



## LOW IMPACT HYDROPOWER INTAKE REVIEW

<b>Name of Project/Facility:</b>	Millinocket – Dolby Developments, Penobscot Mills Hydroelectric Project
<b>FERC License or Exemption # (or N/A):</b>	2458
<b>Date Application Submitted to LIHI:</b>	July 10, 2019
<b>Name of Reviewer:</b>	Gary Franc
<b>Date Review Completed:</b>	July 25, 2019

**Note to applicant:** This intake review is a preliminary review only. The application reviewer may have additional questions or request additional information to fill data gaps identified during the full application review.

### ***General Review Comments:***

This intake review is for two developments (Millinocket and Dolby) within the Penobscot Mills Project. The remaining two developments (North Twin and East Millinocket) are not part of this application for certification. The intake review indicates that additional information and supporting documentation is required to perform the full certification review. The application is not sufficiently complete for posting for public comments at this time.

## I: BACKGROUND INFORMATION REVIEW

<b>Information Type</b>	<b>Complete? (Y, N, NA)</b>	<b>Missing Information</b>	<b>GLHA Response:</b>
<i>Name of the Facility:</i>	Y	None	
<i>Location:</i>	Y	None	
<i>Facility Owner:</i>	Y	None	
<i>Regulatory Status:</i>	N	<p>The Project's Water Quality Certification (WQC), #L-17166-33-A-N, was issued on April 22, 1993 by the Maine Department of Environmental Protection (MDEP). Since this issuance is more than 10 years old, please provide documentation that the WQC terms and conditions remain valid and in effect for the facility. A letter or email from the MDEP will suffice. Alternatively, provide recent water quality monitoring data.</p>	<p>The Maine DEP recently conducted a review of water quality in the State of Maine and recommended upgrades in water quality classifications in many river segments based on recent data, including segments encompassing the Millinocket and Dolby Developments, as a result of water quality data indicating sufficient quality higher than the designated standard. After review and approval by the Maine Board of Environmental Protection and the Maine Legislature, Governor Mills signed the bill (LD 1743, An Act to Reclassify Certain Waters of the State) into law on June 17, 2019. The DEP's final recommendations and additional information on the water quality classification upgrades are available at the links below; the river segments contained in the recommendations and associated with the Millinocket and Dolby Developments are (1) "West Branch Penobscot River, confluence with Millinocket Stream to confluence with East Branch Penobscot River", and (2) "Millinocket Stream, confluence of West Branch Canal to confluence with West Branch Penobscot River"</p> <p><a href="https://www.maine.gov/dep/water/monitoring/classification/reclass/BEP_2018_ReclassProposals_ForBEP_Dec_final.pdf">https://www.maine.gov/dep/water/monitoring/classification/reclass/BEP_2018_ReclassProposals_ForBEP_Dec_final.pdf</a></p> <p><a href="https://www.maine.gov/dep/water/monitoring/classification/PIN-ReclassificationProposals-20171129.pdf">https://www.maine.gov/dep/water/monitoring/classification/PIN-ReclassificationProposals-20171129.pdf</a></p> <p><a href="https://www.maine.gov/dep/water/monitoring/classification/DEP_2018_ReClassProposals.pdf">https://www.maine.gov/dep/water/monitoring/classification/DEP_2018_ReClassProposals.pdf</a></p>

<i>Information Type</i>	<i>Complete? (Y, N, NA)</i>	<i>Missing Information</i>	<i>GLHA Response:</i>
<i>Characteristics of the Power Plant:</i>	N	The majority of turbine data is present. However, only the maximum hydraulic turbine capacities have been provided. For all turbines capable of operation over a range of flows, please provide the minimum hydraulic capacity of each turbine.	Minimum hydraulic capacity for Millinocket turbines: Units 1 and 8 = 100 cfs Units 3,4,5,6, and 7 = 150 cfs  Minimum hydraulic capacity for Dolby turbines: Units 5,6,7 and 8 = 400 cfs

<b>Information Type</b>	<b>Complete? (Y, N, NA)</b>	<b>Missing Information</b>	<b>GLHA Response:</b>
<i>Characteristics of the Dam or Diversion:</i>	N	<p>The application states that water can be pumped from the Millinocket Lake impoundment into the North Twin impoundment. The Millinocket impoundment (Quakish and Ferguson Lakes) receives all flow releases from the North Twin powerhouse. Please discuss the reason(s) for pumping from the Millinocket Lake impoundment into the North Twin impoundment in more detail.</p> <p>Also, the application states that flows out of North Twin Dam are estimated from turbine and gate curves. Although not stated, releases from Quakish Lake into Ferguson Lake and release into the Millinocket bypass (back channel) are determined in a similar fashion. Therefore, some fluctuation in the Millinocket impoundment is required for the owner to adjust outflows from the development such that a pseudo run-of-river (ROR) mode of operation occurs. The application does not define the allowable fluctuation for the Millinocket impoundment. Please discuss in more detail how the owner ensures a pseudo ROR operation is maintained at the Millinocket development.</p>	<p>Based on the availability of storage, water is pumped from Millinocket Lake to the North Twin impoundment to supplement the regulated inflow being received into that impoundment from upstream storage impoundments. Pumping the water into the North Twin impoundment allows increased generation from the North Twin and Millinocket developments (by utilizing approximately 142 feet of gross head at these facilities), because water released at the Millinocket Lake dam would otherwise enter the West Branch of the Penobscot River below these developments. The water pumped to the North Twin impoundment is also utilized as part of the Project's water management plan to maintain water levels in the North Twin impoundment (to provide environmental and recreational enhancements), and to supplement river flows for fisheries and aquatic habitat.</p> <p>Article 403 of the Penobscot Mills FERC license required submittal of a plan for operating the Millinocket, Dolby, and East Millinocket developments in a run-of-river mode while providing an instantaneous minimum flow of 2,000 cfs to the West Branch of the Penobscot River at Millinocket. The plan also had to describe how run-of-river operations and minimum flows specified in Article 403 would be monitored. In order to provide the run-of-river operations, Article 403 further required the licensee to minimize the fluctuation of the reservoir surface elevations by maintaining a discharge from each of these developments so that, at any point in time, flows, as measured immediately downstream from the tailraces of the developments, approximate the sum of inflows to the project reservoir. The April 9, 1997 flow and water level management plan for the Penobscot Mills Project (<a href="https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=9064103">https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=9064103</a>) provided details on how the licensee proposed to maintain the run-of-river operations while providing the 2,000 cfs minimum flow. This plan, which was approved by FERC on September 3, 1997, indicated that the hydro turbines at Millinocket, Dolby and East Millinocket would be used as the primary source for complying with run-of-river, minimum flows and in-stream flow requirements. If such requirements cannot be met through the use of its hydro turbines, then the inflatable flashboard system at Millinocket and the waste gates at Dolby and East Millinocket would be used to ensure that run-of-river, minimum flows and in-stream flow requirements are met. The 1997 plan also established a target water level of 3 inches (0.25 feet) below full pond at the Millinocket Development.</p>

<b>Information Type</b>	<b>Complete? (Y, N, NA)</b>	<b>Missing Information</b>	<b>GLHA Response:</b>
<i>Characteristics of Conduit:</i>	NA	This is not a conduit facility.	
<i>Characteristics of Reservoir and Watershed:</i>	Y	None	
<i>Hydrologic Setting:</i>	N	A review of USGS records indicate that no USGS record is upstream of the Project. The USGS gage identified in the application, 01034500 - Penobscot River at West Enfield, Maine, has a contributing area of 6,422 square miles (SQMI). The drainage areas at Millinocket and Dolby are reported to be 1,890 and 2,108 SQMI, respectively. Proration of stream flows to these locations using USGS gage 01034500 raise concerns that inflows are reasonably estimated. Please provide more detail about how inflows at both developments are determined.	Mass balance equations are used to calculate inflows at both developments, i.e. Natural Inflow = Development Discharge (cfs) - Upstream Development Discharge (cfs). Flows from each Project development are determined using engineered turbine and gate curves and are calculated real-time in Brookfield's SCADA (Supervisory Control and Data Acquisition) system based on net head, wicket gate settings, and gate positions. Since both the Millinocket and Dolby developments are operated in a run-of-river mode, natural inflow for each development can be calculated by subtracting the discharge from the next development upstream from the development's discharge.
<i>Designated Zones of Effect:</i>	Y	None	
<i>Additional Contact Information:</i>	Y	None	
<i>Photographs of the Facility</i>	Y, but ...	Provide photos of turbine/generators if available.	See photos attached below.

<b>Information Type</b>	<b>Complete? (Y, N, NA)</b>	<b>Missing Information</b>	<b>GLHA Response:</b>
Map/aerial of facility and location of nearby dams	Y	None	

## II. CRITERIA INFORMATION REVIEW

**General Criteria Comments:** The Millinocket and Dolby developments of the Penobscot Mills Hydroelectric Project have eight zones of effect (ZOE) that are defined within two developments.

The Millinocket development has five ZOE:

- ZOE 1 is a regulated reach that extends from the base of the North Twin Dam, river mile (RM) 15.0<sup>1</sup>, to the headwater of Quakish Lake at RM 14.1.
- ZOE 2 is Quakish Lake, (RM 14.1 to RM 12.3).
- ZOE 3 extends from Stone Dam in Quakish Lake into the bypass reach (back Channel) approximately 4.5 miles to the confluence with the West Branch of the Penobscot River at Shad Pond (RM 12.3 to RM 7.7).
- ZOE 4 extends from a canal below Stone Dam that passes flow into Ferguson Lake to the Millinocket powerhouse intake situated below Ferguson Lake (RM 12.3 to RM 11).
- ZOE 5 extends from the Millinocket powerhouse into the West Branch of the Penobscot River, downstream to the confluence with Millinocket Stream and the Back Channel (RM 11 to RM 7.5).

The Dolby development has three ZOE:

- ZOE 6 is the Dolby impoundment (RM 7.5 to RM 4.2).
- ZOE 7 is the Dolby bypass reach (RM 4.2 to RM 4.1). Due to the shortness of this zone, I recommend eliminating it.
- ZOE 8 extends from the Dolby Dam powerhouse, which is integral to the dam into the West Branch of the Penobscot River and downstream approximately 100 feet to the backwater of the East Millinocket impoundment (RM 4.2 to RM 4.1).

### A. Ecological Flow Regime

<b>Zone of Effect</b>	<b>Standard selected</b>	<b>Complete? (Y or N)</b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>	<b>GLHA Response</b>

<sup>1</sup> River mile is measured from the confluence of the west and east branches of the Penobscot River.

Zone of Effect	<i>Standard selected</i>	<i>Complete? (Y or N)</i>	Information needed to complete the review	Initial issue identification and standards recommendations	GLHA Response
<b>1-North Twin Dam Outflow Reach</b>	1	Y		Inflow into ZOE 1 is back-calculated from turbine performance curves and outlet gate settings at the North Twin Dam facilities together with levels within the North Twin impoundment.	
<b>2-Quakish Lake</b>	2	N	Please define the allowable rise and fall of the impoundment throughout the year.	Brookfield's National System Control Center (NSCC) monitors the impoundment level and flows. Under normal inflow conditions, any rise or fall of the impoundment, is countered by the NSCC adjusting the generating units at the Millinocket hydro station to stabilize headpond elevations in both Quakish and Ferguson Lakes. If headpond elevation maintenance cannot be met through the turbines (i.e., inflows exceed station capacity and/or units are out of service), the rubber flashboard at Stone Dam is used to discharge excess flows to the bypass reach.	As indicated above, Article 403 requires that the licensee minimize the fluctuation of the Millinocket impoundment water level by maintaining a discharge such that, at any point in time, flows, as measured immediately downstream from the tailrace of the Development, approximate the sum of inflows to the project reservoir. The flow and water level management plan also established a target water level of 3 inches (0.25 feet) below full pond at the Millinocket Development, but no specific minimum or maximum water levels were established or required.

Zone of Effect	<i>Standard selected</i>	<i>Complete? (Y or N)</i>	Information needed to complete the review	Initial issue identification and standards recommendations	GLHA Response
3-Back Channel	1	Y		<p>Instream flow studies demonstrated that increased flows into the Back Channel may not 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.</p> <p>Also, the WQC states existing flows into the Back Channel of leakage and occasional spillage have persisted since the completion of Stone Dam in 1899. As such, the habitat in that reach has established a baseline equilibrium for over 120 years.</p>	
4-Ferguson Lake	2	N	See ZOE 2.	See Zoe 2.	See response above for ZOE 2.



<b>Zone of Effect</b>	<b>Standard selected</b>	<b>Complete? (Y or N)</b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>	<b>GLHA Response</b>
<b>5-Millinocket Outflow Reach</b>	2	Y		A 2,000 cubic feet per second (CFS) minimum flow is required in the West Branch of the Penobscot River downstream from the Millinocket Development. Although natural inflows at times are lower than 2,000 CFS at Millinocket, water storage is typically available in the North Twin impoundment. Outflows from Millinocket Lake Dam into Millinocket Stream also contribute to ensuring the 2,000 CFS minimum flow is met.	
<b>6-Dolby Impoundment</b>	1	N	Please define the allowable rise and fall of the impoundment throughout the year.	Impoundment operated as pseudo-ROR.	Similar to the Millinocket Development, Article 403 requires that water level fluctuation of the Dolby impoundment be minimized by maintaining a discharge such that, at any point in time, flows, as measured immediately downstream from the tailrace of the Development, approximate the sum of inflows to the project reservoir. Also, like Millinocket, GLHA maintains a target water level of 3 inches (0.25 feet) below full pond at the Dolby Development, but there are no specific minimum or maximum water levels required.
<b>7-Dolby Bypass</b>	1	N		Bypass reach is very short with no agency concerns. I would recommend eliminating this ZOE.	While GLHA agrees that the zone of influence is short, it is distinct and GLHA would prefer not to modify the application as submitted.
<b>8-Dolby Downstream</b>	2	Y		See ZOE 5.	

**B. Water Quality Protection**

<b>Zone of Effect</b>	<b>Standard selected</b>	<b>Complete? (Y or N)</b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>	<b>GLHA Response</b>
<b>1-North Twin Dam Outflow Reach</b>	1	Y		Upstream of Quakish Lake backwater.	
<b>2-Quakish Lake</b>	2	N	Since this issuance is more than 10 years old, please provide documentation that the WQC terms and conditions remain valid and in effect for the facility. A letter or email from the MDEP will suffice.	The Project's Water Quality Certification (WQC), #L-17166-33-A-N, was issued on April 22, 1993 by the MDEP. If recent water quality monitoring data at the facility is available and shown to meet water quality standards, LIHI standard B-3 can be selected and that data provided to LIHI along with confirmation from MDEP that the results indicate water quality standards are being met.	See response above on page 2
<b>3-Back Channel</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2
<b>4-Ferguson Lake</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2
<b>5-Millinocket Outflow Reach</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2
<b>6-Dolby Impoundment</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2
<b>7-Dolby Bypass</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2
<b>8-Dolby Downstream</b>	2	N	See ZOE 2.	See ZOE 2.	See response above for ZOE 2

### C. Upstream Fish Passage

Zone of Effect	Standard selected	Complete? (Y or N)	Information needed to complete the review	Initial issue identification and standards recommendations	GLHA Response
1-North Twin Dam Outflow Reach	1	N	Please provide documents from resource agencies and/or licensing documents that provide verification and agreement on the lack of need for fish passage.	<p>The application states 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 at projects upstream.</p> <p>The Millinocket and Dolby Developments do not have, and are not required to have, fish passage facilities, as anadromous fish are not present in the reaches occupied by these developments.</p>	<p>There are currently no migratory anadromous fish species in the West Branch of the Penobscot River. Although the West Branch is within the historic range of Atlantic salmon (and presumably other anadromous species, such as American shad, blueback herring, and alewife), it is not part of designated critical habitat for endangered Atlantic salmon. Thus, the West Branch is currently managed for resident fish species, and not migratory species. However, the Medway Project FERC license, which encompasses the Medway Dam and impoundment located downstream of the Millinocket, Dolby, and East Millinocket Developments, requires consultation with the National Marine Fisheries Service (NMFS) every 5 years regarding <i>“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.”</i> 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.</p> <p>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 <i>“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 salmon recovery.”</i> 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 relicensings of the Medway and Penobscot Mills Projects.</p>
2-Quakish Lake	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1
3-Back Channel	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1

Zone of Effect	Standard selected	Complete? (Y or N)	Information needed to complete the review	Initial issue identification and standards recommendations	GLHA Response
4-Ferguson Lake	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1
5-Millinocket Outflow Reach	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1
6-Dolby Impoundment	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1
7-Dolby Bypass	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1
8-Dolby Downstream	1	N	See ZOE 1.	See ZOE 1.	See response above for ZOE 1

#### D. Downstream Fish Passage and Protection

Zone of Effect	Standard selected	Complete? (Y or N)	Information needed to complete the review	Initial issue identification and standards recommendations	GLHA Response
1-North Twin Dam Outflow Reach	1	N	Please provide documents from resource agencies and/or licensing documents that provide verification and agreement on the lack of need for fish passage.	The application states the facility allows for the safe, timely, and effective downstream passage of migratory fish. For resident fish, 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 to maintain healthy, sustainable fish and wildlife resources in the areas affected by the facility.	See response above section C. Upstream Fish Passage ZOE 1

<b>Zone of Effect</b>	<b>Standard selected</b>	<b>Complete? (Y or N)</b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>	<b>GLHA Response</b>
<b>2-Quakish Lake</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>3-Back Channel</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>4-Ferguson Lake</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>5-Millinocket Outflow Reach</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>6-Dolby Impoundment</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>7-Dolby Bypass</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1
<b>8-Dolby Downstream</b>	1	N	See ZOE 1.	See ZOE 1.	See response above ZOE 1

**E. Watershed and Shoreline Protection**

<b>Zone of Effect</b>	<b>Standard selected</b>	<b>Complete? (Y or N)</b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>
<b>1-North Twin Dam Outflow Reach</b>	2	Y		A Shoreline Management Plan (SMP) has been developed for ZOE 1 through 6.
<b>2-Quakish Lake</b>	2	Y		See ZOE 1.
<b>3-Back Channel</b>	2	Y		See ZOE 1.
<b>4-Ferguson Lake</b>	2	Y		See ZOE 1.
<b>5-Millinocket Outflow Reach</b>	2	Y		See ZOE 1.
<b>6-Dolby Impoundment</b>	2	Y		See ZOE 1.
<b>7-Dolby Bypass</b>	1	Y		No SMP was developed for this ZOE.
<b>8-Dolby Downstream</b>	1	Y		See ZOE 7.

### F. Threatened and Endangered Species Protection

Zone of Effect	Standard selected	Complete? (Y or N)	Information needed to complete the review	Initial issue identification and standards recommendations
1-North Twin Dam Outflow Reach	2	Y		An Information for Planning and Consultation (IPaC) report and USFWS Official Species List was developed for the Project.
2-Quakish Lake	2	Y		See ZOE 1.
3-Back Channel	2	Y		See ZOE 1.
4-Ferguson Lake	2	Y		See ZOE 1.
5-Millinocket Outflow Reach	2	Y		See ZOE 1.
6-Dolby Impoundment	2	Y		See ZOE 1.
7-Dolby Bypass	2	Y		See ZOE 1.
8-Dolby Downstream	2	Y		See ZOE 1.

### G. Cultural and Historic Resource Protection

Zone of Effect	Standard selected	Complete? (Y or N)	Information needed to complete the review	Initial issue identification and standards recommendations
1-North Twin Dam Outflow Reach	2	Y		<p>Article 417 of the Penobscot Mills Project License implements the Programmatic Agreement for the Project's cultural resources, of which the Cultural Resource Management Plan (CRMP) is a part.</p> <p>Pursuant to final CRMPs that were submitted to FERC on April 9, 1998 for the Project, annual reports on activities related to the management of historic properties at these Projects are submitted to FERC. None of the seven prehistoric archaeological sites identified in the CRMP are located at the Millinocket or Dolby Developments, nor in the Zones covered by this application.</p>
2-Quakish Lake	2	Y		See ZOE 1.
3-Back Channel	2	Y		See ZOE 1.
4-Ferguson Lake	2	Y		See ZOE 1.
5-Millinocket Outflow Reach	2	Y		See ZOE 1.

<b>Zone of Effect</b>	<b><i>Standard selected</i></b>	<b><i>Complete? (Y or N)</i></b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>
<b>6-Dolby Impoundment</b>	2	Y		See ZOE 1.
<b>7-Dolby Bypass</b>	2	Y		See ZOE 1.
<b>8-Dolby Downstream</b>	2	Y		See ZOE 1.

## H. Recreational Resources

<b>Zone of Effect</b>	<b><i>Standard selected</i></b>	<b><i>Complete? (Y or N)</i></b>	<b>Information needed to complete the review</b>	<b>Initial issue identification and standards recommendations</b>
<b>1-North Twin Dam Outflow Reach</b>	2	Y		Article 414 requires the licensee to construct, operate and maintain specified recreational facilities. Article 415 requires the licensee to monitor recreational use.
<b>2-Quakish Lake</b>	2	Y		See ZOE 1.
<b>3-Back Channel</b>	2	Y		See ZOE 1.
<b>4-Ferguson Lake</b>	2	Y		See ZOE 1.
<b>5-Millinocket Outflow Reach</b>	2	Y		See ZOE 1.
<b>6-Dolby Impoundment</b>	2	Y		See ZOE 1.
<b>7-Dolby Bypass</b>	2	Y		See ZOE 1.
<b>8-Dolby Downstream</b>	2	Y		See ZOE 1.