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Niagara Hydroelectric Project

FERC No. 2466

Proposed Study Plan Meeting

August 1, 2019

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Meeting Agenda

9 a.m. – 9:30 a.m.	**Introduction** Meeting Objectives Process Plan and Schedule Project and Study Plan Overview
9:30 a.m. – 12:00 p.m. **(15-min. break)**	**Aquatic Studies** Flow and Bypass Reach Aquatic Habitat Fish Community Benthic Aquatic Resources
12:00 p.m. – 1:00 p.m.	**Lunch Break (on your own)**
1:00 p.m. – 4:00 p.m.	**Recreation Study**
	Water Quality Study
	Terrestrial and Shoreline Studies Wetlands, Riparian, and Littoral Habitat Shoreline Stability
	Cultural Resources
4:00 p.m. – 4:30 p.m.	**Closing** Next Steps / Filing Comments on the PSP Open Discussion Adjourn

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Meeting Objectives

- Appalachian Power Company (Appalachian) is pursuing a new license for the Niagara Hydroelectric Project (Project) from the Federal Energy Regulatory Commission (FERC) through the Integrated Licensing Process (ILP) (18 CFR Part 5).
- Current FERC license expires February 29, 2024.
- Appalachian developed a Proposed Study Plan (PSP) - filed with FERC on July 9, 2019.
- The objectives of this PSP Meeting are to:
  - Review the process plan, schedule, and key dates;
  - Provide clarification of the PSP, if needed, and discuss proposed studies and study needs with stakeholders; and
  - Address any outstanding issues regarding the PSP.

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Process Plan and Schedule

Major Milestones	Responsible Party	Dates (Deadline)
File PAD and NOI (18 CFR §5.5(d))	Appalachian	January 28, 2019
Issue Notice of PAD/NOI and SD1 (18 CFR §5.8(a))	FERC	March 26, 2019
File Proposed Study Plan (PSP) (18 CFR §5.11(a))	Appalachian	July 9, 2019
Study Plan Meeting (18 CFR §5.11(e))	**Appalachian**	**August 1, 2018** (August 8, 2019 Deadline)
Comments on PSP (18 CFR §5.12)	Stakeholders	October 7, 2019
File Revised Study Plan (RSP) (18 CFR §5.13(a))	Appalachian	November 6, 2019
Comments on RSP Due (18 CFR §5.13(b))	Stakeholders	November 21, 2019
Issuance of Study Plan Determination (18 CFR §5.13(c))	FERC Director	December 6, 2019
Initial Study Report (ISR) (18 CFR §5.15(c)(1))	Appalachian	December 5, 2020
File Draft License Application (18 CFR §5.16(a))	Appalachian	October 1, 2021
File Updated Study Report (USR) (18 CFR §5.15(f)) (if necessary)	Appalachian	December 5, 2021
File Final License Application (18 CFR §5.17)	Appalachian	February 28, 2022

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Project Overview

- Licensee is Appalachian, a unit of American Electric Power (AEP).
- The Niagara Hydroelectric Project (FERC No. 2466) is a 2.4-MW Project on the Roanoke River in Roanoke County, Virginia.
- Run-of-river project with concrete ogee spillway dam and 62-acre reservoir, intake, metal penstock, and concrete powerhouse.
  - Two vertical shaft 1.2-MW Francis units.
  - Hydraulic capacities: Unit 1 - 379 cfs, Unit 2 - 305 cfs (station total 683 cfs).
- Project constructed in 1906.

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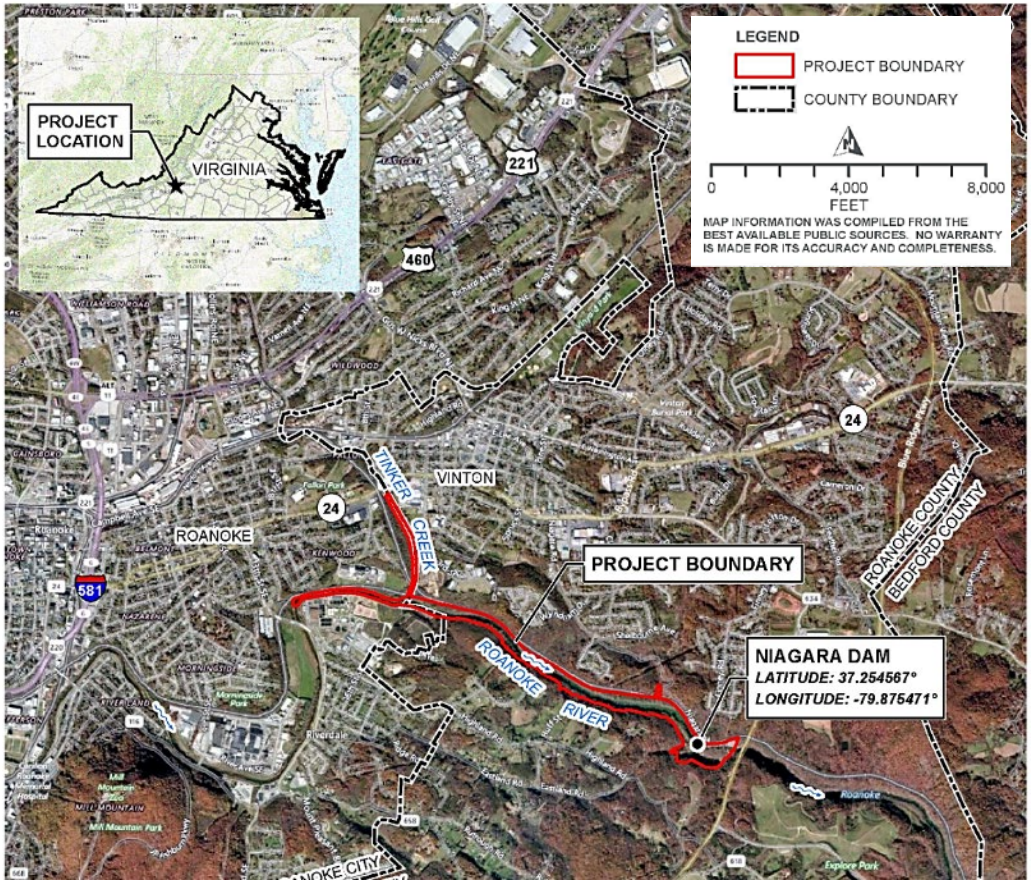
Project Location and Facilities

- The Project is approximately 6 miles southeast of the City of Roanoke.
- The reservoir formed by Niagara dam is approximately 2 miles long and includes the confluence with Tinker Creek.



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Project Location and Facilities

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Project Operations

- The Project operates in run-of-river mode under all flow conditions, with outflows approximating inflows.
- Reservoir elevation maintained at or near 884.4 feet (0.6 feet below the crest of the spillway).
- Required minimum flow below the Project of 50 cubic feet per second (cfs) or inflow, whichever is less. Of the 50 cfs, 8 cfs must be released to the bypass reach to prevent fish stranding.
- Excess flows (greater than discharge capacity of the powerhouse) are passed over and through the main spillway.
- If tailwater elevation at the powerhouse reaches 832.0 feet, the generating units are shut down due to head-loss.

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Project Operations

- Operation and generation at the Project is remotely controlled from AEP's 24-hour control center in Columbus, OH. Station personnel are present at the Project typically daily, Monday-Thursday, and on an on-call basis, 24-hours per day, 365 days per year.

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Proposed Study Plan Overview

- The PSP was filed with FERC on July 9, 2019 (18 CFR § 5.11) and distributed to the Project mailing list.
- The PSP describes Appalachian's study approaches, with consideration of required study criteria, study requests, and stakeholder comments.

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Proposed Study Plan Overview

- Formal study requests were submitted by:
  - Federal Energy Regulatory Commission
  - U.S. Fish and Wildlife Service
  - Virginia Department of Game and Inland Fisheries
  - Virginia Tech
- Informal study requests and/or comments were submitted by:
  - U.S. Environmental Protection Agency
  - National Park Service
  - Virginia Department of Environmental Quality
  - Town of Viton
  - Roanoke County
  - Roanoke River Blueway Committee
  - Roanoke Valley Greenway Commission
  - Tri-County Lakes Administrative Commission

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Required Study Plan Criteria (18 CFR §5.9(b))

1. Describe the goals and objectives of each study proposal and the information to be obtained.
2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.
3. If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.
4. Describe existing information concerning the subject of the study proposal, and the need for additional information.
5. Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.
6. Explain how any proposed study methodology is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.
7. Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

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Proposed Studies

- Flow and Bypass Reach Aquatic Habitat Study
- Fish Community Study
- Benthic Aquatic Resources Study
- Water Quality Study
- Wetlands, Riparian, and Littoral Habitat Characterization Study
- Shoreline Stability Assessment Study
- Recreation Study
- Cultural Resources Study

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Study Area

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Flow and Bypass Reach Aquatic Habitat Study

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Flow and Bypass Reach Aquatic Habitat Study: Goals and Objectives

- **Study Goal:** Conduct a flow and habitat assessment of the Project's tailwater and bypass reach.
- **Specific Objectives:**
  - Identify and characterize locations of habitat management interest in the bypass reach (delineate and quantify aquatic habitat and substrate types)
  - Develop relationships between flow, depth and wetted area in the tailwater and bypass reach at the existing minimum flow requirements and various combinations of tailwater and bypass reach flow scenarios;
    - Evaluate the effects of providing higher seasonal minimum flows to the bypass reach
    - Evaluate the need for ramping rates related to potential fish stranding

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Flow and Bypass Reach Aquatic Habitat Study

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Flow and Bypass Reach Aquatic Habitat Study

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Flow and Bypass Reach Aquatic Habitat Study: Background and Existing Information

- Niagara bypass is ~1,500 ft, exposed bedrock and rock outcroppings
- Required minimum flow below the Project of 50 cfs or inflow, whichever is less. Of the 50 cfs, 8 cfs must be released to the bypass reach to prevent fish stranding
- Powerhouse discharge capacity is 683 cfs
- If Project inflow exceeds the powerhouse discharge capacity, excess flow is passed through the sluice gate and/or over the spillway
- As a result, flow in the bypass reach can be highly variable, depending on season and precipitation

Flow and Bypass Reach Aquatic Habitat Study: Background and Existing Information

- Computerized Hydro Electric Operations Planning Software (CHEOPS™)
  - Historical flow data from USGS gage 02056000 (Roanoke River at Niagara, VA, immediately downstream of the Project): October 1926 through present, 93-years of record
  - 30-year period (1/1/1988 – 12/31/2017) was used for CHEOPS modeling purposes
  - Flow was adjusted based on drainage area specific to Niagara development
- Other physical data: reservoir storage volume, sluice gate capacity, spillway capacity, and tailwater rating curves

Flow and Bypass Reach Aquatic Habitat Study: Project Nexus

- Powerhouse and spillway operations can alter the timing, rate, and spatial distribution of Project inflows.
- Alterations in downstream flows have the potential to effect aquatic species and habitat in the bypass reach and tailwater areas, particularly during periods of low flow or intermittent releases over the spillway.

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Flow and Bypass Reach Aquatic Habitat Study: Methodology

Task 1	
Literature Review and Desktop Assessment	*Review existing information* • Hydrologic record • Existing operations • Topographic/substrate maps • Aerial imagery
	Delineation of mesohabitats • Pools • Runs • Riffles • Glides • Shoals
	Selection of species of interest will be made depending on management objectives
Task 2	
Topography Mapping and Photogrammetry Data Collection	• LiDAR and photogrammetry data (or similar) during period of low/no flow • Field surveys for inundated areas

Flow and Bypass Reach Aquatic Habitat Study: Methodology

Task 3	
Field Data Collection	*Mesohabitat Mapping Verification* • Selection of representative mesohabitats for field verification • Photographed and GPS documented • Spawning habitat will be noted
	Flow and Water Level Assessment • Three target flows of interest will be released into the bypass reach via the sluice gate • Water level data loggers will record water depth • Photographs and/or video will be collected • Total flow in the tailwater and bypass reach will be determined by generation and sluice gate opening calculations or in-channel flow measurements
	Substrate Characterization and Mapping • Substrate mapping based on photogrammetry and site visit • Wolman pebble count (or similar) to provide substrate characterization

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Flow and Bypass Reach Aquatic Habitat Study: Methodology

Task 4	
Hydraulic Modeling Development	• Calibrate HEC-RAS 2-D hydraulic model based on field data collected during target flow releases • Simulate flow conditions and sluice gate operations • Develop relationships between travel time, rise in water surface elevation, and velocities at locations of interest under the different flow regimes
Task 5	
Aquatic Habitat Evaluation	• Depths under each flow release scenario will be overlaid on base maps to determine incremental changes in depth and wetted area in the bypass reach • HEC-RAS 2-D model results will be reviewed for potential stranding issues in the bypass reach • Habitat Suitability Indices (for species of interest) will be evaluated using the HEC-RAS model results to determine potential available habitat under the modeled flow scenarios

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Flow and Bypass Reach Aquatic Habitat Study: Analysis and Reporting

- As part of the study report, the results will include:
  - Summary of topographic and photogrammetry results
  - Relationship between flow and water depth/wetted area
  - Relationship between sluice gate openings and flow releases
  - Details on HEC-RAS 2-D model development
  - Evaluation of potential available aquatic habitat for species of interest:
    - Frequency and total area of mesohabitat types within each bypass reach
    - Substrate characterization (mapping and Wolman pebble counts)
    - Modeled results for water velocity and depth
    - Evaluation of connectivity in the bypass reach under modeled scenarios

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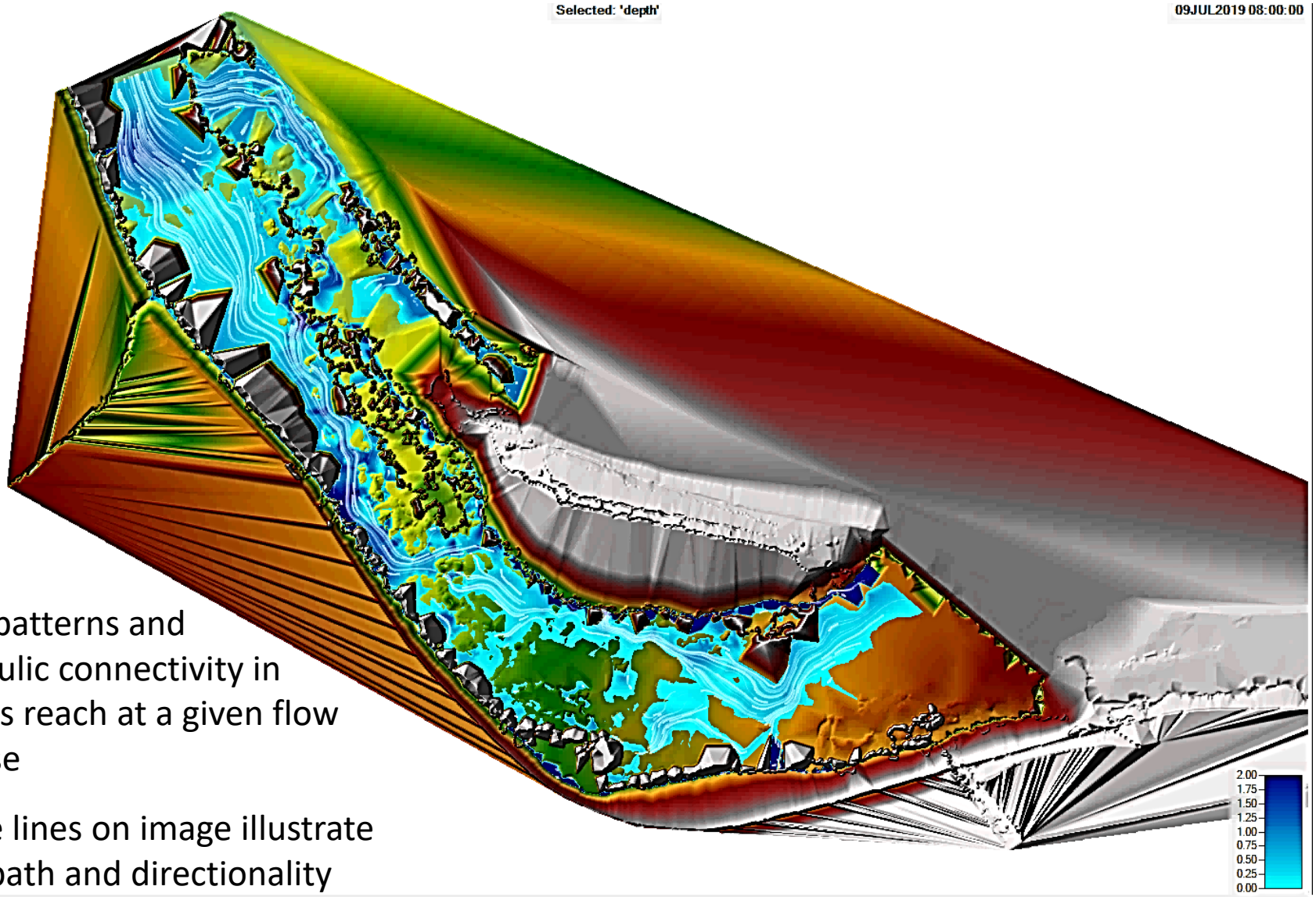
Example HEC-RAS 2-D Model Results



- Flow patterns and hydraulic connectivity in bypass reach at a given flow release
- White lines on image illustrate flow path and directionality

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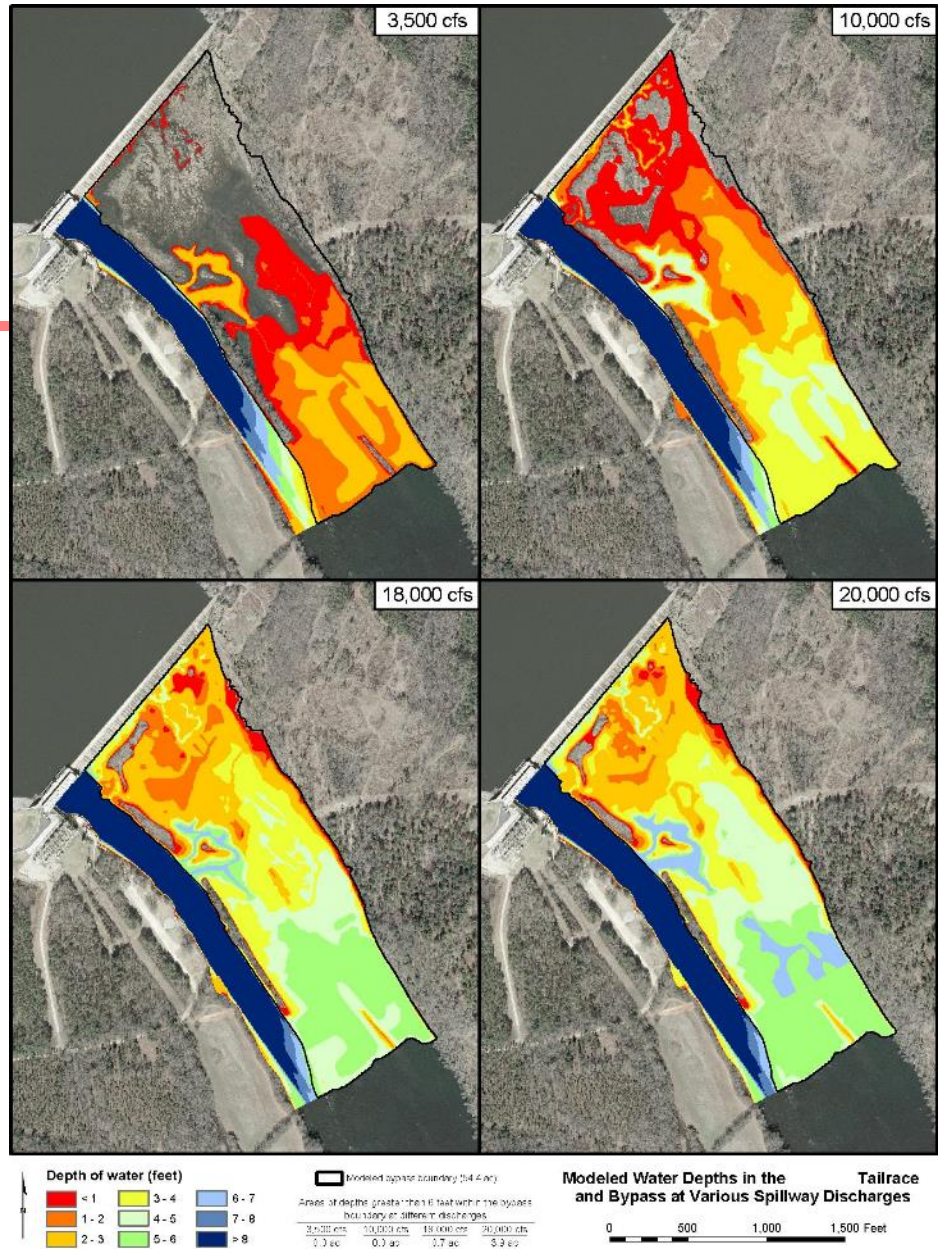
Example HEC-RAS 2-D Model Results

- Water depths in bypass reach at various flow releases
- Red is most shallow, dark blue is greatest depths



Flow and Bypass Reach Aquatic Habitat Study: Schedule and Level of Effort

- Level of effort: ~1,000 hours
- Cost: ~$150,000

Task	Proposed Timeframe for Completion
Literature Review and Desktop Assessment	September – November 2019
Topographic Mapping and Photogrammetry Data Collection	Fall 2019
Distribute Proposed Flow Test Scenario Framework to Interested Parties for Review	Spring 2020
Mesohabitat Mapping and Substrate Characterization Field Data Collection	Summer 2020
Conduct Flow and Water Level Assessment and Hydraulic Model Development	June - October 2020
Distribute Draft Study Report with the ISR	December 2020

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Fish Community Study

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Fish Community Study: Goals and Objectives

- **Study Goal:** Obtain current information on the fish community in the Roanoke River in the vicinity of the Project to support an analysis of Project effects
- **Specific Objectives:**
  - Collect comprehensive baseline of the existing fish community in the vicinity of the Project
  - Compare current fish community data to historical data to evaluate changes to species composition, abundance, or distribution
  - Confirm intake velocities to evaluate the potential of fish impingement or entrainment

Fish Community Study: Background and Existing Information

- **1990's Fish Surveys**
  - Electrofishing, hoop netting, and gill netting; reservoir and riffle/run habitat up- and downstream
  - Warmwater fish community: sunfish, bass, redhorse, carp, shad, suckers, shiners, catfish, and four Roanoke Logperch* (*protected species, collected upstream and downstream of Project)
  - Longitudinal trend of increasing catch rate, species richness, and abundance from upstream to downstream sites
    - New site added in 1991 (0.5-mi below dam) exhibited greater abundance and species richness than upstream reservoir and riffle/run sites. Three Roanoke Logperch were collected at this location (the most downstream extent of Study Area)
    - In 1992, additional 1.25-mi reach below dam was evaluated to identify available habitat for and presence of Roanoke Logperch

Fish Community Study: Background and Existing Information

- **Stocking**
  - Supplemental stocking has not been performed at the Project
  - Stocking has been performed downstream at Smith Mountain Lake
    - Roanoke-strain Striped Bass
    - Tiger Bass®

Smith Mountain Lake

www.visitroanokeva.com

Fish Community Study: Background and Existing Information

- **1990's Impingement and Entrainment Study**
  - Determined the amount of entrainment and impingement mortality at the Project was negligible

Fish Community Study: Project Nexus

- Potential Project effects may include insufficient flows in downstream or bypass reach, water quality or sedimentation effects, fluctuations in reservoir elevations, and possible impingement or entrainment

Fish Community Study: Methodology

Task 1	
Fish Community Study	*Sampling Requirements:* Special permit or skilled surveyor requirements (i.e., Roanoke Logperch) will be identified and obtained in coordination with USFWS and VDGIF.
	Field sampling • May-June and August-September 2020 • Sample sites overlap historical sites (identified on next slide) • Methodology: electrofishing (boat/backpack) and/or seines, hoop nets, gillnets, snorkel surveys (pending approval) • Targeted Roanoke Logperch sampling • Electrofishing and snorkel surveys (Appalachian 1992; Rosenberger and Angermeier 2003; Anderson et al. 2013) • Fish will be enumerated and identified to species; up to 30 individuals per taxon will be measured, weighed and examined
	• Calculate catch per unit effort (CPUE) and develop indices of biotic integrity for c*omparison of study results* to historical data to detect trends or changes in the fish community.

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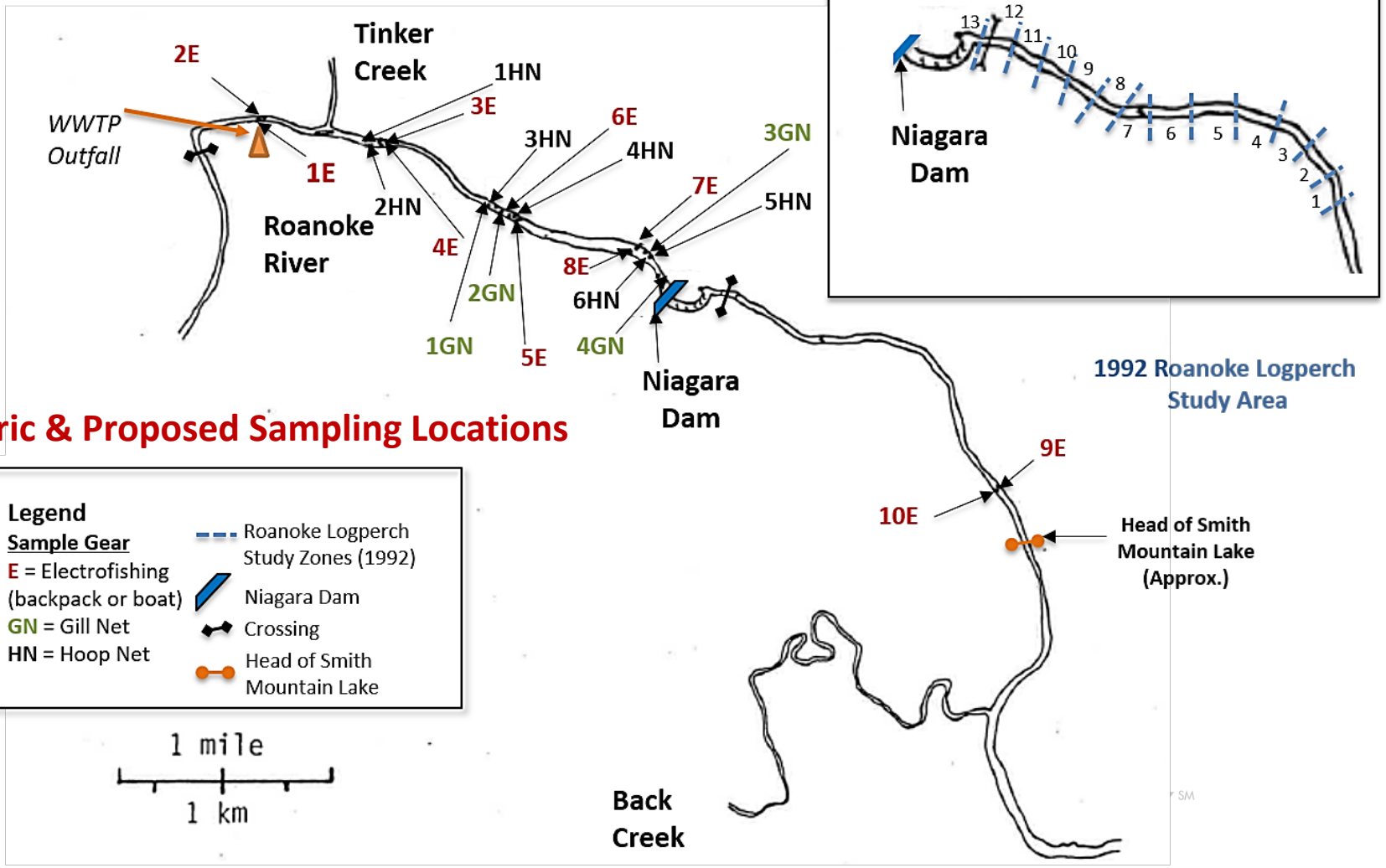
Fish Community Study: Methodology



Historic & Proposed Sampling Locations

Fish Community Study: Methodology

Task 2	
Impingement and Entrainment Desktop Study	*Develop characterization of existing Intake* • Documentation of the intake dimensions and operational parameters
	Perform verification of intake velocities • Velocities will be measured 1 ft in front of the existing trash racks using an acoustic Doppler current profiler • Maximum and efficient generation rates
	Perform assessment of entrainment and impingement potential at the intake • Results of the fish surveys will be used to describe the fish community that may be susceptible to impingement or entrainment • Targeted species list based on fish community composition and abundance in the reservoir • Swim speed, behavior, habitat preferences, life stages, and other life history characteristics will be considered
	A comparison of intake velocities and fish community composition will be made against historical data to evaluate any changes in fish community risk.

Fish Community Study: Analysis and Reporting

- As part of the study report, the results will include:
  - Spatial and temporal trends in fish community composition and abundance across the study area
  - Document habitat and species presence for Roanoke Logperch
  - Evaluation of risk to impingement or entrainment at the intake under existing conditions and fish community
  - Raw data

Fish Community Study: Schedule and Level of Effort

- Level of effort: ~500 hours
- Cost: ~$125,000

Task	Proposed Timeframe for Completion
Study Planning and Existing Data Review	September 2019 – April 2020
Fish Community Study	May 2020 – September 2020
Desktop Impingement and Entrainment Evaluation	December 2019 – November 2020
Distribute Draft Study Report with the ISR	December 2020

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Benthic Aquatic Resources Study

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Benthic Aquatic Resources Study: Goals and Objectives

- **Study Goal:** Obtain information on the benthic aquatic community in the Roanoke River in the vicinity of the Project to support an analysis of Project effects
- **Specific Objectives:**
  - Collect a baseline of macroinvertebrate and crayfish community information existing in the vicinity of the Project
  - Quantify the amount of benthic habitat available for macroinvertebrates, crayfish and mussels in the bypass reach
  - Identify potential habitat and characterize mussel communities in the Project area

Benthic Aquatic Resources Study: Background and Existing Information

- **Macroinvertebrates (including Crayfish)**
  - No existing information in the Project area
  - VDEQ macroinvertebrate sampling in the mainstem of the Roanoke River, downstream of the Project
  - Most of the project reach of Roanoke River and Tinker Creek is 303d-listed for benthic community impairment primarily from *E. coli*; dominated by net-spinning caddisfly larvae and midges
    - Low taxa richness and diversity, low numbers of pollution-sensitive taxa
    - Optimal instream habitat, riparian zone vegetation, and bank stability
    - Overgrowth of filamentous algae and periphyton

Benthic Aquatic Resources Study: Background and Existing Information

- **Mussels**
  - No recent surveys in the Project area
  - Species with potential to occur (VDGIF FWIS)

Common Name	Scientific Name	Protected Status
Atlantic pigtoe	*Fusconaia masoni*	ST
Carolina slabshell	*Elliptio congaraea*	
Creeper	*Strophitus undulatus*	
Eastern elliptio	*Elliptio complanata*	
Notched rainbow	*Villosa constricta*	
Triangle floater	*Alasmidonta undulate*	
Yellow lance	*Elliptio lanceolata*	FT
Green floater	*Lasmigona subviridis*	ST
James spinymussel	*Pleurobema collina*	FE, SE

FE: federal endangered, FT: federal threatened, SE: state endangered, ST: state threatened

Benthic Aquatic Resources Study: Project Nexus

- Potential Project effects may include impacts to habitat due to:
  - flow fluctuations
  - sediment deposition in the impoundment
  - diminished sedimentation downstream of the dam
  - reduced transport of particulate matter, nutrients, and plant propagules

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Benthic Aquatic Resources Study: Methodology

Task 1	
Macroinvertebrate and Crayfish Community Study	*Collector's permits* will be obtained with coordination with USFWS and VDGIF for required scientific sampling permits
	Field sampling • Two sampling events, one each during the sample index periods: Mar 1 – May 31, and Sep 1 – Nov 30, 2020 • Reservoir, tailrace, bypass reach; lower reaches of streams entering the Project area • Qualitative and quantitative sampling following VDEQ protocol (2008), habitats sampled in proportion to availability • Kicknetting, dip netting, hester-dendy samplers, rock picking, and baited minnow traps (crayfish)
	Comparison of study results will be made by processing data following the Virginia Stream Condition Index protocol and compared to historical or recent surveys in the Project vicinity

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Benthic Aquatic Resources Study: Methodology

Task 2	
Mussel Habitat and Community Study	*Collector's permits* will be obtained with coordination with USFWS and VDGIF for required scientific sampling permits
	Field sampling • One sampling event between Apr 1 – Oct 1, 2020 • Performed by an approved, qualified mussel surveyor for the Virginia Atlantic Slope (USFWS and VDGIF 2013) • Snorkel and/or SCUBA transect surveys in 10 areas identified as potential mussel habitat
	Comparison of study results will be made with other mussel surveys performed in the Project vicinity

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Benthic Aquatic Resources Study: Methodology

Task 3	
Benthic Habitat Assessment	*Field sampling* • In conjunction with macroinvertebrate and crayfish sampling • Follow VDEQ (2008) protocol and habitat assessment rubrics • Will also incorporate substrate sampling in the Flow and Bypass Reach Aquatic Habitat Study
	Comparison of study results • Macroinvertebrate and crayfish results will be evaluated to assess trends in species composition, abundance, or distribution in the Study area • Assessment will also be reviewed along with the results of the Flow and Bypass Reach Aquatic Habitat Study to evaluate how much habitat could be gained by various flow scenarios

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Benthic Aquatic Resources Study: Methodology

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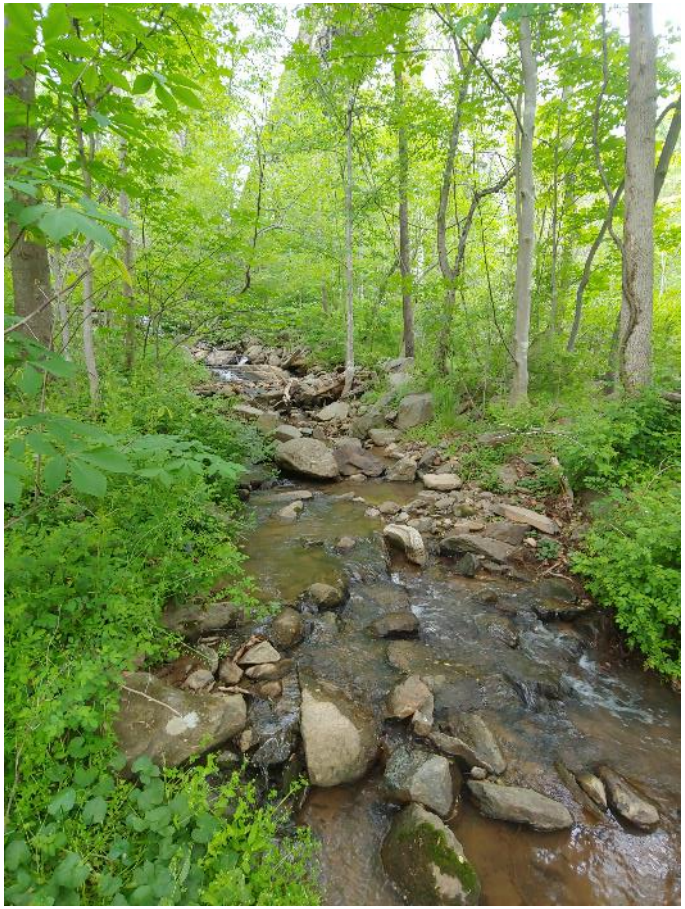
Benthic Aquatic Resources Study: Analysis and Reporting

- As part of the study report, the results will include:
  - Spatial trends in macroinvertebrate, crayfish, and mussel community composition and abundance across the study area
  - Quantification of the amount of benthic habitat available for macroinvertebrates, crayfish, mussels, and fish spawning habitat
  - Raw data



Benthic Aquatic Resources Study: Schedule and Level of Effort

- Level of effort: ~330 hours
- Cost: ~$75,000

Task	Proposed Timeframe for Completion
Study Planning and Existing Data Review	November 2019 – February 2020
Macroinvertebrate and Crayfish Community Study	March – October 2020
Mussel Habitat and Community Survey	March – October 2020
Benthic Habitat Assessment	March – October 2020
Distribute Draft Study Report with the ISR	December 2020

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Recreation Study

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Recreation Study: Goals and Objectives

- **Study Goal:** Determine the need for enhancement to existing recreation facilities, or additional recreational facilities, to support the current and future demand for public recreation in the Project area.
- **Specific Objectives:**
  - Gather information on the condition of the FERC-approved public recreation facility at the Project
  - Characterize current recreational use of the study area and estimate future demand
  - Solicit comments from stakeholders regarding potential enhancement opportunities
  - Evaluate effects of continued Project operation on recreation facilities

Recreation Study: Background and Existing Information

- One formal FERC Project facility included in existing license – canoe portage trail
- Adjacent and overlapping facilities and opportunities:
  - Part of the Roanoke River Blueway (Canoeing, kayaking, tubing, fishing, hiking, walking, jogging, or biking), including the Tinker Creek Canoe Launch (Town of Vinton)
  - Roanoke River Greenway crosses through the Project area just upstream of the confluence of Tinker Creek
  - Project area is immediately upstream of the Blue Ridge Parkway boundary
  - Roanoke River overlook and trail that leads to opposite bank of canoe portage put-in

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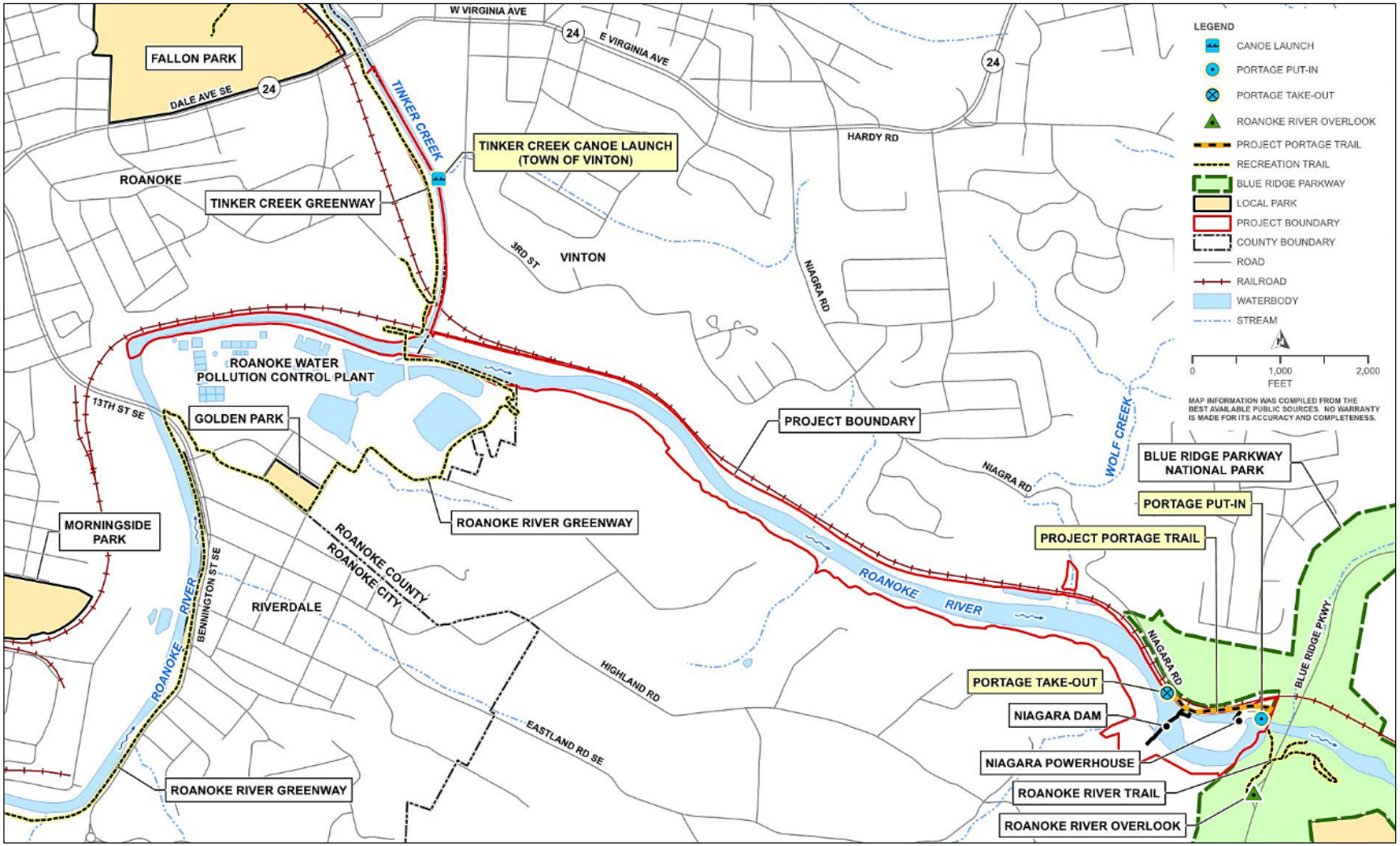
Recreation Study: Background and Existing Information



Recreation Study: Background and Existing Information

Portage Take-Out and Trail

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Recreation Study: Background and Existing Information

Portage Put-In Above Bridge

Recreation Study: Background and Existing Information

Tinker Creek Canoe Launch - Parking

Tinker Creek Canoe Launch

Recreation Study: Background and Existing Information

NPS Overlook Trail and Interpretive Sign

Recreation Study: Project Nexus

- The Project currently provides public recreational opportunities
- The results of this study will inform potential Project effects, recommendations and potential PM&E measures for the new license

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Recreation Study: Methodology

Task 1	
Recreation Facility Inventory and Condition Assessment	*Field inventory of FERC-approved facilities* • Recreation site type (canoe portage trail) and location • Length and type of trails • Existing facilities, signage, and sanitation • Type of vehicular access and parking (if any) • Compliance with Americans with Disabilities Act standards • Photographic documentation

	Qualitative condition assessment
	• The canoe portage trail will be rated with condition criteria, and explanations provided
	  • (N) Needs replacement
	  • (R) Needs repair
	  • (M) Needs maintenance
	  • (G) Good condition

Recreation Study: Methodology

Task 2	
Convene Meeting with Stakeholders	*Meeting and discussion – late summer/fall 2020* • Appalachian will meet with interested stakeholders for a focused discussion of existing and future recreational opportunities at the Project • Discuss conceptual-level enhancement and improvements
Task 3	

Recreation Visitor Use Online Survey	*Recreational use survey*
	• Provide online survey information to stakeholders as well as recreationist who do not frequent the Project regularly
	• Information will include
	  • Resident or visitor
	  • Purpose and duration of visit
	  • Distance traveled
	  • History of site visitation
	  • Type(s) of recreation
	  • Other recreational facility usage information
	  • Level of satisfaction and/or areas that need improvement
	  • Effects from Project operations
	  • Accessibility of facilities

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Recreation Study: Methodology

Task 4	
Recreational Use Documentation	*Trail camera installation* • Two cameras, one each at the canoe portage take-out and put-in • April – September 2020 • Motion activated, date and time stamped
Task 5	
Aesthetic Flow Documentation	• *Key Observation Points (KOP)* will be established with interested stakeholders to characterize and capture the appearance of the dam and bypass reach under a range of flows • Photo and video documentation • November 2019 – November 2020

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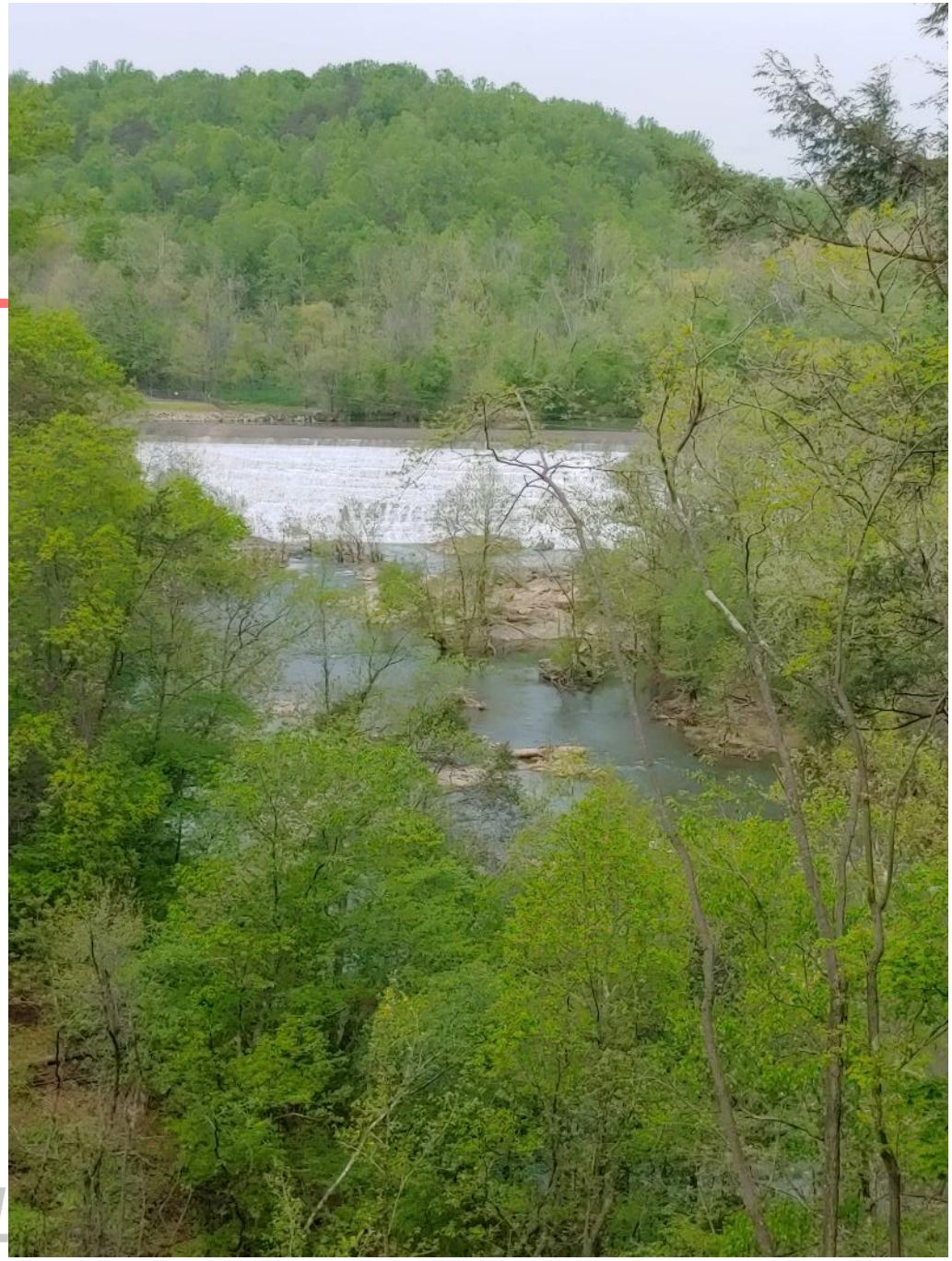
Recreation Study: Analysis and Reporting

- Example KOP



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Recreation Study: Analysis and Reporting (Example Trail Cam Photos)

8/21/2016 10:13

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Recreation Study: Analysis and Reporting (Example Trail Cam Photos)

9/7/2016 6:38

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Recreation Study: Analysis and Reporting (Example Trail Cam Photos)

10/25/2016 11:35

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Recreation Study: Analysis and Reporting (Example Trail Cam Photos)

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Recreation Study: Analysis and Reporting

- As part of the study report, the results will include:
  - An analysis of the current and future recreational facilities usage and needs
  - Evaluation of potential PM&E measures

Recreation Study: Schedule and Level of Effort

- Level of effort: ~400 hours
- Cost: ~$50,000

Task	Proposed Timeframe for Completion
Study Planning and Existing Data Review	November 2019 – March 2020
Aesthetic Flow Documentation	November 2019 – November 2020
Recreational Use Documentation via Cameras	April – September 2020
Recreation Facility Inventory and Condition Assessment, Recreation Visitor Use Online Surveys	April – September 2020
Meeting with Stakeholders	August – October 2020
Distribute Draft Study Report with the ISR	December 2020

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Water Quality Study

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Water Quality Study: Goals and Objectives

- **Study Goal:** Gather baseline water quality data to determine consistency of existing Project operations with VA state water quality standards and designated uses.
- **Specific Objectives:**
  - Gather data to determine if the impoundment undergoes thermal and/or dissolved oxygen (DO) stratification
  - Provide data to support a VA Water Protection Permit application (CWA 401)
  - Evaluate whether additional protection mitigation, and enhancement (PM&E) measures are appropriate for the protection of water quality at the Project

Water Quality Study: Background and Existing Information

- No water quality data available specifically for the Project reservoir or bypass reach
- Data collected nearby by VDEQ and USGS suggest that inflows to and outflows from the Project meet numeric water quality standards
- Multiple reaches within the Project boundary were listed as impaired in the 2018 305(b)/303(d) Water Quality Assessment Integrated Report (VDEQ 2019)
  - Benthic macroinvertebrate bioassessment, mercury, PCBs, E. coli, and temperature
  - Determined to be unrelated to Project operations
- Sedimentation determined to be the main stressor to benthic macroinvertebrates in the upper Roanoke River
- July 2017 fish kill event in Tinker Creek due to herbicide spill
  - Outside of Project boundary and not expected to have long-term effects

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Water Quality Study: Project Nexus

- Meteorological and hydrological conditions (i.e., inflows to the Project reservoir) and operation of the Project, including diversion of flows to the powerhouse for generation and resulting reduction of flow in the bypass reach, may combine to impact water quality (i.e., temperature and DO) in the Project reservoir, powerhouse tailrace, and bypass reach.

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Water Quality Study: Methodology

Task 1	

Continuous Water Temperature and DO Monitoring	• Data sonde deployment: May – September 2020
	• Locations
	  • Upstream of confluence with Tinker Creek
	  • Downstream of confluence with Tinker Creek
	  • Forebay (2 depths)
	  • Tailrace
	  • Bypass reach (up- and downstream)
	• Record at 15-minute intervals
	• Cleaned and calibrated prior to deployment, and monthly
	• Includes collecting data during controlled flow release events into the bypass reach

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Water Quality Study: Methodology

Task 2	

Monthly Water Quality Monitoring	• Depth profiles (1-foot intervals), once per month, May – September 2020
	• *In situ* water quality measurements
	  • Temperature
	  • Dissolved oxygen
	  • pH
	  • Conductivity
	  • Turbidity
	• 2 locations in the forebay

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Water Quality Study: Study Area

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Water Quality Study: Analysis and Reporting

- Study report results will include:
  - Spatial and temporal summary of water quality data findings in areas sampled within the Project impoundment, tailrace, and bypass reach (including characterization of thermal/DO stratification in the impoundment)
  - Documentation of areas, if any, where state water quality standards were not met
  - Evaluation of whether protection, mitigation and enhancement (PM&E) measures may be appropriate
  - Raw data

Water Quality Study: Schedule and Level of Effort

- Level of effort: ~300 hours
- Cost: ~$40,000

Task	Proposed Timeframe for Completion
Study Planning and Existing Data Review	February – April 2020
Continuous and Monthly Water Quality Monitoring (DO and temperature)	May – September 2020
Distribute Draft Study Report with the ISR	December 2020

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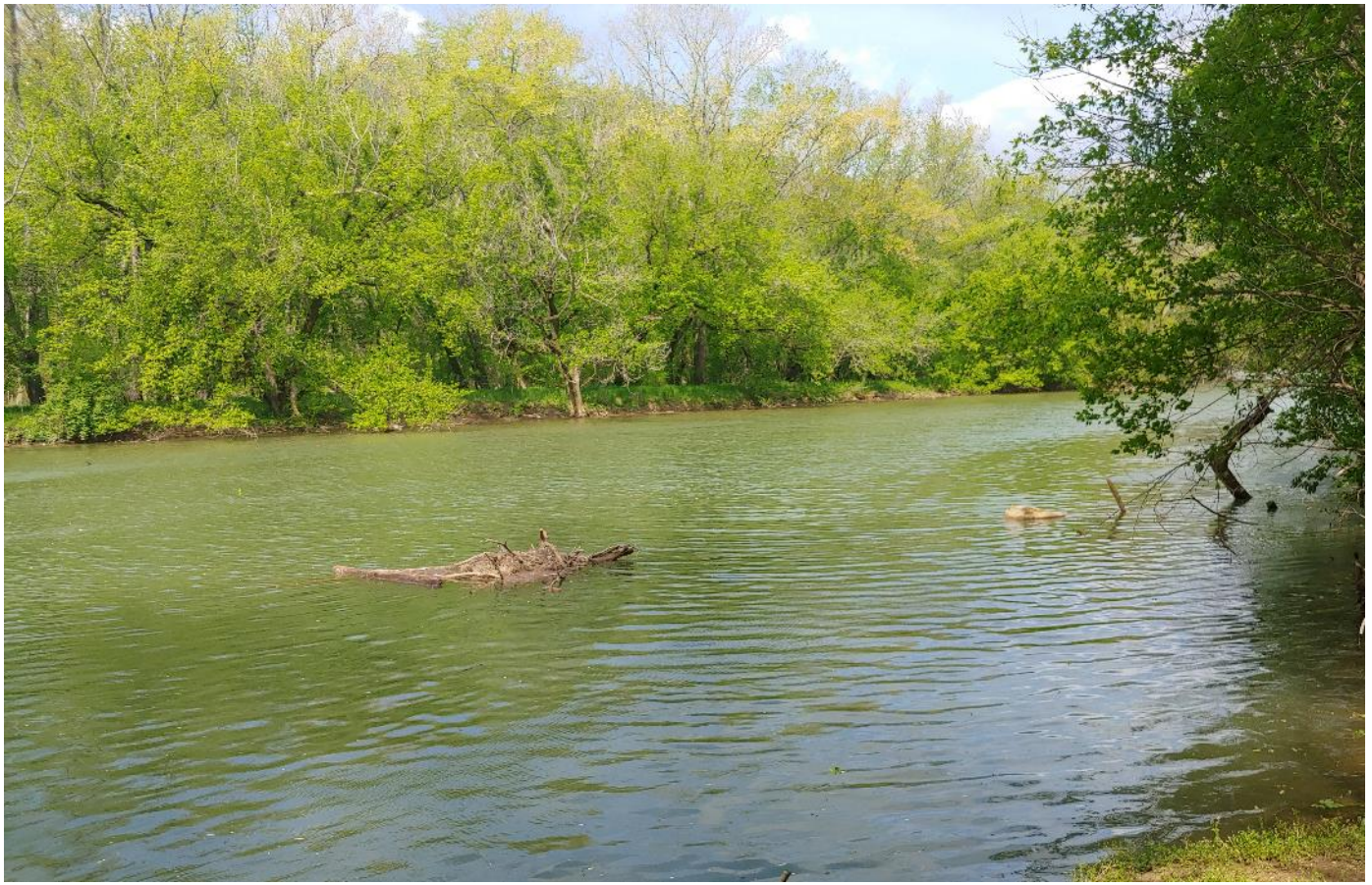
Wetland, Riparian, and Littoral Habitat Characterization Study



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Wetland, Riparian, and Littoral Habitat Characterization Study: Goals and Objectives

- **Study Goal:** Identify and characterize the existing wetlands, waterbodies, and riparian and littoral vegetative habitats (including emergent and submerged aquatic vegetation beds) in the Project area.

- **Specific Objectives:**
  - Perform a desktop analysis to approximate and describe existing wetland, waterbodies, and riparian and littoral resources
  - Perform a field survey to confirm the desktop analysis
  - Develop a map identifying and describing existing resources
  - Evaluate the potential for Project effects on resources

Wetland, Riparian, and Littoral Habitat Characterization Study: Background and Existing Information

- National Wetlands Inventory (NWI)
  - 2 wetland and deepwater types (Cowardin et al. 1979) are currently mapped by the NWI within the Project boundary
    - Palustrine wetland
    - Riverine system
- National Hydrography Dataset (NHD)
  - Tinker Creek
  - Several small tributaries

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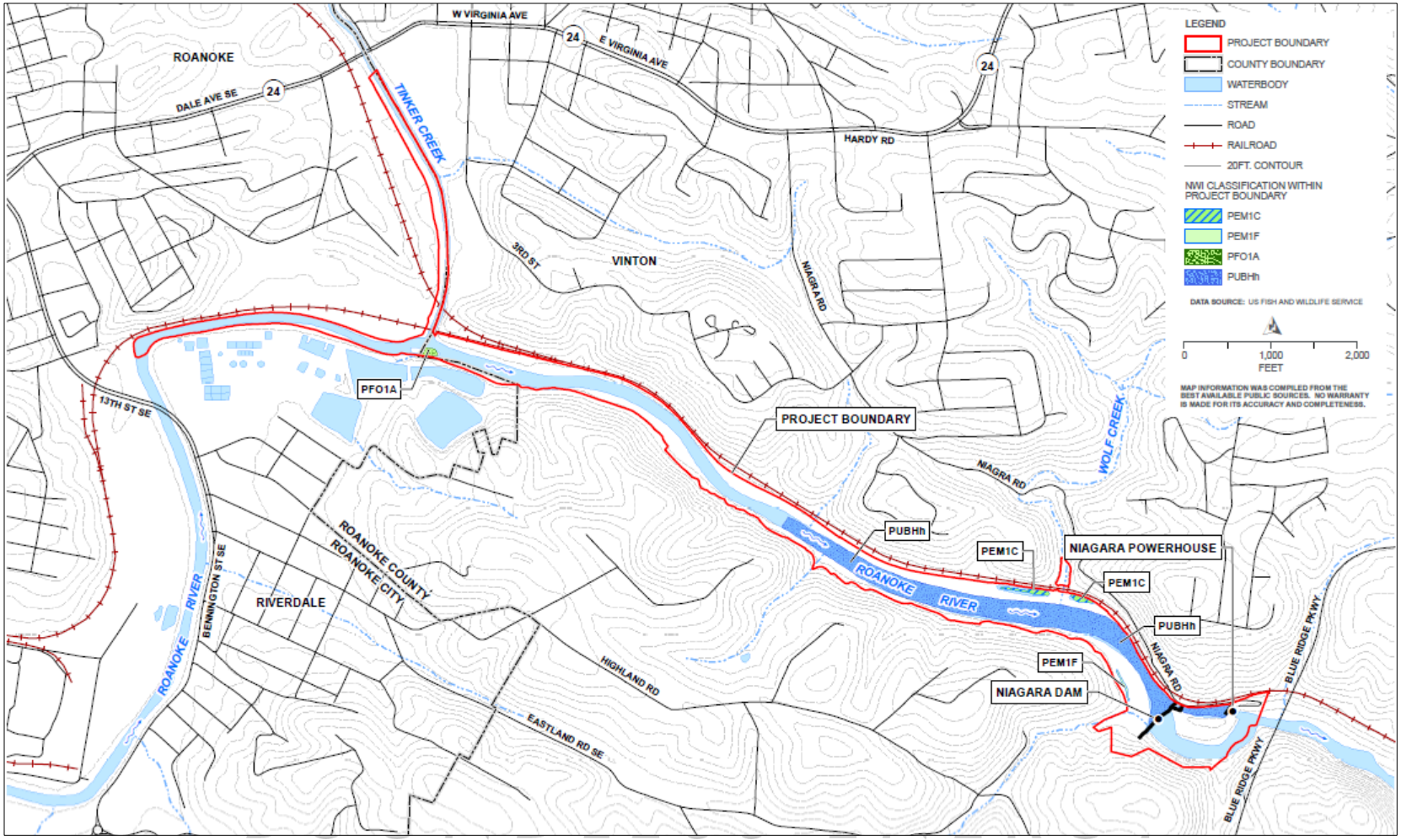
Wetland, Riparian, and Littoral Habitat Characterization Study: Background and Existing Information



Wetland, Riparian, and Littoral Habitat Characterization Study: Background and Existing Information

- 1990 survey of wetlands, riparian, and littoral vegetation
  - Riparian forests: ~20 acres
  - Steep topography and well-drained soils limits wetland formation
  - Little littoral vegetation – potential in two locations
    - Upstream extent where the river depth decreases
    - Near the confluence with Tinker Creek

Wetland, Riparian, and Littoral Habitat Characterization Study: Project Nexus

- Project operations may affect water levels and velocities, as well as the timing and location of releases.
- These factors can affect aquatic vegetation and wetlands, which are important habitats for fish and wildlife.

Wetland, Riparian, and Littoral Habitat Characterization Study: Methodology

Task 1	
Desktop Characterization of Wetland, Riparian, and Littoral Habitats	*Definitions* • Riparian zone: terrestrial areas 100 feet from the shoreline or to the Project boundary, whichever is closer • Littoral zone: shallow shoreline area from the stream bank to the maximum depth of light penetration (~20 feet)
	Resources • USFWS National Wetlands Inventory (NWI) • VDEQ Wetland Condition Assessment Tool (WetCAT) • USGS topographic quadrangles • High-resolution orthoimagery • NRCS soil surveys • USGS National Hydrography Dataset
	Preliminary habitat characterization map • Will be used for field verification efforts

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Wetland, Riparian, and Littoral Habitat Characterization Study: Methodology

Task 2	
Field Verification	*Wetlands and waterbodies* • Field-verified by a qualified wetland scientist, confirmed by wetland hydrology, hydrophytic vegetation, and hydric soils
	Riparian zone • Dominant species of vegetation will be recorded at three strata (tree, sapling/shrub, and herb)
	Littoral zone • Visual assessment of aquatic vegetation beds will be made or sampled with a throw rake, if necessary • General location, species composition, and spatial area will be documented
	Classifications • Wetlands and waterbodies will be categorized using Cowardin Classification (Cowardin et al. 1979) • Invasive species presence will be noted in all surveys

Wetland, Riparian, and Littoral Habitat Characterization Study: Analysis and Reporting

- As part of the study report, the results will include:
  - Vegetation community types observed, estimation of distribution and abundance (qualitative)
  - Wetland, riparian and littoral zone habitat maps with estimates of total area of coverage
  - Analysis and location of species of interest, including rare plant communities and invasive species, if observed

Wetland, Riparian, and Littoral Habitat Characterization Study: Schedule and Level of Effort

- Level of effort: ~180 hours
- Cost: ~$30,000

Task	Proposed Timeframe for Completion
Desktop Mapping of Wetland, Riparian, and Littoral Habitats	September 2019 – March 2020
Field Verification of Preliminary Maps, and Wetland Surveys, and Riparian and Littoral Habitat Characterizations	April – July 2020
Distribute Draft Study Report with the ISR	December 2020

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Shoreline Stability Assessment Study

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Shoreline Stability Assessment Study: Goals and Objectives

- **Study Goal:** Describe the shoreline in the Study Area with focus on erosion or shoreline instability.
- **Specific Objectives:**
  - Use the Bank Erosion Hazard Index (BEHI) to characterize the shoreline within the Project area with regard to erosion and stability rating
  - Inventory, map, and document any areas of erosion or shoreline instability
  - Prioritize areas where remedial action or further assessment may be warranted

Shoreline Stability Assessment Study: Background and Existing Information

- Majority of the Project area consists of undeveloped river banks with steep slopes and tree cover
- Shoreline soils
  - Downstream of Tinker Creek
    - 28E- Hayesville channery fine sandy loam (25-50% slopes), very stony
  - Upstream of Tinker Creek
    - 44A- Speedwell-Urban land complex (0-2% slopes), occasionally flooded
    - 5E- Chiswell-Litz complex (25-50% slopes)
    - 52- Udorthents-Urban land complex
    - 53- Urban land
- Management Plan for Riparian Forest Wildlife Habitat
  - Most recent report filed on November 5, 2015

Shoreline Stability Assessment Study: Project Nexus

- Shoreline erosion is a common concern at hydroelectric projects
- Run-of-river operations (i.e., stable reservoir elevation) and vegetative cover around shoreline helps protect against erosion
- The existing Wildlife Management Plan requires monitoring the riparian forest areas for evidence of increased bank erosion and, in the event of increased erosion, consulting with VDGIF.

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Shoreline Stability Assessment Study: Methodology

Task 1	
Literature Review	*Review of available information/survey planning* • Topographic/elevation data; USGS quadrangles • High-resolution orthoimagery • NRCS soil surveys • USGS Hydrography Dataset • Preliminarily assess bank composition and erosion potential
Task 2	
Shoreline Survey	*Field survey* • BEHI methodology to estimate erosion susceptibility (vegetative cover, height/slope of bank, existing controls, soil/rock type, etc.) • GPS data and photo-documentation will be collected • Map will depict the streambank characteristics in the Project area
Task 3	
Determine Areas Potentially Needing Remediation	*Assessment of erosion potential* • Bank erosion potential and stability will be evaluated • Recommendations for minimizing the effects of bank erosion from Project operations and/or enhancing bank stability

Shoreline Stability Assessment Study: Analysis and Reporting

- As part of the study report, the results will include:
  - Maps approximating the extent and severity of erosion or instability along shorelines within the Project area
  - Analysis of the degree of susceptibility to erosion

Shoreline Stability Assessment Study: Schedule and Level of Effort

- Level of effort: ~150 hours
- Cost: ~$15,000

Task	Proposed Timeframe for Completion
Study Planning and Data Review	September 2019 – March 2020
Shoreline Survey and Determination of Areas Potentially Needing Remediation	April – July 2020
Distribute Draft Study Report with the ISR	December 2020

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Cultural Resources Study

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Cultural Resources Study: Goals and Objectives

- **Study Goal:** Evaluate the historic properties within the Project's Area of Potential Effect (APE) and potential effects of continued Project operations and maintenance activities on historic or cultural resources.
- **Specific Objectives:**
  - Consult with the Virginia State Historic Preservation Office and Delaware Nation to determine the appropriate APE for the Project and known existing resources
  - Conduct background research and an archival review
  - Perform a Phase I Reconnaissance Survey of the APE

Cultural Resources Study: Background and Existing Information

- A Phase 1A Archaeological Investigation was performed for the previous relicensing
  - No sites were recorded for the Project site, but a number of sites were recorded in the vicinity of the Project
- High potential for historic sites along the Roanoke River, however development has resulted in disturbance of the floodplain area
  - The nearest mapped resource is an unevaluated Late Archaic site on an upland plain more than 2,000 feet west of Niagara dam
  - Limited potential for historic sites at the Project due to construction and railroad usage
- The Niagara Project does not meet the National Register Criteria for Eligibility (36 CFR 60.4)
- Blue Ridge Parkway Historic District is NRHP eligible

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Cultural Resources Study: Project Nexus

- At present, no evidence that archaeological or historic resources are currently being affected by Project operations.
- The Project has the potential to directly or indirectly affect historic properties listed in or eligible for inclusion in the NRHP.

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Cultural Resources Study: Methodology

Task 1	
APE Determination	*Proposed APE* • Currently proposed the APE as the FERC Project boundary • Consult with Virginia SHPO and Indian Tribes to determine and document the APE (36 CFR §800.16(d))
Task 2	
Background Research and Archival Review	*Review of existing information* • Currently documented sites with Virginia SHPO • Review Virginia's NRHP listings • Historic maps and aerial photographs of the APE • Relevant documents related to Project construction • Relevant information from local repositories • Information on the current and historical environment (soils, hydrology, topography, etc.) • Historic accounts of the study area

Cultural Resources Study: Methodology

Task 3	

Archeological Phase I Reconnaissance Survey of the APE	*Field survey*
	• Qualified cultural resources professional and geomorphologist
	• Discuss potential (conceptual) enhancement or improvements
	• Visual reconnaissance of the APE
	  ○ Identify areas that have high archeological potential and/or
	  ○ Where Project-related effects have the potential to adversely affect historic properties now or in the future
	• Subsurface testing in accordance with Phase I methodology described in Virginia SHPO's guidelines
	• Delineation of site boundaries and GPS
	• Identify properties of architectural significance within the APE and update Virginia SHPO's records, if necessary

Task 4	
Inventory of Traditional Cultural Properties	*Consultation with Indian Tribes* • Delaware Nation will be consulted to develop specific methods and approaches to conduct a Traditional Cultural Properties (TCP) inventory in the APE, if required

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Cultural Resources Study: Methodology

Task 5	
Historic Properties Management Plan	*Depending on results of Tasks 3 and 4* • Determine whether a Historic Properties Management Plan (HPMP) is warranted for the Project • If required, a HPMP will be developed in consultation with Virginia SHPO, Indian Tribes, and other stakeholders • The HPMP would address: ○ Potential effects and protection of historic properties ○ Compliance with the Native American Graves Protection and Repatriation Act ○ Provisions for unanticipated discoveries ○ A dispute resolution process ○ Categorical exclusions from further review of effects ○ Coordination with Virginia SHPO

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Cultural Resources Study: Analysis and Reporting

- As part of the study report, the results will include:
  - A summary of background research and archival review
  - Maps and descriptions of reported archaeological and historic resources
  - As assessment of the APE's archaeological sensitivity and potential
  - The results of any subsurface sampling
  - As assessment of significant architectural resources within the APE
  - Recommendations regarding additional cultural resource studies and/or management measures for identified resources

Cultural Resources Study: Schedule and Level of Effort

- Level of effort: ~500 hours
- Cost: ~$75,000

Task	Proposed Timeframe for Completion
APE Determination	January – June 2020
Background Research and Archival Review	January – June 2020
Archeological Phase I Reconnaissance Survey of the APE	May – October 2020
Inventory of Traditional Cultural Properties	October 2019 – October 2020
Distribute Draft Study Report with the ISR	November 2020
Historic Properties Management Plan (if necessary)	With the DLA or Preliminary Licensing Proposal

PSP and Revised Study Plan: Stakeholder Participation

- Comments on the PSP are due to FERC by October 7, 2019. Proposed modifications to the PSP must address the seven FERC study criteria in 18 CFR §5.9(b).
- Formal comments should be filed with FERC and include the FERC Project number in the subject line (P-2466-034). These documents will also be available from FERC's elibrary under Docket P-2466.
- Stakeholders can contact Appalachian with questions or comments:

Jon Magalski
American Electric Power Service Corporation
c/o Appalachian Power Company
1 Riverside Plaza, Columbus, OH 43215
(614) 716-2240 jmmagalski@aep.com

- Appalachian will file the Revised Study Plan (RSP) on or before November 6, 2019.

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Closing

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