PRE-APPLICATION DOCUMENT
FOR THE

CRESCENT AND VISCHER FERRY HYDROELECTRIC PROJECTS
FERC NO. P-4678 AND P-4679





Prepared for:

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

Prepared by:

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MAY 2019

Executive Summary

The Power Authority of the State of New York (New York Power Authority, Power Authority, NYPA, or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Crescent Hydroelectric Project (Crescent Project) (FERC No. 4678) and the Vischer Ferry Hydroelectric Project (Vischer Ferry Project) (FERC No. 4679) (collectively referred to as the "Projects"). FERC issued a license for the Crescent Project on June 26, 1984, and this license expires on May 31, 2024. FERC issued a license for the Vischer Ferry Project on June 26, 1984, and this license expires on May 31, 2024. The Power Authority is filing Notices of Intent (NOI) with the Commission to relicense the Projects.

The Power Authority will be applying for a new license for each of the Projects on or before May 31, 2022. The Power Authority is using FERC's Integrated Licensing Process (ILP), as established in regulation at 18 U.S. Code of Federal Regulations [C.F.R.] Part 5. As part of the license application process, FERC requires the Power Authority to prepare and distribute a Pre-Application Document (PAD). The Power Authority will file a single PAD to cover both the Crescent and Vischer Ferry Projects. Separate NOIs will be filed in conjunction with the PAD, and NYPA will file two separate applications for relicensing. The PAD will be filed simultaneously with the NOIs, and these documents will be distributed to federal and state resource agencies, local governments, Native American Nations, and members of the public that may have an interest in the relicensing of the Projects. To further assist in disseminating information throughout the relicensing process, the Power Authority has developed a website (www.nypa.gov/cvf), which will be used to post public documents created during the relicensing process, including the NOIs and PAD. Copies of relicensing documents, such as the PAD, will also be available for public inspection during business hours at the Power Authority's Albany Office, 30 South Pearl Street, Albany NY 12207. A proposed process plan and schedule for relicensing activities is provided in Section 2 of the PAD.

The PAD is a tool for providing relevant engineering, operational, economic, and environmental information pertaining to the Projects that is reasonably available at the time the NOI is filed (C.F.R 5.6). The PAD supplies information to help interested parties understand the Projects and identify information that may be needed to support the issuance of new licenses.

The Crescent and Vischer Ferry Projects are located adjacent to one another on the Mohawk River in New York at river miles 4 and 14, respectively. The upstream project boundary of the Crescent Project is the downstream project boundary of the Vischer Ferry Project. Both Projects generally consist of a dam, powerhouse, impoundment, and appurtenant facilities. Both Projects are located adjacent to the New York State Barge Canal System (Canal System). Descriptions of Project facilities and operations are provided in Section 3.

The Crescent and Vischer Ferry Projects are located in the Mohawk River Watershed. The Mohawk River Watershed lies entirely in the State of New York and encompasses 3,460 square miles within 14 counties (Mohawk River Watershed Coalition [MRWC], 2015). A series of Canal System locks and dams regulates Mohawk River flows for navigation purposes, and navigation is the primary use of Project waters at both the Crescent and Vischer Ferry Projects. There are six hydroelectric facilities on the Mohawk River,

including the Crescent and Vischer Ferry Projects. The FERC-licensed Little Falls Project is the closest hydroelectric project upstream of the Vischer Ferry Project, and the School Street Project is the closest hydroelectric project downstream of the Crescent Project.

The Mohawk River in the area of the Projects abounds with natural, recreational, and cultural resources. Detailed descriptions of existing resources in the vicinity of the Projects including geology and soils; water resources; water quality; fisheries; aquatic life; wetlands; wildlife; botanical; rare, threatened and endangered species; recreation; cultural; Tribal; and socioeconomic resources are provided in Section 4. Based on the resource information available for the Projects, preliminary resource issues and potential studies or information needed for the relicensing effort are outlined and discussed in Section 5.

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List of Abbreviations

BCD	Barge Canal Datum
BP	Before Present
Canal System	New York State Canal System/Barge Canal System
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
Commission	Federal Energy Regulatory Commission
Crescent Project	Crescent Hydroelectric Project
CRIS	Cultural Resource Information System
CRM	Cultural Resources Management
CWA	Clean Water Act
°C	degrees Celsius
DMNC	dependable maximum net capability
DO	dissolved oxygen
ECL	Environmental Conservation Law
ECNHC	Erie Canalway National Heritage Corridor
EPT	Ephemeroptera-Plecoptera-Tricoptera
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
ft.	feet
hp	horsepower
HRECOS	Hudson River Environmental Conditions Observing System
Hz	hertz
ILP	Integrated Licensing Process
iPaC	Information for Planning and Consultation
kW	kilowatt
kWH	kilowatt-hour
Licensee	Power Authority of the State of New York
mg/L	milligram/liter
MGD	million gallons per day
MRWC	Mohawk River Watershed Coalition
MW	megawatt
µS/cm	microsiemens/centimeter

NEPA	National Environmental Policy Act
New York Power Authority	Power Authority of the State of New York
NHL	National Historic Landmark
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NTRU	Nephelometric Turbidity Ratio Unit
NTU	Nephelometric Turbidity Unit
NWI	National Wetlands Inventory
NYISO	New York Independent System Operator
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSTA	New York State Thruway Authority
OPRHP	New York State Office of Parks, Recreation and Historic Preservation
PAD	Pre-Application Document
PAPE	Project Areas of Potential Effect
PLC	programmable logic controller
Power Authority	Power Authority of the State of New York
PRISM	Partnerships for Regional Invasive Species Management
Projects	Crescent and Vischer Ferry Hydroelectric Projects
rpm	revolutions per minute
RTE	Rare, Threatened, and Endangered
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
SD2	Scoping Document 2
SHPO	New York State Historic Preservation Office
SpC	Specific conductance
SPDES	State Pollutant Discharge Elimination System
SUNY ESF	The State University of New York College of Environmental Science and Forestry
TCP	traditional cultural properties

TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	volt
Vischer Ferry Project	Vischer Ferry Hydroelectric Project
WI/PWL	Waterbody Inventory/Priority Waterbodies List
w FB	with flashboards
wo FB	without flashboards
WSRRA	Wild, Scenic, and Recreational Rivers Act

1 INTRODUCTION

1.1 Purpose of the Pre-Application Document (PAD)

The Power Authority of the State of New York (New York Power Authority, Power Authority, NYPA or Licensee) is licensed by the Federal Energy Regulatory Commission (FERC or Commission) to operate the Crescent Hydroelectric Project (Crescent Project) (FERC No. 4678) and the Vischer Ferry Hydroelectric Project (Vischer Ferry Project) (FERC No. 4679) (herein collectively referred to as the "Projects"). FERC issued a license for the Crescent Project on June 26, 1984, and this license expires on May 31, 2024. The FERC issued a license for the Vischer Ferry Project on June 26, 1984, and this license expires on May 31, 2024. The Power Authority is filing Notices of Intent (NOI) with the Commission to relicense the Projects.

The Crescent and Vischer Ferry Projects are located adjacent to one another on the Mohawk River in New York at river miles 4 and 14, respectively. The upstream project boundary of the Crescent Project is the downstream project boundary of the Vischer Ferry Project. Both Projects generally consist of a dam, powerhouse, impoundment, and appurtenant facilities. Both Project dams were originally constructed as part of the New York State Barge Canal System[1] (Canal System[2]) to 'canalize' the Mohawk River from Scotia to Crescent, providing navigable conditions for barges and vessels and facilitating water level control and lock operations. Both Projects have the same license expiration date of May 31, 2024. As required by law, the Power Authority will be applying for a new license for each of the Projects on or before May 31, 2022.

As an initial step in officially commencing the licensing process, the Commission's relicensing regulations (18 U.S. Code of Federal Regulations [C.F.R.] § 5.6) require a licensee to prepare and distribute a Pre-Application Document (PAD). The Power Authority will file a single PAD to cover both Projects. In accordance with the Commission's regulations, the Power Authority will file the PAD simultaneously with the NOIs and will distribute the documents to federal and state resource agencies, local governments, Native American Nations, and members of the public that may have an interest in the relicensing of the Projects. To assist in disseminating information throughout the relicensing process, the Power Authority has developed a website (www.nypa.gov/cvf), which will be used to post schedules,

[1] The existing Barge Canal System was created following the passage of the Barge Canal Act in 1903. However, some portion of the the original Erie Canal built between 1817 and 1825 still exists. For the purposes of this document, the Licensee will consistently refer to the portions of the Barge Canal or Erie Canal adjacent to the Projects as the Canal System.

[2] The Canal System is owned by the People of the State of New York and operated by the New York State Canal Corporation (NYSCC), which was created by the New York State Legislature in 1992 as a subsidiary of the New York State Thruway Authority (NYSTA). Prior to 1992, the operations of the Canal System fell under the New York State Department of Transportation. On January 1, 2017, the NYSCC became a subsidiary of the Power Authority (N.Y. Public Authorities Law § 1005-b).

agendas, meeting minutes, study plans, study reports, and other public documents created during the relicensing process, including the NOIs and PAD.

The PAD is a tool for providing relevant engineering, operational, economic, and environmental information pertaining to the Projects that is reasonably available at the time the NOI is filed. The PAD also serves to help interested parties scope issues and identify study needs for the Commission's National Environmental Policy Act (NEPA) document. The PAD supplies information to help interested parties understand the Projects and identify information that may be needed to support the issuance of new licenses. This evaluation will be documented in the license applications to be prepared by the Power Authority and filed with the Commission at least two years prior to license expiration, or by May 31, 2022.

In compliance with the Commission's regulations governing the content of the PAD, the Power Authority contacted appropriate federal and state resource agencies and parties who may be interested in the relicensing of the Projects. The Power Authority requested that parties provide any relevant studies, data, and information on topics such as geology, water quality, fisheries, recreation, wildlife, wetlands, aesthetics, and cultural resources.

The information contained in this document was assembled based on the requirements set forth in 18 C.F.R. § 5.6 (c) and (d) and is organized as follows:

Section 2 – Proposed process plan and schedule for all pre-application activities, 18 C.F.R. § 5.6(d)(1).

Section 3 – General description of the Projects' location, facilities, and operations, 18 C.F.R. § 5.6(d)(2).

Section 4 – Description of the existing environment and resource impacts, 18 C.F.R. § 5.6(d)(3).

Section 5 – Identification of preliminary resource issues and potential studies or information gathering needs associated with the issues, 18 C.F.R. § 5.6(d)(4).

Section 6 – Literature and information sources cited in the descriptions and summaries of existing resource data, 18 C.F.R. § 5.6(c)(2).

Appendix A – Summary of contacts and correspondence letters made to gather relevant information for preparing the PAD, 18 C.F.R. § 5.6(d)(5).

Appendix B – Current Licenses, 18 C.F.R. § 5.6(d)(2)(v)(A).

Appendix C – Current Water Quality Certifications

Appendix D – Flow Duration Curves

1.2 Overview of the Integrated Licensing Process

The Power Authority is using FERC's Integrated Licensing Process (ILP), as established in regulations issued by FERC on July 23, 2003 (Final Rule, Order No. 2002) and found at 18 C.F.R. Part 5. The ILP was developed to integrate the applicant's pre-filing consultation with the Commission's scoping pursuant to NEPA. The primary activities that are undertaken in the ILP include the filing of the NOI and PAD, FERC's public scoping of issues, the development of a study plan to assess the impacts of continuing the Projects' operations on power and non-power resources, FERC's issuance of its study plan determination, study execution, and report development and preparation of a license application. These activities will take place over a multi-year period ending with the filing of the application for new licenses by May 31, 2022. The Commission will then complete its environmental analysis and processing of the license applications.

The Power Authority's filing of the NOIs and PAD initiates the ILP set forth in Part 5 of the Commission's regulations. As set forth in 18 C.F.R. § 5.7, within 30 days of this filing Commission staff will attempt to meet with each federally recognized Native American Nation that is "likely to be affected by" the Power Authority's relicensing application.

Next, as required in 18 C.F.R. § 5.8, the Commission will issue a notice of commencement of the licensing proceeding and Scoping Document 1 (SD1) within 60 days of the filing of this NOI/PAD. SD1 will include a preliminary list of issues to be assessed during the licensing proceeding and will solicit stakeholder comments on the scope of analysis of issues. FERC will then hold a public scoping meeting and site visit within 30 days of issuing SD1. The site visit will allow stakeholders an opportunity to observe the Projects' layouts and the areas, understand operations, and participate in a question and answer session about the Projects. Subsequent to the scoping meeting and site visit, Commission staff may issue a revised scoping document based on public and agency input.

A detailed proposed Process Plan and Schedule, which depicts all major milestones required in the ILP along with a timetable for those milestones, is set forth in Section 2 of the PAD.

1.2.1 Crescent Project Overview

The Crescent Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The dam was designed in 1907 and construction of the dam was completed in 1914 as part of the extensive modifications made to upgrade the original Erie Canal. These modifications allowed canal traffic to navigate on the Mohawk River, except where channels were constructed to bypass natural barriers. Cohoes Falls, an 80-foot-high set of falls located about 1.5 miles downstream from Crescent Dam, prevented direct navigation between the Mohawk and Hudson Rivers. Crescent Dam is associated with Lock E-6 (Figure 3.3-1) and serves as the upstream terminus of the portion of the Canal System known as the Waterford Flight, which includes the canal between Lock E-2 through Lock E-6. The Waterford Flight is a 2.5 mile-long section of canal (with a total lift of 169 feet) which allows boat traffic to bypass Cohoes Falls.

In 1913, hydropower was harnessed at the site. The original powerhouse was located at the east end of Dam A and dismantled *ca*. 1927 when a line was strung across the river from a newly built, larger powerhouse to take its place. This current powerhouse, located on the western bank, was built in 1925 and expanded in the late 1980s. It houses two 2.8 megawatt (MW) Francis turbines and two 3.0 MW Kaplan turbines, for a total station capacity of 11.6 MW. On April 8, 1991, FERC issued an Order amending the license to an installed capacity of 11.8 MW based on actual performance.

The Crescent dam, powerhouse, and impoundment are contributing elements of the New York State Barge Canal National Historic Landmark.

1.2.2 Vischer Ferry Project Overview

The Vischer Ferry Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The dam was designed in 1907 and construction of the dam was completed in 1913 as part of the extensive modifications made to upgrade the original Erie Canal. These modifications allowed canal traffic to navigate on the Mohawk River, except where channels were constructed to bypass natural barriers. There is a single canal lock at the Vischer Ferry Dam, Lock E-7, which is operated by New York State Canal Corporation (NYSCC).

The current powerhouse was constructed in 1925 and expanded in the 1980s. It houses two 2.8 MW Francis turbines with an installed capacity of 5.6 MW and two 3.0 MW Kaplan turbines, for a total capacity of 11.6 MW. On April 8, 1991, FERC issued an Order amending the license to an installed capacity of 11.8 MW based on actual performance.

The Vischer Ferry dam, powerhouse, and impoundment are contributing elements of the New York State Barge Canal National Historic Landmark.

2 PROCESS PLAN AND SCHEDULE (18 C.F.R. § 5.6 (d)(1))

2.1 Document Distribution and Mailing Lists

2.1.1 Document Distribution

The Power Authority has developed a website (www.nypa.gov/cvf) to assist in disseminating information throughout the relicensing process. The website will be used to post schedules, agendas, meeting minutes, study plans, study reports, and other documents created during the relicensing process. Copies of licensing documents, such as the PAD, will also be available for public inspection during business hours at the Power Authority's Albany Office, 30 South Pearl Street, Albany NY 12207.

2.1.2 Mailing List

The Power Authority will maintain a mailing list of all stakeholders in the relicensing process. Stakeholders may sign up for the mailing list by sending an email to CVFRelicensing@nypa.gov, please include your name and/or organization name and mailing address. The Power Authority will use email notifications when possible.

2.1.3 Source Materials Referenced in PAD

In accordance with 18 C.F.R. § 5.6(c)(2), sources referenced in the PAD will be available to the public.

Members of the public may send an email to CVFRelicensing@nypa.gov to request source materials. The Power Authority will provide requested information. In responding to a request, the Power Authority will provide any requested reference electronically, if possible. The Power Authority may charge for out-of-pocket costs for reproduction of reference materials that were not generated by the Power Authority (e.g., books) and, if applicable, postage fees. Such requests will be handled on a case-by-case basis. Copyrighted sources referenced in the PAD will be available for viewing, and to the extent allowed by copyright, reproduction, at the Power Authority's Albany Office, 30 South Pearl Street, Albany NY 12207.

2.2 Proposed Schedule

A proposed Process Plan and Schedule with a timetable for the balance of the licensing process is shown in Table 2.2-1. The proposed Process Plan and Schedule may reflect deadlines that fall on weekend days (Saturday or Sunday) or holidays. Deadlines falling on a weekend, holiday, or day when the Commission is closed due to adverse conditions are deemed to fall on the close of business of the next Commission business day in accordance with FERC guidelines. While the proposed Process Plan and Schedule were developed in accordance with and incorporate the timeframes set forth in 18 C.F.R. Part 5, the Commission is expected to establish the applicable Process Plan and Schedule when it issues SD1.

Table 2.2-1: Proposed Process Plan and Schedule

Activity	Responsibility	Required Time Frame	Citation	Date
File Notice of Intent (NOI) and Pre-Application Document (PAD)	Power Authority	At least 5 (but no more than 5 1/2) years before existing license expires	18 C.F.R. § 5.5(d)	May 3, 2019
Hold Initial Tribal Consultation Meeting	FERC	Within 30 days of filing of NOI & PAD	18 C.F.R. § 5.7	June 2, 2019
Notice NOI/PAD and Issue Scoping Document 1 (SD1)	FERC	Within 60 days of filing of NOI & PAD	18 C.F.R. § 5.8(a)	July 2, 2019
Hold Scoping Meeting and Site Visit	FERC	Within 30 days of issuance of SD1	18 C.F.R. § 5.8(b)(3)	August 1, 2019
Comment on PAD and SD1; Submit Study Requests	Stakeholders	Within 60 days of issuance of SD1	18 C.F.R. § 5.9(a)	August 31, 2019
Issue Scoping Document 2 (SD2) (if necessary)	FERC	Within 45 days of deadline for filing comments on SD1	18 C.F.R. § 5.10	October 15, 2019
File Proposed Study Plan (PSP)	Power Authority	Within 45 days of deadline for filing comments on PAD and SD1	18 C.F.R. § 5.11(a)	October 15, 2019
Hold Study Plan Meeting	Power Authority	Within 30 days of filing PSP	18 C.F.R. § 5.11(e)	November 14, 2019
Comment on PSP	Stakeholders	Within 90 days of filing PSP	18 C.F.R. § 5.12	January 13, 2020
File Revised Study Plan (RSP)	Power Authority	Within 30 days of deadline for filing comments on PSP	18 C.F.R. § 5.13(a)	February 12, 2020
Comment on RSP	Stakeholders	Within 15 days of filing of RSP	18 C.F.R. § 5.13(b)	February 27, 2020
FERC Issues Study Plan Determination	FERC	Within 30 days of filing of RSP	18 C.F.R. § 5.13(c)	March 13, 2020

Activity	Responsibility	Required Time Frame	Citation	Date
Initiate Formal Study Dispute Resolution Process with filing of Notice of Study Dispute (if necessary)	Agencies with mandatory conditioning authority	Within 20 days of issuance of Study Plan Determination	18 C.F.R. § 5.14(a)	April 2, 2020
File Response to Study Dispute(s) (if necessary)	Power Authority	Within 25 days of Notice of Study Dispute	18 C.F.R. § 5.14(i)	April 27, 2020
FERC Dispute Resolution Panel Issues Finding (if necessary)	Dispute Panel	Within 50 days of Notice of Study Dispute	18 C.F.R. § 5.14(k)	May 22, 2020
FERC Issues Determination on Study Dispute (if necessary)	FERC	Within 70 days of Notice of Study Dispute	18 C.F.R. § 5.14(l)	June 11, 2020
Conduct Field Studies	Power Authority	Pursuant to approved RSP/Study Plan Determination	18 C.F.R. § 5.15	Spring – Fall 2020
File Initial Study Report (ISR)	Power Authority	Pursuant to approved RSP/Study Plan Determination or no later than 1 year after Study Plan Determination	18 C.F.R. § 5.15(c)(1)	March 13, 2021
Hold ISR Meeting	Power Authority	Within 15 days of filing of ISR	18 C.F.R. § 5.15(c)(2)	March 28, 2021
File ISR Meeting Summary	Power Authority	Within 15 days of ISR meeting	18 C.F.R. § 5.15(c)(3)	April 12, 2021
File ISR Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of ISR meeting summary	10 C.F.R. § 5.15(c)(4)	May 12, 2021
File Responses to Disagreements (if necessary)	Power Authority	Within 30 days of filing of ISR meeting summary disagreements	18 C.F.R. § 5.15(c)(5)	June 11, 2021

Activity	Responsibility	Required Time Frame	Citation	Date
Resolve Disagreements (if necessary)	FERC	Within 30 days of filing of responses to disagreements	18 C.F.R. § 5.15(c)(6)	July 11, 2021
Conduct Second Season Field Studies (if necessary)	Power Authority	Pursuant to RSP/Study Plan Determination	18 C.F.R. § 5.15	Spring – Fall 2021
File Preliminary Licensing Proposal (PLP) or Draft License Application	Power Authority	No later than 150 days before deadline for filing final license application	18 C.F.R. § 5.16(a)	January 4, 2022
File Updated Study Report (USR) (if applicable)	Power Authority	Pursuant to approved SP or no later than 2 years after Study Plan Determination	18 C.F.R. § 5.15(f)	March 13, 2022
Hold USR Meeting (if applicable)	Power Authority	Within 15 days of filing of USR	18 C.F.R. § 5.15(c)(2)	March 28, 2022
Comment on PLP or Draft License Application, Additional Information Requests (if necessary)	Stakeholders	Within 90 days of filing of PLP or Draft License Application	18 C.F.R. § 5.16(e)	April 4, 2022
File USR Meeting Summary (if applicable)	Power Authority	Within 15 days of USR Meeting	18 C.F.R. § 5.15(c)(3)	April 12, 2022
File Meeting Summary Disagreements (if necessary)	Stakeholders	Within 30 days of filing of USR summary	18 C.F.R. § 5.15(c)(4)	May 12, 2022
File Responses to USR Meeting Summary Disagreements (if necessary)	Power Authority	Within 30 days of filing of USR meeting summary disagreements	18 C.F.R. § 5.15(c)(5)	June 11, 2022
Resolve USR Meeting Disagreements (if necessary)	FERC	Within 30 days of filing of response to disagreements	18 C.F.R. § 5.15(c)(6)	July 11, 2022
File License Application	Power Authority	No later than 24 months before existing license expires	18 C.F.R. § 5.17(a)	April 3, 2022

3 PROJECT LOCATION, FACILITIES, AND OPERATIONS (18 C.F.R. § 5.6 (d)(2))

3.1 Authorized Agent

The exact name, business address, and telephone for each person authorized to act as agent for the applicant is as follows:

Mark E. Slade, Director of Licensing
New York Power Authority
123 Main St.
White Plains, NY 10601
Telephone: (914) 681-6659
E-Mail: Mark.Slade@nypa.gov

Justin E. Driscoll, Executive Vice President, General Counsel
Susan L. Watson, Special Counsel
New York Power Authority
123 Main St.
White Plains, NY 10601
Telephone: (914) 390-8070
E-Mail: Susan.Watson@nypa.gov

Charles R. Sensiba
Troutman Sanders
401 9th St NW #1000
Washington, D.C. 20004
Telephone: (202) 274-2850
E-Mail: charles.sensiba@troutman.com

3.2 Project Location

3.2.1 Crescent Project

The Crescent Project is an 11.8 MW conventional hydroelectric project located on the Mohawk River, approximately 4 miles upstream from its confluence with the Hudson River. The Crescent Project is located in Saratoga, Albany, and Schenectady Counties, New York, and in the towns of Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna (Figures 3.2-1 and 3.2-2). It is located 2 miles upstream of the School Street Hydroelectric Project (FERC No. 2539) owned by Erie Boulevard Hydropower, L.P. The Crescent impoundment is approximately 10 miles long and the upstream terminus of the impoundment is located at the Vischer Ferry Project Dam.

Figure 3.2-1: Locations of Crescent and Vischer Ferry Projects

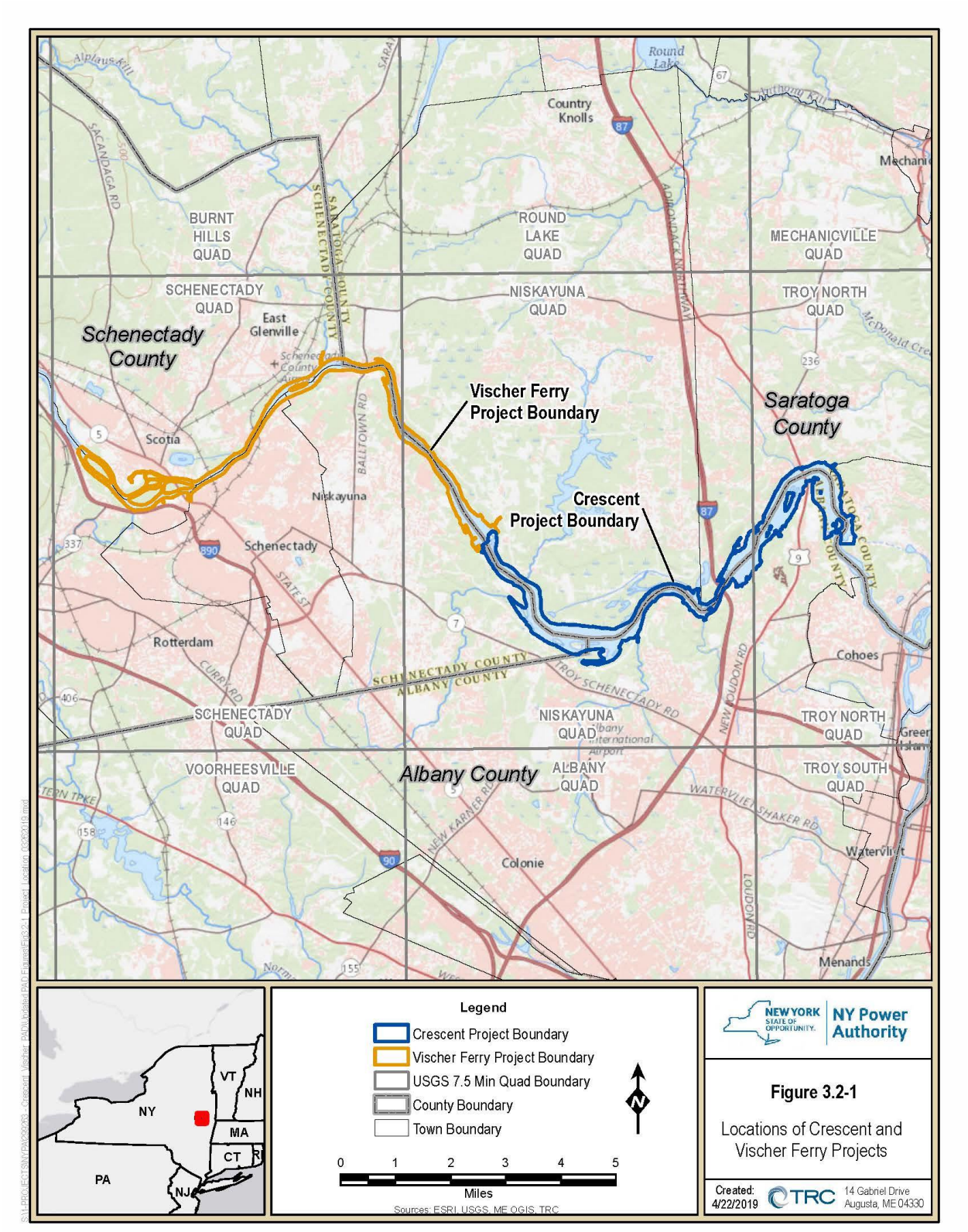
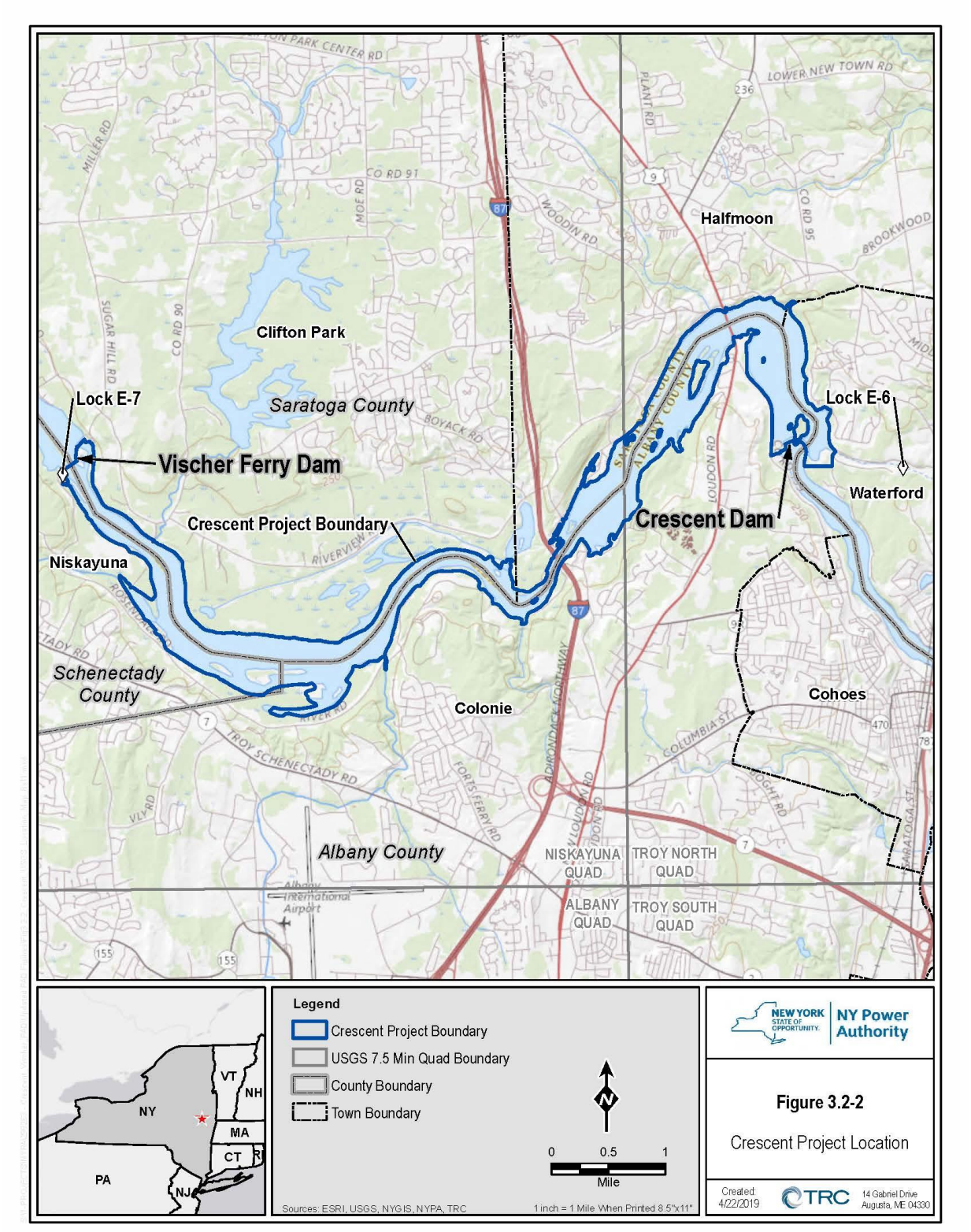


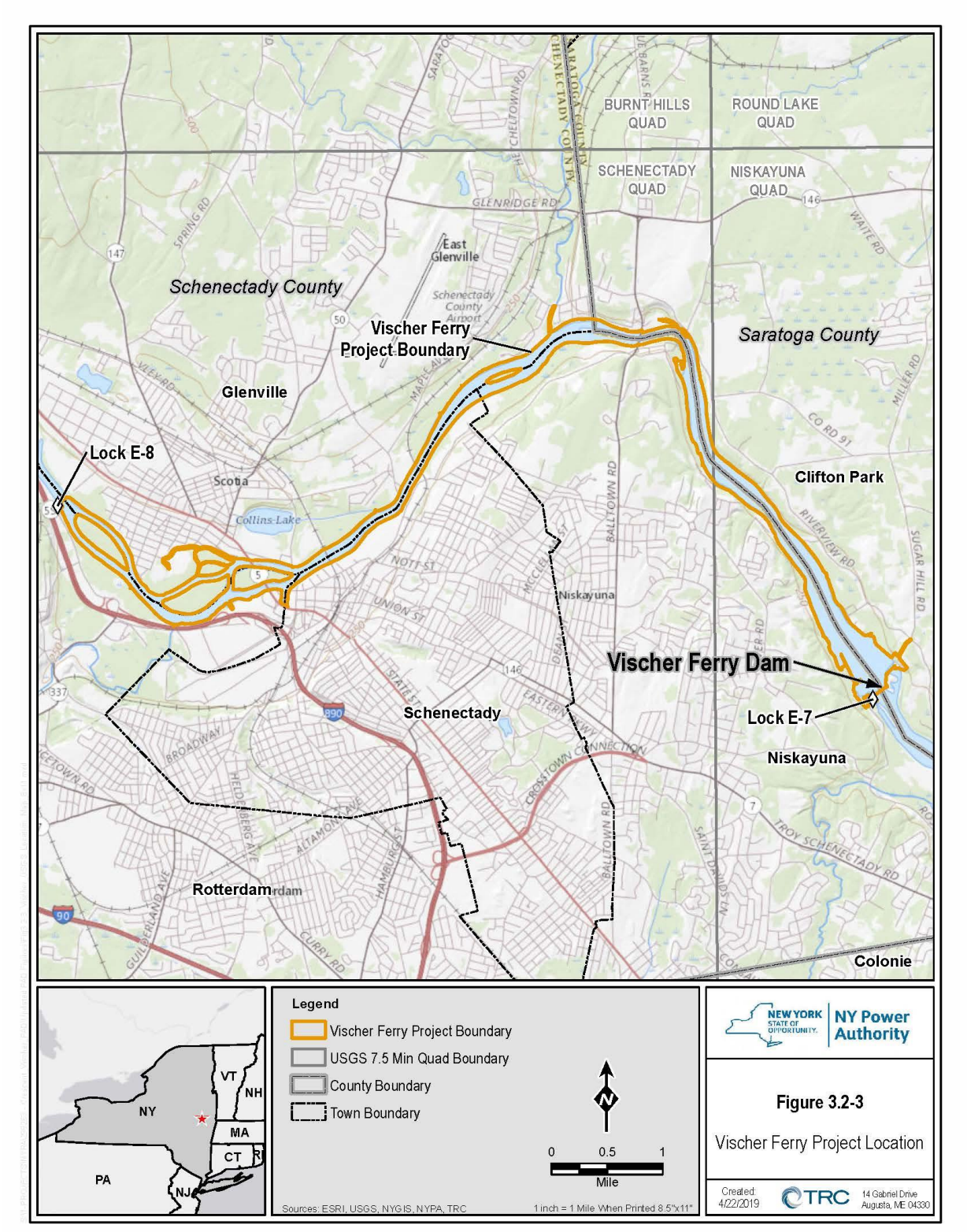
Figure 3.2-2: Crescent Project Location



3.2.2 Vischer Ferry Project

The Vischer Ferry Project is an 11.8 MW conventional hydroelectric project located on the Mohawk River, approximately 14 miles upstream from its confluence with the Hudson River, and approximately 10 miles upstream of the Crescent Project. The Vischer Ferry Project is located in Saratoga and Schenectady Counties, New York, in the towns of Clifton Park and Niskayuna and the City of Schenectady (Figures 3.2-1 and 3.2-3). The Vischer Ferry impoundment is 10.3 miles long and the upstream terminus of the impoundment is located at Lock E-8 in Schenectady.

Figure 3.2-3: Vischer Ferry Project Location



3.3 Project Facilities

3.3.1 Crescent Project

The Crescent Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The Crescent Dam consists of two independent concrete gravity overflow sections which link each river bank to a rock island in the middle of the Mohawk River (Figure 3.3-1). Both sections are curved in plan and have a crest at elevation (El.) 184 BCD.[3] The total length of the dams is 1,435 feet (ft.). The eastern overflow section (Dam A) is 901 ft. long and 52 ft. in height. The western section (Dam B) is 534 ft. long and 32 ft. in height; providing 1,435 feet of spillway crest at El. 184 ft. BCD. A smaller overflow section, Dam C, is located immediately downstream of Dam B. The maximum structural height of this dam is approximately 16 ft., and it has a crest elevation of El. 171 ft. BCD. In order to aid canal navigation, one-foot-high (12 inch) wooden flashboards are installed along the crests of both spillways (Dams A and B) seasonally in Spring (generally in April based on seasonal conditions) and removed in the Fall (generally in November based on seasonal conditions). When the flashboards are installed, the spillway crest is El. 185 ft. BCD.

The regulating section is located at the western end of Dam B. It is constructed of reinforced concrete and consists of an 8-foot-wide sluiceway and a 30-foot-wide Tainter gate bay. The sill of the sluiceway is at El. 182 ft. BCD. The sluiceway is equipped with stoplog slots. The sill of the Tainter gate is at El. 176 ft. BCD; in the closed position, the top of the gate is at El. 188.5 ft. BCD. The gate is operated electrically from a local control panel.

Water is directed to the powerhouse through a 175-foot-long headrace channel. The bottom of the headrace channel is cut rock, and the sides are formed by two mass concrete retaining walls. The channel is rectangular in plan and is approximately 123 ft. wide at the powerhouse. The elevation of the channel bottom varies from El. 171 ft. BCD at the upstream end of the headrace to El. 161 ft. BCD at the powerhouse.

The existing powerhouse located on the western bank is constructed of brick and concrete, and is approximately 180 ft. long and 73 ft. wide. The powerhouse includes an intake structure with trashracks, rake, stoplogs, and gates. The trashrack bar spacing width is 3 7/8 inches. The powerhouse houses four turbine/generator units: two 2.8 MW rated Francis turbines and two 3.0 MW vertical Kaplan turbines. The original portion of the powerhouse contains the two original Francis units (Units 1 and 2). In the 1980s, the powerhouse was expanded to include the two Kaplan units (Units 3 and 4), which are located riverward of the original powerhouse (Figure 3.3-1 and Table 3.3-1).

The tailrace is an open, unlined rock cut approximately 145 ft. wide and 65 ft. long. Elbow-type draft tubes discharge water directly into the excavated tailrace channel. The tailwater is approximately El.

[3] All elevations refer to Barge Canal Datum (BCD) unless stated otherwise. BCD= NAVD88 -1.67 feet or USGS Datum +0.99 feet.

157 ft. BCD, and is controlled by Erie Boulevard's School Street Station, located about 1.5 miles downstream of the Crescent Project.

The Crescent impoundment extends upstream approximately 10 miles to the Vischer Ferry Project Dam. At El. 184 ft. BCD, the surface area of the impoundment is 2,000 acres and impounds approximately 50,000 acre-feet of water. Installation of the flashboards increases the normal full pool elevation of the impoundment by 1 foot, to El. 185 ft. BCD, and the impoundment retains an additional 2,000 acre-feet of water.

Figure 3.3-1: Major Project Facilities of the Crescent Project

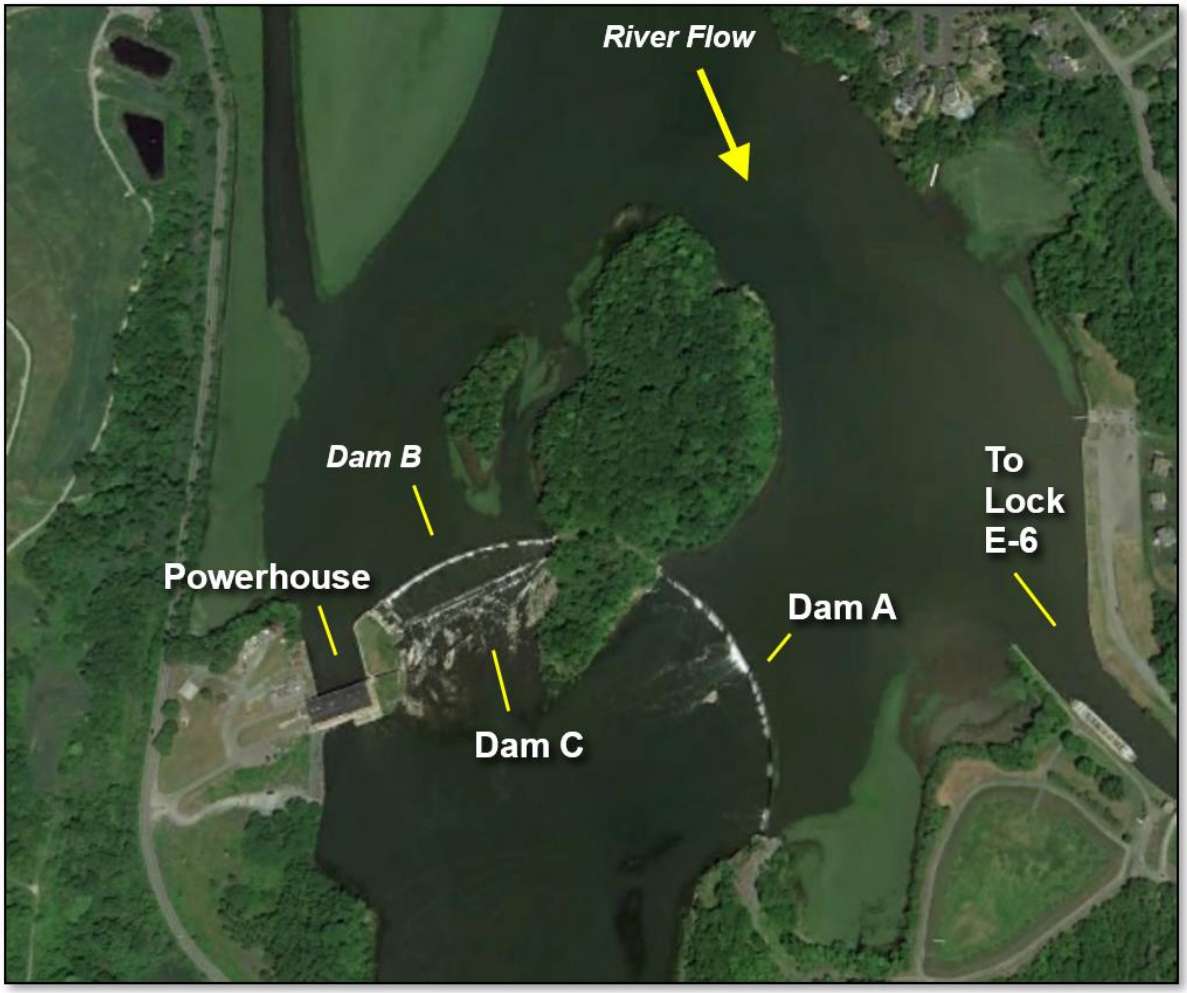


Table 3.3-1: Crescent Project Turbine and Generator Nameplate Data

Turbines				
Number of Units	4 units			
	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
Type	Vertical Francis	Vertical Francis	Vertical Kaplan	Vertical Kaplan
Design Head	26.9' (wo FB)[1] 27.9' w FB[1]	26.9' (wo FB) 27.9' w FB	26.9' (wo FB) 27.9' w FB	26.9' (wo FB) 27.9' w FB
Rated Capacity	4,000 hp[2]	4,000 hp	4,000 hp	4,000 hp
Minimum Discharge	400 cfs[3] per unit	400 cfs per unit	350 cfs per unit	350 cfs per unit
Maximum Discharge	1,500 cfs per unit	1,500 cfs per unit	1,820 cfs per unit	1,820 cfs per unit
Operating Speed	90 rpm[4]	90 rpm	144 rpm	144 rpm
Generators				
Type	Vertical configuration	Vertical configuration	Vertical configuration	Vertical configuration
Rated Capacity	2,800 kW[5]	2,800 kW	3,000 kW	3,000 kW
Power Factor	0.80	0.80	0.80	0.80
Phase	3 Phase	3 Phase	3 Phase	3 Phase
Voltage	2,300 V[6]	2,300 V	4,160 V	4,160 V
Frequency	60 Hz[7]	60 Hz	60 Hz	60 Hz
Synchronous Speed	90 rpm	90 rpm	144 rpm	144 rpm

[1] without flashboards (wo FB), with flashboards (w FB), [2] horsepower (hp), [3] cubic feet per second (cfs), [4] revolutions per minute (rpm), [5] kilowatt (kW), [6] volt (V), [7] hertz (Hz)

3.3.2 Vischer Ferry Project

The Vischer Ferry Project generally consists of a dam, powerhouse, impoundment, and appurtenant facilities. The Vischer Ferry Dam was completed in 1913 and consists of three connected spillway sections having a total length of 1,919 ft. (Figure 3.3-2). The two outer sections are regular, ungated, ogee-shaped weirs with an average structural height of approximately 30 ft. above rock. A 2-foot thick concrete apron extends 40 ft. beyond the toe of the dam and is keyed into bedrock on its downstream edge. The western dam section (Dam D) is 735 ft. long, and the eastern dam section (Dam F) is 502 ft. long. The middle section (Dam E) is a broad-crested weir, 682 ft. long, that was constructed over a small bedrock island near the center of the river. The height of Dam E varies from 1 to 3 ft. above the rock. These three sections of dam are collectively known as "Dam 3 at Vischer Ferry." To aid canal navigation, flashboards are installed along the crests of all spillways seasonally from Spring (generally in April) to the end of navigation season (generally in November based on season conditions). The flashboards are 27 inches high and are installed in sockets spaced 4 ft. apart. When the flashboards are installed the spillway is El. 213.25 ft. BCD. The spillway crest elevation is 211.0 ft. when flashboards are removed.

A gated section is located at the northern end of the spillway dams. It is constructed of reinforced concrete and consists of seven rectangular gate openings with electrically operated sluice gates. Six of the gate openings are 14 ft. high by 8 ft. wide with sills at El. 202.1 ft. BCD. The seventh opening, a trash sluice, is 12 ft. high by 8 ft. wide with a sill at El. 190 ft. BCD. The gate openings are separated by 3-foot-wide concrete piers with semi-circular noses and square tails separating each opening. The gates are locally controlled and are generally closed. A concrete apron approximately 130 ft. long and 16 ft. wide directs flow from the gates to the downstream pond.

Water is directed to the powerhouse through an irregularly shaped headrace channel. The headrace channel width is approximately 145 ft. at the upstream end, but increases to about 180 ft. wide at the entrance to the powerhouse. The bottom of the headrace channel maintains a fairly constant elevation of El. 189 ft. BCD. The Vischer Ferry headrace was once the site of the Vischer Ferry lift (lock) for the old Erie Canal. The current headrace has no controlling upstream gates. The southern side of the headrace is formed by the gate structure described in the previous paragraph; the northern side is cut from rock along the river's edge.

The Vischer Ferry Project powerhouse is located at the northern end of the dam (Figure 3.3-2). The current powerhouse was built in 1925 and expanded in the 1980s. The powerhouse is constructed of brick and concrete, and is approximately 186 ft. long and 73 ft. wide. The powerhouse includes an intake structure with trashracks, rake, stoplogs, and gates. The trashrack bar spacing width is 3 7/8 inches. The powerhouse houses four turbine/generator units: two 2.8 MW rated Francis turbines and two 3.0 MW vertical shaft Kaplan turbines (Figure 3.3-2 and Table 3.3-2).

The tailrace is an open, unlined rock cut approximately 150 ft. wide and 65 ft. long. Elbow-type draft tubes discharge water directly into the excavated tailrace channel. The tailwater is approximately El. 157 ft. BCD.

The Vischer Ferry impoundment extends upstream 10.3 miles to Lock E-8 in Schenectady, New York. At El. 211 ft. BCD, the surface area of the impoundment is 1,050 acres and impounds approximately 25,000 acre-feet of water. Installation of the flashboards raises the normal full pool to El. 213.25 ft. BCD, and the impoundment retains an additional 2,400 acre-feet of water.

Figure 3.3-2: Major Project Facilities of the Vischer Ferry Project



Table 3.3-2: Vischer Ferry Project Turbine and Generator Nameplate Data

Turbines				
Number of Units	4 units			
	Unit 1	**Unit 2**	**Unit 3**	**Unit 4**
Type	Vertical Francis	Vertical Francis	Vertical Kaplan	Vertical Kaplan
Design Head	26.5 ft	26.5 ft	27.5 ft	27.5 ft
Rated Capacity	4,000 hp[1]	4,000 hp	4,000 hp	4,000 hp
Minimum Discharge	400 cfs[2] per unit	400 cfs per unit	350 cfs per unit	350 cfs per unit
Maximum Discharge	1,500 cfs per unit	1,500 cfs per unit	1,820 cfs per unit	1,820 cfs per unit
Operating Speed	90 rpm[3]	90 rpm	144 rpm	144 rpm
Generators				
Type	Vertical configuration	Vertical configuration	Vertical configuration	Vertical configuration
Rated Capacity	2,800 kW[4]	2,800 kW	3,000 kW	3,000 kW
Power Factor	0.80	0.80	0.80	0.80
Phase	3 Phase	3 Phase	3 Phase	3 Phase
Voltage	2,300 V[5]	2,300 V	4,160 V	4,160 V
Frequency	60 Hz[6]	60 Hz	60 Hz	60 Hz
Synchronous Speed	90 rpm	90 rpm	144 rpm	144 rpm

[1] horsepower (hp), [2] cubic feet per second (cfs), [3] revolutions per minute (rpm), [4] kilowatt (kW), [5]volt (V), [6] hertz (Hz)

3.4 Current Project Operations

The Crescent and Vischer Ferry Projects are both operated on a run-of-river basis. The original purpose of the Crescent and Vischer Ferry Dams was to impound water to support navigation on the Barge Canal; this remains true today. In 1983, the State of New York and the Power Authority entered into a Development Agreement whereby the State agreed to grant a perpetual hydroelectric easement to the Power Authority to develop and operate hydropower facilities at both Projects. The Development Agreement contains certain protocols for standard operation and maintenance of both the Projects and the Canal System. During unusual conditions or emergencies associated with either system, public safety is always the first priority. Otherwise, navigation and Canal System operations take priority over the operation of the Projects. Unless emergency conditions exist, the Projects operate in run-of-river mode with minimal fluctuations allowed only at Canal Corporation's direction to aid navigation, to facilitate flashboard installation and removal, and for canal maintenance or safety. Both Projects therefore operate in coordination with the Canal System.

3.4.1 Crescent Project

Crescent Project operations are performed in a manner to maintain the normal full pool elevation of the impoundment. Flow through the Project is through the powerhouse or over the dam. During the non-navigation season, a minimum flow of 100 cubic feet per second (cfs) (or inflow, whichever is less) is required to be passed at the Crescent Dam. In accordance with a July 31, 2007 FERC order, the minimum flow during canal navigation season is increased to 250 cfs and is passed through a notch in the Dam A flashboards. These minimum flows are for fish protection measures. Once minimum flows and any diversions required for canal operations are met, the remaining flow is available for power generation.

The Dam A and B sections of the Crescent Dam utilize 1-foot-high flashboards that are installed seasonally to help maintain the normal pool level in the Canal System upstream of Lock E-6. The existing flashboards are wooden with vertical steel pin supports. The steel pins used to support the flashboards are set to fail when the headpond level overtops the flashboards by 4 feet. When the flashboards are up, the normal full pool elevation of the impoundment is El. 185 ft. BCD. When the flashboards are out, the normal full pool elevation of the impoundment is El. 184 ft. BCD.

The Crescent hydropower plant can be operated remotely and manually. The plant is generally staffed Monday-Friday, during business hours, but the Project is typically operated remotely from the Power Authority's Blenheim Gilboa control room. The Project utilizes a programmable logic controller (PLC) system to monitor impoundment water levels and plant output. Many safeguards are in place for monitoring Project operations at all times.

The Project operators monitor available water level and weather forecasting information (i.e., United States Geological Survey [USGS] webpage) for severe weather predictions. USGS maintains a streamflow gage upstream of the Crescent and Vischer Ferry Projects at Little Falls (USGS Gage No. 01347000), and downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500). The USGS also has streamflow gages in between the Projects and the Little Falls USGS gage, however, these gages have limited periods of records. The Little Falls USGS gage has a period of record extending back to year 1927. The Cohoes USGS gage has a period of record extending back to year 1917. USGS gages on the Mohawk River are discussed in more detail in Section 4.3.

3.4.2 Vischer Ferry Project

Vischer Ferry Project operations are performed in a manner to maintain the normal full pool elevation of the impoundment. Flow through the Project is through the powerhouse or over the dam. A minimum flow of 200 cfs (or inflow, whichever is less) is required to be passed at the Vischer Ferry Dam. Once Project minimum flows and any diversion required for canal operations are met, the remaining flow is available for power generation.

Flashboards are installed along the spillway crests of the Vischer Ferry Dam seasonally for the navigation season. The flashboards are 27 inches high and are installed in sockets spaced 4 ft. apart. When the

flashboards are installed the elevation of the spillway is El. 213.25 ft. BCD. The flashboards are set to fail when the headpond level overtops the flashboards by between 1-3 feet, depending on the dam section.

The Vischer Ferry hydropower plant can be operated remotely and manually. The plant is generally staffed Monday-Friday, during business hours, but the Project is typically operated remotely from the Power Authority's Blenheim Gilboa control room. The Project utilizes a PLC system to monitor impoundment water levels and plant output. Many safeguards are in place for monitoring Project operations at all times.

The Project operators monitor available water level and weather forecasting information (i.e., USGS webpage) for severe weather predictions. The USGS maintains a streamflow gage upstream of the Crescent and Vischer Ferry Projects at Little Falls (USGS Gage No. 01347000), and downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500).

3.5 Current License Requirements

3.5.1 Crescent Project

The existing FERC license for the Crescent Project was issued on June 26, 1984 for a period of 40 years, and expires on May 31, 2024. Numerous amendments were issued by FERC, including a 1991 Order increasing capacity to 11.8 MW, a November 2000 Order amending Article 41 of the Project license, and a July 31, 2007 amendment ordering minimum flows. A copy of the original license and amendments are included in Appendix B. The New York State Department of Environmental Conservation (NYSDEC) issued a Section 401 Water Quality Certification on September 26, 1983 (Appendix C).

3.5.2 Vischer Ferry Project

The existing FERC license for the Vischer Ferry Project was issued on June 26, 1984 for a period of 40 years, and expires on May 31, 2024. Numerous amendments were issued by FERC, including a 1991 Order increasing capacity to 11.8 MW and a November 2000 Order amending Article 41 of the Project license. A copy of the original license and amendments are included in Appendix B. The NYSDEC issued a Section 401 Water Quality Certification on September 26, 1983 (Appendix C).

3.6 Summary of Project Generation and Outflow Records

3.6.1 Summary of Project Generation

Tables 3.6-1 and 3.6-2 provide the annual gross generated kilowatt-hours (KWh) at the Crescent and Vischer Ferry Projects for the past ten years (2009-2018), respectively. The average monthly gross generation of the plants is also provided in the tables for the same period.

Table 3.6-1: Crescent Project Gross Generation by Month (KWh) 2009-2018

Month	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10-year Avg
Jan	5,816,925	5,295,724	4,931,788	6,659,216	5,786,267	5,743,267	4,410,776	2,999,383	7,399,358	6,572,113	5,561,482
Feb	5,621,388	4,440,723	4,641,138	5,597,242	4,755,445	4,057,144	2,190,906	4,963,518	6,310,469	5,466,748	4,804,472
Mar	8,145,790	8,182,878	8,370,255	6,477,868	7,119,745	5,383,796	4,339,441	6,099,470	6,743,293	8,743,765	6,960,630
Apr	6,632,987	6,122,122	8,797,085	2,858,699	8,081,444	6,471,051	6,285,016	5,067,682	8,309,467	8,713,577	6,733,913
May	5,506,497	3,912,716	7,050,543	6,289,441	4,996,102	6,444,119	2,656,903	3,648,423	7,844,314	5,948,478	5,429,754
Jun	5,070,215	4,126,003	4,809,296	3,229,858	7,576,288	4,563,368	4,613,766	1,867,788	5,876,281	1,734,598	4,346,746
Jul	4,564,790	2,953,263	3,423,047	996,258	4,743,195	2,768,745	3,226,400	1,358,785	5,318,376	1,339,048	3,069,191
Aug	4,457,995	3,148,414	2,863,983	1,243,008	1,380,893	2,306,751	491,683	2,111,553	2,291,916	3,877,257	2,417,345
Sep	2,611,397	2,140,501	5,106,465	1,242,087	2,448,687	1,620,467	494,404	887,073	1,986,053	3,966,087	2,250,322
Oct	5,225,811	6,643,867	8,107,630	3,187,896	3,179,426	2,921,539	2,378,832	2,144,888	2,923,227	6,694,901	4,340,802
Nov	6,435,479	8,354,339	6,956,923	3,429,066	5,459,618	3,766,834	3,618,259	3,960,238	7,597,116	8,918,264	5,849,614
Dec	6,952,212	7,195,526	8,676,469	6,849,811	5,943,388	6,667,841	4,132,313	6,679,262	5,203,132	8,625,758	6,692,571
Total	**67,041,486**	**62,516,076**	**73,734,622**	**48,060,450**	**61,470,498**	**52,714,922**	**38,838,699**	**41,788,063**	**67,803,002**	**70,600,594**	**58,456,841**

Generation statistics are based on hourly generation data.

Table 3.6-2: Vischer Ferry Project Gross Generation by Month (KWh) 2009-2018

Month	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10-year Avg
Jan	4,392,519	4,561,797	4,843,299	6,244,818	5,345,115	5,261,901	4,723,651	2,037,721	4,015,250	5,941,950	4,736,802
Feb	4,115,401	4,346,466	4,242,889	6,033,433	3,294,718	3,964,223	2,388,877	1,838,363	4,266,453	5,080,259	3,957,108
Mar	4,507,248	7,349,829	7,468,201	7,613,958	5,988,557	5,088,704	3,441,352	4,169,521	5,174,874	7,969,031	5,877,128
Apr	4,550,400	6,045,196	7,897,407	4,014,936	5,858,429	5,698,289	4,344,649	3,702,379	3,645,242	6,901,572	5,265,850
May	5,379,911	3,773,809	7,498,641	6,468,603	4,038,629	5,972,988	2,435,909	3,251,354	6,452,672	5,734,069	5,100,659
Jun	5,633,408	4,393,087	4,630,687	3,054,464	2,138,620	4,331,306	2,105,927	1,794,455	5,011,420	1,908,894	3,500,227
Jul	4,646,408	2,931,532	3,257,563	776,537	3,195,717	3,242,818	2,152,333	1,303,362	4,518,550	1,447,346	2,747,217
Aug	4,698,791	2,963,883	3,417,445	1,014,597	879,664	2,540,860	160,374	2,071,130	1,629,206	4,019,070	2,339,502
Sep	2,820,782	2,565,405	3,361,916	981,603	1,800,370	1,817,802	516,458	1,089,370	1,772,672	3,959,828	2,068,621
Oct	5,664,591	6,370,673	7,919,759	4,324,784	3,182,108	3,151,955	2,097,166	1,966,169	2,728,880	6,733,539	4,413,962
Nov	6,679,849	7,957,775	6,059,495	2,107,947	4,892,040	4,008,607	1,573,326	3,228,868	6,960,942	8,357,703	5,182,655
Dec	6,580,280	6,487,144	6,026,604	4,925,644	5,032,264	6,201,089	2,062,045	3,834,424	5,188,847	7,775,445	5,411,379
Total	**59,669,588**	**59,746,596**	**66,623,906**	**47,561,324**	**45,646,231**	**51,280,542**	**28,002,067**	**30,287,116**	**51,365,008**	**65,828,706**	**50,601,108**

Generation statistics are based on hourly generation data.

3.6.2 Dependable Capacity

The New York Independent System Operator (NYISO) has established two capability periods during a calendar year: summer (May 1 – October 31) and winter (November 1 – April 30). The dependable maximum net capability (DMNC) values for the limited control run of river projects are not supported by seasonal testing, but instead are representative of their nameplate installed capacity, and are not expected to change. The DMNC for the Crescent Project is 11.6 MW for the summer period and 11.6 MW for the winter period. The DMNC for the Vischer Ferry Project is 11.6 MW for the summer period and 11.6 MW for the winter period.

3.6.3 Outflow Records

Figures 4.3-1 and 4.3-2 depict the annual outflow duration curves at the Crescent Project and Vischer Ferry Projects. Monthly and annual outflow duration curves for both Projects are also provided in Appendix D.

3.7 Current Net Investment

As of the end of the year 2018, the current net investment in the Crescent Project is $41,464,091 and the current net investment in the Vischer Ferry Project is $48,776,963.

3.8 Compliance History

The Power Authority operates the Crescent and Vischer Ferry Projects in accordance with the terms and conditions of their FERC licenses and has had no instances of non-compliance with either Project license. Over the term of the licenses, the Projects have been subject to FERC's standard operational and environmental inspections. The Power Authority has promptly implemented and completed all necessary actions to address the comments and recommendations arising from FERC's inspections.

3.9 Proposed New Facilities and/or Changes in Project Operation

The Power Authority is not proposing to construct new facilities or to alter Projects operations at either the Crescent or Vischer Ferry Projects as part of this relicensing.

4 DESCRIPTION OF EXISTING ENVIRONMENT AND RESOURCE IMPACTS (18 C.F.R. § 5.6 (d)(3))

4.1 General Description of the River Basin (18 C.F.R. § 5.6 (d)(3)(xiii))

The Crescent and Vischer Ferry Projects are located in the Mohawk River Watershed. The Mohawk River Watershed lies entirely in the State of New York and encompasses 3,460 square miles within 14 counties between the Adirondack Mountains to the north and the Catskills to the south (Mohawk River Watershed Coalition [MRWC], 2015). Over 600,000 people live within the watershed's 170 municipalities (MRWC, 2015). The Mohawk River is the largest tributary to the Hudson River and the Mohawk River Watershed comprises approximately 25% of the entire Hudson River Watershed (MRWC, 2015). The Mohawk River is approximately 140 miles in length and the river originates in the valley between the western Adirondacks and the Tug Hill Plateau, then flows to the east where it joins the Hudson River (MRWC, 2015). The Mohawk River Watershed is shown in Figure 4.1-1.

The Mohawk River Watershed can be divided into three main regional watersheds: Main River, Lower Mohawk, and Schoharie Watersheds (MRWC, 2015). The Projects are both located in the Main River Regional Watershed, as shown on Figure 4.1-2.

The Crescent Project Dam is located approximately 4 miles upstream from the convergence of the Mohawk River with the Hudson River. The Vischer Ferry Project Dam is located approximately 14 miles upstream from the convergence of the Mohawk River with the Hudson River.

Figure 4.1-1: Mohawk River Watershed

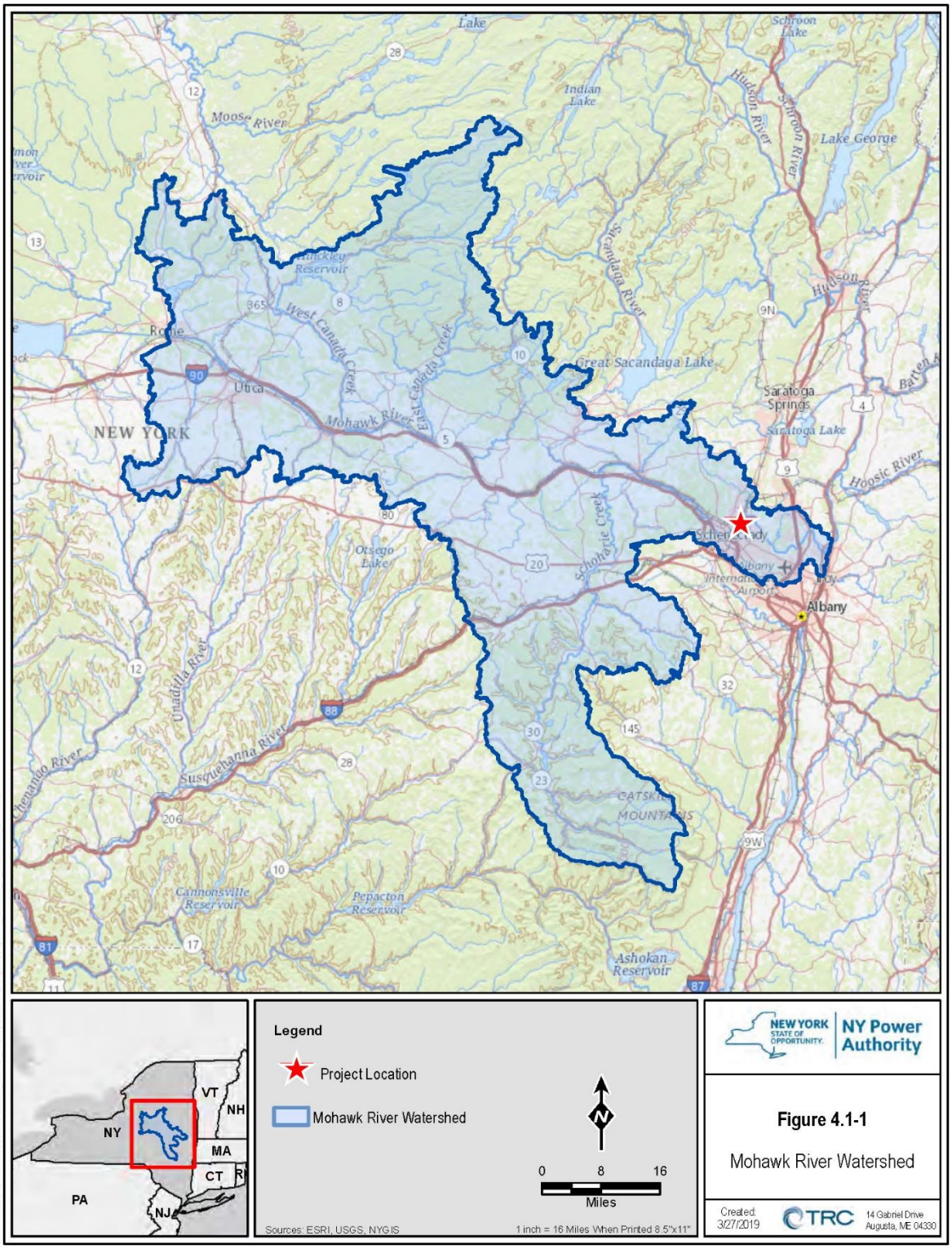
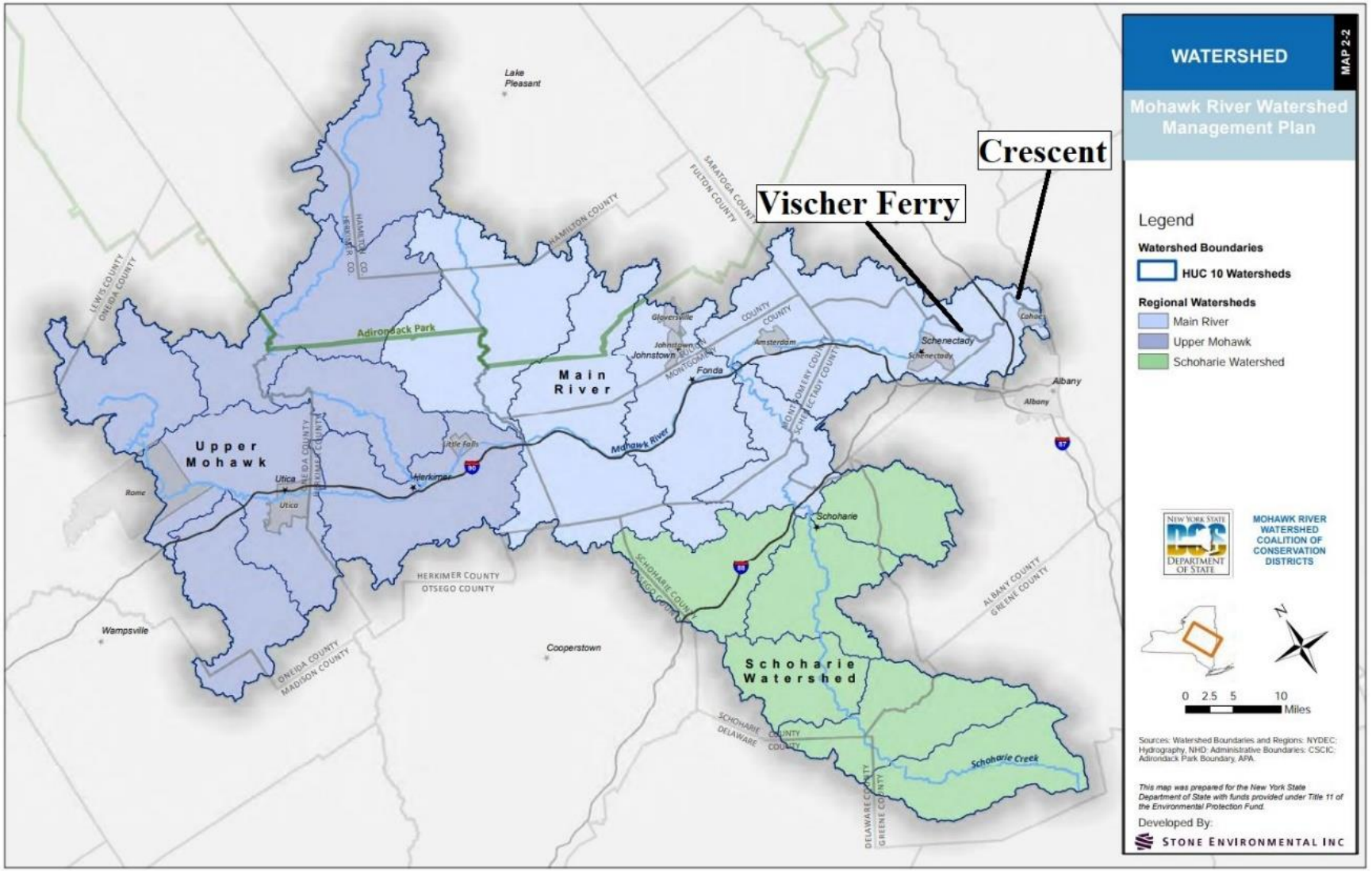


Figure 4.1-2: Mohawk River Regional Watersheds



Source: MRWC, 2015

4.1.1 Major Land Uses

Forests are the dominant land cover in the Mohawk River Watershed, and agriculture is the second most common land cover type. Table 4.1-1 summarizes the land cover types in the Mohawk River Watershed, with a comparison by region (Upper Mohawk, Main River, and Schoharie Watersheds). (MRWC, 2015). Figure 4.1-3 depicts major land cover types in the Mohawk River Watershed.

The principal types of land use within the Mohawk River Watershed are residential (28%), wild/forested/conservation lands (20%), agriculture (20%), and vacant land (19%). Table 4.1-2 summarizes the land use types in the Mohawk River Watershed, with a comparison by region (Upper Mohawk, Main River, and Schoharie Watersheds). Land cover and land use follow largely similar patterns, with the forested lands in the Adirondack highlands to the north and the Catskills to the south. Agriculture and human settlement dominate the lowlands near the Mohawk River and the mid-uplands along major tributaries to the north and south. Most of the population in the Mohawk River Watershed is located in the lowlands and mid-uplands along the main stem of the river, as are most of the roadways and railways, and the Canal System. (MRWC, 2015).

Land use at the Projects and in the vicinity of the Projects is described in Section 4.8.

Table 4.1-1: Major Land Use Cover of the Mohawk River Watershed

Land Cover Type	Total Mohawk River Watershed (%)	Upper Mohawk Watershed (%)	Main River Watershed (%) *	Schoharie Watershed (%)
Forest	50	48	41	71
Agriculture	25	24	21	18
Wetland	10	9	16	4
Developed	7	6	10	5
Herb/Shrub/Scrub	6	9	3	1

Source: MRWC, 2015 (data originally from the 2006 USGS National Land Cover Database)
Note: Values do not sum to 100 as only the major land use cover types are shown.

*The Projects are located in the Main River Watershed

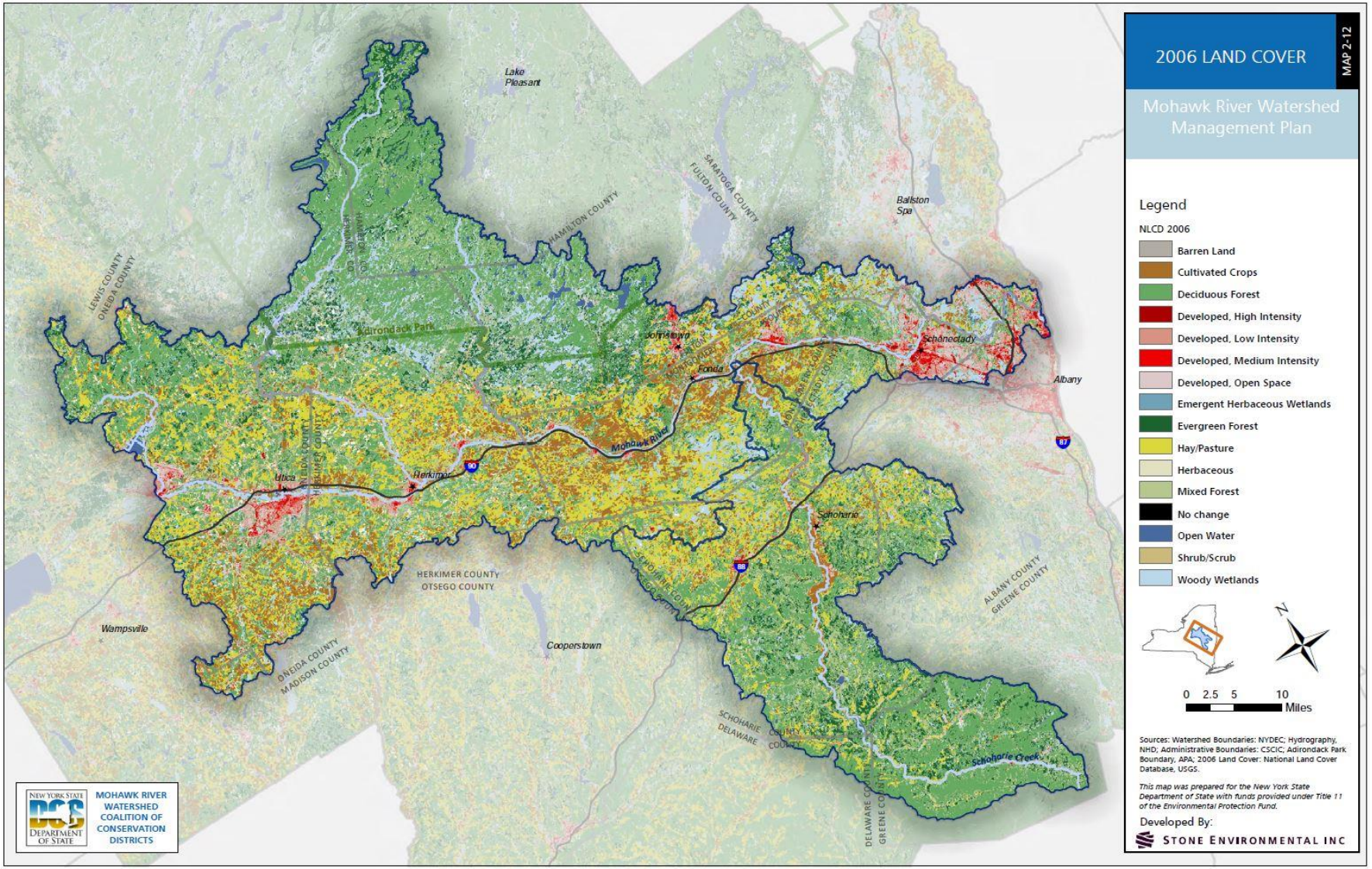
Table 4.1-2: Land Use of the Mohawk River Watershed

Land Use Type	Total Mohawk River Watershed (%)	Upper Mohawk Watershed (%)	Main River Watershed (%) *	Schoharie Watershed (%)
Residential	28	24	29	34
Wild, Forested, Conservation	20	24	18	17
Agriculture	20	23	22	13
Vacant	19	17	17	25
Unknown	7	6	6	7
Misc. (commercial, industrial, recreation)	6	6	5	4

Source: MRWC, 2015 (data originally from the 2006 USGS National Land Cover Database)
Note: Values do not sum to 100 as only the major land use cover types are shown.

* The Projects are located in the Main River Watershed

Figure 4.1-3: Land Use Types in the Mohawk River Watershed



Source: MRWC, 2015

4.1.2 Major Water Uses

Water resources specific to the Projects and the vicinity of the Projects are discussed in Section 4.3.

The Mohawk River has many uses. In addition to providing hydroelectric generation, the Mohawk River is a source of water for agriculture, human consumption, industrial development, and recreation, including boating and angling.

Historically, the Mohawk Valley was a center of manufacturing and other industry, and a productive agricultural region. The growth of industry and agriculture in the 19th and 20th centuries had a significant negative impact on water quality in the Mohawk River and its tributaries (MRWC, 2015). With the passage of the Clean Water Act in the 1970s, water quality began to improve and continues to improve to this day (MRWC, 2015). Water quality is discussed in further detail in Section 4.3. (MRWC, 2015).

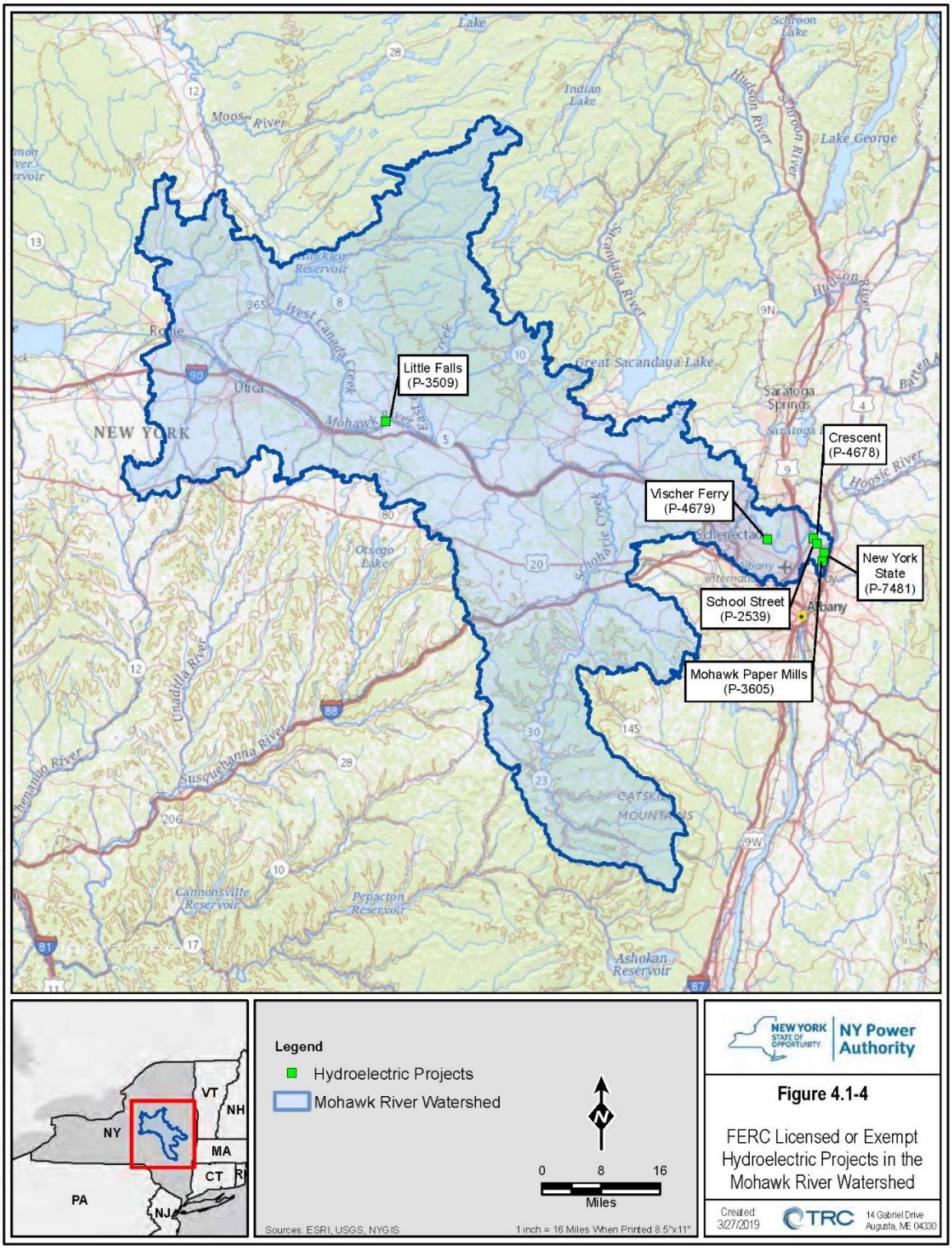
Historically, the Canal System developed along the Mohawk River served as an important transportation link (MRWC, 2015). The canal along the Mohawk River connected to the east-west, cross-state Erie Canal System which served an important transportation link beginning in the early 19th century (MRWC, 2015).

4.1.3 Basin Dams

There are 495 dams in the Mohawk River Watershed, ranging from small earthen dams for ponds to large dams for major reservoirs. Of these, there are 37 high hazard dams, designated Class C by NYSDEC. (MRWC, 2015).

There are several FERC-licensed hydroelectric projects on the Mohawk River in the general vicinity of the Crescent and Vischer Ferry Projects. The FERC-licensed Little Falls Project is the closest project upstream of the Vischer Ferry Project, and the School Street Project is the closest project downstream of the Crescent Project. Other downstream projects include the New York State Dam, and FERC-exempt Mohawk Paper Mills Project. (Figure 4.1-4)

Figure 4.1-4: FERC Licensed or Exempt Hydroelectric Projects in the Mohawk River Watershed



4.1.4 Tributary Streams

The Mohawk River Watershed includes approximately 4,086 miles of freshwater rivers and streams (NYSDEC, 2018a). Major tributary watersheds to the Mohawk River include Schoharie Creek (1,650 river miles), West Canada Creek (1,165 river miles), and East Canada Creek (515 river miles) (NYSDEC, 2018a). The Mohawk River Watershed also includes approximately 135 significant freshwater lakes, ponds, and reservoirs (totaling 18,315 acres), including the Hinckley Reservoir (2,684 acres), the Delta Reservoir (2,376 acres), Peck Lake (1,426 acres), and the Schoharie Reservoir (1,132 acres) (NYSDEC, 2018a), among others.

4.2 Geology and Soils (18 C.F.R. § 5.6 (d)(3)(ii))

4.2.1 Geology

The Mohawk River Watershed took final shape as a result of the last glaciation approximately 10,000 years ago. Glacial ice and melt water played a major role in forming the Mohawk Valley. Prior to the glaciation, the Mohawk River drained south from Schenectady and entered the Hudson River near Coeymans, New York. During glaciation, it flowed north through what is now the Ballston Spa area. Following glaciation, this route was blocked by ice, and as the St. Lawrence lowland was also blocked by ice, a large river called the Iromohawk drained the Great Lakes and the melt water of the eastern Laurentide ice sheet through the area between the mountains of the Adirondacks and Catskills. The Iromohawk cut a wide channel, west to east, to the Hudson, forming the route the Mohawk River follows today. The geological remnants of this river, much larger than the current river, exist within the valley. (MRWC, 2015).

The Crescent and Vischer Ferry Projects are located in the Mohawk Valley subdivision of the Hudson-Mohawk Lowlands physiographic province of New York. This region is located between the Adirondacks on the north and the Appalachian Upland on the south. In this subdivision, the bedrock is mostly soft shales which are easily eroded. The Mohawk River flows in a fairly narrow inner valley and the lowlands range from 10 to 30 miles in width, and have been eroded to depths of 1,000 feet below the higher country to the north and south. (New York State Department of Transportation [NYSDOT], 2013).

Figure 4.2-1 shows the bedrock geology and Figure 4.2-2 shows the surficial geology at the Projects and the surrounding area.

Figure 4.2-1: Bedrock Geology at the Projects

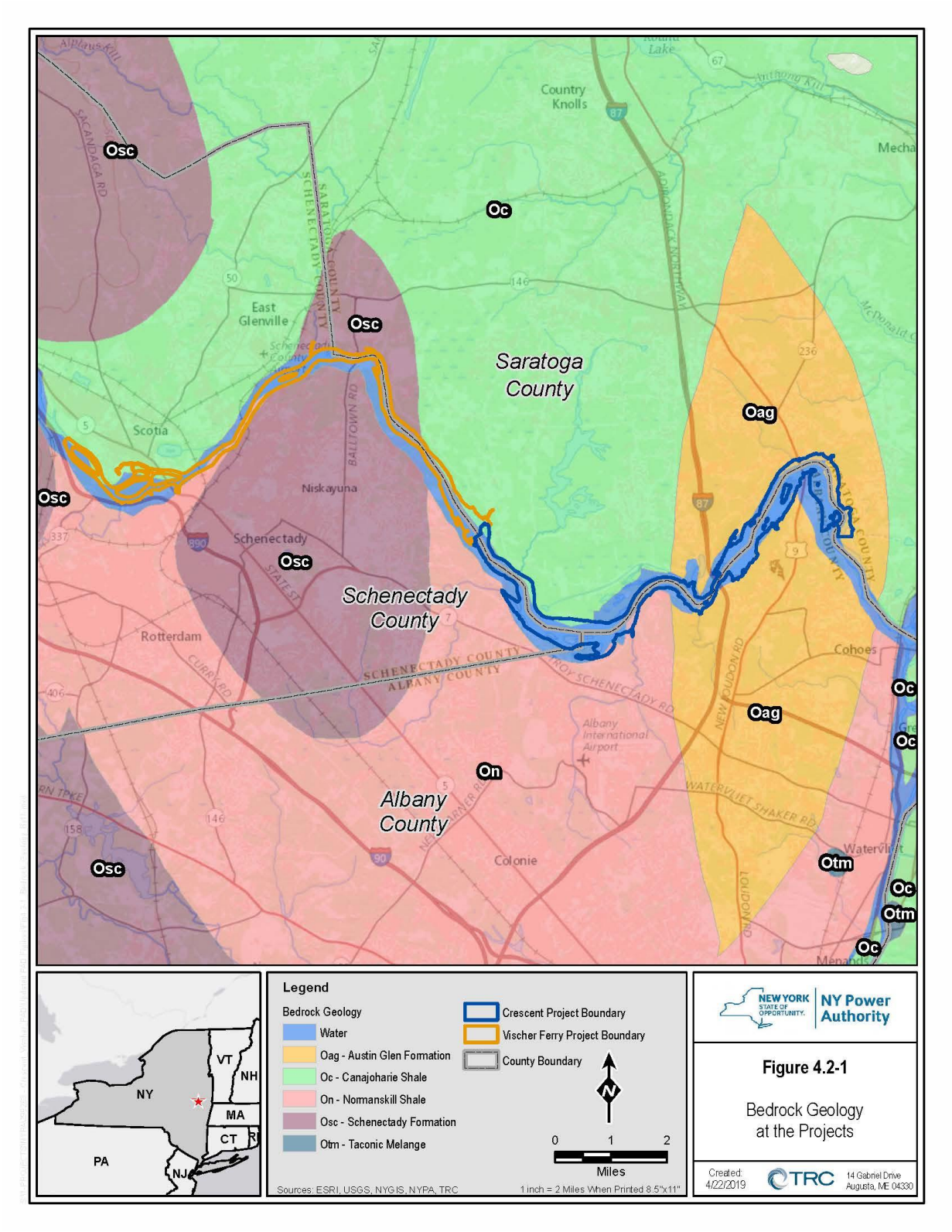
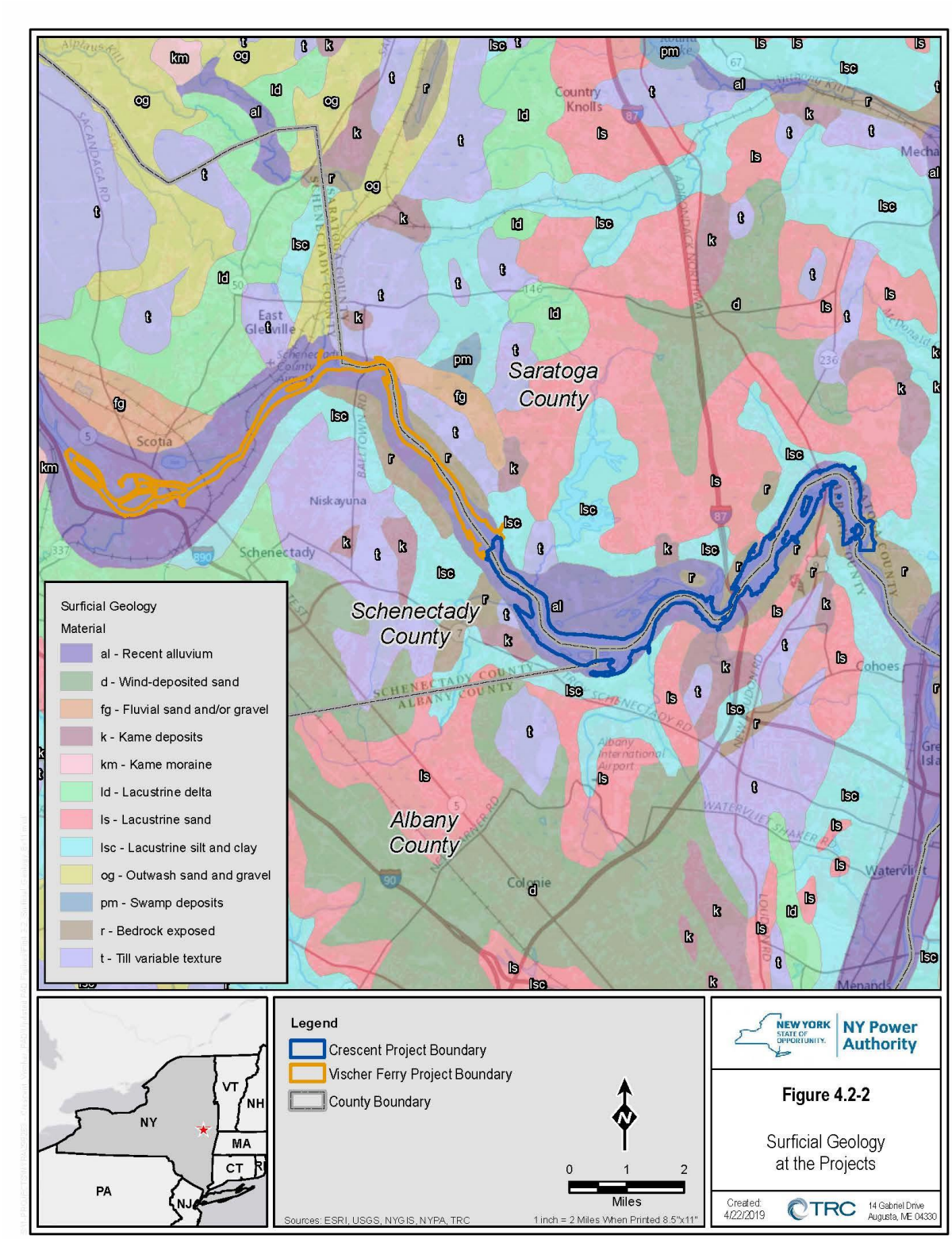


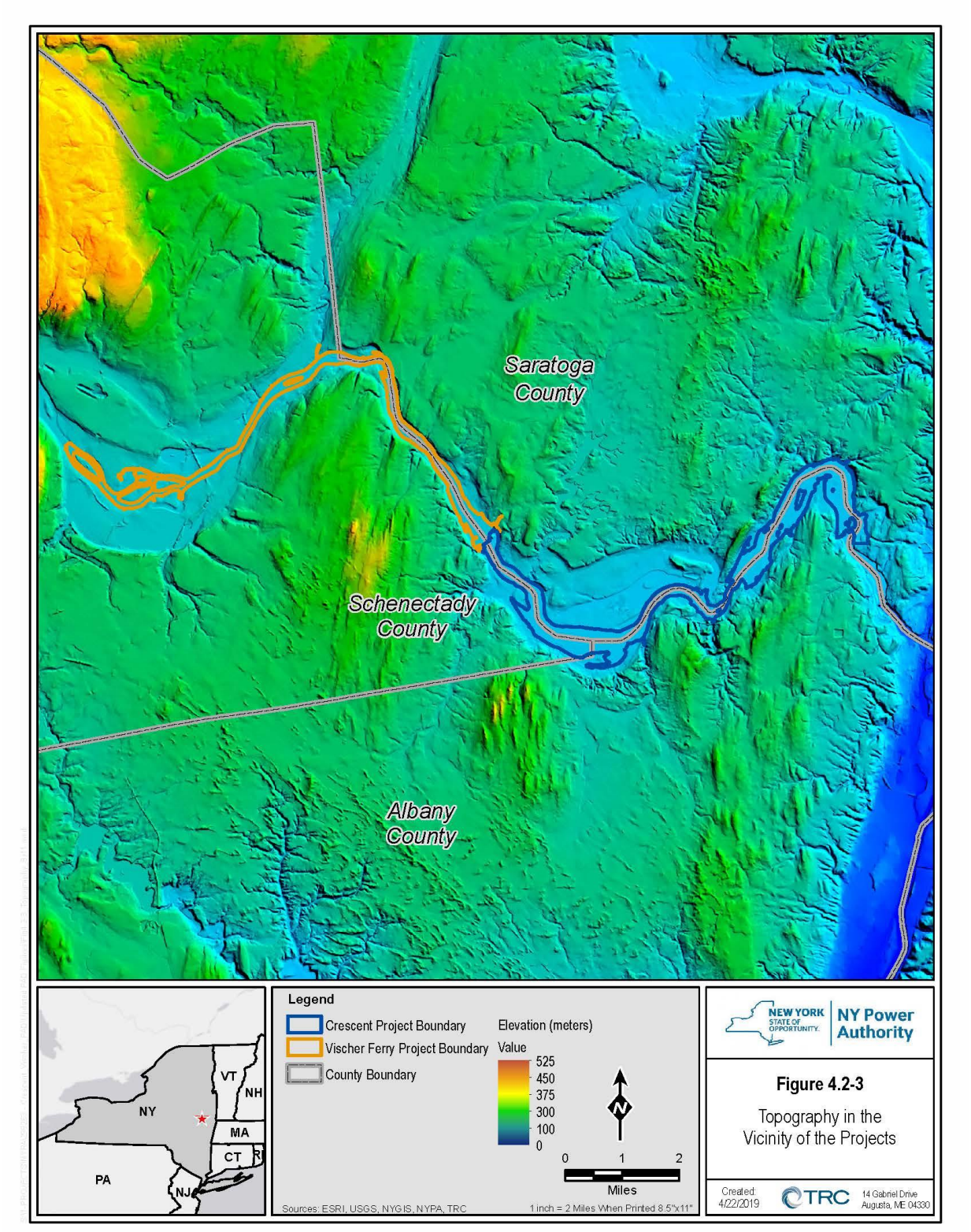
Figure 4.2-2: Surficial Geology at the Projects



4.2.2 Topography

The topography of the region surrounding the Projects varies from rolling terrain with relief of 4 to 5 feet to moderately steep slopes of 20 to 30 feet (Power Authority, 1982a and 1982b). The normal full pool elevation of the Crescent Project impoundment is El. 184 ft. BCD (December through April) and is El. 185 ft. BCD when the flashboards are up (Spring through Fall/navigation season, generally April to November based on seasonal conditions) (FERC, 1984a). The impoundment is El. 211 ft. BCD when the flashboards are out (Winter through Spring generally December through April) and is El. 212.25 ft. BCD when the flashboards are up (Spring through Fall/navigation season, generally April to November based on seasonal conditions) (FERC, 1984b). Elevations in the vicinity of the Projects range from approximately 180 feet to 350 feet. The slopes on the east bank in the immediate vicinity of the Crescent Project ranges up to 40%, and on the western embankment, the slopes range up to 30% (Power Authority, 1982a). In the immediate vicinity of the Vischer Ferry Project the slopes are approximately 40% on the east bank and 50% on the west bank (Power Authority, 1982b). The topography at the Projects and the surrounding area is shown on Figure 4.2-3.

Figure 4.2-3: Topography in the Vicinity of the Projects



4.2.3 Soils

The soil types found within the FERC Project Boundaries for the Crescent and Vischer Ferry Projects, according to the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS), are tabulated in Tables 4.2-1 and 4.2-2 (USDA NRCS, 2018 and 2019) and shown in Figures 4.2-4 and 4.2-5.

Table 4.2-1: NRCS Mapped Soils in the Crescent Project Boundary

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
W [1 2 3]	Water	1873.3	87.7%
Wy [3]	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	45.9	2.2%
NaB [1]	Nassau channery silt loam, undulating	27.8	1.3%
Ue [2]	Udorthents, smoothed	20.9	1.0%
SA [3]	Saprists and Aquents	19.9	0.9%
Wo [1]	Wayland soils complex, non-calcareous substratum, 0 to 3 percent slopes, frequently flooded	19.7	0.9%
BvB [2]	Broadalbin-Manlius-Nassau, complex, undulating	19.0	0.9%
Ha [3]	Hamlin silt loam	9.6	0.4%
OaB [2]	Oakville loamy fine sand, undulating	9.5	0.4%
Te [1]	Teel silt loam	9.2	0.4%
Ug [1]	Udorthents, loamy	8.3	0.4%
NrC [1]	Nassau very channery silt loam, rolling, very rocky	7.8	0.4%
MnC [2]	Manlius-Nassau complex, rolling, rocky	7.2	0.3%
NaD [2]	Nassau-Rock outcrop complex, hilly	5.7	0.3%
Fx [1]	Fluvaquents-Udifluvents complex, frequently flooded	4.8	0.2%
NaC [2]	Nassau-Rock outcrop complex, rolling	4.7	0.2%
NaC [1]	Nassau channery silt loam, rolling	4.5	0.2%
Ut [1]	Urban land-Udorthents complex, 0 to 8 percent slopes	4.4	0.2%
RhB [1]	Rhinebeck silty clay loam, 3 to 8 percent slopes	3.4	0.2%
Mh [1]	Medihemists and Hydraquents, ponded	2.6	0.1%
Tg [2]	Tioga fine sandy loam	2.5	0.1%
Lm [2]	Limerick-Saco complex	2.3	0.1%
BvC [2]	Broadalbin-Manlius-Nassau, complex, rolling	1.6	0.1%
HuD [2]	Hudson silt loam, hilly	2.2	0.1%
NrD [1]	Nassau very channery silt loam, hilly, very rocky	2.1	0.1%
NuB [1]	Nunda silt loam, 3 to 8 percent slopes	2.0	0.1%
Us [1]	Urban land-Udipsamments complex, 0 to 8 percent slopes	1.7	0.1%
Ra [1]	Raynham very fine sandy loam	1.6	0.1%

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
ChA [1]	Chenango gravelly silt loam, loamy substratum, 0 to 3 percent slopes	1.5	0.1%
HuE [1]	Hudson silt loam, 25 to 45 percent slopes	1.3	0.1%
HuE [2]	Hudson silt loam, 25 to 35 percent slopes	1.2	0.1%
BuB [1]	Burdett silt loam, 3 to 8 percent slopes	0.9	0.0%
Cu [3]	Cut and fill land	0.9	0.0%
ScA [1]	Scio silt loam, 0 to 3 percent slopes	0.8	0.0%
NuE [1]	Nunda silt loam, 25 to 35 percent slopes	0.7	0.0%
ScB [1]	Scio silt loam, 3 to 8 percent slopes	0.7	0.0%
NdA [2]	Natchaug muck, ponded, 0 to 2 percent slopes	0.7	0.0%
CoC [1]	Colonie loamy fine sand, rolling	0.6	0.0%
HuC [1]	Hudson silt loam, 8 to 15 percent slopes	0.4	0.0%
Fl [2]	Fluvaqvents frequently flooded	0.4	0.0%
HuB [2]	Hudson silt loam, 3 to 8 percent slopes	0.4	0.0%
RhA [2]	Rhinebeck silt loam, 0 to 3 percent slopes	0.4	0.0%
CoD [1]	Colonie loamy fine sand, hilly	0.3	0.0%
Te [2]	Teel silt loam	0.3	0.0%
EnB [1]	Elnora loamy fine sand, 3 to 8 percent slopes	0.2	0.0%
HuB [1]	Hudson silt loam, 3 to 8 percent slopes	0.2	0.0%
Du [1]	Dumps	0.1	0.0%
Uk [1]	Udorthents, loamy-Urban land complex	0.1	0.0%
Te [3]	Teel silt loam	0.1	0.0%
Br [1]	Birdsall mucky silt loam	<0.1	0.0%
HuC [2]	Hudson silt loam, 8 to 15 percent slopes	<0.1	0.0%
NuB [3]	Nunda channery silt loam, 3 to 8 percent slopes	<0.1	0.0%

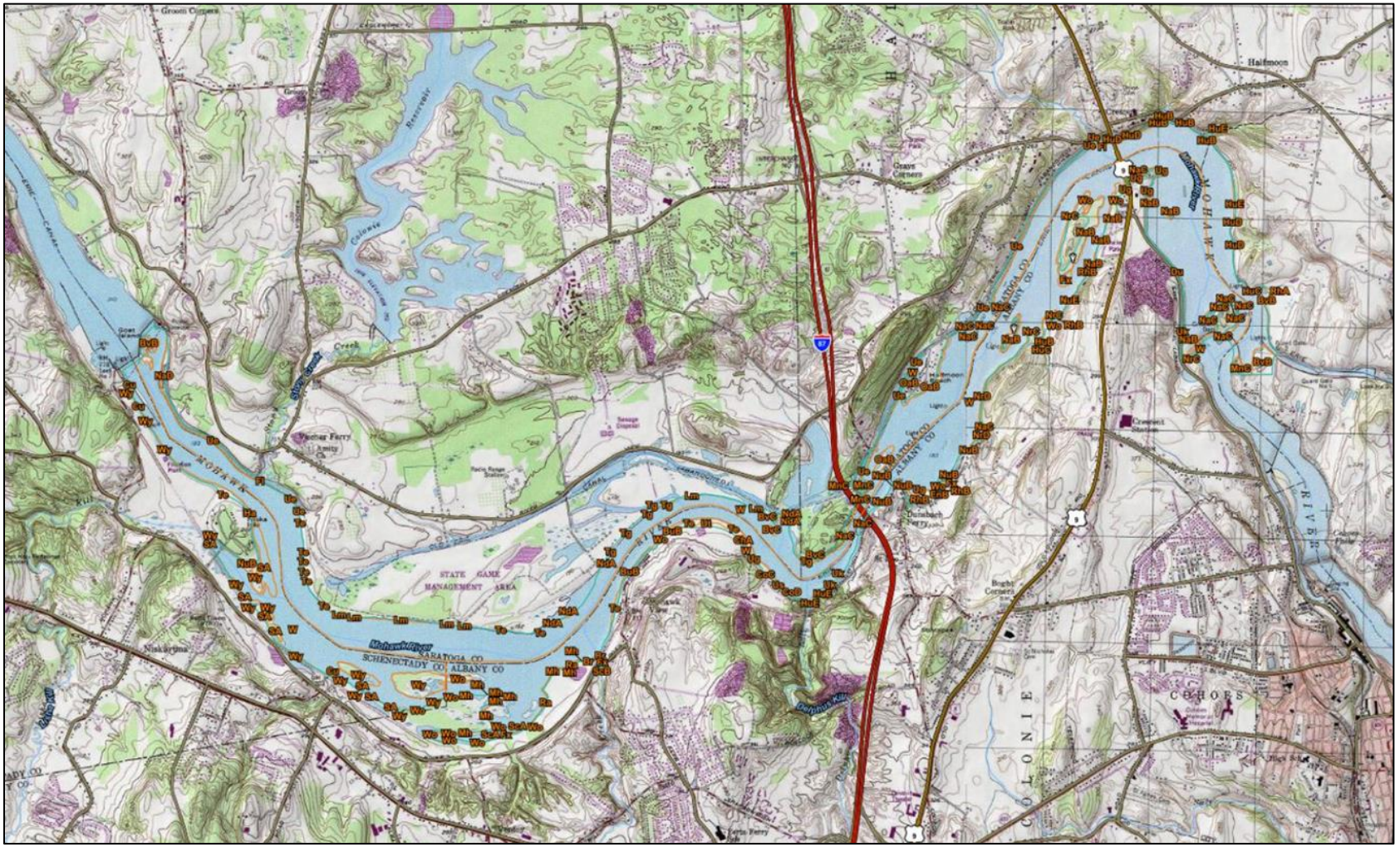
Note: The Crescent Project area includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. The map units are from the following soil surveys and indicated as such in the table: [1] Albany County, New York (NY001); [2] Saratoga County, New York (NY091); [3] Schenectady County, New York (NY093). Approximately 42.6% of the Project area is in NY001; 42.1% of the Project area is in NY091, and 15.2% of the Project area is in NY093.
Source: USDA NRCS, 2019

Table 4.2-2: NRCS Mapped Soils in the Vischer Ferry Project Boundary

Map Unit Symbol	Map Unit Name	Acres	Percent of Area
W [1] [2]	Water	1067.1	92.3%
Cu [2]	Cut and fill land	22.9	2.0%
Ha [2]	Hamlin silt loam	11.0	1.0%
Ra [2]	Raynham silt loam	8.6	0.7%
NaD [1]	Nassau-Rock outcrop complex, hilly	8.4	0.7%
NaB [2]	Nassau channery silt loam, 0 to 8 percent slopes	4.9	0.4%
BvB [1]	Broadalbin-Manlius-Nassau, complex, undulating	4.0	0.3%
UR [2]	Urban land-Colonie complex	3.9	0.3%
HrA [2]	Howard gravelly silt loam, 0 to 3 percent slopes	3.0	0.3%
BvC [1]	Broadalbin-Manlius-Nassau, complex, rolling	2.9	0.2%
FL [2]	Fluvaquents, loamy	2.7	0.2%
Ud [1]	Udipsamments, dredged	2.4	0.2%
Wy [2]	Wayland soils complex, 0 to 3 percent slopes, frequently flooded	1.9	0.2%
NVF [2]	Nunda soils, very steep	1.8	0.2%
UnB [2]	Unadilla silt loam, 0 to 8 percent slopes	1.7	0.1%
IlB [2]	Ilion silt loam, 3 to 8 percent slopes	1.6	0.1%
Ju [2]	Junius loamy fine sand	1.5	0.1%
SA [2]	Saprists and Aquents	1.4	0.1%
MPE [2]	Manlius-Rock outcrop association, steep	1.2	0.1%
Ce [2]	Cheektowaga fine sandy loam	0.8	0.1%
TvA [2]	Tuller-Brockport complex, 0 to 3 percent slopes	0.8	0.1%
Mg [2]	Made land	0.4	0.0%
MnB [1]	Manlius-Nassau complex, undulating, rocky	0.3	0.0%
ScB [2]	Scio silt loam, 3 to 8 percent slopes	0.2	0.0%
NWC [2]	Nunda extremely stony soils, sloping	0.1	0.0%
UnC [2]	Unadilla silt loam, 8 to 15 percent slopes	0.1	0.0%
NuB [1]	Nunda silt loam, 3 to 8 percent slopes	0.1	0.0%
SeB [1]	Scio silt loam, 3 to 8 percent slopes	0.1	0.0%
Gv [2]	Gravel pits	<0.1	0.0%
He [2]	Herkimer channery silt loam, calcareous subsoil variant	<0.1	0.0%
MxB [1]	Mosherville-Hornell complex, undulating	<0.1	0.0%

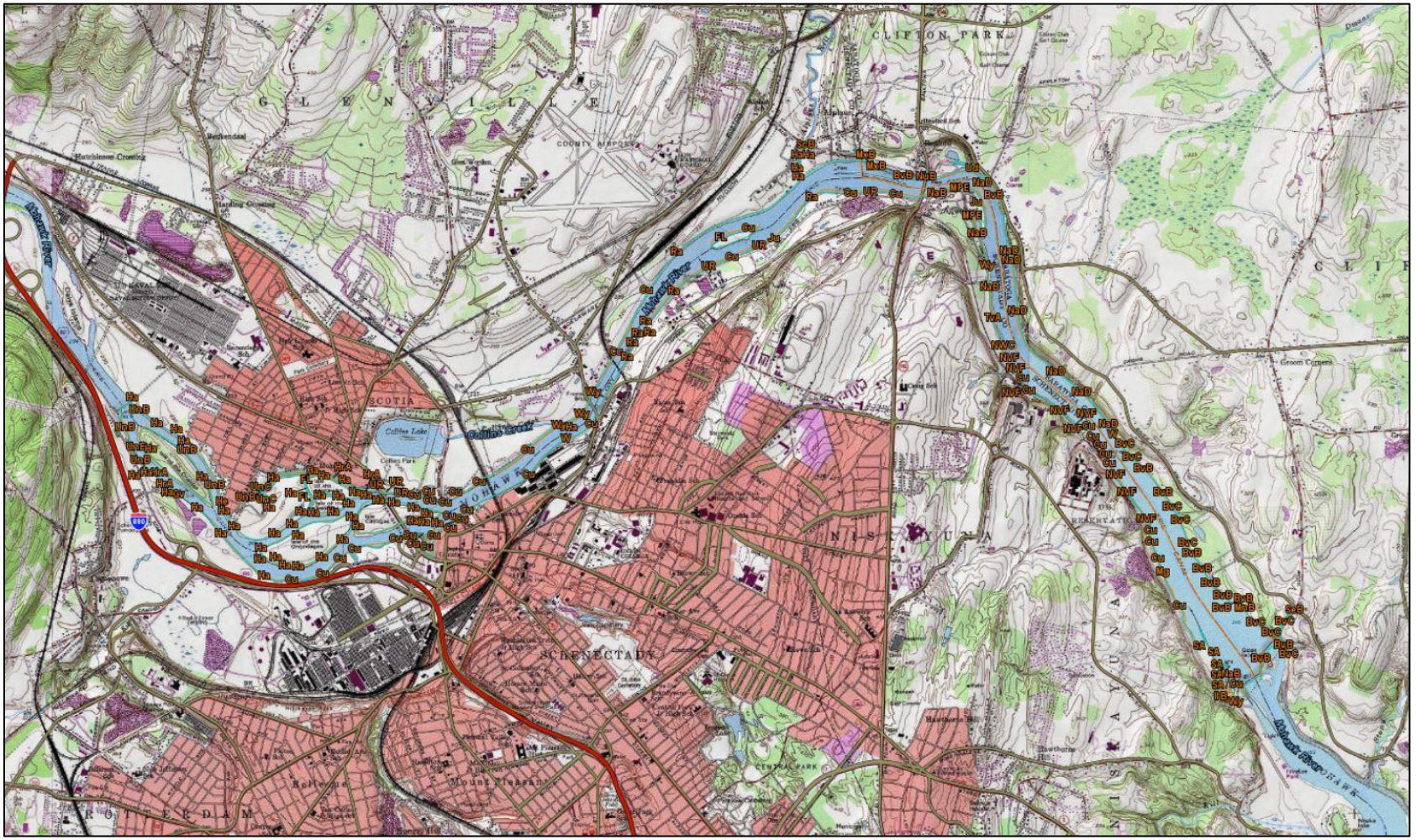
Note: The Vischer Ferry Project area includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. The map units are from the following soil surveys and indicated as such in the table: [1] Saratoga County, New York (NY091); [2] Schenectady County, New York (NY093). 24.7% of the Project area is in NY091, and 75.3% of the Project area is in NY093.
Source: USDA NRCS, 2018

Figure 4.2-4: NRCS Mapped Soils at the Crescent Project



Source: USDA NRCS, 2019

Figure 4.2-5: NRCS Mapped Soils at the Vischer Ferry Project



Source: USDA NRCS, 2018

4.2.4 Reservoir Shoreline and Streambanks

The impoundments at the Projects are riverine in nature. The Crescent impoundment extends approximately 10 miles upstream from the dam and has a surface area of approximately 2,000 acres (at El. 184 BCD) (FERC, 1984a). The Vischer Ferry impoundment extends 10.3 miles upstream from the dam and has a surface area of approximately 1,050 acres (at El. 211 BCD) (FERC, 1984b). The characteristics of the shoreline, including topography, vegetative cover, land use, level of development, and sediment composition, tend to vary along the Projects' impoundments. The shoreline at the Crescent Project consists of steep slopes rising 20 to 30 feet from the water's edge intermingled with low 4 to 5 foot high bluffs (FERC, 2000). The shoreline at the Vischer Ferry Project is characterized by steep shale cliffs along the western shoreline, with low floodplains interspersed with cliffs and bluffs along the eastern shoreline (FERC, 2000).

4.3 Water Resources (18 C.F.R. § 5.6 (d)(3)(iii))

4.3.1 Water Use and Quantity

4.3.1.1 Overview

Navigation is the primary use of Project waters at both the Crescent and Vischer Ferry Projects. A series of locks and dams extending about 160 miles (from Waterford, NY to Three Rivers Junction, NY) regulates Mohawk River flows for navigation purposes, including Lock E-6 at the Crescent Project and Lock E-7 at the Vischer Ferry Project. (FERC, 2000)

The Mohawk River drainage area is about 3,460 square miles, as measured at the Cohoes USGS gage (No. 01357500) located about 2 miles downstream of the Crescent Dam. There are six hydroelectric facilities on the Mohawk River, including the Crescent and Vischer Ferry Projects. There are three hydroelectric developments downstream of the Crescent Project: School Street Project (P-2539); New York State Dam (P-7481), and Mohawk Paper Mills (P-3605) (FERC, 2000). The School Street Project is located 1.5 miles downstream of the Crescent Project.

The impoundment of the Crescent Project has a surface area of approximately 2,000 acres at an El. 184 ft. BCD and storage of 50,000 acre-feet. One-foot flashboards annually installed in Spring (generally in April based on seasonal conditions) and removed in Fall/end of the navigation season (generally in November based on seasonal conditions) add 2,000 acre-feet of storage (FERC, 1984a). Because the Project is operated as run-of-river, there is no useable storage. The total drainage area at the Crescent Project is approximately 3,460 square miles (USGS, 2018a).

The impoundment of the Vischer Ferry Project has a surface area of approximately 1,050 acres at an El. 211 ft. BCD and storage of 25,000 acre-feet. Twenty-seven inch flashboards annually installed in Spring (generally in April based on seasonal conditions) and removed in Fall/end of the navigation season (generally in November based on seasonal conditions) add 2,400 acre-feet of usable storage (FERC,

1984b). Because the Project is operated as run-of-river, there is no useable storage. The total drainage area at the Vischer Ferry Project is approximately 3,371 square miles (USGS, 2018b).

4.3.1.2 Hydrology and Streamflow

The annual and monthly minimum, mean, and maximum recorded flows in cfs of the Mohawk River at the Crescent and Vischer Ferry Projects for the period January 1, 2011 through December 31, 2018 are provided in Tables 4.3-1 and 4.3-2, respectively. Annual flow duration curves for the Crescent Project and Vischer Ferry Projects for the same period of record (January 1, 2011 through December 31, 2018) are shown in Figure 4.3-1 and Figure 4.3-2, respectively. Monthly flow duration curves are provided in Appendix D. The flow statistics and flow duration curves were developed from outflow data collected by the Licensee at the Projects. Mean daily discharge data were used to develop the flow duration curves.[4]

In addition to the hourly outflow data collected by the Licensee at the Projects, the USGS also collects streamflow data for the Mohawk River. The USGS maintains a streamflow gage upstream of the Vischer Ferry Project at Little Falls (USGS Gage No. 01347000), and downstream of the Crescent Project at Cohoes Falls (USGS Gage No. 01357500). The USGS also has streamflow gages between the Projects and the Little Falls USGS gage - however, these other gages have limited periods of records. The Little Falls USGS gage has a period of record extending back to year 1927. The Cohoes USGS gage has a period of record extending back to year 1917. A figure depicting the location of these gages in relation to the Projects is shown in Figure 4.3-3.

[4] The Power Authority's Project outflow data used to develop the flow duration curves were reviewed and outliers excluded. To do this, inconsistent mean daily discharge values (values that were peaks or valleys as compared to adjacent daily discharge values) were excluded from the data used to develop the flow duration curves.

Table 4.3-1: Flow Statistics* (in cfs) for the Crescent Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Period of Record: 7 years (January 1, 2011—December 31, 2018)													
Min	1,754	998	825	687	740	366	142	146	141	325	1,314	1,611	141
Median	4,783	3,840	5,736	10,711	4,403	2,748	1,497	1,315	1,316	2,230	3,991	5,879	3,745
Mean	6,573	6,382	8,870	13,276	6,784	4,923	2,851	1,961	3,324	3,961	5,157	7,196	5,955
Max	31,667	50,201	59,194	61,063	40,469	54,277	29,583	30,186	74,046**	24,832	23,457	26,136	74,046

Source: New York Power Authority

* Flow statistics are based on the average daily total station flow.

** Maximum flows were recorded at both Projects on 9/8/2011 and were associated with flood flows produced by Hurricane Irene and Tropical Storm Lee which exceeded the Licensee's ability to accurately gage flows at the Project stations. The daily average flow for 9/8/2011 recorded at the USGS Cohoes gage (01357500) was 82,200 cfs.

Table 4.3-2: Flow Statistics* (in cfs) for the Vischer Ferry Project

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Period of Record: 7 years (January 1, 2011 – December 31, 2018)													
Min	1,821	1,327	1,190	801	685	441	142	127	177	299	1,104	1,662	127
Median	4,647	3,817	5,930	10,580	4,328	2,319	1,371	1,086	1,095	2,190	3,699	5,288	3,576
Mean	6,027	6,320	8,192	12,653	6,148	3,826	2,494	1,882	2,584	4,140	4,830	6,703	5,552
Max	30,995	57,298	51,587	52,862	30,222	32,012	23,210	37,508	45,187**	28,232	23,919	23,472	57,298

Source: New York Power Authority

* Flow statistics are based on the average daily total station flow.

** Maximum flows were recorded at both Projects on 9/8/2011 and were associated with flood flows produced by Hurricane Irene and Tropical Storm Lee which exceeded the Licensee's ability to accurately gage flows at the Project stations. The daily average flow for 9/8/2011 recorded at the USGS Cohoes gage (01357500) was 82,200 cfs.

Figure 4.3-1: Annual Flow Duration Curve for the Crescent Project

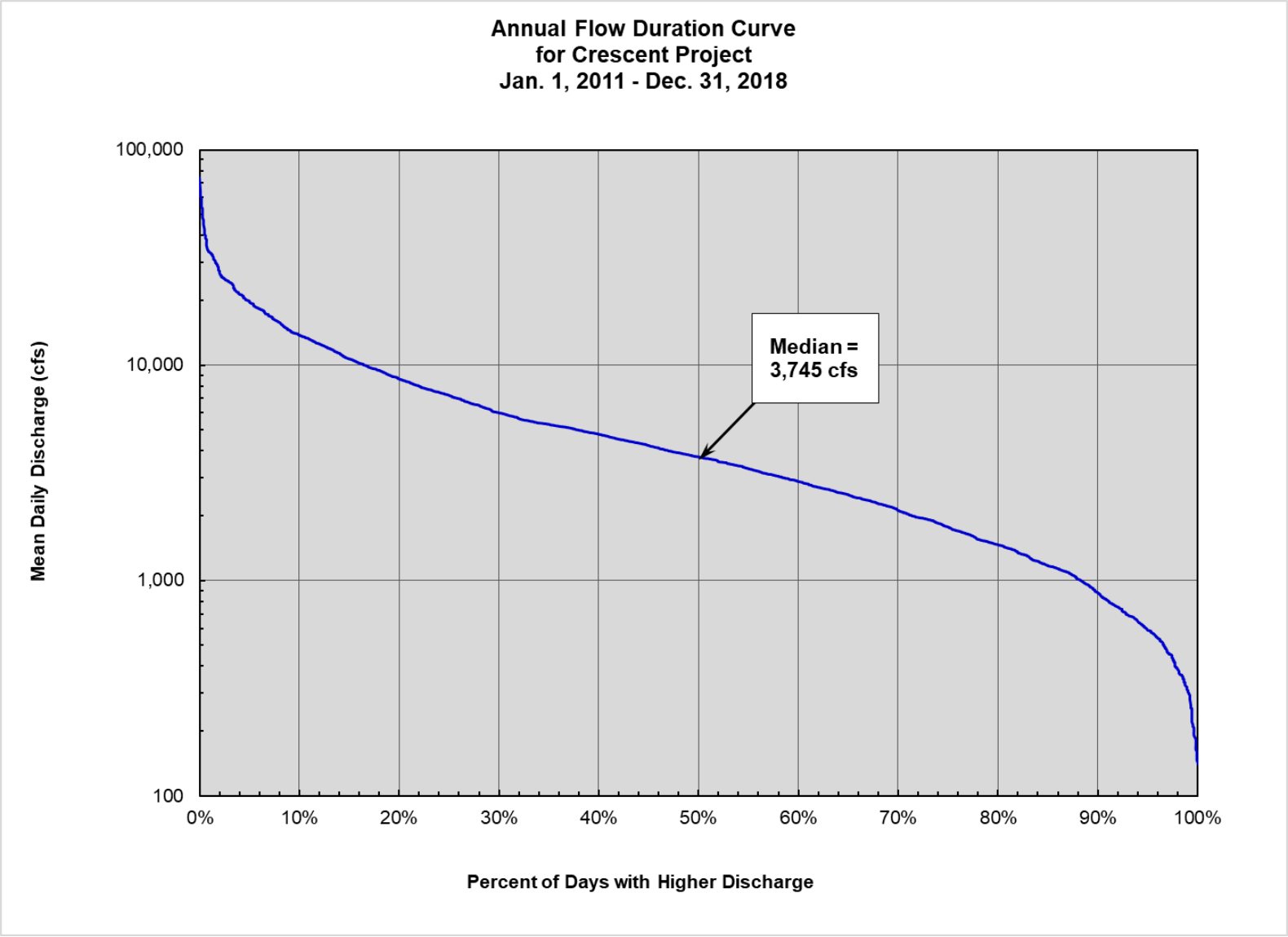


Figure 4.3-2: Annual Flow Duration Curve for the Vischer Ferry Project

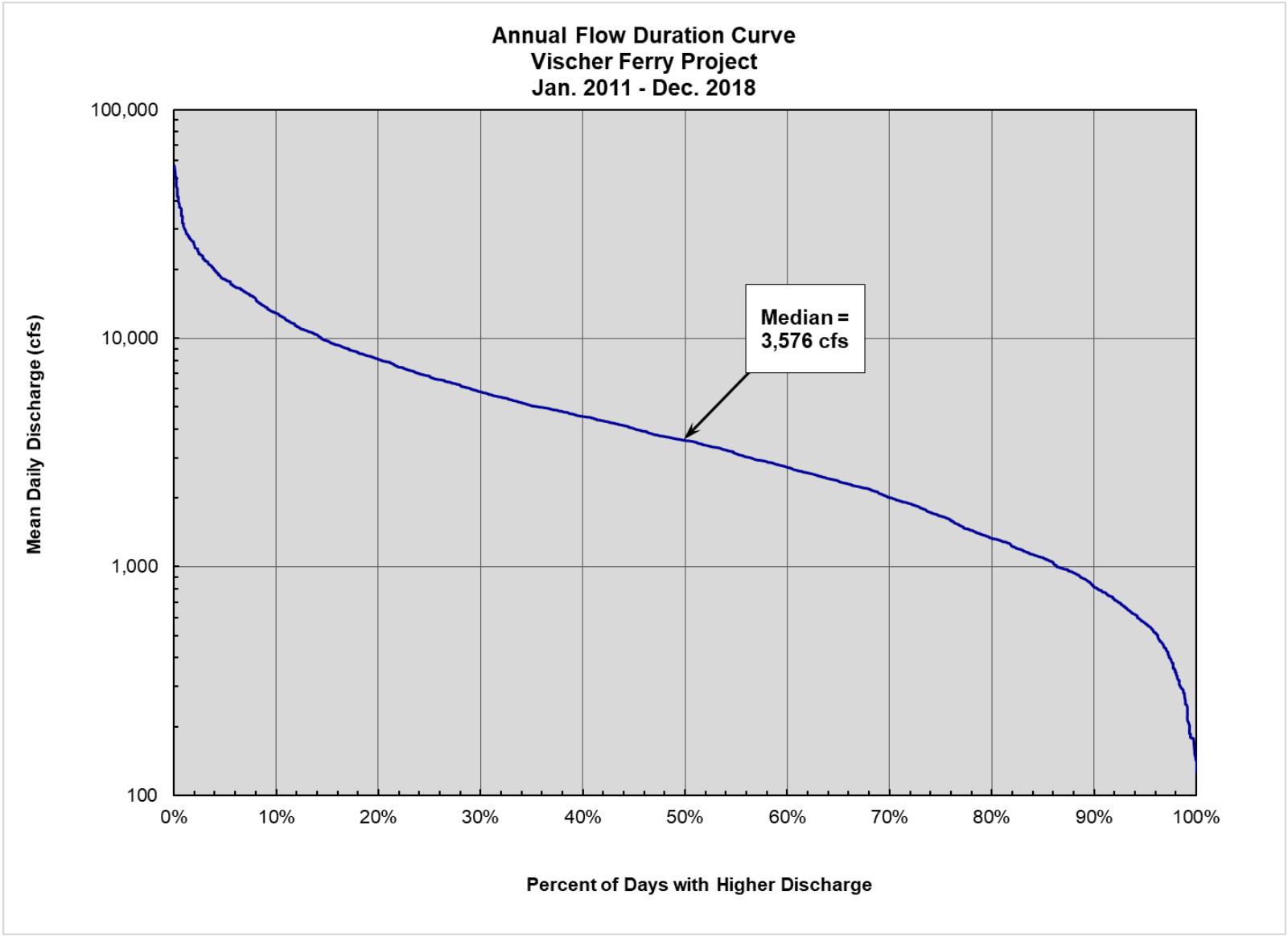
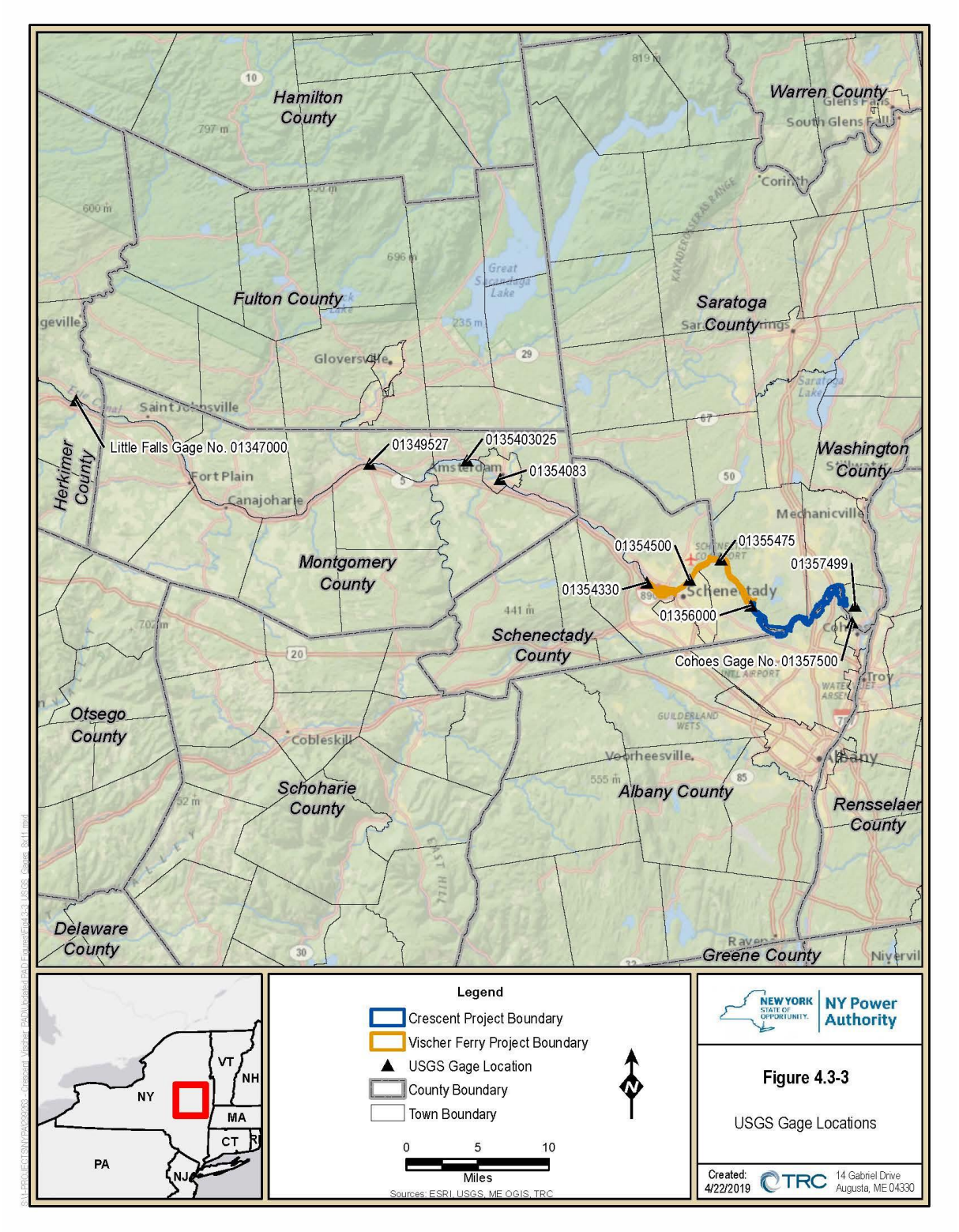


Figure 4.3-3: USGS Gage Locations



4.3.1.3 Existing and Proposed Uses of Water

Navigation is the primary use of Project waters at both the Crescent and Vischer Ferry Projects. Since the 1990s, the Canal System has been used primarily by recreational traffic, although a small but growing amount of commercial traffic still uses it (NYSCC, 2019). Hydroelectric power production is a secondary use of Project waters, as is recreation.

The Mohawk River is also used for water withdrawals and discharges. There are multiple withdrawals and discharges within the boundaries of or in close proximity to the Projects. Information about the facilities are included in Tables 4.3-3 through 4.3-5. Locations of these withdrawals and discharges are shown in Figure 4.3-4.

Table 4.3-3: State Pollutant Discharge Elimination System (SPDES) Multi-sector General Permit Permitted Facilities Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

NPDES ID[1]	Facility	City	Waterbody	Latitude	Longitude
NYR00E011	Schenectady Transfer Station	Schenectady	Mohawk River	42.807	-73.95
NYR00D652	Colonie Landfill	Cohoes	Mohawk River	42.808	-73.731
NYR00E982	Environment One Corporation	Niskayuna	Mohawk River	42.845	-73.894
NYR00B941	Williams Auto Parts Inc	Schenectady	Mohawk River	42.848	-73.895
NYR00F421	Richmor Aviation	Scotia	Mohawk River	42.851	-73.937

Source: Data.NY.gov, 2019b

[1] National Pollutant Discharge Elimination System (NPDES)

Table 4.3-4: Industrial Wastewater Treatment Facilities Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

Plant Type	SPDES Permit Number	Facility Name	Ground or Surface	Average Design Hydraulic Flow	City	Latitude	Longitude
Industrial	NY0005851	USDOE Knolls Atomic Power Laboratory	Surface	7.83	Niskayuna	42.82	-73.87
Industrial	NY0007030	GE Global Research Center	Surface	0.4	Niskayuna	42.83	-73.88
Industrial	NY0007056	General Electric Steam Turbine Generator Global	Surface	18.05	Schenectady	42.81	-73.96
Industrial	NY0023442	109th Airlift Wing	Surface	0.03	Scotia	42.85	-73.92
Industrial	NY0102148	Colonie - T Mohawk View WTP & Well Field	Surface	0.38	Latham	42.79	-73.78
Industrial	NY0131768	Riverview Landing STP	Surface	0.02	Clifton Park	42.83	-73.87
Industrial	NY0224359	Mohawk Asphalt Emulsions	Surface	0.01	Scotia	42.83	-73.93
Municipal	NY0020516	Schenectady - C STP	Surface	18.5	Schenectady	42.84	-73.92
Municipal	NY0027758	Mohawk View Water Pollution Control Plant	Surface	6	Latham	42.78	-73.77

Source: Data.NY.gov, 2019a

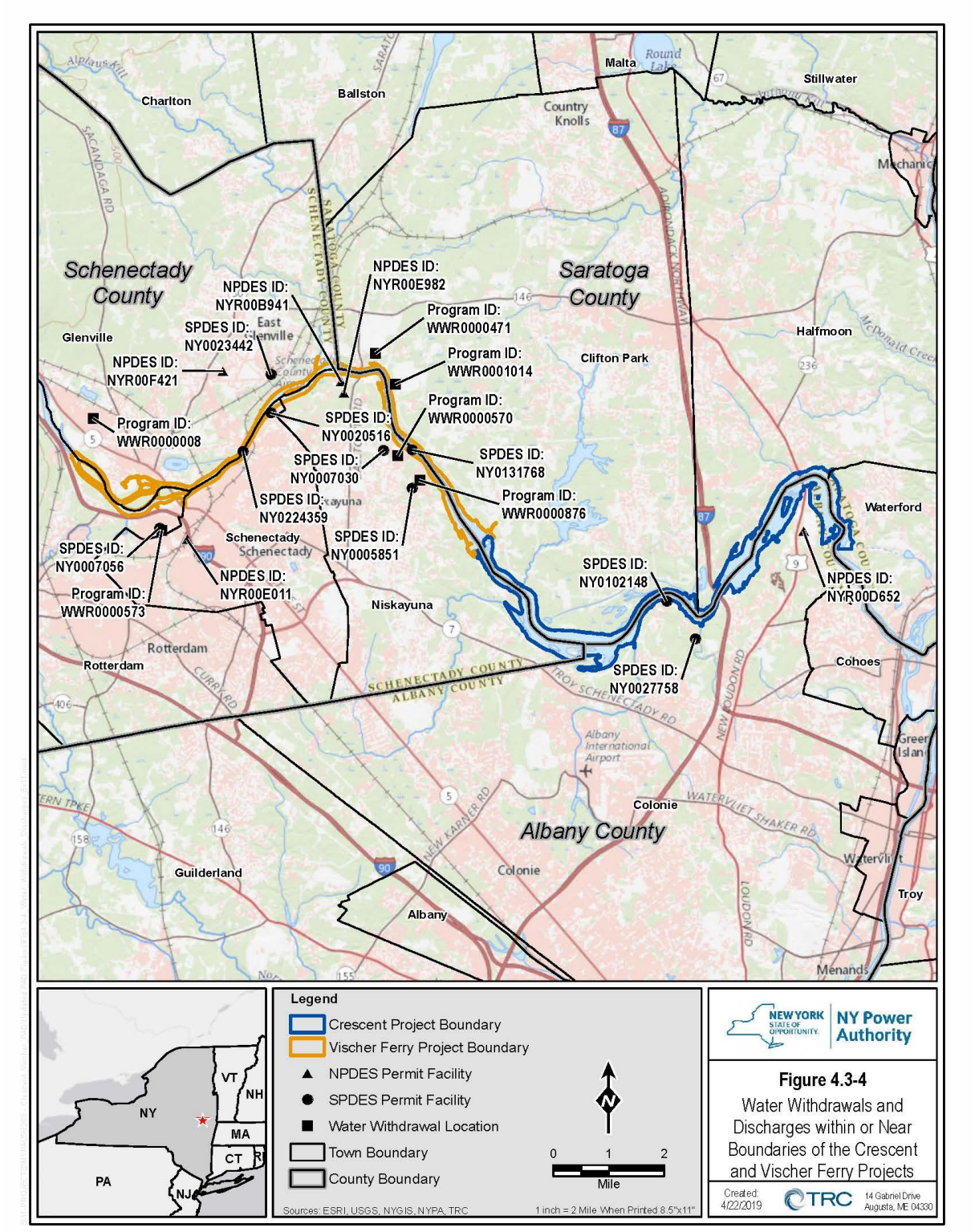
Table 4.3-5: Water Withdrawals Within or Near the Boundaries of the Crescent and Vischer Ferry Projects

Program ID	Facility Name	Town	County	Withdrawal Category	Withdrawal Type	Reporting Year	Average Day Withdrawal (MGD)[1]	Maximum Day Withdrawal (MGD)	Easting	Northing
WWR0000008	Adirondack Beverages	Glenville (T)	Schenectady	Bottled/Bulk Water	Groundwater; Surface Water	2009-2017	0.26-0.38	0.52-0.6	583098	4743426
WWR0000471	Edison Club Golf Course	Clifton Park (T)	Saratoga	Recreational - Golf Course	Surface Water	2009-2017	0-0.15	0-1	591290	4745361
WWR0000570	GE - Global Research Center	Niskayuna (T)	Schenectady	Commercial	Surface Water	2009-2017	0	0	591945	4742397
WWR0000573	GE - Schenectady	Rotterdam (T)	Schenectady	Industrial	Surface Water	2009-2017	4-11.43	17.5-50	585117	4740188
WWR0000876	Knolls Atomic Power Lab - Knolls Site	Niskayuna (T)	Schenectady	Industrial	Surface Water	2009-2017	1.7-3.7	2.2-4.2	592588	4741674
WWR0001014	Mohawk River Golf Course	Clifton Park (T)	Saratoga	Recreational - Golf Course	Surface Water	2010-2017	0.04-0.11	0.21-1.08	591866	4744465

Source: Data.NY.gov, 2019c

[1]Million gallons per day (MGD)

Figure 4.3-4: Water Withdrawals and Discharges Within or Near the Boundaries of the Crescent and Vischer Ferry Projects



4.3.1.4 Existing Instream Flow Uses

In addition to hydroelectric generation, instream uses of water near the Projects generally include navigation, including lock operations, and recreational activities, such as boating and angling.

4.3.2 Water Quality

The following sections discuss water quality standards and classifications applicable to the Mohawk River in the vicinity of the Projects, as well as results from site-specific water quality investigations that pertain to the Mohawk River in the vicinity of the Crescent and Vischer Ferry Projects.

4.3.2.1 Federal Clean Water Act

In 1972, the Federal Water Pollution Control Act Amendments established the Clean Water Act (CWA) as the foundation of modern surface water quality protection in the United States. Sections 303 and 305 of the CWA guide the national program on water quality. Subsections 303(a)-(c) of the CWA are relevant to this water quality discussion, as those subsections discuss the process by which all states adopt and periodically review water quality standards. Subsection 305(b) directs states to periodically prepare a report that assesses the quality of waters in the state.

4.3.2.2 State Water Quality Standards

In accordance with CWA Section 303(a)-(c), the state of New York has developed waterbody classifications and water quality standards which apply to all surface water and groundwater throughout the state. All waters in New York State are assigned a letter classification that denotes their best uses.

Table 4.3-6 identifies the waterbody classifications of the Mohawk River and Barge Canal in the vicinity of the Crescent and Vischer Ferry Projects. Other than one section of the Barge Canal in the vicinity of the Crescent Dam, each of these waters is classified as a Class A water (6 NYCRR § 876.4 Table I). Class A waters have best usages as "a source of water supply for drinking, culinary or food purposes; primary and secondary contact recreation; and fishing" (6 NYCRR § 701.6). Class A waters are also "suitable for fish, shellfish and wildlife propagation and survival" (6 NYCRR § 701.6).

The section of the Barge Canal that extends from Lock E-2 to the vicinity of Crescent Dam where the Barge Canal joins the Mohawk River (the Waterford Flight) is designated as a Class C water (6 NYCRR § 876.4 Table I). The best use of Class C waters is fishing and the waters are considered to be suitable for fish, shellfish, and wildlife propagation and survival. The water quality of Class C waters is considered to be suitable for primary and secondary contact recreation, though other factors may limit the use of Class C waters for these purposes (6 NYCRR § 701.8).

Table 4.3-6: NYSDEC Classifications for Projects' Waterbodies

Name	Description	Class	Standards
CRESCENT PROJECT			
Mohawk River	From Crescent Dam to point 1.0 mile above bridge across Mohawk River on U.S. Route 9.	A	A
Mohawk River	From point 1.0 mile above bridge across Mohawk River on U.S. Route 9 to Lock E-7.	A	A
Barge Canal (Waterford Flight Section)	From Lock E-2 to vicinity of Crescent Dam where Mohawk River and Barge Canal join. This section is the lower end of the Barge Canal.	C	C
VISCHER FERRY PROJECT			
Mohawk River	From Lock E-7 to Schenectady-Scotia Bridge across Mohawk River on N.Y. Route 5.	A	A
Mohawk River	From Schenectady-Scotia Bridge across Mohawk River on NY Route 5 to Schenectady-Montgomery County line (includes reach from Route 5 Bridge to Lock E-8.)	A	A

Source: 6 NYCRR § 876.4

NYSDEC establishes water quality standards and other criteria for many specific parameters. These standards can be either narrative or numeric. Table 4.3-7 outlines the water quality standards and criteria applicable to the surface waters of the Projects.

Table 4.3-7: NYSDEC Water Quality Standards

Parameter	Standard*
Taste -, color-, and odor-producing, toxic and other deleterious substances	None in amounts that will adversely affect the taste, color, or odor thereof, or impair the waters for their best usages.
Turbidity	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and floating substances	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
Phosphorus and nitrogen	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
Thermal discharges	Shall follow the criteria governing thermal discharges in 6 NYCRR § 704.
Flow	No alteration that will impair the waters for their best usages.
pH	Shall not be less than 6.5 nor more than 8.5
Dissolved oxygen (DO)	For trout spawning waters (TS) the DO concentration shall not be less than 7.0 mg/L from other than natural conditions. For trout waters (T), the minimum daily average shall not be less than 6.0 mg/L, and at no time shall the concentration be less than 5.0 mg/L. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO 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 (per 100 mL) (Applies to Class AA waterbodies)	The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 50 and 240, respectively.
Total Coliform (per 100 mL) (Applies to Class A, B, C, D, waterbodies)	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 coliforms (number per 100 mL) (Applies to A, B, C, D waterbodies)	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.

*Standards applicable to both Class A and C, unless otherwise noted.
Source: State of New York, 2018.

4.3.2.3 Water Quality Assessments

NYSDEC provides regular, periodic assessments of the quality of the water resources in New York State and their ability to support specific uses. This information is compiled by the NYSDEC into a database known as the Waterbody Inventory/Priority Waterbodies List (WI/PWL). WI/PWL includes waterbody Fact Sheets outlining: (1) the most recent assessment of use; (2) identification of water quality problems and sources; and (3) a summary of activities to restore and protect each individual waterbody. The Fact Sheets are grouped by the 17 major drainage basins in New York State. WI/PWL is reviewed and updated as sampling results and/or other water quality information becomes available.

The most recent Mohawk River Basin WI/PWL Report was issued in July 2010 and includes an overall evaluation of water quality in the Mohawk River Basin, as well as assessments for specific waterbody segments within the basin. The report also outlines the causes (pollutants) and sources of water quality problems for those waterbodies with known or suspected impacts. Assessed waterbodies are listed as:

- Impaired Waters (Not Supporting Uses);
- Waters with Minor Impacts;
- Threatened Waterbodies;
- Waterbodies with Water Quality Impacts Needing Verification; or
- Waterbodies with No Known Impacts.

Unassessed waterbodies are also included in the WI/PWL. The assessments reflect the best available water quality information at the time of publication of the list (NYSDEC, 2010a). A description of the assessments of the waterbodies in the vicinity of the Projects from the WI/PWL is described briefly below.

The reach of the Mohawk River downstream of Crescent Dam is listed in the WI/PWL Report as suspected of being stressed for water supply and recreation uses. The Report notes that this stress is considered to have minor impacts. The suspected pollutants are nutrients (phosphorus), pathogens, and silt/sediment. Suspected sources of those pollutants are agriculture, municipal, and urban/storm runoff (NYSDEC, undated). A Source Water Assessment was completed along this reach of the Mohawk River and found very high susceptibility to contamination from pathogens and protozoa as a result of agricultural pastureland in the drainage basin, as well as the number of wastewater discharges in the watershed.

The reach of river from the Crescent Dam upstream to Schenectady, which includes the Vischer Ferry impoundment, is listed as having water supply threatened, with a documentation status of “possible.” The possible, and minor, threat to water supply is linked to pathogens. The suspected impairments to water supply and recreation uses are nutrient pollutants and silt/sediment. The suspected sources of the pathogens, nutrients, and silt/sediment are from agriculture, urban/storm runoff, and combined sewer overflows. This reach encompasses both Projects’ impoundments and includes the portion of the river/canal from the Crescent Dam to the Route 5 bridge in Schenectady, New York.

4.3.2.4 Water Quality Studies and Data

The USGS works collaboratively with NYSDEC to collect water quality data in the Mohawk River basin. The primary focus of this monitoring is to collect nutrient samples to support a water quality model being used to develop a phosphorus Total Maximum Daily Load (TMDL) for the Mohawk River. There are thirty (30) monitoring locations located in the Mohawk River Basin, including two long-term monitoring stations in the vicinity of the Crescent and Vischer Ferry Dams: Cohoes (located approximately 1.75 miles downstream of the Crescent Dam) and Latham (located approximately 4.5 miles downstream of the Vischer Ferry Dam and 5.75 miles upstream of the Crescent Dam) water quality sampling locations (Figure 4.3-5). Water samples are analyzed for a number of parameters including temperature, dissolved oxygen (DO), pH, specific conductivity, and nutrients. Data are not available continuously from 2004 through 2016, however, data are available for the following years: 2004, 2005, 2006, 2009, and 2016, as summarized in Table 4.3-8.

Water quality is monitored continuously along a portion of the Mohawk River as part of the Hudson River Environmental Conditions Observing System (HRECOS). There are three monitoring locations along the Mohawk River: at Ilion, New York; at Lock E-8; and at the Rexford Bridge. The Ilion monitoring location is approximately 60 miles upstream of the Vischer Ferry Dam and is above the Little Falls Project on the Mohawk River. Lock E-8 is located approximately 7 miles upstream of the Vischer Ferry Dam. The Rexford Bridge station is located approximately 3.9 miles (or 4.3 river miles) upstream of the Vischer Ferry Dam.

The Rexford Bridge station is maintained by the NYSDEC. The Lock E-8 monitoring location has a USGS stage gage (No. 01354330). These stations record measurements of DO, specific conductance, turbidity, pH, and water temperature at 15-minute intervals. Water quality data for these two monitoring locations from 2013 to 2018 are presented in Table 4.3-9.

Table 4.3-8: Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Cohoes and Latham Monitoring Locations From 2004–2016

Year	Location		Temp (°C)[1]	DO % sat	DO (mg/L)[2]	SpC[3] (µS/cm)	Turbidity (NTRU)[4]	pH
2004	Cohoes	Min	0.00	79.00	6.60	214.00	-	6.80
		Max	24.00	107.00	15.80	358.00	-	8.20
		Year Average	11.89	97.56	11.056	274.22	-	7.58
2005	Cohoes	Min	0.00	64.00	5.30	206.00	-	7.20
		Max	26.00	115.00	14.20	361.00	-	8.10
		Year Average	11.14	94.71	11.01	309.29	-	7.51
2006	Cohoes	Min	0.50	60.00	5.90	221.00	-	7.20
		Max	26.50	113.00	15.80	433.00	-	8.50
		Year Average	14.03	97.67	10.52	319.73	-	7.96
2009	Cohoes	Min	-0.10	102.00	8.20	268.00	-	7.40
		Max	26.60	133.00	19.30	275.00	-	8.20
		Year Average	13.25	117.50	13.75	271.50	-	7.80
2016	Latham	Min	5.00	73.00	6.00	292.00	4.10	7.30
		Max	25.90	134.00	13.00	363.00	14.00	8.00
		Year Average	18.23	96.17	9.40	319.33	7.38	7.67
2016	Cohoes	Min	12.10	76.00	6.20	294.00	2.10	7.50
		Max	26.00	126.00	13.70	357.00	7.20	8.30
		Year Average	19.55	94.33	8.98	325.67	4.08	7.90

Source: USGS, 2018c, d

[1] degrees Celsius (°C), [2] milligram/liter (mg/L), [3] Specific conductance (SpC), microsiemens/centimeter (µS/cm), [4] Nephelometric Turbidity Ratio Unit (NTRU)

Table 4.3-9: Annual Minimum, Maximum, and Averages of Water Quality Data Collected at Lock 8 and Rexford Bridge Monitoring Locations From 2013-2018

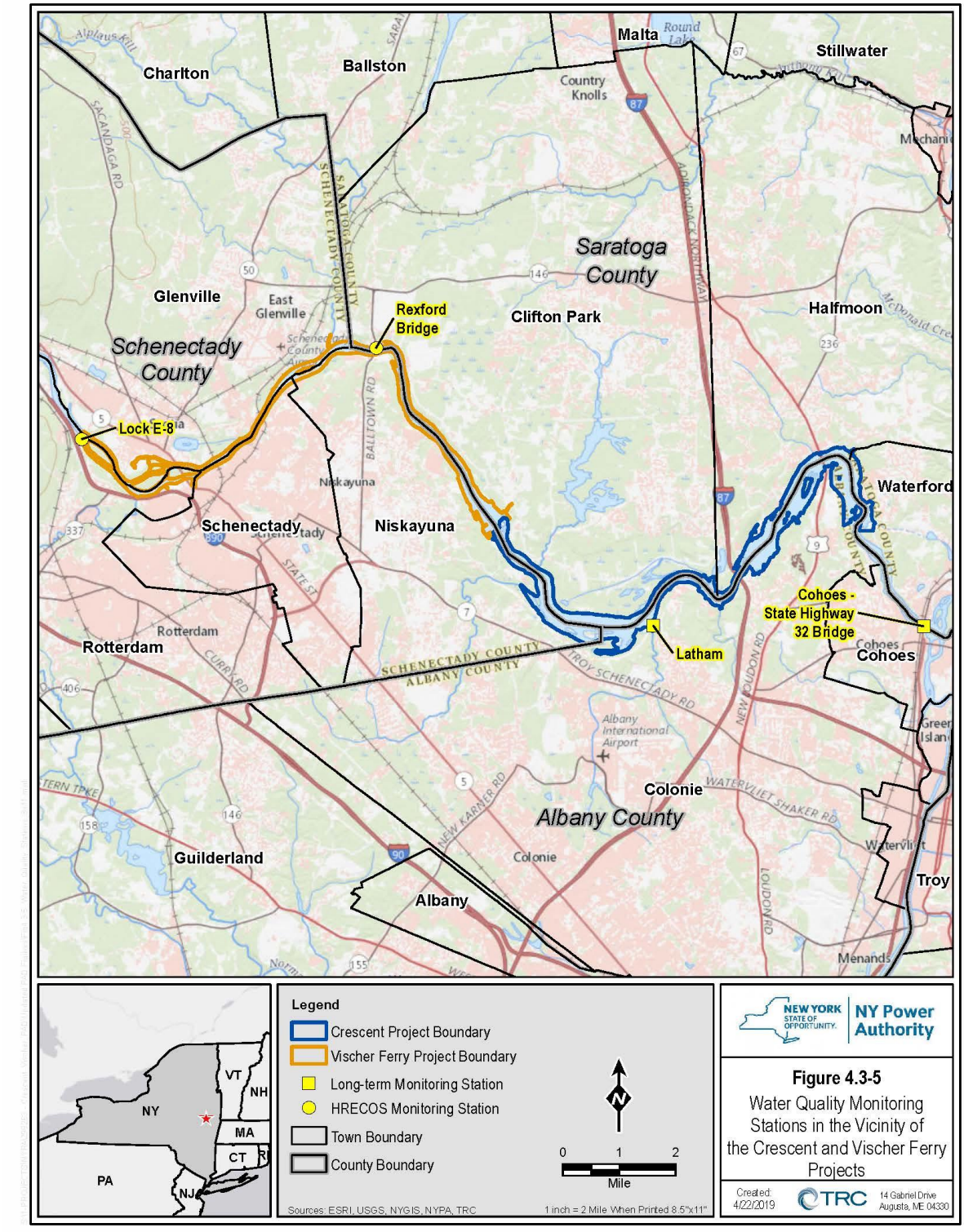
Year	Location		Temp (˚C)	DO % sat	DO (mg/L)[1]	SpC (mS/cm)	Turbidity (NTU)[2]	pH
2013	Lock E-8	Min	-0.03	67.7	5.67	0.01	-0.90	7.66
		Max	27.50	119.9	15.21	0.47	1314.00	8.78
		Year Average	11.15	99.9	11.43	0.29	31.16	8.05
2014	Lock E-8	Min	-0.05	86.90	7.26	0.01	-1.20	7.68
		Max	25.97	115.8	15.10	0.46	1,195.00	8.71
		Year Average	11.10	100.7	11.65	0.30	23.81	8.12
2014	Rexford Bridge	Min	0.28	83.80	7.11	0.00	0.51	7.75
		Max	25.65	135.00	14.78	0.55	240.4	8.60
		Year Average	13.03	97.26	10.62	0.35	8.84	8.04
2015	Lock E-8	Min	-0.05	69.7	5.64	0.20	-0.70	5.67
		Max	26.96	112.6	15.04	0.69	690.50	8.81
		Year Average	11.89	97.8	11.15	0.32	16.48	8.04
2015	Rexford Bridge	Min	-0.03	51.32	4.25	0.00	0.22	4.92
		Max	28.15	141.90	14.57	0.75	2,151.00	8.76
		Year Average	12.17	94.13	10.59	0.36	6.63	7.94
2016	Lock E-8	Min	-0.09	47.0	3.74	0.21	-33.90	7.41
		Max	27.99	149.00	15.98	0.40	1,316.00	9.11
		Year Average	12.61	98.67	11.05	0.30	17.64	7.94
2016	Rexford Bridge	Min	-0.05	46.86	3.85	0.00	0.20	7.4
		Max	28.1	210.40	17.47	0.70	1,189.00	9.33
		Year Average	12.68	93.52	10.48	0.32	8.12	8.02
2017	Rexford Bridge	Min	-0.04	76.63	6.61	0.19	0.5	7.64
		Max	25.7	141.8	14.72	0.61	699.3	8.73
		Year Average	11.68	96.67	10.94	0.31	15.63	7.99
2018	Rexford Bridge	Min	-0.03	27.84	2.22	0.15	0.23	7.62
		Max	19.16	166.5	14.96	8.34	446.3	9.04
		Year Average	11.77	94.71	10.86	2.31	8.53	8.03

Source: HRECOS, 2019a and 2019b (Data prior to July 7, 2018 has been verified. Later data are provisional and subject to change.)

[1] Multiple DOs readings of 0.00 were due to instrument or sensor malfunction. These readings, along with other abnormal DO readings, indicate suspicious data which was rejected during a final review by the HRECOS site manager and was not included in the table.

[2] Nephelometric Turbidity Unit

Figure 4.3-5: Water Quality Monitoring Stations in the Vicinity of the Crescent and Vischer Ferry Projects



4.4 Fish and Aquatic Resources (18 C.F.R. § 5.6 (d)(3)(iv))

This section reviews existing information for the fish and aquatic resources occurring within the vicinity of the Projects.

4.4.1 Aquatic Habitat

The Mohawk River Basin is centrally located within New York and serves as a connection between the watersheds of the Great Lakes and the Hudson River. The Mohawk River and Canal System provides aquatic connectivity between the two watersheds. Since the 1800s, the lock system has allowed for some species that were not originally native to the Mohawk River or Great Lakes, such as blueback herring (*Alosa aestivalis*), to extend their ranges further than occurred prior to the development of the canal.

Since the early 1800s, when the Erie Canal was constructed, aquatic habitat in much of the lower Mohawk River has been altered by the construction of dams, locks and canals. Today, most of the aquatic habitat upstream and downstream of the Projects is largely comprised of impoundment habitat. The Crescent Project Dam impounds an area of approximately 2,000 acres, and the impoundment extends upstream of the dam approximately 10 miles to the Vischer Ferry Dam. The Vischer Ferry Dam impounds an area of 1,050 acres and extends upstream 10.3 miles to the Lock E-8 Dam. Downstream of the Crescent Dam there is a short area of free-flowing river habitat within the Project Boundary that continues approximately 1.5 miles downstream through Cohoes Falls to Erie Boulevard's School Street Project.

The lower Mohawk River supports a diverse assemblage of warm- and cool-water sport fishes, making it popular with anglers (Wells, 2018). No essential fish habitat as defined by the National Marine Fisheries Service was identified in the Project area (National Oceanic and Atmospheric Administration, 2018).

4.4.2 Fish Community

4.4.2.1 Resident Species

At least 62 fish species were documented in the Mohawk River and the Canal System from Lock E-6 in Waterford to Lock E-20 in Rome, New York from 1934 through 1983 (McBride, 2009). Smallmouth bass (*Micropterus dolomieu*) and walleye (*Sander vitreus*) are the most popular gamefish among anglers (Bureau of Fisheries, 2015-2016). Most species of fish in the Mohawk River are considered resident fish except for the anadromous blueback herring, which migrate into the river system in the spring to spawn. Blueback herring are native to the Hudson River and lowermost section of Mohawk River, but prior to the construction of the Canal System did not occur above Cohoes Falls, which was the natural limit of their migration. However, with the construction of the Canal System, herring were able to establish a migration run in the Mohawk River above Cohoes Falls. Juvenile blueback herring are today considered a key component of the forage base for many resident piscivorous species (George et al., 2016).

Fish communities in the Mohawk River have been sampled several times between 1934 - 2016. Studies have been conducted with a wide variety of survey methods including trap nets, gill nets, and electrofishing. Overall, 29 species have been documented within the Crescent and Vischer Ferry Project areas during NYSDEC surveys (Table 4.4-1).

Based on these surveys, the NYSDEC has described the Mohawk River Basin fisheries as being in a state of transition (NYSDEC, 2012). The non-native and invasive zebra mussel (*Dreissena polymorpha*), which was first observed in 1991, spread throughout the lower river by 1993. Freshwater drum became established around 1990 and northern pike have increased in abundance as well. At the same time, the runs of anadromous blueback herring have declined and preliminary data suggest smallmouth bass are becoming less abundant (USGS, 2018e).

Table 4.4-1: Occurrence of Fish Species in NYSDEC State Surveys, 1998-2012

Common Name	Family	Genus and Species	Upstream of Both Project Areas	Within Both Project Areas	Downstream of Both Project Areas
Lake sturgeon	Acipenseridae	*Acipenser fulvescens*	X		
American eel	Anguillidae	*Anguilla rostrata*	X	X	X
Blueback herring	Clupeidae	*Alosa aestivalis*	X	X	X
American shad	Clupeidae	*Alosa sapidissima*		X	X
Gizzard shad	Clupeidae	*Dorosoma cepedianum*	X	X	X
Central stoneroller	Cyprinidae	*Campostoma anomalum*	X	X	X
Goldfish	Cyprinidae	*Carassius auratus*			X
Satinfin shiner	Cyprinidae	*Cyprinella analostana*	X		
Spotfin shiner	Cyprinidae	*Cyprinella spiloptera*	X	X	X
Common carp	Cyprinidae	*Cyprinus carpio*	X	X	X
Common shiner	Cyprinidae	*Luxilus cornutus*	X	X	X
Emerald shiner	Cyprinidae	*Notropis atherinoides*	X	X	X
Spottail shiner	Cyprinidae	*Notropis hudsonius*	X	X	X
Rosyface shiner	Cyprinidae	*Notropis rubellus*	X		
Rudd	Cyprinidae	*Scardinius erythrophthalmus*	X		

Common Name	Family	Genus and Species	Upstream of Both Project Areas	Within Both Project Areas	Downstream of Both Project Areas
Creek chub	Cyprinidae	*Semotilus atromaculatus*	X	X	X
Fallfish	Cyprinidae	*Semotilus corporalis*	X	X	X
White sucker	Catostomidae	*Catostomus commersonii*	X	X	X
Northern hogsucker	Catostomidae	*Hypentelium nigricans*	X		
Shorthead redhorse	Catostomidae	*Moxostoma macrolepidotum*	X		X
Round goby	Goblidae	*Neogobius melanostomus*	X		
Yellow bullhead	Ictaluridae	*Ameiurus natalis*	X		
Brown bullhead	Ictaluridae	*Ameiurus nebulosus*	X	X	X
Channel catfish	Ictaluridae	*Ictalurus punctatus*	X		X
Stonecat	Ictaluridae	*Noturus flavus*	X		
Tadpole madtom	Ictaluridae	*Noturus gyrinus*			X
Margined madtom	Ictaluridae	*Noturus insignis*	X		
Brindled madtom	Ictaluridae	*Noturus miurus*	X		X
Brown trout	Salmonidae	*Salmo trutta*	X	X	
Brook trout	Salmonidae	*Salvelinus fontinalis*	X		
Northern pike	Esocidae	*Esox lucius*	X		
Tiger muskellunge	Esocidae	*Esox lucius X Esox masquinongy*	X		X
Chain pickerel	Esocidae	*Esox niger*	X		
Central mudminnow	Esocidae	*Umbra limi*	X		
Trout perch	Percopsidae	*Percopsis omiscomaycus*	X		X
Brook silverside	Atherinopsidae	*Labidesthes sicculus*	X	X	X

Common Name	Family	Genus and Species	Upstream of Both Project Areas	Within Both Project Areas	Downstream of Both Project Areas
Banded killifish	Fundulidae	*Fundulus diaphanus*	X		
Brook stickleback	Gasterosteidae	*Culaea inconstans*	X		
White perch	Moronidae	*Morone americana*	X	X	X
White bass	Moronidae	*Morone chrysops*	X		
Rock bass	Centrarchidae	*Ambloplites rupestris*	X	X	X
Pumpkinseed	Centrarchidae	*Lepomis gibbosus*	X	X	X
Bluegill	Centrarchidae	*Lepomis macrochirus*	X	X	X
Smallmouth bass	Centrarchidae	*Micropterus dolomieu*	X	X	X
Largemouth bass	Centrarchidae	*Micropterus salmoides*	X	X	X
White crappie	Centrarchidae	*Pomoxis annularis*		X	X
Black crappie	Centrarchidae	*Pomoxis nigromaculatus*	X	X	X
Greenside darter	Percidae	*Etheostoma blennioides*	X		
Rainbow darter	Percidae	*Etheostoma caeruleum*	X		
Fantail darter	Percidae	*Etheostoma flabellare*	X		
Tessellated darter	Percidae	*Etheostoma olmstedi*	X	X	X
Yellow perch	Percidae	*Perca flavescens*	X	X	X
Common logperch	Percidae	*Percina caprodes*	X	X	X
Walleye	Percidae	*Sander vitreus*	X	X	X
Freshwater drum	Sciaenidae	*Aplodinotus grunniens*	X	X	X

Source: Carlson et al., 2016

Proportional abundance of fish species from the survey data are provided in Table 4.4-2 and indicate that the most abundant gamefish species within the vicinity of the Projects are smallmouth bass followed by walleye. Overall, the resident fish community is dominated by warm- and cool-water species such as bluegill (*Lepomis macrochirus*), smallmouth bass, yellow perch (*Perca flavescens*), white sucker (*Catostomus commersonii*), fallfish (*Semotilus corporalis*), and brown bullhead (*Ameiurus nebulosus*).

The first biological fisheries survey of the entire Mohawk River occurred in 1934. The survey was conducted using seins, gill nets, and fyke nets. The purpose of the study was to establish a landmark data base for fisheries information. The survey identified 48 different species of fish. Walleye were the predominant game species followed by largemouth bass and smallmouth bass, while brown bullhead was the predominant panfish. McBride (1985 and 1994) suggested that the overall fishing quality in the Mohawk River during 1934 was likely poor due to pollution impacts.

The second fisheries survey was carried out in 1970 and 1971 by the NYSDEC Region 4 Fisheries Unit (McBride, 1985 and 1994). The purpose of the study was to update information on the quality of the sport fishery of the Mohawk River. Fish sampling was conducted using an electrofishing boat. The survey identified 26 different species in the Mohawk River. Smallmouth bass was the predominant game fish.

The most comprehensive survey of the lower Mohawk River fisheries was conducted from 1979 to 1983 to assess the river's fish populations and management needs (McBride, 1985 and 1994). The surveys were conducted using trap net sets, gill nets, boat electrofishing, bag sein hauls, and otter trawl hauls. The survey identified 56 different fish species. Twelve of the species were not collected during the 1934 survey, while six species collected in 1934 were not collected during this survey effort. The anadromous blueback herring was the most abundant fish collected followed by smallmouth bass. McBride 1985 suggests the lower Mohawk River supports an abundant and diverse warmwater fishery of high quality and is a dynamic system in which the fish community is undergoing change, as evidenced by the presence of 12 new species and the disappearance of six species since the 1934 biological survey.

In 2014-2015, the USGS, in conjunction with NYSDEC, undertook fish community surveys at 24 Mohawk River locations (Table 4.4-2, Figure 4.4-1). The surveys were conducted using boat electrofishing of near-shore habitats. The resulting data were analyzed to assess the condition of current fish assemblages, identify the relative abundance of common species, identify spatial differences associated with seasonal or permanent impoundments, and assess temporal changes in the fish community over the past 30 years. Results of the surveys indicate that the Mohawk River and the Canal System continue to support healthy and diverse fish communities. The surveys identified 39 species and suggested that the abundance and/or distribution of these species varies between permanent and seasonal impoundments. Lentic fish, often associated with ponds and lakes (e.g. sunfish), were generally more abundant in the permanent impoundments, while minnows were a larger component of the fish communities in seasonal impoundments. When all species were considered, mean catch per hour in permanent impoundments was approximately double that of seasonal impoundments (USGS, 2018e). Overall, the surveys found an abundant and healthy fishery in all sections of the river.

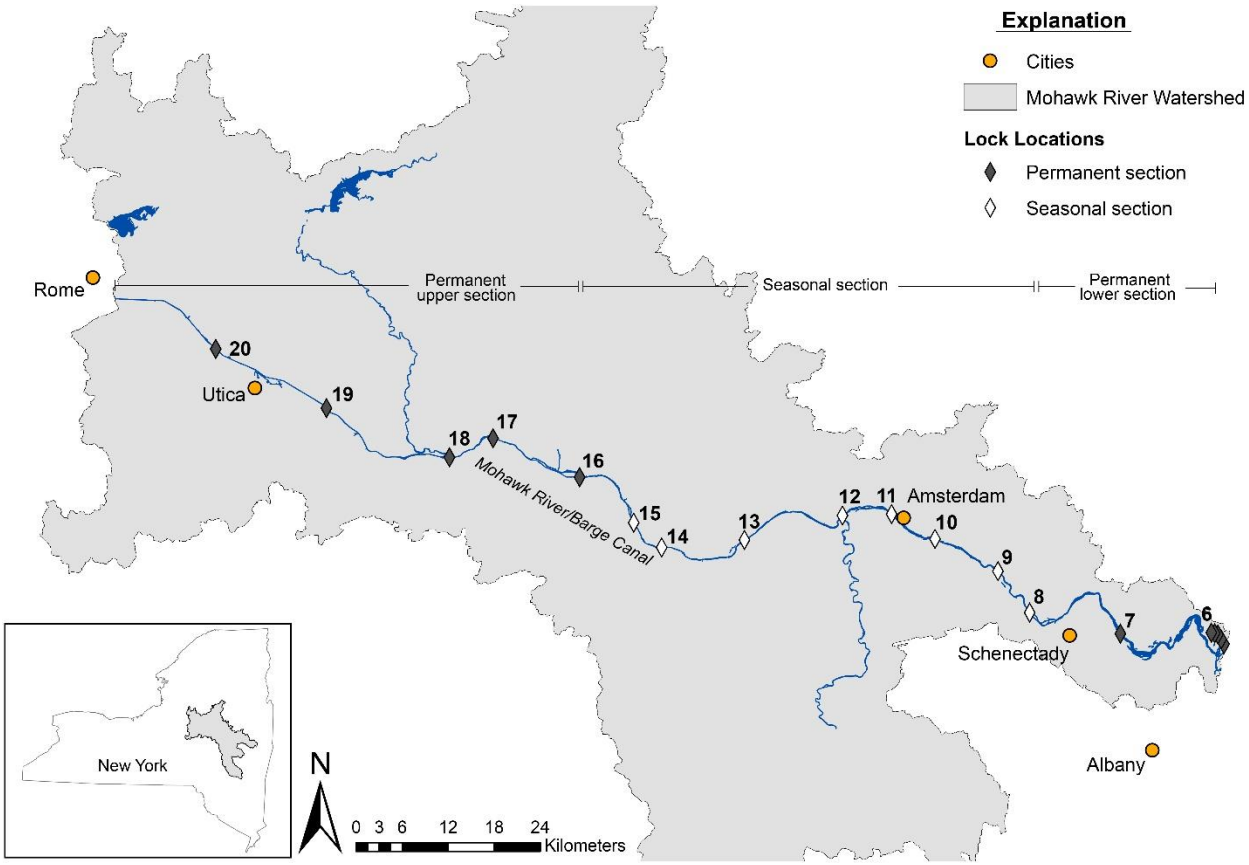
The NYSDEC conducted black bass surveys over a period of six nights between June 18-27, 2018, covering much of the Crescent impoundment shoreline (Table 4.4-2). The primary purpose of the study was to assess the status of black bass (i.e., largemouth and smallmouth), with a secondary focus on walleye. The study was conducted using 27 individual boat shocking runs at night. The surveys identified a total of 27 fish species. The most numerous sportfish captured was smallmouth bass. Large schools of forage fish (young blueback herring, spottail shiner [*Notropis hudsonius*] and spotfin shiner [*Cyprinella spiloptera*]) were observed during the survey, indicating the productivity of the lower Mohawk River. The surveys suggest the smallmouth bass and walleye populations appear to be recruiting well in the Crescent impoundment. The lack of larger walleye and esocids in the survey was likely due to rising water temperatures in early summer when adult fishes tend to move deeper, seeking colder water.

Table 4.4-2: Historic Fish Community Data in the Mohawk River

Date	**1934**[1]	**1970 – 1971**[1, 2, 5]	**1979 – 1983**[2]	**Spring 2014 & 2015**[3]	**June 18-27, 2018**[4]
Number of Species	48	26	56	38	27
Species	**Proportion of Abundance**				
Walleye	0.064		0.005	0.165	0.123
Largemouth bass	0.001		0.011	--	0.026
Smallmouth bass	0.003		0.034	0.082	0.190
Yellow perch	0.119		0.021	0.004	0.039
Brown bullhead	0.142		0.54	--	0.047
Rock bass	0.035		0.015	--	0.091
Pumpkinseed	0.020		0.017	--	0.124
Bluegill	--		0.048	--	0.059
Blueback herring	0.045		0.512	--	--
Other Centrarchids	--		--	0.093	--
Cyprinids	--		--	0.085	--
All other species	--		--	0.002	--
All species	--		--	0.001	--

[1] McBride, 1994
[2] McBride, 1985
[3] George et al., 2016
[4] Wells, 2018
[5] Only total species number given.

Figure 4.4-1: NYSDEC Mohawk River Fish Sampling Locations 2014-2015



Source: USGS, 2018e

4.4.2.2 Blueback Herring

Blueback herring is an anadromous river herring native to the eastern seaboard of North America. Its native range extends from Labrador to Florida. Along this range, the species inhabits coastal, estuarine and riverine systems, as well as some inland lakes. Blueback herring live most of their adult life at sea, returning inland to spawn. Inland migration has been enhanced in many places through man-made locks and canals, which has resulted in its expansion into many inland lakes and waterways adjacent to its native range, including the Mohawk River and Lake Ontario in New York. (NYSDEC, 2019a).

Blueback herring are native to the Hudson River, and run up the Hudson in the spring to spawn in various tributaries. Cohoes Falls, located approximately 1.5 miles downstream of Crescent Dam, presents a natural barrier that blueback herring would be unable to pass but for the Canal System and locks. Blueback herring depend on the operation of locks and gates on the Canal System to gain access to the Mohawk River. Blueback herring adults migrating upstream through the canal enter the Mohawk River upstream of the Crescent Dam.

Blueback herring were first recorded in the lower Mohawk River upstream of Cohoes Falls in 1934 (USGS, 2018f). Blueback herring were first reported in the upper Mohawk (above Little Falls) in 1978 (Owens et al., 1998). Spawning migrations can extend to near Rome, New York, about 120 miles above the river's mouth and more than 100 miles upstream of the Crescent and Vischer Ferry Project dams (FERC, 2000). Spawning occurs in the upper reaches of the Mohawk River and its tributaries, preferably in swift-flowing, hard-bottomed stream reaches, and begins when water temperatures reach 10-15 degrees C. (FERC, 2000). Spent adults migrate downstream shortly after spawning, generally during the period May through July (FERC, 2000). Juvenile blueback herring rear throughout the Mohawk River during summer and are an important prey for game fish such as bass, walleye, and yellow perch. Outmigration of juvenile blueback herring from the Mohawk River occurs during the fall (FERC, 2000).

Over the past two decades, blueback herring runs have been in decline all along the eastern seaboard, including the Mohawk River stocks. In 2012, NYSDEC and The State University of New York College of Environmental Science and Forestry (SUNY ESF) sampled the 2012 spring run. Sampling was conducted below four Canal dams and adjacent locks (E-7, E-9, E-11, and E-15). The tailwaters were boat electrofished during the day and samples of blueback herring were harvested for analyses. Approximately 1,000 blueback herring adults were shocked in 5.25 hours of 'on-time' boat electrofishing with 352 individuals collected in the survey. Males outnumbered females (2.27:1), but were statistically shorter, when measured as total length. Females had an insignificantly higher percentage of food items present in their stomachs versus males (87:79, P = 0.53). Fullness ratios varied among collection dates and sites with no difference found between May and early June sampling. By late June, the few adults that were found had much less food in their stomachs. Run timing was as expected with decreased adult density over time at lower sites and increased density at upper sites. Catch per unit effort (individuals/hour) was highest in late May (106/hour), while dropping from 88/hour to only 4/hour throughout the month of June. (Wells et al., 2013).

4.4.2.3 American Eel

American eel (*Anguilla rostrata*) is another diadromous species known to the Mohawk River and is native to all drainages in the state of New York. American eel are the only catadromous species in the state of New York, meaning they migrate out to sea to spawn. The catadromous life history of the American eel necessitates long migrations up and down rivers to successfully complete their life cycle. American eel spawn in the Sargasso Sea and their larvae then drift and migrate to coastal streams and enter North American estuaries, including the Hudson and Mohawk Rivers. From there, most young eel (elvers) move upstream into freshwater rivers, lakes, and ponds. However, research has shown that some eels complete their life cycle entirely in brackish water habitats (United States Fish and Wildlife Service [USFWS], 2015). Other research indicates that eel movement between fresh water and estuarine zones may be regular and seasonal in nature, in response to low winter temperatures in the estuary (USFWS, 2015).

Dams can create barriers to eel migration. However, upstream migrating juvenile eels (elvers) are strong climbers, and small elvers can negotiate wetted vertical surfaces (USFWS, 2015). Carlson et al.

(2016), referencing Greeley 1935, noted that sufficient numbers ascend the Mohawk River and other tributaries to the Hudson, giving the species a wide range in the Hudson River drainage area.

In 2003 and 2004, a study of six Hudson River tributaries (Wynants Kill, Hannacroix Creek, Saw Kill, Black Creek, Peekskill Hollow Brook, and Minisceongo Creek) was completed evaluating population dynamics of American eels (Machut et al., 2007). The goal of this study was to quantify the distribution of American eel and the impacts of anthropogenic stressors on them. For each of the tributaries, American eel densities were highest near the mouth and below each barrier. The highest densities of American eel were found at the mouth of Hannacroix Creek (155.1 eels/100 m^2) and the lowest densities (0.2 eels/100 m^2) were found at Wynants Kill, which has four barriers between it and the Hudson River mainstem. The regression model completed in this study found that barriers to fish passage were the dominant factor in predicting American eel abundances. In the Hudson River drainages, barriers are thought to play a greater role in eel distribution because of the number of barriers over relatively short distances in the tributaries studied.

The American eel has been caught in the main channel of the Mohawk River as far west as Herkimer, as well as in Schoharie and West Canada Creeks (Carlson et al., 2016). During a 2015 survey conducted by the NYSDEC, no American eel were reported in five tributaries of the Mohawk River: Cayudutta Creek, Zimmerman Creek, Crum Creek, and Canajoharie Creek (the fifth tributary was not identified) (Limburg et al., 2015).

4.4.3 Fish Passage and Protection Facilities

4.4.3.1 Upstream Passage

There are no upstream fish passage facilities at the Crescent or Vischer Ferry Dams. However, as at many other lock/dam facilities on the Mohawk River, fish are passed upstream through the existing lock system (Schmidt et al., 2003). At the Crescent Project, upstream migrating fish gain access to the Crescent impoundment above the dam via the Waterford Flight and Lock E-6. At the Vischer Ferry Project, fish are passed upstream of the dam via Lock E-7.

4.4.3.2 Downstream Passage

There are multiple routes for downstream fish passage at the Crescent and Vischer Ferry Projects. At both Projects, fish can pass over the dams during high-flow conditions or pass via the canal and lock system to downstream areas. Downstream passage at both Projects is also greatly enhanced through the operation of acoustic deterrent systems.

At the Crescent Project, downstream fish passage has been significantly enhanced by the Licensee's installation and operation of an acoustic deterrent system in combination with the provision of a flashboard opening measuring 24.3 meters by 0.3 meters providing access from the main channel through the dam (Figure 4.4-2). The Vischer Ferry Project also supports downstream passage of herring with a combination of acoustic deterrent array and flashboard openings (Figure 4.4-3).

Figure 4.4-2: Fish Passage Routes at the Crescent Hydroelectric Project

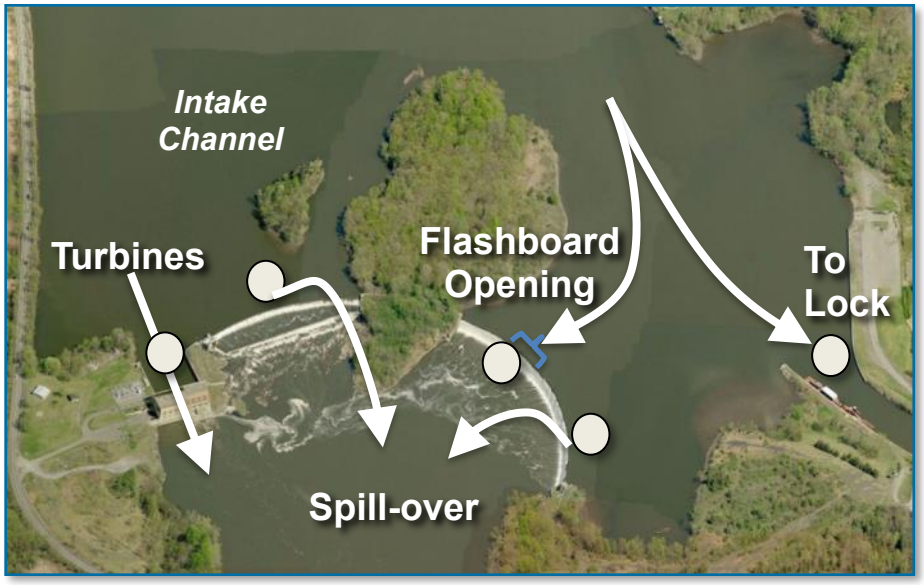
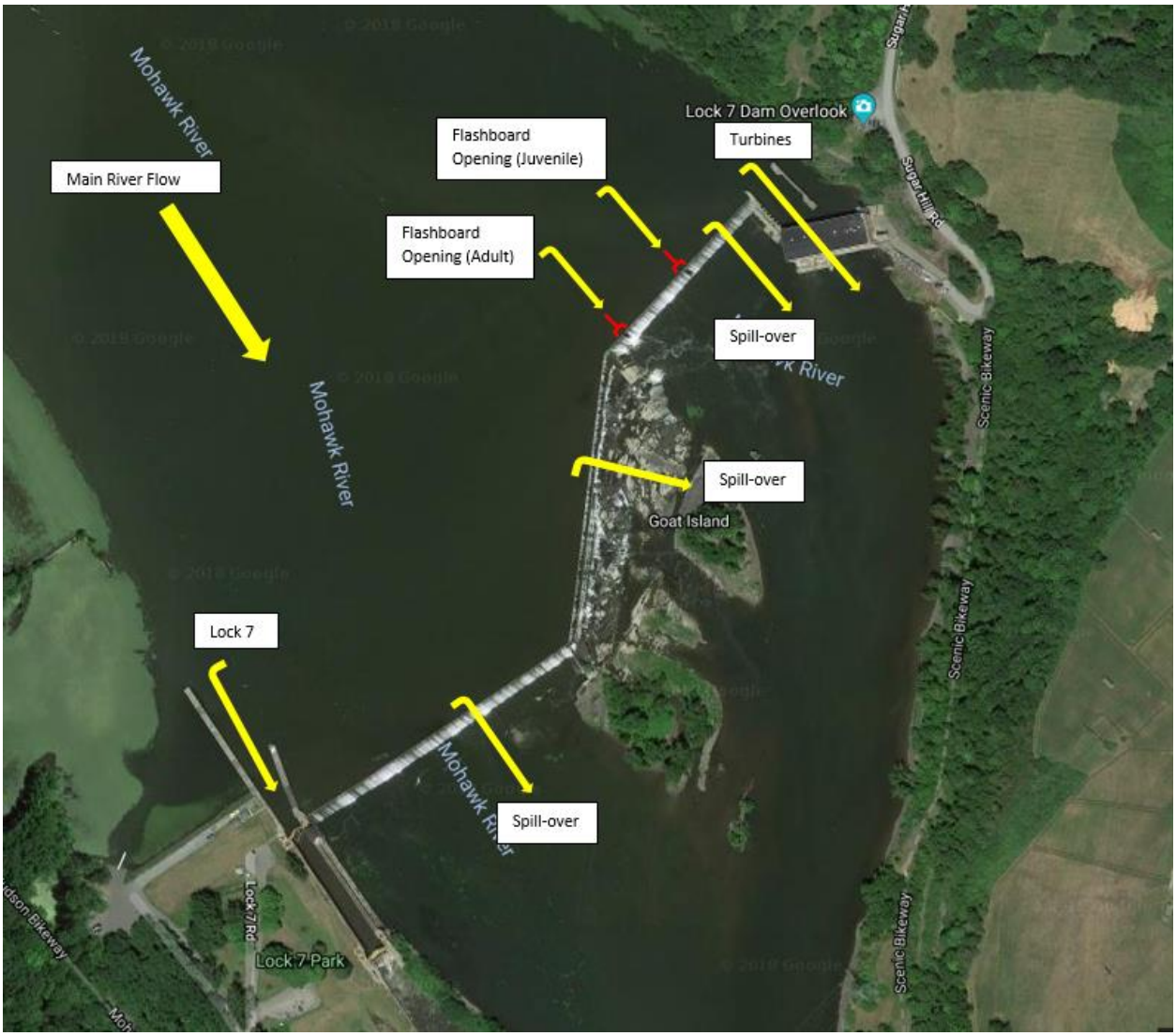


Figure 4.4-3: Fish Passage Routes at the Vischer Ferry Hydroelectric Project



4.4.3.3 Studies of Downstream Fish Passage

In the 1984 License Orders for the Projects, the FERC determined that it was possible for the Crescent Project to affect the downstream passage of blueback herring, but that sufficient information was not available to make a determination. Article 40 required the Licensee to consult with resource agencies and to conduct a study to determine the impacts of the operation on fish migration and potential mitigation to offset these impacts. An initial study of blueback herring outmigration in the Lower Mohawk River was completed from September to November of 1985.

In 1992, the Power Authority provided FERC with the results of a juvenile blueback herring turbine passage mortality study conducted at the Crescent Project (RMC Environmental Services, 1992) and provided recommendations to mitigate impacts to migrating juvenile blueback herring in the vicinity of the Project. Prior study at the site had found that many juvenile blueback herring were migrating

through the Crescent Project's powerhouse during their downstream migration (Chas. T. Main, Inc., 1984; Curtis and Associates, 1987). In 1992, the Power Authority proposed a preferential turbine operational plan to be protective of adult and juvenile blueback herring during the periods of mid-May through June 30 and September 1 through November 10, respectively.

The 48-hour survival of emigrating juvenile blueback herring was evaluated in a study at the Crescent Project (Mathur et al., 1996). The study looked specifically at juvenile blueback herring survival rates through the Kaplan turbine unit and over the spillways. The study was completed using a tag-recapture technique. Survival was estimated to be 96±6.7% through a Kaplan turbine and 88.3±10.7% over a spillway associated with a low-head hydro dam. Since the turbines at the Vischer Ferry Project are nearly identical to those at Crescent, turbine passage survival rates for juvenile blueback herring at Vischer Ferry are likely the same as those determined for the Crescent Project based on passage survival studies conducted at the Crescent Project (96% for the Kaplan turbines (Mathur et al., 1996)).

Feasibility studies were conducted in the Spring of 1997 (Crescent Project) and Fall of 1996 (Vischer Ferry Project) to determine whether or not the use of high frequency sound and bypasses around the headraces would be successful at preventing blueback herring from passing through the turbines (Ross, 1999). These studies were focused on the equipment placed in the forebay (headrace) at each Project. Overall effectiveness varied based on physiographic and hydrodynamic features at each site and fish size. At the Crescent Project, a similar result was obtained for young-of-the-year blueback herring, but was not demonstrated for adult blueback herring. Recommendations to adjust the edge of the ultrasound field were proposed. For the Vischer Ferry Project, the use of high frequency sound resulted in over 90% of fish using the bypass for both adult and young-of-the-year blueback herring.

In 2008, hydroacoustic studies were completed to determine the effects of ultrasound on fish passage in the vicinity of the Crescent Project (Dunning and Gurshin, 2012, Normandeau Associates, 2009). This study was completed after the Crescent Project's acoustic equipment was moved from the forebay area into the side channel. From August 30 to October 5, 2008, the abundance of fish upriver of the ultrasound, downriver of the ultrasound field in the main channel, and downriver of the ultrasound in the secondary channel that leads to the Powerhouse was measured. The percentage of fish upstream of the ultrasound field that passed downstream through the main channel rather than the secondary channel was found to be three times greater than expected based on the relative water volume between the main and secondary channels. An approximately 23% reduction in the number of fish entering the secondary channel was observed. This observation includes both blueback herring and other fishes that are not expected to respond to ultrasound.

In 2009, a study was completed to test the effectiveness of the ultrasonic field in redirecting adult blueback herring away from the powerhouse at the Crescent Project (Kleinschmidt Associates, 2009). The study was completed via radio tagging of adult blueback herring. Of the 102 tagged blueback herring, 38 were tracked via mobile tracking. Of these 38, only 24 were detected below the release location and only 14 of those were detected downriver of the ultrasonic field. Thirteen of these blueback herring were first detected in the main channel when flow ranged from 0.595 to 0.913 of the total flow through both the primary (over Dam A and through the opening in the flashboards atop Dam

A) and secondary (over Dam B, through the tainter gate, debris sluice, and the Crescent turbines) channels.

In 2010, the Power Authority adjusted the western ultrasonic field to have half of the projectors point 45 degrees upriver and a study was conducted to evaluate the effectiveness of the adjusted ultrasonic fields (Gurshin et al., 2014a, Gurshin et al., 2014b). Mobile echosounder surveys were completed during the day and fish density was estimated. Stratified random trawl surveys were conducted at night to verify species composition and compare catch. The study found that after the adjustment approximately 77% of fish bypassed the turbines during the active migration period, which was significantly higher than the 31% of fish bypassing the turbines from the 2008 survey.

The current acoustic deterent system at Crescent was installed in 2008, and is comprised of ultrasonic projectors configured to guide out-migrating blueback herring away from the side channel leading to the powerhouse. Previously, the system had been located within the forebay. The system consists of eight integrated sound projectors emitting frequencies between 122-128 kilohertz with a sound pressure level of 190 decibels re 1 micropascal at 1 meter.

The acoustic deterent system successfully diverts the large majority of juvenile herring away from the powerhouse. The trashrack rack spacing at the Crescent Project is 3 7/8 inches which allows easy passage of juvenile herring.

The acoustic deterrent system at the Vischer Ferry Project was installed in 2000. The Licensee provides two flashboard openings on the Vischer Ferry Dam, one operated to enhance the passage of adult blueback herring and the other is designed to enhance passage of juvenile blueback herring. Based on sound deterrent testing at Vischer Ferry, adult blueback herring are more sensitive to sound and therefore one of the flashboard openings is located further away from the sound projectors. Juvenile blueback herring are less sensitive than the adults, thus the closer flashboard opening (Ross et al., 1999). The flashboard opening to accommodate migrating adults is open from May through July, while the flashboard opening to accommodate juveniles is open from September through November.

The trashrack rack spacing at the Vischer Ferry Project is 3 7/8 inches which allows easy passage of juvenile herring.

4.4.4 Rare, Threatened, and Endangered Fish Species

There are no federally listed rare, threatened or endangered fish species located in the area of the Projects. The NYSDEC reports that lake sturgeon, a state-listed threatened species, has been reported in the Mohawk River (USFWS, 2019a).

4.4.5 Recreational Fishery

Recreational fisheries within the Crescent and Vischer Ferry Projects areas fall under NYSDEC Region 4 and Region 5 jurisdictions. Recreational fishing is permitted on the Mohawk River, downstream of the Route 32 bridge, for all species, year-round (NYSDEC, 2018b). However, the fishing is catch-and-release

only, and all fish must be returned to the water immediately. Certain baitfish may be possessed for use as fish bait. Tip-ups are also permitted. The use or possession of alewife or blueback herring is prohibited from Lock E-2 to Guard Gate 2 (Waterford Flight). Both the Vischer Ferry Dam and Crescent Dam are recommended places to fish according to several fishing guide articles and the "I Fish NY Guide to Capital District Fishing" flyer (Clifton Park, 2018, Mohawk Towpath Byway, 2009, and Streeter, 2011). There is handicapped fishing access under the Crescent (Route 9) bridge (Town of Half Moon, 2018).

Statewide angler surveys conducted during 2007 found that the Mohawk River had an estimated 219,735 (Confidence Limits ± 47,375) angler days overall (Connelly and Brown, 2009). Angler at-location expenditures were $1,778,764 ($8.10 average per day) and $1,072,811 ($4.88 average per day) for en route expenditures for the Mohawk River. Black bass (small or largemouth), trout (brook [*S. fontinalis*], brown [*S. trutta*], rainbow [*O. mykiss*]), walleye, and northern pike were the most sought-after species by anglers fishing the Mohawk (Connelly and Brown, 2009). The mean distance traveled was 24 miles and average satisfaction level was 3.3 on a scale of 1 being very dissatisfied and 5 being very satisfied. There is recreational river herring fishery in the Hudson River and its tributaries, including the Mohawk River. This recreational herring fishery is primarily driven by the need for bait in the striped bass fishery. Herring are fished from shore and boat through angling or net gears. Shore fishers mostly use scap nets or angling while boat fishers utilize all allowable gear (Hattala et. al., 2011).

One of the goals of the draft 2018-2022 Mohawk River Basin Action Agenda is to "Improve fisheries and habitat to create a fishable Mohawk River." Some of the targeted actions of this plan include the following: implementing surveys to better understand fish communities, populations, and their habitats; mitigating the impacts of invasive species; monitoring and restoring declining migratory fish populations; modifying canal lockage plans to better accommodate fish passage; and making improvements to access for recreational opportunities (NYSDEC, 2018c).

4.4.6 Benthic Macroinvertebrates

Historically the Mohawk River was characterized by riffles, pools, and still waters. After completion of the Erie Canal, the Mohawk River, including the lower river in the vicinity of the Crescent and Vischer Ferry Projects, can now be described as a series of permanent and seasonal impoundments (McBride, 2009).

The Onondaga Environmental Institute (Onondaga Environmental Institute, 2015) noted that a macro-invertebrate study of the Mohawk River was conducted by NYSDEC in 1972. This study found that the river supported fewer macro-invertebrate species than would be expected from an undisturbed river. The study also found that the river contained high-amounts of organic materials below Utica and Little Falls and contained ample amounts of plant nutrients and suspended organic particulates (Simpson, 1980).

A more recent survey of macroinvertebrates in the Mohawk River was conducted in 2014-2015 (Onondaga Environmental Institute, 2015). A total of 56 stations were sampled for aquatic macroinvertebrates on the mainstem of the Mohawk River from Crescent Lake (Crescent impoundment)

in the Town of Waterford, to just above Lock E-20, in the Town of Marcy. Surveys were conducted in August of 2014 and July of 2015. Artificial substrate samplers (Hester-Dendy multiplate samplers) were deployed at each of the survey locations and allowed a colonization period (5 weeks) before being retrieved for analysis. Results from the 2014 survey showed that multiple samples were dominated by Chironomidae larvae (midges), compromising two-thirds of total abundance. The second most abundant taxa were species belonging to the Ephemeroptera-Plecoptera-Trichoptera category (EPT). Of the EPT taxa, heptaginiid mayflies (Ephemeroptera) were most abundant, composing 60% of the EPT abundance. Species distribution along the Mohawk River were found to be relatively uniform.

4.4.7 Freshwater Mussels

The Mohawk River Basin Action Agenda recognizes freshwater mussels belonging to the family Unionidae as one of the most imperiled groups of species in the Mohawk River Watershed (NYSDEC, 2012). Unionid mussels are sedentary organisms that are relatively immobile. They spend most of their lives living in the sediments of streams, rivers, ponds, and lakes (Allen and Vaughn, 2010). Unionids require a fish host to complete their life cycle. Once fertilized, the female adults release their larvae, known as glochidia, into the water column. Glochidia require a specific host (typically fish) to attach to and continue development and Unionid mussels have evolved a broad array of techniques for infecting their host with glochidia, which attach to soft tissues (e.g. gills and/or fins) upon contact and persist as a benign parasite for a period of weeks or months while the glochidia transforms into a juvenile. When ready, the mussel releases from the host and falls to the substrate to complete its life cycle. This relationship between a mussel and its host is often species-specific with only one or several hosts (typically fish species) capable of successfully transforming glochidia into viable offspring. The exact host species is not yet confirmed for many mussel species, particularly rare, threatened or endangered species.

As discussed in Section 4.4.6, a survey of macroinvertebrates in the Mohawk River was conducted in 2014-2015 (Onondaga Environmental Institute, 2015), which included data on mussels. Results from the 2015 surveys showed that multiplate samples were dominated by Mollusca (gastropods and bi-valves), compromising 71% of the total abundance. Within the Mollusca category, 99.3% of the individuals were the invasive zebra mussel.

Freshwater mussels have been recorded in the Mohawk River and the Canal System drainages. A list of documented mussel species and potential presence within the boundaries of the Projects is provided in Table 4.4-3 (NYSDEC, 2012).

The New York Natural Heritage Program database suggests that there is potential habitat for the alewife floater (*Anodonta implicata*) in the Mohawk River from approximately one mile upstream of the Crescent Dam, to the confluence with the Hudson River (NYPA, 2018).

Table 4.4-3: Native Unionid Mussel Records for Erie Canal and Mohawk River Drainage, New York

Species	Family	Common Name	Federal Status[1]	NY Status[2,3,4]	Potential Presence Within the Boundaries of the Projects
Alasmidonta marginata	Unionidae	Elktoe	-	-	Possible. Currently extant in Schoharie Creek, tributary to the Mohawk River, within 20 miles (upstream) of the Project Areas.
Alasmidonta undulata	Unionidae	Triangle floater	-	T	Unlikely; no records from 1970-1997. More recent data lacking.
Anodonta implicata	Unionidae	Alewife floater	-	S1S2	Probable.
Anodontoides ferrussacianus	Unionidae	Cylindrical papershell	-	-	Unlikely; no records from 1970-1997. More recent data lacking.
Elliptio complanata	Unionidae	Eastern elliptio	-	-	Unlikely; no records from 1970-1997. More recent data lacking.
Fusconaia flava	Unionidae	Wabash pigtoe	-	T, S2	Unlikely; no records from 1970-1997. More recent data lacking.
Lasmigona compressa	Unionidae	Creek heelsplitter	-	S3S4	Unlikely; no records from 1970-1997. More recent data lacking.
Lasmigona costata	Unionidae	Flutedshell	-	S5	Probable.
Lasmigona subviridis	Unionidae	Green floater	-	T, S1S2	Unlikely; no records from 1970-1997. More recent data lacking.
Pyganodon cataracta	Unionidae	Eastern floater	-	-	Unlikely; no records from 1970-1997. More recent data lacking.
Pyganodon grandis	Unionidae	Giant floater	-	-	Possible. Currently extant in Schoharie Creek, tributary to the Mohawk River, within 20 miles (upstream) of the Project Areas.

Species	Family	Common Name	Federal Status[1]	NY Status[2,3,4]	Potential Presence Within the Boundaries of the Projects
Strophitus undulatus	Unionidae	Creeper	-	-	Possible. Currently extant in Schoharie Creek, tributary to the Mohawk River, within 20 miles (upstream) of the Project Areas.

Source: Strayer and Jirka, 1997
[1] USFWS, 2018a
[2] T = threatened
[3] New York Natural Heritage Program (NYNHP), 2017 S1S2 = uncertain whether critically imperiled (S1) or imperiled (S2) in New York; S3S4 = uncertain whether vulnerable or uncommon but not rare in New York; Demonstrably secure (S5) in New York State.
[4] NYSDEC, 2010b

4.5 Wildlife and Botanical Resources (18 C.F.R. § 5.6 (d)(3)(v))

4.5.1 Regional Setting

The U.S. Environmental Protection Agency (USEPA) has identified ecoregions, which are "areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources" throughout the U.S. Ecoregions are divided into four different levels, from coarse (Level I) to more refined (Level IV). The Projects are located within the Eastern Great Lakes Lowlands Level III ecoregion and within the Hudson Valley Level IV ecoregion (Bryce et al., 2010). This region is underlain primarily by shales and siltstones and much of the area is covered by sediments deposited into Glacial Lake Albany during the Pleistocene Epoch. The coarser-grained sands form what is now areas of dunes and sandplains dominated by pitch pine and scrub oak. Relatively low elevations and moderate climate in the region also allows Appalachian oak-hickory forest to extend further north. These and other assemblages in the region are often at the northern extent of their distribution, but climate change is expected to expand these species into areas where northern hardwoods are dominant (Bryce et al., 2010).

4.5.2 Botanical Resources

Figures 3.2-1, 3.2-2 and 3.2-3 show the boundaries of the Projects, which follow the shoreline of the Mohawk River. Both Projects are comprised predominantly of aquatic habitat. There is a limited area of upland habitat within the boundaries of the Projects which includes 74.5 acres of islands and approximately 10 miles of shoreline along each bank of the Mohawk River within the Crescent Project Boundary and 1.7 acres of islands and approximately 10.3 miles of shoreline along each bank of the Mohawk River within the Vischer Ferry Project Boundary.

Upland habitats were identified using The Nature Conservancy's (TNC) Northeast Terrestrial Habitat Map (Updated, 2015) (TNC, 2017). This Map provides continuous coverage of ecological communities based on terrestrial habitats in the Northeast United States and Canada. The ecological units are based on plant community types and integrates other physical characteristics (geology, soil type, gradient etc.).

The dominant terrestrial habitats within the Crescent Project Boundary consist of two types of North-Central Appalachian Large River Floodplain: Freshwater Marsh (63.1 acres) and Acidic Swamp (55.3 acres). North-Central Appalachian Large River Floodplain habitats consist of floodplains of medium to large rivers in Atlantic drainages with a mixture of wetland and upland vegetation. Vegetation may include silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), box elder (*Acer negundo*), cottonwood (*Populus* species), as well as herbaceous areas. The majority of these habitat areas are underwater in the spring (Ferree et al., 2013). Other common habitats in the Crescent Project area are developed land (45.4 acres), North-Central Interior Wet Flatwoods (35.5 acres), Appalachian (Hemlock)-Northern Hardwood Forest (25.7 acres), agricultural lands (13.6 acres), and Laurentian-Acadian Freshwater Marsh: Smaller river floodplain/riparian (10.7 acres) (TNC, 2017).

The dominant terrestrial habitats within the Vischer Ferry Project Boundary are Appalachian (Hemlock)-Northern Hardwood Forest (29.0 acres) and developed land (14.6 acres) (TNC, 2017). The Appalachian (Hemlock)-Northern Hardwood Forest is dominated by sugar maple, American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), and eastern hemlock (*Tsuga canadensis*). It is found on a variety of bedrock types and landforms (Ferree et al., 2013). Developed land consists of those areas dominated by human development and infrastructure. Other common habitats in the Vischer Ferry Project area are North-Central Appalachian Large River Floodplain: Acidic Swamp (13.5 acres), North-Central Appalachian Large River Floodplain: Rich Swamp (13.1 acres), North-Central Interior and Appalachian Rich Swamp: Smaller river floodplain/riparian (8.6 acres), and North-Central Appalachian Large River Floodplain: Freshwater Marsh (6.5 acres) (TNC, 2017).

Typical plants which are likely to be found in terrestrial habitats in the vicinity of the Crescent and Vischer Ferry Projects are included in Table 4.5-1.

Table 4.5-1: Typical Botanical Species Likely to be Found in Terrestrial Habitats in the Vicinity of the Crescent and Vischer Ferry Projects

Scientific Name	Common Name	Ecosystem[1]	In the Vicinity of the Crescent Project	In the Vicinity of the Vischer Ferry Project
Acer nigrum	Black maple	NCIWF	X	
Acer negundo	Box elder	NCALRF	X	X
Acer rubrum	Red maple	NCAAS, NCIARS, NCIWF, NIDMOF	X	X
Acer saccharinum	Silver maple	NCALRF	X	X
Acer saccharum	Sugar maple	ANHF	X	X
Agrimonia parviflora	Swamp agrimony	NCIWF	X	
Alnus species	Alder species	LAWMS, NCIWF	X	
Andromeda polifolia	Bog rosemary	NCAAS	X	X
Arisaema dracontium	Green dragon	NCALRF	X	X
Asclepias quadrifolia	Four-leaved milkweed	ANHF	X	X
Betula alleghaniensis	Yellow birch	ANHF, NIDMOF, LAWMS	X	X
Betula lenta	Black birch	ANHF, NIDMOF	X	X
Bidens laevis	Smooth bur-marigold	NCALRF	X	X
Calamagrostis canadensis	Bluejoint grass	LAWMS	X	
Callitriche hermaphroditica	Autumnal water-starwort	LAFM	X	
Campanula aparinoides	Greater marsh-bellflower	LAWMS	X	
Cardamine douglassii	Purple cress	NCIWF	X	
Carex alopecoidea	Foxtail sedge	NCIWF	X	
Carex flava	Large yellow sedge	NCIARS	X	X
Carex frankii	Frank's sedge	NCIWF	X	
Carex magellanica	Boreal bog sedge	NCAAS	X	X
Carya species	Hickory species	NIDMOF	X	X
Carya cordiformis	Bitternut hickory	NCIARS	X	X
Carya laciniosa	Big shellbark hickory	NCIARS	X	X
Celtis occidentalis	Common hackberry	NCIWF	X	
Cephalanthus occidentalis	Buttonbush	LAWMS, NCIWF	X	
Claytonia virginica	Narrow-leaved spring beauty	NCIWF	X	
Conopholis americana	Squawroot	ANHF	X	X
Cornus canadensis	Dwarf dogwood	NCIARS	X	X
Cornus florida	Flowering dogwood	ANHF	X	X
Cornus sericea	Red-osier dogwood	LAWMS	X	
Cypripedium reginae	Showy lady's-slipper	NCIARS	X	X
Desmodium rotundifolium	Round-leaved tick trefoil	ANHF	X	X

Scientific Name	Common Name	Ecosystem[1]	In the Vicinity of the Crescent Project	In the Vicinity of the Vischer Ferry Project
Elodea canadensis	American pondweed	LAFM	X	
Elymus hystrix	Bottlebrush grass	NIDMOF	X	X
Elymus villosus	Hairy wild rye	NCIWF	X	
Fagus grandifolia	American beech	ANHF	X	X
Filipendula ulmaria	Meadowsweet	LAWMS	X	
Fraxinus nigra	Black ash	NCIARS	X	X
Fraxinus profunda	Pumpkin ash	NCIARS	X	X
Gaultheria hispidula	Creeping snowberry	NCAAS	X	X
Gaultheria procumbens	American wintergreen	NIDMOF	X	
Geum rivale	Purple avens	NCIARS	X	
Helenium autumnale	Common sneezeweed	NCIWF	X	
Hydrocotyle ranuculoides	Floating pennywort	LAFM	X	
Hydrocotyle verticillata	Whorled pennywort	LAFM	X	
Ilex verticillata	Winterberry	NCIWF	X	
Larix laricina	Eastern larch	NCIARS	X	X
Lilium canadense	Canada lily	NCAAS	X	X
Lindera benzoin	Spicebush	ANHF	X	X
Liquidambar styraciflua	Sweet gum	NCIWF	X	X
Liriodendron tulipifera	Tuliptree	ANHF, NIDMOF	X	
Listera auriculata	Auricled twayblade	LAWMS	X	
Lomatogonium rotatum	Marsh felwort	LAFM	X	X
Lygodium palmatum	American climbing fern	NCIWF	X	X
Lysimachia quadrifolia	Four-flower yellow loosestrife	NCIARS	X	X
Menispermum canadense	Canada moonseed	NCALRF, NCIWF	X	X
Mimosa pudica	Touch-me-not	LAFM	X	X
Mitella nuda	Naked bishop's-cap	NCIARS	X	X
Mondarda clinopodia	Basil beebalm	NCALRF, NIDMOF	X	
Myrica gale	Sweet bayberry	NCAAS	X	X
Nymphaeaceae species	Water lily species	LAFM	X	
Nyssa sylvatica	Black gum	NCAAS, NCIWF	X	
Oenothera laciniata	Cut-leaved evening-primrose	NCIWF	X	
Ophioglossum pusillum	Northern adder's-tongue	LAWMS	X	
Pedicularis lanceolata	Swamp lousewort	LAWMS	X	
Phegopteris hexagonoptera	Broad beech fern	ANHF	X	
Pinus strobus	Eastern white pine	ANHF, NIDMOF	X	X
Pinus virginiana	Virginia pine	NIDMOF	X	

Scientific Name	Common Name	Ecosystem[1]	In the Vicinity of the Crescent Project	In the Vicinity of the Vischer Ferry Project
Platanus occidentalis	Sycamore	NCALRF	X	X
Pontederia cordata	Pickerelweed	LAFM	X	X
Populus species	Cottonwood species	NCALRF	X	X
Potentilla paradoxa	Bushy cinquefoil	NCAAS	X	X
Prunus serotina	Black cherry	ANHF	X	
Pterospora andromedea	Woodland pinedrops	ANHF	X	
Pyrola elliptica	Shinleaf	NIDMOF	X	X
Quercus macrocarpa	Bur oak	NCIWF	X	X
Quercus alba	White oak	ANHF, NIDMOF	X	X
Quercus bicolor	Swamp white oak	NCIWF	X	
Quercus coccinea	Scarlet oak	NIDMOF	X	X
Quercus prinus	Chestnut oak	NIDMOF	X	X
Quercus rubra	Northern red oak	ANHF	X	
Quercus velutina	Black oak	NIDMOF	X	X
Ranunculus fascicularis	Early buttercup	NIDMOF	X	
Rhododendron tomentosum	Northern labrador tea	NCAAS	X	
Ribes hirtellum	Swamp gooseberry	NCAAS	X	X
Rumex verticillatus	Swamp dock	NCAAS	X	
Salix species	Willow species	LAWMS	X	X
Schoenoplectus acutus	Hardstem bulrush	LAFM	X	X
Scirpus georgianus	Georgia bulrush	NCIWF	X	X
Senna obtusifolia	Sicklepod	NIDMOF	X	X
Solidago patula	Roundleaf goldenrod	NCIARS	X	
Stachys hispida	Hairy hedge-nettle	NCAAS	X	
Stachys palustris	Marsh hedge-nettle	LAFM	X	
Thelypteris palustris	Marsh fern	LAFM	X	
Trillium cernuum	Nodding trillium	NCALRF	X	X
Tsuga canadensis	Eastern hemlock	ANHF, NCAAS	X	X
Typha species	Cattails species	LAFM	X	X
Uvularia perfoliata	Perfoliate bellwort	ANHF	X	X
Woodsia obtusa	Blunt-lobed woodsia	NIDMOF	X	
Zizia aurea	Common alexanders	NIDMOF	X	X

Source: TNC, 2017

[1] ANHF = Appalachian (Hemlock)–Northern Hardwood Forest; NCAAS = North-Central Appalachian Acidic Swamp; LAFM = Laurentian-Acadian Freshwater Marsh; LAWMS = Laurentian-Acadian Wet Meadow-Shrub Swamp; NCALRF = North-Central Appalachian Large River Floodplain; NCIARS = North-Central Interior and Appalachian Rich Swamp; NCIWF = North-Central Interior Wet Flatwoods; NIDMOF = Northeastern Interior Dry-Mesic Oak Forest.

4.5.3 Invasive Plant Species

The NYSDEC defines invasive species as "non-native species that can cause harm to the environment, the economy or to human health" (NYSDEC, 2018d). The Crescent and Vischer Ferry Projects are located within the Capital Mohawk regional invasive species management partnership area, which is part of one of the Partnerships for Regional Invasive Species Management (PRISMs). The PRISMs maintain mapping and a database tracking the distribution of invasive species in their regions (New York iMap Invasives, 2019).

Based on a review of the Capital Mohawk PRISM data, there are nine invasive plant species that may occur in the vicinity of the Crescent and Vischer Ferry Projects: black locust (*Robinia pseudoacacia*), honeysuckle (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), Eurasian water-milfoil (*Myriophyllum spicatum*), climbing nightshade (*Solanum dulcamara*), wild parsnip (*Pastinaca sativa*), water chestnut (*Eleocharis dulcis*), curly pondweed (*Potamogeton crispus*), and common buckthorn (*Rhamnus cathartica*) (Table 4.5-2). Three of these species (Eurasian water-milfoil, water chestnut, and curly pondweed) are aquatic and are found within the Mohawk River (New York Invasive Species Information, 2018).

Table 4.5-2: Invasive Plant Species Documented within the Vicinity of the Crescent and Vischer Ferry Projects

Scientific Name	Common Name	Notes
Eleocharis dulcis	Water chestnut	A highly invasive aquatic plant species that forms dense mats of floating vegetation in areas of slow-moving waters. These mats can cause wide-ranging problems for fish and wildlife, as well as human use.
Lonicera spp.	Honeysuckle (species unknown)	*L. morrowii, L.tatarica, and L.maackii,* are perennial shrubs. These three invasive shrub species can form very dense populations that can outcompete and suppress growth of native plant species. The woody vine species leaves are semi-evergreen allowing the plant to grow longer into winter, giving it a competitive advantage over native vegetation. *L. japonica* is a perennial woody vine that thrives in abandoned fields, pastures, and planted forests. One way to distinguish native from invasive honeysuckles is by looking at the stems: native honeysuckles have solid stems while invasive honeysuckles have hollow stems.
Myriophyllum spicatum	Eurasian water-milfoil	A submersed aquatic plant, inhabiting stagnant, slow-moving fresh or slightly brackish waters. It roots at the lake bottom and grows rapidly forming dense beds and canopies. It can also root on muddy shores.

Scientific Name	Common Name	Notes
Pastinaca sativa	Wild parsnip	A biennial/perennial herb commonly found along roadsides, in pastures, and in abandoned fields. It grows best in rich, calcareous, alkaline, moist soils. Wild parsnip invades and modifies open habitats. Well-established fields and meadows are not likely to be invaded, but parsnip can become well-developed in any place the soil has been disturbed and native vegetation has yet to become fully established.
Potamogeton crispus	Curly pondweed	An invasive, aquatic plant species which tolerates fresh or slightly brackish water. It can grow in a range of waters from shallow to deep and from still to flowing. Due its excessive growth, this plant can become a nuisance and sometimes displaces native plants.
Rhamnus cathartica	Common buckthorn	A small deciduous tree or large shrub commonly found in lightly shaded areas such as hedgerows, along roadsides and on ravine slopes. Common buckthorn forms dense thickets with long branches that crowd and shade out native shrubs and herbaceous species, preventing growth of native plants.
Robinia pseudoacacia	Black locust	A tree commonly found in disturbed areas. Stands of black locust have been shown to reduce native plants through shading and soil chemistry alterations.
Rosa multiflora	Multiflora rose	A vigorous perennial shrub that thrives in full and partial sun in well-drained soils. Commonly found in early succession pastures and fields, open woodlands, and forest edges. Multiflora rose is extremely prolific and forms dense thickets, excluding native plant species.
Solanum dulcamara	Climbing nightshade	A shade tolerant perennial commonly found in freshwater marshes, shrub swamps, forested wetlands, cultivated habitats, forests, and roadsides. Climbing nightshade can cause physical damage by climbing on other plants and sometimes reduce abundance of native vegetation.

Source: New York Invasive Species Information, 2018 and Pennsylvania Department of Conservation and Natural Resources, 2019

4.5.4 Wildlife Resources

The FERC Project Boundaries for the Crescent and Vischer Ferry Projects generally follow the shoreline of the Mohawk River and include very limited terrestrial habitat other than Goat Island within the Vischer Ferry Project Boundary and a few smaller islands within the Crescent Project Boundary.

Vischer Ferry Nature and Historic Preserve is located downstream of Vischer Ferry Dam and upstream of Crescent Dam. This 600-acre preserve includes waterfront and wetland habitat areas. The Preserve has been named by Audubon New York as an Important Bird Area (Audubon, 2018) and by the state of New York as a Bird Conservation Area (NYSDEC, 2018e). Species found at the Preserve and that may also be found within the vicinity of the Projects in similar undeveloped habitats along the Mohawk River include great blue heron (*Ardea herodias*), teals (*Anas* species), coots (*Fulica* species), loons (*Gavia* species), pintail *(Anas acuta),* various species of ducks, various species of hawks, osprey *(Pandion haliaetus),* warblers (family Parulidae), Virginia opossum *(Didelphis virginiana),* groundhog *(Marmota monax*), weasels (family Mustelidae)*,* red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), various turtles, spotted salamander (*Ambystoma maculatum*), red efts (*Notophthalmus viridescens*), and bullfrogs (*Lithobates catesbeianus*) (Lakes to Locks Passage, 2018). Developed areas along the Projects' dams may support other small mammals and birds used to human activity such as squirrels (*Sciurus* species), mice (*Mus* species), chipmunk (*Tamias striatus*), voles (*Microtus* species), and raccoon (*Procyon lotor*). Mammal, bird, and herptile species likely to occur within the vicinity of the Projects are provided in Tables 4.5-3, 4.5-4, and 4.5-5.

Table 4.5-3: Mammals Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name
American black bear	*Ursus americanus*
American mink	*Neovison vison*
Bobcat	*Lynx rufus*
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern coyote	*Canis latrans*
Eastern gray squirrel	*Sciurus carolinensis*
Raccoon	*Procyon lotor*
Fisher	*Martes pennanti*
Gray fox	*Urocyon cinereoargenteus*
Groundhog	*Marmota monax*
Long-tailed weasel	*Mustela frenata*
Muskrat	*Ondatra zibethicus*
North American beaver	*Castor canadensis*
North American porcupine	*Erethizon dorsatum*
Northern flying squirrel	*Glaucomys sabrinus*
Red fox	*Vulpes vulpes*
River otter	*Lontra canadensis*
Southern flying squirrel	*Glaucomys volans*
Striped skunk	*Mephitis mephitis*
Mice species	*Mus* spp.
Mole species	*Condylura* spp., *Scalopus* spp., *Parascalops* spp.
Shrew species	*Blarnia* spp., *Cryptotis* spp., *Sorex* spp.
Virginia opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*

Source: Stegemann, 2003

Table 4.5-4: Birds Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
American black duck	*Anas rubripes*	X	
American crow	*Corvus brachyrhynchos*	X	X
American goldfinch	*Spinus tristis*	X	X
American kestrel	*Falco sparverius*	X	
American redstart	*Setophaga ruticilla*	X	X
American robin	*Turdus migratorius*	X	X
Baltimore oriole	*Icterus galbula*	X	X
Bank swallow	*Riparia riparia*	X	
Barn swallow	*Hirundo rustica*	X	
Belted kingfisher	*Megaceryle alcyon*	X	
Black-billed cuckoo	*Coccyzus erythropthalmus*	X	
Black-capped chickadee	*Poecile atricapillus*	X	X
Blue jay	*Cyanocitta cristata*	X	X
Blue-winged warbler	*Vermivora cyanoptera*		X
Bobolink	*Dolichonyx oryzivorus*		X
Broad-winged hawk	*Buteo platypterus*		X
Brown creeper	*Certhia americana*		X
Brown-headed cowbird	*Molothrus ater*	X	X
Canada goose	*Branta canadensis*	X	X
Cedar waxwing	*Bombycilla cedrorum*	X	X
Chestnut-sided warbler	*Setophaga pensylvanica*		X
Chimney swift	*Chaetura pelagica*	X	
Chipping sparrow	*Spizella passerina*	X	X
Common grackle	*Quiscalus quiscula*	X	X
Common yellowthroat	*Geothlypis trichas*	X	X
Downy woodpecker	*Picoides pubescens*	X	X
Eastern bluebird	*Sialia sialis*	X	X
Eastern kingbird	*Tyrannus tyrannus*	X	X
Eastern phoebe	*Sayornis phoebe*	X	
Eastern wood-pewee	*Contopus virens*	X	
European starling	*Sturnus vulgaris*	X	X
Gray catbird	*Dumetella carolinensis*	X	X
Great blue heron	*Ardea herodias*	X	X
Great crested flycatcher	*Myiarchus crinitus*	X	
Green heron	*Butorides virescens*		X
Hairy woodpecker	*Picoides villosus*	X	X
House finch	*Carpodacus mexicanus*	X	X
House sparrow	*Passer domesticus*	X	X
Killdeer	*Charadrius vociferus*	X	X

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
Mallard	*Anas platyrhynchos*	X	X
Mourning dove	*Zenaida macroura*	X	X
Northern cardinal	*Cardinalis cardinalis*	X	X
Northern flicker	*Colaptes auratus*	X	X
Northern mockingbird	*Mimus polyglottos*	X	X
Northern waterthrush	*Parkesia noveboracensis*		X
Orchard oriole	*Icterus spurius*	X	
Ovenbird	*Seiurus aurocapilla*	X	
Pileated woodpecker	*Dryocopus pileatus*		X
Red-bellied woodpecker	*Melanerpes carolinus*	X	X
Red-eyed vireo	*Vireo olivaceus*	X	X
Red-tailed hawk	*Buteo jamaicensis*	X	X
Red-winged blackbird	*Agelaius phoeniceus*	X	X
Rock pigeon	*Columba livia*	X	
Rose-breasted grosbeak	*Pheucticus ludovicianus*	X	X
Ruby-throated hummingbird	*Archilochus colubris*	X	X
Ruffed grouse	*Bonasa umbellus*	X	X
Savannah sparrow	*Passerculus sandwichensis*		X
Scarlet tanager	*Piranga olivacea*		X
Song sparrow	*Melospiza melodia*	X	X
Tree swallow	*Tachycineta bicolor*	X	X
Tufted titmouse	*Baeolophus bicolor*	X	X
Turkey vulture	*Cathartes aura*	X	
Warbling vireo	*Vireo gilvus*	X	X
White-breasted nuthatch	*Sitta carolinensis*	X	X
Wild turkey	*Meleagris gallopavo*	X	X
Willow flycatcher	*Empidonax traillii*	X	
Wood duck	*Aix sponsa*	X	X
Wood thrush	*Hylocichla mustelina*	X	X
Yellow warbler	*Dendroica petechia*	X	X

Source: NYSDEC, 2014

Table 4.5-5: Amphibians and Reptiles Likely to Occur in the Vicinity of the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Within Vicinity of Crescent Project	Within Vicinity of Vischer Ferry Project
Blue-spotted salamander	*Ambystoma laterale*		X
Common garter snake	*Thamnophis sirtalis*	X	X
Common map turtle	*Graptemys geographica*	X	
Common mudpuppy	*Necturus maculosus*	X	
Common snapping turtle	Chelydra serpentina		X
Eastern American toad	*Anaxyrus americanus*		X
Eastern box turtle	*Terrapene carolina carolina*	X	X
Eastern hognose snake	*Heterodon platirhinos*	X	
Eastern milk snake	*Lampropeltis triangulum*	X	X
Eastern ribbon snake	*Thamnophis sauritus*	X	
Gray treefrog	*Hyla versicolor*	X	X
Green frog	*Lithobates clamitans*	X	X
Jefferson salamander	*Ambystoma jeffersonianum*		X
Northern leopard frog	*Lithobates pipiens*	X	X
Northern redback salamander	*Plethodon cinereus*	X	X
Northern spring peeper	*Pseudacris crucifer*	X	X
Northern water snake	*Nerodia sipedon*	X	X
Painted turtle	*Chrysemys picta*	X	X
Pickerel frog	*Rana palustris*		X
Red-spotted newt	*Notophthalmus viridescens*	X	
Smooth green snake	*Opheodrys vernalis*	X	
Spotted salamander	*Ambystoma maculatum*		X
Wood frog	*Rana sylvatica*	X	X

Source: NYSDEC, 2007

4.6 Wetlands, Riparian, and Littoral Habitat (18 C.F.R. § 5.6 (d)(3)(vi))

This section discusses wetland, riparian, and littoral habitats in the vicinity of the Crescent and Vischer Ferry Projects. The primary source of the information used for this discussion is the United States Department of Interior (USDOI) USFWS National Wetlands Inventory (NWI). The USFWS NWI is a publicly available geospatial dataset that provides detailed information on the abundance, characteristics, and distribution of wetlands and deepwater habitats.[5]

Wetlands and deepwater habitats are essential breeding, rearing, and feeding grounds for many species of fish and wildlife. They may also perform important flood protection and pollution control functions. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. Cowardin et. al. (1979) defines five major systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The first four of these systems include both wetland and deepwater habitats, but the Palustrine system includes only wetland habitats (Cowardin et. al., 1979).

Wetlands provide a multitude of ecological, economic, and social benefits. They provide habitat for fish, wildlife and plants - many of which have a commercial or recreational value - recharge groundwater, reduce flooding, provide clean drinking water, offer food and fiber, and support cultural and recreational activities (USFWS, 2018c).

The New York State Legislature passed the Freshwater Wetlands Act in 1975 with the intent to preserve, protect and conserve freshwater wetlands and their benefits, consistent with the general welfare and beneficial economic, social and agricultural development of the state. NYSDEC defines freshwater wetlands as “those areas of land and water that support a preponderance of characteristic wetlands plants that out-compete upland plants because of the presence of wetlands hydrology (such as prolonged flooding) or hydric (wet) soils. Freshwater wetlands commonly include marshes, swamps, bogs, and fens.” (NYSDEC, 2019b).

To be protected under the Freshwater Wetlands Act, a wetland must be 12.4 acres (5 hectares) in size or larger. There are approximately 97.5 acres of NYSDEC regulated wetlands in the Crescent Project Boundary and approximately 21.1 acres of NYSDEC regulated wetlands in the Vischer Ferry Project Boundary. Per statute, there is an 'adjacent area' of 100 feet around every state wetland that is also regulated to provide further protection for the wetland.

[5] USFWS NWI information is acquired primarily through interpreting aerial photographs, and not by conducting field surveys; therefore, it provides an estimate of acreage and location but is not conclusive.

4.6.1 Wetland Habitats

Figures 4.6-1 through 4.6-5 depict wetlands in the vicinity of the Crescent and Vischer Ferry Projects. The figures depict the NWI-mapped wetland types, as well as the NYSDEC-regulated wetland types. Table 4.6-1 lists the total acreage of each NWI-mapped wetland type within the Crescent Project Boundary. Table 4.6-2 lists the total acreage of each NWI-mapped wetland type within the Vischer Ferry Project Boundary.

The Mohawk River within the boundaries of the Crescent and Vischer Ferry Projects is classified by the NWI as lake habitat, L1UBHh. Specifically, the classification code of L1UBHh indicates lacustrine, limnetic, unconsolidated bottom, permanently flooded, and diked/impounded. The classification code of L2EM is also found within the Project. This code indicates lacustrine, littoral, emergent NWI classification.

The NWI data indicate that within the boundaries of the Crescent and Vischer Ferry Projects there are areas classified as freshwater emergent (PEM) wetlands, freshwater forested (PFO) wetlands, freshwater scrub-shrub (PSS) wetlands, riverine (R2UBH, R3UBH, R5UBH, and R4SBC), and freshwater pond (PUBH).

Table 4.6-1: Acreage of NWI-Mapped Wetlands Within the Crescent Project Boundary

Wetland Type	Acres
L1UBHh	1,055.17
PEM1Eh	3.41
PFO1C	2.83
R2UBH	2.69
PEM1/2Fh	2.39
PEM1E	2.23
R5UBH	0.41
L2EM2Fh	0.17
PFO1E	0.15
R4SBC	0.04
PFO1/SS1Eh	0.01
PEM1C	<0.01

Source: USFWS, 2019b

Table 4.6-2: Acreage of NWI-Mapped Wetlands Within the Vischer Ferry Project Boundary

Wetland Type	Acres
L1UBHh	1,877.89
PEM1Eh	42.99
L2EM2Fh	16.49
PFO1Ch	14.80
PFO1C	7.35
PEM1Ch	7.14
PFO1/SS1C	4.03
PFO1/EM1Ch	2.77
PSS1Fh	2.29
PSS1/FO1C	1.63
PEM1/SS1Ch	1.55
PFO1Ah	1.46
PSS1Ch	1.34
PUBHh	1.17
PEM1F	1.11
PFO1E	1.02
PSS1Ah	0.75
PSS1/EM1Ah	0.74
PEM1E	0.71
PEM1Ah	0.57
R5UBH	0.50
R3UBH	0.50
PUBFx	0.24
PEM1Fh	0.18
R4SBC	0.16
PFO1Eh	0.07
PUBHx	0.05

Source: USFWS, 2019b

Figure 4.6-1: Wetlands in the Vicinity of the Projects, Map 1 of 5

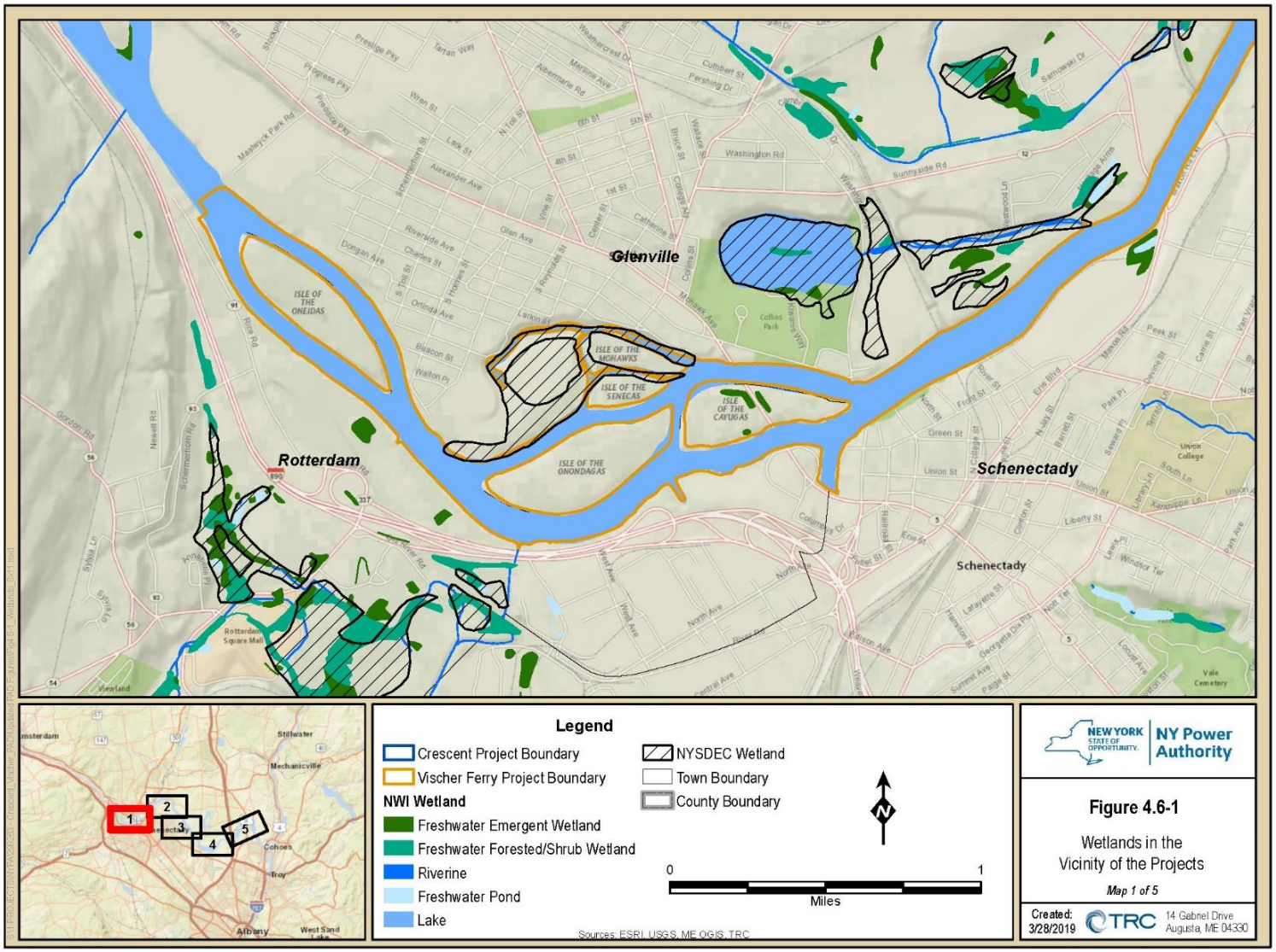


Figure 4.6-2: Wetlands in the Vicinity of the Projects Map 2 of 5

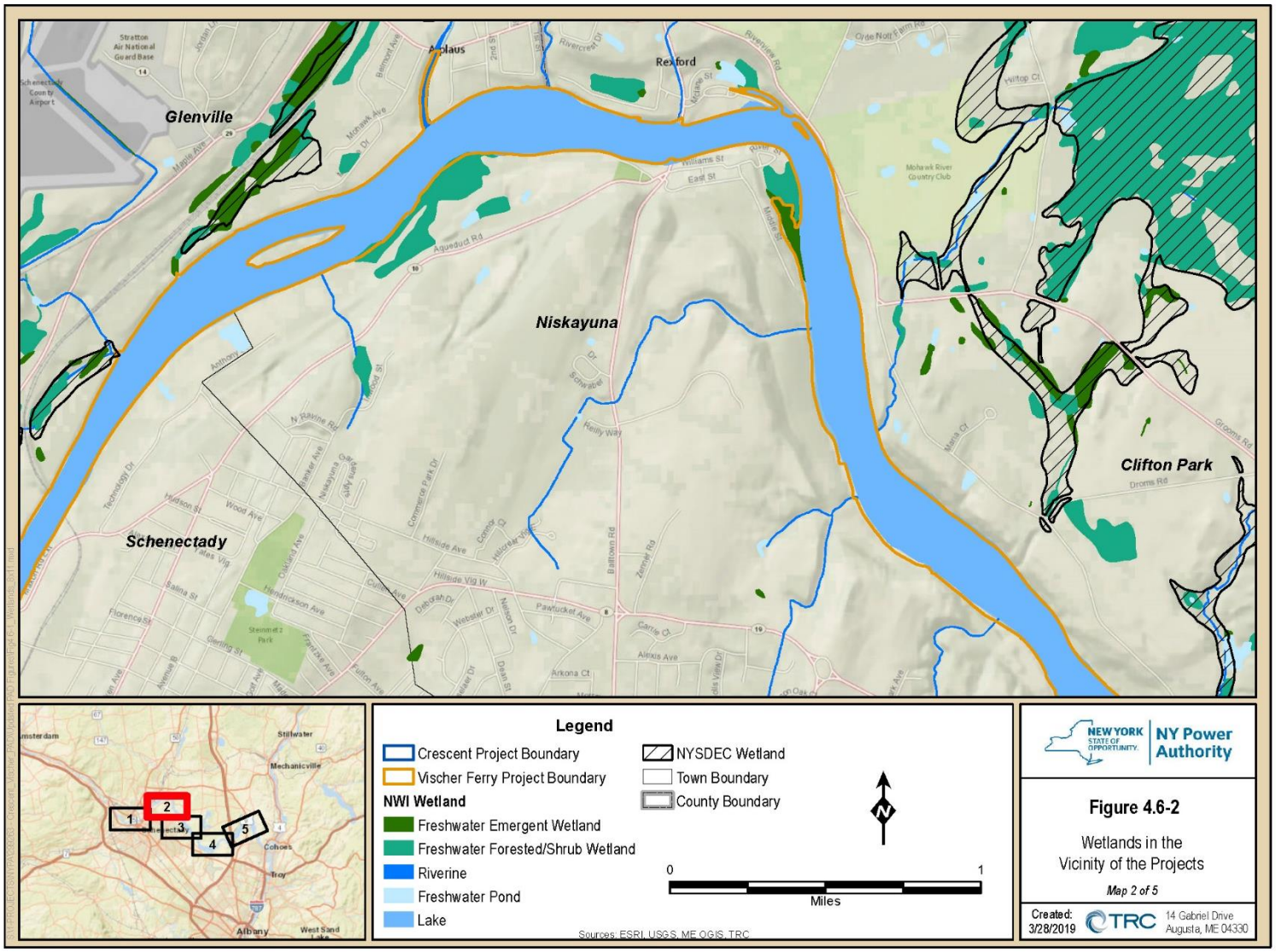


Figure 4.6-3: Wetlands in the Vicinity of the Projects, Map 3 of 5

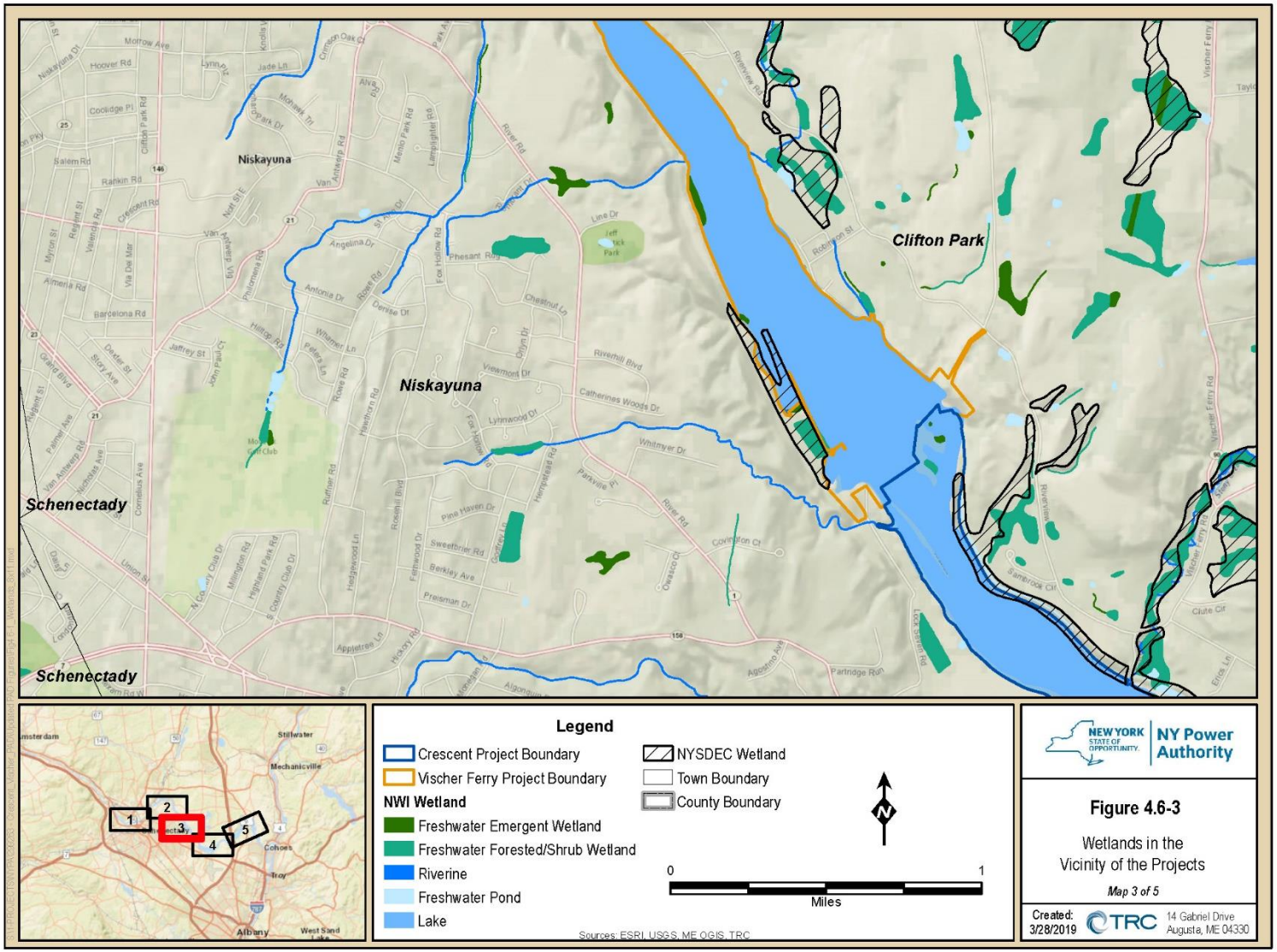


Figure 4.6-4: Wetlands in the Vicinity of the Projects, Map 4 of 5

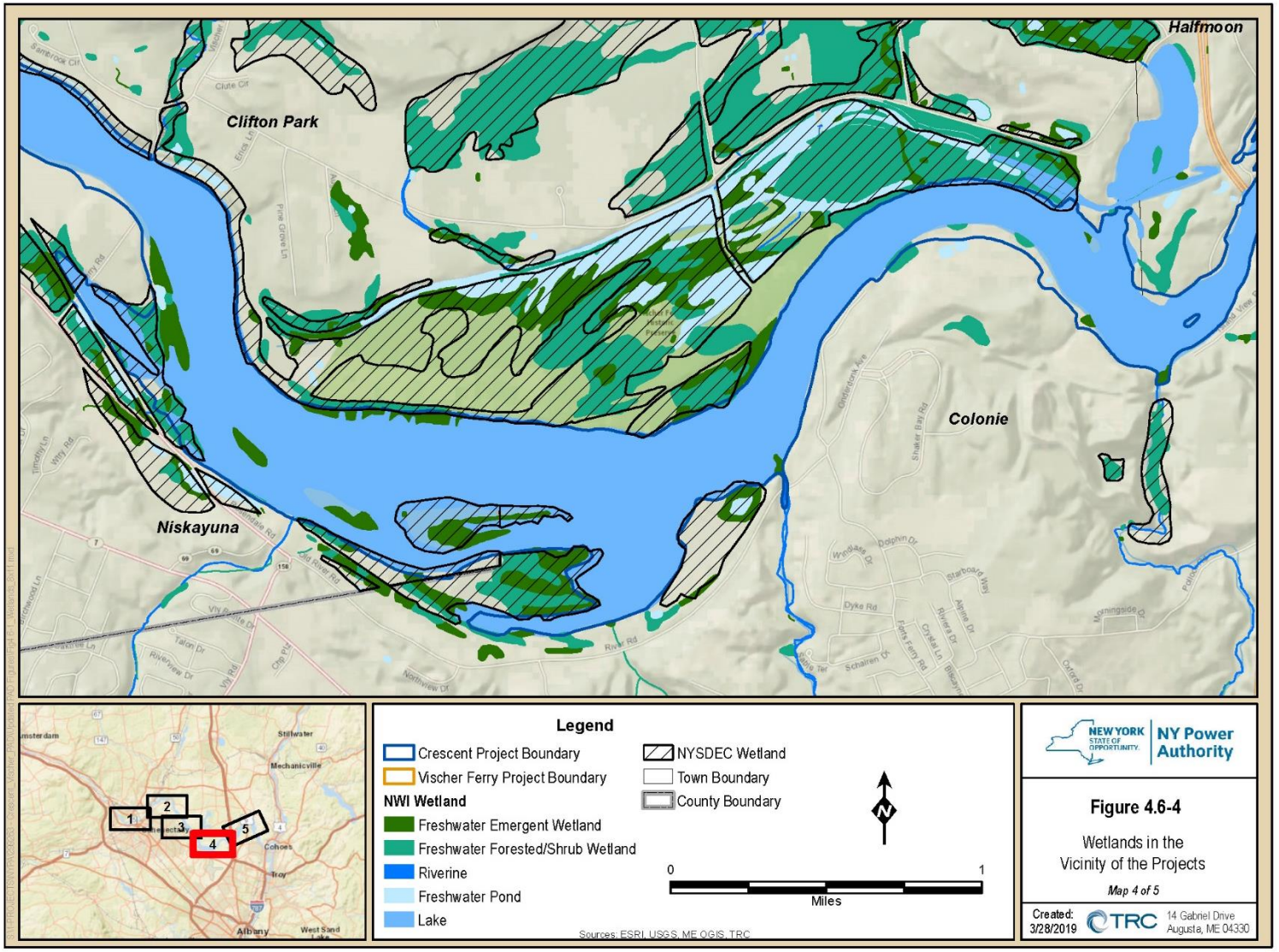
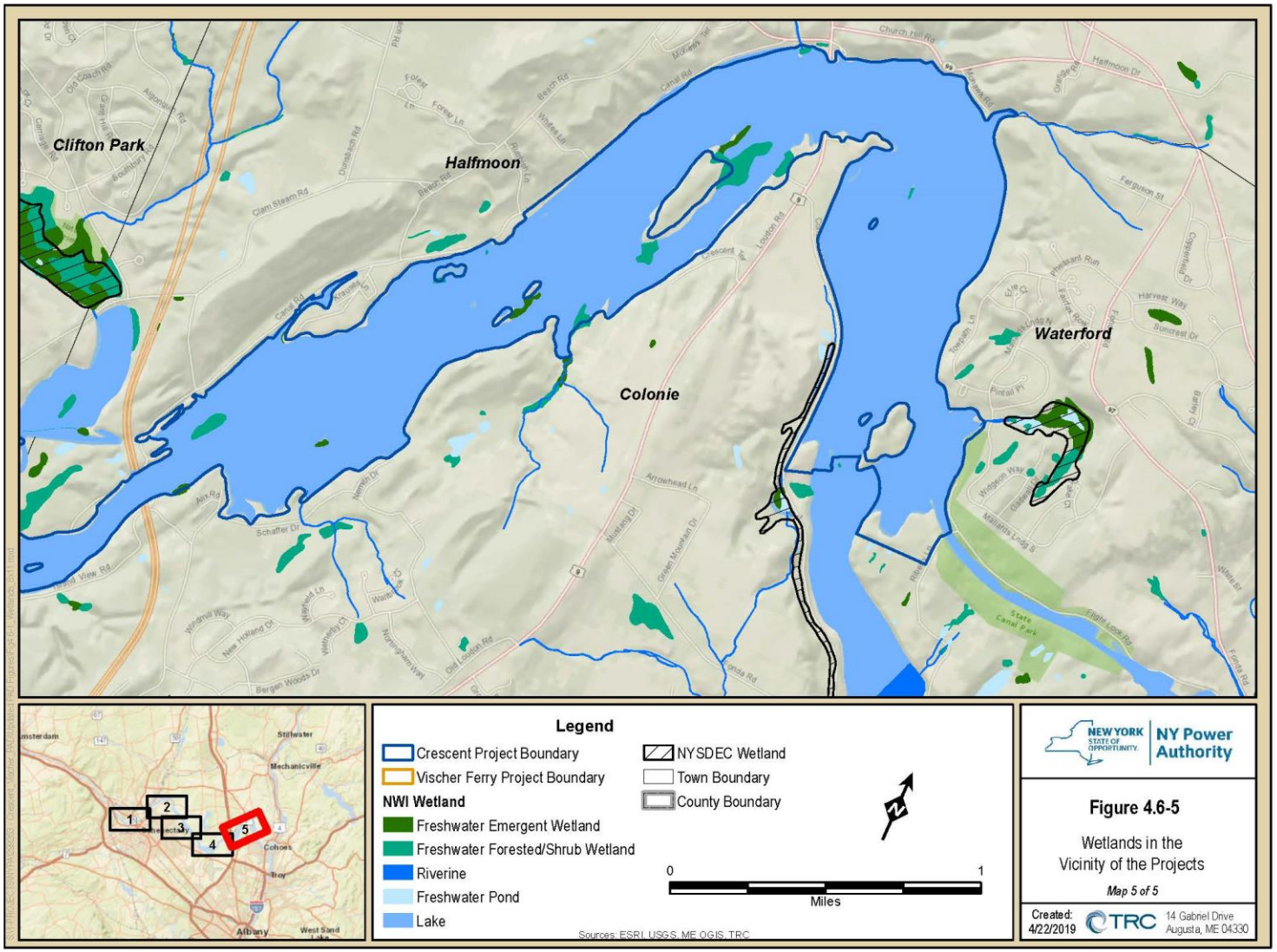


Figure 4.6-5: Wetlands in the Vicinity of the Projects, Map 5 of 5



4.6.2 Wetland, Riparian, and Littoral Zone Vegetation

NWI maps indicate that there are scattered wetlands along portions of the Crescent and Vischer Ferry Project impoundments. In particular, an area of emergent and forested scrub wetland is immediately adjacent to and partially within the Crescent Project Boundary in the town of Clifton Park. This area, which has been designated as the Vischer Ferry Nature and Historic Preserve, is an important wetland complex that provides significant bird and wildlife habitat. Riparian vegetative species that occur in this area and other portions of the Projects include red and sugar maple, maple, shagbark hickory, white, black, and green ash, American sycamore, eastern cottonwood, swamp white oak, black willow, and American basswood (Erie Canalway National Heritage Corridor [ECNHC], 2019a). Wetland species that commonly inhabit emergent wetlands in the Projects Area include cattails, arrowhead, pickerelweed, purple loosestrife, bulrushes, sedges, and iris (ECNHC, 2019a).

4.6.3 Wetland, Riparian, and Littoral Zone Wildlife

Wetland and riparian areas serve as transition zones between aquatic and terrestrial systems and, as such, support many mammal, bird, reptile, and amphibian species that depend on both habitat types to survive. Section 4.5.3 provides additional information on the wildlife that may exist within the vicinity of the Projects.

4.7 Rare, Threatened and Endangered Species (18 C.F.R. § 5.6 (d)(3)(vii))

4.7.1 Overview

The presence of rare, threatened, and endangered (RTE) and candidate or special status species at the Projects was determined by reviewing USFWS and NYSDEC RTE species lists. Databases were utilized to generate a list of federally and/or state listed RTE species which are known to occur, or have the potential to occur, within the boundaries of the Projects. Table 4.7-1 lists the identified RTE species.

A search of the USFWS's Information for Planning and Consultation (IPaC) tool was performed for the Crescent and Vischer Ferry Projects to identify species listed as threatened or endangered under the Federal Endangered Species Act (ESA) that should be considered when evaluating the potential impacts of the Projects. The site-specific IPaC search included the Project Boundary of each Project. The results of this search are presented in Table 4.7-1. The northern long-eared bat was the only species identified at both Projects. The USFWS has not adopted a recovery plan for the northern long-eared bat. (USFWS, 2019c). However, the northern long-eared bat was listed as threatened on May 4, 2015, due to declines caused by white-nose syndrome. The USFWS finalized ESA section 4(d) rules for this species in January 2016, designating a white-nose syndrome zone, and focusing on preventing effects on bats in hibernacula associated with the spread of white-nose syndrome and effects of tree removal on roosting bats or maternity colonies. Under the rules, the USFWS concludes that incidental take from tree removal activities within the white-nose syndrome zone is not prohibited (i.e., excepted from the take prohibitions) if the tree removal: (1) occurs more than 0.25 mile from a known, occupied northern long-eared bat hibernacula; and (2) avoids cutting or destroying known, occupied maternity roost trees, or

any other trees within a 150-foot radius around the maternity roost tree, during the pup season, June 1 through July 31 (USFWS, 2019c).

The state of New York has designated protection status for certain species. For animals and plants, the state legal protected status is under New York State Environmental Conservation Law (ECL) and state of New York regulations. The highest level of protection is given to species listed by the state as state listed endangered or state listed threatened. Regulations regarding animals are administered by NYSDEC's Division of Fish, Wildlife, and Marine Resources and regulations regarding plants are administered by NYSDEC's Division of Lands and Forests. For animals, categories of endangered, threatened, and special concern[6] species are defined in New York State ECL § 11-0535. Animals listed as endangered or threatened are protected against taking, importation, transportation, possession, or sale without a permit. Endangered, threatened, and special concern wildlife species are listed in regulation 6 NYCRR § 182.5. For plants, categories of endangered, threatened, rare, and exploitably vulnerable are defined in ECL § 9-1503. Plants in these categories are protected against picking, removal, or damaging with herbicides without the consent of the landowner. Endangered, threatened, rare, and exploitably vulnerable plant species are listed in regulation 6 NYCRR § 193.3. (NYSDEC, 2018f).

The NYSDEC maintains databases with distribution and status information on New York's animals, plants, and significant natural communities. A site-specific search of the NYSDEC Environmental Resource Mapper was conducted to search for any occurrences of rare or state-listed animals and plants, and significant natural communities known to occur in the immediate vicinity of the Projects (NYSDEC, 2018g). The results indicated that rare plants or animals are within and adjacent to the boundaries of the Projects (NYSDEC, 2018g). The locations indicated are generalized and species names are not given. For this reason, site-specific data was obtained from the New York Natural Heritage Program database regarding any RTE species that may exist in or near the vicinity of the Crescent and Vischer Ferry Projects (NYPA, 2018). The New York Natural Heritage Program identified one (1) bird and one (1) plant: the bald eagle and Culver's root as potentially present in the vicinity of the Projects. The results of this data request are provided in Table 4.7-1. The bald eagle is legally protected by the Bald and Golden Eagle Protection Act. Culver's root is not federally listed, so the USFWS has not adopted a recovery plan for the species. Culver's root is state threatened. In addition, osprey has been documented in the vicinity of the Crescent Project.

The New York Natural Heritage Program also identified three (3) species of dragonfly at or near the Projects: cobra clubtail (*Gomphus vastus*), midland clubtail (*Gomphurus fraternus*), and russet-tipped clubtail (*Stylurus plagiatus*). These species are not federally or state listed as threatened or endangered. The cobra clubtail and russet-tipped clubtail were identified at or near the Crescent Project, and the midland clubtail was identified at or near both Projects.

[6] While special concern animals are not as rare as those listed as endangered or threatened, there is concern for their continued welfare in New York. NYSDEC may promulgate regulations as to the taking, importation, transportation, possession or sale, as it deems necessary, for the proper protection of such species (ECL § 11-0535). (NYSDEC 2018b).

Table 4.7-1: RTE Species with Potential to Occur at the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Legal Status	Potential to Occur Within Project Boundary*	
			Crescent	Vischer Ferry
Bald eagle[2]	*Haliaeetus leucocephalus*	EAG[3], ST	✓	✓
Culver's root[2]	*Veronicastrum virginicum*	ST	✓	✓
Northern long-eared bat[1]	*Myotis septentrionalis*	FT, ST	✓	✓

Definition of Federal Legal Status: FT = Federal Threatened.
Definition of State Legal Status: ST = State Threatened.
***** A check (✓) indicates that at least one source identified the species at the Project.
Sources: [1] USFWS, 2018b; [2] NYPA, 2018
EAG[3] The Bald and Golden Eagle Protection Act was originally enacted in 1940 (16 U.S.C 668-668d) to protect eagles from human-induced alterations and human interactions. As defined in 50 C.F.R. Part 22, permits are required for the "taking" (meaning to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb), possession, and transportation with the United States of bald eagles and golden eagles and their parts, nests, and eggs. The bald eagle is not federally listed as threatened or endangered.

The IPaC tool also lists migratory birds that are of particular concern either because they occur on the USFWS Birds of Conservation Concern list or warrant special attention in the specified location. Seventeen (17) species of birds are listed for the Projects. These species are listed in Table 4.7-2 (USFWS, 2018b).

Table 4.7-2: USFWS IPaC Migratory Bird List with Potential to Occur at the Crescent and Vischer Ferry Projects

Common Name	Scientific Name	Potential to Occur Within Project Boundary*	
		Crescent	Vischer Ferry
American golden-plover	*Pluvialis dominica*	✓	-
Bald eagle	*Haliaeetus leucocephalus*	✓	✓
Black-billed cuckoo	*Coccyzus erythropthalmus*	✓	✓
Bobolink	*Dolichonyx oryzivorus*	✓	✓
Canada warbler	*Cardellina canadensis*	✓	✓
Cerulean warbler	*Dendroica cerulea*	✓	✓
Dunlin	*Calidris alpina*	✓	✓
Eastern whip-poor-will	*Antrostomus vociferus*	✓	✓
Golden eagle	*Aquila chrysaetos*	✓	✓
Golden-winged warbler	*Vermivora chrysoptera*	-	✓
Lesser yellowlegs	*Tringa flavipes*	✓	✓
Prairie warbler	*Dendroica discolor*	✓	✓
Red-headed woodpecker	*Melanerpes erythrocephalus*	✓	✓
Ruddy turnstone	*Arenaria interpres*	✓	✓
Semipalmated sandpiper	*Calidris pusilla*	✓	✓
Short-billed dowitcher	*Limnodromus griseus*	✓	✓
Snowy owl	*Bubo scandiacus*	✓	✓
Wood thrush	*Hylocichla mustelina*	✓	✓

***** A check (✓) indicates that the source identified the species at the Project.
Source: USFWS, 2018b

4.7.2 Habitats

No federally designated critical habitats are located within the FERC Project boundaries of the Crescent and Vischer Ferry Projects (USFWS, 2018b).

A site-specific search of the NYSDEC Environmental Resource Mapper did not identify any significant natural communities[7] within or adjacent to the boundaries of the Projects (NYSDEC, 2018g). A site-specific data request from the New York Natural Heritage Program identified no significant natural communities in the Projects Areas (NYPA, 2018).

The habitat requirements and general habitat information for each of the RTE species identified as having the potential to be located within the boundaries of the Project is listed in Table 4.7-3.

Table 4.7-3: Habitat Requirements of Federally and/or State Listed RTE Species

Common Name	Scientific Name	Habitat Requirements / Information
Bald eagle	*Haliaeetus leucocephalus*	Bald eagles are typically found near large bodies of water, such as bays, rivers, and lakes, that support a healthy population of fish and waterfowl, which are their primary food source. Generally, bald eagles tend to avoid areas with human activities. Bald eagles will perch in either deciduous or coniferous trees. Large, heavy nests are usually built near water in tall pine, spruce, fir, cottonwood, oak, poplar, or beech trees. Non-breeding adults and wintering birds are known to have communal roost sites. During the winter, the roost sites may be farther away from food sources. This may be due to the need for a more sheltered, warmer area. Feeding areas during the winter months usually have a high concentration of fish and waterfowl and open water (NatureServe, 2005). (NYNHP, 2018).
Culver's root	*Veronicastrum virginicum*	In New York, *Veronicastrum virginicum* is known to occur in forest edges, including along bike trails and driveways. The species has been found on north or northwest-facing slopes as well as along the bottomlands of major rivers. It has also been found on prairie remnants, fens, and meadows, river banks, deciduous woodlands (especially with oaks), and adjacent roadsides (Voss, 1996). It has also been found in moist and dry upland woods and prairies (Gleason and Cronquist, 1991). (NYNHP, 2018).

[7] Significant natural communities, as identified by the New York Natural Heritage Program, are rare or high-quality wetlands, forests, grasslands, ponds, streams, and other types of habitats, ecosystems, and ecological areas. The New York Natural Heritage Program calls these different types of habitats or ecosystems "natural ecological communities," and their classification of natural communities recognizes 174 distinct natural community types. While significant natural communities are recognized as an important facet of biodiversity in the law creating the New York Natural Heritage Program (ECL §11-0539), there are no laws or regulations establishing official listing of natural communities. Some natural communities are afforded legal protection through other natural resource regulations, such as freshwater wetland regulations. (NYNHP, 2018).

Common Name	Scientific Name	Habitat Requirements / Information
Northern long-eared bat	*Myotis septentrionalis*	The northern long-eared bat occurs throughout much of the eastern and north-central United States, but is experiencing population declines due to white-nose syndrome, a fungal disease. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, such as caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on suitability to retain bark or provide cavities or crevices. It has also been found, rarely, roosting in structures such as barns and sheds. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They typically use large caves or mines with large passages and entrances; constant temperatures; and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. (USFWS, 2018b).

4.8 Recreation and Land Use (18 C.F.R. § 5.6 (d)(3)(viii))

4.8.1 Recreation

4.8.1.1 Existing Recreational Facilities and Opportunities in the Project Areas

Public recreation opportunities are abundant along the lower Mohawk River in the vicinity of the Crescent and Vischer Ferry Projects. As part of the Canal System, the lower Mohawk River including the Crescent and Vischer Ferry impoundments are used extensively for recreational boating. Though the Canal System was historically operated for commercial transportation, today the Canal System is operated seasonally, and is used almost exclusively for recreational boating traffic. In addition, there are a number of boat launching sites along the lower Mohawk River, including several that provide access to Crescent and Vischer Ferry Project waters (see Tables 4.8-2, 4.8-3 and 4.8-4) (NYSDEC, 2018h and NYSCC, 2019). The eastern Erie Canal is part of the New York State Canalway Water Trail, which is a system of water trails for paddlers with numerous access points across New York State (NYSCC, 2019). There are currently no permits or fees required for locking through the canalway with a recreational vessel (NYSCC, 2019).

Much of the canalway is operated as a park. Several state and municipal parks are located along the Projects' shorelines (ECNHC, 2019b). State and municipal parks located immediately adjacent to the boundaries of the Crescent and Vischer Ferry Projects are listed in Tables 4.8-2, 4.8-3 and 4.8-4 and shown on Figures 4.8-1 and 4.8-2.

There is one nature preserve, the Vischer Ferry Nature and Historic Preserve, located along and adjacent to the Crescent Project shoreline. This natural area and historic place includes more than 600 acres of wetlands, floodplain, and bird and amphibian habitat and is owned by NYSCC and managed by the Town of Clifton Park. The Preserve includes a small picnic area along the shoreline, two Erie Canalway Trails, Historic Double Lock 19, Clute's Dry Dock, Forts Ferry, and an abundance of nature trails. The site is a Bird Conservation Area as designated by the NYSDEC and an Important Bird Area recognized by Audubon New York, with more than 200 bird species being observed (Clifton Park Open Spaces, 2015).

The Erie Canalway Trail[8] stretches across over 350 miles of upstate New York, from Buffalo to Albany. Portions of the trail travel along the Mohawk River in close proximity to the Project impoundments. Trailhead parking and interpretive kiosks with historic information about the Erie Canal and Canal System are located at many points along the trail. The trail closely parallels both active and historic sections of the Erie Canal and offers easy access to and from communities along the Canal System (ECNHC, 2019b).

Crescent Project

Recreation opportunities at the Crescent Project include fishing, boating, trails, and picnicking. An informal tailrace bank fishing area and a small picnic area are located near the Project tailwater and powerhouse (Table 4.8-1 and Figure 4.8-1). In addition, there are numerous recreation sites providing access to the Project, including boat launches, car top kayak launches, trails, a bike path, picnic areas, an overlook, and informal access points (NYPA, 2015a, NYSCC, 2019, and Google Earth, 2018) (Table 4.8-2 and Figure 4.8-1).

[8] The Erie Canal Bike Trail is also known as the Erie Canalway Trail, with the portion between Little Falls and Albany also known as the Mohawk-Hudson Bikeway (Parks and Trails New York, 2019).

Table 4.8-1: Project Recreation Sites at the Crescent Project

Recreation Site Name	Recreation Amenities
Tailrace Bank Fishing Area	Informal tailwater fishing area
Picnic Area	Small picnic area near tailrace and powerhouse

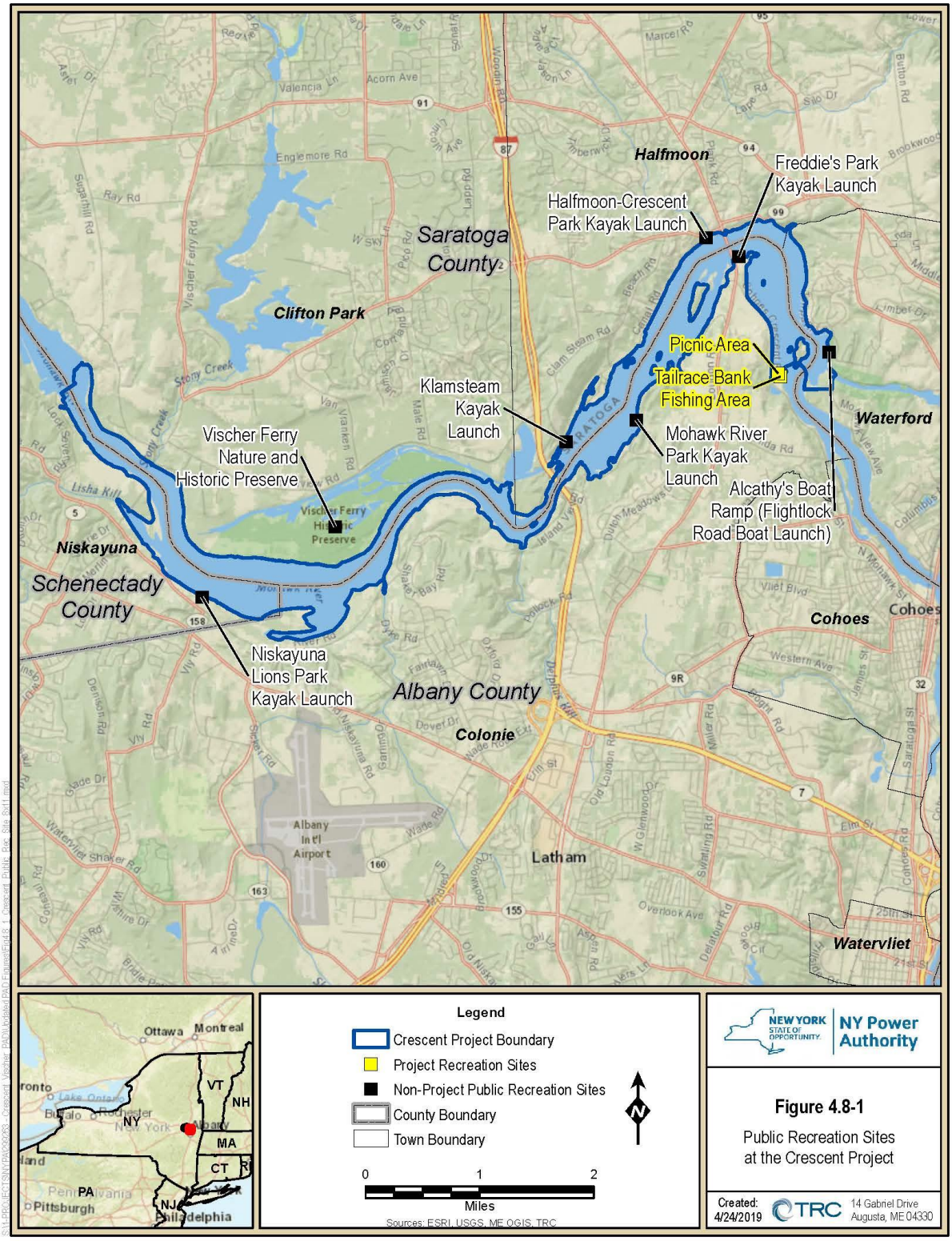
Source: NYSCC, 2019, BikeCowboyTrail.com, 2019, ECNHC, 2019b, and Google Earth, 2018.

Table 4.8-2: Non-Project Public Recreation Sites at the Crescent Project

Recreation Site Name	Recreation Amenities
Alcathy's Boat Ramp (Flightlock Road Boat Launch)	Concrete boat ramp with parking; picnic facilities
Freddie's Park Kayak Launch	Car top kayak launch with parking; picnic facilities
Halfmoon-Crescent Park Kayak Launch	Car top kayak launch with parking; picnic facilities; trail
Vischer Ferry Nature and Historic Preserve	600-acre preserve with hiking trails and picnic areas
Mohawk River Park Kayak Launch	Car top kayak launch with parking; picnic facilities; swimming; trails
Klamsteam Kayak Launch	Car top kayak launch with parking
Niskayuna Lions Park Kayak Launch	Car top kayak launch with parking; picnic facilities; canalway trail
Erie CanalwayTrail	Bike Path

Source: NYSCC, 2019, BikeCowboyTrail.com, 2019, ECNHC, 2019b, and Google Earth, 2018.

Figure 4.8-1: Public Recreation Sites at the Crescent Project



Vischer Ferry Project

Recreation opportunities at the Vischer Ferry Project include fishing, boating, trails, and picnicking. Three formal Project recreation sites offer public access to the shoreline and/or Project waters: (1) Project forebay scenic overlook; (2) tailrace parking facilities, and (3) Town of Niskayuna Boat Ramp (Table 4.8-3 and Figure 4.8-2).

The Project forebay scenic overlook provides views of the impoundment. The overlook parking area provides parking for accessing the shoreline for fishing and hiking. The posted hours of the overlook area are sunrise to sunset year-round.

Downstream of the Project, the Licensee provides parking facilities for fishermen and hikers along the shoreline of the tailrace. On the opposite bank, the Licensee constructed a parking area and boat ramp which is maintained by the Town of Niskayuna, New York. The Niskayuna parking area and boat ramp have been integrated with the NYSCC Lock E-7 picnic, biking, and fishing area to create a park environment. The Licensee allows free public access to its recreational facilities and the posted hours for the Niskayuna parking area and boat ramp are ½ hour after sunrise to ½ hour after sunset. Hiking, biking, picnicking, boating, and fishing are allowed at the Niskayuna parking area and boat ramp.

In addition, there are numerous recreation sites providing access to the Project, including another boat launch, fishing, trails, picnic areas, overlooks/vistas, and informal access points (Table 4.8-4 and Figure 4.8-2) (NYPA, 2015b).

Table 4.8-3: Project Recreation Sites at the Vischer Ferry Project

Recreation Site Name	Recreation Amenities
Project Forebay Scenic Overlook	Provides views of the impoundment and parking for access to the shoreline for fishing and hiking
Tailrace Parking Facilities	Parking for fishing and hiking along the shoreline of the tailrace
Town of Niskayuna Boat Ramp (also known as Lock E-7 (upper end) Boat Ramp)	Boat ramp and parking area that is integrated with the NYSCC Lock 7 State Canal Park

Source: NYSCC, 2019, BikeCowboyTrail.com, 2019, ECNHC, 2019b, Village of Scotia, 2019, and Google Earth, 2018.

Table 4.8-4: Non-Project Recreation Sites at the Vischer Ferry Project

Recreation Site Name	Recreation Amenities
Lock 7 State Canal Park	Lock; rest area; fishing; bike-hike trail; and picnic area that are integrated with the Town of Niskayuna Boat Ramp (also known as Lock E-7 (upper end) Boat Ramp)
Mohawk Landing Kayak Launch	Car top kayak launch with parking; picnic facilities
Aqueduct Park	Car top kayak launch with parking and low dock; trails; picnic facilities; Canalway trail
Freedom Park	Municipal docks in Project impoundment; music venue
Glenville Boat Ramp	Boat ramp with parking; picnic facilities
Gateway Landing Rotary Park/Kayak Launch	Car top kayak launch with parking; Canalway Trail; gazebo; picnic facilities; dock
Lock E-8 (lower end) Kayak Launch	Car top kayak launch with parking; Canalway Trail
Lock 8 State Canal Park	Lock; rest area; fishing; bike-hike trail; and picnic area
Erie Canalway Trail	Bike Path

Source: NYSCC, 2019, BikeCowboyTrail.com, 2019, ECNHC, 2019b, Village of Scotia, 2019, and Google Earth, 2018.

Figure 4.8-2: Public Recreation Sites at the Vischer Ferry Project



4.8.1.2 Other Recreational Facilities and Opportunities in the Vicinity of the Project Areas

In addition, there are several nature preserves and state parks in the vicinity of the Projects. Lock 6 State Canal Park, located approximately 0.25 miles to the southeast of the Crescent Project Boundary at Lock E-6, provides facilities and picnic area for boaters, cyclists and fishing. Peebles Island State Park is located at the confluence of the Hudson and Mohawk Rivers and offers spectacular river and rapids views, trails for hikers and snowshoeing, picnicking, and fishing (New York State Office of Parks, Recreation and Historic Preservation [OPRHP], 2019). There are four nature preserves located in Schenectady County which provide recreation opportunities in addition to nature study (Schenectady, NY, 2019). The Almy D. Coggleshall Plotter Kill Preserve is a 632-acre nature reserve and hiking area in the Town of Rotterdam that provides scenic views of three waterfalls. The Lisha Kill Preserve is a rare example of an old growth forest in a developed area owned by The Nature Conservancy. The Indian Kill Nature Preserve is a 100-acre preserve in the Town of Glenville that provides hiking, fishing, cross-country skiing, and snowshoeing opportunities. The Schenectady County Forest Preserve is a 102-acre forest in the Town of Duanesburg that provides hiking, hunting (November 15-December 15), fishing, cross-country skiing and snowshoeing opportunities.

4.8.1.3 Recreation Use

FERC uses recreation days as a metric for reporting recreational use at hydroelectric projects. A recreation day is defined as each visit by a person to a development for recreational purposes during any portion of a 24-hour period. In 2015, the Power Authority reported estimated recreational use to FERC on a Licensed Hydropower Recreation Report Form 80 (Form 80).

Crescent Project

The most recent estimate of recreation use data for the Crescent Project indicates that approximately 123,530 recreation days occurred at publicly operated areas at the Project in 2014 (NYPA, 2015a). No overnight activity was reported for locations within the Project Boundary.

Review of the Form 80s from 2002, 2008, and 2014 indicate that estimated recreational use within the Project Boundary is increasing over time.

Vischer Ferry Project

The most recent estimate of recreation use data for the Vischer Ferry Project indicates that approximately 152,030 recreation days occurred at publicly operated areas at the Project in 2014 (NYPA, 2015b). No overnight activity was reported for locations within the Project Boundary.

Review of the Form 80s from 2002, 2008, and 2014 indicate that estimated recreational use within the Project Boundary is increasing over time.

4.8.1.4 New York Statewide Comprehensive Outdoor Recreation Plan

New York State's OPRHP reviews statewide recreational needs at five-year intervals. The most recent review is reported in the 2014-2019 Statewide Comprehensive Outdoor Recreation Plan (SCORP) (New York State OPRHP, 2014). Within the SCORP, OPRHP examines the supply and demand for outdoor

recreational opportunities and provides a relative index of need by county. The index is a scale of 1 to 10, where 1 indicates the least level of need, 5 is considered the statewide average, and 10 indicates the highest level of need. Opportunities for pursuits typically identified with hydroelectric projects are generally shown to be near the statewide average in Albany, Saratoga, and Schenectady counties.

The SCORP also identifies operational goals for the period covered. While multiple goals are listed, they fall into the general categories of promoting connectivity between resources for community and nature, conserving and protecting natural resources, and promoting and/or engaging adults and youths in participating in outdoor recreation and interpretation activities.

4.8.2 Land Use

Land use classifications found throughout the Mohawk River Watershed are discussed in Section 4.1.1. The Crescent and Vischer Ferry Projects are located on the Mohawk River in eastern central New York within Albany County, Saratoga County, and Schenectady County, New York. The three surrounding counties are dominantly urban.

The Crescent Project is located in an area of small to medium-sized towns comprised of residences and commercial businesses interspersed with areas of small farms and small areas of undeveloped forestland. The Crescent Project is approximately four miles upstream of the confluence of the Mohawk and Hudson rivers, on the Saratoga and Albany county line. Crescent Lake, the impoundment created by Crescent Dam, extends roughly ten miles upstream of the dam to the Vischer Ferry Project located at Lock E-7.

The Vischer Ferry Project is located in a somewhat developed area located at Lock E-7. The impoundment, created by Vischer Ferry Dam, extends approximately 10 miles upstream of the dam to Lock E-8, located in the City of Schenectady. The land surrounding the Vischer Ferry Project is largely developed and dominantly characterized as high intensity development and medium intensity development.

4.8.2.1 Management of Project Lands

The State of New York owns the lands within the boundaries of the Projects, while lands surrounding the boundaries are owned by surrounding municipalities. The Power Authority has an easement to these lands as part of the 1983 agreement with the State of New York. Lands within the boundaries of the Projects are managed in accordance with federal and state regulations. NYSCC has permitting authority within the boundaries of the Projects as governed by the Canal Real Property Management Policy (NYSCC, 2012). The NYSCC permit program is discussed in greater detail in Section 4.8.3. In general, Project operations and maintenance, along with recreation, are the primary activities that occur on Projects lands.

4.8.2.2 Protected Rivers

The Crescent and Vischer Ferry Projects are not located within or adjacent to any river segments that are designated as a part of, or under study for, inclusion in the National Wild and Scenic River System

(National Wild and Scenic Rivers System, 2018) or included in the Nationwide Rivers Inventory (National Park Service [NPS], 2018a).

New York State's Wild, Scenic, and Recreational Rivers Act (WSRRA) protects rivers with outstanding scenic, ecological, recreational, historic, and scientific values (NYSDEC, 2018i). NYSDEC administers the WSRRA and has implemented regulations affecting the management, protection, enhancement, and control of land use and development on designated river areas. The Projects are not located within or adjacent to any river segments that are designated as part of the WSRRA.

4.8.2.3 National Trails System and National Wilderness Preservation System

No Projects lands are included in, or under study for inclusion in, the National Trails System (NPS, 2018b) or the National Wilderness Preservation System (The Wilderness Society, 2018).

4.8.3 Shoreline Management Policy

There are private residences adjacent to the Projects that use Projects lands for recreation. Applicants wishing to develop or use Projects lands for dock installation or other similar activities are currently required to obtain a permit from NYSCC. NYSCC may issue a 30-day revocable permit upon review by the Division Permit Engineer, the Division Canal Engineer, and the Office of Real Property Management. Permitting decisions are governed by the Guidelines and Procedures for the Disposal or Acquisition of Canal Corporation Real Property; the Canal Corporation Rules and Regulations; and the Canal Corporation's Occupancy and Work Permit Accommodation Guidelines (NYSCC, 2012). NYPA also manages these uses in accordance with Article 42, the standard land-use article which grants the Licensee the authority to grant permission for certain types of use and occupancy of Projects lands and waters (i.e., non-Project use of Projects lands).

In addition to the NYSCC permit, applicants may be required to obtain permits from the applicable towns, the NYSDEC, the U.S. Army Corps of Engineers (USACE), and the applicable jurisdictional municipalities.

4.8.3.1 Shoreline Buffer Zones

The Power Authority does not maintain a buffer zone around the Crescent and Vischer Ferry Project impoundments since the lands are in private and state ownership. However, a number of Town and NYSCC regulations are in place which govern use of the Project shorelines. Shoreline use and the maintenance of buffer zones varies between NYSCC and jurisdictional municipalities within the Projects areas.

4.9 Aesthetic Resources (18 C.F.R. § 5.6 (d)(3)(ix))

4.9.1 Visual Character of Project Lands and Waters

Interstate 87 and Rt. 9 both cross the Mohawk River and Crescent Project Boundary. Cohoes Crescent Road runs along the southern side of the Crescent Project Boundary near the powerhouse. Both the Crescent Project powerhouse and dam are visible from Cohoes Crescent Road.

Western Gateway Bridge (Rt. 5), Rt. 29, and Rt. 146 cross the Mohawk River and Vischer Ferry Project Boundary. Rt. 91 and Riverview Road runs just north of the Vischer Ferry Project Boundary and portions of the river and Project are visible from the road.

The Mohawk Towpath Byway, a national scenic byway, is a network of local, county, state and federal highways that follow the historic route of the Erie Canal from Waterford and Cohoes to the historic Stockade District of Schenectady (Adirondack North Country Association, 2019). Communities along the way include Cohoes, Halfmoon, Colonie, Crescent, Vischer Ferry, and Rexford. The Mohawk Towpath Byway generally parallels the Crescent Project Boundary from the Rt. 9 bridge to the I-87 bridge. The Byway follows Rt. 91 and Riverview Road just north of the Crescent and Vischer Ferry Project Boundaries to Rexford, crosses the Vischer Ferry Project Boundary at the Rt. 146 bridge and runs just south of the Vischer Ferry Project Boundary to Schenectady.

Views of the Projects change with the seasons. As the deciduous trees lose their leaves, the views become less obstructed, and areas with no view in summer may offer limited or clear views of the Projects in winter. Seasonal changes in the full pool elevation of the Project impoundments with the installation and removal of flashboards does not alter the appearance of the impoundments or shorelines.

4.9.2 Scenic Attractions

Scenic views and public recreation opportunities are abundant along the lower Mohawk River in the vicinity of the Crescent and Vischer Ferry Projects and are discussed in detail in Section 4.8.1.

As discussed in Section 4.8.1, the Erie Canalway Trail is an attraction in the region. The trail stretches across over 350 miles of upstate New York. Portions of the trail travel along the Mohawk River in close proximity to the Project impoundments and offers views of the canal. The Vischer Ferry Nature and Historic Preserve is an Important Bird Area recognized by Audubon New York. It is located along the Crescent Project shoreline and offers trails and attracts birders.

As discussed in Section 4.8.1, there are several nature preserves and state parks in the vicinity of the Projects. Several provide notable scenic views. Peebles Island State Park, located at the confluence of the Hudson and Mohawk Rivers, offers spectacular river and rapids views and trails (New York State OPRHP, 2019). In Schenectady County, the Almy D. Coggleshall Plotter Kill Preserve in the Town of Rotterdam provides scenic views of three waterfalls.

The Town of Waterford is considered the Gateway to New York's Canals. The Hudson and Mohawk rivers merge in Waterford, while the Erie and Champlain Canals start in the Village of Waterford. Waterford is the home of the Waterford Flight of Locks, known for being the largest lift in the shortest distance of any lock system in the world. Other local attractions include the views of the river and rapids at Peebles State Park and the monument at Soldiers and Sailors Park (Guide to Albany's Capital Region, 2018).

4.10 Cultural Resources (18 C.F.R. § 5.6 (d)(3)(x))

4.10.1 Cultural Resources Introduction

The following section provides information about known historic and archaeological resources at the Crescent and Vischer Ferry Projects. Most of the information on existing cultural resources is based on background cultural resources research in the New York State Cultural Resource Information System (CRIS), which is maintained by the New York State Historic Preservation Office (SHPO). CRIS contains a comprehensive inventory of archaeological sites, properties listed on the National Register of Historic Places (NRHP), properties determined eligible for listing in the NRHP, and previous cultural resources surveys.

4.10.1.1 Precontact Background

Archaeologists have divided the Precontact period culture history of New York into three general periods: Paleoindian (12000 to 9000 years ago), Archaic (9000 to 3000 years ago) and Woodland (3000 to Contact, ca. 500 years ago). These periods are further subdivided into the Early (9000 to 7000 years ago), Middle (7000 to 5500 years ago) and Late (5500 to 3000 years ago) Archaic periods and the Early (3000 to 1700 years ago), Middle (1700 to 1200 years ago) and Late (1200 to 500 years ago) Woodland periods. The Late Woodland period ends with European contact which ushers in the Contact period (500 to 300 years ago) and finally the Historic period extends from 300 years ago to present.

The Paleoindian Period (ca. 12000 – 9000 years ago)

The first evidence of human occupation in New York State dates to the Paleoindian period, which occurred shortly after the final retreat of the Laurentide Ice Sheet. The environment and climate of this period was in rapid flux, with dramatic warming and cooling periods. As the megafauna, such as mammoth, mastodons, and large carnivores of the Pleistocene became extinct, human hunters in New York focused on new strategies for taking caribou, elk, and deer.

Some of the best known Paleoindian period sites documented in the Northeast are located in the Hudson River Valley, south of where the Projects are located. These include West Athens Hill, the Kings Road, and Dutchess Quarry Cave (Funk, 1976; Ritchie, 1981).

West Athens Hill is located in Greene County on a Normanskill flint-bearing ridge and was interpreted as a Paleoindian period workshop, based on evidence for quarrying stone and the presence of blocky cores (Funk, 1976). Funk additionally concludes the area was used repeatedly as a seasonal campsite with families occupying their own space.

The Kings Road site is situated north of West Athens Hill on clay flats between West Athens and West Coxsackie. A large collection of chipped stone tools, many of which were manufactured from Pennsylvania jasper were recovered from the site.

Dutchess Quarry Cave is located in Orange County. The site consists of a solution cavity in a dolomite cliff. A fluted point was found associated with caribou bone fragments, and an uncorrected radiocarbon date of 10,580 B.C +/- 370 was obtained on the bone. Funk interprets this location as a hunter's temporary refuge (1976:223).

Funk (1976) and Ritchie (1981) summarize that whatever long distance movement of people and/or lithic materials may have been occurring during the Paleoindian period, the local supplies of high-grade lithic material (Normanskill and Coxackie cherts) in the Hudson Valley area meant that the first migrants into the area did not have to travel far for tool making materials. Funk goes on to conclude that such site locations may have been part of a large exchange network involving contact with other hunting and gathering bands centered in Pennsylvania (1976:223).

The Archaic Period (ca. 9000 – 3000 years ago)

The climate continued to warm during the Archaic period allowing modern-day plants and animals to establish themselves in the region (Ritchie, 1981). Human populations slowly increased and began exploiting a much wider range of animals, and especially plants, than they had in the preceding Paleoindian period. During the Archaic period, mobility was influenced by the extraction of food and other subsistence resources within limited areas. Seasonal campsites by small bands were common, and food procurement became a seasonal activity as well.

The Archaic period is typically divided into three subperiods: Early, Middle, and Late. Their archaeological expression varies by region. In general, the Archaic period is defined in terms of broad spectrum foraging patterns and settlement patterns adapted to modern environments of the Holocene Epoch (Ritchie, 1981). Early and Middle Archaic period sites in the Hudson River Valley tend to be small, and characterized largely by lithics only, with few organic remains preserved. As a result, archaeologists have relied on using classic sequences of projectile point typologies to flesh out the framework of the Archaic.

Archaeological sites are much more abundant in the Late Archaic throughout the region. Laurentian tradition sites are the most common Late Archaic manifestation, and sites containing Vergennes phase artifacts (Otter Creek points, gouges, ground slate points, ulus and plummets) are well known in the Hudson River Valley (Ritchie, 1969, 1981). Funk (1976) observed that Vergennes phase sites increased in frequency from south to north into the upper Hudson Valley.

The sequence of Archaic point styles, from Vergennes phase, to Vosburg phase, and later small stemmed point and Susquehanna, has been identified from sites in the Upper Hudson Valley with stratigraphic integrity. For example, the Lotus Point site contained one Otter Creek point in stratum five. Stratum four produced Vosburg points, as well as broad stemmed, narrow stemmed and narrow side-notched points. Other nearby sites in the with similar components are Fish Club Cave, near

Ravenna, and the Hound Dog Rockshelter, in Greene County. The latter site contained two stratigraphic units. The lowest unit produced one Otter Creek point base.

Sites containing transitional or terminal Archaic period deposits are also known from the Upper Hudson Valley (Ritchie, 1981). These sites often contain cultural materials clearly attributed to the Woodland period as well. Sites containing transitional lithic artifacts, i.e., Orient Fishtail projectile points, include the Tufano site, which is located at Fourmile Point in the Hudson River north of Athens, Greene County; the Bronck House Rockshelter, which is located in Coxsackie Township, Greene County; and the Zimmerman Rockshelter, which is located in close proximity to the Bronck site and is another small rockshelter within the limestone face of the Helderberg escarpment.

The Woodland Period (3,000 – Contact)

Following the Archaic, the Woodland period is marked by increased sedentism population density. Like the Archaic period, it is also divided into three subperiods, Early, Middle and Late. The manufacture and use of clay vessels for a whole range of activities is adopted and replaced earlier vessel-making techniques that relied on the use of soft stone. There is evidence of large-scale storing of food resources in pits excavated into the ground and in large ceramic vessels. Populations began settling in more resource-rich lowlands. By A.D. 1100, the Northern Iroquoian linguistic culture began moving up the Susquehanna Valley and east into the Mohawk Valley (Snow, 1994). During this phase, palisades and earthworks begin to appear in the archeological record, along with well-defined agricultural practices Longhouse settlement. As Dean Snow notes (1994), this period is also characterized by increased warfare and elaborate matrilocal settlement patterns. The late Woodland period, the last stage of Precontact history in the Northeast, was characterized by population expansion that resulted in the development of the nations and tribes that were later encountered by European settlers, such as the Iroquois. It is also a time when first contacts with European occurs that sets the stage for enormous changes and upheavals in Native American cultural groups.

Few Early Woodland period sites are reported from the Upper Hudson River Valley. Important but well documented sites from the area are predominately Middle Woodland period in age. For example, the Tufano site is a very rich, Middle Woodland habitation site with numerous burials, pit features, hearths and post molds. A radiocarbon date returned a date of A.D. 700 +- 100 years (Y-1382). The artifact assemblage is typical of the Middle Woodland period and includes diagnostic ceramics (Point Peninsula, Jack's Reef). Diagnostic projectile point forms include Levanna, Jack's Reef Pentagonal, Fox Creek, and Rossville. Faunal and floral remains from the numerous pit features identified on the site provided data on subsistence practices. White tailed deer and sea sturgeon were the most common food species identified with much lesser numbers of black bear, turkey, woodchuck and turtle. Charred hickory nuts suggest a fall occupation. Another well documented Middle Woodland location is the Black Rock Site, which is a large open air site near the Hudson River in Athens, Greene County. As with the Tufano Site, the Black Rock Site contained numerous burials and pit features, assignable "almost exclusively" to the late Middle Woodland (Funk, 1976). The majority of ceramics are late Point Peninsula (Kipp Island phase), associated with Levanna and Jack's Reef projectile point types. A radiocarbon date of A.D. 850 +/- 95 years (I-3444) supports the late Middle Woodland designation. Also like Tufano, white-tailed deer

and sea sturgeon are the highest represented species in the faunal list, with a wide variety of other species present. No floral remains were recovered.

Late Woodland period sites are not unknown from the Upper Hudson River Valley, but they appear to be much less common than Middle Woodland sites. Of particular note is Bronck House Rockshelter where the uppermost cultural stratum was designated Late Woodland II (historic Iroquoian) based on the presence of trade goods and diagnostic Iroquoian pottery (Kingston Incised and Oak Hill) (Funk, 1976).

4.10.1.2 Historical Overview of the Crescent and Vischer Ferry Project Region

When European settlers arrived, the Mohawk River valley was predominantly inhabited by the Mohawk Nation whose original homelands included the north eastern region of New York State extending into southern Canada and Vermont. Through the centuries Mohawk influence extended far beyond their territory and was felt by the Dutch who settled on the Hudson River and in Manhattan. The Mohawks' location as the Iroquois nation closest to Albany and Montreal, and the fur traders there, gave them considerable influence among the other nations. (Saint Regis Mohawk Tribe, 2019). As the Mohawk River valley became more populated by European settlers, the Mohawks began to withdraw from the Mohawk Valley in the mid 1700's.

Schenectady owes its existence and much of its prosperity to its location on the Mohawk River. In 1661, Arendt Van Curler, the eventual founder of Schenectady, and fourteen others were granted permission by Governor Stuyvesant to purchase a tract of land on the lower Mohawk River called the "Great Flat." Shortly after permission was granted house lots were created and streets were laid out in a grid pattern. The cities of Schenectady and Rotterdam presently occupy this land.

In 1684, the settlers in Schenectady, who numbered approximately 400, obtained a patent for 128 square miles that included the present day City of Schenectady and the Towns of Rotterdam, Princetown, Glenville and a portion of Niskayuna. Schenectady's strategic location on the Mohawk River resulted in frequent attacks during the French and Indian War, which discouraged settlement for decades.

In 1798, the city of Schenectady was incorporated and Schenectady County was divided from Albany County in 1809 (Macpherson, 2002).

After the Revolutionary War, the Inland Navigation Company constructed several short canals and locks along the Mohawk River and its tributaries. These transportation improvements led to the construction of wharves, docks and storehouses along Main Binne Kill and by 1795, the area became known for its boatbuilding capabilities.

The 1800s saw continued improvement in local transportation infrastructure. The Erie and Champlain canals were dug through the towns of Schenectady, Rotterdam and Colonie in 1825. The first two railroads in the state were centered in Schenectady, the Mohawk and Hudson in 1831 and the Schenectady and Saratoga in 1832 (Macpherson 2002).

By 1860, the area's fertile river valleys supported intensive agriculture and dairy farming. Census records show large quantities of grain, hay, apples, potatoes, butter, and cheese being produced in the area.

In the 1880s, Thomas Edison moved his Edison Machine Works to Schenectady, bringing with it jobs and a strong economic engine for the region. In 1892, Edison General Electric merged with Thomson-Houston Electric Company to form General Electric and maintained its headquarters in Schenectady for many years thereafter. Other large companies operating in the Schenectady area have included the American Locomotive Company (a.k.a. Alco), the United States Army Depot and the United States Navy Depot. More recently, the city of Schenectady has seen its population and industry decline as residents moved to the suburbs of Glenville and Rotterdam (Macpherson, 2002).

The first settlers arrived in the Town of Glenville in 1665. By 1824 the town had 2,415 residents, 3 churches, 2 grist mills, 6 saw mills and 9 schoolhouses among other enterprises. Glenville's population hovered around 2,500 for most of the 19th century. The founding of the General Electric Company in 1892 led to a demand for workers and drove steady population growth in Glenville until present. By 1970, the town had 28,000 residents (Macpherson, 2002).

Glenville is the only town in Schenectady County north of the Mohawk River. As a result, ferries and bridges have been important to the town's history. In the 18th century, agricultural products from the more rural Glenville were transported to the more densely populated areas of Schenectady by at least 3 ferries. The first bridge between Glenville and Schenectady opened in 1809. Canals and railroads came to Glenville as they did the surrounding area. Saw and grist mills developed during the 19th century, but the most important industry was broom manufacture. Agricultural centers were concentrated in the southern portion of town along the alluvial flats of the Mohawk River, while the mill industry was located in the uplands along streams (Macpherson, 2002).

Between 1817 and 1825, the original Erie Canal was constructed. The canal traversed 363 miles from Albany to Buffalo, connecting the Hudson River to the Great Lakes. At the time of its construction, the Erie Canal was the longest artificial waterway and the greatest public works project in North America. The canal put New York on the map, transformed New York City into the nation's principal seaport, and opened the interior of North America to settlement (ECNHC, 2019c).

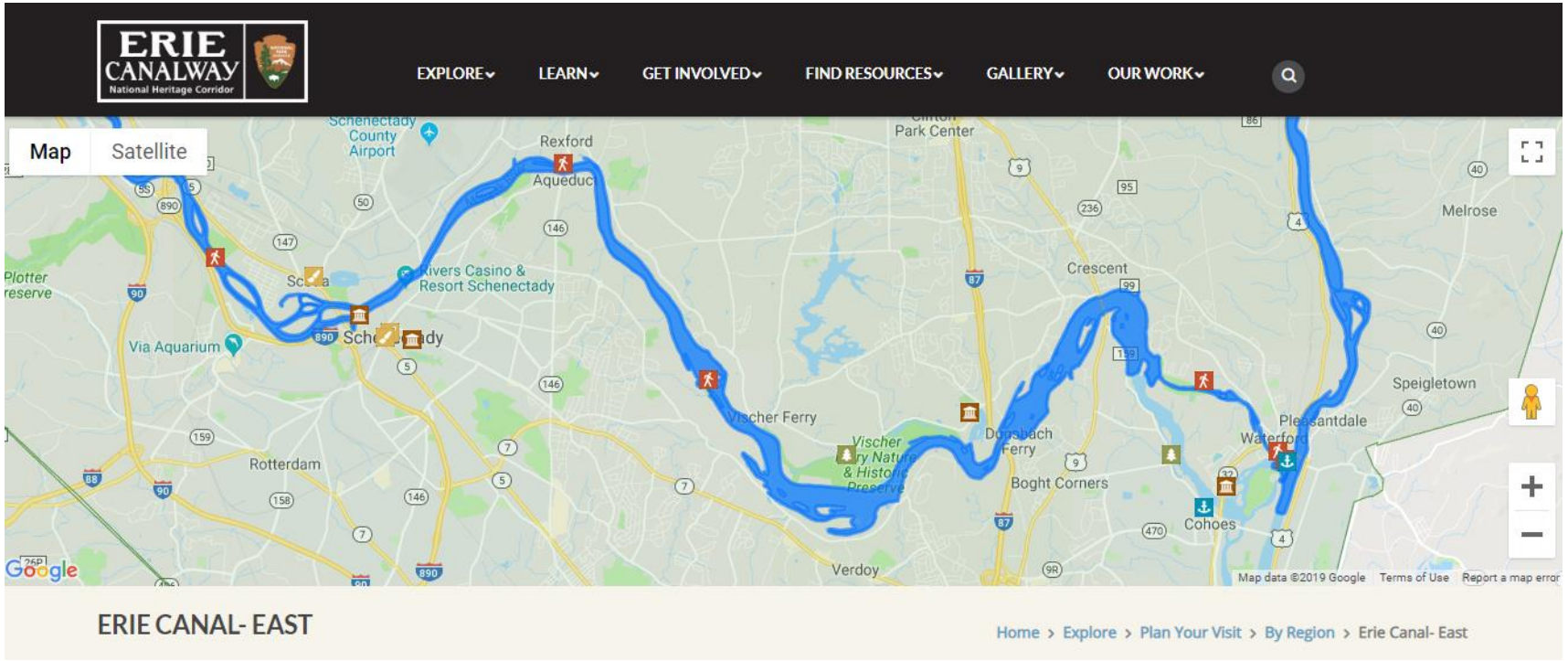
The construction of the Erie Canal, and the New York canal building boom that followed, dramatically accelerated the dispossession and disruption of the traditional ways of life of the region's Native Americans. Native peoples withdrew from their ancestral lands and many were sent to reservations.

The Erie Canal quickly became an important transportation corridor. Originally four feet deep and 40 feet wide, the Erie Canal cut through fields, forests, rocky cliffs, and swamps, crossed rivers on aqueducts, and overcame hills with 83 lift locks. The Erie Canal was the engineering and construction triumph of its day. Canal packet boat passengers traveled in relative comfort from Albany to Buffalo in days rather than weeks and freight boats carried Midwestern produce from Buffalo to Albany, then on to New York City (ECNHC, 2019c).

Over the years, the Erie Canal was expanded. In 1903 the New York State legislature authorized construction of the New York State Barge Canal as an improvement to the Erie Canal. Construction of the Barge Canal began in 1905 and was completed in 1918. The current Crescent and Vischer Ferry Project dams were constructed as part of the Barge Canal Construction in 1912. In the early 1920s the existing powerhouses were added to the dam sites, and in the 1980s the current powerhouses were expanded to add two new generating units at each Project (ECNHC, 2019c).

In 2000, the U.S. Congress recognized the Erie Canal's historic significance by establishing the Erie Canalway National Heritage Corridor. The Corridor spans 524 miles across the full expanse of upstate New York (Figure 4.10-1 depicts the east section). It includes the Erie, Cayuga-Seneca, Oswego, and Champlain Canals and their historic alignments. The Corridor encompasses 4,834 square miles in 23 counties and is managed by the Erie Canalway National Heritage Corridor, in partnership with the National Park Service and numerous local, state, and federal partners. The Crescent and Vischer Ferry Projects both lie along the Canalway National Heritage Corridor (ECNHC, 2019c). National Register of Historic Places listing for the New York State Barge Canal followed in October 2014. The Barge Canal was listed as a National Historic Landmark in January 2017.

Figure 4.10-1: Erie Canalway National Heritage Corridor – East Section



Source: ECNHC, 2019c

4.10.2 Archaeological Sites

Crescent Project

Twenty-five (25) historic archaeological sites, eight (8) unnamed New York State Museum (NYSM) Areas, and forty-five (45) precontact archaeological sites are located within 1 km of the Crescent Project area (Table 4.10-1). Map data suggests that three (3) historic archaeological sites, all eight (8) NYSM Museum Areas, and seven (7) precontact archaeological sites may overlap or fall within the Crescent Project area. Six (6) historic sites located within 1 km of the Project are listed on the NRHP. One (1) historic and two (2) precontact archaeological sites are considered eligible for the NRHP. Two (2) historic sites and two (2) precontact sites have been determined not eligible for listing on the NRHP and all remaining archaeological sites, precontact and historic, have an undetermined NRHP status.

All eight (8) Museum Areas and thirty-three (33) precontact sites were previously identified by NYSM surveys beginning in the 1920s and continuing through the 1970s. Five (5) Museum Areas are identified as "camps," two (2) are defined as "traces of occupation," and one (1), NYSM site 4715, is attributed to the Late Woodland, possibly an "Iroquois village." No information is available for most of the 33 precontact sites. However, NYSM site 4726 is called a "camp," NYSM sites 4718 and 6565 are termed "villages," NYSM 5623 is defined as a "debitage cluster" and NYSM site 4731 shows "traces of occupation." Two (2) sites (NYSM 959 and 962) are attributed to the Late Woodland, possibly Iroquois. Other precontact sites located during later Cultural Resources Management (CRM) work in the area include the Brookfield Precontact Site (09110.000265) and the Onderdonk Prehistoric Site 1 (00104.000647), both of which are not eligible for the NRHP. The Brookfield Precontact site was interpreted as a stray find of an Archaic Neville-like projectile point. The Onderdonk Prehistoric Site 1 also dates to the Archaic Period and produced a Lamoka projectile point, 1 preform biface, 1 utilized flake, 39 debitage, and 26 fire-cracked rock. However, the low artifact frequency, limited artifact types, lack of intact features and cultural horizons make the site ineligible for the NRHP. Other sites located by later CRM work, such as TSR Historic/Prehistoric Site 1 and TSR Prehistoric Site 3, consists only of debitage and fire-cracked rock.

CRIS lists two (2) precontact sites as eligible for the NRHP. Due to the large number of precontact sites in the area surrounding the Crescent Project, discussion will focus on these two (2) NRHP-eligible sites.

The Brownsey Prehistoric Site (09303.000156) underwent Phase II excavations twice by Hartgen Archaeological Associates, once in August 1998 and again in March 1999. This upland site contains evidence of buried material and features as well as precontact material in the plow zone. Cultural material recovered from the site include bifaces, a straight-stemmed drill base, side and end scrapers, a quartzite semi-lunar knife fragment, a ground slate ulu fragment, chert flakes, block flakes, quartzite flakes, utilized flakes, hammerstones, and fire-cracked rock. The site is attributed to a Late Archaic Laurentian occupation, possibly of the Vosburg or Otter Creek groups (2895-2485 B.C.). (Hartgen Archaeological Associates, Inc., 2007)

Phase IB excavations at the Halfmoon Village Precontact Site (09110.000266) were conducted by Curtin Archaeological Consulting, Inc. in September 2008. These excavations produced 1 Meadowood –type

cache blade, 3 chert flakes, 1 possible flake, and 1 fire-cracked rock. Curtin Archaeological Consulting, Inc. also performed the ensuing Phase II excavations, which produced 215 precontact artifacts and demonstrated that the stratigraphy of the sites remains intact. The majority of artifacts were confined to a dark yellowish-brown sandy topsoil at 30-40 centimeters (cm) below the surface. An ephemeral hearth feature was also noted. No temporally diagnostic artifacts were recovered during the Phase II excavations, but the Meadowood-type cache blade found during the Phase IB suggests a 2500-3000 before present (BP) occupation. The sites intact stratigraphy and diverse, though spatially small, artifact assemblage makes it eligible for the NRHP.

Twenty-five (25) historic archaeological sites are located within 1 km of the Project. Map data suggests three (3) of these sites, the Cornelius Claesen Site (09103.000011), the H. Dunsbach Historic Site (09110.000273) and the Crescent Aqueduct (09110.000004), may overlap the Crescent Project. Six (6) historic sites are listed on the NRHP and one (1) site is considered eligible for the National Register of Historic Places (NRHP). Two sites, the Stone Quarry Estates Midden Historic Site (09110.000293) and the Talon Driver Farm Complex (00104.000363), are not eligible for NRHP listing. Due to the large number of historic sites surrounding the Project area, discussion will focus on these NRHP-listed and eligible sites. It should also be noted that a cluster of historic sites including 4 cemeteries (some slightly beyond the 1 km study area) occurs around the Hamlet of Crescent Station.

Three NRHP-listed sites, the Erie Canal Ruins (09103.000080), Erie Canal (enlarged) Lock 19 (09103.000010), and the "Archaeology Site" (09103.000077), are related directly to the building and maintenance of the Erie Canal. The Erie Canal Ruins site consist of standing ruins that run from Ferry Road to Van Vranken Road in the Village of Vischer Ferry. This section of the Erie Canal is the one of the best preserved sections in New York State and includes the remains of Erie Canal Lock 19. Lock 19, built in the 1890s, is a double lock and may be the best preserved isolated lock in the system. Lock 19 was enlarged as part of the notorious "9 million dollar improvement," which was viewed as a scandalous state expenditure at the time. Traces of bottom planking are still evident and the canal bed is faced with stone on both towpath and berm. Three (3) abutments for "farmer's bridges" still exist as well as several cellar holes that were sites of mule barns, a tavern, a general store, and residences. The Archaeology Site lies a ¼ mile east of Vischer Ferry Village and consists of a wagon road built up over a marshy section that led to the Erie Canal and terminated at the old canal store.

Three NRHP-listed sites, the K Rebusman-Vacant Residence (00104.000274), the Dairy Barn site (09103.000073), and the Ruins of Van Vranken Homestead (09103.000072), relate to early residential and farming activity in the area. The K Rebusman-Vacant Residence Site lies in the Town of Colonie and includes the Ebenezer Hills, Jr. House, which dates from around 1806 to present. The house experienced extensive renovation in the late 19th century with an addition on the southwest corner and a porch addition c. 1820-1870. Artifacts were found on all sides of the house, but were concentrated at the rear of the house towards the barns. Artifacts recovered include pearlware, creamware, whiteware, slip redware, stoneware, porcelain, yellowware, a thimble, glass button, copper button, bone handle, vessel glass, bottle glass, faunal bone, shell and pipestems. The Dairy Barn site lies 1 mile east of Vischer Ferry Village south of Riverview Road and may be associated with William H. Van Vranken. Surface traces are visible at the site. The final NRHP-listed site, the Ruins of Van Vranken Homestead, lies 1-½

miles east of the Village of Vischer Ferry and dates to c. 1840. Standing ruins of a barn inhabit the property.

The Burtis-Wood Historic Site (09110.000253) is NRHP-eligible and surrounds the still-standing Swiderski-Dahoda house. Phase II archaeological investigations performed by Edward V. Curtin in 2005-2006 suggest that a buried, intact living surface demonstrating a high degree of integrity may lie below more recent fill deposits. This living surface may date as early as the mid-19th century. Ceramics, vessel glass, flat window glass, cut and wire nails and metal fragments were recovered from the site.

Table 4.10-1: Archaeological Sites and Museum Areas Located Within Approximately 1 km of the Crescent Project

OPRHP Site #	Name	Period(s)	NRHP Status
09303.000132	Unnamed Site (NYSM 6237)	Precontact	Undetermined
NYSM 6338	Unnamed Museum Site	Precontact	Undetermined
09303.000135	Unnamed Site (NYSM 6240)	Precontact	Undetermined
NYSM 960	Ferry Landing	Precontact	Undetermined
09103.000094	Unnamed Site (NYSM 4726)	Precontact	Undetermined
NYSM 7834	Unnamed Museum Site	Precontact	Undetermined
09303.000133	Unnamed Site (NYSM 6238)	Precontact	Undetermined
09303.000237	Flower Hill Site 1	Precontact	Undetermined
NYSM 6245	Unnamed Museum Site	Precontact	Undetermined
NYSM 6244	Unnamed Museum Site	Precontact	Undetermined
09303.000136	Unnamed Site (NYSM 6243)	Precontact	Undetermined
09303.000139	Unnamed Site (NYSM 6246)	Precontact	Undetermined
09103.000095	First Bayou Site (NYSM 958)	Precontact	Undetermined
09103.000096	Second Bayou Site (NYSM 957)	Precontact	Undetermined
09103.000097	Third Bayou Site (NYSM 973)	Precontact	Undetermined
09303.000156	Brownsey Prehistoric Site	Precontact	Eligible
09303.000295	Brownsey Site 2	Precontact	Undetermined
NYSM 6241	Unnamed Museum Site	Precontact	Undetermined
00104.000558	TSR Historic/Prehistoric Site 1	Precontact	Undetermined
00104.000560	TSR Prehistoric Site 3	Precontact	Undetermined
NYSM 969	Stop 29	Precontact	Undetermined
NYSM 974	Shaker Island	Precontact	Undetermined
NYSM 7832	Unnamed Museum Site	Precontact	Undetermined
NYSM 959	Pottery Beach	Precontact	Undetermined
00104.000048	Mohawk View Site (NYSM 962)	Precontact	Undetermined
00104.000047	Rivers Bend Site	Precontact	Undetermined
NYSM 961	River Bend	Precontact	Undetermined
00104.000647	Onderdonk Prehistoric Site 1	Precontact	Not eligible
09103.000104	Unnamed Site (NYSM 6247)	Precontact	Undetermined

OPRHP Site #	Name	Period(s)	NRHP Status
09103.000105	Unnamed Site (NYSM 6248)	Precontact	Undetermined
09103.000099	Unnamed Site (NYSM 4718)	Precontact	Undetermined
09103.000106	Unnamed Site (NYSM 6249)	Precontact	Undetermined
09110.000044	Mohawk Campus Site (NYSM 5623)	Precontact	Undetermined
09110.000043	Rocky Point Site (NYSM 963)	Precontact	Undetermined
00104.000683	Pollock Road Precontact Site	Precontact	Undetermined
NYSM 966	Boght Road	Precontact	Undetermined
00104.000049	Dunsback Site (NYSM 964)	Precontact	Undetermined
09110.000266	Halfmoon Village Precontact Site	Precontact	Eligible
00104.000511	Prehistoric Site P1-CA7	Precontact	Undetermined
00104.000512	Prehistoric Site P2-CA8	Precontact	Undetermined
09110.000046	Unnamed Site (NYSM 4731)	Precontact	Undetermined
NYSM 6565	Unnamed Museum Site	Precontact	Undetermined
09110.000265	Brookfield Precontact Site	Precontact	Not eligible
00104.000356	Unnamed Site (NYSM 6348)	Precontact	Undetermined
00104.000357	Unnamed Site (NYSM 6349)	Precontact	Undetermined
NYSM 4749	Unnamed Museum Area	Precontact	Undetermined
NYSM 7406	Unnamed Museum Area	Precontact	Undetermined
NYSM 6526	Unnamed Museum Area	Precontact	Undetermined
NYSM 6521	Unnamed Museum Area	Precontact	Undetermined
NYSM 4717	Unnamed Museum Area	Precontact	Undetermined
NYSM 4716	Unnamed Museum Area	Precontact	Undetermined
NYSM 4731	Unnamed Museum Area	Precontact	Undetermined
NYSM 4715	Unnamed Museum Area	Precontact	Undetermined
09103.000165	Vischer Edge Site	Historic	Undetermined
09103.000088	18th C Mill Site and Stone Arch Bridge	Historic	Undetermined
09103.000080	Erie Canal Ruins	Historic	Listed
09103.000010	Erie Canal (enlarged) Lock 19	Historic	Listed
09103.000077	Archeology Site	Historic	Listed
09103.000073	Dairy Barn	Historic	Listed
00104.000274	K Rebusman-Vacant Residence	Historic	Listed
00104.000039	Burmaster Farm	Historic	Undetermined
09103.000072	Ruins of Van Vranken Homestead	Historic	Listed
09103.000163	Rachel Fort Homestead	Historic	Undetermined
09103.000011	Cornelius Claesen Site	Historic	Undetermined
09110.000037	Rocky Point Site	Historic	Undetermined
09110.000267	H. Dunsbach Historic Site	Historic	Undetermined

OPRHP Site #	Name	Period(s)	NRHP Status
09110.000273	H. Wood Historic Site	Historic	Undetermined
09110.000257	Burtis-Wood Historic Site	Historic	Eligible
09110.000253	Crittenden Farm Historic Site	Historic	Undetermined
09110.000280	H. Dunison Residential Historic Site (H-1)	Historic	Undetermined
09110.000293	Stone Quarry Estates Midden Historic Site	Historic	Not eligible
00104.000363	Talon Drive Farm Complex	Historic	Not eligible
09110.000281	Stone Quarry Road Dam Historic Site (H-2)	Historic	Undetermined
09110.000189	Crescent-Erie Canal Business Complex Site (NYSM #11059)	Historic	Undetermined
09110.000004	Site of Crescent Aqueduct	Historic	Undetermined
00104.000625	Thomas Powell House & Cemetery Historic Site	Historic w/ Human Remains	Undetermined
00104.000624	Maria Staats House & Cemetery Historic Site	Historic w/ Human Remains	Undetermined
00104.000626	Reepmeyer Cemetery Historic Site	Historic w/ Human Remains	Undetermined

Vischer Ferry Project

Nine (9) unnamed NYSM Areas and sixty (60) Precontact period archaeological sites occur within 1 km of the Vischer Ferry Project (Table 4.10-2). All nine Museum Areas and thirty-seven Precontact period sites were previously identified by NYSM surveys beginning in the 1920s and continuing through the 1970s. The majority of the Museum Areas are identified as "traces of occupation." Three Museum Areas are identified as "camps" and one is labeled a "village." No information is available for most of the 37 Precontact period sites. However, NYSM site 6255 is called a "cemetery," NYSM site 4745 is termed a "village," and NYSM 4753 is defined as a "camp." Three sites (NYSM 4730, 4750 and 4752) show "traces of occupation." Other Precontact period sites located during later CRM work in the area include stray finds such as the Burl Prehistoric Site (09305.000262), plow zone sites like the Route 5 Terrace Prehistoric Site (09302.000138), and sites with intact buried evidence like the Campsites Site (09305.000087).

CRIS lists six Precontact period sites as eligible for the NRHP. Due to the large number of Precontact period sites in the area surrounding the Project, discussion will focus on these six NRHP-eligible sites.

The McMichaels Precontact Site (09302.000031, NYSM 955) dates to the Terminal Archaic/Transitional Periods. Phase II investigations at this site have documented two loci with undisturbed, temporally

discrete cultural deposits and evidence of features. Additionally, both loci have evidence of stratified cultural deposits marking stable and older buried surfaces. Locus 1 covers most of an intermediate river terrace on the Mohawk River and Locus 2 encompasses a paleo-island formation. Both loci have yielded culturally diagnostic artifacts with evidence of the Transitional and Woodland cultural periods found at Locus 1 and the late Middle Woodland/early Late Woodland cultural periods found at Locus 2. The location of this site provides an ideal setting for seasonal villages, base camps, resource procurement/processing sites, as well as short-term encampments. The range of tool types at these loci, including bifaces, expedient flake tools, and cobble tools, can be associated with many of these site types. These tool types suggest activities such as procurement and processing of resources and tool maintenance, as well as those of daily life (Gade, 2013).

The Windsor Estates Precontact period Site (09303.000238) is located on an upland terrace overlooking a series of small seasonal wetlands connected by a seasonal drainage. Excavations at the site suggest task-specific occupation focused on the procurement of food. Artifacts found at the site, including three side-notched Normanskill points, two stemmed Lamoka points, utilized flakes, and a biface fragment, indicate a Late Archaic occupation (Hartgen Archaeological Associates, 2007).

The Edison Woods Site (09303.000246) measures approximately 54 x 30 m and lies on a single, level, upland terrace south of the Mohawk River. During Phase II Investigations, 57 Precontact period artifacts were recovered, including debitage, fire-cracked rock, an end scraper, a uniface fragment, charcoal and a Lamoka projectile point. The artifact assemblage suggests this site was a camp or workshop. The Lamoka projectile point suggest a Middle Late to Late Archaic occupation period. The site holds good stratigraphic integrity with little disturbance and discrete activity areas can be defined (Moyer et al., 2010).

Riverstone Manor Site 1 (09302.000132) and Riverstone Manor Site 2 (09302.000133) are located north of the Mohawk River. Both sites are described as camps and show evidence of stratification and buried features. These sites produced fire-cracked rock, pitted stone and grinding stone artifacts. In addition, both sites may have an intact occupation floor described as a possible roasting platform and living surface approximately 5.5 feet below the surface.

Finally, the Collins Lake Site (09341.000016, NYSM 2677) lies submerged in a 26-hectare lake. The original lake level was raised approximately 4 feet in 1946 by damming. A large wetland on the southern and eastern edges of the lake was also flooded. This damming resulted in submerged shorelines. All recovered artifacts to date have resulted from dredging. Monitoring in 1990 yielded evidence of an intact archaeological deposit. Artifacts recovered include 1205 net sinkers, 34+ flakes, 14 pitted stones, 8 ground stone tools, 5 projectile points, 3 bone/antler tools, and 2 pottery sherds. A tentative Woodland temporal affiliate is based on the pottery sherds and Madison or Levanna type projectile points. Although boundaries for this site have not been established, the site is unique and appears to be in an excellent state of preservation.

Thirty-seven (37) known Historic period archaeological sites are located within 1 km of the Projects and map data suggests nine (9) of these sites may overlap the Vischer Ferry Project (Table 4.10-2). Four

Historic period sites are considered eligible for the NRHP and due to the large number of Historic period sites surrounding the Project area, discussion will focus on these NRHP-eligible sites.

The Erie Canal and Rexford Aqueduct Site (09103.000218, NYSM #10878) dates from the mid 1820s to c. 1920, during the operation of the Erie Canal. The site consists of the original and enlarged canals and remains of the original stone aqueduct. The site contains multiple components on both sides of the Mohawk River, including canal and aqueduct features as well as nearby structures from the 19th century canal era. These structures include a toll house, the McLane Hotel, the Rexford Store, and hotel barns and sheds. Map data indicate that this site overlaps the Vischer Ferry Project area.

The Van Wormer Historic Site (Long Pond Estates 1) (09305.000266) dates from the mid to late 18th century to the present and includes the 19th century Van Wormer house and adjacent intact shell midden deposits. The midden includes a wide variety of ceramics (creamware, pearlware, redware, and whiteware), glass and nails. It is thought that this site has potential to yield important information relating to the early Historic period development of the Town of Rotterdam along the Old River Road.

The Stockade Site (09340.001144) is a line of three post molds and associated artifacts relating to the Schenectady stockade. The location of the post molds and the datable cultural material suggests the site corresponds to the third stockade, built along the Binnie Kill sometime between 1704 and 1783. The Stockade Site is the only systematically excavated and scientifically documented section of the third stockade. This site is located in the National Register-listed Stockade Historic District and is a contributing component.

The Sambrook Edge Site (09103.000164) dates from prior to 1834 to after 1866. Artifacts recovered from the site include British and American refined white earthenware (primarily early-mid 19th century), American stoneware and red earthenware, Kaolin pipe fragments, a clay marble, metal buttons and faunal remains including bone and shell. No additional information is available for this site.

Table 4.10-2: Archaeological Historic Period and Precontact Period Sites and Museum Areas Located Within Approximately 1 km of the Vischer Ferry Project

OPRHP Site #	Name	Period(s)	NRHP Status
09305.000246	Durham Project 219	Historic period	Undetermined
09102.000077	Historic Foundation 1 Site	Historic period	Undetermined
09305.000247	Durham Project 102	Historic period	Undetermined
09305.000326 (14NR06559)	Erie Canal Old Lock 24	Historic period – 19th C.	Undetermined
09305.000256	MDS Van Patten Historic Foundations	Historic period	Undetermined
09302.000106	Durham Project 211	Historic period	Undetermined
09305.000266	Van Wormer Historic Site (Long Pond Estates 1)	Historic period	Eligible
09305.000267	Long Pond Estates 2 Historic Site	Historic period	Undetermined

OPRHP Site #	Name	Period(s)	NRHP Status
09302.000107	Durham Project 262	Historic period	Undetermined
09341.000019	Durham Project 198	Historic period	Undetermined
09341.000014	Glenotia Park	Historic period	Undetermined
09341.000013	Grist Mill Site	Historic period	Undetermined
09341.000009	Reese Homestead/Flint House	Historic period	Undetermined
09341.000020	Durham Project 101	Historic period	Undetermined
09341.000011	The Dyke	Historic period	Undetermined
09341.000023	Old Burr Bridge	Historic period	Undetermined
09340.001198	Durham Project 44	Historic period	Undetermined
09340.001144	Stockade Site	Historic period	Eligible
09340.001832	Van Eps Site	Historic period	Undetermined
09340.001228	Western Gateway Historic Site 1	Historic period – Mid 19th C.	Undetermined
09340.001229	Western Gateway Historic Site 2	Historic period	Undetermined
09340.001230	Western Gateway Historic Site 3	Historic period – 19th C.	Undetermined
09340.001302	Little Italy Historic Site	Historic period	Undetermined
09340.000105	Alpha Knitting Mill	Historic period – c. 1882-1935	Undetermined
09340.000102	Old Erie Canal	Historic period – c. 1825-1915	Undetermined
09340.000099	Elwood Hotel (Arnold's Body Shop)	Historic period – c. 1883	Undetermined
09340.000098	Old Freeman's Bridge Abutments	Historic period	Undetermined
09302.000023	ALB 104	Historic period	Undetermined
09302.000012	Van Voast Family Burial Plot	Historic period with human remains	Undetermined
09303.000293	A. Vedder Historic Site	Historic period- 19th/early 20th C.	Undetermined
09302.000190	Stevens Farm Historic Site	Historic period	Undetermined
09302.000144	Alplaus Schoolhouse Historic Archeological Site	Historic period	Not eligible
09302.000009	Yates Family Plot	Historic periodwith human remains	Undetermined
09303.000158	T Lent House	Historic period	Undetermined
09103.000218	Erie Canal And Rexford Aqueduct Site (NYSM #10878)	Historic period (form missing)	Eligible

OPRHP Site #	Name	Period(s)	NRHP Status
09303.000236	GE Research & Development Historic period Foundation Remains	Historic period	Undetermined
09103.000164	Sambrook Edge Site	Historic period	Eligible
NYSM 6931	Unnamed Museum Area	Precontact period	Undetermined
NYSM 6479	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4753	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4752	Unnamed Museum Area	Precontact period	Undetermined
NYSM 7903	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4720	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4719	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4750	Unnamed Museum Area	Precontact period	Undetermined
NYSM 4726	Unnamed Museum Area	Precontact period	Undetermined
09302.000138	Route 5 Terrace Prehistoric Site	Precontact period – Woodland	Undetermined
09302.000132	Riverstone Manor Site 1	Precontact period – possible Late Archaic	Eligible
09302.000133	Riverstone Manor Site 2	Precontact period – possible Late Archaic	Eligible
09305.000262	Burl Prehistoric Site	Precontact period - Woodland	Undetermined
09305.000257	GEP Locus 1	Precontact period	Undetermined
09305.000119	Unnamed Site (NYSM 6264)	Precontact period	Undetermined
09305.000132	Unnamed Site (NYSM 6277)	Precontact period	Undetermined
09305.000133	Unnamed Site (NYSM 6278)	Precontact period	Undetermined
09305.000259	GEP Locus 3	Precontact period	Undetermined
09305.000258	GEP Locus 2	Precontact period	Undetermined
09305.000134	Unnamed Site (NYSM 6279)	Precontact period	Undetermined
09305.000120	Unnamed Site (NYSM 6265)	Precontact period	Undetermined
09305.000136	Unnamed Site (NYSM 6288)	Precontact period	Undetermined
---	Schermerhorn (NYSM 6258)	Precontact period	Undetermined
09302.000031	McMichaels Precontact Site (NYSM 955)	Precontact period - Terminal Archaic /Transitional Period	Eligible
09302.000075	Unnamed Site (NYSM 6259)	Precontact period	Undetermined

OPRHP Site #	Name	Period(s)	NRHP Status
09302.000076	Unnamed Site (NYSM 6260 Buried Village)	Precontact period	Undetermined
09302.000077	Unnamed Site (NYSM 6261)	Precontact period	Undetermined
09302.000078	Unnamed Site (NYSM 6262)	Precontact period	Undetermined
09302.000079	Unnamed Site (NYSM 6263)	Precontact period	Undetermined
09305.000135	Unnamed Site (NYSM 6280)	Precontact period	Undetermined
09305.000087	Campsites Site	Precontact period – Woodland	Undetermined
09305.000121	Unnamed Site (NYSM 6266)	Precontact period	Undetermined
09341.000017	Collins Park Site (NYSM 2678)	Precontact period	Undetermined
09341.000016	Collins Lake Site (NYSM 2677)	Precontact period - Woodland	Eligible
09305.000128	Unnamed Site (NYSM 6273)	Precontact period	Undetermined
09305.000129	Unnamed Site (NYSM 6274)	Precontact period	Undetermined
09302.000033	Unnamed Site (NYSM 4753)	Precontact period	Undetermined
09340.000719	Unnamed Site (NYSM 4752)	Precontact period	Undetermined
09302.000022	ALB 103	Precontact period	Undetermined
09302.000139	Glenville Reserve 1	Precontact period	Undetermined
09302.000140	Glenville Reserve 2	Precontact period	Undetermined
09302.000141	Glenville Reserve 3	Precontact period	Undetermined
09302.000142	Glenville Reserve 4	Precontact period	Undetermined
09302.000149	Freeman's Bridge Road Site 2	Precontact period	Undetermined
09302.000150	Freeman's Bridge Road Site 3	Precontact period	Undetermined
09302.000151	Freeman's Bridge Road Site 4	Precontact period	Undetermined
09302.000154	Freeman's Bridge Road Site 7	Precontact period	Undetermined
09302.000071	Unnamed Site (NYSM 6254)	Precontact period	Undetermined
09302.000072	Unnamed Site (NYSM 6255)	Precontact period	Undetermined
09303.000127	Unnamed Site (NYSM 4751)	Precontact period	Undetermined
09302.000070	Unnamed Site (NYSM 6253)	Precontact period	Undetermined
---	Unnamed Site (NYSM 9201)	Precontact period	Undetermined
09302.000074	Unnamed Site (NYSM 6257)	Precontact period	Undetermined
09302.000032	Unnamed Site (NYSM 4745)	Precontact period	Undetermined
09302.000069	Unnamed Site (NYSM 6251)	Precontact period	Undetermined
---	Unnamed Site (NYSM 6252)	Precontact period	Undetermined
09302.000145	Yates Farm Precontact Site 1	Precontact period	Undetermined
09302.000146	Yates Farm Precontact Site 2	Precontact period	Undetermined
09303.000246	Edison Woods Precontact Site	Precontact period	Eligible

OPRHP Site #	Name	Period(s)	NRHP Status
09303.000238	Windsor Estates Precontact and Historic Site	Precontact period – Late Archaic/ Historic period	Eligible
09103.000091	Cryne Site (NYSM 971)	Precontact period (form missing)	Undetermined
09103.000092	Steinmetz Site (NYSM 970)	Precontact period (form missing)	Undetermined
09103.000323	Sugar Hill Road Precontact Site	Precontact period	Undetermined
09103.000102	Unnamed Site (NYSM 6235)	Precontact period	Undetermined
09303.000131	Unnamed Site (NYSM 6236)	Precontact period	Undetermined
09303.000245	Whitmyer Drive Precontact Site	Precontact period	Undetermined
09103.000093	Unnamed Site (NYSM 4730)	Precontact period	Undetermined
09303.000128	Unnamed Site (NYSM 4750)	Precontact period	Undetermined
09303.000134	Unnamed Site (NYSM 6239)	Precontact period	Undetermined
09340.000100	Old D&H Freight Yards	Unknown	Undetermined
09305.000162	Rotterdam Well Field Site	Unknown	Undetermined

Summary of Both Projects

The data collection and analysis demonstrated that the Project areas are sensitive for both Historic and Precontact period archaeological resources. Whether National Register-eligible or potential eligible archaeological sites are present within the Project Areas of Potential Effect (PAPE) will be determined based on the approved PAPE and study plan resulting from consultation with FERC, SHPO, and consulting parties.

4.10.3 Historic and Architectural Resources

Crescent Project

An examination of CRIS shows that the Crescent Project is located entirely within the boundaries of the New York State Barge Canal Historic District, listed on the NRHP, and recently designated a National Historic Landmark (NHL). Three of the NHL's contributing historic resources are located within the Crescent Project Boundary, including the Crescent Dam, Crescent Hydroelectric Plant, and Guard Gate Road Bridge. There are six additional inventoried historic resources located adjacent to the Crescent Project Boundary on the banks of the Mohawk River. These six are outside the boundaries of the New York State Barge Canal Historic District and are not contributing resources to it. The inventoried historic resources within or adjacent to the Crescent Project are summarized below in Table 4.10-3.

Table 4.10-3: Inventoried Historic Resources Within and Adjacent to the Crescent Project

USN/NR No.	Property Name	Location	NR/NHL Status	Description	Proximity to Project
14NR06559	New York State Barge Canal Historic District	Waterford to Tonawanda, Whitehall, Oswego and Waterloo	Listed – Criteria A and C; NHL	Twentieth century network of canals, canalized rivers, and lakes that allows commercial and pleasure vessels to pass from the Atlantic Ocean to the Great Lakes. Period of Significance 1905-1963	Project located within NHL Boundary
00104.000676	Crescent Dam	Cohoes-Crescent Rd., Colonie, NY	Listed – Criteria A and C; HAER NY-381	Built 1911, contributing resource to the New York State Barge Canal Historic District.	Within the Project Boundary
00104.000677	Crescent Hydroelectric Plant	Cohoes-Crescent Rd., Colonie, NY	Listed – Criteria A and C	Built 1925, contributing resource to the New York State Barge Canal Historic District.	Within the Project Boundary
Not shown in CRIS	Crescent Terminal	Terminal Road, Crescent Rd., Halfmoon, NY	Listed – Criteria A and C; HAER NY-380	Built 1914, contributing resource in the New York State Barge Canal Historic District.	Within the Project Boundary

USN/NR No.	Property Name	Location	NR/NHL Status	Description	Proximity to Project
09118.000244	Guard Gate 2	Flight Lock Road	Listed – Criteria A and C; HAER NY-379	Built 1911, contributing resource in the New York State Barge Canal Historic District	Within the Project Boundary
09110.000344	Church Hill Historic District	Town of Halfmoon, Saratoga Co.	Eligible – Criterion C	Contains 17 late-nineteenth century buildings	Adjacent to Project Boundary
93NR00446	Oakcliff	78 Church Hill Road, Crescent, Saratoga Co.	Listed, Criterion C	Nineteenth century Greek Revival house	Adjacent to Project Boundary
03NR05136	Noxon Bank Building	9 Terminal Road, Crescent, Saratoga Co.	Listed, Criteria A and C	Nineteenth century Greek Revival bank	Adjacent to Project Boundary
97NR01245	Crescent Methodist Episcopal Church	93 Church Hill Rd., Crescent, Saratoga Co.	Listed, Criterion C	Nineteenth century Greek Revival church	Adjacent to Project Boundary
94NR00698	Godfrey Farmhouse	1312 Loudon Rd	Listed – Criterion C	Nineteenth century Greek Revival house	0.20 miles east of Project Boundary
90NR02587	Vischer Ferry Historic District	Clifton Park, Saratoga Co.	Listed – Criteria A and C	Contains 70 buildings and archaeological sites	Adjacent to Project Boundary

Vischer Ferry Project

An examination of CRIS shows that the Vischer Ferry Project is also located entirely within the boundaries of the New York State Barge Canal Historic District. Three of the NHL's contributing historic resources are located within the Vischer Ferry Project Boundary, including the Vischer Ferry Dam, the Vischer Ferry Hydroelectric Plant, and Lock E-7 – Vischer Ferry. There are three additional inventoried historic resources located adjacent to the Vischer Ferry Project Boundary on the banks of the Mohawk River. These three are outside the boundaries of the New York State Barge Canal Historic District and are not contributing resources to it. The inventoried historic resources within or adjacent to the Vischer Ferry Project are summarized below in Table 4.10-4.

Table 4.10-4: Inventoried Historic Resources Within and Adjacent to the Vischer Ferry Project

USN/NR No.	Property Name	Location	NR/NHL Status	Description	Proximity to Project
14NR06559	New York State Barge Canal Historic District	Waterford to Tonawanda, Whitehall, Oswego and Waterloo	Listed – Criteria A and C; NHL	Twentieth century network of canals, canalized rivers, and lakes that allows commercial and pleasure vessels to pass from the Atlantic Ocean to the Great Lakes. Period of Significance 1905-1963	Project located within NHL Boundary
Not shown in CRIS	Delaware & Hudson RR Bridge (Bridge E-10)	City of Schenectady	Listed – Criteria A and C	Built 1911, contributing resource in the New York State Barge Canal Historic District.	Within Project Boundary
Not shown in CRIS	Railroad Bridge (Bridge E-12)	Schenectady County	Listed – Criteria A and C	Built 1874, contributing resource in the New York State Barge Canal Historic District.	Within Project Boundary
Not shown in CRIS	Lock E-7 – Vischer Ferry	Lock 7 Rd., Niskayuna, Schenectady Co.	Listed – Criteria A and C	Built 1907, contributing resource to the New York State Barge Canal Historic District. Includes the Lock, Vischer Ferry Dam 3 (south and	Within Project Boundary

USN/NR No.	Property Name	Location	NR/NHL Status	Description	Proximity to Project
				west of the lock), a powerhouse, lockhouse, and storehouse.	
Not shown in CRIS	Lock E-8, Scotia	South side of Mohawk River at end of Rice Town Rd, Town of Rotterdam, Schenectady Co.	Listed – Criteria A and C	Completed 1915, contributing resource in the New York State Barge Canal Historic District.	Within Project Boundary
Not shown in CRIS	Vischer Ferry Dam (Dam E-3)	Lock 7 Rd., Niskayuna, Schenectady Co.	Listed – Criteria A and C	Built 1907, contributing resource to the New York State Barge Canal Historic District.	Within Project Boundary
Not shown in CRIS	Vischer Ferry Hydroelectric Plant	North bank of Mohawk River, Clifton Park, Saratoga Co.	Listed – Criteria A and C	Built 1925, contributing resource to the New York State Barge Canal Historic District.	Within Project Boundary
09303.000250	Knolls Atomic Power Laboratory	2401 River Rd., Niskayuna, NY 12309	Eligible – Criterion A	1948 U.S. Atomic Energy Commission nuclear research and development laboratory	Adjacent to Project Boundary
90NR02649	Seely Farmhouse	2 Freeman's Bridge Rd., Schenectady, Schenectady Co.	Listed – Criteria B and C	Nineteenth century Greek Revival farmhouse	Adjacent to Project Boundary
90NR02654	Stockade Historic District	Schenectady, Schenectady Co.	Listed Criteria A, C, and D	Contains 376 resources	Adjacent to Project Boundary

4.11 Socio-Economic Resources (18 C.F.R. § 5.6 (d)(3)(xi))

4.11.1 Development Patterns

The Projects lie within five towns and three counties in the state of New York: the Town of Colonie in Albany County (Crescent Project); the Towns of Clifton Park (Crescent and Vischer Ferry Projects), Halfmoon (Crescent Project), and Waterford (Crescent Project) in Saratoga County; and the Town of Niskayuna (Crescent and Vischer Ferry Projects) in Schenectady County. The three surrounding counties are dominantly urban, ranging from 70 percent in Saratoga County to 92 percent in Schenectady County (Table 4.11-1). The five surrounding towns are dominantly urban ranging from 85 percent in the Town of Clifton Park to 100 percent in the Town of Niskayuna. Population densities within the surrounding towns range from 661.0 persons per square mile in the Town of Halfmoon to 1,539.1 persons per square mile in the Town of Niskayuna. In comparison, Albany County has 581.9 persons per square mile, Saratoga County has 271.1 persons per square mile, and Schenectady County has 756.6 persons per square mile. The population density for the State of New York is 411.2 persons per square mile.

Housing unit densities have a similar trend when compared to population densities, ranging from 302.1 units per square mile in the Town of Halfmoon to 636.4 units per square mile in the Town of Niskayuna. In comparison, Albany County has 263.5 units per square mile, Saratoga County has 121.8 units per square mile, and Schenectady County has 333.5 units per square mile (Table 4.11-1).

Vacancy rates for Albany County, at 8.3 percent, and Schenectady County, at 7.8 percent, are lower than that of the State of New York rate at 9.7 percent; while Saratoga County has a higher vacancy rate at 10.5 percent. The five towns abutting the Projects have a lower vacancy rate than the State of New York with a range of 4.0 percent in the Town of Niskayuna to 6.9 percent in the Town of Waterford (Table 4.11-2). In Saratoga County, the high vacancy rate seems to reflect the high percentage of seasonal housing with 53.1 percent of its housing stock in seasonal use.

4.11.2 Population Patterns and Projections

4.11.2.1 Current and Historical Population

Current and historical population projections for the municipalities abutting the Crescent and Vischer Ferry Projects are depicted in Table 4.11-3. Between 2000 and 2016, the population in the State of New York increased by 3.8 percent. The population of Albany County during the same time frame increased by 4.5 percent and the population of the Town of Colonie increased similarly by 4.6 percent. The population of Saratoga County during the same time frame increased by 12.1 percent. The population of the Town of Clifton Park increased by 12.1 percent while the population of the Town of Halfmoon increased by a staggering 25.7 percent and the population of the Town of Waterford decreased by one percent. The population of Schenectady County during the same time frame increased by 5.7 percent while the population of the Town of Niskayuna increased by 9.3 percent. Although historic populations of some abutting towns changed significantly since 2000, census estimates for 2016 indicate that populations in each of the abutting towns and counties either did not change or increased at a maximum of 7.8 percent from 2010 census populations.

4.11.2.2 Projected Changes in Population

Cornell University's Program on Applied Demographics has developed county-level population projections for the State of New York in ten-year increments through the year 2040. The projections are based on rates of change from historical data collected by the U.S. Census Bureau. Population counts from the 2010 U.S. Census serve as the starting point for projections. As shown in Table 4.11-4 the population of Albany County is projected to increase through the year 2020 then steadily decrease between 2020 and 2040, while populations for Saratoga and Schenectady Counties are projected to steadily increase from 2010 through 2040. The population of the State of New York is projected to steadily increase from 2010 until 2030 and then steadily decrease through 2040.

4.11.3 Economic and Employment Patterns

4.11.3.1 Labor Force and Unemployment

Labor force and unemployment estimates (2016) for the municipalities abutting the Projects are provided in Table 4.11-5. Schenectady County, with a 7.4 percent unemployment rate, is similar to the State of New York's unemployment rate of 7.5 percent. The unemployment rates for the other municipalities and counties abutting the Projects are all below the State of New York's unemployment rate, ranging from 2.8 percent in the Town of Clifton Park to 5.8 percent in Albany County.

4.11.3.2 Income and Poverty

All of the municipalities abutting the Projects have higher median household incomes than the State of New York, except for Schenectady County with a median household income about two percent lower than the State of New York. All of the abutting municipalities have a higher median household income than the United States ranging from 8 to 79 percent higher than the U.S median income of $55,332 (Table 4.11-6). Of the abutting municipalities, Schenectady County has the lowest per capita income (about 15 percent lower than the State of New York and 2 percent lower than the United States) and the Town of Clifton Park has the highest per capita income (about 32 percent higher than the State of New York and 51 percent higher than the United States) (Table 4.11-7). Schenectady County also has the second highest poverty rate, with 12 percent of all residents earning below the poverty threshold, and the Town of Clifton Park has the lowest poverty rate, with 2.8 percent of all residents earning below the poverty threshold (Table 4.11-8). Albany County has the highest poverty rate with 12.9 percent of all residents earning below the poverty threshold (Table 4.11-8).

4.11.3.3 Industry and Occupation

Table 4.11-9 depicts occupation categories for the abutting municipalities and the State of New York. Management, business, science and arts was the highest reported occupation category for all abutting municipalities and the State of New York. Natural resources, construction, and maintenance was the lowest reported occupation category for the majority of the abutting municipalities as well as for the State of New York.

Table 4.11-10 depicts industry categories for the abutting municipalities and the State of New York. Agriculture, forestry, fishing and hunting, and mining was the lowest reported industry category across

all municipalities and the State of New York. Educational services and health care and social assistance was the highest reported category across all municipalities and the State of New York.

Table 4.11-1: Place of Residence and Density, 2010

	Place of Residence: Urban	Place of Residence: Rural	Population	Persons Per Square Mile	Housing Units	Housing Units Per Square Mile	Location[1]
Albany County	90%	10%	304,204	581.9	137,739	263.5	C
Town of Colonie	99%	1%	81,591	1,458.5	34,620	618.8	C
Saratoga County	70%	30%	219,607	271.1	98,656	121.8	C, VF
Town of Clifton Park	85%	15%	36,705	761.5	14,737	305.7	C, VF
Town of Halfmoon	86%	14%	21,535	661.0	9,844	302.1	C
Town of Waterford	93%	7%	8,423	1,282.7	3,897	593.4	C
Schenectady County	92%	8%	154,727	756.6	68,196	333.5	C, VF
Town of Niskayuna	100%	0%	21,781	1,539.1	9,006	636.4	C, VF
State of New York	88%	12%	19,378,102	411.2	8,108,103	172.1	C, VF

Source: Census, 2010b.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-2: Housing Characteristics, 2010 (% of Total Units)

	Housing Units: Total	Occupancy Status: Occupied	Occupancy Status: Vacant	Seasonal Use	Location[1]
Albany County	137,739	91.70%	8.30%	14.30%	C
Town of Colonie	34,620	95.60%	4.40%	14.00%	C
Saratoga County	98,656	89.50%	10.50%	53.10%	C, VF
Town of Clifton Park	14,737	95.70%	4.30%	13.10%	C, VF
Town of Halfmoon	9,844	94.30%	5.70%	14.00%	C
Town of Waterford	3,897	93.10%	6.90%	13.70%	C
Schenectady County	68,196	92.20%	7.80%	7.50%	C, VF
Town of Niskayuna	9,006	96.00%	4.00%	22.20%	C, VF
State of New York	8,108,103	90.30%	9.70%	36.60%	C, VF

Source: Census, 2010a.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-3: Population, 2000 through 2016

	2000	2010	2016	Location[1]
Albany County	294,565	304,204	307,891	C
Change		3.3%	1.2%	
Cumulative from 2000		3.3%	4.5%	
Town of Colonie	79,258	81,591	82,893	C
Change		2.9%	1.6%	
Cumulative from 2000		2.9%	4.6%	
Saratoga County	200,635	219,607	224,929	C, VF
Change		9.5%	2.4%	
Cumulative from 2000		9.5%	12.1%	
Town of Clifton Park	32,995	36,705	37,001	C, VF
Change		11.2%	0.8%	
Cumulative from 2000		11.2%	12.1%	
Town of Halfmoon	18,474	21,535	23,219	C
Change		16.6%	7.8%	
Cumulative from 2000		16.6%	25.7%	
Town of Waterford	8,515	8,423	8,423	C
Change		-1.0%	0%	
Cumulative from 2000		-1.0%	-1.0%	
Schenectady County	146,555	154,727	154,845	C, VF
Change		5.6%	0.1%	
Cumulative from 2000		5.6%	5.7%	
Town of Niskayuna	20,295	21,781	22,177	C, VF
Change		7.3%	1.8%	
Cumulative from 2000		7.3%	9.3%	
State of New York	18,976,457	19,378,102	19,697,457	C, VF
Change		2.1%	1.6%	
Cumulative from 2000		2.1%	3.8%	

Source: Census, 2016a.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-4: Population Projections, 2020 through 2040

	2010 Est.	2020 Proj.	2030 Proj.	2040 Proj.	Location[1]
Albany County	304,204	306,069	304,322	296,686	C
Change		0.6%	-0.6%	-2.5%	
Cumulative from 2010		0.6%	0.0%	-2.5%	
Saratoga County	219,607	231,815	240,507	244,079	C, VF
Change		5.6%	3.7%	1.5%	
Cumulative from 2010		5.6%	9.5%	11.1%	
Schenectady County	154,727	162,383	169,104	173,106	C, VF
Change		4.9%	4.1%	2.4%	
Cumulative from 2010		4.9%	9.3%	11.9%	
State of New York	19,378,102	19,697,021	19,794,733	19,623,506	C, VF
Change		1.6%	0.5%	-0.9%	
Cumulative from 2010		1.6%	2.2%	1.3%	

Source: Vink, 2017.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-5: Labor Force and Unemployment, 2016

	Labor Force	Unemployment	Location[1]
Albany County	256,626	5.8%	C
Town of Colonie	69,045	4.5%	C
Saratoga County	182,915	5.4%	C, VF
Town of Clifton Park	295,520	2.8%	C, VF
Town of Halfmoon	19,038	4.6%	C
Town of Waterford	7,108	5.6%	C
Schenectady County	124,796	7.4%	C, VF
Town of Niskayuna	17,139	4.5%	C, VF
State of New York	15,964,950	7.5%	C, VF

Source: Census, 2016b.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-6: Median Household Income, 2016

	Median Household Income	Percentage of State	Percentage of U.S.[1]	Location[2]
Albany County	$60,904	100.3%	110.1%	C
Town of Colonie	$72,135	118.8%	130.4%	C
Saratoga County	$74,080	122.0%	133.9%	C, VF
Town of Clifton Park	$97,000	159.7%	175.3%	C, VF
Town of Halfmoon	$71,741	118.1%	129.7%	C
Town of Waterford	$60,977	100.4%	110.2%	C
Schenectady County	$59,959	98.7%	108.4%	C, VF
Town of Niskayuna	$99,394	163.6%	179.6%	C, VF
State of New York	$60,741	100%	109.8%	C, VF

Source: Census, 2016c.

[1]U.S. Median Household Income: $55,332

[2] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-7: Per Capita Income, 2016

	Per Capita Income	Percentage of State	Percentage of U.S.[1]	Location[2]
Albany County	$33,888	99.1%	113.6%	C
Town of Colonie	$36,405	106.4%	122.0%	C
Saratoga County	$37,583	109.9%	126.0%	C, VF
Town of Clifton Park	$44,999	131.5%	150.9%	C, VF
Town of Halfmoon	$40,745	119.1%	136.6%	C
Town of Waterford	$30,753	89.9%	103.1%	C
Schenectady County	$29,212	85.4%	97.9%	C, VF
Town of Niskayuna	$43,647	127.6%	146.3%	C, VF
State of New York	$34,212	100%	114.7%	C, VF

Source: Census, 2016c.

[1]U.S. Per Capita Income: $29,829

[2] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-8: Poverty Status, 2016

	Poverty Status: All People	Poverty Status: Under 18 Years	Poverty Status: 18-64 Years	Poverty Status: Over 65 Years	Location[1]
Albany County	12.9%	15.8%	13.3%	7.4%	C
Town of Colonie	4.1%	7.2%	3.9%	1.9%	C
Saratoga County	6.4%	7.4%	6.4%	5.4%	C, VF
Town of Clifton Park	2.8%	1.9%	3.3%	2.6%	C, VF
Town of Halfmoon	8.2%	10.4%	7.4%	8.9%	C
Town of Waterford	7.0%	11.9%	6.5%	3.2%	C
Schenectady County	12.0%	19.6%	10.6%	6.4%	C, VF
Town of Niskayuna	5.4%	5.9%	5.6%	4.1%	C, VF
State of New York	15.5%	21.9%	14.2%	11.4%	C, VF

Source: Census, 2016c.

[1] C = Crescent Project; VF = Vischer Ferry Project

Table 4.11-9: Occupations for Civilian Population 16 Years and Over, 2016

	Albany County	Town of Colonie	Saratoga County	Town of Clifton Park	Town of Halfmoon	Town of Waterford	Schenectady County	Town of Niskayuna	State of New York
Management, Business, Science, and Arts	67,955	19,301	51,441	10,975	5,891	1,578	28,353	6,082	3,703,893
Service	27,442	6,802	17,202	1,845	1,937	1,008	14,053	865	1,886,907
Sales and Office	40,511	11,845	27,610	4,141	3,018	1,352	19,104	2,107	2,197,680
Natural Resources, Construction, and Maintenance	8,586	2,192	8,780	1,157	880	337	4,763	558	673,905
Production, Transportation, and Material Moving	11,870	3,168	9,813	981	893	636	7,544	437	878,493

Source: Census, 2016c.

Table 4.11-10: Industry for Civilian Population 16 Years and Over, 2016

	Albany County	Town of Colonie	Saratoga County	Town of Clifton Park	Town of Halfmoon	Town of Waterford	Schenectady County	Town of Niskayuna	State of New York
Agriculture, Forestry, Fishing and Hunting, and Mining	526	133	1,102	100	92	4	253	45	55,439
Construction	7,282	2,007	6,981	1,249	556	350	3,329	272	520,223
Manufacturing	8,005	2,416	11,307	1,771	1,445	340	5,171	847	592,969
Wholesale Trade	2,911	1,072	2,936	547	347	142	1,424	130	229,666
Retail Trade	17,336	5,028	13,974	2,045	1,556	564	9,838	1,037	1,003,363
Transportation and Warehousing, and Utilities	5,602	1,444	3,691	626	319	257	3,427	379	480,578
Information	3,565	1,152	2,236	386	236	125	1,527	236	274,060
Finance and Insurance, and Real Estate and Rental and Leasing	11,277	3,689	8,464	1,653	1,070	335	4,848	903	752,488
Professional, Scientific, and Management, and Administrative and Waste Management Services	16,648	4,285	13,412	2,512	1,814	491	7,384	1,559	1,083,408
Educational Services, and Health Care and Social Assistance	42,240	11,169	28,899	4,909	2,905	1,164	20,813	2,925	2,561,790

	Albany County	Town of Colonie	Saratoga County	Town of Clifton Park	Town of Halfmoon	Town of Waterford	Schenectady County	Town of Niskayuna	State of New York
Arts, Entertainment, and Recreation, and Accommodation and Food Services	14,380	3,675	10,135	1,072	947	592	6,189	478	893,814
Other Services Except Public Administration	7,575	2,158	4,099	622	493	186	3,522	405	465,669
Public Administration	19,017	5,080	7,610	1,607	839	361	6,092	833	427,411

Source: Census, 2016c.

4.12 Native American Resources (18 C.F.R. § 5.6 (d)(3)(xii))

There are no Native American lands within the boundaries of the Projects. In November 2018 and January 2019, FERC contacted two Native American nations to solicit their interest in participating in the relicensing process for the Projects: the Saint Regis Mohawk Tribe and the Stockbridge Munsee Community, Wisconsin (FERC, 2018a and FERC, 2018b). In addition, the OPRHP, Division for Historic Preservation has identified the Delaware Tribe, Mohawk Nation, and Mohican Tribe as potentially having an interest in the Project areas (New York State OPRH, 2018).

The Power Authority contacted the nations potentially having an interest in the Project areas to request any existing, relevant, and reasonably available information with respect to resources of concern.

Two nations have responded to FERC's request. The Saint Regis Mohawk Tribe has indicated that it wishes to be a consulting party on the Vischer Ferry Project (Saint Regis Mohawk Tribe, 2018). The Stockbridge Munsee Community, Wisconsin has opted not to participate in consultation but asks to be notified in the event of inadvertent discoveries of cultural resources during any construction (FERC, 2019a and FERC, 2019b).

Currently, there are several known properties of traditional cultural significance (i.e., traditional cultural properties or TCPs) or religious properties or National Register-eligible sites associated with Native American nations within the boundaries of the Projects.

5 PRELIMINARY ISSUES AND STUDIES LIST (18 C.F.R. § 5.6 (d)(4))

5.1 Issues Pertaining to Identified Resources

Based on the information the Power Authority provided in Section 4, sufficient information already exists for the majority of environmental resources at the Projects. As such, and as discussed in Section 5.2, the Power Authority is proposing two studies: 1) baseline water quality assessment; and 2) Project recreation site inventory.

5.1.1 Geology and Soils

Based on the extensive information that is available for the Project area, the Power Authority believes that it has sufficient information to adequately characterize geology and soil resources within the Project Boundaries of both Projects. Erosion and sedimentation are the most common issues associated with geology and soils at hydropower projects. At the Crescent and Vischer Ferry Projects which are operated as run of river, impoundment level fluctuations are minimal, and the removal of flashboards in winter, which results in a slightly lower water level, helps to protect the impoundment shorelines from the erosional forces of winter ice. Given the composition, characteristics, and conditions of the impoundment, shoreline erosion is not an issue, and any erosion that is occurring at the Project is a result of natural river flows unrelated to project operations. Nor is there any evidence that the Projects result in sedimentation or sedimentation patterns that are adversely effecting Project resources, or Project operations.

There are currently no known issues related to geology and soils at the Crescent and Vischer Ferry Projects. As a result, no further studies of geology and soils are necessary or proposed.

5.1.2 Water Resources

As described in Section 4.3, extensive water quality data collected for the Mohawk River by NYSDEC and others within the Project boundaries as well as upstream and downstream of the Project, strongly suggests that Project water quality is good and meets the current classification standards established by NYSDEC. In addition, because the two Projects are operated as run of river, and because the impoundments are relatively shallow and riverine in nature, it is not likely that the operation of the Projects causes impoundment stratification or significant warming of impoundment waters that could lead to downstream releases of high temperature or low dissolved oxygen waters. However, there is no recent water quality data specific to the Project impoundments and tailwater areas that clearly demonstrates that the Projects and their operation are not impacting water quality or do not meet state water quality standards.

To fill this data gap, the Licensee is proposing to conduct a water quality study of the Projects to demonstrate that temperature and DO conditions in the impoundments and Project tailwater areas are meeting applicable state water quality standards. The Licensee will consult with the NYSDEC and other resource agencies to ensure that the methods used for this study follow state protocols and that monitoring locations will be representative of Project impoundment and tailwater conditions.

5.1.3 Fish and Aquatic Resources

As discussed extensively in Section 4.4, the fish and aquatic community of the Mohawk River in the vicinity of the Projects, as well as upstream and downstream of the Projects, has been extensively studied by NYSDEC, the USGS, and other agencies and organizations. The Mohawk River supports a healthy and abundant coolwater and warmwater fishery with abundant game species including smallmouth bass and walleye. The river also supports several diadromous fish species that have been afforded access to the river above Cohoes Falls by the Canal System locks. Lock passage by the catadromous American eel and the anadromous blueback herring, American shad and alewife has been well documented at many river lock systems in the United States, and the existing run of blueback herring in the Mohawk River exists solely because herring make excellent use of the Canal System and locks for upstream passage.

Significant further enhancement to fish passage has been made by the Licensee at both Project dams. Since the 1990s, the Licensee has operated and maintained a hydroacoustic deterrent system at both the Crescent and Vischer Ferry Projects. In conjunction with seasonal operation of the acoustic array, the Licensee provides openings in the flashboards at the two Projects during the primary out-migration seasons for juvenile and adult herring. The flashboard openings, which are located to optimize use by the fish, in combination with the hydroacoustic arrays ensure that the majority of outmigrating herring are deterred from the Project powerhouses, and exit the river through the flashboard openings, over the flashboards and spillways during flood events, or through the canal locks. Numerous studies of the effectiveness of the acoustic array systems previously conducted by the Licensee have clearly demonstrated the effectiveness of the existing acoustic array deterrence system (Gurshin et al., 2014a, Gurshin et al., 2014b). The Licensee has also previously studied turbine passage survival rates for entrained fish, and the results of those studies demonstrated that turbine passage survival rates for juvenile blueback herring is very high; 96% survival.

Because the resident fishery of the Mohawk River is healthy and has been well studied, and because the Projects are operated as run of river and thereby sustain natural river flows with minimal fluctuation to impoundment levels, continued Project operation will not have a significant effect on the resident fish and aquatic life, and the Licensee is proposing no studies of resident fish. Similarly, because the existing runs of diadromous fish species, including blueback herring, have become well established in the 150 years since the canal and lock system was first constructed on the river, and because the Licensee has already undertaken significant measures to enhance and study downstream fish passage at the Projects through the installation and operation of an acoustic array system that has been demonstrated to be very effective, the Licensee is proposing no additional study of diadromous fish species at the Project.

There are currently no known issues related to resident fish and aquatic resources at either the Crescent or Vischer Ferry Projects. As a result, no further studies of resident or diadromous fish are necessary or proposed.

5.1.4 Wildlife and Botanical Resources

As discussed in Section 4.5, there is a very limited amount of terrestrial habitat located within the Project Boundaries of the Crescent and Vischer Ferry Projects. Out of the approximately 2,151 acres within the Crescent Project Boundary, only 162 acres are upland (74.5 acres of this is comprised of islands and the remainder is primarily used for Project operations which includes the powerhouse, dams and switchyard. Out of the approximately 1,156 acres within the Vischer Ferry Project Boundary, only 86 acres are upland (1.7 acres of islands the and the remainder is primarily used for Project operations which includes the powerhouse, dams and switchyard). In addition, there is sufficient information about the wildlife and botanical resources that occur in the area of the Projects to characterize and describe existing wildlife and botanical resources and the effects of Project operations on those resources.

Because there are minimal upland areas within the boundaries of the Projects, and because the Projects are operated as run-of-river with minimal fluctuation of impoundment levels, the continued operation of the Projects will have little or no impact on wildlife and botanical resources. As a result, no further wildlife and botanical studies are necessary or proposed.

5.1.5 Wetlands, Riparian, and Littoral Habitat

The FERC Project Boundary for both the Crescent and Vischer Ferry Projects generally follows the normal full pool elevation of the impoundments; as such, there is a very limited amount of wetland, riparian, or littoral habitat within the boundaries of the Projects. The wetlands and riparian communities that currently exist within the boundaries of the Project have become established under the current run-of-river operating regime that has been in place for nearly a hundred years.

Because the Projects are operated as run-of-river with minimal fluctuation of impoundment levels, the Projects do not significantly impact wetland, riparian, or littoral habitats. As a result, no further wetland, riparian, or littoral habitat studies are necessary or proposed.

5.1.6 Rare, Threatened, and Endangered Species

As discussed in Section 4.7, there is only one federally listed species (northern long-eared bat) likely to occur at the Projects. Similarly, state-listed species expected to occur at the Projects are limited to a single plant species (Culver's root), the bald eagle, and the osprey. There is a limited amount of botanical and wildlife habitat located within the boundaries of the Crescent and Vischer Ferry Projects that would support RTE species that have the potential to be present within the Project Boundaries. Existing communities that may potentially exist within either of the Project Boundaries, if any, would have become established under the current operating regime that has existed for nearly a hundred years.

There are currently no known issues related to RTE species at the Projects. Because there are few RTE species likely to occur in the Project Boundaries and because the Licensee is proposing no construction and no changes to Project operations, no further studies for rare, threatened and endangered species are necessary or proposed.

5.1.7 Recreation and Land Use

As discussed in Section 4.8, public recreation opportunities abound at the Crescent and Vischer Ferry Projects. Because the Projects are integrated with and operated in close coordination with the Canal System, and because the Canal System itself is used primarily for recreation purposes, the entire Project area for both Projects affords excellent public recreation opportunities. The list of public recreation sites that provide access to Project waters and lands provided in Section 4.8 demonstrates that there is excellent access for both water and land-based recreation opportunities. The Licensee maintains a boat launch site that provides access to the Vischer Ferry impoundment, provides overlook parking at Vischer Ferry, and shoreline tailrace fishing downstream of Vischer Ferry, and at the Crescent Project the Licensee provides a downstream fishing access and picnic area. These sites in combination with the many other recreation sites, facilities and amenities provided by the NYCC and the adjacent towns and cities, ensure excellent public recreation opportunities at the Project.

However, since the Licensee has not made a recent inventory of the Project recreation sites, facilities and amenities in several years, the Licensee is proposing to conduct a Project recreation site facility inventory for the Crescent and Vischer Ferry Projects. The inventory will include development of site maps indicating the location of Project recreation sites, facilities and amenities in relation to the Project boundary, and an assessment of the condition and function of the Project sites, facilities and amenities (including signage). Resulting inventory information will be sufficient to allow the Licensee to develop a Recreation Management Plan for the Projects, which will be included in the FERC License Applications.

5.1.8 Aesthetic Resources

There are currently no known issues related to aesthetic resources at the Crescent and Vischer Ferry Projects. As a result, no further studies for this resource are necessary or proposed.

5.1.9 Cultural Resources

As discussed extensively in Section 4.10, due to their long association with the Canal System, historic resources at the Project have been extensively studied and documented. All of the Crescent and Vischer Ferry Project facilities have been evaluated for their historic significance, and many including the Project dams and powerhouses, have been determined to be contributing elements to the New York State Barge Canal Historic District, listed on the NRHP, and recently designated a National Historic Landmark (NHL). Historic and precontact archaeological sites too have been well studied and are documented on CRIS. Because Project cultural resources have been well studied and documented, and because there are currently no known issues related to cultural resources at the Crescent and Vischer Ferry Projects, pending consultation with the SHPO, no further studies for cultural resources are proposed at this time.

5.1.10 Socio-Economic Resources

There are currently no known issues related to socioeconomic resources at the Crescent and Vischer Ferry Projects. As a result, no further studies for this resource are necessary or proposed.

5.1.11 Tribal Resources

There are currently no known issues related to tribal resources at the Crescent and Vischer Ferry Projects. Pending consultation with the Tribal Nations, no further studies are proposed at this time.

5.2 Potential Studies or Information Gathering

This section identifies potential studies or information gathering that may be needed to analyze the preliminary resource issues identified in Section 5.1.

5.2.1 Water Quality Study

The Power Authority is proposing to conduct a water quality study of the Crescent and Vischer Ferry Projects to assess current dissolved oxygen (DO) and temperature conditions at the Projects to ensure the Projects are meeting state water quality standards for these parameters.

5.2.1.1 Study Objective

The objective of the study is to evaluate the water temperature and dissolved oxygen conditions in the Project impoundments and tailwaters during appropriate low flow, warm water conditions.

5.2.1.2 Project Nexus

Flow through the Projects and the operation of the Project impoundments and generating stations can modify water temperatures and DO concentrations resulting in Project waters potentially not meeting applicable state water quality standards.

5.2.1.3 Methodology / Level of Effort

The proposed water quality study would follow standard NYSDEC protocols for evaluating compliance with applicable DO and temperature water quality standards at the Projects.

5.2.2 Recreation Site and Facility Inventory

5.2.2.1 Study Objective

The objective of the study is to inventory and conduct a condition assessment of each of the Project recreation sites.

5.2.1.2 Project Nexus

Project recreation sites provide the public with opportunities to access and use the Projects for recreation purposes. While public recreation sites and access opportunities abound at the Projects, the Licensee is responsible for operating and maintaining certain Project recreation sites as part of the FERC licensed Projects.

5.2.1.3 Methodology / Level of Effort

The recreation inventory study will follow standard methods for assessing each of the Project recreation sites. The assessment will include a description of the site, an inventory of the facilities and amenities provided at the site, photographs of the site/facilities/amenities, an estimate of parking capacity provided at the site, an assessment of the overall condition of the site using a standardized condition rating scale, and general observations on site use, condition, and accessibility.

5.3 Relevant Qualifying Comprehensive Waterway Plans

Section 10(a)(2)(A) of the Federal Power Act (FPA), 16 U.S.C. § 803(a)(2)(A), requires FERC to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway affected by the project. FERC Order No. 481-A, issued on April 27, 1998, established that FERC will accord comprehensive plan status under FPA Section 10(a)(2)(A) to any Federal or state plan that:

- Is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- Specifies the standards, the data, and the methodology used; and
- Is filed with the Secretary of the Commission.

FERC currently lists 49 comprehensive plans for the State of New York, 16 of which pertain to waters in the vicinity of the Crescent and Vischer Ferry Projects.

- Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999
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- 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. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

Source: FERC Revised List of Comprehensive Plans, December 2018.

5.4 Relevant Qualifying Resource Management Plans

In addition to the qualifying Federal and state comprehensive waterway plans listed in Section 5.3 above, some agencies have developed resource management plans to help guide their actions regarding specific resources of jurisdiction. The resource management plans listed below may be relevant to the Crescent and Vischer Ferry Projects and may be useful in the relicensing proceeding for characterizing desired conditions.

- New York State Department of Environmental Conservation (NYSDEC). 2011. New York State Invasive Species Management Strategy. Ecology and Environment, Inc.

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APPENDIX A: Consultation/Correspondence Summary

Crescent and Vischer Ferry Projects Consultation/Correspondence Summary

Date	Correspondence Type	Correspondence From	Correspondence To	Description
4/9/2019	Meeting			NYPA and USFWS informal meeting in Cortland, NY
3/27/2019	Email	Cindy Brady (NYPA)	Dr. K. Limburg (State University of New York College of Environmental Science and Forestry [SUNY ESF])	Information Request for the Pre-Application Document
3/27/2019	Email	Cindy Brady (NYPA)	C. Hodkin (SUNY ESF)	Information Request for the Pre-Application Document
3/27/2019	Email	Cindy Brady (NYPA)	D. Carlson (NYSDEC)	Information Request for the Pre-Application Document
3/27/2019	Email	Cindy Brady (NYPA)	M. Chalupnicki (USGS)	Information Request for the Pre-Application Document
3/12/2019	Letter	David A. Stilwell, USFWS	Cindy Brady, NYPA	Response to Information Request for the Pre-Application Document
11/29/2018	FERC Docket Post	Arnold L Printup, III	FERC Docket	The Saint Regis Mohawk Tribe wishes to be a consulting party on Project 4679 Vischer Ferry Hydroelectric Project
11/14/2018	Letter	Cindy Brady (NYPA)	David Stilwell (New York Field Office, USFWS)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Duncan Hay (Northeast Region NPS)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Joseph Seebode (USACE)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Bruce Maytubby (Bureau of Indian Affairs)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	John Fowler (Advisory Council on Historic Preservation)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Keith Goertz (Region 4 NYSDEC)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Tom Allworth (New York State Parks, Recreation & Historic Preservation)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	David Mellen (Engineering, Construction & Maintenance NY State Canal Corporation)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Daniel Mackay (NYS Division of Historic Preservation)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Arnold Printup, Jr. (Saint Regis Mohawk Tribe)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Michael Conners, Jr. (Saint Regis Mohawk Tribe)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Beverly Cook (Saint Regis Mohawk Tribe)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Eric Thompson (Saint Regis Mohawk Tribe)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Bonney Hartley (Stockbridge Munsee Community, Wisconsin)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Brice Obermeyer (Delaware Tribe Historic Preservation Office)	Information Request for the Pre-Application Document
11/14/2018	Letter	Cindy Brady (NYPA)	Mohawk Nation Council of Chiefs	Information Request for the Pre-Application Document

Leclerc, Lauren G.

From: Bley, Wendy
Sent: Wednesday, March 27, 2019 12:29 PM
To: mchalupnicki@usgs.gov; douglas.carlson@dec.ny.gov; klimburg@esf.edu; cnewellh@syr.edu
Cc: Brady, Cindy; Leclerc, Lauren G.
Subject: New York Power Authority Crescent and Vischer Ferry Hydroelectric Project Information
Attachments: 2019_03_27 NYPA Letter Re _ PAD Info for Crescent and Vischer Ferry Projects.pdf

Good afternoon,

On behalf of the New York Power Authority, please see the attached letter requesting resource information for the Crescent and Vischer Ferry hydroelectric projects located on the Mohawk River in New York. Please let me know if you cannot open or read the attached file. Thank you. -Wendy Bley

Wendy Bley
Project Manager, Hydropower
Planning, Permitting and Licensing

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NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

March 27, 2019

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Recipient:

The Power Authority of the State of New York (Power Authority) owns and operates the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (collectively-Projects) which are both licensed by the Federal Energy Regulatory Commission (FERC). Both Projects are located on the Mohawk River in New York and the current operating licenses expire on May 31, 2024. In accordance with FERC's regulations, the Power Authority must file a Notice of Intent (NOI) to relicense the Projects with FERC between November 30, 2018 and May 31, 2019. At the same time, the Power Authority is required to file a Preliminary Application Document (PAD) for the Projects.

Because the two Projects are located close to each other on the Mohawk River, are essentially "twins" sharing nearly identical operating characteristics, and have licenses expiring on the same day, May 31, 2024, the Power Authority plans to prepare a single PAD that covers both Projects. The PAD will provide existing, relevant, and reasonably available information that pertains to the Projects.

The Crescent Project (FERC No. 4678) is located on the Mohawk River at the junction of Saratoga, Albany, and Schenectady Counties, in the Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna Townships, all in New York State. It is located 10 miles downstream of the Power Authority's Vischer Ferry Project (FERC No. 4679). The Vischer Ferry is located on the Mohawk River in Saratoga and Schenectady Counties, in the Clifton Park and Niskayuna Townships and the City of Schenectady, all in New York State.

In November 2018, the Power Authority sent letters to state and federal resource agencies requesting resource information for the Projects. Because of the federal government shut-down in December and January, the Power Authority just recently received a response from the U.S. Fish and Wildlife Service (see attached USFWS letter dated March 12, 2019). In that letter, the USFWS suggests that we reach to several other individuals who might have information about fish and aquatic resources in the Mohawk River in the vicinity of the Projects. Accordingly, we are reaching out to you as suggested by the USFWS.

We are requesting your assistance in identifying existing relevant and reasonably available information that describes fish and aquatic resources in the vicinity of the Projects. We will compile this data with information already in our possession for incorporation into the PAD.

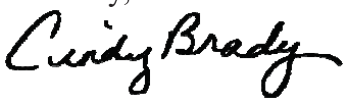
Because we are planning to file the PAD by April 30, 2019, your response to this request for information by April 12, 2019 would be appreciated. Any relevant information received after April 12, 2019 will still be accepted and will be considered as part of the comments received on the PAD.

We thank you in advance for providing any pertinent information that meets the criteria for inclusion in the PAD. Please forward the information electronically via email, or by CD or DVD, to my attention at: Cindy.Brady@nypa.gov.

The mailing address is: New York Power Authority, 123 Main Street, White Plains, NY 10601: Attention Cindy Brady, Mail Stop 6B.

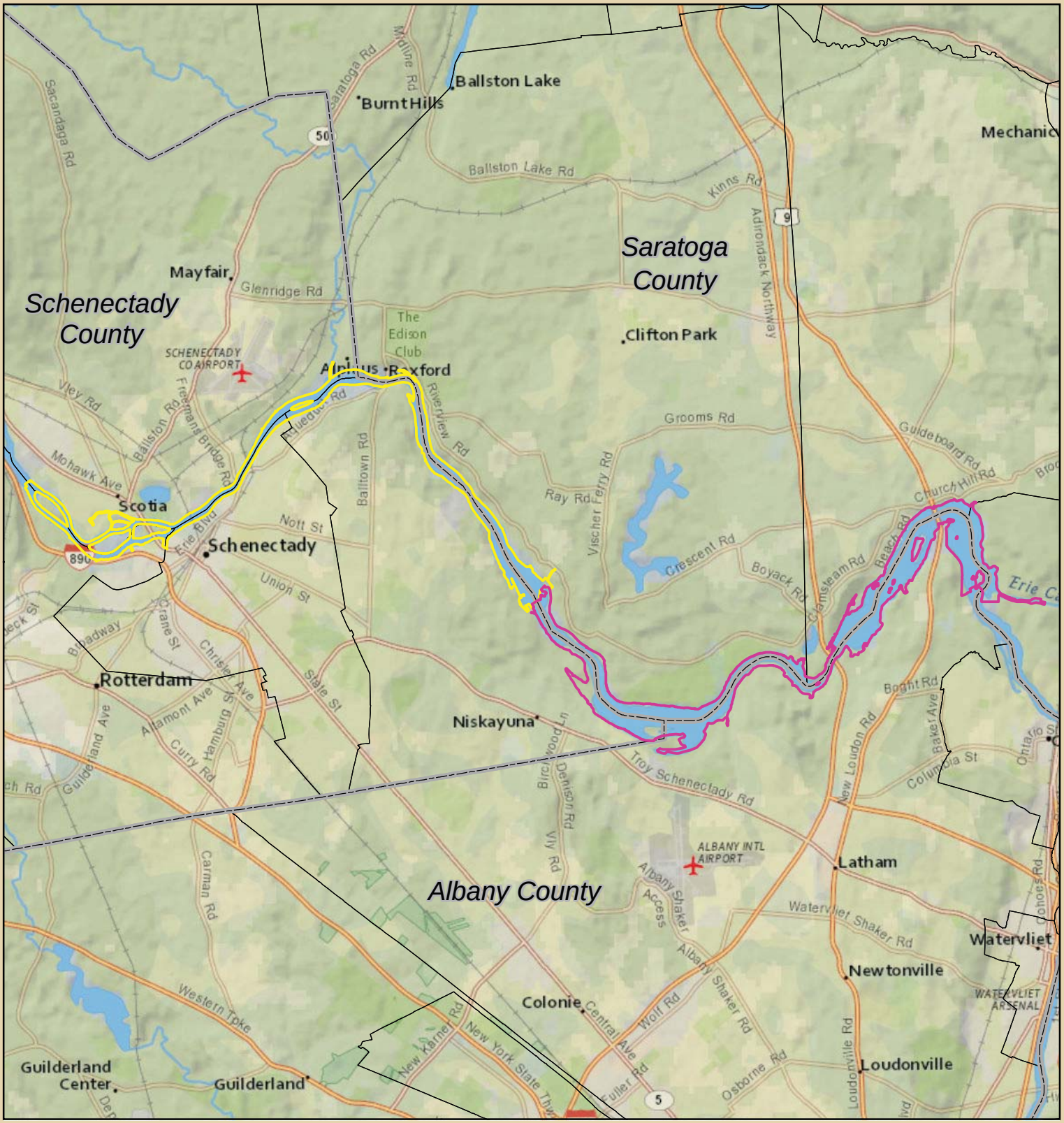
We have engaged the environmental consulting firm TRC to assist us with this FERC relicensing effort. Wendy Bley at TRC is our Project Manager. We look forward to working with you throughout the process. If you have any questions regarding the Projects or the relicensing process, please contact me at 914-287-3153.

Sincerely,



Cindy Brady

Attachments: Map of Project Location
USFWS Letter dated March 12, 2019



New York Power Authority

Crescent & Vischer Ferry Hydroelectric Projects

Project Location Map

Created: 12/4/2018

TRC
14 Gabriel Drive
Augusta, ME 04330

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

FERC No. 4678
FERC No. 4679

March 12, 2019

Ms. Cindy Brady
New York Power Authority
123 Main Street
White Plains, NY 10601

RE: Crescent (FERC No. 4678) and Vischer Ferry (FERC No. 4679) Hydroelectric Projects
Information Request for the Pre-Application Document

Dear Ms. Brady:

The U.S. Fish and Wildlife Service (Service) has reviewed the November 14, 2018, letter from the New York Power Authority (NYPA) requesting existing relevant and reasonably available information for the Crescent (FERC No. 4678) and Vischer Ferry (FERC No. 4679) Hydroelectric Projects (Project or Projects) located on the Mohawk River Saratoga, Albany, and Schenectedy Counties, New York. The NYPA authority is requesting this information in advance of preparing the Pre-Application Document (PAD) for the Projects' relicensing by the Federal Energy Regulatory Commission (FERC or Commission). The Service is providing the following information in support of this request:

Federally Listed Species

As you are aware, federal agencies, such as the Commission, have responsibilities under Section 7 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to consult with the Service regarding projects that may affect federally listed species or designated "critical habitat," and confer with the Service regarding projects that are likely to jeopardize federally proposed species or adversely modify proposed "critical habitat." We expect that the NYPA will be named the non-federal representative by the Commission for the purposes of completing informal consultation with the Service pursuant to Section 7(a)(2) of the ESA. In preparation of the PAD, the NYPA should consult our website at http://www.fws.gov/northeast/nyfo/es/section7.htm.

Please go to this site and follow the instructions to obtain: an official list request response; information about listed, proposed, and candidate species; and steps to complete initial assessments of whether a species may be present and impacted by a proposed action. Please note that this process involves two parts: 1) visiting the Service's IPaC website to obtain an official species list; and 2) returning to the New York Field Office's website to complete the remaining steps in determining your project's potential impacts. Please provide the outputs from the IPaC website and NYPA's review of potential impacts from any continued and proposed operations in the PAD.

Fisheries

Blueback herring (*Alosa aestivalis)* (BBH) and American eel (*Anguilla rostrata*) are migratory fish species known to occur throughout the Mohawk River watershed. We expect that the NYPA will consult with the New York State Department of Environmental Conservation (NYSDEC) regarding their survey data for these species. Extensive information regarding BBH in the Mohawk River may be found in the NYSDEC commissioned studies of this species during 1999-2001.[1,2] Additionally, extensive information regarding American eel in the Mohawk River may be found in a NYSDEC commissioned report.[3] Finally, the NYSDEC, in cooperation with the Service, has prepared a draft watershed agenda[4] for the Mohawk River that may be filed with the Commission as a Comprehensive Plan under Section 10(a)(2)(A) of the Federal Power Act. We also recommend that the NYPA consult with the State University of New York College of Environmental Science and Forestry[5] regarding ongoing studies of BBH in the Mohawk River. The Service recommends that these information sources be incorporated into the PAD prepared by the NYPA for the Projects.

Lake sturgeon (*Acipenser fulvescens*) have been noted as occurring in the Mohawk River, more definitively and in lower portions of the Mohawk River in recent years. It is our understanding that occurrence data can be obtained regarding this species in the Mohawk River from the NYSDEC[6] and United States Geological Survey.[7] The Service recommends that the NYPA review the occurrence of this species and potential impacts from current or proposed operations of the Projects in the PAD.

* * * * *

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[1] Normandeau Associates, Inc. 2007. Spawning stock characteristics of Alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) in the Hudson River Estuary and Tributaries, Including the Mohawk River, 1999-2001, Volume 2.

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[3] Machut, et al. 2010. American eels: Data assimilation and management options for inland waters. Final Report for C005548, comprehensive study of the American eel. American eel history, status, and management options: Hudson River Drainage.

[4] https://www.dec.ny.gov/docs/water_pdf/mohawkactionag.pdf

[5] Dr. K. Limburg (klimburg@esf.edu) and C. Hodkin (cnewellh@syr.edu)

[6] D. Carlson (douglas.carlson@dec.ny.gov)

[7] M. Chalupnicki (mchalupnicki@usgs.gov)

Thank you for the opportunity to provide this information in preparation of the PAD for the Projects. If you have any questions or desire additional information, please contact John Wiley at 607-753-9334.

Sincerely,

Anne J. Secord

for David A. Stilwell
Field Supervisor

cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
USFWS, Hadley, MA (J. Morales)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, New York 13045

FERC No. 4678
FERC No. 4679

March 12, 2019

Ms. Cindy Brady
New York Power Authority
123 Main Street
White Plains, NY 10601

RE: Crescent (FERC No. 4678) and Vischer Ferry (FERC No. 4679) Hydroelectric Projects
Information Request for the Pre-Application Document

Dear Ms. Brady:

The U.S. Fish and Wildlife Service (Service) has reviewed the November 14, 2018, letter from the New York Power Authority (NYPA) requesting existing relevant and reasonably available information for the Crescent (FERC No. 4678) and Vischer Ferry (FERC No. 4679) Hydroelectric Projects (Project or Projects) located on the Mohawk River Saratoga, Albany, and Schenectedy Counties, New York. The NYPA authority is requesting this information in advance of preparing the Pre-Application Document (PAD) for the Projects' relicensing by the Federal Energy Regulatory Commission (FERC or Commission). The Service is providing the following information in support of this request:

Federally Listed Species

As you are aware, federal agencies, such as the Commission, have responsibilities under Section 7 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to consult with the Service regarding projects that may affect federally listed species or designated "critical habitat," and confer with the Service regarding projects that are likely to jeopardize federally proposed species or adversely modify proposed "critical habitat." We expect that the NYPA will be named the non-federal representative by the Commission for the purposes of completing informal consultation with the Service pursuant to Section 7(a)(2) of the ESA. In preparation of the PAD, the NYPA should consult our website at http://www.fws.gov/northeast/nyfo/es/section7.htm.

Please go to this site and follow the instructions to obtain: an official list request response; information about listed, proposed, and candidate species; and steps to complete initial assessments of whether a species may be present and impacted by a proposed action. Please note that this process involves two parts: 1) visiting the Service's IPaC website to obtain an official species list; and 2) returning to the New York Field Office's website to complete the remaining steps in determining your project's potential impacts. Please provide the outputs from the IPaC website and NYPA's review of potential impacts from any continued and proposed operations in the PAD.

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Sincerely,

Anne J. Secord

for David A. Stilwell
Field Supervisor

cc: NYSDEC, Stamford, NY (C. VanMaaren, S. Wells)
USFWS, Hadley, MA (J. Morales)

20181129-5063 FERC PDF (Unofficial) 11/29/2018 11:27:13 AM

Arnold L Printup, III, Akwesasne, NY.
The Saint Regis Mohawk Tribe wishes to be a consulting party on Project 4679 Vischer Ferry Hydroelectric Project.

NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. David Stilwell
Field Supervisor
New York Field Office
US Fish and Wildlife Service
3817 Luker Road
Cortland, NY 13045

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Stilwell:

The Power Authority of the State of New York (the "Power Authority") owns and operates the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (collectively the "Projects") which are both licensed by the Federal Energy Regulatory Commission ("FERC"). Both Projects are located on the Mohawk River in New York and the current operating licenses expire on May 31, 2024. In accordance with FERC's regulations, the Power Authority must file a Notice of Intent ("NOI") to relicense the Projects with FERC between November 30, 2018 and May 31, 2019. The Power Authority must simultaneously file a Pre-Application Document ("PAD") for the Projects.

We are writing to initiate additional information gathering for the Projects and to request your Staff's input. We are requesting your assistance in identifying existing relevant and reasonably available information that describes either existing or historical conditions at the Projects regarding the following resource areas: Geology and Soils; Water; Fish and Aquatics; Wildlife and Botanical; Wetlands, Riparian, and Littoral Habitat; Rare, Threatened & Endangered Species; Recreation and Land Use; Aesthetics; Cultural; Socio-economic; or Tribal resources. We will compile this data with information already in our possession for incorporation into the PAD. Your response to this request for information by January 30, 2019 would be appreciated.

Because the two Projects are located close to each other on the Mohawk River, are essentially "twins" sharing nearly identical operating characteristics, and have licenses expiring on the same day, May 31, 2024, the Power Authority plans to prepare a single PAD that covers both Projects. The PAD will provide existing, relevant, and reasonably available information that pertains to the Projects.

The Crescent Project (FERC No. 4678) is located on the Mohawk River at the junction of Saratoga, Albany, and Schenectady Counties, in the Waterford, Colonie, Halfmoon, Clifton Park,

and Niskayuna Townships, all in New York State. It is located 10 miles downstream of the Power Authority's Vischer Ferry Project (FERC No. 4679). The Vischer Ferry Project is located on the Mohawk River in Saratoga and Schenectady Counties, in the Clifton Park and Niskayuna Townships and the City of Schenectady, all in New York State. A map showing the location of the two projects is attached.

We thank you in advance for providing any pertinent information that meets the criteria for inclusion in the PAD. Please forward the information electronically via email, or by CD or DVD, to my attention at: Cindy.Brady@nypa.gov.

The mailing address is: New York Power Authority, 123 Main Street, White Plains, NY 10601: Attention Cindy Brady, Mail Stop 6B.

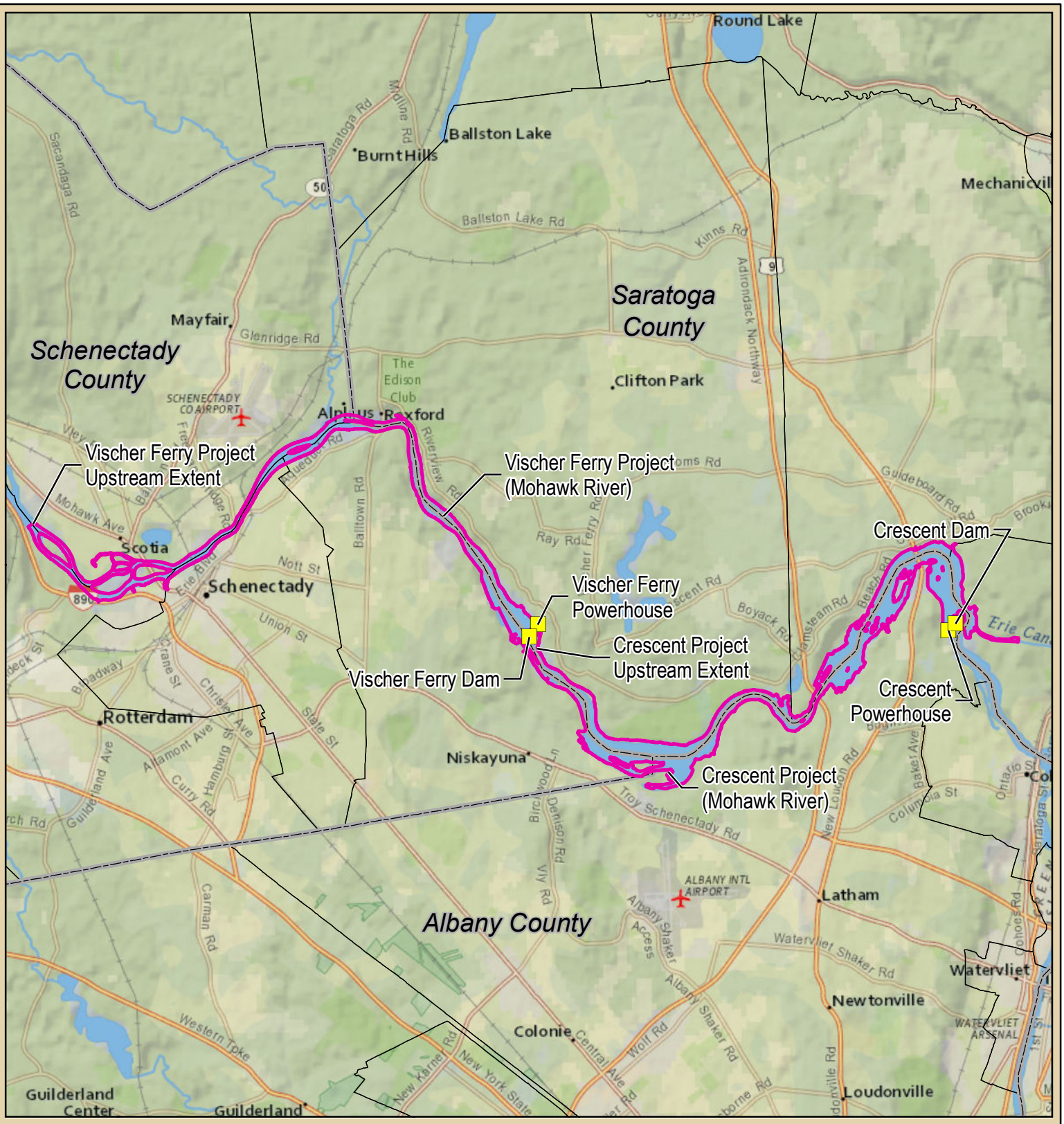
We have engaged the environmental consulting firm TRC to assist us with this FERC relicensing effort. Wendy Bley at TRC is our Project Manager. We look forward to working with you throughout the process. If you have any questions regarding the Projects or the relicensing process, please contact me at 914-287-3153.

Sincerely,

Cindy Brady

Cindy Brady

Attachment: Map of Project Location


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Burnt Hills
Mechanicville
Saratoga County
Schenectady County
Mayfair
Clifton Park
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Crescent Project Upstream Extent
Vischer Ferry Dam
Crescent Powerhouse
Rotterdam
Niskayuna
Crescent Project (Mohawk River)
Albany County
ALBANY INTL AIRPORT
Latham
Watervliet
Newtonville
Colonie
Loudonville
Guilderland Center
Guilderland
Legend
Project Works
Impoundment Extent
Town Boundary
County Boundary
N
0 1 2 3 4 5
Miles
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Project Location Map
Created: 11/14/2018
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NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. Duncan Hay
National Park Service, Northeast Region
US National Park Service
15 State Street
Boston, MA 02109

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Hay:

The Power Authority of the State of New York (the "Power Authority") owns and operates the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (collectively the "Projects") which are both licensed by the Federal Energy Regulatory Commission ("FERC"). Both Projects are located on the Mohawk River in New York and the current operating licenses expire on May 31, 2024. In accordance with FERC's regulations, the Power Authority must file a Notice of Intent ("NOI") to relicense the Projects with FERC between November 30, 2018 and May 31, 2019. The Power Authority must simultaneously file a Pre-Application Document ("PAD") for the Projects.

We are writing to initiate additional information gathering for the Projects and to request your Staff's input. We are requesting your assistance in identifying existing relevant and reasonably available information that describes either existing or historical conditions at the Projects regarding the following resource areas: Geology and Soils; Water; Fish and Aquatics; Wildlife and Botanical; Wetlands, Riparian, and Littoral Habitat; Rare, Threatened & Endangered Species; Recreation and Land Use; Aesthetics; Cultural; Socio-economic; or Tribal resources. We will compile this data with information already in our possession for incorporation into the PAD. Your response to this request for information by January 30, 2019 would be appreciated.

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The Crescent Project (FERC No. 4678) is located on the Mohawk River at the junction of Saratoga, Albany, and Schenectady Counties, in the Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna Townships, all in New York State. It is located 10 miles downstream of the

Power Authority's Vischer Ferry Project (FERC No. 4679). The Vischer Ferry Project is located on the Mohawk River in Saratoga and Schenectady Counties, in the Clifton Park and Niskayuna Townships and the City of Schenectady, all in New York State. A map showing the location of the two projects is attached.

We thank you in advance for providing any pertinent information that meets the criteria for inclusion in the PAD. Please forward the information electronically via email, or by CD or DVD, to my attention at: Cindy.Brady@nypa.gov.

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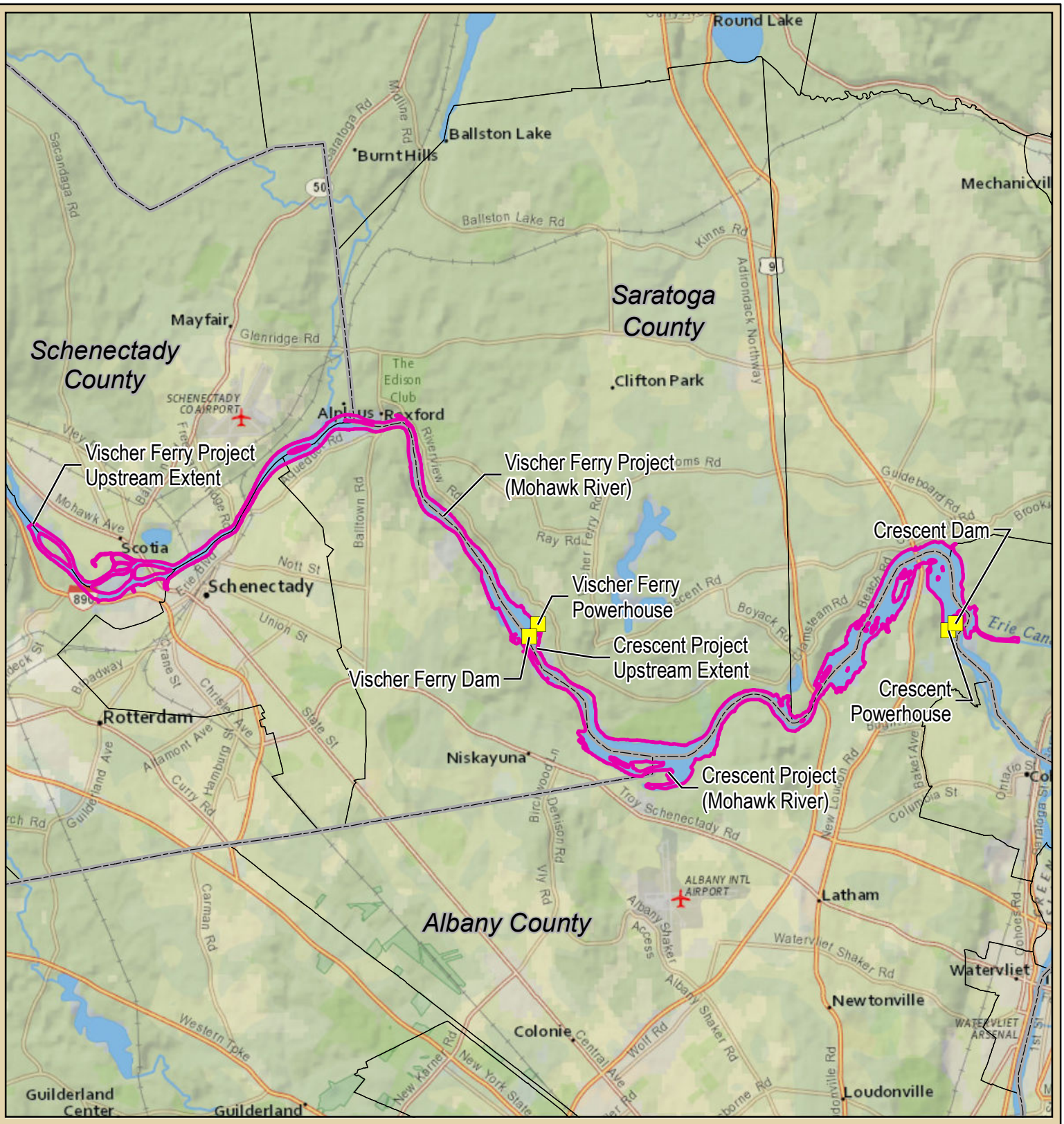
We have engaged the environmental consulting firm TRC to assist us with this FERC relicensing effort. Wendy Bley at TRC is our Project Manager. We look forward to working with you throughout the process. If you have any questions regarding the Projects or the relicensing process, please contact me at 914-287-3153.

Sincerely,

Cindy Brady

Cindy Brady

Attachment: Map of Project Location


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GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. Joseph Seebode
Deputy District Engineer
US Army Corps of Engineers
New York District
26 Federal Plaza
New York, NY 10278-0090

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Seebode:

The Power Authority of the State of New York (the "Power Authority") owns and operates the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (collectively the "Projects") which are both licensed by the Federal Energy Regulatory Commission ("FERC"). Both Projects are located on the Mohawk River in New York and the current operating licenses expire on May 31, 2024. In accordance with FERC's regulations, the Power Authority must file a Notice of Intent ("NOI") to relicense the Projects with FERC between November 30, 2018 and May 31, 2019. The Power Authority must simultaneously file a Pre-Application Document ("PAD") for the Projects.

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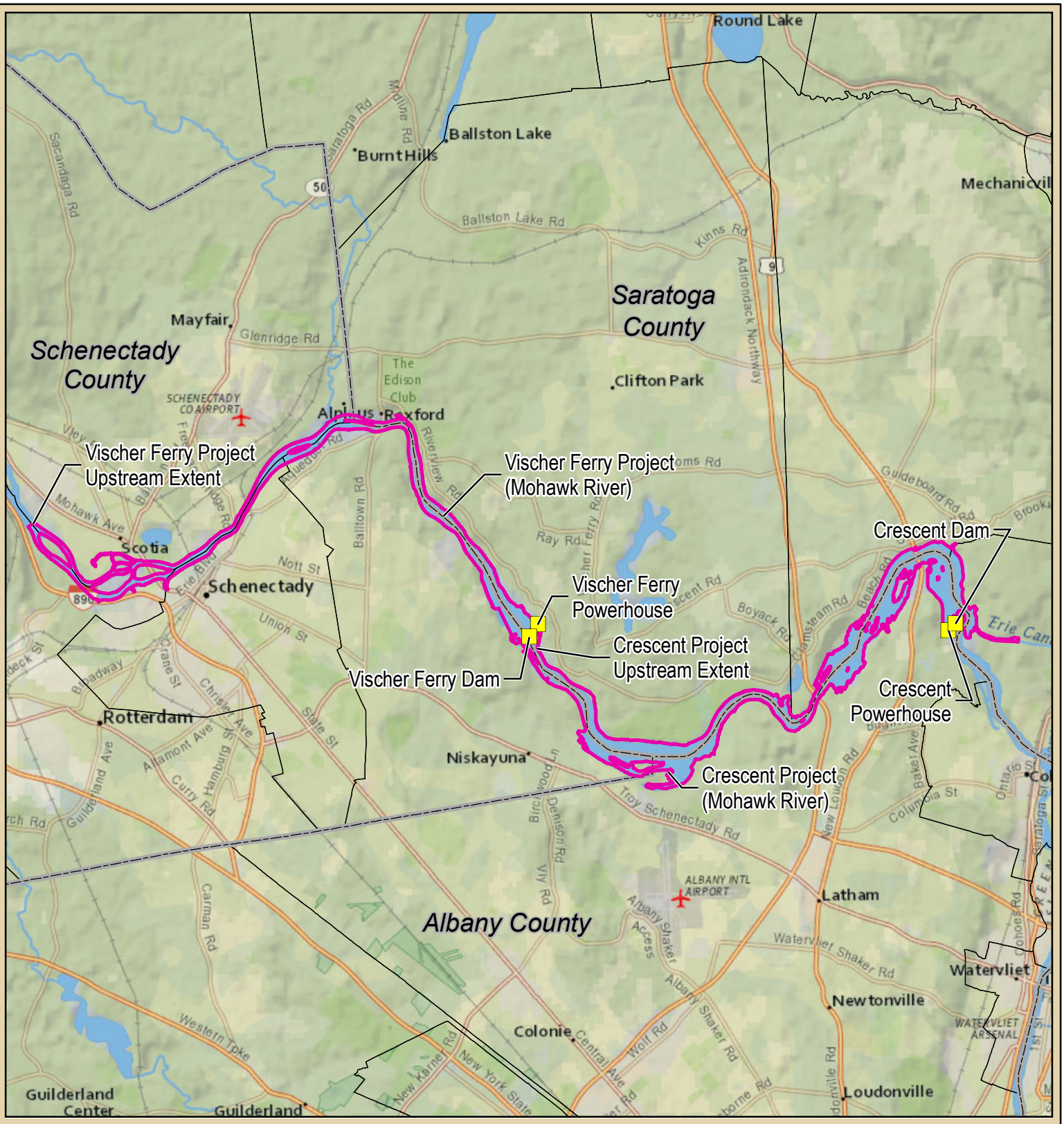
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Sincerely,

Cindy Brady

Cindy Brady

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ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. Bruce Maytubby
Bureau of Indian Affairs
Eastern Region
545 Marriott Drive, Suite 700
Nashville, TN 37214

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Maytubby:

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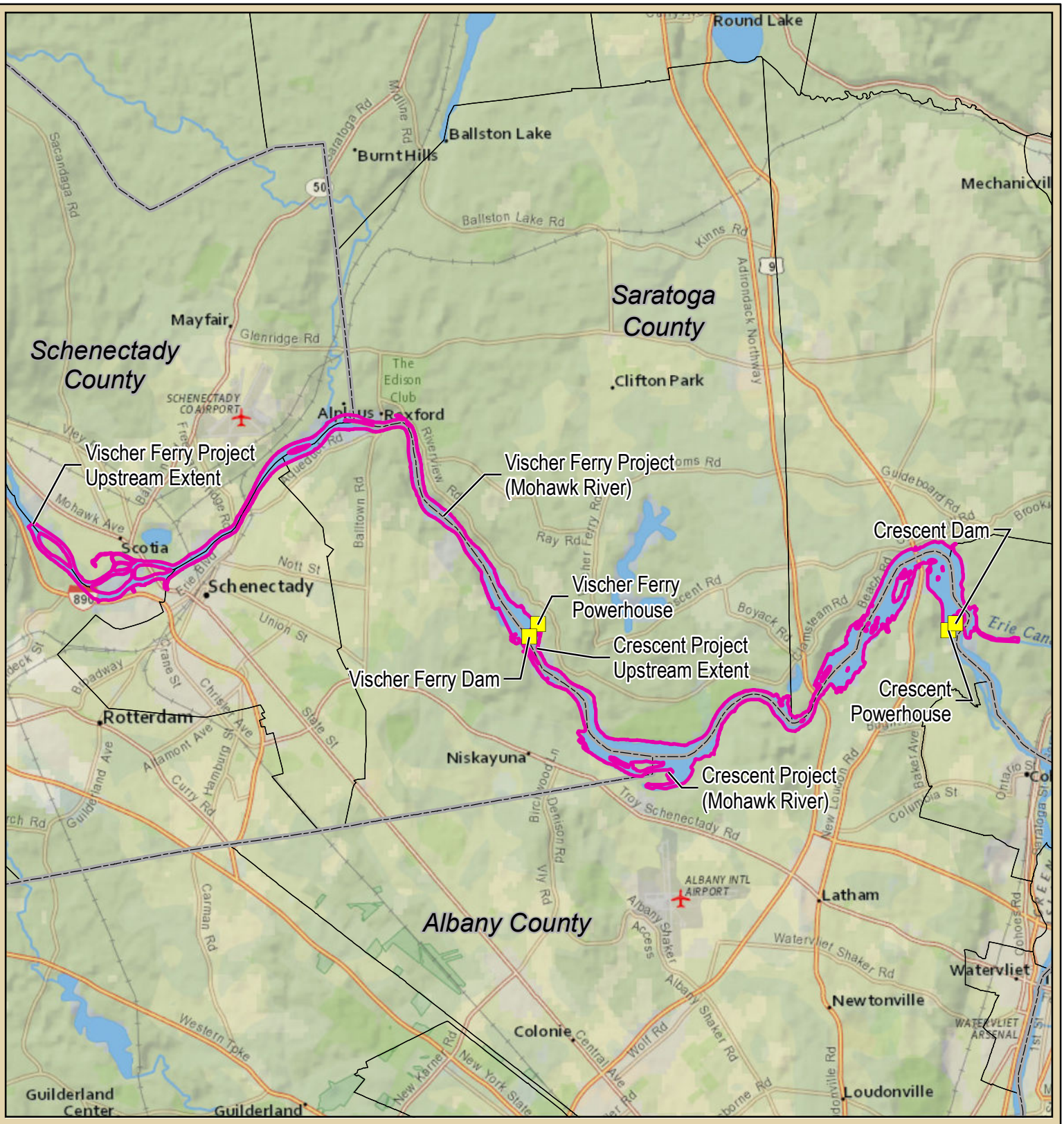
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Sincerely,

Cindy Brady

Cindy Brady

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GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. John Fowler
Executive Director
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Fowler:

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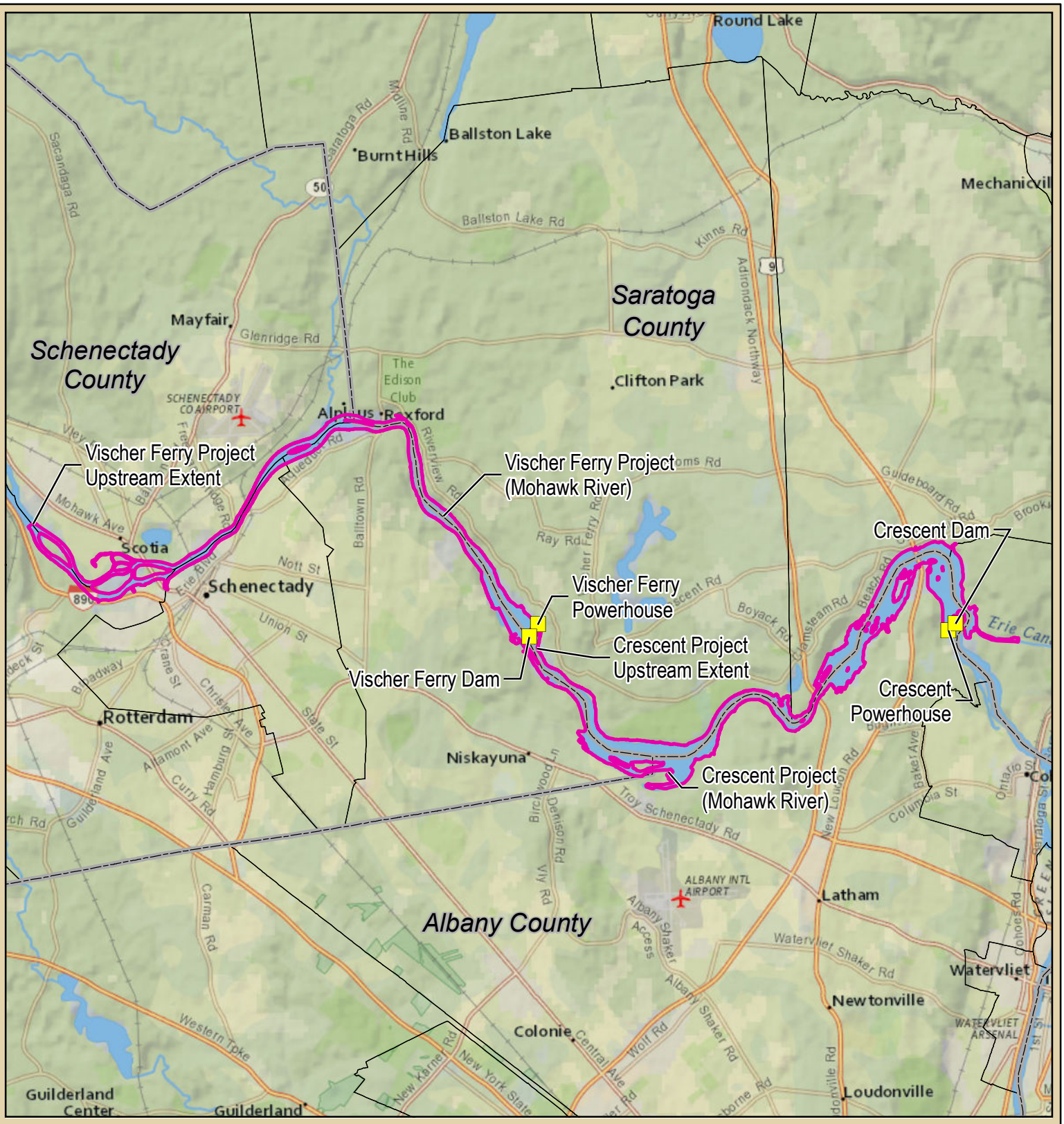
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Sincerely,

Cindy Brady

Cindy Brady

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GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Mr. Keith Goertz
Regional Director, Region 4
New York State Department of Environmental Conservation
65561 State Hwy 10
Stamford, NY 12167

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Mr. Goertz:

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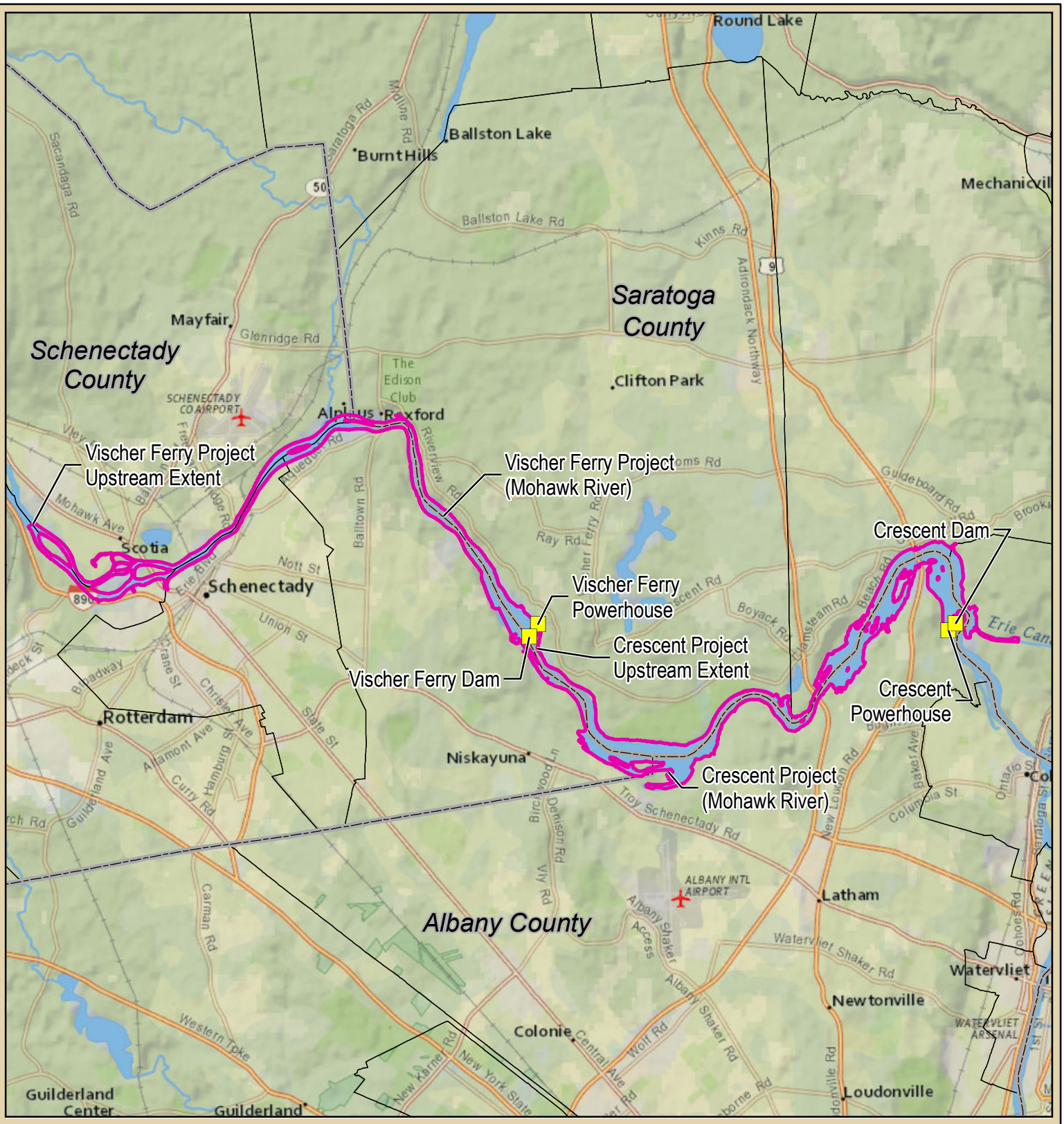
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November 14, 2018

Mr. Tom Allworth
Deputy Commissioner, Resource Management
New York State Parks, Recreation & Historic Preservation
625 Broadway
Albany, NY 12233

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

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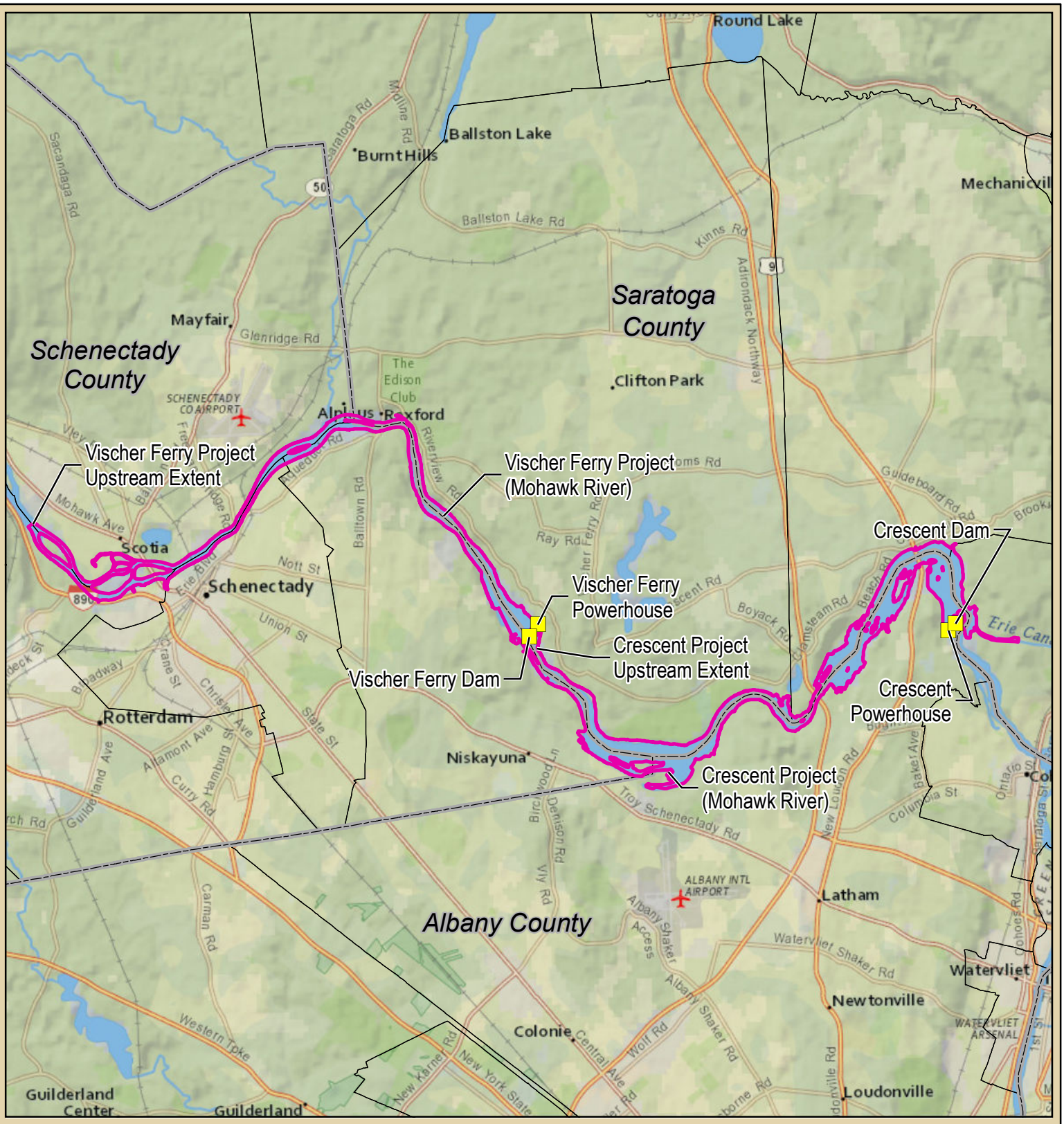
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November 14, 2018

Mr. David Mellen, P.E.
Deputy Director
Engineering, Construction & Maintenance
NY State Canal Corporation
30 South Pearl Street
Albany, NY 12207

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

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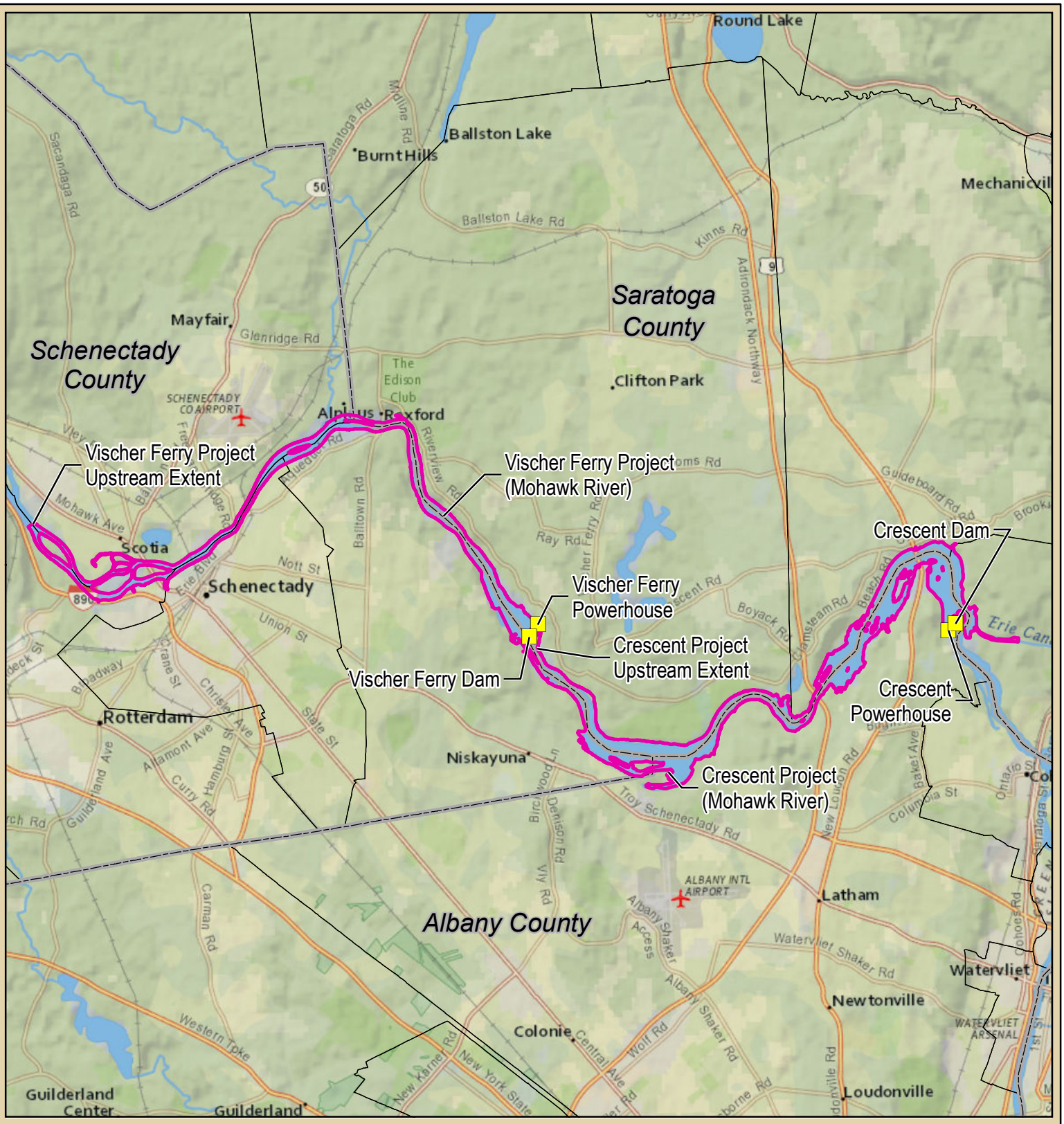
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November 14, 2018

Mr. Daniel Mackay
Deputy Commissioner
NYS Division of Historic Preservation
Peebles Island State Park
PO Box 189
Waterford, NY 12188-0189

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

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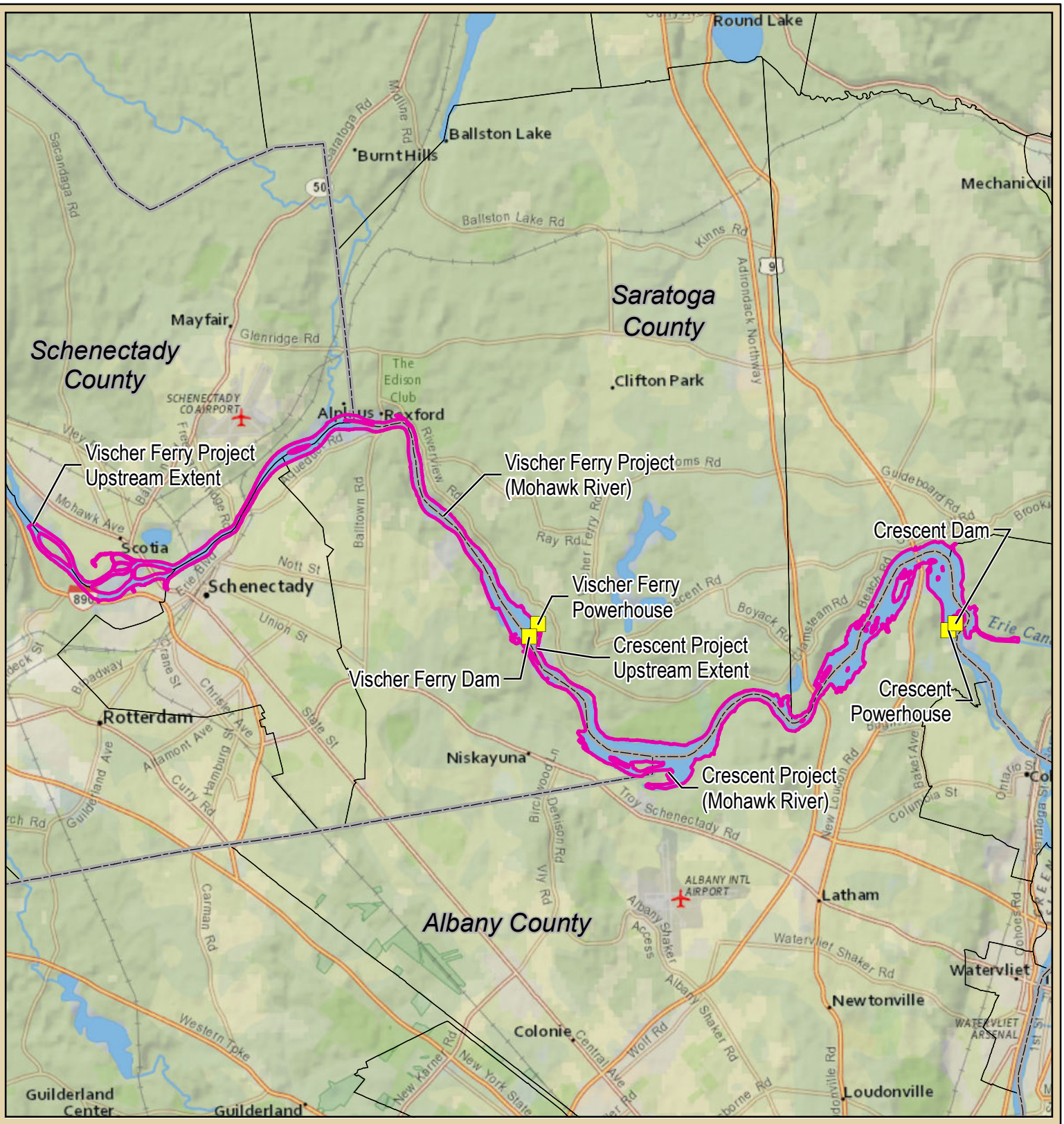
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November 14, 2018

Mr. Arnold Printup, Jr.
THPO
Saint Regis Mohawk Tribe
412 State Route 37
Akwesasne, NY 13655

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

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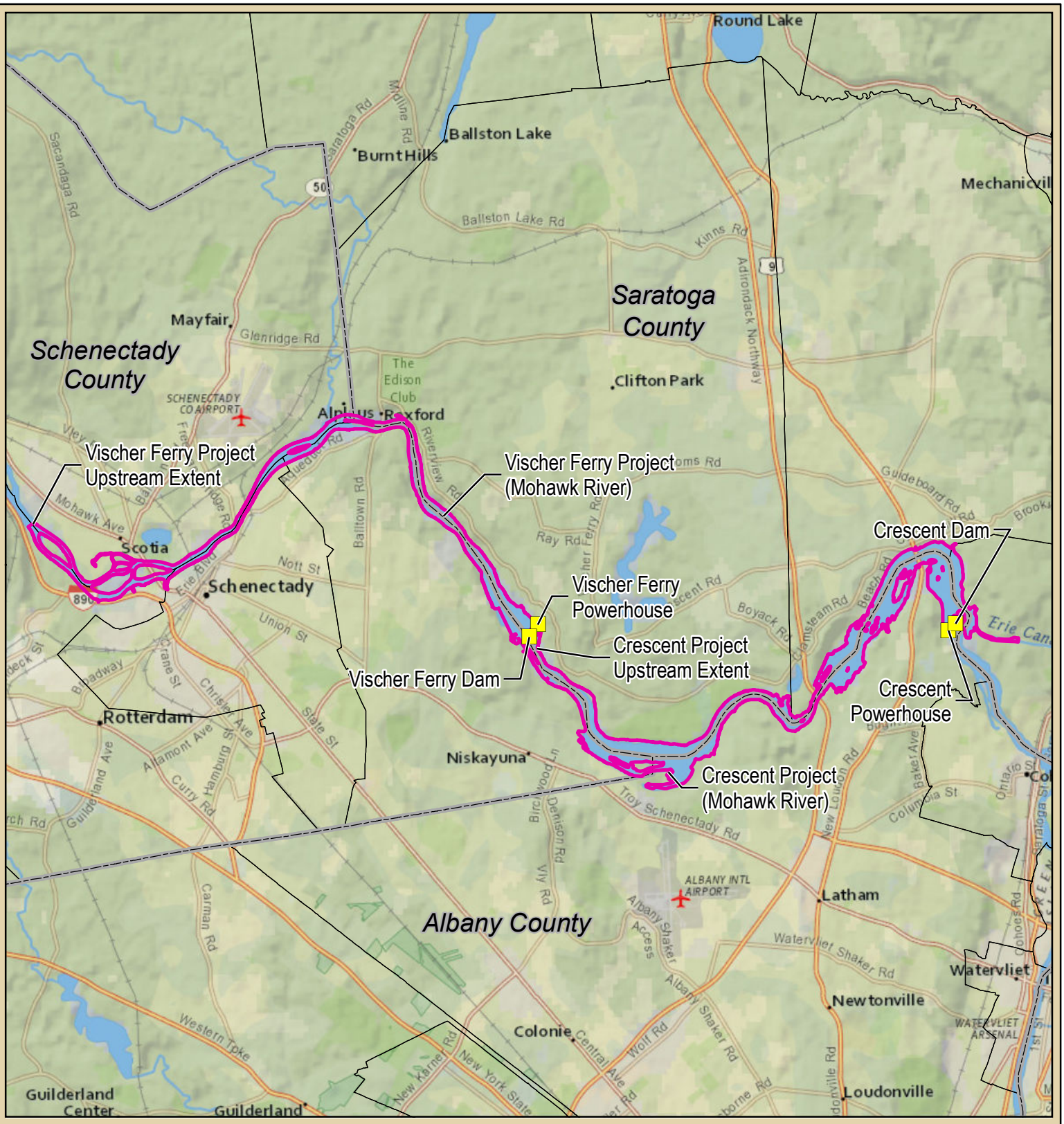
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Project Location Map
Created: 11/14/2018
TRC
14 Gabriel Drive
Augusta, ME 04330
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NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

ANDREW M. CUOMO
Governor

JOHN R. KOELMEL
Chairman

GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Chief Michael Conners, Jr.
Tribal Chief
Saint Regis Mohawk Tribe
412 State Route 37
Akwesasne, NY 13655

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

Dear Chief Conners:

The Power Authority of the State of New York (the "Power Authority") owns and operates the Crescent Hydroelectric Project and the Vischer Ferry Hydroelectric Project (collectively the "Projects") which are both licensed by the Federal Energy Regulatory Commission ("FERC"). Both Projects are located on the Mohawk River in New York and the current operating licenses expire on May 31, 2024. In accordance with FERC's regulations, the Power Authority must file a Notice of Intent ("NOI") to relicense the Projects with FERC between November 30, 2018 and May 31, 2019. The Power Authority must simultaneously file a Pre-Application Document ("PAD") for the Projects.

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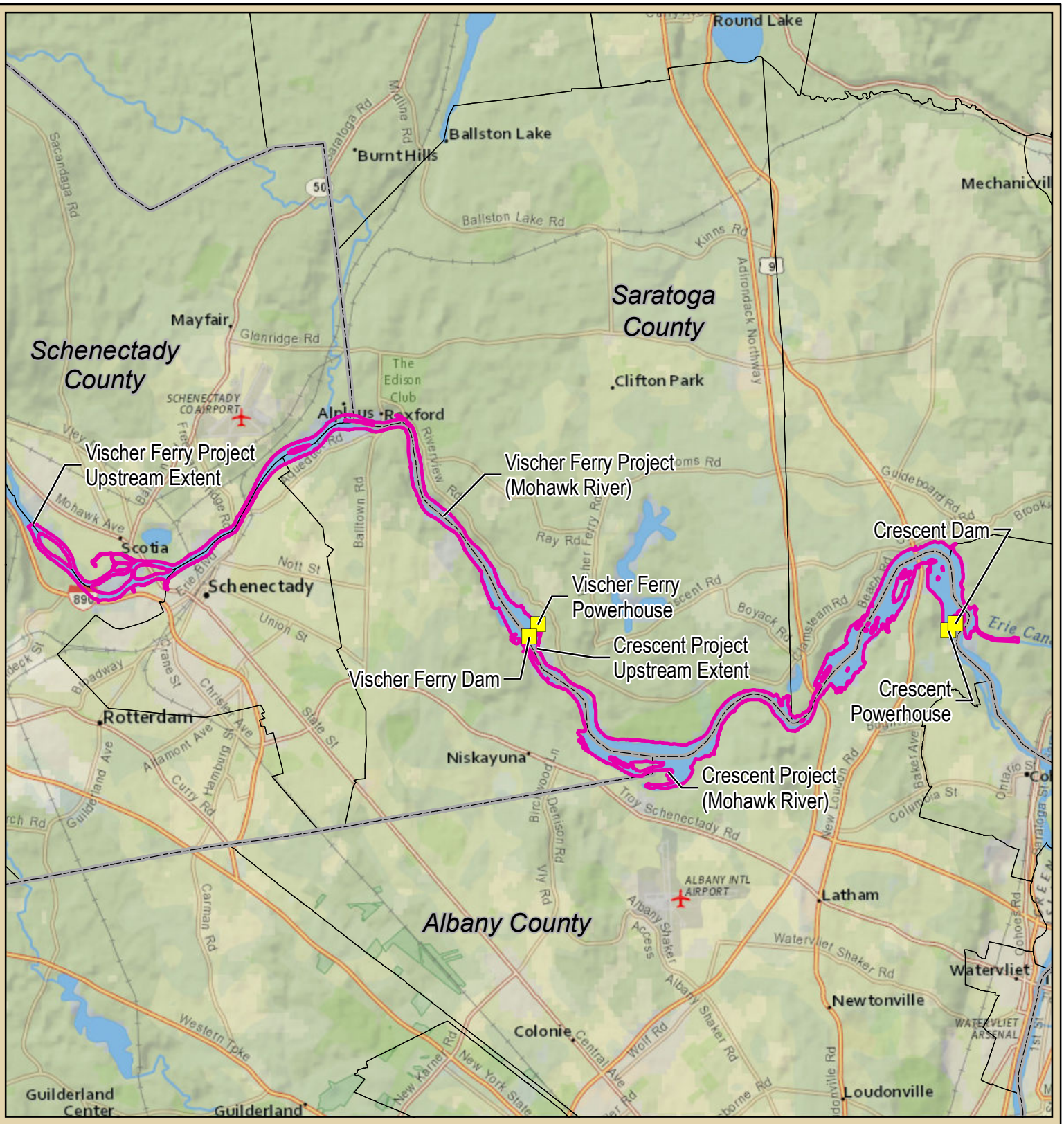
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Sincerely,

Cindy Brady

Cindy Brady

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November 14, 2018

Chief Beverly Cook
Tribal Chief
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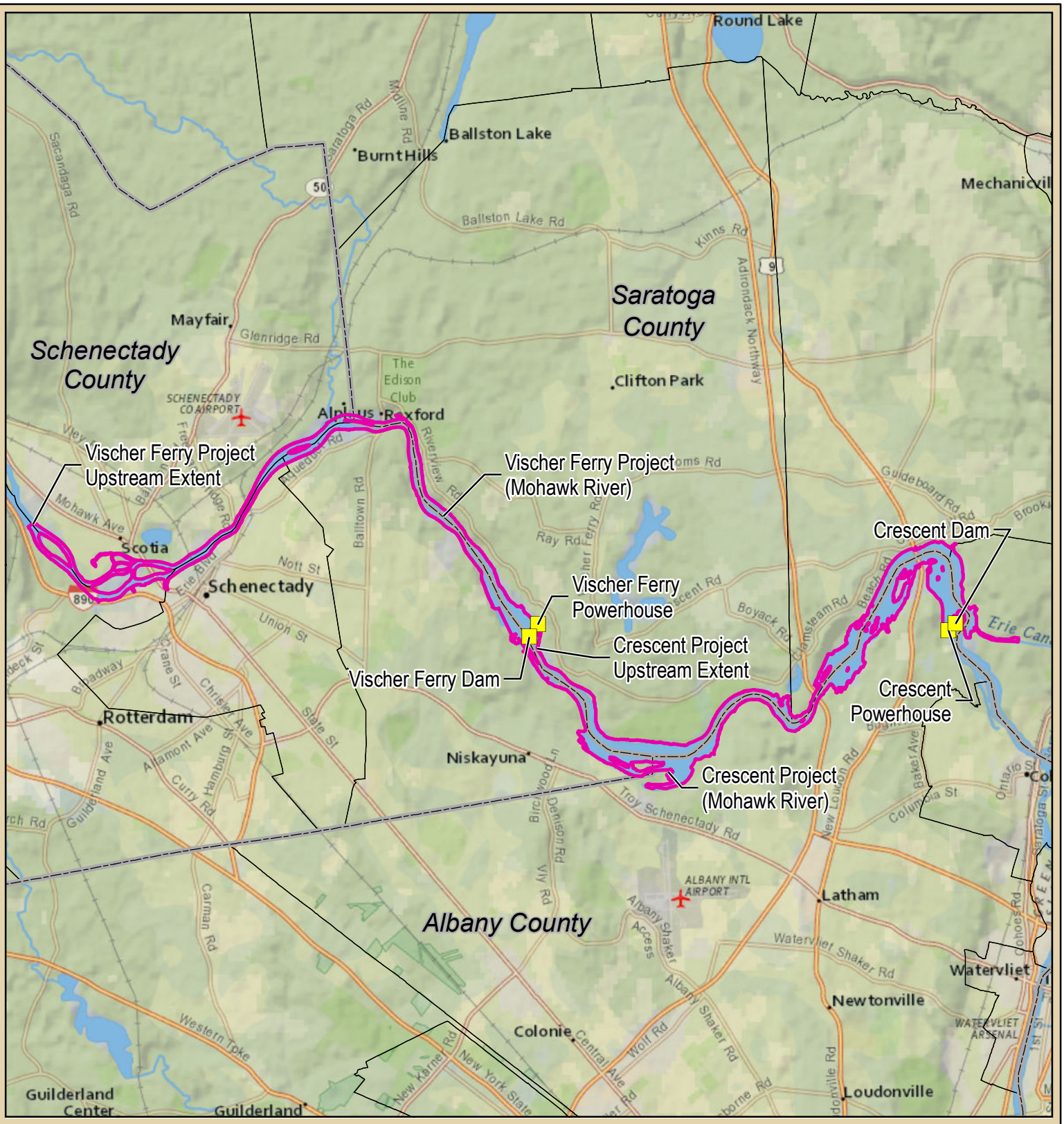
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November 14, 2018

Chief Eric Thompson
Tribal Chief
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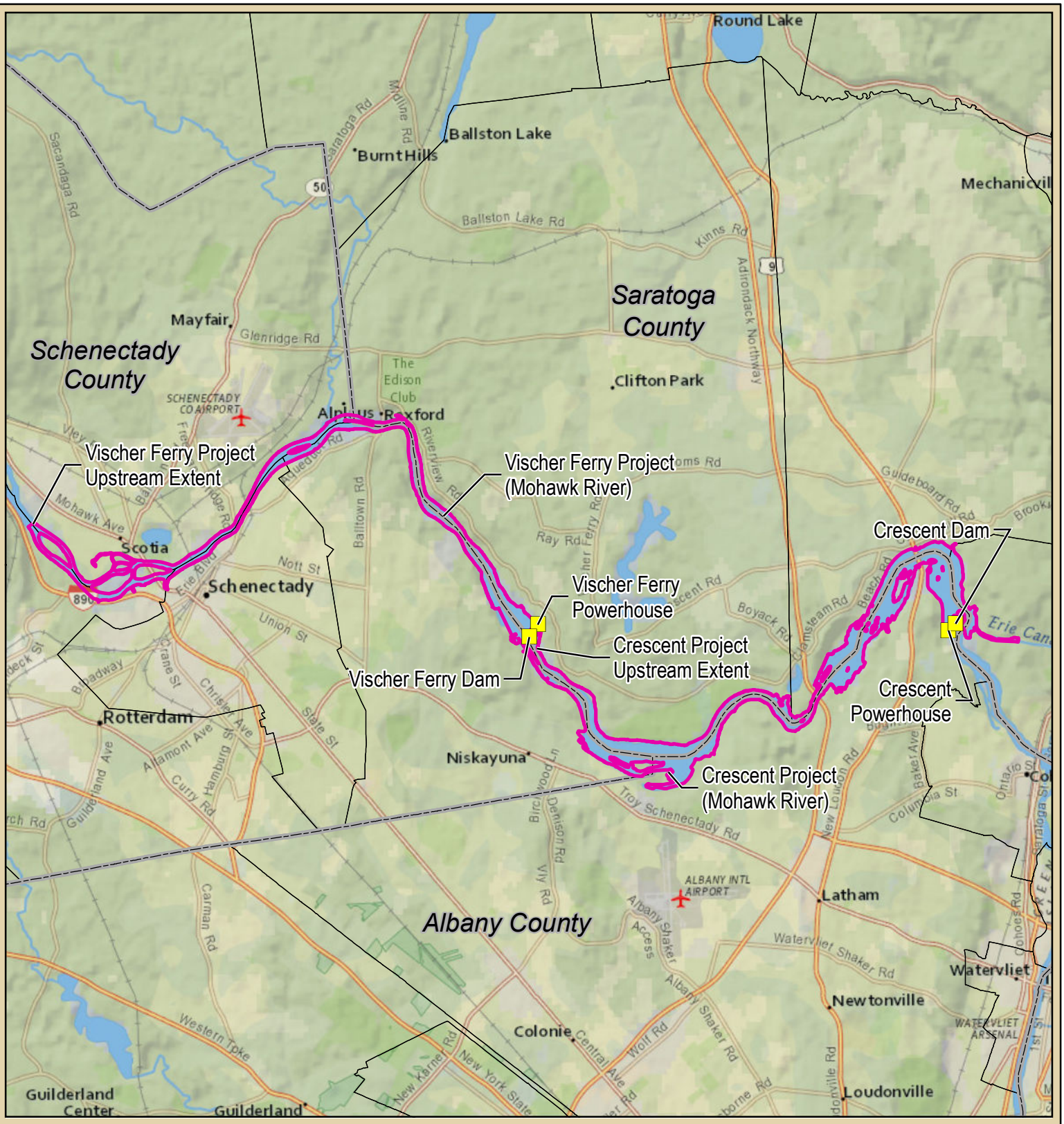
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GIL C. QUINIONES
President and Chief Executive Officer

November 14, 2018

Ms. Bonney Hartley
THPO
Stockbridge Munsee Community, Wisconsin
65 1st Street
Troy, NY 12180

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

Information Request for the Pre-Application Document

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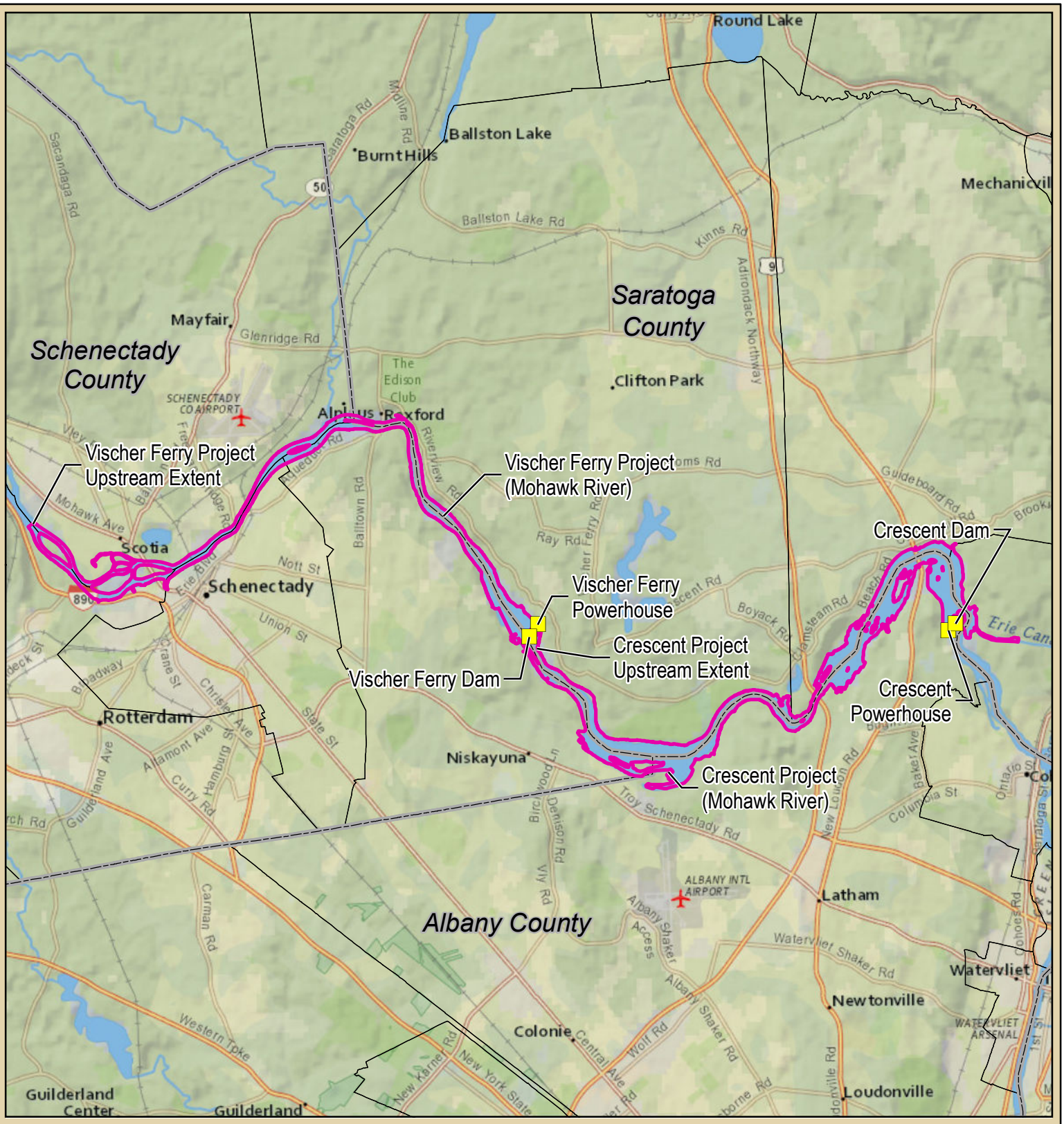
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President and Chief Executive Officer

November 14, 2018

Mr. Brice Obermeyer
Director
Delaware Tribe Historic Preservation Office
Roosevelt Hall, Room 212
1200 Commercial Street
Emporia, KS 66801

Relicensing of the Crescent Hydroelectric Project (FERC No. 4678), and Vischer Ferry Hydroelectric Project (FERC No. 4679)

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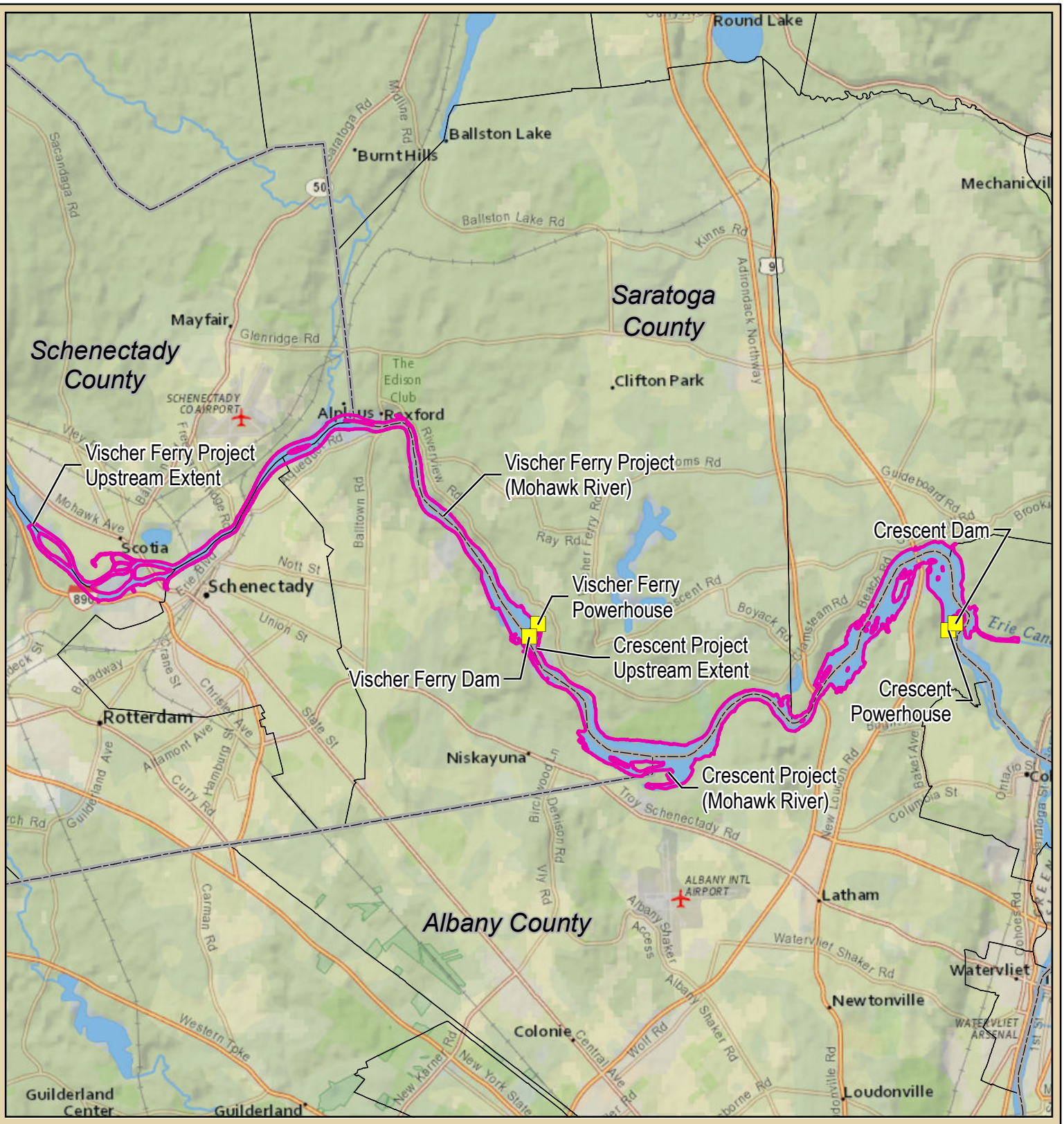
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Mohawk Nation Council of Chiefs
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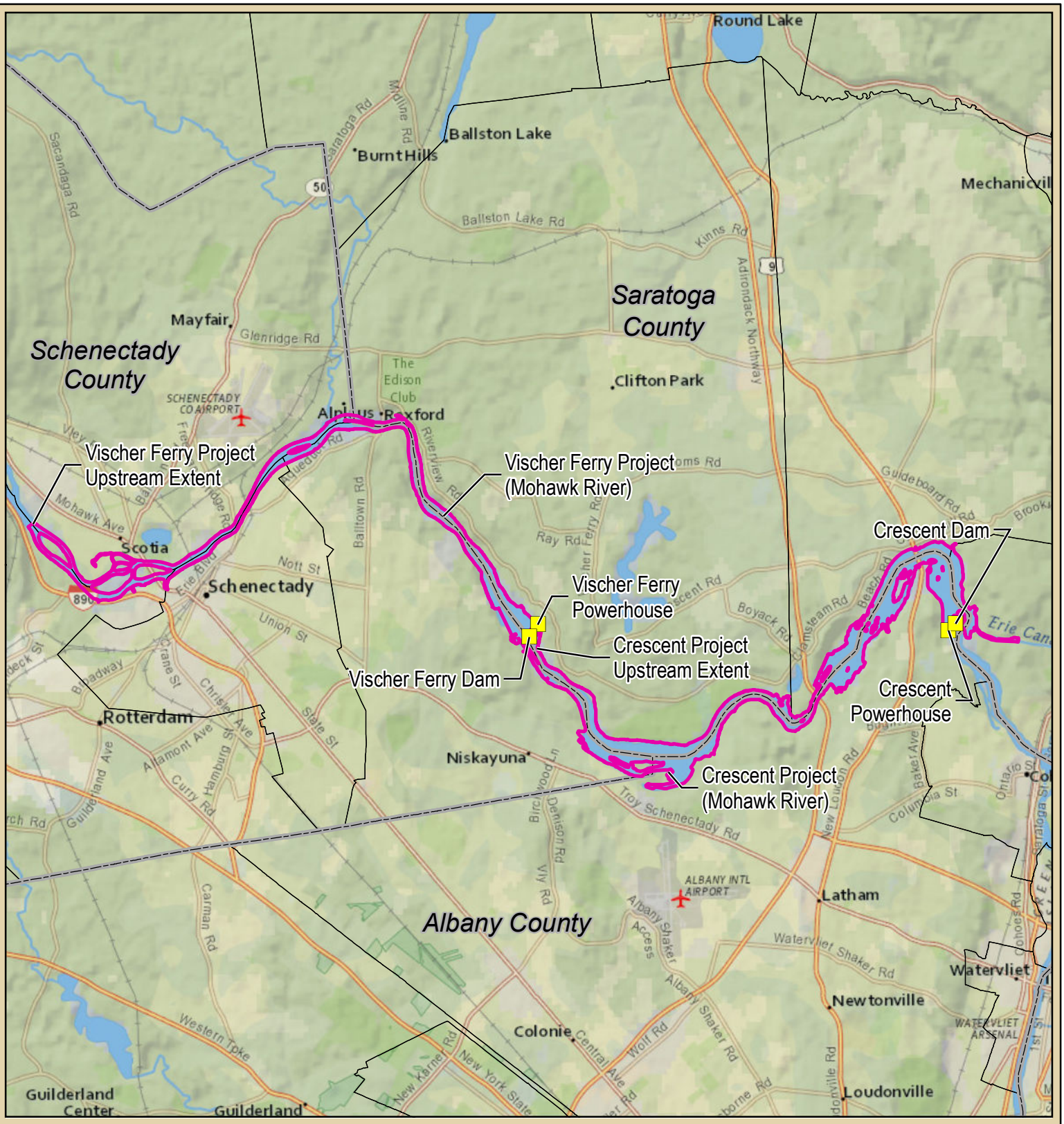
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Vischer Ferry Powerhouse
Crescent Project Upstream Extent
Vischer Ferry Dam
Crescent Powerhouse
Rotterdam
Niskayuna
Crescent Project (Mohawk River)
Albany County
ALBANY INTL AIRPORT
Latham
Watervliet
Newtonville
Colonie
Loudonville
Guilderland Center
Guilderland
Legend
Project Works
Impoundment Extent
Town Boundary
County Boundary
N
0 1 2 3 4 5
Miles
Sources: ESRI, USGS, ME OGIS, TRC
VT
NH
NY
MA
CT
RI
PA
NJ
New York Power Authority
Crescent & Vischer Ferry Hydroelectric Projects
Project Location Map
Created: 11/14/2018
TRC
14 Gabriel Drive
Augusta, ME 04330
S:\1-PROJECTS\NYPA\299263 - Crescent Vischer PAD\CIVIL PAD_USGS_Location_Map_8x11_11142018.mxd

APPENDIX B: Current Licenses

THIS DOCUMENT CONTAINS POOR QUALITY PAGES

27 FERC ¶61,468

LICENSE
WATER QUALITY
APPLICATION AMENDMENT
ANNUAL CHARGES

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Raymond J. O'Connor, Chairman; Georgiana Sheldon, A. G. Sousa and Oliver G. Richard III.

Power Authority of the State of New York) Project No. 4678-001

ORDER ISSUING LICENSE (MAJOR)

(Issued June 26, 1984)

The Power Authority of the State of New York ("Power Authority") has filed an application under Part I of the Federal Power Act for a license for the Cresent Hydroelectric Project, FERC Project No. 4678. The project is located on the Mohawk River, a navigable waterway 1/ of the United States, at the junction of Saratoga, Albany and Schenectady Counties, New York, in Waterford, Colonie, Halfmoon, Clifton Park and Niskayuna Townships. This order grants a license to the Power Authority for the expansion and continued operation of the project.

Project Description

The Crescent Hydroelectric facility is owned by the State of New York and is under the jurisdiction of the New York State Department of Transportation ("NYSDOT"). The NYSDOT operates and maintains the non-generating hydroelectric facilities (as well as the non-hydroelectric facilities), while Niagara Mohawk Power Corporation ("Niagara Mohawk") operates and maintains the hydroelectric generating station, including the switchyard.

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1/ Niagara Mohawk Power Corporation, 41 F.P.C. 772 (1969).

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The project dam, constructed in 1912, was built to upgrade the Erie Canal System. A powerhouse, built on the west bank in 1925, is still in operation and is the site of the Power Authority's proposed expansion. Existing facilities include two independent dams, with a total length of 1,436 feet, that link each bank to a rock island in the middle of the Mohawk River; an impoundment of approximately 2,000 surface acres; a regulating structure; a powerhouse containing two generators each rated at 2.8 MW; a tailrace; and a switchyard. Historically, 12-inch high, breakaway flashboards have been installed on the project dam in May and removed in December. The Power Authority states that the first priority for operation at the dam is to provide adequate pool elevations for lockage and navigation, and that the second priority is to generate power.

The Power Authority proposes to increase the hydroelectric capacity of the project by expanding the powerhouse, installing two generators each rated at 3 MW, widening the tailrace, and expanding the switchyard. In addition, the Power Authority proposes to develop recreational facilities on both river banks. On the south shore, the Power Authority proposes to develop a picnic area near the powerhouse, with shoreline access for bank fishing. On the north shore, immediately downstream from Vischer Ferry Dam, the applicant proposes to clear approximately one mile of the old Erie Barge Canal towpath for hiking, fishing, and other shoreline activities.

The project is essentially run-of-river, using only the storage provided by the flashboards. The Power Authority stated that the proposed development at the project will not alter the existing spillway configuration, or the installation of the flashboards between May and December each year.

Public Notice

Notice of the application has been published, and comments have been received from interested federal, state, and local agencies. No protest has been received, and no agency has objected to issuance of the license. No motions to intervene were filed.

Safety and Adequacy, Economic Feasibility and Comprehensive Development

The project dam is a high hazard dam, and is not safe for flood conditions exceeding one-half the Probable Maximum Flood (PMF). Article 33 requires the Licensee to determine the consequences of dam failure during floods up to the PMF and to submit to the Commission

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a plan and schedule for making the dam safe in the event that its failure would endanger life or cause significant property damage downstream. The study must be approved by the Director, Office of Electric Power Regulation, prior to the start of project construction.

The Commission's New York Regional Office inspected the project and found no major deficiencies.

The expansion of the project would increase its installed capacity from 5,600 kW to 11,600, kW, while increasing the estimated annual average generation from 39,160,000 kWh to 60,802,000 kWh. 2/ The project is economically feasible when compared to the cost of producing an equivalent amount of power from a base load coal-fired facility.

The project would make good use of the flow and fall of the Mohawk River, is not in conflict with any planned or potential development, and would be best adapted to the comprehensive development of the basin under present conditions, upon compliance with the terms and conditions of this license.

Cultural Resources

The New York State Historic Preservation Officer ("SHPO") stated that the proposed project would have no effect upon cultural resources included in or eligible for inclusion in the National Register of Historic Places. The proposed construction would not adversely affect any known cultural resources. To help safeguard previously unrecorded archeological or historical sites that may be discovered during any future construction or development at the project, the license contains Article 35, which requires the Licensee to consult with the SHPO upon discovery of any such sites.

Instream Flows

The United States Department of the Interior ("Interior") and the New York State Department of Environmental Conservation ("DEC") recommended that the Power Authority release an initial minimum flow of 100 cubic feet per second (cfs) over the project spillway to protect the aquatic habitat in the project area. The agencies also recommended

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2/ Equivalent energy production using fossil fuels would consume 99,840 barrels of oil or 28,150 tons of coal.

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that the Power Authority monitor the effectiveness of the initial spillage requirement, and make any changes in the minimum flow that its studies show are warranted.

The Power Authority agreed to provide an initial 100 cfs minimum flow release, monitor the flow's impact on fishery resources and water quality, and make any necessary changes in the initial minimum flow after studying its effectiveness. These measures are provided for in Articles 36 and 40.

The Power Authority did not agree, however, with the agencies' recommendation that the minimum flow be released over the spillway, rather than in the form of leakage through and underneath the flashboards. There is insufficient information available at this time to justify the agencies' recommendation. Therefore, we will permit the Licensee to release the flows in the manner it has proposed (Article 36), and require it to evaluate the impact of the minimum flow point of discharge on downstream migration of anadromous fish (Article 40). The Licensee shall modify the minimum flow point of discharge if necessary to protect fishery resources.

Water Quality 3/

Interior and DEC recommended that the Power Authority develop and conduct a water quality monitoring program to determine the impact of operating the Crescent Project in combination with the proposed Vischer Ferry Project (located 10 miles upstream) on dissolved oxygen levels, and to determine the effectiveness of the proposed minimum flow on dissolved oxygen levels. The Power Authority responded that it had no objection to these recommendations, and that it had begun a long-term water quality sampling program, in consultation with DEC, to determine the potential impact of the project on water quality.

Existing water quality information indicates that dissolved oxygen levels have reached as low as 4.6 mg/l during operation of the existing project. Expansion of the project would result in less spillage, with the potential for reduced aeration of the project discharge. To ensure that project operation would not harm fishery resources, Article 37 is included in this license to require the Licensee to initiate a monitoring program to determine the effects

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3/ DEC issued a water quality certificate for this project on September 26, 1983.

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of project operation on dissolved oxygen, and to implement any corrective measures necessary to maintain disolved oxygen levels adequate to protect fishery resources.

Interior also recommended that a standard sediment analysis be conducted for heavy metals and toxic materials to determine appropriate removal and disposal methods for spoil and silt. The Power Authority has agreed to this requirement and the sediment analysis should be conducted. Article 38 provides for the analysis and disposal of heavy metals and toxic materials.

The City of Cohoes ("City") uses the Mohawk River as a source of drinking water. The Power Authority has agreed to comply with the request of the State of New York Department of Health that it advise the City and the Albany County Health Department ("County") of any unusual changes in water quality due to project construction. Article 39 requires the Licensee to advise the City and County of any changes in water quality, and ensure that project construction and operation does not affect the City's use of the Mohawk River as a municipal water supply.

Fishery Resources

Interior and DEC stated that the blueback herring is an anadromous fish that presently migrates in abundance through project water, but that adequate information is not available to determine the potential for entrainment mortality to downstream migrants. These agencies recommended that the Power Authority conduct a study to determine whether project operations would affect fish migration, and develop mitigative measures, if necessary. The Power Authority acknowledged the possible impacts of project operations on the fishery resource and expressed a willingness to assess the situation.

Article 40 requires the Licensee to consult with the concerned agencies and conduct a study to determine the impacts of project operations on the fishery resource, to recommend any mitigative measures that are needed to protect this resource, and to implement

Interior recommended further that for the conservation and development of the existing fish and wildlife resources, the project be operated so that: (1) the current impoundment rate of drawdown not increase; (2) the impoundment drawdown be limited to 12 inches; and (3) when river flows exceed 3,250 cfs, the project will be in a run-of-river mode, such that the instantaneous flows from the project, including spillage, releases, and leakage, is equal to the inflow to the project impoundment. The Power Authority has agreed to implement Interior's recommendations. To ensure protection of fish and wildlife resources of the project area, Article 41 requires that the Licensee operate the project as agreed to any measures that the Commission finds necessary.

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Recreational Resources

The Power Authority's Report on Recreational Resources, which contains guidelines for the development, operation, and maintenance of recreational facilities at the project, conforms to Commission regulations. The report is approved and made part of the license.

Environmental Impacts

Increased levels of turbidity resulting from construction activities are expected to be minimal and would be localized and temporary. Noise and dust associated with development of project works and recreational facilities would be intermittent and of short duration, confined primarily to the construction period. On the basis of the record, and our independent analysis, we conclude that issuance of a license for the project would not constitute a major federal action significantly affecting the quality of the human environment.

License Term and Annual Charges

The Power Authority proposes to perform substantial new construction at the Crescent Hydroelectric Project. Under our policy for projects of this type, the license will terminate May 31, 2024, forty years from the first day of the month in which this order is issued. 4/

Since portions of the Crescent Project are already operating, the license should be back-dated. Normally, a license that is issued for a constructed project that is located on a navigable waterway and for which there has been no post-1935 construction is given an effective date of April 1, 1962, or the date the stream was found navigable, whichever is earlier. 5/ There has been no post-1935 construction at the Crescent Project, and the Mohawk River was found navigable in 1969. 6/ Accordingly, under Androscoggin, the effective date of this license would ordinarily be April 1, 1962.

4/ Montana Power Co., 56 F.P.C. 2008, 2012 (1976).

5/ Public Service Co. of New Hampshire, 27 F.P.C. 830 (1962). ("Androscoggin"). We established this policy in order to ensure that illegal project operators do not obtain an unmerited advantage over companies that complied with the law. We determined that backdating the license to 1962 (absent an earlier navigability finding) rather than to the date the project operator was placed on notice of the perils of further unlicensed operation gives adequate weight to the period of unlicensed operation.

6/ Niagara Mohawk Power Corp., 41 F.P.C. 772 (1969).

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However, in cases in which our Androscoggin policy produces an effective date more than 50 years before the license termination date, the effective date of the license is advanced to 50 years before the license termination date. In addition, an amount equal to the annual charge that would have been due for the period before what is being set as the effective date will be assessed, in order to ensure that unlicensed operation does not place a person in a better position than licensed operation would. 7/ Therefore, this license will have an effective date of June 1, 1974, and payment in lieu of annual charges will be required for the April 1, 1962 to May 31, 1974 period.

In assessing these back annual charges and payments in lieu of annual charges, we are mindful that unlicensed construction operation was performed by NYSDOT, Niagara Mohawk, and possibly others, while future licensed operation will be performed by the Power Authority. The date a license applicant or licensee acquires a project, however, has no bearing on the amount the licensee must pay in back annual charges for an illegally operated constructed project. 8/ Our back charges policy remains valid regardless of who operated the project previously, because it ensures that the illegal operator of the project does not receive a windfall from its unlicensed operation of the project - and thus discourages unlicensed operation. The same reasoning applies to payments in lieu of annual charges. The illegally benefiting party should ultimately pay for the annual charges and payments in lieu of annual charges owed, although perhaps not directly to the Commission. The person acquiring the project should make provision for the back charges and payments in lieu of annual charges in the project purchase price.

The Commission orders:

(A) This license is issued to the Power Authority of the State of New York (Licensee), under Part I of the Federal Power Act (Act), for a period effective June 1, 1974, and terminating May 31, 2024, for the construction, operation and maintenance of the Crescent Project No. 4678, located on the Mohawk River in Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna Townships, Saratoga, Albany and Schenectady Counties, New York. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

7/ Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 159-60 (D.C. Cir. 1967).

8/ See North Canal Water Works, 21 FERC ¶61,157 (1982); Niagara of Wisconsin Paper Corp., 54 F.P.C. 2507 (1975), 55 F.P.C. 262 (1976); Kennebec River Pulp & Paper Co., 35 F.P.C. 707 (1966).

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(B) The Crescent Project No. 4678 consists of:

(1) all lands, to the extent of the Licensee's interests in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

Exhibit	FERC No. 4678-	Showing
G, Sheet 1	10	Project Location Map

(2) Project works consisting of: (a) Crescent Dam, consisting of two independent concrete gravity overflow sections, the eastern section being 900 feet long and 52 feet high and the western section being 536 feet long and 32 feet high; (b) the reservoir with an area of 2,000 acres and storage of 50,000 acre-feet at an elevation of 184 feet msl (one-foot flashboards, annually installed in May and removed in December, add 2,000 acre-feet of storage); (c) a regulating structure consisting of a sluiceway 8 feet wide and a Taintor gate 30 feet wide; (d) an intake structure with ten arches 8 feet wide and 14 feet high; (e) a brick and concrete powerhouse, 104 feet long and 73 feet wide, enlarged by an addition measuring 73 by 78 feet and containing two turbine/generator units rated at 2.8 MW each and two units rated at 3.0 MW each, all operating under a head of 27.5 feet; (f) an expanded switchyard; (g) the generator leads and transformer banks for the existing and proposed facilities; and (h) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibits cited above and more specifically shown and described by certain other exhibits that also form a part of the application for license and that are designated as:

Exhibit A - Paragraphs A.4.1 through A.6 of the application filed on November 24, 1982.

Exhibit E - The Report on Recreational Resources, pages E-39 through E-47 of the Exhibit E filed on September 30, 1982.

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Exhibit F	FERC No. 4678-	Title
1	1	General Plan of Dam
2	2	Detailed Location Plan and Profile of Dam
3	3	Detailed Plans of Abutments C and D and Sections of Dam
4	4	Regulating Structure Plans and Sections
5	5	Existing Powerhouse Location General Plan and Sections
6	6	Existing Powerhouse Typical Sections
7	7	Proposed Project Location and General Plan
8	8	Proposed Powerhouse Plan and Sections
9	9	Proposed Powerhouse Elevations

(3) all of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project and located within the project boundary, all portable property that may be employed in connection with the project, located within or outside the project boundary, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, E, F, and G, designated in ordering paragraph (B) above, are approved and made a part of the license.

(D) This license is also subject to Articles 1 through 28, except Article 20, set forth in Form L-4 (revised October 1975), entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States," attached to and made a part of this license. The license is also subject

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to the following additional articles:

Article 29. The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representatives of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 30. The Licensee shall commence the construction of the project within two years of the date of issuance of the license, and shall complete construction within four years from the date of issuance of the license.

Article 31. The Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations are consistent with the approved design. At least 30 days prior to start of construction of the cofferdam the Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and Director, Office of Electric Power Regulation) one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.

Article 32. The Licensee shall, within 90 days of completion of construction, file for approval of the Director, Office of Electric Power Regulation, revised Exhibits A and F to describe and show the project as-built.

Article 33. Prior to the start of construction, the Licensee shall file a study which evaluates the consequences to downstream life and property of a failure of Crescent Dam under flood conditions up to the probable maximum flood (PMF). In the event that failure of the dam would constitute a hazard to human life or would cause extensive property damage, the Licensee shall file concurrently with the study its recommendations for modifying the project structures to ensure their integrity during a PMF. Construction of the project shall not commence until the Director, Office of Electric Power Regulation, approves the study and any necessary modifications.

Article 34. The Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and the Director, Office of Electric Power Regulation) one copy each of the contract drawings and specifications for pertinent features

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of the project, such as water retention structures, powerhouses, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Electric Power Regulation, may require changes in the plans and specifications to assure a safe and adequate project.

Article 35. The Licensee shall, prior to the commencement of any construction at the project, consult with the New York State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work. The Licensee shall make available funds in a reasonable amount for any such work as required. If any previously unrecorded archeological or historical sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the SHPO to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 36. The Licensee shall discharge, as measured immediately below the project dam, an interim continuous minimum flow of 100 cubic feet per second or the inflow to the reservoir, whichever is less, for the purpose of protecting and enhancing aquatic resources in the Mohawk River. These flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 37. The Licensee shall monitor dissolved oxygen concentrations below the project dam for an operational period of one year. The monitoring shall be coordinated with dissolved oxygen monitoring at the upstream Vischer Ferry Project, FERC No. 4679. Within 6 months from the date of completion of the study, the Licensee shall file a data summary that shall include observed daily minimum, maximum, and average dissovled oxygen concentrations, and, after consultation and in cooperation with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service, shall file for Commission

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approval a plan to ensure that dissolved oxygen is maintained during project operation at levels adequate to protect fishery resources. Copies of the data summary and plan shall be sent to the consulted agencies when they are filed with the Commission.

Article 38. The Licensee shall consult with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service in the preparation of a detailed plan to: (1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawk River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; and (3) safely dispose of spoils resulting from project construction. This plan shall include an implementation schedule, monitoring and maintenance programs for project construction and operation, and evidence of agency consultation. This plan shall be filed with the Commission (with a copy provided to the Commission's Regional Engineer in New York City, New York, and the Director, Office of Electric Power Regulation) at least 60 days prior to any ground-disturbing activity or spoil disposal. The Director, Office of Electric Power Regulation, reserves the right to require changes in the plan.

Article 39. The Licensee shall, after consultation with the City of Cohoes (City) and the Albany County Health Department (County), implement a monitoring program that is adequate to determine impacts of project construction and operation on the water quality of the Mohawk River. The Licensee shall immediately advise the City and County of any changes in water quality of the Mohawk River resulting from project construction and operation, and shall implement measures as needed to ensure that the City's municipal water supply is protected.

Article 40. The Licensee shall, after consulation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, and within 18 months from the commencement of commercial operation of the project, conduct a study to evaluate the impacts of project operations on the fishery resources of the Mohawk River, which shall include, but not be limited to, an evaluation of impacts of the point of discharge for the minimum flow release on the downstream migration of anadromous fish, and the effectiveness of the 100 cfs minimum flow in protecting fishery resources. Within 6 months from the date of completion of the study, the Licensee shall file, with copies to the agencies consulted, a report on the results of the study, and, for Commission approval, recommendations for the protection and enhancement of the fishery resources of project waters. Documentation of agency consultation on the report and recommendations shall be included in the filing.

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Article 41. The Licensee shall, for the conservation and development of fish and wildlife resources, operate the Crescent Project when available river flows exceed 3,250 cfs in a run-of-river mode, such that instantaneous outflow from the project approximates the instantaneous inflow to the project reservoir and reservoir surface elevation fluctuations are minimized. When available river flows are less than 3,250 cfs, the project shall be operated so as to provide the minimum flow release required by Article 36. Further, the project shall be operated to ensure that the historic rate of drawdown is not altered and that total drawdown does not exceed 12 inches. This operation mode may be modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 42 . (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type

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dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

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(d) The Licensee may convey fee titles to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

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(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

Article 43. The Licensee shall pay the United States the following annual charges, as determined in accordance with the provisions of the Commission's regulations in effect from time to time, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act:

(1) For the period from April 1, 1962 through May 31, 1974, an amount equal to the annual charges that would have applied for the period if the project had been licensed during that period. The authorized installed capacity for this purpose is 7,500 horsepower.

(2) For the period from June 1, 1974 through May 31, 1984, the annual charges ordinarily due in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 7,500 horsepower.

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(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,500 horsepower.

(E) The Licensee's failure to file a petition for rehearing shall constitute acceptance of this license. In acknowledgment of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

By the Commission.

(S E A L)

Kenneth F. Plumb

Kenneth F. Plumb,
Secretary.

Project No. 4678-001

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, the Power Authority of the State of New York, this _____ day of _____, 19____, has caused its name to be signed hereto by _____, its General Counsel, and its corporate seal to be affixed hereto and attested by _____, its Secretary, pursuant to a resolution of its Board of Trustees duly adopted on the _____ day of _____ , 19____, a certified copy of the record of which is attached hereto.

By_____
General Counsel

Attest:

_____
Secretary

(Executed in quadruplicate)

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Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

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Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

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Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

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Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

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Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

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Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

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Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

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Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

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as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee

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or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

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UNITED STATES OF AMERICA 62,015
FEDERAL ENERGY REGULATORY COMMISSION

Power Authority of the State of New York — Project No. 4678-009 New York

ORDER AMENDING LICENSE AND REVISING ANNUAL CHARGES
(Issued April 8, 1991)

The Crescent Hydroelectric Project has a total installed capacity of 11,800 kW, which is higher than the authorized capacity of 11,600 kW. The increase in the generating capacity would not result in any additional adverse environmental effects other than those identified during processing of the original application. Therefore, the license will be amended effective June 1, 1984 to show the project's total authorized nameplate capacity to be 11,800 kW.

The Director orders:

(A) Ordering paragraph B of the license for the Crescent Project, FERC No. 4678 is revised to show the authorized nameplate capacity to be 11,800 kW.

(B) Paragraph (3) of license article 43 is amended to read as follows:

(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,700 horsepower.

(C) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Power Authority of the State of New York — Project Nos. 4678-019, 4679-022

ORDER AMENDING ARTICLE 41
(November 17, 2000)

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. The projects are located on the Mohawk River, New York.

Article 41 of each license currently requires run-of-river operation when river discharge exceeds 3,250 cfs. When available river flows are less than 3,250 cfs, article 41 only requires that the licensee operate the projects to provide the minimum flow release required by article 36. At flows less than 3,250 cfs, ponding is allowed within the top 12 inches of the reservoir at Crescent and 13.5 inches at Vischer Ferry until operation of the units is practical. In addition, article 36 requires a minimum flow release of 100 cfs at the Crescent Project and 200 cfs at the Vischer Ferry Project, or the inflows to the projects, whichever is less.

Background

In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one of the newly installed Kaplan turbines at flow near rated capacity (1,500 cubic feet per second (cfs)) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for

release through the second Kaplan turbine at or near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only

during the period of juvenile blueback herring downstream

migration, about September 1 to November 10.

The Commission reviewed the licensee's operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee s turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee's proposal to operate the turbines at rated capacity during the blueback herring migration season. However, the order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order indicated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is available to operate another turbine at full capacity. Similarly, when river flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs. Therefore, on July 11, 1995, the licensee initially proposed to modify the wording of article 41 to allow ponding within the flashboard height during the blueback herring outmigration period when river flow exceeds 3,250 cfs. The licensee would pond these flows in the same fashion as when inflows are less than 3,250 cfs, as allowed by article 41. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback

herring.

As an alternative to the licensee s initial proposal, the U.S. Fish and Wildlife Service (FWS) recommended that the two projects operate in an instantaneous run-of-river mode. On January 6, 1997, representatives from the Commission, licensee, FWS, the New York State Department of Environmental Conservation (DEC), and the Village of Green Island, New York participated in a teleconference to further discuss FWS's proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. As a result of this teleconference, in a letter dated February 5, 1997, the licensee amended its original proposal and

proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows.

Licensee's Proposal

In a February 5, 1997 supplement to its initial July 1995 application, the licensee proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows. However, the licensee noted the operations of the upstream Barge Canal lock systems may affect project operations. The licensee explained that, with little or no notice, inflows can decrease or increase substantially in a very short period of time. Therefore, to adjust project operations so that outflows match inflows, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for the unusual flow events.

The licensee recommended that article 41 of each license for the Crescent and Vischer Ferry read as follows:

> The Project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the Project reservoir and reservoir surface elevation fluctuations are minimized. Further, the Project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards

during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). During high flows, when inflow exceeds the hydraulic capacity of the Project units, the excess flows shall be spilled over the dam (flashboards) or through the Project works, thus exceeding the 6 inch operational range.

Comments on the Licensee's Proposal

The DEC commented on the licensee's proposal in a letter dated February 14, 1997. DEC agreed with the licensee s proposed definition of run-of-river for operation of the Crescent and Vischer Ferry Projects. DEC suggested that, when inflows to the projects are substantially reduced, some flexibility in run-of-river operations may benefit aquatic resources.

DEC also stated that, if inflows drop near zero, a run-of-river mode of operation may result in zero inflows below the project. DEC recommended the licensee use 18 inches of storage from the project impoundments to provide a 300 cubic feet per second (cfs) base flow until flows resume.

In a letter dated January 24, 1997, FWS noted its support

for run-of-river operations at the Crescent and Vischer Ferry Projects. Likewise, the National Marine Fisheries Service (NMFS), expressed its support for run-of-river operations in a January 31, 1997 letter.

The Commission issued public notice on August 16, 1995, stating the application was ready for public inspection. The following entities filed motions to intervene:

Intervenor	Date of Motion
New York State Department of Environmental Conservation	August 28, 1995
Department of the Interior	September 11, 1995
National Oceanic and Atmospheric Administration	October 2, 1995

Village of Green Island April 17, 1996

Adirondack Hydro Development[2] March 28, 1997
Corporation

In its motion to intervene, the Village of Green Island expressed concerns about potential flooding associated with the operation of the projects. In its motion, Adirondack Hydro Development Corporation (AHDC) expressed concern regarding the effects of changing operations at Crescent and Vischer Ferry on operations on the downstream New York State Dam Project. We address these concerns in the FEA.

Draft Environmental Assessment

On July 18, 1997, staff issued a Draft Environmental Assessment (DEA) that examined the environmental impacts of three alternatives for operation of the Crescent and Vischer Ferry Projects. On July 25, 1997, a Notice of Availability of the DEA was published in the Federal Register. The Notice requested comments on the DEA.

1 The Village of Green Island, New York, was granted a late intervention by notice issued May 15, 1996.

2 Adirondack Hydro Development Corporation is the managing general partner of NYSD Limited Partnership, the licensee for the downstream New York State Dam Project (FERC No. 7481). It was granted a late intervention by notice issued May 1, 1997.

Comments on the DEA were filed by most of the intervenors and, in a letter dated August 19, 1997, by Niagara Mohawk Generation Business Group (Niagara Mohawk). Comments pertaining to the DEA are addressed in the Final Environmental Assessment (FEA)[3] attached to this order. Comments of a more general nature are addressed in this order.

Discussion

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Article 41 allows the licensee to pond inflows less than 3,250 cfs and the January 9 order requires the licensee to operate the turbines only at rated capacity. Therefore, under article 41, when reservoir inflow is less than 1,500 cfs, outflow will alternate between the minimum flow of 100 cfs (200 cfs at Vischer Ferry) and 1,500 cfs. Similarly, when inflow is between 1,500 and 3,250 cfs, outflow will alternate between 1,500 and 3,000 cfs.

The downstream School Street Project is operated by Niagara Mohawk as a store and release pulsing facility at all inflows but has little capacity for storing water (270 acre-feet). The Crescent and Vischer Ferry Projects have substantially greater storage capacity (2,000 and 1,200 acre-feet, respectively). Therefore, the ponding operations of these projects, at inflows less than 3,250 cfs, have been tentatively identified as the primary factor influencing downstream flow fluctuations in the lower Mohawk River.[4]

In the FEA, we examined, in detail, the environmental impacts associated with the licensee's run-of-river proposal relative to current project operations. What follows is a brief synopsis of our findings in the FEA in regards to both aquatic and power resources.

Adverse environmental impacts associated with downstream flow fluctuations may include fish strandings, elimination of algae and aquatic macrophytes due to periodic exposure of channel

[3] Final Environmental Assessment for the Application to Modify Article 41 of the Crescent Hydroelectric Project, FERC No. 4678, and the Vischer Ferry Hydroelectric Project, FERC No. 4679, New York, September, 2000, Office of Energy Projects, Division of Environmental and Engineering Review.

[4] Draft Environmental Assessment for Hydropower License. School Street Hydroelectric Project, FERC Project No. 2539, New York. Federal Energy Regulatory Commission, Office of Hydropower Licensing, Division of Licensing and Compliance. November 1996.

margins, and dislodging of aquatic insects and fish eggs due to

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rapid changes in discharge.[5] With respect to the Mohawk River, DEC states that downstream fluctuating flows have an adverse impact on downstream habitat and aquatic organisms including fish population and stream invertebrates.[6]

The licensee s proposal would allow it to operate its turbines regardless of inflow as long as flows are greater than 300 cfs (minimum hydraulic capacity). Run-of-river operations would eliminate the ponding and corresponding downstream fluctuations in flow that occur between the minimum releases and operational releases when river flows are less than 3,250 cfs. The cumulative effect of operations at the Crescent, Vischer Ferry would contribute to the stabilization of flows downstream of the projects, thereby enhancing Mohawk River aquatic habitat. Finally, implementation of the licensee's proposal would be consistent with DEC s Fisheries Management Plan for the Lower Mohawk River.[7]

In our January 1995 order, we required the licensee to operate its turbines only at rated capacity. This requirement was based on the premise that this operational scenario would provide maximum protection for downstream migrating blueback herring that may pass through the project works. The licensee's proposed amendment to article 41 would allow the licensee to operate its turbines at less than rated capacity, suggesting that fish mortality may increase under this operational scenario. However, in the FEA, we note that more recent research indicates that the relationship between operating turbines at rated capacity and fish mortality may not be as important as previously thought. In addition, the FEA notes that the licensee is currently developing a sonic deterrence system to exclude downstream migrating blueback herring from the intakes. The FEA concludes that, if this system is successfully deployed, project operations under the proposed run-of-river mode would have minimal effects on blueback herring mortality.

Section 18 of the Federal Power Act gives the Secretaries of the U.S. Departments of Commerce and Interior authority to

5 Rochester, H., Jr., T. Lloyd, and M. Farr. 1984. Physical Impacts of Small-scale Hydroelectric Facilities and their Effects on Fish and Wildlife. U.S. Fish and Wildlife Service. FWS/OBS-84/19.

6 McBride, N. 1994. A Fisheries Management Plan for the Lower Mohawk River. Region IV Fisheries Office, Stamford, New York.

7 Ibid.

prescribe fishways at Commission-licensed projects. In a letter dated September 8, 1995, regarding the licensee's proposed amendment, Interior stated that it reserved its authority to prescribe upstream and downstream fishways at the Crescent and Vischer Ferry Projects under section 18. Because the licensee's run-of-river proposal may affect passage of downstream migrating blueback herring in the manner described above, we should include a provision pertaining to both project licenses that reserves our authority to require such fishways as Interior may prescribe in the future.

The licensee suggested that the operations of the upstream Barge Canal may affect project operations by decreasing inflows to the project with little or no notice. Therefore, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for these unusual flow events. We recognize that operations of the upstream Barge Canal may affect project

operations in the manner described by the licensee. We agree that the 6 inch reservoir operating range requested by the licensee would help the licensee compensate for these flow events while maintaining downstream flows. However, we emphasize that the 6 inch reservoir fluctuation is not intended for regular peaking and ponding operations but is necessary to give the licensee flexibility in responding to sudden changes in inflow due to the operation of the upstream Barge Canal.

As part of the licensee's run-of-river proposal, the DEC recommends that, when inflows fall below 300 cfs, the licensee should continue releasing 300 cfs using up to 18 inches of storage from the project reservoirs. DEC is concerned that, during periods of low inflows, downstream reaches may become dewatered. The FEA notes that DEC s proposed 18 inch drawdown is five to six inches more than historic drawdowns of both reservoirs. The FEA analyzes adverse environmental impacts associated with 12 and 13.5 inch reservoir drawdowns as part of the no-action alternative. The FEA concludes that, under the no-action alternative, adverse impacts associated with reservoir drawdowns lead to decreased fish spawning success and juvenile fish survival. The FEA also concludes that these adverse impacts would be manifested to a greater degree under the DEC s proposed 18 inch drawdown.

To estimate the effects of the licensee's run-of-river

proposal on power resources, we developed a peaking/base-load model of the Vischer Ferry, Crescent, and the School Street

8 Review of recent flow records indicates that, at Lock 6, upstream of Crescent, the Barge Canal can divert up to 15% of mean monthly flow of the Mohawk River during low flow periods.

Projects. We included the downstream School Street Project in our analysis based on its close proximity to the Crescent Project (less than 1 mile), its limited ponding capabilities, and comments on the DEA by the Niagara Mohawk Generation Business Group. The current School Street license allows the licensee to operate the project as a peaking operation. We used the model to evaluate the effects of the alternatives on the amounts and value of the on-peak and off-peak energy generated at all three projects under median water conditions. To value on- and off-peak energy in the model, we estimated 2000 on-peak and off-peak energy values of 25.97 mills/kWh and 18.24 mills/kWh, respectively.

The licensee's run-of-river proposal would have a positive effect on the projects' power production and economics. Using current project operations as the baseline, operating the Crescent and Vischer Ferry Projects under the licensee's run-of-river proposal would result in an increase in total annual energy production of 9.40% and an increase in total annual power value of $206,900. The total annual energy production of the downstream School Street Project would be relatively unaffected by either the limited peaking or run-of-river alternatives. However, there would be a negative economic impact on the School Street Project (annual loss of $326,100 under run-of-river) due to a decrease of percentage of peaking energy produced from 50.1% to 43.8%.

Niagara Mohawk is concerned that the proposed run-of-river operations at the Crescent Project would have a negative economic impact on its downstream School Street Project. It believes the loss of peak generating capacity would result in a shift of energy provided during peak hours from 60% to 43% and a 40 year levelized annual cost of $728,000.

As stated above, we agree with Niagara Mohawk that there

would some negative impact to the downstream School Street Project resulting from run-of-river operations at Crescent and Vischer Ferry. However, we respectfully disagree with Niagara Mohawk's assessment of the magnitude this economic impact. Using the current Crescent and Vischer Ferry project operations as a baseline, we estimate that the percentage of peaking energy produced at School Street would decrease from 50.1% to 43.8% resulting in an annual loss of $326,100, approximately $400,000 less than Niagara Mohawk's estimate. We suspect that Niagara Mohawk may have based its loss estimates on the assumption that the Crescent and Vischer Ferry Projects are full peaking facilities. This, in fact, was the case prior to the relicensing of these projects in 1984. If this was the case, then Niagara Mohawk used an inappropriate baseline for its analysis, resulting in an overestimation of School Street economic losses.

Currently, the Commission is reviewing Niagara Mohawk's application for relicensing the School Street Project. In our November 1996 DEA for the School Street Project, we considered the potential effects of changing operations of the upstream Crescent and Vischer Ferry Projects to run-of-river. In the FEA for the School Street Project we will continue to consider these potential effects, including information from our analysis of power resources as presented here and in the Crescent/Vischer Ferry FEA. The Commission will use this information in its economic analysis as part of its licensing decision on the School Street Project

Conclusions

Based on the available information, we conclude that implementation of the licensee's run-of-river proposal would provide cumulative benefits to fishery resources in the lower Mohawk River by reducing downstream fluctuations currently authorized under article 41 and potentially reducing the amount of intermittently dewatered habitat below Crescent dam at flows less than 3,250 cfs. The FEA recommends the licensee's plan as the preferred alternative and concludes that approval of the licensee's proposal would not constitute a major federal action significantly affecting the quality of the human environment. Therefore, the licensee's proposal to amend article 41 of each license for the Crescent and Vischer Ferry Projects should be approved.

The Director orders:

(A) Article 41 of the licenses for the Crescent and Vischer Ferry Projects is amended to read as follows:

"The project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the project reservoir. The licensee shall act at all times to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured downstream from the project tailrace, approximate the sum of inflows to the reservoir. In some instances, the project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). This 6 inch fluctuation shall not be used for regular ponding operations. It shall be used only in the event of curtailment of inflows due to operations of the upstream Barge Canal. Run-of-river operation may be temporarily modified if required by emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee and the New York State Department of Environmental

Conservation. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident."

(B) Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of, such fishways at the Crescent and Vischer Ferry Projects as may be prescribed by the Secretary of the Interior, as appropriate, pursuant to section 18 of the Federal Power Act.

(C) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days from the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director, Division of Environmental
and Engineering Review

FINAL ENVIRONMENTAL ASSESSMENT
for the
APPLICATION TO MODIFY ARTICLE 41
of the

CRESCENT HYDROELECTRIC PROJECT
FERC Project No. 4678 New York

and the

VISCHER FERRY HYDROELECTRIC PROJECT
FERC Project No. 4679 New York

Federal Energy Regulatory Commission

Office of Energy Projects
Division of Environmental and Engineering Review
888 First Street, NE
Washington, D.C. 20426

November, 2000

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SUMMARY

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. Article 41 of the license requires run-of-river operation when river discharge exceeds 3,250 cfs. When available river flows are less than 3,250 cfs, Article 41 requires that the licensee operate the projects to provide the minimum flow release required by Article 36. At Crescent, ponding is allowed within the top 12 (13.5 at Vischer Ferry) inches of the reservoir until operation of the units is practical.

In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one of the newly installed Kaplan turbines at flow near rated capacity (1,500 cubic feet per second (cfs)) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for

release through the second Kaplan turbine at or near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only during the period of juvenile blueback herring downstream migration, about September 1 to November 10.

The Commission reviewed the licensee's 1992 operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee s turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee s proposal to operate the turbines at rated capacity during the blueback herring migration season. However, the order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order stated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is

available to operate another turbine at full capacity. Similarly, when river flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs. Therefore, on July 11, 1995, the licensee initially proposed to modify the wording of Article 41 to allow ponding, within the flashboard height during the blueback herring outmigration period, when river flow exceeds 3,250 cfs. The licensee would pond these flows in the same fashion as when inflows are less than 3,250 cfs, as allowed by article 41. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback herring.

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As an alternative to the licensee s initial proposal, the U.S. Fish and Wildlife Service (FWS) recommended that the two projects operate in an instantaneous run-of-river mode. On January 6, 1997, representatives from the Commission, licensee, FWS, DEC, and the Village of Green Island, New York participated in a teleconference to further discuss FWS s proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. As a result of this teleconference, in a letter dated February 5, 1997, the licensee altered its original proposal and proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows.

In this Final Environmental Assessment (FEA), we analyze three alternatives for operation of the Crescent and Vischer Ferry Projects. These alternatives include: (1) No Action, reflecting current operation under article 41; (2) Run-of-river, the licensee's proposal; and (3) Limited Ponding, the licensee's initial proposal. We analyze the environmental effects of the alternatives on water resources, aquatic resources (including blueback herring), geology and soil resources, cultural resources, and power resources. The FEA concludes the licensee's proposed run-of-river alternative represents the most beneficial use of the Mohawk River resources.

FINAL ENVIRONMENTAL ASSESSMENT
for the
APPLICATION TO MODIFY ARTICLE 41
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CRESCENT HYDROELECTRIC PROJECT
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20001121-0212(1441881) Cres. VF FERC Order Amending Article 41.txt[3/29/2019 11:39:31 AM]

A. APPLICATION

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. The projects are located on the Mohawk River near Cohoes, New York.

B. PURPOSE AND NEED FOR PROPOSED ACTION

1. Purpose

The licensee is required, between May 15 and July 31 and September 1 and November 10, to operate its turbines at or near rated capacity. The Commission ordered this operational modification in January 1995 to protect migrating juvenile and adult blueback herring. In its February 1997 supplemental application, the licensee requested a change in license article 41 allowing it to operate the project in a run-of-river mode and operate the turbines at less than rated capacity.

2. Project Description

The Crescent dam, completed in 1912, consists of two independent, concrete, gravity overflow sections that link each bank to a rock island in the middle of the Mohawk River. Water impounded by the dam maintains a constant upper pond level for about 10 miles upstream to the Vischer Ferry dam. At the fixed crest elevation of 184 feet, the impoundment covers about 2,000 acres and impounds about 50,000 acre feet of water. Flashboards, installed each year in May and dismantled in December, raise the pond level about 1 foot and retain an additional 2,000 acre feet of water.

The powerhouse at the Crescent Project contains two Kaplan turbines and two Francis turbines that power two 3.0-megawatt (MW) generators and two 2.8-MW generators, respectively. The

maximum flow at rated capacity of each Kaplan turbine is approximately 1,500 cubic feet per second (cfs), and the maximum flow at rated capacity for each Francis turbine is 1,625 cfs.

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The Vischer Ferry Project consists of a dam, built in 1913, that is 1,919 feet long and 30 feet high. At the fixed crest elevation of 221 feet, the pond impounds 25,000 acre feet of water and covers about 1,050 acres. After the spring thaw when flashboards are added, the pond impounds an additional 2,400 acre feet of water. The powerhouse contains four turbines and generators that are identical in design and rated capacity to the turbines and generators of the Crescent Hydroelectric Project.

The water surface elevations in both reservoirs are raised by the installation of flashboards during the navigation season and lowered when the flashboards are removed in the fall to minimize ice damage. The timing of the navigation season varies with flow and weather conditions from year to year and extends from about May through November. At Crescent the flashboards are 12 inches high and the reservoir is raised about 12 inches when they are in place. At the Vischer Ferry the flashboards are 27 inches high but the reservoir is only raised about one half of this amount (13.5 inches) for navigation. Historically, the limited storage volumes provided by the flashboards have been used to operate turbines near their rated hydraulic capacity. Consequently, the Crescent reservoir surface typically fluctuates about 12 inches and the Vischer Ferry reservoir fluctuates about 13.5 inches during the navigation season.

3. License Conditions

The Commission issued the Crescent and Vischer Ferry licenses on June 26, 1984. Both licenses contained the pertinent articles 36, 40, and 41. Article 36 requires a minimum flow release of 100 cfs at the Crescent Project and 200 cfs at the Vischer Ferry Project, or the inflows to the projects, whichever is less. These flows are released via leakage through the flashboards when the flashboards are in place or by opening a trash sluice gate when the flashboards are not in place. Article 41 requires run-of-river operation when river discharge exceeds 3,250 cfs. (Each plant had an initial capacity of 3,250 cfs and was upgraded to 6,250 cfs in 1992 with the addition of two Kaplan turbines as proposed in the licensee's 1982 license applications.)

Article 40 requires that the licensee perform fishery studies. In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one

of the newly installed Kaplan turbines at flow near rated capacity (1,500 cfs) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for release through the second Kaplan turbine at near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only during the period of juvenile blueback herring downstream migration, about September 1 to November 10.

4. Commission Order dated January 9, 1995

The Commission reviewed the licensee's operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee's turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee's proposal to operate the turbines at rated capacity during the blueback herring migration season. The pertinent section of the January 9 order is paragraph B, which is quoted in part as follows:

> "(B) The licensee shall operate Kaplan and Francis turbines at or near their rated capacities, approximately 1,500 and 1,600 cubic feet per second, respectively. Beginning in 1995, the licensee shall implement this operational scenario from May 15 through July 31 and September 1 through November 10 for the remainder of the license term . . . ."

The Commission's January 1995 order also noted how article 41 affected project operations as set forth in paragraph B. The order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order indicated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is available to operate another turbine at full capacity. Similarly, when river

flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs.

5. Licensee's Initial Application to Modify Article 41

Based on the information in the Commission s January 9 order, on July 11, 1995, the licensee proposed to modify the wording of Article 41. The licensee's initial rewording of article 41 would allow ponding within the flashboard height during the blueback herring outmigration period, when river flow exceeds 3,250 cfs, in the same fashion as ponding is allowed at flows less than 3,250 cfs. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback herring.

6. Site Visit and Teleconference

The U.S. Fish and Wildlife Service (FWS), in its letter dated September 8, 1995, stated that a continuous base flow would provide benefit to the aquatic resources of the Mohawk River below the Crescent and Vischer Ferry Projects. Therefore, as an alternative to the licensee s initial proposal, the FWS recommended that the two projects operate in an instantaneous run-of-river mode year-round. To discuss FWS s run-of-river proposal, on March 6, 1996, a site visit was conducted with representatives from the Commission, the licensee, the FWS, the National Marine Fisheries Service (NMFS), and the New York State Department of Environmental Conservation (DEC). At the site visit, FWS continued to state it would recommend year-round run-of-river operation with operation of the turbines following river flow, even though the turbines might not always operate near rated capacity. FWS filed further support for run-of-river operation in a letter dated March 22, 1996.

On January 6, 1997, representatives from the Commission, licensee, FWS, DEC, and the Village of Green Island, New York participated in a teleconference. The purpose of the

teleconference was to further discuss FWS s proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. In a letter dated January 15, 1997, parties participating in the teleconference were invited to file additional comments.

7. Licensee s Proposal to Operate Run-of-River

The licensee provided its comments on the teleconference in a letter dated February 5, 1997. As a supplement to its initial July 1995 application, the licensee agreed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows. However, the licensee noted the operations of the upstream Barge Canal lock systems may affect project operations. The licensee explained that, with little or no notice, inflows can decrease or increase substantially in a very short period of time. Therefore, to adjust project operations so that outflows match inflows, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for the unusual flow events.

The licensee proposed that run-of-river operations at the Crescent and Vischer Ferry Projects be defined as follows:

> The Project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the Project reservoir and reservoir surface elevation fluctuations are minimized. Further, the Project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). During high flows, when inflow exceeds the hydraulic capacity of the Project units, the excess flows shall be spilled over the dam (flashboards) or through the Project works, thus exceeding the 6 inch operational range.

8. Other Comments

The DEC commented on the teleconference in a letter dated February 14, 1997. DEC agreed with the licensee s proposed definition of run-of-river for operation of the Crescent and Vischer Ferry Projects. DEC stated, when inflows to the projects

are substantially reduced, some flexibility in run-of-river operations may benefit aquatic resources.

DEC also stated that, if inflows drop near zero, a run-of-river mode of operation may result in zero inflows below the project. DEC recommended the licensee use storage from the project impoundments to provide a base flow until flows resume. Specifically, DEC recommended the licensee add to its definition of run-of-river the following:

> If inflow to the project reservoir drops below 300 cfs (minimum operating gate of Kaplan turbine) the project shall

> continue to release 300 cfs up to a maximum impoundment drawdown of 18 inches.

In a letter dated January 24, 1997, FWS reiterated its support for run-of-river operations at the Crescent and Vischer Ferry Projects. Likewise, NMFS, although absent from the January 6 teleconference, expressed its support for run-of-river operations in a January 31, 1997 letter.

C. PROPOSED ACTION AND ALTERNATIVES

1. Licensee s Proposed Action: Run-of-river operation

As a result of the teleconference with the resource agencies and Commission staff, the licensee proposes to operate the projects in a run-of-river mode. It also requests a 6 inch reservoir drawdown to allow it flexibility in responding to sudden changes in inflow.

Run-of-river operation would eliminate ponding at inflows less than 3,250 cfs, as currently authorized by Article 41. In addition, run-of-river operation would allow the licensee to operate turbines at less than rated capacity, depending on inflow.

2. Alternatives to the Proposed Action

a. No-Action Alternative: Operation Under Article 41 and January 9, 1995 Commission Order

Under the no-action alternative, the licensee would continue

to operate the projects pursuant to article 41 and the Commission s January 9, 1995 order. To maximize survival of blueback herring through the turbines, the order requires that flows be released through the turbines only at the turbines' rated capacity during the outmigration seasons (May 15 through July 31 and September 1 through November 10). The rated capacities for the turbines are approximately 1,500 cfs for each Kaplan unit and 1,625 cfs for each Francis unit.

Article 41 also requires that, at flows greater than 3,250 cfs, the license operate the project in a run-of-river mode where inflows equal outflows. Because the licensee is required to operate the turbines only at rated capacity, flows between 3,250 cfs (approximate capacity of two Kaplan turbines) and 4,625 cfs (approximate capacity of two Kaplan turbines and one Francis turbine), and between 4,625 cfs and 6,250 cfs (approximate capacity of two Kaplan and two Francis turbines) must be spilled and not ponded.

b. Licensee's Initial Proposed Action Alternative: Limited

Ponding

The licensee initially proposed to modify Article 41 of the Crescent and Vischer Ferry Projects licenses to allow ponding, during the blueback herring outmigration seasons, at inflows greater than 3,250 cfs. This action would allow the licensee to pond rather than spill water (in situations previously noted) until enough water is available to operate its turbines only at rated capacity. As previously discussed, the licensee is currently required to operate the turbines at rated capacity to provide safe fish passage for blueback herring. The licensee would continue to limit the total drawdown of the project reservoirs to 12 inches at Crescent and 13.5 inches at Vischer Ferry.

D. COMMENTS

1. Public Notice

The Commission public noticed the licensee's application on August 16, 1995. The following entities commented on the licensee's application for amendment to the licenses for the Crescent and Vischer Ferry Projects:

Commenting Entity	Date of Letter

National Oceanic and Atmospheric Administration, NMFS	July 10, 1995 July 20, 1995 October 11, 1995 January 31, 1997
DEC	August 9, 1995 August 23, 1995 February 14, 1997
Department of the Interior, FWS	June 9, 1995 September 8, 1995 January 12, 1996 March 22, 1996 January 24, 1997
Adirondack Hydro Development Corporation	September 15, 1995

2. Interventions

The following entities filed motions to intervene on the application to modify Article 41 of the licenses for the Crescent and Vischer Ferry Hydroelectric Projects:

Intervener	Date of Motion
New York State Department of Environmental Conservation	August 28, 1995

Department of the Interior	September 11, 1995
National Oceanic and Atmospheric Administration	October 2, 1995

Intervener	Date of Motion
Village of Green Island, New York [9]	April 17, 1996
Adirondack Hydro Development Corporation [10]	March 28, 1997

Environmental issues raised by the commentors and interveners are

discussed in the environmental impacts section.

E. DRAFT ENVIRONMENTAL ASSESSMENT

On July 18, 1997, we issued a Draft Environmental Assessment (DEA) that examined the environmental impacts of the four alternatives for operation of the Crescent and Vischer Ferry Projects. On July 25, 1997, a Notice of Availability of Draft Environmental Assessment was published in the Federal Register. The Notice requested comments on the DEA.

The following entities filed comments on the DEA. These comments are addressed in FEA.

Commentor	Date of Letter
New York State Department of Environmental Conservation	August 14, 1997
U.S. Fish and Wildlife Service	August 25, 1997 September 18, 1997

Commentor	Date of Letter
Environmental Management Services [11]	August 18, 1997

9 The Village of Green Island, New York was granted a late intervention by a notice issued May 15, 1996.

10 Adirondack Hydro Development Corporation is the managing general partner of NYSD Limited Partnership, the licensee for the downstream New York State Dam Project (FERC No. 7481). It was granted a late intervention by a notice issued May 1, 1997.

11 Filed on behalf of NYSD Limited Partnership, the licensee

(continued...)

Commentor	Date of Letter
Niagara Mohawk Generation [12]	

F. ENVIRONMENTAL ANALYSIS

In this section, we describe the Mohawk River, the general locale, and discuss cumulative impacts. We identify several resource areas and conduct an independent environmental analysis evaluating potential impacts. In our analysis, we use the current project operations as the baseline for measuring and defining the potential environmental effects of the alternatives. Because the alternatives would not involve construction or ground-disturbing activities, we do not anticipate any effects to terrestrial resources, land use, recreation, visual resources or socioeconomics. Therefore, we do not discuss these resource areas.

The Mohawk River and the General Locale

The Crescent and Vischer Ferry Projects are located on the Mohawk River in eastern central New York. The Crescent Project is located in a rural, sparsely populated area, about three miles upstream of the confluence of the Mohawk and Hudson Rivers on the Saratoga and Albany county line. Crescent Lake, the impoundment created by Crescent dam, extends about 10 miles upstream of the dam to the Vischer Ferry Project at Lock E-7. Land next to the impoundments and upstream along the river is used in a variety of ways, including wooded areas, active and inactive farmlands, public open space, and limited residential and commercial development.

The climate of the region is classified as continental. This climate type is characterized by large annual temperature ranges with warm to hot summers and cold winters. The mean annual precipitation at the Albany Airport, located about 6 miles south-southwest of the Crescent Project, is 33.4 inches.

The Vischer Ferry Project is about 10 miles upriver from the Crescent Project. The upstream terminus of the Vischer Ferry impoundment is located 10.3 miles upstream at Lock E-8 in Schenectady. Land use next to the impoundment and upstream

(...continued)

for the downstream New York State Dam Project (FERC No. 7481).

12 Niagara Mohawk Generation Business Group is affiliated with Niagara Mohawk Power Corporation, the former licensee for the downstream School Street Project (FERC No. 2539). The current licensee for the School Street Project is Erie Boulevard Hydropower LP.

includes wooded areas, wetlands, orchards, truck farms, residential areas, and industries.

Navigation is the primary use of project waters at both locations. A series of locks and dams extending about 60 miles regulates upstream river flows, and Lock E-7 at Vischer Ferry regulates the downstream flows. The Mohawk River drainage area covers about 3,450 square miles above the U.S. Geological Survey (USGS) gaging station 2 miles downstream of the Crescent dam. Since 1917, the USGS has continuously maintained a stream gaging station on the Mohawk River about 2 miles downstream from Crescent dam (01357500 Mohawk River at Cohoes). The drainage area upstream of the gage is 3,450 square miles, and the USGS classifies the streamflow records as "Good." Before 1926 records were published as total flow and were adjusted to include the barge canal diversions above Crescent dam. Records since 1926 are not adjusted. The average daily discharge for the period 1926 through 1993 (68 years) was 5,672 cfs. The highest discharge occurred when an ice jam broke and released 143,000 cfs on March 3, 1964. The lowest discharge (6 cfs) occurred on September 18, 1941. During the most recent published water year, 1994, the maximum daily discharge was 49,200 cfs, the minimum was 996 cfs, and the average was 6,189 cfs.

We used 41 years of daily flow records (1953-1993) to construct a flow duration curve. Flows of approximately 14,000 cfs are exceeded 10% of the time and flows of approximately 2,000 cfs are exceeded 90% of the time. The Crescent and Vischer Ferry Projects each have the capacity to use 6,250 cfs for power generation. This is exceeded by river discharge 27 percent of the time. The median flow (exceeded 50 percent of the time) is 3,300 cfs, slightly more than the capacity of two turbines. The minimum flow usable to generate electricity by one turbine is 350 cfs, which is exceeded by the daily average 100 percent of the time.

There are six hydroelectric facilities on the Mohawk River, including the Crescent and Vischer Ferry Projects. Hydroelectric developments at the Little Falls (No. 3509), Vischer Ferry, and Crescent Projects operate in combination with the New York State Thruway Authority's navigational dams and locks. There are three hydroelectric developments downstream of the Crescent Project: School Street (No. 2539), New York State Dam (No. 7481), and Mohawk Paper Mills (No. 3605) Projects.

The School Street Project is located 1.5 miles downstream of

the Crescent Project. The project operates in a store and release mode and is supplied by a 1-mile-long head canal and dam that diverts water around the 80-foot-high Cohoes Falls. The licensee for this project, Erie Boulevard Hydropower LP, has applied for a new license with the Commission. In November 1996, Commission staff issued a Draft Environmental Assessment (FERC, 1996) analyzing the potential environmental impacts of the existing School Street Project and alternatives.

Cumulative Impact Summary

An action may cause cumulative impacts on the environment if it overlaps in space or time with the impacts of other past, present, or reasonably foreseeable future actions. Individual minor impacts of multiple actions, when added together, may amount to collectively significant cumulative impacts. We consider cumulative impacts of the proposed action and alternatives in the Environmental Impacts section.

Environmental Impacts

1. Water Resources

a. Affected environment: The Mohawk River flows east for 154 miles from the Town of West Turin to the City of Cohoes, where it joins the Hudson River. Crescent Lake, the impoundment created by Crescent dam, has a maximum width of 0.6 mile and a maximum depth of 37 feet. The impoundment at Vischer Ferry (Lock 7 Pool) has a maximum width of 0.4 mile and a maximum depth of 26 feet.

b. Water quality: The water quality classifications of the Mohawk River near the Crescent Hydroelectric Project have been designated as Class A and Class C. Class A waters, by definition, are suitable as a source of potable water and for any other use, including primary contact recreation, recreational fishing, and fish and wildlife habitation. Class A waters extend upstream from the first dam above Cohoes Falls (School Street dam) to the Vischer Ferry dam, with the exception of the barge canal inlet in Crescent Reservoir.

The water quality classification of the barge canal inlet to Crescent Lake is Class C, which is suitable for fishing and secondary contact recreation but is not suitable as a source of potable water or for primary contact recreation.

Water quality classifications near Vischer Ferry are Class A and Class B. Most of the Vischer Ferry pool is considered Class A. From the Route 5 bridge upstream to Lock 8, the water is classified as Class B and is suitable for any use other than as a source of potable water. Unlike the Class C waters near Crescent, these waters can be used for primary contact recreation and recreational fishing.

c. Environmental effects: Pursuant to article 37, the licensee conducted water quality surveys beginning in 1982. These surveys, in the Crescent and Vischer Ferry impoundments, examined potential effects of local wastewater treatment plant discharge on dissolved oxygen concentrations during high-temperature, low-flow periods. The licensee continued to compile relevant information and submit reports to DEC and FWS until 1992, when DEC concluded that dissolved oxygen monitoring was no longer necessary. The licensee's documentation showed that

dissolved oxygen levels far exceeded DEC standards for project-area surface waters and that current dissolved oxygen levels are adequate to protect aquatic resources (NYPA, 1993).

Reservoir and downstream dissolved oxygen would not be expected to change from historical conditions for any of the four operating alternatives considered here. First, none of the alternatives, most notably the licensee s run-of-river alternative, would significantly change reservoir retention times or stratification patterns. The licensee's initial limited ponding and no-action alternatives provide for only short-term (within day) water retention, rather than long-term retention that would increase stratification potential. Downstream dissolved oxygen would not be adversely affected by the run-of-river alternatives because continuous downstream flows should ensure stable downstream dissolved oxygen conditions. Likewise, the licensee s initial ponding alternative should not adversely affect downstream dissolved oxygen levels, as flow release mode is modified only when flows exceed 3,250 cfs. At flows of this magnitude, downstream dissolved oxygen levels would remain relatively stable.

The Village of Green Island expressed concern about downstream flooding in its "Petition for Late Intervention" filed on April 17, 1996. The petition states that the village (located at the confluence of the Mohawk and Hudson Rivers) recently experienced a "near flooding condition." Green Island was concerned that proposed changes in reservoir operation might

increase the potential for flooding part of the village.

To address Green Island s concerns, we performed a flood frequency analysis on the streamflow records from the USGS stream gage located on the Mohawk River at Cohoes. The analysis shows that a flood with a return interval of 10 years would have a magnitude of about 90,000 cfs. None of the proposed alternatives would affect flows above 6,250 cfs in the Mohawk River. This flow is exceeded 27 percent of the time, is close to the 68-year average daily flow of 5,672 cfs, and is well below the level of potential flooding. Therefore, we conclude that none of the proposed alternatives would have any effect on potential flooding in the Mohawk River.

2. Aquatic Resources

a. Aquatic habitat: The 2,000-acre Crescent Lake impounds about 50,000 acre feet of water and extends upstream from Crescent dam, 3.4 miles above the confluence of the Mohawk and Hudson Rivers, upstream about 10 miles to Vischer Ferry dam. The 1,050-acre Vischer Ferry Lake is immediately upstream of Crescent Lake and impounds approximately 2,400 acre feet of water. The two reservoirs are hydraulically connected by Canal Lock E-7. As previously mentioned, article 41 allows the licensee to fluctuate the Crescent and Vischer Ferry reservoirs 12 and 13.5 inches, respectively, when inflows are less than 3,250 cfs.

The one-mile reach downstream from Crescent Dam to the School Street Dam includes the 100-acre School Street impoundment. Operations at the School Street Project fluctuates this impoundment up to 3 feet daily (FERC, 1996).

b. Resident fisheries: Fisheries resources in the two lakes are generally similar as evidenced by results of DEC fisheries studies in Crescent Lake during 1979 (DEC, 1980) and Vischer Ferry Lake during 1980 (DEC, 1981a). Results of the Crescent Lake studies are summarized below.

The DEC (1980) conducted fisheries studies in Crescent Lake during 1979 that provided information on aquatic resources in the project area. Resident species were dominated by centrarchids (bass and sunfish), percids (walleye and perch), ictalurids (bullhead), and cyprinids (carp and minnows).

The DEC categorized the fish species collected in Crescent Lake as gamefish (6 species), panfish (10 species), or rough or

forage fish (14 species) (DEC, 1980). The ratio, by weight, of nongamefish to gamefish was 18 to 1, with rough or forage fish comprising about two-thirds of all fish collected. Smallmouth bass were the most abundant gamefish collected, followed by largemouth bass and then walleye. The relative abundance of each was rated as common (DEC, 1980). White crappie were the most abundant panfish collected, followed by brown bullhead, bluegill, and black crappie. Each of these species was rated as abundant. Finally, carp, a rough fish, were also rated as abundant in Crescent Lake. Numerous forage species, predominantly cyprinids, were collected but their relative abundance was not estimated (DEC, 1980).

The DEC (1981b) reports that Crescent and Vischer Ferry Lakes of the lower Mohawk River "support good quality, popular warmwater fisheries for smallmouth bass, largemouth bass, walleye, and other species including yellow perch, pumpkinseeds, bluegills, bullheads, rock bass, crappies and white perch." DEC (1980) reports that in Crescent Lake, bass and walleye growth rates are excellent and above average for the Region 4 Fisheries Unit; about one-third of the bass collected are of legal size (12 inches or longer); and about two-thirds of the panfish collected are of "desirable" size to anglers. In DEC s Fisheries Management Plan for the Mohawk River, McBride (1994) suggests the lower Mohawk River "supports one the better smallmouth bass fisheries in New York."

c. Blueback herring: Blueback herring, a forage fish, was the most abundant species in the rough or forage fish category and was also the most abundant fish species collected in Crescent Lake. McBride (1985 [in FERC, 1995]) reports blueback herring were also among the most dominant fish in the lower Mohawk River during the mid-1980's. Abundance of this anadromous species varies seasonally, increasing with upstream spawning migrations during late spring and early summer and decreasing with juvenile

outmigrations during fall. A major objective of DEC s Mohawk River Fisheries Management Plan is to, "Preserve and maintain the anadromous blueback herring run throughout the lower Mohawk" (McBride 1994).

Blueback herring are commercially harvested along the Atlantic Coast and contributes to the recreational fishery on the Hudson and Mohawk Rivers during spring spawning migrations (FWS, 1995a). Upstream spawning migrations of sexually mature adults (3+ years old) move from salt water through the Hudson River and

into the Mohawk River during late spring and early summer. Cohoes Falls, an 80-foot-high natural barrier several miles above the river's mouth, has historically limited migrations into the Mohawk River. However, blueback herring gained access to upstream river reaches with completion of the Erie Canal in 1825 and its successor, the Erie Barge Canal, in 1918.

Currently, adult blueback herring currently depend on the operation of locks and gates on the Erie Section of the New York State Barge Canal to gain access to the Mohawk River. Regular canal operation generally extends from late April or early May through late November or early December. Adults migrating upstream through the canal enter the Mohawk River upstream of Crescent dam.

Spawning migrations can extend to near Rome, New York, about 120 miles above the river's mouth and more than 100 miles upstream of Crescent and Vischer Ferry dams. Spawning occurs in upper reaches of the Mohawk River and its tributaries, preferably in swift-flowing, hard-bottomed stream reaches, and begins when water temperatures reach 10ø to 15øC. Eggs are broadcast, fertilized, and adhere to the stream bottom or are dislodged and drift with the current (NYPA, 1993). Egg incubation is brief, requiring only 2 to 3 days at water temperatures of about 22ø to 24øC (Scott and Crossman, 1973).

Spent adult blueback herring migrate downstream toward salt water shortly after spawning. NYPA (1993) reports spent adults return to the ocean in May and June, passing Crescent and Vischer Ferry through the adjacent navigation locks, in spillage over the dams, or through project turbines. The FERC (1995) suggests the outmigration period of adult blueback herring in the Mohawk River is May through July, citing studies by Loesch and Lund (1977) that indicate peak adult outmigration may continue through July.

Downstream fish passage facilities for adult outmigrating Mohawk River blueback herring are operational at the Little Falls and Mohawk Paper Mills Projects. As previously discussed, FERC (1995) requires that the licensee operate project turbines at or near rated capacities from May 15 through July 31 for the remainder of the license term for the protection of outmigrating adult blueback herring. DEC (1991 [in FERC, 1995]) states that up to 39 percent of spent adults may return to spawn in successive years.

Juvenile blueback herring (young-of-year fish) rear

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throughout the Mohawk River during summer, feeding primarily on zooplankton and growing rapidly. They are an important prey for dominant riverine piscivores such as smallmouth and largemouth bass, walleye, and yellow perch. FWS (1995a) reports blueback herring also provide prey for tiger muskellunge (northern pike x muskellunge), which DEC (1981b) initially stocked in Crescent and Vischer Ferry Lakes in 1980. Other blueback herring predators include small mammals, reptiles, and birds as well as gamefish such as striped bass and bluefish in the Hudson River, estuary, and ocean (NYPA, 1993; FWS, 1995a). NYPA (1993) reports that the addition of blueback herring to the prey base has enhanced the Mohawk River's carrying capacity, especially for piscivorus gamefish. A recent study (Yako et al., 2000) has shown that blueback herring are an energentically valuable and potentially key prey for largemouth bass.

Outmigrations of juvenile blueback herring from the Mohawk River to the Hudson River estuary occur primarily during fall and throughout the day and night (FWS, 1995b; NYPA, 1992). NYPA (1993) reports most outmigrants near the Crescent Hydroelectric Project are between 60 and 90 mm long (fork length) and have a median length of 75 to 80 mm. Potential outmigrant routes past the Vischer Ferry and Crescent Hydroelectric Projects include the adjacent navigation locks, spillage over the dams, and through project turbines. A study at Vischer Ferry concluded that most juvenile blueback herring migrate through the project powerhouses on their downstream migration (Curtis and Associates, 1987).

Reports indicate outmigrations by juvenile blueback herring occur primarily from September through early November but can extend from August into December. NYPA (1992) states most juvenile herring move downstream past Vischer Ferry and Crescent between September 1 and November 10. Fishway operations at the New York State Dam, Little Falls, and Mohawk Paper Mills Projects provide downstream fish passage for juvenile blueback herring in the fall. As previously mentioned, FERC (1995) requires that NYPA operate project turbines at or near rated capacities from September 1 through November 10 for the protection of outmigrating juvenile blueback herring.

Despite the relatively high survival of juvenile blueback herring through the project's Kaplan turbines (96%), the licensee has continued to study ways of excluding migrating adult and juvenile herring from the project works. A recent study at Vischer Ferry (Ross, 1999) reported that more than 90% of hydroacoustically observed juvenile blueback herring moved through a flashboard opening when a high frequency sound system was operating.

d. Environmental effects

1) Effects on aquatic habitat

Article 41 allows the licensee to pond inflows less than 3,250 cfs and the January 9 order requires the licensee to operate the turbines only at rated capacity. Therefore, under the no-action alternative and under the licensee s initial proposed action alternative, when reservoir inflow is less than 1,500 cfs, outflow will alternate between the minimum flow of 100 cfs (200 cfs at Vischer Ferry) and 1,500 cfs. Similarly, when inflow is between 1,500 and 3,250 cfs, outflow will alternate between 1,500 and 3,000 cfs.

As previously mentioned, the downstream School Street Project is operated as a store and release pulsing facility at all inflows but has little capacity for storing water (270 acre-feet). The Crescent and Vischer Ferry Projects have substantially greater storage capacity (2,000 and 1,200 acre-feet, respectively). Therefore, the ponding operations of these projects, at inflows less than 3,250 cfs, have been tentatively identified as the primary factor influencing downstream flow fluctuations in the lower Mohawk River (FERC, 1996).

Adverse environmental impacts associated with downstream flow fluctuations may include fish strandings, elimination of algae and aquatic macrophytes due to periodic exposure of channel margins, and dislodging of aquatic insects and fish eggs due to rapid changes in discharge (Rochester et al. 1984). With respect to the Mohawk River, DEC states that downstream fluctuating flows have an adverse impact on downstream habitat and aquatic organisms including fish population and stream invertebrates (McBride, 1994). Because of the adverse effects on downstream Mohawk River aquatic habitats associated with store and release operations, Commission staff, in its School Street Project Draft Environmental Analysis, recommended the downstream School Street Project operate in a run-of-river mode (FERC, 1996).

The proposed run-of-river alternative would allow the licensee to operate its turbines regardless of inflow as long as flows are greater than 300 cfs (minimum hydraulic capacity). Implementation of either of these alternatives would eliminate the ponding and corresponding downstream fluctuations in flow that occur between the minimum releases and operational releases when river flows are less than 3,250 cfs. If the new School Street license includes a run-of-river requirement, the cumulative effect of run-of-river operations at the Crescent, Vischer Ferry, and School Street Projects would stabilize flows downstream of the projects, thereby enhancing Mohawk River aquatic habitat. In fact, two years after a Michigan hydroelectric project ceased store and release operations and

began run-of-river operations, fish spawning success increased due to the creation of new, more stable downstream habitats (Auer, 1996). In addition, minimizing the peaking capabilities of an Alabama hydroelectric project resulted in increases in fish diversity more reflective of a riverine system (Travnichek et al., 1995). Finally, implementation of the run-of-river alternative would be consistent with DEC s Fisheries Management

Plan for the Lower Mohawk River (McBride, 1994).

Under the no-action alternative, the licensee would continue to drawdown the Crescent reservoir 12 inches and the Vischer Ferry reservoir 13.5 inches, at inflows less than 3,250 cfs. The licensee's initial proposed alternative would also allow these reservoir drawdowns at inflows up to 6,250 cfs. In addition, DEC's suggested modification of the run-of-river alternative would allow reservoir drawdowns of up to 18 inches at inflows less than 300 cfs. Finally, as part of its proposed run-of-river alternative, the licensee has requested a 6-inch drawdown to allow it flexibility in responding to sudden changes in inflow.

Reservoir fluctuations can adversely affect aquatic habitat by exposing nests and dewatering eggs. These fluctuations may also cause fish spawning in shallow water to abandon nests. Drawdowns may displace juvenile fish from shallow vegetated habitats that provide refuge from predators and may reduce prey for juvenile fish by stranding and dewatering benthic macroinvertebrates in shallow habitats. All of these adverse environmental impacts associated with reservoir drawdowns may lead to decreased fish spawning success and juvenile fish survival.

The licensee's proposed run-of-river alternative would limit the fluctuations of the Crescent and Vischer Ferry reservoirs that would be allowed under the no-action and licensee s initial proposed action alternatives. The licensee's requested 6 inch drawdown is approximately one half of the current authorized drawdown level. We note that this 6 inch drawdown is not intended for regular peaking and ponding operations but is necessary to give the licensee flexibility in responding to sudden changes in inflow due to the operation of the upstream

Barge Canal. The licensee's proposed drawdown limitation would reduce the displacement of juvenile fish from shallow refuse habitats and potentially increase prey production for juvenile fish by reducing the exposure and desiccation of benthic

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macroinvertebrates. These enhancements should increase spawning success and recruitment of juvenile fish in the Crescent and Vischer Ferry reservoirs.

Under DEC's suggested modification to the run-of-river alternative, when inflows fall below 300 cfs, the licensee would continue releasing 300 cfs using up to 18 inches of storage from the project reservoirs. DEC is concerned that, during periods of low inflows, downstream reaches may become dewatered. DEC believes its 300 cfs minimum flow would provide the necessary protection for these downstream areas. DEC s proposed 18 inch

13 Review of recent flow records indicate that, at Lock 6, upstream of Crescent, the Barge Canal can divert up to 15% of the mean monthly flow of the Mohawk River during low flow periods (Firda et al., 1996).

drawdown is five to six inches more than historic drawdowns of both reservoirs. Adverse environmental impacts associated with 12 and 13.5 inch reservoir drawdowns previously discussed, especially during low flow periods, would be manifested to a greater degree under the DEC s proposed 18 inch drawdown.

We believe that the DEC concern regarding dewatering of downstream areas during periods of low inflows should be mitigated by the licensee s interim minimum flow requirements. These flow requirements (100 cfs at Crescent, 200 cfs at Vischer Ferry) should ensure the area downstream of the projects are protected even during periods of low inflow. Examination of USGS flow records for the Mohawk River, downstream of the projects, suggests that flows are rarely below the required minimum flows. DEC has not provided any scientific information suggesting that its proposed 300 cfs would provide more protection for downstream areas than the current minimum flow requirements.

DEC believes that sudden reductions of inflow resulting from upstream Barge Canal operations will result in adverse impacts in the downstream habitat. As a result, DEC recommends that if the licensee's run-of-river proposal is approved, the licensee should be required to monitor and report all inflow reductions due to Barge Canal operations. Under article 8 of the project license the licensee is required to maintain gages for the purpose of determining the stage and flow of the stream on which the project is located. The licensee currently monitors project operations

pursuant to article 8.

2) Effects on blueback herring

One source of mortality among fish passing through turbines at these projects is direct contact with the turbine blades. The output of a Kaplan turbine is regulated by adjusting the space between blades and wicket gates to allow more or less water to pass through the turbine runner. As the output approaches the rated capacity the gates and blades approach their maximum opening and it is easier for fish to pass through the turbines. The licensee, citing studies by Turbak, et. al., (1981) and the Electric Power Research Institute (EPRI, 1987), also states "the rated capacity (of turbines) is considered to be the most hydraulically efficient mode and operation in this mode is considered to cause the minimal impact on entrained fish" (NYPA, 1992). The Commission agreed with this premise in its January 1995 order authorizing operation of the Kaplan and Francis turbines only at rated capacity.

At inflows between 1,500 cfs and 3,250 cfs, turbine mortalities of juvenile blueback herring outmigrants passing through the Kaplan turbines operated at rated capacity would be low, about 4%, based on the licensee's site-specific turbine mortality study. At inflows greater than 4,625 cfs, when the Francis turbines are in operation, juvenile blueback herring mortalities may be as low as 6% (RMC Environmental Services,

Inc., 1994).

Under the no-action and licensee s initial proposed alternatives (limited ponding) the licensee would operate the Kaplan turbines preferentially over Francis turbines. Under these alternatives, to minimize fish mortality, the licensee would only operate these turbines at or near their rated capacities during the adult and juvenile blueback herring outmigration periods. In contrast, turbines would not always operate at their rated capacities under the licensee s proposed run-of-river alternative. Under the premise described above, implementation of the licensee's run-of-river alternative may result in slightly higher fish mortalities. However, results of recent turbine mortality studies by Mathur et al. (1994) suggest the relationship between operating turbines at rated capacity and fish survival previously discussed may not be as important as previously thought. The authors found essentially no significant difference ($P>0.05$) in 1-hour turbine-related mortality rates of

juvenile American shad passing through a Kaplan turbine at different wicket gate openings. In addition, Normandeau Associates, et al. (1996) conducted a study of turbine survival of tagged coho salmon that passed through a hydroelectric turbine a four different discharges. The authors found no signifcant relationship between fish survival and turbine discharge after 48 hours. These studies suggest that, despite turbine operation at less than rated capacity, turbine survival rates of herring under the run-of-river alternative may be similar to survival rates under the no-action and limited ponding alternatives.

As previously noted, the licensee is currently developing a sonic deterrence system to exclude downstream migrating blueback herring from the project intakes (Ross, 1999). Our preliminary review of the licensee's experimental system suggests that a sonic detterence system can alter the behavior of blueback herring, demonstrating its potential use to deter downstream migrating blueback herring from entrainment into the intakes of the Crescent and Vischer Ferry Projects. If this system is sucessfully deployed at the projects, operation of the project under the proposed run-of-river mode would have minimal effects on blueback herring mortality.

Concerns have been raised regarding the effects of changing project operations at the Crescent Project on operation of the downstream fishway at New York State Dam Project. The operator of that project, NYSD Limited Partnership, expressed concern regarding the potential effects of the licensee's proposal on downstream low-flow conditions and operation of its juvenile blueback herring bypass system. Further, DEC notes that its recommendation that the licensee use reservoir storage to provide a 300 cfs minimum flow would ensure that this flow would be more available for fish passage at New York State Dam. NYSD Limited Partnership states that a minimum flow from the Crescent Project of 691 cfs (491 cfs for fishway operation and 200 cfs for project operation) is needed for operation of the New York State Dam

Project and fishway.

The most deleterious effects on fishway operation at the downstream New York State Dam Project would result from implementation of the no-action and licensee's initial proposed action alternatives. Because the licensee would be allowed to pond some inflows under these alternatives, inflows to the New York State Dam Project may be less than required for operation of the fish bypass. Therefore, implementation of either ponding

alternative may result in reduced downstream passage of juvenile blueback herring past New York State Dam.

DEC and NYSD Limited Partnership believe that their minimum flow provisions would ensure that flows would be more available for downstream fishway operation during periods of low inflow. As previously mentioned, reservoir drawdowns from increased minimum flows taken from storage during low inflow periods may result in adverse environmental impacts in the project reservoirs. We maintain that the current minimum flow regime coupled with implementation of the run-of-river alternative should ensure that stable flows are available for downstream fish bypass operations representing a substantial improvement over existing condtions.

3. Geology and Soil Resources

a. Affected environment. The Crescent and Vischer Ferry Projects are located in the Mohawk Valley, a subdivision of the Hudson-Mohawk Lowland. To the north of this region are the Adirondacks, and to the south lies the Appalachian Upland. Soft shales underlie this area. Although the Hudson-Mohawk Lowland ranges from 20 to 30 miles in width, the Mohawk River flows in a fairly narrow river valley.

The Mohawk River shoreline near the Crescent dam is characteristic of glacial topography; it consists of steep slopes rising 20 to 30 feet from the water's edge intermingled with low (4- to 5-foot-high) bluffs.

The topography adjacent to the powerhouse at the Vischer Ferry Project is characterized by very steep shale cliffs. Steep cliffs also overlook the impoundment from the west. The east bank, north and south of the powerhouse, is characterized by low floodplains interspersed with steep cliffs. Soil types found near the projects include the Colonie and Otisville Associations and the Claverack-Colonie Association. These well-drained soils are coarsely grained and are underlain by sand and gravel.

The Rhine-Madalin Association, which is also found near the Crescent Project, is characterized by medium- to fine-textured soils overlying glacial lake or marine sediments. These soils vary from being well-drained to somewhat poorly drained. The moderately well-drained, medium-textured, acidic soils of the Troy-Cossayuna Association are found at Vischer Ferry on the

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undulating glacial till plain.

b. Environmental effects. Operation of the projects under the no-action and licensee s initial proposed alternatives may potentially cause shoreline erosion associated with fluctuation of the project reservoirs. However, because the fluctuations would be within the historical range of operations, we expect these impacts to be minor. On the other hand, the DEC s suggested modification to the run-of-river alternative, with its authorized drawdown of 6 inches beyond historical levels, may result in a higher level of shoreline erosion. The licensee s proposed run-of-river alternative would limit reservoir drawdowns to 6 inches and would reduce any potential for soil erosion along shorelines.

4. Cultural Resources

According to the September 1982 license applications for the Crescent and Vischer Ferry Projects, no properties listed on the National Register of Historic Places are located in the project areas.

5. Power Resources

To estimate the effects on the alternatives on power resources, we developed a peaking/base-load model of the Vischer Ferry, Crescent, and the School Street Projects. We included the downstream School Street Project in our analysis based on its close proximity to the Crescent Project (less than 1 mile), its limited ponding capabilities, and comments on the DEA by the Niagara Mohawk Generation Business Group. The current School Street license allows the licensee to operate the project as a peaking operation. We used the model to evaluate the effects of the alternatives on the amounts and value of the on-peak and off-peak energy generated at all three projects under median water conditions. To value on- and off-peak energy in the model, we estimated 2000 on-peak and off-peak energy values of 25.97 mills/kWh and 18.24 mills/kWh, respectively.

a. No-action alternative

Under this alternative, the Crescent and Vischer Ferry Project are required to operate the generating units only at full capacity from May 15 through July 30 and September 1 through November 10, spilling all flows that do not match full capacity flows, whenever the average daily flow into the project in greater than 3,250 cfs. Operating under this alternative, the projects produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 6,981 kW Value: $502,600

On-peak 25.41 GWh Total Peak Value $806,100

Off-peak 29.51 GWh Total Off-Peak Value $651,000
Total Energy 54.92 Gwh Total Value $1,45
7,100

Total Power Value including capacity and energy $1,959,700

Crescent Project:

Average Peaking Capacity: 7,315 kW Value: $526,700

On-peak 26.63 GWh Total Peak Value $844,600
Off-peak 28.32 GWh Total Off-Peak Value $624,900
Total Energy 54.95 Gwh Total Value
$1,46
9,500

Total Power Value including capacity and energy $1,996,200

School Street:

Average Peaking Capacity: 24,518 kW Value: $1,765,300

On-peak 89.24 GWh Total Peak Value $2,830,800
Off-peak 28.32 GWh Total Off-Peak Value $1,960,400
Total Energy 54.95 Gwh Total Value
$4,79
1,200

Total Power Value including capacity and energy $6,556,500

b. Limited Ponding Alternative

This alternative would allow the licensee to pond rather than spill water in the same situations as in the no-action alternative. Under this alternative the project could produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 7,636 kW Value: $549,800

On-peak 27.80 GWh Total Peak Value $881,700
Off-peak 32.84 GWh Total Off-Peak Value $724,400
Total Energy 60.64 Gwh Total Value $1,60
6,100

Total Power Value including capacity and energy $2,155,900

Crescent Project:

Average Peaking Capacity: 7,966 kW Value: $573,500

On-peak 29.00 GWh Total Peak Value $919,700
Off-peak 31.64 GWh Total Off-Peak Value $698,000

Total Energy 60.64 Gwh Total Value $1,617,700

Total Power Value including capacity and energy $2,191,200

School Street:

Average Peaking Capacity: 24,518 kW Value: $1,756,300

On-peak 89.24 GWh Total Peak Value $2,830,900
Off-peak 88.97 GWh Total Off-Peak Value $1,962,700
Total Energy 178.21 Gwh Total Value $4,793,600

Total Power Value including capacity and energy $6,558,900

c. Run-of-river Alternative

Under the run-of-river alternative, the Crescent and Vischer Ferry Projects would operate at whatever capacity is needed to use all of the available inflow within their maximum hydraulic capacity, although they would not be allowed to use active storage to shift any energy from off-peak to on-peak times. With the Vischer Ferry and the Crescent Projects operating in full run-of-river mode and the School Street Project peaking to its maximum capability, using its limited storage, the projects would produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 6,941 kW Value: $499,700

On-peak 25.27 GWh Total Peak Value $801,400

Off-peak 35.37 GWh Total Off-Peak Value $780,300
Total Energy 60.64 GWh Total Value $1,58
1,700

Total Power Value including capacity and energy $2,081,400

Crescent Project:

Average Peaking Capacity: 6,941 kW Value: $499,700

On-peak 25.27 GWh Total Peak Value $801,400
Off-peak 35.37 GWh Total Off-Peak Value $780,300
Total Energy 60.64 GWh Total Value $1,58
1,700

Total Power Value including capacity and energy $2,081,400

School Street:

Average Peaking Capacity: 21,453 kW Value: $1,544,600

On-peak 78.09 GWh Total Peak Value $2,476,900
Off-peak 100.13 GWh Total Off-Peak Value $2,20
8,900
Total Energy 178.22 GWh Total Value $4,68
5,800

Total Power Value including capacity and energy $6,230,400

Using the no-action alternative as the baseline, operating the Crescent and Vischer Ferry Projects under either the limited peaking alternative or the run-of-river alternative would result in an increase in total annual energy production (a 7.63% increase under limited peaking and a 9.40% increase under run-of-river). The total annual energy production of the downstream School Street Project would be relatively unaffected by either the limited peaking or run-of-river alternatives. However, there would be a negative economic impact on the School Street Project (annual loss of $326,100 under run-of-river) due to a decrease of percentage of peaking energy produced from 50.1% to 43.8%.

G. CONCLUSIONS AND RECOMMENDATIONS

We have considered the licensee's initial proposed alternative to allow ponding when flows exceed 3,250 cfs, the licensee's run-of-river alternative, and the no-action

alternative with operation unchanged pursuant to the 1995 order and article 41. Based on the January 6, 1997 teleconference, the licensee, FWS, DEC, and NMFS agreed that the Crescent and Vischer Ferry Project should be operated in a run-of-river mode.

We agree with the licensee and resource agencies and conclude that the licensee's proposed run-of-river alternative represents the most beneficial use of the resources involved for the following reasons.

The licensee s run-of-river alternative would provide cumulative benefits to fishery resources in the lower Mohawk River by reducing downstream fluctuations currently authorized under Article 41 and potentially reducing the amount of intermittently dewatered habitat below Crescent dam at flows less than 3,250 cfs.

The licensee s run-of-river alternative would also limit reservoir fluctuations of the project reservoirs thus increasing fish spawning success and recruitment of juvenile fish into the Mohawk River fishery.

Survival rates of juvenile blueback herring passing through the turbines under the licensee s run-of-river alternative would likely be as high as under either the no-action or licensee's initial proposed alternatives.

Implementation of the licensee's proposed run-of-river alternative would result in an increase in total annual energy production.

H. FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, issuance of an order modifying Article 41 of the licenses, as proposed by the licensee, would not constitute a major federal action significantly affecting the quality of the human environment.

I. RESPONSE TO COMMENTS ON THE DEA

We summarized the comments on the DEA (in italics) of the DEC, FWS, Environmental Management Services (on behalf of NYSD Limited Partnership), and the Niagara Mohawk Generation Business Group and present our responses below.

New York State Department of Environmental Conservation

1. DEC notes that the DEA emphasizes the potential effects on the Crescent and Vischer Ferry impoundments that could result from the DEC modification to the run-of-river alternative to use reservoir storage to provide a 300 cfs downstream minimum flow during periods of no inflow. DEC states that it acknowledges the possibility of some impacts in the impoundments, but believes these impacts are less significant when compared to loss of downstream flows.

DEC's modification to the run-of-river alternative may necessitate a reservoir drawdown of 18 inches. The DEA examined the adverse impacts of 12 and 13.5 inch drawdowns associated with the ponding alternatives and noted that these impacts would be manifested to a greater degree under DEC's proposed 18 inch drawdown. DEC's comment about impoundment fluctuations relative to lower downstream flows during periods of low inflow does not alter the DEA's conclusions about the adverse environmental impacts associated with drawdown operations.

2. DEC states that the fishway at the downstream New York State Dam Project operates with flows up to 491 cfs during the blueback herring outmigration period. It notes that its recommended modification to the run-of-river alternative to use reservoir storage to provide a 300 cfs minimum flow would ensure that this flow would be more available for fish passage at New York State Dam.

The DEA discussed the impacts of run-of-river operations on operation of the fishway at the downstream New York State Dam Project. We noted that implementation of either the no-action or limited ponding alternative may result in reduced downstream passage of juvenile blueback herring past New York State Dam. This section of the DEA did not discuss the effects of DEC's

minimum flow proposal on fishway operations at the New York State Dam Project. The FEA has been expanded to include a discussion of this topic.

3. DEC explains that its proposed 300 cfs base flow would minimize dewatering of aquatic habitats, stranding of aquatic organisms, and overall stress on aquatic systems.

The DEA discussed the impacts of conversion of the project operations to run-of-river. The DEA states that implementation

of either the DEC's run-of-river modification or the licensee's run-of-river alternative would eliminate the downstream fluctuations that occur under current operations, thereby enhancing aquatic habitat. However, DEC believes that a 300 cfs minimum base flow, in addition to run-of-river operations, is necessary to protect downstream aquatic habitat. The DEA states that the licensee's current minimum flow requirement (100 cfs at Crescent, 200 cfs at Vischer Ferry) should ensure that downstream areas are protected during periods of low inflow. DEC has presented no information that would lead us to conclude otherwise. The FEA has been modified to include an expanded discussion of DEC's minimum flow proposal.

4. DEC believes that sudden reductions of inflow resulting from upstream Barge Canal operations will result in adverse impacts in the downstream habitat. As a result, DEC recommends that if the licensee's run-of-river proposal is approved, the licensee should be required to monitor and report all inflow reductions due to Barge Canal operations. DEC wishes to review these data after 2 years and make final recommendations for project operations at the Crescent and Vischer Ferry Projects.

Under article 8 of the project license the licensee is required to maintain gages for the purpose of determining the stage and flow of the stream on which the project is located. The licensee currently monitors project operations pursuant to article 8. Because the DEA did not include a discussion of this topic we have revised the FEA accordingly.

Environmental Management Services for New York State Dam Limited Partnership (NYSDLP)

1. NYSDLP states that the DEA was not clear on the impact of the proposed 6 inch drawdown as part of the run-of-river mode of operation. It believes the drawdown represents a significant volume of water which will create fluctuations in flows and will continue to be detrimental to operations at the downstream New York State Dam Project.

The licensee states that its proposed 6 inch drawdown is intended to give it operating flexibility in responding to sudden changes in inflow due to the operations of the upstream Barge Canal. The FEA has been expanded to note that this operating

flexibility is not intended to be used for regular peaking

operation but only during low flow periods in response to sudden changes in inflow to Crescent resulting from Barge Canal operations.

U.S. Fish and Wildlife Service

1. The FWS notes that the DEA cited a paper by Mather et al. (1994) as suggesting that operating the Crescent and Vischer Ferry Projects at less than their most efficient gate settings will not affect through-turbine passage survival of juvenile blueback herring. FWS points out that Mather et al. (1994) did not detect a statistical difference between survival of fish passing through a turbine at two different wicket gate settings. FWS believes that the Mather et. al. finding of no significant difference between fish survival at different gate settings does not equate to "mortalities at each gate settings were equal." Therefore, FWS does not believe that, based on this study, it was appropriate for the DEA to conclude that "survival rates of juvenile blueback herring passing through the turbines under the licensee's run-of-river alternative would likely be as high as under either the no-action or licensee's initial proposed alternatives."

The DEA states that Mather et al. (1994) found essentially no difference in 1-hour turbine-related mortality rates of juvenile American shad passing through a Kaplan turbine at different wicket gate openings. Based on this study, the DEA concluded that, despite turbine operation at less than rated capacity, turbine survival rates of herring under the run-of-river alternatives should be similar to survival rates under the limited ponding alternatives.

The DEA did not include a discussion of the statistical analysis of Mather et al. (1994). The FEA has been modified to include more statistical information. We disagree with FWS's interpretation of the statistical test presented in Mather et al. In this paper, the authors conducted a chi-square analysis to test the significance of differences in survival between test and control groups as described by Burnham et al. (1987). In their publication, Burnham et al. describe the fundamentals of hypothesis testing which is to test the null hypothesis "there is no treatment effect", which specifies that survival parameters are equal (E) between treatment and control groups, versus the alternative "there is a treatment effect." In the case of Mather et al. the "treatment" was gate setting. The authors found that "Differences in mortality between test and control groups for each power generation level or between generation levels were not significant ($P>0.05$)." Because Mather et al., using the criteria set forth by Burnham et al., failed to reject the null hypothesis, one can conclude that gate setting did not affect survival of fish passing through the turbines. Therefore, we still believe, as stated in the DEA, that Mather et al. (1994) suggests that the relationship between operating turbines at

rated capacity and fish survival may not be as important as previously thought.

2. FWS also criticized Mather et al. because it did not look at long-term survival of American shad passing through turbines at different gate settings.

We agree that Mather et al. (1994) did not consider long-term survival of American shad passing through turbines at different gate setting. However, we note that Normandeau Associates, Inc. et al. (1996) conducted a study of turbine survival of tagged coho salmon that passed through a hydroelectric turbine at four different discharges. The authors found no signifcant relationship between fish survival and turbine discharge after 48 hours. We have included the results of this study in the FEA.

Niagara Mohawk Generation Business Group

1. The Niagara Mohawk Business Group states that the DEA failed to address their 1997 comments on the relicensing of the School Street Project. They suggest that altering project operations at the Crescent and Vischer Ferry Projects would have an economic impact on operations at the downstream School Street Project. Niagara Mohawk estimates that the loss of peak generating capacity resulting from run-of-river operations at Crescent and Vischer Ferry would result in a shift of energy provided on-peak from 60% to 43% at an annual cost of $728,000.

While the DEA did not address, in detail, the effects of altering Crescent and Vischer Ferry operations on the downstream School Street Project, the FEA includes a more thorough analysis of this subject. However, we respectfully disagree with Niagara Mohawk's assessment of the magnitude of economic losses at the School Street Project resulting from run-of-river operations and Crescent and Vischer Ferry. Using the current Crescent and Vischer Ferry project operations as a baseline, the FEA estimates that the percentage of peaking energy produced at School Street would decrease from 50.1% to 43.8% resulting in an annual loss of $326,100. We suspect that Niagara Mohawk may have based its loss estimates on the assumption that the Crescent and Vischer Ferry Projects are full peaking facilities. This, in fact, was the case prior to the relicensing of these projects in 1984. If this was the case, then Niagara Mohawk used an inappropriate baseline for its analysis, resulting in an overestimation of School Street economic losses.

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120 FERC ¶ 62,087
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

New York Power Authority Project No. 4678-043, -044, & -045

ORDER MODIFYING AND APPROVING DOWNSTREAM FISH PASSAGE PLAN UNDER DECEMBER 28, 2006 ORDER,[1] MODIFYING EFFECTIVENESS STUDY PLAN SCHEDULE UNDER JANUARY 31, 2007ORDER,[2] AND APPROVING OPERATING SCHEDULE FOR DOWNSTREAM FISH PASSAGE, UNDER FEBRUARY 15, 2005 ORDER[3]

(Issued July 31, 2007)

The New York Power Authority (licensee) filed, on February 1, 2007, a proposed revision to the approved downstream passage facilities plan, and a request to extend the due date for filing the modified functional design drawings, as required by the Commission's December 28, 2006 order, following discussions with the U.S. Fish and Wildlife Service (FWS). On March 1, 2007, the licensee filed a proposal to modify the downstream fish passage plan as approved by the December 28, 2006 Commission order, at the Crescent Hydroelectric Project. The March 1, 2007 filing superceded the February 1, 2007 filing.

On March 15, 2007, the licensee filed a schedule for operation of the fish deterrence system and for release of fish passage flows, as required by paragraph (C) of the Commission's February 15, 2005 order, and by paragraph (B) of the December 28, 2006 order. The March 15, 2007 filing also proposed modifications to paragraph (C) of the January 31, 2007 Commission order. The 11.6-megawatt Crescent Hydroelectric

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[1] Order Modifying and Approving Fish Passage Modifications Under February 15 and April 18, 2005 Orders, 117 FERC ¶ 62,269.

[2] Order Modifying and Approving, In Part, A Preliminary Fish Passage Effectiveness Pilot Study Plan Under February 15, 2005 Order, 118 FERC ¶ 62,087.

[3] Paragraph (C) of Order Modifying and Approving Fish Protection Recommendations Under August 14, 2002 Order, 110 FERC ¶ 62,141.

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Project is located on the Mohawk River in Schenectady, Saratoga, and Albany Counties, New York.

BACKGROUND

The Crescent Project consists of a dam in two curved sections separated by a mid-river rock island, with an impoundment about 2,000 acres in area. The mid-river island extends upriver roughly 800 feet from the dam and prevents fish from moving freely across the width of the river in the vicinity of the project dam. The main river channel with depths of 25 to 45 feet flows to the east of the mid-river island. A navigational lock, part of the Erie Canal lock system, is accessible from the main river channel. The side channel flowing to the west of the island, where the powerhouse is located, has a depth of about 10 to 13 feet.

Blueback herring (*Alosa aestivalis*) is the target species for downstream passage at the project. The adults move upstream to spawn in the Mohawk River, reaching the area upstream from the Crescent Project dam via the Erie Canal system and its locks. Adults moving downstream after spawning prefer the deeper habitat and would be expected to stay in the main channel of the river.[4] Juveniles emigrating as young-of-year (YOY), however, prefer the shallower habitat, and generally move into the side channel.

A 40-foot-wide notch formed by an opening in the dam's one-foot-high flashboards[5] on the east side of the island (Dam A) will offer a downstream passage path for blueback herring in the main river channel.[6] A second notch formed in the same manner on the west side of the island (Dam B) provides a path for juvenile fish to move downstream past the dam.[7] Additionally, a notch cut in the top of Dam C,[8] the buttressing

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[4] Jenkins, R. E., and N. M. Burkehead, 1993. Freshwater Fishes of Virginia. American Fisheries Society, Bethesda Maryland.

[5] Flashboards are installed seasonally from early May through mid-November to raise the river level for navigational purposes. The December 28, 2006 order required 40-foot-wide fish passage openings in the flashboards on Dams A and B.

[6] The flashboard opening begins about 600 feet from the eastern shoreline, on the 907-foot-long Dam A. Passage is currently at the surface, although the deeper-habitat-preferring adults tend to this main channel.

[7] On the 537-foot-long Dam B, the flashboard opening begins about 180 feet from the western shoreline. The notch opening in the flashboards on Dam B was increased from 10 to 40 feet wide during August 2006.

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dam at the foot of Dam B, provides passage from the pool it forms below Dam B to the river.

The powerhouse, located on the side channel at the west end of Dam B adjacent to the west river bank, contains two Kaplan turbines and two Francis turbines. Each of the four turbines has a hydraulic capacity of about 1,500 cubic feet per second (cfs). A high frequency sound field projects outward from the entrance to the headrace leading to the power house. The sound field is intended to deter blueback herring from entering the head race channel.

In July 1992, the licensee filed recommendations for the protection of blueback herring pursuant to article 40 of its license.[9] Successive modifications to fish protection and passage plans followed.[10,11,12]

By the order dated February 15, 2005, the Commission considered the available information presented by the licensee regarding the success of the acoustic deterrence system. Evidence of successful downstream passage of blueback herring, and the licensee's recommendations for downstream passage based on testing of that system,

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[8] This third dam sits just below dam B, providing added structural stability for Dam B by impounding water to approximately 4.5 feet deep against the downstream toe of Dam B.

[9] Order Issuing License (Major), June 26, 1984, 27 FERC ¶ 61,466. Article 40 required the licensee to evaluate the effects of project operations on fishery resources of the Mohawk River, and to recommend measures for the protection and enhancement of fisheries resources in project waters.

[10] Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request, January 9, 1995, 70 FERC ¶ 62,010.

[11] Order Modifying and Approving Schedule for Installation of Fish Passage, March 16, 2001, 94 FERC ¶ 62,122.

[12] Order Accepting Final Report on Year 2001 System Testing, Requiring Additional Testing, and Approving Fish Bypasses Design Drawings, August 14, 2002, 100 FERC ¶ 62,122.

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were deemed inadequate and inconclusive. Paragraph (C) of the order directed the licensee to consult with the resource agencies in preparation of its proposed design modifications to the downstream fish passage. The licensee was required to propose a fish passage notch design to provide a flow of no less than 125 cfs though the fish passage notches on Dams A and B, at normal operating headpond elevations, and to enlarge the notch in the crest of Dam C, to provide a 125 cfs fish passage flow from the Dam C pool (impounded against the foot of Dam B) to the river below.

On December 28, 2006, the Commission approved, with modifications, the licensee's proposed fish passage modification plans and schedule. The approved plan called for: release of the required 125 cfs fish passage flow at Dams A and B by leaving a 40-foot-wide opening in the one-foot-high flashboards, and by notching the top of Dam C in the same configuration; installation of a plastic membrane on the dam face below the fish passage notches to protect passing fish; and specific modifications to the plunge pool at Dam C.

The February 15, 2005 order also discussed the need for a study to empirically and quantitatively document the effectiveness of the high frequency sound as a deterrent discouraging fish from entering the project's intake, and documenting the effectiveness of the project modifications providing a flow of 125 cfs through each of the fish passage notches. Paragraph (E) of the order required the licensee to design, in consultation with the resource agencies, a mark and recapture study documenting the effectiveness of the fish passage and protection measures. The Commission reserved the right to require changes to project structures and operations or to require further monitoring and testing based on its review of the report and recommendations.

The Commission's January 31, 2007 order approved the licensees' preliminary plan to conduct a pilot study in 2007 to verify that post-spawning (spent) blueback herring can be captured and radio-tagged successfully without incurring high mortalities. Based on the experienced gained during, and the results of, the first year's pilot study, the licensee will plan a larger study for the following year(s) in consultation with the resource agencies.

LICENSEE'S PROPOSED DOWNSTREAM PASSAGE MODIFICATIONS

In its February 1, 2007 filing, the licensee proposed to modify the approved plan for the downstream fish passage facilities. It proposed to relocate the fish passage notch to be cut in the crest of Dam C farther to the west, placing it more in line with the natural channel leading downstream from the dam. The licensee stated that it consulted with the U.S. Fish and Wildlife Service (FWS) regarding this design change via conference calls

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in January 2007. The licensee proposed to begin with an engineering evaluation to confirm that the Dam C notch can be safely relocated farther west. It would then perform numerical modeling of the plunge pool and its exit to assure that water in the plunge pool is a minimum of three feet deep, and that water at the exit of the plunge pool is at least one foot deep. In conjunction with the plunge pool modeling, it would determine the feasibility of making the Dam C notch two feet deep instead of one foot deep. The licensee reported that FWS accepted this change in the dimensions of the notch, and that the need for the plastic membrane at the plunge pool exit might be eliminated depending on the water depth at the exit.

The licensee stated that it would need eight months following Commission approval of its plan to modify the fish passage design to complete the engineering evaluation of Dam C, the numerical modeling, and to prepare functional design drawings of the Dam C plunge pool notch changes. The licensee proposed to make a decision about a more permanent design for the notches in Dams A and B, including the need for the plastic membranes, after the results of a fish tagging study have demonstrated that the acoustic deterrence system is effective and that the notches in Dams A and B are effective. It requested that the Commission amend the December 28, 2006 order to postpone installation of the plastic membrane until the results of the tagging study are in hand.

The January 31, 2007 order required the licensee to conduct a study that assesses differences in passage success for blueback herring at Dams A and B. In its March 1, 2007 filing, the licensee expressed its belief that conducting a study to empirically assess passage success of blueback herring at Dam B would be much more difficult than at Dam A. Consequently, it proposed to modify its approach to providing downstream fish passage as approved by the December 28, 2006 Commission order.

In its March 1, 2007 filing, the licensee proposed a new strategy in lieu of installing the plastic membrane below Dam B and taking the actions proposed in its February 1, 2007 filing: redesigning the Dam C notch, plunge pool, and exit. The licensee proposed to place an acoustic deterrence system at the entrance to the side channel leading to the powerhouse, intended to guide the herring past the side channel, keeping the downstream migrants in the main river channel where they would pass through the Dam A passage notch or into the barge canal. The new acoustic deterrence system at the entrance to the side channel would replace the current deterrence system located at the powerhouse headrace. The licensee proposed to deploy and begin evaluating the acoustic deterrence system at the entrance to the side channel by August 2008. The licensee's March 1, 2007 filing stated that, if evaluation of the system yields results that are acceptable to the resource agencies and the Commission, the licensee

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would then conduct the comprehensive study of downstream fish passage as specified in the Commission's January 31 order.

The licensee's March 15, 2007 filing superceded the March 1, 2007 filing and stated it would conduct the comprehensive study evaluating the success of the acoustic deterrence system for juvenile blueback herring in 2008, and for adult herring in 2009.

The March 1, 2007 filing stated that if the evaluation of the acoustic deterrence system provides results that are not acceptable to the resource agencies and the Commission, the licensee would resume work to prepare modified functional design drawings of the modifications to the Dam C notch, the plunge pool, and the plunge pool exit, as proposed in the February 1, 2007 filing.

LICENSEE'S PROPOSED DOWNSTREAM PASSAGE EFFECTIVENESS STUDY PLAN MODIFICATIONS

The licensee proposed to develop a comprehensive study plan to evaluate its new strategy of deploying an acoustic deterrence system at the entrance to the side channel after conducting its approved 2007 pilot fish passage study. In its March 1, 2007 filing, the licensee proposed that, if the testing of the side channel acoustic deterrence system yields results that are acceptable to the resource agencies and the Commission, the licensee would at that time proceed with the comprehensive study of downstream fish passage effectiveness as required under paragraph (C) of the January 31, 2007 order. The licensee's March 15, 2007 filing superceded the March 1, 2007 filing, and stated it would conduct the comprehensive study evaluating the success of the acoustic deterrence system and passage notches in protecting juvenile blueback herring in 2008, and adult herring in 2009, using radio tags.

LICENSEE'S PROPOSED DOWNSTREAM PASSAGE OPERATING SCHEDULE

The licensee proposed to operate the existing acoustic fish deterrence system at the headrace from the beginning to the end of the barge canal season in 2007. It proposed to release 125 cfs through the notch in Dam A from May through July 2007 for the downstream passage of adult blueback herring. For the downstream passage of juvenile herring, it proposed to release 125 cfs through the notch in the Dam B flashboards from September through November 2007. It stated this operating schedule was based on the operating schedule at the Vischer Ferry Project (FERC Project No. 4679), 7.5 miles upstream from the Crescent Project. The licensee proposed to continue the 2007 operating schedule in subsequent years if the Commission does not approve its alternative approach to downstream fish passage using an acoustic deterrence system deployed at the

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entrance to the side channel, as described above.

If the Commission approves the licensee's proposal to deploy, in 2008, an acoustic deterrence system at the entrance to the shallower side channel flowing to the west of the island separating Dams A and B, the licensee would proceed as follows. The licensee would continue to operate the existing headrace acoustic deterrence system in 2008 until the side channel system is ready and operable in August 2008. The licensee would release through a notch in the Dam A flashboards 125 cfs from the beginning of the barge canal season until August 30, 2008, and 250 cfs from September 1 to the end of the barge canal season in 2008. The licensee would operate the acoustic deterrence system and release 250 cfs through a notch in the Dam A flashboards from the beginning of the barge canal season until the end of the barge canal season in 2009 and subsequent years.

RESOURCE AGENCY CONSULTATION

The licensee consulted with the resource agencies in preparation of its proposal, and included the agencies' comments in its March 1 and 15, 2007 filings. The FWS commented on the licensee's proposed fish passage operating schedule and proposed downstream fish passage system modifications in letters dated February 6 and 28, 2007, respectively. In its February 6, 2007 letter, the FWS recommended that the fish passage facilities be operated annually at Dam A from the date in May when the barge canal opens through July 31, and at Dam B from September 1 through the date in November when the barge canal closes. The FWS stated that actual dates of operation could be adjusted based on results of the proposed studies and experience operating the structures.

In its February 28, 2007 letter, filed with the Commission on March 6, 2007, the FWS concurred with the licensee's proposal to install an acoustic deterrence system at the entrance to the side channel to direct blue back herring down the main river channel to the passage at Dam A, as proposed the licensee's March 1, 2007 filing.

The New York State Department of Environmental Conservation (DEC) commented on the licensee's the proposed fish passage operating schedule and proposed downstream fish passage system modifications in letters dated March 5 and 8, 2007, respectively. In its March 5, 2007 letter, included in the licensee's March 15, 2007 filing, the DEC recommended that the fish passage facilities be operated annually from May 1 through July 31 for adult blueback herring outmigration, and from September 1 through November 15 for juvenile blueback herring outmigration.

In its March 8, 2007 letter, filed with the Commission on March 14, 2007, the DEC responded to the licensee's proposals. In response to the licensee's request to

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amend the December 28, 2006 order by postponing installation of the plastic membrane until the results of the tagging study are in hand, the DEC recommended that the Commission approve the license's request to deploy and test the acoustic deterrence system at the upstream end of the west channel around the mid-river island. If testing shows that the new deterrence system is superior to the existing system in preventing blueback herring entrainment, the DEC would favor continuing with the previously approved effectiveness studies to determine the best location to pass herring over Dam A, and how much water is needed to attract fish to the fish passage facilities. Should the new system prove to be less effective than the presently installed system, the DEC would recommend that the effectiveness of the present system be fully evaluated to determine the appropriate facility design to pass fish over Dams B and C.

The National Marine Fisheries Service (NMFS) did not comment on the licensee's proposed fish passage modifications or its proposed fish passage operating schedule.

DISCUSSION AND CONCLUSIONS

The licensee should consult with the resource agencies in preparation of its plans for the acoustic deterrence system to be deployed at the entrance to the side channel. The licensee must allow at least 30 days for the agencies to comment on the proposed deployment plan and schedule. The licensee should file, by September 15, 2007 for Commission approval, its acoustic deterrence system plan, including the resource agencies' comments on the proposed plan and deployment schedule. If the licensee does not adopt an agency's recommendation, the licensee must explain why the recommendation is not adopted, using site-specific reasons. The Commission should reserve the right to require changes to the plan and schedule.

The resource agencies concurred with licensee's proposal of a new downstream fish passage strategy contained in its March 1, 2007 filing, in lieu of taking the actions proposed in its February 1, 2007 filing. The licensee's proposal to deploy an acoustic deterrence system at the entrance to the side channel would be expected to provide the necessary protection to blueback herring migrating downstream at the Crescent Project. Therefore, the licensee should plan, deploy, and begin evaluating, by August 2008, the effectiveness of the acoustic deterrence system at the entrance to the side channel, as proposed.

The license should operate the downstream fish passage and protection facilities on its proposed schedule. The licensee should release 125 cfs through the notch in the Dam A flashboards through July 2007 for the downstream passage of adult blueback herring. For the downstream passage of juvenile herring, it should operate the acoustic

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deterrence system and release 125 cfs through the notch in the Dam B flashboards from September through November 2007. The licensee should operate the acoustic deterrence system and release 125 cfs through a notch in the Dam A flashboards from the beginning of the barge canal season until August 30, 2008, and 250 cfs from September 1 to the end of the barge canal season in 2008. The licensee should operate the acoustic deterrence system and release 250 cfs through a notch in the Dam A flashboards from the beginning of the barge canal season until the end of the barge canal season in 2009 and subsequent years.

The January 31, 2007 Commission order approved licensee's proposal to develop a comprehensive study plan to evaluate the effectiveness of its downstream fish passage facilities after conducting its 2007 pilot fish passage study. The licensee should, as required by the January 31, 2007 order, file by March 15, 2008, with the Commission for approval, its report of the pilot study results and its plan for the comprehensive study of downstream fish passage, to be conducted following the deployment of the acoustic deterrence system at the entrance to the side channel. The licensee should plan to evaluate downstream juvenile blueback herring passage in 2008, with the side channel acoustic deterrence system operating and the notch in Dam A passing a flow of 250 cfs, and evaluate downstream passage of adult herring using radio tag tracking in 2009, as proposed in its March 15, 2007 filing. If the comprehensive study of downstream fish passage conducted with the side channel acoustic deterrence system in place yields results that are acceptable to the resource agencies and the Commission, the licensee should proceed to operate the proposed downstream fish passage facilities in future years on the proposed schedule.

Paragraph (C) of the January 31, 2007 order stated that the comprehensive study of downstream fish passage effectiveness was to take place following completion of the fish passage facilities modifications approved by the December 28, 2006 Commission order. With the change in fish passage strategy, the implementation schedule for the comprehensive study of downstream fish passage effectiveness should be amended to reference the completion of the deployment of the acoustic deterrence system at the entrance to the side channel, as required by this order.

If evaluation of the side channel acoustic deterrence system provides results that are not acceptable to the resource agencies and the Commission, the licensee should resume work to prepare modified functional design drawings of the modifications to the Dam C notch, the plunge pool, and the plunge pool exit, as proposed in the February 1 and March 1, 2007 filings. In this circumstance, the licensee should file, along with its report of the comprehensive study results and recommendations, to include agency comments, a proposed schedule for: 1) filing functional design drawings of the facilities

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modifications as proposed in its February 1, 2007 filing; 2) constructing the proposed facilities modifications; and 3) filing its plan to conduct a comprehensive study of downstream fish passage after the downstream passage facilities are modified.

A table included in the January 31, 2007 order summarized a chronology of the licensee's obligations, relevant to fish passage studies and facilities. The licensee timely filed its proposed operating schedule for the acoustic deterrence system and for opening flashboard notches, and began conducting the 2007 pilot study. This licensee's proposed modifications to the downstream fish passage plan would modify the chronology laid out in the January 31, 2007 order, as follows:

action	date
File acoustic deterrence system plan ……..	September 15, 2007
File the preliminary pilot study report and proposed comprehensive fish passage study plan and schedule	March 15, 2008
Begin conducting comprehensive fish passage study to evaluate acoustic deterrence system ……...	August 2008

The licensee's proposal, with the modifications discussed above, would allow the licensee to fulfill the requirements of paragraph (E) of the February 15, 2005 order, and should provide sufficient information to judge the effectiveness of fish passage and protection measures for blueback herring moving downstream past the Crescent Project. The licensee's recommendations with the discussed modifications should be approved.

The Director Orders:

(A) The licensee's request to modify the approved downstream fish passage plan, filed with the Commission on March 1, 2007, and the proposed schedule for operation of the fish deterrence system and for release of fish passage flows, filed on March 15, 2007, and proposed changes to the schedule for the comprehensive downstream fish passage effectiveness study schedule, also included in the March 15, 2007 filing, as modified in paragraphs (B) through (F), are approved.

(B) The licensee shall operate the existing acoustic fish deterrence system at the headrace from the beginning to the end of the barge canal season in 2007. The licensee shall, in 2008, install an acoustic deterrence system at the entrance to the side channel leading to the powerhouse, to replace the current deterrence system at the powerhouse headrace.

(C) The licensee shall plan, deploy, and begin evaluating the effectiveness by

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August 2008, of the acoustic deterrence system at the entrance to the side channel, as proposed. The licensee shall consult with the resource agencies in preparation of its plans for the acoustic deterrence system. The licensee must allow at least 30 days for the agencies to comment on the proposed deployment plan and schedule. The licensee shall file, by September 15, 2007 for Commission approval, its acoustic deterrence system plan, including the resource agencies' comments on the proposed plan and deployment schedule. If the licensee does not adopt an agency's recommendation, the licensee must explain why the recommendation is not adopted, using site-specific reasons. The Commission reserves the right to require changes to the plan and schedule.

(D) The license shall operate the downstream fish passage and protection facilities, including the acoustic deterrence system, on the following schedule. The licensee shall release 125 cfs through the notch in the Dam A flashboards through July 2007 for the downstream passage of adult blueback herring. For the downstream passage of juvenile herring, it shall release 125 cfs through the notch in the Dam B flashboards from September through November 2007. The licensee shall release 125 cfs through a notch in the Dam A flashboards from the beginning of the barge canal season until August 30, 2008, and 250 cfs from September 1 to the end of the barge canal season in 2008. The licensee shall release 250 cfs through a notch in the Dam A flashboards from the beginning of the barge canal season until the end of the barge canal season in 2009 and subsequent years.

(E) Paragraph (C) of the January 31, 2007 order is amended by replacing the second sentence in the paragraph with the following sentence:

> The study schedule shall include a proposal to conduct a comprehensive downstream fish passage effectiveness study following completion of the fish passage modifications approved by the February 15, 2005 and December 28, 2006 orders and the modifications required by this order.

(F) If the comprehensive study of downstream fish passage conducted with the side channel acoustic deterrence system in place yields results that are acceptable to the resource agencies and the Commission, the licensee shall operate the downstream fish passage in future years on the schedule approved by paragraph (B). If evaluation of the side channel acoustic deterrence system provides results that are not acceptable to the resource agencies and the Commission, the licensee shall resume work to prepare modified functional design drawings of the modifications to the Dam C notch, the plunge pool, and the plunge pool exit, as proposed in the February 1 and March 1, 2007 filings. In this circumstance, the licensee shall file, along with its report of the comprehensive study results and recommendations, to include agency comments, a proposed schedule for

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1) filing functional design drawings of the facilities modifications as proposed in its February 1, 2007 filing; 2) constructing the proposed facilities modifications; 3) filing its plan to conduct a comprehensive study of downstream fish passage after the downstream passage facilities are modified.

(G) The licensee shall file an original and eight copies of any filing required by this order with:

The Secretary
Federal Energy Regulatory Commission
Mailbox Code: PJ 12.3
888 First Street N.E.
Washington, D.C. 20426

In addition, the licensee shall serve copies of these filings on any entity specified in this order to be consulted on matters related to these filings. Proof of service on these entities shall accompany the filings with the Commission.

(H) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 CFR § 385.713.

George H. Taylor
Chief, Biological Resources Branch
Division of Hydropower Administration
and Compliance

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WATER QUALITY
APPLICATION AMENDMENT
ANNUAL CHARGES

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Raymond J. O'Connor, Chairman; Georgiana Sheldon, A. G. Sousa and Oliver G. Richard III.

Power Authority of the State of New York) Project No. 4679-001
)

ORDER ISSUING LICENSE (MAJOR)

(Issued June 26, 1984)

The Power Authority of the State of New York ("Power Authority") has filed an application under Part I of the Federal Power Act for a license for the Vischer Ferry Hydroelectric Project, FERC Project No. 4679. The project is located on the Mohawk River, a navigable waterway 1/ of the United States, in Saratoga and Schenectady Counties, New York, in Clifton Park and Niskayuna Townships and the City of Schenectady. This order grants a license to the Power Authority for the expansion and continued operation of the project.

Project Description

The Vischer Ferry Hydroelectric facility is owned by the State of New York and is under the jurisdiction of the New York State Department of Transportation ("NYSDOT"). The NYSDOT operates and maintains the non-generating hydroelectric facilities (as well as the non-hydroelectric facilities), while Niagara Mohawk Power Corporation ("Niagara Mohawk") operates and maintains the hydroelectric generating station, including the switchyard.

The project dam, constructed in 1913, was built to upgrade the Erie Canal System. A powerhouse, built on the north side of the river in 1925, is still in operation and is the site of the Power Authority's proposed expansion. Existing facilities include the dam, 1919 feet long and 30 feet high; an impoundment of approximately 1050 surface acres; a regulating structure; a powerhouse containing two generators each rated at 2.8 MW; a tailrace; a switchyard; and Canal Lock E-7. Historically, 27-inch high breakaway flashboards have been installed on the project dam in May and removed in December. The Power Authority states that the first priority for operation at the dam is to provide adequate pool

1/ Niagara Mohawk Power Corporation, 41 F.P.C. 772 (1969).

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elevations for lockage and navigation, and that the second priority is to generate power.

The Power Authority proposes to increase the hydroelectric capacity of the project by constructing a new headrace, expanding the powerhouse, installing two generators of 3 MW each, widening the tailrace, and expanding the switchyard. In addition, the Power Authority proposes to develop recreational facilities on both river banks. On the south shore, the Power Authority proposes to build a boat ramp with a parking area, upgrade the road, and develop a connecting trail link between an existing picnic area and a bike route that parallels the Mohawk River. On the north shore, the applicant proposes to upgrade the overlook area above Clifton Park by providing a parking area and foot access from the parking area to the riverbank for hiking, fishing, and other shoreline activities.

The project is essentially run-of-river, using only the storage provided by the flashboards. The Power Authority stated that the proposed development at the project will not alter the existing spillway configuration, or the installation of the flashboards between May and December each year.

Public Notice

Notice of the application has been published, and comments have been received from interested federal, state, and local agencies. No protest has been received, and no agency has objected to issuance of the license. The Town of Rotterdam intervened in the proceeding; the town's concerns are discussed below.

Safety and Adequacy, Economic Feasibility and Comprehensive Development

The project dam is a high hazard dam, and is not safe for flood conditions exceeding one-half the Probable Maximum Flood (PMF). Article 33 requires the Licensee to determine the consequences of dam failure during floods up to the PMF and to submit to the Commission a plan and schedule for making the dam safe in the event that its failure would endanger life or cause significant property damage downstream. The study must be approved by the Director, Office of Electric Power Regulation, prior to the start of project construction.

The Commission's New York Regional Office inspected the project and found no major deficiencies.

The expansion of the project would increase its installed capacity from 5,600 kW to 11,600, kW, while increasing the estimated annual average generation from 36,280,000 kWh to 60,134,000 kWh. 2/

2/ Equivalent energy production using fossil fuels would consume 98,750 barrels of oil or 27,750 tons of coal.

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The project is economically feasible when compared to the cost of producing an equivalent amount of power from a base load coal-fired facility.

The project would make good use of the flow and fall of the Mohawk River, is not in conflict with any planned or potential development, and would be best adapted to the comprehensive development of the basin under present conditions, upon compliance with the terms and conditions of this license.

Cultural Resources

The New York State Historic Preservation Officer ("SHPO") stated that the proposed project would have no effect upon cultural resources included in or eligible for inclusion in the National Register of Historic Places. The proposed construction would not adversely affect any known cultural resources. To help safeguard previously unrecorded archeological or historical sites that may be discovered during any future construction or development at the project, the license contains Article 35, which requires the Licensee to consult with the SHPO upon discovery of any such sites.

Instream Flows

The United States Department of the Interior ("Interior") and the New York State Department of Environmental Conservation ("DEC") recommended that the Power Authority release an initial minimum flow of 200 cubic feet per second (cfs) over the project spillway to protect the aquatic habitat in the project area. The agencies also recommended that the Power Authority monitor the effectiveness of the initial spillage requirement, and make any changes in the minimum flow that its studies show are warranted.

The Power Authority agreed to provide an initial 200 cfs minimum flow release, monitor the flow's impact on fishery resources and water quality, and make any necessary changes in the initial minimum flow after studying its effectiveness. These measures are provided for in Articles 36 and 40.

The Power Authority did not agree, however, with the agencies' recommendation that the minimum flow be released over the spillway, rather than in the form of leakage through and underneath the flashboards. There is insufficient information available at this time to justify the agencies' recommendation. Therefore, we will permit the Licensee to release the flows in the manner it has proposed (Article 36), and require it to evaluate the impact of the minimum flow point of discharge on downstream migration of anadromous fish (Article 40). The Licensee shall modify the minimum flow point of discharge if necessary to protect fishery resources.

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Water Quality 3/

Interior and DEC recommended that the Power Authority develop and conduct a water quality monitoring program to determine the impact of operating the Vischer Ferry Project in combination with the proposed Crescent Project (located 10 miles downstream) on dissolved oxygen levels, and to determine the effectiveness of the proposed minimum flow on dissolved oxygen levels. The Power Authority responded that it had no objection to these recommendations, and that it had begun a long-term water quality sampling program, in consultation with DEC, to determine the potential impact of the project on water quality.

Existing water quality information indicates that dissolved oxygen levels have reached as low as 3.8 mg/l during operation of the existing project. Expansion of the project would result in less spillage, with the potential for reduced aeration of the project discharge. To ensure that project operation would not harm fishery resources, Article 37 is included in this license to require the Licensee to initiate a monitoring program to determine the effects of project operation on dissolved oxygen, and to implement any corrective measures necessary to maintain disolved oxygen levels adequate to protect fishery resources.

Interior also recommended that a standard sediment analysis be conducted for heavy metals and toxic materials to determine appropriate removal and disposal methods for spoil and silt. The Power Authority has agreed to this requirement and the sediment analysis should be conducted. Article 38 provides for the analysis and disposal of heavy metals and toxic materials.

The Latham Water District ("District") uses the Mohawk River as a source of drinking water. The Power Authority has agreed to comply with the request of the State of New York Department of Health that it advise the District and the Albany County Health Department ("County") of any unusual changes in water quality due to project construction. Article 39 requires the Licensee to advise the District and County of any changes in water quality, and ensure that project construction and operation does not affect the District's use of the Mohawk River as a municipal water supply.

In its motion to intervene, the Town of Rotterdam, New York ("Town") stated that the Power Authority was contemplating including additional upstream lands and water associated with Lock E-8 in the proposed development scheme of Project No. 4679-001. The Town

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3/ DEC issued a water quality certificate for this project on September 26, 1983.

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stated further that such a development may represent a potentially adverse impact on the municipal water supply system. The Power Authority responded to the Town's motion. The Power Authority stated that Lock E-8 is not included in the subject application, and advised that, while it considered the change earlier, it does not propose to amend its application to include Lock E-8 at the present time. Therefore, the concerns of the Town have been resolved.

Fishery Resources

Interior and DEC stated that the blueback herring is an anadromous fish that presently migrates in abundance through project water, but that adequate information is not available to determine the potential for entrainment mortality to downstream migrants. These agencies recommended that the Power Authority conduct a study to determine whether project operations would affect fish migration, and develop mitigative measures, if necessary. The Power Authority acknowledged the possible impacts of project operations on the fishery resource and expressed a willingness to assess the situation. Article 40 requires the Licensee to consult with the concerned agencies and conduct a study to determine the impacts of project operations on the fishery resource, to recommend any mitigative measures that are needed to protect this resource, and to implement any measures that the Commission finds necessary.

Interior recommended further that for the conservation and development of the existing fish and wildlife resources, the project be operated so that: (1) the current impoundment rate of drawdown not increase; (2) the impoundment drawdown be limited to 13.5 inches; and (3) when river flows exceed 3,250 cfs, the project will be in a run-of-river mode, such that the instantaneous flows from the project, including spillage, releases, and leakage, is equal to the inflow to the project impoundment. The Power Authority has agreed to implement Interior's recommendations. To ensure protection of fish and wildlife resources of the project area, Article 41 requires that the Licensee operate the project as agreed to.

Recreational Resources

The Power Authority's Report on Recreational Resources, which contains guidelines for the development, operation, and maintenance of recreational facilities at the project, conforms to Commission regulations. The report is approved and made part of the license.

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Environmental Impacts

Increased levels of turbidity resulting from construction activities are expected to be minimal and would be localized and temporary. Noise and dust associated with development of project works and recreational facilities would be intermittent and of short duration, confined primarily to the construction period. On the basis of the record, and our independent analysis, we conclude that issuance of a license for the project would not constitute a major federal action significantly affecting the quality of the human environment.

License Term and Annual Charges

The Power Authority proposes to perform substantial new construction at the Vischer Ferry Hydroelectric Project. Under our policy for projects of this type, the license will terminate May 31, 2024, forty years from the first day of the month in which this order is issued. 4/

Since portions of the Vischer Ferry Project are already operating, the license should be back-dated. Normally, a license that is issued for a constructed project that is located on a navigable waterway and for which there has been no post-1935 construction is given an effective date of April 1, 1962, or the date the stream was found navigable, whichever is earlier. 5/ There has been no post-1935 construction at the Vischer Ferry Project, and the Mohawk River was found navigable in 1969. 6/ Accordingly, under Androscoggin, the effective date of this license would ordinarily be April 1, 1962.

However, in cases where our Androscoggin policy produces an effective date more than 50 years before the license termination date, the effective date of the license is advanced to 50 years before the license termination date. In addition, an amount equal to the annual charge that would have been due for the period before

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4/ Montana Power Co., 56 F.P.C. 2008, 2012 (1976).

5/ Public Service Co. of New Hampshire, 27 F.P.C. 830 (1962) ("Androscoggin"). We established this policy in order to ensure that illegal project operators do not obtain an unmerited advantage over companies that complied with the law. We determined that backdating the license to 1962 (absent an earlier navigability finding) rather than to the date the project operator was placed on notice of the perils of further unlicensed operation gives adequate weight to the period of unlicensed operation.

6/ Niagara Mohawk Power Corp., 41 F.P.C. 772 (1969).

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what is being set as the effective date will be assessed, in order to ensure that unlicensed operation does not place a person in a better position than licensed operation would. 7/ Therefore, this license will have an effective date of June 1, 1974, and payment in lieu of annual charges will be required for the April 1, 1962 to May 31, 1974 period.

In assessing these back annual charges and payments in lieu of annual charges, we are mindful that unlicensed construction and operation was performed by NYSDOT, Niagara Mohawk, and possibly others, while future licensed operation will be performed by the Power Authority. The date a license applicant or licensee acquires a project, however, has no bearing on the amount the licensee must pay in back annual charges for an illegally operated constructed project. 8/ Our back charges policy remains valid regardless of who operated the project previously, because it ensures that the illegal operator of the project does not receive a windfall from its unlicensed operation of the project -- and thus discourages unlicensed operation. The same reasoning applies to payments in lieu of annual charges. The illegally benefiting party should ultimately pay for the annual charges and payments in lieu of annual charges owned, although perhaps not directly to the Commission. The person acquiring the project should make provision for the back charges and payments in lieu of annual charges in the project purchase price.

The Commission orders:

(A) This license is issued to the Power Authority of the State of New York (Licensee), under Part I of the Federal Power Act (Act), for a period effective June 1, 1974, and terminating May 31, 2024, for the construction, operation, and maintenance of the Vischer Ferry Project No. 4679, located on the Mohawk River in Clifton Park and Niskayuna Townships and the City of Schenectady, in Saratoga and Schenectady Counties, New York. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

7/ See Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 159-60 (D.C. Cir. 1967).

8/ See North Canal Waterworks, 21 FERC ¶61,157 (1982); Niagara of Wisconsin Paper Corp., 54 F.P.C. 2507 (1975), 55 F.P.C. 262 (1976); Kennebec River Pulp & Paper Co., 35 F.P.C. 707 (1966).

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(B) The Vischer Ferry Project No. 4679 consists of:

(1) all lands, to the extent of the Licensee's interests in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

Exhibit	FERC No. 4679-	Showing
G, Sheet 1	9	Project Location Map

(2) Project works consisting of: (a) the Vischer Ferry Dam, a concrete gravity structure composed of three connected spillway sections with a total length of 1,919 feet, the outer ogee-shaped weir sections with an average height of 30 feet while the middle broad-crested weir section has a height varying from 1 to 3 feet above Goat Island; (b) the reservoir with an area of 1,050 acres and gross storage of 25,000 acre-feet at an elevation of 210 feet m.s.l. (27-inch flashboards add 2,400 acre-feet of usable storage); (c) a low-level regulating structure at the northern end of the spillway with seven sluice gates; (d) a headrace with a longitudinal retaining wall having sluice gates; (e) a 104 by 73-foot powerhouse with an 82 by 73-foot addition, housing two turbine/generator units rated at 2.8 MW each and two units rated at 3.0 MW each, all to operate under a head of 26.5 feet; (f) an unlined 150-foot-wide tailrace; (g) a switchyard; (h) the generator leads and transformer banks; and (i) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibits cited above and more specifically shown and described by certain other exhibits that also form a part of the application for license and that are designated as:

Exhibit A - Paragraphs A.4.1 through A.6 of the application filed on September 30, 1982.

Exhibit E - The Report on Recreational Resources, pages E-42 through E-51 of the Exhibit E filed on September 30, 1982.

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Exhibit F	FERC No. 4679-	Title
1	1	General Plan of Dam
2	2	Detailed Location Plan and Profile of Dam
3	3	Plan and Sections of Regulating Structures
4	4	Existing Powerhouse General Plans and Sections
5	5	Existing Powerhouse Typical Sections
6	6	Proposed Project Location and General Plan
7	7	Proposed Powerhouse Plan and Sections
8	8	Proposed Project Elevations

(3) all of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project and located within the project boundary, all portable property that may be employed in connection with the project, located within or outside the project boundary, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, E, F, and G, designated in ordering paragraph (B) above, are approved and made a part of the license.

(D) This license is also subject to Articles 1 through 28, except Article 20, set forth in Form L-4 (revised October 1975), entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States," attached to and made a part of this license. The license is also subject to the following additional articles:

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Article 29. The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representatives of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 30. The Licensee shall commence construction of the project within two years of the date of issuance of the license, and shall complete construction within four years from the date of issuance of the license.

Article 31. The Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days prior to the start of construction of the cofferdam the Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and Director, Office of Electric Power Regulation) one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.

Article 32. The Licensee shall, within 90 days of completion of construction, file for approval of the Director, Office of Electric Power Regulation, revised Exhibits A and F to describe and show the project as-built.

Article 33. The Licensee shall, prior to start of construction, file with the Commission a study which evaluates the consequences to downstream life and property of a failure of Vischer Ferry Dam under flood conditions up to the probable maximum flood (PMF). In the event that failure of dam under flood conditions would constitute a hazard to human life or would cause extensive property damage, the Licensee shall file concurrently with the study its recommendations for modifying for floods up to and including the PMF. Construction of the project shall not commence until the Director, Office of Electric Power Regulation approves the study and any necessary modifications.

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Article 34. The Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and the Director, Office of Electric Power Regulation) one copy each of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouses, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Electric Power Regulation, may require changes in the plans and specifications to assure a safe and adequate project.

Article 35. The Licensee shall, prior to the commencement of any construction at the project, consult with the New York State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work. The Licensee shall make available funds in a reasonable amount for any such work as required. If any previously unrecorded archeological or historical sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the SHPO to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 36. The Licensee shall discharge, as measured immediately below the project dam, an interim continuous minimum flow of 200 cubic feet per second or the inflow to the reservoir, whichever is less, for the purpose of protecting and enhancing aquatic resources in the Mohawk River. These flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 37. The Licensee shall monitor dissolved oxygen concentrations below the project dam for an operational period of one year. The monitoring shall be coordinated with dissolved oxygen monitoring at the downstream Crescent Project, FERC No. 4678. Within 6 months from the date of completion of the study, the Licensee shall file a data summary that shall include observed daily minimum, maximum, and average dissolved oxygen concentrations, and, after consultation and in cooperation with the New York State Department of Environmental Conservation and

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the U.S. Fish and Wildlife Service, shall file for Commission approval a plan to ensure that dissolved oxygen is maintained during project operation at levels adequate to protect fishery resources. Copies of the data summary and plan shall be sent to the consulted agencies coincident with filing with the Commission.

Article 38. The Licensee shall consult with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service in the preparation of a detailed plan to: (1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawk River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; (3) safely dispose of any toxic substances discovered; and (4) adequately dispose of spoils resulting from project construction. This plan shall include an implementation schedule, monitoring and maintenance programs for project construction and operation, and evidence of agency consultation. This plan shall be filed with the Commission (with a copy provided to the Commission's Regional Engineer in New York, New York, and the Director, Office of Electric Power Regulation) at least 60 days prior to any ground-disturbing activity or spoil disposal. The Director, Office of Electric Power Regulation, reserves the right to require changes in the plan.

Article 39. The Licensee shall, after consultation with the Latham Water District (District) and the Albany County Health Department (County), implement a monitoring program that is adequate to determine the impacts of project construction and operation on the water quality of the Mohawk River. The Licensee shall immediately advise the District and County of any changes in water quality of the Mohawk River resulting from project construction and operation, and shall implement measures as needed to ensure that the District's municipal water supply is protected.

Article 40. The Licensee shall, after consultation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, and within 18 months from the commencement of commercial operation of the project, conduct a study to evaluate the impacts of project operations on the fishery resources of the Mohawk River, which shall include, but not be limited to, an evaluation of the impacts of the point of discharge for the minimum flow release on the downstream migration of anadromous fish, and the effectiveness of the 200 cfs minimum flow in protecting fishery resources. Within 6 months from the date of completion of the study, the Licensee shall file, with copies to the agencies

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consulted, a report on the results of the study, and, for Commission approval, recommendations for the protection and enhancement of the fishery resources of project waters. Documentation of agency consultation on the report and recommendations shall be included in the filing.

Article 41. The Licensee shall, for the conservation and development of fish and wildlife resources, operate the Vischer Ferry Project when available river flows exceed 3,250 cfs in a run-of-river mode, such that instantaneous outflow from the project approximates the instantaneous inflow to the project reservoir and reservoir surface elevation fluctuations are minimized. When available river flows are less than 3,250 cfs, the project shall be operated so as to provide the minimum flow release required by Article 36. Further, the project shall be operated to ensure that the historic rate of drawdown is not altered and that total drawdown does not exceed 13.5 inches. This operation mode may be modified if required by operating emergenies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 42. (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and water for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and to ensure compliance with the covenants of the instrument of conveyance for any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

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(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly

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describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The Licensee may convey fee titles to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

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(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

Article 43. The Licensee shall pay the United States the following annual charges, as determined in accordance with the provisions of the Commission's regulations in effect from time to time, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act:

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(1) For the period from April 1, 1962 through May 31, 1974, an amount equal to the annual charges that would have applied for the period if the project had been licensed during that period. The authorized installed capacity for this purpose is 7500 horsepower.

(2) For the period from June 1, 1974 through May 31, 1984, the annual charges ordinarily due in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 7500 horsepower.

(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,500 horsepower.

(E) The Licensee's failure to file a petition for rehearing shall constitute acceptance of this license. In acknowledgement of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

By the Commission.

(S E A L)

Kenneth F. Plumb

Kenneth F. Plumb,
Secretary.

Project No. 4679-001

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, the Power Authority of the State of New York, this _____ day of _____, 19____, has caused its name to be signed hereto by _____, its General Counsel, and its corporate seal to be affixed hereto and attested by _____, its Secretary, pursuant to a resolution of its Board of Trustees duly adopted on the _____ day of _____, 19____, a certified copy of the record of which is attached hereto.

By_____
General Counsel

Attest:

_____
Secretary

(Executed in quadruplicate)

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Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

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Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

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Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

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Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

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Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee

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or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Power Authority of the State of New York) Project No. 4679-001

ERRATA

(August 6, 1984)

ORDER ISSUING LICENSE (MAJOR) 1/
(issued June 26, 1984)

License Article 33 is revised to read:

Article 33. The Licensee shall, prior to the start of construction, file with the Commission a study that evaluates the consequences to downstream life and property of a failure of the Vischer Ferry Dam under flood conditions up to the probable maximum flood (PMF). In the event that failure of the dam under flood conditions would constitute a hazard to human life or would cause extensive property damage, the Licensee shall file concurrently with the study its recommendations for modifying the project structures to ensure their integrity for floods up to and including the PMF. Construction of the project shall not commence until the Director, Office of Electric Power Regulation approves the study and any necessary modifications.

Kenneth F. Plumb
Secretary

1/ 27 FERC ¶ 61,468.

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UNITED STATES OF AMERICA 62,014
FEDERAL ENERGY REGULATORY COMMISSION

Power Authority of the State of New York — Project No. 4679-010 New York

ORDER AMENDING LICENSE AND REVISING ANNUAL CHARGES
(Issued April 8, 1991)

The Vischer Ferry Hydroelectric Project has a total installed capacity of 11,800 kW, which is higher than the authorized capacity of 11,600 kW. The increase in the generating capacity would not result in any additional adverse environmental effects other than those identified during processing of the original application. Therefore, the license will be amended effective June 1, 1984 to show the project's total authorized nameplate capacity to be 11,800 kW.

The Director orders:

(A) Ordering paragraph B of the license for the Vischer Ferry Project, FERC No. 4679 is revised to show the authorized nameplate capacity to be 11,800 kW.

(B) Paragraph (3) of license article 43 is amended to read as follows:

(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,700 horsepower.

(C) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director, Division of Project
Compliance and Administration

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Power Authority of the State of New York — Project Nos. 4678-019, 4679-022

ORDER AMENDING ARTICLE 41
(November 17, 2000)

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. The projects are located on the Mohawk River, New York.

Article 41 of each license currently requires run-of-river operation when river discharge exceeds 3,250 cfs. When available river flows are less than 3,250 cfs, article 41 only requires that the licensee operate the projects to provide the minimum flow release required by article 36. At flows less than 3,250 cfs, ponding is allowed within the top 12 inches of the reservoir at Crescent and 13.5 inches at Vischer Ferry until operation of the units is practical. In addition, article 36 requires a minimum flow release of 100 cfs at the Crescent Project and 200 cfs at the Vischer Ferry Project, or the inflows to the projects, whichever is less.

Background

In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one of the newly installed Kaplan turbines at flow near rated capacity (1,500 cubic feet per second (cfs)) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for

release through the second Kaplan turbine at or near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only

during the period of juvenile blueback herring downstream

migration, about September 1 to November 10.

The Commission reviewed the licensee's operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee s turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee's proposal to operate the turbines at rated capacity during the blueback herring migration season. However, the order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order indicated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is available to operate another turbine at full capacity. Similarly, when river flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs. Therefore, on July 11, 1995, the licensee initially proposed to modify the wording of article 41 to allow ponding within the flashboard height during the blueback herring outmigration period when river flow exceeds 3,250 cfs. The licensee would pond these flows in the same fashion as when inflows are less than 3,250 cfs, as allowed by article 41. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback

herring.

As an alternative to the licensee s initial proposal, the U.S. Fish and Wildlife Service (FWS) recommended that the two projects operate in an instantaneous run-of-river mode. On January 6, 1997, representatives from the Commission, licensee, FWS, the New York State Department of Environmental Conservation (DEC), and the Village of Green Island, New York participated in a teleconference to further discuss FWS's proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. As a result of this teleconference, in a letter dated February 5, 1997, the licensee amended its original proposal and

proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows.

Licensee's Proposal

In a February 5, 1997 supplement to its initial July 1995 application, the licensee proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows. However, the licensee noted the operations of the upstream Barge Canal lock systems may affect project operations. The licensee explained that, with little or no notice, inflows can decrease or increase substantially in a very short period of time. Therefore, to adjust project operations so that outflows match inflows, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for the unusual flow events.

The licensee recommended that article 41 of each license for the Crescent and Vischer Ferry read as follows:

> The Project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the Project reservoir and reservoir surface elevation fluctuations are minimized. Further, the Project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards

during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). During high flows, when inflow exceeds the hydraulic capacity of the Project units, the excess flows shall be spilled over the dam (flashboards) or through the Project works, thus exceeding the 6 inch operational range.

Comments on the Licensee's Proposal

The DEC commented on the licensee's proposal in a letter dated February 14, 1997. DEC agreed with the licensee s proposed definition of run-of-river for operation of the Crescent and Vischer Ferry Projects. DEC suggested that, when inflows to the projects are substantially reduced, some flexibility in run-of-river operations may benefit aquatic resources.

DEC also stated that, if inflows drop near zero, a run-of-river mode of operation may result in zero inflows below the project. DEC recommended the licensee use 18 inches of storage from the project impoundments to provide a 300 cubic feet per second (cfs) base flow until flows resume.

In a letter dated January 24, 1997, FWS noted its support

for run-of-river operations at the Crescent and Vischer Ferry Projects. Likewise, the National Marine Fisheries Service (NMFS), expressed its support for run-of-river operations in a January 31, 1997 letter.

The Commission issued public notice on August 16, 1995, stating the application was ready for public inspection. The following entities filed motions to intervene:

Intervenor	Date of Motion
New York State Department of Environmental Conservation	August 28, 1995
Department of the Interior	September 11, 1995
National Oceanic and Atmospheric Administration	October 2, 1995

Village of Green Island April 17, 1996

Adirondack Hydro Development[2] March 28, 1997
Corporation

In its motion to intervene, the Village of Green Island expressed concerns about potential flooding associated with the operation of the projects. In its motion, Adirondack Hydro Development Corporation (AHDC) expressed concern regarding the effects of changing operations at Crescent and Vischer Ferry on operations on the downstream New York State Dam Project. We address these concerns in the FEA.

Draft Environmental Assessment

On July 18, 1997, staff issued a Draft Environmental Assessment (DEA) that examined the environmental impacts of three alternatives for operation of the Crescent and Vischer Ferry Projects. On July 25, 1997, a Notice of Availability of the DEA was published in the Federal Register. The Notice requested comments on the DEA.

1 The Village of Green Island, New York, was granted a late intervention by notice issued May 15, 1996.

2 Adirondack Hydro Development Corporation is the managing general partner of NYSD Limited Partnership, the licensee for the downstream New York State Dam Project (FERC No. 7481). It was granted a late intervention by notice issued May 1, 1997.

Comments on the DEA were filed by most of the intervenors and, in a letter dated August 19, 1997, by Niagara Mohawk Generation Business Group (Niagara Mohawk). Comments pertaining to the DEA are addressed in the Final Environmental Assessment (FEA)[3] attached to this order. Comments of a more general nature are addressed in this order.

Discussion

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Article 41 allows the licensee to pond inflows less than 3,250 cfs and the January 9 order requires the licensee to operate the turbines only at rated capacity. Therefore, under article 41, when reservoir inflow is less than 1,500 cfs, outflow will alternate between the minimum flow of 100 cfs (200 cfs at Vischer Ferry) and 1,500 cfs. Similarly, when inflow is between 1,500 and 3,250 cfs, outflow will alternate between 1,500 and 3,000 cfs.

The downstream School Street Project is operated by Niagara Mohawk as a store and release pulsing facility at all inflows but has little capacity for storing water (270 acre-feet). The Crescent and Vischer Ferry Projects have substantially greater storage capacity (2,000 and 1,200 acre-feet, respectively). Therefore, the ponding operations of these projects, at inflows less than 3,250 cfs, have been tentatively identified as the primary factor influencing downstream flow fluctuations in the lower Mohawk River.[4]

In the FEA, we examined, in detail, the environmental impacts associated with the licensee's run-of-river proposal relative to current project operations. What follows is a brief synopsis of our findings in the FEA in regards to both aquatic and power resources.

Adverse environmental impacts associated with downstream flow fluctuations may include fish strandings, elimination of algae and aquatic macrophytes due to periodic exposure of channel

[3] Final Environmental Assessment for the Application to Modify Article 41 of the Crescent Hydroelectric Project, FERC No. 4678, and the Vischer Ferry Hydroelectric Project, FERC No. 4679, New York, September, 2000, Office of Energy Projects, Division of Environmental and Engineering Review.

[4] Draft Environmental Assessment for Hydropower License. School Street Hydroelectric Project, FERC Project No. 2539, New York. Federal Energy Regulatory Commission, Office of Hydropower Licensing, Division of Licensing and Compliance. November 1996.

margins, and dislodging of aquatic insects and fish eggs due to

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rapid changes in discharge.[5] With respect to the Mohawk River, DEC states that downstream fluctuating flows have an adverse impact on downstream habitat and aquatic organisms including fish population and stream invertebrates.[6]

The licensee s proposal would allow it to operate its turbines regardless of inflow as long as flows are greater than 300 cfs (minimum hydraulic capacity). Run-of-river operations would eliminate the ponding and corresponding downstream fluctuations in flow that occur between the minimum releases and operational releases when river flows are less than 3,250 cfs. The cumulative effect of operations at the Crescent, Vischer Ferry would contribute to the stabilization of flows downstream of the projects, thereby enhancing Mohawk River aquatic habitat. Finally, implementation of the licensee's proposal would be consistent with DEC s Fisheries Management Plan for the Lower Mohawk River.[7]

In our January 1995 order, we required the licensee to operate its turbines only at rated capacity. This requirement was based on the premise that this operational scenario would provide maximum protection for downstream migrating blueback herring that may pass through the project works. The licensee's proposed amendment to article 41 would allow the licensee to operate its turbines at less than rated capacity, suggesting that fish mortality may increase under this operational scenario. However, in the FEA, we note that more recent research indicates that the relationship between operating turbines at rated capacity and fish mortality may not be as important as previously thought. In addition, the FEA notes that the licensee is currently developing a sonic deterrence system to exclude downstream migrating blueback herring from the intakes. The FEA concludes that, if this system is successfully deployed, project operations under the proposed run-of-river mode would have minimal effects on blueback herring mortality.

Section 18 of the Federal Power Act gives the Secretaries of the U.S. Departments of Commerce and Interior authority to

5 Rochester, H., Jr., T. Lloyd, and M. Farr. 1984. Physical Impacts of Small-scale Hydroelectric Facilities and their Effects on Fish and Wildlife. U.S. Fish and Wildlife Service. FWS/OBS-84/19.

6 McBride, N. 1994. A Fisheries Management Plan for the Lower Mohawk River. Region IV Fisheries Office, Stamford, New York.

7 Ibid.

prescribe fishways at Commission-licensed projects. In a letter dated September 8, 1995, regarding the licensee's proposed amendment, Interior stated that it reserved its authority to prescribe upstream and downstream fishways at the Crescent and Vischer Ferry Projects under section 18. Because the licensee's run-of-river proposal may affect passage of downstream migrating blueback herring in the manner described above, we should include a provision pertaining to both project licenses that reserves our authority to require such fishways as Interior may prescribe in the future.

The licensee suggested that the operations of the upstream Barge Canal may affect project operations by decreasing inflows to the project with little or no notice. Therefore, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for these unusual flow events. We recognize that operations of the upstream Barge Canal may affect project

operations in the manner described by the licensee. We agree that the 6 inch reservoir operating range requested by the licensee would help the licensee compensate for these flow events while maintaining downstream flows. However, we emphasize that the 6 inch reservoir fluctuation is not intended for regular peaking and ponding operations but is necessary to give the licensee flexibility in responding to sudden changes in inflow due to the operation of the upstream Barge Canal.

As part of the licensee's run-of-river proposal, the DEC recommends that, when inflows fall below 300 cfs, the licensee should continue releasing 300 cfs using up to 18 inches of storage from the project reservoirs. DEC is concerned that, during periods of low inflows, downstream reaches may become dewatered. The FEA notes that DEC s proposed 18 inch drawdown is five to six inches more than historic drawdowns of both reservoirs. The FEA analyzes adverse environmental impacts associated with 12 and 13.5 inch reservoir drawdowns as part of the no-action alternative. The FEA concludes that, under the no-action alternative, adverse impacts associated with reservoir drawdowns lead to decreased fish spawning success and juvenile fish survival. The FEA also concludes that these adverse impacts would be manifested to a greater degree under the DEC s proposed 18 inch drawdown.

To estimate the effects of the licensee's run-of-river

proposal on power resources, we developed a peaking/base-load model of the Vischer Ferry, Crescent, and the School Street

8 Review of recent flow records indicates that, at Lock 6, upstream of Crescent, the Barge Canal can divert up to 15% of mean monthly flow of the Mohawk River during low flow periods.

Projects. We included the downstream School Street Project in our analysis based on its close proximity to the Crescent Project (less than 1 mile), its limited ponding capabilities, and comments on the DEA by the Niagara Mohawk Generation Business Group. The current School Street license allows the licensee to operate the project as a peaking operation. We used the model to evaluate the effects of the alternatives on the amounts and value of the on-peak and off-peak energy generated at all three projects under median water conditions. To value on- and off-peak energy in the model, we estimated 2000 on-peak and off-peak energy values of 25.97 mills/kWh and 18.24 mills/kWh, respectively.

The licensee's run-of-river proposal would have a positive effect on the projects' power production and economics. Using current project operations as the baseline, operating the Crescent and Vischer Ferry Projects under the licensee's run-of-river proposal would result in an increase in total annual energy production of 9.40% and an increase in total annual power value of $206,900. The total annual energy production of the downstream School Street Project would be relatively unaffected by either the limited peaking or run-of-river alternatives. However, there would be a negative economic impact on the School Street Project (annual loss of $326,100 under run-of-river) due to a decrease of percentage of peaking energy produced from 50.1% to 43.8%.

Niagara Mohawk is concerned that the proposed run-of-river operations at the Crescent Project would have a negative economic impact on its downstream School Street Project. It believes the loss of peak generating capacity would result in a shift of energy provided during peak hours from 60% to 43% and a 40 year levelized annual cost of $728,000.

As stated above, we agree with Niagara Mohawk that there

would some negative impact to the downstream School Street Project resulting from run-of-river operations at Crescent and Vischer Ferry. However, we respectfully disagree with Niagara Mohawk's assessment of the magnitude this economic impact. Using the current Crescent and Vischer Ferry project operations as a baseline, we estimate that the percentage of peaking energy produced at School Street would decrease from 50.1% to 43.8% resulting in an annual loss of $326,100, approximately $400,000 less than Niagara Mohawk's estimate. We suspect that Niagara Mohawk may have based its loss estimates on the assumption that the Crescent and Vischer Ferry Projects are full peaking facilities. This, in fact, was the case prior to the relicensing of these projects in 1984. If this was the case, then Niagara Mohawk used an inappropriate baseline for its analysis, resulting in an overestimation of School Street economic losses.

Currently, the Commission is reviewing Niagara Mohawk's application for relicensing the School Street Project. In our November 1996 DEA for the School Street Project, we considered the potential effects of changing operations of the upstream Crescent and Vischer Ferry Projects to run-of-river. In the FEA for the School Street Project we will continue to consider these potential effects, including information from our analysis of power resources as presented here and in the Crescent/Vischer Ferry FEA. The Commission will use this information in its economic analysis as part of its licensing decision on the School Street Project

Conclusions

Based on the available information, we conclude that implementation of the licensee's run-of-river proposal would provide cumulative benefits to fishery resources in the lower Mohawk River by reducing downstream fluctuations currently authorized under article 41 and potentially reducing the amount of intermittently dewatered habitat below Crescent dam at flows less than 3,250 cfs. The FEA recommends the licensee's plan as the preferred alternative and concludes that approval of the licensee's proposal would not constitute a major federal action significantly affecting the quality of the human environment. Therefore, the licensee's proposal to amend article 41 of each license for the Crescent and Vischer Ferry Projects should be approved.

The Director orders:

(A) Article 41 of the licenses for the Crescent and Vischer Ferry Projects is amended to read as follows:

"The project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the project reservoir. The licensee shall act at all times to minimize the fluctuation of the reservoir surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured downstream from the project tailrace, approximate the sum of inflows to the reservoir. In some instances, the project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). This 6 inch fluctuation shall not be used for regular ponding operations. It shall be used only in the event of curtailment of inflows due to operations of the upstream Barge Canal. Run-of-river operation may be temporarily modified if required by emergencies beyond the control of the licensee, and for short periods upon mutual agreement between the licensee and the New York State Department of Environmental

Conservation. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident."

(B) Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of, such fishways at the Crescent and Vischer Ferry Projects as may be prescribed by the Secretary of the Interior, as appropriate, pursuant to section 18 of the Federal Power Act.

(C) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days from the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

J. Mark Robinson
Director, Division of Environmental
and Engineering Review

FINAL ENVIRONMENTAL ASSESSMENT
for the
APPLICATION TO MODIFY ARTICLE 41
of the

CRESCENT HYDROELECTRIC PROJECT
FERC Project No. 4678 New York

and the

VISCHER FERRY HYDROELECTRIC PROJECT
FERC Project No. 4679 New York

Federal Energy Regulatory Commission

Office of Energy Projects
Division of Environmental and Engineering Review
888 First Street, NE
Washington, D.C. 20426

November, 2000

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SUMMARY

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. Article 41 of the license requires run-of-river operation when river discharge exceeds 3,250 cfs. When available river flows are less than 3,250 cfs, Article 41 requires that the licensee operate the projects to provide the minimum flow release required by Article 36. At Crescent, ponding is allowed within the top 12 (13.5 at Vischer Ferry) inches of the reservoir until operation of the units is practical.

In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one of the newly installed Kaplan turbines at flow near rated capacity (1,500 cubic feet per second (cfs)) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for

release through the second Kaplan turbine at or near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only during the period of juvenile blueback herring downstream migration, about September 1 to November 10.

The Commission reviewed the licensee's 1992 operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee s turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee s proposal to operate the turbines at rated capacity during the blueback herring migration season. However, the order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order stated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is

available to operate another turbine at full capacity. Similarly, when river flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs. Therefore, on July 11, 1995, the licensee initially proposed to modify the wording of Article 41 to allow ponding, within the flashboard height during the blueback herring outmigration period, when river flow exceeds 3,250 cfs. The licensee would pond these flows in the same fashion as when inflows are less than 3,250 cfs, as allowed by article 41. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback herring.

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As an alternative to the licensee s initial proposal, the U.S. Fish and Wildlife Service (FWS) recommended that the two projects operate in an instantaneous run-of-river mode. On January 6, 1997, representatives from the Commission, licensee, FWS, DEC, and the Village of Green Island, New York participated in a teleconference to further discuss FWS s proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. As a result of this teleconference, in a letter dated February 5, 1997, the licensee altered its original proposal and proposed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows.

In this Final Environmental Assessment (FEA), we analyze three alternatives for operation of the Crescent and Vischer Ferry Projects. These alternatives include: (1) No Action, reflecting current operation under article 41; (2) Run-of-river, the licensee's proposal; and (3) Limited Ponding, the licensee's initial proposal. We analyze the environmental effects of the alternatives on water resources, aquatic resources (including blueback herring), geology and soil resources, cultural resources, and power resources. The FEA concludes the licensee's proposed run-of-river alternative represents the most beneficial use of the Mohawk River resources.

FINAL ENVIRONMENTAL ASSESSMENT
for the
APPLICATION TO MODIFY ARTICLE 41
of the

CRESCENT HYDROELECTRIC PROJECT
FERC Project No. 4678 New York

and the

VISCHER FERRY HYDROELECTRIC PROJECT
FERC Project No. 4679 New York

20001121-0212(1441881) Cres. VF FERC Order Amending Article 41.txt[3/29/2019 11:39:31 AM]

A. APPLICATION

On July 11, 1995, the Power Authority of the State of New York (licensee) filed, and supplemented on February 5, 1997, an application to amend article 41 of the licenses for the Crescent and Vischer Ferry Projects. The projects are located on the Mohawk River near Cohoes, New York.

B. PURPOSE AND NEED FOR PROPOSED ACTION

1. Purpose

The licensee is required, between May 15 and July 31 and September 1 and November 10, to operate its turbines at or near rated capacity. The Commission ordered this operational modification in January 1995 to protect migrating juvenile and adult blueback herring. In its February 1997 supplemental application, the licensee requested a change in license article 41 allowing it to operate the project in a run-of-river mode and operate the turbines at less than rated capacity.

2. Project Description

The Crescent dam, completed in 1912, consists of two independent, concrete, gravity overflow sections that link each bank to a rock island in the middle of the Mohawk River. Water impounded by the dam maintains a constant upper pond level for about 10 miles upstream to the Vischer Ferry dam. At the fixed crest elevation of 184 feet, the impoundment covers about 2,000 acres and impounds about 50,000 acre feet of water. Flashboards, installed each year in May and dismantled in December, raise the pond level about 1 foot and retain an additional 2,000 acre feet of water.

The powerhouse at the Crescent Project contains two Kaplan turbines and two Francis turbines that power two 3.0-megawatt (MW) generators and two 2.8-MW generators, respectively. The

maximum flow at rated capacity of each Kaplan turbine is approximately 1,500 cubic feet per second (cfs), and the maximum flow at rated capacity for each Francis turbine is 1,625 cfs.

20001121-0212(1441881) Cres. VF FERC Order Amending Article 41.txt[3/29/2019 11:39:31 AM]

The Vischer Ferry Project consists of a dam, built in 1913, that is 1,919 feet long and 30 feet high. At the fixed crest elevation of 221 feet, the pond impounds 25,000 acre feet of water and covers about 1,050 acres. After the spring thaw when flashboards are added, the pond impounds an additional 2,400 acre feet of water. The powerhouse contains four turbines and generators that are identical in design and rated capacity to the turbines and generators of the Crescent Hydroelectric Project.

The water surface elevations in both reservoirs are raised by the installation of flashboards during the navigation season and lowered when the flashboards are removed in the fall to minimize ice damage. The timing of the navigation season varies with flow and weather conditions from year to year and extends from about May through November. At Crescent the flashboards are 12 inches high and the reservoir is raised about 12 inches when they are in place. At the Vischer Ferry the flashboards are 27 inches high but the reservoir is only raised about one half of this amount (13.5 inches) for navigation. Historically, the limited storage volumes provided by the flashboards have been used to operate turbines near their rated hydraulic capacity. Consequently, the Crescent reservoir surface typically fluctuates about 12 inches and the Vischer Ferry reservoir fluctuates about 13.5 inches during the navigation season.

3. License Conditions

The Commission issued the Crescent and Vischer Ferry licenses on June 26, 1984. Both licenses contained the pertinent articles 36, 40, and 41. Article 36 requires a minimum flow release of 100 cfs at the Crescent Project and 200 cfs at the Vischer Ferry Project, or the inflows to the projects, whichever is less. These flows are released via leakage through the flashboards when the flashboards are in place or by opening a trash sluice gate when the flashboards are not in place. Article 41 requires run-of-river operation when river discharge exceeds 3,250 cfs. (Each plant had an initial capacity of 3,250 cfs and was upgraded to 6,250 cfs in 1992 with the addition of two Kaplan turbines as proposed in the licensee's 1982 license applications.)

Article 40 requires that the licensee perform fishery studies. In 1992, the licensee filed the results of studies on the effects of project operations on migrating juvenile blueback herring. These studies showed that herring passing through one

of the newly installed Kaplan turbines at flow near rated capacity (1,500 cfs) had a survival rate of 96%. Therefore, the licensee recommended operating the Kaplan turbines only at rated capacity and ponding reservoir inflows within the flashboard height between flows of 100 and 1,500 cfs at the Crescent Project. Similarly, the licensee recommended ponding reservoir inflows within flashboard height between flows of 200 and 1,500 cfs at the Vischer Ferry Project. The licensee also recommended ponding flows between 1,500 and 3,000 cfs for release through the second Kaplan turbine at near 1,500 cfs (total release equals 3,000 cfs). The licensee later modified its recommendation to include ponding flows between 3,250 cfs and 4,750 cfs before water is available to operate the Francis turbine at its rated capacity. The licensee recommended following its proposed operating regime only during the period of juvenile blueback herring downstream migration, about September 1 to November 10.

4. Commission Order dated January 9, 1995

The Commission reviewed the licensee's operational recommendations discussed above. On January 9, 1995, the Commission issued an Order Approving and Modifying a Proposal for Protection and Enhancement of Fishery Resources and Denying Article 36 Amendment Request. The licensee's turbine mortality tests, suggesting 4% mortality, were conducted with the turbines operating at full hydraulic capacity. Therefore, in its order, the Commission approved the licensee's proposal to operate the turbines at rated capacity during the blueback herring migration season. The pertinent section of the January 9 order is paragraph B, which is quoted in part as follows:

> "(B) The licensee shall operate Kaplan and Francis turbines at or near their rated capacities, approximately 1,500 and 1,600 cubic feet per second, respectively. Beginning in 1995, the licensee shall implement this operational scenario from May 15 through July 31 and September 1 through November 10 for the remainder of the license term . . . ."

The Commission's January 1995 order also noted how article 41 affected project operations as set forth in paragraph B. The order concluded that the licensee's ponding recommendations were not consistent with article 41. Because article 41 dictated that the project shall be operated in a run-of-river mode when river flow is between 3,250 and 4,625 cfs, the order indicated that flows in excess of 3,250 cfs must be spilled, not ponded. Article 41 and the January 9 order would require that spill should continue until enough inflow (4,625 cfs) is available to operate another turbine at full capacity. Similarly, when river

flow is between 4,625 and 6,250 cfs, the licensee is required to spill flows above 4,625 cfs. These operational scenarios ensured compliance with the run-of-river requirements of article 41.

Because of environmental impacts associated with ponding activities, the January 9 order suggested that the licensee file a separate request to modify the run-of-river requirements of article 41 if it wished to pond inflows greater than 3,250 cfs.

5. Licensee's Initial Application to Modify Article 41

Based on the information in the Commission s January 9 order, on July 11, 1995, the licensee proposed to modify the wording of Article 41. The licensee's initial rewording of article 41 would allow ponding within the flashboard height during the blueback herring outmigration period, when river flow exceeds 3,250 cfs, in the same fashion as ponding is allowed at flows less than 3,250 cfs. Pursuant to the January 9 order, all turbine releases would continue at or near the rated capacity to provide maximum protection to outmigrating blueback herring.

6. Site Visit and Teleconference

The U.S. Fish and Wildlife Service (FWS), in its letter dated September 8, 1995, stated that a continuous base flow would provide benefit to the aquatic resources of the Mohawk River below the Crescent and Vischer Ferry Projects. Therefore, as an alternative to the licensee s initial proposal, the FWS recommended that the two projects operate in an instantaneous run-of-river mode year-round. To discuss FWS s run-of-river proposal, on March 6, 1996, a site visit was conducted with representatives from the Commission, the licensee, the FWS, the National Marine Fisheries Service (NMFS), and the New York State Department of Environmental Conservation (DEC). At the site visit, FWS continued to state it would recommend year-round run-of-river operation with operation of the turbines following river flow, even though the turbines might not always operate near rated capacity. FWS filed further support for run-of-river operation in a letter dated March 22, 1996.

On January 6, 1997, representatives from the Commission, licensee, FWS, DEC, and the Village of Green Island, New York participated in a teleconference. The purpose of the

teleconference was to further discuss FWS s proposed run-of-river operation plan and to reach a consensus among all parties regarding future operation of the Crescent and Vischer Ferry Projects. In a letter dated January 15, 1997, parties participating in the teleconference were invited to file additional comments.

7. Licensee s Proposal to Operate Run-of-River

The licensee provided its comments on the teleconference in a letter dated February 5, 1997. As a supplement to its initial July 1995 application, the licensee agreed to operate the Crescent and Vischer Ferry Projects in a run-of-river mode such that outflows from the project equal inflows. However, the licensee noted the operations of the upstream Barge Canal lock systems may affect project operations. The licensee explained that, with little or no notice, inflows can decrease or increase substantially in a very short period of time. Therefore, to adjust project operations so that outflows match inflows, the licensee indicated it needed a reservoir operating range of 6 inches to compensate for the unusual flow events.

The licensee proposed that run-of-river operations at the Crescent and Vischer Ferry Projects be defined as follows:

> The Project shall be operated in a run-of-river mode, such that outflow from the project approximates the inflow to the Project reservoir and reservoir surface elevation fluctuations are minimized. Further, the Project shall be operated to maintain the reservoir surface elevation in the range from the top of the dam (or top of the flashboards during the navigation season) to a level 6 inches below the top of the dam (top of the flashboards during the navigation season). During high flows, when inflow exceeds the hydraulic capacity of the Project units, the excess flows shall be spilled over the dam (flashboards) or through the Project works, thus exceeding the 6 inch operational range.

8. Other Comments

The DEC commented on the teleconference in a letter dated February 14, 1997. DEC agreed with the licensee s proposed definition of run-of-river for operation of the Crescent and Vischer Ferry Projects. DEC stated, when inflows to the projects

are substantially reduced, some flexibility in run-of-river operations may benefit aquatic resources.

DEC also stated that, if inflows drop near zero, a run-of-river mode of operation may result in zero inflows below the project. DEC recommended the licensee use storage from the project impoundments to provide a base flow until flows resume. Specifically, DEC recommended the licensee add to its definition of run-of-river the following:

> If inflow to the project reservoir drops below 300 cfs (minimum operating gate of Kaplan turbine) the project shall

> continue to release 300 cfs up to a maximum impoundment drawdown of 18 inches.

In a letter dated January 24, 1997, FWS reiterated its support for run-of-river operations at the Crescent and Vischer Ferry Projects. Likewise, NMFS, although absent from the January 6 teleconference, expressed its support for run-of-river operations in a January 31, 1997 letter.

C. PROPOSED ACTION AND ALTERNATIVES

1. Licensee s Proposed Action: Run-of-river operation

As a result of the teleconference with the resource agencies and Commission staff, the licensee proposes to operate the projects in a run-of-river mode. It also requests a 6 inch reservoir drawdown to allow it flexibility in responding to sudden changes in inflow.

Run-of-river operation would eliminate ponding at inflows less than 3,250 cfs, as currently authorized by Article 41. In addition, run-of-river operation would allow the licensee to operate turbines at less than rated capacity, depending on inflow.

2. Alternatives to the Proposed Action

a. No-Action Alternative: Operation Under Article 41 and January 9, 1995 Commission Order

Under the no-action alternative, the licensee would continue

to operate the projects pursuant to article 41 and the Commission s January 9, 1995 order. To maximize survival of blueback herring through the turbines, the order requires that flows be released through the turbines only at the turbines' rated capacity during the outmigration seasons (May 15 through July 31 and September 1 through November 10). The rated capacities for the turbines are approximately 1,500 cfs for each Kaplan unit and 1,625 cfs for each Francis unit.

Article 41 also requires that, at flows greater than 3,250 cfs, the license operate the project in a run-of-river mode where inflows equal outflows. Because the licensee is required to operate the turbines only at rated capacity, flows between 3,250 cfs (approximate capacity of two Kaplan turbines) and 4,625 cfs (approximate capacity of two Kaplan turbines and one Francis turbine), and between 4,625 cfs and 6,250 cfs (approximate capacity of two Kaplan and two Francis turbines) must be spilled and not ponded.

b. Licensee's Initial Proposed Action Alternative: Limited

Ponding

The licensee initially proposed to modify Article 41 of the Crescent and Vischer Ferry Projects licenses to allow ponding, during the blueback herring outmigration seasons, at inflows greater than 3,250 cfs. This action would allow the licensee to pond rather than spill water (in situations previously noted) until enough water is available to operate its turbines only at rated capacity. As previously discussed, the licensee is currently required to operate the turbines at rated capacity to provide safe fish passage for blueback herring. The licensee would continue to limit the total drawdown of the project reservoirs to 12 inches at Crescent and 13.5 inches at Vischer Ferry.

D. COMMENTS

1. Public Notice

The Commission public noticed the licensee's application on August 16, 1995. The following entities commented on the licensee's application for amendment to the licenses for the Crescent and Vischer Ferry Projects:

Commenting Entity	Date of Letter

National Oceanic and Atmospheric Administration, NMFS	July 10, 1995 July 20, 1995 October 11, 1995 January 31, 1997
DEC	August 9, 1995 August 23, 1995 February 14, 1997
Department of the Interior, FWS	June 9, 1995 September 8, 1995 January 12, 1996 March 22, 1996 January 24, 1997
Adirondack Hydro Development Corporation	September 15, 1995

2. Interventions

The following entities filed motions to intervene on the application to modify Article 41 of the licenses for the Crescent and Vischer Ferry Hydroelectric Projects:

Intervener	Date of Motion
New York State Department of Environmental Conservation	August 28, 1995

Department of the Interior	September 11, 1995
National Oceanic and Atmospheric Administration	October 2, 1995

Intervener	Date of Motion
Village of Green Island, New York [9]	April 17, 1996
Adirondack Hydro Development Corporation [10]	March 28, 1997

Environmental issues raised by the commentors and interveners are

discussed in the environmental impacts section.

E. DRAFT ENVIRONMENTAL ASSESSMENT

On July 18, 1997, we issued a Draft Environmental Assessment (DEA) that examined the environmental impacts of the four alternatives for operation of the Crescent and Vischer Ferry Projects. On July 25, 1997, a Notice of Availability of Draft Environmental Assessment was published in the Federal Register. The Notice requested comments on the DEA.

The following entities filed comments on the DEA. These comments are addressed in FEA.

Commentor	Date of Letter
New York State Department of Environmental Conservation	August 14, 1997
U.S. Fish and Wildlife Service	August 25, 1997 September 18, 1997

Commentor	Date of Letter
Environmental Management Services [11]	August 18, 1997

9 The Village of Green Island, New York was granted a late intervention by a notice issued May 15, 1996.

10 Adirondack Hydro Development Corporation is the managing general partner of NYSD Limited Partnership, the licensee for the downstream New York State Dam Project (FERC No. 7481). It was granted a late intervention by a notice issued May 1, 1997.

11 Filed on behalf of NYSD Limited Partnership, the licensee

(continued...)

Commentor	Date of Letter
Niagara Mohawk Generation [12]	

F. ENVIRONMENTAL ANALYSIS

In this section, we describe the Mohawk River, the general locale, and discuss cumulative impacts. We identify several resource areas and conduct an independent environmental analysis evaluating potential impacts. In our analysis, we use the current project operations as the baseline for measuring and defining the potential environmental effects of the alternatives. Because the alternatives would not involve construction or ground-disturbing activities, we do not anticipate any effects to terrestrial resources, land use, recreation, visual resources or socioeconomics. Therefore, we do not discuss these resource areas.

The Mohawk River and the General Locale

The Crescent and Vischer Ferry Projects are located on the Mohawk River in eastern central New York. The Crescent Project is located in a rural, sparsely populated area, about three miles upstream of the confluence of the Mohawk and Hudson Rivers on the Saratoga and Albany county line. Crescent Lake, the impoundment created by Crescent dam, extends about 10 miles upstream of the dam to the Vischer Ferry Project at Lock E-7. Land next to the impoundments and upstream along the river is used in a variety of ways, including wooded areas, active and inactive farmlands, public open space, and limited residential and commercial development.

The climate of the region is classified as continental. This climate type is characterized by large annual temperature ranges with warm to hot summers and cold winters. The mean annual precipitation at the Albany Airport, located about 6 miles south-southwest of the Crescent Project, is 33.4 inches.

The Vischer Ferry Project is about 10 miles upriver from the Crescent Project. The upstream terminus of the Vischer Ferry impoundment is located 10.3 miles upstream at Lock E-8 in Schenectady. Land use next to the impoundment and upstream

(...continued)

for the downstream New York State Dam Project (FERC No. 7481).

12 Niagara Mohawk Generation Business Group is affiliated with Niagara Mohawk Power Corporation, the former licensee for the downstream School Street Project (FERC No. 2539). The current licensee for the School Street Project is Erie Boulevard Hydropower LP.

includes wooded areas, wetlands, orchards, truck farms, residential areas, and industries.

Navigation is the primary use of project waters at both locations. A series of locks and dams extending about 60 miles regulates upstream river flows, and Lock E-7 at Vischer Ferry regulates the downstream flows. The Mohawk River drainage area covers about 3,450 square miles above the U.S. Geological Survey (USGS) gaging station 2 miles downstream of the Crescent dam. Since 1917, the USGS has continuously maintained a stream gaging station on the Mohawk River about 2 miles downstream from Crescent dam (01357500 Mohawk River at Cohoes). The drainage area upstream of the gage is 3,450 square miles, and the USGS classifies the streamflow records as "Good." Before 1926 records were published as total flow and were adjusted to include the barge canal diversions above Crescent dam. Records since 1926 are not adjusted. The average daily discharge for the period 1926 through 1993 (68 years) was 5,672 cfs. The highest discharge occurred when an ice jam broke and released 143,000 cfs on March 3, 1964. The lowest discharge (6 cfs) occurred on September 18, 1941. During the most recent published water year, 1994, the maximum daily discharge was 49,200 cfs, the minimum was 996 cfs, and the average was 6,189 cfs.

We used 41 years of daily flow records (1953-1993) to construct a flow duration curve. Flows of approximately 14,000 cfs are exceeded 10% of the time and flows of approximately 2,000 cfs are exceeded 90% of the time. The Crescent and Vischer Ferry Projects each have the capacity to use 6,250 cfs for power generation. This is exceeded by river discharge 27 percent of the time. The median flow (exceeded 50 percent of the time) is 3,300 cfs, slightly more than the capacity of two turbines. The minimum flow usable to generate electricity by one turbine is 350 cfs, which is exceeded by the daily average 100 percent of the time.

There are six hydroelectric facilities on the Mohawk River, including the Crescent and Vischer Ferry Projects. Hydroelectric developments at the Little Falls (No. 3509), Vischer Ferry, and Crescent Projects operate in combination with the New York State Thruway Authority's navigational dams and locks. There are three hydroelectric developments downstream of the Crescent Project: School Street (No. 2539), New York State Dam (No. 7481), and Mohawk Paper Mills (No. 3605) Projects.

The School Street Project is located 1.5 miles downstream of

the Crescent Project. The project operates in a store and release mode and is supplied by a 1-mile-long head canal and dam that diverts water around the 80-foot-high Cohoes Falls. The licensee for this project, Erie Boulevard Hydropower LP, has applied for a new license with the Commission. In November 1996, Commission staff issued a Draft Environmental Assessment (FERC, 1996) analyzing the potential environmental impacts of the existing School Street Project and alternatives.

Cumulative Impact Summary

An action may cause cumulative impacts on the environment if it overlaps in space or time with the impacts of other past, present, or reasonably foreseeable future actions. Individual minor impacts of multiple actions, when added together, may amount to collectively significant cumulative impacts. We consider cumulative impacts of the proposed action and alternatives in the Environmental Impacts section.

Environmental Impacts

1. Water Resources

a. Affected environment: The Mohawk River flows east for 154 miles from the Town of West Turin to the City of Cohoes, where it joins the Hudson River. Crescent Lake, the impoundment created by Crescent dam, has a maximum width of 0.6 mile and a maximum depth of 37 feet. The impoundment at Vischer Ferry (Lock 7 Pool) has a maximum width of 0.4 mile and a maximum depth of 26 feet.

b. Water quality: The water quality classifications of the Mohawk River near the Crescent Hydroelectric Project have been designated as Class A and Class C. Class A waters, by definition, are suitable as a source of potable water and for any other use, including primary contact recreation, recreational fishing, and fish and wildlife habitation. Class A waters extend upstream from the first dam above Cohoes Falls (School Street dam) to the Vischer Ferry dam, with the exception of the barge canal inlet in Crescent Reservoir.

The water quality classification of the barge canal inlet to Crescent Lake is Class C, which is suitable for fishing and secondary contact recreation but is not suitable as a source of potable water or for primary contact recreation.

Water quality classifications near Vischer Ferry are Class A and Class B. Most of the Vischer Ferry pool is considered Class A. From the Route 5 bridge upstream to Lock 8, the water is classified as Class B and is suitable for any use other than as a source of potable water. Unlike the Class C waters near Crescent, these waters can be used for primary contact recreation and recreational fishing.

c. Environmental effects: Pursuant to article 37, the licensee conducted water quality surveys beginning in 1982. These surveys, in the Crescent and Vischer Ferry impoundments, examined potential effects of local wastewater treatment plant discharge on dissolved oxygen concentrations during high-temperature, low-flow periods. The licensee continued to compile relevant information and submit reports to DEC and FWS until 1992, when DEC concluded that dissolved oxygen monitoring was no longer necessary. The licensee's documentation showed that

dissolved oxygen levels far exceeded DEC standards for project-area surface waters and that current dissolved oxygen levels are adequate to protect aquatic resources (NYPA, 1993).

Reservoir and downstream dissolved oxygen would not be expected to change from historical conditions for any of the four operating alternatives considered here. First, none of the alternatives, most notably the licensee s run-of-river alternative, would significantly change reservoir retention times or stratification patterns. The licensee's initial limited ponding and no-action alternatives provide for only short-term (within day) water retention, rather than long-term retention that would increase stratification potential. Downstream dissolved oxygen would not be adversely affected by the run-of-river alternatives because continuous downstream flows should ensure stable downstream dissolved oxygen conditions. Likewise, the licensee s initial ponding alternative should not adversely affect downstream dissolved oxygen levels, as flow release mode is modified only when flows exceed 3,250 cfs. At flows of this magnitude, downstream dissolved oxygen levels would remain relatively stable.

The Village of Green Island expressed concern about downstream flooding in its "Petition for Late Intervention" filed on April 17, 1996. The petition states that the village (located at the confluence of the Mohawk and Hudson Rivers) recently experienced a "near flooding condition." Green Island was concerned that proposed changes in reservoir operation might

increase the potential for flooding part of the village.

To address Green Island s concerns, we performed a flood frequency analysis on the streamflow records from the USGS stream gage located on the Mohawk River at Cohoes. The analysis shows that a flood with a return interval of 10 years would have a magnitude of about 90,000 cfs. None of the proposed alternatives would affect flows above 6,250 cfs in the Mohawk River. This flow is exceeded 27 percent of the time, is close to the 68-year average daily flow of 5,672 cfs, and is well below the level of potential flooding. Therefore, we conclude that none of the proposed alternatives would have any effect on potential flooding in the Mohawk River.

2. Aquatic Resources

a. Aquatic habitat: The 2,000-acre Crescent Lake impounds about 50,000 acre feet of water and extends upstream from Crescent dam, 3.4 miles above the confluence of the Mohawk and Hudson Rivers, upstream about 10 miles to Vischer Ferry dam. The 1,050-acre Vischer Ferry Lake is immediately upstream of Crescent Lake and impounds approximately 2,400 acre feet of water. The two reservoirs are hydraulically connected by Canal Lock E-7. As previously mentioned, article 41 allows the licensee to fluctuate the Crescent and Vischer Ferry reservoirs 12 and 13.5 inches, respectively, when inflows are less than 3,250 cfs.

The one-mile reach downstream from Crescent Dam to the School Street Dam includes the 100-acre School Street impoundment. Operations at the School Street Project fluctuates this impoundment up to 3 feet daily (FERC, 1996).

b. Resident fisheries: Fisheries resources in the two lakes are generally similar as evidenced by results of DEC fisheries studies in Crescent Lake during 1979 (DEC, 1980) and Vischer Ferry Lake during 1980 (DEC, 1981a). Results of the Crescent Lake studies are summarized below.

The DEC (1980) conducted fisheries studies in Crescent Lake during 1979 that provided information on aquatic resources in the project area. Resident species were dominated by centrarchids (bass and sunfish), percids (walleye and perch), ictalurids (bullhead), and cyprinids (carp and minnows).

The DEC categorized the fish species collected in Crescent Lake as gamefish (6 species), panfish (10 species), or rough or

forage fish (14 species) (DEC, 1980). The ratio, by weight, of nongamefish to gamefish was 18 to 1, with rough or forage fish comprising about two-thirds of all fish collected. Smallmouth bass were the most abundant gamefish collected, followed by largemouth bass and then walleye. The relative abundance of each was rated as common (DEC, 1980). White crappie were the most abundant panfish collected, followed by brown bullhead, bluegill, and black crappie. Each of these species was rated as abundant. Finally, carp, a rough fish, were also rated as abundant in Crescent Lake. Numerous forage species, predominantly cyprinids, were collected but their relative abundance was not estimated (DEC, 1980).

The DEC (1981b) reports that Crescent and Vischer Ferry Lakes of the lower Mohawk River "support good quality, popular warmwater fisheries for smallmouth bass, largemouth bass, walleye, and other species including yellow perch, pumpkinseeds, bluegills, bullheads, rock bass, crappies and white perch." DEC (1980) reports that in Crescent Lake, bass and walleye growth rates are excellent and above average for the Region 4 Fisheries Unit; about one-third of the bass collected are of legal size (12 inches or longer); and about two-thirds of the panfish collected are of "desirable" size to anglers. In DEC s Fisheries Management Plan for the Mohawk River, McBride (1994) suggests the lower Mohawk River "supports one the better smallmouth bass fisheries in New York."

c. Blueback herring: Blueback herring, a forage fish, was the most abundant species in the rough or forage fish category and was also the most abundant fish species collected in Crescent Lake. McBride (1985 [in FERC, 1995]) reports blueback herring were also among the most dominant fish in the lower Mohawk River during the mid-1980's. Abundance of this anadromous species varies seasonally, increasing with upstream spawning migrations during late spring and early summer and decreasing with juvenile

outmigrations during fall. A major objective of DEC s Mohawk River Fisheries Management Plan is to, "Preserve and maintain the anadromous blueback herring run throughout the lower Mohawk" (McBride 1994).

Blueback herring are commercially harvested along the Atlantic Coast and contributes to the recreational fishery on the Hudson and Mohawk Rivers during spring spawning migrations (FWS, 1995a). Upstream spawning migrations of sexually mature adults (3+ years old) move from salt water through the Hudson River and

into the Mohawk River during late spring and early summer. Cohoes Falls, an 80-foot-high natural barrier several miles above the river's mouth, has historically limited migrations into the Mohawk River. However, blueback herring gained access to upstream river reaches with completion of the Erie Canal in 1825 and its successor, the Erie Barge Canal, in 1918.

Currently, adult blueback herring currently depend on the operation of locks and gates on the Erie Section of the New York State Barge Canal to gain access to the Mohawk River. Regular canal operation generally extends from late April or early May through late November or early December. Adults migrating upstream through the canal enter the Mohawk River upstream of Crescent dam.

Spawning migrations can extend to near Rome, New York, about 120 miles above the river's mouth and more than 100 miles upstream of Crescent and Vischer Ferry dams. Spawning occurs in upper reaches of the Mohawk River and its tributaries, preferably in swift-flowing, hard-bottomed stream reaches, and begins when water temperatures reach 10ø to 15øC. Eggs are broadcast, fertilized, and adhere to the stream bottom or are dislodged and drift with the current (NYPA, 1993). Egg incubation is brief, requiring only 2 to 3 days at water temperatures of about 22ø to 24øC (Scott and Crossman, 1973).

Spent adult blueback herring migrate downstream toward salt water shortly after spawning. NYPA (1993) reports spent adults return to the ocean in May and June, passing Crescent and Vischer Ferry through the adjacent navigation locks, in spillage over the dams, or through project turbines. The FERC (1995) suggests the outmigration period of adult blueback herring in the Mohawk River is May through July, citing studies by Loesch and Lund (1977) that indicate peak adult outmigration may continue through July.

Downstream fish passage facilities for adult outmigrating Mohawk River blueback herring are operational at the Little Falls and Mohawk Paper Mills Projects. As previously discussed, FERC (1995) requires that the licensee operate project turbines at or near rated capacities from May 15 through July 31 for the remainder of the license term for the protection of outmigrating adult blueback herring. DEC (1991 [in FERC, 1995]) states that up to 39 percent of spent adults may return to spawn in successive years.

Juvenile blueback herring (young-of-year fish) rear

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throughout the Mohawk River during summer, feeding primarily on zooplankton and growing rapidly. They are an important prey for dominant riverine piscivores such as smallmouth and largemouth bass, walleye, and yellow perch. FWS (1995a) reports blueback herring also provide prey for tiger muskellunge (northern pike x muskellunge), which DEC (1981b) initially stocked in Crescent and Vischer Ferry Lakes in 1980. Other blueback herring predators include small mammals, reptiles, and birds as well as gamefish such as striped bass and bluefish in the Hudson River, estuary, and ocean (NYPA, 1993; FWS, 1995a). NYPA (1993) reports that the addition of blueback herring to the prey base has enhanced the Mohawk River's carrying capacity, especially for piscivorus gamefish. A recent study (Yako et al., 2000) has shown that blueback herring are an energentically valuable and potentially key prey for largemouth bass.

Outmigrations of juvenile blueback herring from the Mohawk River to the Hudson River estuary occur primarily during fall and throughout the day and night (FWS, 1995b; NYPA, 1992). NYPA (1993) reports most outmigrants near the Crescent Hydroelectric Project are between 60 and 90 mm long (fork length) and have a median length of 75 to 80 mm. Potential outmigrant routes past the Vischer Ferry and Crescent Hydroelectric Projects include the adjacent navigation locks, spillage over the dams, and through project turbines. A study at Vischer Ferry concluded that most juvenile blueback herring migrate through the project powerhouses on their downstream migration (Curtis and Associates, 1987).

Reports indicate outmigrations by juvenile blueback herring occur primarily from September through early November but can extend from August into December. NYPA (1992) states most juvenile herring move downstream past Vischer Ferry and Crescent between September 1 and November 10. Fishway operations at the New York State Dam, Little Falls, and Mohawk Paper Mills Projects provide downstream fish passage for juvenile blueback herring in the fall. As previously mentioned, FERC (1995) requires that NYPA operate project turbines at or near rated capacities from September 1 through November 10 for the protection of outmigrating juvenile blueback herring.

Despite the relatively high survival of juvenile blueback herring through the project's Kaplan turbines (96%), the licensee has continued to study ways of excluding migrating adult and juvenile herring from the project works. A recent study at Vischer Ferry (Ross, 1999) reported that more than 90% of hydroacoustically observed juvenile blueback herring moved through a flashboard opening when a high frequency sound system was operating.

d. Environmental effects

1) Effects on aquatic habitat

Article 41 allows the licensee to pond inflows less than 3,250 cfs and the January 9 order requires the licensee to operate the turbines only at rated capacity. Therefore, under the no-action alternative and under the licensee s initial proposed action alternative, when reservoir inflow is less than 1,500 cfs, outflow will alternate between the minimum flow of 100 cfs (200 cfs at Vischer Ferry) and 1,500 cfs. Similarly, when inflow is between 1,500 and 3,250 cfs, outflow will alternate between 1,500 and 3,000 cfs.

As previously mentioned, the downstream School Street Project is operated as a store and release pulsing facility at all inflows but has little capacity for storing water (270 acre-feet). The Crescent and Vischer Ferry Projects have substantially greater storage capacity (2,000 and 1,200 acre-feet, respectively). Therefore, the ponding operations of these projects, at inflows less than 3,250 cfs, have been tentatively identified as the primary factor influencing downstream flow fluctuations in the lower Mohawk River (FERC, 1996).

Adverse environmental impacts associated with downstream flow fluctuations may include fish strandings, elimination of algae and aquatic macrophytes due to periodic exposure of channel margins, and dislodging of aquatic insects and fish eggs due to rapid changes in discharge (Rochester et al. 1984). With respect to the Mohawk River, DEC states that downstream fluctuating flows have an adverse impact on downstream habitat and aquatic organisms including fish population and stream invertebrates (McBride, 1994). Because of the adverse effects on downstream Mohawk River aquatic habitats associated with store and release operations, Commission staff, in its School Street Project Draft Environmental Analysis, recommended the downstream School Street Project operate in a run-of-river mode (FERC, 1996).

The proposed run-of-river alternative would allow the licensee to operate its turbines regardless of inflow as long as flows are greater than 300 cfs (minimum hydraulic capacity). Implementation of either of these alternatives would eliminate the ponding and corresponding downstream fluctuations in flow that occur between the minimum releases and operational releases when river flows are less than 3,250 cfs. If the new School Street license includes a run-of-river requirement, the cumulative effect of run-of-river operations at the Crescent, Vischer Ferry, and School Street Projects would stabilize flows downstream of the projects, thereby enhancing Mohawk River aquatic habitat. In fact, two years after a Michigan hydroelectric project ceased store and release operations and

began run-of-river operations, fish spawning success increased due to the creation of new, more stable downstream habitats (Auer, 1996). In addition, minimizing the peaking capabilities of an Alabama hydroelectric project resulted in increases in fish diversity more reflective of a riverine system (Travnichek et al., 1995). Finally, implementation of the run-of-river alternative would be consistent with DEC s Fisheries Management

Plan for the Lower Mohawk River (McBride, 1994).

Under the no-action alternative, the licensee would continue to drawdown the Crescent reservoir 12 inches and the Vischer Ferry reservoir 13.5 inches, at inflows less than 3,250 cfs. The licensee's initial proposed alternative would also allow these reservoir drawdowns at inflows up to 6,250 cfs. In addition, DEC's suggested modification of the run-of-river alternative would allow reservoir drawdowns of up to 18 inches at inflows less than 300 cfs. Finally, as part of its proposed run-of-river alternative, the licensee has requested a 6-inch drawdown to allow it flexibility in responding to sudden changes in inflow.

Reservoir fluctuations can adversely affect aquatic habitat by exposing nests and dewatering eggs. These fluctuations may also cause fish spawning in shallow water to abandon nests. Drawdowns may displace juvenile fish from shallow vegetated habitats that provide refuge from predators and may reduce prey for juvenile fish by stranding and dewatering benthic macroinvertebrates in shallow habitats. All of these adverse environmental impacts associated with reservoir drawdowns may lead to decreased fish spawning success and juvenile fish survival.

The licensee's proposed run-of-river alternative would limit the fluctuations of the Crescent and Vischer Ferry reservoirs that would be allowed under the no-action and licensee s initial proposed action alternatives. The licensee's requested 6 inch drawdown is approximately one half of the current authorized drawdown level. We note that this 6 inch drawdown is not intended for regular peaking and ponding operations but is necessary to give the licensee flexibility in responding to sudden changes in inflow due to the operation of the upstream

Barge Canal. The licensee's proposed drawdown limitation would reduce the displacement of juvenile fish from shallow refuse habitats and potentially increase prey production for juvenile fish by reducing the exposure and desiccation of benthic

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macroinvertebrates. These enhancements should increase spawning success and recruitment of juvenile fish in the Crescent and Vischer Ferry reservoirs.

Under DEC's suggested modification to the run-of-river alternative, when inflows fall below 300 cfs, the licensee would continue releasing 300 cfs using up to 18 inches of storage from the project reservoirs. DEC is concerned that, during periods of low inflows, downstream reaches may become dewatered. DEC believes its 300 cfs minimum flow would provide the necessary protection for these downstream areas. DEC s proposed 18 inch

13 Review of recent flow records indicate that, at Lock 6, upstream of Crescent, the Barge Canal can divert up to 15% of the mean monthly flow of the Mohawk River during low flow periods (Firda et al., 1996).

drawdown is five to six inches more than historic drawdowns of both reservoirs. Adverse environmental impacts associated with 12 and 13.5 inch reservoir drawdowns previously discussed, especially during low flow periods, would be manifested to a greater degree under the DEC s proposed 18 inch drawdown.

We believe that the DEC concern regarding dewatering of downstream areas during periods of low inflows should be mitigated by the licensee s interim minimum flow requirements. These flow requirements (100 cfs at Crescent, 200 cfs at Vischer Ferry) should ensure the area downstream of the projects are protected even during periods of low inflow. Examination of USGS flow records for the Mohawk River, downstream of the projects, suggests that flows are rarely below the required minimum flows. DEC has not provided any scientific information suggesting that its proposed 300 cfs would provide more protection for downstream areas than the current minimum flow requirements.

DEC believes that sudden reductions of inflow resulting from upstream Barge Canal operations will result in adverse impacts in the downstream habitat. As a result, DEC recommends that if the licensee's run-of-river proposal is approved, the licensee should be required to monitor and report all inflow reductions due to Barge Canal operations. Under article 8 of the project license the licensee is required to maintain gages for the purpose of determining the stage and flow of the stream on which the project is located. The licensee currently monitors project operations

pursuant to article 8.

2) Effects on blueback herring

One source of mortality among fish passing through turbines at these projects is direct contact with the turbine blades. The output of a Kaplan turbine is regulated by adjusting the space between blades and wicket gates to allow more or less water to pass through the turbine runner. As the output approaches the rated capacity the gates and blades approach their maximum opening and it is easier for fish to pass through the turbines. The licensee, citing studies by Turbak, et. al., (1981) and the Electric Power Research Institute (EPRI, 1987), also states "the rated capacity (of turbines) is considered to be the most hydraulically efficient mode and operation in this mode is considered to cause the minimal impact on entrained fish" (NYPA, 1992). The Commission agreed with this premise in its January 1995 order authorizing operation of the Kaplan and Francis turbines only at rated capacity.

At inflows between 1,500 cfs and 3,250 cfs, turbine mortalities of juvenile blueback herring outmigrants passing through the Kaplan turbines operated at rated capacity would be low, about 4%, based on the licensee's site-specific turbine mortality study. At inflows greater than 4,625 cfs, when the Francis turbines are in operation, juvenile blueback herring mortalities may be as low as 6% (RMC Environmental Services,

Inc., 1994).

Under the no-action and licensee s initial proposed alternatives (limited ponding) the licensee would operate the Kaplan turbines preferentially over Francis turbines. Under these alternatives, to minimize fish mortality, the licensee would only operate these turbines at or near their rated capacities during the adult and juvenile blueback herring outmigration periods. In contrast, turbines would not always operate at their rated capacities under the licensee s proposed run-of-river alternative. Under the premise described above, implementation of the licensee's run-of-river alternative may result in slightly higher fish mortalities. However, results of recent turbine mortality studies by Mathur et al. (1994) suggest the relationship between operating turbines at rated capacity and fish survival previously discussed may not be as important as previously thought. The authors found essentially no significant difference ($P>0.05$) in 1-hour turbine-related mortality rates of

juvenile American shad passing through a Kaplan turbine at different wicket gate openings. In addition, Normandeau Associates, et al. (1996) conducted a study of turbine survival of tagged coho salmon that passed through a hydroelectric turbine a four different discharges. The authors found no signifcant relationship between fish survival and turbine discharge after 48 hours. These studies suggest that, despite turbine operation at less than rated capacity, turbine survival rates of herring under the run-of-river alternative may be similar to survival rates under the no-action and limited ponding alternatives.

As previously noted, the licensee is currently developing a sonic deterrence system to exclude downstream migrating blueback herring from the project intakes (Ross, 1999). Our preliminary review of the licensee's experimental system suggests that a sonic detterence system can alter the behavior of blueback herring, demonstrating its potential use to deter downstream migrating blueback herring from entrainment into the intakes of the Crescent and Vischer Ferry Projects. If this system is sucessfully deployed at the projects, operation of the project under the proposed run-of-river mode would have minimal effects on blueback herring mortality.

Concerns have been raised regarding the effects of changing project operations at the Crescent Project on operation of the downstream fishway at New York State Dam Project. The operator of that project, NYSD Limited Partnership, expressed concern regarding the potential effects of the licensee's proposal on downstream low-flow conditions and operation of its juvenile blueback herring bypass system. Further, DEC notes that its recommendation that the licensee use reservoir storage to provide a 300 cfs minimum flow would ensure that this flow would be more available for fish passage at New York State Dam. NYSD Limited Partnership states that a minimum flow from the Crescent Project of 691 cfs (491 cfs for fishway operation and 200 cfs for project operation) is needed for operation of the New York State Dam

Project and fishway.

The most deleterious effects on fishway operation at the downstream New York State Dam Project would result from implementation of the no-action and licensee's initial proposed action alternatives. Because the licensee would be allowed to pond some inflows under these alternatives, inflows to the New York State Dam Project may be less than required for operation of the fish bypass. Therefore, implementation of either ponding

alternative may result in reduced downstream passage of juvenile blueback herring past New York State Dam.

DEC and NYSD Limited Partnership believe that their minimum flow provisions would ensure that flows would be more available for downstream fishway operation during periods of low inflow. As previously mentioned, reservoir drawdowns from increased minimum flows taken from storage during low inflow periods may result in adverse environmental impacts in the project reservoirs. We maintain that the current minimum flow regime coupled with implementation of the run-of-river alternative should ensure that stable flows are available for downstream fish bypass operations representing a substantial improvement over existing condtions.

3. Geology and Soil Resources

a. Affected environment. The Crescent and Vischer Ferry Projects are located in the Mohawk Valley, a subdivision of the Hudson-Mohawk Lowland. To the north of this region are the Adirondacks, and to the south lies the Appalachian Upland. Soft shales underlie this area. Although the Hudson-Mohawk Lowland ranges from 20 to 30 miles in width, the Mohawk River flows in a fairly narrow river valley.

The Mohawk River shoreline near the Crescent dam is characteristic of glacial topography; it consists of steep slopes rising 20 to 30 feet from the water's edge intermingled with low (4- to 5-foot-high) bluffs.

The topography adjacent to the powerhouse at the Vischer Ferry Project is characterized by very steep shale cliffs. Steep cliffs also overlook the impoundment from the west. The east bank, north and south of the powerhouse, is characterized by low floodplains interspersed with steep cliffs. Soil types found near the projects include the Colonie and Otisville Associations and the Claverack-Colonie Association. These well-drained soils are coarsely grained and are underlain by sand and gravel.

The Rhine-Madalin Association, which is also found near the Crescent Project, is characterized by medium- to fine-textured soils overlying glacial lake or marine sediments. These soils vary from being well-drained to somewhat poorly drained. The moderately well-drained, medium-textured, acidic soils of the Troy-Cossayuna Association are found at Vischer Ferry on the

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undulating glacial till plain.

b. Environmental effects. Operation of the projects under the no-action and licensee s initial proposed alternatives may potentially cause shoreline erosion associated with fluctuation of the project reservoirs. However, because the fluctuations would be within the historical range of operations, we expect these impacts to be minor. On the other hand, the DEC s suggested modification to the run-of-river alternative, with its authorized drawdown of 6 inches beyond historical levels, may result in a higher level of shoreline erosion. The licensee s proposed run-of-river alternative would limit reservoir drawdowns to 6 inches and would reduce any potential for soil erosion along shorelines.

4. Cultural Resources

According to the September 1982 license applications for the Crescent and Vischer Ferry Projects, no properties listed on the National Register of Historic Places are located in the project areas.

5. Power Resources

To estimate the effects on the alternatives on power resources, we developed a peaking/base-load model of the Vischer Ferry, Crescent, and the School Street Projects. We included the downstream School Street Project in our analysis based on its close proximity to the Crescent Project (less than 1 mile), its limited ponding capabilities, and comments on the DEA by the Niagara Mohawk Generation Business Group. The current School Street license allows the licensee to operate the project as a peaking operation. We used the model to evaluate the effects of the alternatives on the amounts and value of the on-peak and off-peak energy generated at all three projects under median water conditions. To value on- and off-peak energy in the model, we estimated 2000 on-peak and off-peak energy values of 25.97 mills/kWh and 18.24 mills/kWh, respectively.

a. No-action alternative

Under this alternative, the Crescent and Vischer Ferry Project are required to operate the generating units only at full capacity from May 15 through July 30 and September 1 through November 10, spilling all flows that do not match full capacity flows, whenever the average daily flow into the project in greater than 3,250 cfs. Operating under this alternative, the projects produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 6,981 kW Value: $502,600

On-peak 25.41 GWh Total Peak Value $806,100

Off-peak 29.51 GWh Total Off-Peak Value $651,000
Total Energy 54.92 Gwh Total Value $1,45
7,100

Total Power Value including capacity and energy $1,959,700

Crescent Project:

Average Peaking Capacity: 7,315 kW Value: $526,700

On-peak 26.63 GWh Total Peak Value $844,600
Off-peak 28.32 GWh Total Off-Peak Value $624,900
Total Energy 54.95 Gwh Total Value
$1,46
9,500

Total Power Value including capacity and energy $1,996,200

School Street:

Average Peaking Capacity: 24,518 kW Value: $1,765,300

On-peak 89.24 GWh Total Peak Value $2,830,800
Off-peak 28.32 GWh Total Off-Peak Value $1,960,400
Total Energy 54.95 Gwh Total Value
$4,79
1,200

Total Power Value including capacity and energy $6,556,500

b. Limited Ponding Alternative

This alternative would allow the licensee to pond rather than spill water in the same situations as in the no-action alternative. Under this alternative the project could produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 7,636 kW Value: $549,800

On-peak 27.80 GWh Total Peak Value $881,700
Off-peak 32.84 GWh Total Off-Peak Value $724,400
Total Energy 60.64 Gwh Total Value $1,60
6,100

Total Power Value including capacity and energy $2,155,900

Crescent Project:

Average Peaking Capacity: 7,966 kW Value: $573,500

On-peak 29.00 GWh Total Peak Value $919,700
Off-peak 31.64 GWh Total Off-Peak Value $698,000

Total Energy 60.64 Gwh Total Value $1,617,700

Total Power Value including capacity and energy $2,191,200

School Street:

Average Peaking Capacity: 24,518 kW Value: $1,756,300

On-peak 89.24 GWh Total Peak Value $2,830,900
Off-peak 88.97 GWh Total Off-Peak Value $1,962,700
Total Energy 178.21 Gwh Total Value $4,793,600

Total Power Value including capacity and energy $6,558,900

c. Run-of-river Alternative

Under the run-of-river alternative, the Crescent and Vischer Ferry Projects would operate at whatever capacity is needed to use all of the available inflow within their maximum hydraulic capacity, although they would not be allowed to use active storage to shift any energy from off-peak to on-peak times. With the Vischer Ferry and the Crescent Projects operating in full run-of-river mode and the School Street Project peaking to its maximum capability, using its limited storage, the projects would produce the following total annual energy:

Vischer Ferry Project:

Average Peaking Capacity: 6,941 kW Value: $499,700

On-peak 25.27 GWh Total Peak Value $801,400

Off-peak 35.37 GWh Total Off-Peak Value $780,300
Total Energy 60.64 GWh Total Value $1,58
1,700

Total Power Value including capacity and energy $2,081,400

Crescent Project:

Average Peaking Capacity: 6,941 kW Value: $499,700

On-peak 25.27 GWh Total Peak Value $801,400
Off-peak 35.37 GWh Total Off-Peak Value $780,300
Total Energy 60.64 GWh Total Value $1,58
1,700

Total Power Value including capacity and energy $2,081,400

School Street:

Average Peaking Capacity: 21,453 kW Value: $1,544,600

On-peak 78.09 GWh Total Peak Value $2,476,900
Off-peak 100.13 GWh Total Off-Peak Value $2,20
8,900
Total Energy 178.22 GWh Total Value $4,68
5,800

Total Power Value including capacity and energy $6,230,400

Using the no-action alternative as the baseline, operating the Crescent and Vischer Ferry Projects under either the limited peaking alternative or the run-of-river alternative would result in an increase in total annual energy production (a 7.63% increase under limited peaking and a 9.40% increase under run-of-river). The total annual energy production of the downstream School Street Project would be relatively unaffected by either the limited peaking or run-of-river alternatives. However, there would be a negative economic impact on the School Street Project (annual loss of $326,100 under run-of-river) due to a decrease of percentage of peaking energy produced from 50.1% to 43.8%.

G. CONCLUSIONS AND RECOMMENDATIONS

We have considered the licensee's initial proposed alternative to allow ponding when flows exceed 3,250 cfs, the licensee's run-of-river alternative, and the no-action

alternative with operation unchanged pursuant to the 1995 order and article 41. Based on the January 6, 1997 teleconference, the licensee, FWS, DEC, and NMFS agreed that the Crescent and Vischer Ferry Project should be operated in a run-of-river mode.

We agree with the licensee and resource agencies and conclude that the licensee's proposed run-of-river alternative represents the most beneficial use of the resources involved for the following reasons.

The licensee s run-of-river alternative would provide cumulative benefits to fishery resources in the lower Mohawk River by reducing downstream fluctuations currently authorized under Article 41 and potentially reducing the amount of intermittently dewatered habitat below Crescent dam at flows less than 3,250 cfs.

The licensee s run-of-river alternative would also limit reservoir fluctuations of the project reservoirs thus increasing fish spawning success and recruitment of juvenile fish into the Mohawk River fishery.

Survival rates of juvenile blueback herring passing through the turbines under the licensee s run-of-river alternative would likely be as high as under either the no-action or licensee's initial proposed alternatives.

Implementation of the licensee's proposed run-of-river alternative would result in an increase in total annual energy production.

H. FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, issuance of an order modifying Article 41 of the licenses, as proposed by the licensee, would not constitute a major federal action significantly affecting the quality of the human environment.

I. RESPONSE TO COMMENTS ON THE DEA

We summarized the comments on the DEA (in italics) of the DEC, FWS, Environmental Management Services (on behalf of NYSD Limited Partnership), and the Niagara Mohawk Generation Business Group and present our responses below.

New York State Department of Environmental Conservation

1. DEC notes that the DEA emphasizes the potential effects on the Crescent and Vischer Ferry impoundments that could result from the DEC modification to the run-of-river alternative to use reservoir storage to provide a 300 cfs downstream minimum flow during periods of no inflow. DEC states that it acknowledges the possibility of some impacts in the impoundments, but believes these impacts are less significant when compared to loss of downstream flows.

DEC's modification to the run-of-river alternative may necessitate a reservoir drawdown of 18 inches. The DEA examined the adverse impacts of 12 and 13.5 inch drawdowns associated with the ponding alternatives and noted that these impacts would be manifested to a greater degree under DEC's proposed 18 inch drawdown. DEC's comment about impoundment fluctuations relative to lower downstream flows during periods of low inflow does not alter the DEA's conclusions about the adverse environmental impacts associated with drawdown operations.

2. DEC states that the fishway at the downstream New York State Dam Project operates with flows up to 491 cfs during the blueback herring outmigration period. It notes that its recommended modification to the run-of-river alternative to use reservoir storage to provide a 300 cfs minimum flow would ensure that this flow would be more available for fish passage at New York State Dam.

The DEA discussed the impacts of run-of-river operations on operation of the fishway at the downstream New York State Dam Project. We noted that implementation of either the no-action or limited ponding alternative may result in reduced downstream passage of juvenile blueback herring past New York State Dam. This section of the DEA did not discuss the effects of DEC's

minimum flow proposal on fishway operations at the New York State Dam Project. The FEA has been expanded to include a discussion of this topic.

3. DEC explains that its proposed 300 cfs base flow would minimize dewatering of aquatic habitats, stranding of aquatic organisms, and overall stress on aquatic systems.

The DEA discussed the impacts of conversion of the project operations to run-of-river. The DEA states that implementation

of either the DEC's run-of-river modification or the licensee's run-of-river alternative would eliminate the downstream fluctuations that occur under current operations, thereby enhancing aquatic habitat. However, DEC believes that a 300 cfs minimum base flow, in addition to run-of-river operations, is necessary to protect downstream aquatic habitat. The DEA states that the licensee's current minimum flow requirement (100 cfs at Crescent, 200 cfs at Vischer Ferry) should ensure that downstream areas are protected during periods of low inflow. DEC has presented no information that would lead us to conclude otherwise. The FEA has been modified to include an expanded discussion of DEC's minimum flow proposal.

4. DEC believes that sudden reductions of inflow resulting from upstream Barge Canal operations will result in adverse impacts in the downstream habitat. As a result, DEC recommends that if the licensee's run-of-river proposal is approved, the licensee should be required to monitor and report all inflow reductions due to Barge Canal operations. DEC wishes to review these data after 2 years and make final recommendations for project operations at the Crescent and Vischer Ferry Projects.

Under article 8 of the project license the licensee is required to maintain gages for the purpose of determining the stage and flow of the stream on which the project is located. The licensee currently monitors project operations pursuant to article 8. Because the DEA did not include a discussion of this topic we have revised the FEA accordingly.

Environmental Management Services for New York State Dam Limited Partnership (NYSDLP)

1. NYSDLP states that the DEA was not clear on the impact of the proposed 6 inch drawdown as part of the run-of-river mode of operation. It believes the drawdown represents a significant volume of water which will create fluctuations in flows and will continue to be detrimental to operations at the downstream New York State Dam Project.

The licensee states that its proposed 6 inch drawdown is intended to give it operating flexibility in responding to sudden changes in inflow due to the operations of the upstream Barge Canal. The FEA has been expanded to note that this operating

flexibility is not intended to be used for regular peaking

operation but only during low flow periods in response to sudden changes in inflow to Crescent resulting from Barge Canal operations.

U.S. Fish and Wildlife Service

1. The FWS notes that the DEA cited a paper by Mather et al. (1994) as suggesting that operating the Crescent and Vischer Ferry Projects at less than their most efficient gate settings will not affect through-turbine passage survival of juvenile blueback herring. FWS points out that Mather et al. (1994) did not detect a statistical difference between survival of fish passing through a turbine at two different wicket gate settings. FWS believes that the Mather et. al. finding of no significant difference between fish survival at different gate settings does not equate to "mortalities at each gate settings were equal." Therefore, FWS does not believe that, based on this study, it was appropriate for the DEA to conclude that "survival rates of juvenile blueback herring passing through the turbines under the licensee's run-of-river alternative would likely be as high as under either the no-action or licensee's initial proposed alternatives."

The DEA states that Mather et al. (1994) found essentially no difference in 1-hour turbine-related mortality rates of juvenile American shad passing through a Kaplan turbine at different wicket gate openings. Based on this study, the DEA concluded that, despite turbine operation at less than rated capacity, turbine survival rates of herring under the run-of-river alternatives should be similar to survival rates under the limited ponding alternatives.

The DEA did not include a discussion of the statistical analysis of Mather et al. (1994). The FEA has been modified to include more statistical information. We disagree with FWS's interpretation of the statistical test presented in Mather et al. In this paper, the authors conducted a chi-square analysis to test the significance of differences in survival between test and control groups as described by Burnham et al. (1987). In their publication, Burnham et al. describe the fundamentals of hypothesis testing which is to test the null hypothesis "there is no treatment effect", which specifies that survival parameters are equal (E) between treatment and control groups, versus the alternative "there is a treatment effect." In the case of Mather et al. the "treatment" was gate setting. The authors found that "Differences in mortality between test and control groups for each power generation level or between generation levels were not significant ($P>0.05$)." Because Mather et al., using the criteria set forth by Burnham et al., failed to reject the null hypothesis, one can conclude that gate setting did not affect survival of fish passing through the turbines. Therefore, we still believe, as stated in the DEA, that Mather et al. (1994) suggests that the relationship between operating turbines at

rated capacity and fish survival may not be as important as previously thought.

2. FWS also criticized Mather et al. because it did not look at long-term survival of American shad passing through turbines at different gate settings.

We agree that Mather et al. (1994) did not consider long-term survival of American shad passing through turbines at different gate setting. However, we note that Normandeau Associates, Inc. et al. (1996) conducted a study of turbine survival of tagged coho salmon that passed through a hydroelectric turbine at four different discharges. The authors found no signifcant relationship between fish survival and turbine discharge after 48 hours. We have included the results of this study in the FEA.

Niagara Mohawk Generation Business Group

1. The Niagara Mohawk Business Group states that the DEA failed to address their 1997 comments on the relicensing of the School Street Project. They suggest that altering project operations at the Crescent and Vischer Ferry Projects would have an economic impact on operations at the downstream School Street Project. Niagara Mohawk estimates that the loss of peak generating capacity resulting from run-of-river operations at Crescent and Vischer Ferry would result in a shift of energy provided on-peak from 60% to 43% at an annual cost of $728,000.

While the DEA did not address, in detail, the effects of altering Crescent and Vischer Ferry operations on the downstream School Street Project, the FEA includes a more thorough analysis of this subject. However, we respectfully disagree with Niagara Mohawk's assessment of the magnitude of economic losses at the School Street Project resulting from run-of-river operations and Crescent and Vischer Ferry. Using the current Crescent and Vischer Ferry project operations as a baseline, the FEA estimates that the percentage of peaking energy produced at School Street would decrease from 50.1% to 43.8% resulting in an annual loss of $326,100. We suspect that Niagara Mohawk may have based its loss estimates on the assumption that the Crescent and Vischer Ferry Projects are full peaking facilities. This, in fact, was the case prior to the relicensing of these projects in 1984. If this was the case, then Niagara Mohawk used an inappropriate baseline for its analysis, resulting in an overestimation of School Street economic losses.

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K. LIST OF PREPARERS

Timothy Welch- Fishery Biologist (M.S., Fisheries Management)

Jack Duckworth - Civil Engineer (B.S., Civil Engineering)

APPENDIX C: Current Water Quality Certifications

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

September 26, 1983

Ms. Christina C. Forbes
New York Power Authority
10 Columbus Circle
New York, New York 10019

Re: Water Quality Certification
Crescent Hydroelectric Project,
Mohawk River, FERC 4678-000

Dear Ms. Forbes:

The New York State Department of Environmental Conservation hereby certifies that the referenced hydroelectric development will comply with all applicable provisions of the Clean Water Act of 1977 (PL 95-217), provided that the following conditions are met.

I. There can be no future changes in any of the following that will result in non-compliance with the intent of this certification:

a. the characteristics of the waters into which the discharges are made,

b. the water quality criteria applicable to such waters, or

c. applicable effluent limitations or other requirements.

II. The development must comply with the applicable provisions of state law and regulations.

III. The following provisions shall become conditions to any Federal Energy Regulatory Commission (FERC) license issued to the New York Power Authority (NYPA) pursuant to Section 401(d) of the Federal Power Act:

a. NYPA will provide an initial minimum continuous release of 100 cfs at the Crescent Dam to maintain downstream water quality standards and aquatic habitats.

The initial minimum release will be provided in the form of leakage under or through the flashboards, spillage over the dam, or a combination of leakage and spillage. Leakage through the turbines will not be considered as part of the minimum release requirement,

b. NYPA will continue the ongoing water quality monitoring program in accordance to the agreements between DEC and NYPA (see Notes of Conference, May 3, 1982) to determine the proposed operational impacts on dissolved oxygen levels and the effectiveness of the initial spillage requirements. The license should provide the opportunity to modify the spillage rate if the above studies indicate that there is a need to do so to maintain acceptable water quality levels,

c. the completion by NYPA of the on-going studies required by DEC and the USFWS to determine: (1) the site-specific impacts of the proposed operation upon anadramous fish, in particular the blueback herring, and (2) the need to include and operate fish by-pass structures to facilitate the downstream migration of adult and juvenile blueback herring and other migratory species,

d. all sediments scheduled for removal from the Mohawk River shall be analyzed for the presence of heavy metals and toxic substances prior to the initiation of construction activities. All sediments must be disposed of in a DEC approved manner,

e. copies of all reports, studies, and notifications provided by the applicant pursuant to this certification and the FERC licensing process shall also be submitted to the Director, Division of Regulatory Affairs, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233.

IV. The DEC reserves the right to require the applicant to implement temporary modifications to the project/mode of operation, if required by emergencies beyond the control of the licensee, to assure the protection of the quality of the water and its biota. The DEC also reserves the right to require the applicant to prepare studies and make whatever reasonable modifications that are deemed necessary to alleviate any unanticipated significant adverse impacts upon the aquatic resource that were not identified during the review process but which can be directly attributed to the creation and operation of the project as licensed by the Commission.

V. The federal license issued by the Commission to construct and operate the referenced project is conditioned to require compliance with the minimum impact abatement requirements identified in the DEC comments submitted to Secretary Plumb on April 19, 1982.

This Water Quality Certification is issued by the Department of Environmental Conservation pursuant to the requirements of the NYS Environmental Quality Review Act, Article 8 of the Environmental Conservation Law and Part 617 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York. The DEC has determined that the proposed action will not have a significant effect upon the environment provided that the proposed construction activities and the mode of operation are compatible or in compliance with:

a. the conditions contained in this Certification,

b. the State of New York's resource management recommendations, submitted to the Commission on April 19, 1982; and

c. the environmental and resource management stipulations contained in the Power Authority's application to the Commission.

This Certification is issued solely for the purpose of Section 401 of the Act. The DEC reserves the right to reconsider the entire Certification if any condition contained herein is declared invalid, if there is a significant change in the scope of the project, or in the event the referenced application is further amended.

A copy of this Certification and the State's recommendations are being forwarded to the Secretary of the Federal Energy Regulatory Commission.

Very truly yours,

Louis M. Concra, Jr., Director
Division of Regulatory Affairs

LMC/kw
cc: K. Plumb
E. Abrams
F. Springer
D. Shumway

Application No. 84-080-YS (PN No. 11727)

Name of Applicant POWER AUTHORITY OF THE STATE OF NEW YORK

Effective Date September 11, 1984

Expiration Date (*If applicable*) September 11, 1987

DEPARTMENT OF THE ARMY
PERMIT #13349

Referring to written request dated 12 JANUARY 1984 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (*33 U.S.C. 403*);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Clean Water Act (*33 U.S.C. 1344*);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (*86 Stat. 1052; P.L. 92-532*);

POWER AUTHORITY OF THE STATE OF NEW YORK
10 Columbus Circle
New York, NY 10019
(212) 397-6200

is hereby authorized by the Secretary of the Army:

to place approximately 1500 cubic yards of fill for temporary cofferdams and permanent concrete fill for foundation material in conjunction with the expansion of a hydroelectric generating facility

in the Mohawk River, Hudson River Basin

at Crescent Dam, Town of Colonie, Albany County, New York

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (*on drawings, give file number or other definite identification marks.*)

1522-15 HUDSON RIVER - PASNY - fill)

subject to the following conditions:

1. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

h. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Clean Water Act (*33 U.S.C. 1344*), the Marine Protection, Research and Sanctuaries Act of 1972 (*P.L. 92-532, 86 Stat. 1052*), or pursuant to applicable State and local law.

e. That when the activity authorized herein involves a discharge during its construction or operation, or any pollutant (*including dredged or fill material*), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall allow the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in reasonable accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

j. That this permit does not obviate the requirement to obtain state or local assent required by law for the activity authorized herein.

k. That this permit may be either modified, suspended or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be materially false, materially incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

o. That if the activity authorized herein is not completed on or before _____ day of _____, 19 _____, (*three years from the date of issuance of this permit unless otherwise specified*) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engineer.

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferree subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the intereste authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

u. That if the permittee during prosecution of the work authorized herein, encounters a previously unidentified archeological or other cultural resource within the area subject to Department of the Army jurisdiction that might be eligible for listing in the National Register of Historic Places, he shall immediately notify the district engineer.

II. Special Conditions: (*Here list conditions relating specifically to the proposed structure or work authorized by this permit*):

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for _____ years from the date of issuance of this permit (*ten years unless otherwise indicated*);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the Clean Water Act and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in toxic amounts.

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

DISPOSAL OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the disposal will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or disposal of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

XX _____ 8-24-84

PERMITTEE — DATE

POWER AUTHORITY OF THE STATE OF NEW YORK

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

"For and in behalf of"

F. H. Griffis

Colonel, Corps of Engineers

DISTRICT ENGINEER,

U.S. ARMY, CORPS OF ENGINEERS

September 11, 1984

DATE

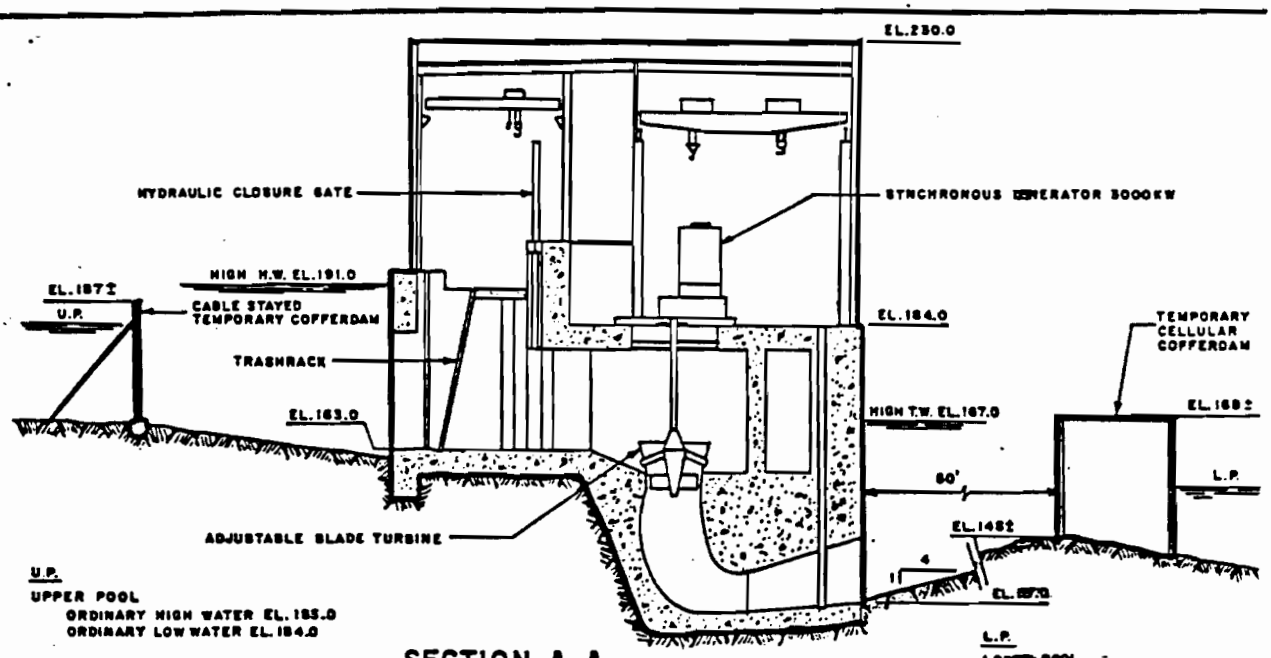
Transferee hereby agrees to comply with the terms and conditions of this permit.

_____ _____

TRANSFEREE — DATE

U.S. GOVERNMENT PRINTING OFFICE : 1983 O - 404-308

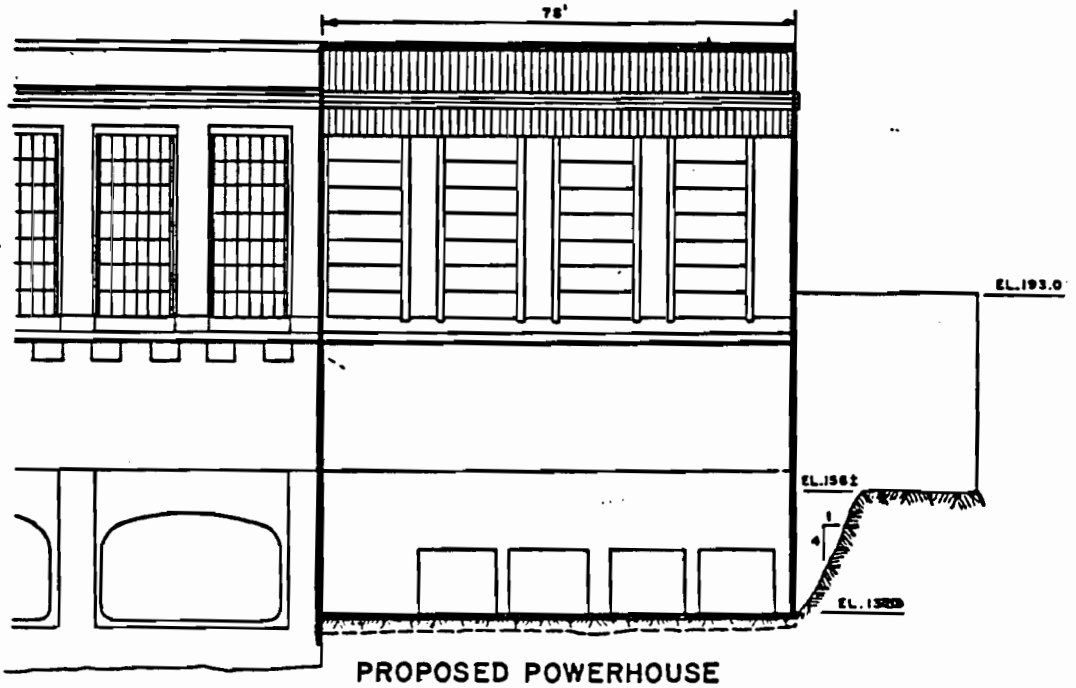
1522-15 (HUDSON RIVER - New York Power Authority - fill)



SECTION A-A

30 15 0 30

SCALE IN FEET



PROPOSED POWERHOUSE DOWNSTREAM ELEVATION

30 15 0 30

SCALE IN FEET

PROPOSED HYDROELECTRIC PROJE
AT CRESCENT DAM
ON MOHAWK RIVER-ERIE CANAL
AT RIVER MILE 3

COUNTIES OF: SARATOGA ALBANY STATE: N

APPLICATION BY: POWER AUTHORITY STATE OF NEW YOR

SHEET 2 OF 2 DATE:

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278-0090

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

District Engineer
U. S. Army Engineer District, New York
ATTN: NANOP-E
26 Federal Plaza
New York, N. Y. 10278

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278

NANOP-E

IMPORTANT

This letter must be completed and mailed to the District Engineer following completion or cancellation of the work authorized under the permit.

Permittee:_____ Permit No.:_____

Issued:_____ Expiration:_____

Waterway:_____ City & State:_____

Type of Work:_____

Check and complete applicable items listed below.

- ☐ Work was completed on_____
- ☐ Work will not be performed on the project.
- ☐ Deviation from work authorized in permit is explained below.
- ☐ Other (explain)_____

_____

_____

_____
Signature & Date

(NOTE: To mail, fold letter in half and tape at bottom.)
"DO NOT STAPLE"

NANY FL-192
APR 77

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT. CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK. N. Y. 10278

NANOP-E

IMPORTANT

This letter must be completed and mailed to the District Engineer prior to commencement of any work under the permit.

Permittee:_____ Permit No.:_____

Issued:_____ Expiration:_____

Waterway:_____ City & State:_____

Type of Work:_____

Work will commence on or about_____

_____
Signature & Date

(NOTE. To mail, fold letter in half and tape at bottom.)
"DO NOT STAPLE"

NANY FL-193
APR 77

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

NOTICE OF AUTHORIZATION

September 11, 19 84

A PERMIT TO place 9000 cubic yards of temporary and permanent fill in conjunction with the expansion of an existing hydro-electric facility. In The Mohawk River, Hudson River Basin.

AT Vischer Ferry Dam, Niskayuna, Schenectady County, New York

HAS BEEN ISSUED TO Power Authority of State of New York ON September 11, 19 84

ADDRESS OF PERMITTEE 10 Columbus Circle
New York, NY 10019
(212) 397-6200

F. H. Griffis
Colonel, Corps of Engineers

PERMIT NUMBER 13348

District Engineer

ENG Form 4336
Jul 70

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.

* GPO: 1977 232-004

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

NOTICE OF AUTHORIZATION

September 11, 19 84

A PERMIT TO place 1500 cubic yards of permanent and temporary fill in conjunction with a hydro-electric facility expansion in Mohawk River, Hudson River Basin.

AT Crescent Dam, Colonie, Albany County, New York

HAS BEEN ISSUED TO Power Authority of State of New York ON Sept. 11, 19 84

ADDRESS OF PERMITTEE 10 Columbus Circle
New York, NY 10019
(212) 397-6200

F. H. Griffis
Colonel, Corps of Enginee

PERMIT NUMBER 13349

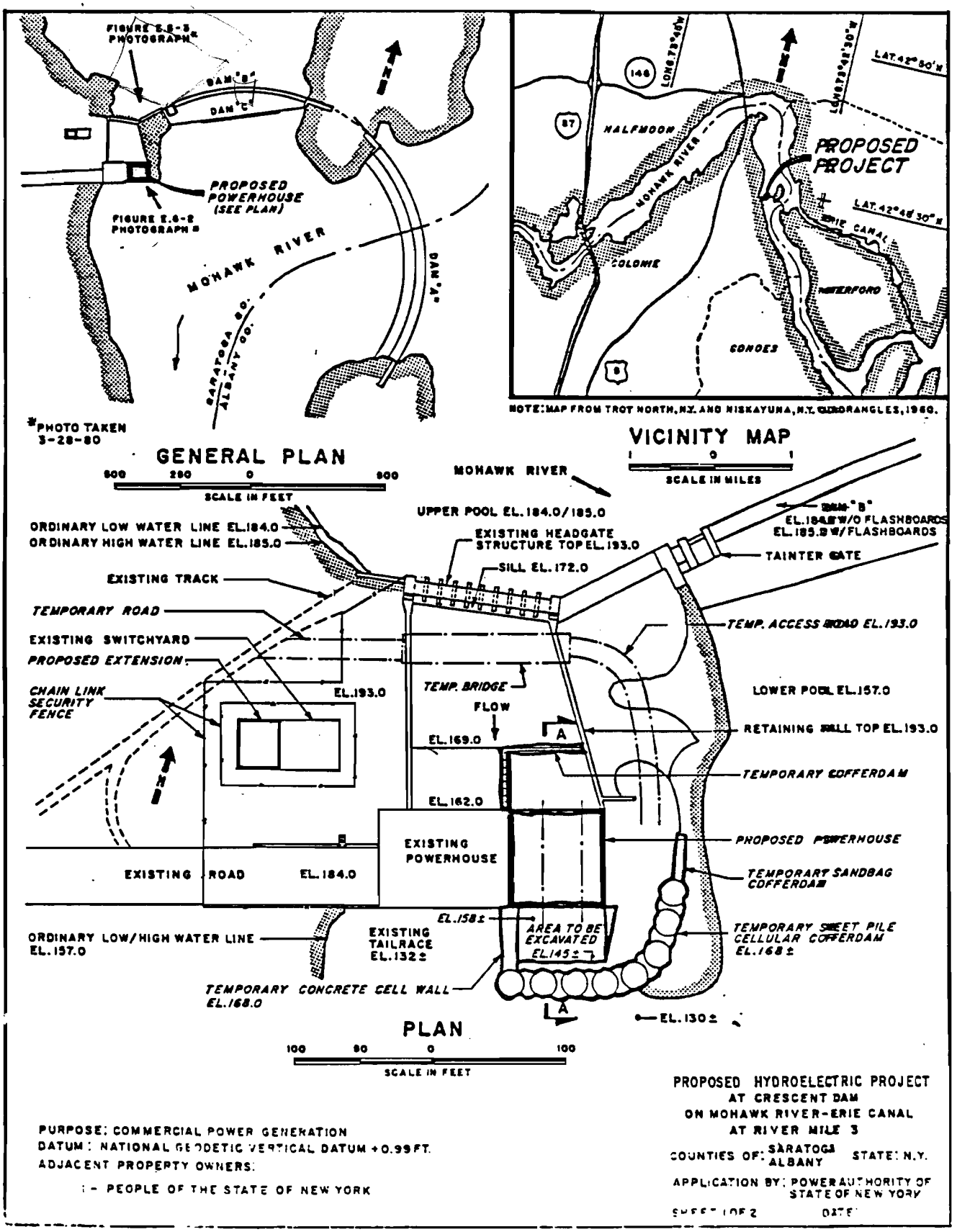
District Engineer

ENG Form 4336
Jul 70

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.

* GPO: 1977 232-004

1522-15 (HUDSON RIVER - New York Power Authority - fill)



PROPOSED HYDROELECTRIC PROJECT
AT CRESCENT DAM
ON MOHAWK RIVER-ERIE CANAL
AT RIVER MILE 3

PURPOSE: COMMERCIAL POWER GENERATION
DATUM: NATIONAL GEODETIC VERTICAL DATUM +0.99 FT.
ADJACENT PROPERTY OWNERS:
1 - PEOPLE OF THE STATE OF NEW YORK

COUNTIES OF: SARATOGA ALBANY STATE: N.Y.

APPLICATION BY: POWER AUTHORITY OF STATE OF NEW YORK

SHEET 1 OF 2 DATE

SECTION 3

27 FERC ¶61,480

LICENSE
WATER QUALITY
APPLICATION AMENDMENT
ANNUAL CHARGES

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Raymond J. O'Connor, Chairman; Georgiana Sheldon, A. G. Sousa and Oliver G. Richard III.

Power Authority of the State of New York) Project No. 4678-001

ORDER ISSUING LICENSE (MAJOR)

(Issued June 26, 1984)

The Power Authority of the State of New York ("Power Authority") has filed an application under Part I of the Federal Power Act for a license for the Cresent Hydroelectric Project, FERC Project No. 4678. The project is located on the Mohawk River, a navigable waterway 1/ of the United States, at the junction of Saratoga, Albany and Schenectady Counties, New York, in Waterford, Colonie, Halfmoon, Clifton Park and Niskayuna Townships. This order grants a license to the Power Authority for the expansion and continued operation of the project.

Project Description

The Crescent Hydroelectric facility is owned by the State of New York and is under the jurisdiction of the New York State Department of Transportation ("NYSDOT"). The NYSDOT operates and maintains the non-generating hydroelectric facilities (as well as the non-hydroelectric facilities), while Niagara Mohawk Power Corporation ("Niagara Mohawk") operates and maintains the hydroelectric generating station, including the switchyard.

1/ Niagara Mohawk Power Corporation, 41 F.P.C. 772 (1969).

The project dam, constructed in 1912, was built to upgrade the Erie Canal System. A powerhouse, built on the west bank in 1925, is still in operation and is the site of the Power Authority's proposed expansion. Existing facilities include two independent dams, with a total length of 1,436 feet, that link each bank to a rock island in the middle of the Mohawk River; an impoundment of approximately 2,000 surface acres; a regulating structure; a powerhouse containing two generators each rated at 2.8 MW; a tailrace; and a switchyard. Historically, 12-inch high, breakaway flashboards have been installed on the project dam in May and removed in December. The Power Authority states that the first priority for operation at the dam is to provide adequate pool elevations for lockage and navigation, and that the second priority is to generate power.

The Power Authority proposes to increase the hydroelectric capacity of the project by expanding the powerhouse, installing two generators each rated at 3 MW, widening the tailrace, and expanding the switchyard. In addition, the Power Authority proposes to develop recreational facilities on both river banks. On the south shore, the Power Authority proposes to develop a picnic area near the powerhouse, with shoreline access for bank fishing. On the north shore, immediately downstream from Vischer Ferry Dam, the applicant proposes to clear approximately one mile of the old Erie Barge Canal towpath for hiking, fishing, and other shoreline activities.

The project is essentially run-of-river, using only the storage provided by the flashboards. The Power Authority stated that the proposed development at the project will not alter the existing spillway configuration, or the installation of the flashboards between May and December each year.

Public Notice

Notice of the application has been published, and comments have been received from interested federal, state, and local agencies. No protest has been received, and no agency has objected to issuance of the license. No motions to intervene were filed.

Safety and Adequacy, Economic Feasibility and Comprehensive Development

The project dam is a high hazard dam, and is not safe for flood conditions exceeding one-half the Probable Maximum Flood (PMF). Article 33 requires the Licensee to determine the consequences of dam failure during floods up to the PMF and to submit to the Commission

a plan and schedule for making the dam safe in the event that its failure would endanger life or cause significant property damage downstream. The study must be approved by the Director, Office of Electric Power Regulation, prior to the start of project construction.

The Commission's New York Regional Office inspected the project and found no major deficiencies.

The expansion of the project would increase its installed capacity from 5,600 kW to 11,600, kW, while increasing the estimated annual average generation from 39,160,000 kWh to 60,802,000 kWh. 2/ The project is economically feasible when compared to the cost of producing an equivalent amount of power from a base load coal-fired facility.

The project would make good use of the flow and fall of the Mohawk River, is not in conflict with any planned or potential development, and would be best adapted to the comprehensive development of the basin under present conditions, upon compliance with the terms and conditions of this license.

Cultural Resources

The New York State Historic Preservation Officer ("SHPO") stated that the proposed project would have no effect upon cultural resources included in or eligible for inclusion in the National Register of Historic Places. The proposed construction would not adversely affect any known cultural resources. To help safeguard previously unrecorded archeological or historical sites that may be discovered during any future construction or development at the project, the license contains Article 35, which requires the Licensee to consult with the SHPO upon discovery of any such sites.

Instream Flows

The United States Department of the Interior ("Interior") and the New York State Department of Environmental Conservation ("DEC") recommended that the Power Authority release an initial minimum flow of 100 cubic feet per second (cfs) over the project spillway to protect the aquatic habitat in the project area. The agencies also recommended

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2/ Equivalent energy production using fossil fuels would consume 99,840 barrels of oil or 28,150 tons of coal.

that the Power Authority monitor the effectiveness of the initial spillage requirement, and make any changes in the minimum flow that its studies show are warranted.

The Power Authority agreed to provide an initial 100 cfs minimum flow release, monitor the flow's impact on fishery resources and water quality, and make any necessary changes in the initial minimum flow after studying its effectiveness. These measures are provided for in Articles 36 and 40.

The Power Authority did not agree, however, with the agencies' recommendation that the minimum flow be released over the spillway, rather than in the form of leakage through and underneath the flashboards. There is insufficient information available at this time to justify the agencies' recommendation. Therefore, we will permit the Licensee to release the flows in the manner it has proposed (Article 36), and require it to evaluate the impact of the minimum flow point of discharge on downstream migration of anadromous fish (Article 40). The Licensee shall modify the minimum flow point of discharge if necessary to protect fishery resources.

Water Quality 3/

Interior and DEC recommended that the Power Authority develop and conduct a water quality monitoring program to determine the impact of operating the Crescent Project in combination with the proposed Vischer Ferry Project (located 10 miles upstream) on dissolved oxygen levels, and to determine the effectiveness of the proposed minimum flow on dissolved oxygen levels. The Power Authority responded that it had no objection to these recommendations, and that it had begun a long-term water quality sampling program, in consultation with DEC, to determine the potential impact of the project on water quality.

Existing water quality information indicates that dissolved oxygen levels have reached as low as 4.6 mg/l during operation of the existing project. Expansion of the project would result in less spillage, with the potential for reduced aeration of the project discharge. To ensure that project operation would not harm fishery resources, Article 37 is included in this license to require the Licensee to initiate a monitoring program to determine the effects

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3/ DEC issued a water quality certificate for this project on September 26, 1983.

of project operation on dissolved oxygen, and to implement any corrective measures necessary to maintain disolved oxygen levels adequate to protect fishery resources.

Interior also recommended that a standard sediment analysis be conducted for heavy metals and toxic materials to determine appropriate removal and disposal methods for spoil and silt. The Power Authority has agreed to this requirement and the sediment analysis should be conducted. Article 38 provides for the analysis and disposal of heavy metals and toxic materials.

The City of Cohoes ("City") uses the Mohawk River as a source of drinking water. The Power Authority has agreed to comply with the request of the State of New York Department of Health that it advise the City and the Albany County Health Department ("County") of any unusual changes in water quality due to project construction. Article 39 requires the Licensee to advise the City and County of any changes in water quality, and ensure that project construction and operation does not affect the City's use of the Mohawk River as a municipal water supply.

Fishery Resources

Interior and DEC stated that the blueback herring is an anadromous fish that presently migrates in abundance through project water, but that adequate information is not available to determine the potential for entrainment mortality to downstream migrants. These agencies recommended that the Power Authority conduct a study to determine whether project operations would affect fish migration, and develop mitigative measures, if necessary. The Power Authority acknowledged the possible impacts of project operations on the fishery resource and expressed a willingness to assess the situation.

Article 40 requires the Licensee to consult with the concerned agencies and conduct a study to determine the impacts of project operations on the fishery resource, to recommend any mitigative measures that are needed to protect this resource, and to implement

Interior recommended further that for the conservation and development of the existing fish and wildlife resources, the project be operated so that: (1) the current impoundment rate of drawdown not increase; (2) the impoundment drawdown be limited to 12 inches; and (3) when river flows exceed 3,250 cfs, the project will be in a run-of-river mode, such that the instantaneous flows from the project, including spillage, releases, and leakage, is equal to the inflow to the project impoundment. The Power Authority has agreed to implement Interior's recommendations. To ensure protection of fish and wildlife resources of the project area, Article 41 requires that the Licensee operate the project as agreed to any measures that the Commission finds necessary.

Recreational Resources

The Power Authority's Report on Recreational Resources, which contains guidelines for the development, operation, and maintenance of recreational facilities at the project, conforms to Commission regulations. The report is approved and made part of the license.

Environmental Impacts

Increased levels of turbidity resulting from construction activities are expected to be minimal and would be localized and temporary. Noise and dust associated with development of project works and recreational facilities would be intermittent and of short duration, confined primarily to the construction period. On the basis of the record, and our independent analysis, we conclude that issuance of a license for the project would not constitute a major federal action significantly affecting the quality of the human environment.

License Term and Annual Charges

The Power Authority proposes to perform substantial new construction at the Crescent Hydroelectric Project. Under our policy for projects of this type, the license will terminate May 31, 2024, forty years from the first day of the month in which this order is issued. 4/

Since portions of the Crescent Project are already operating, the license should be back-dated. Normally, a license that is issued for a constructed project that is located on a navigable waterway and for which there has been no post-1935 construction is given an effective date of April 1, 1962, or the date the stream was found navigable, whichever is earlier. 5/ There has been no post-1935 construction at the Crescent Project, and the Mohawk River was found navigable in 1969. 6/ Accordingly, under Androscoggin, the effective date of this license would ordinarily be April 1, 1962.

4/ Montana Power Co., 56 F.P.C. 2008, 2012 (1976).

5/ Public Service Co. of New Hampshire, 27 F.P.C. 830 (1962). ("Androscoggin"). We established this policy in order to ensure that illegal project operators do not obtain an unmerited advantage over companies that complied with the law. We determined that backdating the license to 1962 (absent an earlier navigability finding) rather than to the date the project operator was placed on notice of the perils of further unlicensed operation gives adequate weight to the period of unlicensed operation.

6/ Niagara Mohawk Power Corp., 41 F.P.C. 772 (1969).

However, in cases in which our Androscoggin policy produces an effective date more than 50 years before the license termination date, the effective date of the license is advanced to 50 years before the license termination date. In addition, an amount equal to the annual charge that would have been due for the period before what is being set as the effective date will be assessed, in order to ensure that unlicensed operation does not place a person in a better position than licensed operation would. 7/ Therefore, this license will have an effective date of June 1, 1974, and payment in lieu of annual charges will be required for the April 1, 1962 to May 31, 1974 period.

In assessing these back annual charges and payments in lieu of annual charges, we are mindful that unlicensed construction operation was performed by NYSDOT, Niagara Mohawk, and possibly others, while future licensed operation will be performed by the Power Authority. The date a license applicant or licensee acquires a project, however, has no bearing on the amount the licensee must pay in back annual charges for an illegally operated constructed project. 8/ Our back charges policy remains valid regardless of who operated the project previously, because it ensures that the illegal operator of the project does not receive a windfall from its unlicensed operation of the project - and thus discourages unlicensed operation. The same reasoning applies to payments in lieu of annual charges. The illegally benefiting party should ultimately pay for the annual charges and payments in lieu of annual charges owed, although perhaps not directly to the Commission. The person acquiring the project should make provision for the back charges and payments in lieu of annual charges in the project purchase price.

The Commission orders:

(A) This license is issued to the Power Authority of the State of New York (Licensee), under Part I of the Federal Power Act (Act), for a period effective June 1, 1974, and terminating May 31, 2024, for the construction, operation and maintenance of the Crescent Project No. 4678, located on the Mohawk River in Waterford, Colonie, Halfmoon, Clifton Park, and Niskayuna Townships, Saratoga, Albany and Schenectady Counties, New York. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

7/ Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 159-60 (D.C. Cir. 1967).

8/ See North Canal Water Works, 21 FERC ¶61,157 (1982); Niagara of Wisconsin Paper Corp., 54 F.P.C. 2507 (1975), 55 F.P.C. 262 (1976); Kennebec River Pulp & Paper Co., 35 F.P.C. 707 (1966).

(B) The Crescent Project No. 4678 consists of:

(1) all lands, to the extent of the Licensee's interests in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

Exhibit	FERC No. 4678-	Showing
G, Sheet 1	10	Project Location Map

(2) Project works consisting of: (a) Crescent Dam, consisting of two independent concrete gravity overflow sections, the eastern section being 900 feet long and 52 feet high and the western section being 536 feet long and 32 feet high; (b) the reservoir with an area of 2,000 acres and storage of 50,000 acre-feet at an elevation of 184 feet msl (one-foot flashboards, annually installed in May and removed in December, add 2,000 acre-feet of storage); (c) a regulating structure consisting of a sluiceway 8 feet wide and a Taintor gate 30 feet wide; (d) an intake structure with ten arches 8 feet wide and 14 feet high; (e) a brick and concrete powerhouse, 104 feet long and 73 feet wide, enlarged by an addition measuring 73 by 78 feet and containing two turbine/generator units rated at 2.8 MW each and two units rated at 3.0 MW each, all operating under a head of 27.5 feet; (f) an expanded switchyard; (g) the generator leads and transformer banks for the existing and proposed facilities; and (h) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibits cited above and more specifically shown and described by certain other exhibits that also form a part of the application for license and that are designated as:

Exhibit A - Paragraphs A.4.1 through A.6 of the application filed on November 24, 1982.

Exhibit E - The Report on Recreational Resources, pages E-39 through E-47 of the Exhibit E filed on September 30, 1982.

Exhibit F	FERC No. 4678-	Title
1	1	General Plan of Dam
2	2	Detailed Location Plan and Profile of Dam
3	3	Detailed Plans of Abutments C and D and Sections of Dam
4	4	Regulating Structure Plans and Sections
5	5	Existing Powerhouse Location General Plan and Sections
6	6	Existing Powerhouse Typical Sections
7	7	Proposed Project Location and General Plan
8	8	Proposed Powerhouse Plan and Sections
9	9	Proposed Powerhouse Elevations

(3) all of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project and located within the project boundary, all portable property that may be employed in connection with the project, located within or outside the project boundary, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, E, F, and G, designated in ordering paragraph (B) above, are approved and made a part of the license.

(D) This license is also subject to Articles 1 through 28, except Article 20, set forth in Form L-4 (revised October 1975), entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States," attached to and made a part of this license. The license is also subject

to the following additional articles:

Article 29. The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representatives of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 30. The Licensee shall commence the construction of the project within two years of the date of issuance of the license, and shall complete construction within four years from the date of issuance of the license.

Article 31. The Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations are consistent with the approved design. At least 30 days prior to start of construction of the cofferdam the Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and Director, Office of Electric Power Regulation) one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.

Article 32. The Licensee shall, within 90 days of completion of construction, file for approval of the Director, Office of Electric Power Regulation, revised Exhibits A and F to describe and show the project as-built.

Article 33. Prior to the start of construction, the Licensee shall file a study which evaluates the consequences to downstream life and property of a failure of Crescent Dam under flood conditions up to the probable maximum flood (PMF). In the event that failure of the dam would constitute a hazard to human life or would cause extensive property damage, the Licensee shall file concurrently with the study its recommendations for modifying the project structures to ensure their integrity during a PMF. Construction of the project shall not commence until the Director, Office of Electric Power Regulation, approves the study and any necessary modifications.

Article 34. The Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and the Director, Office of Electric Power Regulation) one copy each of the contract drawings and specifications for pertinent features

of the project, such as water retention structures, powerhouses, and water conveyance structures, at least 60 days prior to start of construction. The Director, Office of Electric Power Regulation, may require changes in the plans and specifications to assure a safe and adequate project.

Article 35. The Licensee shall, prior to the commencement of any construction at the project, consult with the New York State Historic Preservation Officer (SHPO) about the need for any cultural resource survey and salvage work. The Licensee shall make available funds in a reasonable amount for any such work as required. If any previously unrecorded archeological or historical sites are discovered during the course of construction or development of any project works or other facilities at the project, construction activity in the vicinity shall be halted, a qualified archeologist shall be consulted to determine the significance of the sites, and the Licensee shall consult with the SHPO to develop a mitigation plan for the protection of significant archeological or historic resources. If the Licensee and the SHPO cannot agree on the amount of money to be expended on archeological or historic work related to the project, the Commission reserves the right to require the Licensee to conduct, at its own expense, any such work found necessary.

Article 36. The Licensee shall discharge, as measured immediately below the project dam, an interim continuous minimum flow of 100 cubic feet per second or the inflow to the reservoir, whichever is less, for the purpose of protecting and enhancing aquatic resources in the Mohawk River. These flows may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 37. The Licensee shall monitor dissolved oxygen concentrations below the project dam for an operational period of one year. The monitoring shall be coordinated with dissolved oxygen monitoring at the upstream Vischer Ferry Project, FERC No. 4679. Within 6 months from the date of completion of the study, the Licensee shall file a data summary that shall include observed daily minimum, maximum, and average dissovled oxygen concentrations, and, after consultation and in cooperation with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service, shall file for Commission

approval a plan to ensure that dissolved oxygen is maintained during project operation at levels adequate to protect fishery resources. Copies of the data summary and plan shall be sent to the consulted agencies when they are filed with the Commission.

Article 38. The Licensee shall consult with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service in the preparation of a detailed plan to: (1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawk River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; and (3) safely dispose of spoils resulting from project construction. This plan shall include an implementation schedule, monitoring and maintenance programs for project construction and operation, and evidence of agency consultation. This plan shall be filed with the Commission (with a copy provided to the Commission's Regional Engineer in New York City, New York, and the Director, Office of Electric Power Regulation) at least 60 days prior to any ground-disturbing activity or spoil disposal. The Director, Office of Electric Power Regulation, reserves the right to require changes in the plan.

Article 39. The Licensee shall, after consultation with the City of Cohoes (City) and the Albany County Health Department (County), implement a monitoring program that is adequate to determine impacts of project construction and operation on the water quality of the Mohawk River. The Licensee shall immediately advise the City and County of any changes in water quality of the Mohawk River resulting from project construction and operation, and shall implement measures as needed to ensure that the City's municipal water supply is protected.

Article 40. The Licensee shall, after consulation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, and within 18 months from the commencement of commercial operation of the project, conduct a study to evaluate the impacts of project operations on the fishery resources of the Mohawk River, which shall include, but not be limited to, an evaluation of impacts of the point of discharge for the minimum flow release on the downstream migration of anadromous fish, and the effectiveness of the 100 cfs minimum flow in protecting fish[illegible] resources. Within 6 months from the date of completion of the study, the Licensee shall file, with copies to the agencies consulted, a report on the results of the study, and, for Commission approval, recommendations for the protection and enhancement of the fishery resources of project waters. Documentation of agency consultation on the report and recommendations shall be included in the filing.

Article 41. The Licensee shall, for the conservation and development of fish and wildlife resources, operate the Crescent Project when available river flows exceed 3,250 cfs in a run-of-river mode, such that instantaneous outflow from the project approximates the instantaneous inflow to the project reservoir and reservoir surface elevation fluctuations are minimized. When available river flows are less than 3,250 cfs, the project shall be operated so as to provide the minimum flow release required by Article 36. Further, the project shall be operated to ensure that the historic rate of drawdown is not altered and that total drawdown does not exceed 12 inches. This operation mode may be modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 42 . (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type

dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The Licensee may convey fee titles to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

Article 43. The Licensee shall pay the United States the following annual charges, as determined in accordance with the provisions of the Commission's regulations in effect from time to time, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act:

(1) For the period from April 1, 1962 through May 31, 1974, an amount equal to the annual charges that would have applied for the period if the project had been licensed during that period. The authorized installed capacity for this purpose is 7,500 horsepower.

(2) For the period from June 1, 1974 through May 31, 1984, the annual charges ordinarily due in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 7,500 horsepower.

(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,500 horsepower.

(E) The Licensee's failure to file a petition for rehearing shall constitute acceptance of this license. In acknowledgment of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

By the Commission.

(S E A L)

Kenneth F. Plumb

Kenneth F. Plumb,
Secretary.

Project No. 4678-001

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, the Power Authority of the State of New York, this 31st day of JULY, 1984, has caused its name to be signed hereto by STEPHEN L. BAUM, its General Counsel, and its corporate seal to be affixed hereto and attested by BRADLEY S. TELIAS, its Secretary, pursuant to a resolution of its Board of Trustees duly adopted on the 31st day of JULY, 1984, a certified copy of the record of which is attached hereto.

By _____
General Counsel

Attest:

_____
Secretary

(Executed in quadruplicate)

Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as ne ssary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintanance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee

or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

COPY

THIS AGREEMENT, made as of this 28th day of March, 1983, by and between the TOWN OF CLIFTON PARK (hereinafter called "Town"), a municipal corporation of the State of New York having its office at R.D. No. 2, Town Office Building, Clifton Park, New York 12065, and POWER AUTHORITY OF THE STATE OF NEW YORK (hereinafter called "Authority"), organized and operating pursuant to Title 1 of Article 5 of the Public Authorities Law, having its main office and principal place of business at 10 Columbus Circle, New York, New York 10019.

W I T N E S S E T H:

WHEREAS, on March 30, 1982 the Federal Energy Regulatory Commission (hereinafter called "FERC") issued to the Authority a preliminary permit for the Crescent Hydroelectric Project, No. 4678 (hereinafter called "Project"), and

WHEREAS, the Authority intends to apply to the FERC for a license to construct, operate and maintain the Project; and

WHEREAS, it is the Authority's policy to develop the recreational resources afforded by its hydroelectric projects by providing suitable public recreational facilities consistent with the recreational needs of the area; and

WHEREAS, representatives of the Town have requested that the Authority permit the Town to use a strip of land bordering the northerly bank of the Mohawk River, that was formerly the tow path for the Erie Canal, as shown and described

on Exhibit "A" annexed hereto and made a part hereof (hereinafter called "the premises"), in order to extend the nature and wildlife preserve the Town operates further downstream pursuant to a revocable permit from the New York State Department of Transportation; and

WHEREAS, the Authority is willing to permit such use of the premises in the event the FERC issues the license and the Project is constructed; and

WHEREAS, construction of the Project will generate excavated material which must be disposed of; and

WHEREAS, the Town is willing to accept such material for disposal at its landfill;

NOW THEREFORE, in consideration of the mutual covenants and agreements herein contained and provided that the Project is licensed by the FERC and subsequently constructed by Authority, the parties hereto mutually undertake, covenant and agree as follows:

1. Authority, to the extent that it legally may, will permit Town to use, operate and maintain the premises as part of its nature and wildlife preserve. If necessary Authority will assist Town in obtaining any necessary additional rights from the Department of Transportation.

2. Authority will initially, as part of Project construction, clear the tow path of trees, shrubs and debris.

3. Town will operate, police and maintain the premises at its own cost and expense, provided that, except for maintenance purposes, no motor vehicles or firearms shall be

6. This Agreement shall be subject to all applicable provisions of any license issued for the Project by the FERC; any other regulatory permit or approval applicable to the Project; any applicable provision of the Federal Power Act (Chapter 12, Title 16, United States Code, as amended), and the terms of any property right held by Authority for the Project all of which shall be deemed to be incorporated in and made a part of this Agreement.

7. The Authority reserves the right to use the tow path for access to the Project.

IN WITNESS WHEREOF, the parties hereto have caused their respective corporate seals to be affixed and duly attested and this Agreement to be executed by their duly authorized officials as of the day and year first above written.

TOWN OF CLIFTON PARK

By _____

Its Supervisor

POWER AUTHORITY OF THE STATE OF NEW YORK

By _____

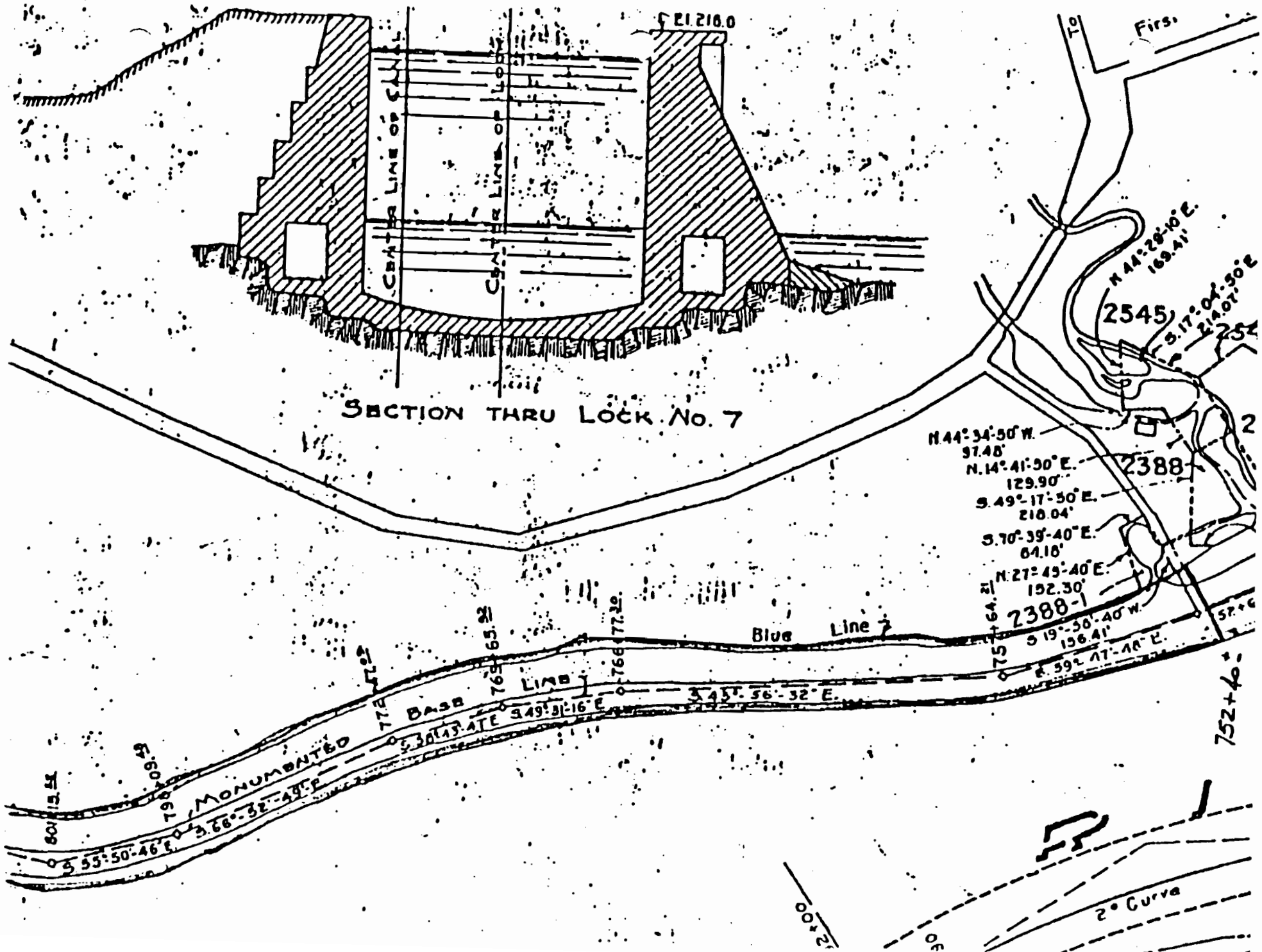
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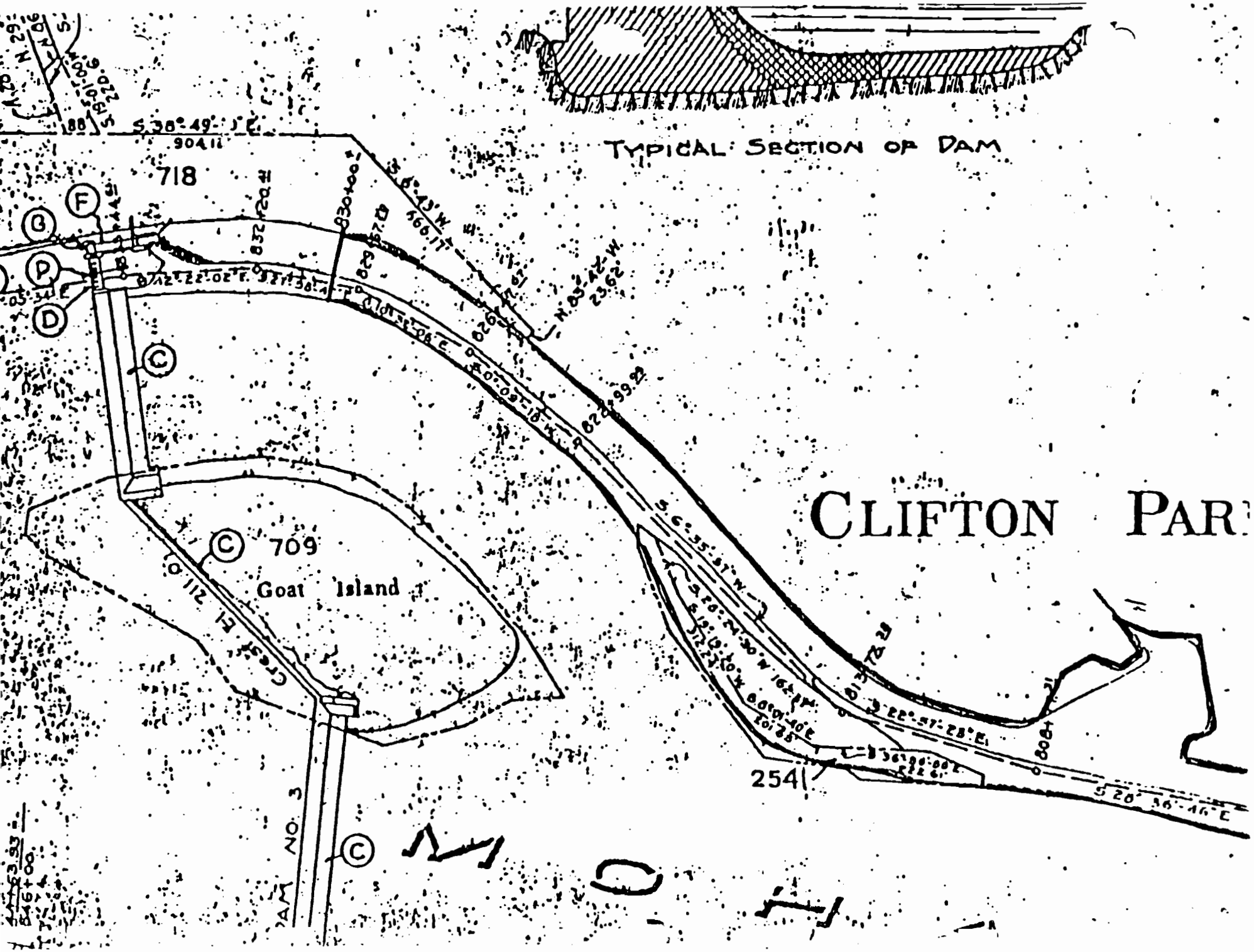
EXHIBIT A

All that parcel of land situate in the Town of Clifton Park, County of Saratoga, State of New York as delineated in red on the attached copy of a portion of Sheet 13 of a set of plans entitled "Barge Canal, State of New York, Eastern Division - Erie Canal - Section 2 Station 756 to Station 854" dated March 29, 1922 and filed in the office of Water Ways Maintenance, Region 1, New York State Department of Transportation located at 84 Holland Avenue, Albany, New York, and being described as follows:

Beginning on the north bank of the Mohawk River at right angles to station 752+40± of the monumented baseline as shown on the above referenced map; thence north westerly along the northerly shoreline of the Mohawk River as it winds and turns to a point at right angles to station 830+00± of the monumented baseline; thence northerly, through station 830+00± to the Canal Blue Line; thence southeasterly along the Canal Blue Line to a point at right angles to Station 752+40± of the monumented baseline; thence southerly through station 752+40± to the point of beginning.

Subject to any and all easements of record which may affect the above described parcel.


SECTION THRU LOCK No. 7
Blue Line
MONUMENTED BASE LINE
2545
2388
2388-1
N 44°-28'-10" E.
169.41'
N 44°-34'-50" W.
97.48'
N. 14°-41'-50" E.
129.90'
S. 49°-17'-50" E.
218.04'
S. 70°-39'-40" E.
64.18'
N. 27°-45'-40" E.
152.30'
S 19°-50'-40" W.
136.41'
S. 55°-50'-46" E.
S. 45°-56'-32" E.
752+40
2° Curve


TYPICAL SECTION OF DAM
CLIFTON PAR
718
709
Goat Island
254
Crest El 112
DAM NO 3
F
G
P
D
C

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

September 26, 1983

Ms. Christina C. Forbes
New York Power Authority
10 Columbus Circle
New York, New York 10019

Re: Water Quality Certification
Vischer Ferry Hydroelectric Project,
Mohawk River, FERC 4679-000

Dear Ms. Forbes:

The New York State Department of Environmental Conservation hereby certifies that the referenced hydroelectric development will comply with all applicable provisions of the Clean Water Act of 1977 (PL 95-217), provided that the following conditions are met.

I. There can be no future changes in any of the following that will result in non-compliance with the intent of this certification:

a. the characteristics of the waters into which the discharges are made,

b. the water quality criteria applicable to such waters, or

c. applicable effluent limitations or other requirements.

II. The development must comply with the applicable provisions of state law and regulations.

III. The following provisions shall become conditions to any Federal Energy Regulatory Commission (FERC) license issued to the New York Power Authority (NYPA) pursuant to Section 401(d) of the Federal Power Act:

a NYPA will provide an initial minimum continuous release of 200 cfs at the Vischer Ferry Dam to maintain downstream water quality standards and aquatic habitats.

The initial minimum release may be provided in the form of leakage under or through the flashboards, spillage over the dam, or a combination of leakage and spillage.

b. NYPA will continue the ongoing water quality monitoring program in accordance to the agreements between DEC and NYPA (see Notes of Conference, May 3, 1982) to determine the proposed operational impacts on dissolved oxygen levels and the effectiveness of the initial spillage requirements. The license should provide the opportunity to modify the spillage rate if the above studies indicate that there is a need to do so to maintain acceptable water quality levels,

c. the completion by NYPA of the on-going studies required by DEC and the USFWS to determine: (1) the site-specific impacts of the proposed operation upon anadramous fish, in particular the blueback herring, and (2) the need to include and operate fish by-pass structures to facilitate the downstream migration of adult and juvenile blueback herring and other migratory species,

d. all sediments scheduled for removal from the Mohawk River shall be analyzed for the presence of heavy metals and toxic substances prior to the initiation of construction activities. All sediments must be disposed of in a DEC approved manner,

e. copies of all reports, studies, and notifications provided by the applicant pursuant to this certification and the FERC licensing process shall also be submitted to the Director, Division of Regulatory Affairs, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233.

IV. The DEC reserves the right to require the applicant to implement temporary modifications to the project/mode of operation, if required by emergencies beyond the control of the licensee, to assure the protection of the quality of the water and its biota. The DEC also reserves the right to require the applicant to prepare studies and make whatever reasonable modifications that are deemed necessary to alleviate any unanticipated significant adverse impacts upon the aquatic resource that were not identified during the review process but which can be directly attributed to the creation and operation of the project as licensed by the Commission.

V. The federal license issued by the Commission to construct and operate the referenced project is conditioned to require compliance with the minimum impact abatement requirements identified in the DEC comments submitted to Secretary Plumb on April 19, 1982.

This Water Quality Certification is issued by the Department of Environmental Conservation pursuant to the requirements of the NYS Environmental Quality Review Act, Article 8 of the Environmental Conservation Law and Part 617 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York. The DEC has determined that the proposed action will not have a significant effect upon the environment provided that the proposed construction activities and the mode of operation are compatible or in compliance with:

a. the conditions contained in this Certification,

b. the State of New York's resource management recommendations, submitted to the Commission on April 19, 1982; and

c. the environmental and resource management stipulations contained in the Power Authority's application to the Commission.

This Certification is issued solely for the purpose of Section 401 of the Act. The DEC reserves the right to reconsider the entire Certification if any condition contained herein is declared invalid, if there is a significant change in the scope of the project, or in the event the referenced application is further amended.

A copy of this Certification and the State's recommendations are being forwarded to the Secretary of the Federal Energy Regulatory Commission.

Very truly yours,

Louis M. Concra, Jr., Director
Division of Regulatory Affairs

LMC/kw
cc: K. Plumb
E. Abrams
F. Springer
D. Shumway

Application No. 84-078-YS (PN No. 11726)

Name of Applicant POWER AUTHORITY OF THE STATE OF NEW YORK

Effective Date September 11, 1984

Expiration Date (If applicable) September 11, 1987

DEPARTMENT OF THE ARMY
PERMIT #13348

Referring to written request dated 12 January 1984 for a permit to:

( ) Perform work in or affecting navigable waters of the United States, upon the recommendation of the Chief of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C. 403);

(X) Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344);

( ) Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (86 Stat. 1052; P.L. 92-532);

Power Authority of the State of New York
10 Columbus Circle
New York, NY 10019
(212) 397-6200

is hereby authorized by the Secretary of the Army:

to place approximately 9000 cubic yards of fill for temporary cofferdams and permanent concrete fill for foundation material in conjunction with the expansion of an existing hydro-electric generating facility

in the Mohawk River, Hudson River Basin

at Vischer Ferry Dam, Town of Niskayuna, Schenectady County, New York

in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit (on drawings, give file number or other definite identification marks.)

1522-15 (HUDSON RIVER - PASNY - fill)

subject to the following conditions:

I. General Conditions:

a. That all activities identified and authorized herein shall be consistent with the terms and conditions of this permit; and that any activities not specifically identified and authorized herein shall constitute a violation of the terms and conditions of this permit which may result in the modification, suspension or revocation of this permit, in whole or in part, as set forth more specifically in General Conditions j or k hereto, and in the institution of such legal proceedings as the United States Government may consider appropriate, whether or not this permit has been previously modified, suspended or revoked in whole or in part.

h. That all activities authorized herein shall, if they involve, during their construction or operation, any discharge of pollutants into waters of the United States or ocean waters, be at all times consistent with applicable water quality standards, effluent limitations and standards of performance, prohibitions, pretreatment standards and management practices established pursuant to the Clean Water Act (*33 U.S.C. 1344*), the Marine Protection, Research and Sanctuaries Act of 1972 (*P.L. 92-532, 86 Stat. 1052*), or pursuant to applicable State and local law.

c. That when the activity authorized herein involves a discharge during its construction or operation, or any pollutant (*including dredged or fill material*), into waters of the United States, the authorized activity shall, if applicable water quality standards are revised or modified during the term of this permit, be modified, if necessary, to conform with such revised or modified water quality standards within 6 months of the effective date of any revision or modification of water quality standards, or as directed by an implementation plan contained in such revised or modified standards, or within such longer period of time as the District Engineer, in consultation with the Regional Administrator of the Environmental Protection Agency, may determine to be reasonable under the circumstances.

d. That the discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act, or endanger the critical habitat of such species.

e. That the permittee agrees to make every reasonable effort to prosecute the construction or operation of the work authorized herein in a manner so as to minimize any adverse impact on fish, wildlife, and natural environmental values.

f. That the permittee agrees that he will prosecute the construction or work authorized herein in a manner so as to minimize any degradation of water quality.

g. That the permittee shall allow the District Engineer or his authorized representative(s) or designee(s) to make periodic inspections at any time deemed necessary in order to assure that the activity being performed under authority of this permit is in accordance with the terms and conditions prescribed herein.

h. That the permittee shall maintain the structure or work authorized herein in good condition and in reasonable accordance with the plans and drawings attached hereto.

i. That this permit does not convey any property rights, either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to property or invasion of rights or any infringement of Federal, State, or local laws or regulations.

j. That this permit does not obviate the requirement to obtain state or local assent required by law for the activity authorized herein.

k. That this permit may be either modified, suspended or revoked in whole or in part pursuant to the policies and procedures of 33 CFR 325.7.

l. That in issuing this permit, the Government has relied on the information and data which the permittee has provided in connection with his permit application. If, subsequent to the issuance of this permit, such information and data prove to be materially false, materially incomplete or inaccurate, this permit may be modified, suspended or revoked, in whole or in part, and/or the Government may, in addition, institute appropriate legal proceedings.

m. That any modification, suspension, or revocation of this permit shall not be the basis for any claim for damages against the United States.

n. That the permittee shall notify the District Engineer at what time the activity authorized herein will be commenced, as far in advance of the time of commencement as the District Engineer may specify, and of any suspension of work, if for a period of more than one week, resumption of work and its completion.

o. That if the activity authorized herein is not completed on or before _____ day of _____, 19 _____, (*three years from the date of issuance of this permit unless otherwise specified*) this permit, if not previously revoked or specifically extended, shall automatically expire.

p. That this permit does not authorize or approve the construction of particular structures, the authorization or approval of which may require authorization by the Congress or other agencies of the Federal Government.

q. That if and when the permittee desires to abandon the activity authorized herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party pursuant to General Condition t hereof, he must restore the area to a condition satisfactory to the District Engineer.

r. That if the recording of this permit is possible under applicable State or local law, the permittee shall take such action as may be necessary to record this permit with the Register of Deeds or other appropriate official charged with the responsibility for maintaining records of title to and interests in real property.

s. That there shall be no unreasonable interference with navigation by the existence or use of the activity authorized herein.

t. That this permit may not be transferred to a third party without prior written notice to the District Engineer, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit in the space provided below and thereby agreeing to comply with all terms and conditions of this permit. In addition, if the permittee transfers the interests authorized herein by conveyance of realty, the deed shall reference this permit and the terms and conditions specified herein and this permit shall be recorded along with the deed with the Register of Deeds or other appropriate official.

u. That if the permittee during prosecution of the work authorized herein, encounters a previously unidentified archeological or other cultural resource within the area subject to Department of the Army jurisdiction that might be eligible for listing in the National Register of Historic Places, he shall immediately notify the district engineer.

8. Special Conditions: (*Here list conditions relating specifically to the proposed structure or work authorized by this permit*):

The following Special Conditions will be applicable when appropriate:

STRUCTURES IN OR AFFECTING NAVIGABLE WATERS OF THE UNITED STATES:

a. That this permit does not authorize the interference with any existing or proposed Federal project and that the permittee shall not be entitled to compensation for damage or injury to the structures or work authorized herein which may be caused by or result from existing or future operations undertaken by the United States in the public interest.

b. That no attempt shall be made by the permittee to prevent the full and free use by the public of all navigable waters at or adjacent to the activity authorized by this permit.

c. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.

d. That the permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the authorized structure or work, shall, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the waterway to its former conditions. If the permittee fails to comply with the direction of the Secretary of the Army or his authorized representative, the Secretary or his designee may restore the waterway to its former condition, by contract or otherwise, and recover the cost thereof from the permittee.

e. Structures for Small Boats: That permittee hereby recognizes the possibility that the structure permitted herein may be subject to damage by wave wash from passing vessels. The issuance of this permit does not relieve the permittee from taking all proper steps to insure the integrity of the structure permitted herein and the safety of boats moored thereto from damage by wave wash and the permittee shall not hold the United States liable for any such damage.

MAINTENANCE DREDGING:

a. That when the work authorized herein includes periodic maintenance dredging, it may be performed under this permit for _____ years from the date of issuance of this permit (*ten years unless otherwise indicated*);

b. That the permittee will advise the District Engineer in writing at least two weeks before he intends to undertake any maintenance dredging.

DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES:

a. That the discharge will be carried out in conformity with the goals and objectives of the EPA Guidelines established pursuant to Section 404(b) of the Clean Water Act and published in 40 CFR 230;

b. That the discharge will consist of suitable material free from toxic pollutants in toxic amounts.

c. That the fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.

DISPOSAL OF DREDGED MATERIAL INTO OCEAN WATERS:

a. That the disposal will be carried out in conformity with the goals, objectives, and requirements of the EPA criteria established pursuant to Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, published in 40 CFR 220-228.

b. That the permittee shall place a copy of this permit in a conspicuous place in the vessel to be used for the transportation and/or disposal of the dredged material as authorized herein.

This permit shall become effective on the date of the District Engineer's signature.

Permittee hereby accepts and agrees to comply with the terms and conditions of this permit.

XX _____ 8-24-84

PERMITTEE — DATE

POWER AUTHORITY OF THE STATE OF NEW YORK

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

"For and in behalf of" _____ September 11, 1984

F. H. Griffis — DATE

Colonel, Corps of Engineers

DISTRICT ENGINEER,

U.S. ARMY, CORPS OF ENGINEERS

Transferee hereby agrees to comply with the terms and conditions of this permit.

_____ _____

TRANSFEREE — DATE

U.S. GOVERNMENT PRINTING OFFICE : 1983 O - 404-308

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

NOTICE OF AUTHORIZATION

September 11, 19 84

A PERMIT TO place 9000 cubic yards of temporary and permanent fill in conjunction with the expansion of an existing hydro-electric facility. In The Mohawk River, Hudson River Basin.

AT Vischer Ferry Dam, Niskayuna, Schenectady County, New York

HAS BEEN ISSUED TO Power Authority of State of New York ON September 11, 19 84

ADDRESS OF PERMITTEE 10 Columbus Circle New York, NY 10019 (212) 397-6200

PERMIT NUMBER 13348

F. M. Griffis
Colonel, Corps of Engineers
District Engineer

ENG Form 4336 Jul 70

THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.

DEPARTMENT OF THE ARMY

CORPS OF ENGINEERS

NOTICE OF AUTHORIZATION

September 11, 19 84

A PERMIT TO place 1500 cubic yards of permanent and temporary fill in conjunction with a hydro-electric facility expansion in Mohawk River, Hudson River Basin.

AT Crescent Dam, Colonie, Albany County, New York

HAS BEEN ISSUED TO Power Authority of State of New York ON Sept. 11, 19 84

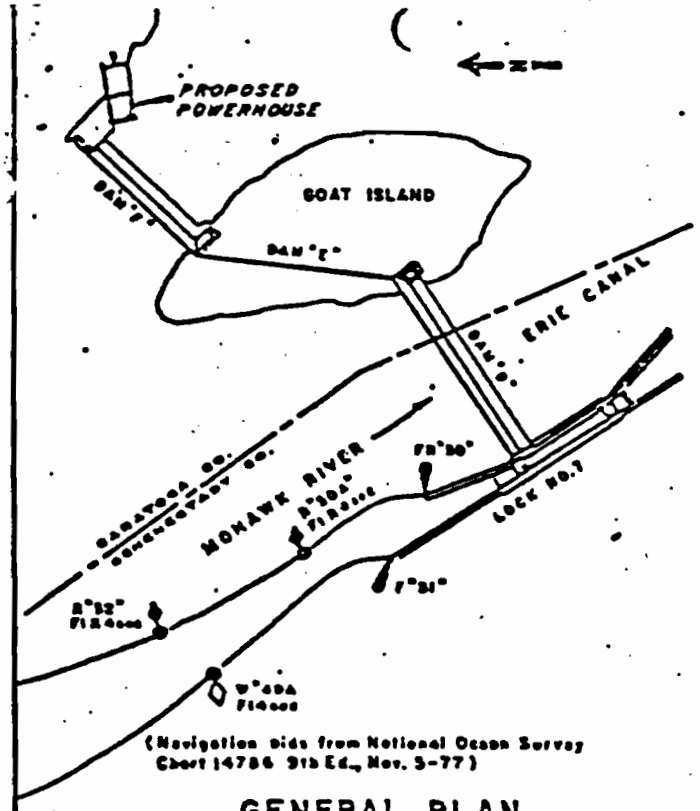
ADDRESS OF PERMITTEE 10 Columbus Circle New York, NY 10019 (212) 397-6200

PERMIT NUMBER 13349

F. M. Griffis
Colonel, Corps of Engineer
District Engineer

ENG Form 4336 Jul 70

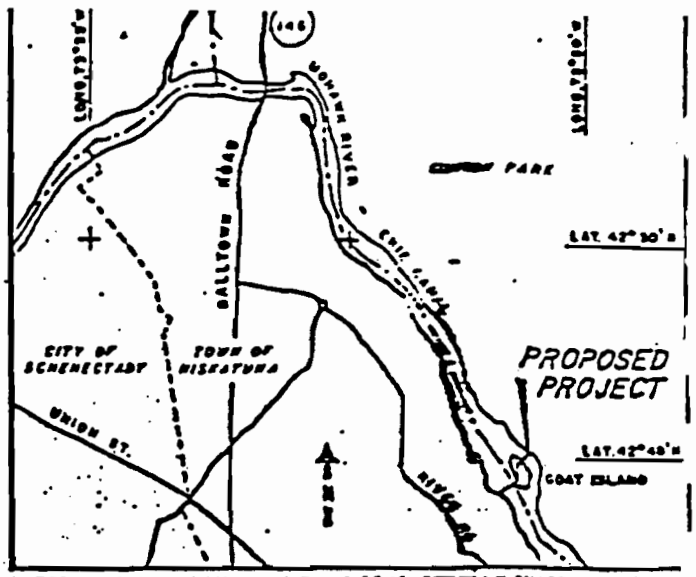
THIS NOTICE MUST BE CONSPICUOUSLY DISPLAYED AT THE SITE OF WORK.



GENERAL PLAN

700 350 0 700

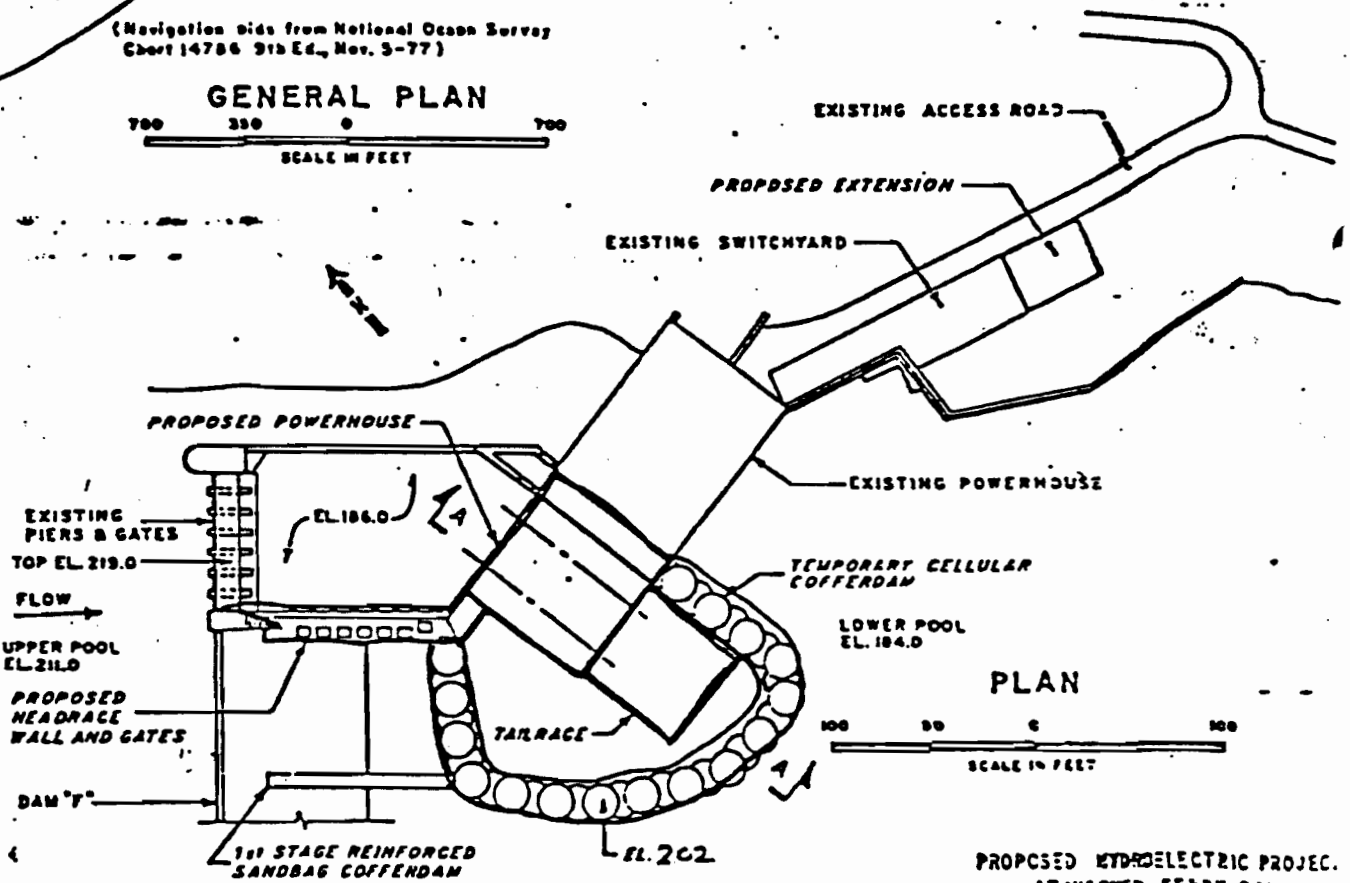
SCALE IN FEET



NOTE: MAP FROM NISKAYUNA, N.Y. AND SCHENECTADY QUADRANGLES, 1980.

VICINITY MAP

SCALE IN MILES



PLAN

100 50 0 100

SCALE IN FEET

PURPOSE: COMMERCIAL POWER GENERATION

DATUM: NATIONAL GEODETIC VERTICAL DATUM +0.99FT.

ADJACENT PROPERTY OWNERS:

1 - PEOPLE OF THE STATE OF NEW YORK

PROPOSED HYDROELECTRIC PROJECT

AT VISCHER FERRY DAM

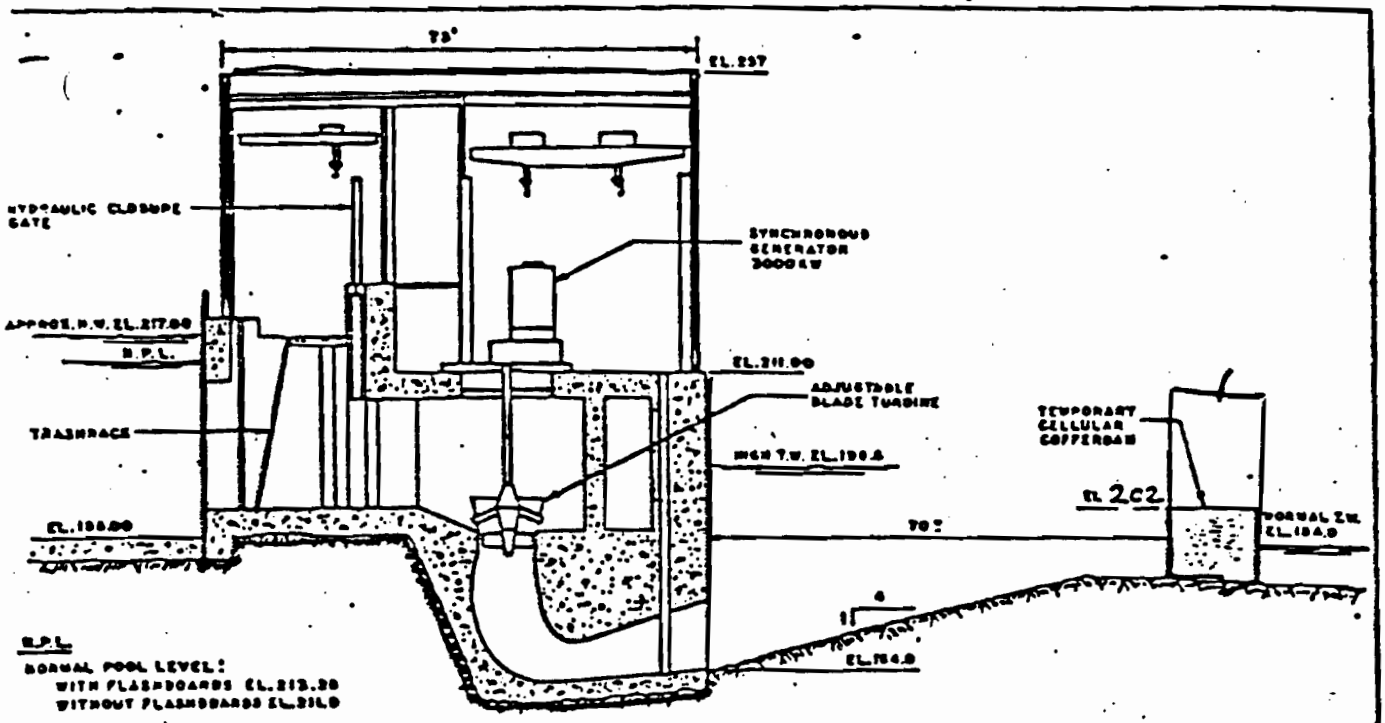
ON MOHAWK RIVER - ERIE CANAL

AT RIVER MILE 13

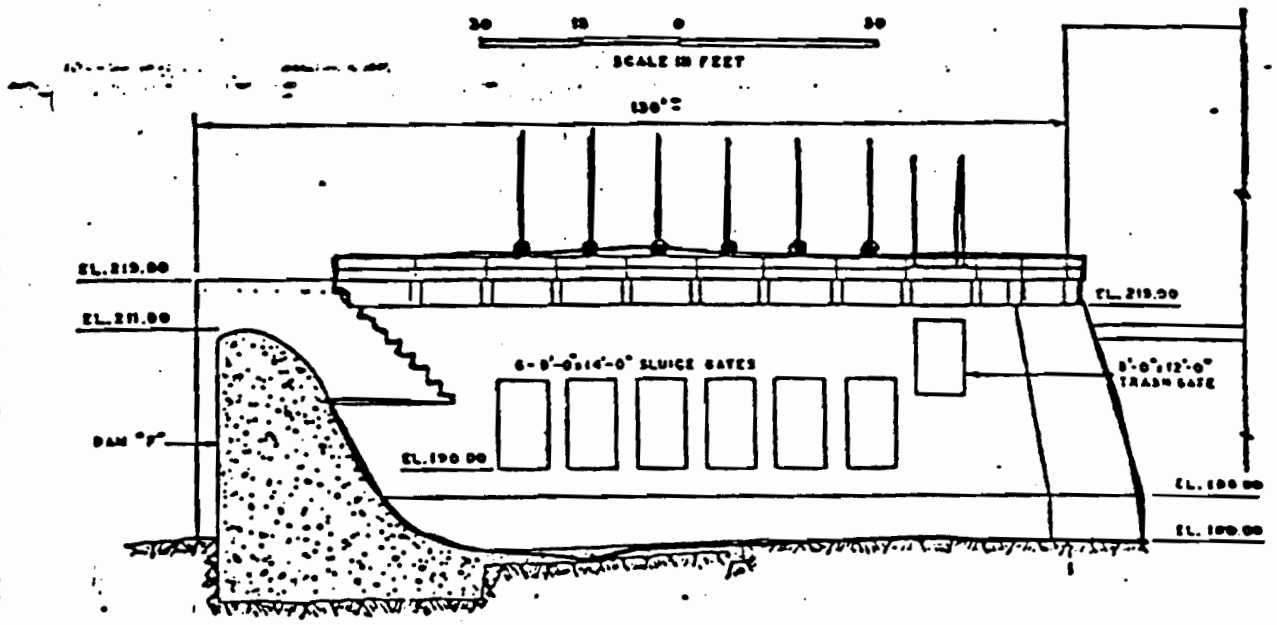
COUNTIES OF: SCHENECTADY SARATOGA STATE OF NEW YORK

APPLICATION BY: POWER AUTHORITY OF STATE OF NEW YORK

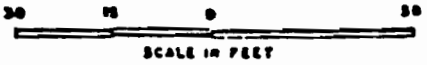
SHEET 1 OF 2 DATE:



SECTION A-A



ELEVATION OF PROPOSED HEADRACE WALL



PROPOSED HYDROELECTRIC PROJECT
AT VISCHER FERRY DAM
ON MOHAWK RIVER - ERIE CANAL
AT RIVER MILE 13

COUNTIES OF: SCHENECTADY / SARATOGA STATE: N.Y.

APPLICATION BY: POWER AUTHORITY OF STATE OF NEW YORK

SHEET 2 OF 2 DATE:

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT. CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK. N. Y. 10278-0090

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

District Engineer
U. S. Army Engineer District, New York
ATTN: NANOP-E
26 Federal Plaza
New York, N. Y. 10278

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278

NANOP-E

IMPORTANT

This letter must be completed and mailed to the District Engineer prior to commencement of any work under the permit.

Permittee:_____ Permit No.:_____

Issued:_____ Expiration:_____

Waterway:_____ City & State:_____

Type of Work:_____

Work will commence on or about_____

_____
Signature & Date

(NOTE: To mail, fold letter in half and tape at bottom)
"DO NOT STAPLE"

NANY FL-193
APR 77

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 12062 WASHINGTON, DC

POSTAGE WILL BE PAID BY DEPARTMENT OF THE ARMY

District Engineer
U. S. Army Engineer District, New York
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New York, N. Y. 10278

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, N. Y. 10278

NANOP-E

IMPORTANT

This letter must be completed and mailed to the District Engineer following completion or cancellation of the work authorized under the permit.

Permittee:_____ Permit No.:_____

Issued:_____ Expiration:_____

Waterway:_____ City & State:_____

Type of Work:_____

Check and complete applicable items listed below.

- ☐ Work was completed on_____
- ☐ Work will not be performed on the project.
- ☐ Deviation from work authorized in permit is explained below.
- ☐ Other (explain)_____

_____

_____

_____
Signature & Date

(NOTE: To mail, fold letter in half and tape at bottom.)
"DO NOT STAPLE"

NANY FL-192
APR 77

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Raymond J. O'Connor, Chairman; Georgiana Sheldon, A. G. Sousa and Oliver G. Richard III.

Power Authority of the State of New York) Project No. 4679-001
)

ORDER ISSUING LICENSE (MAJOR)

(Issued June 26, 1984)

The Power Authority of the State of New York ("Power Authority") has filed an application under Part I of the Federal Power Act for a license for the Vischer Ferry Hydroelectric Project, FERC Project No. 4679. The project is located on the Mohawk River, a navigable waterway 1/ of the United States, in Saratoga and Schenectady Counties, New York, in Clifton Park and Niskayuna Townships and the City of Schenectady. This order grants a license to the Power Authority for the expansion and continued operation of the project.

Project Description

The Vischer Ferry Hydroelectric facility is owned by the State of New York and is under the jurisdiction of the New York State Department of Transportation ("NYSDOT"). The NYSDOT operates and maintains the non-generating hydroelectric facilities (as well as the non-hydroelectric facilities), while Niagara Mohawk Power Corporation ("Niagara Mohawk") operates and maintains the hydroelectric generating station, including the switchyard.

The project dam, constructed in 1913, was built to upgrade the Erie Canal System. A powerhouse, built on the north side of the river in 1925, is still in operation and is the site of the Power Authority's proposed expansion. Existing facilities include the dam, 1919 feet long and 30 feet high; an impoundment of approximately 1050 surface acres; a regulating structure; a powerhouse containing two generators each rated at 2.8 MW; a tailrace; a switchyard; and Canal Lock E-7. Historically, 27-inch high breakaway flashboards have been installed on the project dam in May and removed in December. The Power Authority states that the first priority for operation at the dam is to provide adequate pool

1/ Niagara Mohawk Power Corporation, 41 F.P.C. 772 (1969).

elevations for lockage and navigation, and that the second priority is to generate power.

The Power Authority proposes to increase the hydroelectric capacity of the project by constructing a new headrace, expanding the powerhouse, installing two generators of 3 MW each, widening the tailrace, and expanding the switchyard. In addition, the Power Authority proposes to develop recreational facilities on both river banks. On the south shore, the Power Authority proposes to build a boat ramp with a parking area, upgrade the road, and develop a connecting trail link between an existing picnic area and a bike route that parallels the Mohawk River. On the north shore, the applicant proposes to upgrade the overlook area above Clifton Park by providing a parking area and foot access from the parking area to the riverbank for hiking, fishing, and other shoreline activities.

The project is essentially run-of-river, using only the storage provided by the flashboards. The Power Authority stated that the proposed development at the project will not alter the existing spillway configuration, or the installation of the flashboards between May and December each year.

Public Notice

Notice of the application has been published, and comments have been received from interested federal, state, and local agencies. No protest has been received, and no agency has objected to issuance of the license. The Town of Rotterdam intervened in the proceeding; the town's concerns are discussed below.

Safety and Adequacy, Economic Feasibility and Comprehensive Development

The project dam is a high hazard dam, and is not safe for flood conditions exceeding one-half the Probable Maximum Flood (PMF). Article 33 requires the Licensee to determine the consequences of dam failure during floods up to the PMF and to submit to the Commission a plan and schedule for making the dam safe in the event that its failure would endanger life or cause significant property damage downstream. The study must be approved by the Director, Office of Electric Power Regulation, prior to the start of project construction.

The Commission's New York Regional Office inspected the project and found no major deficiencies.

The expansion of the project would increase its installed capacity from 5,600 kW to 11,600, kW, while increasing the estimated annual average generation from 36,280,000 kWh to 60,134,000 kWh. 2/

2/ Equivalent energy production using fossil fuels would consume 98,750 barrels of oil or 27,750 tons of coal.

The project is economically feasible when compared to the cost of producing an equivalent amount of power from a base load coal-fired facility.

The project would make good use of the flow and fall of the Mohawk River, is not in conflict with any planned or potential development, and would be best adapted to the comprehensive development of the basin under present conditions, upon compliance with the terms and conditions of this license.

Cultural Resources

The New York State Historic Preservation Officer ("SHPO") stated that the proposed project would have no effect upon cultural resources included in or eligible for inclusion in the National Register of Historic Places. The proposed construction would not adversely affect any known cultural resources. To help safeguard previously unrecorded archeological or historical sites that may be discovered during any future construction or development at the project, the license contains Article 35, which requires the Licensee to consult with the SHPO upon discovery of any such sites.

Instream Flows

The United States Department of the Interior ("Interior") and the New York State Department of Environmental Conservation ("DEC") recommended that the Power Authority release an initial minimum flow of 200 cubic feet per second (cfs) over the project spillway to protect the aquatic habitat in the project area. The agencies also recommended that the Power Authority monitor the effectiveness of the initial spillage requirement, and make any changes in the minimum flow that its studies show are warranted.

The Power Authority agreed to provide an initial 200 cfs minimum flow release, monitor the flow's impact on fishery resources and water quality, and make any necessary changes in the initial minimum flow after studying its effectiveness. These measures are provided for in Articles 36 and 40.

The Power Authority did not agree, however, with the agencies' recommendation that the minimum flow be released over the spillway, rather than in the form of leakage through and underneath the flashboards. There is insufficient information available at this time to justify the agencies' recommendation. Therefore, we will permit the Licensee to release the flows in the manner it ha proposed (Article 36), and require it to evaluate the impact of the minimum flow point of discharge on downstream migration of anadromous fish (Article 40). The Licensee shall modify the minimum flow point of discharge if necessary to protect fishery resources.

Water Quality 3/

Interior and DEC recommended that the Power Authority develop and conduct a water quality monitoring program to determine the impact of operating the Vischer Ferry Project in combination with the proposed Crescent Project (located 10 miles downstream) on dissolved oxygen levels, and to determine the effectiveness of the proposed minimum flow on dissolved oxygen levels. The Power Authority responded that it had no objection to these recommendations, and that it had begun a long-term water quality sampling program, in consultation with DEC, to determine the potential impact of the project on water quality.

Existing water quality information indicates that dissolved oxygen levels have reached as low as 3.8 mg/l during operation of the existing project. Expansion of the project would result in less spillage, with the potential for reduced aeration of the project discharge. To ensure that project operation would not harm fishery resources, Article 37 is included in this license to require the Licensee to initiate a monitoring program to determine the effects of project operation on dissolved oxygen, and to implement any corrective measures necessary to maintain disolved oxygen levels adequate to protect fishery resources.

Interior also recommended that a standard sediment analysis be conducted for heavy metals and toxic materials to determine appropriate removal and disposal methods for spoil and silt. The Power Authority has agreed to this requirement and the sediment analysis snould be conducted. Article 38 provides for the analysis and disposal of heavy metals and toxic materials.

The Latham Water District ("District") uses the Mohawk River as a source of drinking water. The Power Authority has agreed to comply with the request of the State of New York Department of Health that it advise the District and the Albany County Health Department ("County") of any unusual changes in water quality due to project construction. Article 39 requires the Licensee to advise the District and County of any changes in water quality, and ensure that project construction and operation does not affect the District's use of the Mohawk River as a municipal water supply.

In its motion to intervene, the Town of Rotterdam, New York ("Town") stated that the Power Authority was contemplating including additional upstream lands and water associated with Lock E-8 in the proposed development scheme of Project No. 4679-001. The Town

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3/ DEC issued a water quality certificate for this project on September 26, 1983.

stated further that such a development may represent a potentially adverse impact on the municipal water supply system. The Power Authority responded to the Town's motion. The Power Authority stated that Lock E-8 is not included in the subject application, and advised that, while it considered the change earlier, it does not propose to amend its application to include Lock E-8 at the present time. Therefore, the concerns of the Town have been resolved.

Fishery Resources

Interior and DEC stated that the blueback herring is an anadromous fish that presently migrates in abundance through project water, but that adequate information is not available to determine the potential for entrainment mortality to downstream migrants. These agencies recommended that the Power Authority conduct a study to determine whether project operations would affect fish migration, and develop mitigative measures, if necessary. The Power Authority acknowledged the possible impacts of project operations on the fishery resource and expressed a willingness to assess the situation. Article 40 requires the Licensee to consult with the concerned agencies and conduct a study to determine the impacts of project operations on the fishery resource, to recommend any mitigative measures that are needed to protect this resource, and to implement any measures that the Commission finds necessary.

Interior recommended further that for the conservation and development of the existing fish and wildlife resources, the project be operated so that: (1) the current impoundment rate of drawdown not increase; (2) the impoundment drawdown be limited to 13.5 inches; and (3) when river flows exceed 3,250 cfs, the project will be in a run-of-river mode, such that the instantaneous flows from the project, including spillage, releases, and leakage, is equal to the inflow to the project impoundment. The Power Authority has agreed to implement Interior's recommendations. To ensure protection of fish and wildlife resources of the project area, Article 41 requires that the Licensee operate the project as agreed to.

Recreational Resources

The Power Authority's Report on Recreational Resources, which contains guidelines for the development, operation, and maintenance of recreational facilities at the project, conforms to Commission regulations. The report is approved and made part of the license.

Environmental Impacts

Increased levels of turbidity resulting from construction activities are expected to be minimal and would be localized and temporary. Noise and dust associated with development of project works and recreational facilities would be intermittent and of short duration, confined primarily to the construction period. On the basis of the record, and our independent analysis, we conclude that issuance of a license for the project would not constitute a major federal action significantly affecting the quality of the human environment.

License Term and Annual Charges

The Power Authority proposes to perform substantial new construction at the Vischer Ferry Hydroelectric Project. Under our policy for projects of this type, the license will terminate May 31, 2024, forty years from the first day of the month in which this order is issued. 4/

Since portions of the Vischer Ferry Project are already operating, the license should be back-dated. Normally, a license that is issued for a constructed project that is located on a navigable waterway and for which there has been no post-1935 construction is given an effective date of April 1, 1962, or the date the stream was found navigable, whichever is earlier. 5/ There has been no post-1935 construction at the Vischer Ferry Project, and the Mohawk River was found navigable in 1969. 6/ Accordingly, under Androscoggin, the effective date of this license would ordinarily be April 1, 1962.

However, in cases where our Androscoggin policy produces an effective date more than 50 years before the license termination date, the effective date of the license is advanced to 50 years before the license termination date. In addition, an amount equal to the annual charge that would have been due for the period before

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4/ Montana Power Co., 56 F.P.C. 2008, 2012 (1976).

5/ Public Service Co. of New Hampshire, 27 F.P.C. 830 (1962) ("Androscoggin"). We established this policy in order to ensure that illegal project operators do not obtain an unmerited advantage over companies that complied with the law. We determined that backdating the license to 1962 (absent an earlier navigability finding) rather than to the date the project operator was placed on notice of the perils of further unlicensed operation gives adequate weight to the period of unlicensed operation.

6/ Niagara Mohawk Power Corp., 41 F.P.C. 772 (1969).

what is being set as the effective date will be assessed, in order to ensure that unlicensed operation does not place a person in a better position than licensed operation would. 7/ Therefore, this license will have an effective date of June 1, 1974, and payment in lieu of annual charges will be required for the April 1, 1962 to May 31, 1974 period.

In assessing these back annual charges and payments in lieu of annual charges, we are mindful that unlicensed construction and operation was performed by NYSDOT, Niagara Mohawk, and possibly others, while future licensed operation will be performed by the Power Authority. The date a license applicant or licensee acquires a project, however, has no bearing on the amount the licensee must pay in back annual charges for an illegally operated constructed project. 8/ Our back charges policy remains valid regardless of who operated the project previously, because it ensures that the illegal operator of the project does not receive a windfall from its unlicensed operation of the project -- and thus discourages unlicensed operation. The same reasoning applies to payments in lieu of annual charges. The illegally benefiting party should ultimately pay for the annual charges and payments in lieu of annual charges owned, although perhaps not directly to the Commission. The person acquiring the project should make provision for the back charges and payments in lieu of annual charges in the project purchase price.

The Commission orders:

(A) This license is issued to the Power Authority of the State of New York (Licensee), under Part I of the Federal Power Act (Act), for a period effective June 1, 1974, and terminating May 31, 2024, for the construction, operation, and maintenance of the Vischer Ferry Project No. 4679, located on the Mohawk River in Clifton Park and Niskayuna Townships and the City of Schenectady, in Saratoga and Schenectady Counties, New York. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

7/ See Niagara Mohawk Power Corp. v. FPC, 379 F.2d 153, 159-60 (D.C. Cir. 1967).

8/ See North Canal Waterworks, 21 FERC ¶61,157 (1982); Niagara of Wisconsin Paper Corp., 54 F.P.C. 2507 (1975), 55 F.P.C. 262 (1976); Kennebec River Pulp & Paper Co., 35 F.P.C. 707 (1966).

(B) The Vischer Ferry Project No. 4679 consists of:

(1) all lands, to the extent of the Licensee's interests in those lands, constituting the project area and enclosed by the project boundary. The project area and boundary are shown and described by a certain exhibit that forms part of the application for license and that is designated and described as:

Exhibit	FERC No. 4679-	Showing
G, Sheet 1	9	Project Location Map

(2) Project works consisting of: (a) the Vischer Ferry Dam, a concrete gravity structure composed of three connected spillway sections with a total length of 1,919 feet, the outer ogee-shaped weir sections with an average height of 30 feet while the middle broad-crested weir section has a height varying from 1 to 3 feet above Goat Island; (b) the reservoir with an area of 1,050 acres and gross storage of 25,000 acre-feet at an elevation of 210 feet m.s.l. (27-inch flashboards add 2,400 acre-feet of usable storage); (c) a low-level regulating structure at the northern end of the spillway with seven sluice gates; (d) a headrace with a longitudinal retaining wall having sluice gates; (e) a 104 by 73-foot powerhouse with an 82 by 73-foot addition, housing two turbine/generator units rated at 2.8 MW each and two units rated at 3.0 MW each, all to operate under a head of 26.5 feet; (f) an unlined 150-foot-wide tailrace; (g) a switchyard; (h) the generator leads and transformer banks; and (i) appurtenant facilities.

The location, nature, and character of these project works are generally shown and described by the exhibits cited above and more specifically shown and described by certain other exhibits that also form a part of the application for license and that are designated as:

Exhibit A - Paragraphs A.4.1 through A.6 of the application filed on September 30, 1982.

Exhibit E - The Report on Recreational Resources, pages E-42 through E-51 of the Exhibit E filed on September 30, 1982.

Exhibit F	FERC No. 4679-	Title
1	1	General Plan of Dam
2	2	Detailed Location Plan and Profile of Dam
3	3	Plan and Sections of Regulating Structures
4	4	Existing Powerhouse General Plans and Sections
5	5	Existing Powerhouse Typical Sections
6	6	Proposed Project Location and General Plan
7	7	Proposed Powerhouse Plan and Sections
8	8	Proposed Project Elevations

(3) all of the structures, fixtures, equipment, or facilities used or useful in the operation or maintenance of the project and located within the project boundary, all portable property that may be employed in connection with the project, located within or outside the project boundary, as approved by the Commission, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, E, F, and G, designated in ordering paragraph (B) above, are approved and made a part of the license.

(D) This license is also subject to Articles 1 through 28, except Article 20, set forth in Form L-4 (revised October 1975), entitled "Terms and Conditions of License for Unconstructed Major Project Affecting Navigable Waters of the United States," attached to and made a part of this license. The license is also subject to the following additional articles:

Article 29. The Licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representatives of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 30. The Licensee shall commence construction of the project within two years of the date of issuance of the license, and shall complete construction within four years from the date of issuance of the license. June 26, 1986 Vischer Ferry

Article 31. The Licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days prior to the start of construction of the cofferdam the Licensee shall file with the Commission (providing a copy to the Commission's Regional Engineer and Director, Office of Electric Power Regulation) one copy of the approved cofferdam construction drawings and specifications and a copy of the letter(s) of approval.

Article 32. The Licensee shall, within 90 days of completion of construction, file for approval of the Director, Office of Electric Power Regulation, revised Exhibits A and F to describe and show the project as-built.

Article 33. The Licensee shall, prior to start of construction, file with the Commission a study which evaluates the consequences to downstream life and property of a failure of Vischer Ferry Dam under flood conditions up to the probable maximum flood (PMF). In the event that failure of dam under flood conditions would constitute a hazard to human life or would cause extensive property damage, the Licensee shall file concurrently with the study its recommendations for modifying for floods up to and including the PMF. Construction of the project shall not commence until the Director, Office of Electric Power Regulation approves the study and any necessary modifications.

the U.S. Fish and Wildlife Service, shall file for Commission approval a plan to ensure that dissolved oxygen is maintained during project operation at levels adequate to protect fishery resources. Copies of the data summary and plan shall be sent to the consulted agencies coincident with filing with the Commission.

Article 38. The Licensee shall consult with the New York State Department of Environmental Conservation and the U.S. Fish and Wildlife Service in the preparation of a detailed plan to: (1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawk River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; (3) safely dispose of any toxic substances discovered; and (4) adequately dispose of spoils resulting from project construction. This plan shall include an implementation schedule, monitoring and maintenance programs for project construction and operation, and evidence of agency consultation. This plan shall be filed with the Commission (with a copy provided to the Commission's Regional Engineer in New York, New York, and the Director, Office of Electric Power Regulation) at least 60 days prior to any ground-disturbing activity or spoil disposal. The Director, Office of Electric Power Regulation, reserves the right to require changes in the plan.

Article 39. The Licensee shall, after consultation with the Latham Water District (District) and the Albany County Health Department (County), implement a monitoring program that is adequate to determine the impacts of project construction and operation on the water quality of the Mohawk River. The Licensee shall immediately advise the District and County of any changes in water quality of the Mohawk River resulting from project construction and operation, and shall implement measures as needed to ensure that the District's municipal water supply is protected.

Article 40. The Licensee shall, after consultation with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation, and within 18 months from the commencement of commercial operation of the project, conduct a study to evaluate the impacts of project operations on the fishery resources of the Mohawk River, which shall include, but not be limited to, an evaluation of the impacts of the point of discharge for the minimum flow release on the downstream migration of anadromous fish, and the effectiveness of the 200 cfs minimum flow in protecting fishery resources. Within 6 months from the date of completion of the study, the Licensee shall file, with copies to the agencies

consulted, a report on the results of the study, and, for Commission approval, recommendations for the protection and enhancement of the fishery resources of project waters. Documentation of agency consultation on the report and recommendations shall be included in the filing.

Article 41. The Licensee shall, for the conservation and development of fish and wildlife resources, operate the Vischer Ferry Project when available river flows exceed 3,250 cfs in a run-of-river mode, such that instantaneous outflow from the project approximates the instantaneous outflow from the project approximates the instantaneous inflow to the project reservoir and reservoir surface elevation fluctuations are minimized. When available river flows are less than 3,250 cfs, the project shall be operated so as to provide the minimum flow release required by Article 36. Further, the project shall be operated to ensure that the historic rate of drawdown is not altered and that total drawdown does not exceed 13.5 inches. This operation mode may be modified if required by operating emergenies beyond the control of the Licensee, and for short periods upon mutual agreement between the Licensee and the New York State Department of Environmental Conservation.

Article 42. (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and water for certain other types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and to ensure compliance with the covenants of the instrument of conveyance for any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable State and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary State and Federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the Licensee shall file three copies of a report briefly

describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The Licensee may convey fee titles to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary State and Federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters for which all necessary Federal and State water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary for which all necessary Federal and State approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the Licensee must file a letter to the Director, Office of Electric Power Regulation, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any Federal or State agency official consulted, and any Federal or State approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with Federal and State fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

Article 43. The Licensee shall pay the United States the following annual charges, as determined in accordance with the provisions of the Commission's regulations in effect from time to time, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act:

(1) For the period from April 1, 1962 through May 31, 1974, an amount equal to the annual charges that would have applied for the period if the project had been licensed during that period. The authorized installed capacity for this purpose is 7500 horsepower.

(2) For the period from June 1, 1974 through May 31, 1984, the annual charges ordinarily due in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 7500 horsepower.

(3) From June 1, 1984, the annual charges computed in accordance with the Commission's regulations. The authorized installed capacity for this purpose is 15,500 horsepower.

(E) The Licensee's failure to file a petition for rehearing shall constitute acceptance of this license. In acknowledgement of acceptance of this order and its terms and conditions, it shall be signed by the Licensee and returned to the Commission within 60 days from the date this order is issued.

By the Commission.

(S E A L)

Kenneth F. Plumb

Kenneth F. Plumb,
Secretary.

Project No. 4679-001

IN TESTIMONY of its acknowledgment of acceptance of all of the terms and conditions of this order, the Power Authority of the State of New York, this 31st day of JULY, 1984, has caused its name to be signed hereto by STEPHEN L. BAUM, its General Counsel, and its corporate seal to be affixed hereto and attested by BRADLEY G. TELIAS, its Secretary, pursuant to a resolution of its Board of Trustees duly adopted on the 31st day of JULY, 1984, a certified copy of the record of which is attached hereto.

By _____
General Counsel

Attest:

_____
Secretary

(Executed in quadruplicate)

Form L-4
(Revised October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR
UNCONSTRUCTED MAJOR PROJECT AFFECTING
NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner

or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

NEW YORK POWER AUTHORITY

Blenheim-Gilboa Power Project

Operating Procedures

Title: Clearance and Protection Procedure — **No.** OP-3

Reviewed By: Control & Communications — 6/14/85 Date

Electrical Maintenance — 6-14-85 Date

Mechanical Maintenance — 6/13/85 Date

Operations — 6-19-85 Date

Approved: Superintendent of Power — 6/13/85 Date

Remarks: Rev. No. 3 June 10, 1985. Revisions are double underscored.

A. Changed wording to reflect rev. from Electic Work Rule Comm. & Chief Operators meeting.

B. Rev. wording to avoid misunderstanding as to responsibility fo grounding of cleared equipment.

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1.0 Purpose:

1.1 To provide a safe working environment for all personnel associated with project maintenance, operations and construction.

1.2 Prevent unauthorized operation of equipment.

1.3 Prevent premature operation of equipment.

1.4 Prevent unauthorized removal of equipment from service.

1.5 Provide a means to restrict the operation of a particular piece of equipment to specific instructions.

2.0 Applicability:

2.1 No person or group of persons shall be considered protected from "Live" or other equipment, or shall be authorized to work on equipment which is subject to CLEARANCE procedures until a CLEARANCE has been issued to the CLEARANCE holder in charge of the work on the line, circuit or equipment involved.

2.2 Equipment Requiring a CLEARANCE: Except as may be exempted by an official memorandum or operating order which shall become a part of this CLEARANCE procedure (see Attachment #11), CLEARANCES shall be required for work on all electrical circuits of 440 volts or over, all equipment which may impair or limit the operation of major equipment, and all equipment which may be subject to dangerous fluid pressures or flows. The provisions of this paragraph shall not preclude Hot Line work by trained and properly equipped personnel.

It should be noted that under certain conditions (such as the brief nature of the work, the necessity of placing a unit into

service quickly, and in some cases where a CLEARANCE would be unwieldy and cumbersome) work will be performed under an "OK to Work" that normally would be covered under a CLEARANCE. It should be understood that while this work is performed under an "OK to Work" protection will be provided by other means such as an Operator in attendance at an open breaker or control switch, the Senior Operator's assurance that a unit will not be started, or fuses pulled. Such work will only be performed with the approval of the responsible Supervisor.

2.3 Authority to Obtain CLEARANCES: (See Attachment #8)

2.3.1 CLEARANCES will be issued, except in the event of an emergency, only to individuals whose names appear on an approved CLEARANCE list.

2.3.2 An employee may be added to the list with the approval of the Superintendent of Power only after reviewing this procedure personally with the Chief Operator or his designee. The Chief Operator shall advise the Superintendent of Power in writing that the employee understands this procedure and his responsibility as a CLEARANCE holder.

2.3.3 In the event of an emergency, with the prior approval of the Superintendent of Power or in his absence the Chief Operator, the Senior Operator may permit a CLEARANCE to be issued to a responsible individual whose name does not appear on the list. If the Senior operator is unable to contact the Superintendent of Power or the Chief Operator,

he may at his discretion issue a CLEARANCE to a responsible individual.

2.3.4 Authorization and CLEARANCE work on any line or equipment under the jurisdiction of the Blenheim-Gilboa Project shall be obtained directly from the Chief Operator or his representative.

3.0 References:

Blenheim-Gilboa Operating Manual, B.G. Prints, Operating Procedures for the equipment involved, the Power Authority Safety Handbook.

4.0 Definitions:

4.1 A CLEARANCE is a formal statement from the Operating Department that specified equipment has been isolated from necessary sources of energy (i.e. electrical, mechanical, chemical, hydraulic) and that it is as safe to work on as is feasible to make it for the work intended.

4.2 A GUARANTEE is a formal statement from the Operations Department that a certain switch or switches, device or devices are tagged in a specific position and will remain so until the guarantee is released by the recipient. A guarantee does not necessarily indicate that the equipment is de-energized.

4.3 A HOT LINE WORK ORDER is a formal statement from the Operations Department that all first contingency automatic reclosing devices have been made inoperative and if the transmission line should relay, manual reclosing of the circuit will not be attempted until contact has been made with the recipient of the order.

4.4 A SPECIAL CONDITION order is a limitation or notice placed on equipment that unusual conditions prevail and special precautions are necessary regarding this equipment.

4.5 A PERMISSION TO OPERATE order is a formal statement from the Operations Department that specific equipment may be operated by maintenance personnel.

4.6 An OK TO WORK order is permission to work on or near operating equipment essential to power system operations. When used, it is issued and recorded by the Operations Department and involves no tagging. It is not intended to provide protection to workmen. Its purpose is to let the Operations Department know that essential equipment is being worked on and to aid in maintaining the safety and reliability of the power system.

5.0 Responsibilities:

5.1 The Superintendent of Power will approve the addition of personnel to the "Authority to Obtain CLEARANCE" list.

5.2 The Chief Operator will supervise and enforce the rules of the "CLEARANCE" procedure.

5.2.1 CLEARANCES on major equipment must be approved by the Chief Operator or his representative. (See Attachment #9)

5.2.2 The Chief Operator will coordinate major equipment outages with the Energy Control Center.

5.2.3 All scheduled major equipment outages should be requested as far as possible in advance but not later than 24 hours prior to the scheduled outage.

5.3 The Senior Operator shall issue all CLEARANCES and shall keep an accurate and complete record of all CLEARANCE transactions and shall be fully responsible for equipment covered by a CLEARANCE being safe for the work to be done.

5.4 The person to whom a CLEARANCE is issued shall assume full responsibility for that equipment until the CLEARANCE is released to the senior operator on duty. He should check the protection provided him by his CLEARANCE when possible. He shall be responsible for the safety of personnel within his CLEARANCE boundaries while test procedures, such as Doble or Hi-Pot tests, are in process. This person will, when requested, explain to others working under his CLEARANCE the protection provided.

5.4.1 The person to whom a CLEARANCE is issued shall keep the Control Room informed of any action or development which may delay restoration of equipment to service beyond the scheduled outage interval.

5.4.2 On high voltage equipment, the person receiving the CLEARANCE shall be responsible for the installation of an approved ground before allowing work to be done and shall, after completing his work, cause the ground to be removed prior to releasing his CLEARANCE.

NOTE: No grounds can be installed unless the equipment is on CLEARANCE and the CLEARANCE cannot be released with a ground in place.

5.4.3 The person placing the ground(s) will advise the Senior Operator of the specific location and number of grounds he has placed. Likewise, when removing the grounds, the person removing the ground(s) will advise the Senior Operator of the specific location and number of grounds he has removed.
The Senior Operator will inform the CLEARANCE holder that the grounds have been placed or removed, their location, and total number at each location.

5.4.4 The Senior Operator will list the grounds on the yellow colored ground sheet (Attachment #10) and attach this ground sheet to the switching program for the CLEARANCE, indicate ground status on the system status drawing (by use of a yellow pin), and review the removal of grounds with the CLEARANCE holder prior to the restoration.

5.4.5 The CLEARANCE holder will inspect the work area prior to the release of the CLEARANCE to insure the equipment is clear of grounds, (personnel are clear) and the equipment and is in the same position as when the CLEARANCE was issued (control switches, relay targets, valves, circuit breakers, etc.) and in an operable state.

5.4.6 Prior to the start of the return to service switching, the operator, where practical, will inspect the work area and equipment to insure it is ready to go back in service (grounds removed and personnel clear).

5.4.7 Personnel working under a CLEARANCE of another may not install or remove grounds, engage in any high voltage tests, or change the status of switches, valves or other devices within the CLEARANCE without the permission of the CLEARANCE holder.

6.0 Special Instructions/Requirements:

6.1 No CLEARANCE shall be issued for work in dangerous proximity to any energized conductor. Unless suitable barriers can be placed, the circuit involved must be included in the CLEARANCE. CO_2 equipment must be made inoperative for work in areas where CO_2 fire protection is provided.

7.0 Procedure:

7.1 CLEARANCE Request

7.1.1 A CLEARANCE order sheet will be completed for each CLEARANCE and will be filled out by the person requesting the CLEARANCE. (See Attachment #1)

7.1.2 Requests for CLEARANCES must be definite. Where it is not practical to submit a written request, to prevent misunderstanding, the operator shall repeat back to the person requesting the CLEARANCE the equipment or circuits to be cleared, the time the CLEARANCE is requested, the extent of the CLEARANCE, the work to be done, the

approximate time for the work to be completed, and the approximate length of time which would be required to restore the equipment to service under emergency conditions.

7.1.3 Ample advance notice shall be given to the Senior Operator to permit completion of all arrangements and operations prior to the time the CLEARANCE is desired.

7.1.4 CLEARANCES on major equipment shall be requested at least 24 hours in advance if possible.

7.1.5 CLEARANCES on major equipment must be approved by the Chief Operator or his representative.

7.2 Switching Program:

7.2.1 The switching program prepared by the Senior Operator is mandatory for circuits and equipment rated at or above 7.2 KV. The switching program is otherwise optional.

7.2.2 A switching program will be prepared upon the receipt and approval of a request for a CLEARANCE. After he has prepared the switching program, the operator will initiate the same. The Senior Operator will review and initial the program prior to execution. (See Attachment #2)

7.2.3 Except under emergency conditions, the switching program will be reviewed and initialed by a person other than the Senior Operator who prepared it. The reviewer may be another Senior Operator, Deputy Chief Operator, or Chief Operator.

7.2.4 Standardized switching programs will be used for frequently requested CLEARANCES such as ACB inspections and unit maintenance.

7.3 Clearing Equipment

7.3.1 Attended Installations: The operator shall be responsible for the clearing and tagging of all equipment under operational jurisdiction and for the safe performance of work outlined in the CLEARANCE. As an added precaution the person doing the work should check the clearing and tagging of equipment where practical.

7.3.2 Unattended, Automatic or Remote Controlled Stations. At these stations an approved qualified employee, probably the man to whom the CLEARANCE will be issued, shall in t absence of operating personnel prepare the CLEARANCE tags and perform the required switching in accordance with the instructions from the Senior Operator. After the work is completed he shall remove the CLEARANCE tags and restore the equipment to normal in accordance with the instructions from the Senior Operator.

7.3.3 Completed CLEARANCE tags shall be returned to the Senior Operator.

7.4 Issuing the CLEARANCE (See Attachment Stamp 7.14.1)

7.4.1 After all CLEARANCE operations are completed and all tags placed, the Senior Operator shall relate this information

to the person taking the CLEARANCE and formally issue CLEARANCE No. _____ to _____ on _____ and where applicable state "Use Your Own Grounds". If the employee is satisfied with the protection he will accept the CLEARANCE, repeating the CLEARANCE coverage. Operations will cooperate with the recipient of a CLEARANCE in regard to any inspection he wishes to make to insure the safety of his work.

7.4.2 CLEARANCES may be issued in person or by communications system.

7.4.3 The issuance or release of a CLEARANCE shall be relayed through operating personnel only when it is impractical for the Senior Operator to communicate directly with the person receiving or holding a CLEARANCE.

7.4.4 Each CLEARANCE shall be assigned a serial number beginning with "1" and prefixed with the year at the start of each calendar year. Examples: 72-1, 72-1, 72-3, etc.

7.5 CLEARANCE on Tie Lines With Other Utilities

7.5.1 These CLEARANCE requests will be handled between NYPA Energy Control Center and similarly responsible personnel of the other utility, marketing agency, customer or central dispatcher as may be appropriate.

7.5.2 These CLEARANCES will be handled between the Senior Operator or responsible supervisory personnel and similarly responsible personnel of the other utility, marketing agency, customer, or central dispatcher as may be appropriate.

7.5.3 This CLEARANCE procedure shall prevail for all CLEARANCES issued on equipment and lines within the jurisdiction of the NYPA Blenheim-Gilboa Project. In the case of a connecting line with another agency, it is expected that the other utility concerned will follow the Power Authority procedure, i.e. controller concerned will issue the Senior Operator a guarantee, Power Authority tags will be used in all cases on our switches.

7.6 Release of a CLEARANCE (Stamp No. 7.14.2)

7.6.1 A CLEARANCE must be promptly released upon completion of the work covered by the CLEARANCE.

7.6.2 Only the person to whom the CLEARANCE is issued is authorized to release the CLEARANCE except as provided in 7.6.3 in the event of an extreme circumstance. As in the issuance of a CLEARANCE, all instructions for its release shall be repeated and clearly understood prior to taking any action.

7.6.3 In the event it is obviously impossible to secure the normal release of a CLEARANCE by reason of death, serious illness or other extremity, the next in command or the employee's supervisor may with the approval of the Chief

Operator, Deputy Chief Operator or the Superintendent of Power, release the CLEARANCE. However, it shall be the responsibility of the Senior Operator and the person releasing the CLEARANCE to insure themselves of the equipment condition. They shall also determine the conditions of the cleared equipment and be assured that all workmen are clear and have been informed that the CLEARANCE has been released and that the grounds, if placed, have been removed.

7.6.4 After all CLEARANCES have been released, the Senior Operator will authorize the required operations to restore the equipment to normal. Where practical, he shall assure himself that the tags returned are those issued.

7.7 Reissue of a CLEARANCE

7.7.1 The primary purpose of a CLEARANCE is to protect personnel. It is not intended that it shall be unwieldy and cumbersome. Occasions will arise when the person holding a CLEARANCE may, because of emergency or other cause, find it necessary to leave the job. In such an event the employee holding the CLEARANCE may contact the Senior Operator and arrange for a reissue of his CLEARANCE to another responsible employee who is eligible to receive a CLEARANCE. Such a reissue shall not be considered valid until the CLEARANCE has been accepted by the employee to whom it has been transferred.

7.7.2 The CLEARANCE may be released to test operate equipment under CLEARANCE with the expectation the same CLEARANCE will be required after the test. The CLEARANCE must be released with an explanation as to what is desired and the release and reissuance of the CLEARANCE must be properly logged.

7.7.3 A CLEARANCE may be modified, when necessary, to add a border point or modify the boundaries to enable the maintenance to be expedited on the equipment.

7.8 Signing On a CLEARANCE

7.8.1 When different crews or work groups are required to work on equipment out of service on CLEARANCE or equipment within a CLEARANCE point, the supervisor or responsible individual shall so advise the CLEARANCE holder and the Senior Operator. The Senior Operator after checking with the CLEARANCE holder will sign this supervisor or responsible individual on the CLEARANCE in the space provided on the CLEARANCE request form and also enter this transaction in the log. The Senior Operator will not restore this equipment to service until he has contacted the individual that is signed on the CLEARANCE and the CLEARANCE holder to be sure that they are clear of the area.

7.9 Violations of this CLEARANCE Procedure

7.9.1 The CLEARANCE Procedure outlined herein is for the safety of personnel. It is, therefore, mandatory that these instructions shall be carefully adhered to.

7.9.2 The Chief Operator shall be advised of all violations of these rules.

7.9.3 Violators will be subject to appropriate disciplinary action.

7.10 Special Conditions Order (See Attachment #1 and Stamp No. 7.14.7)

7.10.1 These orders are issued and released through the Senior Operator in much the same manner as a CLEARANCE, however, they are completely separate and are used for a different purpose. The special conditions order is used to denote a hazardous, abnormal or other unusual condition and to specify certain abnormal operating requirements which must be employed. A CLEARANCE order removes equipment from service, uses red tags and is for the safety or personnel, whereas a special conditions order does not necessarily remove the equipment from service, it uses a white tag and is used to prevent damage to equipment and to convey specific instructions or precautions and to explain other than normal operations.

7.11 Purpose of a Guarantee (See Attachment #1 and Stamp 7.14.3)

7.11.1 When the Senior Operator does not have jurisdiction whereby he may provide complete operational control to assure complete protection as is required by a CLEARANCE, he will then issue a guarantee covering a specific arrangement which assures the recipient that a specific status will prevail until the recipient has released his guarantee.

7.11.2 A guarantee is usually used in tie lines with interconnecting utilities. It may also have other application where safety of personnel is required and a CLEARANCE cannot be issued.

7.12 Hot Line Work Order (See Attachment #1 and Stamp 7.14.5)

7.12.1 A "Hot Line Work Order" is provided for delaying testing of circuits on which Hot Line work is being done. Before issuing a Hot Line Work Order, all first contingency automatic reclosers on the specified circuit shall be disabled. Automatic reclosers and all control switches which could be used to energize a circuit must be tagged with Hot Line Work tags. Tags must be filled out with serial number, date, time, name of circuit, name of employee requesting order and closing delay desired. Hot Line Work Orders shall remain effective until released and may be released only by the person to whom issued. Hot Line Work Orders shall be released at the close of each day's work. No Hot Line Work Order shall be issued except to specially trained and equipped crews.

7.12.2 Hot Line Work Orders must not be issued or placed on circuits while relay tests are being conducted or while relay or relay circuits or relay comm. channels are out of service on any circuit breaker which might energize or de-energize the circuit upon which work is being performed. All communications equipment, e.g., telephone and radio, normally used in the Hot Line Work must be left in service.

7.13 Forms (See Attachment #1)

7.13.1 CLEARANCE, Guarantee, Protective, or Special Condition Order sheet when completed this form contains all the data necessary for issuing the CLEARANCE. It provides a quick and accurate record for review of equipment status while the CLEARANCE is in effect, it records the release of the CLEARANCE and finally it provides a complete record of the entire CLEARANCE transaction and the persons involved. When CLEARANCES are requested and/or released by telephone or radio, the order sheet will be completed by the Senior Operator.

7.13.2 The switching program provides a complete record and sequence of switching for the purpose of removing and restoring equipment to service (See Attachment #2).

7.13.3 The Hold Tag is a red tag which will be completed and attached to every point of a CLEARANCE, such as switches, valves, lifted wires or any other means employed for the purpose of removing a circuit or piece of equipment from service to provide safety to workmen and equipment. Each card shall bear the CLEARANCE number and an alphabetical prefix. Each card and its location will be recorded on the CLEARANCE order sheet (See Attachment #3).

7.13.4 The Hot Line Work Tag is a yellow tag provided for delaying testing of circuits on which Hot Line work is being done. Tags must be filled out with number, date, time, name of circuit, name of employee requesting order and closing delay desired (See Attachment #4).

7.13.5 The Special Conditions Tag is a white tag to be used to indicate unusual with regards to equipment. This tag will be used for special operating instructions, information on the condition of the equipment, etc. (See Attachment #5).

7.13.6 The Maintenance Hold Tag is a salmon colored tag that may be used by authorized persons under specific conditions as mutually agreed by the Superintendent of Power and the Chief Operator and as set forth in a separate bulletin (See Attachments #6 and #11).

7.13.7 The Permission to Operate Tag is a green colored tag used with a formal statement from the Operating Department that specific equipment may be operated by maintenance personnel (See Attachment #7).

7.13.8 An OK to Work Order is a permission to work on or near operating equipment essential to power system operations. When used, it is granted and recorded by the Operating Department and involves no tagging. It is not intended to provide protection to workmen. Its purpose is to let the Operating Department know that essential equipment is being worked on and aid in maintaining the safety and reliability of power system operations (See Attachment Stamp No. 7.14.10).

7.14 Rubber Stamps

The rubber stamps illustrated in Section 7.14.1 thru 7.14.11 wil be used by the Senior Operator to enter the described transactions in the Control Room Log.

7.14.1 For Issuing CLEARANCE - Red Ink

CLEARANCE NO.:

Line or Equipment

Purpose:

Issued To:

Between:

7.14.2 For Releasing a CLEARANCE - Black Inc

CLEARANCE NO:

Line or Equipment:

Released By:

Log Ref. Bk. _____, Pg. _____

7.14.3 For Issuing GUARANTEE - Red Ink

STA. GUAR. NO.:

Issued to:

On:

7.14.4 For Releasing a GUARANTEE - Black Ink

STA. GUAR. NO.:

Released By:

On:

Log Ref. Bk. _____, Pg. _____

7.14.5 For Issuing a HOT LINE WORK ORDER - Red Ink

HLWO NO.:

Issued To:

C.

Kind of Work:

Between:

7.14.6 For Releasing a HOT LINE WORK ORDER - Black Ink

HLWO NO.:

Released By:

On:

7.14.7 For Issuing a SPECIAL CONDITIONS - Black Ink

SPECIAL CONDITIONS:

Issued To:

Equipment:

Reason:

7.14.8 For Releasing a SPECIAL CONDITIONS - Black Ink

SPECIAL CONDITIONS;

Released To:

Equipment:

Reason:

7.14.9 For Issuing a PERMISSION TO OPERATE - Black Ink

PERM. TO OPERATE:

Issued To:

On:

7.14.10 For RELEASING a PERMISSION TO OPERATE - Black Ink

PERM. TO OPERATE:

Released By:

On:

7.14.11 For Issuing or Releasing an OK TO WORK - Black Ink

OK TO WORK:

Issued:

(Released):

ATTACHMENT #1

POWER AUTHORITY OF THE STATE OF NEW YORK
PROTECTIVE OR SPECIAL CONDITION ORDER SHEET

_____ PROJECT

DATE

TIME

CLEARANCE ☐ GUARANTEE ☐
SPEC. COND. ☐ RLWO ☐ NO.

REQUESTED BY

EQUIPMENT OR LINES TO BE CLEARED

PURPOSE

REQUIRED BY | TIME | DATE

CONTACT – LOCATION | PHONE

ESTIMATED TIME OF COMPLETION
TIME M. DATE

ESTIMATED TIME TO RETURN EQUIPMENT TO SERVICE IN EMERGENCY
HOURS

LINES OF PROTECTION AND GROUNDS TO BE PLACED

COMPANY	PERSON	DATE	OUTAGE APPROVED BY TIME	COMPANY	PERSON	DATE	TIME
NYSEG				PLB AFB			
OR				PLB CITY			
NYSEG				GM			
RG&E				REY			
NMPC				ALCOA			
PASNY							

PERSON	TIME	DATE	BOOK NO.	PAGE NO.	
ISSUED TO					BY
RELEASED BY					TO
ISSUED TO					BY
RELEASED BY					TO
ISSUED TO					BY
RELEASED BY					TO
ISSUED TO					BY
ISSUED TO					BY
ISSUED TO					BY
ISSUED TO					BY

ATTACHMENT # 2

_____PROJECT _____DATE	POWER AUTHORITY OF THE STATE OF NEW YORK SWITCHING PROGRAM	CLEARANCE NO. PROGRAM PREPARED BY PROGRAM REVIEWED BY

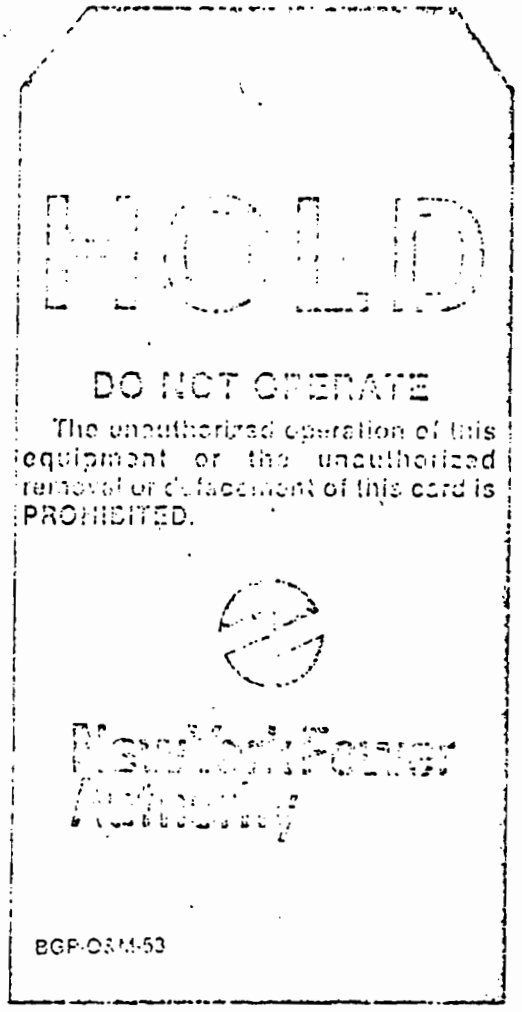
REMOVING FROM SERVICE

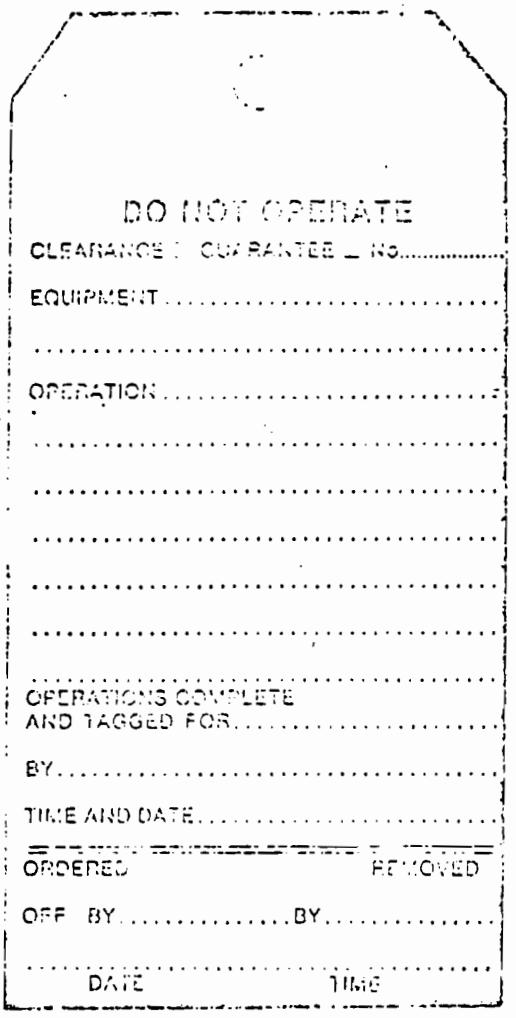
POSITION	SWITCH AND DISCONNECT	LOCATION	LOCK (L) TAG (T)	TAG DES	OPERATOR	TIME

RETURNING TO SERVICE

POSITION	SWITCH AND DISCONNECT	LOCATION	LOCK (L) TAG (T)	TAG DES	OPERATOR	TIME

ATTACHMENT # 3





RED COLORED TAG

ATTACHMENT # 4

POWER AUTHORITY

STATE of NEW YORK

HOT LINE WORK

NO. .....

CIRCUIT .....

BREAKER .....

CLOSING DELAY ..... MIN.

PLACED FOR .....

BY .....
operator

DATE .....TIME.....M

ORDERED OFF BY .....

TIME.....M

REMOVED BY ....
operator

TIME.....M

BGP-O&M-15

YELLOW COLORED TAG

ATTACHMENT # 5

POWER AUTHORITY
STATE of NEW YORK

SPECIAL CONDITION

TAG NO.

EQUIPMENT

PLACED BY DATE

REMOVED BY DATE

REMARKS

SPECIAL CONDITION TAG

REMARKS (CONT.)

BGP-O&M-2

WHITE COLORED TAG

ATTACHMENT # 6

MAINTENANCE

HOLD

DO NOT OPERATE

The unauthorized operation of this equipment or the unauthorized removal or defacement of this card is PROHIBITED.

POWER AUTHORITY
of the
STATE of NEW YORK

BGP-O&M-53

MAINTENANCE

HOLD

DO NOT OPERATE

WORK ORDER NO. .....

EQUIPMENT .....

.....

.....

.....

.....

.....

.....

.....

TAGGED BY .....

TIME .....DATE .....

REMOVED BY .....

TIME .....DATE .....

SALMON COLORED TAG

ATTACHMENT # 7

POWER AUTHORITY
STATE of NEW YORK

PERMISSION
TO
OPERATE

Equipment .....

.....

To .....

By .....

Date .....

DCP-OGM-51

GREEN COLORED TAG

Blenheim-Gilboa
Pumped Storage Power Project
P.O. Box F
Grand Gorge, New York 12434

ATTACHMENT #8

New York Power Authority

September 24, 1975
Rev. November 5, 1975
Rev. February 15, 1975
Rev. March 20, 1979
Rev. July 8, 1980
Rev. August 17, 1982
Rev. January 12, 1983
Rev. December 6, 1983
Rev. January 24, 1984
Rev. June 10, 1985

Memorandum to Operations

From C. F. Payne

Subject: Approved "Required By" Clearance List

A Journeyman ("C") in all classifications may accept and release clearances. All Journeymen ("C") are permitted to accept clearances and release them under the following restrictions:

1. Journeyman's name in the "Required By" space on the "Clearance Order Sheet" with the supervisor's name and initials in the "Requested By" space.

2. Only under the above stipulated conditions are the following Journeymen ("C") to be issued or be allowed to release clearances:

Line Dept.	Electrical Dept.	Maintenance Dept.
Roberts, J.	Dow, R.	Wohlgemuth, D.
Merwin, L.	Gordon, V.	Dawson, R.
Weidman, E.	Lawson, R.	Bellinger, J.
King, W.	Hait, L.	Gunther, H.
Hughes, J.	Serrie, C.	Schaffer, G.
	Vance, C.	Kniskern, W.
	Thom, L.	Weishar, D.
Test Dept.		Pickett, W.
		Jaeger, A.
Hitt, J.		Swing, M.
Long, R.		
Mix, R.		
Roland, R.		
Warzala, G.		
Gifford, M.		

C. F. Payne
Chief Operator

cc: Messrs. Phillips, Siola, VanValkenburgh, Farrell, Davis, Karasch
Pickett, Webster, Morrissey, Roland

REV. NO. 9

DATE 6/10/85

Blenheim-Gilboa
Pumped Storage Power Project
P.O. Box F
Grand Gorge, New York 12434
607 588.6061

ATTACHMENT #9

Rev. June 10, 1985

New York Power Authority

October 5, 1983

Memorandum to Operations

From C. Payne

Subject: Approved "Requested By" Clearance List

Working under the Blenheim-Gilboa Project Clearance Procedure, Authority to Obtain Clearance, clearances will be received and issued, except in the event of an emergency, only to the individuals whose names appear on an approved Clearance "Requested By" List as follows:

John Phillips
Richard S. Siola
Emil T. Karasch, Jr.
John F. Farrell
James E. Webster
Randy VanValkenburg
Richard H. Davis
Bruce Blazo
Phil Zorda
Larry Spiro
Steve Schildhorn
Gerald Rappleyea
Robert Morrissey
Vernon Gordon
James Bellinger
Wayne King
Julio A. Trujillo

C. Payne
Chief Operator

cc: Messrs. J. H. Phillips
R. S. Siola
R. VanValkenburg
J. Farrell
R. Davis
E. T. Karasch
V. Pickett
J. Webster
R. Morrissey
R. Roland

REV. NO. 9
DATE: 6/10/85

ATTACHMENT #10

_____ PROJECT _____ DATE	POWER AUTHORITY OF THE STATE OF NEW YORK GROUND SHEET	CLEARANCE NO PROGRAM PREPARED BY PROGRAM REVIEWED BY

PLACING GROUNDS

POSITION	LOCATION AND NUMBER OF GROUNDS	OPERATOR	TIME

REMOVING GROUNDS

POSITION	LOCATION AND NUMBER OF GROUNDS	OPERATOR	TIME

ATTACHMENT # 11

OPERATING MEMORANDUM #19

SWITCHING AND CLEARANCES

INDEX

A - OPERATING DISCONNECT SWITCHES

B - SWITCHING PROGRAMS

C - CLEARANCE PROCEDURES

D - OPERATION OF 345 KV PCB'S

E - TEST SWITCH OPERATION

F - OPERATION OF MCC BREAKERS

G - TEST SWITCH OPERATION SEQUENCE

OPERATING MEMORANDUM #19

SWITCHING AND CLEARANCES

A - OPERATING DISCONNECT SWITCHES

When operating disconnect switches all blades of the disconnect should be visually checked to be in the fully open or fully closed position, as the case may be. A switching order is not complete until the switch is opened, checked open and locked, or closed, checked closed and locked and reported to the Senior Operator ordering the switching.

B - SWITCHING PROGRAMS

All switching programs should be prepared immediately upon receipt and approval of the request for Clearance. The Senior Operator preparing the switching program should initial the program. The Senior Operator on duty should check the program, approving such by initialing.

The shift ahead of that on which a switching program is to occur should see that all switching orders are ready and should get the proper keys in order for execution of the switching.

It is a bad reflection on the operating organization when excessive time is taken to remove or restore equipment to service. We should strive to use a minimum amount of time for such purposes.

C - CLEARANCE PROCEDURES

A Clearance is issued on specific equipment and the Log Book should make clear just what the equipment is and then list the points of protection, e.g. the limits of the Clearance.

It seems that to avoid any possibility of error, it would be best for the Senior Operator to go over the switching program with the operator to do the switching, if necessary, making sure that there can be no misunderstanding.

Switching programs should be checked and approved in the space provided for this on the form.

A Clearance should not be released by a person to whom the Clearance was not issued. It is conceded that our procedures provide for this, but only in exceptional cases and only with the approval of the Supt. of Power, Chief Operator or Deputy Chief Operator.

SWITCHING AND CLEARANCES

D - OPERATION OF 345 KV PCB'S 1/9/74

Due to the possibility of relay misoperations during switching, routine PCB switching, either in or out of service, should be scheduled during the quiescent time or when the least amount of load is being carried on the plant. If there is an immediate need to switch a PCB to get the load in or out of the plant, or in an emergency, a PCB may be switched as required to facilitate the operation.

Run a Event Recorder summary checking and correcting any abnormal conditions prior to operating any PCB's.

E - TEST SWITCH OPERATION 11/5/74

Test switches will be operable by both the technicians and the operators. Specifically, when on a clearance, a test switch is required for isolation, it will be operated by the operators.

However, when designated that a test switch should be operated, it can be operated by an Operator either under supervision in the Operating Department, the Senior Operator or the Electrical or Test Engineers.

F - OPERATION OF MCC BREAKERS 8/9/74

It has been decided that operation of specific circuit breakers in MCC's can be turned over to maintenance personnel concerned with this equipment. This operation will also include the opening, tagging and locking, if desired, for the protection of workmen concerned with the equipment fed from those MCC's.

It is intended that electrical, test and general maintenance personnel will open and tag these circuit breakers when they have occasion to work on the circuit or on the equipment.

All personnel are cautioned that when these breakers are opened for protection they must always be tagged with a danger tag, maintenance hold, properly filled out.

SWITCHING AND CLEARANCES

F - OPERATION OF MCC BREAKERS (CONT.)

A supply of these tags is available at the warehouse. Under no conditions are the tags to be removed by anyone except the person responsible for placing the tag, or his supervisor. No circuit breaker is to be operated by anyone while thus tagged. It will also be the option of the person placing the protection to lock the circuit breaker where this means is provided, but in all cases a tag must also be used.

Bulletin #3 of the Operating Manual relating to Clearance and Safety procedures includes the provisions of this memorandum. This memorandum is not to be interpreted to authorize operations on any other switch boards or MCC's.

The MCC's involved will have an identifying sign on them to indicate that these provisions apply to that particular equipment. The identifying sign will be a 2" YELLOW CIRCULAR DISC placed on the MCC compartment door.

G - TEST SWITCH OPERATION SEQUENCE 8-30-79

The "J" blade (extreme right) of all test switches located on the unit boards operates the trip coil of the lock-out relay.

When removing these lock-outs from service the "J" blade should be opened last and closed first. By closing the "J" blade first, should there be a trip circuit made up, only the lock-out will operate. Should a trip occur when closing the "J" blade, with the other blades closed, it would jeopardize the operation of associated equipment.

CONSTRUCTION MONITORING PLAN

for

CRESCENT HYDROELECTRIC PROJECT

in conformance with

FERC LICENSE NO. 4678

by

POWER AUTHORITY OF THE

STATE OF NEW YORK

10 Columbus Circle

New York, New York 10019

INTRODUCTION

The following has been developed to fulfill the requirements of Article 38 of FERC License No. 4678, which requires the licensee to develop a plan to:

> "(1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawak River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; (3) safely dispose of any toxic substances discovered; and (4) adequately dispose of spoils resulting from project construction."

The plan is divided into four sections as follows:

I. Sampling and Testing of Sediments.
II. Soil Erosion and Sediment Control Measures.
III. Other Monitoring and Control Measures.
IV. Plan Implementation.

I. Sampling and Testing of Sediments

In the course of the feasibility studies and license application preparation for the Crescent Project, sediments were analyzed in the vicinity of the Crescent Station. The report summarizing this sampling and analysis effort is given in Attachment A. The results indicated that little sediment was present in the areas to be excavated, and that the few sediment samples obtained and analyzed were not polluted.

II. Soil Erosion and Sediment Control Measures

Aspects of the project which are of potential concern with regard to soil erosion and sediment control are given below:

PROJECT ELEMENTS:

1. Cofferdam. Temporary cofferdams will be required both upstream and downstream of the powerhouse extension for construction purposes. Figures 1 and 2 depict a conceptual design for these cofferdams. The final design will be completed by the Contractor.

2. Powerhouse. The plan calls for an extension of the existing powerhouse to the east (Figure 1). The expanded structure will be approximately 73 feet wide and 78 feet long. The substructure will be formed of reinforced concrete. Provisions for rock anchors will be made as required. The superstructure of the eastern wall of the existing powerhouse will be permanently removed to facilitate installation and future maintenance of the new units.

3. Headrace channel. The existing East Wall of the forebay will be demolished. A proposed retaining wall, called New East Wall, will be constructed from North-East corner of the proposed powerhouse to the existing West End of the Abutment Section Dam B. Portion of the existing West End Section of the Abutment Section of Dam B, from the intersection of the New East Wall to the existing North Wall (Headrace Structure) will be extended. The existing North Wall (Headrace Structure) will be extended from the end pier to the New East Wall. The area between these three retaining walls, Existing East Wall, New East Wall and West End of Dam B and the area North of the West End of Dam B will be excavated to the existing forebay channel bottom elevations.

4. Headrace Structure. Headrace Structure, also identified as North Wall, may or may not be demolished as an option to the Authority. If it is to be demolished, the proposed extension as stated in Item 3 will not be constructed. The removal of the North Wall (Headrace Structure) will be performed in an environmentally acceptable manner. The unit will be shut down to avoid downstream propagation of debris and sediment. The entire headrace Structure, except West End of Dam B, will be demolished in accordance to the Hydraulic Model Study Report.

5. Tailrace Channel. The existing unlined tailrace channel will be widened.

6. Switchyard. Since the existing equipment at the switchyard has ratings sufficient only to carry the power generated by the existing units, the increase in generating capacity will require a proportional increase in the switchyard's capacity. One 4.16 kV/34.5 kV transformer and associated switchgear will be added to the existing switchyard. The existing switchyard will be lengthened in a westerly direction.

7. Access Roads. A temporary bridge will be constructed across the headrace channel. Access to this bridge will be gained by an existing path which leads from the present access road and passes the existing switchyard. A temporary access road will be constructed across the area of natural ground separating the regulating structure from the headrace (Figure 2). Some fill will be required for the construction of the temporary access road. Following construction, this area will be regraded and seeded.

PLAN ELEMENTS TO CONTROL EROSION FOR UPLAND CONSTRUCTION:

1. Laydown Areas: The site will be graded and surfaced with a compacted, pervious gravel course. Any unvegetated embankment thus created will be seeded with a fast growing grass mixture once it is no longer needed for laydown or parking[3,4]. Temporary control measures such as fiber mats, hay bales, or netting may be used during construction prior to final seeding. As necessary for protection against erosion from wind and water, seeding will be supplemented by use of mulches such as hay, straw, wood chips or other similar material free of contaminants.

2. Temporary Access Roads: The temporary access road will be surfaced with compacted pervious gravel in order to minimize erosion yet provide surface drainage. Exposed embankments will be seeded with fast-growing grasses, supplemented by use of mulches such as hay, straw, wood chips or similar material.

3. Switchyard: A minimal amount of naturally occurring vegetative cover will be removed inasmuch as only a small addition to the existing yard (approximately 45 feet by 30 feet) will be needed for this project. The balance of the switchyard's surface will be covered with crushed stone to protect against erosion and provide for drainage.

[3]Where seed is needed, a minimum of 4 inches of topsoil will be in place. Where topsoil is needed it shall correspond to NYSDOT specification.

[4]Seed mixture should correspond to NYSDOT specifications and should be proportioned as follows: 30 lbs. tall fescue; 24 lbs. crown vetch; 6 lbs. birdsfoot trefoil; 15 lbs. cereal rye. Application rate should be 75 lbs. per acre plus lime and fertilizer as per Soil Conservation Service Standards.

PLAN ELEMENTS FOR WATERWAY CONSTRUCTION

1. Headrace, Powerhouse and Tailrace: Construction of the headrace, powerhouse and tailrace will be performed in the dry behind the cofferdam. Once the powerhouse and tailrace construction is completed, the cofferdams and temporary bridge will be removed.

Construction and removal of the cofferdams will be undertaken during typical periods of low flow in order to minimize impacts on water quality downstream. Dissolved oxygen and turbidity will be monitored during the construction and removal of the cofferdams. Spoil material resulting from clearing, excavation and demolition will be disposed of in an approved disposal site. Leakage water passing through the cofferdam and all water collected within the confines of the cofferdammed area will be diverted to a settling pond. Treatment will consist of retention in a settling pond sized to meet the anticipated flow rate and designed to remove particles greater than 200 mesh by gravitational settling.

III. Other Monitoring and Protection Measures

1. Use and Maintenance of Construction Equipment: Areas with steep slopes and easily erodible soils will not be traversed by construction vehicles except on the existing access road.

   Construction equipment or machinery will not be washed in any watercourse. Runoff resulting from washing operations performed on site will not be permitted to enter the river.

   Fuels, oils, chemicals, or other potentially harmful substances which might be required during clearing, construction, and restoration will be stored in a safe and secure manner. These substances will be handled and transported with care to avoid their spillage. During vehicle maintenance, refueling, and lubrication, special care will be exercised to prevent leakage, spillage, or other contamination of the soil or river.

   Refueling and lubrication of equipment will be performed away from the banks of the river. Sanitary waste facilities for workers will be supplied in accordance with the rules and regulations of the State of New York.

2. Assurance of Water: Dissolved oxygen and turbidity will be monitored above and below the construction site to ensure that changes in Water Quality are detected.

IV. Plan Implementation

Direct Implementation of the Construction Monitoring Plan will be by incorporation of plan elements into all project contracts. In addition, this document itself will be appended to construction contracts for this project.

Specifically, the contractor will be responsible for:

- Disposal of dredged material in accordance with Corps of Engineers and NYS DEC requirements as per the test results.
- Monitoring all discharge water to assure proper treatment of suspended solids, oils, and/or floatable debris.
- Inspection of each soil erosion and sediment control measure and newly seeded areas at least once per week and immediately following rainstorms and other severe meterological events which may contribute to erosion.
- Monitor dissolved oxygen and turbidity above and below the construction site twice daily and maintain logs of results, and immediately notify the NYPA Resource Manager of differences in dissolved oxygen and turbidity above and below the site.
- Maintaining a weekly log of the condition of the sediment control measures, the dates and times of inspection and any repair work necessary.
- The removal and deposit of sediment from settling pond when the capacity is reduced by 25%.
- Inspection of requirement and vehicles to assure proper maintenance.
- Insuring that sub-contractors comply with the above responsibilities.

NYPA staff will be responsible for:

- In the event of changes in water quality parameters due to construction activities, notify the City of Cohoes and the Albany County Health Department in accordance with Article 39 of the FERC license.
- Inspection of site on at least a weekly basis to ensure compliance with all environmental aspects of the plan.
- Notification to the contractor of any observed deficiencies in carrying out the construction monitoring plan.

NYPA's Resource Manager shall have authority to stop work in accordance with Authority corporate policy in the event of non-conformance to the foregoing. Such authority shall be exercised as a last resort to ensure protection of the environment.

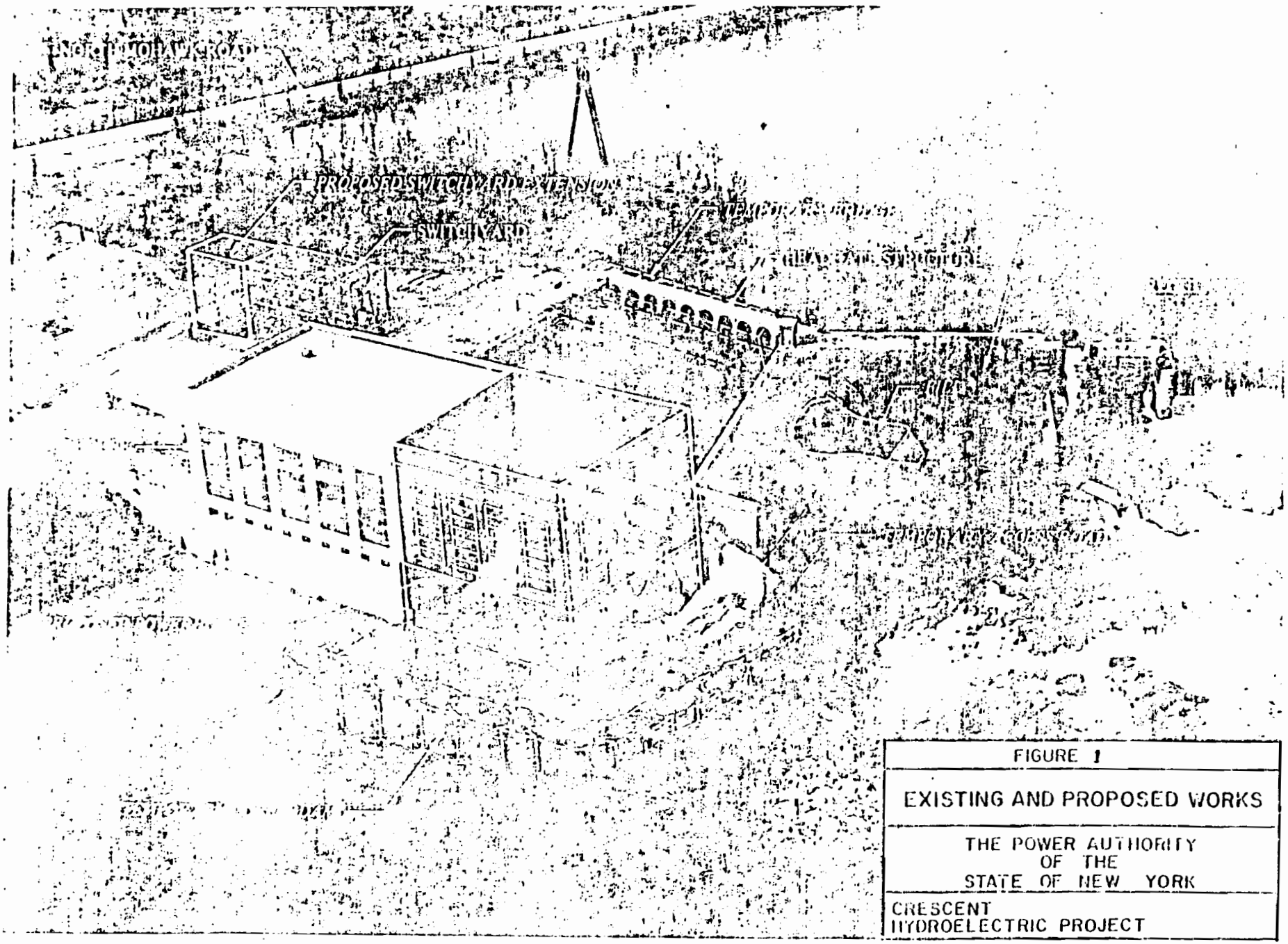


FIGURE 1

EXISTING AND PROPOSED WORKS

THE POWER AUTHORITY
OF THE
STATE OF NEW YORK

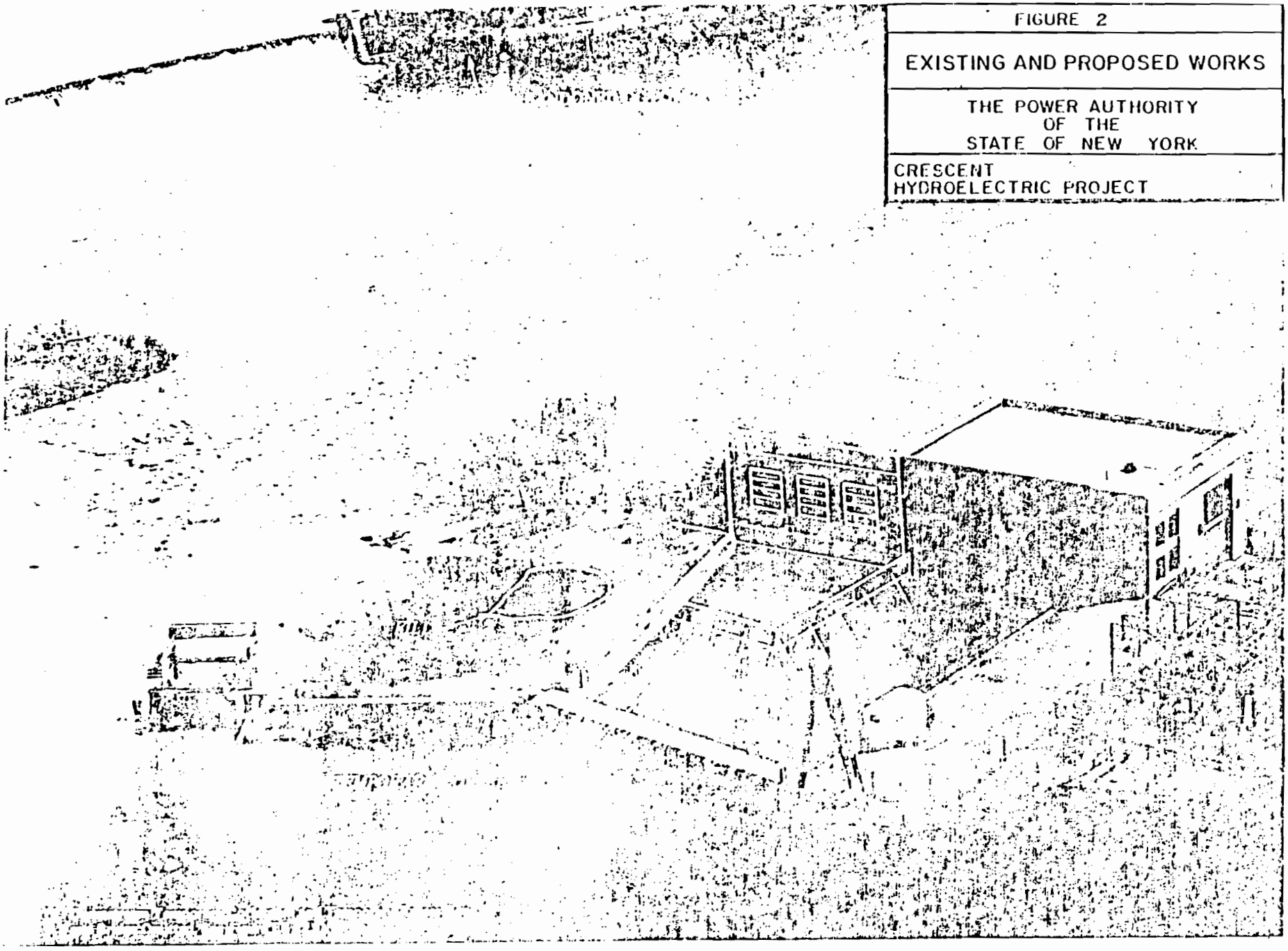
CRESCENT
HYDROELECTRIC PROJECT

FIGURE 2

EXISTING AND PROPOSED WORKS

THE POWER AUTHORITY
OF THE
STATE OF NEW YORK

CRESCENT
HYDROELECTRIC PROJECT



ANALYSIS OF SEDIMENT IN THE VICINITY OF THE CRESCENT AND VISCHER FERRY HYDROELECTRIC STATIONS

Prepared for the

Power Authority of the State of New York

by

Chas. T. Main, Inc.

February 1983

INTRODUCTION

The Power Authority of the State of New York has applied to the Federal Energy Regulatory Commission (FERC) for a license for the Vischer Ferry Hydroelectric Project (FERC Project No. 4679) and for the Crescent Hydroelectric Project (FERC Project No. 4678) on the lower Mohawk River. Pursuant to preparing these license applications, the Power Authority met with various local, state and Federal agencies to discuss their environmental concerns relative to these two projects. New York State Department of Environmental Conservation (NYS DEC) expressed concern in a letter dated 19 April 1982 about the excavation of spoil material or silt from project-related construction and stated that this excavation "... should not commence prior to the completion of a sediment analysis for heavy metals and toxic materials".

The Power Authority in consultation with NYS DEC analyzed sediment that might be affected by project construction to determine if toxic substances were present. NYS DEC provided the Power Authority with a draft of a sediment testing scheme designed for this portion of the NYS Barge Canal. This scheme is called the Flag Test, and it is designed to screen sediment samples for the presence of toxic substances. In addition to the Flag Test, the Power Authority analyzed samples for PCBs, a toxic substance reported from the sediments of many New York waters.

MATERIALS AND METHODS

Sampling Locations - An attempt to collect one bottom sediment core was made at each of four sampling locations (Figures 1 and 2).

At Vischer Ferry Dam, one location was upstream of the powerhouse (Figure 1) in an area where some sediment may be resuspended as a result of the proposed development. A second sampling location was within the proposed tailrace area below the expanded Vischer Ferry powerhouse. Material from this area would be excavated to construct the expanded tailrace.

At Crescent Dam, a location within the powerhouse headrace was sampled because excavation from this area would be required during construction (Figure 2). Access to this area for sampling was limited to the crosswalk immediately upstream of the proposed powerhouse and the retaining wall perpendicular to the proposed powerhouse because the headgate excluded boats from the head race. Sampling was also done within the proposed tailrace area below the expanded powerhouse. The substrate in the proposed tailrace area consisted of rock outcroppings, cobbles, and rock chips so no sample could be obtained. A sediment core was obtained instead from a site adjacent to the existing tailrace along the southern shore, approximately 50 feet downstream of the existing powerhouse (Figure 2).

Sampling Methodology - Sediment samples were collected with a 75-in. (190 cm) by 4-in. (10 cm) polycarbonate-lined gravity coring device

weighing approximately 75 pounds (34 kg). The coring device was deployed either from a boat at the Vischer Ferry sites or from shore at the Crescent sites. If rock or concrete was encountered by the coring device, additional (5 to 30) attempts were made throughout the designated sampling area (See Figures 1 and 2) to obtain a sediment sample. If the substrate throughout the sampling area was hard and devoid of sediment, no sample could be obtained. After collection, sediment samples were placed in pre-cleaned glass containers, placed on ice and transported directly to Ecological Analysts' analytical laboratory.

Laboratory Methodology - Analysis of chemical parameters followed testing methodologies prescribed by the United States Environmental Protection Agency (US EPA) (Table 1). For determination of chromium, copper, lead, silver and zinc, samples underwent nitric acid digestion prior to direct aspiration into the atomic absorption unit.

A representative sediment sample was obtained by spreading the contents of the core on a glass plate, mixing it thoroughly with a Teflon spatula, and removing the appropriate amount required for each analysis. For the particulate size distribution analysis, the sediment was passed through a #200 sieve of the Wentworth sieve series. If the percentage passing through the sieve was equal to or greater than 30%, a hydrometer test was done to determine what percentage of the sediment was silt (particle size finer than 0.05mm in diameter).

Evaluation Criteria - The NYS DEC Flag Test for this portion of the Mohawk River involves separate analyses for volatile solids, oil and

TABLE 1

METHODOLOGIES USED TO ANALYZE SEDIMENTS COLLECTED AT THE CRESCENT/VISCHER FERRY SITES

Parameter	Method	Detection Limit	Reference
Volatile Solids	Gravimetric (550 C)	0.01%	EPA (1979)
Oil and Grease	Extraction - Infrared Spectrophotometry	150 ppm	EPA (1979)
Total Polychlorinated Biphenyls	Electron Capture Gas Chromatography	0.002 ppm	EPA (1980)
Particle Size Distribution	Sieve/Hydrometer Analysis	1%	ASTM (1980)
Arsenic	Gaseous Hydride Atomic Absorption	0.3 ppm	EPA (1980)
Cadmium	Furnace Technique Atomic Absorption	0.01 ppm	EPA (1980)
Chromium	Direct Aspiration Atomic Absorption Following Nitric Acid Digestion	0.5 ppm	EPA (1980)
Copper	"	0.5 ppm	EPA (1980)
Lead	"	10 ppm	EPA (1980)
Silver	"	2 ppm	EPA (1980)
Zinc	"	0.4 ppm	EPA (1980)
Mercury	Cold Vapor Atomic Absorption	0.01 ppm	EPA (1980)

REFERENCES:

American Society for Testing and Materials. 1980. Annual Book of ASTM Standards, Part 19. ASTM, Philadelphia, PA.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes.

TABLE 2

FLAG TEST AND PCB EVALUATION OF SEDIMENT SAMPLES OBTAINED DURING ENVIRONMENTAL STUDIES AT THE CRESCENT AND VISCHER FERRY SITES

			Sampling Location				
Parameter	Units	Flag Test Criteria	Vischer Ferry Spoil Area	Vischer Ferry Tailrace Area	Crescent Headrace Area	Proposed Crescent Tailrace Area	Adjacent to Existing Tailrace Area
Volatile Solids	%	<6	3.78	Substrate impenetrable; no sediments collected	Substrate impenetrable; no sediments collected	Substrate impenetrable no sediments collected	0.89
Oil and Grease	ppm	<10,000(1)	<150				<150
Zinc	ppm	<200(1)	1.0				0.4
Passing through #200 sieve	%	<30	78(2)				3.4
Finer than 0.05 mm	%	<20	53(2)				N/A
Total PCB's	ppm	<1(3)	0.25				0.03

(1) Flag test criteria reported in mg/l, which is equivalent to ppm.

(2) Failure to pass criteria based on particle size; further chemical analysis required (see Table 3).

(3) PCB's are not part of the Flag Test; NYS DEC Proposed Guidelines Regarding Contaminated Hudson River Sed[illegible]ents (1979) consider PCB sediment concentrations <1 ppm sufficient only to exercise precautions normal to [illegible]ent [illegible]so [illegible]unc[illegible]minated dredge spoil disposal.

grease, zinc and sediment grain size. If a sediment sample had values lower than the five criteria for the Flag Test (Table 2), then this material was considered nonpolluted. If the limits were exceeded for any three of the four criteria, then the sample would undergo further testing and classification using the more extensive Great Lakes Criteria for sediments. If a sediment sample failed only the Flag Test criterion for sediment grain size, this indicated that the sample contained a significant portion of silt, and NYS DEC requested that such samples be tested for seven heavy metals: cadmium, chromium, lead, arsenic, copper, silver and mercury.

In addition to the Flag Test, sediments were also analyzed for PCBs. Concentrations were evaluated according to NYS DEC guidelines proposed for contaminated Hudson River sediments in 1979. These criteria state that at PCB concentrations less than 1 ppm, precautions normal to environmentally sound spoil disposal are sufficient unless extremely large quantities are to be dredged. Above a PCB concentration of 1 ppm, various precautions are to be taken for disposal of these sediments.

RESULTS AND DISCUSSION

At the Vischer Ferry site, a sediment sample was obtained from one of the two sampling areas. The area below the proposed powerhouse is rock and no sediment sample could be obtained. A sediment sample was obtained at the spoil area above the dam. The depth of the core was approximately 12-in. (30 cm). Concentrations of volatile solids, oil and grease, and zinc in this sample were below the Flag Test criteria (Table 2), but the sample failed to pass the sediment size criteria. Further analysis for heavy metals indicated that the sediment was nonpolluted in terms of all tested parameters (Table 3) based on US EPA guidelines for the classification of Great Lakes harbor sediments. The concentration of total PCBs was below 1 ppm (Table 2).

The substrate within the headrace and below the proposed tailrace of the Crescent powerhouse was impenetrable to the coring device and no sediment was obtained after repeated attempts. At the sampling site below the proposed powerhouse at Crescent, 95% of the substrate was exposed. The exposed substrate did not contain sediment; it consisted of rock outcroppings, cobbles and rock chips. A 7-in. (18 cm) core of sediment was obtained from the alternative sampling location below the Crescent powerhouse. The analysis of this sediment passed the Flag Test for all parameters including sediment particle size (Table 2). The analysis indicated that the sediment was not polluted by PCBs (Table 2).

The present study indicates that toxic substances will not be of concern relative to construction of the Vischer Ferry and Crescent

TABLE 3

SEDIMENT ANALYSIS FOR HEAVY METALS OF CONCERN TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AT THE VISCHER FERRY SPOIL AREA, 1982

Parameter	Sediment Concentration (ppm)	Pollutional Classification[1]	Criteria for Pollutional Classification (ppm)
Arsenic	0.48	Nonpolluted	<3
Cadmium	<0.01	Not heavily polluted[2]	>6[2]
Chromium	1.52	Nonpolluted	<25
Copper	5.73	Nonpolluted	<25
Lead	<10	Nonpolluted	<40
Mercury	0.2	Nonpolluted	<1
Silver	<2.1	(3)	
Zinc	1.0	Nonpolluted	<90

(1) Source: US EPA (1982) Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments

(2) Lower limits not established; values exceeding 6 ppm are considered heavily polluted.

(3) Guidelines do not address silver

Hydroelectric Projects. Areas to be excavated contained no sediment which might accumulate toxic substances. Furthermore, sediments in the vicinity of the proposed project can be considered nonpolluted because they pass the NYS DEC Flag Test criteria for sediments and they are below the NYS DEC standard for PCB contamination.

CONSTRUCTION MONITORING PLAN

for

VISCHER FERRY HYDROELECTRIC PROJECT

in conformance with

FERC LICENSE NO. 4679

by

POWER AUTHORITY OF THE
STATE OF NEW YORK
10 Columbus Circle
New York, New York 10019

INTRODUCTION

The following has been developed to fulfill the requirements of Article 38 of FERC License No. 4679, which requires the licensee to develop a plan to:

> "(1) assess the occurrence of heavy metals and toxic substances in the Mohawk River in the project area; (2) minimize input to the Mohawak River of inorganic sediments and any potential toxic substances resulting from dredging, constructing, and operating project facilities; (3) safely dispose of any toxic substances discovered; and (4) adequately dispose of spoils resulting from project construction."

The plan is divided into four sections as follows:

I. Sampling and Testing of Sediments.
II. Soil Erosion and Sediment Control Measures.
III. Other Monitoring and Control Measures.
IV. Plan Implementation.

I. Sampling and Testing of Sediments

In the course of the feasibility studies and license application preparation for the Vischer Ferry Project, sediments were analyzed in the vicinity of the Vischer Ferry Station. The report summarizing this sampling and analysis effort is given in Attachment A. The results indicated that little sediment was present in the areas to be excavated, and that the few sediment samples obtained and analyzed were not polluted.

II. Soil Erosion and Sediment Control Measures

Aspects of the project which are of potential concern with regard to soil erosion and sediment control are given below:

PROJECT ELEMENTS:

1. Cofferdam. A cellular cofferdam will extend from the southwestern corner of the existing powerhouse to the area downstream of the north abutment of Dam F. Figures 1 and 2 depict the conceptual design of this cofferdam. The final design will be completed by the Contractor.

2. Powerhouse. The brick wall at the western end of the existing powerhouse will be removed and a streamward addition to the present powerhouse will be constructed. The proposed addition will follow the same alignment and be of the same width as the existing powerhouse.

3. Headrace. A new longitudinal regulating structure, joining the end of the spillway and the powerhouse addition, will be constructed. The existing regulating structure will be removed in an environmentally acceptable manner.

4. Tailrace Channel. The existing unlined tailrace channel will be extended and widened involving excavation of rock.

5. Switchyard. Since the existing equipment at the switchyard has ratings sufficient only to carry the power generated by the existing units, the increase in generating capacity will require a proportional increase in the substation's capacity and size.

6. Access Roads. During construction, access to the cofferdam area will be across a temporary bridge which will span the existing tailrace, linking the riverbank and cofferdam. A temporary access road will be built to link the existing access road and the temporary bridge. The radius of the curve in the permanent access road will be increased and the road will be resurfaced.

PLAN ELEMENTS TO CONTROL EROSION FOR UPLAND CONSTRUCTION:

1. Laydown Areas: Erosion will be minimized by limiting vegetative removal to approximately 100 feet by 40 feet in a fairly level area. The site will be graded and surfaced with a compacted, pervious gravel course. Any unvegetated embankment thus created will be seeded with a fast growing grass mixture once it is no longer needed for laydown or parking[3,4]. Temporary control such as fiber mats, hay bales, or netting may be used during construction prior to final seeding. As necessary for protection against erosion from wind and water, seeding will be supplemented by use of mulches such as hay, straw, wood chips or other similar material free of contaminants.

2. Access Roads: Removal of vegetative cover will be kept to a minimum. Runoff from paved surfaces will be recharged via percolation on the roadway embankments. Naturally occurring vegetative cover will be supplemented as necessary by planting of grasses which will provide erosion control on the vegetated and/or mulched embankments.

3. Temporary Haul Roads: The temporary haul roads will be surfaced with compacted pervious gravel in order to minimize erosion yet provide surface drainage. Exposed embankments will be seeded with the fast-growing grasses, supplemented by use of mulches such as hay, straw, wood chips or other similar material.

4. Switchyard: A minimal amount of naturally occurring vegetative cover will be removed inasmuch as only a small addition to the existing yard will be needed for this project. The balance of the switchyard's surface will be covered with crushed stone to protect against erosion and provide for drainage.

PLAN ELEMENTS FOR WATERWAY CONSTRUCTION

1. Headrace, Powerhouse and Tailrace: Construction of the headrace, powerhouse and tailrace will be performed in the dry behind a temporary cofferdam. During the construction of the new headrace and upstream powerhouse wall, the cofferdam will be extended to the dam.

   The cellular cofferdam will be extended to meet the new wall forming the headrace. The sandbag section will be removed and discharges will then be accommodated by the new gated openings. Once the powerhouse and tailrace construction is completed, the cofferdam and temporary bridge will be removed.

   Construction and removal of the cofferdams will be undertaken during typical periods of low flow in order to minimize impacts on water quality downstream. Dissolved oxygen and turbidity will be monitored during the construction and removal of the cofferdams.

   Leakage water passing through the cofferdam and all water collected within the confines of the cofferdammed area will be diverted to a settling pond. Treatment will consist of retention in a settling pond sized to meet the anticipated flow rate and designed to remove particles greater than 200 mesh by gravitational settling.

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[3]Where seed is needed, a minimum of 4 inches of topsoil will be in place. Where topsoil is needed it shall correspond to NYSDOT specification.

[4]Seed mixture should correspond to NYSDOT specifications and should be proportioned as follows: 30 lbs. tall fescue; 24 lbs. crown vetch; 6 lbs. birdsfoot trefoil; 15 lbs. cereal rye. Application rate should be 75 lbs. per acre plus lime and fertilizer as per Soil Conservation Service Standards.

III. Other Monitoring and Protection Measures

1. Use and Maintenance of Construction Equipment: Areas with steep slopes and easily erodible soils will not be traversed by construction vehicles except on the existing access road.

   Construction equipment or machinery will not be washed in any watercourse. Runoff resulting from washing operations performed on site will not be permitted to enter the river.

   Fuels, oils, chemicals, or other potentially harmful substances which might be required during clearing, construction, and restoration will be stored in a safe and secure manner. These substances will be handled and transported with care to avoid their spillage. During vehicle maintenance, refueling, and lubrication, special care will be exercised to prevent leakage, spillage, or other contamination of the soil or river.

2. Assurance of Water Quality for Latham Water District: Dissolved oxygen and turbidity will be monitored above and below the construction site to ensure that changes in Water Quality are detected.

IV. Plan Implementation

Direct Implementation of the Construction Monitoring Plan will be by incorporation of plan elements into all project contracts. In addition, this document itself will be appended to construction contracts for this project.

Specifically, the contractor will be responsible for:

- Disposal of dredged material in accordance with Corps of Engineers and NYS DEC requirements as per the test results.
- Monitoring all discharge water to assure proper treatment of suspended solids, oils, and/or floatable debris.
- Inspection of each soil erosion and sediment control measure and newly seeded areas at least once per week and immediately following rainstorms and other severe meterological events which may contribute to erosion.
- Monitor dissolved oxygen and turbidity above and below the construction site twice daily and maintain logs of results, and immediately notify the NYPA Resource Manager of differences in dissolved oxygen and turbidity above and below the site.

- o Maintaining a weekly log of the condition of the sediment control measures, the dates and times of inspection and any repair work necessary.

- o The removal and deposit of sediment from settling pond when the capacity is reduced by 25%.

- o Inspection of requirement and vehicles to assure proper maintenance.

- o Insuring that subcontractors comply with the above responsibilities.

NYPA staff will be responsible for:

- o Inspection of site on at least a weekly basis to ensure compliance with all environmental aspects of the plan.

- o Notification to the contractor of any observed deficiencies in carrying out the construction monitoring plan.

In the event of changes in water quality parameters due to construction activities, notify the Latham Water District and the Albany County Health Department.

NYPA's Resource Manager shall have authority to stop work in accordance with Authority corporate policy in the event of non-conformance to the foregoing. Such authority shall be exercised as a last resort to ensure protection of the environment.

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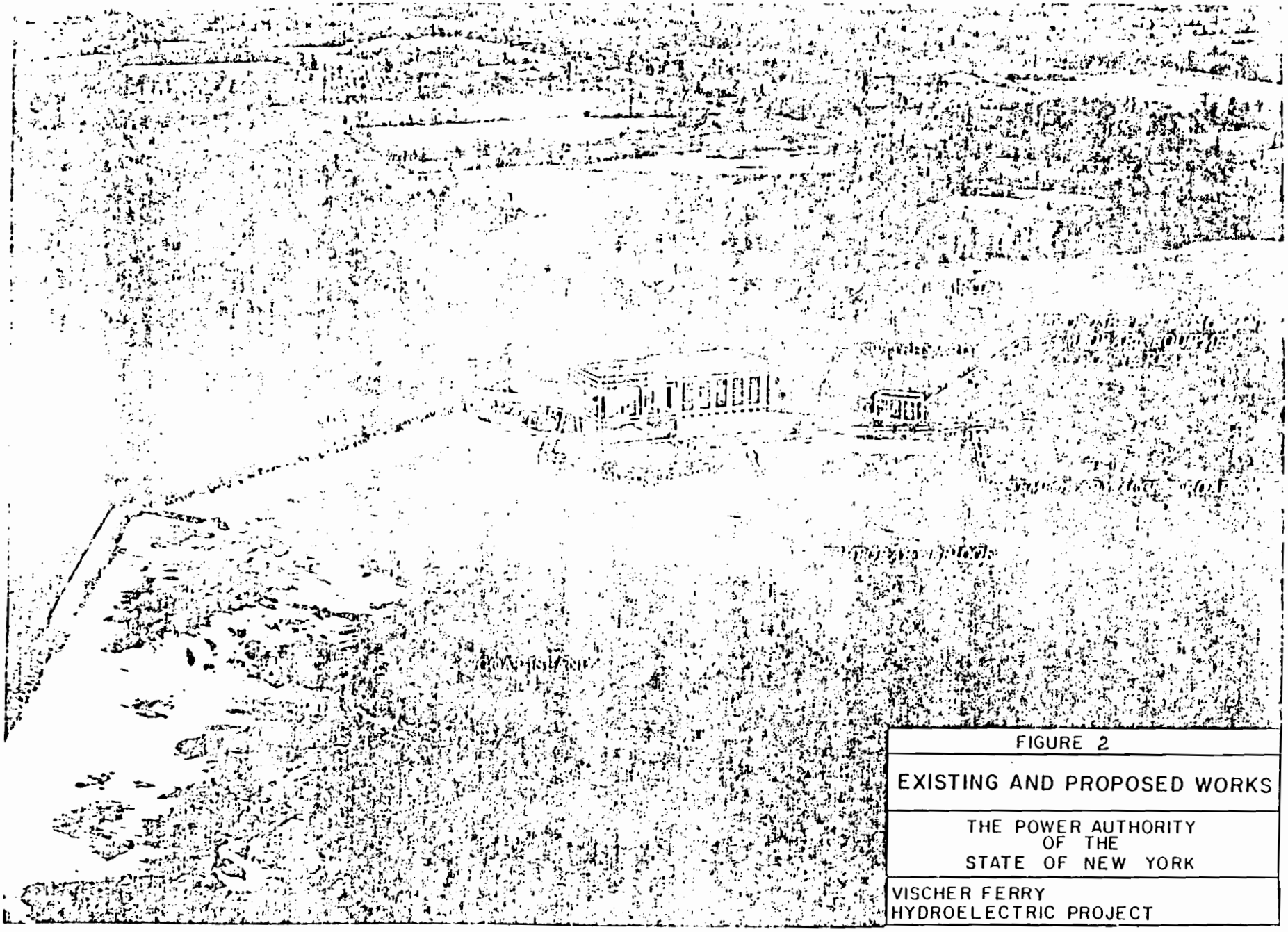


FIGURE 2

EXISTING AND PROPOSED WORKS

THE POWER AUTHORITY
OF THE
STATE OF NEW YORK

VISCHER FERRY
HYDROELECTRIC PROJECT

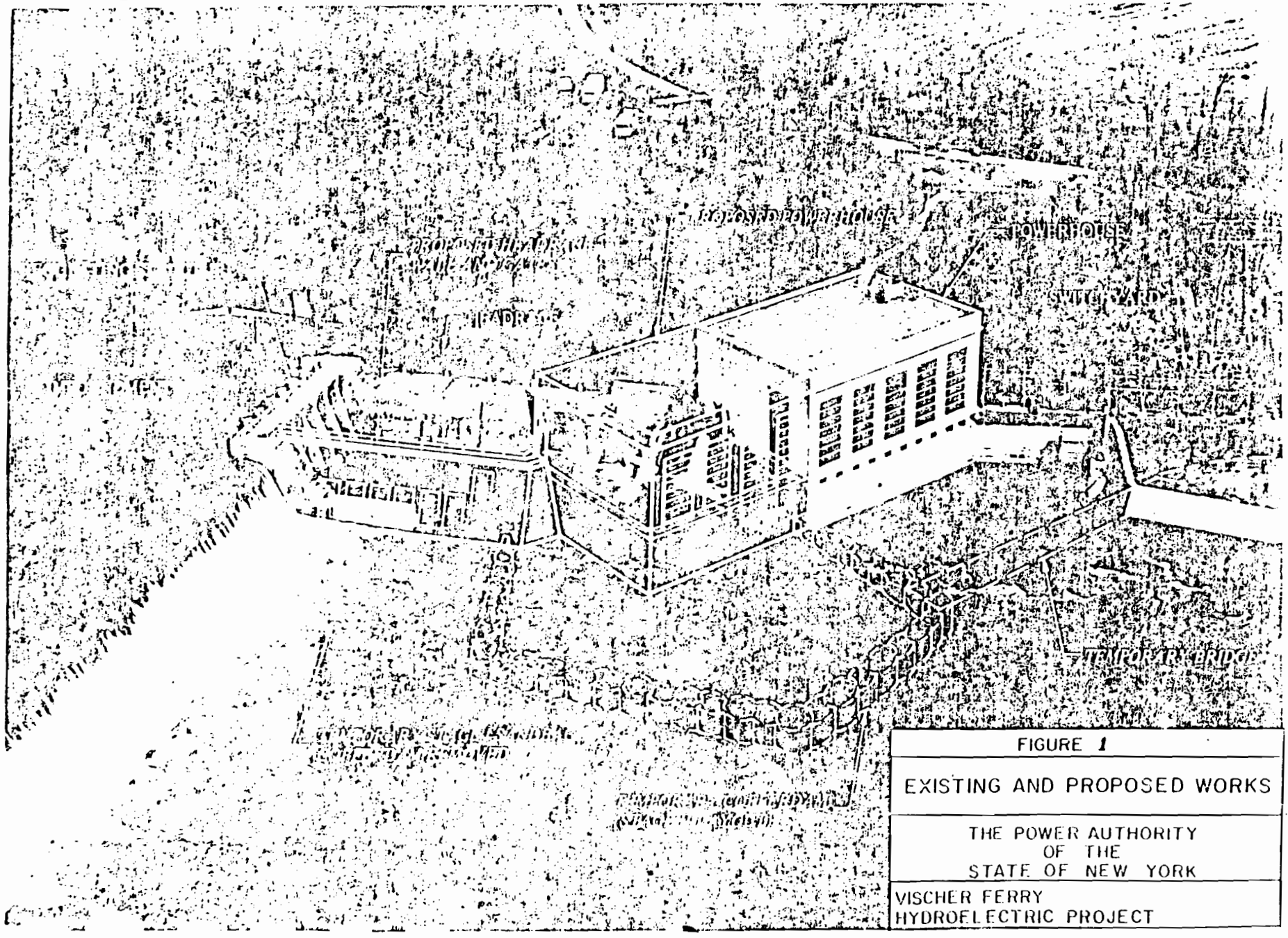


FIGURE 1

EXISTING AND PROPOSED WORKS

THE POWER AUTHORITY
OF THE
STATE OF NEW YORK

VISCHER FERRY
HYDROELECTRIC PROJECT

ANALYSIS OF SEDIMENT IN THE VICINITY OF THE CRESCENT AND VISCHER FERRY HYDROELECTRIC STATIONS

Prepared for the

Power Authority of the State of New York

by

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INTRODUCTION

The Power Authority of the State of New York has applied to the Federal Energy Regulatory Commission (FERC) for a license for the Vischer Ferry Hydroelectric Project (FERC Project No. 4679) and for the Crescent Hydroelectric Project (FERC Project No. 4678) on the lower Mohawk River. Pursuant to preparing these license applications, the Power Authority met with various local, state and Federal agencies to discuss their environmental concerns relative to these two projects. New York State Department of Environmental Conservation (NYS DEC) expressed concern in a letter dated 19 April 1982 about the excavation of spoil material or silt from project-related construction and stated that this excavation "... should not commence prior to the completion of a sediment analysis for heavy metals and toxic materials".

The Power Authority in consultation with NYS DEC analyzed sediment that might be affected by project construction to determine if toxic substances were present. NYS DEC provided the Power Authority with a draft of a sediment testing scheme designed for this portion of the NYS Barge Canal. This scheme is called the Flag Test, and it is designed to screen sediment samples for the presence of toxic substances. In addition to the Flag Test, the Power Authority analyzed samples for PCBs, a toxic substance reported from the sediments of many New York waters.

MATERIALS AND METHODS

Sampling Locations - An attempt to collect one bottom sediment core was made at each of four sampling locations (Figures 1 and 2).

At Vischer Ferry Dam, one location was upstream of the powerhouse (Figure 1) in an area where some sediment may be resuspended as a result of the proposed development. A second sampling location was within the proposed tailrace area below the expanded Vischer Ferry powerhouse. Material from this area would be excavated to construct the expanded tailrace.

At Crescent Dam, a location within the powerhouse headrace was sampled because excavation from this area would be required during construction (Figure 2). Access to this area for sampling was limited to the crosswalk immediately upstream of the proposed powerhouse and the retaining wall perpendicular to the proposed powerhouse because the headgate excluded boats from the head race. Sampling was also done within the proposed tailrace area below the expanded powerhouse. The substrate in the proposed tailrace area consisted of rock outcroppings, cobbles, and rock chips so no sample could be obtained. A sediment core was obtained instead from a site adjacent to the existing tailrace along the southern shore, approximately 50 feet downstream of the existing powerhouse (Figure 2).

Sampling Methodology - Sediment samples were collected with a 75-in. (190 cm) by 4-in. (10 cm) polycarbonate-lined gravity coring device

weighing approximately 75 pounds (34 kg). The coring device was deployed either from a boat at the Vischer Ferry sites or from shore at the Crescent sites. If rock or concrete was encountered by the coring device, additional (5 to 30) attempts were made throughout the designated sampling area (See Figures 1 and 2) to obtain a sediment sample. If the substrate throughout the sampling area was hard and devoid of sediment, no sample could be obtained. After collection, sediment samples were placed in pre-cleaned glass containers, placed on ice and transported directly to Ecological Analysts' analytical laboratory.

Laboratory Methodology - Analysis of chemical parameters followed testing methodologies prescribed by the United States Environmental Protection Agency (US EPA) (Table 1). For determination of chromium, copper, lead, silver and zinc, samples underwent nitric acid digestion prior to direct aspiration into the atomic absorption unit.

A representative sediment sample was obtained by spreading the contents of the core on a glass plate, mixing it thoroughly with a Teflon spatula, and removing the appropriate amount required for each analysis. For the particulate size distribution analysis, the sediment was passed through a #200 sieve of the Wentworth sieve series. If the percentage passing through the sieve was equal to or greater than 30%, a hydrometer test was done to determine what percentage of the sediment was silt (particle size finer than 0.05mm in diameter).

Evaluation Criteria - The NYS DEC Flag Test for this portion of the Mohawk River involves separate analyses for volatile solids, oil and

TABLE 1

METHODOLOGIES USED TO ANALYZE SEDIMENTS COLLECTED AT THE CRESCENT/VISCHER FERRY SITES

Parameter	Method	Detection Limit	Reference
Volatile Solids	Gravimetric (550 C)	0.01%	EPA (1979)
Oil and Grease	Extraction - Infrared Spectrophotometry	150 ppm	EPA (1979)
Total Polychlorinated Biphenyls	Electron Capture Gas Chromatography	0.002 ppm	EPA (1980)
Particle Size Distribution	Sieve/Hydrometer Analysis	1%	ASTM (1980)
Arsenic	Gaseous Hydride Atomic Absorption	0.3 ppm	EPA (1980)
Cadmium	Furnace Technique Atomic Absorption	0.01 ppm	EPA (1980)
Chromium	Direct Aspiration Atomic Absorption Following Nitric Acid Digestion	0.5 ppm	EPA (1980)
Copper	"	0.5 ppm	EPA (1980)
Lead	"	10 ppm	EPA (1980)
Silver	"	2 ppm	EPA (1980)
Zinc	"	0.4 ppm	EPA (1980)
Mercury	Cold Vapor Atomic Absorption	0.01 ppm	EPA (1980)

REFERENCES:

American Society for Testing and Materials. 1980. Annual Book of ASTM Standards, Part 19. ASTM, Philadelphia, PA.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes. US EPA, Cincinnati, OH.

TABLE 2

FLAG TEST AND PCB EVALUATION OF SEDIMENT SAMPLES OBTAINED DURING ENVIRONMENTAL STUDIES AT THE CRESCENT AND VISCHER FERRY SITES

			Sampling Location				
Parameter	Units	Flag Test Criteria	Vischer Ferry Spoil Area	Vischer Ferry Tailrace Area	Crescent Headrace Area	Proposed Crescent Tailrace Area	Adjacent to Existing Tailrace Area
Volatile Solids	%	<6	3.78	Substrate impenetrable; no sediments collected	Substrate impenetrable; no sediments collected	Substrate impenetrable no sediments collected	0.89
Oil and Grease	ppm	<10,000(1)	<150				<150
Zinc	ppm	<200(1)	1.0				0.4
Passing through #200 sieve	%	<30	78(2)				3.4
Finer than 0.05 mm	%	<20	53(2)				N/A
Total PCB's	ppm	<1(3)	0.25				0.03

(1) Flag test criteria reported in mg/l, which is equivalent to ppm.

(2) Failure to pass criteria based on particle size; further chemical analysis required (see Table 3).

(3) PCB's are not part of the Flag Test; NYS DEC Proposed Guidelines Regarding Contaminated Hudson River Sediments (197_) consider PCB sediment concentrations <1 ppm sufficient only to exercise precautions normal to environmentally sound uncontaminated dredge spoil disposal.

grease, zinc and sediment grain size. If a sediment sample had values lower than the five criteria for the Flag Test (Table 2), then this material was considered nonpolluted. If the limits were exceeded for any three of the four criteria, then the sample would undergo further testing and classification using the more extensive Great Lakes Criteria for sediments. If a sediment sample failed only the Flag Test criterion for sediment grain size, this indicated that the sample contained a significant portion of silt, and NYS DEC requested that such samples be tested for seven heavy metals: cadmium, chromium, lead, arsenic, copper, silver and mercury.

In addition to the Flag Test, sediments were also analyzed for PCBs. Concentrations were evaluated according to NYS DEC guidelines proposed for contaminated Hudson River sediments in 1979. These criteria state that at PCB concentrations less than 1 ppm, precautions normal to environmentally sound spoil disposal are sufficient unless extremely large quantities are to be dredged. Above a PCB concentration of 1 ppm, various precautions are to be taken for disposal of these sediments.

RESULTS AND DISCUSSION

At the Vischer Ferry site, a sediment sample was obtained from one of the two sampling areas. The area below the proposed powerhouse is rock and no sediment sample could be obtained. A sediment sample was obtained at the spoil area above the dam. The depth of the core was approximately 12-in. (30 cm). Concentrations of volatile solids, oil and grease, and zinc in this sample were below the Flag Test criteria (Table 2), but the sample failed to pass the sediment size criteria. Further analysis for heavy metals indicated that the sediment was nonpolluted in terms of all tested parameters (Table 3) based on US EPA guidelines for the classification of Great Lakes harbor sediments. The concentration of total PCBs was below 1 ppm (Table 2).

The substrate within the headrace and below the proposed tailrace of the Crescent powerhouse was impenetrable to the coring device and no sediment was obtained after repeated attempts. At the sampling site below the proposed powerhouse at Crescent, 95% of the substrate was exposed. The exposed substrate did not contain sediment; it consisted of rock outcroppings, cobbles and rock chips. A 7-in. (18 cm) core of sediment was obtained from the alternative sampling location below the Crescent powerhouse. The analysis of this sediment passed the Flag Test for all parameters including sediment particle size (Table 2). The analysis indicated that the sediment was not polluted by PCBs (Table 2).

The present study indicates that toxic substances will not be of concern relative to construction of the Vischer Ferry and Crescent

TABLE 3

SEDIMENT ANALYSIS FOR HEAVY METALS OF CONCERN TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION AT THE VISCHER FERRY SPOIL AREA, 1982

Parameter	Sediment Concentration (ppm)	Pollutional Classification[1]	Criteria for Pollutional Classification (ppm)
Arsenic	0.48	Nonpolluted	<3
Cadmium	<0.01	Not heavily polluted[2]	>6[2]
Chromium	1.52	Nonpolluted	<25
Copper	5.73	Nonpolluted	<25
Lead	<10	Nonpolluted	<40
Mercury	0.2	Nonpolluted	<1
Silver	<2.1	(3)	
Zinc	1.0	Nonpolluted	<90

(1) Source: US EPA (1982) Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments

(2) Lower limits not established; values exceeding 6 ppm are considered heavily polluted.

(3) Guidelines do not address silver

Hydroelectric Projects. Areas to be excavated contained no sediment which might accumulate toxic substances. Furthermore, sediments in the vicinity of the proposed project can be considered nonpolluted because they pass the NYS DEC Flag Test criteria for sediments and they are below the NYS DEC standard for PCB contamination.

APPENDIX D: Flow Duration Curves

Figure D-1: Annual Flow Duration Curve for the Crescent Project

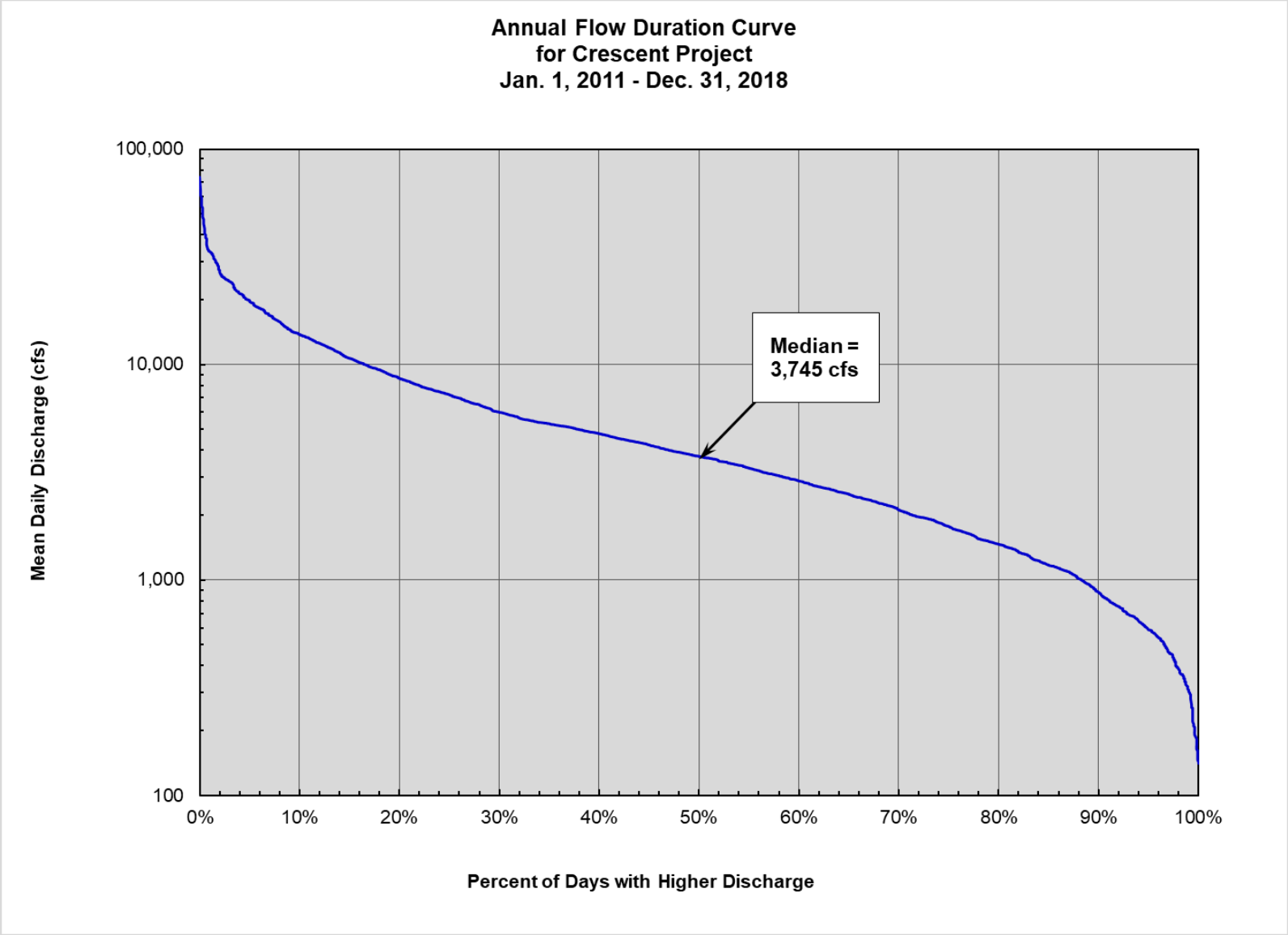


Figure D-2: Monthly Flow Duration Curve for the Crescent Project – January

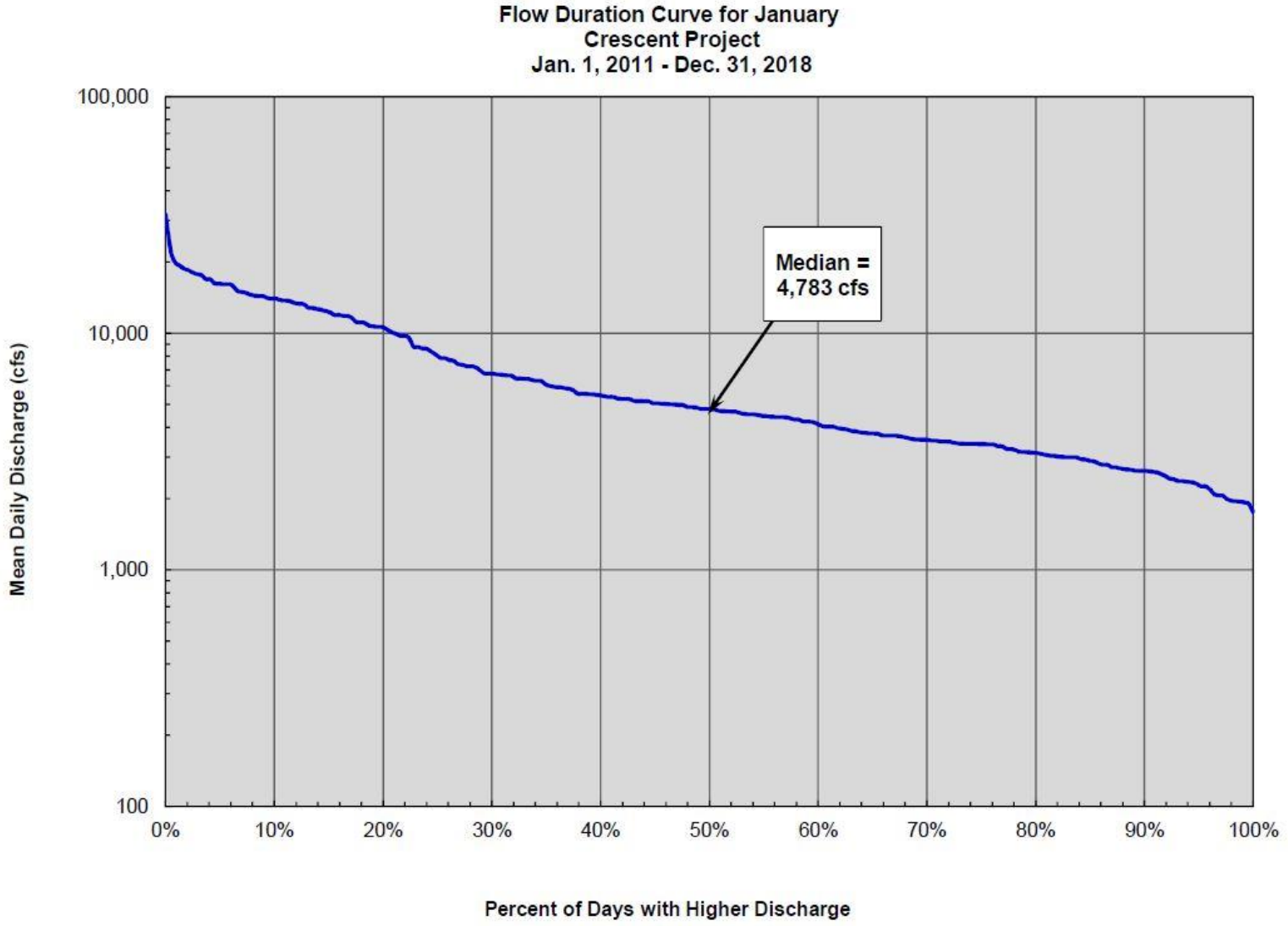


Figure D-3: Monthly Flow Duration Curve for the Crescent Project – February

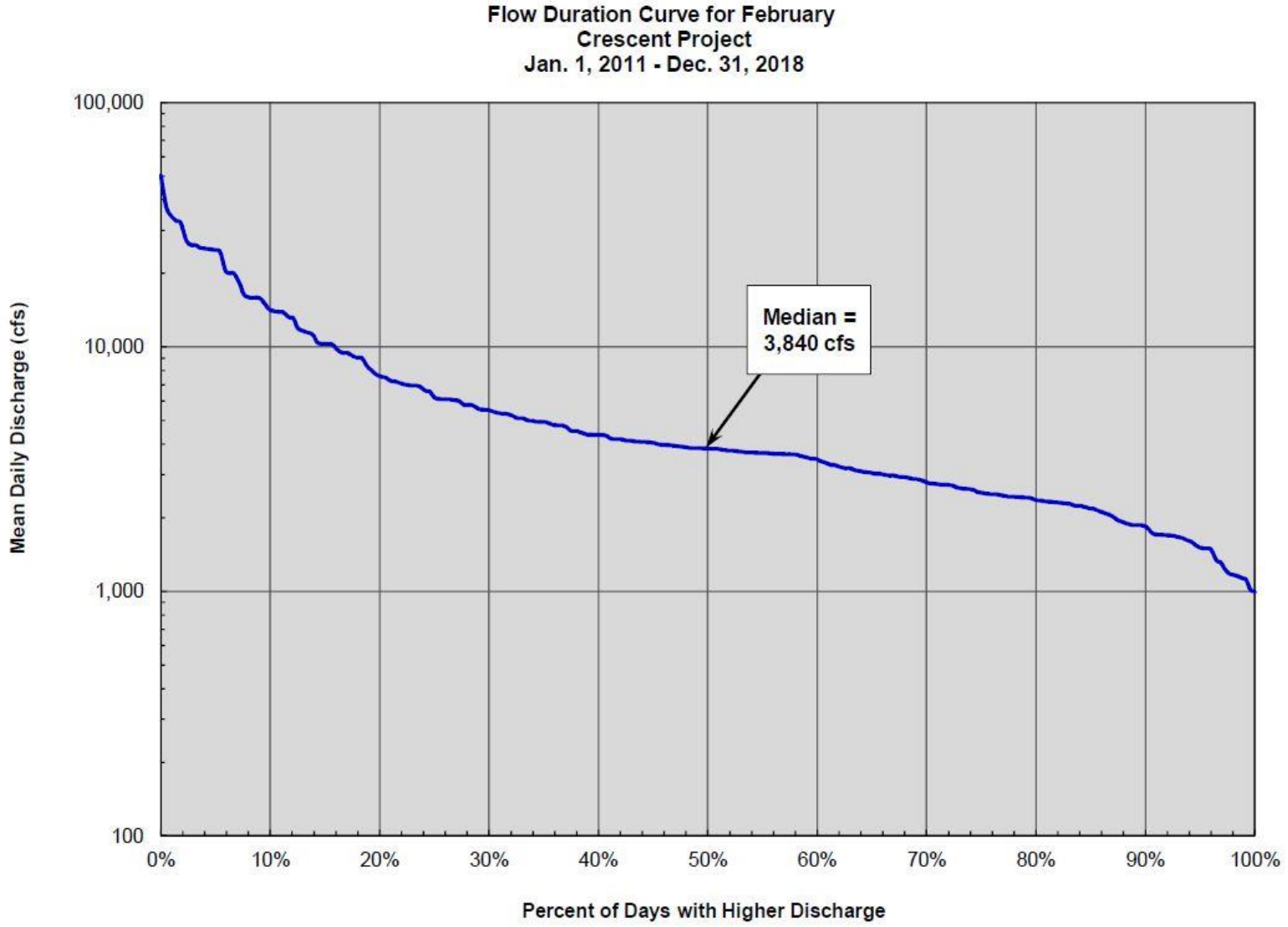


Figure D-4: Monthly Flow Duration Curve for the Crescent Project – March

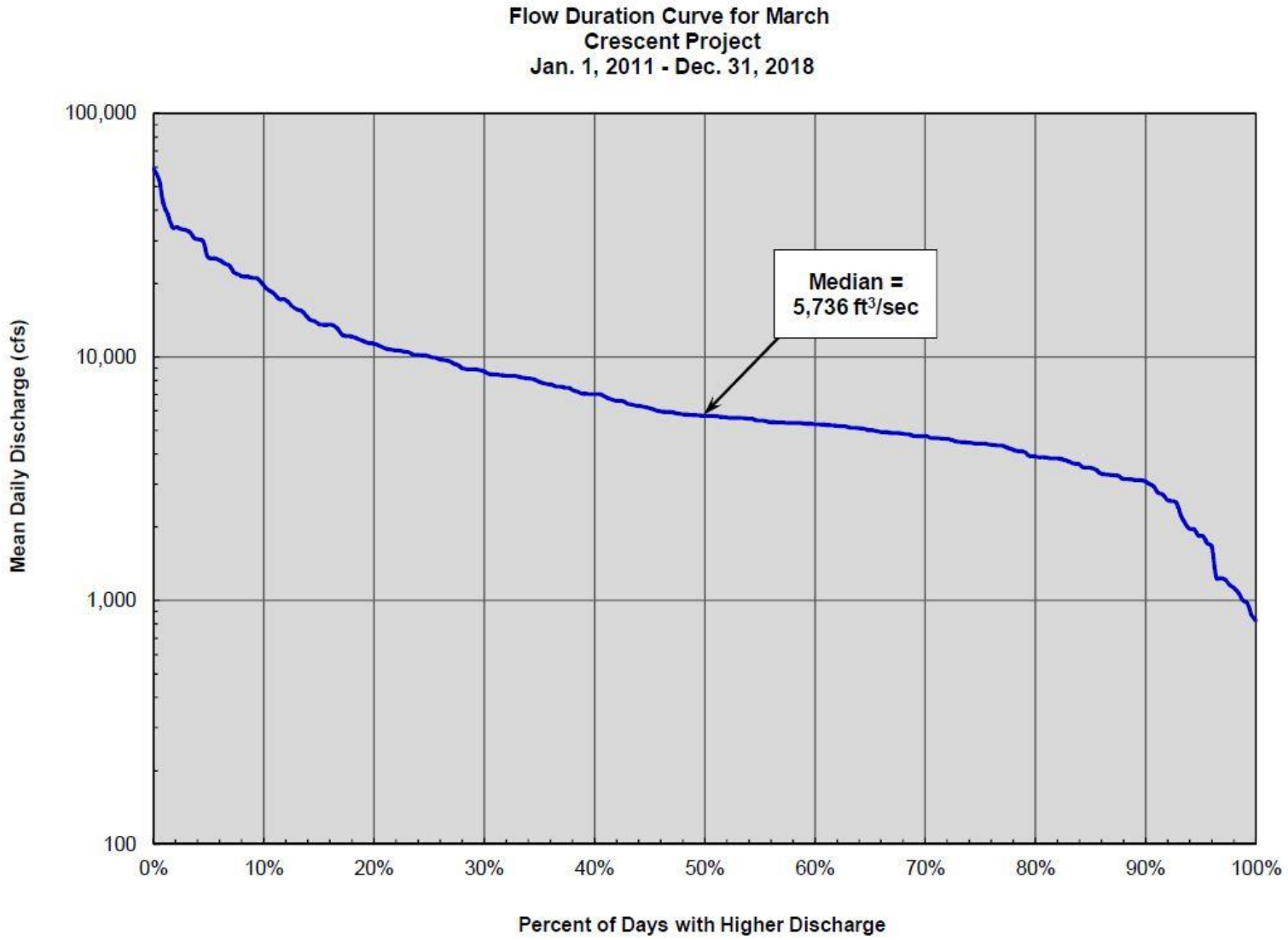


Figure D-5: Monthly Flow Duration Curve for the Crescent Project – April

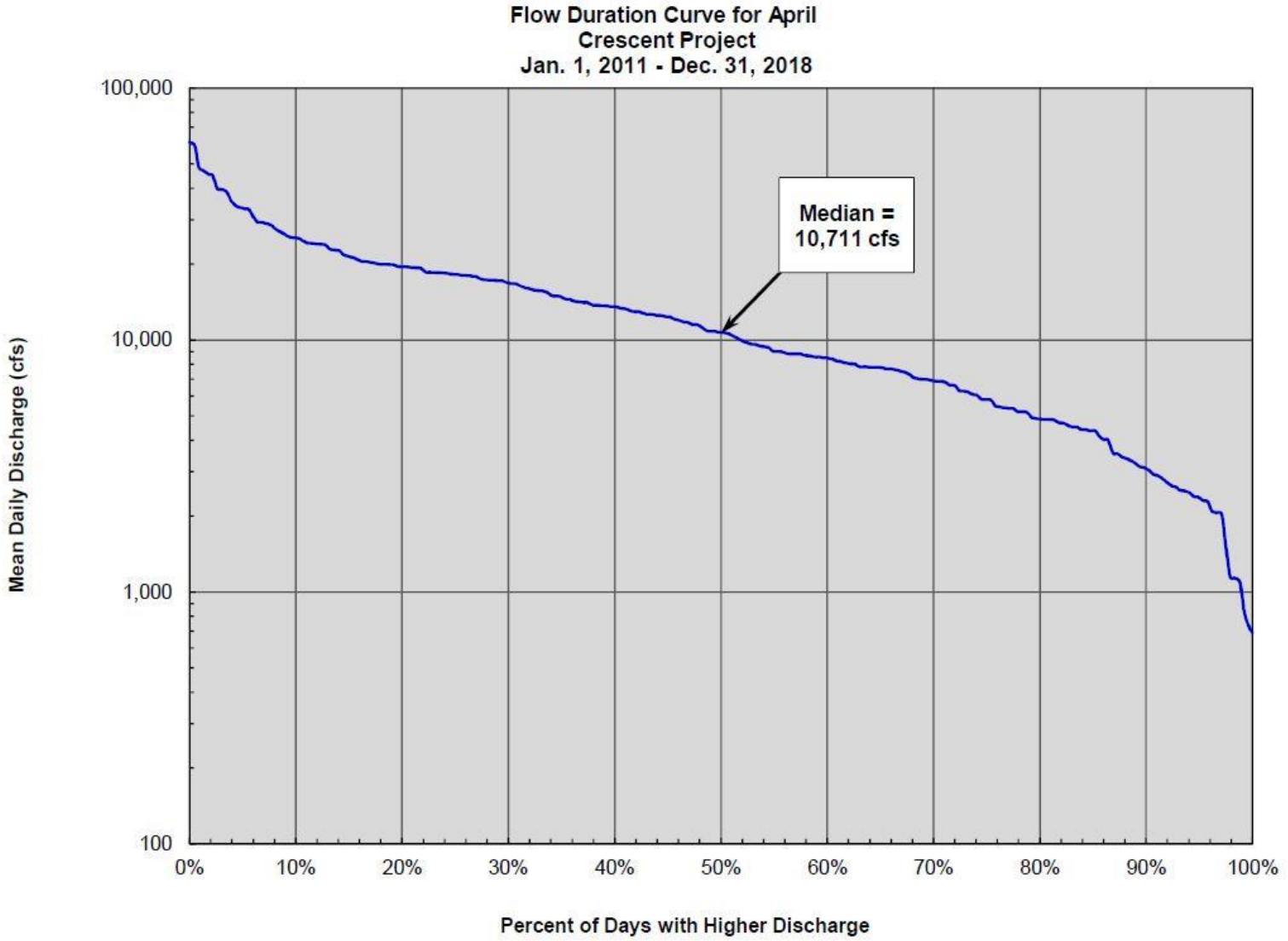


Figure D-6: Monthly Flow Duration Curve for the Crescent Project – May

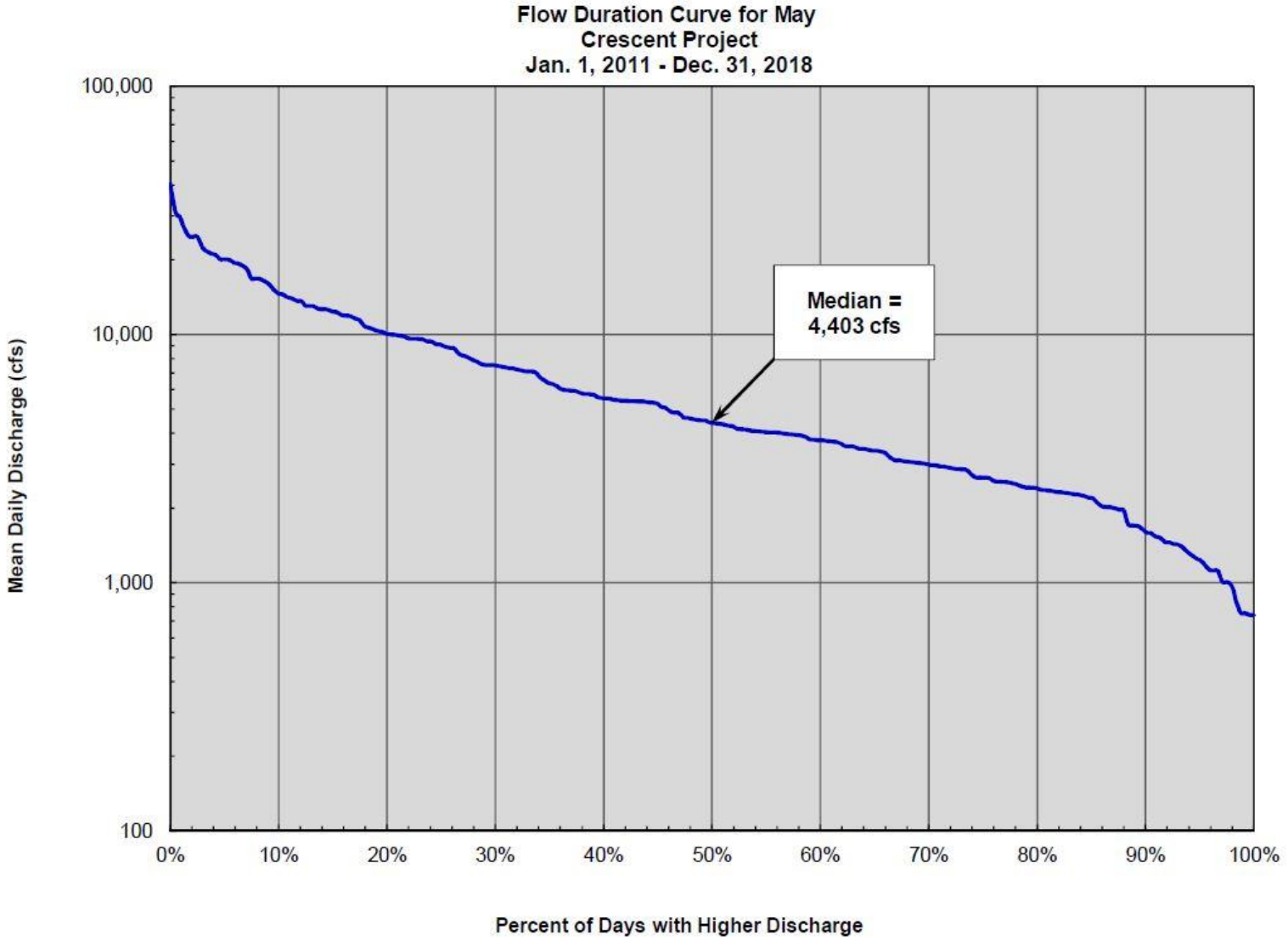


Figure D-7: Monthly Flow Duration Curve for the Crescent Project – June

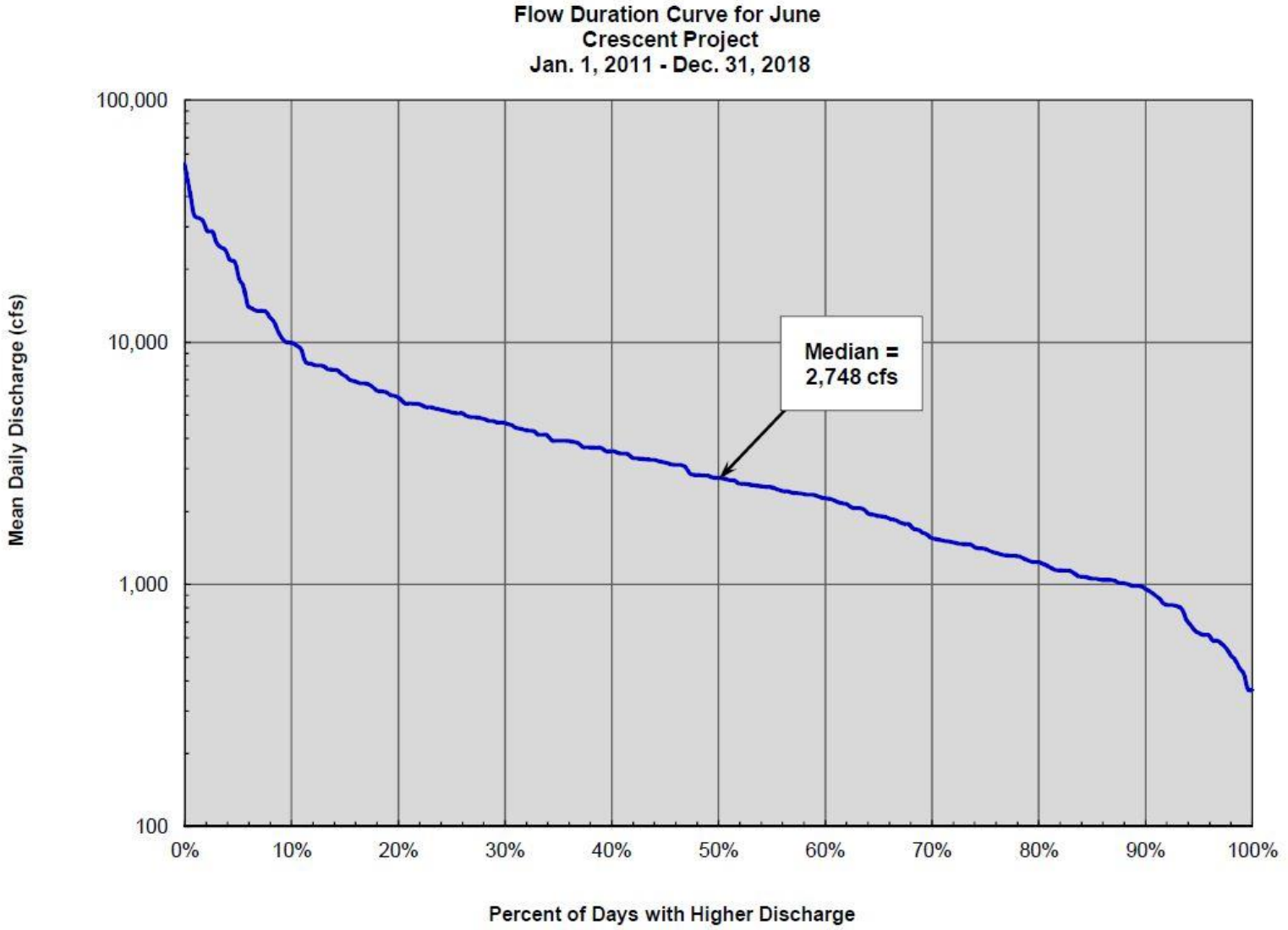


Figure D-8: Monthly Flow Duration Curve for the Crescent Project – July

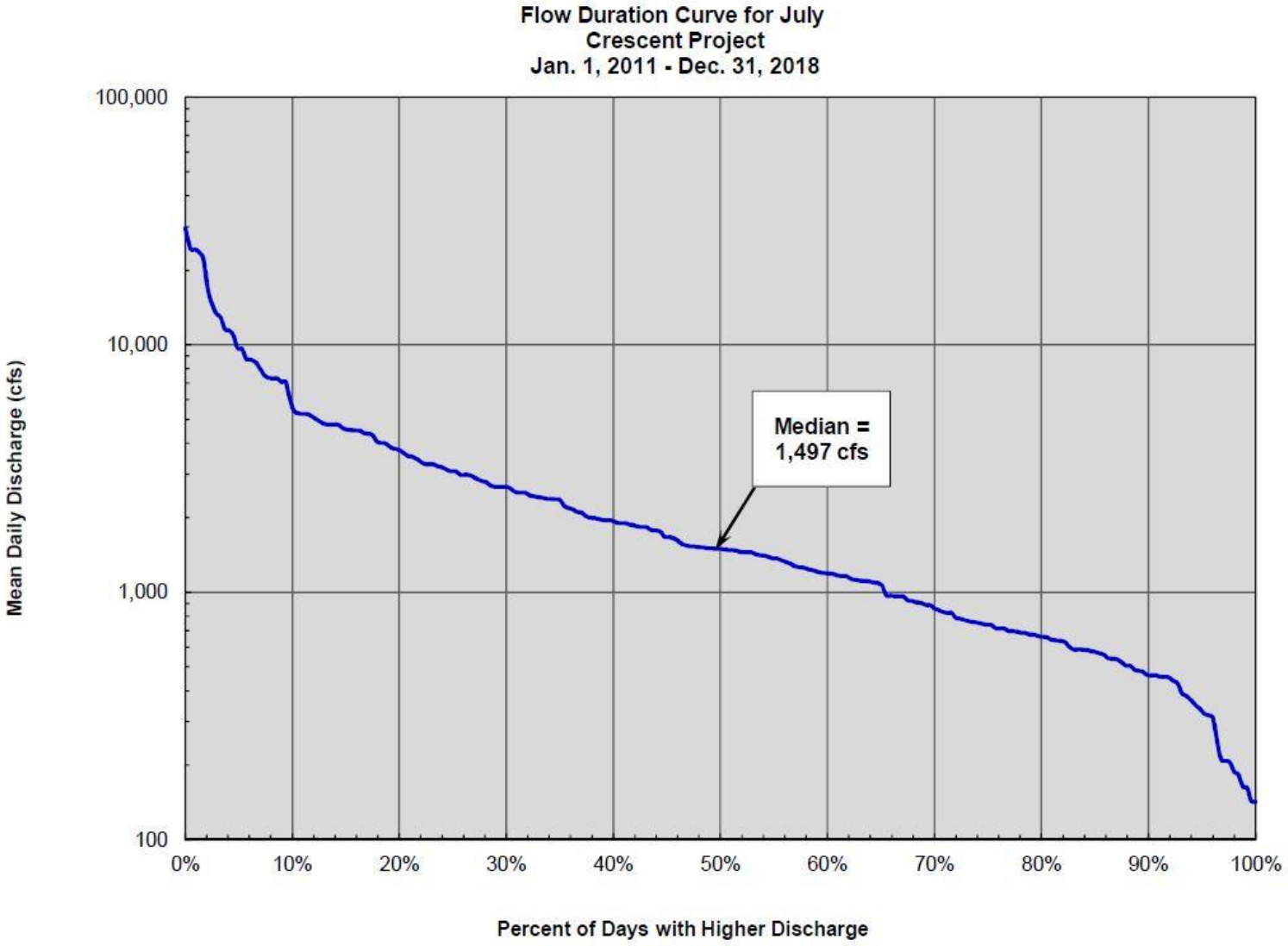


Figure D-9: Monthly Flow Duration Curve for the Crescent Project – August

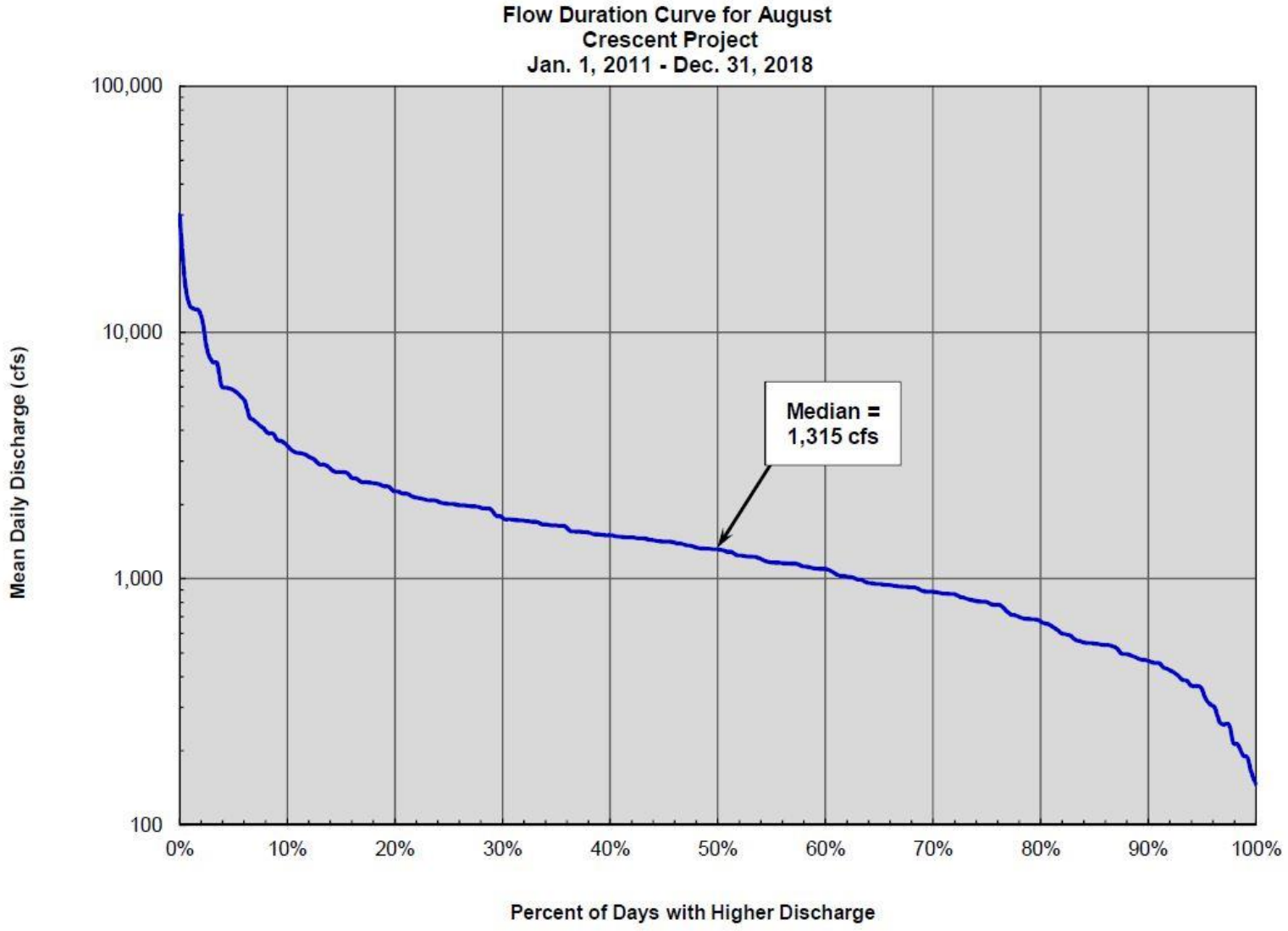


Figure D-10: Monthly Flow Duration Curve for the Crescent Project – September

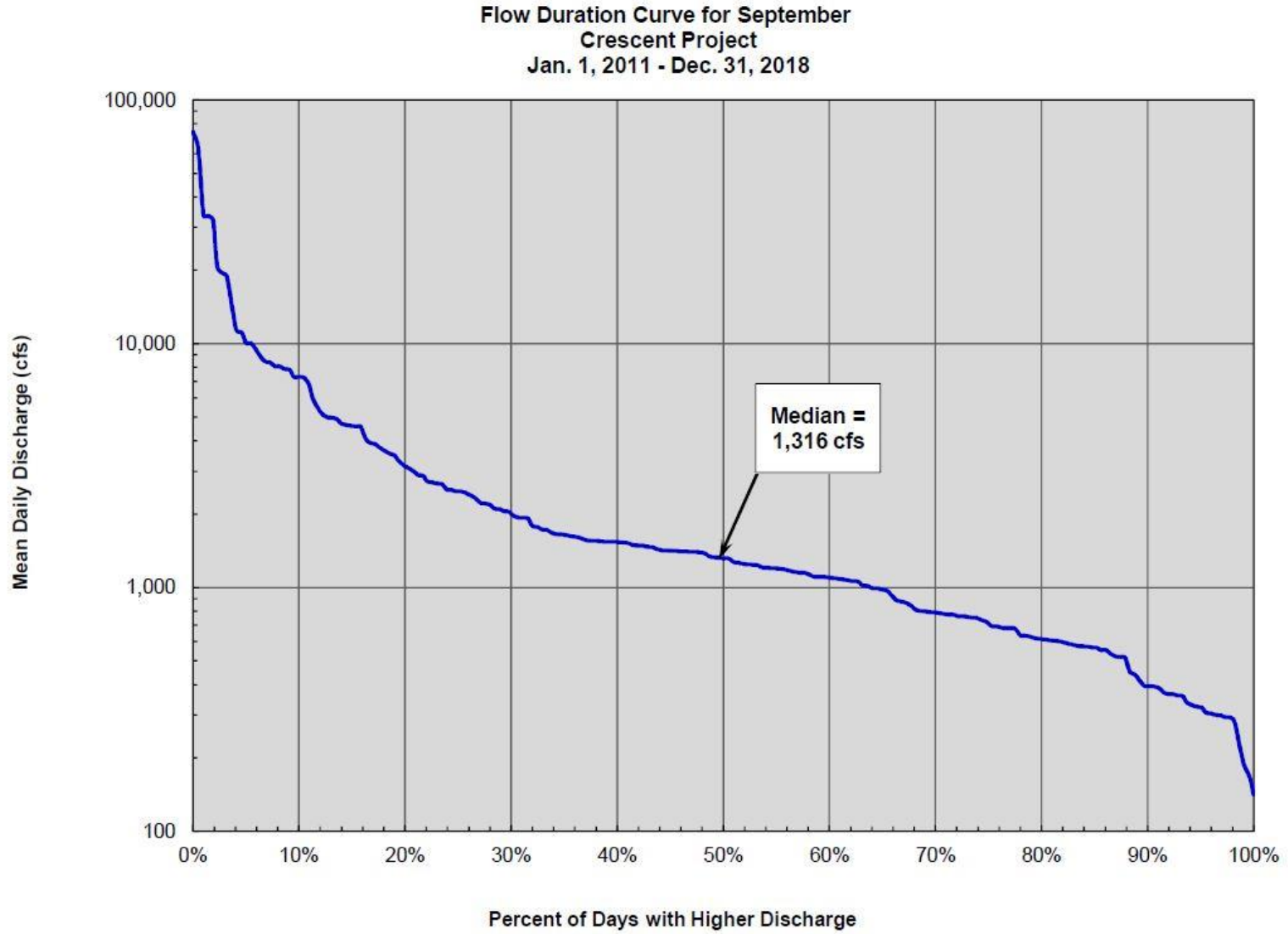


Figure D-11: Monthly Flow Duration Curve for the Crescent Project – October

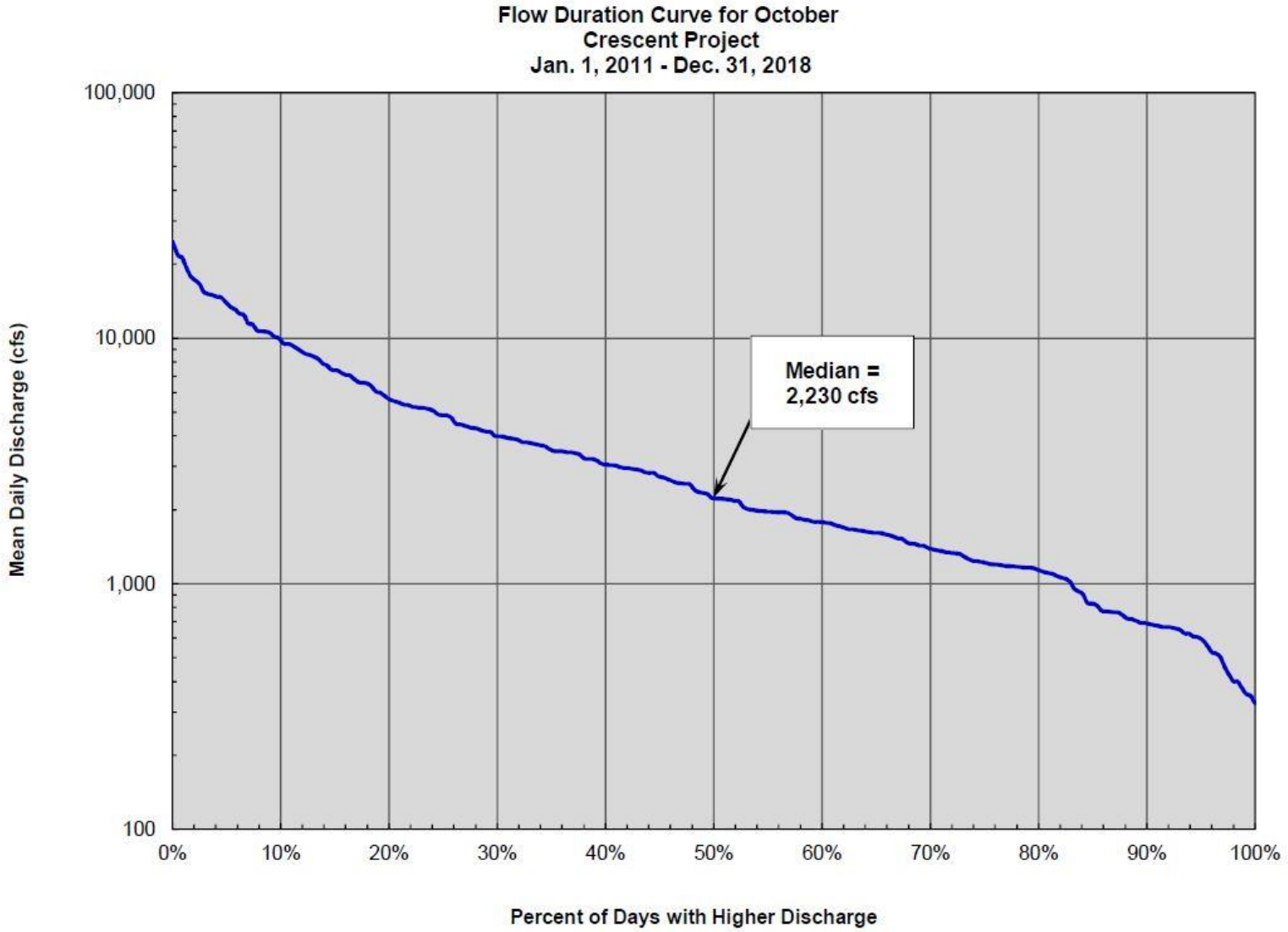


Figure D-12: Monthly Flow Duration Curve for the Crescent Project – November

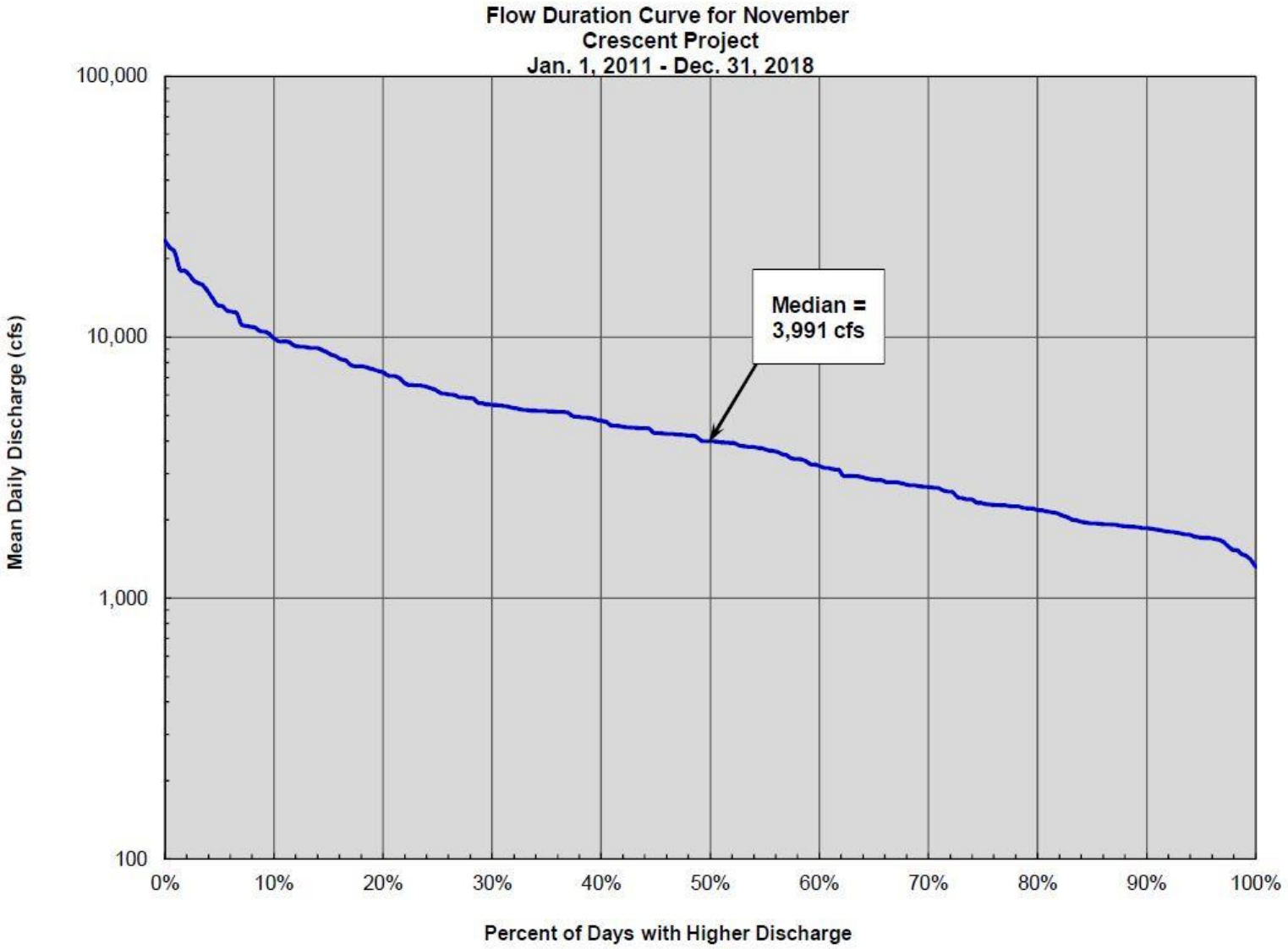


Figure D-13: Monthly Flow Duration Curve for the Crescent Project – December

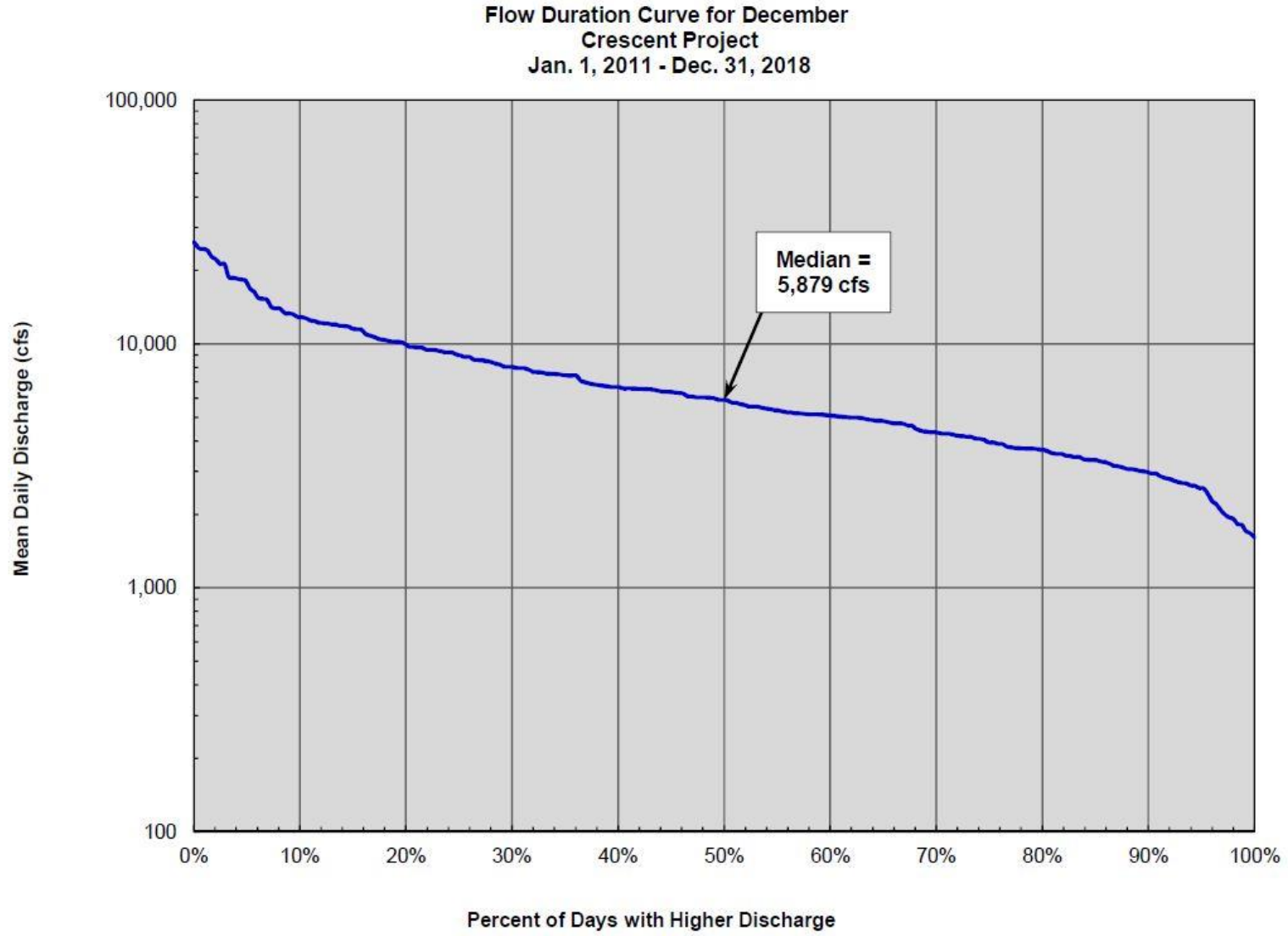


Figure D-14: Annual Flow Duration Curve for the Vischer Ferry Project

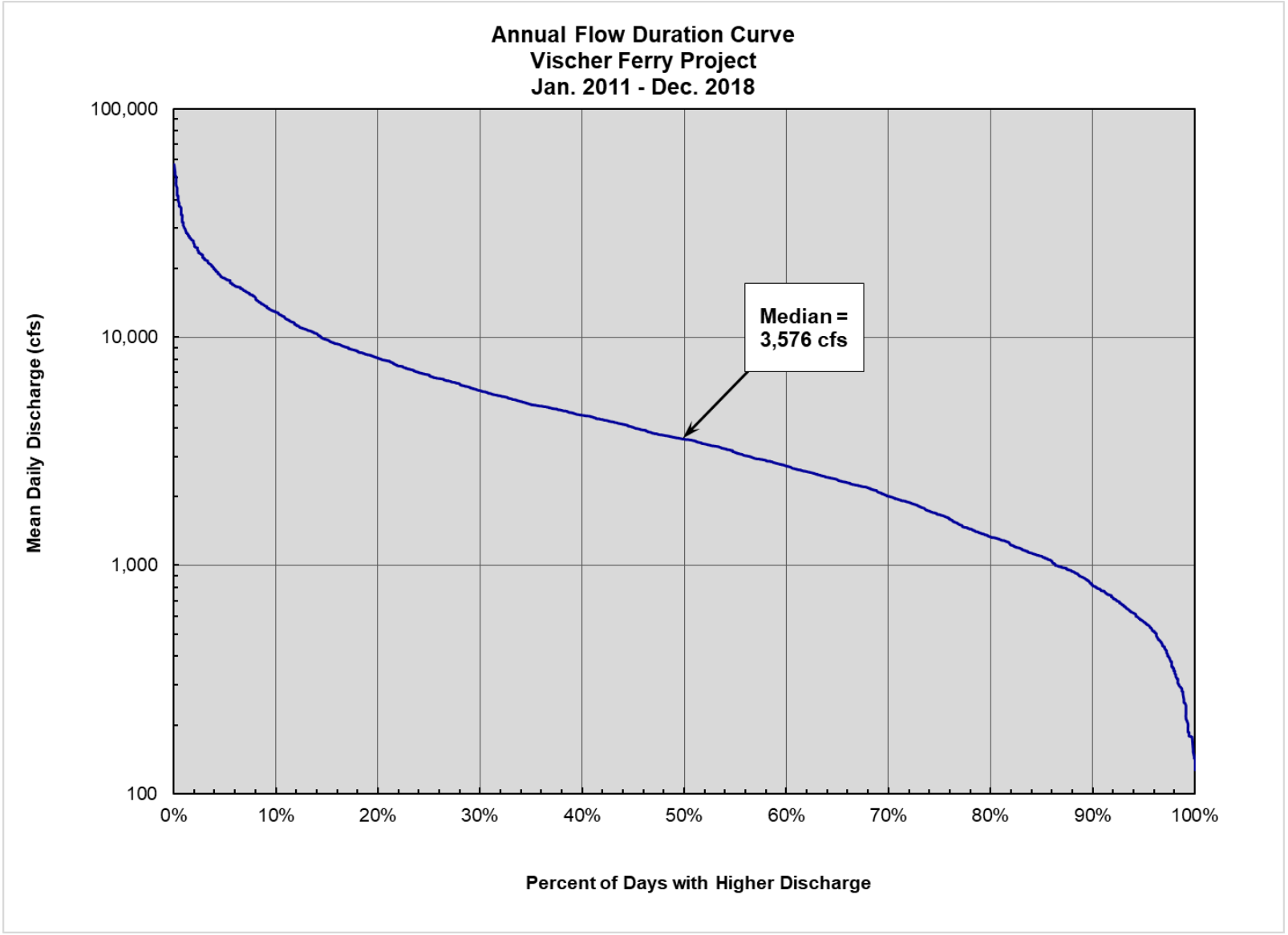


Figure D-15: Monthly Flow Duration Curve for the Vischer Ferry Project – January

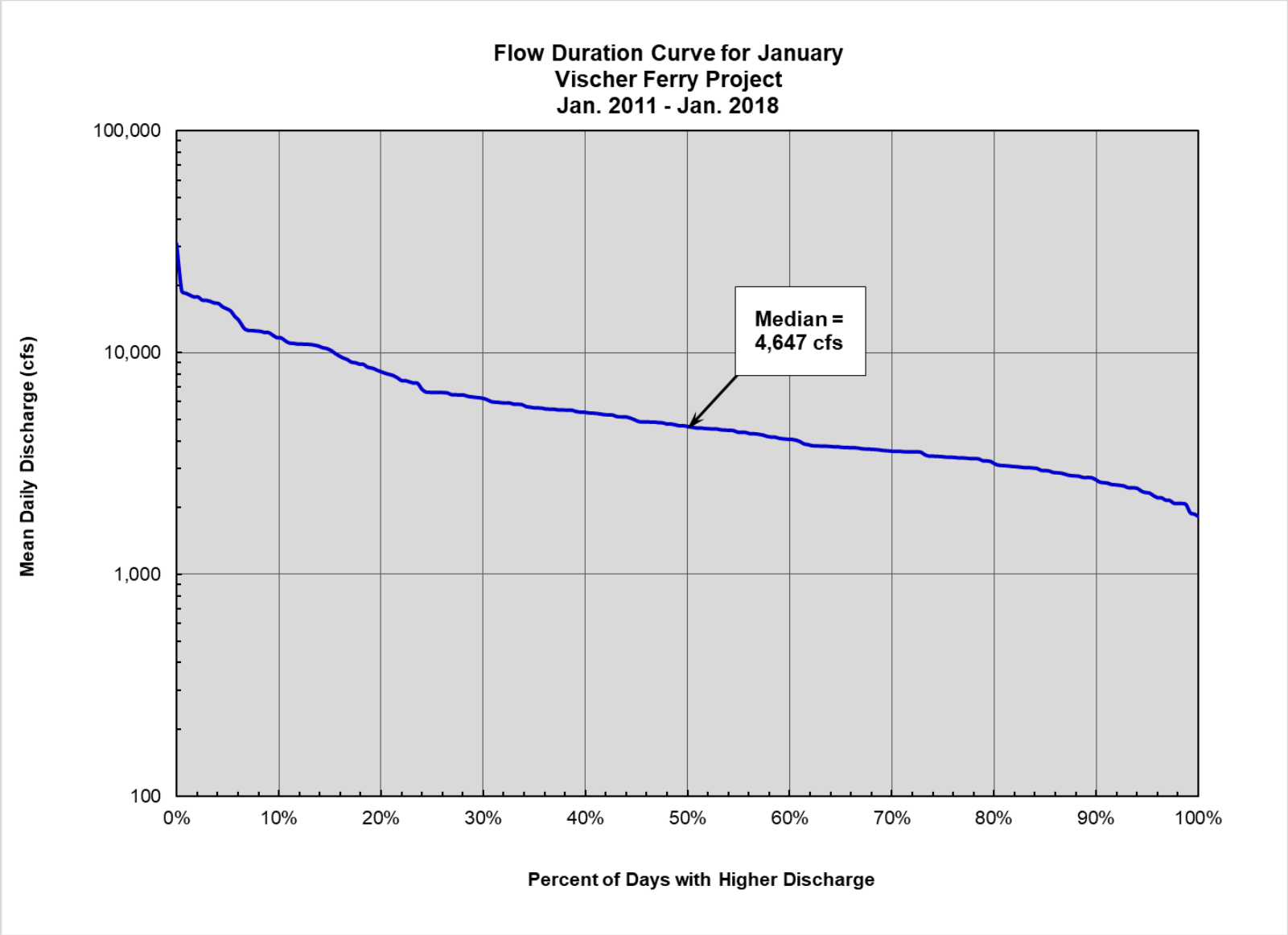


Figure D-16: Monthly Flow Duration Curve for the Vischer Ferry Project – February

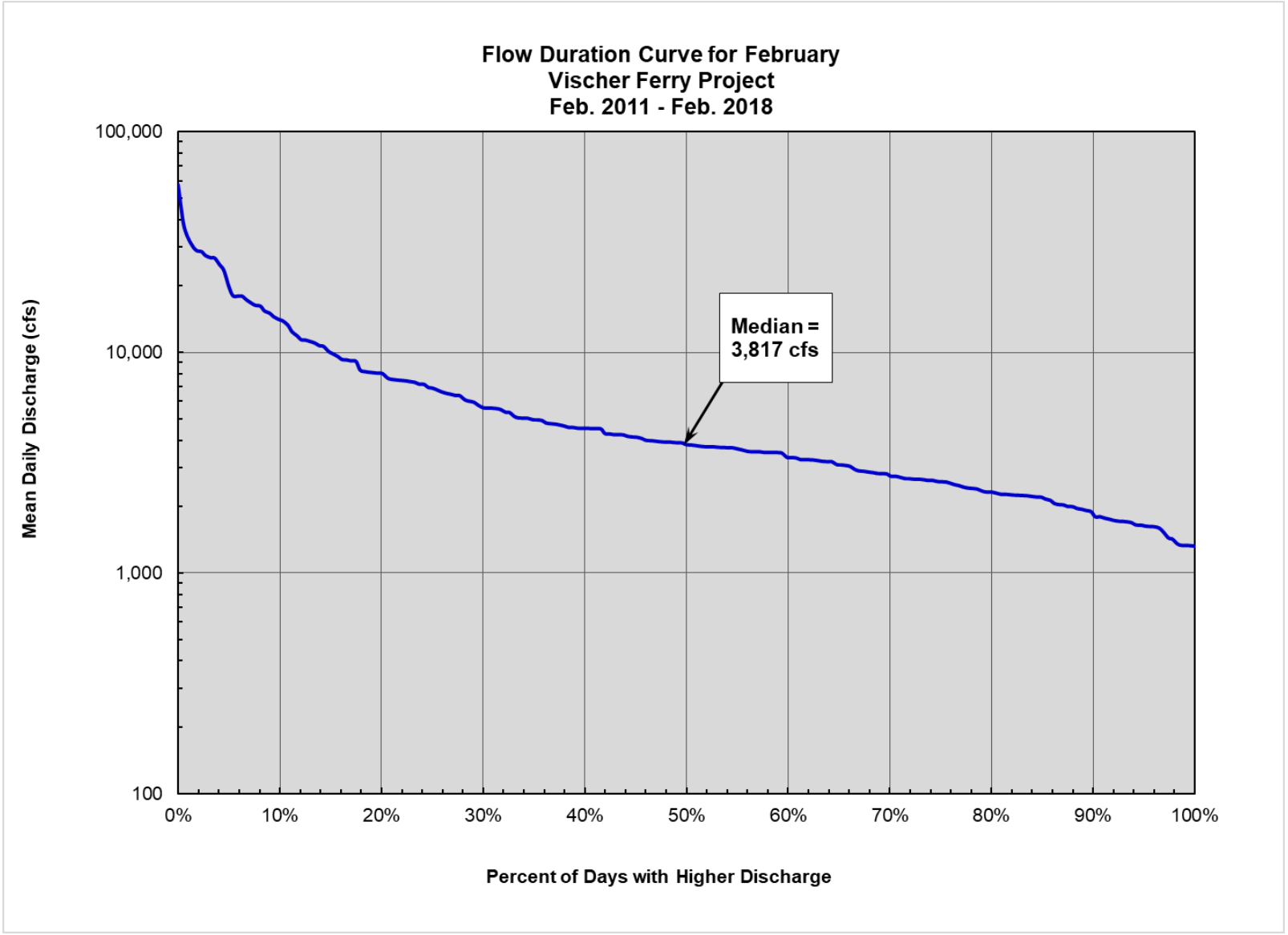


Figure D-17: Monthly Flow Duration Curve for the Vischer Ferry Project – March

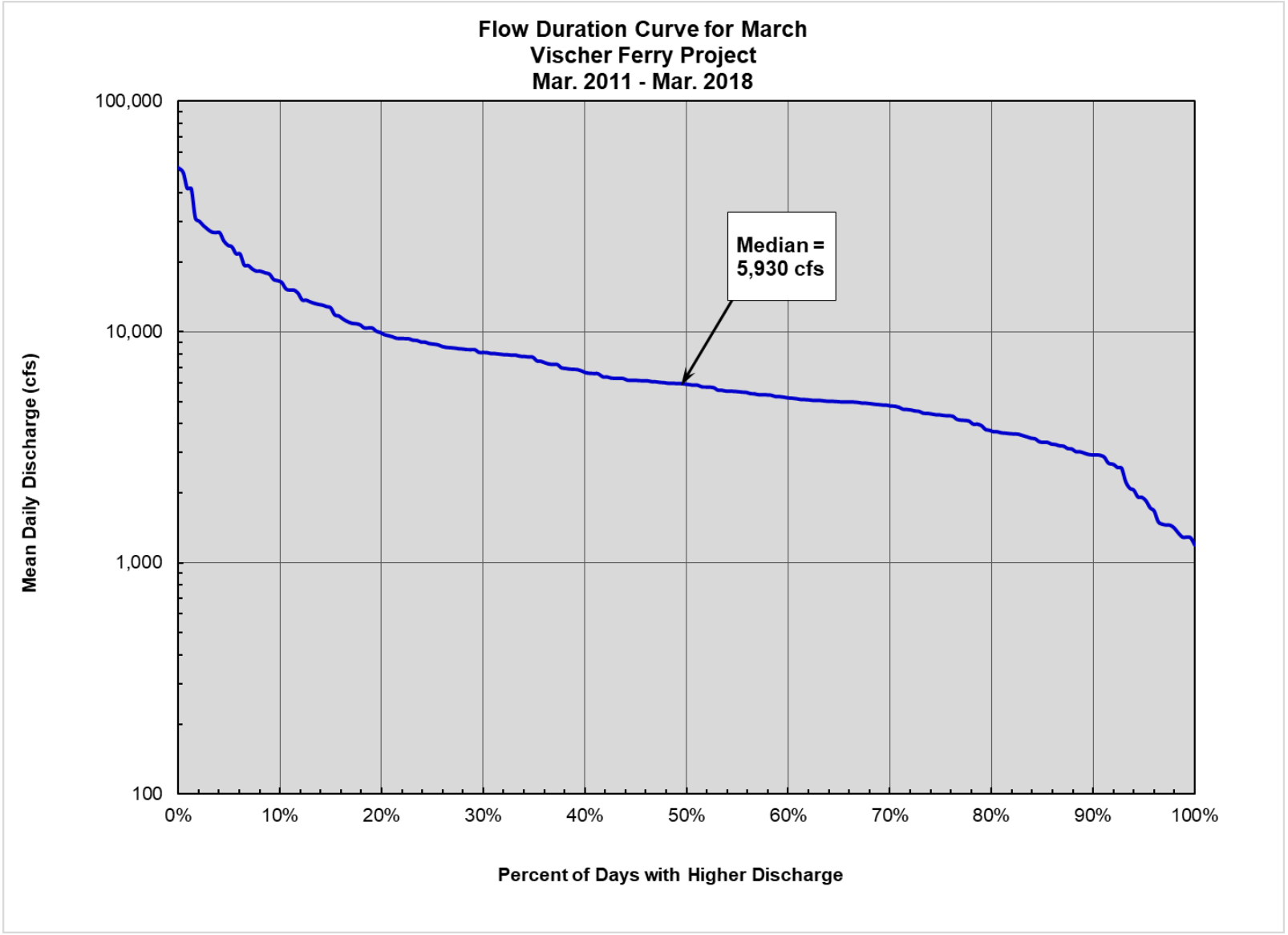


Figure D-18: Monthly Flow Duration Curve for the Vischer Ferry Project – April

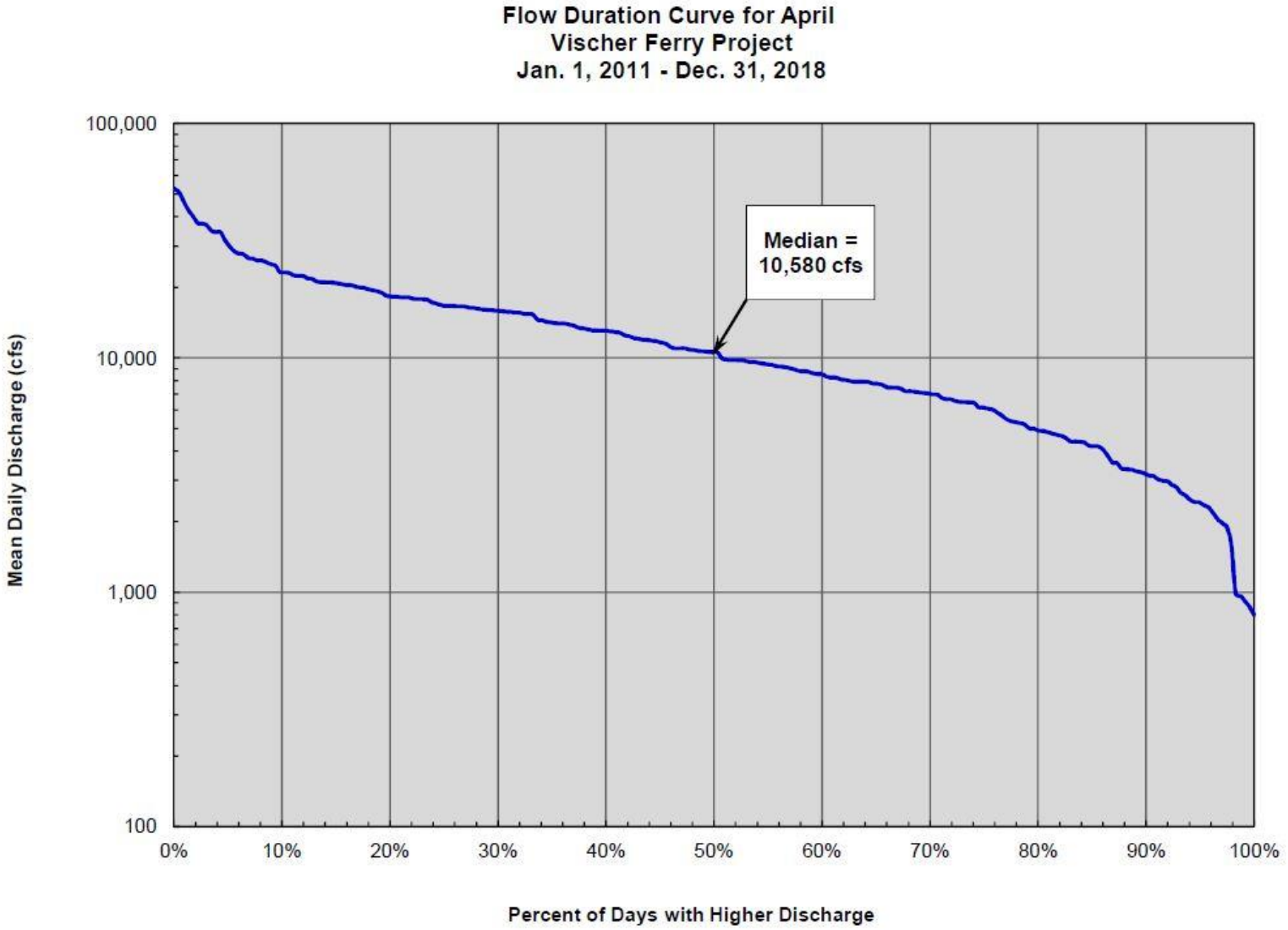


Figure D-19: Monthly Flow Duration Curve for the Vischer Ferry Project – May

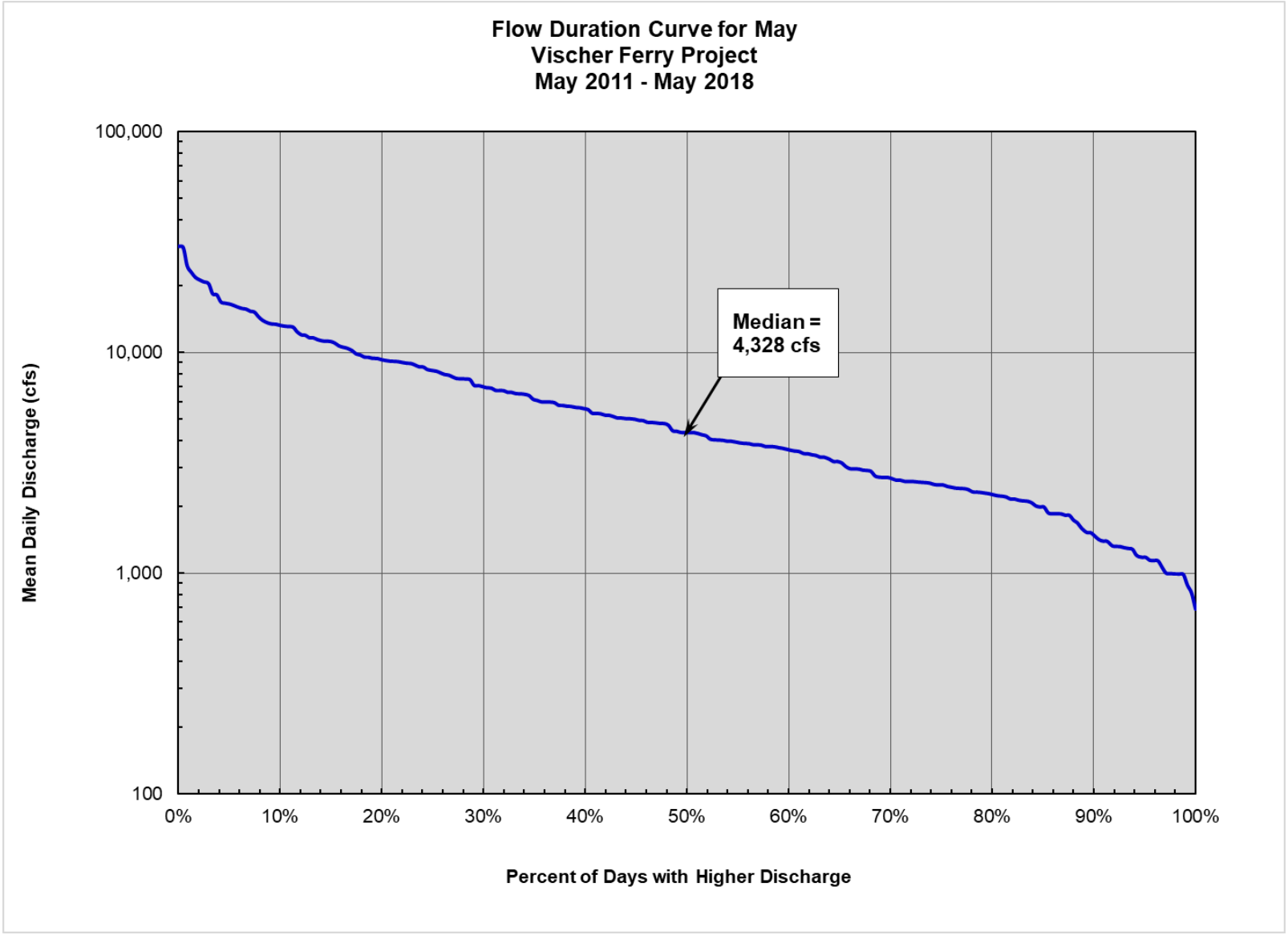


Figure D-20: Monthly Flow Duration Curve for the Vischer Ferry Project – June

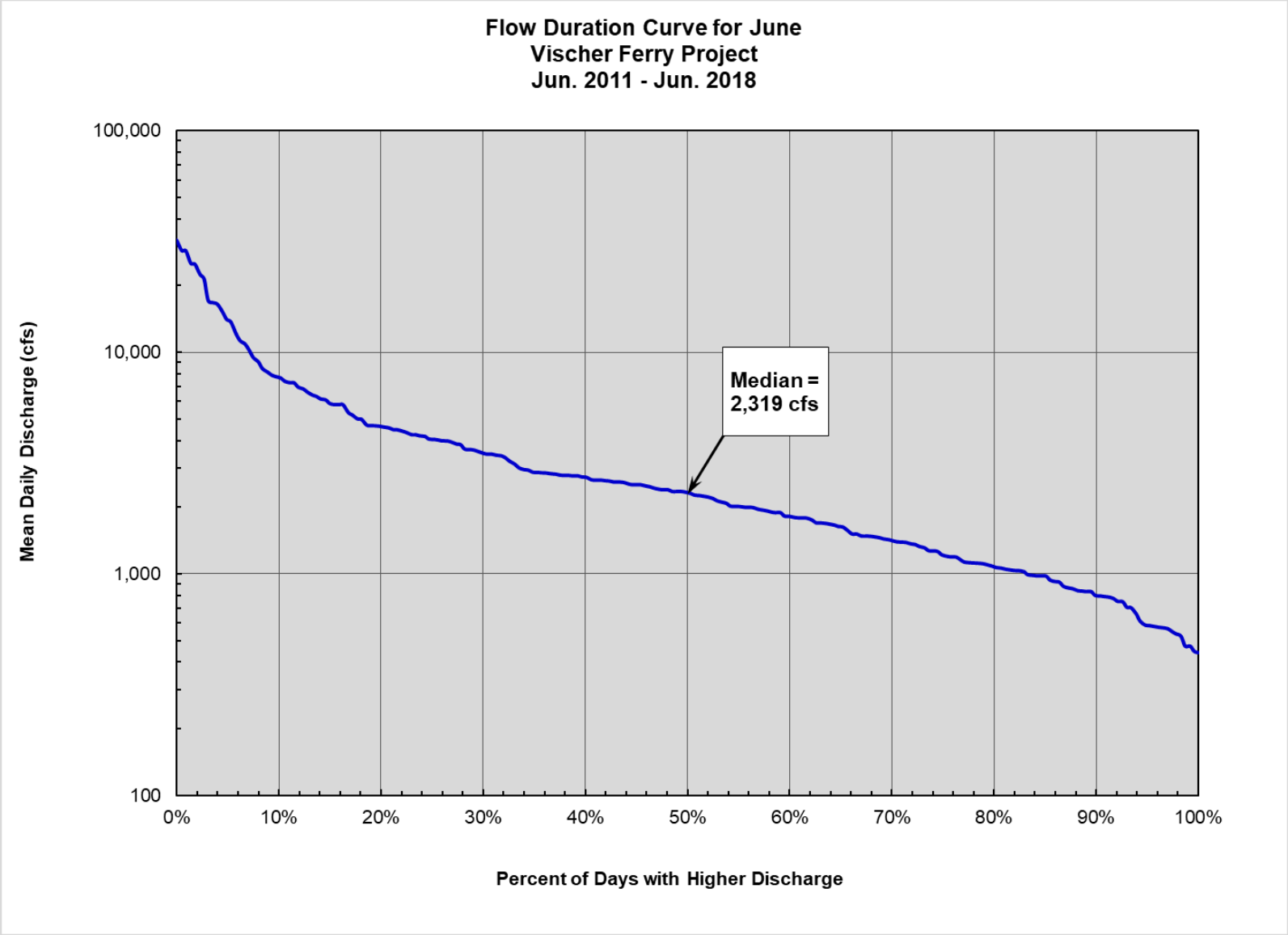


Figure D-21: Monthly Flow Duration Curve for the Vischer Ferry Project – July

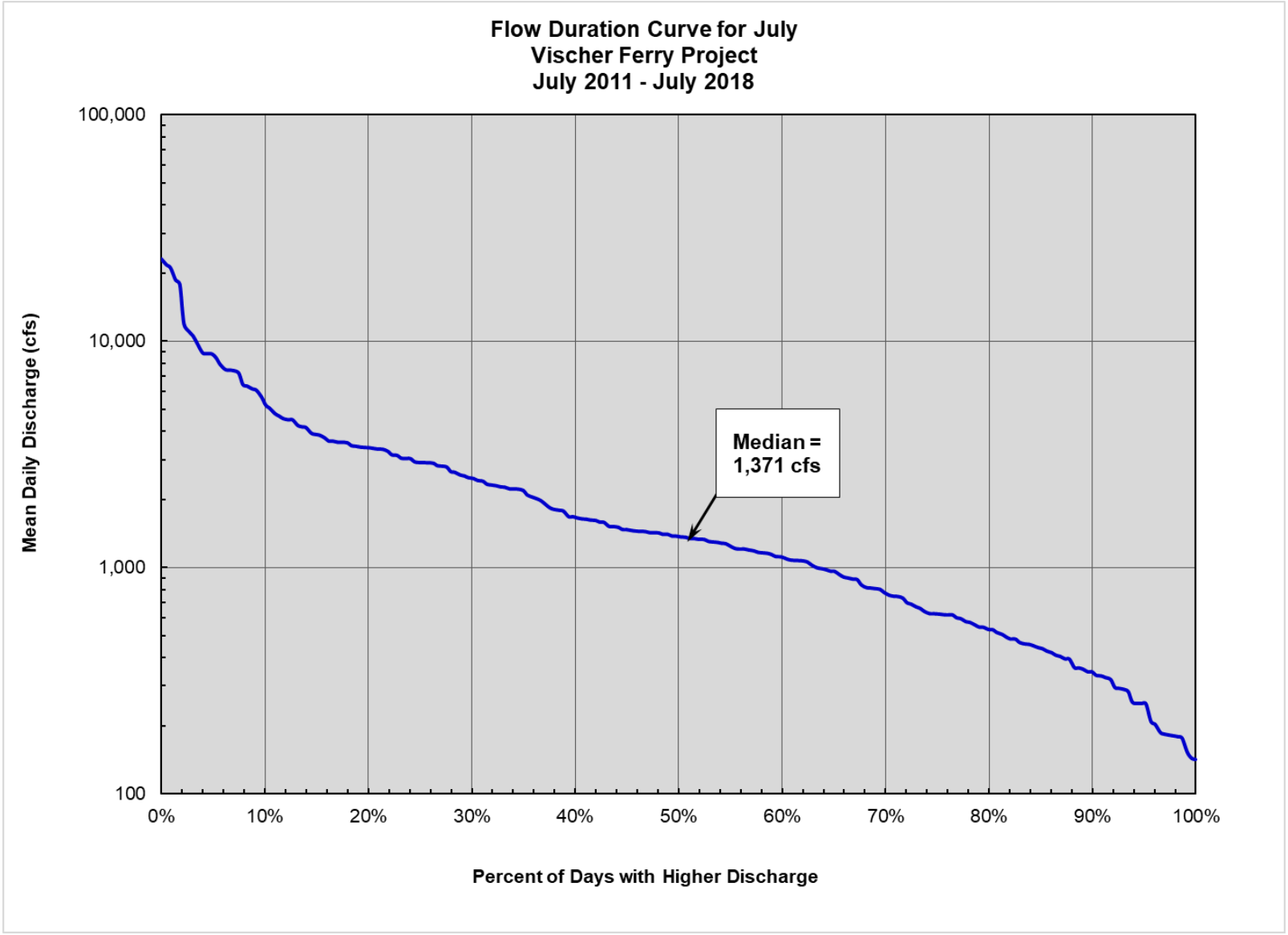


Figure D-22: Monthly Flow Duration Curve for the Vischer Ferry Project – August

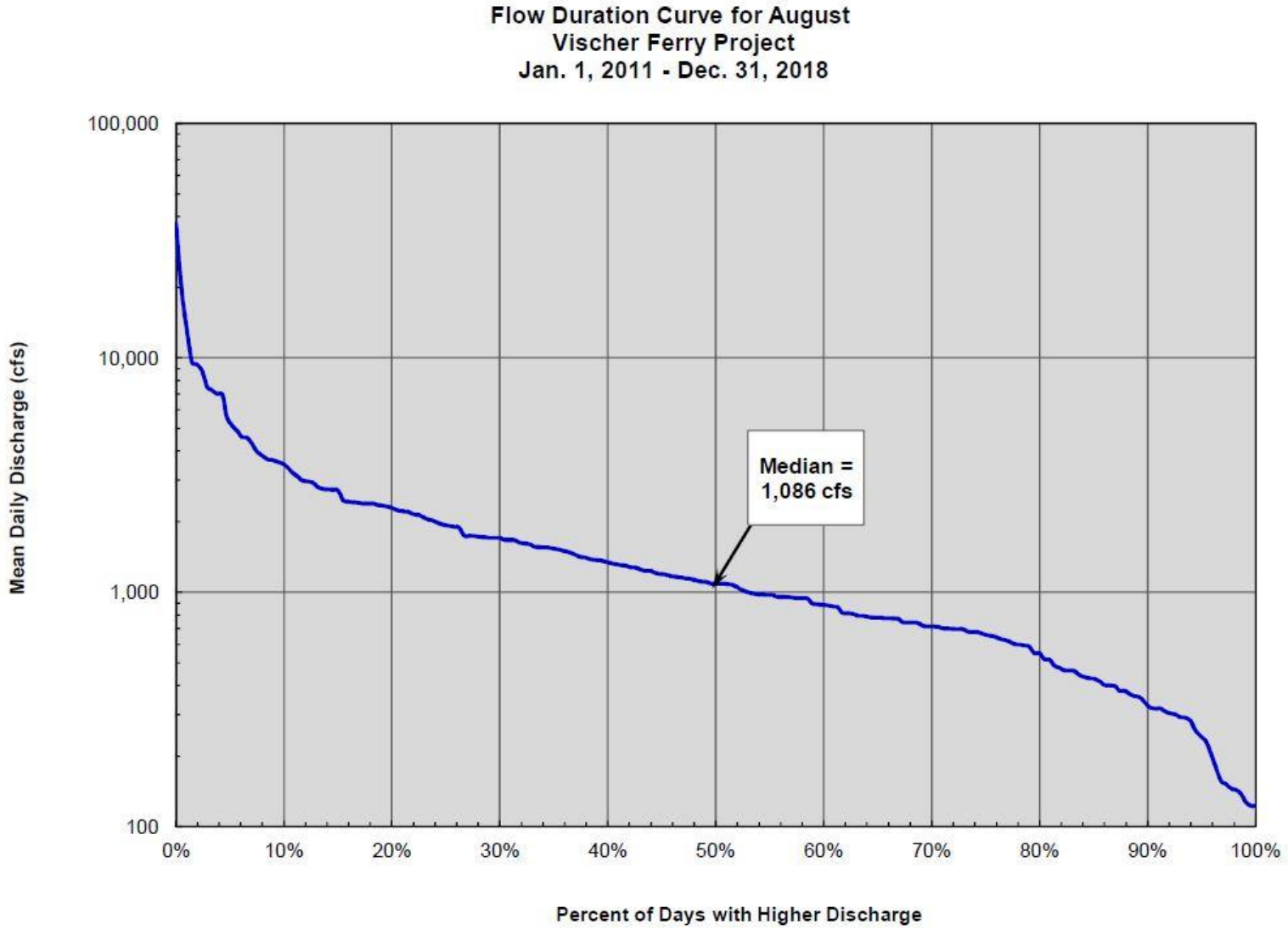


Figure D-23: Monthly Flow Duration Curve for the Vischer Ferry Project – September

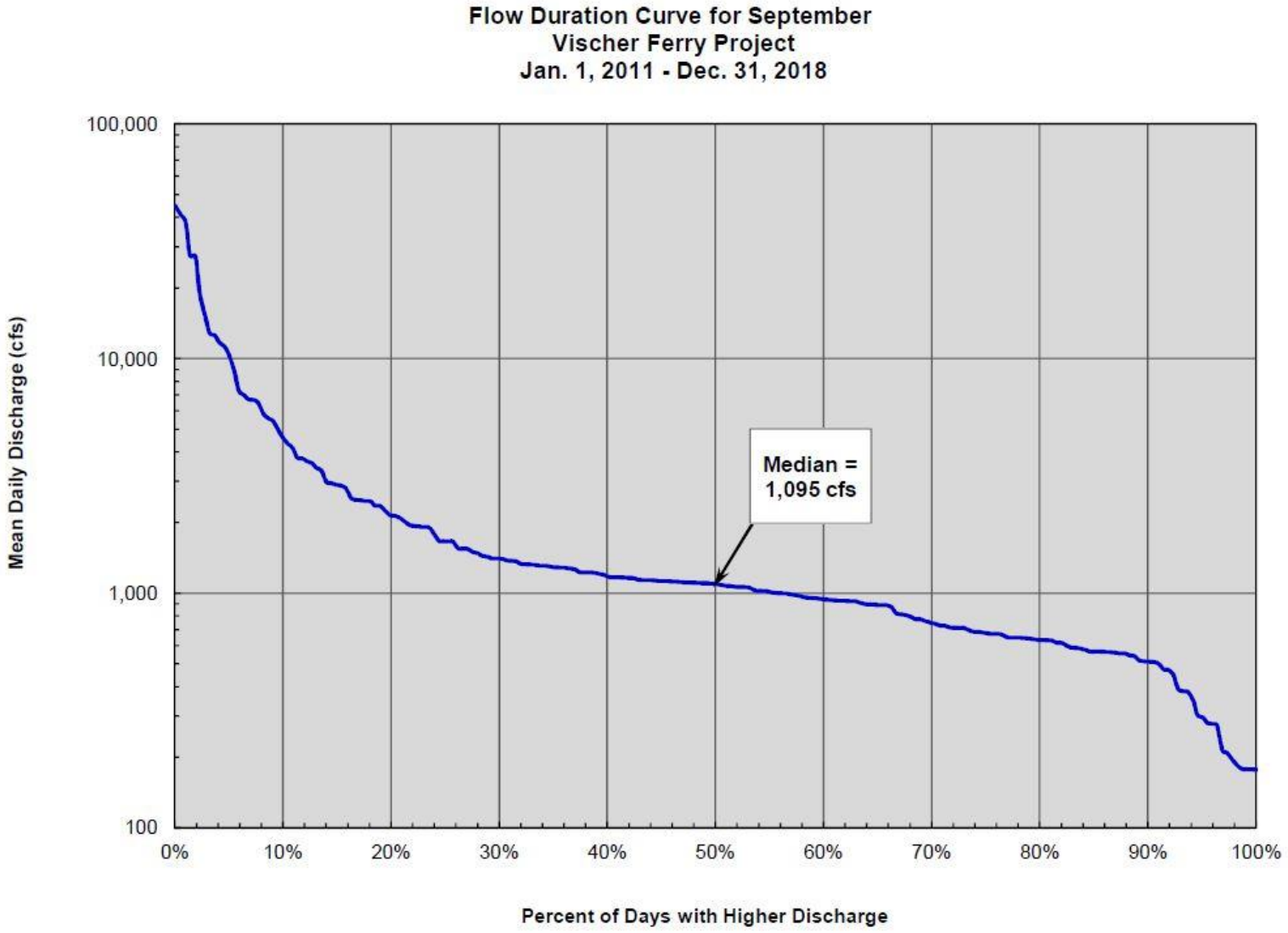


Figure D-24: Monthly Flow Duration Curve for the Vischer Ferry Project – October

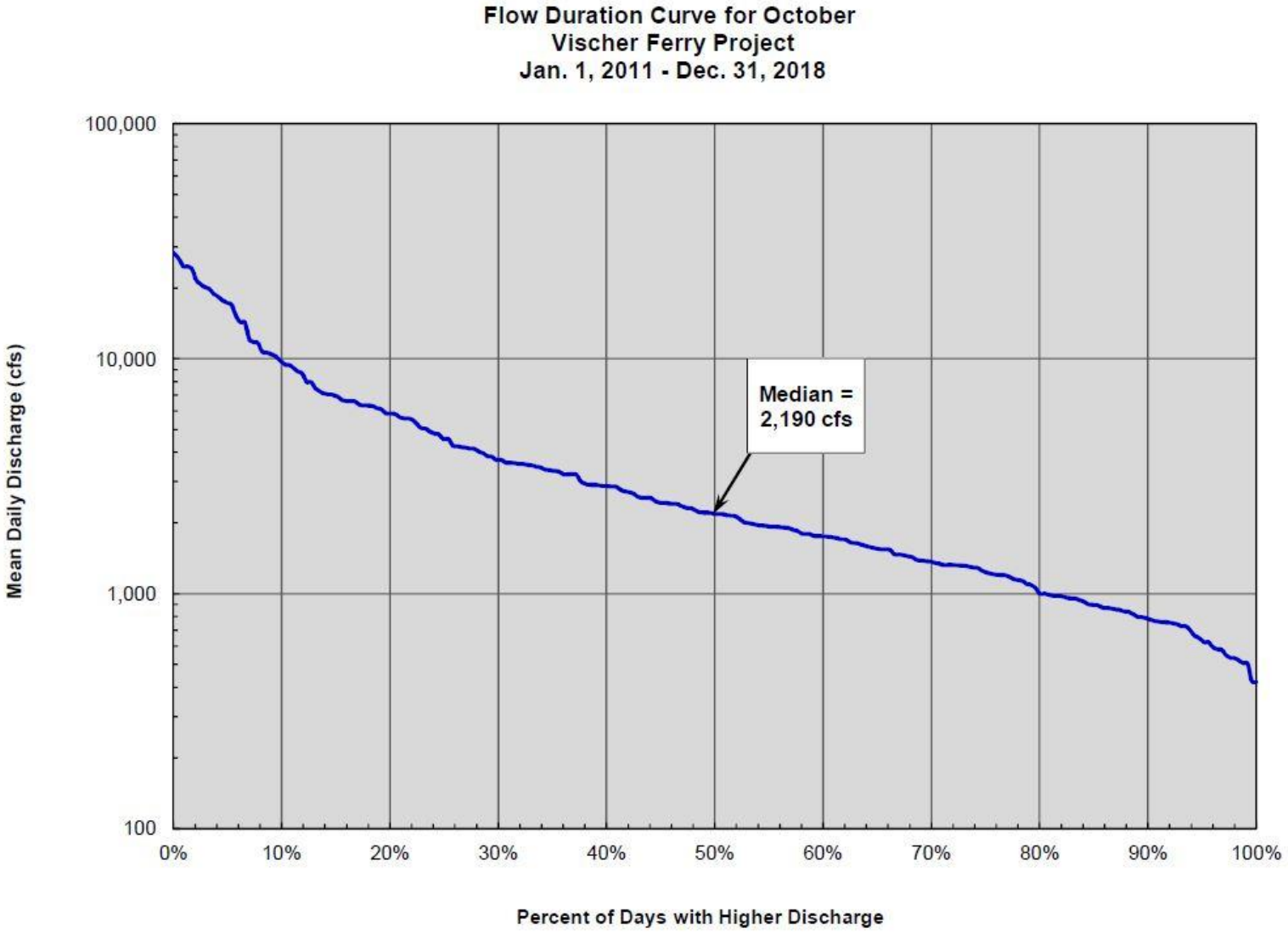


Figure D-25: Monthly Flow Duration Curve for the Vischer Ferry Project – November

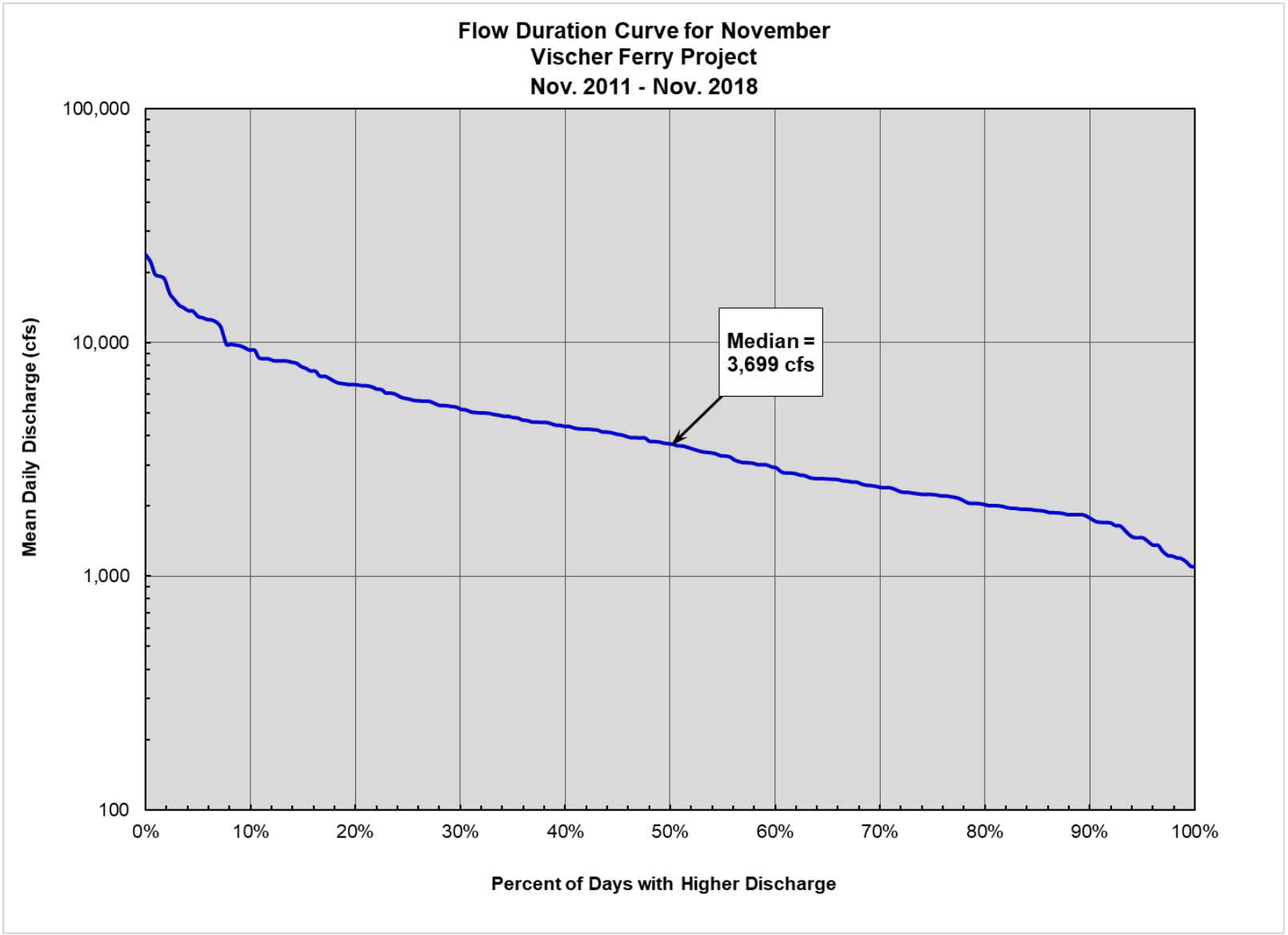


Figure D-26: Monthly Flow Duration Curve for the Vischer Ferry Project – December

