Low Impact Hydropower Institute's (LIHI) Certification Review for Millinocket and Dolby Developments (part of the Penobscot Mills Hydroelectric Project)

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1. BACKGROUND

The Penobscot Mills Hydroelectric Project (PMHP) consists of four hydroelectric developments and a storage dam located between river mile (RM) 2.0 and RM 15.0 on the west branch of the Penobscot River[1] near Millinocket and East Millinocket, Maine. The Project is licensed with the Federal Energy Regulatory Commission (FERC) as Project No. 2458. From upstream to downstream these hydropower developments are the North Twin, Millinocket, Dolby, and East Millinocket. The application for LIHI certification only pertains to the Millinocket and Dolby hydroelectric developments (Project).

These hydropower developments were originally constructed to meet the mechanical demands of the Millinocket Mill Dam, constructed in 1900, and the East Millinocket Mill Dam, constructed in 1906. Millinocket Lake contains a pumping station, located on the opposite end of the lake from the dam. Water can be pumped up approximately 12 feet from Millinocket Lake to Ambajejus Lake, which is part of the North Twin impoundment. Releases from Millinocket Lake dam enter the Millinocket Stream which eventually flows into the west branch of the Penobscot River.

A Section 401 Water Quality Certificate (WQC) was issued by the Maine Department of Environmental Protection (MDEP) on April 22, 1993 and amended by MDEP on July 18, 2012[2]. FERC's Environmental Impact Statement (FEIS) was issued on October 1, 1996. The FERC issued a 30-year major license for the PMHP to Great Northern Paper, Inc. (GNP) on October 22, 1996, effective October 1, 1996, which expires on October 1, 2026[3]. On August 26, 2002, GNP changed its name to Great Lakes Hydro America, LLC (GLHA)[4] which is a wholly owned as a subsidiary of Brookfield Renewable Partners (BRP).[5] On August 18, 2016, the FERC amended the license to remove about 2.5 acres from the Project boundary[6].

The Millinocket development has an authorized installed capacity of 37.4 megawatts (MW) that produced an average annual generation (AAG) of 178.45 megawatt-hours (MWh) for calendar years 2005 through 2018. The Dolby development has an authorized installed capacity of 17.8 MW that produced an AAG of 102.445 MWh for calendar years 2005 through 2018. Accordingly, the Project's total installed capacity of 55.2 MW is estimated to produce an AAG of 280,899 MWh, which corresponds to an annual plant factor of 58.1%.

GLHA submitted an application for LIHI certification of the Project on July 11, 2019. On July 26, 2019, LIHI notified GLHA that the intake review for the Project was complete. The intake review found that only a small amount of supplemental information was needed. GLHA supplied a revised application on September 9, 2019. On September 6, 2019, I committed to perform the certification review for the Project.

[1] River miles at measured above the confluence of the east and west branches of the Penobscot River.
[2] Amended WQC https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13030012
[3] FERC License - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3058862
[4] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10698324
[5] Kelly Maloney, Compliance Manager, Northeast Region, Brookfield Renewable, 150 Main Street, Lewiston, Maine 04240, (207) 755-5606, Kelly.Maloney@brookfieldrenewable.com
[6] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14333803

2. PENOBSCOT RIVER BASIN

The Penobscot River is 264 miles long, making it the longest river system in Maine. The river drains nearly one-third of the State of Maine with a watershed area of 8,670 square miles (SQMI). The basin has a low human population density, is largely forested, and contains many large lakes and multiple tributaries.

Drainage of the Penobscot is wholly within the state, and its tributaries are as follows: the East Branch Penobscot River - 1,150 SQMI, the West Branch Penobscot River - 2,140 SQMI, the Mattawamkeag River - 1,520 SQMI, the Piscataquis River - 1,470 SQMI and the Penobscot River - 2,400 SQMI. The river is tidal for the first 25 miles up to the former Veazie dam, which was removed in 2013 (See Figure 1).

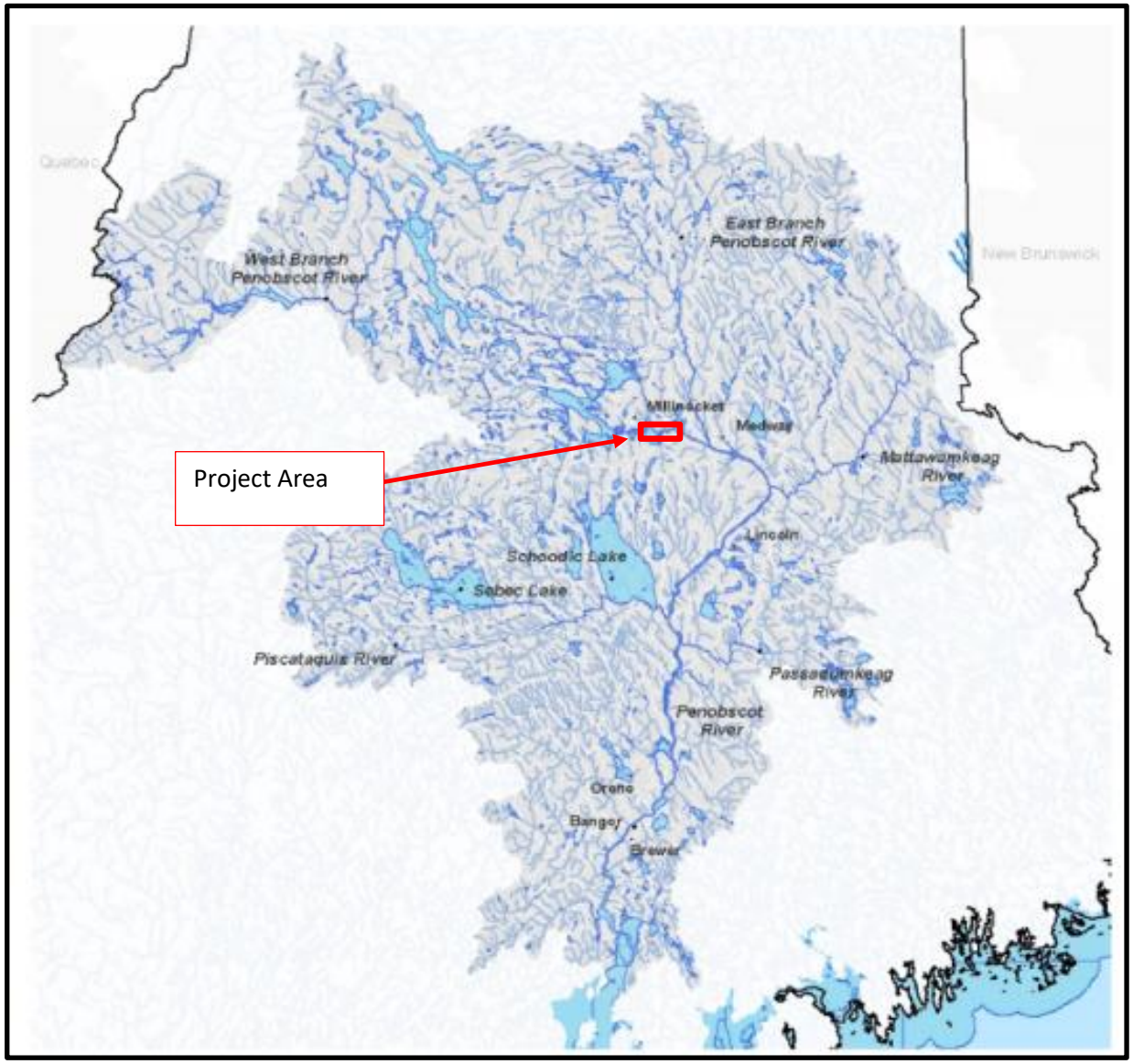

Figure 1 - Penobscot Drainage Basin

Figure 2 is a blowup of the Project area in Figure 1. The Millinocket development is on the left and located in the town of Millinocket. The impoundment is comprised of Quakish Lake and Ferguson Pond. Water can be released downstream from Stone Dam on Quakish Lake (latitude 45°38'18.65" N, longitude 68°43'41.79" W) into a 4.5-mile-long bypass reach of the west branch of the Penobscot River known as the "Back Channel", or through the powerhouse from Ferguson Pond which empties into the Millinocket Stream.

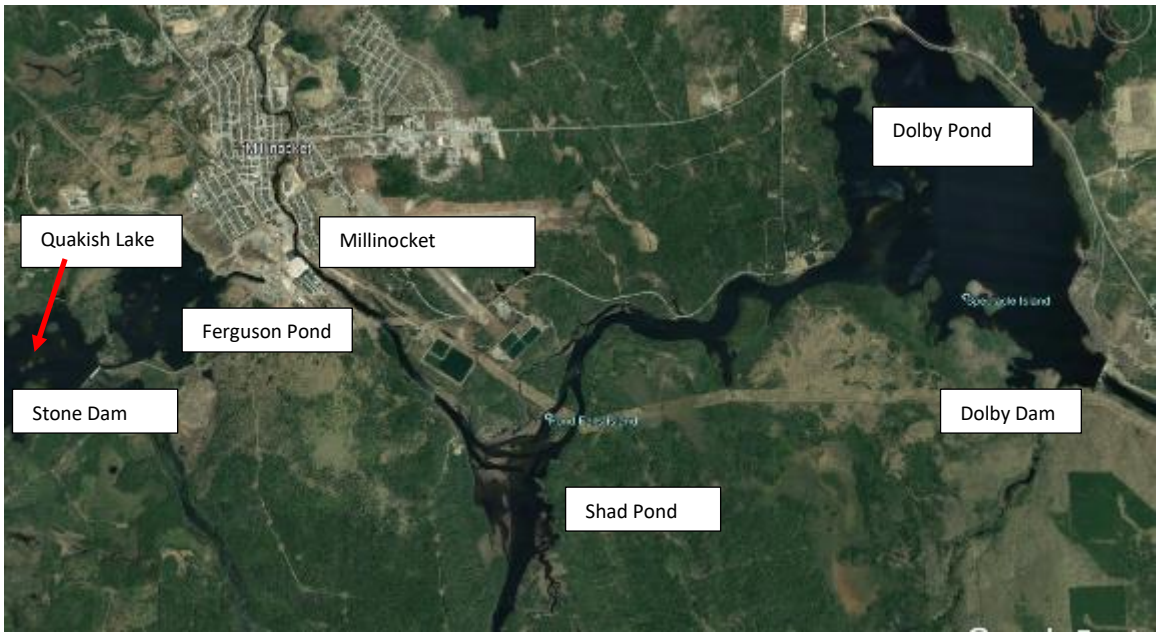

Figure 2 - Blowup of Project Area

An aerial side view of the Millinocket development looking to the west is shown in Figure 3.

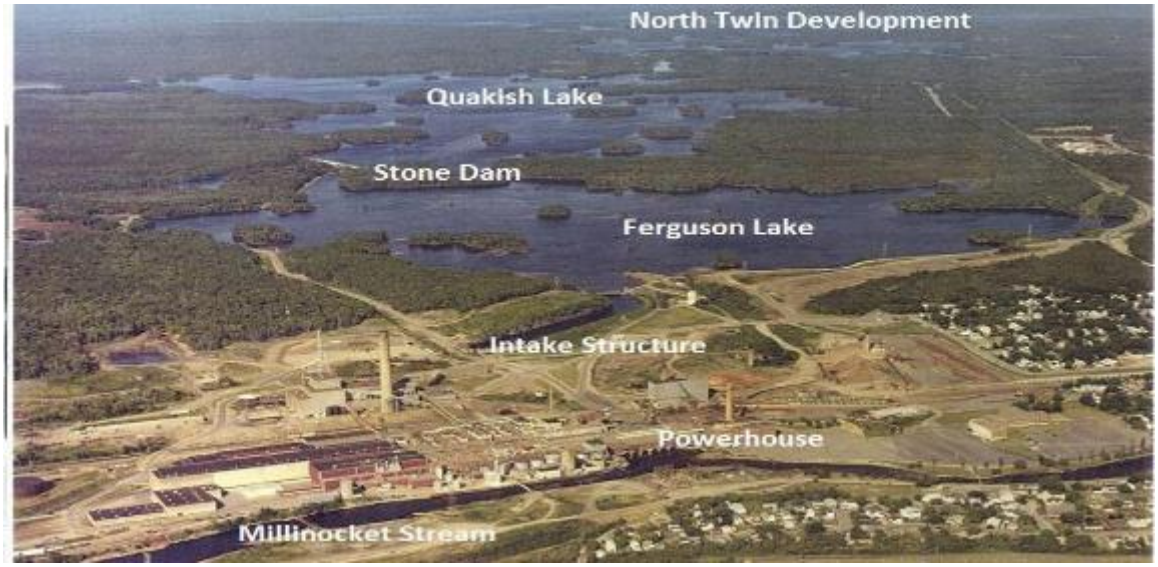

Figure 3 - Aerial Side View of Millinocket Development

The Millinocket Stream and the Back Channel converge at Shad Pond about 1.5 miles downstream of the Millinocket tailrace. Flow from Shad Pond continues about 2.5 miles downstream below entering the Dolby Pond.

The Dolby development dam (latitude : 45° 37' 57" N, longitude 68° 36' 24" W), on the right in Figure 2, impounds water in Dolby Pond and is located in East Millinocket, approximately 4.2 river miles above the confluence of the east and west branches of the Penobscot River. The Dolby powerhouse is integral with the dam. Releases from Dolby dam enter the East Millinocket impoundment. An aerial side view of the Dolby Development looking to the north is shown in Figure 4.

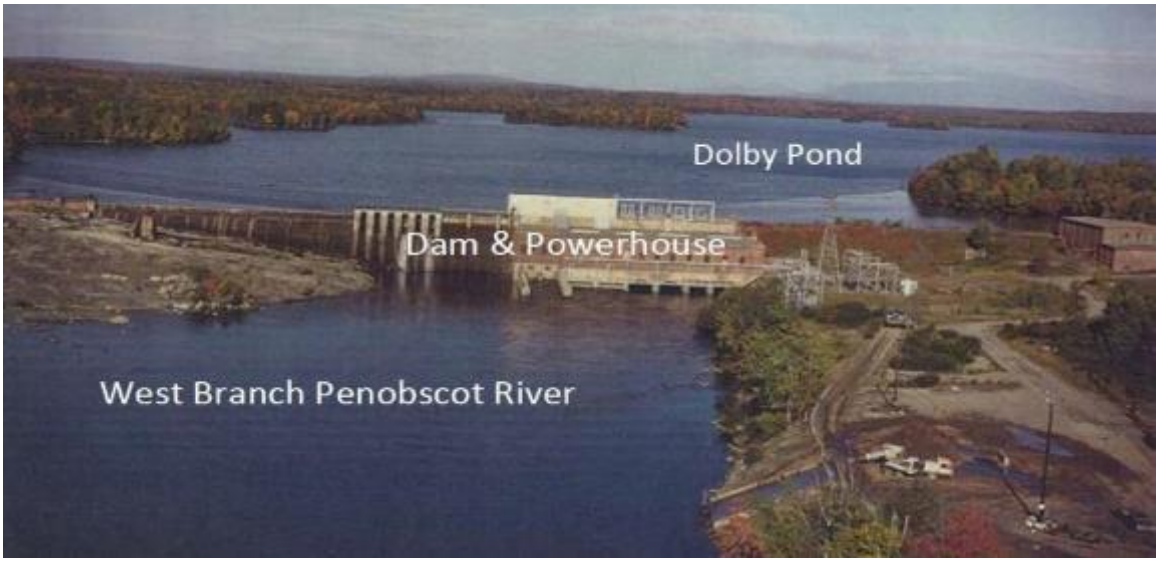

Figure 4 - Aerial View of the Dolby Development from the south.

There are a number[7] of dams both upstream and downstream of the Project's developments. A listing of the dams from upstream to downstream include:

- The Ripogenus Project, owned by GLHA and licensed as FERC Project 2572. Releases from the project enter the North Twin impoundment. The project has no upstream or downstream fish passage.
- The PMHP's Millinocket Lake development at RM 19 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development can pump water into the North Twin impoundment. The development has no upstream or downstream fish passage.
- The PMHP's North Twin development at RM 15 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development has an upstream fishway for resident fish species with no downstream fish passage.
- *The PMHP's Millinocket development at RM 12.3 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development has no upstream or downstream fish passage.*
- *The PMHP's Dolby development at RM 4.2 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development has no upstream or downstream fish passage.*

[7] The Project's developments in this list are italicized.

- The PMHP's East Millinocket development at RM 2.5 on the West Branch Penobscot River, owned by GLHA and licensed as part of FERC Project 2458. The development has no upstream or downstream fish passage.
- The Medway Project at RM 0.7 on the West Branch Penobscot River, owned by Black Bear Hydro Partners (BBHP) a subsidiary of Brookfield Renewable, and licensed as FERC Project 2666 (LIHI #65). The project has upstream and downstream eel passage.

3. ZONES OF EFFECT (ZOEs)

The Millinocket and Dolby developments have a total of eight ZOEs defined from upstream to downstream. ZOEs 1 through 5 are shown in Figure 5.

The ZOEs associated with the Millinocket development are:

- Water released from the North Twin impoundment flows into a section of the west branch of the Penobscot River, which comprises Zone 1 – Regulated River Reach Upstream (RM 15.0 to RM 14.1);
- The Quakish Lake portion of the Millinocket impoundment represents Zone 2 – Quakish Lake (RM 14.1 to RM 12.3);
- Stone Dam discharges excess flows and leakage flows of between 2.0 and 5.0 cubic feet per second (CFS) into the Back Channel, approximately 4.5 miles in length and extending to the confluence with the west branch of the Penobscot River at Shad Pond, which is designated as Zone 3 – Bypass Reach (RM 12.3 to RM 7.7);
- The Millinocket powerhouse intake is situated at Ferguson Pond, which is hydrologically connected to Quakish Lake through a gate structure at Stone Dam and a canal, and is maintained at the same stable elevation as Quakish Lake and included in Zone 4 – Ferguson Pond (RM 12.3 to RM 11.0);
- The discharge from the Millinocket powerhouse, which outlets to Millinocket Stream and combines with the Back Channel at Shad Pond is designated as Zone 5 - Regulated River Reach Downstream of Powerhouse (RM 10.0 to RM 7.5).

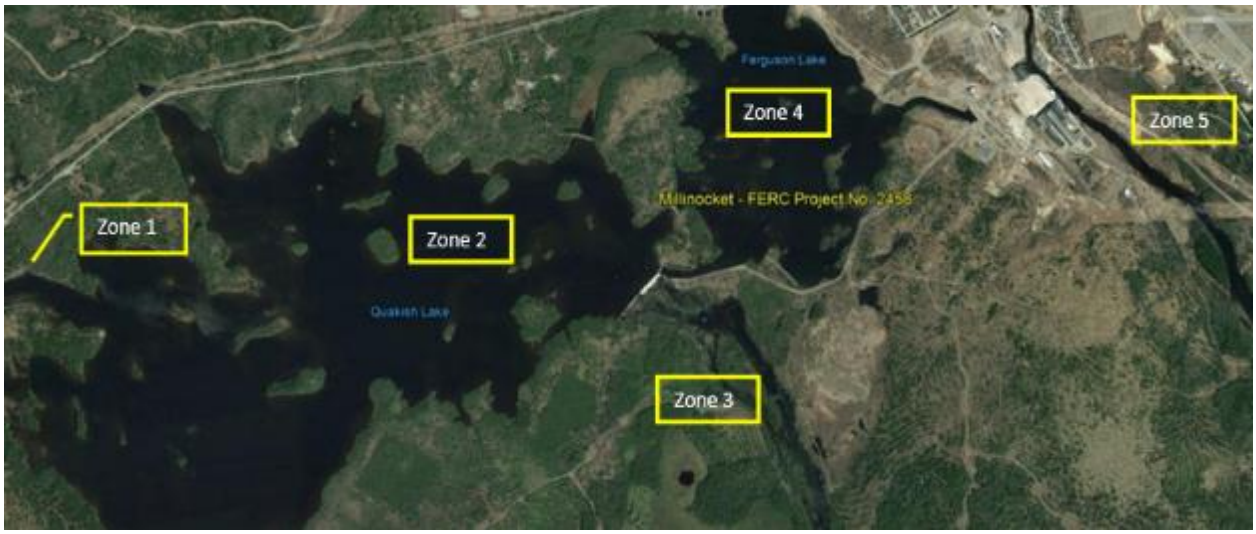

Figure 5 - Millinocket Development ZOEs

ZOEs 5 through 8 are shown in Figure 6. These ZOEs are associated with the Dolby development:

- As discussed above, the Dolby impoundment receives inflow from ZOE 5 (RM 10.0 to RM 7.5);
- Dolby Pond, which serves as the impoundment for the Dolby development, is designated as Zone 6 – Dolby impoundment (RM 7.5 to RM 4.2);
- Dolby Dam has a very short section of high perched ledge immediately downstream of the dam which is designated as Zone 7 – Bypass Reach (RM 4.2 to RM 4.1);
- Dolby Dam powerhouse, which is integral to the dam, discharges to the west branch of the Penobscot River. Because the East Millinocket development backwaters to Dolby Dam, only a short reach of approximately 100 feet is designated as Zone 8 – Regulated River Reach Downstream (RM 4.2 to RM 4.1).

Figure 6 - Dolby Development ZOEs

The alternative standards selected to satisfy the LIHI certification criteria in each of these ZOEs are identified in the following tables. As part of my review process, I checked and agreed with their selection.

Table 1 - Regulated River Reach Upstream (RM 15.0 to RM 14.1) - ZOE 1 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes	X				
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 2 - Quakish Lake (RM 14.1 to RM 12.3) - ZOE 2 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage		X			
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection			X		
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 3 – Millinocket Bypass Reach (RM 12.3 to RM 7.7) - ZOE 3 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 4 – Ferguson Pond (RM 12.3 to RM 11.0) - ZOE 4 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 5 – Regulated Reach Downstream of Millinocket Powerhouse (RM 10.0 to RM 7.5) - ZOE 5 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 6 – Dolby Impoundment (RM 7.5 to RM 4.2) - ZOE 6 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes	X				
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 7 – Dolby Bypass Reach (RM 4.2 to RM 4.1) - ZOE 7 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection	X				
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

Table 8 – Regulated River Reach Downstream of Dolby Dam (RM 4.2 to RM 4.1) - ZOE 8 Alternative Standards						
Criterion		Alternative Standards				
		1	2	3	4	Plus
A	Ecological Flow Regimes		X			
B	Water Quality		X			
C	Upstream Fish Passage	X				
D	Downstream Fish Passage	X				
E	Watershed and Shoreline Protection		X			
F	Threatened and Endangered Species Protection		X			
G	Cultural and Historic Resources Protection		X			
H	Recreational Resources		X			

4. PROJECT HYDROLOGY

There are two US Geological Survey (USGS) gages located upstream of the Project's developments:

1. USGS gage 01027240, located immediately below Canada Falls Lake. This gage has a contributing drainage area of 182 SQMI and only started recording streamflow on October 6, 2016;
2. USGS gage 01027200, located near Pittston Farm, Maine. This gage has a contributing drainage area of 232 SQMI and started recording streamflow on September 6, 2001.

Flows from both gages combine prior to flowing into Seboomook Lake, then continue downstream into Moose Pond, Chesunook Lake, Carbou and Ripogenus Lake, and finally Ambajejus Lake. Additionally, flow into Millinocket Lake is solely from local drainage.

The first USGS gage (01028000) downstream of the PMHP developments is located on the west branch of the Penobscot River near Medway, Maine. This gage stopped recording streamflow in November of 1939. Accordingly, the next USGS gage available is the Penobscot River at West Enfield, Maine (01034500) with a drainage area of 6,422 SQMI.

Due to this situation, mass balance equations are used by GLHA to calculate inflows at both developments. Real-time inflows for each development are back-calculated based on changes in impoundment elevation, turbine data, tailwater data and gate curves using Brookfield's Supervisory Control and Data Acquisition (SCADA) system. Real-time outflows are estimated based on net head, wicket gate settings, and gate positions. Since both the Millinocket and Dolby developments are operated in a run-of-river (ROR) mode, real-time inflow is calculated as the estimated real-time outflow plus any slight change in impoundment elevation (expressed in terms of an average flow release or gain).

However, from a historical perspective, inflows into each of the PMHP's developments can be estimated by initially subtracting flows from USGS gages that contribute to the flow at the USGS gage at West Enfield and then prorating the remaining flow to each development. These USGS gages are from upstream to downstream:

1. The USGS gage on the east branch of the Penobscot River at Grindstone, Maine (01029500) with a drainage area of 837 SQMI. When prorated to its confluence with the west branch of the Penobscot River its drainage area is 1,150 SQMI;
2. The USGS gage on the Mattawamkeag River near Mattawamkeag, Maine (01030500) with a drainage area of 1,418 SQMI. When prorated to its confluence with the Penobscot River its drainage area is 1,520 SQMI;
3. The USGS gage on the Piscataquis River at Medford, Maine (01034000) with a drainage area of 1,162 SQMI. When prorated to its confluence with the Penobscot River its drainage area is 1,470 SQMI.

By subtracting flows from these three gages from the flows at the USGS gage at West Enfield, flows on the west branch of the Penobscot River just prior to its confluence with the east branch of the Penobscot River (WBPF) can be determined. This location has a contributing drainage area of 2,282 SQMI and contains period of record (POR) daily flows since October 1, 1934. The minimum daily flow of 17.7 CFS occurred on October 24, 1970. The maximum daily flow of 35,164 CFS occurred on May 1, 1973. A daily flow of 2,228 CFS is exceeded about 90% of the time annually. A daily flow of 3,477 CFS is exceeded about 50% of the time annually. A daily flow of 5,934 CFS is exceeded about 10% of the time annually. The 1% exceeded annual daily flow is 13,145 CFS. The 10-year daily flow is about 22,250 CFS and the 100-year daily flow is 36,370 CFS.

Typically, inflows for each development would be estimated by prorating daily flows at WBPF using a ratio of the contributing drainage area at each development over the drainage area at WBPF. For the Millinocket development this ratio is (1,890/2,282) or 0.828. For the Dolby development this ratio is (2,108/2,282) or 0.924. The Millinocket and Dolby development POR average annual inflows are 3,288 CFS and 3,651 CFS, respectively.

5. PROJECT DESCRIPTION

GLHA operates the Millinocket and Dolby developments in a ROR mode while providing an instantaneous minimum flow[8] of 2,000 CFS to the west branch of the Penobscot River. ROR operation or minimum flows may be temporarily modified if required by operating emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee, the U.S. Fish and Wildlife Service (USFWS) and the MDEP.

A. Millinocket

The Millinocket development is located in the town of Millinocket and consists of:

- Quakish Lake and Ferguson Pond, which together form the Millinocket impoundment having a combined surface area of 1,344 acres and a gross volume of 8,100-acre-feet (ACFT) at a normal full pond water surface elevation of 458.7 feet mean sea level (FTMSL);
- Stone Dam, a concrete dam on Quakish Lake, 1,262 feet in length comprised of;
    - A 428-foot-long, 27-foot-high north overflow spillway with a crest at 456.4 FTMSL and an inflatable rubber flashboard system 2.75 feet in height;

[8] Although the license article defines the 2,000 CFS downstream flow requirement as a minimum flow, it is actually a base flow because turbine releases upstream can be used to meet the 2,000 CFS requirement.

  - A 358-foot-long, 25-foot-high south overflow spillway with a crest at 456.2 FTMSL with 2.5-foot-high wooden flashboards;
  - A 300-foot-long concrete gravity abutment non-overflow section with a top elevation of 458.95 FTMSL;
  - A 52-foot-long, 25-foot-high waste gate structure containing four steel waste gates, three 9-foot-wide by 6-foot-high slide gates and one 11-foot-wide by 6-foot-high slide gate;
  - Three earthen embankments on Quakish Lake (Dikes 1 through 3) with a total length of approximately 1,854 feet and a maximum height of 10 feet located north of the gatehouse with top elevations of 468 FTMSL, 468.5 FTMSL and 468 FTMSL, respectively;
  - A gatehouse integral with the dam that measures approximately 124 feet in length and approximately 16 feet in height, containing ten gate openings and a 12.5-foot sluiceway for passing flow through a canal approximately 150 feet wide and 1,400 feet long conveying water to Ferguson Pond, known as the “western canal”.
- Facilities on Ferguson Pond consists of:
  - Five earth embankments (Dikes 4 through 8) totaling 3,915 feet in length located around the perimeter of Ferguson Pond with a maximum height of about 15 feet and a top elevation of 462 FTMSL.
  - A 225-foot-long, 17 to 23-foot-high, post-tensioned, concrete gravity canal wall with a crest elevation of 458.2 FTMSL, equipped with 6-inch-high flashboards.
  - A canal, known as the "eastern canal”, conveying water from Ferguson Pond to the intake structure measuring 150 feet wide and 1,300 feet long. The entrance to the intake structure is approximately 7,300 feet from Stone Dam.
- Power facilities consists of:
  - Trashracks approximately 216 feet long located upstream of the powerhouse intake gates;
  - Seven intake structure head gates allowing for passage of water into individual penstocks. Six gates 12.5-foot by 12.5-foot, one gate 13.5 feet by 13.5 feet;
  - Six 10-foot diameter buried steel penstocks and one buried 11-foot diameter steel penstock ranging in length from 1,007 feet to 1,024 feet. All eleven penstocks have trashracks constructed of 3/8-inch by 3-inch bar steel with a clear spacing of $2^{5/8}$ inches;
  - Five hydroelectric turbine-generator units located within the Grinder Room of the former mill complex;
  - Two hydroelectric turbine-generators units located in a powerhouse referred to as the Generator Room;
  - Two transformers, one having a rated capacity of 30/40/50 megavolt amps (MVA) and one at 24/34/40 MVA, and;
  - Two 60-Hz transmission lines approximately 300 feet long. One at 6.9 kilovolts (KV) and one at 13.8 KV.

The maximum discharge for Stone Dam is 109,000 CFS at elevation of 464.2 FTMSL, which corresponds to the deck level of the head gates.

A history of the development’s construction activities follows:

- In 1899 – 1900, the Stone Dam and powerhouse penstocks 1 through 4 and 7 were constructed;
- In 1912, installation of penstocks 5 and 6 occurred;
- In 1964, concrete overlay on downstream slope of Stone Dam spillway was completed;
- In 1974, rehabilitation of the waste gate structure, including installation of new gates was completed;

- In 1982, rehabilitation and post-tensioning of the concrete canal wall was completed;
- In 1984, raising of embankment crests and flattening of downstream slopes was completed;
- From 1989 through 1991, the gatehouse was rehabilitated;
- In 1994, Conversion of Units 2 through 6 to hydroelectric power production (Unit 1 converted prior to 1990)
- In 1997, an inflatable rubber flashboard was added on left section of spillway, units 4 and 6 turbines were overhauled and installation of a trashrack cleaner in the penstock intake structure was completed;
- In 1998, unit 1 turbine was overhauled;
- In 1999, units 2 and 6 turbines were overhauled, and a computerized control system known as Energy Optimization System (EOS) was installed;
- From 2002 through 2005, repairs on penstocks to address minor leaks was completed;
- In 2005, the placement of riprap at Dike No. 4 and the raising of the crest of Dike 8 occurred;
- In 2006, replacement runners for units 4, 5, 6, and 7 were installed;
- In 2006 – 2007, intake gate seals were rehabilitated and grouting of right abutment of Stone Dam occurred;
- From 2008 through 2017, the relining of penstocks occurred.
- Lastly, in 2018 - 2019, the development underwent improvements to its turbine-generating facilities. GLHA replaced three 40 Hz generators (3, 4, & 7) with 60 Hz generators. An amendment application revising the Exhibit A for the Project to reflect these changes is currently in preparation for submittal to the FERC.

Unit 2, a horizontal Francis turbine with a nameplate capacity of 5,250 kW, is currently out of service and does not have a generator associated with it. The application does not specify whether rehabilitation of unit 2 is planned for the future. Table 9 represents the post-conversion condition. The Millinocket development has an authorized installed capacity of 37.4 MW.

Table 9 – Millinocket Hydro Units

Unit	Turbine Nameplate (kW)	Generator Nameplate (kW)	Hydraulic Capacity (CFS)	Authorized Installed Capacity (kW)
Millinocket 1	5,235	5,440	662	5,235
Millinocket 2	Inoperable	Inoperable	Inoperable	Inoperable
Millinocket 3	5,250	5,580	695	5,250
Millinocket 4	5,432	5,580	566	5,432
Millinocket 5	5,432	5,510	566	5,432
Millinocket 6	5,432	5,510	566	5,432
Millinocket 7	5,432	5,580	600	5,432
Millinocket 8	5,164	5,440	650	5,164
TOTAL			4,305	37,377

At a maximum powerhouse hydraulic capacity of 4,305 CFS, the corresponding tailwater elevation is 440 FTMSL.

Based on a flow duration analysis using POR daily flows, the total hydraulic powerhouse flow of 4,305 CFS is exceeded and spillway flow occurs about 26 percent of the time into the Back Channel annually.

A frequency analysis using POR daily flows indicates the 100-year daily flood flow is 30,370 CFS. The highest historical daily flow of 29,362 CFS occurred on May 1, 1973.

B. Dolby

The Dolby development is located on the West Branch of the Penobscot River, between Millinocket and East Millinocket, at approximately 4.2 river miles above the confluence of the East and West Branches.

The development consists of:

- An impoundment with a surface area of 2,048 acres and a gross volume of 41,956 ACFT at a full pond water surface elevation of 336.2 FTMSL;
- A concrete and earth-filled dam approximately 1,395 feet long including;
    - An intake structure and powerhouse integral with the dam containing five operable units and other appurtenant equipment. The intake structure consists of a concrete substructure 23 feet high by 209 feet long located immediately upstream of the powerhouse. The intake substructure contains nine water passages used to convey flow to the five operable turbines. Three gate openings, to units 1, 2 and 3, measure 10 feet by 11 feet. Units 1 and 3 are currently inoperable. Two gate openings, to unit 4, are 6.5 feet by 12 feet. Unit No. 4 is currently inoperable. Three gate openings, to units 5, 6 and 7, are 12 feet by 13 feet. The remaining gate opening, to unit 8, is 14 feet by 14 feet;
    - An abutment 27 feet long adjacent to the southwestern shore;
    - A 550-foot-long earthen dike extending from the northeastern end of the powerhouse to the northern shore with a top elevation of 343.2 FTMSL, topped with a 12-foot-wide surface;
    - A 521-foot long main spillway with a crest elevation of 332.2 FTMSL and 4-foot-high flashboards;
    - A 22-foot-long side spillway with a crest elevation of 332.2 FTMSL and 4-foot-high flashboards, located between two concrete abutments approximately 34 feet long with a top elevation of 340.7 FTMSL;
    - A waste gate structure containing six steel gates approximately 6 feet wide by 9 feet high;
- A powerhouse including:
    - Eight sets of trashracks with a total length of 174 feet, located upstream of the powerhouse unit intakes;
    - Trashracks for units 2 through 4 are 3/8-inch thick bar steel with a clear spacing of $1^{11/16}$ inches between the bars;
    - Trashracks for unit 5 through 8 are 3/8-inch thick bar steel with a clear spacing of $2^{5/8}$ inches between bars;
    - A 60-Hz substation containing one transformer with a rated capacity of 15/20 MVA and a second transformer with a rated capacity of 5 MVA, and;
    - A transmission line extending approximately 2 miles to the Powersville Substation.

The development's maximum discharge is 75,000 CFS with the impoundment at the top of dam elevation of 343.2 feet, with all gates open and the powerhouse shut down.

A history of the development's construction activities follows:

- In 1906 – 1907, the Dolby Dam, an intake structure and powerhouse with 7 units integral with the dam was constructed;
- In 1930, unit 8 was added;
- In 1934, the remaining hydro-mechanical grinders were converted to turbine-generators;
- In 1942 and again in 1974, the crest and sections of the downstream face of the spillway were concrete overlaid;
- In 1975, units 6 and 7 were replaced;
- Throughout the 1980s, powerhouse draft tube piers were rehabilitated;
- In 1987, unit 5 was replaced;
- In 1988, injection grouting of the powerhouse headwall was completed to control leakage;
- In 1992 – 1993, waste gates, operators, and sluices were rehabilitated;
- In 1995, post-tensioned anchors were installed in the 59-foot-long overflow spillway section between the powerhouse and the waste gates and the intake deck upstream of Units 1 through 4 was replaced;
- In 2006, downstream concrete resurfacing of Dolby Dam was completed
- In 2007, the Dolby station headwall was grouted;
- In 2018, GLHA rewound the unit 8 generator from 40 Hz to 60 Hz. An amendment application revising Exhibit A for the Project to reflect these changes is currently in preparation for submittal to FERC;
- GLHA plans to rewind unit 2's generator prior to 2024.

Units 1, 3, and 4 have been removed from service. Generators for these units are currently incapable of grid connection. Table 10 represents the post-conversion condition. The Dolby development has an authorized installed capacity of 17.8 MW.

Table 10 – Dolby Hydro Units

Unit	Turbine Nameplate (kW)	Generator Nameplate (kW)	Hydraulic Capacity (CFS)	Authorized Installed Capacity (kW)
Dolby 1	Inoperable	Inoperable	Inoperable	Inoperable
Dolby 2	1,350	1,300	400	1,300
Dolby 3	Inoperable	Inoperable	Inoperable	Inoperable
Dolby 4	Inoperable	Inoperable	Inoperable	Inoperable
Dolby 5	5,604	5,300	1,524	5,300
Dolby 6	4,260	4,144	1,200	4,144
Dolby 7	4,260	4,144	1,200	4,144
Dolby 8	2,925	3,510	830	2,925
TOTAL			5,154	17,813

At a maximum powerhouse hydraulic capacity of 5,154 CFS, the corresponding tailwater elevation is 287.2 FTMSL.

Based on a flow duration analysis using POR daily flows, the total hydraulic powerhouse flow of 5,154 CFS is exceeded and spillway flow occurs about 17 percent of the time.

A frequency analysis using POR daily flows indicates the 100-year daily flood flow is 33,720 CFS. The highest historical daily flow of 32,597 CFS occurred on May 1, 1973.

6. REGULATORY SUMMARY

On October 14, 1968, FERC issued a license to the Great Northern Paper Company (GNPC) for the PMHP. On June 28, 1991, FERC issued an amended license accepting a request from GNPC on June 10, 1991, to change the name of the licensee to Great Northern Nekoosa Corporation (GNNP)[9]. On October 16, 1991, GNNP submitted a petition to change the name of the PMHP licensee to GNP.

On December 17, 1991, GNNP filed an application for a new major license for the PMHP. On March 31, 1992, GNNP submitted a petition to amend the application for new license for PMHP. On May 8, 1992, FERC approved the transfer of the PMHP license to GNP[10] which later changed its name to Great Lakes Hydro America, LLC (GLHA).

A WQC was issued by the MDEP on April 22, 1993. The FEIS was issued on October 1, 1996. On October 22, 1996, the FERC issued a 30-year major license for the PMHP to GNP, effective October 1, 1996, which expires on October 1, 2026. [11]

A. Post-Licensing and Agency Consultation Summary

The following important licensing correspondence occurring after license issuance follows:

- A Wildlife Management Plan (WMP) for the Back Channel area was submitted to FERC on April 16, 1997 and was approved by FERC on February 12, 1998[12].
- On November 30, 1998[13], FERC denied requests from interveners for rehearing on the issuance of the PMHP license;
- FERC approved the Cultural Resources Management Plan (CRMP) on June 11, 1998[14].
- On December 28, 1999[15], FERC filed notice of GNP's November 29, 1999 filing of application for transfer of the license, filing for an amended license and soliciting on comments.
- On May19, 2000, FERC approves transfer of licenses and substitution of applicant[16].
- FERC approved the Shoreline Management Plan (SMP) on February 12, 2002[17].
- On August 26, 2002, GNP changed its name to GLHA[18]. GLHA is a BRP subsidiary.

[9] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3456796
[10] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3458284
[11] FERC License - https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=3058862
[12] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10804895
[13] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10819678
[14] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10809851
[15] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=8104435:1
[16] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10855717
[17] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=6012718
[18] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10698324

- On January 27, 2009, FERC amended Article 415 of the PMHP to extend the deadline for filing recreation facility monitoring reports to March 31 of the year following the required field season monitoring[19].
- FERC approved a revised SMP revisions on February 16, 2011[20].
- On April 13, 2012[21], GLHA filed a proposed license amendment to eliminate water management for Lake Trout.
- On July 18, 2012[22], GLHA filed the MDEP's July 13, 2012 amended WQC's to FERC to remove Lake Trout requirements.
- On July 26, 2012, FERC approves GLHA's April 13, 2012 request for license amendment.[23]
- On December 16, 2015, GLHA submitted a request for license amendment to remove 2.5 acres of land from the Project Boundary[24].
- On April 18, 2016, FERC files notice of application to remove land from the project boundary accepted for filing[25].
- On May 19, 2016, FERC issues letter to Maine Historic Preservation Commission (MHPC) providing the preliminary determination of effect under Section 106 for removal of project lands, including a historic structure listed on the National Register of Historic Places[26].
- On August 18, 2016, the FERC amended the license to remove about 2.5 acres from the project boundary[27].
- On July 12, 2018[28], FERC amended the WMP as requested in the February 12, 2018 report[29].

B. Compliance Issues

Overall, since issuance of the FERC license, effective October 1, 1996, fifty-six ROR and/or minimum flow deviations whether planned or unplanned have occurred and were reported to FERC. Of these only three were found to be violations of the FERC license.

- From the effective license date, October 1, 1996 through the December 31, 2005, six incidents occurred.
- From January 1, 2006 through December 31, 2010, nine incidents occurred.
- In 2011, ten incidents occurred. Four were planned for flashboard repairs. The remaining six were unplanned incidents dealing with equipment malfunctions and operator error of which two were found to be violations of their license.
- In 2012, eight incidents occurred. Three were planned for flashboard repairs. The remaining five were unplanned incidents dealing with equipment malfunctions of which none were found to be violations of their license.

[19] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=11914901
[20] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12565382
[21] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12945452
[22] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13030012
[23] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13034818
[24] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14073607
[25] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14238874
[26] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14251513
[27] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14333803
[28] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14970535
[29] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14820182

- In 2013, seven incidents occurred. Two were planned for flashboard repairs. The remaining five were unplanned incidents dealing with equipment malfunctions and adverse weather conditions of which none were found to be violations of their license.
- In 2014, one planned incident occurred.
- In 2015, five unplanned incidents occurred and dealt with equipment malfunctions, adverse weather conditions and operator error of which one was found to be a violation of their license.
- In 2016, four unplanned incidents occurred and dealt with equipment malfunctions and adverse weather conditions. None were found to be a violation of the license.
- In 2017, seven unplanned incidents occurred and dealt with equipment malfunctions and adverse weather conditions. None were found to be a violation of the license.
- In 2018, two unplanned incidents occurred and dealt with equipment malfunctions and adverse weather conditions. None were found to be a violation of the license.
- In 2019 through the end of September, four unplanned incidents have occurred and dealt with equipment malfunctions and adverse weather conditions. None have been found a to be a violation of the license.

7. LIHI CERTIFICATION PROCESS

GLHA submitted an application for certification of the Project on July 11, 2019. On July 19, 2019, LIHI notified GLHA that the intake review for the Project was complete. The intake review found that some information was missing, and the application needed modification. GLHA supplied a revised application on September 9, 2019. On September 6, 2019, I committed to perform the certification review for the Project.

A. Comment Letters

On September 9, 2019, LIHI filed notice on their email list that the public comment period for the application has been opened. The notice states, *"LIHI is seeking comment on this application. Comments that are directly tied to specific LIHI criteria (flows, water quality, fish passage, etc.) will be most helpful, but all comments will be considered. Comments may be submitted to the Institute by e-mail at comments@lowimpacthydro.org with "Millinocket-Dolby Project Comments" in the subject line, or by mail addressed to the Low Impact Hydropower Institute, 329 Massachusetts Avenue, Suite 6, Lexington, MA 02420. Comments must be received at the Institute on or before 5 pm Eastern time on November 8, 2019 to be considered. All comments will be posted to the web site and the applicant will have an opportunity to respond. Any response will also be posted. The project description and complete application can be found HERE [30]."* No comments were received.

30 Project Application on LIHI website - https://lowimpacthydro.org/millinocket-and-dolby-projects-complete-application-received/

B. Agency Correspondence

On September 9, 2019, LIHI[31] emailed contacts[32] listed in the Project application as knowledgeable about the Project stating, *"You may have already received this notice if you are on the Low Impact Hydropower Institute (www.lowimpacthydro.org) email list. However, you were also identified as an agency contact on the LIHI certification application recently submitted by Brookfield Renewable Energy Group for the Millinocket and Dolby developments of the Penobscot Mills Project on the West Branch of the Penobscot River. The application reviewer, Gary Franc (copied here), may be in contact with you if he has questions about these projects or wishes to clarify any aspects of the LIHI applications. You may also provide comments directly to LIHI as indicated below.*

More information about the projects and their application can be found in the link below. If you would like to receive additional notices about these projects or other hydroelectric projects in your region applying for LIHI certification, please sign up for our mailing list at https://lowimpacthydro.org/join-our-list/ ."

On September 17, 2019, I called Kelly Maloney to discuss the procedure used to determine inflows at both the Millinocket and Dolby developments. On September 18, 2019, Ms. Maloney sent me an email stating that GHLA uses mass balance equations to calculate inflows at both developments. Real-time inflows are back-calculated based on changes in impoundment elevation, turbine data, tailwater data and gate curves using a SCADA system.

Given that the application provided all supporting documentation and no other apparent issues were uncovered in my review I did not have to reach out to any environmental agencies.

8. CERTIFICATION REVIEW

This section contains my certification review of the Project with regard to the LIHI Certification criteria. As part of my review, I conducted a FERC e-library search to verify claims in the certification application. My review concentrated on the period from license issuance on October 22, 1996, through September of 2019, for FERC docket number P-2458.

A. LIHI Criterion-Flows

The goal of this criterion is to support habitat and other conditions that are suitable for healthy fish and wildlife resources in riverine reaches that are affected by the facility's operation.

The Applicant states the Project is in compliance with resource agency conditions issued regarding flow conditions and impoundment fluctuations and that all of the license and settlement requirements pertaining to flow conditions and impoundment levels have been implemented.

31 Maryalice Fischer – LIHI Certification Program Director - mfischer@lowimpacthydro.org - 603-664-5097 office - 603-931-9119 cell

32 Mark.Bergeron@maine.gov, Jeff.Murphy@noaa.gov, Kathy.Howatt@maine.gov, Kevin.Dunham@maine.gov, Kathleen.Leyden@maine.gov, Gail.Wippelhauser@maine.gov, sean.mcdermott@noaa.gov, Kirk.Mohney@maine.gov, kevin_mendik@NPS.gov, Dan.Kusnierz@penobscotnation.org, chris.sockalexis@penobscotnation.org

GLHA operates the Penobscot Mills Project to maintain an instantaneous minimum flow of 2,000 CFS downstream of the Millinocket Development and a minimum flow of 60 CFS[33] into Millinocket Stream. Operations are managed in conjunction with the water flow and storage of upstream and downstream projects.

FERC license article 403 requires GLHA to operate the Millinocket and Dolby developments in a ROR mode while providing an instantaneous minimum flow of 2,000 CFS to the west branch of the Penobscot River at Millinocket, for the protection of water quality and aquatic habitat in the Penobscot River. Since impoundment inflows are unknown, mass balance equations are used by GLHA to calculate inflows at both developments. Real-time inflows for each development are back-calculated based on changes in impoundment elevation, turbine data, tailwater data and gate curves using BRP's SCADA system.

On April 13, 2012[34], GLHA filed a proposed license amendment to eliminate water management for lake trout since this management has not been successful on the North Twin impoundment. The original Article 408 required the North Twin impoundment to be maintained at or above the trout spawning level from October 15 through May 1 and to be maintained relatively stable from May 1 through August 22. However, despite operating in this fashion for many years, propagation of lake trout has not occurred. Further, rapid fall drawdown to accommodate lake trout spawning reduces boating and fishing access in September and October and causes camp wells to go dry. Given that this water management practice is detrimental to camp owners and recreationist activities on the North Twin impoundment and places difficult constraints on GLHA's water management in the West Branch Penobscot River watershed it was proposed to be eliminated.

Specifically, GLHA proposed that Article 408 of the license be amended to state, *"Except as temporarily modified by approved maintenance activities, by inflows to the project area, by the inability to maintain the minimum flow of 2,000 CFS at Millinocket, or by operating emergencies beyond the licensee's control, the water level in the North Twin impoundment shall be maintained at a relatively stable level from May 1 through August 22 annually, and at a minimum target level of 488.42 FTMSL (3.5 foot drawdown) for the period August 22 through October 15. A minimum flow of 3,000 CFS from North Twin Dam shall also be in effect for the August 22 - October 15 period, so long as the impoundment water level exceeds 488.42 FTMSL."*

The USFWS had no objection to the change in water management at the North Twin impoundment. The MDEP stated approval of the change through modification of the WQC. On July 18, 2012[35], GLHA filed the MDEP's July 13, 2012 amended WQC to FERC to remove Lake Trout requirements. On July 26, 2012, FERC approved GLHA's April 13, 2012 request for license amendment.[36]

ROR operation or minimum flows may be temporarily modified if required by operating emergencies beyond the control of GLHA or for short periods upon mutual agreement between GLHA, the USFWS, and the MDEP. All ROR and minimum flow incident are required to be filed with the FERC no later than 10 days after each such incident. GLHA maintains records of these conditions. In the event of a deviation from

[33] Although not part of this LIHI review, FERC license article 401 requires GLHA to release a minimum flow of 60 CFS from the Millinocket Lake storage dam into Millinocket Stream from May 1 to October 15 annually. A minimum flow of 60 CFS or inflow is released during the remainder of the year.
[34] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12945452
[35] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13030012 – The new 2012 WQC falls within the required 10-year window required by LIHI certification.
[36] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13034818

established minimum flows or impoundment levels, GLHA files documentation with FERC detailing the reasons for the deviation.

A.1 Millinocket

The application states that the development satisfies the LIHI flows criterion in ZOE 2, ZOE 3, ZOE 4 and ZOE 5 by meeting alternative standard A-2[37] and in ZOE 1 by meeting alternative standard A-1[38].

ZOE 1 is the regulated river reach upstream of the backwater effect of the Millinocket impoundment (e.g., Quakish Lake and Ferguson Pond). The Millinocket development is operated with inflow from the North Twin impoundment. Under normal conditions, the daily outflow from the development approximately equals that of the North Twin development, with an average daily regulation flow variation of about 130 CFS between the two outflows due to tributary inflows.

The Millinocket development is operated in a ROR mode with minimum impoundment fluctuations, such that inflows into the impoundment are discharged equally as outflows through the Millinocket hydro station and/or Stone Dam. Impoundment levels and flows are continuously monitored. Depending on inflows with a corresponding incremental rise or fall of the impoundment, the development will utilize the generating units at the Millinocket hydro station to stabilize headpond elevations, which ensures ROR operations. If headpond elevation maintenance cannot be met through the turbines (i.e., inflows exceed station capacity and/or units are out of service), the inflatable rubber flashboard system at Stone Dam may be deflated to discharge excess flows to the bypass reach (Back Channel).

There is a required base flow of 2,000 CFS downstream of the Millinocket development at Shad Pond which can be supplied by releases in the Back Channel, turbine flow from the Millinocket development, or releases of storage from the upstream Millinocket Lake into Millinocket Stream. This 2,000 CFS base flow was negotiated between the USDOI, the Penobscot Nations and the Applicant based on prioritization of flows in the system, with no flow requirement within the Back Channel below Stone Dam. Instream flow studies demonstrated that increased flows into the Back Channel may not necessarily provide suitable spawning habitat nor support a landlocked salmon population and would have an adverse impact on the ability to maintain stable impoundment levels at the North Twin impoundment and required minimum flows into the West Branch of the Penobscot River. During relicensing MIDFW did not support fisheries enhancement in the Back Channel due to prioritization of flows in the system for other habitat enhancements, and because the existing flow regime continues to provide angling opportunities in this reach. Ramping of high flows into the Back Channel when released from the inflatable rubber flashboard system is conducted for safety purposes. Leakage flows of approximately 2 to 5 CFS are released into the Back Channel. As discussed in the 1993 WQC, existing leakage flows into the Back Channel have persisted since the completion of Stone Dam in 1899. The reach habitat has established a baseline equilibrium for over 120 years.

Quakish Lake, the body of water impounded by Stone Dam, has a negligible storage capacity. If Quakish Lake is full and the lake's inflow is greater than the hydropower's turbine capacity of 4,205 CFS, water is discharged over the Stone Dam spillway or through the pneumatic rubber flashboard system into the Back Channel.

37 Agency recommendation
38.NA

During periods of high seasonal flows or whenever abnormal conditions occur such that turbine flow cannot be passed to achieve the 2,000 CFS minimum flow, the pneumatic rubber flashboard system is deflated to release flows in an expeditious effort. When this occurs, a two-minute siren warning is initiated and a safe flow of 200 CFS is released for fifteen minutes. Increases of 400 CFS per hour are made until either the required downstream flow is met, the elevation at Stone Dam falls to 459.45 FTMSL or the pneumatic rubber flashboard system is fully deflated. The ramping down of flows in the Back Channel is initiated once turbine hydraulic capacity is restored or seasonal flows start returning to normal.

A.2 Dolby

The application states that the development satisfies the LIHI flows criterion in ZOE 6 by meeting alternative standard A-1 and in ZOE 7 and ZOE 8 by meeting alternative standard A-2.

The Dolby development has a slightly larger drainage basin than the Millinocket development. The Dolby impoundment receives all flow released from the Millinocket development as well as additional flows in Millinocket Stream and other tributary flows. The development is operated in a ROR mode where flows in excess of the hydraulic capacity of 5,150 CFS are spilled over the spillway. There are no ramping rate requirements at the development. Due to the 2,000 CFS minimum flow requirement upstream at Shad Pond, discharges from the Dolby dam and powerhouse typically exceed 2,000 CFS, including waters that may pass the spillway via overtopping into the bypass reach.

While the Dolby development has a bypass reach for the purposes of this application, it is important to note that the bypass reach is not a true hydrologic bypass reach, as the powerhouse is integral to the dam and spillway. Nevertheless, there is a high perched ledge downstream of the spillway that does not benefit from the backwater effect of the powerhouse tailrace discharge nor the East Millinocket impoundment just downstream. This ledge does not provide any aquatic habitat, being dry under normal operating conditions and sufficiently steep that fish and other aquatic life are not likely to traverse it even under inundated conditions.

A.3 Summary

As previously discussed in section 6B, since issuance of the FERC license, effective October 1, 1996, fifty-six ROR and/or minimum flow deviations have occurred and were reported to FERC. Of these:

- Three were found to be violations of the FERC license due to operator error.
- Sixteen were planned for flashboard repairs. All of these deviations required impoundment fluctuations, but some also resulted in minimum flow deviations.
- Thirteen were due to adverse weather and operational emergencies.
- Fifteen were due to equipment malfunctions or failures.
- Nine were due to lighting strikes.

Based on this review, I recommend that GLHA develop a deviation reduction plan or procedure in an effort to proactively reduce future occurrence of potentially avoidable deviations. Additionally, I recommend that GLHA provide annual reports to LIHI documenting all operational deviations that occurred throughout the year whether unintentional or planned and whether or not they were found to violate the license by FERC.

With these conditions, I believe GLHA can adequately address issues regarding flow conditions and impoundment fluctuations, and therefore the Project satisfies the flows criterion.

B. LIHI Criterion-Water Quality

The goal of this criterion is to ensure water quality is protected in water bodies directly affected by facility operations, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

A 2,000 CFS base flow for the protection of water quality and aquatic life is dictated by the PMHP license, the 1993 WQC and as codified in the 1997 WMP[39]. The WMP was developed in consultation with the Maine Department of Inland Fisheries and Wildlife (MDIFW), the MDEP and the USFWS.

As discussed in the previous section, on April 13, 2012[40], GLHA filed a proposed license amendment to eliminate water management for lake trout since this management has not been successful on the North Twin impoundment. The USFWS had no objection to the change in water management at the North Twin impoundment. The MDEP stated approval of the change through modification of the WQC. On July 18, 2012[41], GLHA filed the MDEP's July 13, 2012 amended WQC to FERC to remove Lake Trout requirements. On July 26, 2012, FERC approved GLHA's April 13, 2012 request for license amendment.[42]

Waters in the PMHP Project area are designated as unimpaired and as Class C and Class B water as defined in MDEP's 2016 Integrated Water Quality Monitoring and Assessment Report (IWQMAR)[43]. Both Class C and Class B waters are suitable for the designated uses of treated drinking water supply, fishing, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation and as unimpaired habitat for fish and other aquatic life.

The dissolved oxygen (DO) of Class C waters shall be at least 5 ppm or 60% of saturation, whichever is higher. The DO of Class B waters are, in general, at least 7 parts per million (ppm) or 75% of saturation, whichever is higher. From October 1 to May 14, in identified fish spawning areas to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration shall be at least 9.5 ppm and the 1-day minimum DO concentration shall be at least 8.0 ppm.

The Applicant states that all of the license requirements pertaining to water quality have been implemented. GLHA maintains records of these conditions. In my review, no water quality issues were found. In the event a deviation from established water quality requirements occurs, GLHA will file documentation with FERC detailing the reasons for the deviation.

[39] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10804895
[40] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12945452
[41] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13030012 – The new 2012 WQC falls within the required 10 year window required by LIHI certification.
[42] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13034818
[43] IWQMAR - https://www.maine.gov/dep/water/monitoring/305b/2016/28-Feb-2018_2016-ME-IntegratedRptLIST.pdf

B.1 Millinocket

The Applicant states that the development satisfies the LIHI water quality criterion in ZOEs 1 through 5 by meeting alternative standard B-2[44].

The West Branch of the Penobscot River, from the outlet of Elbow Lake, at North Twin Dam, to the outlet of Ferguson Pond and Quakish Lakes, is Class B water as defined in the IWQMAR on page 32.

Water quality studies conducted as part of relicensing in the 1990s indicated the DO levels in the Millinocket impoundment met Class B criteria. All designated uses were met as outlined in the 1993 WQC[45]. Specific to aquatic habitat, Class B was satisfied though ROR operation and a minimum flow of 2,000 CFS downstream of the Millinocket Development.

The West Branch of the Penobscot River, from the outlet of Ferguson Pond and Quakish Lake to its confluence with the East Branch of the Penobscot River, including all impoundments, is Class C in the IWQMAR on page 115, but was reclassified to Class B in 2019. Excess and leakage flows have been passed into the back channel downstream of Stone Dam since 1899. Increased flows into the back channel were deemed impractical, considering the flow requirements placed on managed water elsewhere in the system for the protection of aquatic habitat in the West Branch of the Penobscot River.

B.2 Dolby

The Applicant states that the development satisfies the LIHI water quality criterion in ZOEs 6 through 8 by meeting alternative standard B-2.

The west branch of the Penobscot River between Millinocket Stream and the East Branch of the Penobscot River, the Dolby impoundment and the reach of the West Branch of the Penobscot River below Dolby Dam are classified as Class C[46].

Historically these reaches were listed as impaired for aquatic life use because of previously documented non-attainment of DO criteria. However, water quality improved as a result of the closure of the Millinocket and East Millinocket paper mills. During water quality studies conducted as part of relicensing in the 1990s, low DO levels were recorded in the bottom of the Dolby impoundment, but were determined by the MDEP not to be related to the development's operations. In 2004, the MDEP reclassified the Dolby impoundment from impaired to Class C, and in 2019 was reclassified to Class B.

License Article 405 requires GLHA to file annual reports on GLHA activities and cooperation with EPA and MDEP on any studies pertaining to concentrations of mercury, cadmium, lead, and other toxic metals on aquatic life in Project waters. In the latest report[47], GLHA stated it was not asked to participate in any new US Environmental Protection Agency (USEPA) EPA or MDEP monitoring studies of toxic metals in 2018.

44 Agency recommendation.
45 1993 WQC https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13100296
46 IWQMAR – pages 73 and 103.
47 https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15177159

B.3 Summary

My review found no license deviations nor any issues pertaining to the Project's water quality compliance. Based on the information provided, it is my recommendation that the Project satisfies the water quality criterion.

C. LIHI Criterion-Upstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective upstream passage of migratory fish so that the migratory species can successfully complete their life cycles and maintain healthy, sustainable fish and wildlife resources in areas affected by the Project's facilities.

The Applicant states that all ZOEs (1 through 8) satisfy the LIHI upstream fish passage criterion by meeting alternative standard C-1.

There are currently no anadromous fish species present in the West Branch of the Penobscot River. The West Branch is within historical habitat for Atlantic salmon, but it is not designated as critical habitat, and thus is not managed for Atlantic salmon. Likewise, the West Branch is not managed for alosines (river herring; American shad). Eels are present in low numbers in the lower portion of the West Branch of the Penobscot River and the downstream Medway Project has upstream and downstream eel passage facilities but only a small number of eels are passed there.

The West Branch is currently managed for resident fish species, and not migratory species. A Biological Opinion and Incidental Take Statement (BO/ITS) was issued August 3, 2012[48] for the Medway Project and other projects downstream in the Penobscot River basin. Species included the Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon, shortnose sturgeon, and the GOM and New York Bight DPSs of Atlantic sturgeon. A 2013 Species Protection Plan (SPP)[49] which covers the Medway Project details that the West Branch above the Medway Project is not managed for Atlantic salmon or other anadromous fish. Fishery management decisions by resource agencies and current restoration plans have not required passage above Medway Dam.

However, the Medway Project FERC license requires consultation with the National Marine Fisheries Service (NMFS) every 5 years regarding "*the status of Atlantic salmon and other Endangered Species Act-listed fishes in the Penobscot River to ensure that operation of the Medway Project is consistent with the listing determinations for such species and with the then-current recovery objectives for such species*." Since Medway Dam is the first dam on the West Branch of the Penobscot River, this 5-year consultation essentially represents agency management plans and objectives related to fisheries and fish passage needs on the West Branch and at the Penobscot Mills Project.

During the most recent 5-year consultation for the Medway Project, NMFS provided a letter (dated February 12, 2018) stating that no stocking of anadromous fish species is planned in the West Branch over the next 5 years, but that "*in advance of the potential relicensing of the Medway Project in 2029, we are gathering information to further understand the potential significance of the West Branch in supporting Atlantic*

[48] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13059084
[49] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13349180

salmon recovery." Relicensing of the Penobscot Mills Project will also be occurring in the next 10 years, so it is expected that the need (or continued lack of need) for anadromous fish passage on the West Branch will be addressed during the upcoming relicensing of the Medway and Penobscot Mills Projects.

The upstream North Twin development has an upstream fishway for landlocked salmon with no downstream fish passage. The fishway at North Twin Dam is intended to provide any landlocked salmon that have moved downstream from the North Twin impoundment (during high water conditions or for spawning) a means to subsequently move back upstream into the impoundment. However, since a high-quality landlocked salmon fishery exists downstream of North Twin Dam, along with habitat for all life stages of landlocked salmon, the North Twin fishway has little biological importance. The 3,000 cfs minimum flow for North Twin Dam incorporated into the 2012 Penobscot Mills license amendment was requested by the Maine Department of Inland Fisheries and Wildlife to further enhance the North Twin tailrace fishery for landlocked salmon. In reference to the North Twin fishway, FERC stated in their 1996 FEIS that, "*few wild landlocked salmon are found downstream of North Twin dam, and most salmon fisheries below that point are supported almost totally by stocking. The North Twin fishway does not significantly contribute to sustaining existing fish stocks; however, because the facility already exists and is used by some salmon, there is no reason not to continue maintaining and monitoring the facility*". Thu, GLHA continues to operate and maintain this fishway.

My review found no issues pertaining to upstream fish passage. It is my recommendation that the Project satisfies the upstream fish passage criterion.

D. LIHI Criterion-Downstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective downstream passage of migratory fish and for riverine fish such that the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. All migratory species can successfully complete their life cycles and maintain healthy, sustainable populations in areas affected by the facility.

The Applicant states that all ZOEs (1 through 8) satisfies the LIHI downstream fish passage criterion by meeting alternative standard D-1.

There are currently no anadromous fish species present in the West Branch of the Penobscot River, because there are no upstream fish passage facilities for anadromous fish species at the downstream Medway Project and no downstream passage facilities at projects upstream. Resident species include brook trout, smallmouth bass, various species of suckers, shiners and sunfish, fallfish, eastern blacknose dace, creek chub, slimy sculpin, burbot, and landlocked salmon.

The Millinocket and Dolby Developments do not have downstream fish passage facilities, however, the existing trashracks help to reduce entrainment of fish into the penstocks. At the Millinocket development, trashracks approximately 216 feet long are located upstream of the powerhouse intake gates. There are six gates 12.5 feet by 12.5 feet and one gate 13.5 feet by 13.5 feet. All eleven penstocks have trashracks constructed of 3/8-inch by 3-inch bar steel with a clear spacing of $2\ ^{5/8}$ inches. At the Dolby development, trashracks for units 2 through 4 are 3/8-inch thick bar steel with a clear spacing of $1^{11/16}$ inches. Trashracks for unit 5 through 8 are 3/8-inch thick bar steel with a clear spacing of $2^{5/8}$ inches.

My review found no issues pertaining to downstream fish passage. It is my recommendation that the Project satisfies the downstream fish passage criterion.

E. LIHI Criterion-Shoreline and Watershed Protection

The shoreline and watershed protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate and enhance environmental conditions on shoreline and watershed lands associated with the facility.

The Applicant states the LIHI shoreline and watershed protection criterion in all ZOEs are satisfied by meeting alternative standard E-2.

A Shoreline Management Plan (SMP) was initially submitted to FERC on October 17, 1997. The SMP was updated and resubmitted to FERC on September 25, 2001 to correct errors identified during field surveys.

The SMP incorporates license requirements for building setback restrictions of 200 feet and a 100-foot vegetative buffer restriction and provides for appropriate public access to Project impoundments for recreation. The SMP also describes how to manage lands within the Project boundary to provide for the continued effective management of the renewable forest and water resources on Project lands while recognizing and protecting the recreational and other natural resource values on those lands.

FERC approved the SMP on February 12, 2002[50]. This revised SMP and revised Exhibit G drawings incorporated minor changes reflecting improved mapping and surveys. GLHA submitted a subsequent minor revision to the SMP to FERC on January 17, 2011, due to additional surveys that identified two small parcels that should not have been included in the SMP. FERC approved these minor SMP revisions on February 16, 2011[51].

A Wildlife Management Plan (WMP) for the Back Channel area was submitted to FERC on April 16, 1997[52] and was approved by FERC on February 12, 1998[53]. The WMP is designed to enhance forest and habitat diversity and to increase value to wildlife on approximately 2,300 acres of land adjacent to the Back Channel. Wildlife management activities include forest management, waterfowl nesting boxes, and annual mowing/fertilizing to maintain herbaceous conditions favorable for wildlife.

On February 12, 2018[54], GLHA filed its most recent five-year wildlife management summary report. The report summarizes past wildlife management activities in and around the Back Channel area, and proposes to continue these activities, such as maintaining nest boxes and nest sites, maintaining seeded roads, conducting timber harvests, etc., for the remainder of the license term. In addition, the report requested amending the plan to discontinue the five-year summary reports for the remainder of the license term because the prior 20 years of monitoring have demonstrated the success of the wildlife management activities. This request was approved by FERC on July 12, 2018[55].

[50] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=6012718
[51] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12565382
[52] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10804895
[53] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10804895
[54] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14820182
[55] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14970535

My review found no license deviations nor any new or outstanding issues pertaining to the SMP or WMP. Based on my review, it is my recommendation that the Project satisfies the shoreline and watershed protection criterion.

F. LIHI Criterion-Threatened and Endangered Species

The threatened and endangered species protection criterion is designed to ensure that the facility does not negatively impact state or federally-listed threatened or endangered species.

The Applicant states the LIHI threatened and endangered species criterion is satisfied in all ZOEs by meeting alternative standard F-2.

An Information for Planning and Consultation (IPaC) report dated May 30, 2019 and a USFWS Official Species List were included in the application. The following federally-listed Rare, Threatened or Endangered (RTE) or species that may be present in the Project vicinity include:

- Canada Lynx (Threatened - for which critical habitat in the Project vicinity has been identified, but on January 11, 2018, the USFWS announced the completion of a scientific review of the Canada lynx in the contiguous United States. The review concludes that the Canada lynx may no longer warrant protection under the Endangered Species Act and should be considered for delisting due to recovery[56];
- Northern Long-Eared Bat (Threatened - The USFWS has not adopted a formal recovery plan for the northern long-eared bat. On January 14, 2016, the USFWS published the final 4(d) rule identifying prohibitions for the protection of northern long-eared bats[57], and;
- Atlantic salmon - (Endangered - which are documented as historically occupying the West Branch of the Penobscot River but for which critical habitat is not present in the Project vicinity).

In addition, the following state-listed RTE and Special Concern species have been documented in the general vicinity of the PMHP:

- Creeper (Special Concern);
- Tidewater Mucket (State Threatened);
- Yellow lampmussel (State Threatened);
- Wood Turtle (Special Concern), and;
- American Eel (Special Concern).

Bald eagles have also been documented in the Project area but were delisted on both the state and federal level. In addition, several of species of bats could be present within the Project area during migration and/or the breeding season:

- Little brown bat (State Endangered);
- Northern long-eared bat (State Endangered);
- Eastern small-footed bat (State Threatened);
- Big brown bat (Special Concern);
- Red bat (Special Concern);
- Hoary bat (Special Concern);
- Silver-haired bat (Special Concern), and;

[56] https://www.fws.gov/mountain-prairie/pressrel/2018/01112018_Status_Review_Indicates_Canada_lynx_Recovery_inLower48.php
57 https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html

- Tri-colored bat (Special Concern).

Atlantic salmon and American eel have had historic presence in the west branch of the Penobscot River, including Project waters. However, there are no fish passage or eel passage facilities at the downstream East Millinocket Development and no requirement for anadromous fish passage or eel passage at Dolby or Millinocket.

With respect to aquatic species, the Millinocket and Dolby developments are operated in ROR mode with stable headpond. Periodic dam and flashboard repairs may require some authorized drawdown and notification. Routine operations are not anticipated to affect terrestrial species such as bald eagle and bats. There may be periodic vegetation clearing for dam safety, access, and other purposes but these would be conducted in accordance with the Section 4(d) rule for Northern long eared bat. As such, no negative effects are anticipated by this periodic activity.

My review found no license deviations nor any issues pertaining to the Project's threatened and endangered species compliance. Based on the information provided, it is my recommendation that the Project satisfies the threatened and endangered species protection criterion.

G. LIHI Criterion-Cultural Resource Protection

The cultural and historic resource protection criterion is designed to ensure that the facility does not unnecessarily impact cultural and historic resources associated with the facility's lands and waters, including resources important to local indigenous populations.

The application states the LIHI cultural and historic resources criterion in all ZOEs is satisfied by meeting alternative standard G-2.

License article 417 required the implementation of provisions of the July 1, 1996, Programmatic Agreement (PA) among the FERC, the Advisory Council on Historic Preservation (ACHP), and the Maine State Historic Preservation Officer (SHPO), for managing historic properties that may be affected by PMHP's operation. The PA required the development of a Cultural Resources Management Plan (CRMP).

On December 29, 1997, GLHA submitted a draft CRMP for approval.[58] On January 28, 1998, the ACHP submitted comments on the CRMP[59]. On March 16, 1998, the Maine SHPO submitted comments on the CRMP[60]. GLHA submitted a revised CRMP incorporating comments or agencies on April 9, 1998[61]. FERC approved the CRMP on June 11, 1998[62].

The CRMP identified seven historic archaeological sites deemed significant and eligible for listing in the National Register of Historic Places. Their selection was based on an archaeological Phase I survey conducted at the Penobscot Mills Project in the late 1980s and a Phase II archaeological testing report completed circa 1990. None of the sites identified in the CRMP are located within the boundary areas of the Millinocket or Dolby developments.

[58] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=110448:1
[59] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=8143904:1
[60] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=50986:1
[61] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=8158340
[62] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10809851

The CRMP requires GLHA to submit annual reports on activities related to the management of historic properties to FERC. The latest annual CRMP report was submitted on November 22, 2018.[63]

The PMHP is in compliance with all license requirements regarding cultural resource protection. My review found no license deviations nor any issues pertaining to the PMHP's cultural and historical resources protection. Based on the information provided, it is my recommendation that the Project satisfies the cultural and historic resources protection criterion.

H. LIHI Criterion-Recreation

The goal of this criterion is to ensure that recreation activities on lands and waters controlled by the facility are accommodated and that the facility provides recreational access to its associated land and waters without fee or charge.

The Applicant states the LIHI recreation criterion in all ZOEs is satisfied by meeting alternative standard H-2.

The Applicant states the Project's developments are in compliance with recreational access, accommodation, and facilities' conditions in the FERC license.

License Article 414 required recreation improvements follows:

- Space for three vehicles and five trailered vehicles at the Dead Man's Curve boat access site;
- Space for four vehicles at the Route 157 boat access along Dolby Pond; and
- Remove boulders and other obstruction at the shoreline and provide six additional gravel vehicle spaces to the parking area at the Green Bridge boat access site above Quakish Lake.

License article 415 requires recreation monitoring to determine whether existing recreation facilities are meeting recreation needs. A report is required every six years that includes:

- Annual recreational use figures;
- A discussion of the adequacy of the recreation facilities to meet recreation demand;
- A description of the methodology used to collect all study data;
- If there is a need for additional facilities:
    - A submittal of a proposed recreation plan to accommodate recreational demand in the Project area;
    - A design of recreational facilities conforming to the national standards established by the Architectural and Transportation Barriers Compliance Board pursuant to the Americans with Disabilities Act of 1990;
- Documentation of agency consultation and agency comments on the report, and;
- Specific descriptions of how the agency comments are accommodated by the report.

Recreation Facility Monitoring Reports (RFMR) for the PMHP were filed in October 18, 2002[64], January 26, 2009[65]; and April 28, 2015[66]. The RFMR provides annual usage estimates for the recreation facilities

[63] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15078722
[64] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=10658577
[65] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=11922049
[66] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13858681

and demonstrates, with agency and FERC concurrence, that the existing facilities are adequate to meet the current and future recreation needs at the Millinocket and Dolby developments.

GLHA permits free public access to the recreational facilities and the shoreline of the developments' lands where development facilities, hazardous areas and existing leases, easements, and private ownership do not preclude access. The 2015 RFMR indicates recreation use at the Millinocket development was 410 daytime recreational use days and 0 nighttime use visits and at the Dolby development was 2,245 daytime recreational use days and 0 nighttime use visits. The next RFMR is due in April of 2021.

License article 420 requires GLHA to consult with the Maine Department of Conservation (MDOC) to determine the need for a study to mark or remove submerged hazards to recreational boaters using Millinocket Lake and the North Twin Impoundment. These water bodies are located outside the Project boundary for the Millinocket and Dolby developments.

The Millinocket and Dolby developments are also subject to safety signage requirements. Sign inspections are conducted annually at the start of the recreation season, and signs are replaced, as necessary.

The most recent Environmental Inspection Report (EIR) was issued on December 28, 2016 (See Appendix A, page A-2, for the inspection conducted on September 8, 2016). The EIR identified the following requirements related to recreation resources within the Project lands:

- GLHA was required to review the Form 80 report for the North Twin Development and the Dolby Development to determine if the roadside parks are Project facilities or not, and;
- GLHA was required to replace the safety sign at the North Twin boat ramp and repair the Millinocket Lake Boat Ramp (located outside the Millinocket and Dolby boundary areas).

The roadside parks located during the inspection were determined to be State of Maine Department of Transportation rest areas. The safety sign for the North Twin Boat Launch, outside of the Project boundary for the Millinocket and Dolby developments, was documented as deteriorated to the point of being illegible. The sign was replaced by December 31, 2016. Repairs to the Millinocket Lake boat ramp, also outside of the Project boundary of the Millinocket and Dolby developments, were completed on November 11, 2016. No follow up actions were identified for the Millinocket or Dolby development recreational facilities.

The PMHP is in compliance with the license recreational access, accommodation, and facility conditions. My review found no issues pertaining to recreational resources compliance. Therefore, it is my recommendation that the Project satisfies the recreational resources criterion.

9. RECOMMENDATION

A review of the certification application and supporting documentation, and a search of the FERC docket shows that GLHA has successfully complied with the PMHP's FERC license articles and other requirements, and that the Project satisfies the LIHI criteria as discussed in the sections above. I recommend that the Project be certified for a five (5)-year term. Ongoing flow and/or impoundment deviations necessitate a conditional LIHI certification as follows:

- Condition 1: The facility Owner shall develop and implement a deviation reduction plan or procedure in an effort to proactively reduce future occurrence of potentially avoidable deviations. The plan or procedure shall include an implementation schedule and shall be submitted to LIHI for review and approval with the first annual compliance submittal due in September 2020. The plan or procedure should discuss, as applicable:
    - Ways to avoid minimum flow deviations when ROR deviations are planned for flashboard repairs and installation;
    - Ways to improve preventative maintenance programs and/or to make facility modifications to reduce equipment malfunctions and failures, which could include:
        - Review of current preventative maintenance program to ensure maximum reliability of generating assets.
        - Ensuring that operating procedures are current and applicable staff is trained in the application.

- Condition 2: The facility Owner shall provide annual reports to LIHI documenting all operational deviations that occurred during the year, whether unintentional or planned and whether or not they were found to violate the license by FERC. The report shall include root-cause analysis of each deviation and any facility or operational changes being made to reduce similar deviations in the future. The report will be due at the same time as the annual compliance submittals to LIHI.

Gary M. Franc

FRANC LOGIC

Licensing & Compliance
Hydropower Consulting & Modeling

APPENDIX A
DOCUMENTS

ENVIRONMENTAL INSPECTION REPORT
(ELECTRONICALLY SUBMITTED)
FEDERAL ENERGY REGULATORY COMMISSION

New York Region

Date of Inspection September 8, 2016

Name Penobscot Mills **Project No.** 2458-ME

Licensee Great Lakes Hydro America, LLC **License Type** Major

License Issued October 22, 1996 **License Expires** September 30, 2026

Location West Branch Penobscot River (Waterway or reservation) Piscataquis and Penobscot (County) Maine (State)

Inspector Michael Calloway

Licensee Representative Kevin Bernier, Kelly Maloney, and Dan Anderson

Other Participants NA

Summary of Findings

This report covers conditions observed on the day of the inspection, and the availability of recreational facilities, public safety signage and devices, and compliance with the environmental license requirements for the Penobscot Mills Project. The licensee was requested to address seven follow-up items and to submit to the Secretary of the Commission updates regarding the items.

Submitted December 28, 2016

Michael T. Calloway

Michael T. Calloway
Fish Biologist

A: Inspection Findings

Requirements	*Date of Requirement	Follow-up Needed	Photo Nos.
FISH AND WILDLIFE RESOURCES			
Article 401 requires the licensee to release a minimum flow of 60 cfs from Millinocket Lake to the Millinocket Stream from May 1 to October 15 each year and a minimum flow of 65 cfs during the remainder of the year except as temporarily modified by operating emergencies beyond the control of the licensee. Plan filed 4-9-97.	**O:10-22-96 Ap:9-3-97**	No	
Article 402 requires the licensee to maintain the Millinocket Lake reservoir level between elevations 470.0 and 480.0 ft MSL and to maintain levels in North Twin Lake with releases, except as temporarily modified by operating emergencies.	**O:10-22-96 Ap:9-3-97**	No	
Article 403 requires the licensee to operate the Millinocket, Dolby and East Millinocket developments in a run-of-river mode while providing an instantaneous minimum flow of 2000 cfs to the West Branch of the Penobscot River at Millinocket.	**O:10-22-96 Ap:9-3-97**	No	
Article 404 requires the licensee to file a plan for complying with all in-stream flow requirements at the project.	**O:10-22-96 Ap:9-3-97**	No	
Article 405 requires the licensee to cooperate in a study of impacts of toxic metals on aquatic life. Reports filed annually.	**O:10-22-96 Ap:7-10-06**	No	
Article 406 requires the licensee to repair and/or modify the North Twin fishway. Filed 10-22-97.	**O:10-22-96 Ap:5-27-98**	No	1
Article 407 reserves the right to require the licensee to construct, operate and maintain or arrange for fishway construction at the project.	**O:10-22-96**	No	
Article 408 requires the licensee to maintain the water level at North Twin at or above lake trout spawning/incubation level from October 15 to May 1 and at a stable level from May 1 to Aug. 22.	**O:10-22-96 Ap:9-3-97 Ap:7-26-12**	No	

Requirements	*Date of Requirement	Follow-up Needed	Photo Nos.
Article 409 requires the licensee to file a lake trout reproductive monitoring plan for North Twin.	**O:10-22-96** **Ap:12-19-97** **Ap:3-30-11**	No	
Article 410 requires the licensee to file a wetland enhancement plan for Deep Coves East and West at North Twin impoundment. Filed 10-21-97.	**O:10-22-96** **Ap:11-17-97**	No	
Article 411 requires the licensee to file a plan for artificial nesting structures at the project. Filed 10-22-97.	**O:10-22-96** **Ap:2-20-98** **Ap:2-9-11**	No	
Article 412 requires the licensee to file a wildlife management plan for the Back Channel area. Filed 4-21-97.	**O:10-22-96** **Ap:2-12-98** **Ap:2-12-13**	No	14,15
Article 413 requires the licensee to implement an upgraded spring and fall brook trout stocking program.	**O:10-22-96** **Ap:9-3-97** **Ap:9-8-00**	No	
PUBLIC SAFETY			
Facilities and measures to assure public safety (18 CFR, Part 12). Public Safety Plan filed 11-19-07.	**O:10-22-96** **Ap:12-6-07** **Ap:5-31-16**	Yes	2,4
RECREATION RESOURCES			
Article 414 requires the licensee to construct, operate and maintain specified recreational facilities, including parking for three vehicles at the Dead Man's Curve boat access site, four vehicle parking at the Route 157 boat access at Dolby pond and removal of obstructions, and provide six parking spaces the Green Bridge boat access site above Quakish Lake.	**O:10-22-96** **Ap:3-3-03**	Yes	6,8,9, 10,11, 12,13
Article 415 requires the licensee to monitor recreational use.	**O:10-22-96** **Ap:11-18-02** **Ap:1-27-09** **Ap:3-19-15**	No	
Article 416 requires the licensee to file a plan for establishing and collecting fees for recreational facilities. Filed 10-6-97.	**O:10-22-96** **Ap:8-20-99**	No	

Requirements	*Date of Requirement	Follow-up Needed	Photo Nos.
Article 420 requires the licensee to consult with Maine Department of Conservation regarding study to mark and remove recreational navigation hazards. Filed on 5-2-01.	**O:10-22-96 Ap:4-16-98 Ap:8-24-01**	No	
Recreation signing and posting (18 CFR, Part 8)	**O:10-22-96**	Yes	7
Standard Article 13 requires the Licensee to allow public free access to project waters and adjacent lands	**O:10-22-96**	No	
Submission of the Commission's Form 80 monitoring report. Per 18CFR, Part 8, Section 8.11. Due 4-1-09.	**O:10-22-96**	Yes	
CULTURAL RESOURCES			
Article 417 requires the licensee to implement the provisions of the Programmatic Agreement executed with the state on July 1, 1996. Filed 10-3-97 & 4-13-98.	**O:10-22-96 Ap:6-11-98**	No	
OTHER ENVIRONMENTAL RESOURCES			
Standard Article 11 requires the Licensee to install fish passage and other wildlife facilities when requested by state and federal resource agencies.	**O:10-22-96**	No	
Standard Article 14 requires the Licensee to take reasonable measures to control sedimentation and other pollution at the project.	**O:10-22-96**	Yes	3,5
Article 419 gives the Licensee authority to grant conveyances for non-project use of project lands and waters, for certain types of use without prior Commission approval.	**O:10-22-96**	No	
Article 418 requires the licensee to file a Shoreline Management Plan for project and buffer zone lands. Filed 10-20-97. Revision of Exhibit G drawings filed on 9-26-01.	**O:10-22-96 Ap:1-4-99 Ap:2-12-02 Ap:2-16-11**	No	

***O**=Order **C**=OEP-IT Code **18CFR**=Title 18 Code of Federal Regulations,
Ap =Approved

Follow-up Actions:

On October 3, 2016, Commission staff issued a letter requesting that the licensee follow up on several items identified during the inspection. The licensee was required to

review the status of the Millinocket Development substation to determine if it is within the project boundary, and review the Cultural Resources Management Plan to determine if any action was required to address the presumed burial site identified in the Back Channel Wildlife Management Area. The licensee was required to service the oil/water separator #5 at the Dolby Powerhouse to remove oil from a recent spill. The licensee was required to fix a large gap in the fence at the Millinocket Pump Station, and review the status of the East Millinocket Development log boom and the fence on the South Shore of Elbow Lake at the North Twin Development. The licensee was required to review the Form 80 report for the Twin Lakes Development and the Dolby Development to determine if the roadside parks are project facilities or not. The licensee was required to replace the Part 8 sign at the North Twin boat ramp and repair the Millinocket Lake Boat Ramp.

Comments and Observations:

The North Twin Development powerhouse was found to have good secondary containment of oil in the powerhouse. The oil water separators in the turbine sumps were found to be in good condition, and the battery room had secondary containment. The switchyard had adequate secondary containment also. The landlocked Atlantic salmon fishway (Figure 1) at the development was also found to be in good condition, and in operation. The security fence on the South Shore (Figure 2) did not go all the way to the water which the licensee was asked to follow up on.

The gatehouse for the Millinocket Development had a functioning Stillwell gage, and the generator and the hydraulic oil tank for the trash rack had adequate secondary containment. The Millinocket Development powerhouse had adequate secondary containment. The battery room had secondary containment, and all of the water in the powerhouse travels to a sump where it goes through an oil/water separator prior to discharge. The 60 11z switchyard also had adequate secondary containment for the transformers. The Millinocket Lake pump station also had adequate secondary containment of oil on the pumps (Figure 3), but needed follow up regarding a gap in the fence (Figure 4).

The East Millinocket Development powerhouse had each oil containing unit on the generation floor in individual secondary containment. Water from the generation floor was discharged directly to the river. The battery room had adequate secondary containment also. The upstream boat barrier did not appear to be installed, and the licensee was asked to follow up on this issue.

The Dolby Development powerhouse had adequate containment for the battery room and switchyard. There were oil/water separators located in each of the 3 turbine

sumps. The #5 separator (Figure 5) needed maintenance because of a seal failure that occurred a few days before the inspection. The licensee was instructed to complete the maintenance and inform the Commission.

The Twin Lake and Dolby roadside rest areas were inspected. The sites were listed as Commission approved on the project's Form 80 submissions, but did not appear anywhere in project records as being project facilities. The licensee was asked to follow up on this and determine definitively if the rest areas were Commission approved recreation or non-project recreation facilities.

The South Twin Lake Boat Ramp (Figure 6) was found to be in good condition with adequate parking, but the Part 8 sign (Figure 7) was in bad condition and needed to be replaced. The Green Bridge Boat Ramp (Figure 8) which is part of the Millinocket Development was found to be in good condition with adequate parking. The Millinocket Lake boat ramp (Figure 9) was found to be in need of repair because of exposed rebar. The two boat ramps at Dolby pond near Deadman's curve (Figure 10 and Figure 11) were found to be in good condition with adequate parking. The licensee also provided me with a laminated map of submerged hazards in the North and South Twin Lakes upon request as required by licensee conditions. The map was also posted at the South Twin Lake Boat Ramp (Figure 12).

The swim area on the North Twin impoundment (Figure 13) was in good condition with adequate signage and parking. The outflow of the pumping station down the shoreline from the swim area was adequately marked.

The Back Channel Wildlife Management Area was visited in order to observe whether the duck boxes (Figure 14) and kingfisher bank (Figure 15) were maintained. The duck boxes were located and found to be in good condition. The kingfisher bank was observed to be in good condition with surrounding vegetation adequately maintained.

Photographs:

The following illustrate project features:
15 photographs

Figure 1: North Twin Development powerhouse landlocked Atlantic salmon fishway

Figure 2: Security Fence on South Shore of North Twin Development

Figure 3: Secondary oil containment lip on pump motor approximately three quarters of the way up the pump.

Figure 4: Gap in pump house fence

Figure 5: #5 oil separator in need of service

Figure 6: South Twin Lake boat ramp

Figure 7: South Twin Lake Part 8 sign

Figure 8: Green Bridge Boat Ramp

Figure 9: Millinocket Lake Boat Ramp exposed rebar

Figure 10: Dolby Pond Boat Ramp #1

Figure 11: Dolby Pond Boat Ramp #2

Figure 12: Submerged Hazards Map North and South Twin Lakes

Figure 13: Swimming Area on North Twin Impoundment

Figure 14: Back Channel Wildlife Management Area Duck Box

Figure 15: Back Channel Wildlife Management Area kingfisher bank