

**ENVIRONMENTAL ASSESSMENT  
FOR  
HYDROPOWER LICENSE**

Oak Orchard Hydroelectric Project  
FERC Project No. 3452-017  
New York

Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Licensing  
888 First Street, NE  
Washington, D.C. 20426

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## ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
barge canal	New York State Barge Canal
BMP	Best Management Practice
Canal Corporation certification	New York State Canal Corporation water quality certification
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeters
Commission	Federal Energy Regulatory Commission
CRIS	Cultural Resources Information System
CSO	combined sewer overflows
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
°F	degrees Fahrenheit
EA	environmental assessment
ESA	Endangered Species Act
ft/s	feet per second
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
Historic District Interior	New York State Barge Canal Historic District U.S. Department of the Interior
IPaC	Information for Planning and Conservation System
kW	kilowatt
mg/l	milligrams per liter
mgd	million gallons per day
MW	megawatt
MWh	megawatt-hours
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
National Register	National Register of Historic Places
NERC	North American Electric Reliability Corporation
New York DEC	New York Department of Environmental Conservation
NPCC	Northeast Power Coordinating Council
ROR	run-of-river
RM	river mile
SHPO	State Historic Preservation Office
SPDES	State Pollution Discharge Elimination System
U.S.C.	United States Code
USGS	U.S. Geological Survey

Trout Unlimited  
WWTP

New York State Council of Trout Unlimited  
Wastewater Treatment Plant

# ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Licensing  
Washington, D.C.

## Oak Orchard Hydroelectric Project FERC Project No. 3452-017 – New York

### 1.0 INTRODUCTION

#### 1.1 APPLICATION

On June 28, 2019, Erie Boulevard Hydropower, L.P. (Erie), filed an application for a subsequent license with the Federal Energy Regulatory Commission (Commission or FERC) to continue operating the Oak Orchard Hydroelectric Project (Oak Orchard Project or project) (FERC Project No. 3452).<sup>1</sup> The 350-kilowatt (kW) Oak Orchard Project is located adjacent to the New York State Canal Corporation's (Canal Corporation) Barge Canal (barge canal) in the Village of Medina, Orleans County, New York (figure 1). The project does not occupy federal land. The estimated average annual generation of the project (2009 to 2016) is 1,147 megawatt-hours (MWh). Erie 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 Oak Orchard 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 Erie for the Oak Orchard 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, and water supply), the Commission must give equal consideration to

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<sup>1</sup> An original license for the project was issued on July 15, 1981, for a term of 40 years, with an effective date of July 1, 1981, and an expiration date of June 30, 2021. *See Niagara Mohawk Power Corporation*, 16 FERC ¶ 62,044 (1981). The original license was issued to Niagara Mohawk Power Corporation and transferred to Erie pursuant to an order issued July 26, 1999. *See Niagara Mohawk Power Corporation*, 88 FERC ¶ 62,082 (1999), *reh'g denied*, 90 FERC ¶ 61,148 (2000).

the purposes of: (1) energy conservation; (2) the protection, 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.

Issuing a subsequent license for the Oak Orchard Project would allow Erie to continue to generate electricity at the project for the term of the subsequent 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)<sup>2</sup> of 1969 to assess the environmental and economic effects associated with operation of the project, alternatives to the project, and makes recommendations to the Commission on whether to issue a subsequent 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: (a) continued project operation as proposed in the application and as specified in the Oak Orchard Hydroelectric Project Offer of Settlement (Settlement Agreement) (proposed action); and (b) the proposed action with our recommended measures (staff alternative). We also consider the effects of the no-action alternative. The primary issue associated with relicensing the project is the effects of continued operation on fish protection.

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<sup>2</sup> 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. 43,304), which was effective as of September 14, 2020; however, the NEPA review of this project was in process at that time and was prepared pursuant to CEQ's 1978 NEPA regulations.

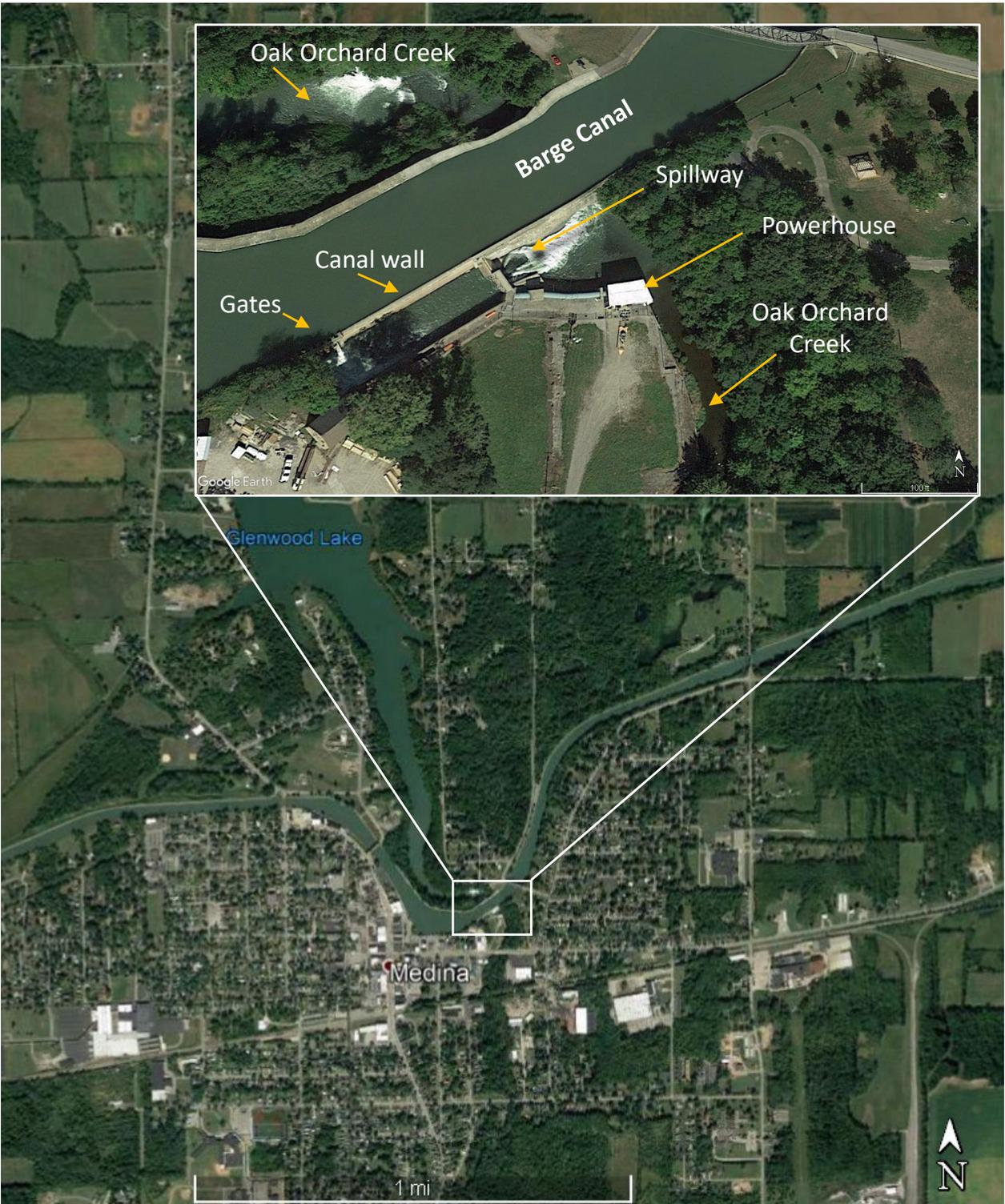


Figure 1. Location and facilities of the Oak Orchard Project (Source: Google Earth and staff).

## **1.2.2 Need for Power**

The Oak Orchard Project serves the State of New York's power system and has an installed capacity of 350 kW and a dependable capacity of 250 kW. It generates an average of approximately 1,147 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 megawatts (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 Amendment to the New York State Energy Plan sets forth a goal for the state utilities to source 70 percent of their electric generation from renewable energy sources by 2030. If issued a new license, the power from the Oak Orchard Project would also help meet the renewable energy goal of the state.

## **1.3 STATUTORY AND REGULATORY REQUIREMENTS**

Any license for the Oak Orchard Project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described in the following sections.

### **1.3.1 Federal Power Act**

#### **1.3.1.1 Section 18 Fishway Prescriptions**

Section 18 of the Federal Power Act states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the Interior. The U.S. Department of the Interior (Interior), by letter filed April 22, 2020, requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

### **1.3.1.2 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 April 22, 2020, Interior timely filed four recommendations under section 10(j), as summarized in table 9, in section 5.3, *Fish and Wildlife Agency Recommendations*. In section 5.3, we also discuss how we address the recommendations and how they comply with section 10(j).

### **1.3.1.3 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 April 22, 2020, Interior filed one recommendation under section 10(a), as summarized in table 8, for a project operation measure consistent with Erie's existing and proposed project operation. We discuss this section 10(a) recommendation in sections 3 and 5 of this EA.

## **1.3.2 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 April 21, 2020, Erie applied to the New York State Department of Environmental Conservation (New York DEC) for a section 401 certification for the Oak Orchard Project. New York DEC received the application April 22, 2020.<sup>3</sup> New York DEC has not yet acted on the certification request.

### 1.3.3 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 September 4, 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.<sup>4</sup> The list shows that there are no federally listed species presently known to occur within the project boundary. Nevertheless, the project is located within the range of the northern long-eared bat, and as discussed in section 3.3.4, *Threatened and Endangered Species*, other information in the project record demonstrates that this species could occur within the project impact area.

An analysis of project effects on northern long-eared bat is presented in section 3.3.4, *Threatened and Endangered Species*, and staff's recommendations are included in section 5.1, *Comprehensive Development and Recommended Alternative*. Based on the available information, we conclude that relicensing the project, with Erie's proposed Northern Long-eared Bat Management Plan,<sup>5</sup> may affect the northern long-eared bat, but incidental take that may result from continued operation and maintenance of the Oak Orchard Project is not prohibited under the final 4(d) rule.<sup>6</sup> Staff's conclusion is consistent with Interior's letter, dated April 22, 2020, that states that, based on the measures outlined in Erie's Northern Long-eared Bat Management Plan, any

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<sup>3</sup> On April 23, 2020, Erie filed a copy of the receipt of delivery and email sent to New York DEC.

<sup>4</sup> See official species list memorandum, filed September 4, 2020.

<sup>5</sup> The Northern Long-eared Bat Management Plan was included in Appendix A of the final license application, filed on June 28, 2019.

<sup>6</sup> On January 14, 2016, FWS issued a final 4(d) rule regarding the northern long-eared bat that prohibits the following activities in areas of the country impacted by white-nose syndrome: 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, 2016a).

take that may occur incidental to the Oak Orchard Project is not prohibited under the final 4(d) rule, and no further ESA coordination or consultation is required for the relicensing of the Oak Orchard Project. Therefore, no further consultation under the ESA is required regarding the northern long-eared bat.

### **1.3.4 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 Erie's certification.

In an e-mail dated December 3, 2015, and filed with Erie's license application, the New York State Department of State indicates that the Oak Orchard Project is not located within New York State's coastal zone and the agency does not anticipate the need for a consistency review because effects on the coastal zone are unlikely.

### **1.3.5 National Historic Preservation Act**

Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108, requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.<sup>7</sup> Historic properties are those that are listed or eligible for listing on 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 state historic preservation office (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 on the National Register. Cultural resources represent things, structures, places, or

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<sup>7</sup> 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 Code of Federal Regulations (C.F.R.) § 800.16(y). Here, the undertaking is the potential issuance of a new license for the Oak Orchard Project.

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.

Commission staff designated Erie as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA on August 10, 2016. Pursuant to section 106, and as the Commission's designated non-federal representative, Erie initiated consultation with the New York State Office of Parks, Recreation, and Historic Preservation, which functions as the New York SHPO, 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).

By letter filed by Erie on August 5, 2019, the New York SHPO stated that while the project is not eligible for listing in the National Register, the barge canal, which is adjacent to the project, is a National Historic Landmark. The New York SHPO concluded that the new construction, including replacement of trash racks and the installation of a plunge pool on the concrete spillway apron, would have no visual impact on the canal. Therefore, the New York SHPO states that the project would have no adverse effect on historic resources. Based on the information provided and comments from the New York SHPO, we conclude that relicensing the project would not adversely affect any historic properties.

The Commission and Erie invited consultation with the Cayuga Nation of New York, Oneida Indian Nation, Onondaga Nation of New York, Saint Regis Mohawk Tribe, Seneca Nation of Indians, and Tuscarora Nation of New York tribes. No tribes responded to the initial consultation letter or filed any comments in the record of the proceeding.

## **1.4 PUBLIC REVIEW AND COMMENT**

The Commission's regulations (18 C.F.R § 16.8) require an applicant to 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, ESA, NHPA, and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

### **1.4.1 Scoping**

Before preparing this EA, we conducted scoping for the Oak Orchard Project to determine what issues and alternatives should be addressed. A scoping document (SD1) was issued on January 14, 2020. It was noticed in the *Federal Register* on January 22, 2020. No entities filed substantive comments on SD1; therefore, staff did not prepare a revised scoping document.

## 1.4.2 Interventions

On December 16, 2019, the Commission issued a notice accepting the license application. The notice set February 14, 2020, as the deadline for filing protests and interventions. In response to the notice, the following entities filed interventions:

<u>Intervenors</u>	<u>Date Filed</u>
Interior	February 3, 2020
New York DEC	February 13, 2020

## 1.4.3 Comments on the Application

On February 26, 2020, the Commission issued a Ready for Environmental Analysis notice setting April 26, 2020 as the deadline for filing comments, recommendations, terms and conditions, and prescriptions. The following entity commented:

<u>Commenting agency</u>	<u>Date Filed</u>
Interior	April 22, 2020

## 1.5 SETTLEMENT AGREEMENT

Erie, on behalf of itself, FWS, New York DEC, and New York State Council of Trout Unlimited (Trout Unlimited) filed a Settlement Agreement as part of the Final License Application. The Settlement Agreement purports to resolve, among the settling parties, various issues associated with issuance of a new license for the project, including project operation, fisheries, and wildlife.

## 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 as the baseline environmental condition for comparison with other alternatives.

#### 2.1.1 Existing Project Facilities

The project is located adjacent to the Canal Corporation's barge canal and discharges into Oak Orchard Creek in the town of Medina in Orleans County, New York (figure 1).

The Oak Orchard Project consists of: (1) a 53.33-foot-long concrete gravity dam containing a 19.33-foot-wide, 14-foot-high spillway with a crest elevation of 507.6 feet<sup>8</sup> surmounted by 2-foot-high flashboards and two 5-foot-wide, 5-foot-high low-level flood gates controlled by hand-crank slide gates; (2) a forebay with a surface area of 0.25 acre and a storage capacity of 3 acre-feet at the normal pool elevation of 509.6 feet; (3) an intake structure, which is a concrete gravity structure and a crest elevation of 512.2 feet, with trash racks; (4) a 7-foot-diameter, 85-foot-long welded steel penstock from the intake to the turbine; (5) a 43-foot-wide, 20-foot-long brick structure powerhouse containing a single turbine-generator unit with a rated capacity of 350 kW; (6) a tailrace located on the left (west) bank of Oak Orchard Creek; (7) a 55-foot-long underground generation lead; (8) three single-phase, 167 kilovolt-ampere pole-mounted power transformers that step power up to 13.2-kilovolts for interconnection to the local grid; (9) a 400-foot-long gravel access road, which is located off East Center Street/Highway 31 and leads to the project powerhouse; and (10) appurtenant facilities.

The project boundary includes the forebay, intake structure, powerhouse, tailrace, and switchyard.

#### 2.1.2 Project Safety

The Oak Orchard Project has been operating for more than 39 years under the existing license issued in 1981, and during this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency, and safety of operations, compliance with the

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<sup>8</sup> All elevation values reported herein are the National Geodetic Vertical Datum of 1929 (NGVD29).

terms of the license, and proper maintenance. As part of the relicensing process, Commission staff will evaluate the continued adequacy of the proposed project facilities under a subsequent license. Special articles would be included in any license issued, as appropriate. Commission staff will continue to inspect the project during the subsequent 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.

### **2.1.3 Current Project Operation and Environmental Measures**

The project's forebay is maintained at an elevation of 509.6 feet with the 2-foot-high flashboards. Erie operates the project off flows provided to it from the adjoining barge canal during the navigation season, which historically has been from mid-April to mid-November. However, since 2017, the navigation season has been shorter, from mid-May through mid-October; this shortened navigation season will continue at least through 2021.<sup>9</sup> During the navigation season, the Canal Corporation provides approximately 225 cubic feet per second (cfs) of surplus canal water to the Oak Orchard Project. Under normal operating conditions, Erie uses approximately 200 cfs of the provided water for the generation of electricity and the remaining water (approximately 25 cfs) is discharged directly to Oak Orchard Creek via the project's spillway. The Canal Corporation does not supply water to the Oak Orchard Project during the non-navigation season.

During high-flow conditions in the navigation season, additional flow (> 225 cfs) may be released by the Canal Corporation to the project for maintaining the proper pool elevations in the barge canal downstream of the project. When barge canal flows greater than 225 cfs released into the project forebay approach a pool elevation of 511.5 feet, the two 5-foot-wide, 5-foot-high low-level flood gates are opened by Erie to release excess flow into Oak Orchard Creek. This operational procedure prevents flows from overtopping of the forebay concrete wall with a crest elevation of approximately 512.0 feet.

The minimum hydraulic capacity is not applicable since the project is only operated at maximum hydraulic capacity of 200 cfs.

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<sup>9</sup> <http://www.canals.ny.gov/boating/hours.html>;  
<http://www.canals.ny.gov/news/pressrel/2018/Canal-Directors-Approve-Three-Year-Waiver-of-Recreational-Boat-Tolls.html>.

## **2.2 ERIE’S PROPOSAL**

### **2.2.1 Proposed Project Facilities**

As described in the Settlement Agreement, Erie proposes to install new seasonal fish passage and protection infrastructure, including year-round trash racks with 1-inch clear spacing, and a seasonal plunge pool downstream of the spillway.

### **2.2.2 Proposed Project Operation and Environmental Measures**

As described in the license application and Settlement Agreement, Erie proposes the following operational and environmental measures:

- Continue to operate the Oak Orchard project based on seasonal water (approximately 225 cfs) provided by the Canal Corporation, of which approximately 200 cfs would be used for power generation and the remaining (approximately 25 cfs) would be released over the spillway into Oak Orchard Creek (section 3.1.1 of the Settlement Agreement);
- Upon replacement of any of the existing three trash rack sections, or within 20 years of the effective date of a subsequent license, install year-round trash racks with 1-inch clear spacing for the protection of adult game fish and other fish (section 3.2.1 of the Settlement Agreement);
- Install and maintain a 3-foot-wide by 14-inch-high flashboard notch to pass excess flow, with the option to add 8 inches of additional flashboard height, and a seasonal plunge pool downstream of the spillway within 24 months of the effective date of the subsequent license to support a “fish-friendly”<sup>10</sup> exit to Oak Orchard Creek (section 3.2.1 and appendix D of the Settlement Agreement);
- Implement the proposed Northern Long-eared Bat Management Plan (Appendix A of the Settlement Agreement);
- Implement the proposed Bald Eagle Management Plan (Appendix B of the Settlement Agreement); and

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<sup>10</sup> The Settlement Agreement defines “fish-friendly” as ensuring the safe downstream movement of fish through such measures as reducing the roughness of the passageway, reducing dispersion of the release across the passageway face, and having a plunge pool whose depth is equal to at least 25 percent of any vertical free-fall.

- Implement the proposed Invasive Species Management Plan (Appendix C of the Settlement Agreement).

## 2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would be operated as proposed by Erie and include the following staff-recommended measures:

- Develop an erosion and sediment control plan, in consultation with the resource agencies (New York DEC and FWS) for Commission approval, to minimize erosion and sedimentation during the construction of the proposed fish passage structures (flashboard notch and seasonal plunge pool); and
- Develop an operation compliance monitoring plan, for Commission approval, to document compliance with the proposed project operation.

## 2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

We considered one alternative<sup>11</sup> to Erie’s proposal, decommissioning the project, but eliminated it from further analysis because it is not a reasonable alternative in the circumstances of this case.

### 2.4.1 Project Decommissioning

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing in most cases.<sup>12</sup> Decommissioning can be accomplished in different ways depending on the project, its environment, and the particular resource needs.<sup>13</sup> For these reasons, the Commission does not speculate about possible

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<sup>11</sup> Because sections 14 and 15 of the Federal Power Act were waived in the original license issued for the project, neither issuing a non-power license nor federal takeover are applicable alternatives.

<sup>12</sup> See, e.g., *Eagle Crest Energy Co.*, 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc.*, 111 FERC ¶ 61,327, at PP 35-38 (2005).

<sup>13</sup> 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 (2019). This can include simply

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 demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative.<sup>14</sup>

Erie 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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shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

<sup>14</sup> See generally *Project Decommissioning at Relicensing*; Policy Statement, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); see also *City of Tacoma, Washington*, 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).

### 3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatics, recreation, etc.). Under each resource area, historic and current conditions are first described. 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 mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.<sup>15</sup>

#### 3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Oak Orchard Project is located adjacent to the barge canal, a 524-mile canal system which includes the Erie, Champlain, Oswego, and Cayuga-Seneca canals (figure 2). The portion of the barge canal from approximately Tonawanda to Syracuse flows easterly. West of the project, the barge canal obtains water from Tonawanda Creek, Ellicott Creek, and the Niagara River. Water diverted from the Niagara River is under the jurisdiction of the International Joint Commission and a 1950 treaty between the United States and Canada. There are 57 locks within the canal system, with the lock in closest proximity to the project, Lock E34-3, located to the west at river mile (RM) 320.7<sup>16</sup> in Lockport, New York.

The project is located at approximately RM 303.5 of the barge canal, within the Erie Canal section, and discharges into Oak Orchard Creek, which is part of the Oak Orchard watershed (figure 3) in Genesee and Orleans Counties and within the larger Western Lake Ontario Basin watershed. The Oak Orchard watershed encompasses approximately 275 square miles. The headwaters of Oak Orchard Creek are located north of the city of Batavia. The stream flows northeast through the town of Elba, then west through the towns of Oakfield and Alabama, and then flows north through the towns of Shelby and Medina. The project's tailrace discharges directly into Oak Orchard Creek and through the Medina Aqueduct, which flows under the barge canal and over Medina Falls. There are two dams on Oak Orchard Creek, the Glenwood Lake Dam and the Waterport Dam, both of which are located downstream from the Oak Orchard Project.

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<sup>15</sup> Unless otherwise noted, the sources of our information are Erie's license application filed on June 28, 2019, and Erie's response to our requests for additional information filed on November 4, 2019.

<sup>16</sup> River miles on the 338.74-mile-long Erie Canal segment of the barge canal are counted starting from the easternmost extent at its confluence with the Hudson River.

The Glenwood Dam is approximately 1.4 miles downstream from the project and impounds Glenwood Lake, a reservoir with an area of 92.6 acres, while the Waterport Dam is approximately 16 miles downstream of the project and impounds Waterport Pond (also known as Lake Alice). Oak Orchard Creek continues northward before discharging into Lake Ontario at Point Breeze Harbor, approximately 21 river miles downstream of the project.

The southern portion of the Oak Orchard watershed has the highest elevations (988 feet above sea level), while the northern portion at Lake Ontario has the lowest elevations (246 feet above sea level). Overall, slopes in the watershed are generally moderate, but there are also areas with steeper topography (e.g., Medina Falls). Main tributaries of Oak Orchard Creek include Brinningstool and Whitney Creeks, located upstream of the project, and Marsh, Beardsley, Fish, and Otter Creeks, which are located downstream of the project (Zollweg et al., 2005).

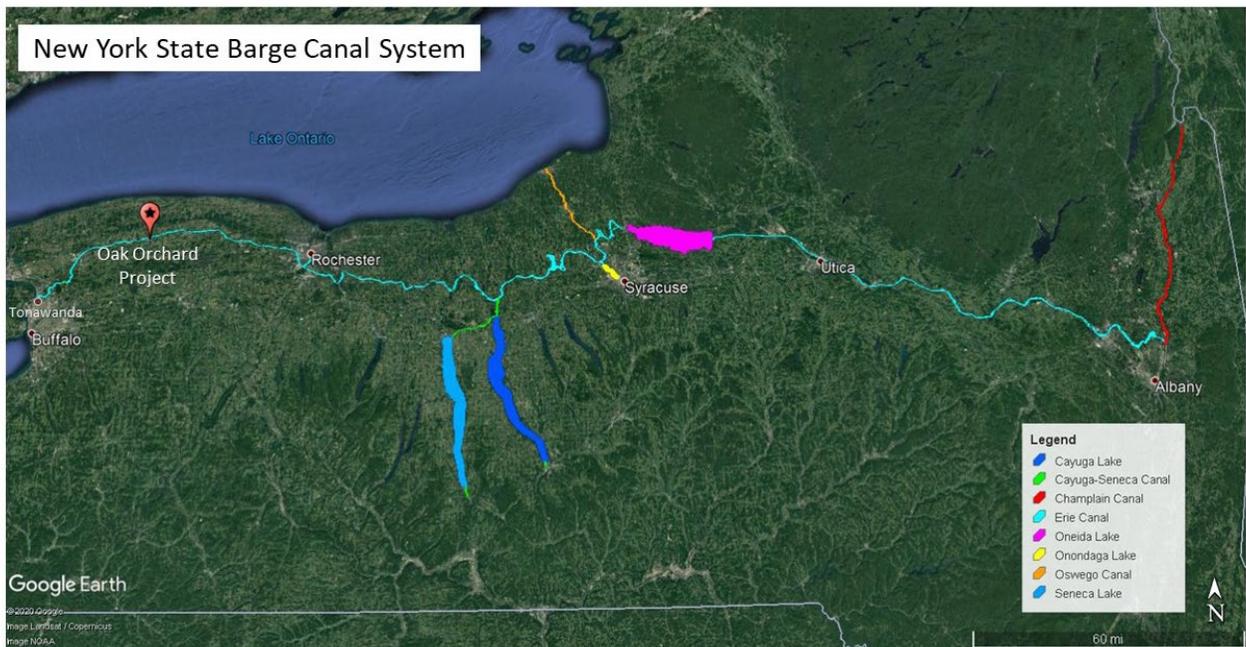


Figure 2. New York State barge canal system (Source: Google Earth, Canal Corporation, staff).

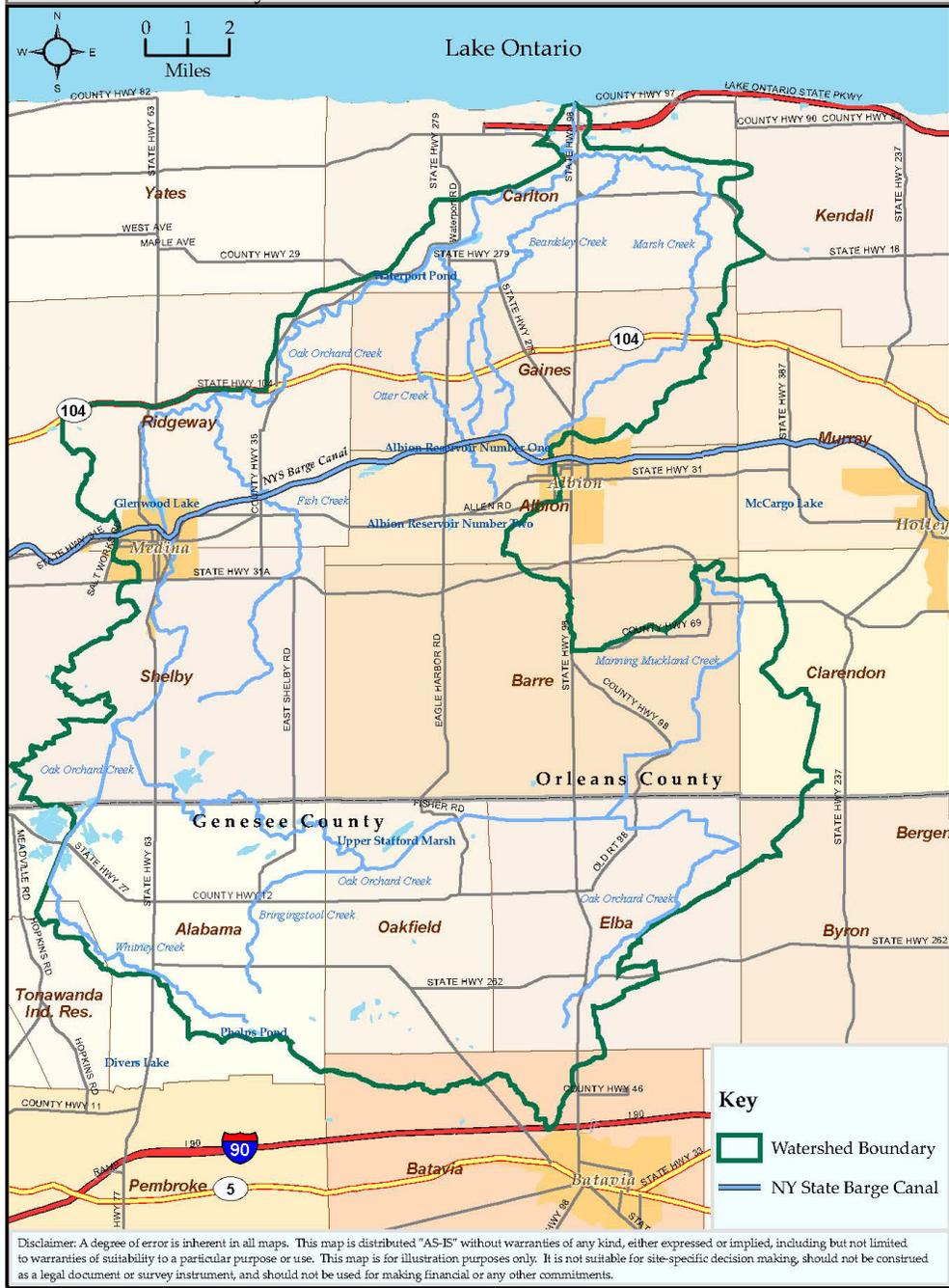


Figure 3. Map of Oak Orchard watershed (Source: Zollweg et al., 2005).

## **3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS**

According to the Council of Environmental Quality's regulations for implementing NEPA (40 C.F.R. § 1508.7 (2019)), a cumulative impact is the impact on the environment that 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 a period of time, including hydropower and other land and water development activities.

Based on our review of Erie's license application for the Oak Orchard Project, agency and public comments, and our independent analysis, we have identified no resources that could be cumulatively affected by the proposed continued operation of the project.

## **3.3 PROPOSED ACTION AND ACTION ALTERNATIVES**

In this section, we discuss the effects of the proposed action and 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 effects and any cumulative effects.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that geology and soils, aquatic, terrestrial, threatened and endangered species, recreation, land use, aesthetic, and cultural resources may be affected by the proposed action and action alternatives. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

### **3.3.1 Geology and Soil Resources**

#### **3.3.1.1 Affected Environment**

The Oak Orchard Project is located in the Erie and Ontario Lowlands physiographic province of New York State. Sediments, including clay, fine sand, limestone, rock salt, and gypsum, were deposited during the Ordovician to Devonian periods of the Paleozoic era, when the region was part of a continental sea, and eventually compacted into rock formations. Ordovician age bedrock are mostly sandstones and shales, Silurian to middle Devonian age bedrock is primarily limestone and dolostone, while late Devonian age bedrock consists mostly of shales with some interbedded siltstone and limestone. The paleozoic strata dip to the south at approximately one degree resulting in the exposure of younger bedrock to the south and

older bedrock to the north. The bedrock underlying the project site belongs to the Grimsby sandstone and shale formation of the Early Silurian Age, which is part of the Medina Group and Queenston formation. This formation consists mainly of red shale with varying amounts of interbedded red sandstone.

After deposition, lithification, uplift and erosion, the bedrock in western New York was then subjected to a long period of erosion prior to the glaciations. Pleistocene glaciations formed the surficial geology of the Ontario Lowlands physiographic province, including the Oak Orchard watershed, during the last two million years, leaving behind Pleistocene glacial till, kame deposits, lacustrine silt and clay, fluvial outwash sand and gravel, peat, and muck. A thin blanket of glacial till was spread across most areas. Distinct elliptical drumlins in the towns of Alabama, Oakfield, and Elba point to the southwest and mark the local ice advance flow direction. Brief pauses in ice retreat resulted in deposition of moraine ridges, with the Batavia, Albion, and Carlton moraines being the most notable in the Oak Orchard watershed.

Soils found in the immediate project area have primarily developed on glaciofluvial or glaciolacustrine deposits and glacial till. These soils are formed on glaciofluvial sands or water-sorted sand, gravel, and cobbles from glacial outwash and are generally derived from crystalline rock, siliceous igneous rock, or sandstone. The prominent ancient shoreline of Lake Iroquois (a precursor of Lake Ontario) crosses the Oak Orchard Watershed along New York State Route 104, located downstream from the project. Glacial till soils are typically formed in a loamy mantle overlying dense, sandy till found on drumlins, moraines, and glaciated uplands. The project area is dominated by Hilton loam, rock substrate of 3 to 8 percent slopes. The Hilton series consists of very deep, moderately well-drained soils derived from sandstone and limestone. Soils to the north of the project are classified as man-altered cut and fill land.

In the vicinity of the project, the stream banks of the barge canal are artificial and consist of vertical walls. Shorelines and stream banks of Oak Orchard Creek are primarily forested, with some exposed rock and ledges. Along Oak Orchard Creek, there are both sections with gradually sloped banks as well as steep slopes. The left descending bank of Oak Orchard Creek just upstream of the project powerhouse consists of old infrastructure (i.e., concrete walls). A portion of the right descending bank is also armored and the remaining portion of the shoreline within the project boundary is vegetated. In 1992, a new reinforced-concrete apron was added to the immediate downstream tailrace section of the project in order to address potential erosion that could occur as water is discharged to the creek. The Oak Orchard Project does not have an impoundment.

### **3.3.1.2 Environmental Effects**

#### Construction of Proposed Fish Passage and Protection Structures

During the Commission's scoping for this project, the effects of construction and operation of the proposed fish passage and protection structures on soil stability and sediment transport were identified by Commission staff as potential issues of concern. Erie is proposing to install a flashboard notch and seasonal plunge pool downstream of the spillway to pass excess flow and provide a "fish-friendly" exit for fish to Oak Orchard Creek. In addition, upon replacement of any of the existing three trash rack sections, or within 20 years of the effective date of the subsequent license, Erie proposes to install year-round trash racks with 1-inch clear spacing to protect adult game fish and other fish from entrainment.

#### *Staff Analysis*

Construction of the fish passage facility may temporarily disturb soil resources, which could result in limited sediment discharge into Oak Orchard Creek. Erie's proposal to install a new downstream fish passage facility would include creation of a plunge pool on the concrete apron immediately downstream of the spillway. As there is no existing pool or associated depth in this area, Erie anticipates using jersey barriers and/or a flashboard type system on the apron area to create 4-foot depth for the plunge pool. Developing an erosion and sediment control plan with procedures and best management practices (BMPs) to reduce erosion, contain sediment, and stabilize soils during and after completion of construction, would help to minimize turbidity and sedimentation associated with the minimal in-water disturbance.

### **3.3.2 Aquatic Resources**

#### **3.3.2.1 Affected Environment**

##### **Water Quantity and Use**

The Oak Orchard Project operates off of flows released from the barge canal by the Canal Corporation in support of navigation on the barge canal. Water has been released at this site since at least 1913. This water is discharged to Oak Orchard Creek through the project's powerhouse or spillway. The barge canal is dewatered outside of the navigation season.

While streamflow data is not available for Oak Orchard Creek at the project location, discharge has been measured at U.S. Geological Survey (USGS) Gage No. 04220045, located approximately 4.7 river miles upstream of the project near Shelby, New York. Monthly and annual flow estimates were calculated for the years 2008

through 2019.<sup>17</sup> The highest flows typically occur from December through April (table 1). The lowest monthly flows typically occur during August and September, when the median flows are less than 25 cfs. During the navigation season, the water released from the barge canal contributes approximately 225 cfs to Oak Orchard Creek at the project location.

Table 1. Historical monthly flow statistics at the USGS Gage No. 04220045 for years 2008-2019 (Source: USGS Gage No. 04220045, as modified by staff).

<b>Flow (cfs)</b>					
<b>Month</b>	<b>Minimum</b>	<b>90% Exceedance</b>	<b>Median</b>	<b>10% Exceedance</b>	<b>Maximum</b>
January	39.9	78.5	154	402	871
February	42	69.8	190	560.1	960
March	50	119	287	630	1,090
April	48.8	91.5	263	580.5	837
May	18	50	108	514	1,030
June	5.8	22.1	71.1	277.1	586
July	0.5	6.72	38.5	124	441
August	0.3	3.43	21	66.5	242
September	0.4	3.3	14.1	31.7	49.1
October	0.1	0.9	42.1	101	161
November	19	32.2	72.1	210	402
December	25.3	37.5	121.5	278.4	953
<b>Annual</b>	0.1	12.2	89.2	396	1,090

There are no water withdrawals in the immediate project vicinity. Municipal or industrial discharges to surface or ground waters of New York State require a State Pollution Discharge Elimination System (SPDES) permit from New York DEC. SPDES permits for discharges into Oak Orchard Creek have been issued to the Medina Wastewater Treatment Plant (WWTP) and Western New York Energy, LLC. The Medina WWTP has nine combined sewer overflows (CSOs), eight of which discharge to Oak Orchard Creek and one that discharges to the barge canal. Four of the CSOs that discharge into Oak Orchard Creek are located just upstream of the project, while the remaining four are located downstream. The WWTP is permitted to discharge a daily average or a daily maximum of up to 4.5 million gallons per day (mgd) of water into Oak Orchard Creek. Western New York Energy, LLC is located in the town of Shelby and releases noncontact cooling water into Oak Orchard Creek. The facility is allowed to discharge a daily average or daily maximum of up to 0.1 mgd of water with an established daily maximum water temperature limit of 90.0 degrees Fahrenheit (°F).

<sup>17</sup> Stream flow data were available through September 2019.

There are two hydroelectric facilities located on Oak Orchard Creek downstream of the project and one FERC conduit exempted facility on the barge canal within the Canal Corporation's Western Region, which includes the barge canal from Buffalo, New York to Oneida Lake. The Oak Orchard Project is approximately 1 mile upstream of the 1.3-MW Glenwood Project and 16 miles upstream of the 3.7-MW Waterport Project, neither of which are under FERC jurisdiction.<sup>18</sup> The 3-MW Hydraulic Race Project (P-2424), operating under a conduit exemption, is located approximately 20 miles west of the Oak Orchard Project along the barge canal.

### **Water Quality**

Waters in the project area, including Oak Orchard Creek and the barge canal, are currently classified by New York DEC as Class C waters. The best usage for Class C waters is fishing and should be suitable for fish, shellfish, and wildlife propagation and survival. Additionally, the water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. Water quality standards<sup>19</sup> for Class C waters are presented in table 2.

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<sup>18</sup> On December 19, 1967, Niagara Mohawk Power Corporation filed an application for a major license for its constructed Oak Orchard River Project (P-2667), which includes the Glenwood and Waterport developments, located on Oak Orchard River in the Towns of Ridgeway, Gaines, and Carlton, Orleans County, New York. On March 26, 1980, the Commission issued an order dismissing the application for Project No. 2667 due to lack of sufficient evidence that it was required to be licensed under subsection 23(b) of the FPA. *See Niagara Mohawk Power Corporation*, 10 FERC ¶ 62,253 (1980).

<sup>19</sup> See 6 NYSRR § 703.3 and 703.4.

Table 2. Water quality standards for Class C waters in New York (Source: license application, as modified by staff).

<b>Parameter</b>	<b>Standard</b>
pH	Shall not be less than 6.5 or more than 8.5.
Dissolved Oxygen	The minimum daily average shall not be less than 5.0 mg/L, and at no time shall the dissolved oxygen concentration be less than 4.0 mg/ L
Dissolved Solids	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L.
Total Coliform (number per 100 ml)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively.
Fecal Coliform (number per 100 ml)	The monthly geometric mean from a minimum of five examinations shall not exceed 200.

The most recent New York State Waterbody Inventory/Priority Waterbodies List (WI/PWL) for the Lake Ontario watershed includes water quality assessments for three segments within the project vicinity, including: (1) Middle Oak Orchard Creek – a 55.6-mile portion of the creek and selected tributaries from Waterport Pond to the barge canal at Medina, (2) Upper Oak Orchard Creek – the creek and all tributaries above the barge canal in Medina, and (3) the New York State barge canal Segment 2b – a 20.0-mile canal segment which extends from Middleport, New York to Holley, New York (New York DEC, 2017a). Segments were assessed based on 2015 biological survey data in the watershed, including macroinvertebrate and water quality sampling. The Middle Oak Orchard Creek segment was categorized as experiencing minor impacts due to nutrient loads, particularly phosphorous, from both urban/municipal and agricultural nonpoint runoff. In spite of these minor impacts, aquatic life is considered to be supported. The Upper Oak Orchard Creek segment is categorized as an impaired waterbody due to aquatic life uses that are known to be impaired by nutrient and sediment loads that enter the creek from the large area of cultivated mucklands along this reach. Previously, a WWTP in the Village of Elba, which discharges into a tributary of Oak Orchard Creek, was identified as a concern, and the town is working to correct the problem. The barge canal segment is categorized as unassessed due to inadequate recent data to evaluate uses and determine a water quality assessment. Neither of the segments are included on the current New York State Section 303(d) List of Impaired/TMDL Waters (New York DEC, 2016).

Water quality monitoring has been conducted at two USGS streamflow gages located in Oak Orchard Creek, with the closest site (No. 04220045) located approximately 4.7 river miles upstream of the project near Shelby, New York. Periodic water quality monitoring was conducted at this location from 2008 to September 2019. Sampling was conducted infrequently from 2008 through 2011; sampling generally occurred on a monthly basis for water temperature and specific conductivity from 2012 through 2019, and for dissolved oxygen (DO) and pH from 2014 through 2019. Water temperatures ranged up to 79.3 °F, while specific conductance ranged from 340 to 2,420 microsiemens per centimeter ( $\mu\text{S}/\text{cm}$ ). Dissolved oxygen concentrations were typically well above the minimum instantaneous state criterion of 4.0 milligrams per liter (mg/L), except for one reading of 2.9 mg/L in March 2015. The pH ranged from 6.6 to 8.2 units and was within the state water quality standard (6.5 to 8.5). Additional water quality sampling was conducted by New York DEC at the same location in 2010 from April through October. Similarly, the DO and pH values were within the state water quality standards.

### **Aquatic Habitat**

Upstream of the project, Oak Orchard Creek is a relatively small, meandering stream and includes some natural cover (e.g., large boulders, overhanging vegetation) for aquatic species. A riffle located approximately 300 feet upstream of the tailrace is followed by a longer run that transitions into the tailrace pool. The left descending bank of this section of Oak Orchard Creek consists of former infrastructure composed of concrete walls. A portion of the right descending bank is also armored with a stone wall and the remainder of the bank within the project boundary is vegetated. Immediately downstream of the project, Oak Orchard Creek passes through the Medina Aqueduct, which consists of a concrete arch with concrete walls on either side of the channel. Medina Falls is located approximately 350 feet downstream from the project. Downstream of the falls, Oak Orchard Creek transitions into Glenwood Lake. The reach below Medina Falls appears to have relatively steep slopes and has mature trees supporting the banks.

In the vicinity of the project, the barge canal is bordered by concrete walls and no structural or natural cover is available for fish species or other aquatic resources. The width of the barge canal ranges from 120 to 200 feet, and during the navigation season, the water depth ranges between 12 to 23 feet. The canal is drained following the conclusion of the navigation season. Aquatic habitat is similarly limited in the 3-acre project forebay. The average water depth within the forebay is 14.2 feet (with flashboards installed) and the maximum depth, located immediately in front of the project's intake, is 17.2 feet (from top of flashboards to bottom or forebay surface).

## Fishery Resources

### Fish Community

Oak Orchard Creek and the barge canal support a coolwater and warmwater recreational fishery. In its comments on the application, Interior states that northern pike, smallmouth bass, largemouth bass, and walleye are the key gamefish species being managed in Oak Orchard Creek and the barge canal in the vicinity of the project. Lower Oak Orchard Creek, downstream of the project, is a popular trout and salmon fishing destination.

The New York DEC conducted an electrofishing survey at four sites in the barge canal between Medina and Rochester in August 2005 to collect fish for analysis of chemical residues present in common game species. Target species collected in the survey included largemouth bass, smallmouth bass, yellow perch, and common carp (table 3). Other species observed during this survey included pumpkinseed, bluegill, spotfin shiner, golden shiner, white sucker, freshwater drum, and quillback.

Table 3. Target fish species and sizes collected in the barge canal by New York DEC in 2005 (Source: license application, as modified by staff).

Common Name	Scientific Name	Number Caught	Length Range (inches)
Common carp	<i>Cyprinus carpio</i>	9	20.9 – 28.4
Smallmouth bass	<i>Micropterus dolomieu</i>	11	9.6 – 14.8
Largemouth bass	<i>Micropterus salmoides</i>	25	7.2 – 16.4
Yellow perch	<i>Perca flavescens</i>	9	6.9 – 10.2

Available fish community data for Oak Orchard Creek near the project was collected by New York DEC in Glenwood Lake in 1991, 2004, and 2005 (table 4). The 1991 survey was conducted using gill nets and a bag seine to collect general fish community information. The 2004 study used a bag seine in a fish community survey to target lesser known fish species, while electrofishing was used for another fish community survey and to search for longear sunfish in 2005. A total of 2,269 fish were collected during these surveys, representing 30 species. The most common species collected were spotfin shiner, common carp, rosyface shiner, and emerald shiner, respectively.

The New York DEC regularly stocks lower Oak Orchard Creek with steelhead (rainbow trout), chinook, and coho salmon. In 2018, 130,560 3.2-inch chinook salmon, 12,220 2.4-inch coho salmon, and 31,560 4.5-inch steelhead were stocked in Oak Orchard Creek near Carlton, New York (New York DEC, 2019). In addition, 6,605 1.5-inch walleye were stocked in Waterport Pond. Brown trout and other salmonids are known to move into Oak Orchard Creek from Lake Ontario during spawning season

(Zollweg et al., 2005), but these species are not found as far upstream as the Oak Orchard Project due to downstream barriers including Waterport Falls, the Waterport Dam, the Glenwood Lake Dam, and Medina Falls.

Table 4. Fish species collected in Glenwood Lake by New York DEC (Source: license application, as modified by staff).

Common Name	Scientific Name	Number Caught		
		1991	2004	2005
Black crappie	<i>Pomoxis nigromaculatus</i>	13	-	-
Bluegill	<i>Lepomis macrochirus</i>	1	21	10
Bluntnose minnow	<i>Pimephales notatus</i>	-	110	4
Brook silverside	<i>Labidesthes sicculus</i>	-	82	10
Brown bullhead	<i>Ameiurus nebulosus</i>	-	-	2
Chain pickerel	<i>Esox niger</i>	-	2	-
Channel catfish	<i>Ictalurus punctatus</i>	7	-	-
Common carp	<i>Cyprinus carpio</i>	43	1	392
Emerald shiner	<i>Notropis atherinoides</i>	-	-	300
Freshwater drum	<i>Aplodinotus grunniens</i>	1	-	-
Gizzard shad	<i>Dorosoma cepedianum</i>	1	-	-
Golden redhorse	<i>Moxostoma erythrurum</i>	-	-	12
Golden shiner	<i>Notemigonus crysoleucas</i>	-	1	-
Greater redhorse	<i>Moxostoma valenciennesi</i>	-	-	2
Largemouth bass	<i>Micropterus salmoides</i>	-	3	13
Logperch	<i>Percina caprodes</i>	-	20	100
Mimic shiner	<i>Notropis volucellus</i>	-	54	5
Northern hog sucker	<i>Hypentilium nigricans</i>		-	1
Northern pike	<i>Esox Lucius</i>	1	-	-
Pumpkinseed	<i>Lepomis gibbosus</i>	1	35	1
Rock bass	<i>Ambloplites rupestris</i>	1	-	2
Rosyface shiner	<i>Notropis rubellus</i>	-	400	-
Shorthead redhorse	<i>Moxostoma macrolepidotum</i>	-	1	
Smallmouth bass	<i>Micropterus dolomieu</i>	1	5	5
Spotfin shiner	<i>Cyprinella spiloptera</i>	57	410	51
Striped shiner	<i>Luxilus chrysocephalus</i>	-	-	1
Unidentified suckers	<i>Catostomus spp.</i>	21	-	-
Walleye	<i>Sander vitreus</i>	1	-	-
White perch	<i>Morone Americana</i>	57	-	-
White sucker	<i>Catostomus commersoni</i>	6	-	-

## Macroinvertebrates and Mussels

No macroinvertebrate or mussel surveys have been conducted in the project vicinity. However, in a letter to Erie dated November 24, 2015, New York DEC stated that three freshwater mussel species have been documented nearby. The paper pondshell (*Utterbackia imbecillis*) and the pink heelsplitter (*Potamilus alatus*) were observed approximately 0.8 mile northeast of the project in the barge canal at an unspecified date during seasonal drawdown of the canal. In addition, the eastern pondmussel (*Ligumia nasuta*) has been observed downstream of Glenwood Lake. None of the observed species are federal or state listed.

Macroinvertebrate sampling was conducted in Oak Orchard Creek by New York DEC in 2015 in support of the update to New York's WI/PWL (New York DEC 2017b). The closest site to the Oak Orchard Project was located upstream of the project near Shelby, New York. The macroinvertebrate community included a mix of mayflies, caddisflies, amphipods, isopods, midges, flies, freshwater clams, and beetles.

### **3.3.2.2 Environmental Effects**

#### **Project Operation**

Erie proposes to continue the current project operation, using seasonal water provided to it by the Canal Corporation from the adjoining barge canal during the navigation season (section 3.1.1 of the Settlement Agreement). Erie states that water has been released at this location since at least 1913 and that while the Canal Corporation intends to continue providing approximately 225 cfs to the project throughout the navigation season, it has no control over the quantity or timing of the water provided. Under normal operating conditions, approximately 200 cfs would be used for power generation, which is the maximum hydraulic capacity of the project turbine. The remaining water (approximately 25 cfs) would be discharged into Oak Orchard Creek via the spillway, which would continue to be equipped with 2-foot-high flashboards. Erie states that while this flow is generally expected, the settlement parties agree that the 25 cfs should not be enforced as a minimum flow. Erie would have the option to add up to 8 inches of additional flashboard height to regain head losses associated with facilitating passage that would protect fish (discussed below). Normal operation would be curtailed or suspended if required by operating emergencies beyond the control of Erie.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and Trout Unlimited support Erie's proposed mode of operation. Interior's 10(a) recommendation includes operating the project as proposed by Erie in the Settlement Agreement.

### *Staff analysis*

Erie's proposal to continue its current project operation would make use of surplus water that is released in support of navigation while providing reasonable safeguards for environmental resources. As Erie acknowledges, the length and timing of the navigation season, as well as amount of water released to the Oak Orchard Project, is ultimately determined by the Canal Corporation and could be subject to change at their discretion. Historically, water has been released from the barge canal at the project location and into Oak Orchard Creek even after the hydroelectric project was retired in 1972.<sup>20</sup> The project was designed to use approximately 200 cfs for the generation of electricity. As described in the following section, approximately 25 cfs of excess water would be passed through a notch in the flashboards, and in combination with the downstream plunge pool, facilitate an exit into Oak Orchard Creek that would be protective of fish.

Erie does not specify how it would document compliance with the proposed operation measure contained in the Settlement Agreement. An operation compliance monitoring plan containing provisions for monitoring and keeping records of power generation and flow through the powerhouse, as well as establishing a schedule for reporting any operational deviations to the Commission would ensure compliance with the proposed mode of operation.

### **Fish Passage and Protection**

The passage of large volumes of water through trash racks and turbines can result in fish impingement and entrainment mortality at hydropower projects. On a seasonal basis, there is a potential for the occasional transfer of fish from the barge canal to the project forebay and subsequently Oak Orchard Creek while the Canal Corporation releases surplus water to the project. Typically, the Canal Corporation opens three of the six gates connecting the barge canal to the project, and typically each of the three gates is opened 28 inches. The existing downstream passage routes for fish encountering the Oak Orchard Project are through the powerhouse, where fish may suffer injury and mortality due to blade strikes, or over the spillway. Under the Settlement Agreement, trash rack replacement and the construction of a flashboard notch to pass excess flow and seasonal plunge pool downstream of the spillway are proposed.

#### Fish Passage

Erie proposes to install and maintain a flashboard notch to pass excess flow (approximately 25 cfs) and a seasonal plunge pool downstream of the project's spillway (figure 4) within 24 months of the effective date of the subsequent license (section 3.2.1

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<sup>20</sup> Prior to the redevelopment of the project in 1981, the surplus water was discharged into Oak Orchard Creek through low-level floodgates.

of the Settlement Agreement). In the Settlement Agreement, Erie states that while there are no existing resource management goals to pass fish from the barge canal to Oak Orchard Creek, the fishway would allow fish that enter the project's forebay to exit the forebay and pass over the spillway into Oak Orchard Creek. The flashboard notch and plunge pool would be maintained during the Canal Corporation's navigation season and would protect fish exiting the project. The flashboard notch would consist of a 14-inch high by 3-foot wide notch provided either through the existing 2-foot-high flashboards or through a combination of the existing 2-foot-high flashboards and the licensee's option to add up to 8 inches of additional flashboard height to the existing flashboards. The additional flashboard height would be used to regain any head losses associated with the installation of the notch. The plunge pool would be created using flashboards and/or jersey barriers and would provide approximately 4 feet of plunge pool depth and approximately 500 cubic feet of plunge pool volume. Erie would consult with New York DEC and FWS on the final design and installation of the flashboard notch and plunge pool and ensure that it meets applicable FWS design criteria and standards. Erie would not be required to monitor or test the effectiveness of the fishway.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and Trout Unlimited support Erie's proposed installation of the flashboard notch and seasonal plunge pool. Interior's 10(j) recommendations include the fish passage structures proposed by Erie in the Settlement Agreement.

#### *Staff analysis*

It is unknown how many fish from the barge canal, including the managed gamefish species, encounter the project by passing through the gate separating the barge canal from the forebay. Nevertheless, the fish passage structure would allow fish that enter the project's forebay to exit the forebay and pass over the project's spillway into Oak Orchard Creek while requiring only minor modifications to the existing project facilities. Although fish can currently pass over the spillway, there is no plunge pool or associated depth immediately downstream of the 14-foot-high spillway. Commensurate with the overall goal of passing excess water (approximately 25 cfs) over the project's spillway in a manner that is protective of fish, the flashboard notch design is not intended to result in a loss of head at the project, and Erie would have the option to add up to 8 inches of additional flashboard height to regain any head losses. The addition of the flashboard notch to pass the existing excess flow and a plunge pool would provide a safer route of passage for resident fish moving from the barge canal to Oak Orchard Creek.

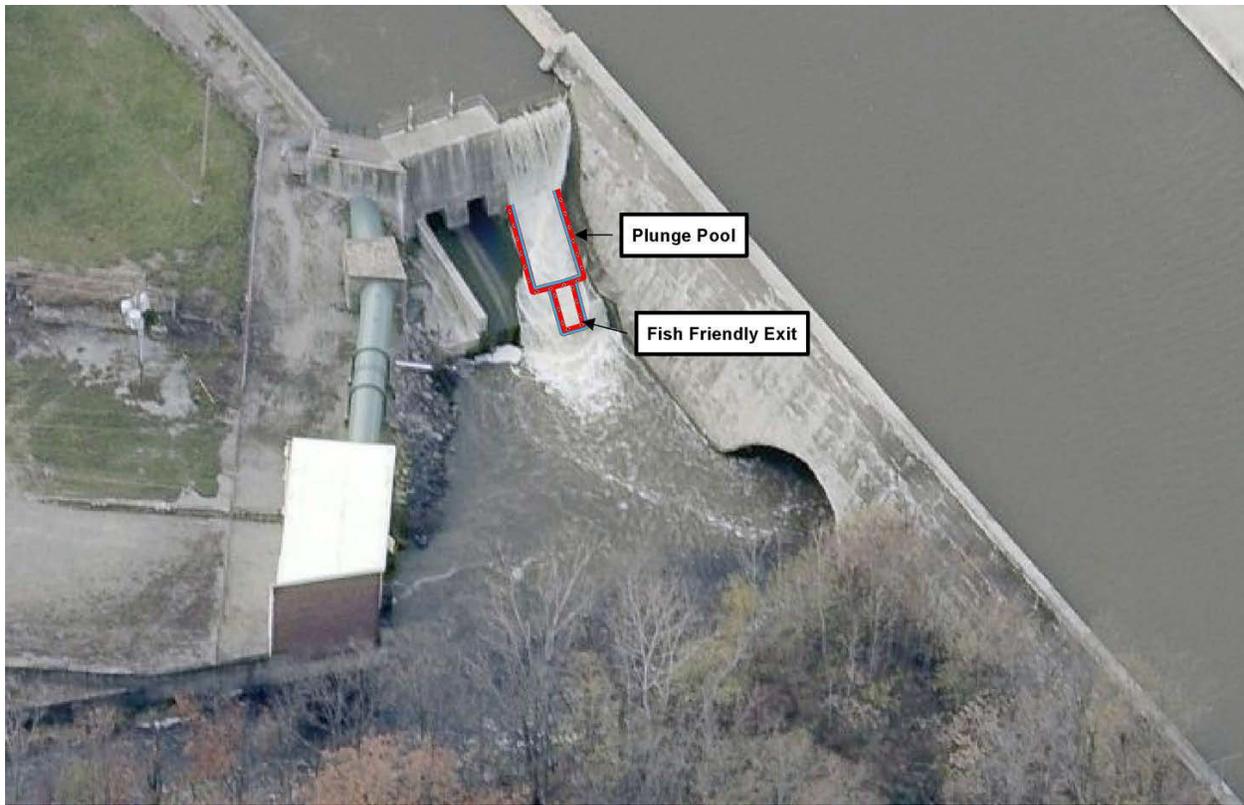


Figure 4. Location and general design of Erie’s proposed plunge pool (Source: license application).

### Entrainment and Impingement

Once fish enter the forebay they may become entrained into the 85-foot-long penstock and pass through the project’s double horizontal Francis turbine. To become entrained, fish would have to pass through the existing trash racks or through the proposed trash racks. The project’s intake trash racks consist of three 3.33-foot-wide by 17-foot-high sections of trash rack panels, with a clear spacing of 1.375 inches. As described in section 3.2.1 of the Settlement Agreement, Erie proposes to replace all three sections with year-round trash racks with 1-inch clear spacing upon replacement of one of these sections, or based on the current life expectancy of the existing trash racks, within 20 years of the effective date of the subsequent license, to protect adult gamefish and other fish from potential entrainment.

As evidenced by their execution of the Settlement Agreement, FWS, New York DEC, and Trout Unlimited support Erie’s proposed fish protection measure. Interior’s 10(j) recommendations include the protection measure proposed by Erie in the Settlement Agreement.

## *Staff Analysis*

Erie does not explicitly state which fish species the replacement of the current trash racks with 1.375-inch clear spacing with trash racks with 1-inch clear spacing would benefit. In its letter responding to staff's additional information request, it states that the target fish species are undetermined by New York DEC. Due to the presence of Medina Falls and other barriers downstream, no migratory fish are known to be present in the project vicinity. We examined the potential entrainment/impingement risk for resident fish species that were previously documented in the barge canal and/or identified by Interior as managed resident gamefish species, including common carp, smallmouth bass, largemouth bass, walleye, northern pike, and yellow perch. Proportional estimates of body width to total length (scaling factor) as compiled by Smith (1985) were used to determine the minimum length of each species that would be excluded from the intake by the existing (1.375-inch spacing) and proposed (1-inch spacing) trash racks. In addition, burst swim speeds<sup>21</sup> for juvenile and adults of these species were compiled from the literature to compare to the approach velocity approximately 1 foot in front of the intake, which Erie estimated as 1.2 feet per second (fps).

Considering the species-specific body width scaling factors for the target species and the 1.375-inch clear spacing of the existing trash rack, most adult game fish would not be entrained at the project (table 5). Trash racks with 1-inch spacing would protect some smaller fish that weren't previously excluded. For example, smallmouth bass greater than 10.7 inches would be excluded by the current configuration, compared to 7.8 inches with trash racks with 1-inch clear spacing. However, most target species and life stages that could physically pass through the existing trash racks based on their body size alone can likely avoid entrainment because their swimming speeds are greater than the approach velocity (table 5). One exception is juvenile yellow perch, whose estimated range of burst speeds would be most likely to overlap with the intake velocity. Nevertheless, as discussed above, most adults can avoid entrainment and impingement based on their swimming ability alone, regardless of the trash rack spacing (1-inch or 1.375-inches). Therefore, while the proposed measure would protect some smaller fish, the deployment of 1-inch trash racks would not be expected to alter the entrainment or impingement potential of resident adult gamefish at the project compared to existing conditions.

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<sup>21</sup> Burst swim speeds are the highest speeds attainable by fish and can be maintained for periods of less than approximately 20 seconds (Beamish, 1978).

Table 5. Minimum sizes (total length, in inches) of fish species physically excluded by the project’s current trash racks (1.375-inch clear spacing) and proposed trash racks (1-inch clear spacing). Fish exclusion sizes were based on body scaling factors relating body width to fish length as reported in Smith (1985). (Source: Staff).

Species	Scaling factor	Minimum sizes excluded from:		Burst swimming speeds (ft/sec)
		1.375-inch trash racks	1-inch trash racks	
Common carp	0.162	8.5	6.2	2.8 – 9.2 (Adults/Juveniles) <sup>a,b</sup>
Smallmouth bass	0.128	10.7	7.8	2.6 – 3.6 (Juveniles) <sup>b,c</sup> 3.5 – 5.6 (Adults) <sup>d</sup>
Largemouth bass	0.134	10.3	7.5	2.0 – 3.3 (Juveniles) <sup>b,e</sup> 1.9 – 3.5 (Adults) <sup>b,f,g</sup>
Walleye	0.125	11.0	8.0	6.0 (Juveniles) <sup>h</sup> 7.2 – 8.6 (Adults) <sup>h</sup>
Yellow perch	0.114	12.1	8.8	1.0 – 2.2 (Juveniles) <sup>b,e</sup> 2.0 – 3.0 (Adults/Juveniles) <sup>b,i</sup>
Northern pike	0.078	17.6	12.8	13.0 (Adult) <sup>j</sup>

<sup>a</sup> Katopodis and Gervais (2016).

<sup>b</sup> Estimated using the relationship in Bell (1991) that the ratio of sustained to burst swim speeds is 0.5.

<sup>c</sup> Webb (1978).

<sup>d</sup> Peake and Farrell (2004).

<sup>e</sup> Beamish (1978).

<sup>f</sup> Klimah (2015).

<sup>g</sup> Cooke et al. (2001).

<sup>h</sup> Peake et al. (2000).

<sup>i</sup> Nelson (1989).

<sup>j</sup> Harper and Blake (1990).

### Short-term Construction Effects

Erie is proposing to install a flashboard notch to pass excess flow and a new seasonal plunge pool downstream of the spillway, as well as trash racks with 1-inch clear spacing. Construction of the proposed facilities may require the movement of construction equipment, installation of cofferdams, and disturbance of the riverbed substrate. Therefore, these activities have the potential to cause erosion and

sedimentation, which could cause a temporary increase in water turbidity, and temporarily displace fish from areas where structures are being installed.

In SD1, Commission staff identified the effects of construction of the proposed fish passage structure on aquatic resources as a resource issue.

### *Staff Analysis*

Erie's proposed fish passage structure includes the creation of a plunge pool on the concrete apron immediately downstream of the spillway. As there is no existing pool or associated depth in this area, Erie anticipates the anchoring of jersey barriers and/or a flashboard type system on the apron area to create the 4-foot depth. Construction of the fish passage structure may temporarily disturb soil resources, which could result in limited sediment discharge into the tailrace and Oak Orchard Creek. Implementing specific measures to control erosion and sedimentation during construction would help ensure that water quality and aquatic habitat are protected. While the magnitude of the construction effects would likely be minimal and of short duration (e.g., days), the development of an erosion and sediment control plan, as described above in section 3.3.1, Geology and Soils, would minimize these effects. Although any effects would likely be limited to the tailrace and Oak Orchard Creek just downstream of the tailrace, fish would likely avoid the immediate area while the fish passage structure is being installed and re-colonize the area following the completion of construction.

## **3.3.3 Terrestrial Resources**

### **3.3.3.1 Affected Environment**

The Oak Orchard Project is located within the Erie/Ontario Lake Plain ecoregion, distinguished by its moderate to mild humid climate, its relatively dense and diverse forest cover, and its high density of human inhabitants (Cooperation, 2008). Urban industries, agriculture, and forestry are major activities, but historically, before agricultural clearing, natural vegetation was largely beech-maple forest, with some chestnut and oak on gravelly soils. Other land cover includes deciduous forest, wooded wetlands, grasslands, and beaches (Bryce et al., 2010). While various species of oaks, hickories, maples, and pines are common, other wide-ranging tree species include ashes, elms, black cherry, yellow poplar, sweet gum, basswood, hackberry, common persimmon, eastern red cedar, and flowering dogwood.

The project boundary encompasses 1.25 acres and the upland habitat within the boundary is primarily grass and shrub with a limited scattering of mixed deciduous trees.

## **Wetlands**

Using the New York State DEC Wetland Mapper and the FWS National Wetlands Inventory (NWI) Wetland Mapper, Erie did not identify any wetlands that occur within the project boundary or adjacent to Oak Orchard Creek in the vicinity of the project with the exception of the riverine designation of Oak Orchard Creek proper and the designation of the barge canal. Oak Orchard Creek is identified as a riverine, lower-perennial, unconsolidated-bottom, permanently flooded, excavated wetland (Wetland ID: R2UBHx) and the barge canal is identified as a lacustrine, limnetic, unconsolidated bottom, permanently flooded, excavated wetland (Cowardin et al., 1979). Therefore, there are approximately 0.03 acre of wetland L1UBHx and 0.25 acre of wetland R2UBHx within the Oak Orchard Project boundary.

Due to the relatively small size of the project, as well as the slope of the stream bank and the armoring of a majority of the shoreline within and adjacent to the project boundary (historically excavated), the littoral zone within the project boundary is negligible. No reservoir or impoundment is associated with the project and all inflows for this project are direct water releases from the barge canal provided by the Canal Corporation.

The riparian area within the project boundary is also negligible and it is restricted to an approximate length of 120 feet, extending along the eastern shore of Oak Orchard Creek from immediately across from the powerhouse to the beginning of the barge canal wall. The relatively steep banks of Oak Orchard Creek within the project boundary and in the immediate vicinity of the project create an abrupt transition from aquatic habitat to terrestrial habitat, resulting in a narrow and negligible riparian zone in this portion of Oak Orchard Creek.

## **Invasive Species**

As noted in the license application, many of New York's species of plants and animals are non-native; however, only a small fraction (approximately ten to fifteen percent) of New York's non-native plants are deemed to be invasive. The license application lists 31 invasive species that have been observed in Western New York and might be present in the project area, including autumn olive, black swallow-wort, buckthorns, Canadian thistle, common reed grass, flowering rush, garlic mustard, giant hogweed, Japanese knotweed, Japanese stiltgrass, lesser celandine, mile-a-minute, mugwort, oriental bittersweet, pale swallow-wort, purple loosestrife, wild parsnip, yellow iris, yellow floating heart, variable-leaf water milfoil, European frogbit, hydrilla, fanwort, Eurasian water milfoil, curly-leaf pondweed, starry stonewort, quagga mussel, Asian clam, fishhook waterflea, spiny waterflea, and zebra mussel. Erie states that no invasive species have been located within the project boundary; however, several invasive species have been confirmed in State Street Park, which is located directly across Oak Orchard

Creek from the project, including garlic mustard, common reed grass, common buckthorn, mugwort, and autumn olive, among others (iMapInvasives, 2020).

## **Wildlife**

The region has extremely diverse populations of birds, fish, reptiles, and amphibians. Wildlife species expected to use habitat available at the project include smaller species tolerant of human development and activity (i.e., eastern chipmunk, red squirrel, eastern gray squirrel, stoat, longtail weasel, American mink, American beaver, striped skunk, raccoon, woodchuck, muskrat, meadow vole, deer mouse, white-footed mouse, starnose mole, northern shorttail shrew, and numerous passerine bird species), and species that would use surrounding riverine habitat (i.e., various amphibian and waterfowl species). Mammals such as white-tailed deer, coyote, snowshoe hare, red fox, and gray fox may use the project area for minimal transient purposes. Although the area is dominated by commercial and residential uses, the occurrence of small forested areas and narrow corridors along Oak Orchard Creek and between commercial or residential properties may provide some terrestrial habitat for fauna that is acclimated to the presence of humans and human disturbance.

### **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 eagle nest in mature trees and snags and on cliffs, rocks, and artificial structures, generally within 1 mile of water. Nesting activity occurs from January through August.

To date, no bald eagle nests have been identified within the project boundary; however, bald eagle breeding activity within New York State has been expanding since the 1980s, and suitable bald eagle breeding habitat exists within the project boundary. Therefore, it is conceivable for bald eagles to nest within the project area during the term of any license that may be issued for the project.

#### **3.3.3.2 Environmental Effects**

Erie proposes to continue to conduct routine maintenance, which, given the limited area of vegetated lands within the project boundary includes mowing the grass roughly once a month. On an as-needed basis (annually or biennially), weeds near fence lines and adjacent to project structures receive herbicide treatment by a certified vendor.

In SD1, Commission staff identified the effects of continued project operation and maintenance on botanical resources and wildlife, including state-listed species (e.g. bald eagle), and on the introduction or spread of invasive plants, as resource issues. SD1 also identified the effects of construction of the proposed fish passage structure on terrestrial resources as a resource issue.

The Commission received no substantive comments regarding the effects of project operation or maintenance on terrestrial resources. The project boundary is slightly over one acre (1.25 acres) and is in a relatively dense commercial and residential area. In addition, land within the project boundary has been previously disturbed and there are minimal wetlands, littoral, and riparian habitat. Further, Erie's proposal to replace the existing trash racks would not include any ground-disturbing activities and Erie's proposed seasonal plunge pool would be constructed on an existing concrete apron. As such, the only potential effects on botanical resources within the project boundary are associated with routine vegetation maintenance. Therefore, staff analyzed the effects associated with Erie's proposals for the Invasive Species Management Plan and the Bald Eagle Management Plan.

#### Invasive Species Management Plan

Erie's Invasive Species Management Plan includes measures to prevent the introduction and spread of terrestrial and aquatic invasive plant species during activities associated with daily operation and routine maintenance and during activities associated with construction or major maintenance. Examples of the measures to be undertaken include: not actively planting on project grounds any terrestrial plants identified by New York DEC as noxious; when in-water work is required, complying with New York DEC-recommended measures for preventing the introduction and/or spread of aquatic invasive species; monitoring areas of disturbance caused by routine operation and maintenance activities within the project boundary to ensure that invasive species do not out-compete desirable vegetation during the reestablishment phase; requiring personnel to visually inspect all exposed boating equipment for attached invasive species; cleaning and drying boats and trailers that come into contact with water; training workers to identify invasive plants and informing them of the importance of infestation prevention; using invasive-free gravel, fill, soil, and mulches, where practical; and quickly seeding and planting disturbed areas in a manner to ensure vigorous growth of desirable vegetation and discourage invasive species and monitoring the seeded sites.

In its 10(j) recommendations, filed April 22, 2020, Interior recommended that Erie implement the Invasive Species Management Plan.

#### *Our Analysis*

Operation and maintenance of the Oak Orchard Project could result in the introduction or spread of terrestrial and aquatic invasive plant species within the project

boundary. However, employing measures to minimize the introduction and spread of invasive plants during operation and maintenance activities, such as those included within the proposed Invasive Species Management Plan, would minimize the introduction or spread of invasive plant species within the project boundary.

### Bald Eagle Management Plan

Erie proposes to implement the Bald Eagle Management Plan to minimize project effects on bald eagles by: (1) notifying New York DEC and FWS within 30 days if a bald eagle nest is discovered within the project boundary during routine maintenance activities; (2) prior to any tree-clearing activities, observing areas to be cleared to determine if any bald eagle nests are present; and (3) if a nest is discovered, consulting with New York DEC and FWS prior to tree-clearing activities and conducting those activities in accordance with applicable regulations and guidance.

In its 10(j) recommendations, filed April 22, 2020, Interior recommended that Erie implement the Bald Eagle Management Plan.

### *Our Analysis*

Project maintenance would result in limited ground disturbance within the project boundary, including the potential removal of trees. However, notifying New York DEC and FWS when any bald eagle nests are discovered within the project boundary, and consulting with New York DEC and FWS prior to any tree-clearing activities if a bald eagle nest is located within or immediately adjacent to the project boundary, as required by the proposed Bald Eagle Management Plan, would minimize effects to bald eagles.

## **3.3.4 Threatened and Endangered Species**

### **3.3.4.1 Affected Environment**

Although FWS's IPaC system indicates that no federally listed species are known to occur in the vicinity of the Oak Orchard Project,<sup>22</sup> the project is located within the range of the federally listed threatened northern long-eared bat (*Myotis septentrionalis*) (FWS, 2019). Further, both Interior's April 22, 2020, letter and section 2.9 of the Settlement Agreement indicate that this species could occur within the project impact area. No critical habitat for any federally listed threatened and endangered species occurs within project-affected lands.

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<sup>22</sup> See official species list memorandum, filed September 4, 2020.

### *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, 2016b).

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 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-swarms<sup>23</sup> and spring-staging<sup>24</sup> 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:<sup>25</sup> 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

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<sup>23</sup> Fall-swarms occur between summer and winter hibernation. The purposes of swarming behavior include introduction of juveniles to potential hibernacula, copulation, and gathering at stop-over sites on migratory pathways between summer and winter regions.

<sup>24</sup> 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).

<sup>25</sup> 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.

other trees within 150 feet of that maternity roost tree, during the pup-rearing season (June 1 through July 31) (FWS, 2016a). 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).<sup>26</sup>

The Oak Orchard Project is located in Orleans County, which is within the white-nose syndrome zone and the northern long-eared bat species range (FWS, 2020). 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 Erie County, southwest of the project, and Wyoming County, south of the project, and winter occurrences in southeast Niagara County, west of the project, and western Genesee County, south of the project (New York DEC, 2018).

### **3.3.4.2 Environmental Effects**

Although New York DEC and FWS records indicate there are no northern long-eared bat hibernacula or maternity roosts known to occur within the project boundary, project lands may provide suitable summer roosting and feeding habitat for the species. 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 Management Plan includes conditions for Erie to notify New York DEC and FWS within 30 days if an occupied maternity roost tree or hibernacula is discovered within the project boundary during routine maintenance activities. The plan also requires Erie, prior to any tree-clearing activity within the project boundary, to observe the areas to be cleared for occupied maternity roost trees, roosting trees, sloughing bark, or dead limbs that provide habitat for the northern long-eared bat, and if observed, consult with New York DEC and FWS prior to any tree-clearing activities. The plan also states that Erie will maintain a minimum distance of 150 feet from a known occupied maternity roost tree, during pup season (June 1 through July 31), when clearing trees; a 0.25-mile buffer will be maintained from known

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<sup>26</sup> 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.

occupied hibernacula during tree removal; and Erie will consult with New York DEC and FWS if tree clearing is required within a buffer area, and tree clearing activities will be performed in accordance with the applicable regulations and guidance.

In its April 22, 2020 letter providing comments, recommendations, terms and conditions, Interior states that “any take that may occur incidental to this project is not prohibited under the final 4(d) rule” and that “no further ESA coordination or consultation is required at this time.” That same letter includes Interior’s 10(j) recommendation that Erie implement the Northern Long-eared Bat Management Plan.

### *Our Analysis*

Observing the area, prior to tree-clearing activities, for occupied maternity roosts or trees that could provide habitat for northern long-eared bats, consulting with New York DEC and FWS regarding any tree-clearing activities in occupied habitat or within a buffer zone, and reporting observations of northern long-eared bats during any removal of hazard trees, is likely to minimize effects to this species. We also conclude 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.

## **3.3.5 Recreation, Land Use, and Aesthetic Resources**

### **3.3.5.1 Affected Environment**

#### **Recreation**

##### Regional Recreation

A variety of recreational opportunities are located within 30 miles of the project. Golden Hill State Park, about 20 miles northwest of the project, offers camping, fishing, boating, shoreline hiking, picnicking, and walking tours of the Thirty Mile Lighthouse site. Winter activities include snowshoeing and 5 miles of snowmobile trails. Lakeside Beach State Park is approximately 20 miles northeast of the project and offers a panoramic view of Lake Ontario and surrounding farms and fruit orchards. The park includes 274 campsites, hiking and biking trails, fishing, picnic grounds, a disc golf course, and playing fields. Winter activities include hiking, cross-country skiing, and snowmobiling. Oak Orchard State Marine Park, less than 30 miles northeast of the project, open from April through November, offers boat launches, fishing, grills, and picnic tables.

The Canalway trail system, which extends along portions of the barge canal in the village of Medina, offers 300 miles of scenic trails and areas for walking, bicycling, and cross-country skiing along the barge canal. Approximately 10 miles southeast of the

project is a 19,000-acre complex of state and federal lands, composed of the Oak Orchard State and Tonawanda State Wildlife Management Areas as well as the Iroquois National Wildlife Refuge. These lands offer recreational opportunities such as wildlife viewing and hiking. The Great Lakes Seaway Trail is about 10 miles north of the project. The 454-mile trail borders Lakes Erie and Ontario as well as the Saint Lawrence River and carries visitors through an array of towns, villages, picturesque bays, and farmland. Harbors, lighthouses, fishing, wildlife, and history also contribute to the trail.

Various locations, listed below, have recreation amenities, and are located within a few miles of the project. The amenities include fishing, picnicking, playgrounds, camping, and restroom facilities.

- Bates Road Launch
- Gulf Street Park
- John E. Butts Park
- Medina Canal Basin Park
- Pine Street Park
- Rotary Park
- State Street Park

Additionally, the project is located adjacent to the Canal Corporation's barge canal, a 524-mile canal system that includes the Erie, Champlain, Oswego, and Cayuga-Seneca canals. Amenities along the barge canal include boat ramps, lodging, marinas, and public docks, and the Erie Canal section offers boating and fishing opportunities during the navigation season (mid-April to mid-November).

#### Project Recreation Facilities and Opportunities

There are no recreational facilities at the project and Erie is not proposing to construct any as part of the relicensing process. Due to the small size of the project, there is limited capacity for recreational facilities.

Oak Orchard Creek and the barge canal are both used for recreational activities such as fishing and boating. Due to the limited amount of recreational activities in the project area, Erie has previously been exempted from reporting usage data via the FERC Form 80 process, and the Form 80 process was discontinued by the Commission in 2005.

#### **Land Use**

The Oak Orchard watershed, located in Genesee and Orleans Counties, is approximately 173,975 acres in size and its waters discharge directly into Lake Ontario. Land use patterns within the Oak Orchard watershed are predominantly rural and agricultural, with secondary residential and commercial uses. Wetlands and forested

areas make up most of the remaining uses. Vegetable crops, dairy farming, and livestock operations are the primary agricultural activities.

The Oak Orchard Project is in the village of Medina, Orleans County, New York, which is a developed area that includes both commercial and residential development. Residential land uses are clustered in the Medina, Albion, Elba, and Oakfield areas, including single- and multi-family residences, rural residential land, and mobile homes. Neighborhoods in the towns of Shelby and Ridgeway outside the village of Medina include farmsteads, homes on large lots in the countryside, and houses stretched along roads or clustered in rural hamlets.

Commercial land uses are proximate to population centers with most uses occurring near Medina, Albion, Elba, and Oakfield, and along highway and railroad corridors. Municipal and community service facilities, such as cemeteries, libraries, and schools, government buildings, healthcare facilities, and religious facilities are distributed throughout the watershed in a pattern that reflects the population distribution.

The village of Medina offers industrial zoned land with rail access, highway access, proximity to markets and suppliers, and water and sewer service. The downtown area of the village of Medina is a vital business, service, and government center.

### **Aesthetic Resources**

The project is located along the Erie Canal portion of the barge canal systems immediately west of where the canal passes over Oak Orchard Creek in the village of Medina. The project site is small, approximately less than 1 acre in size, with upland on either side of the driveway going into the powerhouse. This area is primarily grass and shrub with a scattering of mixed deciduous trees. Due to the proximity of the project to the barge canal, small amounts of useable land, and potential dangers, public access to the area is restricted. The project is visible to passing motorists traveling along NY Route 31/East Center Street and along portions of Oak Orchard Creek. The powerhouse and project features are obscure to boaters passing down the canal because the facility is at a lower elevation than the top of the canal wall.

#### **3.3.5.2 Environmental Effects**

Erie proposes to continue operation of the project based on seasonal water provided by the Canal Corporation from the adjoining barge canal and has not proposed to construct any recreation facilities or amenities. Erie proposes to install a new seasonal fish passage structure, including a flashboard notch to pass excess flow and a seasonal plunge pool downstream of the spillway, and trash racks with 1-inch clear spacing. It states that these improvements would collectively provide protection measures that benefit the recreational fishery.

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

### *Our Analysis*

Installing a new seasonal fish passage structure would benefit fishery resources by enhancing movement of fish through the project, which would be protective of the recreational fishery, the barge canal and in Oak Orchard Creek downstream of the project area. Multiple recreation opportunities exist along the canal and around Oak Orchard Creek. Nearby city, state, and federal parks offer a variety of land-based recreation activities for the public to enjoy; these include several large areas of open space and extensive trails that span multiple counties. Water-based recreation is provided through several boat ramps, kayak launches, and beach access areas. Therefore, there is no demonstrated need for recreation facilities at the project.

The physical components being added to the project, described above, are minimal in scale and would be integrated into the existing project facilities to not alter the visual character of the project or the surrounding area.

Additionally, due to the limited construction actions proposed the composition of land use in the area is not expected to change.

## **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 Preservation a reasonable opportunity to comment on the undertaking. In this case, the undertaking is the issuance of a subsequent license for the Oak Orchard Project. Historic properties are those that are listed or eligible for listing on the National Register. The regulations implementing section 106 of the NHPA also require that the Commission seek concurrence with the 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 on 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.

## **Area of Potential Effect**

The Advisory Council on Historic Preservation defines an APE as the geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 C.F.R. § 800.16(d)). In this case, the APE for the project is the area within the project boundary.

## **Regional History**

Contact between Native Americans and Europeans along the Atlantic Coast of North America may have begun as early as the 1490s. Sustained contact in the project's vicinity began with Samuel de Champlain's exploration of the region in 1609. Jesuit missionaries and French trappers encountered an indigenous population wracked by epidemic diseases brought from the Old World, killing untold numbers of Native Americans living in the Northeast.

The European colonial effort in the seventeenth and eighteenth centuries was driven by the fur trade. As beaver populations declined in the Genesee River Valley, the Seneca extended their raiding parties as far west as the Illinois and Mississippi rivers. By 1717, the Seneca tribe had become active trading partners with the British.

At the conclusion of the American Revolution, western New York was still primarily a frontier territory and initial settlement of the region was slow. In 1805, one of the earliest settlers of Medina, Samuel F. Gear, established a sawmill at Medina Falls, located approximately 350 feet downstream from the project. Gear's sawmill was the first of several mills that would be developed in Medina over the next century.

The construction of the Erie Canal began between 1817 and 1823 provided momentum for people to settle and develop in the village of Medina. The canal provided a vital link between the interior of the continent and centers of commerce along the Hudson River and the Atlantic seaboard. The regional impact of the canal system was immense, and the connectivity that it provided played a central role in transforming New York into the "Empire State." But the growth of the railroads proved a faster means of transporting goods and raw materials to eastern and western markets, reducing the need for canal transport. By the early twentieth century the historic Erie Canal had fallen into disrepair.

Construction of the Rochester, Lockport, and Niagara Falls Railroad through Medina in 1850 brought continued growth to the area. H.J. Heinz established a plant in Medina in 1899 that would continue to play a key role in the local economy through the 20<sup>th</sup> century. Several mills were developed to take advantage of proximity to the canal and the waterpower potential of Oak Orchard Creek. By 1875, William Hedley had

constructed a sawmill and plaster mill along Oak Orchard Creek at the present-day location of the project. Although the sawmill would burn in 1877, Hedley constructed a planing mill from stone at the site in 1884. The stone planing mill building still stands in the lumber yard west of the project.

By 1886, a foundry owned by Bowen, Robinson, and Beech Plumbing Goods and Piping Company occupied the present-day location of the project. In 1895, the S.A. Cook and Company began operating a furniture manufacturing facility at the location. A hydroelectric powerhouse was constructed in 1913 to provide electrical power for the S.A. Cook and Company manufacturing facility, and the powerhouse appears on the 1915 Sanborn fire insurance map of Medina. The project was acquired by Erie's predecessor in 1940.

### **Archaeological and Historic Resources**

A review of the New York SHPO's online Cultural Resources Information System (CRIS) was conducted to identify historic and archaeological resources within 1,000 feet of the project's APE. The following sections summarize the results of the review.

#### ***Historic Architectural Resources***

One historic building previously determined to be eligible for inclusion in the National Register and five contributing resources to the National Register-listed New York State Barge Canal Historic District (Historic District) are located within 1,000 feet of the APE. The National Register nomination form for the Historic District prepared by the National Park Service specifically excludes the Oak Orchard Project from the boundary of the Historic District. While the barge canal, Oak Orchard Creek Aqueduct, and Medina Waste Weir are contributing resources to the Historic District and are immediately adjacent to the project, these structures are not owned or operated by Erie, are not within the project boundary, and as such, are not within the project's APE.

The historic buildings at 123 Ensign Street and the Medina Terminal are located approximately 900 feet and 750 feet away from the project, respectively. The Pleasant Street/Horan Avenue Bridge is approximately 400 feet northeast of the project. There are no recorded historic architectural resources within the project's APE.

As described previously, the project was originally constructed in 1913 to provide power to the S.A. Cook and Company furniture factory. Since construction, the other buildings and structures associated with the factory along Oak Orchard Creek have been demolished. A structure adjacent to the powerhouse (most likely the former "dynamo room") was used as storage as late as 1980 but was demolished when the project underwent a significant rehabilitation in 1981. Additional repairs to the intake structure were conducted in 1987, and in 1992 the spillway was rehabilitated with a 1-foot-thick

overlay, a new reinforced-concrete apron, and upstream concrete “anchor blocks” with shear pins to enhance stability.

While portions of the original powerhouse may remain, the project has undergone extensive rehabilitation since the 1980s. No other buildings associated with the former furniture factory remain intact, and the site was cleared, graded, and planted subsequent to demolition of the furniture factory buildings. While partial foundations of the factory buildings remain, there are no other associated historic features or structures remaining within the APE.

### ***Archaeological Resources***

There are no recorded archaeological resources within 1,000 feet of the project’s APE. The closest recorded archaeological site is a possible historic burial ground located more than 3,000 feet southwest of the project. Given prior construction associated with the barge canal, the S.A. Cook and Company factory, the project, and other industrial development at the site, it is extremely unlikely that intact precontact period archaeological resources could be present within the APE.

As detailed previously, the project underwent significant rehabilitation and ground-disturbing activities since 1980, including grading and clearing land. While partial foundations of the S.A. Cook and Company factory remain, there has been significant modification within the APE since the factory was demolished.

### **3.3.6.2 Environmental Effects**

Erie was designated the non-federal representative to initiate section 106 consultation with the New York SHPO in a notice issued by the Commission on August 10, 2016. By letter filed on August 5, 2019 by Erie, the New York SHPO stated that while the project is not eligible for listing in the National Register, the barge canal, which is adjacent to the project, is a National Historic Landmark. The New York SHPO concluded that the new construction, including replacement of trash racks and the installation of a plunge pool on the concrete spillway apron, would have no visual impact on the canal. Therefore, it is the opinion of the New York SHPO that the project would have no adverse effect on historic resources.

### ***Our Analysis***

The Oak Orchard Project is not eligible for listing in the National Register and no historical or archaeological resources have been identified within the APE. Because the project does not affect any archaeological or historic resources listed in or eligible for inclusion in the National Register, no protection, mitigation, and enhancement measures are being proposed at this time. However, during the term of any license issued,

archaeological or historic resources could be discovered during project related activities that require ground disturbance. In the unlikely event of an unanticipated discovery, stopping any ground disturbing activity and consulting with the New York SHPO would ensure these resources are protected.

### **3.4 NO-ACTION ALTERNATIVE**

Under the no-action alternative, the project would continue to operate as it has in the past. None of the licensee's proposed measures or the resource agencies' recommendations would be required. Improvements to trash racks to minimize entrainment and impingement would not be implemented, fish passage facilities would not be constructed, and vegetation and wildlife would not be protected.

## 4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Oak Orchard Project's use of environmental resources for hydropower purposes to see what effect various 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.*,<sup>27</sup> 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 projects' 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 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 PROJECT

Table 6 summarizes the assumptions and economic information we use in our analysis. This information, except as noted, was provided by Erie in its license application and subsequent submittals. We find that the values provided by Erie are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; and

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<sup>27</sup> See *Mead Corporation, Publishing Paper Division*, 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.

normal operation and maintenance cost. Values provided by Erie in its license application were indexed to 2020 dollars.

Table 6. Parameters for economic analysis of the Oak Orchard Project (Sources: Staff and Erie).

<b>Parameter</b>	<b>Value</b>
Period of analysis <sup>a</sup>	30 years
Term of financing <sup>a</sup>	20 years
Net investment <sup>b</sup>	\$754,980
Annual operation and maintenance <sup>b</sup>	\$44,440
Cost to prepare the license application <sup>b</sup>	\$151,500
Federal income tax rate (percent) <sup>a</sup>	21
Local tax rate (percent) <sup>a</sup>	4
Dependable capacity <sup>b</sup>	250 kW
Insurance rate <sup>b</sup>	Included in the operation and maintenance cost
Interest rate (percent) <sup>a</sup>	6
Discount rate (percent) <sup>a</sup>	6
Energy rate <sup>c</sup>	\$20.59/MWh
Capacity rate <sup>c</sup>	\$159.7/kW-year

<sup>a</sup> Assumed by staff.

<sup>b</sup> Provided by Erie.

<sup>c</sup> 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.

## 4.2 COMPARISON OF ALTERNATIVES

Table 7 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, Erie's proposal, and the staff alternative.

Table 7. Summary of the annual cost of alternative power and annual project cost for the alternatives for the Oak Orchard Project (Source: Staff).

	<b>No-Action Alternative</b>	<b>Erie's Proposal</b>	<b>Staff Alternative</b>
Installed capacity (kW)	350	350	350
Annual generation (MWh)	1,147	1,147	1,147
Dependable capacity (kW)	250	250	250
Annual cost of alternative power (\$) (\$/MWh)	63,540 55.40	63,540 55.40	63,540 55.40
Annual project cost (\$) (\$/MWh)	108,780 94.84	137,380 119.77	137,650 120.01
Difference between the cost of alternative power and project cost (\$) (\$/MWh)	(45,240) (39.44)	(73,840) (64.37)	(74,110) (64.61)

#### **4.2.1 No-Action Alternative**

Under the no-action alternative, the Oak Orchard Project would continue to operate as it does now. With an installed capacity of 350 kW and a dependable capacity of 250 kW, the project generates an average of 1,147 MWh of electricity annually. The average annual cost of alternative power would be \$63,540, or about \$55.40/MWh. The average annual cost of producing this power, including depreciation, operation and maintenance costs, and taxes would be about \$91,000, or about \$79.34/MWh. Overall, the project would produce power at a cost that is \$27,460, or \$23.94/MWh, more than the cost of alternative power.

#### **4.2.2 Applicant's Proposal**

Under Erie's proposal, the project would continue to operate with an installed capacity of 350 kW, a dependable capacity of 250 kW, and an average annual generation of 1,147 MWh. The average annual cost of alternative power would be \$63,540, or about \$55.40/MWh. The average annual project cost would be \$137,380, or \$119.77/MWh. Overall, the project would produce power at a cost that is \$73,840, or \$64.37/MWh, more than the cost of alternative power.

### **4.2.3 Staff Alternative**

The staff alternative would have the same capacity and energy attributes as Erie's proposal. Table 8 presents the staff-recommended additions, deletions, and modifications to Erie's proposed environmental protection and enhancement measures and the estimated cost of each.

Based on a total installed capacity of 350 kW, a dependable capacity of 250 kW, and an average annual generation of 1,147 MWh, the cost of alternative power would be \$63,540, or about \$55.40/MWh. The average annual project cost would be \$137,650, or \$120.01/MWh. Overall, the project would produce power at a cost that is \$74,110, or \$64.61/MWh, more than the cost of alternative power.

### **4.3 COST OF ENVIRONMENTAL MEASURES**

Table 8 gives the cost of each of the environmental enhancement measures for the project considered in our analysis. All costs in table 8 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.

Table 8. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Oak Orchard Project (Sources: Staff and Erie).

<b>Enhancement/Mitigation Measures</b>	<b>Entity</b>	<b>Capital Cost<sup>a</sup></b>	<b>Annual Cost<sup>a</sup></b>	<b>Levelized Annual Cost<sup>b</sup></b>
Continue to operate the Oak Orchard project based on seasonal water (approximately 225 cfs) provided by the Canal Corporation, of which approximately 200 cfs would be used for power generation and the remaining (approximately 25 cfs) would be discharged into Oak Orchard Creek.	Erie, Interior, New York DEC, Staff	\$0	\$0	\$0 <sup>c</sup>
Develop and implement an operation compliance monitoring plan.	Staff	\$2,530	\$0	\$200 <sup>d</sup>
Develop and implement an erosion and sediment control plan for fish passage facility construction.	Staff	\$1,010	\$0	\$80 <sup>d</sup>
Install year-round trash racks with 1-inch clear spacing within 20 years.	Erie, Interior, New York DEC, Staff	\$101,000	\$2,530	\$9,800 <sup>e</sup>
Install and maintain a flashboard notch to pass excess flow, and a seasonal plunge pool, within 24 months.	Erie, Interior, New York DEC, Staff	\$10,100	\$2,530	\$2,810

<b>Enhancement/Mitigation Measures</b>	<b>Entity</b>	<b>Capital Cost<sup>a</sup></b>	<b>Annual Cost<sup>a</sup></b>	<b>Levelized Annual Cost<sup>b</sup></b>
Implement the proposed Invasive Species Management Plan filed with the Settlement Agreement.	Erie, Interior, New York DEC, Staff	\$5,050	\$1,010	\$1,200
Implement the proposed Northern Long-eared Bat Management Plan filed with the Settlement Agreement.	Erie, Interior, New York DEC, Staff	\$5,050	\$1,010	\$1,200
Implement the proposed Bald Eagle Management Plan filed with the Settlement Agreement.	Erie, Interior, New York DEC, Staff	\$5,050	\$1,010	\$1,200

<sup>a</sup> Unless otherwise noted, all cost estimates are from Erie, escalated to 2020 dollars.

<sup>b</sup> All capital and annual costs are converted to equal costs over a 30-year period to give a uniform basis for comparing all costs.

<sup>c</sup> No additional costs as it is a continuing measure.

<sup>d</sup> Cost estimated by staff.

<sup>e</sup> Assumed to install the trash racks at the 11<sup>th</sup>-year.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE**

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When we review a hydropower project, we consider water quality, fish and wildlife, recreation, cultural, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. In deciding whether, and under what conditions, a hydropower project should be licensed, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing the waterway. We weigh the costs and benefits of our recommended alternative against other proposed measures. This section contains the basis for, and a summary of, our recommendations for relicensing the Oak Orchard Project.

Based on our independent review of agency and public comments filed on the project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the proposed action with staff-recommended modifications as the preferred alternative. We recommend this alternative because: (1) issuance of a new license would allow Erie to continue to operate the Oak Orchard Project and provide a beneficial and dependable source of electrical energy; (2) the 350 kW of electric capacity 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 environmental resources affected by the project.

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

#### **5.1.1 Measures Proposed by Erie**

Based on our analysis of Erie's proposal in section 3, and the costs discussed in section 4, we recommend including the following environmental measures proposed by Erie in any license issued for the Oak Orchard Project:

- Continue to operate the Oak Orchard project based on seasonal water (approximately 225 cfs) provided by the Canal Corporation, of which approximately 200 cfs would be used for power generation and the remaining

(approximately 25 cfs) would be released over the spillway into Oak Orchard Creek (section 3.1.1 of the Settlement Agreement);

- Upon replacement of any of the existing three trash rack sections, or within 20 years of the effective date of the subsequent license, install year-round trash racks with 1-inch clear spacing for the protection of adult game fish and other fish (section 3.2.1 of the Settlement Agreement);
- Install and maintain a 3-foot-wide by 14-inch-high flashboard notch to pass excess flow, with the option to add 8 inches of additional flashboard height, and a seasonal plunge pool downstream of the spillway within 24 months of the effective date of the subsequent license to support a “fish-friendly” exit to Oak Orchard Creek (section 3.2.1 and appendix D of the Settlement Agreement);
- Implement the proposed Northern Long-eared Bat Management Plan (Appendix A of the Settlement Agreement);
- Implement the proposed Bald Eagle Management Plan (Appendix B of the Settlement Agreement); and
- Implement the proposed Invasive Species Management Plan (Appendix C of the Settlement Agreement).

### **5.1.2 Additional Staff-Recommended Measures**

Under the staff alternative, the project would be operated with Erie’s proposed measures, as identified above, and the following additional measure:

- Develop an erosion and sediment control plan, in consultation with the resource agencies (New York DEC and FWS) for Commission approval, to minimize erosion and sedimentation during the construction of the proposed fish passage structures (flashboard notch and seasonal plunge pool); and
- Develop an operation compliance monitoring plan, for Commission approval, to document compliance with the proposed project operation.

Below we discuss the basis for our staff-recommended measures and the rationale for modifying Erie’s proposal.

### *Project Operation*

As described in section 3.1.1 of the Settlement Agreement, Erie proposes to continue operating the project as it currently does, using seasonal water provided to it by the Canal Corporation from the adjoining barge canal during the navigation season, as described in section 2.1.3, *Existing Project Operation and Environmental Measures*. Under normal operating conditions, approximately 200 cfs would be used for power generation and the remaining (approximately 25 cfs) would be discharged into Oak Orchard Creek via the spillway, which would continue to be equipped with 2-foot flashboards. Erie states that water has been released at this location since at least 1913 and that while the Canal Corporation intends to continue providing approximately 225 cfs to the project throughout the navigation season, it has no control over the quantity or the timing of the water provided. While the amount of excess flow passed to Oak Orchard Creek over the spillway through the flashboard notch is generally expected to be approximately 25 cfs, Erie states that the Settlement Agreement parties did not envision this flow would be enforced as a minimum flow. To facilitate the protection of fish passing through the project's facilities as discussed below, Erie would have the option to add up to 8 inches of additional flashboard height.

Erie's proposal to continue its current project operation would strike the appropriate balance between developmental and non-developmental resources by continuing to provide a source of hydroelectric power while also protecting environmental resources. However, the length and timing of the navigation season, as well as amount of water released to the Oak Orchard Project, is ultimately determined by the Canal Corporation. Consistent with the mode of operation measure proposed in the Settlement Agreement, we recommend that Erie pass no more than 200 cfs through the powerhouse for power generation. All flows above 200 cfs would be passed through the flashboard notch to facilitate downstream fish passage.

There are no costs associated with this measure, because the measure would not result in a change in operations.

### *Operation Compliance Monitoring Plan*

As described above, we recommend that Erie operate the project as proposed in the Settlement Agreement, using up to 200 cfs for power generation and passing the remaining water above 200 cfs (typically 25 cfs) to Oak Orchard Creek via the flashboard notch and project spillway. To ensure compliance with the recommended operation requirement, Erie should develop and file, for Commission approval, an operation compliance monitoring plan. The operation compliance monitoring plan should contain provisions for monitoring and keeping records of power generation and flow through the powerhouse, as well as provisions for reporting any operational deviations to the Commission. We estimate that the levelized annual cost to develop an operation

compliance monitoring plan would be \$200 and conclude that the benefits of the plan would outweigh the costs.

### *Erosion and Sedimentation Control*

Construction activities associated with the proposed fish passage facility at the Oak Orchard Project, which includes a flashboard notch to pass excess flow (approximately 25 cfs) and a seasonal plunge pool downstream of the project's spillway, may result in some riverbed disturbance and could result in sediment reaching or suspending within Oak Orchard Creek. Developing and implementing an erosion and sediment control plan with procedures and BMPs to minimize erosion, contain sediment, stabilize soils after construction is complete, and minimize turbidity, would minimize effects to soils and aquatic resources associated with construction-related activities. Minimizing sediment transport from construction areas to Oak Orchard Creek would help preserve water quality in the creek and protect fish and other aquatic biota. We estimate that the levelized annual cost to develop an erosion and sediment control plan would be \$80 and conclude that the benefits of the measure would outweigh the costs.

### *Fish Passage*

As described in section 3.2.1 of the Settlement Agreement, Erie proposes to install and maintain a flashboard notch to pass excess flow (approximately 25 cfs) and a seasonal plunge pool downstream of the project's spillway within 24 months of the effective date of the subsequent license. On a seasonal basis, there is a potential for the occasional transfer of resident fish from the barge canal to the project forebay and subsequently Oak Orchard Creek while the Canal Corporation releases surplus water to the project. During the navigation season, the Canal Corporation generally opens three of the six gates connecting the barge canal to the project and typically each of the three gates is opened 28 inches. Of the approximately 225 cfs that is provided to the project, approximately 200 cfs is used for power generation and the remaining water passes over the spillway. Although fish can currently pass over the spillway, there is no plunge pool or associated depth immediately downstream of the spillway, so the addition of the flashboard notch to pass the existing excess flow and a plunge pool would provide a safer route of passage for resident fish moving from the barge canal to Oak Orchard Creek, including managed gamefish species such as walleye, smallmouth bass, and largemouth bass. As the fishway would utilize existing excess flow and Erie would have the option to add up to 8 inches of additional flashboard height to regain any head losses, we

conclude that the benefits of the proposed fish passage measure would outweigh the levelized annual cost of \$2,810.

### *Fish Protection*

As described in section 3.2.1 of the Settlement Agreement, Erie proposes to install trash racks with 1-inch clear spacing at the project upon replacement of any section of the current trash racks, or within 20 years. Staff analysis showed that the benefits to resident adult gamefish species of reducing the trash rack spacing from the current size of 1.375 inches to 1 inch would be minimal. Most adults would be able to avoid impingement/entrainment due to their size relative to the spacing on the existing trash racks (1.375 inches) and/or burst swim speeds relative to the estimated intake velocity, but the reduced spacing would provide additional protection for some juvenile fish species. Although reduced spacing would offer minimal benefits to fishery resources, the proposed timeline to delay installation until replacement of a section of the existing trash racks is necessary, or within 20 years, would reduce the economic impact on Erie.<sup>28</sup> Further, Erie would incur much of the cost to replace the existing trash racks at the end of their lifespan regardless of the trash rack spacing. Therefore, the realized incremental cost may be lower than the estimated levelized cost of \$9,800. In combination with the proposed fish passage structures described above, the proposed trash racks with 1-inch clear spacing would support safe and efficient passage for fish moving from the project forebay to Oak Orchard Creek. Therefore, we recommend Erie's proposed fish protection measure as described in the Settlement Agreement.

### *Invasive Species Management Plan*

As described in section 2.10 of the Settlement Agreement, Erie proposes to implement the Invasive Species Management Plan (Appendix A of the Settlement Agreement). The plan includes measures to prevent the introduction and spread of terrestrial and aquatic invasive plant species, such as employing BMPs during construction or maintenance, cleaning and drying boats that come into contact with water, and using invasive-free materials and seed stock during replanting. Although no invasive species have been identified within the project boundary, several invasive species have been confirmed in State Street Park, which is located directly across Oak Orchard Creek from the project, and operation and maintenance activities of the Oak Orchard Project could result in the introduction or spread of terrestrial and aquatic invasive plant species within the project boundary. Employing invasive plant species BMPs during operation, maintenance, and construction activities, such as those included in the Invasive Species Management Plan, would minimize the introduction or spread of invasive plant species

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<sup>28</sup> Staff estimated the cost based on replacement during the 11<sup>th</sup> year, however, the exact costs would vary depending on when the measure was implemented within the 20-year window.

within the project boundary. We estimate that the levelized annual cost to implement the Invasive Species Management Plan would be \$1,200 and conclude that the benefits of the measure would outweigh the costs.

#### *Bald Eagle Management Plan*

As described in section 2.9 of the Settlement Agreement, Erie proposes to implement the Bald Eagle Management Plan (Appendix B of the Settlement Agreement). The plan includes provisions to: (1) notify New York DEC and FWS within 30 days if a bald eagle nest is discovered within the project boundary during routine maintenance activities; (2) prior to any tree-clearing activities, observe areas to be cleared to determine if any bald eagle nests are present; and (3) if a nest is discovered, consult with New York DEC and FWS prior to tree-clearing activities and conduct those activities in accordance with applicable regulations and guidance.

Maintenance of the project could involve some clearing of forested habitat, including bald eagle nesting habitat. The proposed Bald Eagle Management Plan would minimize the potential for project effects on the species resulting from maintenance activities. We estimate that the levelized annual cost to implement the Bald Eagle Management Plan would be \$1,200 and conclude that the benefits of the measure would outweigh the costs.

#### *Northern Long-eared Bat Management Plan*

As described in section 2.9 of the Settlement Agreement, Erie proposes to implement the Northern Long-eared Bat Management Plan (Appendix C of the Settlement Agreement). The plan includes provisions requiring Erie, prior to any tree-clearing activities, to observe the area to be cleared for occupied maternity roosts or trees that could provide habitat for northern long-eared bats, consult with New York DEC and FWS regarding any tree-clearing activities in occupied habitat or within a buffer zone, and report observations of northern long-eared bats during any removal of hazard trees.

The project boundary is located within the range of the northern long-eared bat. Maintenance of the project has the potential to include clearing of forested habitat, which is an action that would impact summer roosting habitat of this federally listed threatened species. Implementation of the Northern Long-eared Bat Management Plan would minimize the potential for project effects on northern long-eared bat individuals and habitat. We estimate that the levelized annual cost to implement the Northern Long-eared Bat Plan would be \$1,200 and conclude that the benefits of the measure would outweigh the costs.

## **5.2 UNAVOIDABLE ADVERSE EFFECTS**

Some fish entrainment and turbine-induced mortality is likely unavoidable, even with the proposed fish passage and protection measures. With the proposed trash racks with 1-inch clear bar spacing, most adult fish could avoid involuntary entrainment, but entrainment of some small fish could still occur. However, we expect the long-term impact of entrainment to have minimal consequences to the fish communities in the Oak Orchard Creek because only small fish would pass through the turbines and larger fish could pass safely downstream through the proposed fish passage structure.

Construction activities associated with the fish passage structure may cause limited erosion and sedimentation, which may affect aquatic biota. However, these construction-related effects are expected to be short-term (e.g., days) and minor, and any impact to fish and wildlife would be minimal. Also, construction-related erosion and sedimentation would be minimized with implementation of an erosion and sediment control plan.

## **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 should 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 February 26, 2020 notice soliciting comments, recommendations, terms and conditions, and prescriptions, Interior filed four section 10(j) recommendations for the project on April 22, 2020. Table 9 lists the recommendations filed subject to section 10(j) and indicates whether the recommendations are included under the staff alternative.

Table 9. Analysis of fish and wildlife agency recommendations for the Oak Orchard Project (Source: Staff).

Recommendation	Agency	Within the Scope of Section 10(j)	Levelized Annual Cost	Recommend Adopting?
<p>Replace the existing trash racks with trash racks with 1-inch clear spacing upon the replacement of any section or the current life expectancy of the existing trash racks, within 20 years of the effective date of the subsequent license, and</p> <p>Install and maintain a downstream fish passage flashboard notch and plunge pool within 24 months of the effective date of the subsequent license, as described in section 3.2.1 of the Settlement Agreement.</p>	Interior	Yes	<p>\$9,800</p> <p>\$2,810</p>	Yes
Implement the Northern Long-eared Bat Management Plan incorporated as Appendix A of the Settlement Agreement	Interior	Yes	\$1,200	Yes
Implement the Bald Eagle Management Plan incorporated as Appendix B of the Settlement Agreement	Interior	Yes	\$1,200	Yes
Implement the Invasive Species Management Plan incorporated as Appendix C of the Settlement Agreement	Interior	Yes	\$1,200	Yes



## 5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. § 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 qualifying comprehensive plans that are applicable to the Oak Orchard Project, located in New York. No inconsistencies were found.

Adirondack Park Agency. n.d. New York State wild, scenic, and recreational rivers system field investigation summaries. Albany, New York.

National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.

New York Department of Environmental Conservation. 1985. New York State Wild, Scenic, and Recreational River System Act. Albany, New York. March 1985.

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.

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.

U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.

U.S. Fish and Wildlife Service. 1988. The Lower Great Lakes/St. Lawrence Basin: A component of the North American waterfowl management plan. December 29, 1988.

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.

## **6.0 FINDING OF NO SIGNIFICANT IMPACT**

If the Oak Orchard Project is relicensed as proposed with the additional staff-recommended measures, the project would operate while providing enhancements and protective measures for aquatic and terrestrial resources in the project area.

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

## 7.0 LITERATURE CITED

- Beamish, F. H. 1978. Swimming capacity. *Fish Physiology*. Academic Press, NY.
- Bell, M.C. 1991. Fisheries handbook of engineering requirements and biological criteria. U.S. Army Corps of Engineers, North Pacific Division, Portland, Oregon. 380 pp.
- Bryce, S.A., G.E. Griffith, J.M. Omernik, G. Edinger, S. Indrick, O. Vargas, and D. Carlson. 2010. Ecoregions of New York (2 sided color poster with map, descriptive text, summary tables, and photographs). US Geological Survey, Reston, VA. Scale 1:1,250,000. Accessed September 2, 2020 at [http://ecologicalregions.info/data/ny/NY\\_front.pdf](http://ecologicalregions.info/data/ny/NY_front.pdf) and [http://ecologicalregions.info/data/ny/NY\\_back.pdf](http://ecologicalregions.info/data/ny/NY_back.pdf).
- Cooke, S.J., T.W. Kassler, and D.H. Philipp. 2001. Physiological performance of Largemouth Bass related to local adaptation and interstock hybridization: implications for conservation and management. *Journal of Fish Biology* 59: 248-268.
- Cooperation, C. 2008. Ecoregions of North America-Level II (CEC). Accessed on September 2, 2020 at <http://www.eoearth.org/view/article/152145>.
- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. US Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC.
- FWS (United States Fish and Wildlife Service). 2015. Endangered and threatened wildlife and plants; threatened species status for the northern long-eared bat with 4(d) rule. Final Rule, and interim rule with request for comments, Federal Register. 80(63): 17974-18033.
- \_\_\_\_\_. 2016a. Endangered and threatened wildlife and plants; 4(d) rule for the northern long-eared bat. Final Rule, Federal Register. 81(9): 1900-1922.
- \_\_\_\_\_. 2016b. Endangered and threatened wildlife and plants; determination that designation of critical habitat is not prudent for the northern long-eared bat. Federal Register. 81(81): 24707-24714.
- \_\_\_\_\_. 2016c. Programmatic biological opinion on final 4(d) rule for the northern long-eared bat and activities excepted from take prohibitions. US Fish and Wildlife Service, Midwest Regional Office. Accessed September 2, 2020 at <https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/BOnlebFinal4d.pdf>.

- \_\_\_\_\_. 2016d. Key to the northern long-eared bat 4(d) rule for federal actions that may affect northern long-eared bats. Accessed September 2, 2020 at [https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/KeyFinal4dNLEB\\_FedAgencies17Feb2016.pdf](https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/KeyFinal4dNLEB_FedAgencies17Feb2016.pdf).
- \_\_\_\_\_. 2019. Northern Long-eared Bat Range Map. Updated November 29, 2019. Accessed September 2, 2020 at <https://www.fws.gov/midwest/endangered/mammals/nleb/nlebRangeMap.html>.
- \_\_\_\_\_. 2020. Northern long-eared bat final 4(d) rule; white-nose syndrome zone around WNS/Pd positive counties/districts. Updated July 26, 2020. Accessed September 2, 2020 at <https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf>.
- Harper, D. G., and R. W. Blake. 1990. Prey capture and the fast-start performance of northern pike, *Esox Lucius*. *Journal of Experimental Biology* 155: 175-192.
- iMapInvasives. 2020. An online GIS-based invasive species data management system. Accessed September 2, 2020 at <http://www.imapinvasives.org>.
- Katopodis, C. and R. Gervais. 2016. Fish Swimming Performance Database and Analyses. DFO Canadian Science Advisory Secretariat Research Document. vi + 550 pp.
- Klimah, C.A. 2015. Swimming Performance of Coastal and Inland Largemouth Bass at Varying Salinities. Master's Thesis, Auburn University, Auburn, AL.
- Nelson, J.A. 1989. Critical swimming speeds of yellow perch: comparison of populations from a naturally acidic lake and a circumneutral lake in acid and neutral water. *Journal of Experimental Biology* 145: 239-254.
- NERC (North American Electric Reliability Corporation). 2019. 2019 Long-Term Reliability Assessment. [https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC\\_LTRA\\_2019.pdf](https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2019.pdf).
- New York DEC (New York State Department of Environmental Conservation). 2016. FINAL New York State 2016 Section 303(d) List of Impaired/TMDL Waters. Accessed July 27, 2020 at <https://www.dec.ny.gov/chemical/31290.html>.
- \_\_\_\_\_. 2017a. Lake Ontario and Minor Tribs WI/PWL. Accessed July 24, 2020 at <https://www.dec.ny.gov/chemical/36741.html>.

- \_\_\_\_\_. 2017b. Oak Orchard Creek Biological Stream Assessment. Stream Monitoring and Assessment Section Bureau of Water Assessment and Management, Division of Water. July 2017.
- \_\_\_\_\_. 2018. Northern Long-eared Bat Occurrences by Town. Updated June 28, 2018. Accessed September 2, 2020 at [https://www.dec.ny.gov/docs/wildlife\\_pdf/nlebtowns.pdf](https://www.dec.ny.gov/docs/wildlife_pdf/nlebtowns.pdf).
- \_\_\_\_\_. 2019. Fish Stocking Lists (Actual): Beginning 2011. Accessed August 1, 2020 at <https://data.ny.gov/Recreation/Fish-Stocking-Lists-Actual-Beginning-2011/e52k-ymww>.
- Peake, S., R. S. McKinlye, and D. A. Scruton. 2000. Swimming performance of walleye, *Stizostedion vitreum*. Canadian Journal of Zoology 78: 1686-1690.
- Peake, S.J., and A.P. Farrell. 2004. Locomotor behavior and post-exercise physiology in relation to swimming, gait transition, and metabolism in free swimming smallmouth bass (*Micropterus dolomieu*). Journal of Experimental Biology 207:1563-1575.
- Smith, C.L. 1985. The Inland Fishes of New York State. The New York State Department of Environmental Conservation, Albany, New York.
- Webb, P. W. 1978. Hydrodynamics: non-scombroid fish. Fish Physiology, Vol. 7, Locomotion. Academic Press, NY.
- Zollweg, J., M.R. Noll, T.W. Lewis, P. Richards, S. Wells, and E. Kridel. 2005. Oak Orchard Watershed State of the Basin Report. Prepared for the Oak Orchard Watershed Protection Alliance.

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