED	BY: M. GRAESER
	DETAILS	SHEET:	7 OF 15
, LLC			
		DRAWING:	G-007



—— онш ——	ORDINARY HIGH WATER
тстс	TURBIDITY CURTAIN
	COFFERDAM/BULKHEAD/DEWATERING STRUCTURE

QUANTITIES (NOTE 2)			
ITEM	UNIT	QUANTITY	
CONCRETE AREA HEADPOND	SF	200	
CONCRETE VOLUME HEADPOND	CY	90	
CONCRETE AREA TRAILRACE	SF	3,220	
CONCRETE VOLUME TRAILRACE	CY	2,230	



NOTE:

- 1. EXCAVATION LIMITS SHOWN ARE APPROXIMATE. ACTUAL EXCAVATION LIMITS WILL VARY BASED ON CONTRACTOR'S COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.
- 2. COFFERDAMS AND WET ROADS DEPICTED ON THIS DRAWING ARE NOT MANDATED BY THE OWNER. COFFERDAMS AND WET ROADS ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE AREAS, LOCATIONS, AND VOLUMES DEPICTED ARE FOR PERMITTING PURPOSES. IF THE CONTRACTOR REQUIRED COFFERDAMS AND WET ROADS NOT DEPICTED ON THIS DRAWING, THE OWNER MAY NEED TO APPLY FOR OR AMEND APPLICABLE PERMITS BEFORE WORK CAN BE STARTED.
- 3. QUANTITIES ARE ONLY PROVIDED FOR PERMITTING PURPOSES.

LEGEND:

	CONCRETE DEMOLITION
	EXCAVATE BEDROCK (SEE PLAN FOR ELEVATION)
	APPROX OUTLINE OF NEW STRUCTURES
— онш ——	ORDINARY HIGH WATER
—— тс——	TURBIDITY CURTAIN
	COFFERDAM/BULKHEAD/DEWATERING STRUCTURE

QUANTITIES (NOTES 2 AND 3)			
ITEM	UNIT	QUANTITY	
BEDROCK EXCAVATION AREA	SF	2,740	
BEDROCK EXCAVATION VOLUME	CY	800	
CONCRETE DEMOLITION AREA	SF	360	
CONCRETE DEMOLITION VOLUME	CY	170	

	EXISTING SOUTH CHANNEL DAM	
ESIGN O, LLC	DEMOLITION & ROCK EXCAVATION PLAN	PROJECT: 3173WESTFISH DRAWN BY: M. ATWELL DESIGNER: M. GRAESER APPROVED BY: M. GRAESER SHEET: 9 OF 15 DRAWING: C-101





ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldeniab.com	PERMITTING SET NOT FOR CONSTRUCTION DATE: 1/7/2021	1/7/2021 REVISION	PERMITTING SET DESCRIPTION OF ISSUE / REVISION	M. GRAESER REVISED BY	VERIFY SC BAR IS DUE ING ORIGINAL DUA IF NOT ONE INCO SHEET, AN UNC SHEET, AN UNC SHEET, AN UNC	NE NG THIS LES	WESTON FISH LIFT PASSAGE DESIGN BROOKFIELD WHITE PINE HYDRO, LLC	DEMOLITION SECTION	PROJECT: 3 DRAWN BY: DESIGNER: APPROVED BY SHEET: 10 DRAWING:	3173W M. (BY: M. (0 OF	ESTFIS ATWEI RAESE RAESE 15 C-10	H L R
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EXCAVATION NOTE:

 SLOPES SHOWN ARE APPROXIMATE. ACTUAL SLOPES WILL VARY BASED ON CONTRACTORS COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.

LEGEND:

CONCRETE DEMOLITION



EXCAVATION NOTE:

ESIGN	ROCK EXCAVATION SECTIONS	PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
		DESIGNER:	M. GRAESER
		APPROVED I	BY: M. GRAESER
		SHEET:	11 OF 15
O, LLO			
		DRAWING:	C-103



	/	LEGEND:		
		OHW	- ORDINARY HIGH W	ATER
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				PROJECT: 3173WESTFISH DRAWN BY: M. ATWELL
IGN	AWS I	NTAKE AND FI	SH LIFT	DESIGNER: M. GRAESER APPROVED BY: M. GRAESER
LLC	GENERA	L ARRANGEM	ENT PLAN	SHEET: 12 OF 15
				DRAWING: C-104



	FISH LIFT GENERAL ARRANGEMENT SECTION	PROJECT:	3173WE	STFISH
ESIGN		DRAWN BY:	M. A	TWELL
		DESIGNER:	M. GR	AESER
		APPROVED	BY: M. GR	AESER
		SHEET:	13 OF	15
		DRAWING:	C-	105

EL 133.0' HINGED ENTRANCE GATE

MAX GATE HEIGHT EL 125.1' NORMAL WSL EL 123.0'

EL 147.5' EL 145.0'

EL 115.0' EL 113.5'

ISOLATION GATE RAISED





APPENDIX C

FISH LIFT OPERATIONS AND MAINTENANCE PLAN

WESTON HYDROELECTRIC PROJECT

FERC NO. 2325-ME

FISH PASSAGE OPERATIONS & MAINTENANCE PLAN

Version 1.0

March 2021

Operated by:

Brookfield White Pine Hydro, LLC

An indirect subsidiary of

Brookfield Renewable Energy Group

Skowhegan, ME

WESTON FISH PASSAGE OPERATIONS & MAINTENANCE PLAN

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Weston Fish Passage Operations & Maintenance Plan

1.0 - INTRODUCTION

This Fish Passage Operations and Maintenance Plan (the "Plan" or "O&M Plan") is intended to define how Brookfield White Pine Hydro will operate and maintain the fish passage facilities at the Weston Project FERC No. 2325 (the "Project"). This Plan is part of Brookfield's commitment to our environmental principles that are based on the fundamental values of accountability, partnership and open communication. As such, we have accepted the responsibility entrusted to us to manage natural resources in ways to ensure sustainable development.

The Plan will define what fish passage facilities (the "Facilities") are to be constructed at the Weston Project, the period in which the existing and new facilities are to be operated, guidance on the annual start-up and shut-down procedures, routine operating guidelines, debris management, and safety rules and procedures that are in place. Along with these defined procedures and guidelines, the Plan includes the necessary supporting information such as contact information, daily inspection forms, drawings, and spare parts on-site.

2.0 - BACKGROUND

The Weston Project is located at river mile 83.5 (approximately 38 miles above head-of-tide in Augusta) in the Town of Skowhegan and is the fourth dam on the main stem of the Kennebec River. The Weston Project includes a 930-acre impoundment, two dams, and one powerhouse. The normal full pond elevation is 156.0 ft at mean sea level (ft msl). The Project impoundment extends 12.5 miles upstream. The two dams are constructed on the south and north channels of the Kennebec River where the river is divided by Weston Island. A footbridge crosses the Kennebec River about 550 ft downstream from the powerhouse.

The South Channel dam is a concrete gravity and buttress dam 51 ft high with a crest elevation of 156.0 ft. The dam extends about 391.5 ft between abutment walls from the island to the south riverbank and consists of five sections: a 125 ft long powerhouse/intake section, a 33 ft long concrete spillway section, an 18 ft long sluice section, a 188 ft long stanchion section, and a 21.5 ft long concrete non-overflow section. The northern abutment of the south dam consists of a 3 ft wide concrete retaining wall that extends upstream and forms the forebay wall.

The powerhouse/intake section of the dam, located adjacent to the north abutment and integral to the project dam, includes the headworks and four intake bays that lead to the turbines. Each bay houses three reinforced concrete gates that control flow to the individual

turbines. The gates are operated by a track-mounted hoist that travels the length of the intake from a concrete deck at elevation 166.0 ft msl. The 4.0 inch clear spacing trash-racks, which are situated in front of the gate slots, are cleaned using a motor-operated trash rake from a concrete deck at elevation 159.0 ft msl. The 1920 concrete and steel powerhouse contains four vertical Francis units having a total installed capacity of 14.2 MW and combined flow of approximately 6,000 cfs. The concrete spillway adjacent to unit 4 has a permanent crest elevation of 154.0 ft msl and is topped by 2 ft high stop-logs.

The existing surface sluice gate and flume (formerly for logs) and presently used for downstream fish passage has a permanent top elevation of 142.0 ft msl. This gate is located adjacent to Unit 4 and is 18 ft wide by 14 ft high. This gate discharges to a newly resurfaced concrete flume which extends 69.5 ft downstream to the tailrace. The downstream bypass facility consists of a 300-foot-long floating guidance boom with ten-foot-deep sections of 5/16 inch metal punch plate screens suspended under the boom. The boom and associated screens lead to the existing log sluice gate and associated concrete flume that discharges to a deep pool in the river.

The stanchion section has five stanchion bays, with four bays set on sills at elevation 143.0 ft msl and one bay set at sill elevation 145.0 ft msl. The concrete gravity non-overflow section abuts a concrete retaining wall (south abutment) that extends upstream to the U.S. Route 2 Bridge. The non-overflow section has a top elevation of 166.0 ft msl. The project's tailrace is excavated riverbed located between the north and south river channels. The normal tailwater elevation of the station is 122.5 ft msl.

The North Channel dam is a concrete gravity and buttress dam approximately 38 ft high having a crest elevation of 156.0 ft msl. The dam extends about 529.5 ft from the north bank of the Kennebec River to Weston Island, forming a broad V-shaped structure following the high ledge of a natural falls, and consists of four sections: a 22.5 ft long concrete non-overflow section, a 244 ft long stanchion section, a 160.5 ft long pneumatic gate section, and a 93 ft long gated section (located next to the island). The concrete non-overflow section of the dam has a top elevation of 167.0 ft msl and extends from the north retaining wall that functions as the north abutment for the North Channel dam. The stanchion section has five 10.5 ft high stanchion bays set on sills at elevation 145.5 ft msl separated by 3 and 4 ft wide concrete piers. The pneumatic Obermeyer gates are in two sections with lengths of about 81.7 ft and 78.8 ft. The section has a permanent crest at elevation 149.0 ft msl and 7.5 ft high steel panels, which allow for a 6 inches of freeboard. The gated section of the North Channel dam includes a concrete pier and two steel Tainter gates, each 28 ft wide by 16 ft high, with sills at elevation 140.0 ft msl.

A concrete retaining wall and earth fill with a concrete core wall comprise the southern abutment of the North Channel dam.

The Project operates in a run-of-river mode to maintain the impoundment water surface elevation within one foot of the normal full pond elevation of 156.0 ft msl, during normal operations. A minimum flow requirement in the existing license requires the project provide an instantaneous minimum flow of 1,947 cfs or inflow, whichever is less, as measured in the project tailrace immediately downstream of Weston dam.

3.0 - DESCRIPTION OF FISH PASSAGE FACILITIES

3.1 - UPSTREAM FISH PASSAGE

The new upstream fish passage facility, to be constructed and operational by 2022, consists of a fish lift with an integrated attraction water intake and spillway placed downstream of the non-overflow portion of the dam between the surface sluice gate and powerhouse.

The lower portion of the fish lift structure will consist of an 83 ft long by 19 ft wide by 30 ft tall concrete and steel entrance flume. A 10 ft wide entrance widens to a 14 ft channel leading to a fish blocking screen and lifting hopper. The entrance flume will include a pivoting entrance gate to maintain constant entrance velocity and head drop, a set of v-trap gates, an approximately 14 ft by 8 ft traveling hopper, a baffle wall, orifice panel and a weir. Set upon the entrance flume will be an approximately 50 ft long by 15 ft wide by 54 ft tall structural steel tower within which the hopper will travel to the upper level; the open steel tower will also contain an access stairway. At the upper level will be an exit flume (20-inch diameter pipe), a 600-gallon supplemental water storage tank, and steel grating access platform.

An approximately 111 ft long by 7.5 to 12 to 10 ft varying width spillway will be constructed into the non-overflow portion of the dam which extends to discharge adjacent to the fish lift entrance flume. At the upstream edge of the spillway a beveled broad crested weir will open into the headpond. Internally, the spillway channel will include a 32 ft long by 12 ft wide wedge wire intake screen floor which will convey water from the spillway channel to the energy dissipation pool located just upstream of the fish lift hopper and will provide the attraction flow to the entrance flume of the fish lift.

The attraction water intake and spillway are designed to convey 304 cfs of flow from the head pond; of this up to 220 cfs will be diverted through the wedge wire intake screen to the energy dissipation pool and then to the fish lift entrance flume. Up to 300 cfs will be bypassed and spilled adjacent to the fish lift entrance. The exact flow split will be determined during the commissioning of the fish lift.

Upstream Fish Lift Operations

The proposed fish lift will be operational from May 1st to October 31st, annually. The fish lift has a design operating range between 2,500 cfs and 20,300 cfs river flow and will maintain a flow of 1.0-1.5 ft/sec through the hopper and 4-6 ft/sec at the fishway entrance. The facility has been designed in consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, the Maine Department of Inland Fisheries and Wildlife and is designed to pass Atlantic salmon (population size 11,300), American shad (population size 106,000), alewives (population size 51,000), and blueback herring (population size 922,000).

3.2 - DOWNSTREAM FISH PASSAGE

Downstream passage at Weston is currently provided through a surface sluice gate. The sluice is located between the South dam spillway and the power house. It is 18 ft wide by 14 ft deep and flow controlled by the tainter gate. Fish are guided to the sluice by a guidance boom in the forbay.

Currently, the sluice and Tainter gate are operated for Atlantic salmon smolt and kelt downstream passage from April 1 through June 15 and from November 1 through December 31, as river flow and ice conditions allow.

The new upstream fish passage facility will also provide additional downstream passage opportunity via the spillway channel auxiliary attraction water system (AWS). AWS flow in excess of the flow required for the fish lift operation will be discharged (along with any downstream migrating fish passing through the system) to the tailrace adjacent to the fish lift entrance.

4.0 - OPERATION AND MAINTENANCE OF FISH PASSAGE FACILITIES

4.1 - UPSTREAM FISH PASSAGE – OPERATIONS & MAINTENANCE

The upstream fish lift facilities will be operated and maintained by Brookfield. To maximize attraction to the upstream passage facility, the unit closest to the fish lift entrance (Unit 4) is operated first-on and last-off, followed consecutively by Units 3 through 1. In the future, unit prioritization for upstream fish passage may be adjusted based on the results of fish passage studies, and in consultation with the resource agencies.

Brookfield personnel shall visit the fishway several times each day to ensure:

- 1. there is no debris clogging throughout the fish lift facility,
- 2. there is adequate velocity (1 to 1.5 ft/sec) through the hopper,
- 3. adequate velocity (4-6 ft/sec) at the fishway entrance and,

4. a 6 to 9 inch head drop from inside the entrance to the tailwater. The head drop at entrance gate is automatically adjusted via a programmable logic controller (PLC) which tracks the tailrace elevation and associated operator interface terminal (OIT) touch screen.

Proper operation of all the fishway water systems and maintenance of appropriate water velocities will be calculated via staff gauges and/or transducers, flow curves and AWS flow control gate setting. Cleaning of the AWS will be determined based on visual inspection. Brookfield personnel will confirm that the velocities through the fish lift, the attraction flow distribution upstream and downstream of the hopper, and that the entrance flow conditions are set in accordance with agency instructions applicable at the time. All fish passage operational information will be recorded in daily fishway logs and entered into an electronic database such that a weekly update can be provided to the agencies.

The fish lift shall be dewatered annually for a mid-year inspection and maintenance. Typically, August is a good time for this effort as river temperatures often exceed the threshold for handling salmon. Flow will be reduced and fish within the fishway will be safely removed before stopping flow completely in order to prevent stranding. Routine annual maintenance shall include dewatering the fishway, removing accumulated debris from within the fishway as necessary (vacuum truck may be needed) and inspection of the integrity of the fishway. Any fishway components that are found to be damaged shall be replaced, in kind. All mechanical and electrical systems shall be inspected, serviced and maintained per manufacturer specifications.

OPERATIONAL PERIOD

• May 1 to October 31, seven days a week as river conditions allow. Daily hours of operation will be established in consultation with resource agencies based on run timing for the target fish species and numbers of fish present.

OPENING METHODS

At least two to three weeks prior to fish lift start-up if river conditions allow:

Fish Lift

- 1. Remove ice eaters from the lower flume of the fish lift
- 2. De-water fish lift lower flume, inspect and clear all debris from within the entrance channel as well as the AWS diffusion chamber
- 3. Inspect for any damaged components and repair as necessary
- 4. Remove safety chain from the hopper

- 5. Inspect and repair hopper mechanical components as necessary (cotter pins, turn buckles, cable, limit switches, etc.)
- 6. Grease entrance gate operators
- Water up fish lift by opening attraction water gates and adjust entrance gate via the operator interface terminal (OIT) for approximately 6-9 inch differential from inside the fish lift entrance flume to the tailrace

SPARE PARTS

- 4 hopper wheels
- 4 hopper pulleys
- 2 drive bushings for entrance gate operator
- 2 drive bushing for attraction water valve operators
- 2 drive bushings for V-gate operator
- 2 drive bushings for entrance gate operator
- 1 (Operator interface terminal PLC touch screen OIT)
- 2 Hoist fuses
- 2 Limit switches
- Encoder for hoist if required
- Stop logs
- Hopper hoist cable

WORKFORCE PLANNING

- Staffing Requirements:
 - Start Up Crew of 2
 - Routine Operations Crew of 2
 - Routine Maintenance Crew of 2 for standard maintenance, crew of 3 for fishway entry for cleaning and fish removal
 - Shut Down Crew of 2
- Daily basis:
 - The fish lift will be inspected for debris accumulation. Staff will remove debris from fish lift. If debris is not manageable by hand, operations crew will de-water fish lift lower flume as described below and remove debris.
 - The attraction water gates will be adjusted for proper outflow based on head pond and tailwater elevations and flow curves.

- The fish lift entrance gate will be adjusted for proper attraction flow via the PLC/OIT resulting in a 6 to 9 inch head drop from inside the entrance to the tailwater as determined by water level gauges.
- The fishway log sheets are completed consistent with Appendices A and C. and entered into an electronic database such that a weekly update can be provided to the agencies.
- Weekly basis:
 - Facility's lead fishway technician to distribute a weekly Fishway
 Operations Report consistent with Appendix C to the fishery resource agencies
- Cleaning process lower flume:
 - Set up fall arrest/fall retrieval device, inspect fall harness (per procedure)
 - o Install access ladder
 - Dewater fish lift lower flume to 6 inch depth and inspect for stranded fish and safely remove fish as necessary
 - Complete dewatering of lower flume can take place only after all fish are safely removed
 - o Remove debris as necessary
- Preventative Maintenance process:
 - o Monthly :
 - Grease the entrance gate, attraction water gate and V-gate operator mechanisms
 - Inspect and repair hopper mechanical (cotter pins, turn buckles, cable, limit switches, etc.) as necessary
 - o Yearly:
 - Inspect the fish lift hopper hoist
 - Inspect attraction water dewatering gate operators
 - Inspect fish lift hopper isolation screen hoist
 - Inspect the entrance gate, attraction water gate and V-gate operators
 - The fish lift channel shall be dewatered annually (dates and duration to be determined in consultation with the resource agencies, but generally in August) for inspection, cleaning, to

make essential repairs, and to adjust the various mechanical and structural systems as needed.

WINTERIZING METHODS

- Close the attraction water gates and seal to minimize leakage
- Close isolation gates on fish lift channel
- Remove all debris from fish lift channel
- Lift hopper and install safety chains
- Install 2 ice eaters in fish lift lower flume
- Close V-gates
- Open entrance gate (lowered position)
- De-energize all electrical equipment
- Drain water storage tank and leave all valves in the open position
- Drain water storage tank fill piping and pump

4.2 - DOWNSTREAM FISH PASSAGE – OPERATIONS & MAINTENANCE

OPERATIONAL PERIOD

The combined new and existing downstream measures are listed below.

- Forebay Guidance Boom: permanently installed and angled to forebay guidance sluice.
- Open forebay surface sluice: April 1 through December 31, as river conditions allow
- Open forebay surface sluice to provide 6% station flow: 365 cfs during smolt migration period (April 1 June 15).
- New downstream passage opportunity via spillway channel AWS system May 1 – October 31
- Open the log sluice gate adjacent to Unit 4, 8% of total Unit flow from April 1st to June 15th.
- From September 15 to October 31, open log sluice for eels at 6% of unit flow for at least 8 hours per night starting one hour after sunset. If substantial rains are predicted in early September, the log sluice may be requested to be opened earlier by resource agencies.
- From November 1 to December 31 as river conditions allow, open log sluice for salmon at night at 6% of unit flow. The sluice may be closed sooner if there is a risk of freezing due to cold weather.

OPENING METHODS

Fish lift spillway AWS system

- 1. Grease AWS isolation gate and attraction water flow control gate operator mechanisms
- 2. Open the AWS isolation gate 100%
- 3. Close attraction water flow control gate when fish lift is not in operation

SPARE PARTS

• 1 drive bushing for each gate operator

WORKFORCE PLANNING

- Staffing Requirements:
 - Start Up Crew of 1
 - Routine Operations Crew of 1
 - Routine Maintenance Crew of 2 for standard maintenance, crew of 3 for fishway entry for cleaning
 - Shut Down Crew of 1
- Daily basis:
 - Inspect the downstream fish passage entrances for debris and remove it. If debris can't be easily removed, operations crew will assist. Notify the resource agencies (see Section 8.0) if downstream fish passages can't be cleaned the same day.
 - Verify proper outflow of the downstream fish passages.
 - The fishway log sheets are completed consistent with Appendices A and
 C. Information within the daily inspection form will be entered into a database for ease of data sharing throughout and at the end of the season
- Weekly basis:
 - Facility's lead fishway technician to distribute a weekly Electronic Fishway Operations Report consistent with Appendix C to the fishery resource agencies
- Cleaning process:
 - De-water the downstream fish passage (AWS) and inspect fishway for stranded fish
 - Set up fall arrest/fall retrieval device, inspect fall harness (Brookfield procedure)

- Prepare chainsaw for operation, inspect all chainsaw PPE
- Inspect all rigging for hoisting debris
- Preventative Maintenance process:
 - o Yearly:
 - Inspect the isolation gate and attraction water flow control gate operators
 - Inspect the wedge wire intake screen and spillway

DOWNSTREAM FISH PASSAGE DE-WATERING METHOD

- Close the AWS isolation gate and de-energize
- Open attraction water flow control gate and de-energize

WINTERIZING METHODS

- Close AWS isolation gate to drain water and de-energize
- Open attraction water flow control gate to drain water and de-energize

5.0 – FISH STRANDING PLAN

 If a stranding event occurs, contact the Fisheries Lead or Seasonal Fish Technicians along with the local Compliance Specialist and Stakeholder Relations.

5.1 - OBSERVATION POINTS

• The north and south dam aprons can be inspected for stranded fish from the walkways above the flashboards and rubber dams.

5.2 – AVAILABLE RESOURCES

- Nets and handle extensions located inside the Weston powerhouse
- Salmon "vinyl" socks, five-gallon buckets and a trash can located inside the Weston powerhouse
- Canoe and paddles located inside Lockwood Dam powerhouse
- 14-foot motor boat located at Hydro Kennebec

6.0 - FISH MORTALITY DISPOSAL PLAN

• With prior approval of resources agencies, fish mortalities can be picked up by a local bait dealer (Wild Things Bait Shop) located in Oakland. Contact is Scott Horne at 207-313-9741. All mortalities shall be noted on the fish lift daily log sheets.

7.0 - SAFETY

7.1 - SAFETY RULES & PROCEDURES

• Pursuant to Brookfield's Safety Procedure SP9, Job Safety and Environmental Plans are completed prior to, and ideally, well in advance of any work at the various fish ways are started. Job Safety and Environmental Plans are to be completed using the standard form which may be updated from time to time. Review of prior Job Safety and Environmental Plans for similar work is encouraged to help capture all safety risks that may be present at the site.

8.0 – NOTIFICATION AND CONTACT INFORMATION

NOTICE:

- Contact NMFS and MDMR within 24 hours of any interactions with Atlantic salmon, Atlantic sturgeon or shortnose sturgeon, including non-lethal and lethal take
- In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS1
- Notify NMFS of any changes in Project and fishway operations (including maintenance activities)2
- The first Brookfield point of contact for all fishway related issues is the local Operations Manager

BROOKFIELD CONTACTS

- Dave Watson, Operations Manager, Brookfield
 - o (o) 207-474-3921 x 12
 - o (c) 207-520-8870
 - o <u>David.watson@brookfieldrenewable.com</u>
- Joel Rancourt, Senior Operations Manager, Brookfield
 - o (o) 207-474-3921 x 11

¹ This would typically include date collected, species, measurements, photographs, etc.

² This does not include typical operational changes such as generator load swings, putting generators online and offline, normal impoundment and flow fluctuations, and opening/closing gates to control spillage. NMFS should be notified for any fishway dewatering's or maintenance issues, problems meeting fishway operational dates, impoundment drawdowns for flashboard or other maintenance, or any other atypical project operations such as dewatering of tunnels, conduits, or penstocks
- o (c) 207-458-6775
- o joel.rancourt@brookfieldrenewable.com
- Kelly Maloney, Manager of Compliance, Brookfield
 - o (o) 207-755-5606
 - o (c) 207-233-1995
 - o <u>Kelly.maloney@brookfieldrenewable.com</u>
- Adam Brown, Compliance Specialist, Brookfield
 - o (c) 207-313-1173
 - o <u>Adam.brown@brookfieldrenewable.com</u>

AGENCY CONTACTS

- Matt Buyoff, Atlantic Salmon Recovery Coordinator, NMFS
 - o (c) 207-866-4238
 - o <u>Matt.buhyoff@noaa.gov</u>
- Don Dow, Hydro Engineer, NMFS
 - o (o) 207-866-3758
 - o (c) 207-416-7510
 - o <u>Donald.dow@noaa.gov</u>
- Julianne Rosset, Migratory Fish/Hydropower, USFWS
 - o (c) 603-309-4842
 - o julianne rosset@fws.gov
- Bryan Sojkowski, Fish Passage Engineer, USFWS
 - o (o) 413-253-8645
 - o <u>Bryan sojkowski@fws.gov</u>
- Sean Ledwin, Director Sea Run Fisheries Division, MDMR
 - o (o) 207-624-6348
 - o <u>Sean.m.ledwin@maine.gov</u>
- Gail Wippelhauser, Marine Resources Scientist, MDMR
 - o (o) 207-624-6349
 - o <u>Gail.wippelhauser@maine.gov</u>
- Paul Christman, Marine Resources Scientist, MDMR
 - o (c) 207-577-5780

- o (o) 624-6352
- o <u>paul.christman@maine.gov</u>
- John Perry, Environmental Coordinator, MDIFW
 - o (o) 207-287-5254
 - o (c) 207-446-5145
 - o <u>John.perry@maine.gov</u>
- Dwayne (Jason) Seiders, Fishery Biologist, MDIFW
 - o (o) 207-287-5254
 - o <u>Dwayne.j.seiders@maine.gov</u>
- Kathy Howatt, Hydropower Coordinator, MDEP
 - o (o) 207-446-2642
 - o <u>Kathy.howatt@maine.gov</u>
- Chris Sferra, Hydropower Specialist III, MDEP
 - o (o) 207-446-1619
 - o <u>Christopher.sferra@maine.gov</u>

9.0 – APPENDICES

Appendix A: DAILY INSPECTION FORM

Date:		Time:	Inspector:
	River Flow (cfs):	Unit 3	flow (cfs)
	Unit 1 flow (cfs)	Unit 4	flow (cfs)
	Unit 2 flow (cfs)		
iice gate	operation and flow (cfs)		
I	Fish Lift		
1	Lift operating mode	utomatic	Manual
	Fi	requency	Min
2	Fish lift debris		
3	Attraction water Screen		
4	Hopper blocking screen		
5	V-Trap screen		
6	Entrance gate		
	а	Setting	
	b	Flume water elev.	
	C	Tailwater elev.	
	d	Head differential	
	Auxiliary water system		
	Headpond elev. (ft)	<u> </u>	
	AWS flow control gate	Setting (in)	Flow (cfs)
10	Forebay elev. (ft)		
11	Tainter gate	Setting (in)	Flow (cfs)
(Comments:		
_			
_			
-			<u> </u>

Please provide completed inspection forms to the Licensing and Compliance Group every Monday morning Appendix B: FISHWAY DRAWINGS(placeholder)

Appendix C: FISHWAY OPERATIONS WEEKLY REPORT

Shawmut Fishway Operation Weekly Report Form



Weekly Operational Status:

Note:

Weekly Fishway Operations report to be provided to the resource agencies.

Appendix D: <u>Fishway PLC Operations</u> (placeholder)

Appendix E: <u>Fishway Attraction Water Valve Curve</u> (placeholder)

Appendix F: <u>Handling Plan for Shortnose and Atlantic Sturgeon</u> (placeholder)

APPENDIX D

USFWS CONSULTATION

Regulatory review / Endangered species / Species determinations

Species determinations

For listed species¹ not covered by determination keys, an impact analysis should be performed to reach a conclusion about how this project will impact the species. These conclusions will result in *determinations* for each species, which will be used in consultation with the U.S. Fish and Wildlife Service.

Mammals

Northern Long-eared Bat Myotis septentrionalis

Fishes

Atlantic Salmon Salmo salar

Critical habitats

Atlantic Salmon Salmo salar None This species is covered by a determination key

None

None

1. Species listed under the <u>Endangered Species Act</u> are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the <u>listing status page</u> for more information.



United States Department of the Interior

FISH AND WILDLIFE SERVICE Maine Ecological Services Field Office P. O. Box A East Orland, ME 04431 Phone: (207) 469-7300 Fax: (207) 902-1588 http://www.fws.gov/mainefieldoffice/index.html



IPaC Record Locator: 526-24418745

November 24, 2020

Subject: Consistency letter for the 'Weston Hydroelectric Upstream Fish Lift Construction' project indicating that any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Dear Uriah Forest-Bulley:

The U.S. Fish and Wildlife Service (Service) received on November 24, 2020 your effects determination for the 'Weston Hydroelectric Upstream Fish Lift Construction' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. You indicated that no Federal agencies are involved in funding or authorizing this Action. This IPaC key assists users in determining whether a non-Federal action may cause "take"^[1] of the northern long-eared bat that is prohibited under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Please report to our office any changes to the information about the Action that you entered into IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation.

If your Action proceeds as described and no additional information about the Action's effects on species protected under the ESA becomes available, no further coordination with the Service is required with respect to the northern long-eared bat.

The IPaC-assisted determination for the northern long-eared bat **does not** apply to the following ESA-protected species that also may occur in your Action area:

• Atlantic Salmon, *Salmo salar* (Endangered)

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

Weston Hydroelectric Upstream Fish Lift Construction

2. Description

The following description was provided for the project 'Weston Hydroelectric Upstream Fish Lift Construction':

Brookfield White Pine Hydro is proposing to construct a fish lift at the South Channel Dam of the Weston Hydroelectric Project. This will occur after the fish passage season. Construction activities include the clearing and construction of an access road, as well as an upstream and downstream cofferdam. This will allow workers to access the project site in the river way and complete construction in the dry.

Approximate location of the project can be viewed in Google Maps: <u>https://www.google.com/</u> <u>maps/place/44.76412302267208N69.71725832697085W</u>



Determination Key Result

This non-Federal Action may affect the northern long-eared bat; however, any take of this species that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o).

Determination Key Description: Northern Long-eared Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for non-Federal actions is to assist determinations as to whether proposed actions are excepted from take prohibitions under the northern long-eared bat 4(d) rule.

If a non-Federal action may cause prohibited take of northern long-eared bats or other ESA-listed animal species, we recommend that you coordinate with the Service.

Determination Key Result

Based upon your IPaC submission, any take of the northern long-eared bat that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o).

Qualification Interview

- 1. Is the action authorized, funded, or being carried out by a Federal agency? *No*
- 2. Will your activity purposefully **Take** northern long-eared bats? *No*
- 3. [Semantic] Is the project action area located wholly outside the White-nose Syndrome Zone?

Automatically answered No

4. [Semantic] Is the project action area located within 0.25 miles of a known northern longeared bat hibernaculum?

Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency

Automatically answered No

5. [Semantic] Is the project action area located within 150 feet of a known occupied northern long-eared bat maternity roost tree?

Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency

Automatically answered No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0

2. If known, estimated acres of forest conversion from April 1 to October 31 $\it 0$

3. If known, estimated acres of forest conversion from June 1 to July 31 *0*

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

.01

5. If known, estimated acres of timber harvest from April 1 to October 31 .01

6. If known, estimated acres of timber harvest from June 1 to July 31 *0*

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

APPENDIX E

HISTORICAL AND TRIBAL NOTIFICATION



Providing practical solutions to complex problems affecting energy, water, and the environment

October 22, 2020

VIA E-MAIL

Kirk F. Mohney, Director Megan Rideout Maine Historic Preservation Commission 55 Capitol Street 65 State House Station Augusta, Maine, 04333-0065 kirk.mohney@maine.gov Megan.M.Rideout@maine.gov

<u>Weston Hydroelectric Project (FERC No. 2325)</u> <u>Upstream Fish Passage Facility – Project Review Submittal</u>

Dear Mr. Mohney and Ms. Rideout:

Kleinschmidt Associates, on behalf of Brookfield White Pine Hydro, LLC (Brookfield), herein submits the information necessary for Maine Historic Preservation Commission (MHPC) review of the proposed upstream fish passage facility construction at the Weston Hydroelectric Project (FERC No. 2325) (Project). The Project is located on the Kennebec River in the Town of Skowhegan, Somerset County, Maine (see Attachment A).

Project Background

The 14.75-megawatt (MW) Weston Project is operated as a run-of-river facility and is located at river mile 82 of the Kennebec River. The Weston Project includes a 930-acre impoundment, two dams, and a powerhouse. The two dams are constructed on the north and south channels of the Kennebec River where the river is divided by Weston Island. U.S. Route 2 crosses the island, spanning the South Channel impoundment above South Channel Dam and the North Channel bypass section located below the North Channel Dam. The South Channel Dam is a concrete gravity and buttress dam 51-feet-high, with a crest elevation of 156.0 feet. The dam extends about 391.5 feet between abutment walls from the island to the south riverbank and consists of five sections: a 125-foot-long powerhouse/intake section; a 33-foot-long concrete spillway section; a 24-foot-long sluice section. The powerhouse/intake section of the dam, located adjacent to the north abutment and integral to the Project dam, includes the headworks and four intake bays, one for each of the four turbine generator units.

In accordance with the Project's 1997 FERC license and Water Quality Certificate (WQC), an upstream fish passage facility is required to operate at the Project. On September 16, 1998 the Federal Energy Regulatory Commission (FERC) issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement). The 1998 Settlement and corresponding 1998 Water Quality Certificate (WQC) # L-17472-33-C-M amended and updated the Project's 1997 FERC license upstream fish passage requirements. Both the Settlement and WQC stipulate that operation upstream fish passage would be required within two years after the either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC NO. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

Since the 1998 Settlement, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with the FERC a 2013 Interim Species Protection Plan (Interim SPP) for Atlantic Salmon. On May 19, 2016, FERC amended the Weston License to include the Interim SPP that requires an upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC updated the required operational date for the upstream fish passage to May 31, 2022.

In accordance with the Interim SPP, Brookfield proposes to construct a permanent upstream fish passage facility at the Weston Project to provide passage for upstream migration of salmon and other anadromous species.

The proposed facility has been designed in consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife. As such, Brookfield proposes to install a fish lift system to connect the tailrace with the headpond so to provide a zone of passage for upstream migrants. Attachment C depicts the area of project effect.

Proposed Construction Project

BWPH proposes to construct a fish lift system with integrated AWS spillway to provide for permanent upstream fish passage. The fish lift and AWS spillway will be located between the powerhouse and the log sluice on the south channel dam. The total system will be approximately 30-feet-wide by 70-feet-high. An approximate 15-foot-long section of the south channel dam will be removed down to elevation 144 feet to make space for installation of the AWS spillway. Minor bedrock excavation will additionally be required for installation of the fishway entrance.

The fish lift facility will provide a total attraction flow of up to 304 cubic feet per second (cfs) and will have a cycle time of 15 minutes. Migrating fish will swim into a chamber that will lift them to the fish lift exit pipe at approximately elevation 165.5-feet where they will swim out the

approximately 215-foot-long pipe and exit from the pipe at elevation 159-feet and into the headpond at elevation 156-feet to continue their migration upstream.

Brookfield plans to begin construction in spring of 2021 when spring river flows recede and safe river access can be accomplished. Construction activities will include the construction of a temporary access road adjacent to Mill Street in Skowhegan. This will involve some tree removal and grading. The upland access area will be surrounded with a silt fence system. A temporary contractor designed cofferdam will be constructed on the downstream side of the access road and around the fish lift construction area in the tailrace. A small temporary contractor designed cofferdam will also be constructed in the headpond, upstream of the fish lift work area. Turbidity curtain systems will additionally be placed around the cofferdams.

MHPC Review Request

In accordance with Section 106 of the National Historic Preservation Act (NHPA), we are requesting Maine Historic Preservation Commission (MHPC) review of the upstream fish passage facility. Attached please find a USGS topographic map and project location map depicting the proposed project area (Attachment A), photos of the proposed area of project effect (Attachment B), and engineering drawings depicting the proposed project (Attachment C). As required by the U.S. Army Corps of Engineers (USACE), a request for project review is also being provided to the appropriate federally recognized Indian tribes.

Should you have any questions upon review, please contact me at 207.416.1218 or at <u>Katie.Sellers@kleinschmidtgroup.com</u>. Due to COVID-19 related work from home restrictions, please forward any project related responses via email.

Sincerely,

KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds Regulatory Coordinator

KSR:TMJ Attachments: Attachment A – USGS Topographic and Google Earth Maps Attachment B – Project Area Photos Attachment C – 30% Design Drawings

cc: Nathan Baker and Kelly Maloney, Brookfield Renewable Uriah Forest-Bulley, Kleinschmidt Associates

ATTACHMENT A

USGS TOPOGRAPHIC AND GOOGLE EARTH MAPS



Figure 1 Weston Upstream Fish Passage Project Area - Proposed Work Location (Topo Map)



Figure 2 Weston Upstream Fish Passage - Proposed Work Area

ATTACHMENT B

PROJECT AREA PHOTOS



2019 Photo Looking Upstream at Southern Channel Dam View Direction: South West Photographer Location: Walking Bridge Downstream of Project Facilities.



2019 Photo Looking Downstream at Southern Channel Dam. View Direction: North East Photographer Location: Island Ave Bridge

ATTACHMENT **C**

30% DESIGN DRAWINGS

WESTON FISH LIFT PASSAGE DESIGN



LOCATION MAP



BROOKFIELD WHITE PINE HYDRO, LLC

PREPARED BY





ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldeniab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/02/2020 8/02/2019 REVISION	30% DESIGN PRELIMINARY DESIGN DESCRIPTION OF ISSUE / REVISION	M. GRAESER B. MATER REVISED BY	VERIFY SCA BAR IS ONE INCH ORIGINAL DRAWI IF NOT ONE INCH ON SHEET, ADJUST SC. ACCORDINGLY		WESTON FISH LIFT PASSAGE DESIGN	COVER SHEET, VICINITY MAPS	PROJECT: 3173WESTFISI DRAWN BY: M. ATWEL DESIGNER: M. GRAESEI APPROVED BY: M. GRAESEI SHEET: 1 OF 91 DRAWING: G-001	
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		DRAWING LIST
SHEET	DRAWING	DESCRIPTION
GENER	AL	
1	G-001	COVER SHEET, VICINITY MAPS
2	G-002	DRAWING LIST
3	G-003	GENERAL NOTES AND ABBREVIATIONS
4	G-004	EXISTING CONDITIONS OVERALL SITE PLAN
5	G-005	SITE ACCESS, CONSTRUCTION LIMITS, GEOTECHNICAL BORINGS, AND SURVEY CONTROL
6	G-006	STAGING AREAS, EROSION CONTROL, & DEWATERING PLAN
7	G-007	EROSION CONTROL & DEWATERING DETAILS
CIVIL		
8	C-100	OVERALL SITE PLAN
9	C-101	DEMOLITION & ROCK EXCAVATION PLAN
10	C-102	DEMOLITION & ROCK EXCAVATION SECTIONS
11	C-103	AWS INTAKE AND FISH LIFT GENERAL ARRANGEMENT PLAN
12	C-104	FISH LIFT GENERAL ARRANGEMENT SECTION
13	C-105	AWS INTAKE GENERAL ARRANGEMENT SECTION
14	C-106	EXITING PIPING PLAN AND PROFILE
STRUC	TURAL	
15	S-001	STRUCTURAL NOTES
16	S-002	STRUCTURAL DESIGN CRITERIA
17	S-101	AWS INTAKE & FISH LIFT - STRUCTURAL CONCRETE EL 145.00
18	S-102	AWS INTAKE & FISH LIFT - STRUCTURAL CONCRETE EL 157.00
19	S-103	AWS INTAKE & FISH LIFT - ENLARGED PLANS & DETAILS
20	S-104	AWS INTAKE & FISH LIFT - ENLARGED PLANS FTC
21	S-105	AWS INTAKE STRUCTURAL CONCRETE SECTION
21	S-106	
22	S-107	
23	S-107	
24	S-100	
23	S-109	
20	0.444	
20	0-111	
28	5-112	FISH LIFT STRUCTURAL CONCRETE SECTIONS & DETAILS
29	S-118	ELECTRICAL ENCLOSURE
30	S-201	GENERAL STEEL FRAMING PLAN AT ELEVATION 135.00
31	S-202	GENERAL STEEL FRAMING PLAN AT ELVATION 157.00
32	S-203	TOWER STEEL FRAMING SECTIONS
33	S-204	TOWER STEEL FRAMING SECTIONS
34	S-205	TOWER STEEL FRAMING SECTIONS
35	S-206	TOWER STEEL FRAMING SECTIONS (CONT'D)
36	S-207	TOWER STEEL FRAMING SECTIONS (CONT'D)
37	S-208	TOWER STEEL FRAMING STAIR SECTIONS
38	S-209	TOWER STEEL FRAMING PLATFORM PLANS
39	S-210	TOWER STEEL FRAMING PLATFORM PLANS (CONT'D)
40	S-211	TOWER STEEL FRAMING SECTIONS AND DETAILS
41	S-212	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
42	S-213	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
43	S-214	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
44	S-215	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
45	S-216	STAIR SECTIONS AND DETAILS
46	S-217	TRANSITION FLUME AND PLAN SECTIONS
47	S-218	TRANSITION FLUME AND FISH EXIT PIPE FRAMING PLANS
48	S-219	TRANSITION FLUME DETAILS
49	S-220	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DETAILS
50	S-221	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
51	S-222	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
52	S-223	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
53	S-224	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
54	S-225	FISH EXIT PIPE SUPPORT DETAILS
55	S-226	
56	S-301	
57	S-301	
51	S-302	
E0	0.0-00.5	STRUCTURAL STAINDARD DETAILS (CUNTD)
58	S-204	
58 59	S-304	STRUCTURAL STANDARD DETAILS (CONT'D)

MECH	HANICAL	
62	M-101	AWS INTAKE ISOLATION GATE
63	M-102	AWS INTAKE SCREEN
64	M-103	FISHWAY ENTRANCE ISOLATION GATE
65	M-104	FISH LIFT WEIR ELEVATION
66	M-105	FISH LIFT WEIR SECTION DETAILS AND EMBEDMENTS
67	M-106	FISH LIFT WEIR PANEL ELEVATION AND DETAILS
68	M-107	FISH LIFT WEIR PANEL SECTION DETAILS AND EMBEDMENTS
69	M-108	FISH LIFT BAFFLE 1 ELEVATION
70	M-109	FISH LIFT BAFFLE 1 SECTION DETAILS AND EMBEDMENTS
71	M-110	FISH LIFT BAFFLE 2 ELEVATION
72	M-111	FISH LIFT BAFFLE 2 SECTION DETAILS AND EMBEDMENTS
73	M-112	FISH LIFT UPSTREAM SCREEN ELEVATION
74	M-113	FISH LIFT UPSTREAM SCREEN SECTION, DETAILS, AND EMBEDMENTS
75	M-114	FISH LIFT HOPPER - GENERAL LAYOUT AND INFORMATION
76	M-115	FISH LIFT HOPPER DETAILS
77	M-116	FISH LIFT HOPPER - HOPPER GATE AND BRAIL DETAILS
78	M-117	FISH LIFT HOPPER - GENERAL LAYOUT AND INFORMATION
79	M-118	FISH LIFT HOPPER - STEEL COMPONENTS (LIFTING FRAME)
80	M-119	FISH LIFT HOPPER - STEEL COMPONENTS (MISC)
81	M-120	FISH LIFT V-GATE GENERAL PLAN, ELEVATION, & DETAILS
82	M-121	FISH LIFT V-GATE OPERATOR SUPPORT DETAILS
83	M-122	FISH LIFT V-GATE DETAILS
84	M-123	FISH LIFT V-GATE STEEL FRAMING PLANS
85	M-124	FISH LIFT V-GATE BEARING DETAILS
86	M-125	FISH LIFT ENTRANCE GATE ELEVATION AND STEM DETAILS
87	M-126	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS
88	M-127	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS (CO)
89	M-128	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS (CO)
90	M-129	FISH LIFT ENTRANCE ISOLATION GATE REQUIREMENT

ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020	30% DESIGN PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCALE BAR IS DAE INCLON ORIGINAL DRAWING IF NOT ONE INCLOSE SVEET, ADJUST SCALES ACCORDINGLY	WESTON FISH LIFT PASSAGE DESIGN	DRAWING LIST	PROJECT: 3173WE DRAWN BY: M. J DESIGNER: M. G APPROVED BY: M. G SHEET: 2 OF	ESTFISH ATWELL RAESER RAESER 90
		REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY	ACCORDINGLY			DRAWING: G	-002

GENERAL NOTES:

- 1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR ACCURATE. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING THE WORK. SHOULD THE CONTRACTOR IDENTIFY ANY UTILITIES, STRUCTURES OR FEATURES NOT SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY.
- 2. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE UTILITY OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES. ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
- 3. REMOVE, REPLACE OR RELOCATE ALL OVERHEAD INTERFERENCE WHICH MAY AFFECT OPERATION DURING CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER, GAS OR OTHER UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.
- 4. COORDINATE UNDERGROUND UTILITY MARKING WITH THE EXISTING UTILITIES BY CONTACTING DIGSAFE AT 1-888-344-7233 OR 811 DIGSAFE MUST BE CONTACTED A MINIMUM OF 72 HOURS PRIOR TO CONSTRUCTION OR GROUND DISTURBANCE.
- 5. THE CONTRACTOR SHALL REVIEW THE SITE TO DETERMINE EXISTING CONDITIONS. ANYTHING NOT SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA, UNLESS RECOMMENDED BY THE ENGINEER AND APPROVED BY THE OWNER.
- 6. CONTACT THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS ARISING DURING THE CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.
- 7. PRESERVE ALL SURVEY MARKERS AND MONUMENTATION WHEREVER POSSIBLE, THOSE REQUIRING REMOVAL SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE LOCAL, STATE, OR FEDERAL GOVERNING AUTHORITY
- 8. ALL DRAWINGS AND DETAILS INCLUDED IN THE CONTRACT DOCUMENTS SHALL FULLY APPLY TO THE WORK WHETHER SPECIFICALLY REFERENCED OR NOT
- 9. LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY. EASEMENTS, AND DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES OUTSIDE THE DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.
- 10. RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REFER TO RECLAMATION OF DISTURBED AREAS IN SPECIFICATIONS.
- 11. THE CONTRACTOR SHALL REPLACE ALL ROADS, STABILIZED EARTH, FENCES, AND DRIVEWAYS, ETC., WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION.
- 12. SHORING REQUIRED FOR THE STABILITY OF THE UNCOMPLETED STRUCTURE OR FOR INSTALLATION OR MODIFICATION OF STRUCTURAL MEMBERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY
- 13. DIMENSIONS OF VALVES, FITTINGS AND OTHER EQUIPMENT MAY VARY DEPENDING UPON MANUFACTURER. CONTRACTOR SHALL REVIEW SHOP DRAWINGS BEFORE SETTING BASES, SUPPORTS, ETC.
- 14. EXISTING FENCING DISTURBED OR REMOVED SHALL BE REPLACED IN-KIND.
- 15.IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A SECURE PROJECT SITE. BROOKFIELD WHITE PINE HYDRO, LLC. WILL NOT BE RESPONSIBLE FOR STOLEN OR VANDALIZED PROPERTY
- 16. AT THE CLOSE OF EACH WORKING SHIFT, WHERE THE NEXT SHIFT WILL NOT IMMEDIATELY FOLLOW, PROTECT AND SECURE OPEN **EXCAVATION**

FISH PASSAGE NOTES:

1. POWERHOUSE 6075 CFS CAPACITY

2. RIVER FLOW

DESIGN LOW	2500 CFS (95% EXCEEDANCE
AVERAGE	6100 CFS (50% EXCEEDANCE
DESIGN HIGH	20300 CFS (5% EXCEEDANCE
50 YEAR	124,800 CFS
100 YEAR	142,400 CFS

3. WATER LEVELS

EAD POND ELEV	ATIONS
ESIGN LOW	155.5 FT
IORMAL	156 FT
ESIGN HIGH	156.5 FT
0 YEAR	165 FT
00 YEAR	169.5 FT

TAILWATER ELEVATIONS					
DESIGN LOW	121.3 FT (95% EXCEEDANCE)				
NORMAL	123.0 FT				
DESIGN HIGH	129 FT (5% EXCEEDANCE)				
50 YEAR	144.5 FT				
100 YEAR	147.6 FT				

4. TARGET SPECIES AND FISHWAY DESIGN POPULATIONS (NOAA DESIGN MEMORANDUM 2016)

ATLANTIC SALMON:	11,300
AMERICAN SHAD:	106,000
ALEWIVES:	51,000
BLUEBACK HERRING	922,000

5. FISH PASSAGE FACILITIES WILL BE OPERATIONAL FROM MAY 1ST TO OCT 31ST

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6. FISHWAY ENTRANCE
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6 INCH HEAD DROP HINGED FLAP GATE TO MAINTAIN TARGET HEAD DROP AND VELOCITY INVERT EL. 115 FT **10 FT ENTRANCE WIDTH**

7. FISHWAY ATTRACTION WATER SYSTEM

TOTAL ATTRACTION FLOW 304 CFS (5% STATION CAPACITY) FISH LIFT ENTRNACE UP TO 220 CFS AWS AUXILIARY SPILLWAY UP TO 300 CFS AWS INTAKE SCREEN 0.25 INCH SLOT WIDTH WEDGE WIRE

8. FISH LIFT DESIGN FEATURES

FISH LIFT CYCLE TIME 15 MIN TWO SIDED BRAIL, 9.5 DEGREE SLOPE, SMOOTH ALUMINUM W/ 50% POROSITY HOPPER VOLUME 490 CUFT ADJUSTABLE V-TRAP OPENING BETWEEN 1 AND 3 FT 20 INCH SMOOTH FIBERGLASS PIPE, 2% SLOPE EXIT FLUME

LEDEND & SYMBOLS - - - - APPROXIMATE PROPERTY LINE - NHW------- NORMAL HIGH WATER LINE TC TURBIDITY CURTAIN — тс-COFFERDAM / BULKHEAD / DEWATERING STRUCTURE GRATING SPAN DIRECTION – RAILING -----💮 в-х GEOTECHNICAL BORING (3 1/2" BORING) ۲ GEOTECHNICAL BORING (2 1/2" BORING) 45° ANGLED BORING DRILLED IN DIRECTION INDICATED FLOW UNDISTURBED SOIL FLOW FILL GROUT CONCRETE GRATING BEDROCK CONCRETE DEMOLITION EXCAVATE BEDROCK

30% DESIGN ALDEN RESEARCH LABORATORY VERIEY SCALE WESTON FISH LIFT PASSAGE 30 SHREWSBURY ST. HOLDEN, MA 01520 NOT FOR CONSTRUCTION BAR IS ONE IN ORIGINAL DRA TEL: (508) 829-6000 www.aldenlab.com DESIGN 6/03/2020 30% DESIGN M. GRAESER DATE: 06/03/2020 IOT ONE INCH ON T EET, ADJUST SCAL 8/02/2019 PRELIMINARY DESIGN 3. MATER REVISION DESCRIPTION OF ISSUE / REVISION REVISED BY

ABBREVIATIONS:

F	GENERAL NOTES AND	PROJECT: DRAWN BY: DESIGNER:	317	73WE	STFISH TWELL AESER
	ABBREVIATIONS	SHEET: DRAWING:	3 3	OF G-	90 90 003



NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

	PROJECT:	3173WE	STFISH
	DRAWN BY:	M. A	ATWELL
	DESIGNER:	M. GF	RAESER
EXISTING CONDITIONS OVERALL SITE	APPROVED	BY: M. GF	RAESER
PLAN	SHEET:	4 OF	90
	DRAWING:	G	-004



NOTES:

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

LEGEND:



GEOTECHNICAL BORING (3 ½" BORING) GEOTECHNICAL BORING (2 ½" BORING) 45° ANGLED BORING DRILLED IN DIRECTION INDICATED

BORING TABLE								
BORING	NORTHING	EASTING	DESCRIPTION					

	DRAW
SITE ACCESS, CONSTRUCTION LIMITS,	DESIC
GEOTECHNICAL BORINGS, AND	APPR
	SHEE
SURVEY CONTROL	

PROJECT:	317300	ESTRISH
DRAWN BY:	М.	ATWELL
DESIGNER:	M. G	RAESER
APPROVED B	3Y: M. G	RAESER
SHEET:	5 OF	90

G-005



NOTES:

- 1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
- 2. SEE DRAWING G-007 FOR TYPICAL DETAILS.

LEGEND:

- - COFFERDAM/BULKHEAD/DEWATERING STRUCTURE

------ NHW------- NORMAL HIGH WATER LINE

	STAGING AREAS, EROSION CONTROL,	PROJECT:	31	73WE	STFISH
		DRAWN BY:		M. A	TWELL
		DESIGNER:		M. GR	RAESER
		APPROVED BY: M. GRAESER			
	& DEWATERING PLAN	SHEET:	6	OF	90
		DRAWING:		G-	-006



8/02/2019

REVISION

PRELIMINARY DESIGN

DESCRIPTION OF ISSUE / REVISION

B. MATER

REVISED BY

DESIGN

SOIL EROSION & SEDIMENT CONTROL NOTES:

- SEDIMENTATION BASIN: SEDIMENT LADEN WATER SHALL NOT BE 1. RELEASED INTO ANY WATERWAY. CONTRACTOR SHALL PROVIDE APPROPRIATE SIZED SEDIMENTATION BASIN, WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES FOR ALL DEWATERING OR WATER DIVERSION ACTIVITIES.
- SILT FENCE: IF NEEDED TO CONTROL WATER CONTAMINATION. 2 PROVIDE SILT FENCE CONFORMING TO THE FOLOWING:
 - EQUIVALENT OPENING SIZE OF A US STANDARD SIEVE SIZED 40 (MAX), 70 (MIN).
 - MULLEN BURST STRENGTH 200 PSI.
 - GRAB STRENGTH 120 LBS MIN.
 - SPUN-BONDED NYLON FABRIC REINFORCED WITH POLYESTER NETTING, OR POLYPROPYLENE FABRIC WITH 2" x 4" 12 GA WOVEN WIRE BACKING FENCE.
- 3. DE-SILTING BASINS OR WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES ON SHORE SHALL HAVE A VEGETATIVE BUFFER FOR THE DISCHARGE. BASINS NEED TO BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF THE WAY OF LAYDOWN AND CONSTRUCTION ACTIVITIES.

	EROSION CONTROL & DEWATERING DETAILS	PROJECT: DRAWN BY: DESIGNER: APPROVED E SHEET:	3173WES M. AT M. GRA 3Y: M. GRA 7 OF	TFISH WELL ESER ESER
		DRAWING:	G-(007








ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020 30% DESIGN 8/02/2019 PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCA BAR IS ONE INCH ORIGINAL DRAWN IF NOT ONE INCH ON SHEET, ADURTS OF SHEET, ADURTS OF	E H is	WESTON FISH LIFT PASSAGE DESIGN	DEMOLITION & ROCK EXCAVATION SECTIONS	PROJECT: 317 DRAWN BY: DESIGNER: I APPROVED BY: SHEET: 10	173WESTFISH M. ATWELL M. GRAESER M. GRAESER OF 90
		REVISION DESCRIPTION OF ISSUE / REVISION	REVISED BY	, ACCONDUCE,				DRAWING:	C-102

EXCAVATION NOTE:

 SLOPES SHOWN ARE APPROXIMATE. ACTUAL SLOPES WILL VARY BASED ON CONTRACTORS COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.

LEGEND:



CONCRETE DEMOLITION





B AWS INTAKE SECTION VIEW C-103 SCALE: 1"=6'

ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020 8/02/2019	30% DESIGN PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCALE BAR IS ONE REVION ORIGINAL DRAWING F NOT ONE REVION THES SHEET, ADJAST SCALES ACCORDINGLY	WESTON FISH LIFT PASSAGE DESIGN	FISH LIFT GENERAL ARRANGEMENT SECTION	PROJECT: DRAWN BY: DESIGNER: APPROVED B SHEET: 1 DRAWING:	3173WEST M. AT M. GRAN 3Y: M. GRAN 12 OF C-1	FISH NELL ESER 90
		REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY				DRAWING.	0-1	07

- ISOLATION GATE RAISED

EL 145.0

EL 133.0' - HINGED ENTRANCE GATE HIGH WSL EL 129.0'

MAX GATE HEIGHT EL 125.1 ▼ LOW WSL —EL 121.3'

EL 115.0' EL 113.5'



REVISED BY

REVISION

DESCRIPTION OF ISSUE / REVISION

		PROJECT:	3173W	ESTFISH
		DRAWN BY:	M.	ATWELL
-		DESIGNER:	M. G	RAESER
=	AVIS INTARE GENERAL	APPROVED	8Y: M. G	RAESER
	ARRANGEMENT SECTION	SHEET:	13 OF	90
		DRAWING:	С	-105



DUTH	0+25						
	CL STA 0+39.97 PIPE SUDPORT EL=161.80'	CL STA 0+29 97 PIPE SUPPORT EL=161.60'	CL STA 0+19.98 EL=161.40' AL CL STA 0+14.99	HPPE ACCESS EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30'		190 185 180 175 170 170 165 160 155 150 145 140	
+50 E	0+40	0+30	0+20	0+10	0+00	135 130 -0+10 PROJECT: DRAWN BY: DESIGNER:	3173WESTFISH M. ATWELL M. GRAESER

GENERAL NOTES:

- THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS
- 2. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE OTHER PROJECT DRAWINGS AND SPECIFICATIONS.
- 3 REFER TO CIVIL MECHANICAL ELECTRICAL AND OTHER DISCIPLINES DRAWINGS FOR ANCHORS, PIPE SLEEVES, CONDUITS OR OTHER ITEMS TO BE EMBEDDED IN OR THAT PASS THROUGH THE STRUCTURE. IN GENERAL, EMBEDMENTS AND PENETRATIONS LESS THAN 12 INCHES IN DIAMETER ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS.
- 4. STANDARD DETAILS SHALL BE USED AT ALL APPLICABLE LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- 5. PLANS ON THESE DRAWINGS ARE TREATED AS HORIZONTAL SECTIONS (I.E. "PLANS AT ELEVATION 100.00" SHOW ITEMS BELOW 100.00).
- DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
- 7. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO CONSTRUCTION. NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS
- SHOP DRAWINGS SHALL BE FURNISHED FOR REVIEW BEFORE ANY FABRICATION AND ERECTION IS STARTED. POORLY EXECUTED SHOP DRAWINGS SHALL BE REJECTED AND RESUBMITTED

CONCRETE NOTES:

- 1. SPECIFIED MINIMUM COMPRESSIVE STRENGTH OF CLASS A STRUCTURAL CONCRETE SHALL BE 4500 PSI AT 28 DAYS UNLESS OTHERWISE NOTED. REFER TO THE SPECIFICATIONS
- 2. CONCRETE WORK SHALL CONFORM TO ACI 301 AND ACI 318.
- 3. REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615 OR A706, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60.
- 4. ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI-315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION
- 5. REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH PIPE, PIPE FLANGE OR METAL PARTS EMBEDDED IN CONCRETE, A MINIMUM OF 2 INCHES CLEARANCE SHALL BE PROVIDED AT ALL TIMES.
- 6. UNLESS OTHERWISE SHOWN ON THE DRAWINGS CONCRETE COVER FOR REINFORCING BARS SHALL BE 3" UNO
- 7. UNLESS OTHERWISE NOTED, WALLS AND SLABS SHOWN WITH A SINGLE LAYER OF REINFORCEMENT SHALL HAVE THAT REINFORCEMENT CENTERED.
- 8. CHAMFER EDGES OF PERMANENTLY EXPOSED CONCRETE SURFACES WITH A 45 DEGREE BEVEL AS SHOWN IN THE STANDARD DETAILS.
- 9. ALL REINFORCEMENT BENDS, LAPS AND SPLICES UNLESS OTHERWISE NOTED, SHALL SATISFY THE MINIMUM REQUIREMENTS SHOWN IN THE STANDARD DETAILS.
- 10. DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS SHOWN OTHERWISE.
- 11 BARS SHOWN WITH BENDS NOT DIMENSIONED SHALL BE ASSUMED TO END WITH A STANDARD HOOK AS SHOWN IN THE STANDARD DETAILS.
- 12. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1-1/3 TIMES THE MAXIMUM AGGREGATE SIZE
- 13. THE FIRST AND LAST BARS IN STRUCTURAL MEMBERS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING.
- 14. CONTRACTOR SHALL NOT BACKFILL AGAINST STRUCTURAL CONCRETE UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER. SEE SPECIFICATIONS
- 15. PLACE BACKFILL EQUALLY ON ALL SIDES OF STRUCTURES. SEE SPECIFICATIONS.
- 16. LOCATE CONSTRUCTION JOINTS WHERE SHOWN OR NOTED ON DRAWINGS. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL THE LOCATION OF PROPOSED CONSTRUCTION JOINTS.
- 17. MAXIMUM JOINT SPACING SHALL BE NO MORE THAN 30'.
- 18. MINIMUM TIME BETWEEN ADJACENT POURS SHALL BE 5 DAYS



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- SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH CHAPTER 17 OF THE IBC ARE 1 REQUIRED AS PART OF THIS PROJECT. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE COMPLIANCE WITH THESE OVERSIGHT AND QUALITY ASSURANCE REQUIREMENTS.
- THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE, ACTING AS 2 THE OWNERS AGENT WILL BE PROVIDING SPECIAL INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE IBC. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING ADEQUATE TIME AND ACCESS FOR COMPLETION OF SPECIAL INSPECTIONS BY THE OWNER OR OWNER'S AGENT. PRIOR TO COVERING THE WORK TO BE INSPECTED WITH NEW WORK.
- AS A MINIMUM, SPECIAL INSPECTIONS ARE TO BE COMPLETED FOR THE FOLLOWING AREAS OF 3. CONSTRUCTION

CONSTRUCTION TYPE	APPLICABLE CODE TABLE(S)
SOILS / FOUNDATIONS	IBC 1705.6
CONCRETE	IBC 1705.3
STRUCTURAL STEEL	AISC 360
STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL	IBC 1705.2.2

- 4. THE CONTRACTOR SHALL PROVIDE A "STATEMENT OF RESPONSIBILITY" TO THE OWNER OR OWNER'S AGENT, IN ACCORDANCE WITH SECTION 1706 OF THE IBC.
- SPECIAL INSPECTORS SHALL SUBMIT THEIR QUALIFICATIONS TO THE BUILDING OFFICIAL AND BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO BEGINNING WORK

DEFERRED SUBMITTAL ITEMS:

- 1. THE FOLLOWING PORTIONS OF THE PROJECT ARE DEFERRED SUBMITTAL ITEMS AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD
 - ANCHORAGE OF EQUIPMENT AND APPURTENANCES GRATING HYDRAULIC GATES LADDERS PRE-ENGINEERED BUILDING RAILING
- 2. DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE ENGINEER OF RECORD HAS REVIEWED THE SUBMITTAL DOCUMENTS AND INDICATED AS A MINIMUM THAT THEY HAVE BEEN REVIEWED AND FOUND TO BE IN GENERAL CONFORMANCE WITH THE DESIGN OF THE STRUCTURE.
- 3. DEFERRED SUBMITTAL ITEMS SHALL BE PREPARED AND STAMPED BY A LICENSED CIVIL OR STRUCTURAL PROFESSIONAL ENGINEER UNLESS OTHERWISE NOTED ELSEWHERE IN THESE DOCUMENTS.

STRUCTURAL STEEL AND STAINLESS STEEL NOTES:

MATERIALS SHALL CONFORM TO THE STANDARDS LISTED:

- STEEL HSS	ASTM A500, GRADE C
- STEEL CHANNELS	ASTM A36 (UNO)
- STEEL PLATE	ASTM A36
- STEEL ANGLES	ASTM A36
- STEEL BEAMS	ASTM A992
- STEEL BOLTS	ASTM A325
- STEEL ANCHOR BOLTS	ASTM F1554, GR 36
- STEEL HEADED ANCHOR STUDS (HAS)	TYPE A108
- STEEL WT	ASTM A992
- STAINLESS STEEL ANGLES	ASTM A276, TYPE 3041

- STAINLESS STEEL PLATE	ASTM A240, TYPE 304L
- STAINLESS STEEL HEADED ANCHOR STUDS (HAS)	TYPE 304L
- STAINLESS STEEL BOLTS	ASTM F593
- STAINLESS STEEL ANCHOR BOLTS	ASTM A193

- STAINLESS STEEL ANCHOR BOLTS - STAINLESS STEEL NUTS
- ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL BE IN ACCORDANCE WITH 2. THE LATEST STANDARDS OF THE AWS AND AISC. INSPECT ALL WELDING IN ACCORDANCE WITH THE SPECIFICATIONS.
- DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT ENGINEER'S WRITTEN 3. APPROVAL
- ALL STRUCTURAL STEEL MEMBERS AND MISCELLANEOUS ITEMS SHALL BE HOT DIP 4. GAI VANIZED AFTER FABRICATION

EXCAVATION AND ROCK TRIMMING:

- ACCOMPLISH WORK
- MATERIAI
- 5. CONTRACTOR

ROCK SURFACE PREPARATION:

- 1. SUBMIT A ROCK SURFACE PREPARATION PLAN FOR REVIEW.
- PRODUCTION ROCK SURFACE PREPARATION.
- STANDARD DETAIL 1
- 5. CONCRETE PLACEMENT
- 6. ENGINEER PRIOR TO CONCRETE PLACEMENT

NOTE:

THE CONTRACTOR SHALL WORK WITH THE ENGINEER TO IDENTIFY LOCATIONS FOR ROCK TRIMMING AND CONCRETE FILL.

TRIM LARGE ROCK PROJECTIONS (NOTE 3) -



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30% DESIGN									
NOT FOR CONSTRUCTION				ľ	BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY		WESTON FISH LIFT PASSA		
DATE: 06/03/2020	6/03/2020	30% DESIGN	M. GRAESER	F			DESIGN		
DATE: 00/03/2020	8/02/2019	PRELIMINARY DESIGN	B. MATER						
	REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY						

ASTM F594

1 PROVIDE ADEQUATE SURVEY CONTROL TO AVOID UNAUTHORIZED OVEREXCAVATION

2. REMOVE THE ORGANIC AND LOOSE/WEATHERED MATERIAL DOWN TO SOUND ROCK

3. EXCAVATE TO LINES, GRADES, AND DIMENSIONS SHOWN AND AS NECESSARY TO

4. TRIM TO NEAT LINES WHERE CONCRETE IS TO BE PLACED AGAINST FOUNDATION

EXCAVATION MATERIALS SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS AND AT A LOCATION DETERMINED BY THE

2. PREPARE A TEST SECTION FOR REVIEW BY THE ENGINEER PRIOR TO COMMENCEMENT OF

ROCK SHALL BE PREPARED BY A COMBINATION OF ROCK TRIMMING AND CONCRETE FILL TO A SMOOTHNESS AND UNIFORMITY SUITABLE FOR CONCRETE PLACEMENT. REFER TO

4. ROCK SURFACES AGAINST WHICH CONCRETE ARE TO BE PLACED SHALL BE CLEAN, FREE OF LOOSE MATERIAL, AND FREE FROM STANDING OR RUNNING WATER.

ROCK SURFACES SHALL BE CLEAN AND SATURATED SURFACE DRY (SSD) DURING

ROCK SURFACES TO BE IN CONTACT WITH NEW CONCRETE SHALL BE REVIEWED BY THE



ROCK SURFACE PREPARATION DETAIL SCALE: NTS

		PROJECT:	3173WEST	FISH
			M. ATV	WELL
_		DESIGNER:	M. GRA	ESER
	STRUCTURAL NOTES	APPROVED I	3Y: M. GRAE	ESER
		SHEET:	15 OF	90
		DRAWING:	S-0	01

GENERAL DESIGN CRITERIA:

- 1. THE FOLLOWING, DESIGN CODES, DESIGN CRITERIA AND STRUCTURE LOADS WERE USED TO COMPLETE THE STRUCTURAL DESIGN.
 - 2012 INTERNATIONAL BUILDING CODE
 - 2016 ASCE7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
 - AISC MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
 - ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, BY THE AMERICAN CONCRETE INSTITUTE.



ABORATORY DLDEN, MA 01520 w.aldenlab.com	30% DES NOT FOR CONSTR DATE: 06/03/2

2020	6/03/2020	30% DESIGN
2020	8/02/2019	PRELIMINARY
	REVISION	

30% DESIGN PRELIMINARY DESIGN DESCRIPTION OF ISSUE / REVISION

M. GRAESER

REVISED BY

B.MATER

VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

WESTON FISH LIFT PASSAGE DESIGN

		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
-		DESIGNER:	M. GRAESER
=	STRUCTURAL DESIGN CRITERIA	APPROVED B	Y: M. GRAESER
		SHEET: 1	6 OF 90
		DRAWING:	S-002









- 1. CONCRETE SLAB MUST HAVE MINIMUM THICKNESS OF 2'-0".
- 2. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
- 3. MAXIMUM HEIGHT OF FLOW FILL LIFT IS 4'-0".
- 4. MINIMUM STRUCTURAL CONCRETE THICKNESS AND REINFORCEMENT ARE SHOWN.
- 5. LOWER STRUCTURAL CONCRETE SURFACE CAN BE ALTERED (STEPPED, SLOPED, ETC.) TO ACCOMMODATE CONTRACTOR'S MEANS AND METHODS. CONTRACTOR SHALL SUBMIT PROPOSED CONSTRUCTION APPROACH FOR REVIEW BY ENGINEER.

		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
-		DESIGNER:	M. GRAESER
-	ANS INTARE STRUCTURAL CONCRETE	APPROVED B	BY: M. GRAESER
	SECTION		21 OF 90
		DRAWING:	S-105









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AAA/ DEALAN			<u>+</u>			· · · · · · · · · · · · · · · · · · ·	'	DRAWN BY:	M. ATWELL
30% DESIGN				VERIFY SCALF				DESIGNER:	M. GRAESER
INT FOR CONSTRUCTION				BAR IS ONE INCH ON ORIGINAL DRAWING		WESTON FISH LIFT FASSAGE	AVVS INTAKE & FISH LIFT -	APPROVED BY	Y: M. GRAESER
	6/03/2020	30% DESIGN	M. GRAESER			DESIGN	STRUCTURAL CONCRETE SECTIONS	SHEET: 25	.5 OF 90
DATE: 06/03/2020	8/02/2019	PRELIMINARY DESIGN	B. MATER	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	S				
	REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY			· · · · · · · · · · · · · · · · · · ·	'	DRAWING:	S-109









- 1. FLUSH FLOOR MOUNT SLEEVE SHALL BE MADE OF STURCTURAL STEEL.
- 2. LOCATE SLEEVE AT DIRECTION OF OWNER.
- 3. EACH MOUNT SHALL HAVE A CAP TO KEEP WATER AND DEBRIS OUT OF BASE.



STRUCTURAL STANDARD DETAILS	DESIGNER: APPROVED	M. GRAESER BY: M. GRAESER
(CONT'D)	SHEET:	59 OF 90
	DRAWING:	S-304





REVISION

DESCRIPTION OF ISSUE / REVISION

REVISED BY



NOTES:

- 1. GENERAL OVERVIEW OF GATE 1 (AWS ENTRANCE) IS PROVIDED:
- SIZE OF OPENING, 7.5'W x 6.5'H
- MOVEMENT OF GATE. UPWARD OPENING. -
- OPERATION OF GATE: OPEN / CLOSE
- 2. HEAD POND WATER LEVELS:
 MINIMUM XXX
 NORMAL XXX
- MAXIMUM XXX (100 YR)
- T/O GATE EL 157.0± (GATE IN CLOSED POSITION)

TOC EL 150.5

AWS INTAKE ISOLATION GATE	SHEET:	62 OF 9	90
	DRAWN BY: DESIGNER:	M. ATV M. GRAE	VELL SER
	PROJECT:	3173WEST	FISH





- 1. GENERAL OVERVIEW OF GATE 2 (ISOLATION GATE) IS PROVIDED:
- SIZE OF OPENING, 10.00'W x 19.60'H
- MOVEMENT OF GATE. UPWARD OPENING.
- OPERATION OF GATE: OPEN / CLOSE
- 2. TAILWATER ELEVATIONS:
- DESIGN LOW XXX
- NORMAL XXX
- DESIGN HIGH XXX

		aneel na ve Mu	FISHWAY ENTRANCE ISOLATION GATE	DESIGNER: M. GRAESER APPROVED BY: M. GRAESER
--	--	----------------	---------------------------------	---



WELDING NOTES:

- 1. WELDS SHALL BE CONTINUOUS SEAL WELDS.
- 2. ANY SKIN PLATE SPLICES SHALL BE FULL PENETRATION.

DESIGN NOTES:

- 1. WEIGHT OF WEIR PANEL ASSEMBLY 2500 POUNDS.
- 2. WEIR PANEL DESIGNED FOR A DIFFERENTIAL HEAD AT WSEL 94.0.



W6x16 -	STRUC MEMBER FLG TO FLG
	TRIM FLANGES AND CONTOUR WEB AS NEEDED
	¼" STRUC MEMBER WEB TO ¼" FLG & WEB(3 SIDES)
2	TYPICAL FRAME WELDS
<u> </u>	SCALE: 1"=1"-0"

	PROJECT:	3173WESTFISH
	DRAWN BY:	M. ATWELL
	DESIGNER:	M. GRAESER
FISH LIFT WEIR PANEL ELEVATION	APPROVED	BY: M. GRAESER
AND DETAILS	SHEET:	67 OF 90
	DRAWING:	M-106



- 1. ALL MEMBERS C6x8.2 (UNO)
- 2. SPLICE STEEL MEMBERS AS REQUIRED FOR INSTALLATION. PROVIDE 4 BOLTS AND $\%^{\rm "}$ SPACE AS SHOWN.
- 3. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.



		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
-		DESIGNER:	M. GRAESER
-	FISH LIFT BAFFLE 1 FLEVATION	APPROVED B	BY: M. GRAESER
TISHEIT BATTLE TELEVATION			39 OF 90
		DRAWING:	M-108







		PROJECT: DRAWN BY:	3173WES M. A	TFISH
Ξ	FISH LIFT V-GATE DETAILS	DESIGNER: APPROVED E SHEET: 8	M. GRA 3Y: M. GRA 33 OF	AESER AESER 90
		DRAWING:	M-	122



MAINE HISTORIC PRESERVATION COMMISSION 55 CAPITOL STREET 65 STATE HOUSE STATION AUGUSTA, MAINE 04333



KIRK F. MOHNEY DIRECTOR

December 28, 2020

Ms. Kathryn Sellers Reynolds Kleinschmidt PO Box 650 Pittsfield, ME 04967

Project: MHPC #1663-20

Weston Hydroelectric Project; FERC 2325 Upstream Fish Passage Facility

Town: Skowhegan, ME

Dear Ms. Reynolds:

In response to your recent request, I have reviewed the information received June 17, 2020 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that the proposed undertaking will have **no adverse effect** upon historic properties (architectural or archaeological), as defined by Section 106.

Please contact Megan Rideout at (207) 287-2992 or megan.m.rideout@maine.gov if we can be of further assistance in this matter.

Sincerely,

Kult. Mohney

Kirk F. Mohney / State Historic Preservation Officer



Providing practical solutions to complex problems affecting energy, water, and the environment

October 22, 2020

Attached Distribution List

<u>Weston Hydroelectric Project (FERC No. 2325)</u> <u>Upstream Fish Passage Facility – Project Review Submittal</u>

To Whom it May Concern:

Kleinschmidt Associates, on behalf of Brookfield White Pine Hydro, LLC (Brookfield), herein submits the information necessary for the tribe's review of the proposed upstream fish passage facility construction at the Weston Hydroelectric Project (FERC No. 2325) (Project). The Project is located on the Kennebec River in the Town of Skowhegan, Somerset County, Maine (see Attachment A).

Project Background

The 14.75-megawatt (MW) Weston Project is operated as a run-of-river facility and is located at river mile 82 of the Kennebec River. The Weston Project includes a 930-acre impoundment, two dams, and a powerhouse. The two dams are constructed on the north and south channels of the Kennebec River where the river is divided by Weston Island. U.S. Route 2 crosses the island, spanning the South Channel impoundment above South Channel Dam and the North Channel bypass section located below the North Channel Dam. The South Channel Dam is a concrete gravity and buttress dam 51-feet-high, with a crest elevation of 156.0 feet. The dam extends about 391.5 feet between abutment walls from the island to the south riverbank and consists of five sections: a 125-foot-long powerhouse/intake section; a 33-foot-long concrete spillway section; a 24-foot-long sluice section. The powerhouse/intake section of the dam, located adjacent to the north abutment and integral to the Project dam, includes the headworks and four intake bays, one for each of the four turbine generator units.

In accordance with the Project's 1997 FERC license and Water Quality Certificate (WQC), an upstream fish passage facility is required to operate at the Project. On September 16, 1998 the Federal Energy Regulatory Commission (FERC) issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement). The 1998 Settlement and corresponding 1998 Water Quality Certificate (WQC) # L-17472-33-C-M amended and updated the Project's 1997 FERC license upstream fish passage requirements. Both the Settlement and WQC stipulate that operation upstream fish passage would be required within two years after the either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC NO. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

Since the 1998 Settlement, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with the FERC a 2013 Interim Species Protection Plan (Interim SPP) for Atlantic Salmon. On May 19, 2016, FERC amended the Weston License to include the Interim SPP that requires an upstream fish passage facility be designed and constructed at the Project. On July 13, 2020, FERC updated the required operational date for the upstream fish passage to May 31, 2022.

In accordance with the Interim SPP, Brookfield proposes to construct a permanent upstream fish passage facility at the Weston Project to provide passage for upstream migration of salmon and other anadromous species.

The proposed facility has been designed in consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife. As such, Brookfield proposes to install a fish lift system to connect the tailrace with the headpond so to provide a zone of passage for upstream migrants. Attachment C depicts the area of project effect.

Proposed Construction Project

BWPH proposes to construct a fish lift system with integrated AWS spillway to provide for permanent upstream fish passage. The fish lift and AWS spillway will be located between the powerhouse and the log sluice on the south channel dam. The total system will be approximately 30-feet-wide by 70-feet-high. An approximate 15-foot-long section of the south channel dam will be removed down to elevation 144 feet to make space for installation of the AWS spillway. Minor bedrock excavation will additionally be required for installation of the fishway entrance.

The fish lift facility will provide a total attraction flow of up to 304 cubic feet per second (cfs) and will have a cycle time of 15 minutes. Migrating fish will swim into a chamber that will lift them to the fish lift exit pipe at approximately elevation 165.5-feet where they will swim out the approximately 215-foot-long pipe and exit from the pipe at elevation 159-feet and into the headpond at elevation 156-feet to continue their migration upstream.

Brookfield plans to begin construction in spring of 2021 when spring river flows recede and safe river access can be accomplished. Construction activities will include the construction of a temporary access road adjacent to Mill Street in Skowhegan. This will involve some tree removal and grading. The upland access area will be surrounded with a silt fence system. A temporary contractor designed cofferdam will be constructed on the downstream side of the access road and around the fish lift construction area in the tailrace. A small temporary contractor designed cofferdam will also be constructed in the headpond, upstream of the fish lift work area. Turbidity curtain systems will additionally be placed around the cofferdams.

Tribal Review Request

In accordance with Section 106 of the National Historic Preservation Act (NHPA), we are requesting the tribe's review of the upstream fish passage facility. Attached please find a USGS topographic map and project location map depicting the proposed project area (Attachment A), photos of the proposed area of project effect (Attachment B), and engineering drawings depicting the proposed project (Attachment C). As required by the U.S. Army Corps of Engineers (USACE), a request for project review is also being provided to the appropriate federally recognized Indian tribes.

Should you have any questions upon review, please contact me at 207.416.1218 or at <u>Katie.Sellers@kleinschmidtgroup.com</u>. Due to COVID-19 related work from home restrictions, please forward any project related responses via email.

Sincerely,

KLEINSCHMIDT ASSOCIATES

Kathryn Sellers Reynolds Regulatory Coordinator

KSR:TMJ Attachments: Attachment A Attachment B

Attachment A – USGS Topographic and Google Earth Maps Attachment B – Project Area Photos Attachment C – 30% Design Drawings

cc: Nathan Baker and Kelly Maloney, Brookfield Renewable Uriah Forest-Bulley, Kleinschmidt Associates

DISTRIBUTION LIST

Chief Ralph Dana & THPO Passamaquoddy Tribe of Indians Pleasant Point Reservation P.O. Box 343 Perry, ME 04667 <u>soctomah@gmail.com</u>

Chief William J. Nicholas, Sr. & THPO Passamaquoddy Tribe of Indians Indian Township P.O. Box 301 Princeton, ME 04668 <u>soctomah@gmail.com</u>

Chris Sockalexis, THPO Penobscot Indian Nation Cultural and Historic Preservation Dept. 12 Wabanaki Way Indian Island, ME 04468 <u>chris.sockalexis@penobscotnation.org</u>

Chief Edward Peter Paul & THPO Aroostook Band of Micmacs 7 Northern Road Presque Isle, ME 04769 jpictou@micmac-nsn.gov

Susan Young Historic Preservation Officer Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730

Houlton Band of Maliseet Indians 88 Bell Road Littleton, Maine 04730 (207) 532-4273, x215 (phone) (207) 532-6883 (fax) envplanner@maliseets.com

ATTACHMENT A

USGS TOPOGRAPHIC AND GOOGLE EARTH MAPS



Figure 1 Weston Upstream Fish Passage Project Area - Proposed Work Location (Topo Map)


Figure 2 Weston Upstream Fish Passage - Proposed Work Area

ATTACHMENT B

PROJECT AREA PHOTOS



2019 Photo Looking Upstream at Southern Channel Dam View Direction: South West Photographer Location: Walking Bridge Downstream of Project Facilities.



2019 Photo Looking Downstream at Southern Channel Dam. View Direction: North East Photographer Location: Island Ave Bridge

ATTACHMENT **C**

30% DESIGN DRAWINGS

WESTON FISH LIFT PASSAGE DESIGN



LOCATION MAP



BROOKFIELD WHITE PINE HYDRO, LLC

PREPARED BY





ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldeniab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/02/2020 8/02/2019 REVISION	30% DESIGN PRELIMINARY DESIGN DESCRIPTION OF ISSUE / REVISION	M. GRAESER B. MATER REVISED BY	VERIFY SCA BAR IS ONE INCH ORIGINAL DRAWI IF NOT ONE INCH ON SHEET, ADJUST SC. ACCORDINGLY		WESTON FISH LIFT PASSAGE DESIGN	COVER SHEET, VICINITY MAPS	PROJECT: 3173WESTFISI DRAWN BY: M. ATWEL DESIGNER: M. GRAESEI APPROVED BY: M. GRAESEI SHEET: 1 OF 91 DRAWING: G-001	
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		DRAWING LIST
SHEET	DRAWING	DESCRIPTION
GENER	AL	
1	G-001	COVER SHEET, VICINITY MAPS
2	G-002	DRAWING LIST
3	G-003	GENERAL NOTES AND ABBREVIATIONS
4	G-004	EXISTING CONDITIONS OVERALL SITE PLAN
5	G-005	SITE ACCESS, CONSTRUCTION LIMITS, GEOTECHNICAL BORINGS, AND SURVEY CONTROL
6	G-006	STAGING AREAS, EROSION CONTROL, & DEWATERING PLAN
7	G-007	EROSION CONTROL & DEWATERING DETAILS
CIVIL		
8	C-100	OVERALL SITE PLAN
9	C-101	DEMOLITION & ROCK EXCAVATION PLAN
10	C-102	DEMOLITION & ROCK EXCAVATION SECTIONS
11	C-103	AWS INTAKE AND FISH LIFT GENERAL ARRANGEMENT PLAN
12	C-104	FISH LIFT GENERAL ARRANGEMENT SECTION
13	C-105	AWS INTAKE GENERAL ARRANGEMENT SECTION
14	C-106	EXITING PIPING PLAN AND PROFILE
STRUC	TURAL	
15	S-001	STRUCTURAL NOTES
16	S-002	STRUCTURAL DESIGN CRITERIA
17	S-101	AWS INTAKE & FISH LIFT - STRUCTURAL CONCRETE EL 145.00
18	S-102	AWS INTAKE & FISH LIFT - STRUCTURAL CONCRETE EL 157.00
19	S-103	AWS INTAKE & FISH LIFT - ENLARGED PLANS & DETAILS
20	S-104	AWS INTAKE & FISH LIFT - ENLARGED PLANS FTC
21	S-105	AWS INTAKE STRUCTURAL CONCRETE SECTION
21	S-106	
22	S-107	
23	S-107	
24	S-100	
23	S-109	
20	0.444	
20	0-111	
28	5-112	FISH LIFT STRUCTURAL CONCRETE SECTIONS & DETAILS
29	S-118	ELECTRICAL ENCLOSURE
30	S-201	GENERAL STEEL FRAMING PLAN AT ELEVATION 135.00
31	S-202	GENERAL STEEL FRAMING PLAN AT ELVATION 157.00
32	S-203	TOWER STEEL FRAMING SECTIONS
33	S-204	TOWER STEEL FRAMING SECTIONS
34	S-205	TOWER STEEL FRAMING SECTIONS
35	S-206	TOWER STEEL FRAMING SECTIONS (CONT'D)
36	S-207	TOWER STEEL FRAMING SECTIONS (CONT'D)
37	S-208	TOWER STEEL FRAMING STAIR SECTIONS
38	S-209	TOWER STEEL FRAMING PLATFORM PLANS
39	S-210	TOWER STEEL FRAMING PLATFORM PLANS (CONT'D)
40	S-211	TOWER STEEL FRAMING SECTIONS AND DETAILS
41	S-212	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
42	S-213	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
43	S-214	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
44	S-215	TOWER STEEL FRAMING SECTIONS AND DETAILS (CONT'D)
45	S-216	STAIR SECTIONS AND DETAILS
46	S-217	TRANSITION FLUME AND PLAN SECTIONS
47	S-218	TRANSITION FLUME AND FISH EXIT PIPE FRAMING PLANS
48	S-219	TRANSITION FLUME DETAILS
49	S-220	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DETAILS
50	S-221	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
51	S-222	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
52	S-223	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
53	S-224	TRANSITION FLUME AND FISH EXIT PIPE SEC. & DET. (CO)
54	S-225	FISH EXIT PIPE SUPPORT DETAILS
55	S-226	
56	S-301	
57	S-301	
51	S-302	
E0	0.0-00.5	STRUCTURAL STAINDARD DETAILS (CUNTD)
58	S-204	
58 59	S-304	STRUCTURAL STANDARD DETAILS (CONT'D)

MECH	HANICAL	
62	M-101	AWS INTAKE ISOLATION GATE
63	M-102	AWS INTAKE SCREEN
64	M-103	FISHWAY ENTRANCE ISOLATION GATE
65	M-104	FISH LIFT WEIR ELEVATION
66	M-105	FISH LIFT WEIR SECTION DETAILS AND EMBEDMENTS
67	M-106	FISH LIFT WEIR PANEL ELEVATION AND DETAILS
68	M-107	FISH LIFT WEIR PANEL SECTION DETAILS AND EMBEDMENTS
69	M-108	FISH LIFT BAFFLE 1 ELEVATION
70	M-109	FISH LIFT BAFFLE 1 SECTION DETAILS AND EMBEDMENTS
71	M-110	FISH LIFT BAFFLE 2 ELEVATION
72	M-111	FISH LIFT BAFFLE 2 SECTION DETAILS AND EMBEDMENTS
73	M-112	FISH LIFT UPSTREAM SCREEN ELEVATION
74	M-113	FISH LIFT UPSTREAM SCREEN SECTION, DETAILS, AND EMBEDMENTS
75	M-114	FISH LIFT HOPPER - GENERAL LAYOUT AND INFORMATION
76	M-115	FISH LIFT HOPPER DETAILS
77	M-116	FISH LIFT HOPPER - HOPPER GATE AND BRAIL DETAILS
78	M-117	FISH LIFT HOPPER - GENERAL LAYOUT AND INFORMATION
79	M-118	FISH LIFT HOPPER - STEEL COMPONENTS (LIFTING FRAME)
80	M-119	FISH LIFT HOPPER - STEEL COMPONENTS (MISC)
81	M-120	FISH LIFT V-GATE GENERAL PLAN, ELEVATION, & DETAILS
82	M-121	FISH LIFT V-GATE OPERATOR SUPPORT DETAILS
83	M-122	FISH LIFT V-GATE DETAILS
84	M-123	FISH LIFT V-GATE STEEL FRAMING PLANS
85	M-124	FISH LIFT V-GATE BEARING DETAILS
86	M-125	FISH LIFT ENTRANCE GATE ELEVATION AND STEM DETAILS
87	M-126	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS
88	M-127	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS (CO)
89	M-128	FISH LIFT ENTRANCE GATE STEEL SECTIONS & DETAILS (CO)
90	M-129	FISH LIFT ENTRANCE ISOLATION GATE REQUIREMENT

ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020	30% DESIGN PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCALE BAR IS DAE INCLON ORIGINAL DRAWING IF NOT ONE INCLOSE SVEET, ADJUST SCALES ACCORDINGLY	WESTON FISH LIFT PASSAGE DESIGN	DRAWING LIST	PROJECT: 3173WE DRAWN BY: M. J DESIGNER: M. G APPROVED BY: M. G SHEET: 2 OF	ESTFISH ATWELL RAESER RAESER 90
		REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY	ACCORDINGLY			DRAWING: G	-002

GENERAL NOTES:

- 1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE DRAWINGS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR ACCURATE. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING THE WORK. SHOULD THE CONTRACTOR IDENTIFY ANY UTILITIES, STRUCTURES OR FEATURES NOT SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY.
- 2. ALL UTILITIES SHALL BE KEPT IN OPERATION EXCEPT WITH THE EXPRESS WRITTEN CONSENT OF THE UTILITY OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PRESERVE EXISTING UTILITIES. ANY AND ALL DAMAGE TO EXISTING UTILITIES AS A RESULT OF THE CONTRACTOR'S ACTIONS, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
- 3. REMOVE, REPLACE OR RELOCATE ALL OVERHEAD INTERFERENCE WHICH MAY AFFECT OPERATION DURING CONSTRUCTION AND TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO SAME. USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD OR UNDERGROUND POWER, GAS OR OTHER UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS AND LIABILITY IN CONNECTION THEREWITH.
- 4. COORDINATE UNDERGROUND UTILITY MARKING WITH THE EXISTING UTILITIES BY CONTACTING DIGSAFE AT 1-888-344-7233 OR 811 DIGSAFE MUST BE CONTACTED A MINIMUM OF 72 HOURS PRIOR TO CONSTRUCTION OR GROUND DISTURBANCE.
- 5. THE CONTRACTOR SHALL REVIEW THE SITE TO DETERMINE EXISTING CONDITIONS. ANYTHING NOT SHOWN ON THESE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA, UNLESS RECOMMENDED BY THE ENGINEER AND APPROVED BY THE OWNER.
- 6. CONTACT THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS ARISING DURING THE CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.
- 7. PRESERVE ALL SURVEY MARKERS AND MONUMENTATION WHEREVER POSSIBLE, THOSE REQUIRING REMOVAL SHALL BE RE-ESTABLISHED IN ACCORDANCE WITH THE LOCAL, STATE, OR FEDERAL GOVERNING AUTHORITY
- 8. ALL DRAWINGS AND DETAILS INCLUDED IN THE CONTRACT DOCUMENTS SHALL FULLY APPLY TO THE WORK WHETHER SPECIFICALLY REFERENCED OR NOT
- 9. LIMIT CONSTRUCTION OPERATIONS TO WITHIN THE RIGHT-OF-WAY. EASEMENTS, AND DESIGNATED WORK AREAS AS INDICATED. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGES OUTSIDE THE DESIGNATED WORK AREAS SHOWN ON THE DRAWINGS.
- 10. RESTORE ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. REFER TO RECLAMATION OF DISTURBED AREAS IN SPECIFICATIONS.
- 11. THE CONTRACTOR SHALL REPLACE ALL ROADS, STABILIZED EARTH, FENCES, AND DRIVEWAYS, ETC., WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED DURING CONSTRUCTION.
- 12. SHORING REQUIRED FOR THE STABILITY OF THE UNCOMPLETED STRUCTURE OR FOR INSTALLATION OR MODIFICATION OF STRUCTURAL MEMBERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY
- 13. DIMENSIONS OF VALVES, FITTINGS AND OTHER EQUIPMENT MAY VARY DEPENDING UPON MANUFACTURER. CONTRACTOR SHALL REVIEW SHOP DRAWINGS BEFORE SETTING BASES, SUPPORTS, ETC.
- 14. EXISTING FENCING DISTURBED OR REMOVED SHALL BE REPLACED IN-KIND.
- 15.IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A SECURE PROJECT SITE. BROOKFIELD WHITE PINE HYDRO, LLC. WILL NOT BE RESPONSIBLE FOR STOLEN OR VANDALIZED PROPERTY
- 16. AT THE CLOSE OF EACH WORKING SHIFT, WHERE THE NEXT SHIFT WILL NOT IMMEDIATELY FOLLOW, PROTECT AND SECURE OPEN **EXCAVATION**

FISH PASSAGE NOTES:

1. POWERHOUSE 6075 CFS CAPACITY

2. RIVER FLOW

DESIGN LOW	2500 CFS (95% EXCEEDANCE
AVERAGE	6100 CFS (50% EXCEEDANCE
DESIGN HIGH	20300 CFS (5% EXCEEDANCE
50 YEAR	124,800 CFS
100 YEAR	142,400 CFS

3. WATER LEVELS

EAD POND ELEV	ATIONS
ESIGN LOW	155.5 FT
IORMAL	156 FT
ESIGN HIGH	156.5 FT
0 YEAR	165 FT
00 YEAR	169.5 FT

TAILWATER ELEVATIO	DNS
DESIGN LOW	121.3 FT (95% EXCEEDANCE)
NORMAL	123.0 FT
DESIGN HIGH	129 FT (5% EXCEEDANCE)
50 YEAR	144.5 FT
100 YEAR	147.6 FT

4. TARGET SPECIES AND FISHWAY DESIGN POPULATIONS (NOAA DESIGN MEMORANDUM 2016)

ATLANTIC SALMON:	11,300
AMERICAN SHAD:	106,000
ALEWIVES:	51,000
BLUEBACK HERRING	922,000

5. FISH PASSAGE FACILITIES WILL BE OPERATIONAL FROM MAY 1ST TO OCT 31ST

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6. FISHWAY ENTRANCE
```

6 INCH HEAD DROP HINGED FLAP GATE TO MAINTAIN TARGET HEAD DROP AND VELOCITY INVERT EL. 115 FT **10 FT ENTRANCE WIDTH**

7. FISHWAY ATTRACTION WATER SYSTEM

TOTAL ATTRACTION FLOW 304 CFS (5% STATION CAPACITY) FISH LIFT ENTRNACE UP TO 220 CFS AWS AUXILIARY SPILLWAY UP TO 300 CFS AWS INTAKE SCREEN 0.25 INCH SLOT WIDTH WEDGE WIRE

8. FISH LIFT DESIGN FEATURES

FISH LIFT CYCLE TIME 15 MIN TWO SIDED BRAIL, 9.5 DEGREE SLOPE, SMOOTH ALUMINUM W/ 50% POROSITY HOPPER VOLUME 490 CUFT ADJUSTABLE V-TRAP OPENING BETWEEN 1 AND 3 FT 20 INCH SMOOTH FIBERGLASS PIPE, 2% SLOPE EXIT FLUME

LEDEND & SYMBOLS - - - - APPROXIMATE PROPERTY LINE - NHW------- NORMAL HIGH WATER LINE TC TURBIDITY CURTAIN — тс-COFFERDAM / BULKHEAD / DEWATERING STRUCTURE GRATING SPAN DIRECTION – RAILING -----💮 в-х GEOTECHNICAL BORING (3 1/2" BORING) ۲ GEOTECHNICAL BORING (2 1/2" BORING) 45° ANGLED BORING DRILLED IN DIRECTION INDICATED FLOW UNDISTURBED SOIL FLOW FILL GROUT CONCRETE GRATING BEDROCK CONCRETE DEMOLITION EXCAVATE BEDROCK

30% DESIGN ALDEN RESEARCH LABORATORY VERIEY SCALE WESTON FISH LIFT PASSAGE 30 SHREWSBURY ST. HOLDEN, MA 01520 NOT FOR CONSTRUCTION BAR IS ONE IN ORIGINAL DRA TEL: (508) 829-6000 www.aldenlab.com DESIGN 6/03/2020 30% DESIGN M. GRAESER DATE: 06/03/2020 IOT ONE INCH ON T EET, ADJUST SCAL 8/02/2019 PRELIMINARY DESIGN 3. MATER REVISION DESCRIPTION OF ISSUE / REVISION REVISED BY

ABBREVIATIONS:

F	GENERAL NOTES AND	PROJECT: DRAWN BY: DESIGNER:	317	73WE	STFISH TWELL AESER
	ABBREVIATIONS	SHEET: DRAWING:	3 3	OF G-	90 90 003



1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

	PROJECT:	3173WE	STFISH
	DRAWN BY:	M. A	ATWELL
	DESIGNER:	M. GF	RAESER
EXISTING CONDITIONS OVERALL SITE	APPROVED	BY: M. GF	RAESER
PLAN	SHEET:	4 OF	90
	DRAWING:	G	-004



1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.

LEGEND:



GEOTECHNICAL BORING (3 ½" BORING) GEOTECHNICAL BORING (2 ½" BORING) 45° ANGLED BORING DRILLED IN DIRECTION INDICATED

BORING TABLE							
BORING	NORTHING	EASTING	DESCRIPTION				

	DRAW
SITE ACCESS, CONSTRUCTION LIMITS,	DESIC
GEOTECHNICAL BORINGS, AND	APPR
	SHEE
SURVEY CONTROL	

PROJECT:	317300	ESTRISH
DRAWN BY:	М.	ATWELL
DESIGNER:	M. G	RAESER
APPROVED B	3Y: M. G	RAESER
SHEET:	5 OF	90

G-005



- 1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS, ELEVATIONS, AND DIMENSIONS OF ALL EXISTING UTILITIES AND STRUCTURES.
- 2. SEE DRAWING G-007 FOR TYPICAL DETAILS.

LEGEND:

- - COFFERDAM/BULKHEAD/DEWATERING STRUCTURE

------ NHW------- NORMAL HIGH WATER LINE

	PROJECT:	31	73WE	STFISH
	DRAWN BY:		M. A	TWELL
	DESIGNER:		M. GR	RAESER
STAGING AREAS, EROSION CONTROL,	APPROVED	BY:	M. GR	AESER
& DEWATERING PLAN	SHEET:	6	OF	90
	DRAWING:		G-	-006



8/02/2019

REVISION

PRELIMINARY DESIGN

DESCRIPTION OF ISSUE / REVISION

B. MATER

REVISED BY

DESIGN

SOIL EROSION & SEDIMENT CONTROL NOTES:

- SEDIMENTATION BASIN: SEDIMENT LADEN WATER SHALL NOT BE 1. RELEASED INTO ANY WATERWAY. CONTRACTOR SHALL PROVIDE APPROPRIATE SIZED SEDIMENTATION BASIN, WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES FOR ALL DEWATERING OR WATER DIVERSION ACTIVITIES.
- SILT FENCE: IF NEEDED TO CONTROL WATER CONTAMINATION. 2 PROVIDE SILT FENCE CONFORMING TO THE FOLOWING:
 - EQUIVALENT OPENING SIZE OF A US STANDARD SIEVE SIZED 40 (MAX), 70 (MIN).
 - MULLEN BURST STRENGTH 200 PSI.
 - GRAB STRENGTH 120 LBS MIN.
 - SPUN-BONDED NYLON FABRIC REINFORCED WITH POLYESTER NETTING, OR POLYPROPYLENE FABRIC WITH 2" x 4" 12 GA WOVEN WIRE BACKING FENCE.
- 3. DE-SILTING BASINS OR WATER FILTERING BAGS OR OTHER APPROVED SEDIMENT REMOVAL DEVICES ON SHORE SHALL HAVE A VEGETATIVE BUFFER FOR THE DISCHARGE. BASINS NEED TO BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF THE WAY OF LAYDOWN AND CONSTRUCTION ACTIVITIES.

EROSION CONTROL & DEWATERING DETAILS	PROJECT: DRAWN BY: DESIGNER: APPROVED E SHEET:	3173WES M. AT M. GRA 3Y: M. GRA 7 OF	TFISH WELL ESER ESER 90
	DRAWING:	G-0	007









ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020 30% DESIGN 8/02/2019 PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCA BAR IS ONE INCH ORIGINAL DRAWN IF NOT ONE INCH ON SHEET, ADURTS OF SHEET, ADURTS OF	E H is	WESTON FISH LIFT PASSAGE DESIGN	DEMOLITION & ROCK EXCAVATION SECTIONS	PROJECT: 317 DRAWN BY: DESIGNER: I APPROVED BY: SHEET: 10	173WESTFISH M. ATWELL M. GRAESER M. GRAESER OF 90
		REVISION DESCRIPTION OF ISSUE / REVISION	REVISED BY	, ACCONDUCE,				DRAWING:	C-102

EXCAVATION NOTE:

 SLOPES SHOWN ARE APPROXIMATE. ACTUAL SLOPES WILL VARY BASED ON CONTRACTORS COMPLIANCE WITH APPLICABLE SAFETY REQUIREMENTS.

LEGEND:



CONCRETE DEMOLITION





B AWS INTAKE SECTION VIEW C-103 SCALE: 1"=6'

ALDEN RESEARCH LABORATORY 30 SHREWSBURY ST, HOLDEN, MA 01520 TEL: (508) 829-6000 www.aldenlab.com	30% DESIGN NOT FOR CONSTRUCTION DATE: 06/03/2020	6/03/2020 8/02/2019	30% DESIGN PRELIMINARY DESIGN	M. GRAESER B. MATER	VERIFY SCALE BAR IS ONE REVION ORIGINAL DRAWING F NOT ONE REVION THES SHEET, ADJAST SCALES ACCORDINGLY	WESTON FISH LIFT PASSAGE DESIGN	FISH LIFT GENERAL ARRANGEMENT SECTION	PROJECT: DRAWN BY: DESIGNER: APPROVED B SHEET: 1 DRAWING:	3173WEST M. AT M. GRAN 3Y: M. GRAN 12 OF C-1	FISH NELL ESER 90
		REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY				DRAWING.	0-1	07

- ISOLATION GATE RAISED

EL 145.0

EL 133.0' - HINGED ENTRANCE GATE HIGH WSL EL 129.0'

MAX GATE HEIGHT EL 125.1 ▼ LOW WSL —EL 121.3'

EL 115.0' EL 113.5'



REVISED BY

REVISION

DESCRIPTION OF ISSUE / REVISION

		PROJECT:	3173W	ESTFISH
		DRAWN BY:	М.	ATWELL
-		DESIGNER:	M. G	RAESER
=	ARRANGEMENT SECTION	APPROVED	8Y: M. G	RAESER
		SHEET:	13 OF	90
		DRAWING:	С	-105



DUTH	0+25						
	CL STA 0+39.97 PIPE SUDPORT EL=161.80'	CL STA 0+29 97 PIPE SUPPORT EL=161.60'	CL STA 0+19.98 EL=161.40' AL CL STA 0+14.99	HPPE ACCESS EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30' EL=161.30'		190 185 180 175 170 170 165 160 155 150 145 140	
+50 E	0+40	0+30	0+20	0+10	0+00	135 130 -0+10 PROJECT: DRAWN BY: DESIGNER:	3173WESTFISH M. ATWELL M. GRAESER

GENERAL NOTES:

- THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS
- 2. ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE OTHER PROJECT DRAWINGS AND SPECIFICATIONS.
- 3 REFER TO CIVIL MECHANICAL ELECTRICAL AND OTHER DISCIPLINES DRAWINGS FOR ANCHORS, PIPE SLEEVES, CONDUITS OR OTHER ITEMS TO BE EMBEDDED IN OR THAT PASS THROUGH THE STRUCTURE. IN GENERAL, EMBEDMENTS AND PENETRATIONS LESS THAN 12 INCHES IN DIAMETER ARE NOT SHOWN ON THE STRUCTURAL DRAWINGS.
- 4. STANDARD DETAILS SHALL BE USED AT ALL APPLICABLE LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- 5. PLANS ON THESE DRAWINGS ARE TREATED AS HORIZONTAL SECTIONS (I.E. "PLANS AT ELEVATION 100.00" SHOW ITEMS BELOW 100.00).
- DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
- 7. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO CONSTRUCTION. NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS
- SHOP DRAWINGS SHALL BE FURNISHED FOR REVIEW BEFORE ANY FABRICATION AND ERECTION IS STARTED. POORLY EXECUTED SHOP DRAWINGS SHALL BE REJECTED AND RESUBMITTED

CONCRETE NOTES:

- 1. SPECIFIED MINIMUM COMPRESSIVE STRENGTH OF CLASS A STRUCTURAL CONCRETE SHALL BE 4500 PSI AT 28 DAYS UNLESS OTHERWISE NOTED. REFER TO THE SPECIFICATIONS
- 2. CONCRETE WORK SHALL CONFORM TO ACI 301 AND ACI 318.
- 3. REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615 OR A706, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60.
- 4. ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI-315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION
- 5. REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH PIPE, PIPE FLANGE OR METAL PARTS EMBEDDED IN CONCRETE, A MINIMUM OF 2 INCHES CLEARANCE SHALL BE PROVIDED AT ALL TIMES.
- 6. UNLESS OTHERWISE SHOWN ON THE DRAWINGS CONCRETE COVER FOR REINFORCING BARS SHALL BE 3" UNO
- 7. UNLESS OTHERWISE NOTED, WALLS AND SLABS SHOWN WITH A SINGLE LAYER OF REINFORCEMENT SHALL HAVE THAT REINFORCEMENT CENTERED.
- 8. CHAMFER EDGES OF PERMANENTLY EXPOSED CONCRETE SURFACES WITH A 45 DEGREE BEVEL AS SHOWN IN THE STANDARD DETAILS.
- 9. ALL REINFORCEMENT BENDS, LAPS AND SPLICES UNLESS OTHERWISE NOTED, SHALL SATISFY THE MINIMUM REQUIREMENTS SHOWN IN THE STANDARD DETAILS.
- 10. DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS SHOWN OTHERWISE.
- 11 BARS SHOWN WITH BENDS NOT DIMENSIONED SHALL BE ASSUMED TO END WITH A STANDARD HOOK AS SHOWN IN THE STANDARD DETAILS.
- 12. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1-1/3 TIMES THE MAXIMUM AGGREGATE SIZE
- 13. THE FIRST AND LAST BARS IN STRUCTURAL MEMBERS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING.
- 14. CONTRACTOR SHALL NOT BACKFILL AGAINST STRUCTURAL CONCRETE UNTIL CONCRETE HAS REACHED ITS DESIGN STRENGTH UNLESS OTHERWISE APPROVED IN WRITING BY ENGINEER. SEE SPECIFICATIONS
- 15. PLACE BACKFILL EQUALLY ON ALL SIDES OF STRUCTURES. SEE SPECIFICATIONS.
- 16. LOCATE CONSTRUCTION JOINTS WHERE SHOWN OR NOTED ON DRAWINGS. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL THE LOCATION OF PROPOSED CONSTRUCTION JOINTS.
- 17. MAXIMUM JOINT SPACING SHALL BE NO MORE THAN 30'.
- 18. MINIMUM TIME BETWEEN ADJACENT POURS SHALL BE 5 DAYS



|--|

- SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH CHAPTER 17 OF THE IBC ARE 1 REQUIRED AS PART OF THIS PROJECT. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE COMPLIANCE WITH THESE OVERSIGHT AND QUALITY ASSURANCE REQUIREMENTS.
- THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE, ACTING AS 2 THE OWNERS AGENT WILL BE PROVIDING SPECIAL INSPECTIONS IN ACCORDANCE WITH CHAPTER 17 OF THE IBC. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING ADEQUATE TIME AND ACCESS FOR COMPLETION OF SPECIAL INSPECTIONS BY THE OWNER OR OWNER'S AGENT. PRIOR TO COVERING THE WORK TO BE INSPECTED WITH NEW WORK.
- AS A MINIMUM, SPECIAL INSPECTIONS ARE TO BE COMPLETED FOR THE FOLLOWING AREAS OF 3. CONSTRUCTION

CONSTRUCTION TYPE	APPLICABLE CODE TABLE(S)
SOILS / FOUNDATIONS	IBC 1705.6
CONCRETE	IBC 1705.3
STRUCTURAL STEEL	AISC 360
STEEL CONSTRUCTION OTHER THAN STRUCTURAL STEEL	IBC 1705.2.2

- 4. THE CONTRACTOR SHALL PROVIDE A "STATEMENT OF RESPONSIBILITY" TO THE OWNER OR OWNER'S AGENT, IN ACCORDANCE WITH SECTION 1706 OF THE IBC.
- SPECIAL INSPECTORS SHALL SUBMIT THEIR QUALIFICATIONS TO THE BUILDING OFFICIAL AND BE APPROVED BY THE BUILDING OFFICIAL PRIOR TO BEGINNING WORK

DEFERRED SUBMITTAL ITEMS:

- 1. THE FOLLOWING PORTIONS OF THE PROJECT ARE DEFERRED SUBMITTAL ITEMS AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD
 - ANCHORAGE OF EQUIPMENT AND APPURTENANCES GRATING HYDRAULIC GATES LADDERS PRE-ENGINEERED BUILDING RAILING
- 2. DEFERRED SUBMITTAL ITEMS SHALL NOT BE INSTALLED UNTIL THE ENGINEER OF RECORD HAS REVIEWED THE SUBMITTAL DOCUMENTS AND INDICATED AS A MINIMUM THAT THEY HAVE BEEN REVIEWED AND FOUND TO BE IN GENERAL CONFORMANCE WITH THE DESIGN OF THE STRUCTURE.
- 3. DEFERRED SUBMITTAL ITEMS SHALL BE PREPARED AND STAMPED BY A LICENSED CIVIL OR STRUCTURAL PROFESSIONAL ENGINEER UNLESS OTHERWISE NOTED ELSEWHERE IN THESE DOCUMENTS.

STRUCTURAL STEEL AND STAINLESS STEEL NOTES:

MATERIALS SHALL CONFORM TO THE STANDARDS LISTED:

- STEEL HSS	ASTM A500, GRADE C
- STEEL CHANNELS	ASTM A36 (UNO)
- STEEL PLATE	ASTM A36
- STEEL ANGLES	ASTM A36
- STEEL BEAMS	ASTM A992
- STEEL BOLTS	ASTM A325
- STEEL ANCHOR BOLTS	ASTM F1554, GR 36
- STEEL HEADED ANCHOR STUDS (HAS)	TYPE A108
- STEEL WT	ASTM A992
- STAINLESS STEEL ANGLES	ASTM A276, TYPE 3041

- STAINLESS STEEL PLATE	ASTM A240, TYPE 304L
- STAINLESS STEEL HEADED ANCHOR STUDS (HAS)	TYPE 304L
- STAINLESS STEEL BOLTS	ASTM F593
- STAINLESS STEEL ANCHOR BOLTS	ASTM A193

- STAINLESS STEEL ANCHOR BOLTS - STAINLESS STEEL NUTS
- ALL WELDING SHALL BE DONE BY CERTIFIED WELDERS AND SHALL BE IN ACCORDANCE WITH 2. THE LATEST STANDARDS OF THE AWS AND AISC. INSPECT ALL WELDING IN ACCORDANCE WITH THE SPECIFICATIONS.
- DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT ENGINEER'S WRITTEN 3. APPROVAL
- ALL STRUCTURAL STEEL MEMBERS AND MISCELLANEOUS ITEMS SHALL BE HOT DIP 4. GAI VANIZED AFTER FABRICATION

EXCAVATION AND ROCK TRIMMING:

- ACCOMPLISH WORK
- MATERIAI
- 5. CONTRACTOR

ROCK SURFACE PREPARATION:

- 1. SUBMIT A ROCK SURFACE PREPARATION PLAN FOR REVIEW.
- PRODUCTION ROCK SURFACE PREPARATION.
- STANDARD DETAIL 1
- 5. CONCRETE PLACEMENT
- 6. ENGINEER PRIOR TO CONCRETE PLACEMENT

NOTE:

THE CONTRACTOR SHALL WORK WITH THE ENGINEER TO IDENTIFY LOCATIONS FOR ROCK TRIMMING AND CONCRETE FILL.

TRIM LARGE ROCK PROJECTIONS (NOTE 3) -



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30% DESIGN						
NOT FOR CONSTRUCTION				ľ	BAR IS ONE INCH ON ORIGINAL DRAWING	WESTON FISH LIFT PASSAG
DATE: 06/03/2020	6/03/2020	30% DESIGN	M. GRAESER	F	NOT ONE INCH ON THIS	DESIGN
DATE: 06/03/2020	8/02/2019	PRELIMINARY DESIGN	B. MATER	SHEET, ADJUST SCALES ACCORDINGLY		
	REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY			

ASTM F594

1 PROVIDE ADEQUATE SURVEY CONTROL TO AVOID UNAUTHORIZED OVEREXCAVATION

2. REMOVE THE ORGANIC AND LOOSE/WEATHERED MATERIAL DOWN TO SOUND ROCK

3. EXCAVATE TO LINES, GRADES, AND DIMENSIONS SHOWN AND AS NECESSARY TO

4. TRIM TO NEAT LINES WHERE CONCRETE IS TO BE PLACED AGAINST FOUNDATION

EXCAVATION MATERIALS SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS AND AT A LOCATION DETERMINED BY THE

2. PREPARE A TEST SECTION FOR REVIEW BY THE ENGINEER PRIOR TO COMMENCEMENT OF

ROCK SHALL BE PREPARED BY A COMBINATION OF ROCK TRIMMING AND CONCRETE FILL TO A SMOOTHNESS AND UNIFORMITY SUITABLE FOR CONCRETE PLACEMENT. REFER TO

4. ROCK SURFACES AGAINST WHICH CONCRETE ARE TO BE PLACED SHALL BE CLEAN, FREE OF LOOSE MATERIAL, AND FREE FROM STANDING OR RUNNING WATER.

ROCK SURFACES SHALL BE CLEAN AND SATURATED SURFACE DRY (SSD) DURING

ROCK SURFACES TO BE IN CONTACT WITH NEW CONCRETE SHALL BE REVIEWED BY THE



ROCK SURFACE PREPARATION DETAIL SCALE: NTS

		PROJECT:	3173WES7	TFISH
		DRAWN BY:	M. AT	WELL
_		DESIGNER:	M. GRA	ESER
	STRUCTURAL NOTES	APPROVED I	3Y: M. GRA	ESER
		SHEET:	15 OF	90
		DRAWING:	S-0	001

GENERAL DESIGN CRITERIA:

- 1. THE FOLLOWING, DESIGN CODES, DESIGN CRITERIA AND STRUCTURE LOADS WERE USED TO COMPLETE THE STRUCTURAL DESIGN.
 - 2012 INTERNATIONAL BUILDING CODE
 - 2016 ASCE7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES
 - AISC MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION.
 - ACI 318-14, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, BY THE AMERICAN CONCRETE INSTITUTE.



ABORATORY ULDEN, MA 01520 w.aldenlab.com	30% DES NOT FOR CONSTR DATE: 06/03/2

2020	6/03/2020	30% DESIGN
2020	8/02/2019	PRELIMINARY
	REVISION	

30% DESIGN PRELIMINARY DESIGN DESCRIPTION OF ISSUE / REVISION

M. GRAESER

REVISED BY

B.MATER

VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

WESTON FISH LIFT PASSAGE DESIGN

		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
-		DESIGNER:	M. GRAESER
=	STRUCTURAL DESIGN CRITERIA	APPROVED B	Y: M. GRAESER
		SHEET: 1	6 OF 90
		DRAWING:	S-002









- 1. CONCRETE SLAB MUST HAVE MINIMUM THICKNESS OF 2'-0".
- 2. CONTRACTOR MAY USE LEAN CONCRETE OR STRUCTURAL CONCRETE INSTEAD OF FLOW FILL.
- 3. MAXIMUM HEIGHT OF FLOW FILL LIFT IS 4'-0".
- 4. MINIMUM STRUCTURAL CONCRETE THICKNESS AND REINFORCEMENT ARE SHOWN.
- 5. LOWER STRUCTURAL CONCRETE SURFACE CAN BE ALTERED (STEPPED, SLOPED, ETC.) TO ACCOMMODATE CONTRACTOR'S MEANS AND METHODS. CONTRACTOR SHALL SUBMIT PROPOSED CONSTRUCTION APPROACH FOR REVIEW BY ENGINEER.

		PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
-	AWS INTAKE STRUCTURAL CONCRETE	DESIGNER:	M. GRAESER
-		APPROVED B	BY: M. GRAESER
	SECTION	SHEET: 2	21 OF 90
		DRAWING:	S-105









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AAA/ DEALAN			<u>+</u>			· · · · · · · · · · · · · · · · · · ·	'	DRAWN BY:	M. ATWELL
30% DESIGN				VERIFY SCALF				DESIGNER:	M. GRAESER
INT FOR CONSTRUCTION				BAR IS ONE INCH ON ORIGINAL DRAWING		WESTON FISH LIFT FASSAGE	AWO INTAKE & FIOR LIFT -	APPROVED BY	Y: M. GRAESER
	6/03/2020	30% DESIGN	M. GRAESER			DESIGN	STRUCTURAL CONCRETE SECTIONS	SHEET: 25	.5 OF 90
DATE: 06/03/2020	8/02/2019	PRELIMINARY DESIGN	B. MATER	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY	S				
	REVISION	DESCRIPTION OF ISSUE / REVISION	REVISED BY			· · · · · · · · · · · · · · · · · · ·	'	DRAWING:	S-109









- 1. FLUSH FLOOR MOUNT SLEEVE SHALL BE MADE OF STURCTURAL STEEL.
- 2. LOCATE SLEEVE AT DIRECTION OF OWNER.
- 3. EACH MOUNT SHALL HAVE A CAP TO KEEP WATER AND DEBRIS OUT OF BASE.



STRUCTURAL STANDARD DETAILS	DESIGNER: APPROVED	M. GRAESER BY: M. GRAESER
(CONT'D)	SHEET:	59 OF 90
	DRAWING:	S-304





REVISION

DESCRIPTION OF ISSUE / REVISION

REVISED BY



NOTES:

- 1. GENERAL OVERVIEW OF GATE 1 (AWS ENTRANCE) IS PROVIDED:
- SIZE OF OPENING, 7.5'W x 6.5'H
- MOVEMENT OF GATE. UPWARD OPENING. -
- OPERATION OF GATE: OPEN / CLOSE
- 2. HEAD POND WATER LEVELS:
 MINIMUM XXX
 NORMAL XXX
- MAXIMUM XXX (100 YR)
- T/O GATE EL 157.0± (GATE IN CLOSED POSITION)

TOC EL 150.5

AWS INTAKE ISOLATION GATE	SHEET:	62 OF 9	90
	DRAWN BY: DESIGNER:	M. ATV M. GRAE	VELL SER
	PROJECT:	3173WEST	FISH





- 1. GENERAL OVERVIEW OF GATE 2 (ISOLATION GATE) IS PROVIDED:
- SIZE OF OPENING, 10.00'W x 19.60'H
- MOVEMENT OF GATE. UPWARD OPENING.
- OPERATION OF GATE: OPEN / CLOSE
- 2. TAILWATER ELEVATIONS:
- DESIGN LOW XXX
- NORMAL XXX
- DESIGN HIGH XXX

FISHWAY ENTRANCE ISOLATION GATE	SHEET:	вү: М. G 64 ОF	90
	DRAWING:	N	1-103


WELDING NOTES:

- 1. WELDS SHALL BE CONTINUOUS SEAL WELDS.
- 2. ANY SKIN PLATE SPLICES SHALL BE FULL PENETRATION.

DESIGN NOTES:

- 1. WEIGHT OF WEIR PANEL ASSEMBLY 2500 POUNDS.
- 2. WEIR PANEL DESIGNED FOR A DIFFERENTIAL HEAD AT WSEL 94.0.



W6x16	STRUC MEMBER FLG TO FLG
	TRIM FLANGES AND CONTOUR WEB AS NEEDED
	½" STRUC MEMBER WEB TO ½" FLG & WEB(3 SIDES)
2	YPICAL FRAME WELDS
<u> </u>	SCALE: 1"=1-0"

		PROJECT:	3173WESTFISH
	FISH LIFT WEIR PANEL ELEVATION AND DETAILS	DRAWN BY:	M. ATWELL
		DESIGNER:	M. GRAESER
		APPROVED	BY: M. GRAESER
		SHEET:	67 OF 90
		DRAWING:	M-106



NOTES:

- 1. ALL MEMBERS C6x8.2 (UNO)
- 2. SPLICE STEEL MEMBERS AS REQUIRED FOR INSTALLATION. PROVIDE 4 BOLTS AND $\%^{\rm "}$ SPACE AS SHOWN.
- 3. ALL CARBON STEEL ITEMS SHALL BE GALVANIZED.



E	FISH LIFT BAFFLE 1 ELEVATION	PROJECT:	3173WESTFISH
		DRAWN BY:	M. ATWELL
		DESIGNER:	M. GRAESER
		APPROVED B	BY: M. GRAESER
		SHEET: 6	39 OF 90
		DRAWING:	M-108







	FISH LIFT V-GATE DETAILS	PROJECT: DRAWN BY:	3173WES M. A	TFISH
Ξ		DESIGNER: APPROVED E SHEET: 8	M. GRA 3Y: M. GRA 33 OF	AESER AESER 90
		DRAWING:	M-	122

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Prepaid Mail Princeton, ME O Weight: O lb 1 Acceptance Date Thu 10/22/2020 Tracking #: 911490118986636	1 4668 5.90 oz ; 3031089		\$Ü.OO
Prepaid Mail Presque Isle, M Weight: O lb 1 Acceptance Date Thu 10/22/2020 Tracking #: 911490118986636	1 E 04769 5.90 oz : 3031096		\$0 .00
Prepaid Mail Old Town, ME 04 Weight: 0 lb 1 Acceptance Date Thu 10/22/2020 Tracking #: 911490118986636	1 468 5.80 oz :		\$0.00
Prepaid Mail Houlton, ME 047 Weight: 0 lb 1 Acceptance Date Thu 10/22/2020 Tracking #: 911490118986636	1 30 5.80 oz : 3031126		\$0.00
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Good morning,

We do not have an immediate concern with your project or project site, and do not currently have the resources to fully investigate same. Should any human remains, archaeological properties or other items of historical importance be unearthed while working on this project, we recommend that you stop your project and report your findings to the appropriate authorities including the Houlton Band of Maliseet Indians.

Thank you,

Isaac St. John Tribal Historic Preservation Officer Houlton Band of Maliseet Indians 88 Bell Road Littleton, ME 04730 **APPENDIX F**

2016 FERC LICENSE AMENDMENT

155 FERC ¶ 61,185 UNITED STATES OF AMERICA FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Norman C. Bay, Chairman; Cheryl A. LaFleur, Tony Clark, and Colette D. Honorable.

Merimil Limited Partnership	Project Nos. 2574-069)
Brookfield White Pine Hydro, LLC	2574-075	,
	2322-054	-
	2325-077	/

ORDER AMENDING LICENSES TO REQUIRE INTERIM SPECIES PROTECTION PLAN FOR ATLANTIC SALMON, AND HANDLING AND PROTECTION PLAN FOR SHORTNOSE AND ATLANTIC STURGEON

(Issued May 19, 2016)

1. On February 21, 2013, Brookfield White Pine Hydro, LLC (Brookfield), on behalf of itself and Merimil Limited Partnership (Merimil), filed an application to amend the licenses for three hydroelectric projects on the Kennebec River in Maine to require an interim species protection plan (Interim Plan) for endangered Atlantic salmon. The Interim Plan, for years 2013 through 2019, would require interim measures to avoid and minimize impacts to endangered Atlantic salmon during operation of Merimil's Lockwood Project No. 2574, and Brookfield's Shawmut Project No. 2322 and Weston Project No. 2325.¹ On March 29, 2013, Brookfield amended its application to

¹ Merimil is (and has always been) the licensee for the Lockwood Project. Brookfield is the general partner for Merimil, and is responsible for operating the Lockwood Project. Brookfield is the licensee for the other two projects. The Commission originally licensed the Shawmut and Weston Projects to Central Maine Power Company, and approved a transfer of the licenses to FPL Energy Maine Hydro, LLC, on December 28, 1998. *Central Main Power Co.*, 85 FERC ¶ 62,208 (1998). The Commission amended the licenses to reflect the company's new name, Brookfield White Pine Hydro, LLC, on July 29, 2013. *FPL Energy Main Hydro, LLC*, 144 FERC ¶ 62,075 (2013). For convenience, we refer to Brookfield as the licensee throughout this order.

include a sturgeon handling and protection plan (Sturgeon Plan) that would require permanent measures to avoid and minimize impacts to endangered shortnose sturgeon and threatened Atlantic sturgeon at the Lockwood Project. Several parties have intervened in opposition to the Interim Plan for Atlantic salmon, contending that it is inadequate and conflicts with an earlier settlement agreement for fish protection measures in the Kennebec River Basin. One intervenor opposes both plans, contending that the Commission should instead require removal of the Lockwood Dam. For the reasons discussed below, we amend the licenses to require both plans.

Background

2. The Commission originally licensed the Lockwood, Shawmut, and Weston projects in the 1960s, and has subsequently relicensed them. The 6.915-megawatt (MW) Lockwood Project is located at river mile 63 in Waterville, Maine, and is the first dam on the mainstem of the Kennebec River.² The Hydro-Kennebec Project No. 2611, which is the next dam upriver from the Lockwood Project, is located just upstream at river mile 64. It is not involved in this amendment proceeding but obtained a similar amendment to require an interim plan for Atlantic salmon in 2013.³ The 8.775-MW Shawmut Project is located at river mile 66.⁴ The 14.75-MW Weston Project is the next upstream dam and is located at river mile 82.⁵

³ See Hydro-Kennebec, LLC, 142 FERC ¶ 62,174 (2013) (approving Interim Species Protection Plan for Atlantic Salmon). As part of that plan, the licensee was required to file final plans and a schedule for construction of upstream fish passage facilities. Commission staff approved the licensee's final design plans for those facilities on March 7, 2016. *Hydro-Kennebec, LLC*, 154 FERC ¶ 62,161 (2016).

⁴ The Commission issued an original license for the Shawmut Project in 1964, and relicensed the project on January 5, 1981. *Central Main Power Co.*, 14 FERC \P 62,004 (1981). The current license expires in 2021, and the licensee is now involved in the pre-filing phase of the relicensing process.

⁵ The Commission issued an original license for the Weston Project in 1964 and relicensed the project on November 25, 1997. *Central Main Power Co.*, 81 FERC ¶ 61,251 (1997). The license expires in 2036.

² The Commission issued an original license for the Lockwood Project in 1969, and relicensed the project on March 4, 2005. The license expires in 2036. *See Merimil Limited Partnership*, 110 FERC ¶ 61,240 (2005).

3. The Kennebec River supports a varied fish population, including both resident and migratory species. In 1987, licensees of a number of projects on the Kennebec (including Lockwood, Shawmut, and Weston) and Sebasticook Rivers⁶ and state fisheries agencies entered into an agreement, known as the Kennebec Hydro Developers Group Agreement (KHDG Agreement or Kennebec Agreement), to facilitate the restoration of American shad, alewife, and Atlantic salmon in the Kennebec River Basin. The licensees agreed to provide funding to the state fishery agencies for interim trap and truck operations at the projects, to install and operate permanent downstream and upstream fish passage facilities according to a schedule, and to conduct studies related to the restoration efforts. Among other things, the Kennebec Agreement assumed that fish passage would be provided at the Edwards Project No. 2389, which at the time was the first dam on the Kennebec River, within the next few years.

4. This did not happen, and in 1997 the Commission denied a new license for the Edwards Project and ordered the licensee to file a plan for dam removal.⁷ Thereafter, on May 28, 1998, the licensees of the Edwards Project and seven upstream projects (again including Lockwood, Shawmut, and Weston), together with state and federal fisheries agencies and environmental groups, filed an offer of settlement, known as the Lower Kennebec River Comprehensive Settlement Accord.⁸ This settlement modified and replaced the earlier agreement, and parties continued to refer to it as the KHDG

⁷ Edwards Manufacturing Co., Inc., 81 FERC ¶ 61,255 (1997).

⁸ Signatories to the 1998 Kennebec Agreement are: Edwards Manufacturing Company and the City of Augusta, Maine (the licensees for the now-removed Edwards Project); U.S. Fish and Wildlife Service; National Marine Fisheries Service, the State of Maine; Central Maine Power Company (the then licensee for the Fort Halifax Project No. 2552, the Shawmut Project, and the Weston Project); Merimil Limited Partnership (licensee for the Lockwood Project); Hydro Kennebec Limited Partnership (licensee for the Hydro Kennebec Project No. 2611); Benton Falls Associates (licensee for the Burnham Project No. 11472); and a group of intervenors collectively called the Kennebec Coalition, comprising American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited.

⁶ The Sebasticook River joins the Kennebec River about half a mile downstream of the Lockwood Project.

Agreement.⁹ The revised agreement included provisions for removing the Edwards Dam and, on the occurrence of certain triggering events, installing fish passage at the upstream projects. Later that year, the Commission amended the licenses for these projects to incorporate the new terms of the Kennebec Agreement.¹⁰ The Edwards Project was removed in 1999.

5. In 2005, the Commission issued a new license for the Lockwood Project that continued to require the fish passage measures of the Kennebec Agreement, some of which were already being developed. To implement part of the agreement, Brookfield installed a fish lift and trap and truck facility at the Lockwood powerhouse as an interim upstream fish passage facility and began operating it in 2006. Brookfield also developed operational and effectiveness study plans for the new fish lift in consultation with resource agencies, and the Commission approved these plans on April 26, 2006.

6. The Lockwood, Shawmut, and Weston Projects are located within the range of several species of fish listed as threatened or endangered under the Endangered Species Act (ESA). The Lockwood Project is within the range of endangered shortnose sturgeon and within two Distinct Population Segments (DPS)¹¹ of Atlantic sturgeon (Gulf of Maine DPS and New York Bight DPS). All three projects (Lockwood, Shawmut, and Weston) are within the range of the endangered Gulf of Maine DPS of Atlantic salmon.

¹¹ A Distinct Population Segment or DPS is the smallest division of a species permitted to be protected under the ESA. It is a population or group of populations that is discrete from other populations of the species and is significant in relation to the entire species. The ESA provides for listing species, subspecies, or distinct population segments of vertebrate species. *See* the joint Fish and Wildlife Service (FWS) and NMFS policy statement, 61 Fed. Reg. 4722 (1996).

⁹ Because the settlement agreement includes a number of parties who are not members of the Kennebec Hydro Developers Group, we refer to it as the Kennebec Agreement in this order.

¹⁰ See Edwards Manufacturing Co., Inc., et al., 84 FERC ¶ 61,227 (1998) (incorporating relevant parts of the 1998 Kennebec Agreement in the licenses for the Lockwood, Shawmut, and Weston Projects, among others). The new license for the Lockwood Project, issued in 2005, includes the relevant provisions of the 1998 Kennebec Agreement as a condition of the project's water quality certification. See Merimil Limited Partnership, 110 FERC ¶ 61,240 at Appendix B.

7. Regarding sturgeon, the National Marine Fisheries Service (NMFS) had issued a final recovery plan for shortnose sturgeon in December 1998,¹² and the new license for the Lockwood Project included a shortnose sturgeon handling and protection plan. The listing of Atlantic sturgeon came later. On February 26, 2012, NMFS listed the Atlantic sturgeon as endangered in the New York Bight DPS¹³ and as threatened in the Gulf of Maine DPS.¹⁴

8. Regarding Atlantic salmon, NMFS and the U.S. Fish and Wildlife Service (FWS; collectively, the Services) listed the Gulf of Maine DPS of Atlantic salmon as endangered on November 17, 2000.¹⁵ At the time, the listing range for the Gulf of Maine DPS of Atlantic salmon did not include areas where the Lockwood, Shawmut, and Weston Projects are located. On June 19, 2009, the Services expanded the listing range for these fish to include these areas.¹⁶ At the same time, NMFS designated critical habitat for the Gulf of Maine DPS of Atlantic salmon that includes the location of all three projects.¹⁷

9. Concerned that the projects might affect Atlantic salmon, Brookfield initially contacted NMFS in 2009 to discuss obtaining an Incidental Take Permit¹⁸ through a Habitat Conservation Plan¹⁹ under section 10 of the ESA.²⁰ After preparing a draft

- ¹³ 77 Fed. Reg. 5880 (2012).
- ¹⁴ 77 Fed. Reg. 5914 (2012).
- ¹⁵ 65 Fed. Reg. 69,459 (2000).
- ¹⁶ 74 Fed. Reg. 29,344 (2009).
- ¹⁷ 74 Fed. Reg. 29,300 (2009).

¹⁸ An Incidental Take Permit is a permit issued under section 10(a)(1)(B) of the ESA to a non-federal party undertaking an otherwise lawful activity that might result in the take of an endangered or threatened species. As defined in ESA section 3(19), the term "take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

¹⁹ A Habitat Conservation Plan is a plan that outlines ways of maintaining, enhancing, and protecting a given habitat type needed to protect ESA-listed species. A Habitat Conservation Plan is required before an incidental take permit may be issued.

¹² Shortnose sturgeon were listed as endangered on March 11, 1967 (32 Fed. Reg. 4001), and remained on the endangered list with the enactment of the ESA in 1973.

Habitat Conservation Plan for review, Brookfield met with NMFS and indicated that instead, it would develop an Interim Plan for Atlantic salmon that could be incorporated in the project licenses as a license amendment. On January 31, 2013, Brookfield requested that the Commission designate it as the Commission's non-federal representatives for the purpose of informal consultation with NMFS on Atlantic salmon. Commission staff agreed and made the requested designation by letter issued on February 7, 2013.

10. On February 21, 2013, Brookfield filed its proposed Interim Plan for Atlantic salmon, together with a draft Biological Assessment of the plan.²¹ Brookfield requested that the Commission initiate formal consultation with NMFS on the Interim Plan and incorporate the proposed measures in the project licenses.

11. On March 14, 2013, Commission staff adopted Brookfield's Biological Assessment and initiated formal consultation with NMFS on Atlantic salmon. Based on the analysis in the Biological Assessment, Commission staff concluded that operation of the projects under the Interim Plan may adversely affect Atlantic salmon and the species' designated critical habitat.

12. Meanwhile, on March 4, 2013, Brookfield requested that the Commission designate it as the Commission's non-federal representative to consult informally with NMFS regarding effects of operating the Lockwood Project on endangered shortnose sturgeon and threatened Atlantic sturgeon. Shortly thereafter, in a letter to NMFS dated March 25, 2013, Commission staff made the requested designation.

13. On March 29, 2013, Brookfield filed its Sturgeon Plan and an addendum to its earlier draft Biological Assessment to address effects of operating the Lockwood Project on Atlantic and shortnose sturgeon.²² Brookfield requested that the Commission initiate formal consultation with NMFS on the Sturgeon Plan and include the plan as part of a single ESA consultation on both the Interim Plan and the Sturgeon Plan to address all three listed species (Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon).

²⁰ See NMFS Biological Opinion at 5-6, which provides a consultation history (filed July 22, 2013).

²¹ The Interim Plan appears in Appendix A to Brookfield's draft Biological Assessment (filed February 21, 2013).

²² The Sturgeon Plan is Attachment A to Brookfield's addendum to the Biological Assessment (filed March 29, 2013).

14. On May 1, 2013, Commission staff adopted the addendum to the Biological Assessment and initiated formal consultation with NMFS on shortnose and Atlantic sturgeon. Based on the analysis in the Biological Assessment, Commission staff concluded that operation of the Lockwood Project under the Sturgeon Plan is likely to adversely affect shortnose sturgeon and the Gulf of Maine DPS and New York Bight DPS of Atlantic sturgeon. By letter filed on May 15, 2013, NMFS informed the Commission that it had received all the information needed for formal consultation and would prepare a single Biological Opinion addressing both the Interim Plan and the Sturgeon Plan.

15. On July 9, 2013, a group of intervenors collectively called the Kennebec Coalition, comprising American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited, filed comments opposing the Interim Plan and Commission staff's Biological Assessment for Atlantic salmon. The Kennebec Coalition expressed concern that the Interim Plan is inadequate to protect Atlantic salmon and would conflict with and be less stringent than existing license articles for the three projects and the terms of the Kennebec Agreement, particularly with respect to provisions for downstream passage of endangered Atlantic salmon and other species.

16. On July 22, 2013, NMFS filed its Biological Opinion, addressing not only the Interim Plan for Atlantic salmon at Lockwood, Shawmut, and Weston, but also the Sturgeon Plan for Atlantic and shortnose sturgeon at Lockwood.²³ On September 3, 2013, NMFS filed an amendment to its Biological Opinion, clarifying its consideration of the effects of the Lockwood Project on Atlantic and shortnose sturgeon and adding a condition to the incidental take statement for the project. For Atlantic salmon, NMFS concluded that operation of the Lockwood, Shawmut, and Weston Projects under the Interim Plan may adversely affect but is not likely to jeopardize the continued existence

²³ The Biological Opinion also included an Interim Plan for Atlantic salmon at the Brunswick Project No. 2284 and the Lewiston Falls Project No. 2302, as well as a Sturgeon Plan for Atlantic and shortnose sturgeon at the Brunswick Project. These two projects, which are located on the Androscoggin River, are not at issue in this amendment proceeding. The Androscoggin River joins the Kennebec River near tidewater at Merrymeeting Bay. Commission staff approved the protection plans for these projects on December 13, 2013. *See Brookfield White Pine Hydro, LLC*, 145 FERC ¶ 62,187 (2013) (approving Interim Plan and Sturgeon Plan for the Brunswick Project), and *Brookfield White Pine Hydro, LLC*, 145 FERC ¶ 62,188 (2013) (approving Interim Plan for the Lewiston Falls Project).

of the Gulf of Maine DPS of Atlantic salmon. NMFS further found that, although these projects would continue to adversely affect essential features of the species' designated critical habitat, the proposed action would improve the functioning of migratory habitat by constructing upstream fishways and by implementing an adaptive management strategy to improve downstream survival. NMFS therefore concluded that the proposed action would not lead to adverse modification or destruction of critical habitat. For sturgeon, NMFS concluded that implementing the Sturgeon Plan may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or the Gulf of Maine or New York Bight DPSs of Atlantic sturgeon, and that the plan would protect listed shortnose and Atlantic sturgeon that occur downstream of the Lockwood Project.²⁴

17. On January 29, 2014, the Atlantic Salmon Federation (Atlantic Salmon) and the Natural Resources Council of Maine (Natural Resources) filed a request that, before incorporating the Interim Plan for Atlantic salmon in the licenses for the projects, the Commission should require Brookfield to file a formal application for a license amendment and should issue public notice of the amendment application, when filed. In support, they argued that the Biological Opinion and Interim Plan would require physical changes to the projects if the Interim Plan is included in the licenses.

18. On March 18, 2014, Atlantic Salmon filed a motion to intervene in the proceeding to consider the Interim Plan at Lockwood, Shawmut, and Weston. The Maine Department of Marine Resources (Maine Marine Resources) filed a notice of intervention on May 2, 2014, stating that if the Interim Plan is approved, the Department's efforts to restore American shad and blueback herring to historical habitats above the Lockwood Project will be thwarted or indefinitely delayed. On June 18, 2014, in response to Maine Marine Resources' comments, NMFS filed comments supporting the Interim Plan.

19. On July 17, 2014, Atlantic Salmon, Natural Resources, and Trout Unlimited filed comments objecting to the Biological Opinion and Interim Plan for Atlantic salmon at the projects. They requested that the Commission reject the Biological Opinion and deny any license amendments to incorporate the Interim Plan. On July 28, 2014, Maine Rivers filed similar comments, urging the Commission to reject both the Biological Opinion and the Interim Plan.

²⁴ See letter from John Bullard, NMFS, to Kimberly Bose, Commission Secretary, at 1 (attaching the Biological Opinion and summarizing its conclusions).

20. On August 11, 2014, Natural Resources filed a motion to intervene. On September 5, 2014, Brookfield filed a response to the comments of Maine Marine Resources and others, indicating actions it had taken at the projects to implement provisions of the Kennebec Agreement.

21. On September 5, 2014, Brookfield filed a response to Maine Marine Resources' notice of intervention and comments, noting that while Brookfield did not oppose the intervention, it had already met many of its obligations under the Kennebec Agreement. Brookfield added that it was working with Maine Marine Resources and other resource agencies to design additional fish passage facilities at the Hydro Kennebec and Lockwood Projects to ensure that the fish passage needs of all species covered by the agreement are addressed, consistent with the schedule for fishway improvements in the Interim Plan.

22. On January 7, 2015, Atlantic Salmon, Natural Resources, and Trout Unlimited filed additional comments, expressing concern about the failure to meet the biological triggers of the Kennebec Agreement for upstream passage facilities at any of the dams on the mainstem Kennebec River. Among other things, they stated that as provided in the Kennebec Agreement, because the biological triggers for permanent fish passage had not been met by December 2014, they were planning to meet with Brookfield to assess progress in restoring fish species covered by the agreement and would attempt to reach consensus on future fish passage measures. On January 14, 2015, Douglas Watts, an intervenor in the Lockwood Project relicensing proceeding, filed comments expressing concern about the failure of the Lockwood Dam and fish trap to pass American shad. On February 12, 2015, Atlantic Salmon, Natural Resources, and Trout Unlimited filed additional comments opposing the Biological Opinion and Interim Plan.

23. On February 13, 2015, Brookfield filed a request to amend the schedule in the Interim Plan to extend the date for completing construction and beginning operation of the volitional component of the fish lift at Lockwood from May 1, 2016 to May 1, 2017.²⁵ The company stated that the additional time would allow Brookfield to focus on determining why fewer American shad than expected are captured in Lockwood's fish lift and to work with the agencies and other parties to the Kennebec Agreement to attempt to find a solution. Brookfield attached a record of consultation indicating that NMFS, FWS, Maine Department of Inland Fisheries and Wildlife, Maine Department of Environmental Protection, and Maine Marine Resources supported the request for a delay. In contrast, Atlantic Salmon, Natural Resources, and Trout Unlimited stated that they did not concur

²⁵ A volitional component of a fish passage system is a structure, like a fish ladder, that allows but does not force fish to use it.

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with the proposal and reiterated their opposition to the Biological Opinion and Interim Plan.

24. On July 9, 2015, the Maine Council of Atlantic Salmon, Natural Resources, the Kennebec Valley Chapter of Trout Unlimited, and Maine Rivers filed a complaint for a declaratory judgment and injunctive relief in the United States District Court for the District of Maine, seeking judicial review of the Biological Opinion and an injunction directing NMFS to withdraw it.²⁶ Among other things, they requested that the court direct NMFS to reinitiate consultation with the Commission and prepare a new Biological Opinion that complies with the ESA.

25. On August 27, 2015, Commission staff issued a public notice of Brookfield's application to amend the licenses for the Lockwood, Shawmut, and Weston Projects to incorporate the Interim Plan, and to amend the license for the Lockwood Project to incorporate the Sturgeon Plan. The notice established a deadline for filing comments, motions to intervene, and protests by September 27, 2015.²⁷

26. On September 8 and 9, 2015, Mr. Watts filed additional information on American shad for consideration in the proceeding. On September 14, 2015, Mr. Watts filed a motion to intervene. NMFS filed a notice of intervention on September 18, 2015. On September 24, 2015, Maine Marine Resources filed comments, noting its earlier comments and intervention opposing the Interim Plan and including additional information on fish passage effectiveness at the Lockwood Project. On September 25,

²⁷ Because September 27, 2015, was a Sunday, the filing deadline was Monday, September 28, 2015. *See* 18 C.F.R. § 385.2007(a)(2) (2015). Thus, all interventions were timely, including those filed before the notice was issued. If the proceeding is one for which intervention is permitted, a party can intervene once the application is filed, even if Commission staff has not yet accepted the application or issued notice of it. *See Central Nebraska Public Power and Irrigation District*, 43 FERC ¶ 61,225, at 61,578 & n.8 (1988).

²⁶ See Maine Council of the Atlantic Salmon Federation, et al. v. National Marine Fisheries Service, No. 2:15-cv-00261-JAW, U.S. Dist. Ct. Maine (filed July 8, 2015). The complaint also seeks judicial review of a 2012 Biological Opinion for a proposed amendment to incorporate an interim species protection plan for Atlantic salmon in the license for the Hydro-Kennebec Project No. 2611. As noted, Commission staff granted that amendment request in 2013. See note 3, supra. The complaint asks the court to direct Brookfield to request that the Commission revoke this license amendment.

2015, the U.S. Department of the Interior filed a letter stating that it had no comments on the application.

27. On September 28, 2015, Atlantic Salmon, Natural Resources, Trout Unlimited, and the Kennebec Valley Chapter of Trout Unlimited, collectively, filed a motion to intervene in opposition to the amendment. Among other things, they objected to the fish passage provisions in the Interim Plan and requested that, in light of their suit challenging the Biological Opinion, the Commission defer action on the amendment application pending resolution of that litigation. On September 29, 2015, Mr. Watts filed comments on the proposed amendment applications, contending that because of the failure to pass American shad at the Lockwood Project, the Commission should reject the Interim Plan and require that the Lockwood Dam be breached to provide effective passage for not only American shad but also Atlantic and shortnose sturgeon and striped bass.

28. On February 16, 2016, Mr. Watts filed additional information regarding American shad passage at Commission-licensed dams in Maine.

29. On March 29, 2016, Brookfield filed an annual report of its activities to implement the Interim Plan. Brookfield's cover letter accompanying the report indicates, among other things, that it has been conducting studies and meeting with NMFS and other resource agencies regarding progress under the plan and other issues concerning Atlantic salmon.²⁸ Brookfield states that it met with resource agencies on February 25, 2016 to discuss the results of shad-related studies conducted at the Lockwood Project in 2015. Brookfield further states that, at that meeting, it was decided that Brookfield should proceed with the engineering design and construction of the new upstream volitional fish passage component for the existing Lockwood fish lift. Brookfield adds that at this time, it anticipates that the engineering design will take place in 2016 and construction will begin in 2017.

Discussion

30. Before turning to the parties' arguments, we provide a brief review of the major provisions of the Kennebec Agreement. We then review the actions contemplated in the Interim Plan for Atlantic salmon and the Sturgeon Plan, and review the incidental take provisions of the Biological Opinion. Finally, we address the parties' arguments concerning the two protection plans and explain our reasons for amending the licenses to include them.

²⁸ Letter from Kelly Maloney, Brookfield, to Kimberly Bose, Commission Secretary, at 7 (filed March 29, 2016).

A.

In 1998, the Commission amended the Lockwood, Shawmut and Weston Project 31. licenses to include the relevant provisions of the Kennebec Agreement.²⁹ The agreement provides a process and schedule for installing interim and permanent upstream and downstream fish passage facilities for American shad, alewife, blueback herring, Atlantic salmon, and American eel at a series of hydroelectric projects on the Sebasticook and Kennebec Rivers, including the Lockwood, Shawmut, and Weston Projects. The schedule is based on the anticipated growth of the American shad population in the Kennebec River. However, the State of Maine's goal to restore anadromous fish upstream of the Lockwood Project also includes restoring Atlantic salmon, alewife, and blueback herring above the Lockwood, Hydro Kennebec, Shawmut, and Weston Projects. If the growth of Atlantic salmon, alewife, or blueback herring populations requires a different approach for triggering fishway installation (that is, one not based on American shad), the licensees and resource agencies³⁰ will meet to attempt to reach consensus on the need, timing, and design of permanent upstream passage facilities at the four projects. The interim upstream passage facilities were installed and operational at Lockwood by May 2006.

32. Under the Kennebec Agreement, interim downstream passage is to be accomplished through a combination of controlled spills, turbine shutdown, and sluicing. New structures are not required. If turbine passage is pursued as an alternative, the licensees must conduct qualitative and quantitative studies demonstrating that passage through the turbines does not cause significant mortality. Before installing permanent downstream passage facilities, passage studies are required to determine the effectiveness of various techniques and alternatives.

33. Permanent upstream and downstream passage must be installed and operating within two years after 8,000 American shad are captured at the interim Lockwood fish trap in a single season, or the licensees and resource agencies determine that upstream

²⁹ See note 10, supra.

³⁰ Section I of the Kennebec Agreement identifies the resources agencies as the National Marine Fisheries Service, Maine Department of Inland Fisheries and Wildlife, Maine Marine Resources, Maine State Planning Office, and the U.S. Fish and Wildlife Service.

passage is warranted based on an alternative approach, whichever occurs earlier. To date, neither condition has occurred.³¹

34. The Kennebec Agreement further provides that, if by December 2014 the biological triggers for permanent upstream passage facilities have not been met at one or more of the dams covered by the agreement, the parties will meet to assess the progress in restoring the species covered by the agreement and will attempt to reach consensus on future fish passage measures. Any disputes are to be handled through the Commission's process. As noted, the parties have initiated discussions under this provision but have not reached consensus.

B. <u>Existing Upstream Fish Passage Facilities</u>

35. In accordance with the license and the Kennebec Agreement, in 2006 Brookfield completed construction of a fish lift and an interim trap, sort, and transport system at the Lockwood Project to trap and truck fish upstream of the Lockwood, Shawmut, and Weston Projects. The Lockwood fish lift facility is located on the west side of the powerhouse adjacent to Unit 7. The lift operates with an attraction flow of up to 150 cubic feet per second (cfs), and has a cycle time of about 10 minutes.

36. The attraction flow attracts the fish through the fish lift entrance gate into the lower flume of the fish lift. The fish then swim through a vee-gate crowder and remain in the lower flume of the lift. The vee-gate crowder closes to hold the fish in a 1,800-gallon water-filled hopper. The hopper lifts the fish to the holding tank elevation and the fish are sluiced into a 2,500-gallon discharge tank. The sorting and trucking portion of the facility includes: the discharge tank, which collects fish discharged from the hopper; two 1,250-gallon holding tanks that sluice fish into Maine Marine Resources' stocking trucks; and a 250-gallon holding tank for Atlantic salmon. The discharge tank is also equipped with piping that can discharge fish back into the tailrace.

³¹ The Kennebec Agreement provides for the possibility of a biologically-based trigger based on the status and growth of Atlantic salmon or river herring (river herring refers collectively to alewives and blueback herring). Thus, under the agreement, an alternative trigger for permanent passage facilities could be based on a biological review of the status of Atlantic salmon. In this case, however, the licensees and resource agencies did not adopt an alternative trigger for installing permanent passage facilities under the Kennebec Agreement. Instead, the status of Atlantic salmon as endangered, together with expansion of its geographic range, provided the trigger for development of the Interim Plan to protect Atlantic salmon at these projects.

C. <u>Existing Downstream Fish Passage</u>

37. Currently, downstream passage at the Lockwood Project is accomplished by a surface sluice installed in the forebay canal. An angled 300-foot-long floating guide boom is installed seasonally and is operated from April 1 to June 15 and from November 1 to December 15. A 32-foot-long section of the floating boom supports a 10-foot-deep metal punch plate screen to guide downstream migrants to the surface sluice.³² In addition to the guide boom and surface sluice, downstream passage is also provided through three orifices, each 3-feet long by 8-inches high, cut into the flashboards along the spillway. The orifices pass approximately 50 cfs, and provide downstream passage routes along the spillway even when the project is not spilling water over the top of the flashboards. In addition, river flows exceed the turbine capacity for much of the time period that downstream fish migrations occur, thus providing substantial fish passage capability over the spillway whenever water is spilling over the dam.

38. At the Shawmut Project, downstream fish passage is provided through a surface sluice located on the right-hand side of the intake structure next to Unit 6. With all three stoplogs removed, the sluice passes flows between 30 and 35 cfs. Flows from this sluice discharge over the face of the dam and drain into a 3-foot-deep plunge pool below the dam. In addition, there is a 7-foot-high, 10-foot-wide Taintor gate located next to this sluice that can pass 600 cfs. This gate is used to pass debris and excess flows, which also discharge over the face of the dam into a shallow plunge pool connected to the river.

39. Downstream fish passage at the Weston Project is provided by a 300-foot-long floating guidance boom with 10-foot-deep sections of 5/16-inch metal punch plate screens suspended from the boom. The boom leads to the log sluice gate, which in turn discharges by way of an existing concrete flume to a plunge pool below the dam. During the downstream migration period, the gate is opened to pass 6 percent of turbine unit flow to attract fish to the log sluice. The gate is opened for smolt and kelt passage³³ generally from April 1 through June 15 and between November 1 and December 31, if river and ice conditions allow. The gate is capable of discharging up to 2,250 cfs, which is approximately 38 percent of turbine unit flow.

 $^{^{32}}$ A metal punch plate screen is a metal sheet with holes that functions as a net but is more sturdy.

³³ A smolt is a young salmon when it becomes covered with silvery scales and first migrates from fresh water to the sea. Kelts are salmon that have spawned. Kelts require downstream passage because Atlantic salmon can spawn more than once.

40. The Interim Plan identifies measures necessary to avoid and minimize the effects of operating the Lockwood, Shawmut, and Weston Projects on federally-listed Atlantic salmon. It covers a 7-year period, from 2013 through 2019, and contemplates that a final protection plan will be developed and filed for Commission approval in 2019 to cover the remaining period from 2020 to expiration of the project licenses in 2036.³⁴ The Interim Plan provides for installing new upstream fishways at the three projects and conducting upstream and downstream passage and survival studies for Atlantic salmon. These studies are to be conducted as part of an adaptive management strategy designed to achieve high passage and survival rates for Atlantic salmon through the Lockwood, Shawmut, and Weston Projects. As described in its annual reports of activities under the Interim Plan, Brookfield has implemented some parts of the plan, such as studies, that could be accomplished consistent with the existing license terms.

1. Upstream Passage of Atlantic Salmon

41. Under the Interim Plan, Brookfield proposes to continue to operate the Lockwood Project fish lift during upstream migration periods for Atlantic salmon from about May 1 through October 31 and to increase the daily number of lifts from the current range of three to five lifts per day to the proposed range of five to eight lifts per day. The exact timing would continue to be determined in consultation with Maine Marine Resources. Brookfield proposes to: (1) trap and sort all fish species, including Atlantic salmon; (2) capture and hold Atlantic salmon for Maine Marine Resources to transfer them to sites or facilities as determined by the fishery management agencies; (3) undertake measures necessary to keep the fish lift in good operating condition; (4) if the fish lift breaks down during the migration period, repair and return it to service as soon as it can safely and reasonably be done; and (5) maintain records of all fish trapped or moved in the fish lift, and allow Maine Marine Resources to continue to collect data on the size, age, and condition of all Atlantic salmon captured in the fish lift.

42. Brookfield also proposes to design a volitional component to the upstream passage facility at Lockwood, and to install it in 2016 and begin operating it in 2017.³⁵ Although

³⁵ The Interim Plan provides that this volitional component of the upstream fishway will be operational in 2016. As noted earlier, however, Brookfield requested a delay to allow time for the agencies to consider issues concerning passage of American shad.

³⁴ Because the Shawmut Project license expires in 2021, the final plan would be considered in that project's relicensing proceeding.

this component is not yet designed, Brookfield has indicated that it will involve a modification of the existing fishway.³⁶ Once the volitional component has been installed, Brookfield would conduct Atlantic salmon adult upstream passage effectiveness studies for up to three years. The licensee would: (1) continue to use underwater cameras in and around the fish lift to observe Atlantic salmon behavior and identify any issues with Atlantic salmon movement into the fish lift; (2) monitor areas of the tailrace that can be visually observed for the presence of holding Atlantic salmon and collect information on numbers and time periods, and monitor angler activity near the fish lift and collect available information on numbers of Atlantic salmon accidentally captured or observed; (3) monitor the bypass reach ledge area during flashboard replacement; (4) with Maine Marine Resources' assistance, collect adult Atlantic salmon for transfer to the Sandy River³⁷ or release back into the Kennebec; and (5) collaborate with Hydro Kennebec Project personnel to gather visual observation data on Atlantic salmon that may migrate to the Hydro Kennebec Project via the Lockwood spillway section.

43. Under the Interim Plan, Brookfield would continue to use the existing Lockwood fish lift and trap and truck system to provide interim upstream passage for Atlantic salmon past the Shawmut and Weston Projects. The company would also design new upstream passage facilities at the Shawmut and Weston projects, in consultation with the fisheries agencies, incorporating the biological needs of Atlantic salmon, in 2016 and 2017, respectively. Brookfield anticipates starting construction of the upstream fish passage facilities in 2017 at the Shawmut Project and in 2019 at the Weston Project. These facilities would then be completed and operating at Shawmut and Weston, respectively, during the 2018 and 2020 upstream migration seasons.

2. Downstream Passage of Atlantic Salmon

44. For downstream passage, Brookfield proposes to expand operation of the downstream passage facilities at the Lockwood, Shawmut, and Weston Projects from April 1 to December 31 for use by adult and juvenile Atlantic salmon. The sluice gates at each project would be operated to maintain an interim flow of 6 percent of station unit flow through each of the gates during evening passage hours. As applicable at Lockwood and Weston, Brookfield would undertake measures necessary to keep the guidance booms in place and in good operating condition. If the guidance booms become

³⁶ See Biological Opinion at 19 (filed July 22, 2013).

³⁷ The Sandy River is a tributary to the Kennebec River and enters the Kennebec several miles upstream of the Weston Project.

dislodged or damaged, the company would repair or replace them as soon as the work could be safely and reasonably done.

45. Spill flows are an important aspect of downstream fish passage at the projects. Flows in excess of total turbine capacity would be spilled in accordance with the projects' high water guidelines and reservoir fluctuation limits, unless Brookfield determines in consultation with NMFS that additional spill is needed for downstream passage. At flows less than the projects' total hydraulic capacity, downstream passage would be provided through the sluice gates, unless Brookfield determines in consultation with NMFS that additional spill is needed.

3. <u>Atlantic Salmon Passage Studies</u>

46. Under the Interim Plan, Brookfield would study downstream smolt passage from 2013 to 2015 at the projects. The study at each project would use between 100 and 200 smolts each year obtained from the Great Lakes National Fish Hatchery. The company would use a paired release study design. Using radio-tagged smolts released upstream of each project and detections at the upstream side of each dam, radio telemetry would record tagged smolts' arrival and passage through the projects. Survival through each project's dam spillway, turbines, or downstream fishway would be determined by the number of smolts known to have arrived alive at each project minus the number of smolts detected alive downstream of the project. An overall survival rate for outmigrating smolts in the Kennebec River would be calculated as the product of each project's individual survival rate. To estimate mortality unrelated to dam passage and occurring within the downstream river reach of each project, a release of tagged smolts would be conducted in each project's tailrace and compared to the smolts arriving at the next downstream project. An overall survival rate for out-migrating smolts in the Kennebec River would be calculated as the product of each project's individual survival rate. Brookfield would consult with NMFS, FWS, and Maine Marine Resources to develop a detailed study plan. In addition to the adult and smolt passage studies, Brookfield also proposes to conduct downstream passage studies of kelts for up to three years between 2015 and 2017 to determine the downstream survival of Atlantic salmon kelts.³⁸ The company would consult with NMFS to develop a detailed study plan for this effort as well.

³⁸ On February 7, 2014, the licensees amended the Interim Plan to postpose the downstream kelt passage studies to 2015 based on a shortage of available kelts.

4. <u>Adaptive Management and Reporting</u>

47. Adaptive management is an integral part of the Interim Plan. Measures included in the plan would be subject to revision after agency consultation and, if necessary, Commission approval. To that end, Brookfield would prepare an annual report, describing the previous year's activities under the Interim Plan and the company's progress on implementing the plan's measures. Brookfield would provide a draft report to the agencies by January 31 of each year and would then meet with the agencies to discuss the draft report, implementation of the Interim Plan, and any other issues related to Atlantic salmon restoration and management activities in the Kennebec River. Brookfield would file a final report with the resource agencies and the Commission by March 31 of each year.

E. <u>Sturgeon Handling and Protection</u>

48. Sturgeon are not present in the Kennebec River in the vicinity of the Shawmut and Weston projects, but are found downstream of the Lockwood Project. Sturgeon will not be passed upstream of Lockwood because the dam location is thought to be the historical upper limit of upstream migration for sturgeon on the Kennebec River and because of concerns about the safety of downstream passage for these fish.³⁹ To protect Atlantic and shortnose sturgeon downstream of the Lockwood Project, Brookfield proposes to implement its Sturgeon Handling and Protection Plan (Sturgeon Plan). The purpose of the plan is to protect sturgeon from effects associated with the operation and maintenance of the Lockwood Project and fish lift.

49. For each sturgeon found in the fish lift, Brookfield would scan the fish for an existing tag and record river flow, bypassed reach minimum flow, and water temperature. Any live, uninjured sturgeon would be returned to the Kennebec River downstream of the project, and Brookfield would report this to NMFS within 24 hours. If any injured sturgeon are found, the licensee would measure, photograph if possible, and report them to NMFS within 24 hours. Brookfield would retain any severely injured fish until notified by NMFS of instructions for potential rehabilitation. Any dead sturgeon would be recovered and preserved in a freezer until after the licensee notifies NMFS and discusses disposal procedures.

50. The project's flashboards are replaced about once a year. Sturgeon may potentially be stranded in the pools below the dam whenever the flashboards are replaced. Sturgeon found in the pools would be removed by dip net or other appropriate equipment.

³⁹ See Biological Opinion at 20.

F. Endangered Species Act Consultation

51. Section 7(a)(2) of the ESA requires federal agencies to ensure, in consultation with NMFS or FWS as appropriate, that their actions are not likely to jeopardize the continued existence of federally-listed threatened and endangered species, or destroy or adversely modify critical habitat established for those species. NMFS is the lead agency for Atlantic salmon protection under the ESA in Maine.

52. As noted, Commission staff consulted formally with NMFS on Brookfield's request to include the Interim Plan in the licenses for the Lockwood, Shawmut, and Weston Projects to protect Atlantic salmon, and to include the Sturgeon Plan in the license for the Lockwood Project to protect Atlantic and shortnose sturgeon. The Biological Opinion that NMFS filed with the Commission assumes that the measures provided in these two plans are part of the proposed action and that the Commission will require them in the licenses for these projects.

53. The Biological Opinion includes an incidental take statement, which specifies the amount of incidental take of Atlantic salmon that can occur through 2019 as a result of project operations and the activities that will take place under the Interim Plan. The incidental take statement also specifies the amount of incidental take of Atlantic sturgeon and shortnose sturgeon that can occur at the Lockwood Project as a result of activities under the Sturgeon Plan. Unlike the Interim Plan, however, the Sturgeon Plan applies throughout the remainder of the license term.

54. The incidental take statement includes three reasonable and prudent measures (RPM) to avoid or minimize incidental take of the species, as well as terms and conditions to implement those measures. NMFS states that these terms and conditions are non-discretionary actions that the Commission must require in order to comply with the take prohibitions of section 9 of the ESA.⁴¹ NMFS adds that these terms and conditions are in addition to the measures provided in the two protection plans.⁴² The

⁴⁰ Biological Opinion at 152.

⁴¹ Section 9 of the ESA prohibits any taking of listed species unless the take is authorized in an incidental take statement after formal consultation under ESA section 7, or in an incidental take permit issued under ESA section 10.

⁴² Biological Opinion at 153.

terms and conditions of the Biological Opinion are set out in Appendix A and are adopted as conditions of this order by ordering paragraph (C).

55. RPM 1 requires the Commission to ensure, through enforceable conditions of the project license, that the licensee conducts all in-water and near-water construction activities in a manner that minimizes incidental take of ESA-listed species or those proposed for listing and conserves the aquatic resources on which ESA-listed species depend. To implement RPM 1, the Biological Opinion lists 17 terms and conditions related to: (a) contractor education; (b) timing of construction; (c) erosion control and protection of water quality; (d) storage and staging of materials and construction equipment; and (e) riparian vegetation management.

56. Under RPM 2, the Commission must ensure, through enforceable conditions, that Brookfield measures and monitors the provisions contained in the Interim Plan in a way that adequately protects listed Atlantic salmon, shortnose sturgeon and Atlantic sturgeon. To implement RPM 2, the Biological Opinion includes 10 terms and conditions for the Lockwood, Shawmut, and Weston Projects. Under these conditions, Brookfield is required to: (a) prepare plans to study the passage and survival of migrating salmon; (b) not allow test fish to migrate upstream of the project until volitional fish passage is provided at all dams downstream of the Sandy River; (c) provide NMFS the opportunity to comment on any fishway design at various design phases; (d) allow NMFS to inspect the fishways at least annually; (e) inspect the fishways each day between April 1 and December 31; (f) conduct maintenance requiring shutdown of the upstream fishways during the first two weeks of August; and (g) develop project specific adaptive management plans to address any downstream passage deficiencies at the project, documented through site-specific survival studies during the period of the Interim Plan. Three of the ten terms and conditions are not applicable to the Lockwood, Shawmut, or Weston Projects because they pertain to operation of the Lewiston Falls Project No. 2302 or the Brunswick Project No. 2574. These terms and conditions are omitted from Appendix A.

57. Under RPM 3, the Commission must ensure, through enforceable conditions, that Brookfield completes an annual monitoring and reporting program to confirm that it is minimizing incidental take and is reporting to NMFS all project-related observations of dead or injured salmon or sturgeon. To implement RPM 3, the Commission must require the licensee to: (a) notify NMFS of any changes in operation, maintenance activities, and debris management; (b) contact NMFS within 24 hours of any interactions with Atlantic salmon or sturgeon, including any non-lethal and lethal takes; (c) in the event of lethal take, to photograph, measure, and preserve any dead salmon or body parts until after discussing disposal with NMFS; and (d) follow specific procedures when collecting fin clips of any sturgeon captured at the Lockwood Project.

58.

Brookfield may choose to implement this recommendation, we will not require it, because there is no direct link between the recommendation and project operations or protection of salmon and sturgeon at the projects.

59. The remaining three recommendations address operation of all Commissionlicensed hydroelectric projects in Maine that are within the range of federally-listed Atlantic salmon. First, NMFS recommends that the Commission use its authorities to implement license requirements for all of these projects to provide safe and effective upstream and downstream passage for listed Atlantic salmon and other diadromous species. NMFS notes that, for Atlantic salmon, this can be accomplished through station shutdowns during the smolt passage season (April to June) and kelt passage season (October to December and April to June) or by installing highly effective fishways. Second, NMFS recommends that the Commission require all licensed projects in Maine to document the effectiveness of station shutdowns or fishways in protecting listed species. Third, NMFS recommends that the Commission require all licensed projects in Maine to operate in a manner that protects listed species. NMFS notes that this can be accomplished by requiring these projects to operate in a run-of-river mode to simulate a natural stream hydrograph.

60. These last three recommendations are not specific to the Lockwood, Shawmut, or Weston Projects and are therefore not included in these licenses. The Commission considers project-specific recommendations in its licensing and amendment proceedings, and must review and balance a range of public interest considerations, both developmental and environmental, in doing so. We are unable to adopt general recommendations for a broad class of projects.⁴⁴ The proposed amendments include provisions for upstream and downstream passage for Atlantic salmon and other species, monitoring and studies of their effectiveness, and measures to protect listed species. Nothing further is required in this case.

⁴³ Conservation recommendations are discretionary agency activities intended to minimize or avoid effects to listed species or critical habitat, to help implement recovery plans, or to develop information.

⁴⁴ In addition, section 6 of the FPA, 16 U.S.C. § 798 (2012), limits the Commission's ability to unilaterally alter project licenses.

G. <u>Comments and Objections Concerning the Interim Plan</u>

61. As noted earlier, several members of the Kennebec Coalition request that the Commission defer action on the Interim Plan while their petition for judicial review of the Biological Opinion is pending.⁴⁵ We deny this request. Because NMFS has listed the Gulf of Maine DPS of Atlantic salmon as endangered and has designated critical habitat for the species, any taking of the species is prohibited unless authorized by an incidental take permit under ESA section 10 or an incidental take statement after formal consultation under ESA section 7. Brookfield prepared the Interim Plan in consultation with NMFS and requested these license amendments in order to obtain that authorization for any incidental harm that its projects may cause. If we were to delay our approval of the amendment pending judicial review, this would also delay the interim protection for Atlantic salmon and designated critical habitat that the Interim Plan and Biological Opinion are designed to provide.⁴⁶

62. We encourage our licensees to take a proactive approach and consult informally with the Services to protect listed species if ongoing operation of their projects may affect the species or their critical habitat. We do so because ongoing operation of a licensed hydroelectric project is not considered federal agency action under the ESA, but rather is private action that does not trigger formal consultation.⁴⁷ If the licensee and the Service can agree on what actions are needed to protect listed species and their critical habitat, the licensee can then request a license amendment, thus providing the necessary federal agency action (approval of the amendment) to trigger formal ESA consultation. In this case, we consulted formally with NMFS on Brookfield's Interim Plan and are now in a position to approve the amendment and incorporate the terms and conditions of the

⁴⁶ In addition, it is unclear whether judicial review of the Biological Opinion is available now in federal district court, or must instead await review of this amendment order in the court of appeals. *See* 16 U.S.C. § 825*l*(b) (2012); *City of Tacoma, Washington v. FERC*, 460 F.3d 53, 76 (D.C. Cir. 2006) (observing that when a Biological Opinion is prepared in the course of a Commission proceeding, the only means of challenging its validity is on review of the Commission's decision in the court of appeals).

⁴⁷ See California Sportfishing Protection Alliance v. FERC, 472 F3d 593 (9th Cir. 2006).

⁴⁵ *See* motion to intervene of Atlantic Salmon, Natural Resources, Trout Unlimited, and the Kennebec Valley Chapter of Trout Unlimited at 6 (filed September 28, 2015).

63. In their comments and objections, intervenors raise three main concerns with the Interim Plan: that it is inadequate to protect and recover endangered Atlantic salmon, that it relies on fish passage facilities that are ineffective to pass American shad and other fish species, and that it violates the Kennebec Agreement. We address these arguments in turn.

64. The Kennebec Coalition,⁴⁸ several of its members (Atlantic Salmon, Natural Resources, and Trout Unlimited),⁴⁹ and Maine Rivers⁵⁰ contend that the projects harm Atlantic salmon and that the measures in the Interim Plan are inadequate to protect and restore these fish. The Coalition argues that the proposed upstream fishways at the Lockwood Project will not work to restore Atlantic salmon upstream of the project, because there has been no study of upstream passage efficiency, the Biological Opinion does not explain why the estimated 40 percent passage efficiency will be adequate to restore Atlantic salmon, and there are no performance standards for upstream and downstream passage. The Coalition also maintains that the passage studies proposed in the Interim Plan rely on an unrealistically high estimate of the number of smolts available for the study and provide no estimate of the number of fish needed to draw statistically valid conclusions. Similarly, Maine Rivers contends that the Interim Plan provides no evidence that it will improve Atlantic salmon recovery. Maine Rivers is also concerned that investing millions of dollars on inefficient and non-functional fishways will make it difficult to correct these problems in the future.

⁴⁹ See comments of Atlantic Salmon, Natural Resources, and Trout Unlimited (filed July 17, 2014, January 7, 2015, and February 12, 2015, respectively).

⁵⁰ See Maine Rivers' comments (filed July 28, 2014).

⁴⁸ See Kennebec Coalition's Comments (filed July 9, 2013). This is the only filing on behalf of all five members of the Kennebec Coalition. Subsequent filings include three or four of the five. For convenience, we consider these comments together and refer to the Coalition in discussing them, while noting the subsequent filings of the various Coalition members.

65. As discussed above, Brookfield developed the Interim Plan in consultation with NMFS to provide interim measures to protect Atlantic salmon and avoid or minimize incidental take as a result of project operation. The plan includes adding a volitional component to upstream fish passage facilities, upstream and downstream passage studies, and adaptive management to revise these measures, as needed. Commission staff consulted formally with NMFS under section 7 of the ESA on the Interim Plan, and NMFS determined in its Biological Opinion that, if the plan is implemented, the projects may adversely affect but are not likely to jeopardize the continued existence of the Gulf of Maine DPS of Atlantic salmon. NMFS further concluded that the projects will continue to adversely affect essential features of designated critical habitat for the species over the interim period. However, NMFS concluded that the plan is anticipated to improve the functioning of migratory habitat by constructing three volitional upstream fishways, and by implementing an adaptive management strategy to improve downstream survival of Atlantic salmon smolts and kelts in the Kennebec River. NMFS therefore concurred in Commission staff's determination that the proposed action will not lead to adverse modification or destruction of critical habitat.

66. The Coalition faults the Biological Opinion for failing to set performance standards for upstream and downstream passage. However, this is an interim plan, and NMFS states that the passage and survival studies, together with adaptive management, will be used to make any needed changes to the study design, project structures, or project operation during the interim period, and to establish performance standards that will be incorporated in the final protection plan.⁵¹

67. The Interim Plan outlines a process by which Brookfield will study upstream and downstream Atlantic salmon passage at the projects. Under the Interim Plan, the license would study downstream smolt passage through telemetry to determine smolt passage routes, out-migration travel time and movement rates through the Lockwood, Shawmut, and Weston Projects and determine project-related mortality of downstream migrating smolts for the three projects.

68. For upstream passage of adult salmon under the Interim Plan, the licensee would continue to use an underwater camera to monitor salmon behavior in and around the fish lift, as well as angler activity, and would conduct upstream passage effectiveness studies by telemetry.

⁵¹ See Biological Opinion at 13.

69. The purpose of the Interim Plan is to develop studies designed to address many of the concerns expressed by the Coalition and Maine Marine Resources, such as determining the adequacy of any zone of passage leading to the fish lift entrance, and passage efficiency and effectiveness. Through the knowledge gained by these studies, Brookfield, after consulting with NMFS and other resource agencies, should be able to design, construct and operate efficient and effective passage for Atlantic salmon that can be included in the final species protection plan for these projects.

70. NMFS is the expert agency charged with implementing the ESA for these fish, and is therefore in the best position to make discretionary factual determinations about what measures might be needed to protect them. Although the Commission is ultimately responsible for ensuring, in consultation with NMFS, that its actions are in compliance with the ESA, the Commission is entitled to defer to that agency's expertise, and need not undertake a separate, independent analysis of the issues addressed in a Biological Opinion.⁵² In any event, based on our review and adoption of Brookfield's draft Biological Assessment in this case, we have no basis for concluding that the Interim Plan is inadequate to protect Atlantic salmon.

71. The Coalition and Maine Marine Resources contend that the Interim Plan will undermine the Kennebec Agreement because it applies only to Atlantic salmon rather than shad, blueback herring, and alewife. Maine Marine Resources⁵³ further maintains that the plan will thwart or indefinitely delay the agency's efforts to restore shad, alewife, and blueback herring to the Kennebec River upstream of the Lockwood Project. Maine Marine Resources contends that the Lockwood fish lift is ineffective at passing shad upstream and the Interim Plan does not address the failure of the fish lift to attract shad to the fish lift's entrance. Maine Marine Resources is also concerned that under the Interim Plan, permanent downstream passage for species other than Atlantic salmon would not be quantitatively tested to ensure safe, efficient, and effective passage of other fish species. Mr. Watts expresses similar concerns, and provides information for the record on shad passage at other dams in Maine as compared to Lockwood.

72. As Brookfield has acknowledged, since 2006 when the Lockwood fish lift began operating, it has captured very few American shad despite an apparently increasing shad population in the Kennebec River below the project.⁵⁴ Beginning in February 2014,

⁵² See City of Tacoma, Washington v. FERC, 460 F.3d at 75-76.

⁵³ See Maine Marine Resources' Motion to Intervene (filed May 2, 2015).

⁵⁴ See Brookfield's request for a one-year delay in the schedule for providing volitional passage at the Lockwood Project at 1 (filed February 13, 2015).

Brookfield began consulting with Maine Marine Resources, NMFS, FWS, and Atlantic Salmon to identify studies and operational measures to improve shad passage at the project.⁵⁵ In 2014, Brookfield operated the fish lift with the maximum attraction flow of 170 cfs, made underwater video observations of shad in the tailrace, and collected addition bathymetric data of the tailrace. In 2015, the licensee again operated the fish lift with a maximum attraction flow of 170 cfs and made underwater video observations in the tailrace. Brookfield also agreed to use underwater acoustics to survey for project-related sounds that may negatively affect shad use of the lift, to develop a 2-dimensional hydraulic model of the tailrace and spillway area, and to conduct a telemetry study of shad behavior in the project tailrace and spillway area to determine if any operational changes may improve fish passage at the project. Maine Marine Resources reports that, as of September 2015, only the telemetry study had been completed and that despite these efforts, interim upstream passage of shad continues to be ineffective.⁵⁶

73. The Kennebec Agreement provides that, if by December 2014 the biological triggers for permanent upstream passage facilities have not been met (i.e., the earlier of either 8,000 American shad captured in a single season at the Lockwood interim fish trap, or a different biological assessment trigger is developed for Atlantic salmon, alewife, or blueback herring), parties to the agreement will meet to assess progress and attempt to reach consensus on future fish passage measures. To date, neither condition has been met; that is, very few shad have been captured at Lockwood each year, and an alternative biological trigger has not been developed. Therefore, Brookfield and the other parties began consulting as contemplated in the agreement. This effort is separate from Brookfield's development of the Interim Plan, which deals exclusively with endangered Atlantic salmon as a result of the expanded geographic range for the Gulf of Maine DPS of Atlantic salmon.

74. As NMFS points out,⁵⁷ the Interim Plan did not cause the lack of fish passage improvements at the projects and would not preclude Maine Marine Resources from seeking fish passage improvements at any hydro projects on the Kennebec River, including those which are part of the Interim Plan. We see no reason why the parties cannot continue to consult under the Kennebec Agreement on ways to improve fish passage at the projects for American shad, alewife, and blueback herring while improvements and studies are underway to protect endangered Atlantic salmon.

⁵⁶ *Id.* at 1-2.

⁵⁷ See NMFS Comments at 2 (filed June 18, 2014).

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⁵⁵ See Maine Marine Resources' Comments at 1 (filed September 25, 2015).

Therefore, we conclude that the Interim Plan and the Kennebec Agreement are not in conflict. More importantly, however, Atlantic salmon are listed as endangered, and the other fish species addressed in the Kennebec Agreement are not. As a result, the Commission must give priority to protection of Atlantic salmon in the event of any conflict, whether actual or perceived, with the Kennebec Agreement.

Mr. Watts⁵⁸ states that, to achieve the long-term fish passage and recovery goals of 75. the Kennebec Agreement, the Lockwood Project Dam must be breached. He argues that the recent approval of 185 MW of wind generation to be sited near the Kennebec River in Bingham, Maine and adjacent towns makes the 5-MW capacity of the Lockwood Project inconsequential, while the project's negative effects on fish restoration are severe. Mr. Watts states that the licensee has had over 17 years to develop efficient adult shad passage at the project, and failure of shad passage at Lockwood would ensure passage failure at the upstream projects. He maintains that the low numbers of shad, alewife, and blueback herring passed upstream at the project are a fraction of the number he estimates to be in the spillway area and attempting to move upstream. Mr. Watts also states that he observed a sturgeon attempting to ascend the Kennebec River in the spillway area. He believes that, if not for the presence of the dam, sturgeon would have continued to ascend the Kennebec River upstream of the Lockwood Project, and that the geographic range for both ESA-listed sturgeon species must be extended.⁵⁹ In summary, Mr. Watts contends that the fish lift's poor history of passing Atlantic salmon, shad, blueback herring and alewife makes the Lockwood Project a public nuisance that must be removed.

76. These comments are beyond the scope of this amendment proceeding. Moreover, they are insufficient to suggest a need to initiate a proceeding to reopen and amend the license for the Lockwood Project to consider possible dam breach or removal. The Commission can consider whether to reopen and amend a license if a project has unanticipated, serious impacts on fishery resources.⁶⁰ In this case, the project's effects on

⁵⁸ See comments of Douglas Watts at 3 (filed September 29, 2015).

⁵⁹ Mr. Watts also contends that before construction of dams on the Kennebec, sturgeon historically migrated farther upstream than the location of the Lockwood Project, which NMFS recognized in its Biological Opinion as the historic upper migration limit for sturgeon. In support, Mr. Watts cites the results of an archaeological excavation of a food cache some 35 miles upstream of the Lockwood Project that included one sturgeon bone. *Id.* at 7-8. Lacking any information about how the bone ended up in this food cache, we find this information insufficient to support a conclusion that sturgeon historically migrated past the location of the Lockwood Project.

⁶⁰ See Hoopa Valley Tribe v. FERC, 629 F.3d 209 (D.C. Cir. 2010).
fishery resources are both anticipated and addressed in the Kennebec Agreement, which provides that if the triggering condition for permanent upstream fish passage is not met by December 2014, the parties will consult and attempt to reach a consensus on future fish passage measures. As noted, Brookfield began this consultation in January 2015. Any additional studies or fish passage measures that may be needed can be considered as part of that consultation. In these circumstances, we believe it is appropriate to allow the Kennebec Agreement process to proceed.

77. Apart from Mr. Watt's arguments concerning sturgeon migration and the possible need for dam breach or removal, no party commented on Brookfield's Sturgeon Plan. We find that the Sturgeon Plan provides appropriate protection for Atlantic and shortnose sturgeon, and there is no need to provide upstream passage for those species. To the contrary, NMFS provides in its Biological Opinion that if sturgeon are found in the fish lift, they are to be returned unharmed to the river downstream of the Lockwood Project.

Conclusion

78. For the above reasons, we conclude that Brookfield's Interim Plan will help improve conditions for Atlantic salmon and will avoid or minimize incidental take of Atlantic salmon at the Lockwood, Shawmut, and Weston Projects. The licensee began implementing the Interim Plan in 2013 in consultation with NMFS and other resource agencies. Work under the Interim Plan involves designing and building upstream fish passage facilities, planning upstream passage effectiveness studies, and conducting studies of existing downstream passage facilities. The Interim Plan would also help to ensure compliance with the ESA. We therefore approve the Interim Plan and amend the licenses for those projects to require Brookfield to implement the plan.

79. We also conclude that Brookfield's Sturgeon Plan will provide adequate protection for Atlantic and shortnose sturgeon that may be affected by operation of the Lockwood fish lift and replacement of the project's flashboards. We therefore approve the Sturgeon Plan and amend the license for the Lockwood Project to require the licensee to implement it.

80. The licensee must follow the terms and conditions of the incidental take statement included with NMFS's July 22, 2013 Biological Opinion that apply to the Lockwood, Shawmut, or Weston Projects and the supplemental term and condition filed September 3, 2013, to ensure exemption from the take prohibitions of Section 9 of the ESA. Therefore, these terms and conditions are attached to this order as Appendix A, and are incorporated in the project licenses by ordering paragraph (C).

81. Under the Interim Plan and the terms and conditions of NMFS's incidental take statement, the licensee will design and install upstream fish passage facilities at the projects. The Commission must review and approve final plans and schedules related to

this work to ensure that they are consistent with Commission regulations. Therefore, the final plans and schedule for upstream fish passage facilities must be filed for Commission approval, prior to the start of construction, as provided in ordering paragraph (D).

The Commission orders:

(A) The Interim Species Protection Plan (Interim Plan) filed on February 21, 2013, by Brookfield White Pine Hydro LLC (Brookfield), on behalf of itself as licensee for the Shawmut Hydroelectric Project No. 2322 and the Weston Hydroelectric Project No. 2325, and on behalf of Merimil Limited Partnership, licensee for the Lockwood Hydroelectric Project No. 2574, is approved. The licensee must implement the Interim Plan at the Lockwood, Shawmut, and Weston Projects.

(B) The Sturgeon Handling and Protection Plan (Sturgeon Plan) filed on March 29, 2013, by Brookfield on behalf of Merimil Limited Partnership, licensee for the Lockwood Hydroelectric Project No. 2574, is approved. The licensee must implement the Sturgeon Plan at the Lockwood Project.

(C) The terms and conditions of the incidental take statement included with the National Marine Fisheries Service's July 22, 2013 Biological Opinion are hereby incorporated in the licenses for the Lockwood, Shawmut, and Weston Projects. The terms and conditions are attached to this order as Appendix A.

(D) Prior to the start of construction, the licensee must file, for Commission approval, final plans and a schedule for construction of upstream fish passage facilities at the Lockwood, Shawmut, and Weston Projects. The plans and schedule shall be accompanied by evidence that the National Marine Fisheries Service has approved them. The filing shall include copies of comments and recommendations from the U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife, or evidence that these agencies were given at least 30 days to provide comments and chose not to do so. If the licensee does not adopt an agency recommendation, the plan should include the licensee's reasons, based on site-specific information.

(E) The licensee must file, for Commission approval, plans for Atlantic salmon adult upstream passage effectiveness monitoring studies, Atlantic salmon kelt downstream passage monitoring studies, and any remaining Atlantic salmon smolt downstream passage studies for 2016 through 2019. The Commission must approve the study plans before the studies begin. The study plans must be accompanied by evidence that the National Marine Fisheries Service has approved them, and copies of comments and recommendations from the U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and the Maine Department of Inland Fisheries and Wildlife, or

evidence that these agencies were given at least 30 days to provide comments and chose not to do so. If the licensee does not adopt any agency recommendations, the plans should include the licensee's reasons, based on site-specific information.

(F) The licensee must file any remaining annual reports described in the Interim Species Protection Plan (Interim Plan) by March 31 of each year for activities completed during the preceding calendar year, beginning on March 31, 2017, for calendar year 2016. Each annual report must include, at minimum: (1) results of fish passage studies, and a summary of progress on the elements described in the Interim Plan; (2) a summary of consultation and other correspondence with the National Marine Fisheries Service (NMFS) and other resource agencies regarding progress on the elements in the Interim Plan, as well as any other pertinent issues regarding Atlantic salmon; (3) anticipated schedules associated with the elements in the Interim Plan; and (4) descriptions of any issues that arise that may affect the timely completion of the elements in the Interim Plan, and how the issues are being addressed in consultation with NMFS, the U.S. Fish and Wildlife Service (FWS), Maine Department of Marine Resources (Maine DMR), and the Maine Department of Inland Fisheries and Wildlife (Maine DIFW). The annual reports should also describe any plans and schedules discussed with NMFS regarding revisions to the Interim Plan and preparation of a Final Species Protection Plan. Copies of the annual reports should be provided to NMFS, FWS, Maine DMR, and Maine DIFW at the same time they are filed with the Commission.

(G) The licensee must inform Commission staff, via telephone or email, as soon as possible after contacting the National Marine Fisheries Service (NMFS) regarding any issue pursuant to the terms and conditions of the incidental take statement included with the NMFS July 22, 2013 Biological Opinion. The licensee must then file a written report on the issue with the Commission within 15 days of the issue.

(H) Article 406 of the license for the Lockwood Hydroelectric Project No. 2574 is amended by adding Atlantic sturgeon to the Shortnose Sturgeon Handling and Protection Plan; referencing the terms and conditions of the incidental take statement filed by the National Marine Fisheries Service (NMFS) on July 22, 2013, and the supplement filed by NMFS on September 3, 2013; and omitting the requirement to file annual revisions to the sturgeon handling plan; to read as follows:

Article 406. Sturgeon Handling and Protection Plan. Pursuant to the terms and conditions of the incidental take statement filed by the National Marine Fisheries Service (NMF) on January 1, 2005, the incidental take statement filed by NMFS on July 22, 2013, and the supplement filed by NMFS on September 3, 2013, the licensee must implement the Sturgeon Handling and Protection Plan for the Lockwood Project. Within 24 hours of any interactions with shortnose or Atlantic

sturgeon (lethal and non-lethal), the licensee must notify NMFS by email or phone, complete the Sturgeon Reporting Sheet for the Lockwood Project, and mail and fax the completed form to the attention of the NMFS Endangered Species Coordinator.

The Commission reserves the right to require changes to the plan. Any updates to the plan that would result in long-term changes to project operations or facilities may not be implemented without prior Commission authorization granted after the filing of an application to amend this license.

(I) The licensee shall file with the Commission, by March 31st of each year, an annual report of the licensee's actions undertaken in the previous calendar year to implement the project's Sturgeon Handling and Protection Plan. Copies of the annual reports must be provided to NMFS, the U.S. Fish and Wildlife Service, Maine Department of Marine Resources, and Maine Department of Inland Fisheries and Wildlife at the same time they are filed with the Commission.

(J) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 8251 (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2015). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

By the Commission.

(SEAL)

Nathaniel J. Davis, Sr., Deputy Secretary.

APPENDIX A

DEPARTMENT OF COMMERCE NATIONAL MARINE FISHERIES SERVICE

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS OF THE INCIDENTAL TAKE STATEMENT INCLUDED IN THE BIOLOGICAL OPINION FOR THE LOCKWOOD HYDROELECTRIC PROJECT NO. 2574, SHAWMUT HYDROELECTRIC PROJECT NO. 2322, AND WESTON HYDROELECTRIC PROJECT NO. 2325

Filed July 22, 2013, and supplemented September 3, 2013

Reasonable and Prudent Measures

- FERC and the ACOE [Army Corps of Engineers] must ensure, through enforceable conditions of the Project licenses, that the licensee conduct all inwater and near-water construction activities in a manner that minimizes incidental take of ESA-listed or proposed species and conserves the aquatic resources on which ESA-listed species depend.
- FERC must ensure, through enforceable conditions of the Project licenses, that the licensee measure and monitor the provisions contained in the March 14, 2013 Interim Species Protection Plan (SPP) in a way that is adequately protective of listed Atlantic salmon.
- 3. FERC must ensure, through enforceable conditions of the Project licenses, that the licensee complete an annual monitoring and reporting program to confirm that they are minimizing incidental take and reporting all project-related observations of dead or injured salmon or sturgeon to NMFS.

Terms and Conditions

1. To implement reasonable and prudent measure #1, FERC and ACOE must require the licensee to do the following:

- a. Hold a pre-construction meeting with the contractor(s) to review all procedures and requirements for avoiding and minimizing impacts to Atlantic salmon and to emphasize the importance of these measures for protecting salmon.
- b. Timing of in-water work: Work below the bankfull elevation should occur outside of the smolt outmigration period (April 1 to June 15) or within a dewatered cofferdam. The licensee must notify NMFS one week before in-water work begins.
- c. Use Best Management Practices that will minimize concrete products (dust, chips, larger chunks) mobilized by construction activities from entering flowing or standing waters. Best practicable efforts shall be made to collect and remove all concrete products prior to rewatering of construction areas.
- d. Employ erosion control and sediment containment devices at the Lockwood, Shawmut, and Weston Dams during in-water construction activities. During construction, all erosion control and sediment containment devices shall be inspected weekly, at a minimum, to ensure that they are working adequately. Any erosion control or sediment containment inadequacies will be immediately addressed until the disturbance is minimized.
- e. Provide erosion control and sediment containment materials (e.g., silt fence, straw bales, aggregate) in excess of those installed, so they are readily available on site for immediate use during emergency erosion control needs.
- f. Ensure that vehicles operated within 150 feet (46 m) of the construction site waterways will be free of fluid leaks. Daily examination of vehicles for fluid leaks is required during periods operated within or above the waterway.
- g. During construction activities, ensure that BMPs are implemented to prevent pollutants of any kind (sewage, waste spoils, petroleum products, etc.) from contacting water bodies or their substrate.

- h. In any areas used for staging, access roads, or storage, be prepared to evacuate all materials, equipment, and fuel if flooding of the area is expected to occur within 24 hours.
- i. Perform vehicle maintenance, refueling of vehicles, and storage of fuel at least 150 feet (46 m) from the waterway, provided, however, that cranes and other semi-mobile equipment may be refueled in place.
- j. At the end of each work shift, vehicles will not be stored within, or over, the waterway.
- k. Prior to operating within the waterway, all equipment will be cleaned of external oil, grease, dirt, or caked mud. Any washing of equipment shall be conducted in a location that shall not contribute untreated wastewater to any flowing stream or drainage area.
- 1. Use temporary erosion and sediment controls on all exposed slopes during any hiatus in work exceeding seven days.
- m. Place material removed during excavation only in locations where it cannot enter sensitive aquatic resources.
- n. Minimize alteration or disturbance of the streambanks and existing riparian vegetation to the greatest extent possible.
- o. Remove undesired vegetation and root nodes by mechanical means only. No herbicide application shall occur.
- p. Mark and identify clearing limits. Construction activity or movement of equipment into existing vegetated areas shall not begin until clearing limits are marked.
- q. Retain all existing vegetation within 150 feet (46 m) of the edge of the bank to the greatest extent practicable.
- 2. To implement reasonable and prudent measure #2, FERC must require the licensee to do the following:
 - a. Prepare in consultation with NMFS a plan to study the passage and survival of migrating Atlantic salmon (adults, smolts, and kelts) at the Lockwood,

- b. Upstream passage studies at the Lockwood Project should not allow test fish to migrate upstream of the Project until such time as there is volitional passage all the way to the Sandy River.
- c. [omitted]
- d. [omitted]
- e. [omitted]
- f. The licensee should seek comments from NMFS on any fish passage design plans at the 30%, 60%, and 90% design phase.
- g. The licensee should allow NMFS staff to inspect fishways at the Projects at least annually.
- h. The licensee should inspect the upstream and downstream fish passage facilities at the Lockwood, Shawmut, and Weston Projects daily during from April 1 to December 31, annually [reference to the Brunswick Project omitted]. Submit summary reports to NMFS weekly during the fish passage season.
- i. Annual maintenance requiring the shutdown of upstream fishways should be conducted during the first two weeks of August. The fishway should not be inoperable for any longer than it takes to make the necessary repairs. If water temperatures make it unsafe to sample Atlantic salmon, they should be allowed to volitionally swim through the fishway without being handled.
- 3. Require that the licensee develop, in consultation with NMFS, project specific adaptive management plans to address any downstream passage deficiencies at the Weston, Shawmut, and Lockwood Projects [reference to the Brunswick Project omitted] as documented through site-specific survival studies during the period of the ISPP. The plans should include descriptions of: 1. potential measures to be implemented at each project to improve survival, 2. the statistical methodology that will be used to interpret study results, and 3. the monitoring studies that will be used to verify the efficacy of the permanent

downstream fish passage facilities. These plans should be completed no later than January 1, 2014. To implement reasonable and prudent measure #3, FERC must require the licensee to do the following:

- a. Notify NMFS of any changes in operation including maintenance activities and debris management at the project during the term of the ISPP.
- b. Contact NMFS within 24 hours of any interactions with Atlantic salmon, shortnose sturgeon or Atlantic sturgeon including non-lethal and lethal takes (Dan Tierney: by email (Dan.Tierney@noaa.gov) or phone (207) 866- 3755 and the Section 7 Coordinator (incidental.take@noaa.gov).
- c. In the event of any lethal takes, any dead specimens or body parts must be photographed, measured, and preserved (refrigerate or freeze) until disposal procedures are discussed with NMFS.
- d. Ensure that fin clips are taken from any sturgeon at the Lockwood Project and that the fin clips are submitted to the NOAA repository in Charleston, SC for genetic analysis [reference to the Brunswick Project omitted].
 A 1 cm2 fin clip from one of the pelvic fins from living sturgeon should be taken and placed in a labeled vial with an o-ring caps containing 95% nondenatured ethyl alcohol (EtOH) for genetic analysis (the pelvic fin is regarded at the least intrusive, particularly for small individuals) (following the procedures described in Damon-Randall et al. 2010). Fin clips of mortalities must be taken prior to preservation of other fish parts or whole bodies.

ALTERNATIVES ANALYSIS

US ARMY CORPS OF ENGINEERS

ALTERNATIVES ANALYSIS

WESTON HYDROELECTRIC PROJECT FERC No. 2325

UPSTREAM FISH LIFT FACILITY

Prepared for: Brookfield White Pine Hydro, LLC

Prepared by: Kleinschmidt Associates

July 2021



Kleinschmidtgroup.com

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1.0 INTRODUCTION

Brookfield White Pine Hydro, LLC (BWPH or Licensee), owner and operator of the Weston Hydroelectric Project (FERC No. 2325) (Project), proposes to construct an upstream fish passage facility at the Weston Project located on the Kennebec River in Skowhegan, Maine.

In accordance with U.S. Army Corps of Engineers (USACE) Individual Permit Application requirements, this Alternatives Analysis evaluates the available alternatives evaluated for the project.

2.0 PROJECT NEED

On May 26, 1998, the Licensee for the Weston Project filed the 1998 Lower Kennebec River Settlement Accord which modified a 1987 Agreement between a group of licensees known as the Kennebec Hydro Developer Group (KHDG) and the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), State of Maine, and the Kennebec Coalition, a group consisting of American Rivers, Inc., Atlantic Salmon Federation, Kennebec Valley Chapter of Trout Unlimited, Natural Resources Council of Maine, and Trout Unlimited. On September 16, 1998, the Federal Energy Regulatory Commission (FERC or Commission) issued an order approving the Lower Kennebec River Comprehensive Hydropower Settlement Agreement (Settlement).

The 1998 Settlement and corresponding 1998 Water Quality Certificate (WQC) # L-19751-33-A-M amended the Project's 1997 FERC license to include permanent upstream fish passage requirements (Condition D and F). Both the Settlement and WQC stipulate that installation of permanent upstream fish passage at the Project would be required within two years after either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC No. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

Since the 1998 Settlement, Atlantic salmon have been listed as an endangered species under the Endangered Species Act and Atlantic salmon runs have increased within the Kennebec River. To proactively address protection and enhancement of the Atlantic salmon ahead of any pending action before the Commission (such as Project relicensing), Brookfield consulted with fisheries agencies and subsequently filed with the FERC a 2013 Interim Species Protection Plan (Interim SPP) and Biological Assessment for Atlantic salmon and as amended on March 29, 2013. On July 22, 2013 and as amended on September 3, 2013, NMFS issued its Biological Opinion for the ISPP.

On May 19, 2016, FERC amended the Weston License to include the Interim SPP that requires an upstream fish passage facility be designed and constructed at the Project. On May 31, 2021, Brookfield filed an SPP and Biological Assessment with the FERC, which analyzes the construction effects of the upstream fish passage facilities on listed species. Section 7 Endangered Species Act (ESA) consultation is being conducted pursuant to this BA.

In accordance with the FERC license and WQC, Brookfield proposes to construct a permanent upstream fish passage facility at the Weston Project to provide passage for upstream migration of salmon and other anadromous species.

3.0 **PROJECT PURPOSE**

The project purpose is to provide a permanent upstream fish passage facility at the Weston Hydroelectric Project that is designed for passage of Atlantic salmon and other anadromous fish species.

4.0 **PROPOSED ACTION**

The Proposed Action (Alternative 1) is to construct a fish lift which will contain a tailrace entrance located between the Weston Project log sluice and powerhouse on the south channel dam, a hopper elevator system, Attraction Water System (AWS) spillway, and an exit pipe located on the Stanchion section of the south channel dam. Construction of the Proposed Action will include the development of an access road, in-water excavation, alterations to the dam, installation of the fish lift tower, exit pipe and concrete entrance structure. Excavation will be required below the ordinary high water line (OHW) of the Kennebec River to construct a portion of the concrete entrance channel (in the tailrace). The proposed facility has been designed in consultation with the NMFS, USFWS, Maine Department of Marine Resources (MDMR), and the Maine Department of Inland Fisheries and Wildlife (MIFW) (design consultation for supporting studies and the conceptual 30%, 60%. 90% design efforts are provided in Appendix A of the USACE Permit Application Additional Information Report).

As the Proposed Action will involve the discharge of concrete fill into the Kennebec River (classified as waters of the United States under Section 10 of the Rivers and Harbors Act), BWPH is required to comply with Section 404(b)(1) of the Clean Water Act and provide an analysis of potential alternatives to the Proposed Action.

5.0 EVALUATION CRITERIA

5.1 Waterway Impacts

The specific, estimated proposed project related impacts to the waterway, both temporary and permanent fills as well as excavation quantities, are summarized in the Additional Information Report for the Weston Upstream Fishway. Design Drawings included in Appendix B of the USACE Permit Application Additional Information Report visually depict these impacts.

Fill and construction methods, as well as impact footprint vary with the considered alternatives. The effects of the proposed fishway on aquatic habitat, fish and wildlife resources, and wetlands are analyzed in Section 7.0.

5.2 Erosion and Sedimentation

Best Management Practices (BMPs) will be implemented before and during construction to limit any temporary adverse impacts to water quality, soil stability, and the natural environment. In-stream work will occur on bedrock and no significant erosion or sedimentation problems are expected as a result of the proposed construction. All work will occur behind a cofferdam and in the dry, eliminating the risk of sediment plumes. To avoid adverse environmental impacts, installation and removal of cofferdams will be scheduled during summer or winter low flows during the designated in water work windows. To create a dry work area, water will be pumped out of the cofferdam areas and back into the river. This pumped water will pass through a filtration system before reentering the riverway to avoid depositing sediment laden waters back into the waterway. Additionally, the cofferdam structures will be surrounded by turbidity curtains. Silt fences will be employed around all upland access and laydown areas to eliminate the risk of sedimentation.

Erosion and sediment control features are included within the Proposed Action designs (see USACE Permit Application Additional Information Report Appendix B).

Any alternative for a fishway at the Project would require cofferdamming and wet road access regardless of design.

5.3 Temporary Operational Changes

During construction, Weston Project minimum flows will be spilled via the north channel dam. Units 1 and 2 will be operational during construction activities while units 3 and 4 remain offline until construction is complete.

For the safety of workers during cofferdam construction, the impoundment will be operated approximately 1.5 feet below normal full pond elevation. The impoundment will again be drawn down 1.5 feet below normal full pond elevation prior to removal of the cofferdam to allow for a safe work environment. Upon completion of cofferdam removal, the impoundment will be brought back to normal operating levels.

Impoundment drawdowns required for construction activities will not exceed a rate of 1inch per hour. During periods when downstream flow regulation is necessary to raise the impoundment level, BWPH will follow a 90/10 refill protocol rate: passing 90% of inflow and allowing 10% of inflow to refill the impoundment.

Any alternative for a fishway in the bypass reach would require temporary changes to water levels regardless of design.

5.4 Magnitude and Duration of In-Stream Activity

Construction is proposed within a specific timeframe such that proposed work minimizes the magnitude and duration of in-stream activity, and when water levels are at a naturally low level. In-river work will not begin until the downstream smolt migration period (May 1 to June 15) has passed and will be targeted for in water work windows of July 15 to September 30 and November 8 to April 8. Construction and removal of the cofferdam system will encompass the majority of construction activity impact. The construction of the cofferdam system will occur in the low flow summer months, in order to avoid environmentally sensitive time periods, including downstream smolt passage season. "Instream activity" will occur in the dry behind a cofferdam system

Once the cofferdam system is installed, construction activities will take place in the dry behind the cofferdams.

Any alternative for a fishway at the Project would in water construction take place within the proposed work windows regardless of design.

6.0 ALTERNATIVES INITIALLY REMOVED FROM CONSIDERATION

Throughout the design process, BWPH worked closely with regulatory agencies to determine an appropriate technology and location to provide permanent upstream fish passage system for anadromous fish species including Atlantic salmon. During consultation and examination of the project site, it was quickly deemed that the only feasible upstream fish passage structure was some type of fish lift. This site has extremely limited space due to its location in downtown Skowhegan which limits the potential for facilities such as nature-like fishways or fish ladder systems. The Weston facility also consists of two dams, however only the south channel dam houses generation equipment and the majority of flows (other than required minimum bypass flows released at the north channel dam) are released through the powerhouse at the south channel dam. For this reason, only designs at the south channel dam were explored because it is expected that these generation flows would act as too much of an attraction flow and fish would likely not be attracted to the north channel dam. Therefore, this document only explores design possibilities for fish lift structures at the south channel dam.

7.0 ALTERNATIVE ANALYSIS

The following analysis examines the viable alternatives taken into consideration during the development of upstream fish passage designs at the Weston Hydroelectric Project.

Alternatives considered included:

• Alternative 1 (Proposed Action) - Fish Lift Structure

- Alternative 2 Straight Exit Pipe Fish Lift Design
- Alternative 3 Multi Entrance Fish Lift Design
- Alternative 4 No Action Alternative

7.1 Alternative 1 (Proposed Action) - Fish Lift Structure

7.1.1 Summary of Scope and Construction Methods

Alternative 1 (Proposed Action) consists of a fish lift system with an integrated AWS spillway to provide for permanent and effective upstream fish passage. The fish lift and AWS spillway will be located between the powerhouse and the log sluice on the south channel dam (Figure 1). The total system will be approximately 30-feet-wide by 70-feet-high. An approximate 15-foot-long section of the south channel dam will be removed down to elevation 144 feet to make space for installation of the AWS spillway which will have the capacity of up to 300 cfs and the fish lift has the capacity to pass 220 cfs. Minor bedrock excavation will additionally be required for installation of the fishway entrance.

The fish lift structure itself with have a 10-foot entrance width where the fish will swim into and stay in a hopper with a volume of 490 cubic feet. The fish lift facility will provide a total attraction flow of up to 304 cfs and will have a cycle time of 15 minutes. The attraction flow will be provided via the isolation gate with a wedge wire screen with 0.25inch slot widths. Migrating fish will swim into the fish lift entrance (invert elevation of 115 feet), through a V-Gate and then into the hopper, which will lift fish from an elevation of approximately 113-feet to an elevation of 165.5-feet where they will swim out the approximately 215-foot-long by 20-inch pipe to an elevation of 159-feet and exit into the headpond at elevation 156-feet to continue their migration upstream. The exit pipe has a maximum of 5% slope. Flows through the exit pipe will not be continuous. A total of 490 cubic feet (3,665 gallons) of water will be passed through the exit pipe over approximately 30 seconds, with instantaneous flows ranging from 10 to 40 cfs. An additional 600 gallons will discharge through the exit pipe for approximately 30 seconds from an auxiliary tank following the hopper discharge. A design drawing package for the proposed alternative can be found in Appendix B of the USACE Permit Application Additional Information Report.

Fish lifts are a cost effective and very efficient fish passage technology. While mechanical fish lift technology requires higher maintenance and operational costs as opposed to traditional volitional fishways, lifts are preferred at sites where space is limited, or site constraints are present. As the space surrounding the Weston Project is limited and

composed of bedrock ledge, the design for a lift-based fishway is ideal for a hydraulic connection between the tailrace and headpond. The Proposed Action does meet the project purpose of providing an upstream fish passage facility at the Weston Hydroelectric Project designed for Atlantic salmon and other anadromous fish species.



Figure 1 Alternative 1 (Proposed Action) - Fish Lift Structure

7.1.2 Environmental Impacts

Aquatic Habitat

The Kennebec River within the Proposed Action vicinity provides critical habitat for Atlantic salmon as well as essential fish habitat (EFH) for American shad, alewives, and blueback herring. Although the conditions of the Kennebec River will be permanently and temporarily altered by proposed construction activities, the Proposed Action will have an overall long-term beneficial effect on the area's critical habitat and EFH as it will provide upstream passage for anadromous fish species. After discussion and consultation with agencies this design has been deemed the most effective at successfully passing anadromous species from the tailrace to the headpond of the Weston Project.

Fish Resources

The Kennebec River supports approximately 50 species of freshwater and diadromous fish species, including cold and warm water angling opportunities for wild and stocked brook trout, landlocked salmon, brown trout, rainbow trout, and smallmouth bass. The lower Kennebec River supports runs of diadromous fish species, including American shad, blueback herring, alewives, endangered Atlantic salmon, and American eel. Endangered Atlantic and shortnose sturgeon also occur in the lower Kennebec River, but typically no further upstream than the Lockwood Project located approximately 19 miles downstream of the Weston Project.

Throughout construction, prescribed minimum flows will be maintained and downstream fish passage will continue to be provided via spill.

Construction of the fish lift will take place within the waterbody, for a limited duration. Temporary effects will mostly be associated with the cofferdam construction and removal, as all other in-river work will occur behind the cofferdam. Some noise may be associated with construction and excavation, though it will be buffered by the cofferdam. Proposed construction activities are not anticipated to negatively affect water quality as sediment and erosion control BMP's will be implemented during project construction to limit any temporary adverse impacts to water quality (sedimentation inputs).

No in water work will commence until the downstream Atlantic salmon smolt season has passed and will be completed within the proposed work windows. Atlantic salmon presently only occur in the Project area as smolts and kelts during the downstream migration season. As such, the project is not anticipated to negatively affect Atlantic salmon or other diadromous species.

Overall, the intent of this project is to provide upstream fish passage for Atlantic salmon and other migratory species. Operation of the new upstream fish lift will not change the normal pond elevation or minimum flows and thus will have minimal effect on the existing aquatic habitat.

A Biological Assessment of the construction impacts to Atlantic salmon and critical habitat was filed with the Commission on May 31, 2021.

Wildlife Resources

The project area is located within an urbanized and previously disturbed area and wildlife species likely to inhabit the area are mostly rodent-type mammals and some bird species. There is a possibility that project construction may temporarily impact endangered Northern Long Eared Bat (NLEB), which are documented as having the potential to occur in the project area. Construction activities may disturb NLEB feeding patterns and transient bald eagles. Provided the temporary nature and short timeline associated with this project, impacts are expected to be temporary and short in duration.

Wetlands

Lands surrounding the Weston dam consist of a mix of residential and industrial developments and represent a disturbed upland system with limited to no vegetated surfaces. The Kennebec River shoreline within and surrounding the Proposed Project area is characterized by steep, bedrock slopes and does not host freshwater wetland systems as identified in the U.S. Fish and Wildlife Service's National Wetlands Inventory Database. There is a freshwater emergent wetland system located approximately 0.8 of a mile south of the Project area on the east side of the Kennebec River (USFWS, 2021) (Figure 2).

Proposed Project activities are not anticipated to affect this wetland area. The majority of construction activities will occur within the facility's existing bypass reach which will be dewatered during construction. BMPs such as silt fencing will be implemented to prevent sediment run-off into the Kennebec River.



Figure 2 USFWS National Wetlands Mapper - No wetlands in the Project Area

7.2 Alternative 2 – Straight Exit Pipe Design

7.2.1 Summary of Scope and Construction Methods

Alternative 2 is very similar to the Proposed Action. This structure would also be positioned between the log sluice and the powerhouse on the south channel dam and would similarly contain a tailrace entrance, a hopper elevator system, AWS spillway, and an exit pipe.

The primary difference between this design and the Proposed Action is the location of the exit pipe. As shown in Figure 3, this design shows the exit pipe for the fish directly upstream of the fish lift structure. While this alternative is viable, the location of the exit pipe is not ideal as fish will enter the impoundment within a close proximity to the log sluice. When the log sluice is open this could pose a risk of migrating fish falling back downstream over the dam.

Overall, Alternative 2 does meet the project purpose of providing an upstream fish passage facility at the Weston Hydroelectric Project designed for Atlantic salmon and other anadromous fish species.





7.2.2 Environmental Impacts

Alternative 2 would have almost identical project impacts as Alternative 1 (see direct temporary environmental impacts and proposed mitigation measures outlined in Section 5.2). The primary difference between this design and the Proposed Action is the location of the exit pipe. This location for the exit pipe is more cost effective as it requires less piping and area. However, this location poses a risk of migrating species to falling back into the tailrace area when the log sluice is operational due to its proximity to the sluiceway.

7.3 Alternative 3 – Multi Entrance Fish Lift Design

7.3.1 Summary of Scope and Construction Methods

Alternative 3 is very similar to the Proposed Action. This structure would also be positioned between the log sluice and the powerhouse on the south channel dam and would similarly contain two tailrace entrances, a hopper elevator system, AWS spillway, and an exit pipe.

Through the agency consultation process, there were discussions surrounding a second entrance to the proposed fish lift. Originally options were explored to add a second entrance on the west most side of the powerhouse (of the south channel dam). This option would have required a flume extending from the far side of the powerhouse back to the fish lift structure. This flume, though, would have blocked a portion of the draft tube discharge, which would have created unacceptable operational and generation consequences for the Weston Hydroelectric Project. Creating an additional entrance closer to the powerhouse discharge may have increased the fish passage success rate by creating another available option for passage. BWPH developed the design shown in Figure 4 to attempt to accommodate multiple entrances to the fish lift with one entrance abutting the outflow from the unit 4 of the powerhouse.

This design was deemed less desirable based on the additional effort required to develop the second entrance, resulting generation implications, and the minimal added value it creates in this location. Overall, Alternative 3 does meet the project purpose of providing an upstream fish passage facility at the Weston Hydroelectric Project designed for Atlantic salmon and other anadromous fish species.





7.3.2 Environmental Impacts

Alternative 3 would also have almost identical environmental impacts as Alternative 1 (see direct temporary environmental impacts and proposed mitigation measures outlined in Section 5.2). Alternative 3 would require a slight increase in fill below the OHW line for the second entrance to the fish lift. This additionally would slightly increase costs of the project overall. As previously mentioned, the idea for the second entrance to the fish lift was to help ensure fish attracted by the power generation flows could find an entrance to the lift structure. Through consultation it was deemed unfeasible to locate the second entrance on the far side of the powerhouse, due to the potential for confusion with bypass reach flows. BWPH explored a second entrance closer to the tailrace on the existing fish lift structure. With this location it is unknown if there is any added benefits to a second entrance for confusion between attraction flows provided directly into the tailrace and flows originating from the powerhouse. Due to an increase unknown levels of potential fishway attraction this alternative may not provide an effective upstream fish passage system.

7.4 Alternative 4 – No Action Alternative

7.4.1 Summary of Scope and Construction Methods

Under the No Action Alternative, the installation of a permanent upstream fishway at the Weston Hydroelectric Project would not occur. This may be considered the least practicable of the available alternatives as a permanent upstream fishway for the Weston dam is currently required by fisheries agencies in response to the listing of Atlantic salmon under the Endangered Species Act (ESA). Under the Project's amended 1998 Water Quality Certificate (WQC) (# L-19751-33-A-M) it is additionally stipulated that installation of permanent upstream fish passage at the Project would be required within two years after either of the following events, whichever occurs first: a) 35,000 American shad pass in any single season in the permanent passage facility at the downstream Shawmut Hydroelectric Project (FERC NO. 2322), or b) resource agencies determine upstream passage is necessary for Atlantic salmon, alewife, or blueback herring.

With the listing of Atlantic salmon as an endangered species under the ESA and classification of the Kennebec River as critical habitat for the Atlantic salmon population, fisheries agencies recommended BWPH develop permanent upstream passage for Atlantic salmon and other anadromous species at the Project. Although listed here, this alternative is not practicable because it does not meet the project purpose. This alternative would have the greatest environmental impact as it would prevent the passage of ecologically important anadromous fish species past the Weston dam and prevent the enhancement of critical salmon habitat in the Kennebec River basin.

7.4.2 Environmental Impacts

Under the No Action Alternative, environmental conditions at the Weston Hydroelectric Project would remain unchanged. This alternative may have the greatest environmental impact as it would prevent the potential for passage of Atlantic salmon and other anadromous fish species over the Weston dams and prevent the enhancement of critical Atlantic salmon habitat in the Kennebec River.

7.5 Alternatives Analysis

Alternatives 1, 2 and 3 are all very similar in terms of environmental impacts. All three designs are based on a fish lift structure in between the Weston Project log sluice and powerhouse. Because of this, similar construction methods and therefore temporary impacts associated with the construction are almost identical for all three fish lift

alternatives. As they all also require similar footprints, in-water fill amounts are expected to be very similar between all three alternatives with the exception of the potential for slightly more fill associated with Alternative 3. While Alternative 2 does meet the project purpose with slightly less fill and materials in the river way it is expected to be less effective in passing fish upstream due to its proximity to the log sluice, and therefore potential of drop backs.

In all, construction related environmental impacts, fill amounts, and pricing are not driving factors in the decision to move forward with Alternative 1. Overall anticipated fish passage effectiveness is the driving force in the concept surrounding the alternatives evaluated. Alternative 1 is anticipated to be the most effective fish passage system and therefore the least environmentally damaging practicable alternative of the evaluated alternatives.

8.0 CONCLUSION

Throughout the design process, BWPH worked closely with resource agencies to determine an appropriate technology that would provide permanent upstream fish passage by connecting the Weston headpond and tailrace while also providing effective passage for anadromous fish species including Atlantic salmon. Technologies aside from Alternative 1 (Proposed Action), Alternative 2, and Alternative 3 were considered but filtered out from design possibilities as the technologies proved impracticable for the Weston Project site. The No Action Alternative additionally proved impracticable as an upstream fish passage facility has been mandated by resource agencies and the absence of an upstream fish passage facility would be the least environmentally desirable of all considered alternatives. Additionally, Alternative 2 may be less effective than the Proposed Action (Alternative 1) and Alternative 3 may prove to have no added benefits compared to the Proposed Action and would contribute to a higher level of in water impact and effort. In accordance with the above review, the Proposed Action (Alternative 1) is therefore the Least Environmentally Damaging Practicable Alternative available.

ACCESS PERMISSION STATEMENT

Weston Hydroelectric Project Upstream Fish Lift Facility Access Permission Statement

The U. S. Army Corps of Engineers has permission to enter the project work site for inspection and other purposes during normal business hours. Brookfield White Pine Hydro, LLC requests one business days' notice for access to the project site such that appropriate personnel may be present.

Brookfield White Pine Hydro, LLC

Kells Malomey Signed:__

Kelly Maloney Manager, Compliance - Northeast

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION PERMIT APPLICATION (ENCLOSED SEPARATELY)