

Cross Power Hydroelectric Project — LIHI Mid-Term Review

LIHI Certificate #174 | FERC No. P-2326

Androscoggin River, Berlin, Coos County, New Hampshire

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Project Information

1. Introduction

The current LIHI Certificate for the 3.445-MW Cross Power Hydroelectric Project (Cross Power Project or Project), LIHI #174, FERC Project Number P-2326, was issued to Great Lakes Hydro America, LLC (GLHA or Applicant) effective August 31, 2020, and expires on August 30, 2030. The Cross Power Project was first certified by LIHI in 2020. The current LIHI certificate includes Condition 1 which required the Facility Owner to provide updates to LIHI on the ongoing status of Project relicensing (satisfied in 2026) (Kleinschmidt Associates 2026).

The Cross Power Project was recently relicensed by FERC on September 9, 2025, with a new 40-year license expiring September 1, 2065 (P-2326) (FERC 2025). In accordance with Section 5.3.4 of the 2nd Edition LIHI Handbook, issuance of a new license constitutes a “material change” and triggers a mid-term LIHI Certification review. A mid-term review application package was submitted to LIHI by GLHA on February 17, 2026 (Kleinschmidt Associates 2026). A new Certificate term may be granted if the Project continues to satisfy the LIHI criteria.

Note on shared context: The Cross Power Project is one of six LIHI Certified® hydroelectric projects within an 11-mile reach of the Androscoggin River between Berlin and Shelburne, New Hampshire (Table 1). Two non-LIHI projects, Riverside and J. Brodie Smith, are located between the Sawmill and Cross Power projects.

Table 1. Nearby LIHI-Certified Hydroelectric Projects in the Upper Androscoggin River between Berlin and Shelburne, New Hampshire.

Facility Name	LIHI Certification Number	FERC Project Number	Project Owner	Location (RM)
Sawmill	173	P-2422	GLHA / Brookfield	~140
Cross Power	174	P-2326	GLHA / Brookfield	~138
Cascade	188	P-2327	GLHA / Brookfield	135.6

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Facility Name	LIHI Certification Number	FERC Project Number	Project Owner	Location (RM)
Upper Gorham	175	P-2311	GLHA / Brookfield	~133
Gorham	153	P-2288	Patriot Hydro / LS Power	130.4
Shelburne	176	P-2300	GLHA / Brookfield	~129

Of the six certified projects in this stretch, the Cross Power Project and four others (Sawmill, Cascade, Upper Gorham, and Shelburne) are owned by GLHA, a subsidiary of Brookfield Renewable Energy Group. The Gorham Project (LIHI #153) is the only facility in this reach owned by a different operator, Central Rivers Power NH, LLC (CRP), a subsidiary of LS Power/Patriot Hydro, LLC. The Cross Power Project is located downstream from the Sawmill (LIHI #173) and upstream from the Cascade Project (LIHI #188). All six projects received new 40-year FERC licenses in 2025. The GLHA projects submitted a combined LIHI mid-term review application (Kleinschmidt Associates 2026). The Gorham Project submitted a separate LIHI mid-term review application.

The long-term, primary flow reference gage for this reach is USGS 01054000 (Androscoggin near Gorham), which has records back to the early 1900s (Table 2).

Table 2. Nearby USGS Stream Gages in the Upper Androscoggin River between Berlin and Shelburne, New Hampshire.

USGS Gage	Gage Name	Location (River Mile)	Nearest Project
01053600	Androscoggin R. at Cambridge NH	~141	Riverside (upstream) J. Brodie Smith (downstream)
01054000	Androscoggin R. near Gorham, NH	~131	Cascade (upstream) Upper Gorham (downstream)

Background information on watershed conditions, shoreline regulations, cultural resources, studies conducted for FERC relicensing on water quality, fish passage, threatened and endangered species, and recreation are inherently similar across all six projects. With this shared context, standard language is used across each mid-term review report where applicable.

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2. Facilities and Operations

The Cross Power Project is a 3.445-MW run-of-river hydroelectric facility located on the Androscoggin River at river mile 136.9 in Berlin, New Hampshire (Figures 1 and 2). The Project was originally constructed and completed in 1903. The annual average generation from 2016-2021 was 12,674 MWh.

The dam is a 566-foot-long, 20-foot-high structure consisting of a concrete non-overflow section, a 276-foot-long spillway with 42-inch flashboards. A retaining wall extends to the river embankment from a 19 x 124-foot-long gatehouse with five bays. The powerhouse contains five horizontal propeller turbines and five horizontal generators units.

The Project operates in run-of-river mode, impounding a 22-acre reservoir with a storage volume of 120 acre-feet. The impoundment fluctuates over a six-inch range from normal pond elevation of 921.7 feet (NGVD 29). The Project does not maintain a minimum flow requirement into the bypassed reach due to backwatering from the Cascade Project just downstream.

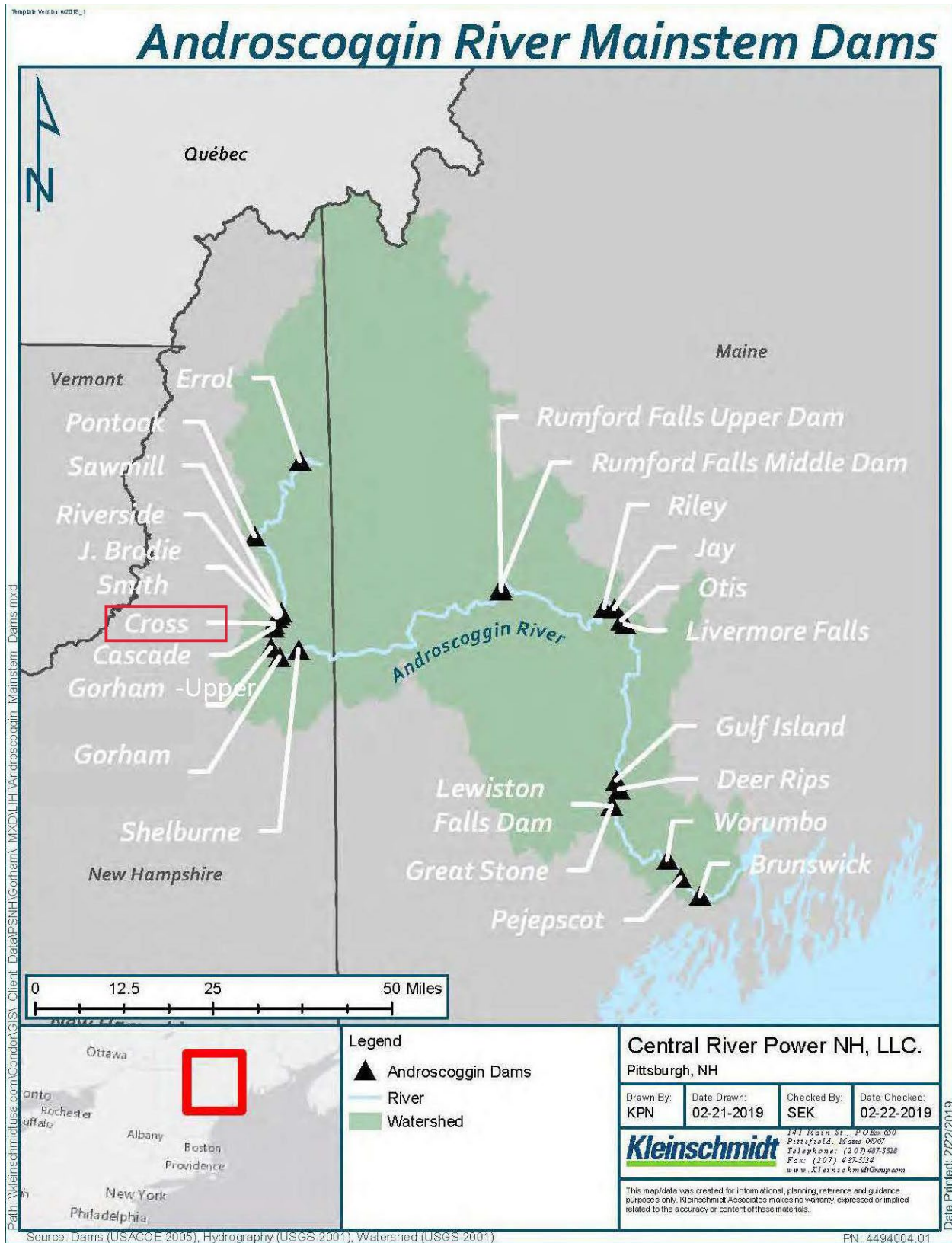


Figure 1 – Androscoggin River Watershed. The Cross Power Project is outlined in red (edited from original).

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Figure 2 – Cross Power Project on the Androscoggin River in Berlin, Coos County, NH.

Under the new license, the Project continues to operate in substantially the same manner as before, with an additional notification and reporting requirement to FERC for planned and unplanned deviations (Article 402) (Table 3) (GLHA 2025).

Table 3. Articles from the 2025 Cross Power Project (FERC No. 2326) license order:

Article	Title	Summary
401	Commission Approval, Reporting, and Filing of Amendments	Plans and reports required under the water quality certification must be filed with FERC for approval; amendments require FERC application.
402	Project Operation	Licensee must operate run-of-river per NHDES certification condition E-7; additional notification and reporting requirements apply for operational deviations.
403	Reservation of Authority (Fishways)	FERC reserves authority to require fishways as may be prescribed by the Secretary of the Interior under FPA section 18.
404	Protection of Northern Long-Eared Bat and Tricolored Bat	No tree removal of any size on project land from April 15–October 31, except for public/project safety hazards; emergency removal requires notification to NH FGD and FWS.

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Article	Title	Summary
405	Recreation Facilities	The licensee must file, for FERC approval, a project-specific recreation management plan within one year of license issuance.
406	Programmatic Agreement and Historic Properties Management Plan	Licensee must implement the January 14, 2025 PA with the NH SHPO and file a new HPMP for FERC approval within one year of license issuance.
407	Use and Occupancy	Licensee may grant permission for minor uses and occupancies of project lands without prior FERC approval, provided they are consistent with protecting scenic, recreational, and environmental values.

3. Scope of the Mid-Term Review

This review evaluates the Cross Power Project’s continued compliance with the current LIHI criteria and standards in consideration of the new FERC license, the 2024 New Hampshire Department of Environmental Services (NHDES) Water Quality Certificate (WQC), and other regulatory and operational requirements (FERC 2025, Appendix A). This review includes a comparison of the prior and new FERC licenses, the FERC Environmental Assessment, the NHDES WQC, annual LIHI compliance submittals, and the supporting studies prepared for FERC relicensing.

Public notice of the mid-term review was made on April 28, 2026, on the LIHI webpage, to LIHI email subscribers in New Hampshire and to agencies and stakeholders provided by GLHA. The 60-day public comment period closed on June 27, 2026 and no comments were received. Due to the completeness of information in the application and recent relicensing documents, the reviewer did not need to reach out to any resource agencies or interested parties.

4. Zones of Effect

In the mid-term review application, GLHA selected the exact same two Zones of Effect (ZoEs) as in their current LIHI Certificate. Zone 1 is the impoundment extending upstream from the dam about 0.6 miles. Zone 2 is the bypassed reach (river mile 136.1-136), which is very short given the powerhouse’s integral position at the dam and backwatering from the Cascade Project downstream. There is no Zone 3 tailrace zone designated for this Project since that area is also the Cascade impoundment (Table 4).

The Applicant stated that the proposed standards remain unchanged from the 2020 LIHI review because the new license does not create significant changes in operations or other requirements that would substantially affect Project resources. However, the reviewer disagrees

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with the selections for some criteria and changes to the selected standards are noted in **red** in Table 4 and discussed in Section 5.

Table 4. Selected LIHI Standards

Zone of Effect:		Zone 1 Impoundment	Zone 2 Bypassed Reach
River mile at upper and lower extent of Zone:		RM 136.7 – 136.1	RM 136.1 – 136
Criterion		Standard Selected	
A	Flow Regimes	1 , 2	2
B	Water Quality	3 , 2	3 , 2
C	Upstream Fish Passage	1	1
D	Downstream Fish Passage	1	1
E	Shorelines and Watershed	3	3
F	Threatened and Endangered Species	2	2
G	Cultural and Historic Resources	2	2
H	Recreational, Public, and Traditional Cultural Access	2	1

5. Detailed Criteria Review

A. Flow Regimes

Goal: The flow regimes in riverine reaches affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

Assessment of Criterion: Standard A-2, Resource Agency and Tribal Government Recommendations are appropriate for both zones as discussed below. The Cross Power Project has no discrete minimum flow release requirement in the WQC or FERC license. No flow study was conducted during relicensing given the absence of a true bypass reach.

Under the new license, the Project continues to operate in a run-of-river mode, maintaining the impoundment at a target elevation of 921.7 feet within a 6-inch fluctuation range (GLHA 2025). An Operations Compliance Monitoring Plan (OCMP) is required under Article 402 and Condition E-9 of the Water Quality Certificate (NHDES 2024, FERC 2025, Appendix A) which constitutes a formal recommendation under Standard A-2 for the impoundment. The Project is now also subject to notification and reporting in the event of flow or impoundment level deviations (Article 402, Condition E-8 of the WQC). GLHA is additionally required to protect aquatic

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resources downstream under Condition E-7 for emergency or maintenance “Impoundment Refill Procedures” to discharge 90 percent of inflow using 10% of inflow for refill (FERC 2025, Appendix A).

There were no reported flow or impoundment-level deviations identified in the FERC eLibrary. The flow regime has not changed under the new license, and the Project continues to provide a stable hydraulic environment consistent with prior operations. Therefore, the Project continues to satisfy the flow regimes criterion with the condition recommended in Section 7 to implement the OCMP.

B. Water Quality

Goal: Water quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

Assessment of Criterion: Standard B-2, Resource Agency and Tribal Government Recommendations for all zones is appropriate, given the recent Water Quality Certification (WQC) although Standard B-3, Site Specific Studies could also be appropriate because the Project completed a water quality study during relicensing (GLHA 2025) which confirmed that it does not contribute to existing water quality impairments. The Project reach is designated Class B by NHDES and is impaired for mercury, low dissolved oxygen, and pH.

The Project continues to meet surface water quality standards consistent with the Androscoggin Rivers Class B designation and the Water Quality Certificate issued by NHDES on September 19, 2024 (NHDES 2024, FERC 2025, Appendix A). The Project does not adversely affect water quality under Condition E-1 of the WQC and the new license does not impose a different water quality regime. A 10-week water quality study conducted by GLHA between June and September of 2020, observed pH and dissolved oxygen (concentration and percent saturation) exceeded or were within the range of attainment for Class B standards during the monitoring period. Similar to the other projects on the river, pH occasionally fell below 6.5 during times of cooler water temperatures and higher flows following rain events. Chlorophyll-a and total phosphorus values indicated overall low productivity, consistent with oligotrophic conditions, and no presence of nuisance algal blooms (FERC 2024).

The new license preserves compliance obligations addressed during relicensing under Conditions E-10 and E-11 of the WQC, which requires GLHA to provide a Water Quality Improvement Plan to NHDES within 120 days of notice if the Project is determined to be contributing to a violation. Although there remain legacy impairments in this reach of the Androscoggin River unrelated to Project operations, the Project continues to satisfy the water quality criterion.

C. Upstream Fish Passage

Goal: The facility allows for the safe, timely, and effective upstream passage of migratory fish.

Assessment of Criterion: Standard C-1, Not Applicable/De Minimis Effect, remains appropriate for all zones. The upper Androscoggin River is not accessible to diadromous species in the Project area (Wippelhauser et al. 2017, Yoder 2006). As such, there is no upstream migratory fish passage at the Project, and the new license does not impose a current operational requirement for fish passage (Article 403, FERC 2025). No fish passage studies were requested or conducted during FERC relicensing, and no upstream fish passage structures are currently required per the new FERC license.

Although there are no anadromous fish present in the Project area, the new license preserves FERC's authority to require fishways that may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act. Based on the absence of migratory fish in the reach and the lack of any passage structures required by the new license, the Project continues to satisfy this criterion.

D. Downstream Fish Passage

Goal: The facility allows for the safe, timely, and effective downstream passage of migratory fish and minimizes loss of resident fish from impoundments.

Assessment of Criterion: Standard D-1, Not Applicable/De Minimis Effect, remains appropriate for all zones. There are no catadromous or other migratory fish requiring downstream passage at the Project (FERC 2024). Downstream passage for resident fish occurs through spillage, low-level gate releases, and turbine flow through the trashracks. Resident fish species include stocked trout, fallfish, smallmouth bass, white sucker, and longnose dace (FERC 2024).

During relicensing, GLHA conducted a desktop entrainment/impingement study and created estimates of turbine passage survival for juvenile and adult life stages of resident fish species using the USFWS Turbine Blade Strike Analysis model (Towler and Pica 2020). Results indicated low entrainment and impingement risk in addition to a baseline lack of quality aquatic habitat due to legacy impairments in this riverine reach and the absence of migratory fish species.

The Project's operational and structural characteristics were also determined by FERC's EA to create little downstream passage concern for the resident species present (FERC 2024). Resource agencies did not identify downstream passage measures that were required as part of the new license. Therefore, the Project has little to no impact on downstream passing fish and continues to satisfy the downstream passage criterion.

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E. Shorelines and Watershed Protection

Goal: The facility has demonstrated that sufficient action has been taken to protect, mitigate, or enhance the condition of soils, vegetation, and ecosystem functions on shoreline and watershed lands associated with the facility.

Assessment of Criterion: Standard E-3, Enforceable Protection remains appropriate for all zones. All projects on the river are subject to the New Hampshire Shoreland Water Quality Protection Act (SWQPA), which governs shoreland uses within a 250-foot buffer of the high-water mark. The SWQPA establishes minimum standards for the subdivision, use and development of shorelands adjacent to the state's public water bodies. It includes limits on impervious surfaces, a provision for waterfront and natural woodland buffers in which vegetation removal is limited, shoreland protection, and the establishment of a permit requirement for many new construction, excavation and filling activities within the Protected Shoreland.

Neither the prior license nor the new license requires a shoreline management plan in lieu of the SWQPA. The Project lands are limited to the area occupied by Project infrastructure in the City of Berlin and there are no lands of ecological significance. Shoreline protection is maintained through compliance with the SWQPA. The Project continues to operate in a run-of-river mode that minimizes shoreline erosion and negative impacts of reservoir fluctuation. Therefore, the Project continues to satisfy the shorelines and watershed criterion.

F. Threatened and Endangered Species

Goal: The facility does not negatively impact federal or state listed species or tribal trust species.

Assessment of Criterion: Standard F-2, Finding of No Negative Effect remains appropriate for all zones. Based on the USFWS IPaC online tool, the federally endangered northern long-eared bat, the federally threatened Canada lynx, the federally proposed endangered tricolored bat, and the federally proposed threatened monarch butterfly have the potential to occur within the Project boundary (FERC 2024). No critical habitat for either bat species, Canada lynx, or monarch butterfly is proposed or designated within the Project area. In addition, a freshwater mussel survey conducted in the summer of 2021 found no state-listed mussel species. A botanical survey conducted in September 2020 documented no federal or state threatened or endangered plant species. In an August 23, 2024 letter to FERC, the USFWS indicated that the Project would have no effect on Canada lynx and any effect on bats would be “insignificant and/or discountable”.¹

Article 404 of the new FERC license implements protection for the northern long-eared bat and tricolored bat on Project land by imposing a seasonal tree-cutting restriction from April 15 through October 31 (FERC 2024, 2025). Operation under the new license is not expected to

¹ https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20240826-5026&optimized=false&sid=81cecaab-53b3-48d9-8053-ab3eaccbf6e0

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create significant impacts. Therefore, Project continues to satisfy the threatened and endangered species criterion.

G. Cultural and Historic Resources

Goal: The facility does not adversely impact cultural or historic resources associated with the facility's lands and waters, including archaeological sites, historic era sites, traditional cultural landscapes, traditional cultural properties, and other tribal trust resources.

Assessment of Criterion: Standard G-2, Approved Plan, remains appropriate for all zones. Article 405 of the new license requires implementation of a Programmatic Agreement between FERC and the New Hampshire State Historic Preservation Office for managing cultural and historic resources pursuant to which CRP must develop a Historic Properties Management Plan (HPMP) (FERC 2025).

The previous license required annual reporting for managing historic properties under the 1993 Programmatic Agreement for Managing Historic Properties and the 1996 Programmatic Agreement Amendment. GLHA was required to report on the dam, powerhouse, gatehouse, and gatehouse machinery which were determined to be eligible for listing on the National Register of Historic Places (NRHP).

FERC designated GLHA as its non-federal representative for Section 106 consultation in 2019. No cultural or archaeological studies were requested or conducted for relicensing. No Native American lands, known as traditional cultural properties, or NRHP-eligible tribal resources are present within the Project boundary. There are no state or federal recognized tribes in New Hampshire, but three local tribes² were notified of the LIHI mid-term review application. No comments were received from any tribal interests. Given the development of a new HPMP, the Project continues to satisfy the cultural and historic resources criterion with the condition recommended in Section 7 to implement the HPMP.

H. Recreational, Public, and Traditional Cultural Access

Goal: The facility accommodates recreational activities and provides recreational, public, and traditional cultural access to associated lands and waters without fee or charge.

Assessment of Criterion: Standard H-2, Resource Agency and Tribal Government Recommendations, remains appropriate the impoundment. Standard H-1, Not Applicable/De Minimis Effect remains appropriate for the bypassed reach since there is no safe access to that reach.

Article 406 of the new license requires GLHA to develop a Recreation Management Plan (RMP) within one year of license issuance to address the identified lack of impoundment access and to

² Abenaki Nation of New Hampshire, Koasek Abenaki Nation, and Pennacook New Hampshire Tribe

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formalize recreational features. The RMP must describe proposed facilities, an operation and maintenance schedule, a development plan and schedule, and provisions for informing boaters of potential hazards.

GLHA conducted recreation user intercept surveys during the 2022 recreation season. Respondents reported good or excellent conditions and adequate facilities. Respondents recommended recreational improvements to water access but most users on the site participated in hiking and walking, followed by water activities (fishing, swimming and boating).

In the final license application GLHA proposed to develop a hand carry boat access to the impoundment and to improve the existing Cross Informal Access by upgrading fencing, gates, and safety signage. The Cross informal access area, also referred to as Glenside Park, is located downstream of Cross dam off of Route 16 on river right and is not within the Project boundary; however, the site is currently owned and maintained by GLHA which proposed to install fencing against motorized vehicles and to provide safety signage. The City of Berlin submitted comments on the Draft EA³ supporting those modifications.

The Project continues to provide free public access where it is safe to do so, and therefore satisfies the recreation, public and traditional cultural access criterion with the condition recommended in Section 7 to implement the recreation management plan.

6. Current Certificate Conditions

The current LIHI certificate includes one condition. Condition 1 required the Facility Owner to provide updates to LIHI on the ongoing status of Project relicensing, including studies, FERC filings, resource agency consultation, recommendations, and agency comments on study results. This condition was fully satisfied with the issuance of the new FERC license in September 2025 and the submission of the mid-term review application (Kleinschmidt Associates 2026).

7. Conclusion and Recommendation

This review determined that the Project continues to satisfy the LIHI criteria and that a new 10-year Certificate term can be granted. All requirements of Condition 1 of the current certification have been satisfied. The Project's new FERC license formalizes existing operational practices and establishes compliance reporting structures and monitoring requirements for continued resource protection. However, the following conditions are recommended to ensure completion of post-license requirements related to the LIHI criteria:

Condition 1: The Facility Owner shall submit the final Operational Compliance Monitoring Plan (OCMP) to LIHI once it has been approved by resource agencies and FERC. In annual compliance

³ https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20240625-5042&optimized=false&sid=a7dc41cc-b520-4c95-acae-d6d5c65081fa

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submittals to LIHI the Facility Owner shall submit a summary of all planned and unplanned operational deviations that occurred during the year along with evidence of resource agency consultation and comments received.

Condition 2: The Facility Owner shall submit the final Historic Properties Management Plan (HPMP) to LIHI once it has been approved by the SHPO and FERC. In annual compliance submittals to LIHI, the Facility Owner shall report on any consultation that occurred during the year related to ground-disturbing or other activities subject to the HPMP.

Condition 3: The Facility Owner shall submit the Recreation Management Plan (RMP) to LIHI once it has been approved by resource agencies and FERC. In annual compliance submittals to LIHI, the Facility Owner shall report on any required maintenance, development of sites or other activities subject to the RMP.

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Appendix A — License Crosswalk

Resource Area	Previous License Requirement	Change from Existing License
Flow Regimes	Articles 401 – 403 included restrictions on run-of-river operations, minimum bypass flows, and an operational compliance monitoring plan.	Articles 401, 402 and WQC Conditions E-7 – E-9 require an updated operational compliance monitoring plan including deviation reporting and drawdown/refill operations.
Water Quality	Article 405 required developing a water quality monitoring plan.	Article 401 and WQC Conditions E-10 and E-11 require a water quality improvement plan and reporting, if NHDES determines that the project is contributing to non-compliance with state water quality standards.
Fish Passage	Article 404 retained FERC’s Section 18 reservation of authority to prescribe fishways.	Article 403 preserves FERC's authority to require fishways.
Shorelines and Watershed Protection	Article 407 required developing a shoreline management plan.	The new license does not require a shoreline management plan; the project is subject to restrictions under the state Shoreline Water Quality Protection Act
Threatened and Endangered Species Protection	No species-specific protection measures.	Article 404 requires avoidance of tree removal, trimming from April 15 through October 31.
Cultural and Historic Resources	Article 406 required implementation of the Programmatic Agreement with the NH SHPO providing annual monitoring and reporting of repair and improvement activities.	Article 406 requires implementation of the new PA and development of an updated historic properties management plan.
Recreation	Article 406 required development of a recreation management plan.	Article 405 requires recreation facility maintenance and development of a recreation management plan.

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