ENVIRONMENTAL ASSESSMENT FOR HYDROPOWER LICENSE

Evelyn Hydroelectric Project

FERC Project No. 14799-002

Kentucky

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, DC 20246

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TABLE OF CONTENTS

TABLE OF CONTENTS i

LIST OF FIGURES iii

LIST OF TABLES iii

ACRONYMS AND ABBREVIATIONS iv

1.0 INTRODUCTION 1
- 1.1 APPLICATION 1
- 1.2 PURPOSE OF ACTION AND NEED FOR POWER 1
  - 1.2.1 Purpose of Action 1
  - 1.2.2 Need for Power 3
- 1.3 STATUTORY AND REGULATORY REQUIREMENTS 3
- 1.4 PUBLIC REVIEW AND COMMENT 4
  - 1.4.1 Scoping 4
  - 1.4.2 Interventions 4
  - 1.4.3 Comments on the Application 4

2.0 PROPOSED ACTION AND ALTERNATIVES 5
- 2.1 NO-ACTION ALTERNATIVE 5
- 2.2 APPLICANT'S PROPOSAL 5
  - 2.2.1 Project Facilities 5
  - 2.2.2 Project Safety 5
  - 2.2.3 Project Operation 6
  - 2.2.4 Environmental Measures 7
  - 2.2.5 Modifications to the Applicant's Proposal – Mandatory Conditions 8
- 2.3 STAFF ALTERNATIVE 8

3.0 ENVIRONMENTAL ANALYSIS 9
- 3.1 GENERAL DESCRIPTION OF THE RIVER BASIN 10
- 3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS 11
  - 3.2.1 Geographic Scope 11
  - 3.2.2 Temporal Scope 12
- 3.3 PROPOSED ACTION AND ACTION ALTERNATIVES 12
  - 3.3.1 Geology and Soil Resources 13
  - 3.3.2 Aquatic Resources 17
  - 3.3.3 Terrestrial Resources 27
  - 3.3.4 Threatened and Endangered Species 36
  - 3.3.5 Recreation and Land Use 52
  - 3.3.6 Cultural Resources 56
- 3.4 NO-ACTION ALTERNATIVE 63

4.0 DEVELOPMENTAL ANALYSIS 63
4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT 64
4.2 COMPARISON OF ALTERNATIVES 65
4.2.1 No-Action Alternative 66
4.2.2 Applicant's Proposal 66
4.2.3 Staff Alternative 67
4.3 COST OF ENVIRONMENTAL MEASURES 67
5.0 CONCLUSIONS AND RECOMMENDATIONS 67
5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE 67
5.1.1 Environmental Measures Proposed by the Applicant 68
5.1.2 Additional Measures Recommended by Staff 69
5.2 UNAVOIDABLE ADVERSE EFFECTS 73
5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS 73
5.4 CONSISTENCY WITH COMPREHENSIVE PLANS 73
6.0 FINDING OF NO SIGNIFICANT IMPACT 74
7.0 LITERATURE CITED 74
8.0 LIST OF PREPARERS 74
APPENDIX A – Statutory and Regulatory Requirements A-1
APPENDIX B – Water Quality Certification Conditions for the Evelyn Project B-1
APPENDIX C – Section 3 Tables C-1
APPENDIX D – Cost of Environmental Measures D-1
APPENDIX E – Literature Cited E-1
APPENDIX F – List of Preparers F-1

LIST OF FIGURES

Figure 1-1. Proposed Evelyn Project location and project boundary 2
Figure 2-1. Approximate locations of proposed Evelyn Project facilities 6

LIST OF TABLES

Table 4-1. Parameters for economic analysis of the project 64
Table 4-2. Summary of the annual cost of alternative power and annual project cost for three alternatives for the Evelyn Project 66

Table C- 1. Select characteristics of mapped soil units at the Evelyn Project C-1
Table C- 2. Monthly flow data (cfs) at Lock and Dam No. 13 ..... C-2
Table C- 3. Estimated seasonal fish entrainment by family and total seasonal and annual entrainment C-2
Table C- 4. Estimated fish mortality rates by family at the Evelyn Project C-3
Table C- 5. Estimated seasonal and annual mortality of fishes by family at the Evelyn Project C-3
Table C- 6. Land cover type within a 1,000-meter (0.6-mile) buffer of the proposed Evelyn Project impoundment C-4
Table C- 7. Special status terrestrial species that may occur in Lee County, Kentucky C-5

ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
BMPs	best management practices
Lock 12 Partners	Lock 12 Hydro Partners, LLC
Lock 13 Partners	Lock 13 Hydro Partners, LLC
Lock 14 Partners	Lock 14 Hydro Partners, LLC
°C	degrees Celsius
certification	water quality certification
C.F.R.	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dbh	diameter at breast height
DO	dissolved oxygen
EA	environmental assessment
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
Heidelberg Project	Heidelberg Hydroelectric Project
HPMP	Historic Properties Management Plan
Interior	U.S. Department of the Interior
IPaC	Information for Planning and Conservation
KRA	Kentucky River Authority
Kentucky DEP	Kentucky Department for Environmental Protection
Kentucky DFWR	Kentucky Department of Fish and Wildlife Resources
Kentucky EPPC	Kentucky Exotic Pest Plant Council
kV	kilovolt
mg/L	milligrams per liter
mm	millimeters
Mother Ann Lee Project	Mother Ann Lee Hydroelectric Project
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act

NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
PA	Programmatic Agreement
Ravenna Project	Ravenna Hydroelectric Project
RM	river mile
SERC	Southeastern Electric Reliability Council
SHPO	State Historic Preservation Officer
T&E species	threatened and endangered species
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey

ENVIRONMENTAL ASSESSMENT

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Washington, D.C.

Evelyn Hydroelectric Project, P-14799-002
Kentucky

1.0 INTRODUCTION

1.1 APPLICATION

On July 1, 2019, Lock 13 Hydro Partners, LLC (Lock 13 Partners or applicant) filed an application with the Federal Energy Regulatory Commission (Commission) for an original license for the proposed 2.8-megawatt (MW) Evelyn Hydroelectric Project (Evelyn Project or project) (Project No. 14799-002). The proposed project would be located on the Kentucky River, in Lee County, Kentucky, at the existing Kentucky River Lock and Dam No. 13, which is owned by the Commonwealth of Kentucky and operated by the Kentucky River Authority (KRA) (figure 1-1). As proposed, the project would generate an average of about 12,161 megawatt-hours (MWh) of energy annually. No federal land would be occupied by project works or located within the project boundary.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the proposed Evelyn 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 Lock 13 Partners for the Evelyn 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.

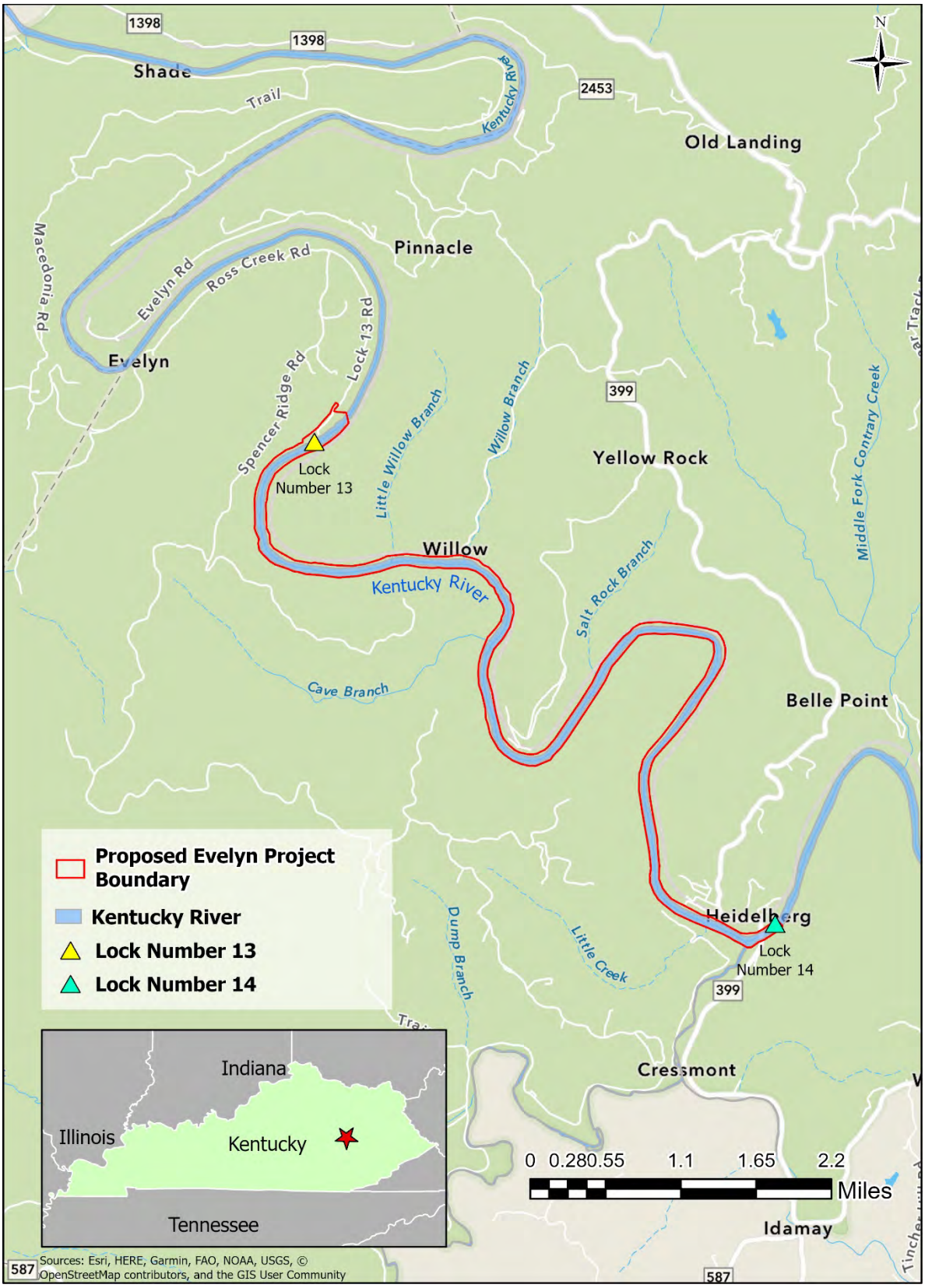

Figure 1-1. Proposed Evelyn Project location and project boundary (Source: Staff).

Issuing a license for the project would allow Lock 13 Partners to construct the project and generate electricity for the term of the license, making electric power from a renewable resource available to the electric grid.

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA)[1] of 1969 to assess the environmental and economic effects associated with the proposed construction, operation, and maintenance of the project and alternatives to the proposed project. This EA also makes a recommendation to the Commission on whether to issue a license, and if so, recommends terms and conditions to become a part of any license issued.

In this EA, we assess the environmental and economic effects of constructing, operating, and maintaining the project: (1) as proposed by the applicant (proposed action), and (2) with our recommended measures (staff alternative). We also consider the effects of the no-action alternative. The issues that are assessed include project-related construction, operation, and maintenance effects on geology and soils, aquatic and terrestrial resources, threatened and endangered species, recreation, and cultural resources.

1.2.2 Need for Power

The Evelyn Project would provide hydroelectric generation to meet part of the region's power requirements, resource diversity, and capacity needs. The proposed project would have an installed capacity of 2.8 MW and generate approximately 12,161 MWh per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Evelyn Project is located in the Central Subregion of the Southeastern Electric Reliability Council (SERC), which is one of six regional reliability councils of NERC. According to NERC's most recent 2019 forecast for the Central Subregion, the total internal demand is projected to grow at an annual rate of 0.9 percent from 2020 through 2030.

Power from the Evelyn Project would help meet the need for power in the Central Subregion in both the short- and long-term. The project would provide low-cost power that could displace 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 proposed project is subject to numerous requirements under the

[1] 42 U.S.C. §§ 4321 *et seq*.

FPA and other applicable statutes. The major regulatory and statutory requirements are described in Appendix A.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 C.F.R. § 4.38) require that applicants 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, the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. We distributed scoping document (SD1) to interested agencies and others on January 9, 2018. It was noticed in the Federal Register on January 18, 2018.[2] We distributed SD2 on March 12, 2018. The following entities provided written comments:

Commenting Entity	Date Filed
U.S. Fish and Wildlife Service (FWS)	January 30, 2018
U.S. Environmental Protection Agency (EPA)	February 2, 2018[3]
Kentucky Energy and Environment Cabinet (Cabinet)	February 8, 2018[4]
Kentucky State Historic Preservation Officer (SHPO)	February 20, 2018

1.4.2 Interventions

On March 9, 2020, the Commission issued public notice accepting Lock 13 Partners' application for original license for the Evelyn Project. The notice set May 8, 2020, as the deadline for filing protests and motions to intervene. No entities filed motions to intervene or protests in response to the notice.

1.4.3 Comments on the Application

The March 9, 2020 notice also requested comments, recommendations,

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[2] 83 Fed. Reg. 2635-2636 (January 18, 2018).

[3] EPA's February 2, 2018 letter references EPA's December 1, 2017 comments on the pre-application document.

[4] This filing includes comments from the Kentucky Department for Environmental Protection's (DEP) Divisions of Water, Waste Management, and Air Quality, as coordinated by the Cabinet, which is the state clearinghouse for review of environmental documents.

preliminary terms and conditions, and preliminary prescriptions. No entities filed comments, recommendations, preliminary terms and conditions, and preliminary prescriptions in response to the notice.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

The no-action alternative is license denial. Under the no-action alternative, the project would not be built and environmental resources in the project area would not be affected.

2.2 APPLICANT'S PROPOSAL

2.2.1 Project Facilities

The proposed project would be located at Lock and Dam No. 13, which is owned by the Commonwealth of Kentucky and operated by the KRA. Lock 13 Partners proposes to construct a powerhouse within the existing, but no longer used, navigation lock chamber, and to construct a transmission line. The principal existing structures associated with the project are: (1) a 223-acre impoundment (pool 13) at an elevation of 617.38 feet North American Vertical Datum of 1988 (NAVD88); (2) a fixed crest concrete dam with a 246-foot-long, 34-foot-wide, and 38.2-foot-high spillway; and (3) a 148-foot-long by 52-foot-wide by 38.2-foot-high navigation lock chamber.

The proposed project would consist of: (1) a 40-foot-high by 52-foot-wide trashrack installed at a 12.5-degree angle with 2-inch open bar spacing located at the powerhouse entrance; (2) a 64-foot-long by 52-foot-wide reinforced concrete powerhouse that would be submerged in the existing lock chamber, with five horizontal, Kaplan style turbine generator units, each rated at 560-kilowatts (kW), for a total installed capacity of 2.8 MW; (3) a 110-foot-long buried cable transmitting power from the submerged powerhouse to a new, two story, 30-foot-long by 20-foot-wide control building onshore; (4) a 600-foot-long, 12.47-kilovolt (kV) overhead transmission line that would connect to an existing Jackson Energy Cooperative (Jackson Energy) line of the same voltage; and (5) appurtenant facilities (figure 2-1).

2.2.2 Project Safety

As part of the licensing process, the Commission would review the adequacy of the proposed project facilities. Special articles would be included in any license issued, as appropriate. Commission staff would inspect the licensed project both during and after construction. Inspection during construction would concentrate on adherence to

Figure 2-1. Approximate locations of proposed Evelyn Project facilities (Source: Staff).

Commission-approved plans and specifications, special license articles relating to construction, and accepted engineering practices and procedures. Operational inspections would focus on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance.

2.2.3 Project Operation

The proposed project would operate in run-of-river mode, utilizing flows between 459 cubic feet per second (cfs) and 2,295 cfs for power generation. The turbines would be operated sequentially based on inflow. Run-of-river operation would be maintained by not allowing the water level in the impoundment to drop below the level of the crest of the dam (617.38 feet NAVD88) when the project is operating. Lock 13 Partners proposes to install monitoring equipment in the lock chamber and headwater pool, designed to shut down the generating units when water levels in the impoundment fall below 617.38 feet.

In addition to run-of-river operation, Lock 13 Partners proposes measures to ensure that the project does not affect municipal water withdrawals from the Kentucky River. The proposed project would not operate when flow limits on the Kentucky River are required by the Kentucky DEP, Division of Water, which may occur during severe droughts. Also, the proposed project would not operate when the KRA implements bypass valve releases from pool 13. During a drought, the KRA may open bypass valves in the dam to allow water stored behind the dam to be passed downstream.

The proposed project would generate 12,161 MWh annually, which would be sold to a local utility.

2.2.4 Environmental Measures

The applicant proposes the following measures:

- Develop and implement an erosion and sedimentation control plan to minimize the effects of project construction on the Kentucky River.
- Avoid disturbing clay capped, lead-contaminated soils adjacent to the concrete esplanade[5] during project construction.
- Operate the project in run-of-river mode.
- Implement an Operations Compliance Monitoring Plan, filed on July 1, 2019, which includes provisions to cease generation during low-flow restricted periods as declared by the Kentucky DEP's Division of Water or KRA.
- Implement a Water Quality Monitoring Plan, filed on August 13, 2020, that includes the following provisions: (1) monitor water temperature and dissolved oxygen (DO) concentrations in the tailrace from May 1 through October 31; (2) report monitoring results annually by March 31 of the following year; and (3) shut down project turbines incrementally, to total shutdown as needed, if DO levels fall below 5.0 milligrams per liter (mg/L) over a 24-hour average period, or 4.0 mg/L instantaneously.
- Implement a Trashrack Design and Maintenance Plan, filed on February 7, 2020, that includes the following provisions: (1) install a trashrack at a 12.5-degree angle to keep inlet speeds low; and (2) use 2-inch clear bar spacing with a maximum approach velocity that does not exceed 1.5 feet per second (fps), to minimize potential for fish entrainment and impingement.

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[5] Esplanades are long, level, open stretches of paved or grassy ground, usually found next to a river or large body of water and bordered by a lock wall and "training" walls at the upstream and downstream ends of the lock. At working locks and dams they provide a place for lock tenders to work, and the training walls prevent shoreline erosion around the lock.

- To avoid electrocution of birds/wildlife on transmission facilities, implement the following protection measures: (1) eliminate some exposed energized parts by installing a pad-mounted, combined main transformer and main breaker; (2) install animal protection guards on any exposed bushings on the pole-mounted auxiliary power transformers; and (3) arrange conductors on the cross arms of the overhead transmission line consistent with Avian Power Line Interaction Committee (APLIC) and FWS's Avian Protection Plan Guidelines.
- Mark and avoid running buffalo clover during transmission line construction.
- Avoid disturbing bat swarming and roosting habitat.[6]
- Limit tree removal to the period between November 15 and March 31.
- Implement a Recreation Plan, filed October 27, 2020, with provisions for providing recreation facilities at the project, including a canoe portage, bank fishing area, picnic tables, toilet, and gravel drive and parking area.
- Implement a Historic Properties Management Plan (HPMP), filed January 29, 2021, for the protection of historic properties within the project's APE.

2.2.5 Modifications to the Applicant's Proposal – Mandatory Conditions

Kentucky DEP issued a water quality certification (certification) pursuant to section 401 of the Clean Water Act (CWA) with 12 mandatory conditions and 11 general conditions.[7] Some conditions are administrative; therefore, they are not analyzed in this EA.[8] The resource-specific conditions are discussed in section 3, *Environmental Analysis* below. The certification is included in its entirety in Appendix B.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include all of the applicant's

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[6] While Lock 13 Partners proposed to avoid disturbing bat swarming and "nesting" habitat, we assume the intent is to avoid bat swarming and *roosting* habitat as stated here.

[7] The certification identifies two submittal conditions (S-1 and S-2) and ten narrative conditions (T-1 through T-10). Condition T-8 references 11 general conditions.

[8] S-1, T-1 (in part), T-2, T-3, T-7, T-8.1 through T-8.3, T-8.9, T-8.11, T-9, and T-10 are considered administrative and not analyzed in this EA. Condition T-1 includes project dimensions from Lock 13 Partners' pre-application document filed on September 7, 2017. The project dimensions analyzed in this EA are detailed in section 2.2.1, *Project Facilities*, as described in the final license application filed on July 1, 2019, the modifications to the proposed project design filed on November 8, 2019, and additional information, filed by Lock 13 Partners, on February 7, 2020, October 16, 2020, and January 29, 2021, as appropriate.

proposed measures noted above and the conditions in the certification, with the following additional measures:

- Include in the proposed, and certification-required, erosion and sediment control plan, the following provisions: (1) Lock 13 Partners' proposal to avoid disturbing clay capped, lead-contaminated soils adjacent to the concrete esplanade during project construction; (2) consult with Kentucky DEP's Divisions of Water and Waste Management in the development of the plan; and (3) consult with Kentucky DEP's Division of Waste Management if the clay capped soils cannot be avoided or are inadvertently disturbed during project construction.
- Compile Lock 13 Partners' proposed avian protection measures in an Avian Protection Plan with additional provisions to maintain the avian/wildlife protection devices, train personnel on avian protection measures, and identify and address impacts on birds and other wildlife to minimize the potential for electrocution and/or collision in a timely manner throughout any license term.
- Modify Lock 13 Partners' proposal to mark and avoid running buffalo clover during construction of the proposed transmission line, to also include construction of the proposed canoe portage route and take-out point.
- Modify the Recreation Plan to include a requirement to complete construction of recreation facilities within 5 years of license issuance, and provisions for monthly visual inspection of recreation facilities, and a periodic review of the adequacy of the facilities to meet demand.

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 other recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Under each resource area, historic and current conditions are described first. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection, and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.[9]

[9] Unless otherwise indicated, the source of our information is the license application filed on July 1, 2019, the modifications to the proposed project design filed on November 8, 2019, and additional information filed by Lock 13 Partners on February 7, 2020, October 16, 2020, January 29, 2021, and February 8, 2021.

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Kentucky River, a tributary of the Ohio River, is located entirely within the state of Kentucky. The proposed project would be located in the Kentucky River Basin in northeastern Kentucky at River Mile (RM) 239.9. The Kentucky River flows approximately 265 miles northwesterly from Beattyville, Kentucky to Carrolton Kentucky where it joins the Ohio River. The Kentucky River drains an area of about 6,970 square miles. The Kentucky River was historically used for navigation, with a system of 14 locks and dams, but due to small width and depth limitations, Lock and Dam Nos. 5 through 14 have been retired and conveyed to the Commonwealth of Kentucky, and are now used for domestic water supply, recreation, and hydroelectric power. Lock and Dam Nos. 1 through 4 are still in operation and used for navigation. River flows pass over the spillways at Lock and Dam Nos. 5, 6, 8, 9, 10, and 13 because the locks were sealed. Four of the Kentucky River locks and dams are licensed FERC projects, including the following three projects downstream from the proposed Evelyn Project: (1) Mother Ann Lee Hydroelectric Project (Mother Ann Lee Project), located at Lock and Dam No. 7 (RM 117);[10] (2) Kentucky River Lock and Dam No. 11 Hydroelectric Project (RM 201);[11] and (3) Ravenna Hydroelectric Project (Ravenna Project), located at Lock and Dam No. 12 (RM 220). In addition, the Heidelberg Hydroelectric Project (Heidelberg Project) is located upstream from the proposed Evelyn Project at Lock and Dam No. 14 (RM 249).[12]

The topography in the basin varies from flat and rolling plains to mountainous. The headwaters portion of the basin lies in the Eastern Coal Field region of the Appalachian Plateau. Extensive forest cover, narrow valleys, steep stream gradients, flash floods during the rainy season, and low stream flows during the dry season are characteristic of this area. The underlying bedrock varies greatly in mineral and hydrological characteristics.

The climate in the area is temperate with abundant moisture. Average annual precipitation in the project area is about 47 inches. Average monthly precipitation ranges from 2.9 inches in October to 5.3 inches in July. The average annual snowfall is 1.0 foot. Average monthly temperature ranges from 31 degrees Fahrenheit (°F) in January to 86°F in July, or about -0.6 to 30 degrees Celsius (ºC), respectively.

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[10] The Mother Ann Lee Project (FERC No. 539) was originally licensed in 1926, relicensed in 1992, and is currently in relicensing.

[11] The Commission granted an original license for the Kentucky River Lock and Dam No. 11 Hydroelectric Project (FERC No. 14276) on May 5, 2016.

[12] The Commission granted original licenses for the Ravenna (FERC No. 13214) and Heidelberg (FERC No. 13213) Projects on December 21, 2015.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing NEPA,[13] a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the license application, we identified water quality, recreation resources, and cultural resources as having the potential to be cumulatively affected by the proposed project, in combination with other past, present, and foreseeable future activities. Water quality was selected because construction of the project could contribute to increased turbidity and sedimentation levels associated with other land use practices in the basin, and because operation of the proposed project may affect DO concentrations that are also affected by other developmental activities in the basin. Recreation resources were selected because construction and operation of the project, as well as associated recreation enhancement measures, may affect the overall development recreation resources along the Kentucky River, including the Kentucky River Water Trail. Cultural resources were selected because construction of the project has the potential to affect the integrity of the National Register-eligible system of locks and dams along the Kentucky River that were originally constructed for commercial navigation and which the Kentucky SHPO treats as a noncontiguous historic district.

3.2.1 Geographic Scope

The geographic scope of analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect resources differently, the geographic scope for each resource may vary.

For water quality, the geographic scope of analysis has been identified as the Kentucky River from Lock and Dam No. 13 downstream to Lock and Dam No. 12 (i.e., the Ravenna Project), which is located about 19 miles downstream from the proposed project. We chose this geographic bound because the proposed project operations in concert with operations of the other aforementioned hydropower projects could affect water quality in the reservoir downstream of Lock and Dam No. 12 due to changes in

[13] On July 16, 2020, the Council on Environmental Quality (CEQ) issued a final rule, *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act* (Final Rule, 85 Fed. Reg. 43,304), which was effective as of September 14, 2020; however, the NEPA review of this project was in process at that time and was prepared pursuant to CEQ's 1978 NEPA regulations.

how water is delivered to the project tailrace.

The geographic scope of analysis for recreation and cultural resources is the entire 260-mile mainstem of the Kentucky River from the confluence of the North, Middle, and South Forks near Beattyville, Kentucky to its confluence with the Ohio River at Carrollton, Kentucky. We chose this geographic scope because it encompasses the full system of locks and dams along the Kentucky River. These locks and dams have been identified by the Commonwealth of Kentucky for both their potential for recreational development as well as their historic significance.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on water, fishery, and recreational resources. Based on the term of the proposed license, the temporal scope looks 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information for each resource. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

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

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 geologic and soil resources, threatened and endangered species, as well as aquatic, terrestrial, recreation, and cultural resources may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to air quality,[14] aesthetic resources and socioeconomics associated with the proposed action, and therefore, these resources are not assessed in the EA. Land use is addressed in the recreation and terrestrial sections. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative* section.

[14] Given the short-term nature and small project footprint, requiring emission control strategies or technologies for construction equipment would have insignificant benefits to air quality regionally and in the project area and therefore we do not recommend that they be required in a license.

3.3.1 Geology and Soil Resources

3.3.1.1 Affected Environment

The proposed Evelyn Project would be located within the Eastern Kentucky Coalfields Physiographic Region of the Cumberland Plateau which is characterized by mountainous to rolling hills and karst[15] topography. The Kentucky River generally sits 100 to 600 feet below the adjacent uplands and flows northwest. Often the hillsides along the Kentucky River are steep. The surface geology of the region includes quaternary alluvium that is often eroded and redeposited. The underlying regional geology consists mostly of shale, sandstone, conglomerates, and coals of the Pennsylvanian age. Limestone beds also occur. Three sinkholes have been documented about a half mile southwest of the project on the south side of the Kentucky River and one sinkhole exists about a mile west-southwest of the project on the northwest side of the Kentucky River. All four sinkholes are located outside the proposed project boundary.

Soils

Soils on the northwestern bank of Kentucky River, where the existing lock, esplanade, access road, and boat launch are located, are composed of alluvial layers with fine sandy loam, overlying alternating layers of loam, silt, silt loam, loamy sand, and fine sandy loam. The specific soil types in the project area include Grisby-Chavies-Yeager complex, Elk silt loam, and Bledsoe silt loam. The majority of the project area where the proposed control building, transmission line, canoe portage, and other recreation amenities, would be located on Grisby-Chavies-Yeager soils. These soils are found in floodplains and natural levees, are known to flood frequently, and have a moderate erosion potential (table C-1, Appendix C).

The erosion potential in the vicinity of the project varies greatly. The proposed underground cable, control building, the initial segment of new transmission line corridor, picnic tables, and composting toilet would be located primarily in Grigsby-Chavies-Yeager soils with a moderate erosion hazard value. Only small segments of the proposed transmission line and canoe portage would be installed on Bledsoe silt loams, which have a severe erosion hazard value (table C-1). The proposed parking area and the remaining segment of transmission line corridor to the point of interconnection would cross Elk silt loams, which have a slight erosion hazard value (table C-1). No new project structures would be built on the southeastern riverbank (figure 2-1).

Approximately 1.75 acres of the area adjacent to Lock and Dam No. 13 is capped with compacted clay to contain soil contamination caused by lead paint used in the lock

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[15] Karst topography occurs where water dissolves and erodes limestone and other soft bedrocks, forming caves, sinkholes, fissures, and underground streams.

tender's houses and other buildings that were formerly located at the proposed project site. The U.S. Army Corps of Engineers (Corps) placed this clay cap on the site to mitigate lead exposure before turning the property over to the Commonwealth of Kentucky. Kentucky DEP, Division of Waste Management manages the site with respect to the clay cap. Specifically, this agency limits use of the property to non-residential purposes, restricts groundwater use to non-domestic purposes, requires approval for disturbances to soil coverings and changes in land use, reserves the right to require further characterization or remedial measures, and reviews the site every 5 years to determine whether additional action is necessary to protect human health and the environment.

3.3.1.2 Environmental Effects

Effects of Project Construction

Construction of the new project facilities (control building, underground and overhead transmission line segments, powerhouse, and recreation amenities) could cause soil erosion, sedimentation, and stream bed material transport. Disturbances to the clay capped soils in the project area could expose lead contamination to wind and/or water erosion and result in adverse effects to aquatic resources. To minimize these potential effects, Lock 13 Partners proposes to develop and implement a soil erosion control and sedimentation plan as part of its site preparation. Lock 13 Partners also states that their current construction plans would limit construction of project facilities to areas that would not disturb the clay capped soils.

No entity filed comments in response to the Commission's public notice indicating that the application was ready for environmental analysis. However, the Kentucky DEP's certification for the project requires Lock 13 Partners to develop and implement an erosion and sedimentation control plan with provisions to prevent adverse effects to water quality from soil erosion during construction (Conditions T-4 and T-8.4 through T-8.8, and T-8.10), avoid the use of heavy equipment in the stream channel or, if unavoidable, minimize resuspension of sediments and disturbance to the channel, banks, or riparian vegetation (Conditions T-5 and T-8.8), and maintain all sediment and erosion control measures until vegetation has become well-established (Conditions T-6 and T-8.5).

Our Analysis

Soils in the project area are generally protected from erosion by the existing project structures, vegetative cover, and/or level topography where most of the new project facilities would be built. The northwestern riverbank within the immediate project area is relatively flat and is currently covered by the concrete lock wall, esplanade, and bulkhead within the lock chamber. Grasses and other herbaceous vegetation cover much of the clay capped soils adjacent to the esplanade. From either end of the lock wall, riparian vegetation covers much of the riverbank, which slopes

moderately to steeply to the river. The southeastern riverbank slopes moderately to the river with riparian vegetative cover present both upstream and downstream of the dam.

During construction, Lock 13 Partners would access the site using the existing access road to Lock and Dam No. 13. Construction of the powerhouse would take place during low flow, and in the dry within the existing concrete lock structure, which would minimize the potential for disturbance and resuspension of sediments. Lock 13 Partners would install cofferdams at the upstream and downstream ends of the lock on top of the existing gate sills to dewater the lock. Prior to dewatering, a barge-mounted excavator would be used, if necessary, to clear the lock floor of sediment and debris. However, the primary substrate identified within the lock chamber is existing concrete,[16] and therefore excavation is expected to be limited to removing loose and weathered material to provide a sound surface of foundation rock on which to cast the new concrete of the powerhouse. Excavation of a trench in the adjacent concrete esplanade would also be required to install a duct to house the underground segment of the proposed transmission line, which would connect the powerhouse to the control building (figure 2-1).

Construction of the overhead transmission line would involve installing wooden poles from the powerhouse to the point of interconnection. The proposed transmission line route crosses the project access road and open mowed areas at Lock and Dam No. 13, and would then run roughly parallel with the project access road to the point of interconnection. Installation of the new transmission line poles is expected to require minimal vegetation removal and ground disturbance.

Minimal vegetation removal and ground disturbance is expected to construct the recreation amenities as well. The project access road, parking area, and boat ramp are existing amenities that would be improved and used to provide access to the project for both operation and recreation. Construction of the canoe portage would involve adding segments of gravel pathway to complete the proposed route. Some riparian vegetation would be removed to construct a concrete stairway that would serve as the canoe take-out point. The riprap that Lock 13 Partners proposes to place next to this stairway would stabilize the impoundment shoreline and minimize potential erosion in this area. No other land disturbing activities are proposed after construction is complete.

According to the preliminary supporting design report filed on July 1, 2019, the concrete esplanade would be the primary staging area for the heavy equipment (e.g., 60-ton crane) needed to construct the powerhouse and install the 12-ton turbine generator units. Limiting use of heavy equipment to this area would avoid the disturbance of the clay capped soils during construction. Avoiding the clay capped soil areas for all construction activities, including for staging materials and equipment, would ensure that

[16] *See* figure 5 of the ESA Coordination – Technical Memorandum filed with the final license application (*see* Exhibit E Section V – Resource 1) on July 1, 2019.

lead-contaminated soils would not be exposed or mobilized (e.g., transported on construction equipment or eroded by wind or stormwater runoff).

Implementing an erosion and sediment control plan, as proposed by the applicant and with the provisions required by the certification, would ensure that Lock 13 Partners minimizes erosion, including on the riverbanks and impoundment shorelines, during project construction. In addition to the requirements of the certification, including Lock 13 Partners' proposal to avoid disturbance of the clay capped soils during project construction in the plan would help to avoid mobilization of lead-contaminated soils. Developing the plan in consultation with Kentucky DEP's Division of Water and Division of Waste Management would ensure that appropriate best management practices (BMPs) would be used during construction, including any measures to avoid, or appropriately manage, the clay capped soils in the project boundary. Including a provision to consult the Kentucky DEP's Division of Waste Management again if field conditions during construction make disturbance of the clay capped soils unavoidable, would further help to prevent mobilization of lead-contaminated soils. Including these additional provisions would avoid or minimize the potential disturbance and exposure of lead-contaminated soils in the project boundary to potential transport on construction equipment, wind and/or water erosion, and runoff of these soils into the Kentucky River, and associated effects of suspended lead-contaminated sediment on aquatic resources.

Effects of Project Operation

Lock 13 Partners proposes to operate the project in a run-of-river mode, such that inflows from 459 cfs to 2,295 cfs would be diverted from the spillway through the existing lock, and the impoundment water level would be maintained at the crest of the dam when the project is operating. The project would shut down generating units when water levels in the impoundment fall below the crest of the dam. Any flows in excess of the maximum hydraulic capacity of the project would be discharged over the existing spillway, as occurs under existing conditions. Lock 13 Partners states that ongoing maintenance of the site would include periodic mowing and care of the proposed picnic area, composting toilet, parking area, boat ramp, fishing access area, and the canoe take-out, put-in, and portage.

No entity filed comments in response to the Commission's public notice indicating that the application was ready for environmental analysis. However, the Kentucky DEP's certification requires Lock 13 Partners to operate the project in run-of-river mode (Condition T-1).

Our Analysis

Lock 13 Partners' proposed run-of-river mode of operation would maintain existing impoundment elevations at or above the crest of the dam while the project is generating. While the average reservoir elevation would be lower and there would be

less frequent fluctuations in water levels in the project impoundment, run-of-river operation would maintain the same historical minimum and maximum reservoir elevations. The combined outflows (i.e., total water quantity) from the project turbines and spill over the project dam would not change from the existing flow conditions. The project would shut down generating units as needed during drought to maintain existing flow conditions. Therefore, the proposed project operation would not appreciably change the quantity or timing of flows downstream from the project.

Vegetation along the Kentucky River has been established since the lock and dam system was constructed and it is adapted to the frequency and duration of water depths under current project operation. This vegetation is expected to adapt relatively quickly to the minor changes to average elevations during Lock 13 Partners' proposed run-of-river operation. Given that flow patterns through the project would mimic the current hydroperiod and the impoundment shorelines and downstream riverbanks are well-vegetated, operation of the project would not affect the stability of riverbanks and impoundment shorelines. Sediment transport and deposition patterns would also remain unchanged from current conditions.

3.3.2 Aquatic Resources

3.3.2.1 Affected Environment

Water Quantity

The mainstem Kentucky River is formed at the confluence of the North, Middle, and South Forks of the Kentucky River near Beattyville, Kentucky. The Kentucky River, at the proposed project site, has a basin area of 2,784 square miles. Lock 13 Partners and staff compiled monthly flow data (cfs) at Lock and Dam No. 13, based on records from USGS gage no. 03282000 Kentucky River at Heidelberg, Kentucky (Period of Record: 1963-2018) (table C-2, Appendix C).

Water Use

As discussed above in section 3.1, *General Description of the River Basin*, the Kentucky River has 14 locks and dams, with Lock and Dam Nos. 5 through 14 retired and conveyed to the Commonwealth of Kentucky. The Commonwealth uses them for domestic water supply, recreation, and hydroelectric power. Municipal water is withdrawn from pools 3 through 11 and from pool 14. The Evelyn Project's pool 13 serves as a municipal water source during low flow and near drought conditions. Kentucky DEP's Division of Water or the KRA may request water releases from pool 13 discharged through low-level drawdown valves when necessary.

Water Quality

According to the water quality statutes for Kentucky (401 KAR 10:026), the designated uses for the Kentucky River in the vicinity of the proposed project include:

(1) warmwater aquatic life habitat; (2) primary contact recreation; (3) secondary contact recreation; and (4) domestic water supply. Relevant water use designations by the State of Kentucky are as follows: (1) dissolved oxygen (DO) concentration must meet a minimum of 4.0 mg/L instantaneously and of 5.0 mg/L over a 24-hour average; (2) water temperature values must never exceed 89ºF (or 31.7ºC).

The Kentucky DEP's 2016 Integrated Report (Kentucky DEP, 2016) identifies impaired water bodies in the state. The Kentucky River main stem was found to be fully supporting all monitored uses except for fish consumption. Fish consumption was not supported from the confluence with the Ohio River to RM 11, and was only partially supported from RM 53 to 209, an area encompassing locks 4 through 11. These river sections are downstream of Lock No. 12, which is located at RM 220.9, and therefore outside of the proposed Evelyn Project area (i.e., Lock and Dam No. 13 at RM 239.9).

While Lock 13 Partners did not conduct water quality monitoring in the proposed area, Lock 7 Hydro Partners, LLC (Lock 7 Partners) has been monitoring water quality in the tailrace of the Mother Ann Lee Project since 2006.[17] Lock 7 Partners monitors DO and temperature from June 1 through October 31, when the Kentucky River is generally warmer and DO tends to be lower. From 2006 to 2018, the average annual DO concentration at the Mother Ann Lee Project ranged from 7.76 to 9.75 mg/L and the minimum instantaneous DO recorded annually in the same years ranged from 4.0 to 5.95 mg/L.[18] DO concentrations were generally consistent with DO concentrations stipulated under State standards.

Fisheries

Aquatic Habitat

The Kentucky River is an extremely channelized river, containing a series of 14 lock and dams, which limit fish movement through the river (Herrala, 2014). Lock and Dam No. 13, the proposed location of the Evelyn Project, impounds the Kentucky River, creating low gradient pool habitat. In the project area the predominant substrate is sand (70 percent) with some gravel/cobble (30 percent). The substrate matrix close to the

[17] The Mother Ann Lee Project is located about 120 miles downstream from the Evelyn Project on the Kentucky River, and has operated in run-of-river mode since 1926. Since the Mother Ann Lee and Evelyn Projects are similar in (proposed) operation and location, we expect similar results in DO concentrations.

[18] DO data at the Mother Ann Lee Project are limited to the monitoring season of June through October, excluding probe maintenance. October of 2013 was removed because of equipment failure. Additionally, DO monitoring data in 2019 were compromised due to a major flood and therefore are not available.

thalweg[19] is principally sand (90 percent). Gravel and cobble substrate are prevalent downstream of the dam.

Fish Community

The mainstem of the Kentucky River has over 70 species of freshwater fish of which over 20 species are gamefish, including muskellunge, white bass, sauger, walleye, largemouth bass, smallmouth bass, spotted bass, white crappie, and black and crappie. Muskellunge, sauger, and hybrid striped bass are stocked in the lower pools (*see* stocked species, below). Other fish species include mooneye, flathead catfish, channel catfish, smallmouth buffalo, bigmouth buffalo, freshwater drum, longnose gar, bowfin, green-sided darter, and common carp.

Kentucky Department of Fish and Wildlife Resources (Kentucky DFWR) conducted fish sampling in the Kentucky River, near the proposed project area from 2000 to 2002 using electrofishing. Sampling was conducted in the Heidelberg and Ravenna Project pools, located approximately 9 RMs upstream and 19 RMs downstream, respectively from the proposed Evelyn Project. Due to equipment sampling bias, the majority of the catch was gamefish, with some other smaller species collected.

Overall, the Kentucky River offers good recreational fishing opportunities for bass, crappie, bream, and catfish for boat anglers. The steep sides of the valley in parts of this river segment make shore angling access difficult in many areas, therefore most fishing is done by boats or near river access points.

Stocked Species

Kentucky DFWR routinely stocks the lower pools of the Kentucky River with gamefish to provide recreational fishing opportunities (Kentucky DFWR, 2016). On average, from 2015 to 2019, the agency annually stocked about 36,000 sauger and about 500 muskellunge in pools 9 through 13 and about 4,500 hybrid striped bass to pool 9 to support a "put-grow-take fishery" (Kentucky DFWR, 2016, 2017c, 2018, 2019, 2020c). Spring catch rates are directly related to the number of fish stocked in the previous year (Herrala, 2014).

3.3.2.2 Environmental Effects

Effects of Proposed Operation on Water Quantity

Currently all flows are passed over the spillway. Under Lock 13 Partners' proposal, the majority of flow passing through the project would be released through the powerhouse, rather than over the crest of the dam. To monitor, control, and maintain the

[19] The thalweg is the path of the fastest flow in a river and usually is located over the lowest point of any cross section of the river.

Evelyn Project's run-of-river operation, Lock 13 Partners proposes to implement an Operation Compliance Monitoring Plan. To ensure operation compliance, Lock 13 Partners proposes to install hydro station controls that would monitor and take corrective actions to shut down generating units in order to maintain water levels at or above the crest of the dam. Additionally, as a component of the plan, the Lock 13 Partners proposes to comply with, and report, emergency project shutdown during periods of low-flow or drought conditions, as declared by the Kentucky DEP or KRA.

No entity provided recommendations in response to the Commission's ready for environmental analysis.

Our Analysis

Under existing conditions, all flows passing the dam are released over the spillway, as the lock is not operational. Operating the project in a run-of-river mode would maintain the existing reservoir water surface elevation no lower than the crest of the dam while the project is generating. Inflows in the range of 459 cfs to 2,295 cfs, which are typical during the summer months, would be released through the powerhouse, rather than over the spillway. Diverting up to 2,295 cfs of flow (i.e., the project's maximum hydraulic capacity) to the generating units would reduce the frequency of flows above the crest of the spillway during some high-flow months;[20] however flows downstream of the project would remain unchanged. Consequently, the shoreline of the project reservoir during these months would experience a lower average reservoir elevation, but not less than the height of the crest of the dam. Lock 13 Partners' proposed measures to monitor and report compliance with run-of-river operation, including reporting any project shutdowns resulting from Kentucky DEP or KRA emergency low-flow declarations and drought conditions, would foster coordinated management of water resources and ensure compliance with the operational requirements of any new license.

Effects of Proposed Construction and Operation on Water Quality

Construction Effects

Construction of the proposed project has the potential to affect water quality in the Kentucky River, both upstream and downstream from the Evelyn Project at Lock and Dam No. 13. Construction of the proposed project facilities would require both in-water construction work (e.g., installation of the powerhouse and turbine pits within the lock, etc.) and some limited land-disturbing activities (e.g., construction of the control building and underground and overhead transmission lines). Overall, these activities may result in localized increases in turbidity levels within the affected reaches of the Kentucky River.

[20] A river flow of 2,295 cfs is equivalent to passing about 2.0 feet of water over the crest of the 246-foot-long spillway. Spill above the crest of the spillway, up to 2.0 feet, which could occur when the flow is equal to or greater than 2,295 cfs, would occur less frequently than under current conditions.

As discussed in section 3.3.1, *Geologic and Soil Resources*, Lock 13 Partners proposes to develop and implement an erosion and sediment control plan.[21] The certification (Appendix B) Conditions T-4 and T-8.4 require Lock 13 Partners to develop an erosion and sedimentation control plan and implement it at all times during construction. Additionally, Conditions T-5 and T-8.8 stipulate that if heavy equipment (e.g., bulldozers, backhoes, draglines, etc.) is required for this project, it should not be used or operated within the stream channel. In those instances where such instream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation. Finally, Conditions T-6 and T-8.5 require the removal of all sediment and erosion control measures after re-vegetation has become well-established.

Our Analysis

Construction of the project would involve minor excavation at the project site. Construction activities have the potential to disturb the topsoil, exposing soils to wind and water forces that could cause localized erosion and runoff into the Kentucky River.

Lock 13 Partners' proposal and the certification requirements to develop a soil erosion and sediment control plan that includes site-specific BMPs would minimize effects associated with erosion and sedimentation created during project construction. Controlling and preventing soil erosion and sedimentation during construction would minimize the potential adverse effects of soil disturbances on terrestrial and aquatic habitats and water quality.

Operation Effects on Water Quality

Releasing water through the proposed project powerhouse has the potential to alter water temperatures or DO concentrations in the Kentucky River downstream of the project. These altered conditions could in turn affect fish and other aquatic species.

To address uncertainties regarding potential adverse effects on water quality during project operation, Lock 13 Partners proposes to implement a Water Quality Monitoring Plan. This plan includes provisions to monitor hourly water temperature and DO concentrations in the project tailrace when the project is operating. In addition, if low DO concentrations are observed in the tailrace after the project begins operating, Lock 13 Partners would shut down the project turbines, incrementally, or all turbines, as needed, to release inflow over the spillway until discharges meet the state standard for DO. Lock 13 Partners would submit the monitoring data to resource agencies annually.

[21] *See* Response to Commission staff's November 20, 2019 Additional Information Request (Lock Partners' February 7, 2020 Response).

No entity provided other recommendations in response to the Commission's notice that the application was ready for environmental analysis.

Our Analysis

At some hydropower projects, passing the majority of river flow through the project's turbines,[22] instead of over the spillway would reduce DO concentrations downstream of the powerhouse. This phenomenon occurs because: (1) turbine intakes draw water from a point below the surface of the river where the DO concentration could be low if the impoundment stratifies preventing vertical mixing; and (2) water flowing through the submerged turbines can have less opportunity for reaeration than water flowing over the dam and exposed to the atmosphere.

We expect that the proposed operation of the Evelyn Project would not affect overall DO concentrations, because the reservoir is riverine in nature and shallow and the project must operate in a run-of-river mode (certification Condition T-1). The hydraulic water residence time in pool 13 is about 10.4 hours,[23] indicating that the water in the pool is replaced quickly and is not likely to stratify or lack vertical mixing.

As such, water exiting the submerged turbines should have temperature and DO characteristics similar to the impoundment because the project does not draw water from a deep, cool stratified layer (with less oxygen). Therefore, water exiting the project's turbines would not be expected to significantly modify temperature or DO levels of the river downstream of the project's tailrace and water would not require reaeration at the dam to maintain adequate DO concentration.

The development of a water quality monitoring plan, as proposed by the applicant and required by the certification (Condition S-2), which includes provisions to monitor DO concentrations at the project hourly, would be useful to detect if low DO releases result from project operation. The applicant's proposal to release inflow over the spillway and shut down the project's turbines, incrementally, or all turbines, as needed, if monitoring detects low DO, would be effective in restoring DO concentration to minimize any project effects on downstream water quality (certification Condition T-1).

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[22] Proposed flows diverted from the existing spillway to the project's powerhouse would range from 459 cfs to 2,295 cfs, which are typical during the summer months.

[23] The hydraulic residence time measures the average length of time the impoundment stores water, which can be many years for larger reservoirs. At the Evelyn Project, the calculation for residence time is 10.4 hours using 3,500 acre-feet storage capacity (*See* Lock 7 Partners' September 28, 2020 Response to Commission staff's June 29, 2020 Deficiency of License Application and Additional Information Request for the Mother Ann Lee Project P-539), divided by 7,195-cfs mean annual flow.

We reviewed the water quality data for the downstream Mother Ann Lee Project.[24] Similarities between the projects, including a similar water residence time of about 9.8 hours[25] and submerged turbines, indicate that the proposed Evelyn Project operation would not lower DO concentrations in the river between the Evelyn Project and the Mother Ann Lee Project. Twelve years of DO concentrations measured immediately downstream of the Mother Ann Lee Project consistently exceed Kentucky DEP's instantaneous (4.0 mg/L) and mean daily (5.0 mg/L) minimum DO requirements. These DO concentrations are supportive of typical warmwater fisheries (401 KAR 10:026).

Operational Effects on Aquatic Habitat

Reservoir fluctuations have been shown to adversely affect the quantity and quality of littoral habitat present within reservoirs. Rapid changes in reservoir levels can reduce the production of macroinvertebrates, lead to fish stranding, and desiccate fish spawning habitat, as well as any eggs, larval fish, or freshwater mussels that may be present within the substrates. Such changes in reservoir levels can also have adverse effects on aquatic vegetation, which provides important forage, rearing, and shelter habitat for juvenile fish species. Changes to the timing and quantity of downstream flows can lead to fish and mussel stranding, a reduction in macroinvertebrate production, and a reduction in habitat used for the various life-cycle functions of resident aquatic species.

As discussed above, Lock 13 Partners proposes, and the certification requires, that the project be operated in a run-of-river mode whereby outflows would approximate inflows and the impoundment water levels would be maintained at the crest of the dam when the project is operating. The project would shut down generating units as needed during drought to maintain existing flow conditions. Any flows in excess of the maximum hydraulic capacity of the project would be discharged over the existing spillway, as occurs under existing conditions.

No entity provided recommendations in response to the Commission's notice that the application was ready for environmental analysis.

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[24] The Mother Ann Lee Project operates in manner comparable to the proposed Evelyn Project: operates in run-of-river mode; shuts down operation if the pool level is at or above the crest of the dam; monitors DO hourly to detect low DO, if found, releases inflow over the spillway, or shuts down the project's turbines.

[25] At the Mother Ann Lee Project, the residence time is 9.8 hours, using 3,500 acre-feet storage capacity, divided by 7,195-cfs mean annual flow (USGS gage No. 03286500 using a period of record of 1993-2019).

Our Analysis

Under Lock 13 Partners' proposed run-of-river operations, and the quantity and timing of flows downstream of the dam would not be altered compared to the existing conditions. While the average elevation of the reservoir would be lower, fluctuations would be minimized and within the current naturally occurring water levels. Therefore, project-related effects on aquatic habitat would be limited to minor changes and would not extend downstream of the dam.

Fish Impingement, Entrainment, and Turbine Mortality

Operation of the proposed project has the potential to cause fish mortality due to impingement on the trashracks, especially for larger fish that cannot easily fit through the openings in the trashracks and are not able to overcome the approach velocity. Entrainment of fish at the project could occur when fish are unable to escape water flowing into the intakes and could result in injury or mortality to fish that pass through the project's turbines.

To minimize impacts to fish from impingement, and entrainment and turbine mortality, Lock 13 Partners proposes to install a trashrack at a 12.5-degree angle, to keep inlet speeds low, with a 2-inch clear spacing and a maximum approach velocity of 1.5 fps.

No entity provided recommendations in response to the Commission's notice that the application was ready for environmental analysis.

Our Analysis

The ability of various fish species to avoid impingement or entrainment is based largely on swimming ability, size, form, and behavior, and the physical characteristics of the project, such as trashrack bar spacing, approach velocity, and intake location.

<u>Impingement</u>

Impingement potential at the project is low. Most of the fish species in the Kentucky River that grow to a size large enough to potentially become impinged on a trashrack with 2-inch bar spacing have sufficient burst swimming speeds[26] to maintain their position upstream of the trashrack and avoid impingement. The swimming speed capability data presented in Bell (1991) and Electric Power Research Institute (EPRI) (2000) indicate that the fish species in the Kentucky River including common carp, largemouth bass, and catfish species are able to maintain swimming speeds of between 4 and 7 body lengths per second for 15 minutes or more, and are capable of higher burst speeds. Fish of these species commonly exceed 12 inches in length and should be able to

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

overcome the maximum approach velocity of 1.5 fps at the trashracks. Smaller fish that do approach the racks are able to pass through the trashracks with little or no risk of impingement.

Entrainment

Lock 13 Partners conducted a desktop fish entrainment study at the upstream Heidelberg Project and downstream Ravenna Project to determine the types and sizes of fish likely to be entrained at those projects and probable survival rates of entrained fishes. Data from those projects were extrapolated to the Evelyn Project. Lock 13 Partners used EPRI's database (1997) on fish entrainment and mortality trends at other hydroelectric projects to establish correlative (similar turbine types) entrainment and mortality information for the proposed project's operation.

As stated above, smaller fish would have the potential to pass between the trashrack bars and therefore be subject to entrainment. Studies at other projects have generally concluded that small fish (i.e., less than 4 inches) account for the majority of fish entrained (EPRI, 1997). However, the survival of these entrained smaller fish is expected to be relatively high compared to larger fish because they are less prone to mechanical injury from turbine passage (i.e., turbine blade strike); and less prone to injury resulting from shear stresses and rapid pressure changes created by spinning turbines. Based on monthly and seasonal entrainment rates, the total number of entrained fish would approach 12,700 fish per year. The project would entrain about 6,200 fish in the spring, representing about 50 percent of the total number of fishes expected to be entrained annually. A summer estimate of 4,400 fish entrained represents about 33 percent of the total number of fish that would be entrained annually. Entrainment likely would be substantially lower during fall and winter, with estimates of 3 percent and 14 percent, respectively.

Lock 13 Partners and staff estimated the seasonal entrainment of fish by family and total seasonal and annual entrainment (expressed in total individuals) (*see* table C-3, Appendix C). Lock 13 Partners and staff predicted that Centrarchidae (sunfishes) would have the highest rate of entrainment at just under 4,150 fish, followed by Ictaluridae (catfishes), and Catostomidae (suckers). Among these latter groups, a marked increase in entrainment during the spring and summer was anticipated, which may reflect peak dispersal of early life stages. Clupeidae (herring and mooneyes) would be entrained rarely, because of their low abundance. Based on research at other hydroelectric projects, the majority of the entrained fish would be juveniles. High percentages of the fish entrained in spring and summer have been attributed to dispersal of large numbers of young-of-year and small fishes to downstream habitats.

Lock 13 Partners estimated fish mortality rates by family using the average mortality rate from studies at similar projects with Kaplan-style turbines (expressed in percentage) (*see* table C-4, Appendix C). Additionally, Lock 13 Partners estimated

seasonal and annual mortality of fishes by family (expressed as total individuals, *see* table C-5, Appendix C). Based on estimated seasonal and annual mortality of fishes by family, the vast majority of mortalities, nearly 73 percent, are expected to be juvenile Centrarchidae (sunfishes) and Catostomidae (suckers) that would be killed primarily during the spring and summer. Most of the other fish killed would be expected to be juvenile cyprinidae, which at about 13 percent of the total entrained, would number about 430 annually. The Kaplan-style turbines proposed by Lock 13 Partners are generally recognized to be among the more "fish-friendly" types of turbines because their hydraulic head and pressure changes typically have negligible effects on fishes.

In summary, the project's Kaplan-style turbines would cause minimal instances of turbine mortality of mostly juvenile sunfish, suckers, and minnow species, and the 2-inch trashrack bar spacing and low maximum intake approach velocity would prevent most instances of fish impingement on the trashrack bars.

3.3.2.3 Cumulative Effects

Water quality within the Kentucky River is currently affected by municipal and industrial wastewater discharges, agriculture, residential and commercial development, and reservoirs along the length of the river. Construction of the proposed project may add a small amount of suspended sediments within the vicinity of the proposed project, potentially resulting in a temporary increase in turbidity levels within the affected reach of the Kentucky River. Developing and implementing an erosion and sediment control plan for the project, as proposed by Lock 13 Partners and required by the certification, would reduce the potential for project construction to contribute to cumulative effects on water quality in the Kentucky River Basin.

Operation of the proposed project would add a fourth consecutive run-of-river hydropower project (i.e., in addition to the Ravenna, Heidelberg, and Lock and Dam No. 11 Projects) to this segment of the Kentucky River. However, operating the project in a run-of-river mode as proposed by Lock 13 Partners, would result in relatively stable impoundment elevations and downstream flows, which would minimize the project's potential contribution to cumulative effects on aquatic habitat and water quality. Water quality in the vicinity of the existing projects is good and there is no indication that the Evelyn Project would degrade it.

Additionally, Lock 13 Partners would monitor DO throughout the early summer and late fall, when low DO concentrations associated with high water temperatures are most likely in the Kentucky River. If low DO concentrations are detected, alternative measures for project operation, including provisions to automatically shut down the generating units, would allow more water to spill over the spillway, and oxygenate the water. The three aforementioned licensed hydropower projects are required to implement similar water quality monitoring measures, sampling schedules, and corrective actions to

minimize potential effects on DO in the Kentucky River.[27] Therefore, any contribution of the Evelyn Project operation to cumulative effects on water quality in the Kentucky River is expected to be minimal.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

The proposed Evelyn Project spans the border between the EPA's Northern Forested Plateau Escarpment and the Ohio/Kentucky Carboniferous Plateau within the Western Allegheny Plateau Ecoregion. The Western Allegheny Plateau is unglaciated, mostly forested, with rugged hills and ridges. Streams in this region typically have cool water and moderate to high gradients. Forests within the Western Allegheny Plateau are a mixed mesophytic[28] makeup of oak and oak–pine, variously dominated by white oak, black oak, yellow-poplar, red maple, scarlet oak, Virginia pine, shortleaf pine, white pine, and northern red oak. Past land use and topographic variation have contributed to today's highly patchy forest composition, including logging, recreational opportunities, livestock farming, and oil production. Primary land uses are logging, farming, and surface and underground coal mining (Kentucky DFWR, 2013). Corn, hay, soybean, small grain, and patches of tobacco are grown, and livestock are raised, on agricultural lands.

Land cover within about a half mile of the project impoundment is largely forested hillside (table C-6, Appendix C). A few, small agricultural fields are maintained near Heidelberg, Kentucky, predominately for hay production. Homes are sparsely dispersed on the hillsides, with small, maintained lawns. Areas of barren land consisting of exposed rock occur at a rock mining operation near Yellow Rock, Kentucky. The proposed project is located on a small floodplain and is surrounded by steep, heavily forested, limestone hillsides dominated by American sycamore, pin oak, black walnut, white oak, river birch, red maple, and yellow popular. Riparian zones along the Kentucky River are known for ephemeral wildflowers like blue lobelia, purple coneflower, and grey goldenrod; tall grasses such as switchgrass, riverbank rye, and river oats; and shrubs and small trees, such as spice bush, arrowhead viburnum, silky dogwood, and eastern redbud.

The immediate project area was cleared of vegetation during the construction of the existing dam, large concrete esplanade, and original lock houses, and KRA currently maintains it almost entirely as a mowed field. There is also a mid-to-late successional

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[27] On August 13, 2020, Lock 13 Partners filed a Revised Water Monitoring Plan for the Evelyn Project so that requirements for DO monitoring, schedule, and corrective actions are consistent for all aforementioned projects on the Kentucky River.

[28] Mesophytic vegetation grows in places with a moderate amount of moisture.

riparian forest with sycamore, boxelder, black walnut, yellow poplar, river birch, black cherry, and silver maple trees adjacent to the river. Only sparse herbaceous vegetation grows in cracks in the concrete esplanade adjacent to the lock chamber and in the location of the proposed control building. There is an unmaintained field and tree line along the proposed 600-foot-long transmission line corridor. The field contains giant ragweed, red clover, Canada goldenrod, tall fescue, old field aster, and blackberry, as well as non-native invasive plant species.[29] The proposed transmission line corridor would intersect with an existing Jackson Energy distribution line in a fully shaded, roadside, woodlot dominated by white pine, redbud, and flowering dogwood (figure 2-1).

Wetlands

Lock 13 Partners used data provided by the National Wetlands Inventory (NWI) to identify wetlands in the project area. One 0.85-acre freshwater forested/shrub wetland is located upstream of the project dam within the project boundary and another 1.37-acre freshwater forested/shrub wetland is located just outside the project boundary, adjacent to the impoundment. Both wetlands were created or modified by human-made barriers or dams and are characterized by vegetation that is about 20 feet tall or greater and seasonal flooding (Federal Geographic Data Committee, 2013).

Invasive Species

Numerous non-native invasive plant species, including trees, shrubs, vines, and herbaceous species occur in Kentucky. Invasive plant species, including Japanese honeysuckle (*Lonicera* spp.), Japanese stiltgrass (*Microstegium vimineum*), sericea lespedeza (*Lespedeza cuneate*), and periwinkle (*Vinca minor* L.) were observed in fairly high densities along the proposed transmission line corridor.[30] Additionally, garlic mustard (*Alliaria petiolate*), winter creeper (*Euonymus fortune*), and multiflora rose (*Rosa multiflora*) are likely to occur within the project boundary.

Japanese honeysuckle, Japanese stiltgrass, sericea lespedeza, garlic mustard, winter creeper, and multiflora rose are among the non-native invasive plants that the Kentucky Exotic Pest Plant Council (EPPC) classifies as “severe threats” because they spread easily into native plant communities and displace native vegetation. The Kentucky EPPC classifies periwinkle, among other non-native invasive plants, as a “significant threat” because it may have the capacity to invade natural communities along disturbance corridors, or to spread from stands in disturbed sites into undisturbed areas, but has fewer characteristics of invasive species than species ranked as severe threats (Kentucky EPPC, 2013). Among these non-native species, herbaceous species, such as Japanese stiltgrass, sericea lespedeza, and garlic mustard are prolific producers of tiny seeds (Evans et al., 2012; Kurtz and Hansen, 2017; Gucker, 2010; USDA NRCS, 2002)

[29] Lock 13 Partners’ February 7, 2020 Response.

[30] Lock 13 Partners’ February 7, 2020 Response.

that are commonly spread by wind, water, and/or wildlife, as well as on tires, equipment, and the soles of shoes during construction, maintenance, and recreation activities (Fryer, 2011; Ohlenbusch et al., 2007; USDA NRCS, 2002).

Wildlife

The proposed Evelyn Project is located within the proclamation boundary for the Daniel Boone National Forest, it is not located on U.S. Forest Service-owned land.[31] This nearby national forest provides nearly 708,000 acres of protected and managed forested habitat for numerous species of mammals, birds, reptiles and amphibians. These protected lands, along with the rugged topography of the area, provide habitat for the region's diverse wildlife community.

In Lee County, Kentucky, 39 mammal species are known to occur including: American black bear, bobcat, white-tailed deer, elk, coyote, gray and red fox, American mink, northern river otter, striped skunk, Virginia opossum, American beaver, as well as various species of squirrels, voles, moles, shrews, and mice. Kentucky also provides diverse terrestrial and subterranean habitats for 14 species of bats, including upland forests, riparian corridors, forested wetlands, as well as caves and sinkholes scattered throughout the state (Kentucky DFWR, 2013). Bat species potentially occurring in Lee County include: Rafinesque's and Virginia big-eared bats, Indiana bat, northern long-eared bat, southeastern and eastern small-footed myotis, big brown bat, silver-haired bat, eastern red bat, hoary bat, little brown bat, and tricolored bat.[32]

Roughly 375 species of landbirds, waterbirds, shorebirds, and waterfowl have been recorded in Kentucky, with about 150 of these species regularly breeding in the state (Kentucky DFWR, 2013). Species documented in Lee County include: brown creeper, dark-eyed junco, ruby-throated hummingbird, turkey vulture, eastern screech owl, barred owl, red-tailed hawk, red-shouldered hawk, Cooper's hawk, sharp-shinned hawk, broad-winged hawk, American kestrel, pileated woodpecker, red-belied woodpecker, downy woodpecker, hairy woodpecker, great blue heron, green heron, wood duck, mallard, wild turkey, cedar waxwing, red-winged blackbird, as well as numerous warbler, sparrow, thrush, vireo, and wren species.

Of the 55 species of amphibians (i.e., 20 frogs and 35 salamanders) and 56 species of reptiles known to occur in Kentucky (9 lizards, 33 snakes, and 14 turtles), a wide variety have been documented in Lee County (Kentucky DFWR, 2013). Amphibians

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[31] A proclamation boundary defines the area inside which the Forest Service may exchange or purchase land for management of a national forest. Within the proclamation boundary, the federally-owned national forest lands are fragmented and interspersed with state and private lands.

[32] Federally listed bat species are discussed in section 3.3.4, *Threatened and Endangered Species*.

known to occur in Lee County include the northern cricket frog, Cope's gray treefrog, northern spring peeper, bullfrog, green frog, pickerel frog, wood frog, American toad, Fowler's toad, eastern hellbender, mudpuppy, eastern newt, and 15 salamander species (e.g., spotted, marbled, green, southern two-lined, and Kentucky spring salamanders). Reptiles found in Lee County include the fence lizard, five-lined skink, broadhead skink, ground skink, coal skink, eastern spiny softshell turtle, snapping turtle, map turtle, musk turtle, eastern box turtle, and 15 snake species (e.g., copperhead, timber rattlesnake, ringneck, black rat, and Eastern hognose snake).

Special Status Species

Lock 13 Partners identified federal and state protected species and other species of concern that may occur within Lee County (table C-7, Appendix C). Federally listed species are discussed further in section 3.3.4, *Threatened and Endangered Species*.

3.3.3.2 Environmental Effects

Effects of Project Construction, Operation and Maintenance, and Recreation on Vegetation

Ground-disturbing activities associated with the construction or modification of project facilities, as well as routine maintenance and project-related recreation, have the potential to affect vegetation, including special status species and non-native invasive plants at the proposed project.

As part of the proposed recreation plan, Lock 13 Partners proposes that vegetation management during the spring, summer, and fall would consist of regularly mowing existing grassy areas. Vegetation management would not occur in the winter. Lock 13 Partners does not anticipate the need to use herbicides or tree trimming/removal.[33] Additionally, while no suitable running buffalo clover habitat was identified within the proposed transmission line corridor,[34] Lock 13 Partners proposes to mark and avoid any running buffalo clover if it is encountered during transmission line construction.[35]

No entity provided comments in response to the Commission's public notice that the application was ready for environmental analysis. However, Kentucky DEP's certification for the project requires Lock 13 Partners to develop and implement an erosion and sedimentation control plan with provisions to minimize disturbance of existing vegetation during construction (Conditions T-4, T-5, and T-8.4 through T-8.8,

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[33] If necessary, Lock 13 Partners would restrict tree trimming/removal to the period between November 15 and March 31 to minimize project effects on wildlife habitat. This measure is discussed in this section, under *Effects of Project Construction, Operation, and Maintenance on Wildlife*.

[34] Lock 13 Partners' February 7, 2020 Response.

[35] This measure is discussed in section 3.3.4, *Threatened and Endangered Species*.

and T-8.10), and remove all sediment and erosion control measures after vegetation has become well-established (Conditions T-6 and T-8.5).

Our Analysis

There are approximately 24.50 acres[36] of land on the northwestern shoreline of the Kentucky River within the proposed project boundary in the vicinity of Lock and Dam No. 13 where the project facilities would be built and maintained. The majority (approximately 14 acres) of that area, immediately adjacent to the lock, the concrete esplanade, and a gravel parking area, is currently maintained by the KRA as mowed lawn. Roughly 0.02 acres of this mowed lawn would be permanently cleared for construction of the proposed control building. Additionally, about 28 square feet of riparian vegetation may be permanently cleared at the take-out location (about 390 feet upstream of the crest of the dam) to build concrete or stone steps for access from the water to the shoreline and portage. The steps would be flanked by riprap to minimize the potential effects of installing the stairs on adjacent riparian vegetation. In places where roads or pathways do not exist along the proposed canoe portage route, Lock 13 Partners would remove grasses and build a gravel path to connect the put-in/take-out points.

Vegetation could also be temporarily disturbed during construction of the proposed control building, buried cable, transmission line, and recreation features (i.e., canoe portage, fishing area, picnic tables, and composting toilet). Specifically, staging materials and equipment, construction or modification of project roads and canoe portage, vegetation clearing, excavation, and stock piling and regrading soil could damage or remove vegetation. Installing the 110-foot-long buried cable would require excavation of a narrow linear trench within the concrete esplanade from the lock chamber to the control building, which may temporarily disturb vegetation depending on where excavated soil is stock piled and then regraded into the project area. The proposed 600-foot-long transmission line would traverse an unmaintained field with a tree line running parallel to the main project access road, and tie into the existing Jackson Energy distribution line in a fully shaded, roadside woodlot at the northeast portion of the line. Transmission line construction would require minimal vegetation removal and ground disturbance to install the new wooden poles. The proposed 1,750-foot-long canoe portage would also involve minimal vegetation disturbance given that about 1,060 feet of it would use existing roads or pathways, and the remainder would traverse the open mowed areas within the project boundary. The existing road to the boat launch would serve as part of the portage and the boat launch, which would also serve as the downstream canoe put-in location.

Project operation and maintenance could include mowing and/or trimming of tree branches to keep vegetation clear from the proposed control building, overhead transmission lines, access road, and recreation amenities. These vegetation management

[36] We estimated areas using GIS.

activities would maintain the current conditions at the project and would not be expected to affect vegetation in undeveloped areas adjacent to the proposed project boundary.

Areas disturbed by project construction, maintenance, and recreation activities can create suitable conditions for the establishment of non-native invasive plants (Hobbs and Huenneke, 1992). Non-native invasive plants can rapidly colonize new areas and out-compete and displace native species, thereby reducing biodiversity and altering compositions of existing native plant and animal communities. Of the seven invasive plant species that are known or likely to occur at the proposed project, the seeds of Japanese stiltgrass, sericea lespedeza, and garlic mustard are the most likely to be spread by construction, maintenance, and recreation equipment, within, and potentially outside of the project area. Given that the canoe portage would be composed of existing roads and new gravel pathways, there is less potential for recreationists to come into contact with invasive plant seeds and spread them to new areas. Implementing a sediment and erosion control plan and minimizing vegetation disturbance, as required by the project certification (i.e., Conditions T-4, T-5, T-6, T-8.4, T-8.8, and T-8.10) would minimize the potential spread of invasive plants within the project boundary during project construction and allow for successful revegetation after construction is complete.

The effects to botanical resources during project construction, operation and maintenance, and project-related recreation are expected to be minimal as the project area has been previously disturbed, maintained as mostly open lawn, and the proposed removal and disturbance of vegetation would be limited.

Effects of Project Construction, Operation, and Maintenance on Wetlands

Hydropower facilities that vary impoundment surface elevations and decrease water levels in the impoundment can dewater riparian and wetland habitats. In addition, construction of new project facilities and use of temporary staging areas could disturb vegetation and expose surface soils to erosive elements. Soil eroded from construction sites and disturbance of the riverbed could adversely affect wetlands.

Lock 13 Partners proposes to operate in run-of-river mode and maintain impoundment elevations at or above the crest of the dam when the project is operating. Lock 13 Partners does not propose any specific wetlands protection measures related to project construction, operation, and maintenance.

No entity provided comments on the effects of project construction, operation, or maintenance on wetlands in response to the Commission's public notice that the application was ready for environmental analysis. However, Kentucky DEP's certification for the project requires that Lock 13 Partners avoid disturbances to riparian vegetation during construction (i.e., Condition T-5, T-8.8, and T-8.10).

Our Analysis

Two freshwater forested/shrub wetlands are located upstream of the project dam, one of which is within the proposed project boundary; however, neither wetland is adjacent to, or crossed by, the proposed project structures. There are no wetlands immediately upstream or downstream from the project. Construction of the proposed control building, transmission line corridor, and most of the canoe portage would be concentrated around the existing concrete esplanade and lock structure and would not disturb wetland or riparian vegetation. As discussed above, installation of the proposed canoe portage take-out would require clearing of some riparian vegetation for placement of a gravel path and construction of a stone or concrete stairway from the top of the riverbank to the water level. Implementing Condition T-5, T-8.8, and T-8.10 of the certification would ensure that disturbance of riparian vegetation would be minimized during construction. The riprap that Lock 13 Partners proposes to place next to the stairway would stabilize the riverbank and minimize potential erosion after construction.

Operating the project in a run-of-river mode would maintain reservoir levels at the crest of the dam when inflows are less than the maximum hydraulic capacity of the project (i.e., 2,295 cfs). As a result, the average reservoir elevation would be lower and there would be less frequent fluctuations in water levels in riparian wetlands and vegetation adjacent to the project impoundment, but project operation would maintain the same historical minimum and maximum reservoir elevations. The combined outflows from the project turbines and spill over the project dam would not change from the existing flow conditions. Wetland and riparian vegetation along the Kentucky River developed in zones related to the frequency and duration of water depths following the construction and operation of the 14 existing locks and dams. This vegetation is expected to adapt relatively quickly to the minor changes to average elevations during project operation. As a result, operating the project in a run-of-river mode would have minimal effect on the distribution and species composition of these communities.

Effects of Project Construction, Operation, and Maintenance on Wildlife

Project construction, operation and maintenance, and project-related recreation could affect wildlife by creating noise, habitat disturbances, and an increased human presence within the project area. A new transmission line poses electrocution and collision risks for birds and other wildlife and vegetation maintenance along the transmission line corridor could affect birds or other wildlife that may be present during these activities.

Lock 13 Partners proposes to restrict tree removal to the period between November 15 and March 31 to minimize project effects on federally listed bat species, but this measure could also benefit other wildlife. Additionally, to minimize the risk to avian species of electrocution at the project's 12.47 kV overhead transmission line, Lock 13 Partners proposes to: (1) eliminate some exposed energized parts by installing a

pad-mounted, combined main transformer and main breaker; (2) install animal protection guards on any exposed bushings on the pole-mounted auxiliary power transformers; and (3) arrange conductors on the cross arms of the overhead transmission line consistent with APLIC and FWS's Avian Protection Plan Guidelines.

No entity provided comments in response to the Commission's public notice that the application was ready for environmental analysis.

Our Analysis

Project Construction

The areas within the proposed project boundary that would be disturbed during project construction, operation, and maintenance were previously disturbed by lock and dam construction and ongoing maintenance (e.g., mowing), and therefore these areas generally do not provide high quality wildlife habitat. Wildlife in the project vicinity may use the project area while foraging or as travel corridors to access adjacent habitats. Noise or increased human presence associated with construction, operation and maintenance, and recreation activities could interfere with these movements temporarily. Given the diversity and abundance of habitats present within the nearby Daniel Boone National Forest, most wildlife would likely avoid the immediate project area and return when these activities are complete. Species with smaller home ranges or limited mobility would be more susceptible to adverse effects or may be lost during construction activities. However, vegetation removal and other potential habitat disturbances are expected to be minimal and short term.

Revegetating temporarily disturbed areas with native vegetation and removing temporary sediment and erosion control structures (e.g., silt fences) after construction would limit potential adverse effects on wildlife in the project vicinity and allow wildlife to recolonize/use the area. These types of measures are typically included in sediment and erosion control plans. As mentioned above, Condition T-4 of the project certification requires that Lock 13 Partners develop and implement an erosion and sedimentation control plan and Conditions T-5, T-8.4 through T-8.8, and T-8.10 include standard BMPs that would avoid or minimize disturbance to riparian habitats. In addition, Condition T-6 requires that all sediment and erosion control measures be removed after construction when disturbed areas have been successfully revegetated. Removing the sediment and erosion control measures after revegetation would prevent these materials from becoming hazards to wildlife (e.g., ingestion, entanglement).

Transmission Line

Avian electrocutions typically occur on powerlines with voltages less than 60 kV (APLIC, 2006). During low visibility conditions, such as inclement weather, transmission lines can pose a collision risk for flying birds, which could result in injury or mortality. Transmission lines can also pose an electrocution hazard for birds with large

wing spans, large head to foot distances (heights), or that build nests on transmission line poles (APLIC and FWS, 2005).

Lock 13 Partners' proposed 12.47 kV overhead transmission line would begin approximately 50 feet from the proposed control building and extend 600 feet along forest/field edge habitat before interconnecting with the existing Jackson Energy distribution line. By eliminating or covering exposed energized parts and arranging conductors on the cross arms of the overhead transmission line consistent with APLIC[37] standards[38] and FWS's Avian Protection Plan Guidelines, Lock 13 Partners would minimize the potential for wildlife electrocution through project design. Ensuring the overall transmission line design is consistent with APLIC standards and FWS guidelines, and is based on experience maintaining the transmission line at the downstream Mother Ann Lee Project (Lock and Dam No. 7), would help Lock 13 Partners determine the most appropriate devices that could be installed to prevent electrocution. These devices could include perch guards and conductor covers. If needed, Lock 13 Partners could also consider installing devices that minimize the potential for collisions with the transmission lines, such as marker balls, swinging markers and bird flight diverters.

Project Operation

Wetland and riparian communities are adapted to the current frequency and magnitude of reservoir fluctuations. Lock 13 Partners' proposed run-of-river operation would reduce the frequency of reservoir fluctuations, but would also maintain the reservoir elevation at the crest of the dam when the project is operating and preserve the same minimum and maximum reservoir elevations. Given that the magnitude of inundation patterns would be similar to existing conditions, these communities are expected to adapt relatively quickly to the proposed run-of-river project operation. Therefore, the effects of proposed project operation on wildlife that depend on riparian communities are expected to be negligible.

Transmission Line

Although installing avian protection devices on the new transmission facilities would protect birds and other wildlife from electrocution and collision, unanticipated avian/wildlife actions could occur (e.g., nest establishment on the transmission poles after project construction). Lock 13 Partners' proposal lacks a plan for maintaining the devices and adapting avian protection measures to conditions in the field after the project

[37] APLIC, a consortium of utilities, and the FWS, developed guidelines for the design of electrical lines to minimize the potential for electrocutions (APLIC, 2006) and collisions (APLIC, 2012).

[38] APLIC standards include measurements, specifications, and other technical information to design transmission lines with adequate separation between energized and grounded components and hardware.

begins operation. Devices may need to be repaired or modified to account for damage over time. Nest-discouraging devices may be needed on the transmission line poles to further minimize the potential risks of electrocution on birds and other wildlife. The development of an Avian Protection Plan would provide a mechanism for maintaining the devices, training personnel on avian protection measures, and identifying and addressing impacts to birds and other wildlife in a timely manner throughout a license term.

Tree trimming and other vegetation management within the transmission line corridor and project boundary are expected to be infrequent and limited in scope. Limiting tree removal/trimming activities to November 15 to March 31 would avoid inadvertent disturbances or removal of wildlife nests or roosts (e.g., resident and migratory birds, squirrels, bats) while the young are being reared. The proposed animal protection guards would cover energized parts of the transmission line, thereby minimizing the probability of adversely affecting nesting birds or other wildlife during project operation.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

On December 1, 2017, Commission staff used the FWS's ECOS-Information for Planning and Conservation (IPaC) website to generate the following list of threatened and endangered (T&E) species that may be found in the project area or be affected by the Evelyn Project: the threatened northern long-eared bat, Kentucky arrow darter, rabbitsfoot mussel; and the endangered Indiana bat, gray bat, Virginia big-eared bat, and sheepnose and snuffbox mussels (FWS, 2017).[39] In addition, the endangered running buffalo clover was discussed during Lock 13 Partners' joint agency meeting on December 11, 2017, and Lock 13 Partners surveyed the proposed transmission line route for this species and filed the results with its license application. A review of the IPaC system on October 7, 2020, indicated that the endangered, clubshell, fanshell, and purple cat's paw mussels may also be present in the project area, or be affected by the project (FWS, 2020a).[40]

Terrestrial Species

<u>Running Buffalo Clover</u>

Running buffalo clover is a perennial herbaceous species with white flowers and leaves with three leaflets. Runners (i.e., stolons) extend from the base of stems, run along the ground surface, and root at nodes, forming and expanding small clumps. Blooming

[39] The initial IPaC species list for the project was generated on December 1, 2017, and filed on December 6, 2017.

[40] Updated IPaC species lists were filed on October 8, 2020 and February 22, 2021.

from late spring to early summer, this species' 1-inch-wide flowers grow on 2 to 8-inch-long stems and resemble white clover (*Trifolium repens*). Although the pollinators are unknown, *Apis* and *Bombus* bees visit this species. Flowerheads with 20 to 40 flowers can produce 10 to 20 seeds, which is thought to be adequate seed production to maintain the species (Taylor *et al.*, 1994; NatureServe, 2020).

Primarily occurring in the Appalachian and Bluegrass regions of the U.S., the largest running buffalo clover population is in West Virginia and the greatest number of individual populations is in Kentucky. This species was likely dispersed by buffalo historically. It is usually found in mesic habitats (i.e., moderate moisture) with partial to filtered sunlight and periodic disturbances, such as grazing, mowing, trampling, or flood-scouring. Suitable habitat types include mesic woodlands, stream banks, grazed woodlots, mowed paths, old logging roads, trails, fence rows, mowed openings in mature forests, savannahs, sandbars, and steep ravines. While often found in areas with limestone or other calcareous bedrock, it does not require limestone soil (FWS, 2007a). No critical habitat has been designated for this species (FWS, 2020b).

Ongoing threats to this species include road construction and other permanent habitat disturbances, poor dispersal due to a reduction of hooved mammal populations, low genetic diversity, small population size, increased herbivory from rabbits, groundhogs, etc., over-shading after succession of open woodlands or canopy gaps to closed canopy forests, loss of canopy allowing full sun conditions, and competition with non-native invasive plants, such as white clover, Japanese stilt grass, and garlic mustard (NatureServe, 2020). However, in 2019, FWS proposed to delist running buffalo clover, indicating that its threats have been eliminated or reduced so that it no longer meets the definition of an endangered or threatened species under the ESA.[41]

Indiana Bat

Indiana bats are small with fine, fluffy grayish-chestnut fur and blackish brown wing membranes and ears. This species is semi-migratory, hibernating in mines and caves in the winter and roosting in wooded areas during the summer. Typically preying on butterflies, moths, and adult aquatic (flying) insects, Indiana bats forage in riparian areas along rivers and lakes, in upland and floodplain forest canopies, and over ponds and fields (FWS, 2007b). Forested areas are the most important habitat in agricultural landscapes for this species (Menzel *et al.*, 2005).

In late summer, Indiana bats start migrating to hibernacula,[42] with the males arriving first. Suitable hibernacula include underground limestone caves and cave-like structures (e.g., abandoned mines, railroad tunnels), with a wide range of vertical

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[41] *See* 84 Fed. Reg. 44,832-44,841 (August 27, 2019).

[42] Hibernacula are sheltered places, typically caves and mines for bats, that are occupied when these animals are dormant during the winter.

structures, and cool, stable temperatures between 39.2ºF and 46.4ºF, and humidity levels above 74 percent, but below saturation (FWS, 2015a; FWS, 2011b). Bats exhibit a fall swarming behavior, in which large numbers of bats congregate in forest habitat near winter caves entrances for several weeks from September to mid-October to feed, mate, and roost until temperatures drop to a point that forces them into hibernation. After mating, females immediately begin hibernation (usually by late October), and males generally continue swarming after mating to replenish fat reserves prior to hibernation (usually by late November). Females store sperm through hibernation and become pregnant upon emergence in late March or early April. Males emerge shortly afterward and either remain at the hibernaculum in a bachelor colony or disperse to summer colony sites. During this spring emergence (i.e., about April 1 to May 14), Indiana bats forage in their swarming habitat and then migrate to their respective summer ranges. Primarily adult males use this swarming area year-round. The proposed project is located within known Indiana bat swarming habitat.[43]

Females form maternity colonies with an average of 50 to 80 adults, roosting in hollow trees, under loose bark, or in cracks or holes in mature oaks, hickories, elms, and maples, as well as ash, cottonwood, pine, and hemlocks in riparian or upland forests (FWS, 2007b). In June or early July, females give birth to a single pup, which is capable of flight within about one month of birth (NatureServe, 2020). Suitable summer habitat includes a variety of forested/wooded areas where the bats roost, forage, and travel (FWS, 2015a; FWS, 2011b), like forested blocks and corridors with variable amounts of canopy closure, such as fencerows and riparian forests. Isolated live or dead trees may provide summer roosting habitat if they have a diameter at breast height (dbh) of 5 inches or greater and exfoliating bark, crevices, or cracks. Dead or dying trees of 16 inches dbh or greater are considered optimal for maternity colony roosts. While fidelity of female Indiana bats to summer roosting trees has been documented, a tree may only provide suitable habitat for a few years. Successful maternity colonies may form in different suitable trees in subsequent years, if available (FWS, 2007b).

Historically, Indiana bats ranged throughout much of the eastern half of the U.S. Large hibernating populations occur in Indiana, Virginia, Missouri, and Kentucky (FWS, 2007b). FWS designated critical habitat for Indiana bats in 11 caves and 2 mines in 6 states, including critical habitat in caves in Carter and Edmonson Counties, Kentucky.[44] The proposed project site does not contain, and is not located near, critical habitat for Indiana bats (FWS, 2020a).

Habitat loss and degradation, forest fragmentation, winter disturbance, and environmental contaminants are among the most significant range-wide threats to Indiana

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[43] *See* FWS's January 30, 2018 Letter filing scoping comments for the Evelyn Project (FWS's January 30, 2018 Letter).

[44] 42 Fed. Reg. 47,840-47,841 (September 22, 1977).

bats. However, more recently white-nose syndrome,[45] non-native invasive species, climate change, and wind turbines have also become significant threats to the recovery of this species (FWS, 2019a). In addition, 85 percent of the total population hibernates in 7 of the caves designated as critical habitat and 50 percent in 2 caves. The concentration of the population in so few places makes this species extremely vulnerable to adverse impacts during the winter (FWS, 2007b).

Northern Long-Eared Bat

Northern long-eared bats are a medium-sized migratory bat species with longer ears (average 0.7 inches) than other *Myotis* species. They use high frequency echolocation[46] to hunt moths, beetles, spiders, flies, and leafhoppers primarily between the understory and canopy in forested areas, but also in more open areas, such as forest clearings, over water bodies, and along roads starting at dusk. During the winter, small groups of northern long-eared bats typically hibernate in cracks and crevices in the walls or ceilings of caves or abandoned mines with high humidity, cool temperatures, and no air currents, but this species has also been observed hibernating in buildings, railroad tunnels, and other human-made structures. Every two to three days during the summer, individuals or colonies switch roosts, which can include a wide variety of live and dead tree species and sizes (i.e., typically with 3 inches dbh or greater), as well as the nooks and crannies of human-made structures (FWS, 2016a). Northern long-eared bats breed from late July to October, females store sperm during hibernation, delaying fertilization (of a single egg) until ovulation during the spring. Typically born between late May and July, pups are raised in maternity colonies of 30 to 60 individuals,[47] and are most vulnerable to disturbances at maternal roosts before they learn to fly,[48] from 18 to 21 days after birth.[49]

Although the northern long-eared bat range includes much of the eastern and north central U.S. and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia, its distribution is patchy and historically has been observed more frequently in the northeastern U.S. and in Quebec and Ontario, Canada. Populations in southern Canada and east of the Mississippi River have declined sharply since the spread of white-nose syndrome. Recent surveys in upland areas indicate that this species is more common in the Tennessee, Kentucky, Arkansas, and Missouri parts of its range than previously thought (NatureServe, 2020). The proposed project area includes known

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[45] White-nose syndrome is a disease caused by a white fungus (i.e., *Pseudogymnoascus destructans*) that infects the muzzle and other parts of bats, and is associated with high mortality rates of 12 cave-hibernating bat species (FWS, 2019b).

[46] Echolocation is a technique that bats use to detect their surroundings by emitting high-pitched sounds that reflect off objects back to the animals' ears.

[47] *See* 78 Fed. Reg. 61,046 (October 2, 2013).

[48] *See* 80 Fed. Reg. 2,371 (January 16, 2015).

[49] *Supra* note 44.

northern long-eared bat swarming and summer habitat[50] and one or more hibernacula are known to occur in Lee County, Kentucky (FWS and Kentucky DFWR, 2017).

The primary threat to northern long-eared bats is white-nose syndrome (FWS, 2014). Other threats to northern long-eared bats include: a) changes to hibernacula openings that restrict movement or change the microclimate; b) blasting, drilling, and other noises that disturb bats during hibernation; c) clearing trees that are used for staging or swarming habitat or as maternity roosts; d) burning that allows smoke to pass through roost trees (spring through fall) or enter hibernacula during the winter; e) changes to water resources entering hibernacula or used for drinking or foraging habitat; and f) exposure to pesticides and herbicides. Critical habitat has not been designated for northern long-eared bats (FWS, 2020d).

Gray Bat

Gray bats are small migratory species with chestnut brown to russet dorsal fur, except after the summer molt when their fur is gray. Gray bats roost, breed, rear young, and hibernate in caves, migrating between summer and winter caves and using transient caves along the way. Hibernacula caves must have an average temperature ranging from 42 to 52°F (Kentucky DFWR, 2014a) and most have deep vertical passages and large rooms that function as cold air traps. During summer, maternity colonies roost in caves with temperature ranging between about 57 and 77°F in small rooms or domes that trap the bats' body heat (Kentucky DFWR, 2014a).

Similar to Indiana and northern long-eared bats, gray bats swarm and mate upon arrival at the winter caves (September through early November), females immediately begin hibernation, and then males forage for several weeks longer to replenish fat reserves that must last for six to seven months during hibernation. Most juveniles and adult males are in hibernation by early November. Adult females become pregnant soon after emerging from hibernation in late March or early April. Most juveniles and adult males leave hibernacula between mid-April and mid-May. Each summer colony occupies a home range that often contains several roosting caves scattered along as much as about 43 miles of river or reservoir borders. Gray bats are extremely loyal to their colony home range, but tend to disperse among several different caves within that area. In late May or early June, reproductively active females congregate in a single maternity cave to give birth to a single pup. Most pups begin to fly within 20 to 25 days after birth. Males and non-reproductive females congregate in smaller groups in nearby caves.

Gray bats eat a variety of flying insects present along streams, rivers, and lakes. Except for brief periods of inclement weather in early spring and possibly late fall, adults forage almost exclusively over water along river or reservoir edges with forested riparian zones. Females in maternity colonies may forage 12 miles or more from their roost.

[50] FWS's January 30, 2018 Letter.

However, summer caves, especially those used by maternity colonies, are nearly always located within about a half a mile of rivers or reservoirs (rarely more than 2.5 miles).

Gray bats range from southern Illinois and Indiana, south to north-western Florida and from the Appalachians to eastern Oklahoma. Although there are scattered records from caves across Kentucky, this species is known to occur primarily in the south-central portion of the state with major hibernacula located in Edmonson County (Kentucky DFWR, 2014a). About 95 percent of the entire known population hibernates in 9 caves, with more than half in a single cave (Tuttle, 1979). Given their high fidelity to particular caves, gray bats are very susceptible to disturbance (NatureServe, 2020). Arousing bats during hibernation can deplete their energy stores before food becomes available and human disturbance of maternity colonies in June and July can lead to mortality if fleeing females drop their flightless young (FWS, 1997a). Ongoing threats include human disturbances to preferred caves, white-nose syndrome, reduction in prey species and/or potential poisoning associated with insecticide and pesticide use near riparian areas where bats forage, deforestation, and impoundments that flood caves (NatureServe, 2020). Critical habitat has not been designated for this species (FWS, 2020e).

Virginia Big-Eared Bat

Virginia big-eared bats are medium-sized (i.e. ranging from 3.5 to 4.4 inches long, and weighing under half an ounce), non-migratory bats, with elongated nostrils and large ears that are joined across the forehead, coiling slightly when bats are at rest (Virginia Department of Game and Inland Fisheries, 2020). Suitable habitat includes karst areas with limestone caves and forests dominated by mature hardwood oak, hickory, beech, maple, and hemlock trees (Matthews and Moseley, 1990). Foraging, primarily for moths and butterflies, occurs over fields and a variety of edge and woody habitats along streams with mostly closed canopies.

Virginia big-eared bats hibernate in tight clusters near the entrances of well-ventilated caves where temperatures range from 32 to 54°F (Kentucky DFWR, 2020). Males and females hibernate together in colonies that can range from a single individual to several thousand animals. They roost pendant-like, on open surfaces, making them readily detectable when present (commonly in low numbers) in caves and abandoned mines throughout their range (FWS, 1984).

Virginia big-eared bats are considered to be relatively sedentary compared to other bats, rarely travelling more than about 39 miles between hibernacula and maternity caves (Matthews and Moseley, 1990). Dispersal from natal ranges appears to primarily be done by males, while females exhibit site loyalty. Between March and June hibernation ends, females become pregnant upon emergence from hibernacula, the bats disperse to summer caves where maternity colonies form, and a single pup per female is born between May and July. Pups grow rapidly, are capable of flight within 2.5 to 3 weeks, and are fully weaned by 6 weeks. Summer maternity colonies can include several hundred individuals.

Distribution of Virginia big-eared bats is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. Population centers are known to occur in areas dominated by exposed, cavity forming rock and/or in historic mining districts. This species is found in isolated populations in western North Carolina, eastern Tennessee, southwestern Virginia, eastern Kentucky, and southern West Virginia (FWS, 2011a). FWS designated five caves in West Virginia as critical habitat for Virginia big-eared bats.[51] In addition, there are 11 counties in Eastern Kentucky with records of Virginia big-eared bat (Kentucky DFWR, 2014b). While the proposed project site does not contain critical habitat for this species (FWS, 2020f), there is one known (cave) hibernaculum in Lee County, Kentucky, within about 4 miles of Lock and Dam No. 13, which supports a population of 4,000 to 5,000 individuals. FWS did not designate this cave as critical habitat, to avoid encouraging increased public use and disturbance of the bats.[52]

Virginia big-eared bats are very intolerant of disturbances in both summer and winter. Spelunking and other human disturbance of hibernacula and maternity colonies are probably the largest ongoing factor in the decline of this species. Arousal of hibernating bats, vandalism, natural disaster, and disturbance of maternity colonies can result in significant mortality of adults and juveniles because bats deplete energy reserves to avoid disturbances. After frequent disturbance, bats may abandon preferred caves and search for other suitable habitat (NatureServe, 2020).

Aquatic Species

Kentucky Arrow Darter

Kentucky arrow darters are large darters (4.6 inches long) with a slender body, elongated snout, large mouth, and virtually scaleless head (FWS, 2015b). This species is found in pools or transitional areas between riffles and pools (runs and glides) in moderate- to high-gradient, first to third order streams, with 60 percent of known populations occurring in second order streams, draining an area of 7.7 square miles or less. Individuals are usually associated with bedrock, boulder, and cobble substrates and occasionally observed around woody debris.

The historical distribution of Kentucky arrow darters is limited to the upper Kentucky River system in eastern Kentucky. Kentucky arrow darters are known, or believed to have inhabited the following counties of Kentucky: Breathitt, Clay, Harlan, Jackson, Knott, Lee, Leslie, Owsley, Perry, and Wolfe (FWS, 2016b). Ongoing threats to this species include degraded water quality as a result of surface coal mining, oil and gas exploration, and removal of riparian vegetation, as well as increased siltation associated

[51] 44 Fed. Reg. 69,206-69,208 (November 30, 1979).
[52] *Id.*

with poor mining practices, logging, and agriculture (FWS, 2015b). The proposed project is located outside of designated critical habitat for this species (FWS, 2020g).[53]

Sheepnose Mussel

Sheepnose mussel is a medium-sized freshwater mussel with a smooth, shiny, and light yellow to yellowish-brown shell with dark concentric ridges (FWS, 2012a). This species typically occurs in shallow areas, ranging from a few inches to two feet deep, in large rivers and streams with moderate to swift currents over coarse sand and gravel (Oesch, 1984). They are also occasionally found in areas of mud, cobble, and boulders, and in deep runs of large rivers (Parmalee and Bogan, 1998). Documented fish hosts include sauger and central stoneroller, though numerous other potential fish hosts exist (NatureServe, 2020).

Although sheepnose is found throughout the Midwest and Southeast, it has been eliminated from two-thirds of the streams from which it was historically found (FWS, 2012a). Most existing populations, located in Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin, are small and geographically isolated, making this species vulnerable to catastrophic events and limiting reproductive ability without human assistance (FWS, 2012a). Primary threats to this species include habitat destruction and alteration as a result of dams and channelization, reductions in water quality due to pollution, and invasive species. Critical habitat has not been designated for this species (FWS, 2020h).

Snuffbox Mussel

Snuffbox mussel is a small to medium-sized freshwater mussel with a yellow, green, or brown shell with green rays, blotches, or chevron-shaped[54] lines (FWS, 2018). This species typically occurs in the swift currents of riffles and shoals in small to large rivers and wave-washed shores of lakes over gravel and sand (FWS, 2018). Individuals generally burrow deep into the substrate, except when spawning or attempting to attract a fish host (Parmalee and Bogan, 1998). Documented fish hosts that are known to occur in the Kentucky River include banded sculpin and logperch (NatureServe, 2020).

Historically, the snuffbox occurred in 210 streams and lakes in 18 states and Ontario, Canada (FWS, 2012b). However, this species has been eliminated from about 61 percent of the streams. Currently, the snuffbox is found in Alabama, Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin, and Ontario, Canada. Most populations

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[53] 81 Fed. Reg. 69,312-69,363 (October 5, 2016).

[54] Chevrons have an inverted V-shape and many chevrons placed together form a zig-zag pattern.

are small and geographically isolated from one another (FWS, 2012b). The decline in occupied range and habitat fragmentation is largely a result of modification and destruction of river and stream habitats through impoundment construction. Ongoing threats to this species include water quality degradation from point and non-point sources including agricultural runoff, municipal effluents, industrial sources, and spills (FWS, 2012b). No critical habitat has been designated for this species (FWS, 2020i).

Clubshell

Clubshell is a small to medium-sized freshwater mussel with a yellow to brown shell containing prominent green, blotchy, rays (Cummings and Mayer, 1992). This species inhabits small to medium rivers in clean gravel or loose sand substrates (FWS, 1997b). Potential fish hosts known to occur in the Kentucky River include striped shiner, blackside darter, central stoneroller, and logperch (NatureServe, 2020).

Clubshell was historically found in Alabama, Illinois, Indiana, Kentucky, Michigan, New York, Ohio, Pennsylvania, Tennessee, and West Virginia (FWS, 2019c). Of 100 streams once known to be inhabited, 19 streams are thought to contain 11 existing populations located in Indiana, Ohio, Michigan, Pennsylvania, West Virginia, and Kentucky (FWS, 2019c). Sedimentation as a result of land development, reduced water quality, industrial pollution, and slower velocities in, and maintenance of, extensive impoundments for navigation are some of the main ongoing threats to this species (FWS, 1997b). Critical habitat has not been designated for this species (FWS, 2020j).

Fanshell

Fanshell is a medium-sized freshwater mussel with a light green or yellow shell and a pattern of dark green rays with numerous broken lines or dots (Cummings and Mayer, 1992). This species inhabits sand or gravel substrates in medium to large rivers and is often found in deeper waters with moderate current (FWS, 1997c). Documented fish hosts known to occur in the Kentucky River include banded sculpin, greenside darter, mottled sculpin, banded darter, blotchside logperch, and logperch (NatureServe, 2020).

Historically, fanshell was found in the Ohio River and many of its large tributaries in Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Kentucky, Tennessee, Alabama, and Virginia. Reproductively viable populations are now believed to be restricted to the Clinch River (Tennessee and Virginia), the Green River, and Licking River (Kentucky) (FWS, 2019d). Ongoing threats to this species include the construction of impoundments and navigation facilities, dredging for channel maintenance, sand and gravel mining, and water pollution (FWS, 2019d). Critical habitat has not been designated for this species (FWS, 2020k).

Purple Cat's Paw

Purple cat's paw is a medium-sized freshwater mussel with a smooth and shiny rectangular-shaped shell containing distinct growth lines, fine wavy green rays, and a smooth and shiny surface that is yellowish green to brown in color (FWS, 1992). The inside of the shell is shiny and purple. This species is found in shallow to medium depths of large rivers with moderate current and stable, undisturbed, sand to boulder substrates (FWS, 1992). Known fish hosts that occur in the Kentucky River include rock bass, mottled sculpin, greenside darter, stonecat, logperch, and blackside darter (NatureServe, 2020).

Purple cat's paw was historically found in the Ohio, Cumberland, and Tennessee River systems in Ohio, Illinois, Indiana, Kentucky, Tennessee, and Alabama (FWS, 2020b). Currently, this species occurs in the Ohio River, four of its tributaries (Killbuck Creek and Walhonding River in Ohio; and Green River and Licking River in Kentucky), and one Tennessee River tributary (Duck River, Tennessee) (FWS, 2020b). Excluding the Killbuck Creek population, all populations are the result of reintroduction efforts during 2017 (FWS, 2020o). Ongoing threats to this species survival include small, isolated, population sizes, habitat destruction and alteration as a result of dams, reductions in water quality due to pollution, and invasive species. Critical habitat has not been designated for this species (FWS, 2020l).

Rabbitsfoot

Rabbitsfoot is a medium-sized to large freshwater mussel with a shell containing large, rounded, low bumps, and a smooth and yellowish to greenish color pattern with dark green or nearly black chevrons and triangles (FWS, 2009). This species is found in small to medium-sized rivers of moderate current with clean, shallow, water and a mixture of sand and gravel substrates (USDA, 2002). Known fish hosts that occur in the Kentucky River include spotfin shiner and bigeye chub (NatureServe, 2020).

Historically, rabbitsfoot was a wide-ranging species, known from 139 streams in 15 states (FWS, 2009). Populations persist in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee. However, the total range and population have been reduced by more than 90 percent and only 10 of the remaining populations are considered to be large enough for long-term survival (FWS, 2009). The small size and isolated nature of existing populations makes this species vulnerable to catastrophic events. Ongoing threats to the rabbitsfoot include habitat destruction and alteration as a result of dams and channelization, reductions in water quality due to pollution, and invasive species. The

proposed project is located outside of designated critical habitat for this species (FWS, 2020m).[55]

3.3.4.2 Environmental Effects

Construction, operation, and maintenance of the proposed project, including recreation features, could affect T&E species, such as bats, plants, and freshwater mussels, if they are present. Vegetation clearing could result in the removal of suitable maternity roost trees and/or disturbance of bats, and loss of adults and young if roost trees are occupied. If unidentified caves or cave-like features are present, construction and maintenance activities could also disturb roosting bats or prevent access to winter habitat. Removal or disturbance of riparian vegetation could also increase downstream sedimentation by altering shoreline stability, which can alter water quality and aquatic habitat, creating poor conditions for the reproduction and survival freshwater mussels and their fish hosts. Hydropower operation can change the natural hydroperiod of rivers, leading to inundation and dewatering of littoral (nearshore) habitat in the impoundment, increased retention time of water in the impoundment, higher water temperatures and lower DO concentrations, and altered flow fluctuations downstream of the dam (i.e., dewatering and/or scouring aquatic habitat).

Lock 13 Partners proposes to operate the project in a run-of-river mode, with outflows approximating inflows. A portion of the water that is currently flowing over the spillway would be diverted through the project turbines, returning flows to the river through the existing lock chamber. Any inflow in excess of the maximum hydraulic capacity of the project would pass over the spillway, as occurs under existing conditions. To minimize potential project effects on listed species, Lock 13 Partners proposes to 1) mark and avoid running buffalo clover, if present, during transmission line construction; 2) avoid disturbing bat swarming and roosting habitat; and 3) limit tree removal to between November 15 and March 31.

No entity provided comments regarding federally listed species in response to the Commission's public notice that the application was ready for environmental analysis. However, on January 30, 2018, FWS indicated that of the T&E species identified in the Commission's SD1 (issued on January 9, 2018), only Indiana bat, gray bat, Virginia big-eared bat, northern long-eared bat, and snuffbox mussel may be affected by the proposed project. FWS stated that the Kentucky arrow darter, rabbitsfoot, and sheepnose are unlikely to occur in the project area based on site-specific habitat information provided by Lock 13 Partners and FWS's T&E species occurrence data. FWS recognizes that Lock 13 Partners is willing to survey for running buffalo clover and mark and avoid the species, if found, but does not believe that suitable habitat for this species occurs in the

[55] 80 Fed. Reg. 24,692-24,774 (April 30, 2015).

project area. Subsequently, the endangered clubshell, sheepnose, and fanshell mussels were included on the updated IPaC species list (FWS, 2020a).

Our Analysis

Running Buffalo Clover

Riparian areas, stream terraces, and woodlands, which are known to be suitable habitats for running buffalo clover, occur within the project boundary. Construction of the proposed project transmission line would require some minor vegetation removal and ground disturbance for new wooden pole installation. Lock 13 Partners surveyed this corridor and did not observe any running buffalo clover or suitable habitat for this species. The majority of this area contains a high density of invasive species and does not have periodic disturbances (e.g., mowing or grazing) or the filtered light conditions that running buffalo clover requires for growth and survival. Similarly, the roadside woodlot, where the proposed project transmission line would intersect with the Jackson Energy distribution line, is fully shaded and lacks periodic disturbances. However, the numbers of rooted crowns in any given sub-population of this species can vary widely over time, including within a growing season (NatureServe, 2020). Therefore, Lock 13 Partners' proposal to mark and avoid running buffalo clover during construction of the proposed transmission line would minimize the chance of adversely affecting any previously dormant or unidentified populations during transmission line installation.

Lock 13 Partners' running buffalo clover survey did not include the rest of the project area. Construction of the proposed recreation amenities would also involve some minor vegetation removal and ground disturbance. The majority of the proposed recreational features would use existing facilities (e.g., boat ramp) or be constructed on open (full sun) areas that are unsuitable for running buffalo clover. However, the proposed canoe portage would require the installation of new gravel walkways where there are no existing roads, and new concrete steps on the riverbank for the canoe take-out where filtered light through riparian vegetation occurs. To avoid or minimize the potential effects of canoe portage construction and recreational use on running buffalo clover, Lock 13 Partners could expand its proposed pre-construction survey and avoidance measures to include the canoe portage route and take-out area. If any running buffalo clover plants are found during the surveys, Lock 13 Partners could avoid them by repositioning the canoe portage route and/or the take-out steps.

Run-of-river operation would not affect any running buffalo clover plants that may be growing along the banks of pool 13 or downstream from the project because reservoir elevations would be stable (i.e., maintained at the crest of the spillway during project operation) and would not change the historical magnitude of reservoir fluctuations or total downstream flow. While mowing around the lock and dam may result in periodic disturbances that could favor running buffalo clover, the previously disturbed and open,

full-sun conditions in this portion of the project area would likely prevent it from being suitable habitat for this species.

Based on the above analysis, licensing the project, with a pre-construction survey of both the transmission line corridor, canoe portage and take-out area, and if running buffalo clover are observed, implementing the proposed avoidance measures, is not likely to adversely affect running buffalo clover.

Bats

During pre-filing, at FWS's recommendation, Lock 13 Partners conducted surveys to determine if suitable habitat for federally listed bat species (e.g., cliff-line, caves, or cave-like features) occurs within the project area, and to evaluate any potential project effects on these species. Winter habitat was not found for any of the four federally listed bat species potentially occurring within the project area. In addition, no suitable summer caves or cave-like features for gray and Virginia big-eared bats were observed. Summer roosting habitat for Indiana bat and northern long-eared bat was documented, but it ranged from none to poor quality. Suitable travel and foraging habitat for these bat species were identified along the riparian zone of the Kentucky River and the disturbed grassland located along the northwest portion of the project boundary.

Indiana Bat

The proposed project is located within known swarming habitat and is in close proximity to the Danielle Boone National Forest, which contains both summer and winter habitat for Indiana bats. As a result, any loss of trees within the project area would remove habitat for travelling and foraging bats. Project construction would take place on previously cleared land that has been maintained in an open condition, and therefore Lock 13 Partners does not propose tree trimming or clearing, blasting, or herbicide application. Should tree removal or trimming become necessary (e.g., removal of hazardous trees or along the proposed canoe portage or transmission line corridor), Lock 13 Partners' proposal to limit those activities to the period between November 15 and March 31 would prevent disturbing, harming, or killing Indiana bats because any undocumented summer roost trees would not be occupied during this period.

Because no suitable winter habitat was identified within the project area and no tree removal is expected during project construction, operation, or maintenance, direct effects on Indiana bats and their habitat are not expected. Further, indirect effects as a result of disturbance and removal or modification of swarming habitat are unlikely because no caves or cave-like features were identified within the project area and no tree removal or blasting is anticipated. Implementing certification Conditions T-5, T-8.8, and T-8.10 would minimize disturbances to riparian vegetation, and thereby ensure that project activities would have only minor and temporary effects on the travel and foraging corridors that were identified within the project area (Kentucky DEP, 2020). Based on

the above analysis, licensing the proposed project is not likely to adversely affect Indiana bats.

Northern Long-Eared Bat

The project is located within an area identified by FWS as the "white-nose syndrome zone," which encompasses the majority of the U.S. portion of the northern long-eared bat range. In addition, Lee County, Kentucky, is among many counties identified as having hibernacula infected with the fungus that causes white-nose syndrome (FWS, 2020n). Under FWS's January 14, 2016 final 4(d) rule for northern long-eared bats, incidental take[56] of this species within the white-nose syndrome zone is prohibited only if: (1) actions result in the incidental take of northern long-eared bats in hibernacula; (2) actions result in the incidental take of northern long-eared bats by altering a known hibernaculum's entrance or interior environment if the alteration impairs an essential behavioral pattern, including sheltering this species; or (3) tree-removal[57] results in the incidental take of this species when the activity either occurs within 0.25 mile of a known hibernaculum, or cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree, during the pup season (i.e., June 1 through July 30). Incidental take attributable to removal or management of hazardous trees or the protection of human life or property is not prohibited. FWS recommends that these activities be conducted during the winter, wherever possible, to protect potential northern long-eared bat roosts. To protect known northern long-eared bat maternity roosts and hibernacula during tree-removal activities, FWS recommends the following two conservation measures: (1) apply a 0.25 mile buffer around known, occupied hibernacula; and (2) do not cut or destroy known, occupied maternity roost trees, or any other trees within a 150-foot radius around the maternity roost tree, during the pup season.[58]

As discussed above for Indiana bat, suitable summer roosting habitat within the project boundary is limited and no winter habitat for northern long-eared bat was identified. In addition, there are no known occupied northern long-eared bat hibernacula within 0.25-mile, and there are no known maternity roost trees within 150 feet of the project boundary. Project construction would occur on land that has been previously cleared and maintained in an open condition; and therefore, no tree trimming or clearing, blasting, or herbicide application is anticipated. Vegetation clearing would be minimized

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[56] "Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct." "Incidental take" is defined as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, an otherwise lawful activity." 81 Fed. Reg. 1900-01 (January 14, 2016).

[57] FWS defines "tree removal" as "cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation likely to be used by northern long-eared bats." *Id.*

[58] *Id.*

and likely limited to herbaceous species and woody stems less than 3 inches dbh that would not provide suitable summer roosting habitat for northern long-eared bat. Unexpected tree trimming or removal would likely be limited to emergency removal of hazardous trees. Lock 13 Partners' proposal to limit tree trimming activities to winter months, between November 15 and March 31, would avoid spring and fall swarming and maternity/summer roosting periods. Implementing this measure would prevent disturbing, directly harming, or killing northern long-eared bats because bats would be dormant (hibernating) during this time.

As discussed for Indiana bats, because no suitable winter habitat was identified within the project area and no tree removal or blasting is expected during project construction, operation, or maintenance, direct effects on northern long-eared bats and their habitat are not expected. Finally, implementing certification Conditions T-5, T-8.8, and T-8.10 would minimize disturbance of riparian vegetation and thereby ensure that project activities would have only minor and temporary effects on the travel and foraging corridors that were identified within the project area (Kentucky DEP, 2020). Based on the above analysis, licensing the proposed project may affect the northern-long eared bat, but would not result in prohibited incidental take of this species under the 4(d) rule.

Gray Bat and Virginia Big-Eared Bat

Gray bats and Virginia big-eared bats are known to occur within Lee County, Kentucky, and FWS stated that Virginia big-eared bats and gray bats have the potential to use the project area for roosting and foraging.[59] Gray bats typically forage in riparian and stream corridors, while Virginia big-eared bats tend to forage along forest edges. While suitable traveling and foraging habitat for gray or Virginia big-eared bats occur within the project boundary, no suitable caves or cave-like features for these species summer or winter habitat were identified during Lock 13 Partners' survey of bat habitat in the project area (Kentucky DFWR, 2017a; Kentucky DFWR, 2017b). Therefore, project construction, maintenance, and operation would not adversely affect cave roosting habitat for gray bats or Virginia big-eared bats. The effects of project construction on riparian habitat are expected to be temporary and negligible, but they could result in minor effects to suitable travel or foraging corridors for gray bat and/or Virginia big-eared bat. Implementing certification Conditions T-5, T-8.8, and T-8.10 would minimize disturbance of riparian vegetation and thereby ensure that project activities would have only minor and temporary effects on the travel or foraging corridors that were identified within the project area (Kentucky DEP, 2020). Based on the above analysis, licensing the proposed project is not likely to affect the gray bat or Virginia big-eared bat. The project would also have no effect on the Virginia big-eared bat's designated critical habitat because it is located outside of Kentucky.

[59] *See* FWS's January 30, 2018 Letter.

Kentucky Arrow Darter

The Kentucky arrow darter is typically found in small, high gradient tributaries to the Kentucky River that would not be affected by project construction or operation. Although Kentucky arrow darters could be found in the project vicinity, the slow-moving, deep pool habitat created by pool 13 and other existing dams within the Kentucky River makes it unlikely that individuals would be found within the area affected by the proposed project. Therefore, the project would have no effect on the Kentucky arrow darter.

Freshwater Mussels

Per a recommendation by FWS, Lock 13 Partners conducted a qualitative survey of freshwater mussel habitat within the Lock No. 13 chamber and about 1,100 feet downstream of the lock chamber to evaluate potential project effects on federally listed mussels. Although mussel populations were not surveyed, fresh shells of three mussel species, including one fatmucket (*Lampsilis siliquoidea*), two pink heelsplitters (*Potamilus alatus*), and half a valve of a hickory nut (*Obovaria subrotunda*) were observed incidentally during the mussel habitat survey in the vicinity of the existing boat ramp downstream from Lock and Dam No. 13. Substrate documented within the lock chamber is concrete. A small area downstream of the lock chamber and a larger area immediately downstream from the dam spillway are heavily scoured, and unsuitable for mussels. However, sand and gravel deposits are present in a zone from about 200 feet downstream from the lock chamber to about 300 feet downstream of the boat ramp, which is where the mussel shells were found.

Given that construction of the powerhouse would occur entirely within the existing concrete lock chamber and would not involve disturbance or suspension of sediment, these construction activities would not adversely affect downstream mussel habitat. Although construction of the upstream canoe portage stairway (take-out point) has the potential to disturb a small amount of riparian vegetation and temporarily affect bank stability, implementation of Conditions T-4, T-5, T-8.4, T-8.8, and T-8.10 of the certification issued by the Kentucky Division of Water would minimize the re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation (Kentucky DEP, 2020). As a result, erosion and sedimentation associated with the construction of the upstream canoe portage take-out stairway is expected to be negligible. Additionally, Lock 13 Partners proposes to install riprap on the bank along the stairway, which would minimize erosion of the banks and sedimentation downstream during project operation.

Under the proposed run-of-river operation, flows over the spillway would be diverted through the powerhouse in the lock chamber and would likely shift/redistribute some of the existing sand and gravel substrates downstream from the lock. However, the quantity of flow through the project area and wetted perimeter downstream from the project would not change. Therefore, diversion of flows through the new powerhouse in

the lock chamber is expected to result in only minor shifts in these substrate deposits and scoured areas and maintain the current downstream extent of these effects. After the initial shifts in substrates from the lock chamber side of the river, sand and gravel deposits would likely accumulate within the existing larger scoured area downstream from the spillway, and could eventually provide suitable habitat for mussels during a license term. Minor shifts in the existing sand and gravel substrates and the long-term accumulation of these types of substrates downstream from the spillway after project operation could result in no net-loss, or a small increase, in potential mussel habitat downstream from the dam. Therefore, the project is not expected to further degrade existing aquatic habitat, including stream substrates.

While no live mussels (including federally listed mussels) were found during Lock 13 Partners' mussel habitat survey and no federally listed mussel species are known to occur in the project-affected area, the survey methods did not include collecting data on existing mussel populations. In addition, as described in section 3.3.4.1 above, known fish hosts for sheepnose, snuffbox, clubshell, fanshell, purple cat's paw, and rabbitsfoot occur in the Kentucky River. These fish hosts may have dispersed listed mussel species to suitable habitat downstream from the project that were not detected during Lock 13 Partners' substrate survey. Therefore, it is undetermined whether or not any federally listed mussel species occur within the project-affected area downstream from the dam. Based on the above analysis, the construction and operation of the proposed project are not likely to adversely affect the federally listed sheepnose, snuffbox, clubshell, fanshell, purple cat's paw, and rabbitsfoot freshwater mussels.

3.3.5 Recreation and Land Use

3.3.5.1 Affected Environment

Regional Recreation

According to the Kentucky State Comprehensive Outdoor Recreation Plan, the Kentucky River corridor is a unique recreation, scenic, and historic resource of statewide significance (Kentucky DLG, 2019). Historically managed for barge traffic, the KRA now manages the river for water supply and recreation (KRA, 2020a). Lock Nos. 1, 2, 3, and 4 are operated on a seasonal schedule for recreation, and small motorized boats, canoes, and kayaks are able to recreationally navigate the river using the locks (KRA, 2020b). The Kentucky River is popular among visitors because of its excellent recreational boating, fishing, and scenic resources.

Since 2012, the National Park Service (NPS), in conjunction with the Commonwealth of Kentucky, local governments, and the Kentucky Riverkeeper (collectively the Kentucky Water Trail partners), has developed plans for improving river access for recreational boating and interpreting the ecology and cultural history along the Kentucky River as part of the Kentucky River Water Trail system (Interior, 2012).

Currently, the most intensely developed recreation areas occur downstream from the proposed project, near populated areas like Frankfort, Kentucky (KRA, 2014b).

The Kentucky River basin provides diverse fishing opportunities, ranging from cold-water trout fishing in its tributaries to plentiful warm-water fishing in the mainstem. In most years, anglers can expect quality populations of catfish, black bass, white bass, hybrid striped bass, drum, crappie, sauger, and muskellunge. Natural populations are supported by periodic stocking. Land-based recreation opportunities, such as camping, hiking, biking, horseback riding, and hunting, are also widely available in the region, including at the Daniel Boone National Forest, and at various state parks and recreation areas. Local parks provide additional recreation resources.

Recreation at the Proposed Project

In the 1990s, the Corps permanently closed the lock structure at Lock and Dam No. 13 by constructing a concrete cut-off wall in the lock chamber and sealing the lock-filling valves (KRA, 2020c). With the lock closed, the river at Lock and Dam No. 13 is not passable by boat, and no portage is provided for recreational boaters.

There is an existing boat launch downstream of Lock and Dam No. 13, which provides access to Pool 12, and is maintained by Lee County under an agreement with the KRA (KRA, 2014b). The launch is suitable for boats less than 20 feet in length (KRA, 2014a). KRA maintains boat exclusion buoys 300 feet above and 150 feet below the dam to protect boaters (KRA, 2011). The upland area around the lock and dam is closed to the public and no trespassing signs are posted. Lock and Dam No. 13 is the most remote and difficult to access of all of the Kentucky River locks and dams.

Land Use

The proposed project is located in a remote, rural area where land use is predominantly agricultural (i.e., cropland and pastureland) with large patches of mixed and evergreen forests. The project is located on non-federal land within the proclamation boundary of Daniel Boone National Forest (USDA Forest Service, 2020). Beattyville, the county seat and largest city in Lee County, is about 22 miles or a 45-minute drive from the project location.

3.3.5.2 Environmental Effects

Recreation Enhancements and Public Access

Lock 13 Partners proposes to implement a recreation plan, filed October 27, 2020, to guide the development, operation, and maintenance of recreation facilities at the project. The recreation plan was developed in consultation with Kentucky DFWR, KRA, Lee County, and Kentucky Riverkeeper. The plan includes a construction schedule,

conceptual drawings, signage, and discussion of how Lock 13 Partners would operate and maintain the recreation facilities at the Evelyn Project.

Under the plan, Lock 13 Partners would provide designated bank fishing access, a canoe portage, picnic tables, and a composting toilet. Lock 13 Partners would also improve the existing gravel drive and parking area for recreation use. The canoe portage would include new stairs from the upstream take-out, and an approximately 1,750-foot-long gravel path around the project facilities, leading to a downstream put-in at the existing Lock 13 boat launch. Lock 13 Partners proposes to enter into an agreement with Lee County, for maintenance of the recreation facilities over the term of a license.

Our Analysis

Construction of the proposed project facilities would be unlikely to significantly affect existing recreation use near Lock and Dam No. 13. The project is located in a remote area of the Kentucky River, which receives very little recreation use. There is currently no downstream portage at the facility to encourage through-paddling, and the only existing recreation facility is the Lock 13 boat launch, located more than 500 feet downstream of the dam. Any construction-related disturbance to boaters or anglers using the existing Lock 13 boat launch for river access would be minimal and would not affect the quality of the recreation experience outside of the immediate project area.

Lock 13 Partners' proposed recreation enhancements would improve recreational boating access to the Kentucky River, in a stretch of the river that has fewer access points than are available in more populous areas downstream. The portage around Lock 13 would make it easier for boaters to through-paddle the Kentucky River, and the picnic tables and composting toilet would encourage use of the site as a waypoint for through-paddlers. The proposed signage directing canoeists to the put-in and take-out locations would improve accessibility and visibility of the site's recreation amenities. These measures would support the continued development of the Kentucky River Water Trail by improving connectivity around the lock and dam.

The plan's schedule does not specify a completion date for construction of the recreation amenities. Rather, Lock 13 Partners states that the recreation facilities would be available to the public upon completion of project construction, when the power plant is put on-line. Establishing a deadline to complete construction of the recreation facilities within 5 years of license issuance, consistent with the Commission's standard requirement for construction of original projects, would ensure that the recreation facilities are constructed and opened to the public as stated in the recreation plan.

The recreation plan does not include provisions for monitoring recreation condition or use, or review and update of the plan, as needed, over the term of a license. Lock 13 Partners and stakeholders expressed concerns about vandalism and/or disuse of

the recreation site because of its remote nature. Periodic monitoring, through visual inspection, of recreation facility use and condition is needed to ensure that the facilities are serving their intended purpose. This monitoring could occur as part of the proposed maintenance agreement between Lee County and Lock 13 Partners, or as a separate, monthly inspection. Further, as recreation facilities reach the end of their lifespan, an assessment of their use, in consultation with stakeholders, would help to determine whether continued investment in rehabilitating existing facilities or constructing new facilities is warranted. If existing recreation facilities are not being used or are subject to frequent vandalism, Lock 13 Partners could seek alternative measures, appropriate to the levels of recreation use and conditions at the project, that could be identified through consultation with stakeholders. Requirements for monthly maintenance inspections and review of the recreation plan to address maintenance challenges or changes in recreation use or conditions would help Lock 13 Partners document the usability and continued need for the recreation facilities at the project.

Effects of Project Operation on Fishing and Boating

Lock 13 Partners proposes to operate the project in run-of-river mode, with operational restrictions during low-flow periods in order to maintain pool levels at or above the crest of the dam.

Our Analysis

Operation of the proposed project is unlikely to affect boaters because Lock 13 Partners proposes to operate the project in run-of-river mode, keeping the pool level at or above the crest of the dam when the project is operating. KRA's existing safety measures, including the boat exclusion buoys upstream and downstream from the dam, as well as any safety measures required by the Commission as part of a standard license, would help ensure boater safety after the project is constructed and operational.

During proposed project operation, flows would pass through the powerhouse and tailrace. Because the lock is not operational, all flows currently spill over the dam. The proposed project would shift the primary location of downstream flows to the tailrace of the newly constructed powerhouse, with only excess flow spilling over the dam. This shift in the location of flow could benefit anglers because the flows through the project may concentrate fish near the tailrace. The proposed designated bank fishing area (at the Lock 13 boat launch) would help anglers take advantage of the new flows while maintaining public safety around the project facilities.

3.3.5.3 Cumulative Effects

As discussed previously, the Commonwealth of Kentucky has focused significant resources on developing the Kentucky River Water Trail and promoting recreational use of the river corridor. To date, projects include rehabilitating and opening Lock Nos. 1, 2, 3, and 4 for recreational navigation, as well as developing plans for recreation

enhancements at the series of locks and dams for the length of the Kentucky River. When viewed in combination with the pending improvements at other FERC-licensed projects (Kentucky River Lock and Dam No. 11 Hydroelectric Project No. 14276, Ravenna Project No. 13214, and Heidelberg Project No. 13213) at Lock and Dam Nos. 11, 12 and 14, as well as the recreation improvements proposed by the NPS and Kentucky Riverkeeper, the applicant's proposed recreation enhancement measures have the potential to be cumulatively beneficial. This potential addition to the series of portage trails around the lock and dam structures would improve recreational connectivity. Improved parking and restroom facilities would improve accessibility and comfort for recreationists using the Kentucky River Water Trail. Over the term of a license, the applicant's proposed recreation enhancement measures at the Evelyn Project would contribute to the Kentucky Water Trail partners' long-term vision for recreation use of the Kentucky River.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.[60] Historic properties are those that are listed or eligible for listing in the National Register. The regulations implementing Section 106 of the NHPA also require that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties and consult with interested Indian tribes or Native Hawaiian organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term "cultural resources" for properties that have not been determined eligible for listing in the National Register. Cultural resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

Area of Potential Effects

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a proposed license within a project's APE. The APE is determined in consultation with the SHPO and is defined as

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

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 the project is the footprint of the project itself, and any nearby properties that might be affected in such a way that would diminish the attributes that make them eligible for the National Register. The APE encompasses a 24.3-acre area along the northwest bank of the Kentucky River at Lock & Dam No. 13, and an adjacent portion of the river that would be affected by the construction, operation, and maintenance of the project (Crowell and Hussein-Wetzel, 2020). The Kentucky SHPO, concurred with the APE in a meeting with Lock 13 Partners and Commission staff, on March 3, 2020.[61]

Cultural History Overview[62]

Historical Era

At the time of European contact, the three main indigenous groups occupying eastern Kentucky were the Shawnee, Cherokee, and Iroquois. Eastern Kentucky was the traditional homeland for the Shawnee, who lived in permanent towns and villages and interacted with European traders. The Cherokee also inhabited the region at the time, living primarily in the mountainous region to the south, but claiming lands as far north as the Ohio River. The Iroquois frequented the Central Bluegrass region of Kentucky and raided Shawnee villages; however, their traditional lands were primarily located further north. Other smaller groups in the area include the Delaware, Miami, Mingo, Tutelo, and Wyandotte. Many of these groups had been driven out of their traditional homelands and settled or camped for short periods of time within the region prior to being forced west by European and American settlers (Stallings, 2016).

The earliest European explorers to eastern Kentucky came by way of the complex and heavily used trail system of these indigenous groups. The first European explorer in the area was Dr. Thomas Walker, who traveled through Kentucky in 1750. In the eighteenth century, permanent European settlements developed in or around forts and other defensible spaces. Settlement rates increased dramatically after the American Revolution. Among the first American settlers during the early nineteenth century were Josiah (or Jacob) Miller and his family and John and Michael Stufflebean. Many of these early settlers migrated to the area to mine saltpeter, which was used to make gunpowder.

Kentucky was granted statehood in 1792. Lee County, the proposed location of the project, was established in 1870 with Beattyville as the county seat. Steamboats and

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[61] *See* Commission staff's March 9, 2020 Teleconference Memo.

[62] Unless otherwise noted, the Cultural History Overview is adapted from Crowell and Hussein-Wetzel (2020), which is available at: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=15708688. In addition to providing a discussion of the site's history, Crowell and Hussein-Wetzel also provide a full discussion of the region's prehistory, which is not summarized in this EA for the sake of brevity.

railroads made Lee County a transportation hub during the mid-to-late nineteenth century. Located at the confluence of the three forks of the Kentucky River, Beattyville was the eastern terminus for steamboats on the river. The railroads, which eventually displaced steamboat travel continued to help Lee County prosper as a transportation hub. In the mid-twentieth century, the oil and coal industries drove Lee County's economy, before steadily declining in the 1970s and 1980s.

History of the Kentucky River Locks and Dams

The Kentucky River served as a major transportation route from the time of the state's founding. Flatboats transported tobacco, whiskey, and other early agricultural products down the Ohio and Mississippi rivers to markets as far away as New Orleans. The river's natural character was relatively narrow and meandering, subject to periods of both floods and low water. Pools of deep water, impounded by sand and gravel bars or rocky shoals, existed every few miles along the length of the river. River transportation became increasingly important to the state's economy, and plans were made for a system of locks and dams along the river. The Commonwealth of Kentucky constructed the first five locks on the river between 1836 and 1842.

As railroads pushed into the region, river transportation declined. When the Corps took over the system of locks in 1880, many of the existing structures were in poor condition and unusable. The Corps rebuilt Lock and Dam Nos. 1 through 5, and by 1917, a total of 14 locks and dams were complete and a 6-foot-deep channel stretched nearly 255 miles from Beattyville at the confluence of the North and South Forks to Carrollton, near the confluence with the Ohio River. The purpose of building the locks and dams was to ship coal; however, by the time the system was completed, they were already obsolete and not able to compete with railroads.

Following World War II, improvements in rail and highway transportation ended any potential use of the Kentucky River for transportation. At mid-century, river management shifted from navigation to flood control and later water quality and supply, recreation, and fish and wildlife resources. Operation and maintenance costs for the locks became cost prohibitive by the 1970s and the Corps permanently closed locks 5 through 14. Subsequently, KRA assumed responsibility for all 14 lock and dam structures along the Kentucky River and manages them for recreation and water supply.

Historic Properties

In 2018, Gray & Pape, Inc. conducted Phase I archaeological and historical/architectural surveys of the APE for the proposed Evelyn Project (Striker, 2018; McCuin and Anderson, 2018). The purpose of these surveys was to determine if historic properties were present within the project's APE.

The Phase I archaeological survey consisted of background research, field investigations of the entire APE, data collection and analysis, and reporting. One

previously unrecorded archaeological resource was identified within the APE, Non-Site Locality 1. Non-Site Locality 1 is a low-density prehistoric lithic scatter, located south of the Kentucky River. Because of the extremely low density of cultural materials and absence of temporally diagnostic artifacts, the data collected during the survey indicated that additional investigation of this site would not add to theoretical or substantive knowledge of regional prehistory. Therefore, this site is recommended as ineligible for listing on the National Register (Striker, 2018).

The Phase I historical/architectural survey consisted of background research and field investigation of the APE. Field investigations focused on documenting existing conditions with digital photographs and inventorying resources more than 50 years of age within the APE. Visual impacts to nearby resources were also assessed. The Phase I historic/architectural survey yielded one previously recorded National Register-eligible property within the APE (McCuin and Anderson, 2018). Kentucky River Lock and Dam No. 13 (LE-25) is eligible for listing in the National Register under Criteria A and C.[63] Lock and Dam No. 13 is eligible under Criterion A for its association with the history of transportation and commerce on the Upper Kentucky River. Lock and Dam No. 13 is also eligible under Criterion C as a good intact example of an early twentieth century reinforced concrete lock and dam facility. Such construction represented a significant shift in lock and dam technology as the Corps transitioned from traditional cut stone and timber construction to reinforced concrete. Despite previous modifications to the facility by the Corps, Lock and Dam No. 13 retains good overall integrity and provides an important example of early twentieth century lock and dam construction (Crowell and Hussien-Wetzel, 2020). No other historic/architectural resources were identified within the project's APE.

3.3.6.2 Environmental Effects

Lock 13 Partners proposes to construct, operate, and maintain hydropower facilities and associated recreation amenities at National Register-eligible Lock and Dam No. 13. Construction of the project's powerhouse would occur within the original navigation lock, a character-defining feature of Lock and Dam No. 13. Striker (2020) concludes that construction of the project would diminish the integrity of a defining feature of the structure, adversely affecting its National Register-eligibility.

Lock 13 Partners proposes to implement a HPMP, containing measures for protecting against and mitigating adverse effects to Lock and Dam No. 13 as well as

[63] Criterion A resources are those that have an association "with events that have made a significant contribution to the broad patterns of [U.S.] history." 36 C.F.R. § 60.4. Criterion C resources are those "that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction[.]" *Id*.

procedures for management of any cultural resources identified during future ground-disturbing activities, including project construction. To mitigate for adverse effects on Lock and Dam No. 13, Lock 13 Partners includes, within the HPMP, provisions for documenting the historic resources and providing interpretive signage and educational resources at the project. The HPMP states that these mitigation measures would be conducted in consultation with the Kentucky Heritage Council.

In comments filed on October 24, 2017, Cherokee Nation requested to be consulted regarding cultural resources at the project. Cherokee Nation provided no additional comments in response to requests from the applicant to review the results of cultural resource studies or draft documents. To address Cherokee Nation's request for consultation, Lock 13 Partners includes, within its HPMP, provisions for continued consultation with Cherokee Nation regarding management of historic properties at the project.

On January 29, 2021, Lock 13 Partners filed a final HPMP with the Commission. The Kentucky SHPO filed comments on the final HPMP on February 4, 2021. In the comment letter, the Kentucky SHPO requested modification to the HPMP's discussion of activities exempt from further review, protocol for emergency response, annual reporting, and review and update procedures. Lock 13 Partners filed a response to the Kentucky SHPO's comments on February 8, 2021. Lock 13 Partners recommended that no changes be made to the HPMP as filed on January 29, 2021.

Our Analysis

Section 106 of the NHPA requires the Commission to take into account the effect of licensing a hydropower project on historic properties. Project-related effects on cultural resources within the APE may result from: (1) project construction and other ground disturbing activities, including construction of recreational enhancement measures; (2) project operations, such as reservoir and regulated river reach fluctuations; and/or (3) routine maintenance or modification to National Register-eligible properties associated with the project.

Based on the findings presented in both Striker (2018) and McCuin and Anderson (2018), we find that the project would result in adverse effects to the National Register-eligible Kentucky River Lock and Dam No. 13. Construction of the project's powerhouse would occur within the lock chamber, which is a character-defining feature of Lock and Dam No. 13. This, and other project-related construction, would diminish the integrity of design, materials, feel, and association of the site. Mitigation for the adverse effect, including documentation of the historic property and development of educational materials, would mitigate for adverse effects to the resource caused by construction of the project. Additionally, treatment measures (e.g., recommended strategies for preserving extant concrete masonry associated with the lock and dam) within the HPMP would guide future operation and maintenance activities in a way that

is consistent with protection of the historic property. The HPMP also includes provisions for protection of any unknown cultural resources at the project that may be discovered during the term of a license.

The HPMP includes a list of activities which may be exempted from further SHPO review. These include routine maintenance, safety-related activities, and activities located within previously disturbed areas, such as areas that have been excavated or graded. In the HPMP, Lock 13 Partners states that they would consult with the Kentucky SHPO prior to the installation of docks, bulkheads, riprap, or dredging activities. The HPMP also states that Lock 13 Partners would consult with the Kentucky SHPO if activities are planned that would affect any character-defining feature of the lock and dam. In response to the final HPMP, the Kentucky SHPO requested that the list of exempted activities be more specific.

Routine operation and maintenance of the hydropower facility would not constitute a new undertaking under section 106 of the NHPA and would therefore not require additional consultation with the Kentucky SHPO. While it is not possible to list every maintenance activity that would occur as part of Lock 13 Partners' day-to-day operations, providing examples of exempted maintenance activities in the HPMP could prove useful to clarify the intent of this exemption. For example, commonly-exempted maintenance activities include maintenance of transmission structures and fixtures, maintenance of mechanical and electrical equipment, landscaping and vegetation management, trash and debris removal, placement and maintenance of signage, and placement and maintenance of security or safety alarms and systems. Rather than being exempted in entirety, safety-related activities may be exempted if they do not require major structural modification. Emergency activities should follow the procedures described in section 6.7 of the HPMP. Other activities not contemplated in the license application may require additional consultation, whether or not they occur on previously disturbed areas, and would require consultation with the Commission and Kentucky SHPO, as appropriate.

The Kentucky SHPO requests that section 6.7 of the HPMP be modified to require notification of the Commission, Kentucky SHPO, KRA, and Cherokee Nation during step 1 of the Emergency Response Protocol, after Lock 13 Hydro Partners is notified of an emergency at the project. Lock 13 Partners requests that the consulting parties opt-in to receive communication about emergencies at the project and specify the format for receiving notification.

In general, the procedures used to respond to project emergencies are addressed through the Commission's Division of Dam Safety and Inspections (D2SI). The provisions within the HPMP for protection of historic properties during emergencies are supplemental to any notification procedures required by D2SI. Modifying the HPMP's Emergency Response Protocol to require notification of the SHPO of an emergency

immediately after Lock 13 Partners is notified has the potential to slow response during a crisis that could affect public health and safety or cause significant damage to public and private property. Alerting the consulting parties, including the Commission, Kentucky SHPO, KRA, and Cherokee Nation of the emergency, as soon as practicable but no more than 10 days from the date of the emergency would ensure that Lock 13 Partners could both address the emergency and initiate consultation regarding affected historic properties, if any, in a timely manner.

The Kentucky SHPO requests that section 7.2.3, *Annual Reporting*, of the HPMP be modified to require annual reports for the duration of the HPMP, not only during project construction. The Kentucky SHPO also requests that the reports be inclusive of all activities associated with the project including project operations and maintenance. The HPMP is a document designed to guide management of historic properties for the term of any license issued for a project, including both construction and operation of the project and, therefore, licensees must comply with the provisions of the HPMP for the term of a license. Although filing annual reports with the Commission is not typically required, providing annual reports to the Kentucky SHPO would provide documentation of how Lock 13 Partners has complied with the provisions of the HPMP. As stated in the HPMP, in years when no work is completed under the HPMP, a letter from the licensee to the Kentucky SHPO would suffice to satisfy this requirement.

Section 7.2.4 of the HPMP includes provisions for reviewing and updating the HPMP. These provisions allow the Kentucky SHPO, KRA, and Cherokee Nation to propose revisions to the HPMP, in writing, at any time. The provisions also state that Lock 13 Hydro Partners may propose modification to the HPMP if the proposed undertaking changes, and the changes may affect the character-defining features of the Lock and Dam 13. The Kentucky SHPO recommends modifying the conditions under which the HPMP should be revised, stating that if the undertaking changes, the HPMP should be updated to reflect the change.

At this time, the "undertaking" addressed in the HPMP is the construction, operation, and maintenance of the Evelyn Project, as outlined in this EA. Any project-related activities not contemplated as part of the licensing proposal, and not exempted from consultation by section 6.4 of the HPMP, would require additional consultation with the Commission, the Kentucky SHPO, and other affected parties to determine their effects on historic properties. This consultation may result in the need to amend the HPMP. Amendments to the HPMP would require Commission approval.

To meet the requirements of section 106 of the NHPA, the Commission intends to execute a Programmatic Agreement (PA) with the Kentucky SHPO for the protection of historic properties that would be affected by the construction, operation, and maintenance of the project. The terms of the PA would require Lock 13 Partners to implement the

HPMP, filed January 29, 2021, for the term of any license issued for the project with modifications to address comments filed by the Kentucky SHPO on February 4, 2021.

3.3.6.3 Cumulative Effects

As described in section 3.3.6.1, the Kentucky River locks and dams, which were constructed between 1836 and 1917, are representative of the history of commercial barge navigation from the Eastern Coalfields and Bluegrass regions of Kentucky to the Ohio and Mississippi Rivers. Although their use has changed over time, the locks and dams and their contributing resources (such as lock houses and other ancillary structures) maintain sufficient integrity to be considered historic resources. Based on studies conducted by the Corps in the 1980s, the structures are recognized by the Kentucky SHPO to form a non-contiguous historic district (FERC, 2016).

The modifications to Lock and Dam No. 13, including use of the navigational lock for construction of the project's powerhouse, would not only adversely affect a National Register-eligible property (Lock and Dam No. 13), but would also diminish the integrity of the historic district. This action, when taken with other federal actions in the Kentucky River system (including three additional FERC-licensed projects with similar design effects on the navigational locks at Lock and Dam Nos. 11, 12, and 14), would cumulatively affect cultural resources.

However, the mitigation measures proposed for the Evelyn Project, other mitigation at Lock and Dam Nos. 11, 12 and 14, and education efforts as part of the Kentucky River Water Trail, have the potential to provide greater public accessibility to information about the history of the Kentucky River and lessen any negative effects of development of the Kentucky River for hydropower.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Evelyn Project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project (12,161 MWh) would not occur. The power that would have been developed from renewable resources would have to be replaced from nonrenewable fuels.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Kentucky River 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.*,[64] 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 Corp.*, 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 construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

4.1 POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT

Table 4-1 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by the applicant in their 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; estimated capital investment required to develop the project; licensing costs; normal operation and maintenance cost; and Commission fees. All costs have been adjusted to 2020 dollars.

Table 4-1. Parameters for economic analysis of the project (Source: Lock 13 Partners, and staff).

Parameter	Value
Installed Capacity	2.8 MW
Average annual generation	12,161 MWh
Period of analysis	30 years

[64] *See Mead Corp.*, 72 FERC ¶ 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.

Parameter	Value
Local and Federal income tax rate	0 %
Insurance rate	Included in the Operation and Maintenance (O&M) cost
Interest rate	5.5 %
Construction cost [a]	$8,900,000
Application cost	$80,000
Operation and maintenance [b]	$107,000/yr
Estimated Commission fees [c]	$24,000/yr
Cost of Alternative Power (2020) [d, e]	
1) Energy cost	$19.19/MWh
2) Dependable Capacity Cost	$160/kW-yr

[a] Excludes protection, mitigation, and enhancement measures and licensing cost.

[b] The annual O&M cost includes an annual management fee paid to the operating partner.

[c] The Commission collects an annual administration charge for all licensed projects which is based on the authorized installed capacity of the project and amount of federal land occupied by the project.

[d] The Cost of Alternative Power is based on the cost of providing the same amount of generation and capacity from a natural gas-fired combined cycle plant, as reported by The U.S. Energy Information Administration (EIA), Annual Energy Outlook 2020, for the Division 6, East South-Central Region. The total cost of alternative power is a combination of energy costs and cost for dependable capacity.

[e] The applicant provided an estimate of the value of power based on a contract rate from a similar project located on the Kentucky River at Lock and Dam No. 7. This rate is $50.89/MWh for on-peak energy, $42.17/MWh for off-peak energy, and $6.02/KW for monthly peak demand periods ($72/kW-yr). Assuming 25 percent peak energy, 75 percent off-peak energy, and $72/kW-yr for capacity, this energy rate is equivalent to $640,140/yr, or about $52/MWh. Staff does not use contract rates in its analysis, rather, as described above, staff's estimate is based on the cost of the most likely alternative source of power.

4.2 COMPARISON OF ALTERNATIVES

Table 4-2 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no-action, the applicant's proposal, and the staff alternative.

Table 4-2. Summary of the annual cost of alternative power and annual project cost for three alternatives for the Evelyn Project (Source: staff).

	No Action	Applicant's Proposal	Staff Alternative
Installed capacity	0.0	2.8 MW	2.8 MW
Annual generation	0	12,161 MWh	12,161 MWh
Dependable Capacity [a]	0.0	1.7 MW	1.7 MW
Annual value of project power [b]	$0	$514,004	$514,004
	$0.00	$42.3/MWh	$42.3/MWh
Total annual project cost (2020) [c]	$0	$747,306	$749,118
	0.00	$61.45/MWh	$61.6/MWh
Difference between the cost of alternative power and project cost [d]	$0	($233,302)	($235,114)
	0.00	($19.18/MWh)	($19.33/MWh)

[a] Staff estimated the dependable capacity based on the ratio of the mean annual flow available for generation for each of 12 months, and the hydraulic capacity of the project.

[b] The value of power for the Evelyn Project is based on the Cost of Alternative Power in the East-South Central Region, as identified in table 4-1 above.

[c] All project costs were adjusted to 2020 dollars.

[d] A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative, thus the project cost is greater than the cost of alternative power.

4.2.1 No-Action Alternative

Under the no-action alternative, the project would not be constructed as proposed. There are no costs associated with this alternative, other than the costs for preparing the license application.

4.2.2 Applicant's Proposal

Under the applicant's proposal, the project would have a total capacity of 2.8 MW, a dependable capacity of 1.7 MW, and an average annual generation of 12,161 MWh. The annual value of project power would be $514,004, or $42.3/MWh. The total annual project cost would be $747,306 or $61.45/MWh. Subtracting the total cost of the project from the value of project power, the project would produce power at a cost which is $233,302, or $19.18/MWh, more than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative includes the same developmental components as the applicant's proposal and therefore, would have the same capacity and energy values described above for the applicant's proposal. Appendix D shows the applicant's proposed environmental protection and enhancement measures, staff-recommended additions, deletions, and modifications to these measures, and the estimated cost of each.

Under the recommended staff alternative, based on an installed capacity of 2.8 MW, a dependable capacity of 1.7 MW, and an average annual generation of 12,161 MWh, the annual value of project power would be $514,004 or $42.3/MWh. The total annual project cost would be $749,118 or $61.6/MWh. Subtracting the total cost of the project from the value of power, the project would produce power at a cost which is $235,114, or $19.33/MWh, more than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

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

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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

Based on our independent review of agency and public comments filed on this project and our evaluation of the environmental and economic effects of the proposed action and its alternatives, we selected the staff alternative for the Evelyn Project. We recommend this alternative because: (1) issuing an original license for the project would allow Lock 13 Partners to operate the project as a beneficial and dependable source of electric energy; (2) generation from the project, which would have an installed electric capacity of 2.8 MW, comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of this alternative would exceed those of

the no-action alternative; and (4) the recommended measures would protect and enhance aquatic, terrestrial, and cultural resources, and threatened and endangered species at the project.

In the following section, we make recommendations as to which environmental measures proposed by Lock 13 Partners, or recommended by agencies or other entities, should be included in any license issued for the project. In addition to Lock 13 Partners' proposed environmental measures listed below, and the conditions of the project water quality certification (Appendix B), we recommend additional staff-recommended environmental measures to be included in any new license issued for the project.

5.1.1 Environmental Measures Proposed by the Applicant

Based on our environmental analysis of the applicant's proposal in section 3, and the costs presented in section 4, we conclude that the following environmental measures proposed by the applicant would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project.

- Develop and implement an erosion and sedimentation control plan to minimize the effects of project construction on the Kentucky River.
- Avoid disturbing clay capped, lead-contaminated soils adjacent to the concrete esplanade during project construction.
- Operate the project in run-of-river mode.
- Implement an Operations Compliance Monitoring Plan, filed on July 1, 2019, that includes provisions to cease generation during low-flow restricted periods declared by the Kentucky DEP, Division of Water, or KRA.
- Implement a Water Quality Monitoring Plan, filed on August 13, 2020, that includes the following provisions: (1) monitor temperature and DO concentrations in the tailrace May 1 through October 31; (2) report monitoring results annually by March 31 of the following year; and (3) shut down project turbines incrementally, to total shutdown as needed, if DO levels fall below 5.0 mg/L over a 24-hour average period, or 4.0 mg/L instantaneously.
- Implement a Trashrack Design and Maintenance Plan, filed on February 7, 2020, that includes the following provisions: (1) install a trashrack at a 12.5-degree angle to keep inlet speeds low; and (2) use 2-inch clear bar spacing with a maximum approach velocity that does not exceed 1.5 fps to minimize potential for fish entrainment and impingement.
- To avoid electrocution of birds/wildlife on transmission facilities, implement the following protection measures: (1) eliminate some exposed energized parts by installing a pad-mounted, combined main transformer and main breaker;

(2) install animal protection guards on any exposed bushings on the pole-mounted auxiliary power transformers; and (3) arrange conductors on the cross arms of the overhead transmission line consistent with APLIC and FWS's Avian Protection Plan Guidelines.

- Mark and avoid running buffalo clover during transmission line construction.
- Avoid disturbing bat swarming and roosting habitat.
- Limit tree removal to the period between November 15 and March 31.
- Implement a Recreation Plan, filed on October 27, 2020, with provisions for providing recreation facilities at the project, including a canoe portage, bank fishing access area, picnic tables, toilet, and gravel drive and parking area.
- Implement a HPMP, filed January 29, 2021, for the protection of historic properties within the project's APE.

5.1.2 Additional Measures Recommended by Staff

Under the staff alternative, the project would include Lock 13 Partners' proposed operational and environmental measures and the mandatory conditions of the certification. The staff alternative would also include the following staff-recommended modifications:

- Include the following provisions in the proposed, and certification-required, erosion and sediment control plan: (1) Lock 13 Partners' proposal to avoid the disturbance of clay capped, lead-contaminated soils adjacent to the concrete esplanade during project construction; (2) consult with Kentucky DEP's Divisions of Water and Waste Management in the development of the plan; and (3) consult with Kentucky DEP's Division of Waste Management if the clay capped soils cannot be avoided or are inadvertently disturbed during project construction.
- Compile Lock 13 Partners' proposed avian protection measures in an Avian Protection Plan with additional provisions to maintain the avian/wildlife protection devices, train personnel on avian protection measures, and identify and address impacts on birds and other wildlife to minimize the potential for electrocution and/or collision in a timely manner throughout any license term.
- Modify Lock 13 Partners' proposal to mark and avoid running buffalo clover during construction of the proposed transmission line to also include construction of the proposed canoe portage route and take-out point.
- Modify the Recreation Plan to include a requirement to complete construction of recreation facilities within 5 years of license issuance, and provisions for monthly visual inspection of recreation facilities and a periodic review of the adequacy of the facilities to meet demand.

Soil Erosion and Sediment Control Plan

Lock 13 Partners proposes, and the certification requires, the development and implementation of an erosion and sedimentation control plan (Condition T-4). The certification also requires provisions to: prevent adverse effects to water quality from soil erosion during construction (Conditions T-4 and T-8.4 through T-8.8, and T-8.10); avoid the use of heavy equipment in the stream channel or, if unavoidable, minimize resuspension of sediments and disturbance to the channel, banks, or riparian vegetation (Conditions T-5 and T-8.8); and remove all sediment and erosion control measures after vegetation has become well-established (Conditions T-6 and T-8.5). Lock 13 Partners also proposes to avoid disturbing the clay capped, lead-contaminated soils adjacent to the concrete esplanade during project construction.

Implementing an erosion and sediment control plan, as proposed by Lock 13 Partners and with the provisions required by the certification, would ensure that the applicant avoids and/or minimizes potential effects to soils, including riverbanks and impoundment shorelines, during project construction. However, the plan has not been developed yet and the certification does not specifically mention avoiding the clay capped soils. Including a requirement to ensure avoidance of the clay capped soils during project construction, with the requirements of the certification would help to avoid release of lead-contaminated soil from under the clay cap. Consulting with Kentucky DEP's Divisions of Water and Waste Management to develop the plan once construction plans are finalized would ensure that appropriate BMPs would be used during construction, including any measures to avoid and/or appropriately manage the clay capped soils in the project boundary. The plan could also include a provision to consult the Kentucky DEP's Division of Waste Management during project construction, if the clay capped soils cannot be avoided or are inadvertently disturbed.

Including these additional provisions in an erosion and sediment control plan would consolidate construction-related BMPs into one plan and facilitate Lock 13 Partners' proposal to avoid or minimize the potential disturbance and exposure of lead-contaminated soils during project construction. Implementing this measure would also prevent the potential transport of these soils on construction equipment, and through erosion, or runoff of these soils into the Kentucky River. It would also protect aquatic resources from potential effects associated with lead-contaminated sediment moving through the project area and downstream in the Kentucky River. There are no additional costs associated with including the applicant's proposal to avoid the clay capped soils as a provision of the proposed erosion and sediment control plan, or to consult with the Kentucky DEP during the development of the plan, and during project construction, if needed, to minimize the disturbance of clay capped soils.

Avian Protection Plan

Lock 13 Partners proposes to install a 12.47 kV overhead transmission line for the Evelyn Project. Powerlines with voltages less than 60 kV are known to have higher risk of avian electrocution than higher voltages (APLIC, 2006). To address these risks, Lock 13 Partners proposes to implement several avian protection measures including: (1) eliminating some exposed energized parts by installing a pad-mounted, combined main transformer and main breaker; (2) installing animal protection guards on any exposed bushings on the pole-mounted auxiliary power transformers; and (3) spacing conductors on the cross arms of the overhead transmission line consistent with APLIC and FWS's Avian Protection Plan Guidelines. Implementing these proposed measures would reduce the risk of adverse interactions (e.g., electrocution and/or collision) for birds and other wildlife with the proposed overhead transmission line.

However, the proposal lacks a plan for maintaining and adapting the devices after the project begins operation to account for unanticipated damage to the devices and/or effects on birds and other wildlife after project construction (e.g., nest establishment on the transmission line poles). An Avian Protection Plan would provide a mechanism for maintaining the devices, training personnel on avian protection measures, and identifying and addressing impacts to birds and other wildlife in a timely manner throughout a license term. We estimate that the levelized annual cost to develop an Avian Protection Plan would be $336. The benefits of implementing an Avian Protection Plan would outweigh the cost.

Running Buffalo Clover Protection Measures

Lock 13 Partners proposes to mark and avoid any running buffalo clover that may be found along the transmission line route during construction. While no suitable habitat or existing running buffalo clover populations were found during Lock 13 Partners' 2019 survey along the proposed project transmission line route, the numbers of rooted crowns in a given sub-population of this species have been shown to vary widely over time, including within a growing season (NatureServe, 2020). Marking and avoiding this species during construction would ensure that no previously dormant or unidentified populations are adversely affected during transmission line installation.

The majority of the proposed recreational features would use existing facilities (e.g., boat ramp, parking area, access road) or be constructed on previously disturbed, open (full sun) areas that are unsuitable habitat for running buffalo clover as discussed above. However, the proposed canoe portage would require placement of a gravel walkway where existing roads/pathways do not exist, as well as installation of concrete steps on the riverbank for the canoe take-out. Riparian vegetation in these areas may provide the filtered sunlight and mesic soil conditions suitable for this species. The proposed canoe route was not surveyed for running buffalo clover. Potential effects of the canoe portage construction and recreational use could be avoided or minimized by

surveying for running buffalo clover prior to construction and marking and avoiding any identified plants by repositioning the canoe portage route and/or take-out steps. Therefore, we recommend that Lock 13 Partners' modify its proposal to mark and avoid running buffalo clover before construction of the proposed transmission line, to include the canoe portage route and take-out point. We estimate that the levelized annual cost of surveying the canoe portage route and take-out point for running buffalo clover prior to construction would be $36, which is the same as the applicant-estimated cost for resurveying the proposed transmission line route for this species. The benefits of these surveys, and if needed, marking and avoiding running buffalo clover during construction, would outweigh the cost.

Recreation Plan

Lock 13 Partners proposes to implement its Recreation Plan, filed on October 16, 2020, to guide the construction and operation maintenance of recreation facilities at the Evelyn Project. In general, implementation of the plan would improve recreation access to a remote stretch of the Kentucky River and support development of the Kentucky River Water Trail. However, the plan lacks specificity relating to the completion of construction. We recommend that the construction schedule included in the plan be modified to require completion of construction of the recreation amenities within 5 years of license issuance, commensurate with license requirements for completion of construction of the project works. There is no additional cost associated with this measure.

We also recommend that the Recreation Plan be modified to include monthly visual inspection of the recreation facilities. This visual inspection could be performed in conjunction with routine maintenance at the project. Lock 13 Partners and other licensing stakeholders expressed concern about vandalism or disuse of the recreation facilities proposed at the Evelyn Project because of the site's remote nature. These visual inspections would allow assessment of the condition of the project's recreation facilities over time and identification of the need for maintenance in response to regular use or vandalism. We estimate that the levelized annual cost of monthly visual inspections of the recreation facilities would be $1,500, although if these inspections occurred during routine maintenance, the cost could be minimized. The benefits of monitoring to ensure recreation facilities are safely and adequately maintained through monthly monitoring would outweigh the cost.

Additionally, staff recommend that the Recreation Plan be modified to include provisions for periodic monitoring and assessment of recreation use and facility condition, in consultation with the Kentucky DFWR and KRA. Staff recommend that this monitoring occur 10 years after completion of construction of the recreation facilities, and every 10 years thereafter through the term of the license. These assessments would allow Lock 13 Partners to evaluate recreation use and facility condition at times when the recreation facilities (e.g., picnic tables, composting toilet)

may need replacement or require significant maintenance. Should the assessment indicate a need for a change in the type of recreation facilities provided at the site, Lock 13 Partners could then file an amended recreation plan for the project. Otherwise, Lock 13 Partners could file a report stating that no recreation facility changes would be necessary. This type of assessment would maximize Lock 13 Partners' flexibility to adapt to changes in recreation use as the Kentucky River Water Trail is developed. We estimate that the levelized annual cost of periodic monitoring and assessment of the recreation amenities would be $276. The benefits of modifying the Recreation Plan to include this mechanism for identifying a need to update the plan outweighs the cost.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Construction of the powerhouse would result in the disturbance of localized areas within the existing lock structure and near the existing dam. Construction of the transmission line would involve minor disturbances to install poles. These construction activities may cause some sediment to enter the Kentucky River, even with the implementation of erosion and sediment control methods.

Operation of the project would result in the mortality of an estimated 3,340 fish annually. The majority of the fish, however, would likely consist of young fish of highly prolific species such as sunfish, gizzard shad, and catfish that have the ability to compensate for losses.

5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

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

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency will attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. No section 10(j) recommendations were filed in response to the ready for environmental assessment notice.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) 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 seven comprehensive plans that are applicable to the Evelyn Project, located in Kentucky.[65] No inconsistencies were found.

6.0 FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, we find that the issuance of a license for the Evelyn Project, with our recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

7.0 LITERATURE CITED

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

8.0 LIST OF PREPARERS

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

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[65] (1) Kentucky Department for Local Government. 2008. Kentucky Statewide Comprehensive Outdoor Recreation Plan (SCORP). Frankfort, Kentucky. October 2008; (2) Kentucky Department for Natural Resources and Environmental Protection. 1979. Kentucky wild rivers statewide management plan. Frankfort, Kentucky. June 1979; (3) Kentucky Division of Water and National Park Service. 1992. Kentucky rivers assessment. Department of the Interior. Atlanta, Georgia; (4) National Park Service. 1993. The Nationwide Rivers Inventory. Department of the Interior. Washington, D.C.; (5) Ohio River Basin Commission. 1976. Kentucky/Licking River Basins comprehensive coordinated joint plan. Cincinnati, Ohio. October 1976; (6) U.S. Fish and Wildlife. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.; (7) U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.

APPENDIX A

STATUTORY AND REGULATORY REQUIREMENTS

Federal Power Act

Section 18 Fishway Prescriptions

Section 18 of the Federal Power Act (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 Interior. Neither the Secretary of Commerce nor the Secretary of Interior filed section 18 prescriptions or requested a reservation of authority to prescribe fishways under section 18 be included in any license issued for the Evelyn Project.

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 law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. No section 10(j) recommendations were filed in response to the Commission's notice requesting conditions and recommendations for the Evelyn Project, issued on March 9, 2020.

Clean Water Act

Under section 401 of the Clean Water Act (CWA),[66] a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On February 9, 2018, Lock 13 Partners applied to the Kentucky Department for Environmental Protection (Kentucky DEP) for a section 401 water quality certification (certification). On July 2, 2018, Kentucky DEP issued a certification for the project. On August 3, 2020, Kentucky DEP issued a revised

[66] 33 U.S.C. § 1341(a)(1).

certification for the project.[67] The conditions of the certification are described under section 2.2.5, *Modifications to the Applicant's Proposal - Mandatory Conditions.*

Endangered Species Act

Section 7 of the Endangered Species Act (ESA)[68] 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.

The U.S. Fish and Wildlife Service's (FWS) Information, Planning, and Conservation (IPaC) system indicates that eleven federally listed species may occur within the proposed Evelyn Project boundary, or be affected by the project: the endangered gray bat, Indiana bat, Virginia big-eared bat, sheepnose mussel, snuffbox mussel, clubshell, fanshell, and purple cat's paw; and the threatened northern long-eared bat, Kentucky arrow darter, and rabbitsfoot mussel. No designated critical habitat for any federally listed species occurs within the project area (FWS, 2017, 2020a, and 2021). Our analyses of project impacts on threatened and endangered species are presented in section 3.3.4, *Threatened and Endangered Species*, and our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

Project construction and operation would not affect the small, high gradient tributaries to the Kentucky River that provide suitable habitat for Kentucky arrow darters, and the slow-moving, deep pool habitat created by pool 13 and the other existing dams within the Kentucky River make it unlikely that individuals would be found within the area affected by the proposed project. In addition the project is located outside of designated critical habitat for this species. We conclude that licensing the Evelyn Project, as proposed with mandatory conditions and staff-recommended measures, would have no effect on the Kentucky arrow darter or its critical habitat. Therefore, no further consultation under the ESA is required for this species.

No federally listed mussel species were found alive or dead during Lock 13 Partners' mussel habitat survey. However, the habitat survey did not collect data on existing mussel populations, and sand and gravel habitats occupied by non-listed mussels occur near the boat ramp downstream from the lock chamber, where flows would be diverted during project operation. The proposed run-of-river project operation would shift/redistribute these substrates, but would not change the quantity of flow or the extent

[67] Modifications to the original certification were limited to the water quality monitoring reporting schedule and conditions considered to be administrative. Although the monitoring cycle remains the same, the schedule for filing water quality monitoring reports was revised from a monthly to an annual basis for at least 10 years.

[68] 16 U.S.C. § 1536.

of the wetted perimeter downstream from the project and would likely result in no net loss of potentially suitable mussel habitat downstream from the project during any license term. Implementation of erosion and sedimentation control measures required by the certification would ensure that erosion and sedimentation associated with project construction would be minimal and would not affect mussel habitat. We conclude that licensing the Evelyn Project, as proposed with mandatory conditions and staff-recommended measures, is not likely to adversely affect the sheepnose, snuffbox, clubshell, fanshell, purple cat's paw, and rabbitsfoot freshwater mussels.

While Lock 13 Partners' surveys did not detect any existing populations of running buffalo clover along the proposed transmission line route, this does not preclude occurrences at unsurveyed locations within the project boundary. The potential effects of the canoe portage construction and recreational use could be avoided or minimized by surveying for running buffalo clover prior to construction, and marking and avoiding any identified plants by repositioning the canoe portage route and/or take-out steps. Potential effects to this species would be further minimized through the implementation of certification Conditions T-5, T-8.8, and T-8.10 which would minimize disturbance of riparian vegetation. We conclude that licensing the project, as proposed, with the certification conditions and the additional staff-recommended measures, is not likely to adversely affect running buffalo clover.

No caves or cave-like structures were identified during Lock 13 Partners' survey of bat habitat in the project area (Kentucky DFWR, 2017a; Kentucky DFWR, 2017b). As such, the project does not provide summer or winter roosting habitat for gray or Virginia big-eared bats, and does not provide winter habitat for Indiana or northern long-eared bats. However, suitable travel and foraging habitat occurs within the project boundary for all four of these species, and there are a very limited number of trees that may serve as potential summer roosting habitat for Indiana bat and/or northern long-eared bat within the project boundary. Lock 13 Partners does not propose to remove trees during construction. If tree removal becomes necessary, Lock 13 Partners' proposal to limit this activity to the period between November 15 and March 31 would avoid the pup season and potential effects to any undocumented maternity roost trees for Indiana and/or northern long-eared bats. The effects of project construction on riparian habitat are expected to be temporary and negligible, but they could result in minor effects to suitable travel or foraging corridors Indiana, northern long-eared, gray, and/or Virginia big-eared bats. These potential effects would be avoided or minimized through the implementation of the Conditions T-5, T-8.8, and T-8.10 in the project certification which would minimize disturbance of riparian vegetation.

Therefore, we conclude that licensing the project, as proposed, with the certification conditions and the additional staff-recommended measures, is not likely to adversely affect Indiana bat, gray bat, or Virginia big-eared bat. In addition, the project would have no effect on Indiana bat's designated critical habitat because it is located

outside of the project area; and no effect on Virginia big-eared bat's designated critical habitat because it is located outside of Kentucky. We also conclude that although licensing the project may affect northern long-eared bats, it would not result in the prohibited incidental take of this species under the final 4(d) rule because there are no known occupied hibernacula within 0.25-mile of the project and no known maternity roost trees within the project boundary or 150 feet of proposed project construction activities. We are requesting FWS concurrence with these findings.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA)[69] 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).

In response to Lock 13 Partners' request filed on September 9, 2017, the Commission designated the applicant as non-federal representative for the purpose of conducting section 106 consultation under the NHPA on November 6, 2017. Pursuant to section 106, and as the Commission's designated non-federal representative, Lock 13 Partners consulted with the Kentucky Heritage Council, acting on behalf of the Kentucky State Historic Preservation Officer (Kentucky SHPO); affected tribes; and the KRA to locate, determine National Register eligibility, and assess potential adverse effects on historic properties associated with the project. This consultation, and other investigations conducted to date, identified Kentucky River Lock & Dam No. 13 as eligible for listing on the National Register. The lock and dam are the only known historic properties within the project's area of potential effects (APE). To address potential effects to historic properties identified within the project's APE, Lock 13 Partners proposes to implement a Historic Properties Management Plan (HPMP), filed January 29, 2021. The HPMP, which was developed in consultation with Commission and the Kentucky SHPO, would direct the preservation and long-term management of historic properties within the APE, including measures to avoid, minimize, or mitigate adverse effects on historic properties throughout the term of a new license.

To meet the requirements of section 106, staff intends to execute a Programmatic Agreement (PA) with the Kentucky SHPO for the protection of historic properties from the effects of construction, operation, and maintenance of the Evelyn Project. The terms of the PA would ensure that Lock 13 Partners addresses and treats all historic properties identified within the APE through the implementation of its HPMP.

[69] 54 U.S.C. § 306108.

APPENDIX B

Water Quality Certification Conditions for the Evelyn Project Issued by the Kentucky Department for Environmental Protection, Division of Water on August 3, 2020

S-1 Lock 13 Hydro Partners shall notify the Water Quality Certification Supervisor at least 2 weeks prior to the scheduled start of operation. [Clean Water Act]

S-2 Lock 13 Hydro Partners shall submit an Annual Monitoring Report for not less than 10 years to the Kentucky Division of Water by March 31st of the following year for each monitoring year as required in the Water Quality Plans for the Evelyn FERC No. 14799. The annual report will summarize the results of the water quality monitoring for the year during the 6 months that monitoring is required, May through October, and shall include the following information:

A summary for each month that dissolved oxygen (DO) levels were measured. Include in the summary the following information:

a) The average DO for each month;

b) Whether or not the average DO fell below the 5 mg/L level for a 24-hour period for each month;

c) Whether or not any DO readings fell below the 4 mg/L instantaneous level for each month;

d) Whether or not the facility shut down its operations at any point within the monitoring year and the reason(s) why it shut down; and

e) Whether any corrective actions were required during each month to improve or record DO. [Clean Water Act]

T-1 The work approved by this certification shall be limited to:

The installation of a small hydroelectric plant under FERC Project No. 14799. The plant will be built inside the abandoned lock chamber at Lock and Dam No. 13 on the Kentucky River, RM 239.9. Neither the dam nor flow of the river will be modified by the activity (run-of-river operation).

Five 1500 mm Flygt submersible turbine-generators will be installed in the existing lock chamber. The submerged powerhouse will be 52 ft. wide and 74 ft. long, from trashrack to end of the draft tubes. Power is to be transmitted through buried cables to a control bldg. located on shore.

The existing lock chamber contains an 18-inch thick cut-off wall that guards against a loss of pool should the existing miter gates fail. During project construction, both the upper miter gates and cut-off wall will remain in place to allow for the dewatering of the lock chamber. Once the project is constructed, both the upper miter gates and cut-off wall will be removed, which will open the intake water passage for the project.

Concrete will be poured around steel draft tube liners during the dewatered phase of construction, making the draft tubes an integral part of the submerged powerhouse. The outflow dimensions of each of the five draft tubes will be approximately 8 ft. 9 in. by 8 ft. 9 in.

Each turbine pit will have a hydraulically actuated slide gate. The slid gates will be approximately 9 ft. 6 in. wide by 13 ft tall.

The trashrack will be located in front of the turbine pit slide gates and will be made of a series of steel bars spaced on 2-inch centers. The trashrack will be 52 feet wide by 44 ft. tall.

The project will be operated as a Run-of-River project, defined as not allowing the water level to drop below the crest of the dam. So low-flow will be anytime the flow of the river is less than the flow through the plant with all five turbines running or 2,218 cfs. If flow is below this benchmark, one or more turbines will be shut down. During high flows, the variable speed turbines will be slowed down as the net head decreases. The plant will be able to operate during most high-flow events, except during the most extreme floods (50-year flood events or greater).

Sampling will be conducted with optical sampling equipment; calibration is monthly and membrane replacement is annually. HACH LDO, Model 2, optical process dissolve oxygen probe, with a 100 meter cable, long enough to go form sampling site to project control room on the shore. The probe cable is run into a HACH SC200 universal controller, which allows for stored data to be removed and transfers current data to the programmable logic controller (PLCP that monitors DO levels and takes corrective action, if necessary). The probe will be located at the end of the tailrace guide wall. The sensing element will be located approximately 5 ft. below normal tail water level.

The generating units will be shut down immediately if the DO level falls below the minimum standards (4.0 mg/L instantaneously or 5.0 mg/L over a 24-hr. average period). Shutting down a unit will allow more water to tumble over the dam spillway and further oxygenate the water. Units are shut down individually until DO levels corrected to above the minimum level. [Clean Water Act]

T-2 All work performed under this certification shall adhere to the design and specifications set forth in the following document(s):

- Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification reviewed on February 9, 2018;
- "Notice of Intent to File Application for Original License, Pre-Application Document, Request for Approval to Use the Traditional Licensing Process, and Request for Expedite Action," dated September 7, 2017, received September 12, 2017.
- Agenda Joint Meeting December 11, 2017;
- Pre-Application Document (PAD), dated September 7, 2017, received September 12, 2017
- Correction of PAD Deficiencies, dated November 10, 2017, received November 14, 2017;
- Water Quality Monitoring Plan (Evelyn Hydroelectric Project – FERC Project No. 14799, received via email June 8, 2018;
- Release for construction Drawings for the Ravenna Hydroelectric Development Lock No. 12, FERC Project No.: 1349-002, dated June 1, 2018. [Clean Water Act]

T-3 The Division of Water reserves the right to modify or revoke this certification should it be determined that the activity is in noncompliance with any condition set forth in this certification. [Clean Water Act]

T-4 Lock 13 Hydro Partners is responsible for preventing degradation of waters of the Commonwealth from soil erosion. An erosion and sedimentation control plan must be designed, implemented, and maintained in effective operating condition at all times during construction. [Clean Water Act]

T-5 Heavy equipment (e.g., bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such instream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation. [Clean Water Act]

T-6 Remove all sediment and erosion control measures after re-vegetation has become well-established. [Clean Water Act]

T-7 If the scope of work or construction plans change, including, but not limited to Department of Army permit modification, a letter requesting a modification should be submitted to the Water Quality Certification Project Manager or Supervisor. [Clean Water Act].

T-8 Attached to this certification and cover letter is a listing of General Conditions for Water Quality Certification that apply to this project. [Clean Water Act]
(*See* Attachment 1)

T-9 If construction does not commence within one year of the date of this letter, this certification will become void. A letter requesting a renewal should be submitted to the Water Quality Certification Project Manager or Supervisor at least one month prior to expiration. [Clean Water Act]

T-10 Other permits from the Division of Water may be required for this activity. If this activity occurs within a floodplain, a Permit to Construct Across a Stream may be required. Please contact the Floodplain Management Section Supervisor (502-564-3410) for more information. If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre of more of land, a Kentucky Pollution Discharge Elimination System (KPDES) Stormwater Permit shall be required. Please contact Surface Water Permits Branch (502-564-3410 or SWPBSupport@ky.gov) for more information. [Clean Water Act]

Attachment 1

General Conditions for Water Quality Certification as Referenced in Condition T-8

1. The Kentucky Division of Water may require submission of a formal application for an Individual Certification for any project if the project has been determined to likely have a significant adverse effect upon water quality or degrade the waters of the Commonwealth so that existing uses of the water body or downstream waters are precluded.
2. Nationwide permits issued by the U.S. Army Corps of Engineers for project in Outstanding State Resource Waters, Cold Water Aquatic Habitats, and Exceptional Waters as defined by 401 KAR 10:026 shall require individual water quality certifications.
3. Projects requiring in-stream stormwater detention/retention basins shall require individual water quality certifications.
4. Erosion and sedimentation pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur.
5. Sediment and erosion control measures (e.g., check dams, silt fencing, or hay bales) shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, placement shall not be conducted in such a manner that may cause instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control measures shall be removed and the natural grade restored prior to withdrawal from the site.
6. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse.
7. To the maximum extent practicable, all in-stream work under this certification shall be performed during low flow.
8. Heavy equipment (e.g., bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances where such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize re-suspension of sediments and disturbance to the channel, banks, or riparian vegetation.
9. If there are water supply intakes located downstream that may be affected by increased turbidity, the permittee shall notify the operator when work will be performed.
10. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.

11. Should stream pollution, wetland impairment, and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/564-2380.

APPENDIX C

Section 3 Tables

Table C- 1. Select characteristics of mapped soil units at the Evelyn Project (Sources: USDA NRCS, 2020; Kentucky Office of Technology, Division of Geographic Information, 2020; and Lock 13 Partners, 2019, as modified by staff).

Soil Type	Slope	Landform	Drainage Class	Flooding	Capacity to Transmit Water[1]	Erosion Hazard Rating,[2] and Kf surface[3]
Grigsby-Chavies-Yeager complex	2 to 55 percent	Floodplain steps, natural levees	Well drained	Frequent	High	Moderate, 0.10
Elk silt loam	0 to 2 percent	Terraces	Well drained	Rare	Moderately High to High	Slight, 0.43
Bledsoe silt loam	20 to 65 percent	Very rocky hillslopes	Well drained	None	Moderately Low to Moderately High	Severe, 0.37

[1] Measured as Ksat, or saturated hydraulic capacity, is an indicator of seepage potential in the upper 60 inches.

[2] Erosion hazard ratings are based on slope, soil erosion factor K, and the content of rock fragments. They indicate potential soil loss from on- and off-road/trail-areas after soil-disturbing activities. "Slight" = erosion is unlikely under ordinary climatic conditions. "Moderate" = some erosion is likely; erosion control measures and periodic road/trail maintenance may be needed. "Severe" = erosion is very likely; erosion control measures (e.g., revegetation of bare areas), are advised; and roads/trails likely require frequent maintenance (USDA NRCS, 2020).

[3] The K factor is a soil erodibility measurement ranging from 0.02 to 0.69. Kf surface quantifies detachment of soil particles less than 2.0 millimeters (mm). K is equivalent to Kf for most soils. The higher the K value, the more susceptible the soil is to erosion. K factors may increase if subsoil is exposed, organic matter depleted, soil structure is destroyed, or permeability is reduced due to compaction (Institute of Water Research, 2002; USDA NRCS, 2020).

Table C- 2. Monthly flow data (cfs) at Lock and Dam No. 13, based on records from USGS gage no. 03282000 Kentucky River at Heidelberg, Kentucky (Period of Record: 1963-2018) (Source: Lock 13 Partners, as modified by staff).

Month	Min.	Flow Exceeded 90 percent of time	Flow Exceeded 75 percent of time	Flow Exceeded 50 percent of time	Flow Exceeded 25 percent of time	Flow Exceeded 10 percent of time	Max.
January	175	900	1,797	3,672	8,033	13,926	77,642
February	187	1,594	2,572	4,449	8,603	15,145	77,537
March	672	2,080	33,136	5,637	10,201	17,322	84,453
April	597	1,472	2,369	4,228	8,406	14,873	63,706
May	360	747	1,260	2,412	5,505	11,336	90,006
June	86	326	558	1,039	2,461	6,093	48,827
July	47	286	476	791	1,574	3,384	41,493
August	47	188	319	589	1,143	2,488	22,947
September	50	144	231	399	827	2,004	44,322
October	76	188	315	594	1,182	2,589	52,809
November	110	326	553	1,110	2,838	6,539	56,686
December	131	493	1,003	2,730	6,226	12,031	83,614

Note: The Heidelberg gage is located about 9 miles upstream of the project and has a drainage area of about 2,657 square miles. Flows were pro-rated to the project using the formula 2,784/2,657.

Table C- 3. Estimated seasonal fish entrainment by family and total seasonal and annual entrainment (Source: Lock 13 Partners, as modified by staff).

Family	**Fall**	**Winter**	**Spring**	**Summer**	**Total Individuals**
Centrarchidae (sunfish)	115	724	1,868	1,431	4,138
Ictaluridae	162	462	1,195	2,304	4,123
Cyprinidae	13	59	200	256	528
Anguillidae	0	0	6	4	10
Catostomidae	14	245	2,133	147	2,539
Clupeidae	7	157	120	0	284
Percidae	0	13	25	8	46
Centrarchidae (bass)	2	17	462	99	580
Salmonidae	0	0	2	0	2
Moronidae	3	17	62	44	126
Escocidae	6	35	124	88	253
Total Individuals	322	1,729	6,197	4,381	12,629

Table C- 4. Estimated fish mortality rates by family at the Evelyn Project (Source: Lock 13 Partners).

Family	Average mortality rate used (percentage)
Centrarchidae (sunfish)	45.42
Ictaluridae	0.00
Cyprinidae	80.00
Anguillidae	0.00
Catostomidae	21.57
Clupeidae	92.86
Percidae	21.28
Centrarchidae (bass)	12.39
Salmonidae	17.65
Moronidae	12.39
Escocidae	51.11

Table C- 5. Estimated seasonal and annual mortality of fishes by family at the Evelyn Project (Source: Lock 13 Partners, as modified by staff).

Family	Fall	Winter	Spring	Summer	Total Individuals
Centrarchidae (sunfish)	52	329	848	650	1,879
Ictaluridae	0	0	0	0	0
Cyprinidae	10	47	160	205	422
Anguillidae	0	0	0	0	0
Catostomidae	3	53	460	32	548
Clupeidae	7	146	111	0	264
Percidae	0	3	5	2	10
Centrarchidae (bass)	0.2	2.1	57	12	72
Salmonidae	0	0	0.4	0	0
Moronidae	0	2	8	5	16
Escocidae	3	18	63	45	129
Total Individuals	76	600	1,714	951	3,340

Table C- 6. Land cover type within a 1,000-meter (0.6-mile) buffer of the proposed Evelyn Project impoundment (Source: Lock 13 Partners, as modified by staff).

Land Cover Type	**Acreage**	**Percentage**
Forested upland	6,753.2	92.82
Agricultural Fields	253.1	3.48
Maintained Lawn	31.6	0.43
Barren	12.7	0.17
Roads	225.4	3.10
Total	**7,276**	**100**

Table C- 7. Special status terrestrial species that may occur in Lee County, Kentucky (Source: Kentucky DFWR, 2020b; NatureServe, 2020).

Common Name (*Scientific Name*)	**Federal Status**	**State Status/ Rank**	**Distribution/ Habitat Notes**
Plants			
Running buffalo clover (*Trifolium stoloniferum*)	E[70]	T/S2	Perennial herb found in Indiana, Ohio, Missouri, West Virginia, and Kentucky; occurs in moderately disturbed, mesic woodlands underlain with limestone and low phosphorus soils.
Mammals			
Virginia big-eared bat (*Corynorhinus townsendii*)	E	E/S1	Appalachian mountains, known from 15 caves in Virginia, West Virginia, North Carolina, and Kentucky; hibernates in cool, well-ventilated caves in limestone karst regions with mature hardwood forests; maternity colonies use deep portions of caves.
Gray bat (*Myotis grisescens*)	E	T/S2	Primary range includes cave regions of Alabama, Arkansas, Kentucky, Missouri, Tennessee, and a small but increasing population in Indiana; roosts in caves year-round; population concentrated in less than 20 caves for hibernation; summer caves usually within 1 kilometer (km) of forested areas of rivers or reservoirs for foraging.
Northern long-eared bat (*Myotis septentrionalis*)	T	E/S1	Broad, patchy range in southern Canada and eastern and northcentral U.S.; many hibernacula (e.g., primarily caves and mines) and roost sites; summer roosts in interior, late succession forested areas; forages in forests, forest edges/clearings, and over ponds.
Indiana bat *(Myotis sodalis)*	E	E/S1	Range includes eastern and midwestern U.S.; primarily uses a few hibernacula in Indiana, Missouri, Kentucky, and Illinois; maternity roosts behind loose tree bark or in cavities; forages in riparian areas, upland forests, fields, and over ponds.

[70] FWS proposed delisting this species. *See* 84 Fed. Reg. 44,832-44,841 (August 27, 2019).

Common Name (*Scientific Name*)	**Federal Status**	**State Status/ Rank**	**Distribution/ Habitat Notes**
Rafinesque's big-eared bat *(Corynorhinus rafinesquii)*	N/A	S/S3	Range includes southeastern U.S. in very small groups or single individuals; nonmigratory, typically residing in caves year-round; forages in bottomland hardwoods, forests, open fields, and riparian areas.
Southeastern myotis *(Myotis austroriparius)*	N/A	E/S1	Widespread range in the southeastern U.S.; roosts in caves, hollow trees and human structures (i.e. barns, bridges, and attics); forages over water.
Eastern small-footed Myotis *(Myotis leibii)*	N/A	T/S2	Broad range including the U.S. and Canada from Ontario to Georgia; spring and summer roosts include human structures, hollow trees, and caves/cave-like features; hibernacula are cold, dry areas in caves; forages on insects in forests, forest edges, and over water.
American black bear (*Ursus americanus*)	N/A	S/S4	Range includes North America north of central Mexico, except the desert region of the southwestern U.S.; occurs in various forested habitats and river floodplains.
Birds			
Sharp-shinned hawk *(Accipiter striatus)*	N/A	S/S3	Range includes much of North, Central, and South America; typically found in pine, fir, and aspen forests.
Brown creeper *(Certhia americana)*	N/A	E/S1	Widespread throughout North America and as far south as northern Nicaragua; preferred habitat includes forests, woodlands, forested floodplains, and swamps.
Dark-eyed junco *(Junco hyemalis)*	N/A	S/S2	Ranges throughout North America; occurs in woodland areas with openings and dense ground cover including coniferous and deciduous forests, forest edges, woodland clearings, stream borders, and brushy cover bordering mountain meadows.
Reptiles			
Coal skink *(Eumeces anthracinus)*	N/A	T/S1	Range includes southern and eastern U.S.; found in humid wooded areas with abundant leaf litter and loose rocks, often near springs, swamps, and bogs.

Common Name (*Scientific Name*)	**Federal Status**	**State Status/ Rank**	**Distribution/ Habitat Notes**
Amphibians			
Eastern hellbender *(Cryptobranchus alleganiensis alleganiensis)*	N/A	E/S3	Range includes the Appalachian region and parts of Illinois, Indiana, Oklahoma, and Kansas; inhabits shallow, cool, well oxygenated, and fast-flowing rocky streams and is typically found under woody debris, large flat rocks, or rock ledges.
Insects			
Sixbanded longhorn beetle *(Dryobius sexnotatus)*	N/A	T/S2	Range includes eastern U.S.; inhabits hardwood forests with large, mature trees; larvae develop in dead/dying sugar maples, elms, ash, beech, and American basswood; adults are diurnal and fly primarily June through July (Diesel *et al.*, 2017).

E – Endangered

T – Threatened

S – Special Concern

N/A – not applicable

S1– At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors (NatureServe, 2020).

S2 – At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors (NatureServe, 2020).

S3 – At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors (NatureServe, 2020).

S4 – At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors (NatureServe, 2020).

APPENDIX D

COST OF ENVIRONMENTAL MEASURES

Enhancement/ Mitigation Measure	Entity	Capital Cost [a] (2020$)	Annual Cost [b] (2020$)	Levelized Annual Cost [c] (2020$)
Geology and Soil Resources				
1. Develop and implement a soil erosion and sediment control plan.	Applicant, Kentucky DEP, Staff	$4,000 [d]	$0	$276
2. Avoid disturbing the clay capped, lead-contaminated soils adjacent to the esplanade during project construction.	Applicant, Staff (as described in item 3 below)	$0 [e]	$0	$0
3. Include, in the proposed erosion and sediment control plan, provisions to: (1) avoid disturbing clay capped, lead-contaminated soils; (2) consult with Kentucky DEP's Divisions of Water and Waste Management during plan development; and (3) and consult with Kentucky DEP's Division of Waste Management if clay capped soils cannot be avoided or are inadvertently disturbed during project construction.	Staff	$0 [e]	$0	$0

Enhancement/ Mitigation Measure	Entity	Capital Cost [a] (2020$)	Annual Cost [b] (2020$)	Levelized Annual Cost [c] (2020$)
Aquatic Resources				
4. Run-of-River Operation	Applicant, Kentucky DEP, Staff	$0	$0	$0
5. Implement the Operation Compliance Monitoring Plan	Applicant, Staff	$5,000	$0	$336
6. Implement the Water Quality Monitoring Plan	Applicant, Kentucky DEP, Staff	$15,000	$3,000	$4,020
7. Low Flow Restrictions (project shutdown) during low flow periods to provide drinking water	Applicant, Kentucky DEP, Staff	$0	$2,670	$2,670
8. Implement the Trashrack Design and Maintenance Plan	Applicant, Kentucky DEP, Staff	$20,000	$0	$1,368
Terrestrial Resources				
9. Implement the following avian protection measures: (1) use a combined main transformer and main breaker; (2) use a pad mount for the combined main transformer/main breaker; (3) install animal protection guards on any exposed bushings on the pole-mounted auxiliary power transformers; and (4) arrange	Applicant, Staff	$3,000 [d]	$0	$204

Enhancement/ Mitigation Measure	Entity	Capital Cost [a] (2020$)	Annual Cost [b] (2020$)	Levelized Annual Cost [c] (2020$)
conductors on the overhead transmission line cross arms consistent with APLIC and FWS's Avian Protection Plan Guidelines.				
10. Develop and implement an Avian Protection Plan with provisions to maintain the proposed avian protection measures, train personnel, and identify and address avian impacts during project operation.	Staff	$5,000	$0	$336
Threatened and Endangered Species				
11. Mark and avoid running buffalo clover during construction of transmission lines	Applicant, Staff	$500 [d]	$0	$36
12. Modify Lock 13 Partners' proposal to mark and avoid running buffalo clover during construction of the proposed transmission line, to include construction of the proposed canoe portage route and take-out point.	Staff	$500 [f]	$0	$36
13. Restrict tree removal/trimming to the period between November 15 and March 31	Applicant, Staff	$0	$0	$0

Enhancement/ Mitigation Measure	Entity	Capital Cost [a] (2020$)	Annual Cost [b] (2020$)	Levelized Annual Cost [c] (2020$)
14. Avoid disturbing roosting or swarming bats	Applicant, Staff	$0	$0	$0
Recreation and Land Use				
15. Construct Canoe Portage	Applicant, Kentucky DFWR, Staff	$50,000	$0	$3,408
16. Construction Other Recreation Features (parking and access road improvements, picnic table, composting toilet)	Applicant, Kentucky DFWR, Staff	$10,000	$0	$684
17. Recreational signage	Applicant, Kentucky DFWR, Staff	$4,000	$0	$276
18. Recreation facility maintenance	Applicant, Kentucky DFWR, Staff	$0	$8,000	$8,000
19. Monthly visual inspection of recreation facilities.	Staff	$0	$1,500 [d]	$1,500
20. Assessment of recreation use and facility condition every 10 years.	Staff	$4,000 [d]	$0	$276
Cultural Resources				
21. Implement a HPMP	Applicant, Kentucky SHPO, Staff	$10,000	$500	$1,184

[a] Capital costs include all construction and one-time costs.
[b] Annual costs typically include operational and maintenance costs and any other costs which occur on a yearly basis.
[c] All capital and annual costs are converted to equal annual costs over a 30-year period to give a uniform basis for comparing costs.
[d] Cost provided by Lock 13 Partners in its February 7, 2020 filing.
[e] Staff assumes that these measures are included in project construction costs and there would be no additional cost.
[f] Staff assumes that the cost of marking and avoiding any occurrences of running buffalo clover on the proposed canoe portage route and take-out point would be similar to the cost of resurveying the proposed transmission line corridor prior to construction.

APPENDIX E

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APPENDIX F

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