ENVIRONMENTAL ASSESSMENT

FOR HYDROPOWER LICENSE

Municipal Hydroelectric Project, FERC Project No. 1235-017

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

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TABLE OF CONTENTS

LIST OF FIGURES
LIST OF TABLESiv ACRONYMS AND ABBREVIATIONSv 1.0 NTRODUCTION
ACRONYMS AND ABBREVIATIONS
1.0 NTRODUCTION 1 1.1 APPLICATION 1 1.2 PURPOSE OF ACTION AND NEED FOR POWER 2 1.2.1 Purpose of Action 2 1.2.2 Need for Power 4
1.1 APPLICATION 1 1.2 PURPOSE OF ACTION AND NEED FOR POWER 2 1.2.1 Purpose of Action 2 1.2.2 Need for Power 4
1.2 PURPOSE OF ACTION AND NEED FOR POWER 2 1.2.1 Purpose of Action 2 1.2.2 Need for Power 4
1.2.1Purpose of Action21.2.2Need for Power4
1.2.2 Need for Power
1.3 STATUTORY AND REGULATORY REQUIREMENTS
1.3.1 Federal Power Act4
1.3.2 Clean Water Act6
1.3.3 Endangered Species Act6
1.3.4 Coastal Zone Management Act
1.3.5 National Historic Preservation Act
1.4 PUBLIC REVIEW AND COMMENT
1.4.1 Scoping
1.4.2 Interventions
1.4.3 Comments on the License Application
2.0 PROPOSED ACTION AND ALTERNATIVES
2.1 NO-ACTION ALTERNATIVE
2.1.1 Existing Project Facilities
2.1.2 Project Safety
2.1.3 Existing Project Operation
2.1.4 Existing Environmental Measures
2.2 APPLICANT'S PROPOSAL
2.2.1 Proposed Project Facilities
2.2.2 Proposed Project Operation
2.2.3 Proposed Environmental Measures
2.3 STAFF ALTERNATIVE
2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM
DETAILED ANALYSIS15
2.4.1 Retiring the Project
3.0 ENVIRONMENTAL ANALYSIS
3.1 GENERAL DESCRIPTION OF THE RIVER BASIN
3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS
3.2.1 Geographic Scope
3.2.2 Temporal Scope
3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

	3.3.1 Geology and Soil Resources	20
	3.3.2 Aquatic Resources	22
	3.3.3 Terrestrial Resources	43
	3.3.4 Threatened and Endangered Species	48
	3.3.5 Recreation Resources	53
	3.3.6 Cultural Resources	58
	3.4 NO-ACTION ALTERNATIVE	64
4.0	DEVELOPMENTAL ANALYSIS	65
	4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT	65
	4.2 COMPARISON OF ALTERNATIVES	66
	4.2.1 No-action Alternative	67
	4.2.2 City's Proposal	67
	4.2.3 Staff Alternative	67
	4.3 COST OF ENVIRONMENTAL MEASURES	68
5.0	CONCLUSIONS AND RECOMMENDATIONS	74
	5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED	
	ALTERNATIVE	74
	5.1.1 Measures Proposed by the City	74
	5.1.2 Additional Staff-Recommended Measures	75
	5.2 UNAVOIDABLE ADVERSE EFFECTS	81
	5.3 SUMMARY OF SECTION 10(J) RECOMMENDATIONS	81
	5.4 CONSISTENCY WITH COMPREHENSIVE PLANS	85
6.0	FINDING OF NO SIGNIFICANT IMPACT	86
7.0	LITERATURE CITED	87

LIST OF FIGURES

Figure 1. Location of the Little River Dam at the Municipal Hydroelectric Project No.
1235 (Source: staff)
Figure 2. Bathymetry of the project impoundment based on a bathymetric survey that was conducted in August 2015 while the impoundment water level was held at an
elevation of $1,7/2.3$ feet (0.3 foot above full pool). Note that elevations are color-
coded, whereby greens represent the deepest locations and browns the shallowest
locations as indicated in the figure legend (Source: license application, as modified
by staff)26
Figure 3. Example of riffle habitat located approximately 900 feet downstream of the
project dam (just below the Route 605 bridge). Picture was taken on October 2,
2017, when outflow from the Municipal Project was 142 cfs (Source: staff)27
Figure 4. Length frequency distributions of common centrarchids in the project
impoundment, based on boat electrofishing surveys conducted during September
2013 ("n" refers to the number of each species collected) (Source: staff)
Figure 5. Time series of impoundment elevations (blue line) and project inflows (orange
line) during the summer of 2003 (June through August), which was the wettest on
record across years 1997 through 2012. Periods when the Municipal Project was
peaking, denoted on the graph below, were inferred from patterns in impoundment
stage data (Source: staff)
Figure 6. Time series of impoundment elevations (blue line) and project inflows (orange
line) during the summer of 2002 (June through August) which was the driest on
record across years 1997 through 2012 Based on the pattern in impoundment stage
data the project appeared to be peaking for most of this 3 month period (Source:
staff)
5(a11)

LIST OF TABLES

Table 1. Percent of days each month that daily impoundment fluctuations were less than
2 feet based on impoundment stage data (years 1997 through 2012) from USGS gage
No. 03170500 (Source: staff)13
Table 2. Monthly project inflow statistics for years 1928 through 2017 (Source: Staff).
Table 3. Species composition of the impoundment fish community based on boat
electrofishing surveys conducted by Virginia DGIF during September 2013. For
comparative purposes, species are included in this table that were not collected in the
impoundment (e.g., walleye), but were collected downstream of the dam (see table 4)
(Source: license application, as modified by staff)
Table 4. Species composition of the fish community downstream of the dam based on
boat electrofishing surveys conducted by Virginia DGIF during September 2013. For
comparative purposes, species are included in this table that were not collected
downstream of the dam (e.g., largemouth bass), but were collected in the
impoundment (see table 3) (Source: license application, as modified by staff) 29
Table 5. Burst swimming speeds of juvenile and adult stages of fish present in the
project impoundment (Source: staff)
Table 6. Wetted perimeters measured at each of three transects within a riffle area
downstream of the project dam at flows of approximately 25 cfs (leakage flow) and
210 cfs (the maximum flow tested) during a 1988 minimum flow study (W.M. Lewis
and Associates, 1988). The last column expresses the wetted perimeter at 25 cfs as a
percentage of the wetted perimeter at 210 cfs (Source: staff)
Table 7. Recreation Days at the Municipal Project, April through October 2016 (Source:
City)
Table 8. Parameters for the economic analysis of the Municipal Project (Source: license
application, as modified by staff)66
Table 9. Summary of the annual cost of alternative power and annual project cost for
four alternatives for the Municipal Project (Source: Staff)67
Table 10. Cost of environmental mitigation and enhancement measures considered in
assessing the environmental effects of continuing to operate the Municipal Project
(Source: staff and City)
Table 11. Fish and wildlife agency recommendation for Municipal Project (Source:
staff)83

ACRONYMS AND ABBREVIATIONS

APE	area of potential effect
certification	water quality certification
cfs	cubic feet per second
City	City of Radford
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	Dissolved Oxygen
EA	environmental assessment
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FLA	final license application
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
HPMP	Historic Properties Management Plan
Interior	U.S. Department of Interior
kW	kilowatt
Municipal Project	Municipal Hydroelectric Project
MWh	megawatt-hours
National Register	National Register of Historic Places
NERC	North American Electric Reliability Corporation
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
PA	Programmatic Agreement
PJM	Pennsylvania-New Jersey-Maryland
REA	Ready for Environmental Analysis
RFC	Reconstruction Finance Corporation
ROR	run-of-river
SD1	scoping document 1
USGS	United States Geological Survey
VCRIS	Virginia Cultural Resource Information System
Virginia DCR	Virginia Department of Conservation and Recreation
Virginia DGIF	Virginia Department of Game and Inland Fisheries
Virginia DEQ	Virginia Department of Environmental Quality
Virginia SHPO	Virginia Department of Historic Resources

ENVIRONMENTAL ASSESSMENT

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

Municipal Hydroelectric Project FERC Project No. 1235-017 – Virginia

1.0 INTRODUCTION

1.1 APPLICATION

On May 30, 2017, the City of Radford (City), filed an application for a subsequent license with the Federal Energy Regulatory Commission (Commission or FERC) to continue operating the Municipal Hydroelectric Project (Municipal Project or project) (FERC Project No. 1235). The 1,200-kilowatt (kW)¹ Municipal Project is located on the Little River near the city of Radford in Montgomery and Pulaski Counties, Virginia (figure 1). The project does not occupy federal land. The project has historically generated an average of 4,550 megawatt-hours (MWh) per year.²

In August of 2014, the project experienced a complete turbine failure, which permanently stopped generation, and operation has not resumed as of the issuance of this EA. The City is currently in the process of installing a new "in-kind" turbine to replace the old turbine.³ On July 21, 2018, the project suffered an electrical system failure during

² Average annual generation is based on a 30-year period from 1984 through 2013.

³ See Memo of Telephone Conversation issued on October 30, 2018. Accession No. 20181030-3000.

¹ In response to an Additional Information Request issued on October 11, 2018, the City filed, on October 25, 2018, a revised Exhibit A and supporting documentation to verify the capacities of the existing generator (1,200 kilovolt-amperes, operated at a power factor of 1.0), which has been rewound multiple times (most recently in 1989) and the turbine (1,733 horsepower) that is being installed to replace the old turbine (1,700 horsepower) that was damaged in 2014. Therefore, the project is generator-limited and according to section 11.1(i) of the Commission's regulations, the authorized installed capacity would be 1,200 kW. This value differs from the project's current authorized installed capacity of 1,185 kW as specified in the Order Amending License and Revising Annual Charges issued on August 6, 1997, which was based on a turbine rating of 1,585 horsepower.

turbine testing prior to a FERC Dam Safety Inspection.⁴ The City anticipates replacing the damaged electrical components by December 1, 2018, and resuming operation of the project in late 2018 or early 2019. The City otherwise proposes no new capacity or new construction at the project.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

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

⁴ See Annual Dam Safety Inspection Follow-Up issued September 5, 2018. Accession No. 20180905-3042.



Figure 1. Location of the Little River Dam at the Municipal Hydroelectric Project No. 1235 (Source: staff).

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

In this environmental assessment (EA), we assess the environmental and economic effects of continuing to operate the project: (1) as proposed by the City; and (2) with our recommended measures (staff alternative). We also consider the effects of the no-action alternative. Important issues that are addressed include the effects of continued operation

on water quality and quantity (including minimum flows), fish entrainment and impingement, centrarchid⁵ spawning success in the project impoundment, and recreation.

1.2.2 Need for Power

The Municipal Project has an installed capacity of 1,200 kW and over the term of its license has generate approximately 4,550 MWh per year. To assess the need for project power, we look at the needs in the operating region in which the project is located.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Municipal Project is located in the Pennsylvania-New Jersey-Maryland (PJM) region of NERC. According to NERC's 2017 forecast, the peak season (summer) demand for the PJM region is expected to grow at an annual rate of 0.12 percent from 2018 to 2027 (NERC, 2017). On a local scale, the power generated by the project is used to reduce the amount of electricity the City purchases from the grid, typically via Appalachian Power Company (Appalachian Power).

We conclude that power from the project would continue to help meet a need for power in the PJM region in both the short- and long-term. The project would continue to provide low-cost power that displaces generation from non-renewable sources. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

A license for the Municipal Project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the U.S. Department of the Interior (Interior). Interior, by

⁵ Centrarchids are a family of fishes that include common sunfish and panfish species such as smallmouth bass, largemouth bass, bluegill, rock bass, and redbreast sunfish, all of which prefer to spawn close to the shore of lakes (littoral zone).

letters filed April 13, 2018 and April 17, 2018,⁶ requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for this project.

1.3.1.2 Section 10(j) Recommendations

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

On April 13, 2018, Interior timely filed six recommendations under section 10(j), as summarized in table 11, in section 5.3, *Recommendations of Fish and Wildlife Agencies*. In section 5.3, we also discuss how we address the agency recommendations and comply with section 10(j). Recommendations that were not filed pursuant to section 10(j) of the FPA are considered under section 10(a) of the FPA. We discuss these recommendations by resource area in sections 3 and 5 of this EA.

1.3.1.3 Section 10(a) Recommendations

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

In its letter filed on April 10, 2018, Virginia DGIF recommended several measures for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project including: (1) limiting impoundment fluctuations to 1.5 feet below full pool from April 1 through July 31; (2) providing minimum flows that are higher than the existing 25-cfs leakage flows; and (3) developing a wetland management plan. However, because none of these recommendations were filed pursuant to section 10(j) of the FPA, we consider them herein as 10(a) recommendations. In its letter filed on April 13, 2018,

⁶ Interior timely filed comments, section 10(j) recommendations, and fishway prescriptions, on April 13, 2018, within the deadline (April 14, 2018) specified in the Ready for Environmental Analysis notice; on April 17, 2018, Interior filed a revised comment letter, which clarified that its terms and conditions were preliminary.

Interior's recommendations to: (1) limit impoundment fluctuations to 1.5 feet below full pool from April 1 through July 31 to enhance centrarchid spawning success; (2) consult with FWS if bald eagles are found at the project; and (3) consult with adjacent landowners about the protection of the Virginia fringed mountain snail were not filed pursuant to section 10(j) of the FPA. Therefore, we consider these recommendations under section 10(a) of the FPA. We discuss section 10(a) recommendations by resource area in sections 3 and 5 of this EA.

1.3.2 Clean Water Act

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

On April 10, 2018, the City submitted an application to the Virginia Department of Environmental Quality (Virginia DEQ) for a section 401 certification for the Municipal Project. Virginia DEQ confirmed receipt of the application on April 10, 2018.⁷

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.

Using the U.S. Fish and Wildlife Service's (FWS) ECOS-IPaC website,⁸ Commission staff generated an official list of federally threatened, endangered, candidate, and proposed species, and designated or proposed critical habitats that may occur within the boundary of or be affected by the relicensing of the Municipal Project.⁹ The list includes the threatened northern long-eared bat (*Myotis septentrionalis*), the endangered Indiana bat (*Myotis sodalis*), the endangered Virginia big-eared bat (*Corynorhinus townsendii virginianus*), the endangered Virginia fringed mountain snail

⁷ The City filed a copy of the certification requests and email confirmation from Virginia DEQ on April 12, 2018.

⁸ <u>https://ecos.fws.gov/ipac/</u>

⁹ See memo filed March 29, 2018. Accession No. 20180329-3005.

(*Polygyriscus virginianus*), and the endangered smooth coneflower (*Echinacea laevigata*).

In its letter filed April 13, 2018, Interior states that based on limited anticipated effects on forest habitat, a new license for the Municipal Project would not have an adverse effect on listed bats. Interior further states that recreational use enhancements or routine transmission corridor maintenance could involve the clearing of trees which could disturb listed bats. However, if tree removal is restricted to between November 15 and March 31, Interior concludes that the effects of proposed project activities would be insignificant or discountable to the Indiana bat and impacts to the northern long-eared bat would be minimal. Staff agrees with this determination. Interior did not comment on the Virginia big-eared bat, however, Commission staff have determined that, with the seasonal tree clearing restriction in place, this species would not be affected by the project.

Regarding the federally endangered Virginia fringed mountain snail, which may be found along the Little River shoreline on private lands, Interior states that the City could develop public educational information for display at the boat launch and bank fishing area as well as outreach information for shoreline landowners whose property contains suitable habitat. Because no habitat for the Virginia fringed mountain snail occurs within the project boundary or areas that may be affected by project operation, Commission staff has determined that continued operation and maintenance of the project along with the proposed recreation enhancements will not affect the Virginia fringed mountain snail and that protection, mitigation, or enhancement measures are not warranted.

Although Interior identified the endangered smooth coneflower as a species that may occur within the project area, it did not provide any recommendations for this species. Because the areas where potential habitat may occur is frequently mowed, it is highly unlikely that the smooth coneflower occurs at the project. Therefore Commission staff determined that continued operation and maintenance of the project along with the proposed recreation enhancements will not affect the endangered smooth coneflower.

1.3.4 Coastal Zone Management Act

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

On June 27, 2018, the City filed Virginia DEQ's response to its inquiry of CZMA consistency. Virginia DEQ agreed that the project is not located within Virginia's coastal management zone and is unlikely to affect coastal resources or use. Therefore, the project is not subject to Virginia coastal zone program review and no consistency certification is needed.

1.3.5 National Historic Preservation Act

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

The City completed a historic resources survey of the area of potential effect (APE) and a historic architectural investigation of the Municipal Project. The project dam and exterior of the powerhouse have not been significantly altered since their original construction in 1934. The dam footprint, concrete facing, gate structures, mechanical equipment, powerhouse exterior, and arched multi-pane windows are all original components of the project. Due to the project's association with the history of Radford and its relationship to the Reconstruction Finance Corporation, a depression-era relief agency, the City recommends the Municipal Project as eligible for listing in the National Register.

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) with the Virginia Department of Historic Resources (Virginia SHPO) for the protection of historic properties from the effects of continued operation of the Municipal Project. The terms of the PA would ensure that the City addresses any adverse effects to historic properties identified within the APE through implementation of a Historic Properties Management Plan (HPMP).

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R., §§ 5.1-5.16) require an applicant to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA, and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EA, we conducted scoping for the Municipal Project to determine what issues and alternatives should be addressed. A scoping document (SD1) was issued on September 1, 2017. Scoping meetings were held on October 2 and 3, 2017, to request comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. In addition to comments provided at the scoping meetings, the following entities provided written comments:

Commenting Entity	Date Filed
Virginia Department of Environmental Quality	September 12, 2017
Virginia Department of Health	September 20, 2017
Virginia Department of Transportation	October 3, 2017
Federal Emergency Management Agency	October 16, 2017
Virginia Department of Conservation and Recreation	October 30, 2017
Brian McGurk	October 31, 2017
Virginia Department of Game and Inland Fisheries	November 1, 2017

Based on comments received during the October 2 and 3, 2017, scoping meetings and written comments received during the scoping process, a revised scoping document was issued on December 14, 2017.¹⁰

1.4.2 Interventions

On February 13, 2018, the Commission issued a notice accepting the license application. The notice set April 14, 2018, as the deadline for filing protests and motions to intervene. No protests or motions to intervene were filed.

1.4.3 Comments on the License Application

The Commission issued a Ready for Environmental Analysis (REA) notice for the project on February 13, 2018, and requested comments, recommendations, terms and conditions, and fishway prescriptions. The following entities filed comments, terms and conditions, recommendations, or prescriptions:

Commenting Entity	Date Filed
Virginia Department of Game and Inland Fisheries	April 10, 2018
Interior	April 13, 2018

¹⁰ Virginia DEQ filed a letter providing information for coordinating Virginia's review of federal NEPA documents on February 22, 2018.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

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

2.1.1 Existing Project Facilities

The Municipal Project consists of the following facilities: (1) a 293-foot-long, 58foot-high reinforced concrete slab and buttress dam that includes: (a) a south nonoverflow section; (b) an overflow bulkhead section; (c) an eight-bay spillway section each with a steel tainter gate; (d) a powerhouse intake section; and (e) a north nonoverflow section; (2) a 77-acre impoundment with a gross storage capacity of 562 acrefeet at a full pool elevation of 1,772 feet¹¹ National Geodetic Vertical Datum (NGVD) of 1929¹² and a net storage capacity of 220 acre-feet between elevations 1,768 and 1,772 feet; (3) a 20-foot, 3-inch-wide intake section with angled steel trash racks (3-inch by 5/16th-inch trash rack bars spaced 2.5 inches on center) and a steel roller type head gate; (4) a 27-foot-long steel-lined penstock in concrete that transitions from a 13.5-foot-wide, 11-foot-high entrance to an 8-foot-diameter conveyance to the turbine scroll case; (5) a 30-foot-long, 28-foot-wide, and 62-foot-high powerhouse containing a 1,200-kVA generator and a 1,733 horsepower turbine;¹³ (6) a 2.7-mile-long transmission line; and (7) appurtenant facilities. Project recreation facilities include a boat launch, a portage trail, and an upper parking area and a lower parking area, both of which can accommodate up to four vehicles with trailers.

¹¹ Exhibit F of the final license application (FLA) indicates the full pool elevation of the reservoir is 1,772.1 feet National Geodetic Vertical Datum (NGVD). However, throughout the remainder of the FLA, the City refers to a full pool elevation of 1,772.0 feet NGVD. Throughout this EA, we assume the full pool elevation of the project reservoir is 1,772.0 feet NGVD.

¹² Unless otherwise noted, all elevation data in this EA are given in NGVD of 1929.

¹³ Based on the revised Exhibit A filed on October 25, 2018, which provides the capacity ratings of the existing generator (which was last rewound in 1989) and the new turbine currently being installed to replace the old turbine unit that was damaged beyond repair in August 2014.

2.1.2 Project Safety

The Municipal Project has been operating for more than 29 years under its existing license.¹⁴ During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structure, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant, and a consultant's safety report has been submitted for Commission review. As part of the relicensing process, Commission staff would evaluate the continued adequacy of the project's facilities under a new license. Special articles would be included in any license issued, as appropriate. Commission staff would continue to inspect the project during the term of the new license to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation

The project primarily operates in a peaking mode but may operate in run-of-river (ROR) mode when project inflows are high and exceed the maximum hydraulic capacity of the powerhouse (420 cfs¹⁵). The City generally maintains the project impoundment between 1,769 feet and 1,772 feet (the full pool elevation).

The current license (Article 401) requires the City to provide a continuous minimum flow of 25 cubic feet per second (cfs), or inflow (whichever is less), to the Little River downstream of the dam.

 $^{^{14}}$ The Commission issued the current license on May 31, 1989. 47 FERC \P 62,220 (1989).

¹⁵ Because it is an in-kind turbine replacement, we assume for the purposes of our analyses herein that the maximum hydraulic capacity of the new turbine is also 420 cfs.

Although project operation is not specified in the current license, the City operates the project in the following manner. When project inflows are less than 445 cfs (sum of the maximum hydraulic capacity and minimum flow), the project generally operates in peaking mode, storing water during periods of low electrical demand and generating during high-demand periods (e.g., mornings in the winter and afternoons in the summer). Typical automatic start and stop levels for project operation are 1,771.9 feet and 1,770 feet, respectively (i.e., once an elevation of 1,770 feet is reached, generation stops to allow the impoundment to re-fill). Based on available stage data from USGS Gage No. 03170500, located immediately upstream of the project dam, maximum daily impoundment fluctuations during the period 1997 through 2012¹⁶ were less than 2.0 feet 93 percent of the time; with little seasonal differences as daily impoundment fluctuations were less than 2.0 feet 87 to 96 percent of the time on a monthly basis (table 1). Under some circumstances, the City may operate the project until a stop level of 1,769 feet is reached. When project inflows are greater than 445 cfs, the project generally operates in a ROR mode.

A hydro operator checks conditions at the dam in the morning and evening and monitors inflows at the U.S. Geological Survey (USGS) Gage No. 03170000 at Graysontown, Virginia, which is 8 miles upstream of the project. Under high-water conditions, or other adverse weather, the operator checks the plant with increased frequency. During flood conditions, or any other unusual event, City personnel remain at the project dam until conditions are within a safe range. Spillway gate operations are implemented as necessary to release flows in excess of the plant capacity (maximum hydraulic capacity of 420 cfs). Project operation may be modified depending on flow conditions, such as flooding or drought.

¹⁶ Data after 2012 were not used in this calculation because there were two turbine failures, one in 2013 and another in 2014, which caused the project to cease operation. The turbine unit is currently being replaced and the project is not operational at this time.

Table 1. Percent of days each month that daily impoundment fluctuations were less than 2 feet based on impoundment stage data (years 1997 through 2012) from USGS gage No. 03170500 (Source: staff).

Month	Percent of days fluctuations were less	
WOIIII	than 2 feet	
January	92.4	
February	96.0	
March	92.6	
April	92.6	
May	91.8	
June	92.3	
July	93.3	
August	95.6	
September	89.9	
October	87.4	
November	89.3	
December	90.1	

2.1.4 Existing Environmental Measures

Under the current license, the City provides a continuous minimum flow of 25 cfs, or inflow to the project, whichever is less, to the Little River downstream of the project dam (Article 401). The 25-cfs flow is provided via leakage through the spillway gates. Article 403 includes measures for consultation with the Virginia SHPO to protect cultural resources discovered during land-clearing or land-disturbing activities. The project includes a small boat launch and a canoe portage, which are required by Article 404.

2.2 APPLICANT'S PROPOSAL

2.2.1 Proposed Project Facilities

The City proposes to remove from the project boundary the currently licensed 2.7mile-long transmission line and instead enclose only three 560-foot-long, 4.16-kilovolt overhead conductors that originate from the powerhouse and transmit project power to a switched disconnect/interconnection with the local distribution grid. The City states that the 2.7-mile-long transmission line should no longer be considered part of the project because it has become part of the distribution grid.

2.2.2 Proposed Project Operation

The City proposes no changes in project operation and proposes to continue operating the project in both peaking and ROR modes. The City would continue to

operate the project such that impoundment elevations remain between 1,772 feet and 1,769 feet during normal project operating conditions, including peaking.

2.2.3 Proposed Environmental Measures

Aquatic Resources

• Continue to provide a minimum flow of 25 cfs, or project inflow, whichever is less, to the Little River downstream of the project dam.

Recreation Resources

- Create an impoundment bank fishing area by constructing a trail from the boat launch to the informal shoreline fishing area and installing a bench within the project boundary.
- Improve the existing primitive canoe portage by providing a tiered/sloped path to the river, installing improved signage, and providing information on the City's website.
- Install a picnic shelter with permanent picnic facilities and parking (as feasible) within the project boundary.

Cultural Resources

• Implement an HPMP, developed in consultation with the Virginia Department of Historic Resources, for the protection of undiscovered historic properties and the National Register-eligible project dam and powerhouse.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the Municipal Project would be operated as proposed, and include all of the City's proposed measures and the following additional staff-recommended measures:

- Develop an erosion and sediment control plan for construction of the proposed recreation enhancements.
- Develop an operation compliance monitoring plan to document compliance with the proposed 25-cfs minimum flow and 3-foot impoundment operation band (between elevations of 1,769 feet and 1,772 feet).

- Restrict tree removal to between November 15 and March 31, to avoid killing or injuring listed bats.
- Follow the FWS' National Bald Eagle Management Guidelines and consult with the FWS and Virginia DGIF should any nests be found at the project or any tree removal is required for construction of the proposed recreation enhancements, to avoid killing or injuring bald eagles.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Retiring the Project

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing a project in most cases, when appropriate protection, mitigation, and enhancement measures are available.¹⁷ The Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or there are serious resource concerns that cannot be addressed with appropriate measures, making decommissioning a reasonable alternative.¹⁸ This is consistent with NEPA and the Commission's obligation under section 10(a) of the FPA to issue licenses that balance developmental and environmental interests.

¹⁷ See, e.g., Eagle Crest Energy Co., 153 FERC ¶ 61,058, at P 67 (2015); Public Utility District No. 1 of Pend Oreille County, 112 FERC ¶ 61,055, at P 82 (2005); Midwest Hydro, Inc., 111 FERC ¶ 61,327, at PP 35-38 (2005).

¹⁸ See generally Project Decommissioning at Relicensing; Policy Statement, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); see also City of *Tacoma, Washington*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

Project retirement could be accomplished with or without dam removal.¹⁹ Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions.

No participant has recommended project retirement, and we have no basis for recommending it. The power produced by the Municipal Project would be lost if the project was retired, and replacement power would need to be found. There also could be significant costs associated with retiring the project powerhouse and appurtenant facilities.

Project retirement without dam removal would involve retaining the dam and disabling or removing equipment used to generate power. Certain project works could remain in place and could be used for historic or other purposes. This approach would require the Commonwealth of Virginia to assume regulatory control and supervision of the remaining facilities. However, no participant has advocated this alternative, nor do we have any basis for recommending it. Removing the dam would be more costly than retiring it in place, and removal could have substantial, negative environmental effects.

¹⁹ In the event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission" 18 C.F.R. § 6.2 (2017). This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatics, recreation, etc.). Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommendations are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.²⁰

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Little River flows for approximately 93 miles through southwestern Virginia. The Little River and its watershed are located mainly in Floyd County; however, portions of the river flow through Pulaski and Montgomery Counties. Headwaters of the Little River start near Copper Hill, in northeastern Floyd County, and flow west-northwest downstream to its confluence with the New River at the Pulaski and Montgomery County line, south of Radford, Virginia. The project is located on the Little River approximately 0.5 mile upstream from its confluence with the New River. The 75-MW Claytor Project (FERC No. 739), owned and operated by Appalachian Power, is located on the New River, about 0.7 mile upstream of the Little River-New River confluence. The Little River has a drainage area of approximately 225,000 acres.

The Little River watershed makes up a portion of the Kanawha River Basin, also known as the New River Basin, which ultimately drains into the Mississippi River and the Gulf of Mexico. Portions of the Kanawha River Basin span over North Carolina, Virginia, and West Virginia and cover approximately 12,223 square miles.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR § 1508.7), a cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively

²⁰ Unless otherwise noted, the sources of our information are the license application filed by the City on May 30, 2017 and the responses to our request for additional information filed on September 29, 2017.

significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application and scoping site visit, we have identified water quality (specifically dissolved oxygen (DO) and water temperature) as a resource that could be cumulatively affected by the proposed continued operation and maintenance of the Municipal Project in combination with other hydroelectric projects and activities in the New River Basin.

3.2.1 Geographic Scope

Our geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the proposed action's effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the New River Basin.

If the project impoundment stratifies, low DO water could be released downstream, regardless of the mode of operation (peaking or ROR) because the project intakes are located in the bottom half of the water column. This low DO water could enter the New River, which is also affected by the operation of the nearby Claytor Project. Altered water quality conditions (e.g., reduced DO and modified temperatures) have been found to extend at least 28 miles downstream of this confluence under some conditions.²¹ It should be noted that 28 miles was the downstream limit of sampling; therefore, the effects of the Claytor and Municipal Projects on water quality, particularly water temperature, could extend further downstream of Claytor Dam). Given its higher discharge, the Claytor Project likely has a greater effect than the Municipal Project on water quality in this portion of the New River Basin. However, there are times when the Claytor Project would not be releasing water (e.g., 37 minutes of each hour when that project is autocycling),²² during which time the Municipal Project might be operating and thus releasing water into the New River.

²¹ Claytor Hydroelectric Project Final Water Quality Study Report, filed on January 15, 2009. Accession No. 20090115-4013.

²² Minimum flows at the Claytor Project (average hourly flow of 750 cfs from April 1 to November 30) are typically achieved by autocycling through one of the project's turbine units, each of which has a maximum hydraulic capacity of 2,000 cfs, on average. During autocycling, one unit will use a higher flow (~2,000 cfs) to generate for a portion of 1 hour to provide the required flow. For example, to release an average hourly flow of 750 cfs, the unit would operate 23 minutes every hour.

Therefore, we have identified the geographic scope for our cumulative effects analysis for water quality to include the Little River from the upper end of the Municipal Project impoundment (3.5 miles upstream of the project dam) downstream to its confluence with the New River and extending down the mainstem New River approximately 58 miles to the upper end of the Bluestone Reservoir, which is the next impoundment downstream. This is consistent with the downstream limit of the geographic scope identified for the Claytor Project.²³

3.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis in the EA will include a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of a new license, the temporal scope will look 30 to 50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource. The quality and quantity of information, however, diminishes as we analyze resources further away in time from the present.

In section 3.3.2.2, *Aquatic Resources, Environmental Effects*, we discuss the cumulative effects of licensing the project on water quality (DO and temperature).

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

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

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that aquatic, terrestrial, threatened and endangered species, recreation, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to land use or aesthetic resources associated with the proposed action, and therefore, these resources are not addressed in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

²³ Scoping Document 2 for the Claytor Hydroelectric Project, issued on June 15, 2006. Accession No. 20060615-3040.

3.3.1 Geology and Soil Resources

3.3.1.1 Affected Environment

The Municipal Project is located in southwest Virginia, within the Valley and Ridge physiographic province. This province was formed on thick, folded beds of sedimentary rock, and therefore, is characterized by elongate parallel ridges and valleys. The project is specifically located within the Great Valley sub-province, a broad valley with low to moderate slopes underlain by carbonate rocks. Elevations range from 1,200 feet to 2,300 feet above sea level. The Great Valley sub-province is located between the Blue Ridge Mountains in the east and the Allegheny Mountains in the west.

Soils within the project area are typically well drained with slopes ranging from 10 to 60 percent throughout the area. Impoundment shorelines are composed primarily of steep rock outcrops. There are some areas of silty and sandy clay loam that have slopes of only 0 to 2 percent in the upper portion of the project impoundment, where the impoundment is more riverine in nature. Although steep slopes dominate the banks around the impoundment, there are no areas of significant shoreline or riverbank erosions, slides, or instability at the project. Additionally, no areas of impoundment shoreline instability were noted during the Commission's two most recent dam safety inspections conducted on April 13, 2016 and May 3, 2017.

A bathymetric study of the project impoundment was completed by the City in August 2015. The study showed that sediment deposition occurs on the inside of river bends and deeper holes on outside bends; typical riverine depositional patterns that persist throughout the impoundment. At the full pool elevation (1,772 feet), water depths directly behind the dam approach 30 feet which suggests limited sediment accumulations in this area. Sediment levels directly behind the dam have likely been influenced by powerhouse operation and periodic operation of the spillway gates over the life of the project. Results of the bathymetry study also indicate that the impoundment surface area at full pool is currently 77 acres with approximately 560 acre-feet of storage. These results are significantly less than the 350-acre surface area and 1,600 acre-feet of storage documented when the project was constructed in the 1930's.

In order to estimate the thickness of alluvial sediments and the depth to bedrock at the project, the City conducted a review of original project construction drawings. Along with the results of the bathymetry study, it was estimated that between 14 and 20 feet of sediment has accumulated at the dam over the life of the project (approximately 14 feet in the vicinity of the intake, and approximately 20 feet in the vicinity of the tainter gates). Additionally, the City reviewed a project impoundment sedimentation study performed by the U.S. Department of Agriculture, Soil Conservation Service in 1944 in order to examine historical sedimentation processes within the project impoundment. This study reported that 628 acre-feet of sediment accumulated in the project impoundment over a 10-year period, equating to approximately 63 acre-feet per year from 1934 to 1944. Thus, the impoundment storage volume has declined from 1,018 acre-feet in 1944 to 560 acre-feet in 2015. This equals a decrease of approximately 6.5 acre-feet per year, when averaged over 71 years.

3.3.1.2 Environmental Effects

Shoreline Erosion

During the Commission's scoping for this project, shoreline erosion was identified as an issue of concern by Virginia DGIF and was noted in its comments filed November 1, 2017.²⁴ In letters filed April 25, 2017 and November 1, 2017,²⁵ Virginia DGIF states that based on observations during its fish sampling excursion in September 2013, bank erosion is occurring in the upper impoundment (upstream from the Cracker Neck area²⁶), most likely due to head-cutting as the impoundment fills in the lower lake with sediment over time. The City responded in its final license application (FLA) that during survey work, no areas were observed where project operation has contributed to shoreline erosion and that no areas of impoundment shoreline instability were noted during the Commission's dam safety inspection conducted on April 13, 2016.²⁷

No comments about shoreline erosion were filed by Virginia DGIF in response to the REA notice.

Staff analysis

The project's impoundment shoreline is composed primarily of steep rock outcrops. No areas of impoundment shoreline instability were noted during the Commission's most recent dam safety inspection conducted on May 3, 2017²⁸ and none were noted in any of the City's surveys conducted for relicensing. No further

²⁶ The Cracker Neck area is about 1 mile upstream from the Little River Dam.

²⁴ See letter filed by Virginia DGIF on November 1, 2017, Re: Comments on Scoping Document 1 for the Radford Municipal (Little River Dam) Project P-1235-016. Accession No. 20171101-5274.

²⁵ See letter filed by Virginia DGIF on April 25, 2017, Re: Comments on the January 2017 Draft License Application for the Radford Municipal (Little River Dam) Project P-1235-016. Accession No. 20170425-5108.

²⁷ See Dam Safety Inspection Report issued September 17, 2017. Accession No. 20170907-5047.

²⁸ See Dam Safety Inspection Report issued September 28, 2017. Accession No. 20180313-3014.

information was provided by Virginia DGIF regarding the bank erosion it observed upstream from the Cracker Neck area in 2013. Due to the steep rocky slopes of the project impoundment, shoreline erosion does not appear to be occurring despite the 3foot fluctuation band of the impoundment elevation. Given that the City proposes no changes in project operation, shoreline erosion of the impoundment due to continued operation and maintenance of the project is not anticipated.

Construction of Proposed Recreation Enhancements

Existing recreation facilities consist of a boat launch, a primitive portage trail, and two parking areas. In addition, there is an existing informal path that leads from the boat launch to a bank fishing area near the dam. The existing canoe portage is a rocky, uneven pathway beginning at the river's edge downstream of the dam that ascends up a steep hillside for about 90 feet to the lower parking area at the project. The City proposes to construct a formal trail from the boat launch to the bank fishing area, a tiered pathway for the canoe portage, and a picnic shelter. The City would install a bench along the trail to provide a place for the public to rest while fishing or viewing nature. The City also proposes to install a picnic shelter with permanent picnic facilities within a grassy area near the entrance to the project. The City states that providing a formal trail from the boat launch to the bank fishing area would minimize degradation of the shoreline by consolidating foot traffic into a direct path. Constructing a tiered pathway from the river to the parking area would provide a stable path allowing the public to traverse safely up and down the hill to access the canoe portage.

No comments or concerns regarding the effects of the proposed recreation enhancements on geology and soils were filed by the agencies in response to our REA notice.

Staff Analysis

The City's proposal to enhance recreation facilities at the project would require some excavation that would temporarily disturb soil resources, which could result in limited sediment discharge into the project impoundment and Little River causing temporarily increased turbidity. To reduce these impacts, an erosion and sediment control plan that utilizes best management practices in the construction areas such as erosion control fencing, soil stabilization mats, and revegetating disturbed areas could be developed at minimal cost.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity

The majority of the Little River watershed (USGS Hydrologic Unit Code 05050001) is located in Floyd County, Virginia with smaller portions in Pulaski and Montgomery Counties. The watershed is a part of the Kanawha-New River Basin, which drains via the Mississippi River to the Gulf of Mexico. The Little River watershed encompasses 351 square miles, with primary land uses including forest land and pasture land (Virginia DEQ, 2011b). Monthly inflow statistics for the project from 1928 through 2017 are shown in table 2.²⁹ The median daily inflow at the project is 303 cfs and the historical minimum and maximum daily flows are 35 cfs and 14,994 cfs, respectively. The lowest monthly flows at the project typically occur during August and September, when the 90 percent exceedance flows are 108 and 106 cfs, respectively (table 2).

Month	Median (cfs)	90 percent	10 percent
IVIOIIIII		exceedance (cfs)	exceedance (cfs)
January	352	159	768
February	416	193	908
March	473	260	996
April	445	259	920
May	395	219	741
June	315	159	611
July	250	126	499
August	207	108	426
September	189	106	459
October	207	117	527
November	244	147	573
December	302	148	647

Table 2. Monthly project inflow statistics for years 1928 through 2017 (Source: Staff).

Water Use

Along with hydroelectric power generation, water from the Little River is also used for agriculture and recreation purposes (Virginia DEQ, 2011a). All waters within the State of Virginia are designated for recreation, the propagation and growth of indigenous aquatic life, wildlife, and the production of edible and marketable natural resources (Virginia DEQ, 2014b).

²⁹ All flow data herein are prorated based on the difference in drainage area between USGS Gage No. 03170000 at Graysontown, Virginia (309 square miles) and the drainage area at the project (351 square miles).

The Virginia Water Withdrawal Reporting Regulation (9 VAC 25-200-10, *et seq.*) requires that individuals or facilities that withdraw water at volumes greater than 300,000 gallons in a month must obtain a permit from Virginia DEQ. Reportable surface water withdrawals include those for public water supply, manufacturing, mining, commercial uses, institutional uses, livestock watering, artificial fish culture, and steam-electric power generation, among others. There are no current Virginia DEQ permitted water withdrawals on the Little River within Montgomery and Pulaski Counties. The City withdraws water for water supply from the New River downstream of its confluence with the Little River. Hydroelectric power is not considered a consumptive water use and thus is not considered a water withdrawal (Virginia DEQ, 2014a).

Water Quality

Project waters are located in Virginia DEQ's Class IV Mountainous Zone. Water quality criteria for surface waters located in this zone are: (1) daily average DO values of at least 5.0 milligrams per liter (mg/L), with instantaneous DO values remaining above 4.0 mg/L; (2) pH levels between 6.0 and 9.0; and (3) a maximum water temperature of 84 degrees Fahrenheit (°F).³⁰ In man-made impoundments in Virginia, including the project impoundment, these criteria only apply to surface waters³¹ (i.e., above any thermocline that may be present).

Due to its shallow depth (10 to 30 feet, see *Aquatic Habitat* below), the project impoundment is not subject to strong stratification. Vertical profiles of temperature and DO collected in the impoundment during the summer of 2006 by Virginia DEQ indicated the impoundment was vertically homogenous with respect to temperature and DO in July and September, and exhibited only weak stratification in August, when temperature and DO at a depth of 16 feet were 1.3°F cooler and 3 mg/L lower than surface waters. Temperature and DO of impoundment surface waters during these 2006 point samples ranged from to 65 to 78°F and from 6.5 to 8.9 mg/L.

Downstream of the dam, values of water temperature, DO, and pH are consistent with the state's water quality criteria. Occasional water quality sampling was conducted by Virginia DEQ approximately 750 feet downstream of the project dam at the Route 605 bridge (figure 1); in total, 46 grab samples were taken during the months of July, August,

³⁰ Maximum water temperature criteria (84°F) for the section of the New River Basin where the project is located (upstream of the Montgomery-Giles County line to the Virginia-North Carolina border) differs from the New River Basin as a whole, pursuant to 9VAC25-260-540, see <u>https://law.lis.virginia.gov/admincode/title9/agency25/</u> <u>chapter260/section540/</u>.

³¹ <u>https://law.lis.virginia.gov/admincode/title9/agency25/chapter260/section50/</u>

and September across years 1970 to 2008. Based on these data, water temperatures ranged from 58.6 to 84.0°F, with a mean of 72.0°F. DO values ranged from 5.4 to 9.1 mg/L, with a mean of 7.5 mg/L, and pH ranged from 6.2 to 8.8, with a mean of 7.6.

Aquatic Habitat

The project impoundment is narrow (generally less than 300 feet wide) and shallow, typically less than 10 feet at full pool, with the exception of some deeper areas that approach 30 feet deep along the outside bends of the river and just upstream of the dam (figure 2). The shallowest portion of the impoundment is the upstream end, in the vicinity of the island noted in figure 2, where depths are approximately 4 feet at full pool. The dominant substrate throughout the impoundment is mud and silt, with some sand and detritus. Some silt-covered cobble and gravel substrate is present near the island located at the upstream end of the impoundment (figure 2). The banks of the impoundment are primarily mud and silt, although a steep limestone cliff is present just upstream of the dam along the northern shoreline.

Downstream habitat, from the dam to the confluence of the Little River with the New River, consists of pools and runs separated by riffles (figure 3) (W.M. Lewis and Associates Inc., 1988). The substrate downstream of the dam is dominated by bedrock, boulder, and cobble, with some higher quality mussel habitat (mixed sand, gravel, and cobble) present in run and riffle habitats.



Figure 2. Bathymetry of the project impoundment based on a bathymetric survey that was conducted in August 2015 while the impoundment water level was held at an elevation of 1,772.3 feet (0.3 foot above full pool). Note that elevations are color-coded, whereby greens represent the deepest locations and browns the shallowest locations as indicated in the figure legend (Source: license application, as modified by staff).



Figure 3. Example of riffle habitat located approximately 900 feet downstream of the project dam (just below the Route 605 bridge). Picture was taken on October 2, 2017, when outflow from the Municipal Project was 142 cfs (Source: staff).

Fish Community

The fish community in the project area was characterized during boat electrofishing surveys conducted in September 2013 by Virginia DGIF. These surveys included the project impoundment and the Little River downstream of the dam to its confluence with the New River. These survey data show that centrarchids dominate the impoundment fish community as they composed 71 percent of the total catch—with species such as redbreast sunfish, smallmouth bass (a popular game fish), and rock bass common in the project impoundment (table 3). White sucker were also prevalent in the impoundment. Centrarchids also dominated the fish community downstream of the dam (67 percent of the total catch), although a notable difference was the absence of largemouth bass downstream of the dam (table 4). White sucker was also less common downstream. Meanwhile, walleye, a popular game fish was only found downstream of the dam (29 individuals ranging in length from 14 to 21 inches); shiner species also appeared to be more abundant downstream of the dam (14 percent of the total catch) compared to the project impoundment (2 percent of the catch). Few catfish, three individuals in total, were collected in project waters—one brown bullhead in the impoundment and two flathead catfish downstream of the dam. There is no active fish stocking in the Little River, nor are there any diadromous species present in the river.

Table 3. Species composition of the impoundment fish community based on boat electrofishing surveys conducted by Virginia DGIF during September 2013. For comparative purposes, species are included in this table that were not collected in the impoundment (e.g., walleye), but were collected downstream of the dam (see table 4) (Source: license application, as modified by staff).

Common name	Number collected	Percent of total catch
Redbreast sunfish	181	32.8
White sucker	116	21.0
Smallmouth bass	92	16.7
Rock bass	38	6.9
Largemouth bass	30	5.4
Bluegill	21	3.8
Northern hog sucker	17	3.1
Spotted bass	17	3.1
Common carp	16	2.9
White shiner	8	1.4
Green sunfish	7	1.3
Black crappie	3	0.5
Silver shiner	3	0.5
Bluntnose minnow	1	0.2
Brown bullhead	1	0.2
Central stoneroller	1	0.2
Walleye	0	0.0
Spottail shiner	0	0.0
Whitetail shiner	0	0.0
Gizzard shad	0	0.0
Striped bass	0	0.0
Bigmouth chub	0	0.0
Black jumprock	0	0.0
Pumpkinseed	0	0.0
Flathead catfish	0	0.0
Logperch	0	0.0
Striped bass hybrid	0	0.0

Table 4. Species composition of the fish community downstream of the dam based on boat electrofishing surveys conducted by Virginia DGIF during September 2013. For comparative purposes, species are included in this table that were not collected downstream of the dam (e.g., largemouth bass), but were collected in the impoundment (see table 3) (Source: license application, as modified by staff).

Common name	Number collected	Percent of total catch
Rock bass	73	25.3
Redbreast sunfish	63	21.9
Bluegill	34	11.8
Walleye	29	10.1
Whitetail shiner	21	7.3
Spottail shiner	19	6.6
Smallmouth bass	14	4.9
Gizzard shad	13	4.5
Spotted bass	4	1.4
Northern hog sucker	3	1.0
Striped bass	2	0.7
Green sunfish	2	0.7
Pumpkinseed	2	0.7
Flathead catfish	2	0.7
White sucker	1	0.3
Common carp	1	0.3
Bigmouth chub	1	0.3
Black crappie	1	0.3
Black jumprock	1	0.3
Logperch	1	0.3
Striped bass hybrid	1	0.3
Largemouth bass	0	0.0
White shiner	0	0.0
Silver shiner	0	0.0
Bluntnose minnow	0	0.0
Brown bullhead	0	0.0
Central stoneroller	0	0.0

Freshwater Mussels

Qualitative mussel surveys (timed searches) were conducted in September 2015 throughout the project impoundment and a reach below the dam that extended 1,800 feet downstream of the tailrace and contained potentially high quality mussel habitat—mixed substrate consisting of sand, gravel, and cobble within run and riffle habitats. The target

species were the state-threatened green floater (*Lasmigona subvirdis*) and pistolgrip (*Quadrula verrucosa*). Despite extensive searching (11 person hours), no freshwater mussels (live individuals or shells) were found in the project impoundment, although Asian clams were fairly common (up to 15 individuals per square meter). Downstream of the dam, only one live mussel was found, a partially gravid pocketbook (*Lampsilis ovata*). Thus, it appears the project impoundment currently lacks freshwater mussels, but a small, relict population of pocketbook mussels exists downstream of the dam.

Eastern hellbender

The eastern hellbender (*Cryptobranchus alleganiensis*) is a somewhat cryptic, stout-bodied, fully-aquatic salamander that prefers clear, fast-flowing, well-oxygenated streams and rivers and seeks refuge under large flat boulders, logs, and debris.³² It is found throughout the eastern U.S. in the Susquehanna, Missouri, Ohio, and Mississippi Rivers. In Virginia, it can be found in the mainstem and tributaries of the New River drainage (including the Little River) and in the Clinch, Powell, and Holston River tributaries of the Upper Tennessee River. The eastern hellbender is known to occur upstream of the project impoundment and in the mainstem of the New River downstream of Claytor Dam.³³

The eastern hellbender is a federal species of concern because it has declined throughout most of its range due to habitat alteration, water pollution, and indiscriminant killing. Although it is not listed as threatened or endangered at state or federal levels, the 2015 Virginia Wildlife Action Plan³⁴ classifies eastern hellbender as a tier I species of concern. This means that Virginia DGIF has determined its populations are at critically low levels, face immediate threat(s), or occur within an extremely limited range.

3.3.2.2 Environmental Effects

Effects of Project Operation on Water Quality

Hydropower projects located on impoundments that stratify can pass bottom waters with low DO levels downstream if the project has deep intakes, such as the Municipal Project. Accordingly, project operation could lower DO values and negatively affect aquatic organisms downstream of the powerhouse.

³² https://www.dgif.virginia.gov/hellbender/

³³ See letter filed by Virginia DGIF on November 1, 2017. Accession No. 20171101-5274.

³⁴ <u>http://bewildvirginia.org/wildlife-action-plan/</u>
The applicant proposes no changes in project operation. Nor were there any substantive comments or concerns regarding water quality in response to our REA notice.

Staff Analysis

As described above, the project impoundment is shallow, experiences moderate siltation, and contains only a few small areas where depths exceed 30 feet. As such, the impoundment is not prone to strong stratification and the development of large areas of bottom waters with low DO that could be passed downstream through the project intakes. Furthermore, downstream water quality data collected across years 1970 through 2008, when the project was operating as it does currently (with at least 25 cfs leaking through the tainter gates),³⁵ indicates downstream water quality is suitable for aquatic life as temperature, DO, and pH values are consistent with the state's water quality criteria. Therefore, continuing to operate the project with no changes, as proposed by the City, would not be expected to result in any project-related changes in water quality conditions, which appear suitable at this time for aquatic biota in the project area.

Effects of Impoundment Fluctuations on Centrarchid Spawning Success

Hydropower projects that operate in peaking mode, such as the Municipal Project, cause fluctuations in impoundment water levels. These project-related water level fluctuations can expose shoreline areas (when the project is generating and water levels drop) and thereby affect aquatic organisms and ecological functioning of the littoral zone (Szluha et al., 1979; Hildebrand, 1980; Marmulla, 2001). For example, centrarchid fishes build nests in littoral habitats for the purposes of spawning and rearing their young. Depending on the magnitude and frequency of such fluctuations, they may affect the spawning success of centrarchids in numerous ways, including: reducing the amount of stable spawning habitat, causing males to abandon the nests they are guarding, or result in direct mortality of eggs and larvae via dessication (Clark et al., 2008).

The City proposes to continue operating the project such that impoundment fluctuations do not exceed 3 feet under normal operating conditions (i.e., the impoundment would be maintained between elevations of 1,769 feet and 1,772 feet). Virginia DGIF and Interior both recommend that daily impoundment fluctuations associated with project operation (peaking) should be limited to 1.5 feet from April 1 through July 31, which corresponds to the spawning season for centrarchids in this region. In addition, Virginia DGIF states this measure would also benefit catfish (which

³⁵ The current license for the project, issued on May 31, 1989, indicates that 25 cfs has been leaking through the tainter gates for many years prior to 1989. Although it has not been operating since 2014 due to a turbine failure, the project started operating in November 1934.

also spawn in littoral habitats) because the April through July time period encompasses the first two months (June and July) of the catfish summer spawning season.

Staff Analysis

As described above in section 2.1.3, *Existing Project Operation*, although the City's current practice is to operate the project with a 3-foot impoundment fluctuation band, the project appears capable of meeting the majority of its generation needs with impoundment fluctuations that are considerably lower in magnitude. Specifically, during the April 1 to July 31 timeframe across years 1997 through 2012, daily impoundment fluctuations (the difference between maximum and minimum water levels on a given day) were less than 2.0 feet 93 percent of the time and less than 1.5 feet 80 percent of the time, with a mean of 1.2 feet. Available length data from impoundment fish surveys demonstrate that local recruitment occurs in the project area under this current operating regime as juvenile centrarchids (less than 5 inches) are well represented in size distributions as are larger adults of popular game fishes such as smallmouth and largemouth bass (figure 4). Accordingly, these conditions-naturally reproducing centrarchid populations that support an impoundment fishery—would be expected to be maintained under the City's proposal to continue operating the project with a 3-foot fluctuation band. In addition, the City's proposal to continue operating within a 3-foot fluctuation band would ensure that no further dewatering of the littoral zone occurs (compared to existing conditions), which is especially important for the upstream end of the impoundment, where depths are as shallow as 4 feet at full pool. The recommendation by Virginia DGIF and Interior to limit impoundment fluctuations to 1.5 feet from April 1 through July 31 would be expected to have minimal benefits because daily impoundment fluctuations under existing project operation are already less than 1.5 feet during most (80 percent) of this proposed time period; therefore, this measure would only reduce fluctuations an additional 20 percent of the time compared to existing project operation.

Regarding benefits to catfish, survey data suggest that catfish species are rare in the project impoundment. Although a total of 556 fish (16 different species) were collected during boat electrofishing in the impoundment, only one catfish (a brown bullhead) was captured. Therefore, given the apparent scarcity of catfish in the project impoundment, restricting daily impoundment fluctuations to 1.5 feet from April 1 through July 31, as recommended by Virginia DGIF and Interior, would not be expected to enhance catfish spawning success in the project impoundment as these conditions (fluctuations of 1.5 feet or less) have persisted over much of the current license term, yet catfish remain rare in the impoundment. The City's proposal to continue operating the project with a 3-foot fluctuation band would be expected to maintain current conditions for catfish species.



Figure 4. Length frequency distributions of common centrarchids in the project impoundment, based on boat electrofishing surveys conducted during September 2013 ("n" refers to the number of each species collected) (Source: staff).

Fish Entrainment and Impingement

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

In its section 10(j) letter, Interior recommends that the City develop and implement, in consultation with the U.S. Fish and Wildlife Service, impingement/entrainment and turbine operation protocols that minimize fish mortality. Interior's recommendation provides no specific measures to be analyzed, nor does it provide any justification as to why it believes there is a need to reduce entrainment mortality at the project (e.g., Interior provides no estimate of the current levels of entrainment mortality at the project under existing operation). Therefore, to provide information on the expected entrainment mortality at the project under current project operation and to inform the need for potential measures to mitigate entrainment mortality, we summarize below the results of the City's desktop impingement and entrainment study.

Staff Analysis

Impingement potential at the project is low. The only species in the project impoundment that would be susceptible to impingement - and excluded from the trash racks (2.5-inch clear spacing) based on fish skull widths - is adult common carp larger than 20 inches. However, adult carp of this size would be able to avoid impingement because their burst swimming speeds of 4 to 14 feet per second (fps) (table 5) well exceed the calculated approach velocity at the project of 1.64 fps when the project is generating at maximum capacity (420 cfs). Therefore, impingement mortality at the project is expected to be very low under existing project operation.

Although most fish present in the project impoundment could theoretically fit through the trash racks based on their body size alone, entrainment risk is low due to the low approach velocities at the project in relation to fish swimming speeds. The only fish species susceptible to entrainment are juvenile shiners (silver and white shiners), as all other species and life stages should be able to avoid entrainment because their burst swimming speeds (table 5) exceed the calculated approach velocity at the project intake. Based on the Franke et al. (1997) blade strike model, entrained juvenile shiners (less than 2 inches) would exhibit high survival (98.2 percent) through the project turbines. Therefore, under existing project operation, entrainment mortality at the project appears to be minimal and would not be expected to adversely affect fish populations that inhabit the project impoundment.

	Burst swimming	Burst swimming	
Species	speeds of juveniles	speeds of adults	
	(fps)	(fps)	
Redbreast sunfish	2.4 ^{c,h}	4.3 ^k	
White sucker	$2.4-3.8^{1}$	5-10 ^a	
Smallmouth bass	2.0-3.2 ^g	3.5-5.6 ^b	
Rock bass	2.6 ^k	4.3 ^k	
Largemouth bass	2.0-3.2 ^{c,d,e}	3.5-5.6 ^f	
Bluegill	2.6 ^{c,h}	4.3 ^j	
Northern hog sucker	2.4-3.8 ^m	5-10 ^m	
Spotted bass	2.0-3.2 ^g	3.5-5.6 ^f	
Common carp	2.8 ^{c,e}	$4.0-14.0^{a}$	
White shiner	1.3 ^{j,n}	4.5 ^{j,n}	
Green sunfish	2.4^{i}	4.3 ^k	
Black crappie	2.6 ^k	4.3 ^k	
Silver shiner	1.3 ^{j,n}	4.5 ^{j,n}	
Bluntnose minnow	1.8 ^{o,p}	5.8 ^{o,p}	
Brown bullhead	$3.6^{c,q,r}$	$7.9^{c,q,r}$	
Central stoneroller	2.1 ^h	4.1 ^{c,h}	

Table 5. Burst swimming speeds of juvenile and adult stages of fish present in the project impoundment (Source: staff).

^a Bell, 1991

^b Peake and Farrell, 2004

^c estimated using the relationship in Bell, 1991 that the ratio of sustained to burst swim speeds is 0.5

^dKolok, 1992

^e Katopodis and Gervais, 1991

^f using smallmouth bass as surrogate species

^g using largemouth bass as a surrogate species

^h Leavy and Bonner, 2009

ⁱ using redbreast sunfish as a surrogate species

^j Webb, 1978

^k using bluegill as a surrogate species

¹ Peake, 2008

^m using white sucker as a surrogate species

ⁿ using common shiner as a surrogate species

^o Webb, 1986

^p using fathead minnow as a surrogate species

^qBeecham et al., 2009 ^rusing blue catfish as a surrogate species

Minimum Flow Releases

At hydropower projects that operate in peaking mode, such as the Municipal Project, downstream areas can become dewatered (when the project is storing water and not generating) if a sufficient minimum flow is not provided.

The City proposes no changes in project operation and to continue releasing a minimum flow of 25 cfs downstream of the dam and generally operating the project in a peaking mode, depending on project inflows. Virginia DGIF and Interior recommend that to protect downstream aquatic resources, particularly freshwater mussels, the minimum flow should be higher than the existing 25-cfs flow, but do not specify a value. These entities further recommend that flow releases should more closely mimic the historic hydrograph for the Little River (in terms of flow magnitude, duration, and seasonality), but again provide no specific flow values in their recommendation. Virginia DGIF questions the adequacy of the existing 25-cfs minimum flow because the historic 7Q10³⁶ (for years 1929 through 2016) at the USGS gage at Graysontown is 32 cfs and the lowest recorded daily mean flow at that gage is 31 cfs. Virginia DGIF also states that the constant increases and decreases in downstream flows associated with peaking induce shear stress at the river bed that reduces the settlement success of juvenile mussels. Because Interior and Virginia DGIF do not provide specific flow values as part of their minimum flow recommendations, we are only able to analyze the general effects of: (1) increasing minimum flows above the existing 25-cfs minimum flow and (2) providing flow releases that more closely approximate natural flow conditions.

Staff Analysis

A minimum flow (wetted perimeter) study was conducted at the Municipal Project during low-flow conditions in July and August of 1988 (W.M. Lewis and Associates, 1988). The study site was a riffle located approximately 600 feet downstream of the project dam. This site was chosen because all areas farther downstream, to the confluence of the Little River with the New River, were subject to interfering flows (via backwatering, see below) from the nearby Claytor Project. At the study site, wetted perimeter was measured at each of three cross-river transects under six different flow releases from the Municipal Project of: 25, 50, 75, 105, 170, and 210 cfs. Approximately 25 cfs leaks from the project's tainter gates when the project is not generating; therefore, this was the lowest flow that could be tested at the time of the study (W.M. Lewis and Associates, 1988). At a flow of 25 cfs, the riffle habitat remained

³⁶ The 7Q10 is the minimum 7-day consecutive flow that is expected to occur once every 10 years on average.

mostly wetted. Specifically, there was little difference in wetted perimeter between the lowest and highest flows evaluated (25 cfs to 210 cfs) as wetted perimeter values at a flow of 25 cfs were 91 to 95 percent of those observed at the highest flow tested (210 cfs) (table 6).

The minimum flow study also revealed there was a strong backwatering effect from the nearby Claytor Project (W.M. Lewis and Associates, 1988). When the Claytor and Municipal projects were not generating and releasing only their minimum flows (i.e., 25 cfs was leaking from the gates of the Municipal Project and the Claytor Project was auto-cycling and releasing approximately 2,000 cfs for 22 minutes of each hour), flows from Claytor backwatered up the Little River to the base of the riffle area (study site) downstream of the Municipal Project. Under more normal flow conditions, when the Claytor Project was generating with two turbine units, this backwatering effect was stronger and extended to the base of the project dam and water depths at the base of the dam and riffle area increased by 0.71 feet and 0.54 feet, respectively.

Continuing to release a minimum flow of 25 cfs would ensure that riffle habitats below the dam remain wetted. Because they are the shallowest downstream habitat, if riffle areas remain wetted at 25 cfs, so would other downstream habitats (pools and runs) adjacent to riffle areas, especially given the strong backwatering effect from the nearby Claytor Project. Increasing the minimum flow above the existing 25-cfs flow, as recommended by Virginia DGIF and Interior, would provide minimal gains in habitat—only a 5 to 9 percent increase in wetted perimeter if minimum flows were increased to 210 cfs (the highest flow tested during the minimum flow study). Therefore, the existing minimum flow of 25 cfs appears adequate to support aquatic life (fish and mussels) downstream of the Municipal Project.

Regarding the recommendations by Virginia DGIF and Interior that downstream flow releases from the project should more closely approximate natural (non-peaking) flow conditions, it should be noted that the project does not operate in peaking mode at all times.³⁷ For example, when project inflows are consistently high (e.g., above 445 cfs), it appears, based on continuous stage data from the impoundment, that the project occasionally operates in more of a run-of-river mode. The summer of 2003 (June through August) was the wettest on record across years 1997 through 2012 (with an average daily project inflow of 677 cfs), and during this period there were several weeks at a time (June-early July; early August; figure 5) when the project did not appear to be peaking and impoundment stage generally mirrored project inflows, with flows in excess

³⁷ See letter filed by the City on May 29, 2018, in response to comments on recommended terms and conditions. Accession No. 20180529-5057.

of 420 cfs (the maximum hydraulic capacity) likely being spilled through the tainter gates.³⁸ Meanwhile, during the summer of 2002, the driest on record across years 1997 through 2012, inflows were much lower and peaking routinely occurred throughout the entire 3-month period (figure 6). Therefore, continuing to operate the project with no changes, as proposed by the City, may provide some windows of time that are conducive for the settlement of juvenile mussels and would be expected to continue to sustain any remnant mussel populations that are present downstream of the project.

Table 6. Wetted perimeters measured at each of three transects within a riffle area downstream of the project dam at flows of approximately 25 cfs (leakage flow) and 210 cfs (the maximum flow tested) during a 1988 minimum flow study (W.M. Lewis and Associates, 1988). The last column expresses the wetted perimeter at 25 cfs as a percentage of the wetted perimeter at 210 cfs (Source: staff).

Transect Number	Wetted Perimeter (feet) at 25 cfs	Wetted Perimeter (feet) at 210 cfs	Percent of maximum wetted perimeter
1	101.79	107.67	94.5
2	110.91	118.36	93.7
3	121.77	133.19	91.4

³⁸ In its letter filed on September 29, 2017, in response to our AIR request, the City indicated that during periods of high flow (above the maximum hydraulic capacity of the turbine unit), that it would likely operate the project at capacity and pass flow in excess of the powerhouse capacity through the tainter gates.

Figure 5. Time series of impoundment elevations (blue line) and project inflows (orange line) during the summer of 2003 (June through August), which was the wettest on record across years 1997 through 2012. Periods when the Municipal Project was peaking, denoted on the graph below, were inferred from patterns in impoundment stage data (Source: staff).



Figure 6. Time series of impoundment elevations (blue line) and project inflows (orange line) during the summer of 2002 (June through August), which was the driest on record across years 1997 through 2012. Based on the pattern in impoundment stage data, the project appeared to be peaking for most of this 3-month period (Source: staff).



Operation Compliance Monitoring

Although compliance measures do not directly affect environmental resources, they do allow the Commission to ensure that a licensee complies with the environmental requirements of a license. Therefore, operational compliance monitoring and reporting are standard requirements in Commission-issued licenses.

In its FLA, the City indicates it uses a tailwater sensor to determine if the required 25-cfs minimum flow is being met, but provides no further details in terms of how minimum flows or impoundment elevations would be monitored for compliance purposes. Based on our scoping visit, it appears this sensor is damaged and currently inoperable, but presumably will be back online when the new turbine is installed and the project is again operational. We received no comments or recommendations in response to our REA notice regarding compliance monitoring of the City's proposed measures (25-cfs minimum flow and 3-foot impoundment fluctuation band).

Staff Analysis

An operation compliance monitoring plan describes the methodology and instrumentation the licensee intends to use to verify the operational requirements included in any new license issued for the project. Therefore, developing an operation compliance monitoring plan would facilitate Commission administration of the license and ensure that all operation requirements for the protection and enhancement of aquatic resources, namely required minimum flows and impoundment fluctuation allowances at the project, are being met.

Access to Project Site for Environmental Inspection

On April 13, 2018, Interior filed a 10(a) recommendation that the Municipal Project shall at all times be subject to inspection by representatives of the FWS in order to ensure compliance with any fish and wildlife protection, mitigation and enhancement measures that may be contained in any license issued for the Project.

Staff Analysis

Ensuring compliance with the terms and conditions of any license issued for the project is the Commission's responsibility and a standard article in the Commission's hydropower licenses already requires the licensee to provide employees of the U.S. Government access to project lands and works in performance of their official duties. This standard article would apply to site access for FWS employees and designated representatives for the purposes of inspecting project facilities. Accordingly, Interior's recommended measure would be largely redundant with the standard articles contained in any license issued for the project and would therefore be minimally beneficial because it

would not provide for additional opportunities to access and inspect the project site and facilities for environmental purposes.

Eastern hellbender

Interior recommends, under section 10(j) of the FPA, that due to the potential for the eastern hellbender to be federally listed under the ESA in the near future, the City should continue coordination with the FWS. ³⁹ Because consultation is an administrative matter, and not a specific fish and wildlife measure, we do not consider this recommendation as a measure to be analyzed in this EA. That said, future consultation under the ESA could be required if any proposed license amendments would affect federally listed species (i.e., should eastern hellbender become federally listed). Below, we discuss the potential effects of project operation on eastern hellbender.

Staff Analysis

Eastern hellbender is most likely to occur downstream of the project dam because this area contains the habitat this species prefers (faster flows and rocky substrate) as compared to the project impoundment, which experiences siltation and is more lentic in nature. As described above, water quality conditions downstream of the project dam are consistent with the state's water quality standards under existing project operation (see section 3.3.2.1, *Water Quality*). In addition, Virginia DGIF has noted that when low DO conditions exist in the New River downstream of the Claytor Project during the summer that the stretch of the Little River downstream of the project dam to its confluence with the New River serves as an oxygen refuge.⁴⁰ Therefore, continuing to operate the Municipal Project, with no changes, as proposed by the City, would not be expected to negatively affect any hellbenders that may be present in the project area.

Cumulative Effects

Water quality in the New River has been degraded by multiple point and non-point sources in the basin over time, including the construction and operation of impoundments and hydroelectric facilities beginning in the early 1900s, and from discharges related to industrial and municipal water treatment plants and runoff from agricultural land. The construction of the Claytor Dam on the New River in 1939 and associated operation of the hydroelectric project at that site caused, and continues to cause, low DO levels (less

³⁹ We assume here that FWS is referring to consultation when using the term "coordination."

⁴⁰ See letter filed by Virginia DGIF on April 25, 2017, providing comments on the Draft License Application.

than 5 mg/L) and modified stream temperatures (warmer in the fall and winter and cooler in the spring and summer) downstream of the dam.⁴¹ This occurs because the Claytor Project withdraws deep water (with low DO) from a seasonally stratified impoundment and releases this water downstream to the New River when the project is operating. Because it is located just 0.5 mile upstream of the New River, water released from the Municipal Project during its operation also enters, and potentially affects, water quality in the New River.

Staff Analysis

Operation of the Municipal Project does not appear to exacerbate the low DO conditions in the New River that have resulted, in part, from the past and ongoing operation of the nearby Claytor Project. As described in section 3.3.2.1, *Water Quality*, the impoundment of the Municipal Project does not experience strong stratification that would promote the development of a large mass of water with low DO or differing temperatures that could be passed downstream when the project is generating; Little River DO levels (5.4-9.1 mg/L) and water temperatures (less than 84°F) below the project dam are consistent with state water quality standards. Moreover, Virginia DGIF has indicated that this stretch of the Little River serves as an oxygen refuge in summer based on the observation that fish tend to concentrate downstream of the Little River Dam. Therefore, there is no indication that continuing to operate the Municipal Project as proposed by the City (with no operational changes) would significantly add to the cumulative effects on water quality that have occurred or may occur in the future due to any new activities in the basin.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The Municipal Project is located within the Southern Limestone/Dolomite Valleys and Low Rolling Hills and the Southern Shale Valleys ecoregions. The Southern Limestone/Dolomite Valleys and Low Rolling Hills Ecoregion is characterized by heavily farmed areas in the fertile valleys that have a low drainage density due to the presence of limestone and dolomite. Agricultural practices dominate the landscape due to the warm climate and long growing season. Much of the woodland is on steeper slopes. Forest-types include Oak-Hickory-Pine Forest (hickory, longleaf pine, shortleaf pine, loblolly pine, white oak, and post oak) in the northern sections and Appalachian Oak Forest to the south. The second ecoregion, Southern Shale Valleys, is located from the James River, Virginia south to Tennessee. The area contains rolling valleys and low

⁴¹ See Water Quality Monitoring Program, 2017 Annual Report, filed with the Commission on June 15, 2018.

hills. Due to the geology of the underlying fine grained rock, surface streams are larger and drainage density is higher compared to the Southern Limestone/Dolomite Valleys and Low Rolling Hills Ecoregion. Forest types include Appalachian Oak Forest and Bottomland Forests. According to the Virginia DGIF Fish and Wildlife Information Service, there are over 575 animal species known or likely to occur within a 3-mile radius of the project.

Upland Habitat

The immediate vicinity surrounding the project is predominately forested. The vegetation is typical of a mixed hardwood/conifer forest with white oak, red maple, northern red oak, white ash, white pine, and Virginia pine on the southern and southwestern slopes and scarlet oak and chestnut oak on the northern and northeastern slopes. These areas likely provide habitat for a number of species that include: common gray and red fox; white-tailed deer; Virginia opossum; eastern fox, red, and northern gray squirrel; and southern flying squirrel. Other small mammal species include: long-tailed, least, pygmy, smoky, southeastern, and ashen-masked shrew; common golden, deer, eastern harvest, house, northern white-footed, and woodland jumping mouse; and Indiana, Virginia big-eared, northern long-eared, big brown, eastern red, evening, hoary, little brown, and silver-haired bat.

Typical birdlife of the project area includes game species such as bobwhite quail, wild turkey, and mourning dove. Resident songbirds include: downy, hairy, pileated, red-bellied, and redheaded woodpecker; American robin; eastern bluebird; and eastern meadowlark. Neotropical migrants are also present including eight warbler species and four vireo species. Raptors known to occur in the region include American kestrel; northern goshawk; broad-winged, Cooper's, red-shouldered, red-tailed, rough-legged, and sharp-shinned hawk; and barred, great horned, short-eared, eastern screech, northern sawwhet, and barn owl.

Littoral and Wetland Habitat

The Little River littoral zone could provide habitat for northern river otter, southwestern mink, common muskrat, and American beaver; and for waterfowl and wading birds including American black and wood duck; black-crowned night, yellowcrowned night, green, and great blue heron; and great egret. Open-water habitat is used by Franklin's gull, osprey, purple martin, and belted kingfisher.

The City conducted a Wetland Mapping and Characterization Survey on September 1, 2015, and identified seven unique wetlands within the project area totaling 8.82 acres. All wetlands exhibited similar soils, vegetation, and hydrology and were classified as palustrine emergent wetlands. The study area as a whole contains limited wetland areas due to the steep slopes of the project shoreline. In areas where wetlands were identified, they occurred in narrow bands along the shoreline of the impoundment. The investigators also evaluated wetland function and identified multiple functions and values present at the project wetlands, including fish habitat, sediment/toxicant retention, nutrient removal, shoreline stabilization, and wildlife habitat.

Invasive Species

The City identified invasive plant species in the areas surrounding the project. Documented invasive plants included tree of heaven, autumn olive, multiflora rose, bush honeysuckle, Japanese knotweed, tall fescue, Japanese honeysuckle, and oriental bittersweet.

Bald Eagle

While the bald eagle was delisted under the Endangered Species Act on August 8, 2007, the species continues to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The Bald and Golden Eagle Protection Act, originally passed in 1940, provides for the protection of the bald eagle and the golden eagle (as amended in 1962) by prohibiting the take, possession, sale, purchase, barter; offer to sell, purchase or barter; transport, export, or import of any bald or golden eagle, alive or dead, including any part, nest, or egg unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22). The Migratory Bird Treaty Act prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit (50 CFR 21.11).

Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. The largest North American breeding populations are currently in Alaska and Canada, but there are also significant bald eagle populations in the Great Lakes states, Florida, the Pacific Northwest, the Greater Yellowstone area, and the Chesapeake Bay region. Bald eagles are opportunistic feeders with fish comprising much of their diet. They also eat waterfowl, shorebirds, colonial waterbirds, small mammals, turtles, and carrion (often along roads or at landfills). Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike (FWS, 2016).

Bald eagles generally nest near coastlines, rivers, and large lakes where there is an adequate food supply. They nest in mature or old-growth trees, snags (dead trees), cliffs, and rock promontories. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water, where they forage. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4 to 6 feet in diameter and 3 feet deep, although larger nests exist. Dates vary regionally, but generally, the time between

egg-laying and fledging is approximately 4 months. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later. The entire breeding cycle, from initial activity at a nest through the period of fledgling dependency, is about 6 months (FWS, 2016).

Bald eagles may respond in a variety of ways when they are disturbed by human activities. During the nest building period, for example, eagles may inadequately construct or repair their nest, or may abandon the nest, both of which can lead to failed nesting attempts. During the incubation and hatching period, human activities may startle adults or cause them to flush from the nest. Startling can damage eggs or injure young when the adults abruptly leave the nest. If human activities disrupt the adults' foraging and feeding schedule, the young may not develop healthy plumage, which can affect their ability to survive (FWS, 2016).

The City knows of no bald eagle nests within the Municipal Project boundary. However, in 2007, Appalachian Power performed a bald eagle habitat study during its relicensing of the Claytor Project and located a single nest on Claytor project lands near Claytor Dam, not far from the Little River Dam. Therefore, it is likely that bald eagles use the project area for foraging and roosting.

3.3.3.2 Environmental Effects

Effects of Impoundment Fluctuation on Wetlands

As described above in section 3.3.2, *Aquatic Resources*, the City's peaking operation causes impoundment fluctuations that may affect shoreline emergent wetlands and shallow-water habitats.

Interior and Virginia DGIF recommend that the project be operated in a manner as to maintain as little effect as possible on shoreline emergent wetlands and shallow-water habitats. Specifically, they recommend that not more than a 1.5-foot daily water level fluctuation within the impoundment occur during the period April 1 to July 31 to reduce reproductive failure in exposed spawning areas for catfish and sunfish, important recreational species for anglers and host species for mussel populations. Virginia DGIF also recommends that a wetland management plan be developed that considers waterfowl habitat enhancement measures. However, Virginia DGIF provides no details on the content of such a plan or the need to enhance waterfowl habitat at the project.

In its letter filed May 29, 2018, ⁴² the City responded that the construction of the Municipal Project over 80 years ago created the wetland environment that exists today

⁴² See letter filed by the City on May 29, 2018. Accession No. 20160529-5057.

and that the wetlands provide functional value through the continued operation of the project under the same conditions proposed for the new license term.

Staff analysis

Based on the City's wetlands survey, palustrine emergent wetlands at the impoundment are limited to 8.82 acres due to the steep slopes along the impoundment shoreline, yet appear to be healthy, and are performing valuable ecological functions. Further, as discussed above in section 3.3.2, *Aquatic Resources*, the current project license allows for operation within a 3-foot fluctuation band, but the project meets the majority of its generation needs with fluctuations that are considerably lower in magnitude. Specifically, the average daily fluctuation range from April 1 to July 31 (across years 1997 through 2012) was 1.2 feet; daily impoundment fluctuations were less than 2.0 feet 93 percent of the time and less than 1.5 feet 80 percent of the time. Because existing project wetlands are geographically limited by steep slopes along the impoundment but are healthy and performing valuable ecological functions, continued operation and maintenance of the project would not affect project wetlands.

Bald Eagle Protection

The City knows of no bald eagles nests within the

project boundary, however, nesting is known to occur at the nearby Claytor Dam,⁴³ therefore, it is likely that nearby nesting pairs use the project impoundment for roosting and foraging. Further, adequate nesting habitat occurs within the project boundary, therefore, it is likely that bald eagles would use the project area for nesting in the future. Continued operation of the project would require vegetation management activities (mowing or tree clearing) around project features such as the 560-foot-long overhead conductors, powerhouse, dam abutments, and penstock. Additionally, the City proposes to enhance recreation facilities at the project that would include some tree removal and other construction activity associated with building a trail to a bank fishing area, a tiered pathway for the canoe portage, and a picnic shelter. These activities could disturb bald eagles in the project area.

In its letter filed April 13, 2018, Interior commented that bald eagle nests have been sighted in the Claytor Lake area nearby, that it is very likely that eagle foraging and roosting occurs in the Little River Dam's impoundment and below the dam, and that future nests may also occur in the project area. Interior recommends that the City follow

⁴³ See Claytor Hydroelectric Project Wetland, Riparian, Woody Debris, Littoral & Bald Eagle Habitat Studies Final Report, filed on January 15, 2009. Accession No. 20090115-4013.

the National Bald Eagle Management Guidelines⁴⁴ and consult with the FWS to avoid disturbance or other impacts to the bald eagles in the event that new developments or other disturbance activities be undertaken in the future and bald eagles are determined to be present within the project area.

Staff Analysis

The City does not propose any changes to project operation and most of the habitat in the project area where vegetation management may occur has previously been disturbed or is currently developed. Therefore, continued operation and maintenance of the project is not expected to have an effect on bald eagles. However, the City proposes to construct trails and a picnic shelter that may require a limited amount of tree removal, potentially resulting in the disturbance of bald eagle habitat. Although most of the proposed construction area has previously been disturbed or is currently developed, following the FWS' National Bald Eagle Management Guidelines and consulting with FWS and Virginia DGIF if bald eagle nests are discovered in the project area, would ensure protection of the species.

3.3.4 Threatened and Endangered Species

On March 28, 2018,⁴⁵ Commission staff accessed the U.S. Fish and Wildlife Service's ECOS-IPaC website (https://ecos.fws.gov/ipac/) to generate an official list of federally threatened, endangered, candidate, and proposed species, and designated or proposed critical habitats that may occur within the boundary of or be affected by the relicensing of the Municipal Hydroelectric Project. The list includes the threatened northern long-eared bat (*Myotis septentrionalis*), the endangered Indiana bat (*Myotis sodalis*), the endangered Virginia big-eared bat (*Corynorhinus townsendii virginianus*), the endangered Virginia fringed mountain snail (*Polygyriscus virginianus*), and the endangered smooth coneflower (*Echinacea laevigata*).

<u>Indiana Bat</u>

The Indiana bat is a federally listed endangered species that is known to occur in Montgomery and Pulaski Counties, Virginia. The FWS listed the Indiana bat as

⁴⁴ In May 2007, the FWS published National Bald Eagle Management Guidelines that recommend the following to avoid disturbing nesting bald eagles: 1) keeping a distance between the activity and the nest (distance buffers); 2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers); and 3) avoiding certain activities during the breeding season. https://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf

⁴⁵ See Memo filed by Commission Staff on March 29, 2018. Accession No. 20180329-3005.

endangered on March 11, 1967. Critical habitat for the Indiana bat was designated on September 24, 1976 and consisted of 11 caves and 2 mines in 6 states. The original recovery plan for the species was published in 1983 and a revised version was released in 2007 (FWS, 2018a).

In winter, the species hibernates colonially in limestone and sandstone caves, cliff lines, and abandoned mine shafts from October through April. The non-hibernation season (April 1 through November 15) includes spring emergence and migration, summer reproduction in maternity roosts, and fall migration, swarming, and mating. Loss, degradation, and fragmentation of roosting habitat in hibernacula or maternity colonies are major factors in their decline. In summer, most reproductive Indiana bat females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark. Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically within canopy gaps in a forest, in a fence line, or along a wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage for flying insects along river and lake shorelines, in the crowns of trees in floodplains, and in upland forests (FWS, 2018a).

Northern Long-Eared Bat

The northern long-eared bat was listed as threatened on May 4, 2015, due to declines caused by white-nose syndrome. This species is known to occur in Montgomery and Pulaski Counties, Virginia. The FWS finalized 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 FWS 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 (FWS, 2018c).

The northern long-eared bat spends winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. 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, like 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 like barns and sheds. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies,

leafhoppers, caddisflies, and beetles. The northern long-eared bat also feeds by gleaning motionless insects from vegetation and water surfaces. Fall migration and the return to wintering habitat occur between mid-August and mid-October (FWS, 2018b).

Virginia Big-Eared Bat

The FWS listed the Virginia big-eared bat as endangered on December 31, 1979 and approved a recovery plan on May 5, 1984. This species is known to occur in Pulaski County, Virginia. The Virginia big-eared bat is a medium-sized bat with distinctive long ears (over 2.5 centimeters) and facial glands on either side of its snout. This species of bat is typically located in karst regions dominated by oak-hickory or beech-maplehemlock communities. They will use caves in these habitats in both winter and summer. The concentration of these bats in a few caves is what makes this species vulnerable to being extirpated. This bat feeds principally on moths and forages over fields and woods, with individuals routinely traveling 3 to 5 miles from roost cave to foraging area (FWS, 2018d; Virginia DGIF, 2018b).

Virginia Fringed Mountain Snail

This snail was listed as federally endangered by the FWS in July 1978. In 1983, the FWS published a recovery plan for this species, which lists several conservation actions including protection of known habitat areas through easements, cooperative agreements and acquisitions, summer and fall surveys, and the establishment of monitoring and management programs. The FWS published a 5-Year Review of the Virginia fringed mountain snail in August 2007. The review indicated the snail remains on the endangered species list due to the lack of information about the snail's status, existence, and habitat protection. No critical habitat has been designated for the species (FWS, 2018e).

The Virginia fringed mountain snail is a globally rare land snail that is endemic to the New River in Pulaski County, Virginia. The shell is a pale greenish color and has four prominent raised spiral lines with less prominent spiral lines between them. The shell is 0.18 inch in diameter and 0.06 inch in height. The animal inside, is white and probably blind. It is associated with permanently damp rock fragments and angular limestone pieces approximately 0.4 to 4 inches across. These areas are heavily shaded and may be overgrown with honeysuckle. Living individuals occur in the soil at depths of 4 to 24 inches. The only location where live specimens have been observed is along 6 miles of bluffs on the north shore of the New River in Radford, Virginia (FWS, 2018e). Only 27 living snails have been documented on 4 occasions during the last 50 years (Virginia DGIF, 2018c). The last live specimen observed was in 1986. The lack of any recent specimens could indicate extinction, but the species is notoriously difficult to survey because population numbers are so low, the snail can burrow 2 to 3 feet below the surface, and the shell is very small (NatureServe, 2018).

The City contracted Ken Hotopp, a leading expert on this species, to perform surveys of approximately 5.4 miles of shoreline forest, field, and wetland surrounding the project impoundment. The survey classified the habitat surrounding the impoundment as either poor, fair, or good for the species based on the bluff height and the availability of rock ledges, talus, scree, and mature hardwood forest. Approximately 1.9 miles of potential snail habitat was rated as good, 0.9 mile was rated as fair, and 2.7 miles were rated as poor.

Smooth Coneflower

Smooth coneflower was listed as federally endangered on October 8, 1992 and the FWS published a recovery plan for this species in 1995. No critical habitat has been designated, but it is known to occur in Montgomery County, Virginia (FWS, 2011). It is a perennial herb in the Aster family that grows up to 5 feet tall from a vertical root stock. The large elliptical to broadly lanceolate basal leaves may reach 8 inches in length and are smooth to slightly rough in texture. The rays of the flowers (petal-like structures) are light pink to purplish in color, usually drooping, and 2 to 5 inches long. Flowering occurs from late May through mid-July and fruits develop from late June to September. Reproduction is accomplished both by seed and by rhizome (Virginia DCR, 2008).

Smooth coneflower habitat is typically found in open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium and calcium rich soils associated with amphibolite, dolomite, or limestone. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. Many of the herbs associated with smooth coneflower are also sunloving species that depend on periodic disturbances to reduce the shade and competition of woody plants. Threats to the smooth coneflower include maintenance activities in roadside and utility rights-of-way (FWS, 2011).

3.3.4.2 Environmental Effects

Listed Bats

In its letter filed April 13, 2018, Interior states that based on limited anticipated effects on forest habitat, it has determined that proposed activities during the new license term for the project would not have a significant adverse effect on overall habitat quality or availability for the Indiana bat. Therefore, if a seasonal restriction on tree removal is implemented to avoid the take of Indiana bats (limiting tree clearing to between November 15 and March 31), Interior has determined that the effects of proposed project activities on the Indiana bat are insignificant or discountable. However, if the City is unable to implement the seasonal restriction for any tree removal, further consultation with the FWS would be necessary.

Interior further states that the recreational use enhancements could involve the clearing of vegetation. Other potential tree-clearing and disturbance activities include routine transmission corridor maintenance, if within the license period the transmission lines are moved from existing road right-of-ways. If any of these proposed activities occur within 0.25 mile of a known northern long-eared bat hibernaculum, further consultation with the FWS regarding this species would be necessary. Interior states that although not a prohibited action under the 4(d) rule for northern long-eared bat, conducting tree clearing between November 15 and March 31, as requested to avoid impacts to Indiana bats, would also further minimize impacts to northern long-eared bats.

Although Interior identified the endangered Virginia big-eared bat as a species that may occur within the project area, it did not provide any recommendations for the species.

Staff Analysis

The area around the powerhouse, dam, and 560-foot-long overhead conductors requires regular vegetation management (i.e., mowing and tree clearing). A very limited amount of low quality roosting or foraging habitat for listed bats may occur in this area, but much of it has previously been disturbed or is currently developed. A major portion of the 560-foot-long overhead conductors traverses the river, traveling diagonally from the powerhouse on the north bank of the river to the south bank, slightly downstream, providing no habitat for listed bats. The portion of the overhead conductors that occurs on land crosses steep rocky banks, highly disturbed mowed areas and roads, providing limited habitat for listed bats. Therefore, continued project operation and maintenance is not likely to affect listed bats around the powerhouse, dam, and overhead conductors due to limited habitat availability. Suitable habitat for listed bats does occur around the project impoundment, but none of that habitat occurs within the project boundary, which is limited to the high water mark of the impoundment (at approximately 1,772 feet) or on lands affected by project operation. Because the City does not propose any changes to project operation, the habitat around the project impoundment is not likely to be affected by project operation.

However, the City does propose to construct trails and a picnic shelter that may require a minimal amount of tree removal near the dam, potentially resulting in the disturbance of low quality habitat for listed bats. Although most of the proposed construction area has previously been disturbed or is currently developed, limiting any necessary tree removal activities to the period between November 15 and March 31 would protect these species. Therefore, with a seasonal restriction on tree removal, continued operation and maintenance of the project, along with the proposed recreational enhancements, is not likely to adversely affect listed bats.

Virginia Fringed Mountain Snail

In its April 13, 2018 letter, Interior states that, for the protection and enhancement of the federally endangered Virginia fringed mountain snail that may be found within the good and fair habitats identified during the Hotopp survey along the Little River shoreline on private lands, the City could work with adjacent private landowners to share the knowledge gained from the study research along the project shoreline. Information on potential easement possibilities and educational and outreach information could be prepared for sharing, at the project site public access as well as within outreach to shoreline landowners with suitable habitat.

Staff Analysis

Because no habitat for the Virginia fringed mountain snail occurs within the project boundary or areas that may be affected by project operation, continued operation and maintenance of the project along with the proposed recreation enhancements will not affect the Virginia fringed mountain snail and protection, mitigation, or enhancement measures are not warranted.

Smooth Coneflower

Although Interior identified the endangered smooth coneflower as a species that may occur within the project area, it did not provide any recommendations for the species.

Staff Analysis

Because the areas, where potential habitat may occur, are frequently mowed, it is highly unlikely that the smooth coneflower occurs at the project. Therefore, continued operation and maintenance of the project along with the proposed recreation enhancements will not affect the endangered smooth coneflower.

3.3.5 Recreation Resources

3.3.5.1 Affected Environment

Local and Regional Recreation Opportunities

Recreation opportunities including boating, angling, hiking, camping, swimming, canoeing, kayaking, and picnicking abound regionally and locally. Pulaski County is home to several parks including Randolph Park (87 acres), Gatewood Park (400 acres), the New River Trail State Park (57-mile-long linear park), and the Jefferson National Forest. These parks and forest offer a variety of recreation opportunities from picnic facilities, playgrounds, swimming areas, trails, athletic courts, camping, boating, and

fishing. Montgomery County also has several parks that offer similar recreation opportunities to the public. The largest park in Montgomery County is Mid-County Park, which sits on 110 acres, and includes a disc golf course, a swimming pool, and an activities center. Other smaller parks in Montgomery County include McCoy Park, Motor Mile Park, and Plum Creek Park.

Recreation and public access are provided locally at Claytor Lake, which is less than 2 miles southwest of the project. Recreation facilities at Claytor Lake include three boat launches, a county park, a state park, and a group picnic area. The three boat launches at Claytor Lake are maintained by Virginia DGIF; they are the Allisonia Boat Launch, Dublin Boat Launch, and the Harry DeHaven Boat Launch (Virginia DGIF, 2018). The Harry DeHaven Park is located on Claytor Lake and is maintained by Pulaski County. Claytor Lake State Park is located along 3 miles of Claytor Lake's shoreline and encompasses 472 acres; it is managed by the Virginia Department of Conservation and Recreation (Virginia DCR). Claytor Lake State Park includes a full-service marina, lodges, cabins, campgrounds, three boat launches, two angling docks, a swimming beach, 7 miles of hiking trails, and playgrounds (Virginia DCR, 2018). The Appalachian Group Picnic Area, which sits on 10 acres adjacent to Claytor Dam, includes a picnic pavilion, picnic tables, garbage cans, benches, bathroom facilities, courtesy pier, and a boat dock. Downstream of Claytor Dam at the confluence of the New River and the Little River, Virginia DGIF maintains the New River Boat Launch area.

Project Recreation

Within the Municipal Project's boundary, the City maintains a public recreation site and a portage trail. At the public recreation site, which is upstream of the dam, the City provides recreational access to the project impoundment via a paved boat launch. There is an upper and a lower parking area at the project, and each one can accommodate up to four vehicles with trailers. There is also an approximately 30-yard-long canoe portage trail about 150 yards downstream of the dam. The trail leads from the water's edge to the entry road and the lower parking area at the project. Users can then walk to the paved boat launch to access the impoundment. No formal fishing piers are located at the project, however, bank fishing occurs around the impoundment shoreline and downstream of the dam.

Recreation Use Assessment

The City conducted a Recreation Use Assessment in 2016 on 24 days from April through October, which is the peak recreation season at the project. The objectives of the study were to: (1) identify use patterns; (2) estimate recreation days by month and day type (weekend, weekday, and holiday); (3) identify primary recreational activities; (4) identify existing uses and user preferences; (5) estimate future recreational use of existing

sites; and (6) identify potential needs for additional recreation sites and facilities. Data was gathered through 24 spot counts and 10 surveys administered at the project.

Recreational use at the Municipal Project was estimated to be 1,330 days⁴⁶ from April 1 through October 31. In order to calculate recreation use, the City estimated the number of days that the project was visited based on the information gathered during the study period. Table 7 shows the distribution of recreation days throughout the study period; July had the most recreation use and October had the least amount of recreation use. Recreation activities enjoyed at the project included boat fishing, bank fishing, canoeing/kayaking, motor boating, sightseeing, nature study/wildlife viewing, and picnicking.

Month	Weekday	Weekend	Holiday	Total
April	80	57	0	137
May	80	44	23	147
June	136	137	0	273
July	124	137	46	306
August	142	137	0	279
September	40	38	23	101
October	38	51	0	89
Total	639	600	91	1,330

Table 7. Recreation Days at the Municipal Project, April through October 2016 (Source: City).

Visitors indicated that the project recreation sites and facilities were in excellent condition and that crowding was generally perceived to be light. Crowding typically increased on weekends to a level participants indicated as moderate to heavy. However, when asked why they chose to visit the project recreation site, answers included the lack of crowding, trying a new site for fishing, and close proximity to home. Parking capacity was also examined during the study. Based on the data collected, the parking capacity of the site reached a peak of 38 percent on holidays, 32 percent on weekends, and 23 percent on weekdays. The results of the study indicate that future population growth estimates and the ensuing use at the site could increase by approximately 449 recreation days by the year 2060.

3.3.5.2 Environmental Effects

Informal fishing access occurs upstream of the dam on the south side of the impoundment along an approximately 30-yard stretch of shoreline between the dam and

⁴⁶ A recreation day is defined as a visit by one person to a project for purposes of recreation during any 24-hour period.

the boat launch. As a result of the public's desire to access this area, an informal and uneven trail has started to form along the bank of the impoundment. There are no benches for fishermen or the public to sit and enjoy the impoundment at this site. The existing canoe portage, which is about 150 yards downstream of the dam, is a primitive pathway that provides access from the shoreline to the lower parking area at the project via a steep hillside. The pictures provided in the FLA show a rocky, uneven path beginning at the river's edge on the southern side of the river looking downstream. The portage then becomes narrow and steep as it climbs 30 yards up a hill to the lower parking area. A small portage sign exists at the top of the trail marking the entrance from land.

The City proposes the following recreation enhancement measures: (1) create an impoundment bank fishing area by constructing a trail from the boat launch to the informal shoreline fishing area and installing a bench within the project boundary; (2) improve the existing primitive canoe portage by providing a tiered/sloped path to the river, install improved signage, and provide information on the City's website; and (3) install a picnic shelter with permanent picnic facilities and parking (as feasible) within the project boundary. The City intends to file a plan and schedule for developing these areas in consultation with Virginia DGIF within 1 year of license issuance.

Virginia DGIF and Interior recommend the City discuss the coordination of recreational flow releases from the Municipal Project to enhance low flow operation from Claytor Dam with Appalachian Power. Virginia DGIF states that during the Claytor Project relicensing process, it became evident that Little River Dam operation enhances recreational flow in the Radford reach of the New River when Claytor Dam is operating under low-flow conditions. Virginia DGIF and Interior recommend that the City develop a hand-launch facility in the upper impoundment, stating that this would facilitate nonmotorized boat angling and paddling on the impoundment and would provide throughpaddling opportunities for people continuing their trip downstream of the dam. Virginia DGIF and Interior also recommend that the placement of impoundment bank fishing benches be developed in consultation with Virginia DGIF and the Virginia DCR.

In response to the agencies' recommendations, the City states that peaking flows from the Municipal Project (approximately 400 cfs) increases New River stage levels less than 3 inches on the Radford gage, which is downstream of both projects. Additionally, recreationists did not notice a stage increase caused by operation at the Municipal Project, according to the New River Flows and Recreation Study conducted during the Claytor Project relicensing. The City also states that Appalachian Power has not formally requested recreation flow coordination between the two projects. Regarding the agencies' recommended hand-launch facility, the City states that it only owns land up to the high-water mark and private land surrounds the impoundment, essentially eliminating the possibility of developing a hand-launch facility. The City states that it provides a boat launch and other recreational enhancements adjacent to the dam. The City also states that it would consult with the two agencies for the placement of impoundment bank fishing benches.

Staff Analysis

Applicant-proposed recreation improvements

The City's proposed enhancements of existing recreation facilities would upgrade the current facilities at the project. The addition of a trail at the impoundment bank fishing area would improve the existing informal shoreline fishing access at the project because it would provide direct access to a desired fishing location. The trail would also minimize degradation of the shoreline that might typically be created over a larger area by consolidating foot traffic onto a direct path to the bank fishing area. The installation of a bench at this site would provide a place for the public to rest while fishing or viewing nature.

Providing a tiered pathway from the river to the parking area would enhance the portage trail by providing a stable path that would allow the public to traverse safely up and down the hill. A tiered pathway would provide even surfaces at regular intervals for an improved boat transport experience up and down a steep hillside. The addition of improved signage would alert the public as to the location of the portage trail. By providing portage trail information on the City's website, the public would be able to read information about the conditions and location of the trail before arriving at the project. This information would be especially helpful for those who are coming to visit the project for the first time.

A picnic shelter with permanent picnic facilities would allow the public to experience various recreational aspects of the project while having a place to enjoy a picnic and a shelter in case adverse weather conditions arise quickly. The public would be able to host gatherings with family and friends while enjoying the scenic quality of the area. A picnic shelter and facilities would provide an improved experience over existing conditions for the public at the Municipal Project.

Agency recommended recreation improvements

Enhancing recreational opportunities downstream of the Radford reach of the New River during low-flow periods by coordinating flow releases from the Municipal Project and the Claytor Project, as recommended by the agencies, would depend on Municipal Project operations, water availability, and coordination with Appalachian Power. Typically, low river flow conditions occur during the summer months when rain is less abundant than in typical spring or fall seasons. Due to their proximity, if the Claytor Project is experiencing low water levels, the Municipal Project would also likely be experiencing low water levels. If this was the case, the Municipal Project may not have enough water for project operation and New River recreation enhancement flows. Moreover, the agencies did not provide specific recommendations regarding how much water would enhance New River recreational flows nor the timing and duration of such releases. Without this information, staff could not fully evaluate this recommendation.

The existing boat launch provides access to and from the impoundment for handcarried boats. Virginia DGIF does not describe how the addition of a hand-launch facility in the upper impoundment would improve paddling access or opportunities any differently than the existing boat launch near the dam. In addition, the existing boat launch is within a reasonable distance of the portage trail, which provides access downstream of the Little River Dam.

Consultation with the Virginia DGIF and Virginia DCR, for the placement of the benches at the bank fishing area near the boat launch, would allow for collaboration among the entities interested in improving the recreation experience for the public at this site.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the NHPA requires the Commission to evaluate potential effects on properties listed or eligible for listing in the National Register prior to an undertaking. In this case, the undertaking is the issuance of a new license for the Municipal Project. Project-related effects could be associated with the operation and maintenance of the existing project.

Historic properties are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. Traditional cultural properties are a type of historic property eligible for the National Register because of their association with cultural practices or beliefs of a living community that are: (1) rooted in that community's history or (2) important in maintaining the continuing cultural identity of the community. In this EA, we also use the term cultural resources to include properties that have not been evaluated for eligibility for listing in the National Register. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register.

Section 106 also requires that the Commission seek concurrence with the Virginia SHPO on any finding involving effects or no effects on historic properties and allow the Advisory Council on Historic Preservation (Advisory Council) an opportunity to comment on any finding of effects on historic properties. If Native American properties have been identified, section 106 requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties.

On July 11, 2014, the Commission designated the City of Radford as the nonfederal representative for carrying out day-to-day consultation regarding the licensing efforts pursuant to section 106 of the NHPA. However, the Commission remains largely responsible for all findings and determinations regarding the effects of the proposed project on any historic property, pursuant to section 106.

Area of Potential Effect

Pursuant to section 106 of the NHPA, the Commission must take into account whether any historic property could be affected by a new license within the project's area of potential effect (APE). The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE for this project is all lands within the Municipal Project's boundary and any lands outside of the project boundary where cultural resources may be affected by project-related activities that are conducted in compliance with the license. On November 23, 2015, the City consulted with the Virginia SHPO and the Virginia SHPO concurred with the City regarding the APE.⁴⁷

History of the Region

The Municipal Project is located on the Little River just upstream from its confluence with the New River. The Little River is a relatively short river, approximately 65 miles long, that rises in Floyd County, Virginia and meanders along the border of Floyd and Montgomery Counties, and then forms the border between Montgomery and Pulaski Counties before joining the New River immediately south of Claytor Dam. While the New River was the target of extensive power development efforts by the Appalachian Power in the late nineteenth and early twentieth centuries, the Little River provided power to a manufacturing center in the mid-nineteenth century at Snowville, several miles upstream of the current Little River Dam. Later in the nineteenth century, a group of private investors from Radford created a private utility, the Radford Water Power Company, which provided both water and power to the City of Radford and its new industries. The need to provide utility services, and maintain and expand the facilities, eventually became too much for the Radford Water Power Company.

In 1922, officials with the company approached the City of Radford about selling the company's assets to the City, including the dam on the Little River with its hydroelectric plant, the electrical distribution system, the water works system, and the

⁴⁷ Conference call meeting notes summary located in Appendix B, Consultation Documentation, of the Final License Application filed on May 31, 2017.

street railway. In June 1922, the city council voted to approve the sale, which closed on August 1, 1922. In order to manage the new municipal utility, city council created the position of Commissioner of Public Utilities, and hired James M. Cox for the position at a monthly salary of \$250; Cox reported for duty on July 17, 1922.

The dam which the City of Radford acquired from the Radford Water Power Company was small and the associated hydroelectric plant could not provide all of the power which the city's growing industrial and residential population needed. As early as November 1925, the city council was looking into the possibility of building a new dam, with new hydroelectric machinery in the existing powerhouse; the transmission lines also were in only fair condition, and needed substantial improvement. By the mid-1920s the City's dam on the Little River had been breached in a flood, but the expense of rebuilding it proved challenging to acquire. The city continued to purchase electric current from Appalachian Power throughout the 1920s, and then sold this to its customers in the city. In October 1927, the city had to stop the Lynchburg Foundry Company in Radford from buying electricity directly from Appalachian Power, in an attempt to generate needed revenue. The supply of electricity continued to be a concern for the city council through the late 1920s, with occasional discussions of a new dam that led to no action; council authorized a vote on a bond issuance of \$175,000 to enlarge and improve the city's electric facilities, and a local engineer, Lee H. Williamson, was hired to conduct an evaluation of what would be involved in the construction of a new dam; the bond was voted down. Throughout 1929, the city received offers to purchase the electric plant, and in September 1929 city council announced that it would accept sealed bids for the property. Unfortunately, the stock market collapse of October 1929 put a halt to the City's plans to sell the plant, and the issue died.

As the effects of the Depression spread throughout the nation through 1930 and 1931, the Hoover administration and Congress began formulating plans to help stimulate recovery. With banks largely incapacitated for lack of capital, Congress in early 1932 authorized the Reconstruction Finance Corporation (RFC). Able to receive funds from the sale of U.S. Treasury Notes, and to accept collateral that traditional banks could not approve, the RFC made loans to state and local governments for specific relief projects. In August 1932, the Mayor of Radford arranged for public participation in a city council meeting, in order to discuss the possibility of approaching the RFC for a loan to rebuild the Little River Dam. Although the citizens of Radford several years ago had voted down a bond issuance for a replacement dam, the conditions had changed significantly since then; relief and employment were on everyone's mind. The next month city officials, with engineer Lee H. Williamson, met with RFC officials in Washington, D.C. to discern whether the city's loan request was feasible. The City's representatives were received favorably, and work began to prepare a loan application.

In December 1933, the voters in the City of Radford approved bonds totaling

\$115,000 for the work, which RFC purchased in stages through the spring of 1934. In the meantime, work on the dam and powerhouse began in late 1933 and continued through 1934, with work completed by August 1934. The total cost of the dam and hydroelectric station came to approximately \$148,000. An opening ceremony for the new dam was held on August 30, 1934. The Municipal Project continued to operate with the original equipment until the 2000s, but has been out of service since 2014.

Cultural Resources Investigation

The City conducted a historic resources survey of the project according to the Historic Properties Survey Study Plan, which was developed in consultation with the Virginia SHPO. The survey identified historic architectural resources near the project by reviewing previous cultural resource investigations within and adjacent to the APE using the Virginia Cultural Resource Information System (VCRIS) database. According to the VCRIS database, eight cultural resources were identified within one-quarter of a mile of the APE. The only cultural resource located in the APE is the Little River Dam and powerhouse. None of the identified resources were evaluated for National Register eligibility.

The survey included an intensive historic architectural investigation and identified the project dam and powerhouse as eligible for listing in the National Register. The dam and powerhouse complex was the only site identified as a historic architectural resource within the APE. The project dam and exterior of the powerhouse, including the windows and brickwork, have not been significantly altered since their original construction in 1934. The dam footprint, concrete facing, gate structures, and mechanical equipment are all original. The powerhouse exterior is original, including the arched multi-pane windows on the south and west sides, which are a significant design component.

The cultural resources investigations identified the City of Radford as having regional historical significance because the Municipal Project is a rare example of a city-operated hydroelectric facility in Virginia. The use of RFC financing for a municipal hydroelectric facility was uncommon, and was an innovative solution to meet several needs of the city during the depths of the Depression, including providing electricity and employment for local workers. The City determined that the dam and the powerhouse exterior are eligible for listing in the National Register under Criterion A, association with events that have made a significant contribution to the broad pattern of history, for their historical association with the City of Radford's municipal electric department and the RFC, a Depression-era relief agency.

Traditional Cultural Properties

The City states that none of the eight cultural resources that may be eligible for listing in the National Register are associated with tribal interests. The City has not identified any tribes, tribal lands, or tribal interests that the project may affect.

By letter issued on January 23, 2013, the Commission initiated tribal consultation with the Cherokee Nation, Eastern Band of Cherokee Indians, United Keetowah Band of Cherokee Indians in Oklahoma, Absentee Shawnee Tribe of Oklahoma, Eastern Shawnee Tribe of Oklahoma, Shawnee Tribe, and Tuscarora Nation of New York on the Municipal Project. Additionally, by letters issued on February 21, 2018 and May 16, 2018, the Commission initiated tribal consultation with the Pamunkey Indian Tribe and the Nansemond Indian Tribal Association, respectively. Commission staff received an email on March 2, 2018 from Chief Robert Gray of the Pamunkey Indian Tribe; Chief Gray indicated that the tribe should be notified in the event of any inadvertent discoveries.⁴⁸

No other responses to the letters were received and no consulted tribes have reported any known traditional cultural properties within the APE of the project. However, the City states that it will continue to notify the Eastern Band of Cherokee Indians and the Virginia Council of Indians of relicensing activities and documents in order to determine if the continued operation of the project would have any effect on tribal lands or interests.

3.3.6.2 Environmental Effects

Currently, project operation does not affect cultural resources located in the APE. However, continued operation and maintenance of the project has the potential to adversely affect the Little River Dam, the powerhouse, and any undiscovered archaeological or historic resources, during the term of any new license issued. Maintenance of project facilities, recreation, vandalism, and mitigation measures associated with other project resources could affect cultural resources in the APE. Project effects are adverse when an activity directly or indirectly alters the characteristics of a historic property that qualifies it for inclusion in the National Register. Any adverse effects must be resolved in consultation with the Virginia SHPO. The City determined that due to its association with events that have made a significant contribution to the broad pattern of history, the Little River Dam complex is eligible for listing in the National Register.

To address project-related effects, the City developed a draft HPMP in accordance with the *Guidelines for the Development of Historic Properties Management Plans for FERC Projects* established by the Advisory Council and the Commission. The purpose of an HPMP is to set forth specific actions and processes to manage historic properties

⁴⁸ See Response filed by Commission Staff on April 5, 2018. Accession No. 20180405-4001.

within the APE during the term of a new license. It is intended to serve as a guide for the City's operating personnel if they determine project operation is affecting cultural and historic resources. The draft HPMP includes measures for evaluating the effects of proposed actions or activities on known historic properties, performing routine maintenance activities, protocols for handling inadvertent discoveries of potentially historic properties, protection measures for the discovery of human remains, and HPMP implementation procedures. The draft HPMP was developed in consultation with the Virginia SHPO. Implementation of the HPMP would ensure the adequate protection and management of historic properties as part of the continued operation of the Municipal Project during the term of any license issued. To date, the Virginia SHPO has not provided final comments or concurrence with the draft HPMP.

The City has been renovating the single generating unit at the project due to a catastrophic failure that occurred in 2014. The renovation includes a replacement of the existing turbine and the replacement of the existing mechanical and electronic controls with modern equipment. The City states that because the powerhouse generating and control equipment do not contribute to the significance of the Municipal Project, the changes would not adversely affect the project as a historic property. The addition of a more efficient turbine and modern mechanical and electronic controls would allow the City to continue to operate the facility as an active hydroelectric station, and thus retain its historic function. The City determined that relicensing the project would not have an adverse effect on the eligible resource.

Staff Analysis

In accordance with section 106, the City has consulted with the Virginia SHPO and Native American tribes to determine the effects of project operation on cultural resources. Current operations do not affect cultural resources and the City is not proposing any changes to project operation. However, through regular project operation and maintenance, there is a potential for adverse effects on the Little River Dam, powerhouse, and undiscovered historic properties throughout the term of any license issued. The implementation of an HPMP to mitigate any adverse effects that may arise over the term of any license issued would protect cultural resources that are eligible for the National Register. The measures described in the HPMP provide direction for the City's management of historic properties. To meet the requirements of section 106, the Commission intends to execute a PA with the Virginia SHPO for the protection of historic properties that would be affected by the operation of the project.

While the turbine and control system inside the powerhouse are being renovated, it is clear that these components do not contribute to the eligibility of the Little River Dam powerhouse nor would they adversely affect the historic resource.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate as it has in the past. None of the licensee's proposed measures or the resource agencies' recommendations would be required. Recreation access would not be enhanced at the project and cultural resources would not be protected through an HPMP and PA.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the Municipal Project's use of environmental resources for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp.*,⁴⁹ the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: 1) the cost of individual measures considered in the EA for the protection, mitigation, and enhancement of environmental resources affected by the project; 2) the cost of alternative power; 3) the total project cost (i.e., for operation, maintenance, and environmental measures); and 4) the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power. If the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 8 summarizes the assumptions and economic information we use in our analysis based on information, except as noted, provided by the City in its license application and subsequent submittals. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); relicensing cost; and normal operation and maintenance cost.

⁴⁹ See *Mead Corporation, Publishing Paper Division,* 72 FERC \P 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

Table 8. Parameters for the economic analysis of the Municipal Project (Source: license application, as modified by staff).

Economic Parameter	Value	
Period of economic analysis (years)	30	
Term of financing (years)	20	
Federal & local taxes rate (percent)	0.0	
Insurance (\$/year)	650 (2016)	
Energy rate (\$/MWh)	66.55	
Capacity rate (\$/kW-year)	181.61	
Interest rate (percent) ^a	6.0	
Discount rate (percent) ^b	6.0	
Net investment (\$) ^c	3,200,000 (2016)	
Annual operation & maintenance cost (\$)	120,000 (2016)	
Relicensing cost (\$) ^d	305,000 (2016)	

- ^a Assumed by Staff.
- ^b Assumed by Staff to be same as interest rate.
- ^c Net investment is the depreciated project investment allocated to power purposes including project rehabilitation costs.
- ^d Relicensing cost includes consultation, environmental studies, administrative, and legal costs.

4.2 COMPARISON OF ALTERNATIVES

The expected authorized installed capacity of the project is 1,200 kW.⁵⁰ Table 9 compares the installed capacity, annual generation, annual cost of alternative power, annual estimated total project cost, and difference between the annual cost of alternative power and annual project cost for each of the alternatives considered in this EA: no action, the City's proposal, and the staff alternative.

⁵⁰ Pursuant to the section 11.1(i) of the Commission's regulations, the authorized installed capacity is the lesser of the ratings of the generator (or 1,200 kW based on a capacity of 1,200 kVA and power factor of 1.0) and the newly installed turbine (1,300 kW based on a capacity of 1,733 hP).
	No-Action	City's	Staff
	Alternative	Proposal	Alternative
Installed capacity (kW)	1,200	1,200	1,200
Annual generation (MWh)	6,550	6,550	6,550
Annual cost of alternative power (\$)	\$435,903	\$435,903	\$435,903
(\$/MWh)	66.55	66.55	66.55
Annual project cost (\$)	\$370,206	\$449,461	\$458,959
(\$/MWh)	56.52	68.62	70.07
Difference between cost of alternative power and project cost (\$) (\$/MWh)	\$65,697 10.03	(\$13,558) (2.07)	(\$23,056) (3.52)

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

4.2.1 No-action Alternative

Under the no-action alternative, the project would continue to operate as it does now. The project would have an installed capacity of 1,200 kW and generate an average of 6,550 MWh of electricity annually. The average annual cost of alternative power would be \$435,903, or about \$66.55/MWh. The average annual project cost would be \$370,206, or about \$56.52/MWh. Overall, the project would produce power at a cost that is \$65,697 or \$10.03/MWh, less than the cost of alternative power.

4.2.2 City's Proposal

Based on a total installed capacity of 1,200 kW and an average annual generation of 6,550 MWh, the cost of alternative power would be \$435,903, or about \$66.55/MWh. The average annual project cost would be \$449,461, or about \$68.62/MWh. Overall, the project would produce power at a cost that is \$13,558, or \$2.07/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative would have the same capacity and energy attributes as the City's proposal. Table 10 shows the staff recommended additions, deletion, and modifications to the City's proposed environmental protection and enhancement measures and the estimated cost of each.

Based on a total installed capacity of 1,200 kW and an average annual generation of 6,550 MWh, the cost of alternative power would be \$435,903, or about \$66.55/MWh.

The average annual project cost would be \$458,959, or about \$70.07/MWh. Overall, the project would produce power at a cost that is \$23,056, or \$3.52/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 10 gives the cost of each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 10. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Municipal Project (Source: staff and City).

Enhancement / Mitigation Measure	Entity	Capital Cost ^a (2018\$)	Annual Cost ^a (2018\$)	Levelized Annual Cost ^b (2018\$)
Geology and Soil Resources				
 Develop and implement a sediment and erosion control plan for construction of proposed recreation enhancements. 	Staff	\$2,000	\$0	\$137°
Aquatic Resources				
 Continue to provide a minimum flow of 25 cfs, or project inflow, whichever is less, to the Little River downstream of the project dam. 	City, Staff	\$0	\$34,465	\$34,465 ^d
3. Provide downstream releases from the project that are higher than the existing 25-cfs minimum flow and more closely approximate natural flow conditions.	Virginia DGIF, Interior	\$N/A	\$N/A	\$N/A ^e
4. Continue to operate the project such that impoundment elevations remain between 1,772 feet and 1,769 feet during normal project operating conditions.	City, Staff	\$0	\$0	\$0

Enhancement / Mitigation Measure	Entity	Capital Cost ^a (2018\$)	Annual Cost ^a (2018\$)	Levelized Annual Cost ^b (2018\$)		
 Limit impoundment fluctuations to 1.5 feet below the full pool elevation of 1,772 feet from April 1 through July 31 to improve centrarchid spawning success. 	Virginia DGIF, Interior	\$0	\$4,930	\$4,930 ^f		
 Develop an operation compliance monitoring plan, including provisions for monitoring minimum flows and impoundment levels. 	Staff	\$16,000	\$8,000	\$9,097°		
7. Implement impingement/entrainment and turbine operation protocols that minimize fish mortality.	Interior	\$N/A	\$N/A	\$N/A ^e		
8. Allow FWS employees access to the project site for the purposes of environmental inspection.	Interior	\$0	\$0	\$0		
Terrestrial Resources						
9. To avoid killing or injuring bald eagles, should any nests be found or tree removal be required at the project during construction of the proposed recreation enhancements, follow the National Bald Eagle	Interior, Staff	\$0	\$0	\$0 ^g		

Enhancement / Mitigation Measure	Entity	Capital Cost ^a (2018\$)	Annual Cost ^a (2018\$)	Levelized Annual Cost ^b (2018\$)
Management Guidelines and consult with the FWS and Virginia DGIF.				
10. To protect nearshore wetlands and shallow-water habitats, during the period April 1 to July 31 restrict impoundment water level fluctuations to not more than 1.5 foot daily.	Interior, Virginia DGIF	\$0	\$4,930	\$4,930 ^f
11. Develop a wetland management plan that considers waterfowl habitat enhancement measures.	Virginia DGIF	\$N/A	\$N/A	\$N/A ^e

Enhancement / Mitigation Measure	Entity	Capital Cost ^a (2018\$)	Annual Cost ^a (2018\$)	Levelized Annual Cost ^b (2018\$)
Threatened and Endangered Species		-		
12. To avoid killing or injuring listed bats, restrict tree removal to between November 15 and March 31.	Interior, Staff	\$0	\$0	\$0 ^g
13. For the protection of the Virginia fringed mountain snail, the City could develop and distribute public educational and outreach information for sharing at the project's public access areas as well as with shoreline landowners with suitable habitat.	Interior	\$0	\$0	\$O ^h
Recreation Resources				
14. Create an impoundment bank fishing area by constructing a trail and installing a bench within the project boundary.	City, Staff	\$10,483	\$2,097	\$2,815
15. Improve the existing primitive canoe portage by providing a tiered/sloped path to the river, installing improved signage, and providing information on the City's website.	City, Staff	\$15,725	\$2,097	\$3,175
16. Install a picnic shelter with permanent picnic facilities with	City, Staff	\$52,415	\$7,862	\$11,454

Enhancement / Mitigation Measure	Entity	Capital Cost ^a (2018\$)	Annual Cost ^a (2018\$)	Levelized Annual Cost ^b (2018\$)		
additional parking (as feasible) within the project boundary.						
Cultural Resources						
17. Implement an HPMP.	City, Staff	\$7,338	\$1,048	\$1,551		

^a Unless otherwise noted, all cost estimates are from the City, escalated to 2018 dollars.

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

^c Cost estimated by staff.

^d This cost represents a worst-case scenario (the cost of 450 MWh of lost generation as indicated in Exhibit A of the FLA) in the event that the 25-cfs minimum flow could no longer be provided via leakage.

- ^e Cost for this measure was not provided by the recommending agencies, and a cost cannot be estimated by staff due to a lack of details.
- ^f To estimate this cost, staff made the following assumptions: (1) from April 1 through July 31, the project undergoes one peaking cycle per day, and (2) only 20 percent of the time would daily impoundment fluctuations exceed 1.5 feet below full pool (same as current project operating conditions). The volume of water in the elevation band (1,769 feet to 1770.5 feet) that could no longer be used for generation purposes under this measure was based on the stage-storage relationship from the recent impoundment bathymetry study. To estimate the cost of lost generation that would result from the City no longer being able to use this band of water, staff applied the cost provided by the applicant in Exhibit A of the FLA— \$34,465 annually for providing a minimum flow of 25 cfs (or 16,157,922 gallons per day).
- ^g Staff assumes no additional cost to implement this measure.
- ^h Staff did not assign a cost to this measure because it is a suggestion for consultation rather than a specific fish and wildlife protection measure.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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

Based on our independent review of agency and public comments filed on the project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the proposed action with staff-recommended modifications as the preferred alternative. We recommend this alternative because: (1) issuance of a subsequent license would allow the City to continue to operate the Municipal Project and provide a beneficial and dependable source of electrical energy; (2) the 1,200 kW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended measures would protect and enhance environmental resources affected by the proposed project.

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

5.1.1 Measures Proposed by the City

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

• Continue to provide a 25-cfs minimum flow, or project inflow, whichever is less, to the Little River downstream of the dam.

- Continue to operate the project such that impoundment elevations remain between 1,772 feet and 1,769 feet during normal project operating conditions.
- Create an impoundment bank fishing area by constructing a trail from the boat launch to the shoreline fishing area and installing a bench within the project boundary.
- Improve the existing primitive canoe portage by providing a tiered/sloped path to the river, installing improved signage, and providing information on the City's website.
- Install a picnic shelter with permanent picnic facilities and parking (as feasible) within the project boundary.
- Implement an HPMP, developed in consultation with the Virginia SHPO, for the protection of undiscovered historic properties and the National Registereligible project dam and powerhouse.

5.1.2 Additional Staff-Recommended Measures

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

- Develop an erosion and sediment control plan for construction of proposed recreation enhancements.
- Develop an operation compliance monitoring plan to document compliance with the proposed 25-cfs minimum flow and 3-foot impoundment operation band (between elevations of 1,769 feet and 1,772 feet).
- Restrict tree removal to between November 15 and March 31, to avoid killing or injuring listed bats.
- Follow the FWS' National Bald Eagle Management Guidelines and consult with the FWS and Virginia DGIF should any nests be found at the project or any tree removal is required for construction of the proposed recreation enhancements, to avoid killing or injuring bald eagles.

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

Erosion and Sedimentation Control

The City's proposal to enhance recreation facilities at the project would require some excavation activities that would temporarily disturb soil and botanical resources. Construction of the trail near the impoundment shoreline at the dam could potentially affect water quality if erosion of disturbed soils run off into the Little River causing temporarily increased turbidity. To reduce these impacts, staff recommends that the City develop an erosion and sediment control plan to utilize best management practices in the construction areas such as erosion control fencing, soil stabilization mats, and revegetating disturbed areas using weed-free seed. We estimate that the cost to develop this plan would be \$2,000 and implementation of the plan would be incorporated into the cost of construction of the proposed recreation enhancements. The benefits of this plan to soils, water quality, and botanical resources would outweigh the cost to develop the plan.

Minimum Flow Releases

The City proposes to continue releasing a minimum flow of 25 cfs, or inflow to the project, whichever is less, to the Little River downstream of the project dam. However, both Virginia DGIF and Interior recommend that, to protect fish and especially mussels, minimum flows should be higher than the existing 25-cfs minimum flow (but do not specify a flow value) and that project outflows should more closely approximate the historic hydrograph of the Little River (but again, provide no specific flow values). Although we cannot estimate a cost for Virginia DGIF's and Interior's recommended measures due to a lack of specificity, our analysis indicates there is little gain in aquatic habitat downstream of the project dam as minimum flows increase above the existing 25cfs minimum flow. Specifically, there is only a 5 to 9 percent increase in wetted perimeter as outflows from the project increase from 25 cfs up to a flow of 210 cfs. Furthermore, under the existing minimum flow, riffle areas and other habitats downstream of the project dam remain wetted during the low-flow season, especially given the strong backwatering effect from the nearby Claytor Project. The stretch of the Little River downstream of the project dam to its confluence with the New River has also been noted to serve as an oxygen refuge during the summer and supports a relict population of pocketbook mussels. Furthermore, a continuous minimum flow of 25 cfs would ensure the protection of downstream aquatic life in the event that this flow could no longer be provided via leakage at the dam. Therefore, we recommend releasing a continuous minimum flow of 25-cfs, as proposed by the City, because this existing minimum flow regime appears to adequately support aquatic life (fish and mussels) downstream of the project. We conclude the benefits of a 25-cfs minimum flow are worth the levelized annual cost (in lost generation) of \$34,465. Because the existing minimum flow appears adequate, we do not recommend increasing (above 25 cfs) or modifying minimum flow releases as recommended by Virginia DGIF and Interior.

Impoundment Water Level Fluctuations

The City proposes to continue operating the project such that impoundment elevations do not exceed 3 feet during normal project operating conditions (including peaking) such that impoundment elevations are maintained between 1,769 feet and 1,772 feet (full pool). Meanwhile, Virginia DGIF and Interior recommend that impoundment fluctuations be limited to no more than 1.5 feet below the full pool elevation of 1,772 feet from April 1 to July 31 to improve the spawning success of centrarchids and also catfish. Our analysis shows that under the existing operating regime, impoundment fluctuations are mostly within 1.5 feet of the full pool elevation (80 percent of the time) during the April 1 through July 31 timeframe; centrarchids are successfully reproducing in the impoundment (based on size distributions) under this operating regime. Therefore, it appears unlikely that formally restricting impoundment fluctuations to 1.5 feet from April 1 to July 31, as recommended by Virginia DGIF and Interior, would significantly improve the spawning success of centrarchids, or catfish for that matter, due to their apparent scarcity in the project impoundment. Instead, we recommend the City's proposal to continue operating the project with a 3-foot maximum impoundment fluctuation band (with no additional annual cost) because successful recruitment of centrarchids is occurring under this current operating regime and this measure would also help ensure that no further dewatering of the littoral zone occurs in the shallow upstream end of the impoundment during peaking. We conclude the benefits of Virginia DGIF's and Interior's recommended measure are not worth the levelized annual cost of \$4,930.

Operation Compliance Monitoring

Although the City indicates in its FLA that it uses a tailwater sensor to determine if the required 25-cfs minimum flow is being met, it provides no further details or proposed measures as to how minimum flows or impoundment elevations would be monitored for license compliance purposes. Based on our scoping visit, this tailwater sensor appears to be damaged and is currently inoperable, but presumably will be back online when the new turbine unit is installed and the project is again operational. Therefore, we recommend that any license issued for the project include the development of an operation compliance monitoring plan that describes the monitoring methods and devices (including calibration procedures) that would be used to ensure compliance with other environmental measures (e.g., minimum flows and impoundment fluctuation allowances) required by any new license issued for the project, and reporting procedures.

Staff's recommendation for the City to develop an operation compliance monitoring plan would facilitate Commission administration of the license and verify that operational constraints for the protection and enhancement of aquatic resources are working as intended. We estimate the levelized annual costs to develop a plan with these compliance monitoring procedures would be \$9,210, and conclude the benefits of ensuring the protection of aquatic resources would be worth the cost.

Bald Eagle Protection

Although there are no known bald eagle nests within the project boundary, nesting is known to occur at the nearby Claytor Project Reservoir, and nearby nesting pairs may use the project impoundment for roosting and foraging. Additionally, future use of the project area by nesting bald eagles is likely since suitable habitat occurs there. Continued operation and maintenance of the project is not expected to have an effect on bald eagles. However, the City proposes to construct two trails and a picnic shelter that may require a limited amount of tree removal, potentially resulting in the disturbance of bald eagle habitat.

To ensure protection of the bald eagle, staff recommends that the City follow FWS' National Bald Eagle Management Guidelines and consult FWS and Virginia DGIF if a nest is discovered or any tree removal is required for construction of the proposed recreation enhancements. Specifically, the City should notify the FWS and Virginia DGIF within 30 days if a bald eagle nest is discovered within the project boundary. Additionally, prior to any tree removal within the project boundary or areas immediately adjacent to the project boundary, the area to be cleared should be surveyed for bald eagle nests by project staff. If any nests are discovered, the FWS and Virginia DGIF should be consulted prior to any tree removal. The City should also file, with the Commission, a summary of consultation and any recommended mitigation measures.

We estimate that implementing the National Bald Eagle Management Guidelines and consultation with FWS and Virginia DGIF, should any nests be found, would not add any additional cost to the project because it would be incorporated into normal project operation and maintenance activities and the one-time cost of the construction necessary for the proposed recreation enhancements.

Seasonal Restriction on Tree Removal

A very limited amount of low quality roosting or foraging habitat for listed bats and bald eagles may occur around the powerhouse, dam, and 560-foot-long overhead conductors. Although suitable habitat for listed bats occurs around the project impoundment, none occurs within the project boundary, which is limited to the highwater mark of the impoundment. The City's proposed recreation enhancements may require a limited amount of tree removal near the dam, potentially resulting in the disturbance of habitat for listed bats.

Most of the area where vegetation management currently occurs and the construction of the proposed recreation enhancements would take place has previously been disturbed or is currently developed. However, staff recommends that all tree removal should be restricted to the period between November 15 and March 31 to

minimize impacts to federally listed bat species, including the Indiana bat, northern longeared bat, and Virginia big-eared bat.

We estimate that this seasonal restriction on tree removal would not add any additional cost to the project because it would be incorporated into the cost of normal project operation and maintenance and the one-time cost of the construction necessary for the proposed recreation enhancements.

Recreation Enhancements

The City proposes the following recreation enhancements within the project boundary: (1) create an impoundment bank fishing area near the boat launch by installing a trail and bench; (2) improve the existing primitive canoe portage by providing a tiered/sloped path to the river, installing improved signage, and providing information on the City's website; and (3) install a picnic shelter with permanent picnic facilities and additional parking (as feasible). Each of these measures provide an improvement to the existing recreation opportunities that currently exist at the project. Creating a designated trail for fishermen and the public to access the impoundment bank fishing area consolidates foot traffic and minimizes degradation of the shoreline. Providing a bench would allow the public to comfortably enjoy the scenery surrounding the project. Designing a portage trail with an improved path increases sure footedness when traversing up and down the path and could decrease the chances for injuries that occur more easily on uneven terrain. Providing signage and online information educates the public as to the location and status of the trail. A picnic shelter would provide a covered facility at the project for gatherings or for protection during inclement weather. We estimate that the annual levelized cost of these improvements would be \$17,980 and conclude that the benefits of these measures outweigh the costs.

Historic Properties Management

The Little River Dam and powerhouse facilities are eligible for listing in the National Register. To ensure that adverse effects on known and potential historic properties, and to any as yet unidentified cultural resources, are satisfactorily resolved over the term of any new license, we intend to execute a PA with the Virginia SHPO for the Municipal Project. The PA would require the City to implement the HPMP that was developed in consultation with the Virginia SHPO.

5.1.3 Measures Not Recommended by Staff

Impingement/entrainment

Interior recommends that the City develop and implement, in consultation with the FWS, impingement/entrainment and turbine operation protocols that minimize fish mortality. Based on our analysis, there is little risk of impingement at the project and

entrainment survival is expected to be high (98 percent) under existing project operation. Therefore, we have no justification for recommending any impingement or entrainment mitigation measures. Due to a lack of details, we are not able to estimate a cost for Interior's recommended measure.

Access to Project Site for Environmental Inspection

Interior recommended that the Municipal Project shall at all times be subject to inspection by representatives of the FWS in order to ensure compliance with any fish and wildlife protection, mitigation and enhancement measures that may be contained in any license issued for the Project.

This measure is unnecessary because the Commission's standard terms and conditions for a hydropower license already require the licensee to provide employees of the U.S. Government access to project lands and works in performance of their official duties. This standard article would apply to site access for FWS employees and its designated representatives for inspection purposes. In addition, ensuring compliance with the terms of the license is the Commission's responsibility.

Wetland Management

Virginia DGIF recommends that the City develop a wetland management plan that considers waterfowl habitat enhancement measures. However, Virginia DGIF provides no details on the content of such a plan or the need to enhance waterfowl habitat at the project. Based on the City's wetlands survey, palustrine emergent wetlands are limited to 8.82 acres due to steep slopes along the impoundment shoreline, but appear to be healthy and performing valuable ecological functions. Because the City proposes to continue its current mode of operation, and existing wetlands appear to be healthy, continued operation and maintenance of the project would not be likely to adversely affect project wetlands. Therefore, Virginia DGIF's recommendation for a wetland management plan that considers waterfowl habitat enhancement measures is not warranted. Additionally, the estimated cost for this plan was not provided by the Virginia DGIF and cannot be estimated by staff due to a lack of details. Therefore, staff does not recommend this plan.

Virginia Fringed Mountain Snail Public Outreach and Education

Interior recommends, for the protection of the Virginia fringed mountain snail, the City could develop public educational information at the project's public access areas as well as outreach information for shoreline landowners whose property contains suitable habitat. Adequate habitat for the Virginia fringed mountain snail occurs in the vicinity of the project impoundment, although none occurs within the project boundary. Because the City does not propose any changes to project operation, continued operation and maintenance of the project would not affect the Virginia fringed mountain snail, thus no

mitigation measures are warranted. Additionally, the cost of this measure was not provided by Interior and a cost cannot be estimated by staff due to a lack of details. Therefore, staff does not recommend this measure. However, if the City chooses to, it could voluntarily provide public education and outreach materials regarding the Virginia fringed mountain snail.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Continued operation of the Municipal Project would result in some unavoidable fish impingement and entrainment. However, given the relatively low approach velocities (1.43 fps) and large trash rack spacing at the project (2.5 inches clear), most fish susceptible to impingement would be large (e.g., adult carp) and could therefore avoid impingement due to their increased swimming ability. Most fish entrained at the project would be small (e.g., juvenile shiners) and, therefore, would experience low blade strike mortality. The younger individuals in a population generally have high rates of natural mortality, even in the absence of hydropower operations, and fish populations have generally evolved to withstand losses of these smaller and younger individuals with little or no impact to long-term population sustainability. Therefore, entrainment and turbine mortality of smaller individuals could occur, but is expected to be very low and have minimal consequences on the sustainability of the fish communities and associated fisheries at the projects.

5.3 SUMMARY OF SECTION 10(j) RECOMMENDATIONS

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

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

In response to our February 13, 2018, notice soliciting comments, recommendations, terms and conditions, and prescriptions, Interior filed six section 10(j) recommendations for the project on April 13, 2018.⁵¹ Table 11 lists the recommendations filed subject to section 10(j), and indicates whether the

⁵¹ Although Virginia DGIF filed six recommendations in its letter filed on April 10, 2018, these recommendations were not filed pursuant to section 10(j) of the FPA and are therefore considered under section 10(a).

recommendations are included under the staff alternative, as well as the basis for our preliminary determinations concerning measures that we consider inconsistent with section 10(j) of the FPA. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA and are addressed in the specific resource sections of this document.

Table 11. Fish and wildlife agency recommendation for Municipal Project (Source: staff).

	Recommendation	Agency	Within the Scope of Section 10(j)	Annual Cost	Adopted?
1.	The licensee shall provide low flow releases consistent with ecological function, below the dam and into the Little River, in magnitude, duration, and seasonality of the historic hydrograph for the region, beyond currently designated 25 cfs seepage minimum flow values for the purposes of protecting freshwater mussels downstream of the dam.	Interior	No. Measure lacks specificity as to what specific flow values would meet the intent of the recommendation.	\$0ª	No. Because it lacks specificity, we cannot assess the benefits and costs of this measure.
2.	The licensee shall develop and implement, in consultation with the Fish and Wildlife Service, impingement/entrainment and turbine operation protocols that minimize fish mortality.	Interior	No. Measure lacks specificity with regard to what specific actions would meet the intent of the recommendation.	\$0 ^a	No. Because it lacks specificity, we cannot assess the benefits and costs of this measure.
3.	Due to the potential for the eastern hellbender to be federally listed under the Endangered Species Act in the near future, the Department recommends continued coordination with the U.S. Fish and Wildlife Service.	Interior	No. Consultation is an administrative matter, not a fish and wildlife measure.	\$О ^ь	Adopted to the extent that future consultation under the ESA could be required if any proposed license amendments would affect

	Recommendation	Agency	Within the Scope of Section 10(j)	Annual Cost	Adopted?
					federally listed species.
4.	In the event that bald eagles are documented at or in the vicinity of the project area, the City should follow the national bald eagle management guidelines and consult with the FWS in order to avoid disturbance or other impacts to this species.	Interior	No. Consultation is an administrative matter, not a fish and wildlife measure.	\$О ^ь	Yes.
5.	For the protection and enhancement of federally listed bat species and their habitats, the City shall conduct any necessary tree removal activities between November 15 and March 31 in order to avoid the injuring or killing these species.	Interior	Yes	\$О ^ь	Yes
6.	For the protection and enhancement of the Virginia fringed mountain snail, the City could work with adjacent private landowners to share the knowledge gained from the study research along the project shoreline. Information on potential easement possibilities and educational and outreach information could be prepared for sharing at the project site public	Interior	No. Consultation is an administrative matter, not a fish and wildlife measure.	\$0°	No. Because it lacks specificity, we cannot assess the benefits and costs of this measure.

	Recommendation	Agency	Within the Scope of Section 10(j)	Annual Cost	Adopted?
	access as well as within outreach to shoreline landowners with suitable habitat.				
a	¹ Cost for this measure was not provided by the recommending agencies and a cost cannot be estimated by staff due to a lack of details.				

- ^b Staff assumes no additional cost to implement this measure.
- ^c Staff did not assign a cost for this measure because it is a suggestion for consultation rather than a specific fish and wildlife protection measure.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 10 qualifying comprehensive plans that are applicable to the Municipal Project.⁵² No inconsistencies were found.

⁵² (1) Forest Service. 2004. Jefferson National Forest revised land and resource management plan. Department of Agriculture, Roanoke, Virginia. January 2004. (2) Forest Service. 1993. George Washington National Forest revised land and resource management plan. Department of Agriculture, Harrisonburg, Virginia. (3) National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993. (4) Ohio River Basin Commission. 1977. Kanawha River Basin comprehensive coordinated joint plan. Cincinnati, Ohio. July 1977. (5) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986. (6) U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C. (7) Virginia Department of Conservation and Recreation. The 2007 Virginia outdoors plan (SCORP). Richmond, Virginia. (8) Virginia Department of Conservation and Historic Resources. n.d. Virginia's scenic rivers. Richmond, Virginia. (9) Virginia Department of Environmental Quality. 2015. Commonwealth of Virginia State Water Resources Plan. Richmond, Virginia. October 2015. (10) Virginia State Water Control Board. 1986. Minimum instream flow study - final report. Annandale, Virginia. February 1986.

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Municipal Project is relicensed as proposed with the additional staffrecommended measures, the project would operate while providing enhancements and protective measures for aquatic, terrestrial, recreation, and cultural resources in the project area.

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

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