ENVIRONMENTAL ASSESSMENT
FOR
HYDROPOWER LICENSE

Cornell University Hydroelectric Project
FERC Project No. 3251-010
New York

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
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ACRONYMS AND ABBREVIATIONS

Advisory Council	Advisory Council on Historic Preservation
APE	area of potential effects
BAP	Biological Assessment Profile
certification	water quality certification
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
conductivity	specific conductance
Cornell	Cornell University
CZMA	Coastal Zone Management Act
dbh	diameter at breast height
DO	dissolved oxygen
EA	Environmental Assessment
EPT	Ephemeroptera, Plecoptera, Trichoptera
ESA	Endangered Species Act
˚F	degrees Fahrenheit
fps	feet per second
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
HPMP	Historic Properties Management Plan
Interior	Department of the Interior
IPaC	Information for Planning and Consultation
µS/cm	microsiemens per centimeter
mg/L	milligrams per Liter
msl	mean sea level
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
New York DEC	New York State Department of Environmental Conservation
New York NHP	New York Natural Heritage Program
New York SHPO	New York State Historic Preservation Officer
NHPA	National Historic Preservation Act of 1966
NPCC	Northeast Power Coordinating Council
PA	Programmatic Agreement
PLC	Programmable Logic Controller
REA	Ready for Environmental Analysis
SD1	Initial Scoping Document

SPDES	State Pollution Discharge Elimination System
TDS	total dissolved solids
U.S.C	United States Code
USGS	United States Geological Survey
WNS	White-nose syndrome

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Cornell University Hydroelectric Project
FERC Project No. 3251-010 – New York

1.0 INTRODUCTION

1.1 APPLICATION

On June 28, 2019, Cornell University (Cornell) filed an application for a new license with the Federal Energy Regulatory Commission (Commission or FERC) to continue operating the 1.718-megawatt (MW) Cornell University Hydroelectric Project No. 3251 (Cornell Project or project).[1] The project is located on Fall Creek within the Cornell campus in the City of Ithaca, Tompkins County, New York (figure 1). The project does not occupy federal land. The estimated average annual generation of the project (2013 to 2018) is 4,599 megawatt-hours (MWh). Cornell proposes no changes to the project's capacity.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Cornell Project is to provide a source of hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a new license to Cornell for the project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

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[1] A license for the project was issued on July 28, 1981, for a term of 40 years, with an effective date of July 1, 1981, and an expiration date of June 30, 2021. *See Cornell Univ.*, 16 FERC ¶ 62,114 (1981) (delegated order).

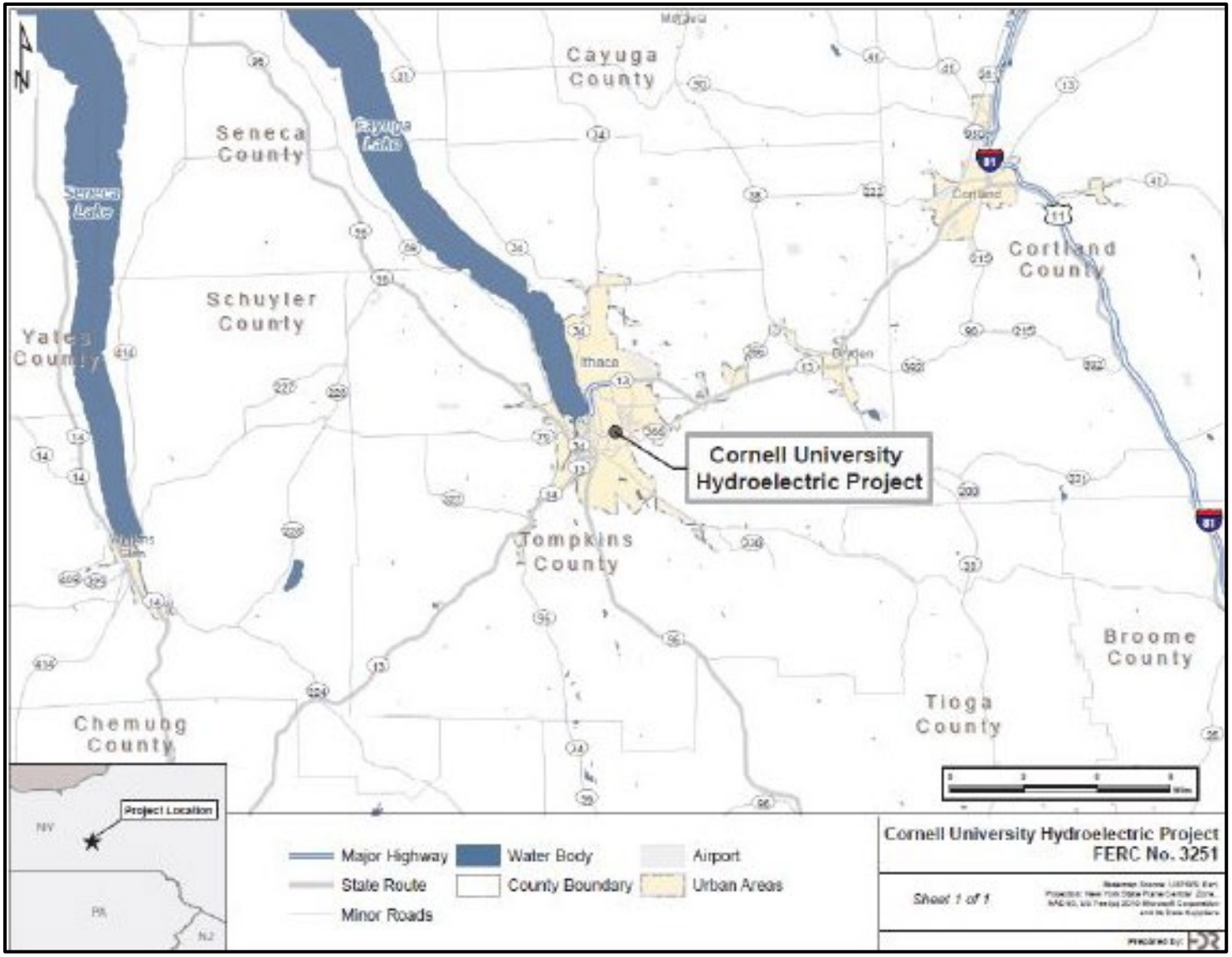

Figure 1. Location of the Cornell Project (Source: license application, as modified by staff).

Issuing a new license for the Cornell Project would allow Cornell to continue to generate electricity at the project for the term of the new license, making electric power from a renewable resource available to its customers.

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA)[2] of 1969 to assess the environmental and economic effects associated with the operation of the project, alternatives to the project, and makes recommendations to the Commission on whether to issue a new license, and if so, recommends terms and conditions to become a part of any license issued.

In this EA, we assess the environmental and economic effects of: (1) continued project operation and maintenance as proposed by Cornell (proposed action); (2) the proposed action with additional or modified measures (staff alternative); and (3) no action. The primary issues associated with relicensing the project are the effects of continued operation and maintenance on aquatic species and their habitat, terrestrial resources, threatened and endangered species, and cultural resources.

1.2.2 Need for Power

The Cornell Project provides hydroelectric generation to meet part of the State of New York's power requirements, resource diversity, and capacity needs. The project has an installed capacity of 1.718 MW and generates an average of about 4,599 MWh per year.

Power produced at the project would be used to support demand in the Northeast Power Coordinating Council (NPCC) region, which includes the State of New York. NPCC is a regional electric reliability council in the North American Electric Reliability Corporation (NERC). NERC annually forecasts electrical supply and demand on a national and regional level for a 10-year period. According to NERC's 2019 long-term reliability assessment report, annual total internal demand in the NPCC-New York region is expected to range between 31,068 MW to 32,202 MW over the period 2020 to 2029 (NERC, 2019). Anticipated reserve capacity margins (generating capacity in excess of demand) in the region is projected to range from 22.66 percent to 27.18 percent of peak demand during the same period. Although anticipated capacity margins would be above the target capacity margin levels of 15 percent, the project would continue to meet part of existing load requirements as well as maintain stability of the power system. In addition, the 2020 New York State Energy Plan sets forth a goal for the state utilities to source

[2] On July 16, 2020, the Council on Environmental Quality (CEQ) issued a final rule, *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* (Final Rule, 85 Fed. Reg. 43304), which was effective as of September 14, 2020; however, the NEPA review of this project was in process at that time and therefore this EA was prepared pursuant to CEQ's 1978 NEPA regulations.

70 percent of their electric generation from renewable energy sources by 2030. If issued a new license, the power from the Cornell Project would also help meet the renewable energy goal of the state.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Any license for the Cornell Project would be subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described in Appendix A.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 Code of Federal Regulations [C.F.R.], § 4.38) require that an applicant consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, Endangered Species Act (ESA), National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EA, we conducted scoping for the Cornell Project to determine what issues and alternatives should be addressed. We issued an initial scoping document (SD1) on December 13, 2019. It was noticed in the *Federal Register* on December 19, 2019.[3] The Department of the Interior (Interior) filed written comments on January 8, 2020, and Cornell filed comments on January 13, 2020. However, neither entity's comments affected the content of SD1;[4,5] therefore, Commission staff did not prepare a second scoping document.

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[3] 84 Fed. Reg. 69738.

[4] In its January 8, 2020, comments, Interior recommends that Cornell develop a sediment management plan for the project and states its opposition to Cornell's proposal to remove the island located in Beebe Lake from the project boundary. These subjects are generally listed in sections 3.2.1, *Proposed Project Facilities and Operation*, and 4.2.1, *Geologic and Soil Resources,* of SD1, and are addressed in section 3.3.1.2, *Geology and Soil Resources, Environmental Effects*, of this EA.

[5] In its January 13, 2020 comments, Cornell requests that the *Fisheries Enhancement Plan for the Oswego River* be removed from the Commission's list of

1.4.2 Interventions

On November 22, 2019, the Commission issued a notice accepting the license application. This notice set January 21, 2020, as the deadline for filing protests and motions to intervene. The following entities filed notices of intervention or motions to intervene (none in opposition to the project):

Entity	Date Filed
New York State Department of Environmental Conservation (New York DEC)	December 23, 2019
Interior[6]	January 15, 2020

1.4.3 Comments on the Application

On January 23, 2020, the Commission issued a Ready for Environmental Analysis (REA) notice for the Cornell Project, and solicited comments, recommendations, terms and conditions, and prescriptions. The following entities filed comments, recommendations, terms and conditions, or prescriptions:

Entity	Date Filed
Interior	March 23, 2020

Cornell filed reply comments on May 7, 2020.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

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comprehensive plans that are relevant to the project. Cornell also requests an update to the project's mailing and service lists.

[6] Interior filed a notice of intervention on behalf of its component bureaus, the U.S. Fish and Wildlife Service and the Bureau of Indian Affairs.

2.1.1 Existing Project Facilities

The Cornell Project (figure 2) consists of: (1) an existing 28-foot-high, 304-foot-long reinforced-concrete gravity dam, known as Beebe Lake dam, consisting of a non-overflow section (intake forebay) with two 5-foot-wide stoplog gates (minimum bypass flow weirs) and three overflow sections with a combined length of 260 feet and a crest elevation of 780.7 feet;[7] (2) an impoundment (Beebe Lake) with a surface area of 16 acres and a storage capacity of 50 acre-feet at the normal pool elevation of 780.7 feet; (3) a forebay formed by a concrete wall and retaining wall; (4) a reinforced-concrete intake with a 6-foot-high, 6-foot-wide steel vertical-slide gate along the right (north) bank and trash racks with 0.914-inch clear spacing; (5) a 5-foot-diameter, 1,507-foot-long reinforced-concrete underground pipeline and a 5-foot-diameter, 200-foot-long riveted-steel underground penstock; (6) a surge chamber, now only used for access to the penstock, located within the cast-in-place concrete penstock about 791 feet downstream of the intake; (7) a 79-foot-long, 29-foot-wide, 24-foot-high stone masonry powerhouse containing two Ossberger crossflow turbines and induction motor generators with a combined authorized capacity of 1.718 MW (unit 1 = 0.716 MW and unit 2 = 1.002 MW); (8) a tailrace located on the river right-side of Fall Creek directly below the powerhouse; (9) a bypassed reach that consists of a narrow gorge with steep walls and bedrock substrate, extending approximately 1,800 feet from the toe of the dam to the powerhouse tailrace; (10) a 385-foot-long, 2.4-kilovolt single transmission line connecting to Cornell's distribution system via the interconnect point located on a transmission pole adjacent to Cornell's Foundry building; and (11) appurtenant facilities.

2.1.2 Current Project Boundary

The Cornell Project's existing boundary comprises 20.07 acres and includes the dam, impoundment (to an elevation of 780.7 feet), powerhouse, transmission line corridor, and appurtenant facilities. Cornell holds title or rights to all lands within the project boundary and there are no project recreation facilities required pursuant to the current license or included in the existing project boundary.

2.1.3 Project Safety

The Cornell Project has been operating for more than 39 years under the existing license issued in 1981.[8] During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of

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[7] Unless otherwise noted, all elevations reported herein are referenced to mean sea level.

[8] *Cornell Univ.*, 16 FERC ¶ 62,114.

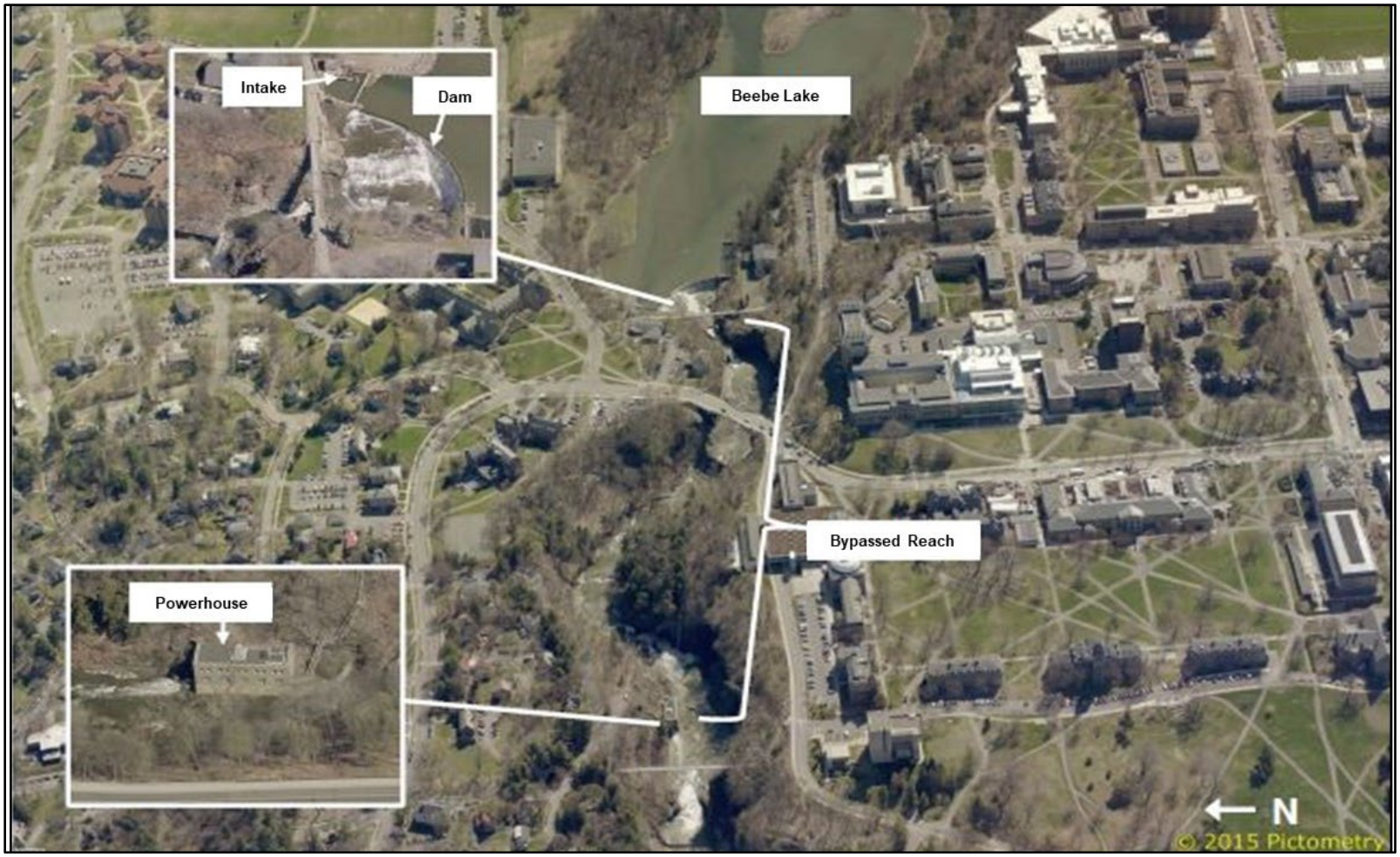

Figure 2. Location of the project facilities of the Cornell Project (Source: license application, as modified by staff).

unauthorized modifications, efficiency, and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report has been submitted for Commission review.

As part of the relicensing process, Commission staff will evaluate the continued adequacy of the proposed project facilities under a new license. Special articles will be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the new license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.4 Current Project Operation

The Cornell Project is operated in a run-of-river mode, with project outflows approximating inflows to the impoundment. Impoundment elevation is controlled by a pressure level sensor at the intake forebay that feeds to a programmable logic controller (PLC) in the powerhouse to control the turbine gates. The PLC program contains alarms and automatic shutdown capabilities to control operation of the project in the event of an emergency. A continuous minimum flow of 10 cubic feet per second (cfs) or inflow to the impoundment, whichever is less, is provided to the 1,800-foot-long bypassed reach through the project's minimum flow weir and/or by flow over the overflow spillway. During high flows, maximum generation is achieved but is limited by the capacity of the penstock (e.g., approximately 160 cfs),[9] with remaining inflow spilled over the dam. The spillway and stoplog gates (minimum flow weirs) are designed to pass a total flow of approximately 5,700 cfs. Flows less than 20 cfs are passed through the project with no generation. When inflows exceed 20 cfs, the minimum bypass flow is provided through the minimum flow weirs or the overflow spillway and the remaining flow is passed through the powerhouse for generation.

The project's powerhouse is unstaffed, except during weekly inspections. The project intake is visited once or twice per week by a Central Energy Plant operator and is inspected daily by Cornell shift mechanics. Project operation is remotely monitored 24-hours-per-day via remote sensing equipment and camera views of the project's trash rack and dam.

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[9] Head loss, resulting from the design of the penstock and surge chamber, limits maximum generation to well below the authorized installed capacity of the project. *See Cornell Univ.*, 71 FERC ¶ 62,222 (1995) (delegated order).

For the period 2013 through 2018, the estimated average annual generation at the project was about 4,599 MWh. At the rated plant capacity of 1.718 MW, the annual plant capacity factor is about 30.56 percent.

2.1.5 Current Environmental Measures

Under the current license, as modified in 1995 by the Commission, Cornell operates the project as described above in section 2.1.4 *Existing Project Operation*.

As required by Article 20 of the existing license, Cornell currently provides a continuous minimum flow of 10 cfs or a flow equal to the inflow to Beebe Lake, whichever is less, from the project forebay into Fall Creek. The required minimum flow into the bypassed reach is provided from the project's minimum flow weirs at the dam or the overflow spillway. There have been no instances of noncompliance with the minimum bypass flow requirement since license issuance.

2.2 CORNELL'S PROPOSAL

2.2.1 Proposed Project Facilities and Project Boundary

Cornell proposes to include in the project boundary the existing chilled water plant forebay and the associated outlet drain valve,[10] the downstream portion of the project dam, and the staircase required to access the project powerhouse (figure 3). Cornell states that these modifications are necessary to include all project features needed and necessary for the operation and maintenance of the project.

Cornell also proposes to modify the project boundary to correct: (1) the transmission line right-of-way by removing a portion of right-of-way south of the powerhouse; (2) a portion of the buried penstock right-of-way to the west of the project intake; and (3) portions of the north and east shorelines of Beebe Lake.

Lastly, Cornell proposes to remove the island in Beebe Lake[11] from the project boundary, which it states is not needed for project purposes. In total, the proposed boundary changes would remove 1.46 acres and add 0.41 acre, resulting in a modified project boundary that would comprise 19.02 acres.

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[10] The chilled water plant forebay, integral to the southern end of the project dam, is the drainage point for Beebe Lake and served a former Hydraulics Lab and Chilled Water Plant. The forebay contains electric inlet gates and an electric discharge gate that provides flow to a 4-foot-by-4-foot-wide tunnel.

[11] For consistency, this EA uses the term "Beebe Lake Island" for the island in the eastern portion of Beebe Lake.

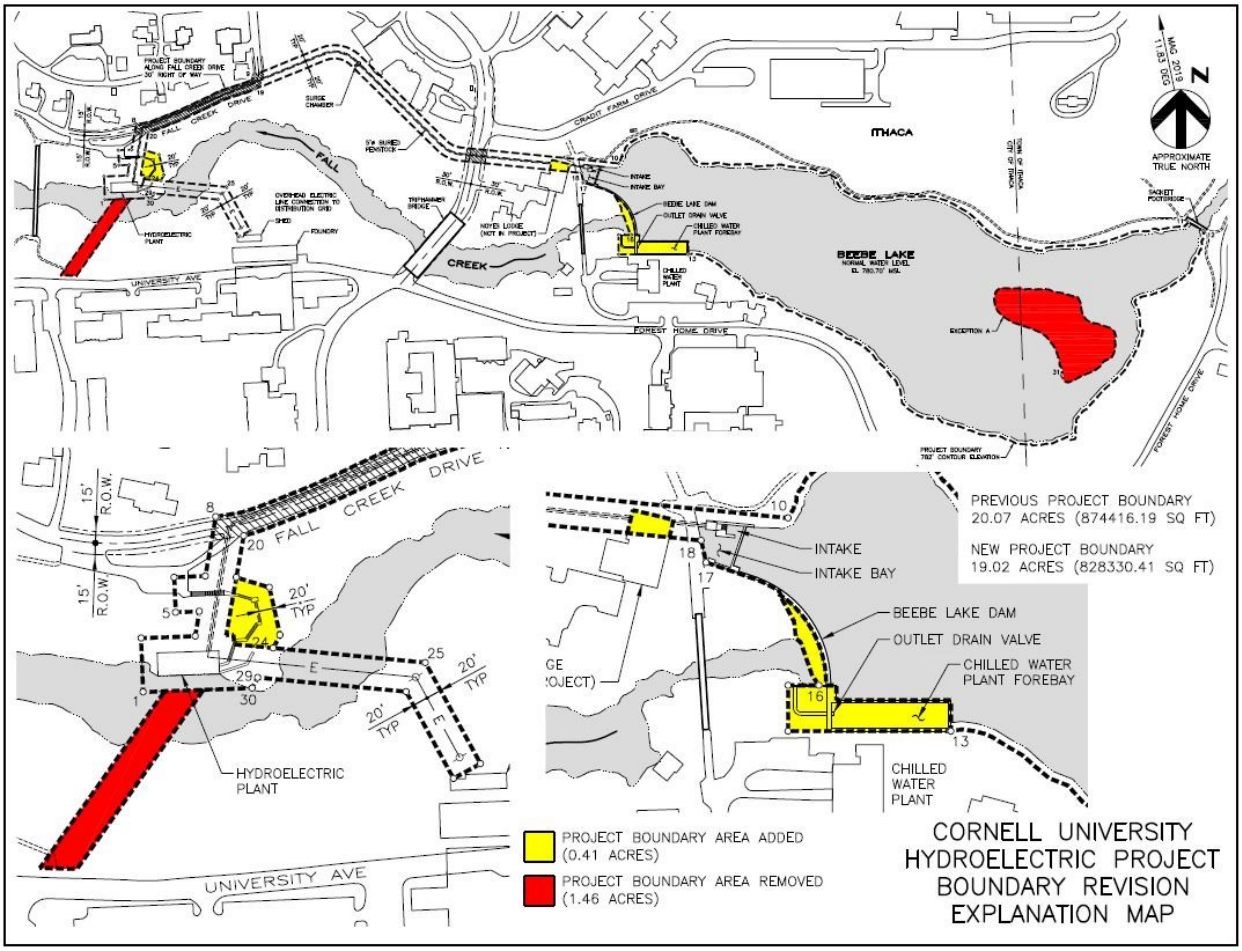

Figure 3. Proposed modifications to the project boundary of the Cornell Project.

2.2.2 Proposed Project Operation

As described in the license application, Cornell does not propose any new project facilities; however, Cornell does propose the following operational measures:

- Continue to operate the project in a run-of-river mode where outflow approximates inflow as measured by the upstream U.S. Geological Survey (USGS) gage on Fall Creek (USGS Gage No. 04234000);

- Maintain the impoundment elevation at or above the spillway crest (780.7 feet), with fluctuations limited to no more than 0.5 foot below the spillway crest (i.e., 780.2 feet).[12]

[12] In its license application, Cornell erroneously equates the 0.5-foot decrease in impoundment elevation to 780.1 feet.

2.2.3 Proposed Environmental Measures

In addition to the operational measures described above, Cornell proposes the following environmental measures:

- Provide a minimum flow of 10 cfs or inflow to the project, whichever is less, into the project's bypassed reach through existing weirs and/or flow over the project's overflow spillway;
- Operate the project using stepwise shutdown and startup procedures to help attenuate changes in flows downstream of the project;
- If the project's existing trash racks require replacement during the term of the new license, the existing trash racks would be replaced with trash racks with clear bar spacing of 1 inch or less;
- Implement a proposed Invasive Plant Species Management Plan filed as Appendix D of the license application;
- Implement a proposed Northern Long-eared Bat and Bald Eagle Management Plan filed as Appendix D of the license application; and
- Within 1 year of license issuance, develop and file with the Commission a historic properties management plan (HPMP).

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include Cornell's proposed operational and environmental measures, except measures to: (1) replace, if necessary, the existing project trash rack with a trash rack with 1-inch clear spacing or less, (2) implement a proposed Invasive Plant Species Management Plan, and (3) implement a proposed Northern Long-eared Bat and Bald Eagle Management Plan. The staff alternative would also include the following staff-recommended additions or modifications:

- Develop and implement a sediment management plan to limit the potential for sediment releases (caused by maintenance or larger-scale dredging) that may impact fish and wildlife resources, and including provisions for the development of criteria for larger-scale dredging within the project impoundment, and consultation with the resource agencies prior to larger-scale dredging activity.

- Develop a stream flow and water level monitoring plan in consultation with the U.S. Fish and Wildlife Service (FWS) and New York DEC to assist in the administration of compliance with Cornell's proposed run-of-river operation, impoundment level fluctuation, and minimum flow requirement.

- Develop a final Northern Long-eared Bat and Bald Eagle Management Plan[13] and a final Invasive Plant Species Management Plan,[14] following consultation with FWS and New York DEC.[15]

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Certain alternatives to Cornell's proposal were considered but eliminated from further analysis because they are not reasonable in this case. These alternatives are presented in Appendix B.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project's vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and other recommended environmental measures. Sections are organized by resource area, with historical and current conditions described first. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed

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[13] In its March 23, 2020 letter, Interior refers to this plan as the Northern Long-eared Bat and Bald Eagle *Protection* Plan. For consistency with Cornell's proposal, this EA uses Northern Long-eared Bat and Bald Eagle *Management* Plan.

[14] In its March 23, 2020, letter, Interior refers to this plan as the *Invasive Species Management Plan*. For consistency with Cornell's proposal, this EA uses *Invasive Plant Species Management Plan*.

[15] In its letter, Interior states that FWS and New York DEC were not provided with drafts of Cornell's two plans prior to being filed with the license application, and that the two plans "…should be *implemented in consultation with…*[emphasis added]" FWS and New York DEC. However, it is unclear how these plans can be approved and implemented if FWS and New York DEC may contemplate changes to the plans as filed with the license application. Therefore, Commission staff interpret Interior's recommendation as developing final plans, in consultation with FWS and New York DEC.

mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.[16]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Cornell Project is located on Fall Creek in Tompkins County, New York. The mainstem of Fall Creek originates at Lake Como in Cayuga County, New York, and flows 33 miles in a westerly direction before emptying into Cayuga Lake. From the Cornell Project, located 1.8 miles upstream of Cayuga Lake, Fall Creek descends over 400 feet through the Fall Creek Gorge, past steep-sided gorge walls and five natural waterfalls, ranging from 30 to 156 feet high.[17] The Fall Creek watershed encompasses 128 square miles. Agricultural and forested land collectively comprise more than 88 percent of the watershed, followed by residential and urban land use at 5.7 and 3.1 percent, respectively (table 1).

Table 1. Percent land cover classifications in the Fall Creek watershed, Tompkins County, New York.

Land Classification	Percent Cover	Land Classification	Percent Cover
Agriculture	46.5	Outdoor Recreation	0.7
Forest/Brush	41.7	Institutional	0.5
Residential	5.7	Commercial	0.4
Urban	3.1	Disturbed	0.3
Water	0.9	Industrial	0.2

The project is located in the Finger Lakes Uplands and Gorges ecoregion of the Northern Allegheny Plateau (Bryce et al., 2010). The region is characterized by glacially smoothed rolling hills and north-flowing drainages, with large glacially carved lakes, hanging valleys, and waterfall-eroded gorges. Elevations range from 382 to 2,196 feet, and local relief is typically between 200 and 600 feet (Bryce, 2010). The climate is

[16] Unless noted otherwise, the sources of our information are the final license application filed June 28, 2019, and additional information filed by Cornell on October 31, 2019.

[17] From Triphammer Falls at the project dam, the remaining waterfalls and their approximate distance downstream are as follows: Rocky Falls, 0.29 mile; Horseshoe Falls, 0.36 mile; Forest Falls, 0.50 mile, and Ithaca Falls, 0.65 mile.

humid continental, characterized by warm summers and longer, colder winters. Mean annual precipitation is 37.3 inches, with an additional 64.4 inches of snowfall. Mean annual temperature ranges from 36.7 to 56.5 degrees Fahrenheit (°F) and the frost-free season generally spans 105 to 180 days.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 C.F.R., § 1508.7),[18] a cumulative effect is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Through scoping, agency consultation, and our independent analysis, we have not identified any resources that would be cumulatively affected by the continued operation of the Cornell Project.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the site-specific environmental issues.

Only the resources that have the potential to be affected are addressed in this EA. Based on this, we have determined that geology and soils, aquatic resources (including water quantity, water quality, and fisheries), terrestrial resources, threatened and endangered species, recreation, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to land use or aesthetic resources associated with the proposed action, and therefore, these resources are not addressed in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

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[18] As noted earlier in this EA, although the CEQ updated its NEPA regulations on July 16, 2020 (effective September 14, 2020), the NEPA process for this project was ongoing at the time of the update, and therefore, this EA was prepared pursuant to CEQ's 1978 NEPA regulations.

3.3.1 Geology and Soil Resources

3.3.1.1 Affected Environment

The Cornell Project is located in the Appalachian Highlands physiographic province, on the northern extent of the Appalachian Plateau province (Cornell University, 1997). The province is generally composed of sedimentary rocks (such as sandstones, conglomerates, and shales) that were deposited during the late Paleozoic era (National Park Service, undated). As noted above in section 3.1, *General Description of the River Basin*, the physiographic setting of the project corresponds to the Northern Allegheny Plateau Finger Lakes and Upland Gorges IV ecoregion (Bryce et al., 2010).

Bedrock and Surficial Geology

Three types of bedrock are found at the Cornell Project. Bedrock underlying Fall Creek generally consists of alternating beds of sandstone and shales. Near Beebe Lake dam, bedrock consists of a thick sequence of interbedded gray to black shale, fissile black shale, brown-gray argillaceous limestone, gray siltstone occasionally calcareous, brownish-black petroliferous shale, brown sandstone, silty mudstone, and cross laminated siltstone (D'Appolonia Consulting Engineers, Inc., 1981). The bedrock underlying the Cayuga Lake Basin is situated upon Devonian and Silurian era systems and consists of stratified sediments that were deposited as bottom sediments in a sea that covered central New York during the Paleozoic era (Cornell University, 1982).

Surficial geology within the project boundary comprises unconsolidated Pleistocene glacial till, which consists of a mixture of clay and silt with varying quantities of gravel. The till layer is relatively thin on hilltops and slopes and thicker in the valleys (D'Appolonia Consulting Engineers, Inc., 1981).

Soils

Soils within the project boundary are glacial in origin and formed from four types of parent material: (1) glacial till (unsorted soil and angular rocks deposited by glaciers); (2) glacial outwash (coarse gravel and cobble material carried by flowing water); (3) lacustrine deposits (fine particles deposited by water); and (4) alluvial deposits (deposits from streams since glaciation) (Cornell University, 1982). Dominant soil types in the project boundary are alluvial in origin.[19] The bypassed reach is composed almost entirely of bedrock substrate and larger boulders, which are less prone to massive soil movement or erodibility.

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[19] *See* figure E.3-1 (Mapped soils in the vicinity of the Cornell University Project), final license application.

Seismicity

The Cornell Project is located near the southern boundary of the western Quebec-Adirondack seismic zone (Ebel, 1987) and is characterized by small magnitude events with occasional larger shocks. Seismic behavior within the area is not associated with known surficial faults. According to the USGS's National Earthquake Information Center Database, the largest earthquake near the project was a magnitude of 5.1 on July 10, 1983 (152 miles from the project), and the closest earthquake was a magnitude of 2.0 on September 10, 2013, 23.9 miles from the project.

Sediment Deposition and Management in Beebe Lake

Beebe Lake and the surrounding slopes exist in a deep gravel deposit, and the swift-flowing Fall Creek moves through it (Cornell Botanic Gardens, undated [1]). As Fall Creek enters Cayuga Lake, it slows and deposits its sediment load into the lake. Sand and gravel bars, as observed in the eastern portion of the lake, are created when heavy gravel is dropped in the slower-moving lake water and finer sediments are carried farther into the lake.

In its November 1, 2019, additional information response (2019 letter), Cornell states that dredging within Beebe Lake during the current license term has included: (1) large-scale dredging activities in 1986 and 2000; and (2) periodic, routine dredging activities in 2- to 5-year intervals (i.e., 2005, 2009, 2014, 2017, and 2019) to remove a limited amount of sediment from the project's forebay and intake area.

Regarding the 1986 dredging, Cornell states that Beebe Lake Island was created using some of the approximately 40,000 cubic yards of silt-clay material dredged from Beebe Lake, which was conducted to "aesthetically enhance the lake and to restore the lake's depth to 5 feet." Further, Appendix B of the license application notes that the island was designed to "reduce sedimentation within the reservoir and grass growth."

Cornell states the dredging in 2000 was conducted to "remove gravel that was built up on the south and east sides of the island at the east end of Beebe Lake" and removed about 4,000 cubic yards of gravel and sand with conventional construction equipment. Cornell indicated that it conducted the gravel dredging while the lake was drawn down for a Cornell University capital project to install a primary cooling water conduit beneath Beebe Lake.

Cornell's routine maintenance dredging since 2005 has produced approximately 150 to 200 cubic yards of excavated sediment per removal. During these operations, sediment has been hauled to a Cornell University Grounds Department facility, where it is dried and used as fill on campus.

3.3.1.2 Environmental Effects

In SD1, Commission staff identified the effects of continued project operation and maintenance, including routine dredging, on geologic and soil resources and shoreline erosion as a resource issue associated with relicensing the Cornell Project.

In response to the issuance of SD1, the Commission received no substantive comments regarding the effects of project operation and maintenance on geologic resources or shoreline erosion. However, in its March 23, 2020, letter providing terms and conditions, Interior recommends that Cornell develop a sediment management plan. Additionally, Cornell proposes to remove Beebe Lake Island, which was created from material dredged from Beebe Lake in 1986, from the project boundary. Therefore, staff analyzed the effects on soil resources associated with Interior's recommended sediment management plan and Cornell's proposal to remove Beebe Lake Island from the existing project boundary.

Sediment Management

FWS has commented on the need for a sediment management plan associated with the project throughout the relicensing proceeding. In its January 8, 2020, comments on SD1, FWS indicated its concerns about "the general issue of sediment management in small, shallow impoundments associated with proportionally much larger watersheds" and a specific sediment release during a "lake-lowering maintenance activity" in 2000 that resulted in a fish kill.[20] FWS observed that this event was project-related, because hydroelectric project facilities were used to drain the impoundment, and the activity both affected the ability of the project to operate and the aquatic resources downstream of the project.

For these reasons, Interior recommends that Cornell develop a sediment management plan to limit the potential for sediment releases (caused by maintenance or larger-scale dredging) that may impact fish and wildlife resources. Interior recommends that the plan include the following provisions: (1) a description of how sediment is managed at the project (including Beebe Lake Island); (2) a description of expected sediment management activities over the license term; and (3) protocols for any dredging or impoundment lowering activities.

Cornell maintains that a sediment management plan is not necessary for the project. In the license application and 2019 letter, Cornell states that the draining of the

[20] FWS stated that the downstream macroinvertebrate community was affected by the 2000 sediment release, and that it took approximately 1 year to flush the sediment. *See* Summary of Cornell's October 27, 2016, Meeting with FWS and New York DEC, included as Appendix B of the license application.

impoundment and associated release of sediment in 2000 was the result of a renewable energy and student housing project (i.e., Cornell University's North Campus Residential Initiative) that installed a primary cooling water conduit beneath Beebe Lake via directional drilling and not due to routine project-related operation and maintenance. Cornell adds that the cooling water conduit installation was a one-time activity associated with an unrelated capital project, and thus does not justify the need for a sediment management plan.

Cornell states that its routine maintenance dredging is limited in both the amount of sediment removed and the area addressed (i.e., "a 30 to 50 yard area" in front of the intake and forebay), and that there are no unique aspects of the project, Beebe Lake, or Cornell's routine maintenance dredging to justify the development of a sediment management plan. Further, Cornell states that it does not use project gates or other structures to actively pass or manage sediments downstream of the project, and that it would continue to consult with federal and state resource agencies regarding sediment removal, and perform the work in compliance with the conditions of the required permits and authorizations.

Lastly, Cornell states that it has no current plan to conduct dredging of the magnitude done in 1986 or 2000, but if the lake continues to fill with sediment, a sediment management plan could be developed during the term of any new license for the project.[21]

Staff Analysis

Due to geologic and soil resources and streamflow dynamics at the project, sedimentation within Beebe Lake is, and will continue to be, an ongoing process. While two larger-scale dredging operations were conducted during the current license term, including one in 1986 to restore storage capacity to the impoundment, Cornell has primarily conducted small-scale, periodic maintenance dredging near the project works to maintain project operation over the past 20 years.

Regarding Interior's recommended sediment management plan, Cornell has already provided much of the information in the project relicensing record that would be included in such a plan. For instance, Cornell described how it manages small- and large-scale sediment removal at the project to date, the dates and quantities of sediment removed during maintenance dredging, and where it has placed sediment from past dredging activities.

However, while Cornell indicates that it does not currently have plans for a large-scale dredging activity in the future, it also acknowledges that if Beebe Lake continues to

[21] *Id.*

fill with sediment, it would consult with federal and state resource agencies regarding sediment removal and perform the work in compliance with the conditions of the required permits and authorizations.

Standard Article 4 in the current license states that "[t]he construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission." Cornell has maintained correspondence with the Commission's Division of Dam Safety and Inspections regarding sediment removal at the project, including sediment removal around the project dam associated with dam repairs. However, to protect soil resources and also minimize the potential for fish and wildlife impacts associated with small- and large-scale dredging at the project over the term of any license issued, it would be beneficial to have a sediment management plan in place that specifies Cornell's sediment management practices, identifies conditions under which larger-scale dredging are necessary, and includes consultation with the Commission, FWS, New York DEC, and other relevant resource and permitting agencies prior to large-scale dredging within Beebe Lake.

Project Boundary Change to Remove Beebe Lake Island

Cornell proposes several modifications and additions to the current project boundary, including the removal of Beebe Lake Island. In Exhibit G of the license application, and reiterated in its 2019 letter, Cornell proposes to remove Beebe Lake Island from the project boundary because "the island is not needed and necessary for operation or maintenance of the project." Cornell states that the project boundary follows the contour of elevation 782 feet around the impoundment, associated with full pond elevation, which would also incorporate a portion of Beebe Lake Island up to that elevation. Although Cornell states that Beebe Lake Island is not needed for project purposes, it also acknowledges the potential need for sediment removal during the term of a relicensed project.

In its January 8, 2020, comments on SD1, FWS states that it does not support the removal of Beebe Lake Island from the project boundary. FWS notes that, in the license application, Cornell indicates that Beebe Lake Island was specifically designed to reduce sedimentation within the impoundment and was created from dredging activity in 1986. FWS states that, as sediment management (i.e., maintenance dredging) is an ongoing component of project operation, Beebe Lake Island should remain within the project boundary.

Staff Analysis

As Beebe Lake Island was created by material from Cornell's 1986 dredging activity, it is conceivable that future sediment accumulation in the project impoundment may involve the use of the island as a location to deposit excavated sediment from large-

scale maintenance dredging in the project impoundment, including gravel that periodically accumulates in the east end of the project impoundment in the island's vicinity.

Although Cornell states that Beebe Lake Island is not needed for project purposes and therefore should be removed from the project boundary, it also acknowledges that the creation of the island and its location at the upstream end of Beebe Lake was designed to reduce sedimentation and grass growth in the project reservoir, which is an ongoing project purpose.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity and Use

Across a 40-year period, from 1979 through 2019, mean annual flow at Fall Creek is 193 cfs (table 2).[22] Flows vary seasonally, typically reaching their highest values during March and April and the lowest in August and September. The minimum and maximum instantaneous flow at the project is 3.3 cfs and 7,060 cfs, respectively. Maximum hydraulic capacity of the project is exceeded about 25 percent of the time.

The Cornell Water Filtration Plant, located about 0.5 mile upstream of the project boundary, withdraws about 1.199 million gallons of water per day from Fall Creek to serve 35,000 people, including students, faculty, academic and non-academic employees, as well as residents of the hamlet of Forest Home and a portion of the City of Ithaca. There are no other water withdrawals in the immediate vicinity of the project.

Municipal or industrial discharges to surface or ground waters of New York State are regulated through State Pollution Discharge Elimination System (SPDES) permits from the New York DEC. The are no SPDES-permitted municipal or industrial discharges in the immediate project vicinity.

Prior to 2001, Beebe Lake was used as a heat sink for the condensing system for Cornell's chilled water plant, located on the south shore of Beebe Lake, but the water plant was decommissioned in 2001. There is no active or planned heat exchange with Beebe Lake.

[22] The USGS gage (No. 04234000) is located on Fall Creek, Tompkins County, New York, about 0.2 mi upstream of Beebe Lake dam.

Table 2. Historical monthly flow statistics at the Cornell Project for water years 1979–2019 (Source: USGS Gage No. 04234000, as modified by staff).

	Flow (cfs)				
Month	**Minimum**	**90% Exceedance**	**Mean**	**10% Exceedance**	**Maximum**
January	14	70	213	403	5,100
February	28	70	238	505	3,840
March	28	104	358	762	3,220
April	55	134	392	789	5,010
May	36	67	199	379	2,820
June	14	34	126	234	2,030
July	5	20	92	179	2,350
August	6	16	71	133	3,110
September	3	14	73	148	3490
October	10	23	124	256	7,060
November	17	53	196	376	3,700
December	22	78	241	449	3,370
Annual	**3**	**27**	**193**	**411**	**7,060**

Water Quality

Fall Creek, from the Cornell Water Filtration Plant to the Town of Freeville, 12 miles upstream, is classified by New York DEC as a Class A waterbody. Downstream of the filtration plant to the mouth of Fall Creek is a Class B waterbody. New York DEC defines the best usage of Class A waters as a source of water supply for drinking, culinary or food processing purposes, primary or secondary recreation, and fishing. Class B waters are best used for primary and secondary contact recreation and fishing, and are suitable for fish, shellfish, and wildlife propagation and survival. Relevant state water quality standards for Class A and B waters are as follows: (1) daily average dissolved oxygen (DO) values shall be no less than 5.0 milligrams per liter (mg/L), and at no time shall DO concentrations be less than 4.0 mg/L, and (2) pH values shall be between 6.5 and 8.5.[23]

Cornell conducted a water quality study from June 15 through October 2017. Continuous monitoring (at 1-hour intervals) of water temperature and DO occurred at four sites: (1) 0.4 mile upstream of the project boundary; (2) in the project impoundment, upstream of the intake; (3) at the midpoint of the bypassed reach, between Triphammer and Rocky falls; and (4) downstream of Horseshoe Falls (figure 4). Air temperature and

[23] *See* 6 NYSRR § 703.3.

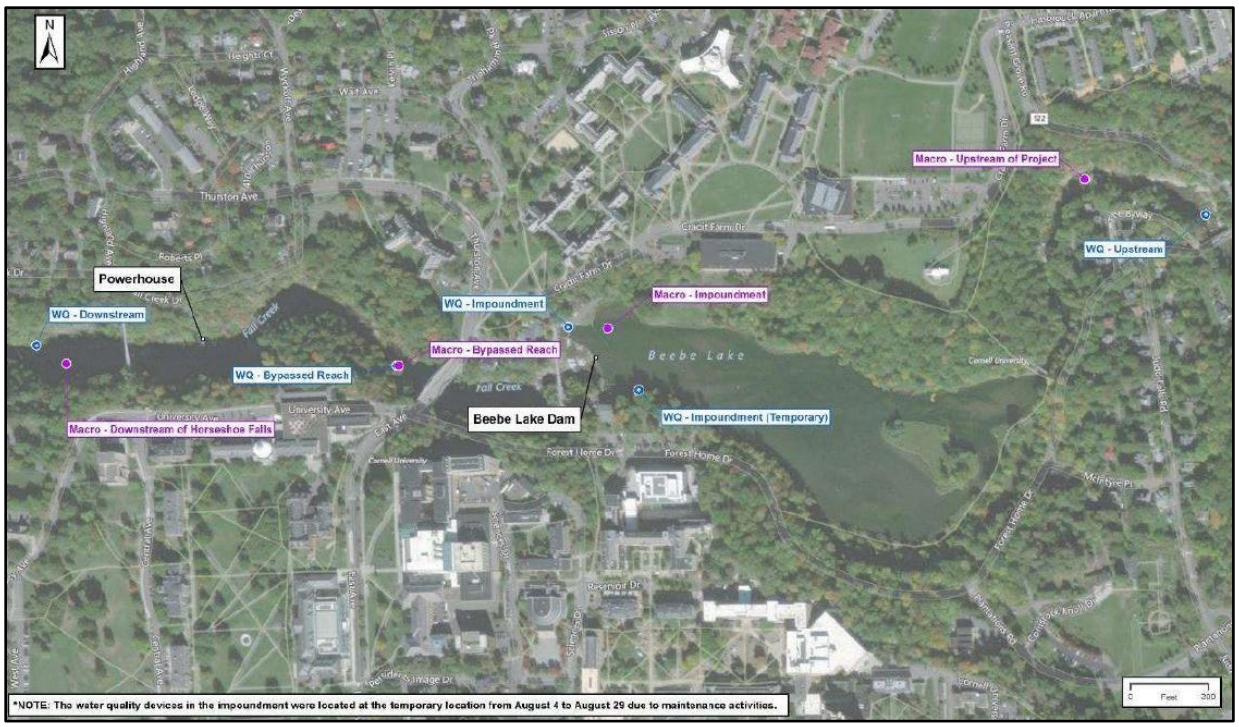

Figure 4. Water quality and benthic macroinvertebrate sampling locations on Fall Creek.

precipitation data were obtained from a weather station in the City of Ithaca.[24] Discrete measurements of water temperature, DO, specific conductance (conductivity), and pH were collected every 2 to 4 weeks as data loggers were maintained and downloaded.

The water quality study occurred under higher than normal flow conditions, as mean flow during the continuous monitoring was considerably higher than over the same date range for the 40-year period of record (148 versus 86 cfs). Further, air temperature and precipitation in New York State during the summer of 2017 were above average.[25]

With the exception of August 24 through September 16, water temperature varied between 66 and 78°F (figure 5). Temperature at the upstream monitoring location is higher and more variable than that of the downstream location. Dissolved oxygen concentrations at all monitoring locations were consistent with state water quality standards, generally exceeding 6 mg/L; however, several fouling events, due to organic debris or sediment buildup on the upstream and impoundment monitoring devices, resulted in low DO concentrations during part of August and September (figure 6).

[24] Northeast Regional Climate Center, Game Farm Road observations (http://www.nrcc.cornell.edu/wxstation/ithaca/ithaca.html).

[25] https://www.ncdc.noaa.gov/temp-and-precip/us-maps/

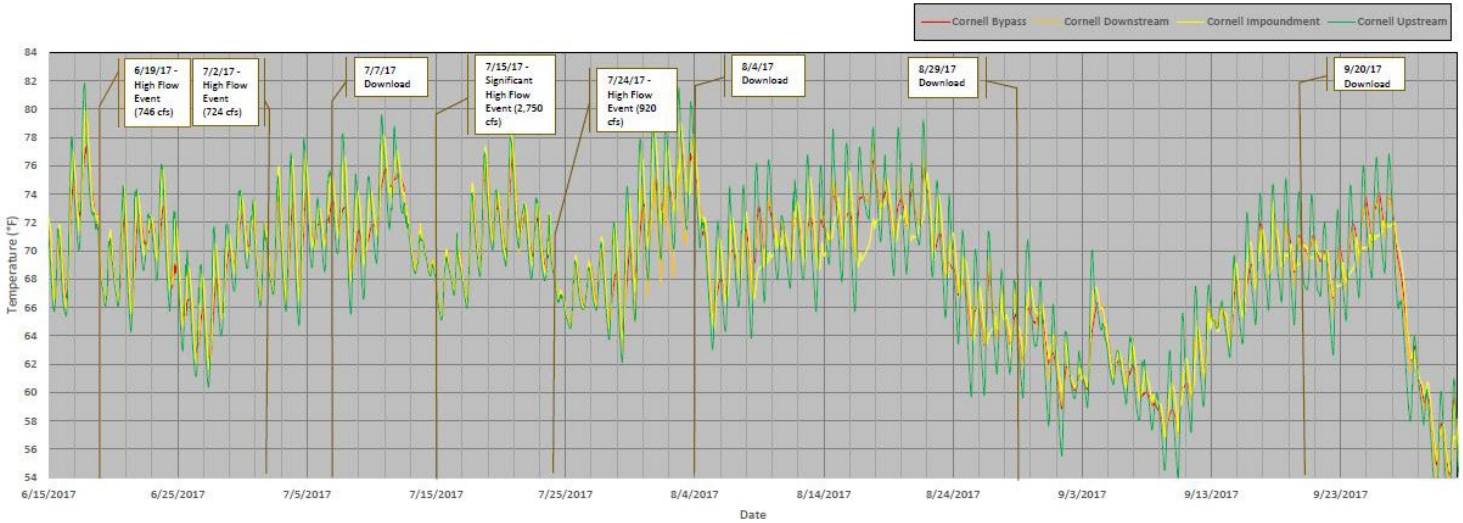

Figure 5. Water temperature at four continuous monitoring locations on Fall Creek, June 15–October 3, 2017.

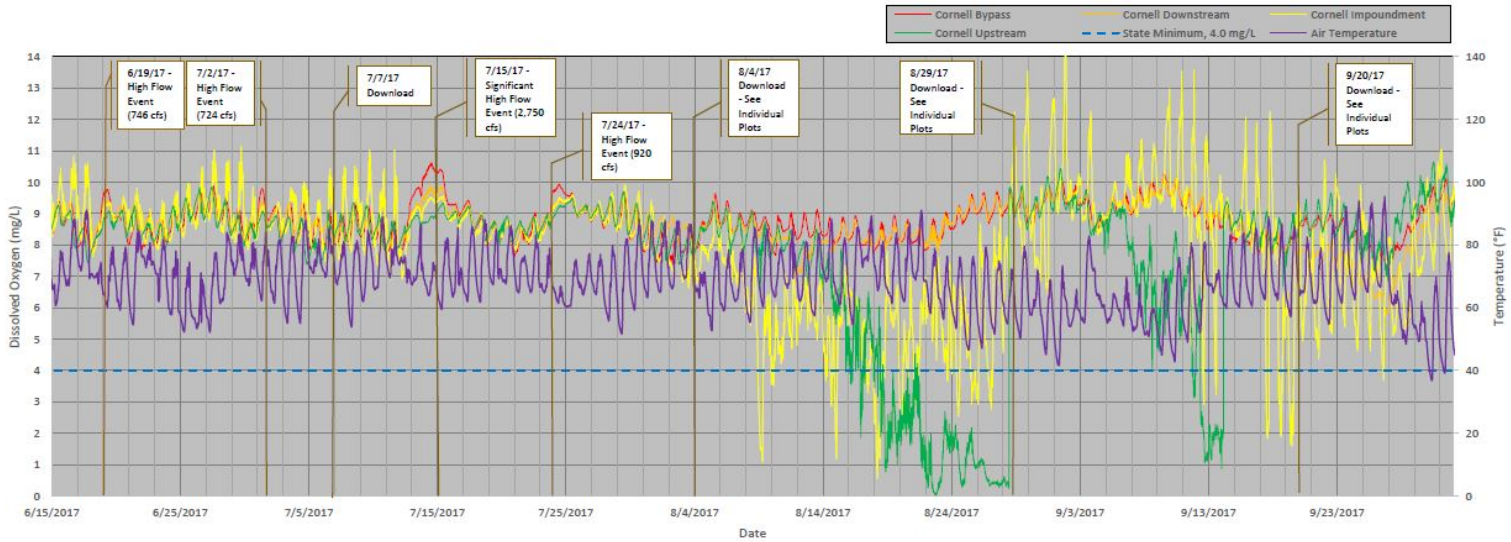

Figure 6. Dissolved oxygen concentrations at four continuous monitoring locations on Fall Creek, June 15–October 3, 2017.

The discrete measurement of water temperature and DO generally confirmed the readings of the continuous monitoring equipment, averaging 68.4°F and 9.2 mg/L, respectively, from June to October (table 3). Mean conductivity across the sampling sites was 423 microsiemens per centimeter (µS/cm), ranging from 374 µS/cm to 456 µS/cm, and is typical of the region's streams. Mean pH was slightly alkaline at 8.4.

Aquatic Habitat

The project impoundment, Beebe Lake, is a shallow, eutrophic lake with silt and gravel substrate and high plant and algal growth. Water depth generally ranges from 1 to 3 feet, with a maximum depth of 5 feet. Shoreline modifications, including riprap[26] and a recreational trail, are prevalent along the periphery of the lake and somewhat limit overhead cover. Owing to the shallow depth and run-of-river operation of the project, the lake does not experience thermal stratification.

Downstream of Beebe Lake dam, the project's bypassed reach extends about 1,800 feet from Triphammer Falls to the upstream portion of Rocky Falls (immediately upstream of the project powerhouse). Mesohabitat mapping of the area, conducted in August 2017, determined that bedrock comprises over 90 percent of the reach, with the remaining substrate consisting of bedrock shards (cobble to boulder-sized pieces of bedrock) and smaller particles filling interstitial spaces (figure 7). Under the project's 10-cfs minimum flow requirement, most of the bypassed reach is dominated by sheet flow separated by small step-pool habitat (figure 8).[27] Cascades, due to Triphammer Falls and Rocky Falls, are common at the upstream and downstream ends of the reach, respectively.

Resident Fish Community

A total of 31 fish species have been documented in Fall Creek, with the families Cyprinidae (minnows and carps) and Centrarchidae (bass and sunfishes) representing the greatest diversity of fishes with 13 and 5 species, respectively (table 4). The 156-foot-high Ithaca Falls, located about 0.65 mile downstream of the Beebe Lake dam, effectively defines fish community structure in Fall Creek. Downstream of Ithaca Falls supports a primarily warm-water fishery, where lake-run rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and landlocked Atlantic salmon *(Salmo salar*) offer seasonal angling opportunities. Non-game fishes include species comprising the families Cyprinidae, Percidae (perch and darters), and Centrarchidae. Upstream of Ithaca Falls,

[26] Riprap is a permanent, erosion-resistant cover of large, loose, angular stone.

[27] Sheet flow is shallow, unconcentrated and irregular flow down a slope.

Table 3. Discrete water quality data at four continuous monitoring stations on Fall Creek, June 15–October 3, 2017.

Location	Date	Time	Water Temperature (°F)	Specific Conductivity (µS/cm)	DO (mg/L)	pH	Depth Below Water Surface (ft)
Upstream	6/15/17	13:05	72.9	373.8	8.6	8.8	1.6
	7/7/17	10:30	69.6	397.4	8.8	8.5	1.5
	8/4/17	8:45	71.9	430.9	8.7	8.5	1.6
	8/29/17	9:46	62.1	447.7	9.8	8.1	1.9
	9/20/17	13:50	71.7	436	8.9	8.5	1.7
	10/3/17	13:59	59.6	450.8	10.2	8.6	2.0
Impoundment	6/15/17	13:55	70.8	397.7	9.1	8.2	2.0
	7/7/17	11:32	73.3	405.7	10.6	8.5	2.0
	8/4/17	9:25	74.9	416.7	7.5	8.3	1.7
	8/29/17	10:02	64.0	438.4	9.5	7.8	2.5
	9/20/17	14:05	69.7	437.8	9.7	8.2	2.1
	10/3/17	14:13	60.1	449.6	10.7	8.3	2.6
Bypassed Reach	6/15/17	15:45	70.8	393.6	8.6	8.6	1.6
	7/7/17	9:49	71.2	385.2	8.8	8.5	1.7
	8/4/17	11:52	76.8	408.5	8.9	8.6	1.6
	8/29/17	11:01	63.6	436.1	9.5	8.2	1.7
	9/20/17	14:55	70.5	439.2	8.9	8.4	1.6
	10/3/17	14:34	58.2	456.3	10.1	8.5	1.8
Downstream	6/15/17	14:45	70.4	407.1	8.7	8.5	1.9
	7/7/17	8:00	70.3	401.3	8.7	8.3	1.9
	8/4/17	10:20	75.1	418.5	8.4	8.5	1.2
	8/29/17	10:44	64.0	438.8	9.6	8.0	1.7
	9/20/17	14:21	70.4	439.7	8.7	8.4	1.6
	10/3/17	15:06	59.3	453.6	9.9	8.5	1.8

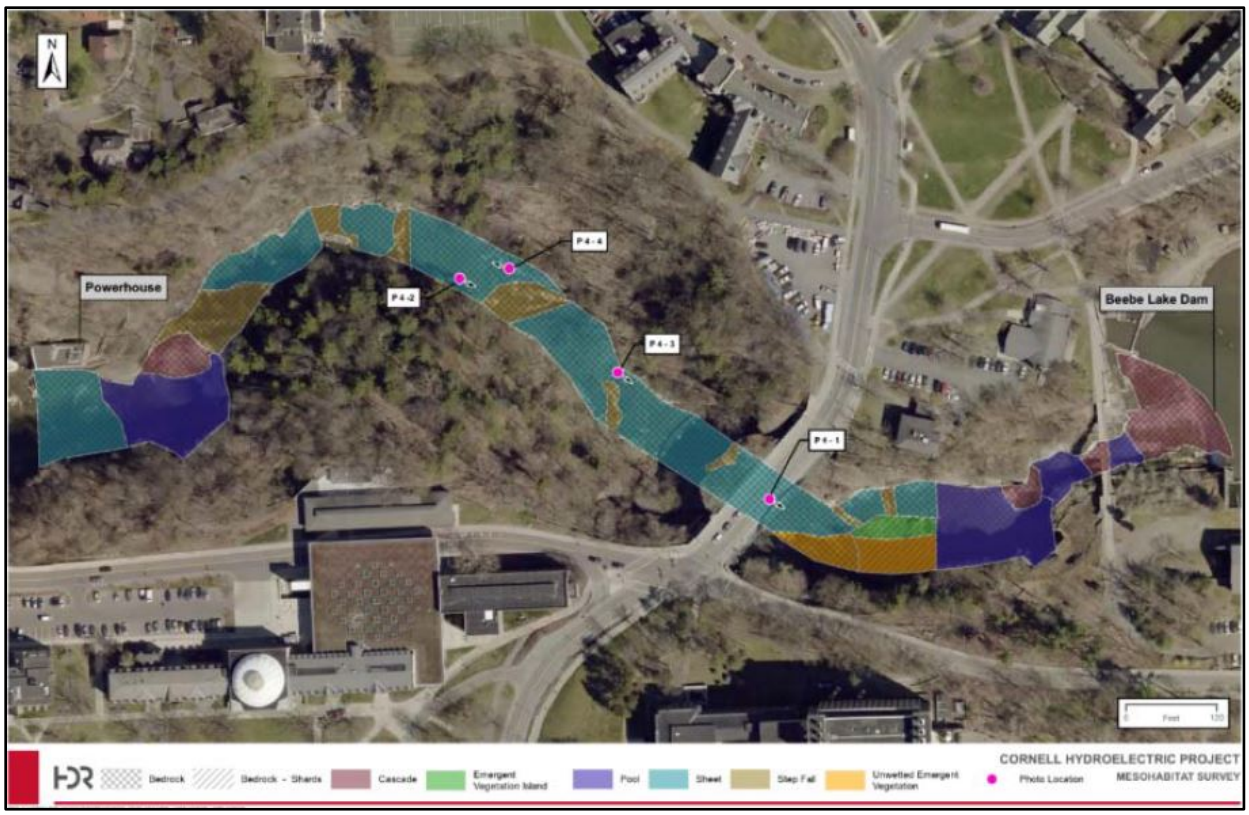

Figure 7. Results of mesohabitat mapping in the bypassed reach of the Cornell Project.

Figure 8. Representative bedrock substrate, bedrock shards, and step pools below Beebe Lake dam on Fall Creek.

Table 4. Fish species documented in Fall Creek, Tompkins County, New York.

Family		**Relative Abundance (percent) and Total Length Range (millimeters)**		
Common Name	**Scientific Name**	**1992[a]**	**1994[b]**	**2005[c]**
Sturgeons				
Lake sturgeon[d]	*Acipenser fulvescens*			
Minnows and Shiners	**Cyprinidae**			
Central Stoneroller	*Campostoma anomalum*	4.53 (45-173)	1.99 (40-139)	4.00 (na)
Cutlip Minnow	*Exoglossum maxilingua*	9.85 (50-120)	2.46 (65-109)	16.00 (na)
Common Shiner	*Luxilus cornutus*	9.32 (51-152)	12.33 (43-147)	1.60 (na)
Striped Shiner	*Luxilus chrysocephalus*			0.80 (na)
Golden Shiner	*Notemigonus crysoleucas*	0.05 (40-50)		
Spottail Shiner	*Notropis hudsonius*	1.32 (60-98)	3.12 (56-87)	
Bluntnose Minnow	*Pimephales notatus*	1.95 (50-77)		
Fathead Minnow	*Pimephales promelas*	0.21 (50-65)	0.16 (45-61)	
Eastern Blacknose Dace	*Rhinichthys atratulus*	13.59 (25-85)	39.00 (25-85)	
Longnose Dace	*Rhinichthys cataractae*	10.32 (39-115)	14.04 (55-110)	
Creek Chub	*Semotilus atromaculatus*	4.16 (35-230)	4.14 (50-208)	1.60 (na)
Fallfish	*Semotilus corporalis*	2.21 (50-343)	0.56 (155-255)	0.80 (na)
Suckers	**Catostomidae**			
White Sucker	*Catostomus commersoni*	14.54 (35-450)	8.43 (40-320)	24.00 (na)
Eastern Creek Chubsucker	*Erimyzon oblongus*	0.21 (40-130)		
Northern Hog Sucker	*Hypentilium nigicans*	5.85 (97-298)	0.62 (93-220)	3.20 (na)
Catfishes	**Ictaluridae**			
Brown Bullhead	*Ameiurus nebulosus*	0.27 (120-205)	0.04 (80-150)	
Margined Madtom	*Notorus insignis*	3.90 (95-120)	2.42 (50-133)	1.60 (na)
Trouts	**Salmonidae**			
Rainbow Trout	*Oncorhynchus mykiss*		0.01 (172-172)	

Family		Relative Abundance (percent) and Total Length Range (millimeters)		
Common Name	**Scientific Name**	**1992[a]**	**1994[b]**	**2005[c]**
Atlantic Salmon[e]	*Salmo salar*			
Brown Trout	*Salmo trutta*		0.08 (120-460)	
Eastern Brook Trout	*Salvelinus fontinalis*	0.06 (143-222)	0.05 (125-220)	
Pikes and Mudminnows	**Esocidae**			
Chain Pickerel	*Esox niger*	032 (75-265)		
Sunfishes	**Centrarchidae**			
Rock Bass	*Ambloplites rupestris*	0.56 (50-168)	0.08 (140-140)	4.00 (na)
Pumpkinseed	*Lepomis gibbosus*	0.29 (68-77)		2.40 (na)
Bluegill	*Lepomis macrochirus*	0.11 (30-50)	0.08 (64-176)	
Smallmouth Bass	*Micropterus dolomieu*			8.00 (na)
Largemouth Bass	*Micropterus salmoides*	0.01 (170)		
Perches	**Percidae**			
Fantail Darter	*Etheostoma flabellare*	7.95 (32-73)	9.16 (50-74)	
Tessellated Darter	*Etheostoma olmstedi*	8.43 (30-68)	1.25 (50-70)	32.00 (na)
Yellow Perch[e]	*Perca flavescens*			

[a] New York DEC, 1992.
[b] New York DEC, 1994.
[c] New York DEC, 2005.
[d] Zollweg-Horan, 2019.
[e] Personal communication with Mr. Kurt Jurka, as cited in Cornell's 2019 letter.

Fall Creek supports a cool-water fishery. Game fishing mainly targets Eastern brook trout (*Salvelinus fontinalis*), stocked brown trout, and smallmouth bass (*Micropterus dolomieu*). Recreational fishing also occurs at Beebe Lake, where anglers target largemouth bass, smallmouth bass, rock bass (*Ambloplites rupestris*), chain pickerel (*Esox niger*), and yellow perch (*Perca flavescens*).

Stocking by New York DEC is prevalent in the watershed. Spring 2020 allotments of brown trout for Fall Creek, in the Town of Groton, and Virgil Creek, a tributary of Fall Creek, in the Town of Dryden, consisted of nearly 7,000 fish, ranging from 8 to 15 inches in total length.[28] Farther downstream at the Cayuga Lake Inlet, rainbow trout are stocked annually to provide angling opportunities in both the lake and in surrounding tributaries during spawning runs. In recent years, lake sturgeon (*Acipenser fulvescens*), stocked in Cayuga Lake since 1995, have been documented in the lower reaches of Fall Creek.

Aquatic Invertebrates

In support of the final license application, Cornell conducted a benthic macroinvertebrate study in 2017. Three locations in riffle habitat (upstream of the project at the USGS gage, the bypassed reach, and downstream of Horseshoe Falls) and the project impoundment, were sampled to generate three, 350-organism replicate samples (*see* figure 4).

Species richness ranged from 30 to 49, with the orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) (EPT) accounting for 9 to 21 taxa at the riffle sites. Overall Biological Assessment Profile (BAP)[29] scores ranged from 6.2 to 8.4 (table 5), translating to a categorical water quality rating of slightly impacted to non-impacted.

No freshwater mussel studies were conducted as part of the project's relicensing. However, no mussel shells or middens were documented by field staff performing other relicensing studies.

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[28] Total length is the length of a fish measured from the tip of the snout to the tip of the longer lobe of the caudal fin (tail), usually measured with the lobes compressed along the midline.

[29] The Biological Assessment Profile is a multimeric index of biological integrity used to translate macroinvertebrate community data into a numerical water quality impact score between 0 (poor) and 10 (very high) (*see* https://www.dec.ny.gov/docs/water_pdf/bapnarrative18.pdf.

Table 5. Select index data and overall BAP scores for 100-organism data sets obtained in riffle sites in Fall Creek, New York.

Site	Replicate	Species Richness	EPT Taxa Richness	BAP Score[a]
Upstream of project at USGS Gage	1	32	9	6.6
	2	43	18	8.1
	3	34	17	6.2
Bypassed Reach	1	40	20	6.6
	2	49	21	8.4
	3	35	17	7.0
Downstream of Horseshoe Falls	1	30	15	6.0
	2	43	18	6.9
	3	48	17	7.9

[a] BAP categorical levels: Non-impacted >7.5; Slightly Impacted 5.0–7.5; Moderately Impacted 2.5–5.0; Severely Impacted <2.5.

3.3.2.2 Environmental Effects

Project Operation and Impoundment Level

Flow fluctuations during the operation of hydroelectric projects may affect the availability of shoreline habitat in project impoundments and downstream riverine habitat due to periodic dewatering. Water level fluctuations during fish spawning periods are of particular concern because such fluctuations may alter habitat suitability (e.g., depth and water temperature), or may result in exposure and mortality of fish eggs and larvae if spawning has already occurred.

In the license application, Cornell proposes to continue operating the project in a run-of-river mode, where outflow from the project approximates inflow, and to use the impoundment level sensor to automatically adjust the project's turbines to make a good faith effort to maintain Beebe Lake at or above spillway crest (780.7 feet). If the lake level drops in excess of 0.5 foot below the spillway crest (i.e., below 780.2 feet), Cornell would notify FWS and New York DEC as soon as possible, but no later than 10 business days. The 0.5-foot impoundment fluctuation limit would not be used to provide storage and release capability.

Under section 10(j), Interior recommends that Cornell operate the project in a year-round, run-of-river mode,[30] where instantaneous inflow to the impoundment equals

[30] In its March 23, 2020, letter, Interior contends that run-of-river operation requires that impoundment elevation be maintained at or above dam crest. Interior uses

outflow downstream of the project tailrace. All flows below the sum of the project's minimum hydraulic capacity and above the project's maximum hydraulic capacity, plus the required bypassed reach flows, would be required to be passed over the project's spillway.

In response to Interior's recommendation, Cornell states that instantaneous inflow and/or outflow should not be applied to any working definition of run-of-river operation, adding that Interior's recommendation cannot be reasonably achieved and would result in routine compliance reporting due to fluctuations of the impoundment level. Cornell further asserts that Interior has failed to provide any information regarding potential adverse effects to aquatic or terrestrial species or resources associated with the project as a result of its current and proposed operation.

Staff Analysis

Although water level fluctuations can negatively influence the reproductive success of fishes that spawn in near-shore areas (Sammons and Bettoli, 2000; Ploskey, 1986; Carlander, 1977), nearly all species of Centrarchidae, the predominant shallow water spawning species in Beebe Lake, engage in nest building that would be expected to take place outside the zone of water level fluctuation at depths greater than 0.5 foot (Edwards et al., 1982; Stuber et al., 1982). Further, there is no indication that impoundment fluctuations under the current license occur at a frequency or magnitude to affect habitat quality or availability, nor is there any evidence that spawning and recruitment of resident fishes in Beebe Lake or downstream have been adversely affected by the existing project operation.

Beyond stating that the maximum allowable impoundment fluctuation of 0.5 foot represents a considerable portion of the mean depth in Beebe Lake,[31] Interior has not described how the recommended instantaneous run-of-river operation would provide additional protections or benefits to aquatic biota over those of the existing condition. There is also no indication that the project is technologically capable of operating under conditions where outflow from the project specifically *equals* inflow rather than approximates it. Cornell's proposed run-of-river operation whereby outflows

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the terms dam crest and impoundment crest interchangeably, in reference to Cornell's proposal to maintain the impoundment elevation at the spillway crest. We note that these project features are all at an elevation of 780.7 feet. Therefore, for consistency, we use the term spillway crest in this EA.

[31] Interior erroneously reports that the 0.5-foot impoundment fluctuation limit equates to one-quarter to one-third of the 2- to 3-foot mean depth of Beebe Lake. We note that 0.5 foot would represent one-fourth to one-sixth of the depth range, respectively.

approximate inflows at any given point in time, would continue to provide habitat stability in the impoundment and minimize project effects on water quality, particularly water temperature and DO concentrations. Shoreline erosion and resultant turbidity as well as sediment mobilization would be negligible as any changes in impoundment water levels would occur slowly. Similarly, maintaining stable impoundment levels and project flows would limit the potential for stranding of fish and other aquatic organisms and minimize disruptions to habitat necessary for feeding, cover, spawning, and rearing.

Minimum Flow to the Bypassed Reach

Under the current license, Cornell is required to provide a minimum continuous year-round release of 10 cfs to the approximately 1,800-foot-long bypassed reach, or inflow to the project, whichever is less. The minimum flow is released through the project's minimum flow weirs or over the overflow spillway.

Cornell proposes, and Interior, under section 10(j), recommends continuing the minimum continuous year-round 10-cfs release to the bypassed reach, or inflow to the project, whichever is less.

Staff Analysis

As described in section 3.3.2.1, *Aquatic Resources, Affected Environment,* bedrock accounts for over 90 percent of the available substrate in the bypassed reach, most of which is covered by sheet flow of relatively uniform depth and velocity. As such, quality fish habitat is relatively limited and confined to distinct portions of the channel that offer breaks in the gradient and increased substrate diversity. Water quality throughout the reach is consistent with state water quality standards and adequately supports aquatic biota.

As described below, Cornell conducted a Bypassed Reach and Flow Observation Study (Flow Observation Study) that included a visual evaluation by stakeholders of the proposed minimum flow release to the bypassed reach. The stakeholders concluded that the 10-cfs flow was adequate to maintain downstream habitat and support aquatic biota. There were no further recommendations from the participants to change the current minimum flow requirement and no additional studies were requested.

Downstream Water Level Monitoring

To minimize downstream flow fluctuations during scheduled shutdowns of the project or unit trips, Cornell proposes to use stepwise shutdown and startup procedures for the project. The proposed procedures would be implemented when applicable but may not occur during emergency conditions including, but not limited to, adverse operating conditions beyond the control of the licensee or a public safety incident.

Cornell's stepwise shutdown procedure would gradually decrease flow to the powerhouse, allowing the project impoundment level to rise and spill over the dam into the bypassed reach. At inflows to the project of less than 60 cfs, Cornell would initially decrease the powerhouse flow (not total inflow) by 50 percent. Thirty minutes into the shutdown procedure, Cornell would then close the intake gate(s), thus terminating flow to the powerhouse. At inflows to the project between 60 cfs and 320 cfs, Cornell would decrease the powerhouse flow by 50 percent at the start of the shutdown procedure and again at 30 minutes. At 60 minutes, flow to the powerhouse would be terminated by closing the intake gate(s). A controlled shutdown procedure at inflows greater than 320 cfs would be unnecessary due to the volume of spill over the project dam.

Under the proposed startup procedures, Cornell would increase flow to the powerhouse to gradually decrease spill into the bypassed reach. Upon initiation of the startup procedure, Cornell would slowly open gate 1 to allow generator unit 1 to ramp up to 1,200 revolutions per minute in order to connect to Cornell's 2.4-kV electrical grid. Once connected, gate 1 would be opened to its minimum opening (i.e., 20 percent). If the project's impoundment level sensor indicates that the impoundment elevation is rising, the startup procedure would continue. If the impoundment level is stagnant or decreases, the gate 1 opening would be suspended or would begin to close. This process would continue until the impoundment level set point is reached,[32] at which point the same process would be repeated in the opening of gate 2. When gates 1 and 2 meet their set point for generator unit 1, the process would be repeated by gates 1 and 2 for the operation of generator unit 2.

Under section 10(j), Interior recommends that Cornell develop and implement a stream flow and water level monitoring plan in consultation with FWS and New York DEC. Interior recommends that the plan include methods to: (1) ensure the release of the required minimum flow to the bypassed reach under all head pond elevations, (2) maintain impoundment elevations generally at or above the spillway crest, and (3) provide controlled shutdown and startup procedures to minimize downstream fluctuations in Fall Creek.[33] To inform the development of its recommended controlled shutdown and startup procedures, Interior further recommends that Cornell conduct downstream monitoring during a 1-year ice-free period (i.e., May through November) to evaluate the

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[32] The impoundment level set point is the impoundment level that allows the required 10-cfs minimum flow to be passed into the bypassed reach through the Beebe Lake weir.

[33] Minimize is defined by Interior as limiting downstream water level fluctuations under the control of Cornell (i.e., except emergency unit trips) to less than 25 percent of the average depth of Fall Creek downstream of the project.

effectiveness of Cornell's proposed shutdown and startup procedures and to ensure that downstream fluctuations are minimized as defined in the recommended stream flow and water level monitoring plan. Interior recommends that the monitoring occur in the first field season following the acceptance by the Commission of the stream flow and water level monitoring plan.[34]

In its reply comments, Cornell agrees with Interior's recommendation regarding the development of the stream flow and water level monitoring plan, but asserts that the plan should only address the means by which the project's required bypass flow is provided and how the impoundment is operated in accordance with any new license issued for the project. Cornell disagrees that additional downstream water level monitoring is needed as it states that its Flow Observation Study was completed to the satisfaction of the resource agencies and that the results of the study support its proposed shutdown and startup procedures. Cornell also disagrees that its proposed shutdown and startup procedures should be modified or that new procedures should be developed and contends that Interior's recommendation limiting downstream fluctuations to less than 25 percent of the average depth of Fall Creek is unnecessary and not supported by any previously performed study or communicated in any river management goal.

Staff Analysis

Cornell's Flow Observation Study used visual observations from stakeholders, including FWS and New York DEC, and cross-sectional data (wetted width and depth) at two transects downstream of the project's powerhouse to evaluate Cornell's proposed controlled shutdown and startup procedures. The study observed stream flow under baseline conditions (i.e., normal project operation) and under the following operational scenarios: (1) a controlled shutdown, (2) a controlled startup, and (3) a simulated unit trip.

Relative to the simulated unit trip, which represents uncontrolled conditions, the controlled shutdown procedures decrease the magnitude of water level change by 44 percent at the study's flow transect and 40 percent at the habitat transect,[35] thereby leaving 85 percent and 58 percent of the transects' lengths, respectively, with water depths greater than 4 inches (table 6). Further, the procedure shortened the time required to initiate spill over the project dam by 8 minutes, thereby re-watering the bypassed reach

[34] We interpret Interior's recommendation to mean that the monitoring would take place in the first field season following Commission approval of a stream flow and water level monitoring plan.

[35] In the final license application, Cornell erroneously reports the decrease in water level change as 56 percent at the flow transect and 60 percent at the habitat transect.

Table 6. Change in water level during various flow demonstration operating scenarios.

Flow Demonstration Scenario	Maximum Change in Water Level (feet)		Duration for Maximum Change in Water Level to Occur (minutes)
	Flow Transect[a]	Habitat Transect[b]	
Controlled Unit Shutdown	0.308	0.377	22
Controlled Unit Startup	0.251	0.340	42
Simulated Unit Trip	0.553	0.629	30

[a] Maximum and mean depth equal 1.9 feet and 0.95 foot, respectively.
[b] Maximum and mean depth equal 1.5 feet and 0.42 foot, respectively.

sooner. Observers determined that both procedures provide adequate habitat availability for aquatic biota and, therefore, no additional studies were planned or requested.

Cornell's proposed shutdown and startup procedures significantly reduce downstream water level fluctuations, maintain adequate water levels to support aquatic life, and decrease the time necessary to initiate spill over the project dam. We note that at the conclusion of the Flow Observation Study, no study participants indicated the need for additional studies; therefore, it is unclear why Interior is now requesting downstream monitoring to evaluate and modify Cornell's proposed procedures. Further, Interior's recommendation that the shutdown and startup procedures limit downstream fluctuations to less than 25 percent of the mean depth of Fall Creek is not supported by any biologically meaningful evidence, including the information obtained from the Flow Observation Study. While the proposed shutdown and startup procedures limited water level fluctuations to 32 and 26 percent of the mean depth, respectively, at the study's flow transect, fluctuations at the habitat transect exceeded 80 percent of the mean depth. Given that 90 percent of the aquatic habitat downstream of the project is composed of bedrock covered by shallow sheet flow (less than 1 foot), limiting water level fluctuations to less than 25 percent of the average depth would be impractical, would not provide justifiable benefits, and would not be representative of the deeper and more complex habitats (e.g., pools, step-pools, and cascades) available to aquatic biota.

Developing a plan to monitor compliance of Cornell's proposed run-of-river operation, impoundment fluctuations, and minimum flow requirements would help ensure that the proposed measures are being met and achieving their intended purposes to help maintain water quality conditions and provide adequate habitat for aquatic resources in Beebe Lake and downstream.

Fish Protection

The passage of large volumes of water through trash racks and turbines can result in fish impingement and entrainment mortality at hydroelectric projects. Blade strikes are thought to be the primary source of mortality for fish entrained through hydroelectric projects (Franke et al., 1997; Pracheil et al., 2016). Fish size plays an important role in entrainment susceptibility and turbine mortality, whereby smaller fish are more likely to be entrained but experience lower turbine mortality, although the physical properties of turbine units also play a role in turbine mortality (Winchell et al., 2000; Čada et al., 1997; Pracheil et al., 2016).

Cornell proposes to continue to operate the project in a run-of-river mode and would employ and maintain the existing trash racks with 0.914-inch clear spacing at the project intake. If necessary, during the term of any new license issued for the project, Cornell proposes to replace the existing trash racks with trash racks of 1.0-inch clear spacing or less.

Under section 10(j), Interior recommends that Cornell conduct regularly scheduled visual inspections of the project's intake trash racks to ensure maintenance of the existing clear bar spacing. Any openings exceeding 1 inch would require prompt repair. Inspections would occur within 1 year of license issuance and no more than every 5 years thereafter, requiring a report of the inspection for review by FWS and New York DEC.

Cornell, in its reply comments, disagrees that routine inspections of the project's trash racks are necessary, noting that there is no indication of excessive wear on the existing trash racks and that any disrepair of the project facilities would be observed and addressed through its own inspection process. Cornell adds that it proposes to replace the existing trash racks, if deemed necessary over the term of the new license, with trash racks with 1-inch clear bar spacing or less.

Staff Analysis

Impingement potential at the project is low. Based on calculations by Lawler (1991), the only species in the project impoundment that would be susceptible to impingement – and excluded from the trash racks (0.914-inch clear spacing) based on skull widths – would be smallmouth and largemouth bass (>9 inches), brown trout (>9 inches), and brown bullhead (>5 inches). However, specimens of this size would be able to avoid impingement because their burst swimming speeds[36] exceed 3.5 feet per second

[36] Burst swim speeds are the highest speeds attainable by fish and can be maintained for periods of less than approximately 20 seconds (Beamish, 1978).

(fps) (table 7), thereby outpacing the calculated 1.42-fps approach velocity at the project under its maximum hydraulic capacity (211 cfs).[37] Therefore, impingement mortality at the project is expected to be very low under the proposed project operation.

Although most fishes in the project impoundment could theoretically fit through the trash racks based on their body size alone, entrainment risk is minimal due to the low approach velocities at the project in relation to fish swimming speeds. Juveniles of the families Centrarchidae and Cyprinidae could be susceptible to entrainment, but most other species and life stages should be able to avoid entrainment based on their burst swimming speeds exceeding the calculated approach velocity at the intake (table 7). Given that any entrained fishes would be small, turbine blade strikes would be unlikely and, therefore, entrainment mortality would be minimal.

Regarding the maintenance of the existing trash racks, Commission staff's review of the Cornell project's dam safety inspection reports dating back to 2010 finds that the project's trash racks have been consistently well-maintained and kept in good working condition. Similarly, the project's Compliance History Report reveals that there are no irregularities with Cornell's compliance history, nor has there been any enforcement action.

While it is possible that defects in the project trash racks could cause the clear bar spacing to exceed 1 inch, it is likely that any such deviations would be relatively small and localized due to the location of the project intake immediately along the shoreline (i.e., outside of the thalweg[38]), the project's low approach velocity, and the presence of a protective skimmer in the project forebay. We also note that while the calculated intake velocity based on the project's maximum hydraulic capacity (212 cfs) is 1.42 fps, the maximum capacity that can be provided through the project's penstock is 160 cfs, thereby making the functional approach velocity 1.07 fps. Regardless, burst swimming speeds of resident fishes in Beebe Lake, which are generally greater than 2.0 fps for juveniles and greater than 3.5 fps for adults, would allow all but the smallest fishes to avoid entrainment. Therefore, most defects in the project trash racks would have little to no effect on entrainment mortality.

Regarding the potential replacement of the project's trash racks, under any new license for the project, Cornell would not be permitted to substantially change any plans, specifications, or statements regarding the project facilities as approved by the

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[37] The project's penstock configuration limits the hydraulic capacity to about 160 cfs, thus the functional approach velocity is 1.07 fps.

[38] The thalweg is defined as a path through the lowest points along the length of a stream channel, typically carrying the channel's greatest volume.

Table 7. Burst swimming speeds of juvenile and adult stages of fish present in the project vicinity (Source: staff).

Species	Burst swimming speeds of juveniles (fps)	Burst swimming speeds of adults (fps)
Central stoneroller	2.1[h]	4.1[c,h]
Common Shiner	1.3[i]	4.5[i]
Bluntnose minnow	1.8[m,n]	5.8[m,n]
White sucker	2.4-3.8[k]	5-10[a]
Northern hog sucker	2.4-3.8[l]	5-10[l]
Brown bullhead	3.6[c,q,r]	7.9[c,q,r]
Brown trout	2.4 [e]	3.5[e]
Rock bass	2.6[j]	4.3[j]
Bluegill	2.6[c,h]	4.3[i]
Smallmouth bass	2.0-3.2[g]	3.5-5.6[b]
Largemouth bass	2.0-3.2[c,d,e]	3.5-5.6[f]

[a] Bell, 1991.
[b] Peake and Farrell, 2004.
[c] Estimated using a 0.5 ratio of sustained to burst swim speeds (Bell, 1991).
[d] Kolok, 1992.
[e] Katopodis and Gervais, 1991.
[f] Using smallmouth bass as surrogate species.
[g] Using largemouth bass as a surrogate species.
[h] Leavy and Bonner, 2009.
[i] Webb, 1978.
[j] Using bluegill as a surrogate species.
[k] Peake, 2008.
[l] Using white sucker as a surrogate species.
[m] Webb, 1986.
[n] Using fathead minnow as a surrogate species

Commission in its license order without first allowing for the review and approval by the Commission. As Cornell's proposal is contingent on an uncertain future event, predicting when the measure would, if ever, be implemented at the project along with the specific environmental conditions that would exist at that time, would be entirely speculative.

Curtailment and Suspension of Project Operation

Under section 10(a), Interior recommends an article be included in any license issued allowing the licensee to curtail or suspend the requirements of the license for short periods upon prior mutual agreement with FWS and New York DEC or in the event of any operating emergency beyond the control of the licensee, with notification of FWS

and New York DEC within 5 business days and the Commission within 10 business days.[39]

In its May 7, 2020, reply comments, Cornell contends that any planned curtailment or suspension should be based on prior mutual agreement between the licensee and the Commission, and any additional notification requirements would be accomplished at the direction of the Commission.

Staff Analysis

The Commission typically includes license provisions for planned and unplanned deviations from license articles pertaining to project operation. In those cases, planned deviations may occur for short periods of time (e.g., up to 3 weeks) and are generally allowable after mutual agreement between the licensee and resource agencies and would need to be reported to the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Unplanned deviations are characterized as occurrences lasting more than 3 hours or resulting in visible environmental effects, such as a fish kill, turbidity plume, bank erosion, or downstream flooding. The licensee must file a report as soon as possible, but no later than 14 days after each such incident.

Effects of Project Operation on Water Quality

Operation of a hydroelectric project can cause fluctuations in impoundment levels that can contribute to shoreline erosion, increase turbidity, and thereby decrease water quality. Some modes of project operation also have the potential to reduce flows downstream of a project, which can lead to increases in water temperature and decreases in DO. As previously described, Cornell proposes to operate the project in a run-of-river mode. Cornell does not propose, nor does any agency or other entity recommend, additional measures pertaining to water quality.

In SD1, Commission staff identified the effects of continued project operation and maintenance on water quality in the project impoundment and downstream of the dam as a resource issue associated with relicensing the Cornell Project. The Commission received no comments regarding the effects of project operation and maintenance on water quality.

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[39] In its recommendation, Interior did not specify which measures could be curtailed or suspended. Commission staff assumes this recommendation is limited to project operation measures (e.g., impoundment level, minimum flow requirements, start-up and shut-down procedures, etc.) and, therefore, addresses Interior's recommendation as such.

Staff Analysis

As discussed above in section 3.3.2.1, *Aquatic Resources, Affected Environment*, *Water Quality*, historical data and Cornell's recent studies indicate that water quality in the project impoundment and downstream of the project is generally good and supports all species and life stages of aquatic life. DO generally remains above 6.0 mg/L and water temperature remains below 78°F during the summer months. Other parameters, including conductivity and pH, are typical of streams in the region and are supportive of aquatic life. Similarly, results of Cornell's benthic macroinvertebrate study yielded water quality ratings of "slightly impacted to non-impacted."

Cornell's proposal to continue operating the project in run-of-river mode and provide a minimum flow of 10-cfs to the bypassed reach would help maintain the current DO and water temperature conditions downstream of the project. Further, maintaining impoundment water levels at the spillway crest, with fluctuations limited to 6 inches or less, in combination with Cornell's proposed shutdown and startup procedures (discussed above), would ensure that spill can occur quickly during an operational disruption, therefore restoring run-of-river operation in a timely manner and minimizing the effect on downstream water quality.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The Cornell Project is located within the campus of Cornell University. The existing project boundary encompasses about 20 acres and is primarily composed of the project impoundment (Beebe Lake), project facilities, and associated wetland habitat. Upland habitat within the project boundary that has not been developed for educational or industrial uses is primarily forested habitat.

The primary forest community types along the narrow perimeter of the project impoundment, as defined by Edinger et al. (2014), is successional northern hardwood. This community is described as a mixed forest occurring on sites that have been cleared or otherwise disturbed, and include a dominant layer of aspen, poplar, birch, black cherry, red maple and ash species, and a diverse understory and ground layer. Appalachian oak-hickory forest also occurs in the project area.

In the western portion of the project boundary that includes the primary transmission line right-of-way, Fall Creek gorge contains smaller trees, shrubs, and grasses, with some difference in forest species composition and size between the drier, south-facing wall of the gorge (smaller Eastern red cedar, hophornbeam, honeysuckle, and other species in the lower gorge and larger trees near the top) and the cooler microclimate of the north-facing wall (hemlock near the top and along the edge, black birch, striped maple, white ash, purple-flowering raspberry, polypody fern, grasses,

mosses, and lichens.) The project transmission lines cross Fall Creek gorge on the east side of the powerhouse and extend approximately 385 feet to the point of interconnection. The transmission lines are about 35 feet above Fall Creek, and about 24 feet above grade through a forested area between the south side of the Fall Creek gorge to the point of interconnection.

Beebe Lake Island, a 1.25-acre island created from silt-clay material dredged from Beebe Lake in 1986, is currently covered by a mix of low shrub and herbaceous habitat with a few trees.[40]

Upland habitat around Beebe Lake is managed by Cornell Botanic Gardens, which manages Cornell University's campus and grounds, including horticultural collections, natural areas, hiking trails, and recreational areas.

Wetlands

Cornell identified 18.34 acres of National Wetlands Inventory mapped wetlands near the Cornell Project. Wetland habitat present near the project is primarily represented by the impounded Beebe Lake, most of which is classified as impounded, permanently flooded, palustrine habitat with an unconsolidated bottom (15.90 acres). An area within the northwest corner of the project impoundment is classified as impounded, seasonally flooded, palustrine habitat with an unconsolidated shore (2.44 acres). Additionally, the segments of Fall Creek upstream and downstream of the project boundary are classified as upper perennial, permanently flooded, riverine habitat with an unconsolidated bottom. There are no New York DEC mapped wetlands within the project boundary.

Invasive Plant Species

About 155 invasive plant species are known to occur within Tompkins County (NatureServe, undated). Invasive species within the project boundary are managed by Cornell Botanic Gardens as part of its Natural Areas Program, which seeks to limit invasive species introduction and spread within its natural area holdings. Invasive plant species such as pale swallow-wort (*Vincetoxicum rossicum*), garlic mustard (*Alliaria petiolata*), Japanese knotweed (*Fallopia japonica*), Norway maple (*Acer platanoides*), common buckthorn (*Rhamnus cathartica*), amur honeysuckle (*Lonicera maackii*), and other species are actively managed (Cornell Botanic Gardens, undated [2]).

Additionally, Cornell Botanic Gardens follows an internal management policy and code of conduct to balance the management of its horticultural holdings and preservation of natural areas (Cornell Botanic Gardens, 2018). Cornell's policy involves a multi-year

[40] Estimated acreage and habitat described from Commission staff's review of aerial imagery.

process of removing, phasing out, and containing invasive species in its cultivated collections; not adding new invasive species or distributing seeds of invasive species in its cultivated collections; controlling invasive species in its natural areas; and public education.

Wildlife

Upland and wetland habitat within the project supports a variety of wildlife, including those tolerant of human development and activity (i.e., raccoon, coyote, eastern cottontail rabbit, gray fox, and eastern gray squirrel, and numerous passerine and non-passerine bird species), game species such as white-tailed deer, and species associated with wetland habitat (i.e., various reptile, amphibian, waterfowl and marsh bird species, and mammals such as beaver). The Cornell Lab of Ornithology's 230-acre Sapsucker Woods Sanctuary, located 5 miles from the project, supports a diverse population of breeding, wintering, and migrating bird species.

Rare and State-listed Species

Bald eagle

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, which prohibit the "take" of eagle eggs, nests, and offspring, and can also include substantially disturbing normal breeding and feeding activities, except as permitted by regulation. Bald eagles are listed as a threatened species in New York State and are protected under New York State law.

Bald eagles typically forage over water and other open habitats. Bald eagles nest in mature trees and snags and on cliffs, rocks, and artificial structures, generally within 1 mile of water. In New York State, nesting activity occurs between December and June.

New York Natural Heritage Program's (New York NHP) May 16, 2016, letter (2016 letter)[41] provided a list of rare and state-listed species in the project vicinity but did not include a record for bald eagle. Although the license application indicates that no bald eagles were observed during Cornell's 2017 field studies,[42] bald eagle immatures and adults have been regularly observed within the project boundary over the past 10

[41] New York NHP's 2016 letter was filed with Appendix B of the license application.

[42] As noted in Appendix F of the license application, Cornell conducted several field studies in May through November 2017, although it was not required to conduct a targeted bald eagle survey.

years, generally roosting or in transit.[43] However, there is no evidence that bald eagles are currently nesting within 1 mile of the project boundary.

Plants and Insects

New York NHP's 2016 letter provided records for six state-listed plants (the state threatened Drummond's rock-cress, butterwort, bird's-eye primrose, and blunt-lobe grape fern, and the state endangered southern bluets and swamp smartweed), three rare dragonfly species (tiger spiketail, rapids clubtail, and spine-crowned clubtail) and three rare bumble bee species (Ashton's cuckoo bumble bee, black and gold bumble bee, and rusty patched bumble bee).[44]

New York NHP indicates that the six plant species have not been recorded near the project for 100 years or more.

Two rare bumble bee species have records in the project area: black and gold bumble bee (July 5, 1998 near Beebe Lake) and Ashton's cuckoo bumble bee (August 7, 1994 at Cornell). The black and gold bumble bee has never been common in New York and is a habitat generalist that prefers clovers, bee balms, and other herbaceous species as food plants, and overwinters in rotting logs, mulch, or loose soil.[45] Ashton's cuckoo bumble bee is a nest parasite of other bumble bee species, primarily uses pasture habitat, and has been experiencing a rapid range-wide decline likely due to a pathogen affecting several bumble bee species that it parasitizes.[46] Few observations of Ashton's cuckoo bumble bee exist in the northeastern U.S. since 1994, and none from Tompkins County.[47]

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[43] According to the Cornell Lab of Ornithology's eBird database (http://ebird.org), numerous sightings of bald eagle adults and immatures were observed within and adjacent to the project boundary over the past 10 years in the December to June period. Most sightings involved individual birds, with one observation on February 15, 2020, of an adult and immature together flying over Beebe Lake.

[44] One species, the rusty patched bumblebee, was listed as endangered under the ESA on January 11, 2017 (82 Fed. Reg. 3186), with the final rule in effect on February 10, 2017. This species is further discussed below in section 3.3.4, *Threatened and Endangered Species*.

[45] https://guides.nynhp.org/black-and-gold-bumble-bee/

[46] https://www.dec.ny.gov/docs/wildlife_pdf/hpsgcnbees.pdf

[47] https://val.vtecostudies.org/projects/bumble-bee-atlas/bombus-ashtoni/

3.3.3.2 Environmental Effects

In SD1, Commission staff identified three terrestrial resource issues associated with relicensing the Cornell Project, including the effects of continued project operation and maintenance on: (1) upland habitat and associated wildlife; (2) wetland habitat and associated wildlife; and (3) state-listed species (e.g., bald eagle).

The Commission received no substantive comments regarding the effects of project operation or maintenance on terrestrial resources, other than on Cornell's proposed plans regarding the management of invasive plant species and bald eagles filed with its license application. Therefore, staff analyzed the effects associated with these two plans.

Invasive Plant Species Management Plan

Cornell's proposed Invasive Plant Species Management Plan, filed with the license application, includes measures to prevent the introduction and spread of terrestrial and aquatic invasive plant species, for example: (1) employing best management practices during construction or maintenance, such as cleaning and drying boats that come into contact with water; (2) training workers to identify and remove invasive species from construction equipment before entering an invasive-free area; and (3) use of invasive-free gravel, fill, erosion control material (i.e., straw or fiber rolls), and seed stock during replanting.

Under section 10(j), Interior recommends that Cornell's proposed Invasive Plant Species Management Plan filed with the license application be included in any license issued for the project. Interior also states that FWS and New York DEC did not have the opportunity to provide comments on Cornell's plan, and that the agencies should be consulted prior to implementation.

Staff Analysis

About 155 invasive plant species are known to occur in Tompkins County, and the Cornell Botanic Gardens actively manages invasive plant species as part of its Natural Areas Program. Continued operation and maintenance of the project could result in the introduction or spread of terrestrial and aquatic invasive species within the project boundary. However, employing the proposed measures to minimize the introduction and spread of invasive species during project operation and maintenance, including cleaning and drying boats that come into contact with water, and using invasive-free erosion control materials, would minimize the introduction or spread of invasive species within the project boundary.

Bald Eagle Protection

Cornell proposes to implement the Northern Long-eared Bat and Bald Eagle Management Plan, filed with the license application, to minimize project effects on bald eagles by implementing the following provisions: (1) prior to tree clearing, observe the impacted area for bald eagle nests, and notify FWS and New York DEC within 5 days of discovery if bald eagle nesting activity is discovered within or immediately adjacent to the project boundary; (2) during the nesting season (December 1 through June 30), no tree clearing would occur within 330 feet, and no construction activities would occur within 660 feet, of any known bald eagle nests; and (3) Cornell must consult with New York DEC and FWS regarding activities that cannot meet these conditions.

In its letter filed March 23, 2020, Interior states that bald eagles could occur within the project impact area and recommends that Cornell's proposed management plan be included in any license issued for the project. Interior also states that FWS and New York DEC did not have the opportunity to provide comments on Cornell's plan, and that the agencies should be consulted prior to implementation.

Staff Analysis

Bald eagles have been regularly observed within the project boundary over the past 10 years. While it is unlikely that the project transmission lines' short crossing over Fall Creek[48] represents a collision or electrocution hazard to bald eagles, project maintenance would result in limited ground disturbance within the project boundary, including the potential removal of trees during periodic maintenance. However, consulting with FWS and New York DEC when bald eagles nest within or immediately adjacent to the project boundary and incorporating measures to minimize habitat disturbance surrounding active nests on project lands, such as those included in the proposed plan, would minimize effects to bald eagles.

[48] Staff estimates that an approximately 200-foot-long section of the project transmission lines are over Falls Creek. In its 2019 letter, Cornell states that it is not aware of any wildlife collisions or electrocutions resulting from contact with the project's electrical infrastructure.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

According to FWS's Information for Planning and Consultation (IPaC) system, one federally listed species, the threatened northern long-eared bat,[49] has the potential to occur within the project boundary.[50] No critical habitat for any federally listed threatened and endangered species occurs within project-affected lands.

Northern long-eared bat

FWS listed the northern long-eared bat as threatened on May 4, 2015 (FWS, 2015), and determined on April 27, 2016, that designating critical habitat is not prudent (FWS, 2016a).

The northern long-eared bat is a medium-sized bat species (3 to 3.7 inches in length) with longer ears than other species in the *Myotis* genus (FWS, 2015). The species' range includes 37 states, including most of the central and eastern United States, as well as the southern and central provinces of Canada, coinciding with the greatest abundance of forested areas.

The northern long-eared bat is found in a variety of forested habitats in the summer season. During this time, bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. In the fall season, northern long-eared bats leave their forested habitat to hibernate in caves, mines, and other similar habitat. The bats arrive at hibernacula between August and September, enter hibernation between October and November, and emerge from hibernacula between March and April. Hibernacula and surrounding forest habitats play important roles in the bat's life cycle beyond the time when bats are overwintering, including for fall-swarming[51] and spring-

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[49] *See* January 30, 2020, memorandum.

[50] As noted in section 3.3.3.1, *Affected Environment*, New York NHP's 2016 letter indicates an April 25, 1999 record for the endangered rusty patched bumble bee at Beebe Lake. As FWS's IPaC database did not include this species in the project area, staff reviewed FWS' guidance for this species (https://www.fws.gov/midwest/Endangered/insects/rpbb/ProjectProponent.html.) The Cornell Project does not occur in a high potential zone for the species (https://www.fws.gov/midwest/Endangered/insects/rpbb/rpbbmap.html), and FWS' guidance states that no further section 7 consultation is required for the rusty patched bumble bee.

[51] Fall-swarming occurs between summer and winter hibernation. The purposes of swarming behavior include: introduction of juveniles to potential hibernacula,

staging[52] activities. Reproduction is limited to one pup per year in late spring. As such, bat populations can be slow to rebound from anthropogenic and naturally occurring mortality events.

On January 14, 2016, FWS issued a final 4(d) rule that prohibits the following activities in areas of the country impacted by white-nose syndrome:[53] incidental take within a hibernation site; tree removal within 0.25 mile of a known, occupied hibernaculum; and cutting or destroying known occupied maternity roost trees, or any other trees within 150 feet of that maternity roost tree, during the pup-rearing season (June 1 through July 31) (FWS, 2016b). On January 5, 2016, FWS developed an optional streamlined consultation framework that allows federal agencies to rely on a programmatic biological opinion on FWS's final 4(d) rule to fulfill section 7(a)(2) consultation requirements for northern long-eared bat (FWS, 2016c).[54]

The Cornell Project is in Tompkins County, which is within the white-nose syndrome zone and the northern long-eared bat species range (FWS, 2019a and 2019b). There are no known summer or winter occurrences of northern long-eared bats within the project boundary. However, there are confirmed summer occurrences of northern long-eared bats in Schuyler and Cayuga counties (west and north of the project, respectively)

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copulation, and gathering at stop-over sites on migratory pathways between summer and winter regions.

[52] Spring-staging occurs between winter hibernation and migration to summer habitat. During this time, bats begin to gradually emerge from hibernation and exit the hibernacula to feed but re-enter the same or alternative hibernacula to resume daily bouts of torpor (i.e., a state of mental or physical inactivity).

[53] White-nose syndrome is the main threat to the northern long-eared bat and has caused a precipitous decline in bat numbers (in many cases, 90 to 100 percent) where the disease occurs.

[54] FWS developed a key to help federal agencies determine if they can rely on the streamlined section 7 consultation in the 4(d) rule or if their actions may cause prohibited incidental take that requires separate section 7 consultation (FWS, 2016d). FWS's key considers whether the federal action: (1) may affect the northern long-eared bat; (2) involves the purposeful take of northern long-eared bats; (3) is located inside the white-nose syndrome zone; (4) will occur within a hibernaculum or alter the entrance/environment of a hibernaculum; (5) involves tree removal; (6) involves the removal of hazardous trees; and (7) includes (a) the removal of an occupied maternity roost tree or any trees within 150 feet of a known occupied roost tree from June 1 through July 31, or (b) the removal of any trees within 0.25 mile of a hibernaculum at any time of year.

(FWS, 2019c; New York DEC, 2018), and winter occurrences in Onondaga County north of the project (FWS, 2019d; New York DEC, 2018).

3.3.4.2 Environmental Effects

Northern long-eared bat

Lands within the project boundary may provide suitable summer roosting and feeding habitat for the northern long-eared bat. Routine maintenance in the project boundary may involve the removal of trees, which may remove potential summer roosting habitat used by northern long-eared bats.

The proposed Northern Long-eared Bat and Bald Eagle Management Plan filed with the license application includes the following provisions regarding the northern long-eared bat: (1) if a roost tree or hibernaculum is discovered within or immediately adjacent to the project boundary, Cornell must inform FWS and New York DEC within 72 hours of discovery; (2) any trees that are a threat to human life or property (hazard trees) may be removed without prior consultation, provided FWS and New York DEC are informed if bats are observed; (3) any trees less than 3 inches in diameter at breast height (dbh) may be removed at any time, provided their removal does not damage adjacent larger trees; (4) any suitable roost trees 3 inches dbh or greater may be removed between October 1 and March 31; and (5) Cornell must consult with FWS and New York DEC should it be necessary to remove suitable roost trees 3 inches dbh or greater between April 1 and September 30.

In its letter filed March 23, 2020, Interior states that "[b]ased on the measures outlined in the Northern Long-eared Bat and Bald Eagle [Management] Plan (i.e., size and timing restrictions for tree clearing), the [p]roject is not likely to adversely affect the [northern long-eared bat]" and that "no further ESA coordination or consultation is required at this time." Interior also states that FWS and New York DEC did not have the opportunity to provide comments on Cornell's plan, and that the agencies should be consulted prior to implementation.

Staff Analysis

Seasonal limits on tree-clearing activity for trees 3 inches dbh or larger, consultation with FWS and New York DEC regarding implementation of Cornell's proposed plan and certain tree-clearing activities during the northern long-eared bat's active period, and reporting observations of northern long-eared bats during any removal of hazard trees, is likely to minimize effects to this species. Staff concludes that, while continued operation and maintenance of the project may affect the northern long-eared bat, any incidental take that may result from these activities is not prohibited by the final 4(d) rule. Further, Interior has determined that the project is not likely to adversely affect the northern long-eared bat, and no further ESA consultation is required.

3.3.5 Recreation Resources

3.3.5.1 Affected Environment

Recreation

Regional and Local Recreation

A variety of recreation opportunities exist on lands within a relatively short drive of the project. Two nationally significant areas within a 1-hour drive of the project are the Finger Lakes National Forest and the Montezuma National Wildlife Refuge. These lands allow the public to enjoy hiking, wildlife viewing, hunting, camping, fishing, and snowmobiling. State lands within a 1-hour drive of the project include Taughannock Falls State Park, Robert Treman State Park, Buttermilk Falls State Park, and Cayuga State Lake Park. These parks offer similar water and land-based recreation opportunities as the nationally significant lands, plus athletic fields, playgrounds, and golf courses.

Within the city of Ithaca and Tompkins County, a variety of recreational facilities are available at 20 city parks and over 28,000 acres of public New York State forest lands. Local recreation opportunities include athletic fields, pavilions, playgrounds, trails for hiking, mountain biking, and skiing. Cornell has established and maintains a variety of facilities in support of recreational activities in the vicinity of the project.

From its inception in 1865, Cornell prioritized protecting nearby areas for natural study, research, and enjoyment.[55] In 1944, Cornell created Cornell Plantations, later renamed Cornell Botanic Gardens in 2014, to preserve the natural beauty of the campus and surrounding natural areas. Cornell Botanic Gardens maintains 3,600 acres of land with multiple trails, gardens, gorges, and outdoor spaces that provide hiking, walking, biking, and picnicking opportunities.[56] Cornell Outdoor Education and Cornell Athletics provide canoes and kayaks for access to Beebe Lake during the spring, summer, and fall months. Beebe Lake is surrounded by the 1-mile-long forested Beebe Lake Loop. Other trails near the project area include a 2-mile-long trail from Beebe Lake to the Mundy Wildflower Garden and a 4-mile-long trail from Beebe Lake to the F.R. Newman Arboretum. None of the recreational facilities described here are located within the project boundary.

The Beebe Dam Bridge (also referred to as the Triphammer Foot Bridge) offers a bird's-eye view of Triphammer Falls. Below the dam in Fall Creek Gorge there are five

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[55] https://cornellbotanicgardens.org/about/about-the-gardens/

[56] https://cornellbotanicgardens.org/about/about-the-gardens/cornell-botanic-gardens-then-to-now/

hiking trails, including the Risley Trail (adjacent to the project boundary), Rim Trail (downstream of the project boundary), and Horseshoe Falls Trail (downstream of the project boundary). These hikes offer beautiful views of the gorge and its forested, rocky slopes. The Risley Trail and the Horseshoe Falls Trail follow steps down to viewing areas at creek level. The Rim Trail and the pedestrian suspension bridge also offer views of the gorge.

Recreation Use

Beebe Lake Loop and the five trails associated with Fall Creek Gorge (primarily downstream of the project) offer daily use. The Beebe Lake Loop provides access to the impoundment for hiking, walking, fishing, boating, and picnicking, while the five trails downstream provide excellent hiking access with views of the woods and gorge below the dam. No formal data are available regarding recreation use levels for the trails above and below the project dam. For public safety reasons, particularly due to the swift currents and undercuts of the bypassed reach, swimming and bathing are strictly prohibited within the bypassed reach and Beebe Lake. Numerous protective barriers, fences, guardrails, and signs are installed at points near the dam, bypassed reach, and powerhouse to notify the public to the hazards of, and restricted access to, these areas.

Cornell conducted a Recreation Study to document the existing recreational facilities and opportunities associated with the project and to evaluate the use of the project's impoundment for recreational purposes. Cornell staff documented recreation use in the project's impoundment during routine maintenance activities from the project's spillway between May and October of 2017. A total of 16 observations of recreation use were documented, including canoeing, shoreline fishing, wading, kayaking, paddle boarding, and boat fishing. The largest documented group size consisted of 20 people on the water. Incidental recreational activities observed during field studies included individuals walking on trails adjacent to the project boundary, recreational fishing downstream of Ithaca Falls, and observers of Ithaca Falls.

On November 29, 2017, Cornell conducted the Recreation Study site visit in association with performing the Flow Observation Study. At the site visit for the Recreation Study, ten participants (who also took part in the Flow Observation Study) representing FWS, New York DEC, Trout Unlimited, Cornell and its consultant, discussed the recreational opportunities existing at and near the project. The group identified fishing opportunities that were located downstream of Ithaca Falls. The group talked about public safety concerns related to the steep walls of the gorge and why the gorge was off limits to recreation access. The group acknowledged that the surrounding trails were not formal recreational facilities associated with the project and that Beebe Lake provided recreational boating for Cornell students and personnel.

3.3.5.2 Environmental Effects

Recreation

Cornell is not proposing any recreation-related protection, mitigation, or enhancement measures for the project.

No recommendations for access improvements or recreational amenities were received from local, state, or federal entities.

Staff Analysis

Multiple land and water-based recreation opportunities exist in and around the project area. Numerous nearby city and state parks, as well as a national forest and a wildlife refuge, offer a variety of land-based and water-based recreation activities for the public to enjoy. Cornell provides multiple opportunities for recreation in and around the project boundary by providing access to Beebe Lake, including several nearby trails for the public, university staff, and students to enjoy. Although the trails in Fall Creek Gorge, as well as those around and upstream of Beebe Lake, are in the vicinity of the project, they: (1) are part of a network of trails and natural areas associated with Cornell Botanic Gardens and Cornell, and (2) do not serve a specific project purpose.[57] Therefore, they are not included in the project boundary.

Cornell facilitated discussions with the Recreation Study participants and the group confirmed that several recreation opportunities for hiking, fishing, and boating exist at or near the project. However, the study participants did not convey the need for additional recreation opportunities at or near the project. Further, there has not been a demonstrated need or a request by any stakeholders for the addition of recreation facilities at the project. Thus, current recreation access at and near the project appears to be meeting the demand for desired outdoor experiences.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic

[57] As noted previously, some or all of the trails likely pre-date the project, and therefore, were constructed for purposes other than to access the project.

Preservation a reasonable opportunity to comment on the undertaking.[58] Historic properties are those that are listed or eligible for listing in the National Register of Historic Places (National Register). The regulations implementing section 106 of the NHPA also require that the Commission seek concurrence with the New York State Historic Preservation Officer (New York SHPO) on any finding involving effects or no effects on historic properties and consult with interested Indian tribes or Native Hawaiian organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term "cultural resources" for properties that have not been determined eligible for listing in the National Register. Cultural resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

Areas of Potential Effects

Pursuant to section 106 of the NHPA, the Commission must take into account whether any historic property could be affected by the issuance of a license within a project's area of potential effects (APE). The APE is determined in consultation with the New York SHPO and is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.[59] The APE for this project is defined as all lands within the project boundary and any lands outside the project boundary where cultural resources may be affected by project-related activities that are conducted in accordance with the FERC license. For the Cornell Project, the approximately 22-acre APE encompasses three components within the project boundary: (1) Fall Creek Pedestrian Bridge to the crest of the dam (3.8 acres); (2) the penstock, hydroelectric plant, and transmission line to the Foundry building (2.1 acres); and (3) Beebe Lake (16 acres).

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[58] An undertaking means "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval." 36 C.F.R. § 800.16(y) (2020). Here, the undertaking is the potential issuance of a new license for the Cornell Project.

[59] 36 C.F.R. § 800.16(d) (2020).

In its letter dated March 26, 2018,[60] the New York SHPO confirmed its review of the materials submitted by Cornell in accordance with section 106 of the NHPA, which included a description of the APE.

Cultural History Overview

The Cornell Project was built in 1904, at a time when water-powered electrical plants in New York State were rapidly developing. The plant is situated in an area previously developed for a variety of industries beginning in the first quarter of the 19th century. By 1832, Ezra Cornell erected a large dam at Triphammer Falls, creating an impoundment that became known as Beebe Lake. The lake was named for Cornell's employer, Jeremiah Beebe, who operated a plaster and flour mill on Fall Creek. Ezra Cornell eventually amassed a fortune in the telegraph business, becoming a primary owner of Western Union. Much of Ezra Cornell's land holdings passed to the university that was established in 1868 and named in his honor.

A turbine wheel was erected on the creek in 1883, providing electrical power to the university's Mechanical Department and to an innovative lighting system on campus. By the 1890s, sedimentation had reduced Beebe Lake to a swamp with little storage capacity. Cornell recognized the need to construct a new dam to facilitate hydroelectric power generation for the university and provide water storage for the Cornell Hydraulics Laboratory, which was under development. The existing Beebe Lake dam was constructed in 1896 downstream from the Triphammer dam. The Triphammer dam was left in place and puddled clay (hydraulic fill) was placed between the old and new dams to reinforce the structure.

The wheel, dam, and appurtenances were replaced and significantly improved in 1904 under the direction of the Cornell University Hydraulics Department. In the new configuration, the hydroelectric plant was placed over 1,500 feet to the west of the Triphammer Falls and the dam was repositioned as well. As a result, many of the archaeological features and deposits associated with the former industries at Triphammer Falls are close to the existing dam.

The hydroelectric plant was operated until 1969 when the project was retired. The Commission issued a 40-year license for the Cornell Project in 1981, and the plant was completely renovated at that time. The original machinery of the 1904 hydroelectric plant was replaced in 1981, but much of the rough stone masonry façade remains mostly intact. Larger maintenance activities since 2007 include new PLC controls, renovated

[60] The New York SHPO letter is in Appendix B – Consultation Correspondence of the FLA that was filed with the Commission on June 28, 2019.

2.4-kilovolt switchgear, a new powerhouse roof and stairs to the powerhouse, and factory overhaul of both Ossberger turbines.

Cultural Resources Investigations

Prior to this relicensing, the most recent cultural resources investigation occurred in 2000, when the State University of New York at Binghamton's Public Archaeology Facility conducted a Phase 1 Archaeological Reconnaissance Survey in association with construction and installation of a chilled water pipe beneath Beebe Lake, including subsurface testing. The background research and field investigations concluded that prior to the mid-19th century, the area surrounding present-day Beebe Lake was primarily wetlands. The landscape was modified first by the creation of Beebe Lake and then by subsequent anthropogenic alteration of the lake's shoreline. Subsurface tests revealed wetland soils overlain by fill deposits, suggesting that there is a low potential for prehistoric cultural deposits to be located along the shoreline of Beebe Lake. For these reasons, Cornell does not expect that continued operation and maintenance of the project would affect prehistoric or historic archaeological resources.

In 2017, Cornell conducted a Phase 1-A Literature Review and Sensitivity Assessment (phase 1-A assessment) pursuant to the Cultural Resources Study Plan. The purpose of the study was to: (1) identify previously reported historic properties, archaeological sites, and architectural resources that may be affected by relicensing; (2) determine the potential impacts of continued operation and maintenance of the project on historic properties, archaeological sites, and architectural resources that may exist within the APE; and (3) provide recommendations regarding any additional cultural resources studies or management measures that may be appropriate.

In the phase 1-A assessment, Cornell searched the New York State Cultural Resource Information System and identified 15 previously reported archaeological sites within 1 mile of the APE. None of the reported archaeological sites are located within or adjacent to the APE. Cornell identified 12 historic properties listed on the National Register in the vicinity of the project; four of the properties are in or partially within the APE. The National Register-listed properties include the Sackett Bridge, the residence at 326 Fall Creek Drive, the Cornell Heights Historic District, and the Forest Home Historic District; the districts include portions of the powerhouse, bypassed reach, and Beebe Lake. However, the project features are not contributing resources to the historic districts and Cornell does not expect project operation to affect the historic districts. The project itself has not been evaluated for inclusion in the National Register but it is likely eligible for inclusion based on its association with Cornell and the Hydraulics Laboratory.

The methods, results, and recommendations of the phase 1-A assessment were filed with the Commission as privileged information. The phase 1-A assessment was provided to the New York SHPO and tribes for review and comment. The New York

SHPO provided its comments to Cornell in a letter dated March 26, 2018, stating that it concurs with the recommendation in the phase 1-A assessment to develop an HPMP.

3.3.6.2 Environmental Effects

Project-related effects on cultural resources within the APE can result from modifications to project facilities or project operation; project-related ground-disturbing activities; construction, modification, or maintenance of project recreation facilities and use of such facilities by visitors; project-induced shoreline erosion;[61] and vandalism. Current project operation is not affecting cultural resources within the APE. Cornell is not proposing to modify project operation or conduct any project-related land-clearing or land-disturbing activities within the APE that would impact any archaeological site, historic cemetery, architectural resource, or area that has been identified as having moderate to high potential for containing archaeological sites. However, during the term of any license issued, continued operation and maintenance of the project, including ground-disturbing activities that may be needed in the future, have the potential to affect undiscovered historic and archaeological resources. Any adverse effects must be resolved in consultation with the New York SHPO. To avoid, minimize, or mitigate adverse effects on historic properties that may be affected by relicensing the project, Cornell proposes to develop an HPMP within 1 year of any new license issued for the project.

Cornell determined that four historic sites listed on the National Register were in or partially within the APE. The New York SHPO concurred that developing an HPMP would address management of the project facilities and any previously unidentified resources that may be discovered in the APE.

Staff Analysis

In accordance with section 106, Cornell has consulted with the New York SHPO and potentially affected tribes to determine the effects of project operation on cultural resources. The Sackett Bridge, the residence at 326 Fall Creek Drive, and portions of both the Cornell Heights Historic District and the Forest Home Historic District, are listed on the National Register and are within the APE. Current project operation does not adversely affect cultural resources and Cornell is not proposing any changes to project operation. However, through regular project operation and maintenance, there is a potential for adverse effects on National Register-listed, National Register-eligible, and undiscovered historic properties throughout the term of any license issued. The implementation of an HPMP to mitigate any adverse effects that may arise over the term

[61] Project-induced shoreline erosion does not include shoreline erosion attributable to flood flows or natural phenomena, such as wind-driven wave action, erodible soils, and loss of vegetation due to natural causes.

of any license issued would protect cultural resources that are eligible for the National Register. An HPMP would provide direction and guidance for Cornell's management of historic properties and would ensure that appropriate consultation occurs prior to any activity that could affect historic properties in the APE.

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) with the New York SHPO for the protection of historic properties that could be affected by the continued operation and maintenance of the project. The terms of the PA would require Cornell to develop and implement an HPMP for the term of any new license issued for the project.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Cornell Project would continue to operate in its current manner. None of the licensee's proposed measures or the resource agencies' recommendations would be required. Improvements in operational procedures to limit flow fluctuations downstream of the project would not be implemented, and botanical resources, bald eagles, and northern long-eared bats would not be protected.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we examine the Cornell Project's use of Fall Creek for hydropower purposes to determine what effect various operation and environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,[62] the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total

[62] *See Mead Corp., Publishing Paper Div.*, 72 FERC ¶ 61,027 (1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECTS

Table 8 summarizes the assumptions and economic information we use in our analysis. This information, except as noted, was provided by Cornell in its license application and subsequent submittals. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives, except the no-action alternative, would include: taxes and insurance costs, net investment (the total investment in power plant facilities remaining to be depreciated), normal operation and maintenance costs, and licensing costs. Values provided by Cornell in its license application were indexed to 2020 dollars.

Table 8. Economic analysis of the Cornell Project (Sources: Cornell and staff).

Economic Parameter	Value
Period of economic analysis (years)[a]	30
Term of financing (years)[a]	20
Federal income tax rate (percent)[a]	21
Local tax rate (percent)[a]	4
Insurance rate[b]	Included in the operation and maintenance cost
Energy rate ($/MWh)[c]	20.59
Capacity rate ($/kilowatt-year)[c]	159.7
Interest rate (percent)[a]	6
Discount rate (percent)[a]	6
Net investment ($)[b]	901,580
Annual operation and maintenance ($/year)[b]	282,700
Relicensing cost ($)[d]	505,000

[a] Assumed by staff.
[b] Provided by Cornell.
[c] Source: Energy Information Administration's Annual Energy Outlook 2020 at http://www.eia.gov/outlooks/aeo/index.cfm. The energy rate includes ancillary services values.
[d] Relicensing cost includes environmental studies, consultation, and internal and administrative costs.

4.2 COMPARISON OF ALTERNATIVES

Table 9 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: the no-action alternative, Cornell's proposal, and the staff alternative.

Table 9. Summary of the annual cost of alternative power and annual project cost for alternatives for the Cornell Project (Source: Staff).

	No-Action Alternative	Cornell's Proposal	Staff Alternative
Installed capacity (MW)	1.718	1.718	1.718
Annual generation (MWh)	4,599	4,599	4,599
Dependable capacity (MW)	0.114	0.114	0.114
Annual cost of alternative power ($) ($/MWh)	112,910 24.55	112,910 24.55	112,910 24.55
Annual project cost ($) ($/MWh)	319,080 69.38	377,030 81.98	374,630 81.46
Difference between the cost of alternative power and project cost ($) ($/MWh)[a]	206,170 (44.83)	(264,120) (57.43)	(261,720) (56.91)

[a] Parentheses denote negative values; thus, the project cost is greater than the cost of alternative power.

4.2.1 No-action Alternative

Under the no-action alternative, the Cornell Project would continue to operate as it does now. With an installed capacity of 1.718 MW and a dependable capacity of 0.114 MW, the project generates an average of 4,599 MWh of electricity annually. The average annual cost of alternative power would be $112,910, or about $24.55/MWh. The average annual cost of producing this power, including depreciation, operation and maintenance costs, and taxes would be about $319,080, or about $69.38/MWh. Overall, the project would produce power at a cost that is $206,170, or $44.83/MWh, more than the cost of alternative power.

4.2.2 Applicant's Proposal

Under Cornell's proposal, the project would have a total capacity of 1.718 MW, a dependable capacity of 0.114 MW, and an average annual generation of 4,599 MWh.

The average annual cost of alternative power would be $112,910, or $24.55/MWh. In total, the average annual project cost would be $377,030, or $81.98/MWh. Overall, the project would produce power at a cost that is $264,120, or $57.43/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative includes the same development components as Cornell's proposal and, therefore, would have the same capacity and energy attributes described above for Cornell's proposal. Appendix C shows the staff-recommended deletions and modifications to Cornell's proposed environmental protection and enhancement measures, and the estimated cost of each.

Based on a total capacity of 1.718 MW, a dependable capacity of 0.114 MW, and an average annual generation of 4,599 MWh, the average annual cost of alternative power would be $112,910, or $24.55/MWh. In total, the average annual project cost would be $374,630, or $81.46/MWh. Overall, the project would produce power at a cost that is $261,720, or $56.91/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Appendix C presents the cost of each of the environmental enhancement measures considered in our analysis. All costs are in 2020 dollars. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for licensing the Cornell Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on this project and our evaluation of the environmental and economic effects of the proposed

action and its alternatives, we selected the staff alternative as the preferred alternative for the Cornell Project. We recommend this alternative because: (1) issuing a new license for the project would allow Cornell to operate the project as a beneficial and dependable source of electric energy; (2) generation from the Cornell Project, with an installed electric capacity of 1.718 MW, comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance aquatic, terrestrial, and cultural resources and threatened and endangered species at the project.

In the following section, we make recommendations as to which environmental measures proposed by Cornell, or recommended by agencies or other entities, should be included in any license issued for the project. In addition to Cornell's proposed environmental measures listed below, we recommend additional staff-recommended environmental measures to be included in any new license issued for the project.

5.1.1 Measures Proposed by Cornell

Based on our environmental analysis of Cornell's proposal, as discussed in section 3.0, *Environmental Analysis*, and the costs presented in section 4.0, *Developmental Analysis*, we conclude the following operation and environmental measures proposed by Cornell would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including the following measures in any new license issued for the Cornell Project:

Project Operation

- Operate the project in a run-of-river mode where outflow approximates inflow as measured by the upstream USGS gage on Fall Creek; and

- Maintain the impoundment elevation at or above the spillway crest (780.7 feet), with fluctuations limited to no more than 0.5 foot below the spillway crest (i.e., 780.2 feet).

Aquatic Resources

- Provide a minimum flow of 10 cfs or inflow to the project, whichever is less, into the project's bypassed reach through existing weirs and/or flow over the project's overflow spillway; and

- Operate the project using stepwise shutdown and startup procedures to help attenuate changes in flow downstream of the project.

Cultural Resources

- Develop and implement an HPMP.

5.1.2 Additional Measures Recommended by Staff

Under the staff alternative, the project would be operated with Cornell's proposed measures, as identified above, and the following additions or modifications:

- Develop and implement a sediment management plan to limit the potential for sediment releases (caused by maintenance or larger-scale dredging) that may impact fish and wildlife resources, and including provisions for the development of criteria for larger-scale dredging within the project impoundment, and consultation with the resource agencies prior to larger-scale dredging activity.

- Develop a stream flow and water level monitoring plan in consultation with FWS and New York DEC to assist in the administration of compliance with Cornell's proposed run-of-river operation, impoundment level fluctuation, and minimum flow requirement.

- Develop a final Northern Long-eared Bat and Bald Eagle Management Plan and a final Invasive Plant Species Management Plan, following consultation with FWS and New York DEC.

Below, we discuss the basis for our staff-recommended measures and the rationale for modifying Cornell's proposal.

Sediment Management Plan

Due to geologic and soil resources and streamflow dynamics at the project, sedimentation within Beebe Lake is, and will continue to be, an ongoing process. While Cornell conducted two larger-scale dredging operations during the current license term, including one in 1986 to restore storage capacity to the impoundment, it has used periodic maintenance dredging near the project works to maintain project operation over the past 20 years. Dredging has resulted in the removal of between about 200 cubic yards (for periodic maintenance of the project intake and forebay) and 40,000 cubic yards (reservoir-wide dredging to restore capacity) of sediment from the project reservoir in order to effectively operate the project, and has the potential to affect fish and wildlife resources within the project reservoir and downstream of the project.

Interior recommends that Cornell develop and implement a sediment management plan to include: (1) a description of how sediment is managed at the project (including Beebe Lake Island); (2) a description of expected sediment management activities over

the license term; and (3) protocols for any dredging or impoundment lowering activities. Interior states that such a plan is necessary to manage sediment in small, shallow impoundments, such as Beebe Lake, which are associated with proportionally much larger watersheds.

While Cornell has been able to manage sedimentation within Beebe Lake and maintain project operation in the absence of a formal sediment management plan, it states that it has no current plans for large-scale dredging within the project impoundment. Cornell further states that, if the impoundment continues to fill with sediment, it would consult with federal and state resource agencies regarding sediment removal and perform the work in compliance with the conditions of the required permits and authorizations. However, to protect soil resources and also minimize the potential for fish and wildlife impacts associated with small- and large-scale dredging at the project over the term of any license issued, we recommend the development and implementation of a sediment management plan, including, but not limited to, the following provisions: (1) a general description of Cornell's sediment management practices at the project (including Beebe Lake Island); (2) a list of expected sediment management activities over the license term (e.g., routine maintenance dredging at the forebay and intake); (3) protocols for dredging at the project, including a reporting requirement indicating the quantity of sediment removed, where excavated sediment would be stored or placed, and whether lowering the project impoundment would be necessary; (4) criteria for determining when sedimentation has reached the point that larger-scale dredging would be warranted in the project impoundment; and (5) a provision for consultation with FWS, New York DEC, and other relevant resource and permitting agencies prior to larger-scale dredging within Beebe Lake.

We estimate that the levelized annual cost to develop and implement a sediment management plan would be $1,190 and conclude that the benefits of the measure would outweigh the costs.

Project Boundary Change

Cornell holds title or rights to all lands within the project boundary, and proposes to amend the project boundary to: (1) remove Beebe Lake Island from the project boundary; (2) replace an inaccurate depiction of the transmission line right-of-way in the existing Exhibit G with the existing 385-foot-long transmission line corridor from the powerhouse east to the point of interconnection; (3) correct the depictions of a portion of the penstock right-of-way, and portions of the north and east shorelines of Beebe Lake; and (4) add the chilled water plant forebay and the associated outlet drain valve, the downstream portion of the dam, and the stairway required to access the powerhouse, (*see* figure 3). Cornell states that these modifications are necessary to include all project features needed and necessary for the operation and maintenance of the project.

We recommend the following changes to the project boundary: (1) correcting the depictions in Exhibit G of the project transmission line right-of-way, penstock right-of-way, and portions of the north and east shorelines of Beebe Lake to accurately reflect these project features; (2) adding the chilled water plant forebay and associated drain valve to the project boundary, because these facilities are integral to the project dam, represent a drainage point for the project impoundment, and are necessary for operation and maintenance of the project; and (3) adding the downstream portion of the dam and powerhouse access stairway to the project boundary, because these facilities are necessary for operation and maintenance of the project. As Cornell holds title or rights to these lands, there would be no cost associated with these changes. However, we do not recommend removing Beebe Lake Island from the project boundary, as discussed below in section 5.1.3.

Project Operation and Impoundment Level

Cornell proposes to operate the project in a run-of-river mode, where outflow from the project approximates inflow, and to limit impoundment fluctuations to less than 0.5 foot below the spillway crest using the impoundment level sensor to automatically adjust the project's turbines. Any fluctuations exceeding 0.5 foot below the spillway crest would be a reportable event to FWS and New York DEC as soon as possible, but no later than 10 business days.

Interior, under section 10(j), recommends that Cornell operate the project in a year-round, run-of-river mode, where instantaneous inflow to the impoundment equals outflow downstream of the project tailrace. Under Interior's definition of run-of-river operation, the impoundment elevation would be maintained at or above spillway crest to ensure that downstream reaches may be quickly re-watered from spill during a unit trip. As such, all flows below the sum of the project's minimum hydraulic capacity and above the project's maximum hydraulic capacity, plus the required bypassed reach flows, would be required to be passed over the project's spillway.

Interior has not described how instantaneous run-of-river operation would provide additional protections or benefits to aquatic biota over those of the existing condition whereby project outflows approximate project inflows. Further, there is no indication that the project is technologically capable of operating under conditions where outflow from the project equals inflow on an instantaneous basis. Cornell, in its response to Interior, did not provide cost estimates for implementing Interior's recommendation but did state that doing so would result in numerous compliance violations, thereby suggesting that such operation would not be technologically feasible with the project's current capabilities. For these reasons, there is no substantial evidence to support the recommended measure.

Operating the project in a run-of-river mode as proposed by Cornell would continue to provide sufficient habitat stability in the impoundment and minimize any project effects on downstream water quality, particularly water temperature and DO concentrations. Shoreline erosion and resultant turbidity as well as sediment mobilization would be negligible as minor changes in impoundment water levels would occur slowly. Similarly, maintaining relatively stable impoundment levels and project flows would limit the potential for stranding of fish and other aquatic organisms and minimize disruptions to habitat necessary for feeding, cover, spawning, and rearing. Maintaining the impoundment level at the spillway crest, as recommended by Interior, would not result in benefits to aquatic resources that would outweigh the costs to Cornell in attempting to ensure compliance with the precision stipulated in the recommendation. Therefore, we recommend that the Cornell Project be operated in a run-of-river mode with impoundment level management as proposed by Cornell. There are no incremental costs associated with these measures because they reflect Cornell's current mode of project operation.

Minimum Flow

Cornell proposes, and Interior recommends, continuing the minimum continuous year-round 10-cfs release to the bypassed reach, or inflow to the project, whichever is less. Releasing a minimum flow of 10 cfs into the bypassed reach as proposed by Cornell would maintain the existing wetted width, water depth, and quantity of downstream habitat that adequately supports aquatic biota. Providing a 10-cfs minimum flow in the bypassed reach would also maintain water quality, particularly water temperature and DO concentrations. Therefore, as proposed by Cornell, and recommended by Interior, we recommend releasing a continuous minimum flow of 10 cfs. There are no incremental costs associated with these measures because they reflect Cornell's current mode of project operation.

Shutdown and Startup Procedures

As described in the license application, Cornell proposes controlled shutdown and startup procedures for the project to help minimize downstream flow fluctuations. The procedures would be implemented when applicable but may not occur during an emergency condition including, but not limited to, adverse operating conditions or a public safety incident. Interior recommended, as part of its recommendation for a stream flow and water level monitoring plan, that Cornell develop shutdown and startup procedures with the goal of limiting downstream water level fluctuations to less than 25 percent of the average depth of Fall Creek.

As discussed in section 3.3.2.2*, Aquatic Resources, Environmental Effects, Downstream Water Level Monitoring*, the proposed shutdown and startup procedures reduce flow fluctuations downstream of the project by more than 40 percent, leaving 58

to 85 percent of habitat along study transects with water depths greater than 4 inches. Further, the controlled shutdown considerably decreases the amount of time needed to achieve spill over the project dam, reducing the duration of low-flow conditions downstream. Interior's recommended 25 percent criterion is not supported by any biologically meaningful evidence and, as 90 percent of habitat downstream of the project is composed of bedrock with shallow sheet flow, would be an underrepresentation of the uniquely deeper and more complex habitats that provide refugia for aquatic biota. Therefore, employing Cornell's proposed shutdown and startup procedures would benefit aquatic biota by minimizing and reducing the duration of flow fluctuations downstream of the project, reducing stranding potential of fish and other aquatic organisms, and minimizing disruptions to the availability of habitat necessary for feeding, cover, spawning, and rearing. We estimate that the levelized annual costs to implement the proposed shutdown and startup procedures would be $2,000 and conclude that the benefits would outweigh the costs.

Stream Flow and Water Level Monitoring Plan

Interior recommends that Cornell develop and implement a stream flow and water level monitoring plan in consultation with FWS and New York DEC that would include methods to: (1) ensure the release of the required minimum flow to the bypassed reach, (2) maintain impoundment elevations generally at or above the spillway crest, and (3) provide controlled shutdown and startup procedures to minimize downstream fluctuations in Fall Creek. With the exception of Interior's recommendation that the controlled shutdown and startup procedures limit downstream water level fluctuations to less than 25 percent of the average depth of Fall Creek (discussed above), a stream flow and water level monitoring plan would assist the Commission's administration of compliance with Cornell's proposed run-of-river operation, adherence to impoundment levels, and delivery of minimum flow requirements.

As it is the Commission's sole responsibility under the FPA to administer compliance with the operation and environmental measures required by any Commission-issued license, we recommend that the Commission review and approve any stream flow and water level monitoring plan.

We estimate that the levelized annual cost to develop a stream flow and water level monitoring plan with Commission staff's modifications is $3,950 and conclude the benefits of the plan would outweigh the costs.

Northern Long-eared Bat and Bald Eagle Management Plan

Cornell proposes to implement the Long-eared Bat and Bald Eagle Management Plan filed with the license application.

Regarding northern long-eared bats, the plan includes the following provisions: (1) if a roost tree or hibernaculum is discovered within or immediately adjacent to the project boundary, Cornell must inform FWS and New York DEC within 72 hours of discovery; (2) any trees that are a threat to human life or property (hazard trees) may be removed without prior consultation, providing FWS and New York DEC are informed if bats are observed; (3) any trees less than 3 inches dbh may be removed at any time, provided their removal does not damage adjacent larger trees; (4) any suitable roost trees 3 inches dbh or greater may be removed between October 1 and March 31; and (5) Cornell must consult with FWS and New York DEC should it be necessary to remove suitable roost trees 3 inches dbh or greater between April 1 and September 30.

Suitable roost tree habitat for the northern long-eared bat is located within the project boundary. As maintenance of the project has the potential to clear forested habitat, and thus impact summer roosting habitat for the federally listed threatened northern long-eared bat, such a plan would minimize the potential for project effects on northern long-eared bat individuals and habitat.

The plan includes the following provisions regarding bald eagles: (1) prior to tree clearing, observe the impacted area for bald eagle nests, and notify FWS and New York DEC within 5 days of discovery if bald eagle nesting activity is discovered within or immediately adjacent to the project boundary; (2) during the nesting season (December 1 through June 30), no tree clearing would occur within 330 feet, and no construction activities would occur within 660 feet, of any known bald eagle nests; and (3) Cornell must consult with FWS and New York DEC regarding activities that cannot meet these conditions.

Although no bald eagles or nests were observed during Cornell's 2017 field studies, immature and adult bald eagles have been routinely observed at the project during the December to June period. As maintenance of the project has the potential to clear forested habitat, and thus impact nesting habitat for the state-listed threatened bald eagle, such a plan would minimize the potential for project effects on bald eagles.

We estimate that the levelized annual cost to develop a final Northern Long-eared Bat and Bald Eagle Management Plan, following consultation with FWS and New York DEC, would be $2,400 and conclude that the benefits of the measure would outweigh the costs.

Invasive Plant Species Management Plan

Cornell proposes to implement the Invasive Plant Species Management Plan included in its license application. The plan includes measures such as employing best management practices during construction or maintenance to prevent the introduction or spread of invasive plant species, cleaning and drying boats that come into contact with water, and the use of invasive-free materials and seed stock during replanting. Several

aquatic and terrestrial invasive plant species occur at the Cornell Project. Employing measures to minimize the introduction and spread of invasive species during construction, operation, and maintenance, such as those included within the proposed Invasive Plant Species Management Plan, would minimize the introduction or spread of invasive species at the project. We estimate that the levelized annual cost to develop a final Invasive Plant Species Management Plan, following consultation with FWS and New York DEC, would be $2,400 and conclude that the benefits of the measure would outweigh the costs.

Historic Properties Management Plan

The Sackett Bridge, the residence at 326 Fall Creek Drive, the Cornell Heights Historic District, and the Forest Home Historic District are listed in the National Register and are in or partially within the APE. The project itself is potentially eligible for listing in the National Register. Operation of the Cornell Project has the potential to adversely affect cultural resources; thus, implementation of an HPMP would ensure that any adverse effects on National Register-eligible components of the project would be properly identified and resolved through consultation with the New York SHPO. To ensure that adverse effects on known and potential historic properties, and to any as yet unidentified cultural resources, are satisfactorily resolved over the term of any new license, we intend to execute a PA with the New York SHPO for the Cornell Project. The PA would require Cornell to develop and implement an HPMP in consultation with the New York SHPO. We estimate that the levelized annual cost to develop and implement the HPMP would be $6,010 and conclude that the benefits of the measure would outweigh the costs.

5.1.3 Measures Not Recommended by Staff

Project Boundary Change to Remove Beebe Lake Island

Cornell holds title or rights to all lands within the project boundary and proposes to amend the project boundary to remove Beebe Lake Island from the project boundary (*see* figure 3). In Exhibit G of the license application, and reiterated in its 2019 letter, Cornell's justification for the removal of Beebe Lake Island from the project boundary is that "the island is not needed and necessary for operation or maintenance of the project."

Although Cornell states that Beebe Lake Island is not needed for project purposes, it also acknowledges that the creation of the island and its location at the upstream end of Beebe Lake was designed to reduce grass growth and sedimentation in the lake. Based on this information, Beebe Lake Island appears to serve the ongoing project purpose of reducing sediment and grass growth in Beebe Lake, and Cornell has not provided sufficient information for Commission staff to conclude otherwise.

Staff recommends modifying the project boundary to include the correct depiction of the transmission line corridor and several project facilities, as those areas are necessary for the operation and maintenance of the project. However, Cornell has not demonstrated why Beebe Lake Island is no longer necessary for project purposes, considering its ongoing use for sediment management and reducing grass growth. Therefore, staff does not recommend the removal of Beebe Lake Island from the project boundary.

Downstream Water Level Monitoring

To ensure that downstream water level fluctuations are minimized in accordance with Interior's recommended stream flow and water level monitoring plan (i.e., water level fluctuations downstream of the project do not exceed 25 percent of the mean depth), Interior recommends that Cornell evaluate the effectiveness of its proposed shutdown and startup procedures through monitoring downstream flows over a 1-year ice-free period (i.e., May through November).

Cornell's Flow Observation Study concluded that its proposed shutdown and startup procedures reduce downstream water level fluctuations by more than 40 percent and decrease the time necessary to initiate spill over the project dam. Under these conditions, cross-sectional transects evaluated during the study retained nearly 60 percent of habitat at water depths greater than 4 inches. As described in section 3.3.2.2, *Aquatic Resources*, *Environmental Effects*, Interior's recommendation to limit downstream water level fluctuations to less than 25 percent of the average depth of Fall Creek is not supported by any biologically meaningful evidence and would be based on conditions that do not accurately consider or represent refugia available to aquatic biota.

For these reasons, there is no basis for the recommended 25-percent criterion or the associated monitoring measure. Moreover, the measures' lack of benefits do not justify the estimated levelized annual cost of $11,850. Therefore, Commission staff does not recommend Interior's 25-percent criterion or downstream water level monitoring.

Trash Rack Maintenance

Interior recommends that Cornell, through regularly scheduled visual inspections, maintain the intake trash racks with 1-inch clear spacing, or less. Cornell would be required to conduct an inspection within 1 year of license issuance and no more than every 5 years thereafter, producing a report of the inspection for review by FWS and New York DEC. Any irregularities or defects resulting in an increase in the trash rack bar spacing would require prompt repair.

Commission staff's review of the Cornell Project's dam safety inspection reports dating back to 2010 finds that the project's trash racks have been consistently well-maintained and kept in good working condition. Similarly, a review of the project's

compliance history reveals that there are no irregularities, nor has there been any enforcement action.

While it is possible that defects in the project trash racks could cause the clear bar spacing to exceed 1 inch, it is likely that any such deviations would be relatively small and localized due to the location of the project intake immediately along the shoreline, the project's low approach velocity, and the presence of a protective skimmer in the project forebay. We also note that while the calculated intake velocity based on the project's maximum hydraulic capacity (212 cfs) is 1.42 fps, the maximum capacity that can be provided through the project's penstock is 160 cfs, thereby making the functional approach velocity 1.07 fps. Regardless, burst swimming speeds of resident fishes in Beebe Lake, which are generally greater than 2.0 fps for juveniles and greater than 3.5 fps for adults, would allow all but the smallest fishes to avoid entrainment. Most defects in the project trash racks would have little to no effect on entrainment mortality; therefore, Commission staff does not recommend the measure on the basis that the recommended trash rack maintenance would not justify the annual levelized cost of $160.

Trash Rack Replacement

Cornell's proposal to replace the project's existing trash racks, if required during the term of the new license, with trash racks with clear bar spacing of 1 inch or less is contingent on an uncertain future event. Predicting when the measure would, if ever, be implemented at the project, along with the specific environmental conditions that would exist at that time, would be entirely speculative. However, we note that under any new license for the project, Cornell would not be permitted to substantially change any plans, specifications, or statements regarding the project facilities as approved by the Commission in its license order without first allowing for the review and approval by the Commission. Therefore, we have no basis for estimating the cost and recommending the specifications of any future trash rack replacement.

Curtailment and Suspension of Project Operation

Interior recommends that an article be included in any license issued allowing the licensee to curtail or suspend the requirements of the license for short periods upon prior mutual agreement with FWS and New York DEC or in the event of any operating emergency beyond the control of the licensee, with notification of FWS and New York DEC within 5 business days and the Commission within 10 business days.

As described in section 3.3.2.2, *Aquatic Resources*, *Environmental Effects*, in any license issued for a hydroelectric project, the Commission typically includes provisions for planned and unplanned deviations from license articles pertaining to project operation. Consultation with resource agencies and reporting would be required. Therefore, because Interior's recommendation fails to identify specific articles that would be curtailed or suspended under its recommendation, and any license issued by the

Commission for the Cornell Project would include provisions for planned and unplanned deviations to project operation measures, we have no basis for recommending Interior's recommendation.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Continued operation of the Cornell Project would result in some unavoidable fish impingement and entrainment. However, given the relatively low approach velocity (1.42 fps) and the 0.914-inch trash rack spacing at the project, most fish susceptible to impingement would be adults and could therefore avoid impingement due to their strong swimming ability. Entrainment would be limited to juvenile species of the Centrarchidae and Cyprinidae families and, therefore, would experience low blade strike mortality. As younger individuals in a population typically have high rates of natural mortality, even in the absence of hydropower operations, and fish populations have generally evolved to withstand losses of these smaller and younger individuals, the expected consequences on the sustainability of the resident fish population at the project is minimal.

Impoundment fluctuations associated with project operation could periodically reduce near-shore habitat used by Centrarchids; however, Cornell's proposal to operate in a run-of-river mode with impoundment fluctuations limited to less than 0.5 foot below the spillway crest would result in infrequent and minimal disturbances to habitat availability. Further, most Centrarchids would typically nest at depths greater than the extent of the zone of fluctuation. Therefore, we anticipate the effect of impoundment level fluctuations on those species to be minimal. Similarly, riverine habitat downstream of the project could be adversely affected during scheduled or unscheduled shutdowns of the project due to fluctuating water levels during such events. However; as these events occur infrequently and water level fluctuations would be reduced by the proposed shutdown and startup procedures, impacts to aquatic biota are expected to be minimal. As such, we expect that continued operation of the project, with its associated impoundment level fluctuations, would continue to support healthy centrarchid populations in the project area.

5.3 SUMMARY OF SECTION 10(j) RECOMMENDATIONS

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency will attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

In response to our January 23, 2020, notice soliciting comments, recommendations, terms and conditions, and prescriptions, Interior filed eight section 10(j) recommendations for the project on March 23, 2020. Table 10 lists the recommendations filed subject to section 10(j) and indicates whether the recommendations are included under the staff alternative.

We have preliminarily determined that four of Interior's recommendations within the scope of section 10(j) may be inconsistent with the purposes and requirements of the FPA or other applicable law.

Table 10. Analysis of fish and wildlife agency recommendations for the Cornell Project (Source: staff).

Recommendation	Agency	Within the scope of 10j?	Annualized Cost[a]	Adopted?
Operate the project in a year-round, run-of-river mode, where instantaneous inflow to the impoundment equals outflow downstream of the project tailrace.	Interior	Yes	Indeterminate[b]	No, due to a lack of substantial evidence that the project is technologically capable of operating in this mode.
Provide a minimum continuous year-round release of 10 cubic feet per second to the project's bypassed reach, or inflow to the project, whichever is less.	Interior	Yes	$0	Yes
Develop and implement a stream flow and water level monitoring plan.	Interior	Yes	$1,190	No, due to a lack of substantial evidence to support the provision to limit downstream water level fluctuations to 25 percent of the mean depth.

Recommendation	Agency	Within the scope of 10j?	Annualized Cost[a]	Adopted?
Monitor downstream water levels during a 1-year ice-free period to evaluate the effectiveness of the shutdown and startup procedures.	Interior	No, monitoring could have been conducted during pre-licensing (i.e., the monitoring constitutes a pre-licensing study) and, therefore, is not within the scope of section 10(j).	$1,190	No, results of Cornell's flow observation study support staff's recommended shutdown and startup procedures.
Routinely monitor and maintain the project's trash racks such that no openings greater than 1-inch are present.	Interior	Yes	$160	No, limited benefits would not justify the costs.
Develop a final Northern Long-eared Bat and Bald Eagle Management Plan, following consultation with FWS and New York DEC.	Interior	Yes	$2,400	Yes
Develop a final Invasive Plant Species Management Plan, following consultation with FWS and New York DEC.	Interior	Yes	$2,400	Yes

Recommendation	Agency	Within the scope of 10j?	Annualized Cost[a]	Adopted?
In consultation with the FWS and New York DEC, develop and implement a sediment management plan.	Interior	Yes	$1,190	Yes

[a] Cost estimated by staff (*see* section 5.1.2 above).

[b] Costs related to any required new or upgraded equipment and expenses incurred due to compliance violations cannot be accurately estimated.

Instantaneous Run-of River Operation

As discussed in section 3.3.2.2, *Environmental Effects*, *Project Operation and Impoundment Level*, Interior has not described how the recommended instantaneous run-of-river operation would provide additional protections or benefits to aquatic biota over those of the existing condition. Further, there is no evidence to suggest that the project is technologically capable of operating under conditions where outflow from the project equals inflow. Therefore, this recommended measure may be inconsistent with the substantial evidence standard of section 313(b) of the FPA.

Stream Flow and Water Level Monitoring Plan

In its recommendation to develop and implement a stream flow and water level monitoring plan, and in reference to Cornell's proposed shutdown and startup procedures, Interior defines minimizing downstream water level fluctuations as limited to less than 25 percent of the mean depth of Fall Creek. However, as discussed in section 3.3.1.2, *Environmental Effects*, *Downstream Water Level Monitoring*, Commission staff finds that the 25 percent criterion is not supported by any biologically meaningful evidence and, given the dominance of shallow sheet flow in the area, would not be representative of the uniquely deeper and more complex habitats that provide refugia for aquatic biota.

Therefore, we are making a preliminary determination that Interior's section 10(j) recommendation to develop and implement a stream flow and water level monitoring plan with respect to the 25 percent criterion is inconsistent with the substantial evidence standard of section 313(b) of the FPA.

Trash Rack Monitoring

Interior recommends that Cornell conduct visual inspections of the project's intake trash racks to ensure maintenance of the existing clear bar spacing. Any openings exceeding 1 inch would require prompt repair. Inspections would occur within 1 year of license issuance and no more than every 5 years thereafter, requiring a report of the inspection for review by FWS and New York DEC. As discussed in section 3.3.2.2, *Environmental Effects*, *Fish Protection*, any deviations in the bar spacing of the project's trash racks would likely be relatively small and localized. Given that the burst swimming speeds of most resident fishes in the impoundment far exceed approach velocities at the project intake, defects in the trash racks would have little to no effect on impingement and entrainment mortality and would not be worth the cost. Therefore, we are making a preliminary determination that Interior's section 10(j) recommendation for trash rack monitoring may be inconsistent with the comprehensive development and public interest standards of sections 10(a) and 4(e) of the FPA.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 United States Code § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed eight comprehensive plans that are applicable to the Cornell Project, located in New York.[63] No inconsistencies were found.

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[63] (1) National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993. (2) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. (3) U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. (4) New York Department of Environmental Conservation. 1985. New York State Wild, Scenic, and Recreational River System Act. Albany, New York. March 1985. (5) New York Department of Environmental Conservation. 1986. Regulation for administration and management of the wild, scenic, and recreational rivers system in New York State excepting the Adirondack Park. Albany, New York. March 26, 1986. (6) New York State Office of Parks, Recreation, and Historic Preservation. New York Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2003-2007. Albany, New York. January 2003. (7) Adirondack Park Agency. 1985. Adirondack Park state land master plan. Ray Brook, New York. January 1985. (8) Adirondack Park Agency. n.d. New York State wild, scenic, and recreational rivers system field investigation summaries. Albany, New York.

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Cornell Project is relicensed with our recommended measures, the project would operate while providing enhancements and protective measures for aquatic, terrestrial, and cultural resources in the project area.

Based on our independent analysis, issuance of a new license for the Cornell Project, with additional staff-recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment.

7.0 LITERATURE CITED

The literature cited in this EA is presented as Appendix D.

8.0 LIST OF PREPARERS

The list of preparers of this EA is presented as Appendix E.

APPENDIX A

STATUTORY AND REGULATORY REQUIREMENTS

Federal Power Act

Section 18 Fishway Prescription

Section 18 of the FPA, 16 United States Code (U.S.C.) § 811, states that the Commission is to require construction, maintenance, and operation by a licensee of such fishways as may be prescribed by the Secretary of the U.S. Department of Commerce or the Secretary of the U.S. Department of the Interior (Interior). By letter dated March 23, 2020, Interior requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

Section 10(j) Recommendations

Under section 10(j) of the FPA, 16 U.S.C. § 803(j), each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

On March 23, 2020, Interior timely filed eight recommendations under section 10(j), as summarized in table 10 of section 5.3, *Recommendations of Fish and Wildlife Agencies*. In section 5.3, we also discuss how we address the agency's recommendations and how they comply with section 10(j).

Section 10(a) Recommendations

Under section 10(a) of the FPA, each hydroelectric license issued by the Commission must be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce; for the improvement and utilization of waterpower development; for the adequate protection, mitigation, and enhancement of fish and wildlife; and for other beneficial public uses, including irrigation, flood control, water supply, recreation, and other purposes.

On March 23, 2020, Interior filed one recommendation under section 10(a). We discuss this section 10(a) recommendation in sections 3.3.3.2 and 5.1.3 of this EA.

Clean Water Act

Under section 401(a)(1) of the Clean Water Act, 33 U.S.C. § 1341(a)(1), a license applicant must obtain either a water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from a project would comply with applicable provisions of the Clean Water Act, or a waiver of the certification by the appropriate state agency. The failure to act on a request for certification within a reasonable period of time, not to exceed one year, after receipt of the request constitutes a waiver.

On March 23, 2020, Cornell applied to the New York State Department of Environmental Conservation (New York DEC) for certification for the Cornell Project. New York DEC received the application on the same day.[64] New York DEC has not yet acted on the certification request. The certification is due by March 23, 2021.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1536, requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species. On January 30, 2020, Commission staff requested an official species list for the project through the U.S. Fish and Wildlife Service's (FWS) Information for Planning and Conservation (IPaC) system, which indicated that one federally listed species, the threatened northern long-eared bat (*Myotis septentrionalis*), has the potential to occur within the project boundary.[65] There are no proposed or designated critical habitats in the project area.

Our analysis of project effects on the northern long-eared bat is presented in section 3.3.4, *Threatened and Endangered Species*, and our recommendations are included in section 5.1, *Comprehensive Development and Recommended Alternative*. Based on the available information, we conclude that relicensing the project, with Cornell's proposed Northern Long-eared Bat and Bald Eagle Management Plan filed as Appendix D of the license application, may affect the northern long-eared bat, but any incidental take that may result from these activities is not prohibited under the final 4(d) rule. In a letter filed March 23, 2020, Interior indicates that, based on the measures in

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[64] Cornell filed a copy of the receipt of delivery of the application to New York DEC on March 23, 2020.

[65] *See* January 30, 2020, official species list memorandum.

Cornell's proposed Northern Long-eared Bat and Bald Eagle Management Plan[66] (i.e., size and timing restrictions for tree clearing), the project is not likely to adversely affect the northern long-eared bat. Therefore, no further consultation under the ESA is required regarding the northern long-eared bat.

Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. §1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state's coastal zone management agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 6 months of its receipt of the applicant's certification.

In a May 4, 2016, e-mail filed with Cornell's pre-application document, the New York State Department of State indicates that the Cornell Project is not located within New York State's coastal zone, and the agency does not anticipate that the project would have an effect on coastal uses or resources within New York State's coastal area.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, requires that a federal agency "take into account" how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

Commission staff designated Cornell as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA on August 9, 2016. Pursuant to section 106, and as the Commission's designated non-federal representative, Cornell initiated consultation with the New York State Office of Parks, Recreation, and Historic Preservation, which functions as the New York State Historic Preservation Office (New York SHPO), and potentially affected tribes to identify historic properties, determine National Register eligibility, and assess potential adverse effects on historic properties within the project's area of potential effects (APE). Cornell conducted a Phase 1-A Literature Review and Sensitivity Assessment for this relicensing. Four National Register-listed properties were found within the APE. The project itself is potentially eligible for inclusion in the National Register due to its historical association with Cornell

[66] In its March 23, 2020, letter, Interior refers to this plan as the Northern Long-eared Bat and Bald Eagle *Protection* Plan. For consistency with Cornell's proposal, this EA uses Northern Long-eared Bat and Bald Eagle *Management* Plan.

and the Hydraulics Laboratory. The results of the investigation indicate that continued project operation is not likely to affect cultural resources in the APE but that a historic properties management plan (HPMP) would provide proper management of the existing project features and specific guidance if archaeological discoveries were made during future project improvement activities.

In a letter dated March 26, 2018, and filed with the final license application, the New York SHPO agrees with Cornell's recommendation to develop an HPMP. To address potential effects to historic properties identified within the APE, Cornell proposes to develop an HPMP within 12 months of any new license issued for the project. The HPMP would direct the long-term management of historic properties and archaeological sites within the APE, including measures to avoid, minimize, or mitigate adverse effects on historic properties throughout the term of a new license.

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) with the New York SHPO for the protection of historic properties within the project's APE from the effects of continued operation and maintenance of the Cornell Project. The terms of the PA would ensure that Cornell addresses and treats any adverse effects to historic properties identified within the APE through the development of an HPMP.

APPENDIX B

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Issuing a Non-power License

A non-power license is a temporary license that the Commission would terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no agency has suggested a willingness or ability to take over the project. No party has sought a non-power license, and we have no basis for concluding that the Cornell Project should no longer be used to produce power.

Federal Government Takeover

Federal takeover and operation of the Cornell Project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the project.

Project Retirement

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing in most cases.[67] Decommissioning can be accomplished in different ways depending on the project, its environment, and the particular resource needs.[68] For these reasons, the Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or a participant in a relicensing proceeding

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[67] *See, e.g.*, *Eagle Crest Energy Co*., 153 FERC ¶ 61,058, at P 67 (2015); *Pub. Util. Dist. No. 1 of Pend Oreille Cnty.*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc*., 111 FERC ¶ 61,327, at PP 35-38 (2005).

[68] In the unlikely event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission." 18 C.F.R. § 6.2 (2020). This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative.[69]

Cornell does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; as such, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis.

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[69] *See generally Project Decommissioning at Relicensing*; Policy Statement, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); *see also City of Tacoma, Wash.*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

APPENDIX C

COST OF ENVIRONMENTAL MEASURES

Enhancement / Mitigation Measure	Entity	Capital Cost[a] (2020$)	Annual Cost[a] (2020$)	Levelized Annual Cost[b] (2020$)
Geology and Soils				
1. Develop and implement a sediment management plan that includes criteria for larger-scale dredging within the project impoundment, and consultation with the resource agencies.[c]	Interior, Staff	$5,000[d,e]	$1,000[d]	$1,190
Aquatic Resources				
2. Continue operating the project in a run-of-river mode where outflow downstream of the project tailrace approximates inflow to the project impoundment.	Cornell, Staff	$0	$0	$0
3. Operate the project in a run-of-river mode where instantaneous inflow to the project impoundment equals outflow downstream at the project tailrace.	Interior	Indeterminate[f]		
4. Continue providing a minimum flow of 10 cfs or inflow to the project, whichever is less.	Cornell, Interior, Staff	$0	$0	$0
5. Operate the project using stepwise shutdown and startup procedures.	Cornell, Staff	$0	$2,530[d]	$2,000
6. Develop and implement a stream flow and water level monitoring plan that includes methods to ensure: (1) the release of any required bypassed reach flows	Interior	$5,000[d,e]	$1,000[d]	$1,190

Enhancement / Mitigation Measure	Entity	Capital Cost[a] (2020$)	Annual Cost[a] (2020$)	Levelized Annual Cost[b] (2020$)
under all impoundment elevations, (2) the impoundment elevation is generally maintained at or above the spillway crest, and (3) that controlled shutdown and startup procedures limit downstream water level fluctuations to less than 25 percent of the mean depth of Fall Creek.				
7. Develop and implement a stream flow and water level monitoring plan that includes methods to ensure: (1) the release of any required bypassed reach flows under all impoundment elevations, (2) the impoundment elevation is generally maintained at or above the spillway crest, and (3) the implementation of controlled shutdown and startup procedures.	Cornell, Staff	$5,000[d,e]	$1,000[d]	$1,190
8. Routinely monitor and maintain the project's trash racks such that no openings greater than 1 inch are present.	Interior	$0	$200[d]	$160
9. Monitor downstream flows during a 1-year ice-free period to evaluate the effectiveness of the shutdown and startup procedures	Interior	$0	15,000[d]	$11,850
10. If needed, replace the existing trash racks with 0.914-inch clear bar spacing with trash racks with clear bar spacing of 1 inch or less	Cornell	$20,000[d]	$2,500[d]	$3,570
Terrestrial Resources and Threatened and Endangered Species				
11. Implement the proposed Northern Long-eared Bat and	Cornell	$5,050	$2,530	$2,400

Enhancement / Mitigation Measure	Entity	Capital Cost[a] (2020$)	Annual Cost[a] (2020$)	Levelized Annual Cost[b] (2020$)
Bald Eagle Management Plan.				
12. Develop a final Northern Long-eared Bat and Bald Eagle Management Plan, following consultation with FWS and New York DEC.	Interior, Staff	$5,050	$2,530	$2,400
13. Implement the proposed Invasive Plant Species Management Plan, following consultation with FWS and New York DEC.	Cornell	$5,050	$2,530	$2,400
14. Develop a final Invasive Plant Species Management Plan, following consultation with FWS and New York DEC.	Interior, Staff	$5,050	$2,530	$2,400
Cultural Resources				
15. Develop and implement an HPMP.	Cornell, Staff	$25,250	$5,050	$6,010

[a] Unless otherwise noted, all cost estimates are from Cornell, escalated to 2020 dollars. Commission staff reviewed these costs and determined that they are reasonable estimates.

[b] All capital and annual costs are converted to equal costs over a 30-year period to give a uniform basis for comparison.

[c] Staff estimates that its modification to Interior's recommended sediment management plan would be included in the plan's cost.

[d] Cost estimated by staff.

[e] The estimated value only considers administrative costs of producing a plan and not the cost of implementing its measures.

[f] Costs related to any required new or upgraded equipment and expenses incurred due to compliance violations cannot be accurately estimated.

APPENDIX D

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APPENDIX E

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