April 22, 2022

VIA E-FILING

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Robert C. Byrd Hydroelectric Project (FERC No. 15094)
Filing of Notice of Intent, and Pre-Application Document

Dear Secretary Bose:

Ohio Power and Light, LLC. (Applicant) (the Applicant) is filing with the Federal Energy Regulatory Commission (FERC or Commission) its Pre-Application Document (PAD) for the proposed Robert C. Byrd Hydroelectric Project (RC Byrd Project, or Project). The Applicant is an entity fully owned by Current Hydro, LLC. (Current Hydro). The proposed Project is located at the U.S. Army Corps of Engineers' (USACE) Robert C. Byrd Locks and Dam on the Ohio River, near the Town of Gallipolis, in Gallia County, Ohio and the Town of Gallipolis Ferry, Mason County, West Virgina.

The Applicant is concurrently filing its Notification of Intent (NOI) to seek an original license for the project, and the required PAD. These documents are being filed pursuant to 18 CFR §5.5 and §5.6 of the Commission's regulations and this letter is being simultaneously distributed to agencies and stakeholders listed in the attached Distribution List.

Individuals may download the Preliminary Permit Application, NOI, and PAD from FERC's elibrary (www.ferc.gov/elibrary), or from the project website at https://www.currenthydro.com/RCByrd.

The Applicant requests designation as the non-federal representative under Section 7 of the Endangered Species Act and under Section 305(b) of the Magnuson-Stevens Fishery

Conservation and Management Act, request the authority to initiate consultation pursuant to Section 106 of the National Historic Preservation Act, and request to use the Traditional Licensing Process (TLP) for the Project.

DOCUMENT DISTRIBUTION

In accordance with 18 CFR §5.5 and §16.8 of the Commission's regulations, we are transmitting this letter to relevant and known resource agencies, Tribes, non-governmental organizations, and stakeholders that we believe may have an interest in the Project (see attached Distribution List). The preliminary permit application, NOI, and PAD are available for download on the project website at https://www.currenthydro.com/RCByrd. The Applicant published the notice of this filing in the Point Pleasant Register, a newspaper in general circulation in Mason County, West Virginia.

We kindly ask stakeholders to share their email addresses with the Applicant to enable a faster, more direct consultation process either by contacting Roy@currenthydro.com or by visiting https://www.currenthydro.com/rcbyrd and signing up the project's stakeholder email list.

NON-FEDERAL REPRESENTATIVE

In accordance with 18 CFR §5.5(e) and in order to identify potential issues earlier in the process so that they can be addressed prior to filing of the license application with the Commission, the Applicant hereby requests that the Commission designate the Applicant as a non-federal representative under Section 7 of the Endangered Species Act and the joint agency regulation there under 50 CFR §402 to undertake formal consultation with applicable federal and state agencies regarding federally threatened and endangered species that may be impacted by the Project.

CONSULTATION AUTHORITY

The Applicant requests that it be granted authority to initiate consultation with the State Historic Preservation Officer (SHPO), appropriate federally recognized Tribes and other consulting parties pursuant to 36 CFR §800.2(c)(4) of the regulations implementing Section 106 of theNational Historic Preservation Act.

REQUEST TO UTILIZE THE TRADITIONAL LICENSING PROCESS

The following sections outline how use of the TLP will: a) comply with the criteria outlined in 18 CFR Section 5.3 (C)(1)(ii)(A-F); b) benefit the participants to the process, and c) provide FERC with the information it needs to complete its licensing obligations.

- *Likelihood of on-time license issuance (§5.3A)*
  The resource agencies that will be involved in the relicensing process for the Project have substantial knowledge of the Ohio River basin, and the Applicant has already begun consultation with key resource agencies. Therefore, the agencies and Applicant are aware of the issues that are likely to be raised at the Project. In addition, the agencies' familiarity with the process and informational needs should allow for the timely issuance of the project license on or before the expiration date of the existing license.

- *Level of Anticipated Controversy (§5.3C)*
  Due to past proposals to develop the site, agencies and the Applicant are familiar with issues that are likely to be raised. Given the low complexity of issues already identified at the Project, it is not currently anticipated that the project will result in any significant controversy that cannotbe overcome through a cooperative TLP process.

- *Relative cost of the Traditional Licensing Process compared to the Integrated Licensing Process (§5.3D)*

  The Applicant's request to use the TLP is based upon the desire to conduct some licensing and scoping efforts concurrently with the licensing of Current Hydro Project 19 LLC's New Cumberland Locks and Dam Project (FERC No. 15045) and Pike Island Hydropower Corporation Pike Island Locks and Dam Hydroelectric Project (FERC No. 15230). Concurrent licensing efforts for these projects is expected to result in some efficiencies for the Applicant, agencies, and interested parties for all three projects.

- *The amount of available information and potential for significant disputes over studies (§5.3E)*
  As indicated in the attached PAD, baseline information exists for environmental resources in the Ohio River basin. Within the project area, the Applicant and the resource agencies identified existing information and data sources. The Applicant will

work with the resource agencies and stakeholders on sufficient data collection efforts to address resource concerns associated with the Project. Should a significant dispute arise during the process, the Applicant would initiate FERC's dispute resolution process outlined in 18 CFR §16.8 (b)(6)(i).

The Applicant published notice of Intent to use the TLP in the April 22, 2022 edition of the Point Pleasant Register, the newspaper having local distribution. That notice requests that any comments in response to this request be filed with the Commission by May 21, 2022.

By copy of the is letter, the Applicant also requests that agencies and interested parties to which the request has been distributed (see attached distribution list) provided comments on the request to use the TLP to the Commission within 30 days, by May 21, 2022. Please note that comments on the PAD and study request will then be required after the Applicant's Joint Meeting later this year, pending FERC approval of the TLP.

The Applicant hereby respectfully requests that the Commission notice the filing of this NOI, approve the filing of its PAD, grant non-federal representative status and consultation authority to the Applicant and grant the request to use the TLP.

If there are any questions or comments related to the NOI, PAD or any of the other information presented above, please contact me at 914-805-2522 or by email at Roy@currenthydro.com.

Sincerely,

Roy Powers

Chief Operations Officer

Current Hydro LLC.

Attachments:

Certificate of Service and Distribution List Notification of Intent

Pre-Application Document

ATTACHMENT A

CERTIFICATE OF SERVICE AND DISTRIBUTION LIST

CERTIFICATE OF SERVICE

I hereby certify that Ohio Power and Light, LLC. distributed notice of the Pre-Application Document for the proposed Robert C. Byrd Hydroelectric Project to all parties on the attached Distribution List on or about the 22nd day of April 2022.

By:_____

Joel Herm, CEO
Current Hydro LLC.

Robert C. Byrd Hydroelectric Project Distribution List

U.S. Army Corps of Engineers

MAJ Patrick Kelley
District Hydropower Program Manager
USACE, Huntington District
502 Eighth St.
Huntington, WV 25701

Belinda Weikle, PE
District Hydropower Lead Technical Engineer
USACE, Huntington District
502 Eighth St.
Huntington, WV 25701

Daniel Rabon
National Hydropower Program Director
USACE, Headquarters
441 G. Street, NW
Washington, D.C. 20314-1000

U.S. Bureau of Indian Affairs

Regional Director
U.S. Bureau of Indian Affairs
Eastern Regional Office
545 Marriott Drive – Suite 700
Nashville, TN 37214-5081

U.S. Department of Agriculture, Natural Resources Conservation Service

Jackie Byars, District Conservationist
U.S. Department of Agriculture
224-C 1st Street
Point Pleasant, WV 25550

U.S. Department of the Interior, National Park Service

Regional Director
U.S. National Park Service, Northeast Regional Office
200 Chestnut Street
Philadelphia, PA 19106

U.S. Environmental Protection Agency

U.S. Environmental Protection Agency, Region III
Water Protection Division
1650 Arch Street
Philadelphia, PA 19103-2029

U.S. Federal Emergency Management Agency

U.S. Federal Emergency Management Agency Region III
615 Chestnut Street
One Independence Mall – 6th Floor
Philadelphia, PA 19106-4404

U.S. Federal Energy Regulatory Commission

Secretary Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street, NE
Washington, D.C. 20426

U.S. Fish and Wildlife Service

Richard C. McCorkle
U.S. Fish & Wildlife Service
110 Radnor Road, Ste 101
State College, PA 16801

U.S. Geological Survey

U.S. Geological Survey
West Virginia Water Science Center
11 Dunbar Street
Charleston, WV 25301

West Virginia Department of Environmental Protection

West Virginia Department of Environmental Protection
Division of Water and Waste Management
601 57th Street SE
Charleston, WV 25304

West Virginia Department of Commerce

West Virginia Department of Commerce
1900 Kanawha Boulevard, E
Capitol Complex – Bldg. 6, Room 525 Charleston, WV 25305-0311

West Virginia Division of Natural Resources

District 5 Office
West Virginia Division of Natural Resources
480 Forks of Coal Way
Alum Creek, WV 25003

West Virginia State Historic Preservation Office

West Virginia Division of Culture and History
State Historic Preservation Office
1900 Kanawha Boulevard
East Charleston, WV 25305-1300

West Virginia Representatives

Senator Shelley Moore Capito
311 Hart Senate Office Bldg.
Washington, D.C. 20510

Adam Berry
c/o Senator Joe Manchin, III
900 Pennsylvania Ave., Ste. 629
Charleston, WV 25302

Carol Miller
US House of Representatives

2699 Park Avenue Suite 220
Huntington, WV 25704

Amy Grady
West Virginia State Senate
Room 206W, Building 1
State Capitol Complex
Charleston, WV 25305

Eric Tarr
West Virginia State Senate
Room 461M, Building 1
State Capitol Complex
Charleston, WV 25305

Johnnie Wamsley
West Virginia House of Delegates
Room 216E, Building 1
State Capitol Complex
Charleston, WV 25305

Mason County, West Virginia

Mason County Clerk
Mason County Courthouse
200 6th Street
Point Pleasant, WV 25550

Non-governmental Organizations (NGOs)

American Rivers
Great Lakes Region Office 348 S. Erie Street
Toledo, OH 43604

The Nature Conservancy
435 Wilson Street
Elkins, WV 26241

American Planning Association, WV Chapter
Morgantown Planning Department
389 Spruce Street

Morgantown, WV 26505

Sierra Club, West Virginia Chapter
P.O. Box 4142
Morgantown, WV 26504-4142

Native American Tribes and Tribal Organizations

Wyandotte Nation
64700 East Highway 60
Wyandotte, OK 74370

West Virginia Native American Coalition, Inc.
P.O. Box 62
Fairview, WV 26570

Native American Interests
West Virginia University
P.O. Box 6296
Morgantown, WV 26506-6296

Munsee Delaware Indian Nation of Ohio
70463 Hopewell Road
Cambridge, OH 43725

Appalachian American Indians of West Virginia
P.O. Box 672
Rainelle, WV 25962

ATTACHMENT B

Pre-Application Document

PRE-APPLICATION DOCUMENT

Historic photo of a steam powered riverboat in one of the two original Gallipolis locks that were abandoned in 1993 for larger more contemporary locks and renamed Robert C. Byrd Locks and Dam that same year. The Applicant proposes an adaptive reuse of existing federal infrastructure to generate renewable energy from an existing resource.

Robert C. Byrd Hydroelectric Project

Ohio Power and Light, LLC.
Submitted by: Current Hydro LLC

April 22, 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
Af	Acre-foot, the amount of water needed to cover one acre to a depth of one foot
ALT	Androscoggin Land Trust
APE	Area of Potential Effect as pertaining to Section 106 of the National Historic Preservation Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	Cubic feet per second
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
DLA	Draft License Application
DO	Dissolved oxygen
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
EA	Environmental Assessment
EAP	Emergency Action Plan
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EL	Elevation
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOIA	Freedom of Information Act
FPA	Federal Power Act
FWCA	Fish and Wildlife Coordination Act
GIS	Geographic Information Systems
GWh	Gigawatt-hour (equals one million kilowatt-hours)
Hp	Horsepower

Hz	hertz (cycles per second)
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
Installed Capacity	The nameplate MW rating of a generator or group of generators
Interested Parties	The broad group of individuals and entities that have an interest in a proceeding
kV	Kilovolts
KVA	Kilovolt amps
kW	kilowatt
kWh	kilowatt-hour
License Application	Application for New License submitted to FERC no less than two years in advance of expiration of an existing license. See DLA
MW	megawatt
MWh	megawatt-hour
NAVD88	North American Vertical Datum of 1988
NHPA	National Historic Preservation Act
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Services, same as NOAA Fisheries
NOAA Fisheries	NOAA National Marine Fisheries Service, same as NMFS
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NOI	Notice of Intent
Normal Operating Capacity	The maximum MW output of a generator or group of generators under normal maximum head and flow conditions
NWI	National Wetlands Inventory
PAD	Pre-Application Document
PDF	Portable Document Format
PLP	Preliminary Licensing Proposal
PM&E	Protection, Mitigation and Enhancement Measures
PMF	Probable Maximum Flood
Project Area	The area within the proposed FERC Project Boundary
Project Boundary	The boundary line that surrounds those areas needed for operation of the Project.
Project Vicinity	The general geographic area in which the Project is located
QC	Quality control

RM	River mile
Run-of-river	A hydroelectric Project that uses the flow of a stream with little or no reservoir capacity for storing water
SD	Scoping Document
Service List	A list maintained by FERC of parties who have formally intervened in a proceeding. In licensing, there is no Service List until the license application is filed and accepted by FERC. Once FERC establishes a Service List, any documents filed with FERC must also be sent to the Service List
SHPO	State Historic Preservation Office
Tailrace	Channel through which water is discharged from the powerhouse turbines
T&E Species	Threatened and endangered species
TLP	Traditional Licensing Process
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQC	Water Quality Certificate

1.0 INTRODUCTION

Ohio Power and Light, LLC. (Applicant) (the Applicant) is submitting this Pre-Application Document (PAD) as required by Title 18 § 5.6 and §16.8 of the U.S. Code of Federal Regulations (CFR) for the Robert C. Byrd Hydroelectric Project (RC Byrd Project, or Project) Federal Energy Regulatory Commission (FERC) Project No. 15094. This PAD accompanies the Applicant's Notice of Intent (NOI) to seek a new license for the Project. The Applicant proposes to construct a new powerhouse at the United States Army Corps of Engineers' (USACE) Robert C. Byrd Locks and Dam (R.C. Byrd L&D) on the Ohio River. The Applicant applied for a Preliminary Permit on February 19, 2021, which FERC granted on June 8, 2021, giving the Applicant a 48-month Preliminary Permit for the site, effective January 1, 2021.

The proposed construction and operation described in this PAD has changed significantly from the information provided in the February 2021 Preliminary Permit which placed the powerhouse on the far western end of the USACE dam. The Applicant has since determined that utilizing the existing decommissioned USACE lock structures in the mid-channel of the Ohio River will be less disruptive to R.C. Byrd L&D USACE operations, reduce CAPEX, and possibly improve river flow and sediment management.

The Applicant is an entity fully owned by Gallipolis, LLC. (Current Hydro). Current Hydro, as agent for the Applicant, intends to develop the RC Byrd Project. The Applicant distributed notification of this PAD and NOI simultaneously to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others interested in the licensing proceeding. The distribution list for the NOI and PAD is provided in the cover letter to this filing. As specified in 18 CFR § 5.6 (c) and (d) the PAD provides FERC and the entities listed above with summaries of existing, relevant, and reasonably available information related to the Project that is in the Applicant's possession or was obtained through due diligence. The Applicant conducted some preliminary consultation with resource agencies in advance of filing this PAD (Appendix A).

1.1 Agents For Client

The following persons are authorized to act as agent for the Applicant pursuant to 18 CFR § 5.6(d)(2)(i):

Joel Herm Joel@currenthydro.com
Roy Powers Roy@currenthydro.com

Current Hydro, LLC, Post Office Box 224, Rhinebeck NY, 12572
Phone: 917-244-3607

1.2 PAD Content

This PAD follows the content and form requirements of 18 CFR § 5.6 (c) and (d), with minor changes in form for enhanced readability. This PAD contains all the information required by 18 CFR § 5.6 (c) and (d) for distribution to Federal and state resource agencies, local governments, Native American tribes, members of the public, and others likely to be interested in the licensing proceeding.

The PAD is organized as follows:

- Table of Contents; List of Tables; List of Tables; List of Figures; List of Appendices; and Definitions of Terms, Acronyms, and Abbreviations.
- Section 1.0 – Introduction and Background Information.
- Section 2.0 – Process Plan and Schedule, Communications Protocol, and Traditional Licensing Process (TLP) Flow Chart, per 18 CFR § 5.6(d)(1).
- Section 3.0 – General Description of the Ohio River, per 18 CFR § 5.6(d)(3)(xiii).
- Section 4.0 – Description of Project Location, Facilities, and Operation, per 18 CFR § 5.6(d)(2).
- Section 5.0 – Description of the Existing Environment by Resource Area, per 18 CFR § 5.6(d)(3)(ii)-(xii).
- Section 6.0 – Description of Impacts, Issues, Study and Information Needs, Resource Measures, and Existing Plans, per 18 CFR § 5.6(d)(3) and (4).
- Appendices: Agency Consultation; Flow Duration Curves; Single Line Diagram

2.0 PROCESS PLAN, SCHEDULE, AND COMMUNICATION

In its NOI, the Applicant requests FERC's approval to use the TLP for the Project. The TLP has three stages (18 CFR 4.38).

The first stage involves coordination between the Applicant, resource agencies, affected Indian tribes, and the public. It includes the sharing of project information, notification of interested parties, and study planning and implementation using the PAD.

The second stage involves study implementation and additional data gathering as well as development of a Draft License Application (DLA) and review of the Draft License Application by resource agencies and optionally, FERC.

The third stage commences with the filing of the Final License Application (FLA), whereby FERC initiates its own review and public comment process, ultimately issuing a license for the Project.

2.1 Process Plan and Schedule Through Filing of License Application

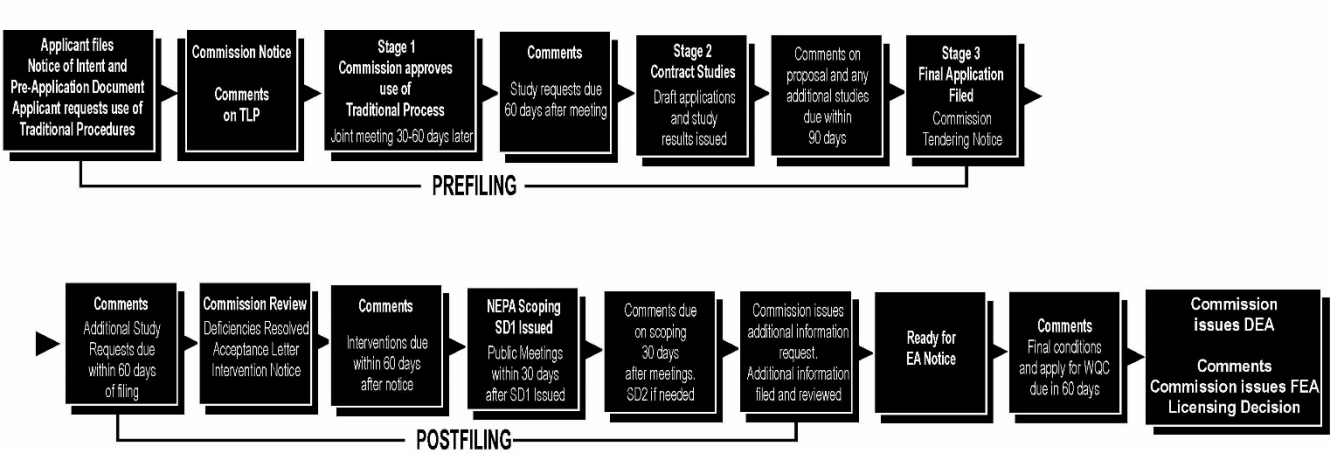
The Process Plan and Schedule outlines actions by FERC, the Applicant, and other participants in the licensing process through filing of the FLA. The Applicant plans to file the FLA prior to expiration of the preliminary permit. The following diagram prepared by FERC and provided as Figure 2.1 illustrates the TLP pursuant to 18 CFR 4.38.

Figure 2.1 TLP Process Flow Chart

Source: FERC, 2004

TRADITIONAL LICENSING PROCESS

Figure 2. Traditional Licensing Process



2.2 Proposed Communications Protocols

Effective communication is essential for timely, cost-effective licensing. The Applicant anticipates that the primary means of communication will be in-person and virtual meetings, documents, email, and telephone.

2.2.1 Parties to the Licensing

Under FERC proceedings, participating individuals are identified as one of two groups: a) Interested Parties, which is the broad group of individuals and entities that may have an interest in a proceeding, including Native American tribes, agencies, groups and individuals that may wish to participate in the licensing process and are sometimes referred to as "stakeholders" and b) Licensing Participants, which is a subset of Interested Parties and consists of individuals and entities that are actively participating in a proceeding, such as by participating on committees.

Licensing Participants may receive additional communications relative to the specific activity or function. Any Interested Party may elect to be a Licensing Participant by request to the Applicant.

FERC also maintains a mailing list of Interested Parties, on which the Applicant's mailing list is based. FERC generally integrates the Applicant's Interested Parties mailing list with their own once the licensing process has started. Once the FLA is filed with the FERC, FERC will establish an official Service List for parties who formally intervene in the proceeding.

2.2.2 General Communications

Communications include written correspondence, emails, and notes from individual and conference telephone calls. The Applicant ‘s goal is to keep the lines of communication open during the licensing process and make it easy for Interested Parties, Licensing Participants and the public to get information related to the licensing and the interests of other stakeholders.

2.2.2.1 Telephone

The Applicant anticipates that telephone calls among Interested Parties and Licensing Participants will be treated informally, with no specific documentation unless specifically agreed upon in the discussion or as part of formal agency consultation proceedings.

The Applicant anticipates that FERC will distribute to the FERC Mailing List summaries of any informal decisional telephone calls in which it participates prior to acceptance of the FLA.

2.2.2.2 Electronic Communications

The Applicant anticipates distribution of relevant documents, submittal of comments, correspondence, and study requests from agencies will be conducted primarily electronically (either by electronic filing of documents with the FERC and/or email distribution). In addition, some formal agency consultation proceedings and correspondence may, as a matter of convenience and expediency, occur electronically or via email. The Applicant will maintain documentation of all correspondence as part of formal agency consultation proceedings. Applicable licensing documents are updated and maintained on Applicant’s website, www.currenthydro.com/RCByrd.

FERC makes information available to the public via the Internet through eLibrary, a records information system that contains documents submitted to and issued by the FERC. Documents filed with the FERC as part of the Project's licensing process are available for viewing and printing via eLibrary, accessed through the Commission’s homepage or directly at http://www.ferc.gov/docsfilings/elibrary.asp. Interested Parties and Licensing Participants can also subscribe to the docket for the Project under eSubscription and be sent notices of issuances

and filings by email. Instructions for subscribing to the electronic FERC docket is provided on FERC's website at https://www.ferc.gov/esubscription.

2.2.2.3 Meetings

The Applicant will work with all Interested Parties to develop meeting schedules that include practical locations and times to accommodate the majority of participants. In general, the Applicant will schedule meetings between the hours of 9 a.m. and 4 p.m. and make every effort to begin and end meetings on time.

The Applicant will notify all Interested Parties at least two weeks in advance of the next planned public meeting. The Applicant will provide a meeting agenda by email and will also distribute any documents or other information that will be the subject of meeting discussions.

2.2.2.4 Proposed Location and Date for Joint Meeting and Site Visit [§4.38 (b)(3)]

The Applicant will host a Joint Meeting and site viewing no earlier than 30 days, and no later than 60 days after TLP approval, if FERC approves this request. The Applicant anticipates hosting a Joint Meeting on or about June 2022. The Applicant will provide meeting details and the date and time following FERC's decision regarding use of the TLP.

2.2.3 Documents

The Applicant will maintain digital copies of all mailing lists, announcements, notices, communications, and other documents related to the licensing of the Project. The Applicant will regularly update the public files to ensure the public has access to the latest information related to the licensing process available to them and that all public documents are available. Anyone may obtain documents at www.currenthydro/RCByrd by contacting:

Roy Powers
Roy@currenthydro.com
Current Hydro, LLC
Post Office Box 224
Rhinebeck NY, 12572

As discussed above, documents submitted to and issued by the FERC for the Project are available through eLibrary under the FERC Project No. 15094 (https://elibrary.ferc.gov/eLibrary/search). In

addition, all materials filed with or issued by the FERC will be available for review and copying at the FERC offices in Washington, DC:

Federal Energy Regulatory Commission
Public Reference Room, Room 2-A
Attn: Secretary
888 First Street, N.E.
Washington, D.C. 20426

2.2.3.1 Public Reference File

The public reference file is a listing of important materials pertaining to the licensing. This includes background reference material as well as the consultation record, all relevant studies and data collected during the development of the PAD, meeting summaries, notices, and reports as well as Project documents.

The Applicant will maintain digital public reference files on the project. Individuals may request a digital copy of any material, or, for a nominal copying fee, hard copies of all documents, by contacting the Applicant.

All communications added to the public reference file will be available to the public consistent with the public records procedures set forth in the Freedom of Information Act (FOIA).

2.2.3.2 Restricted Documents

Project-related documents determined to be Critical Energy Infrastructure Information (CEII) are restricted from public viewing in accordance with FERC regulations (18 C.F.R. §388.113). This includes CEII information related to the design and safety of the dam and appurtenant Project facilities. USACE restricted documents are protected under DoD Instruction 5200.48 Controlled Unclassified Information (CUI) date March 6, 2020. The restricted viewing of CEII and CUI material is necessary to protect national security and public safety. Stakeholders or the general public requesting to review CEII information from the FERC must file a CEII request. The FERC website at this address https://www.ferc.gov/ceii contains additional details related to CEII and how to submit a formal request.

Information related to protecting sensitive archaeological or other culturally important information is also restricted under Section 106 of the National Historic Preservation Act (NHPA).

In addition, information related to threatened and endangered species is protected under Section 7 of the Endangered Species Act (ESA). Anyone seeking this information from FERC must file a FOIA request. Instructions for FOIA are available on FERC's website at https://www.ferc.gov/foia.

2.2.3.3 Mailing Lists

The Applicant will maintain a Licensing Mailing List of all Interested Parties including Licensing Participants. The list will include email addresses and when available, U.S. postal addresses, for distributing notices and documents for public review (Table 2.1).

FERC also maintains a mailing list of Interested Parties for the Project. The Applicant anticipates that once the licensing proceeding begins, the Applicant's Licensing Mailing List and FERC's Mailing List will be consolidated into one common list.

After the Applicant files the FLA, FERC will establish an official Service List (Table 2.1) for parties who formally intervene in the proceeding. Once FERC establishes a Service List, any written documents filed with FERC must also be sent to the Service List. A Certificate of Service must be included with the document filed with FERC.

Table 2.1 Mailing Lists for Licensing

Entity	Type	Description
Ohio Power and Light	Interested Parties Mailing List	A list of Interested Parties prepared by the Applicant in anticipation of the Project licensing proceeding.
FERC	Project No. 15094 Mailing List	A mailing list of Interested Parties prepared and maintained by FERC throughout the Project licensing proceeding.
FERC	Project No. 15094 Service List	A mailing list of parties that have formally intervened in the licensing proceeding, prepared and maintained by FERC after it accepts the License Application.

2.2.3.4 Document Distribution

The Applicant will distribute, whenever possible, all documents electronically, either via email or Cloud Sharing Link, or for download from the www.currenthydro/RCByrd. The Apllicant may distribute hard copies of some documents by request. Distribution of information will follow the guidelines presented below (Table 2.2).

Table 2.2 Document Distribution

Document	Method	Distribution
Public Meeting Notices	Email or US Mail, Newspapers, and website	Public and all Potential Interested Parties
Meeting Agendas	Email* and website	Interested Parties
Meeting Summaries	Website*	On Request
Major Documents: Proposed Study Plans, Study Reports, Draft License Application, Final License Application, etc.	Email* and website	Notice of availability by US Mail or Email to Interested Parties; Major documents via Cloud Sharing Link to Licensing Participants
PAD support documents	Email*	On Request
Written Communications	Email*	On Request

*U.S. Mail service by special request.

2.2.4 Study Requests

In the development of the PAD, The Applicant worked with Interested Parties and Licensing Participants to identify areas where there is little or no information relevant to issues of potential concern for Project effects to the human and natural environments. However, stakeholders may identify additional studies for consideration. As specified by CFR 18, § 5.9(b), any study request must:

- Describe the goals and objectives of each study proposal and the information to be obtained.
- If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.

- If the requestor is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.
- Describe existing information concerning the subject of the study proposal, and the need for additional information.
- 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.
- Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.
- 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.

The requestor should also describe any available cost-share funds or in-kind services that the sponsor of the request may contribute towards the study effort.

Email or mail completed study requests in MS Word or PDF format to:

Roy Powers
Roy@currenthydro.com
Current Hydro, LLC
Post Office Box 224
Rhinebeck NY, 12572

3.0 GENERAL DESCRIPTION OF RIVER BASIN

3.1 General Description of the River Basin

The proposed Project is located at the R.C. Byrd L&D, on the Ohio River, near the Town of Gallipolis, in Gallia County, Ohio and Mason County, West Virgina. The tailrace will discharge from the center decommissioned and abandoned locks in the State of West Virginia.

Flows in the Ohio River are largely controlled by the USACE by an array of reservoirs located throughout the watershed. The entire length of the Ohio River is navigable by barges, with depths averaging approximately 24 feet. The USACE owns and operates L&Ds at 20 locations on the river, where they maintain a nine-foot minimum depth for commercial navigation (ORF 2021; ORSANCO 2021). The RC Byrd L&D is one of 20 stair-step dams along the Ohio River used to facilitate navigation. It forms the 41.7-mile-long RC Byrd Pool, which extends upstream to the Racine L&D at RM 237.5. It also extends about 31 miles up the Kanawha River to the Winfield L&D (FERC 2014).

In the Project area, the Ohio River flows through the foothills of the Appalachian Mountains. The topography is nearly level along the River, with moderately steep side slopes to the west (FERC 2014). The Project area is part of the Appalachian Plateau Physiographic Province, which encompasses most of the state as it stretches from New York to Alabama, identifiable by primarily flat or gently rolling lands known for containing extractable coal and petroleum (NPS 2018; WVGES 2020).

3.2 Major Land Uses and Demographics

The Ohio River is 981 miles long and borders or runs through six states in the eastern region of the United States. The Ohio takes its headwaters in Pittsburgh, Pennsylvania at the confluence of the Allegheny and Monongahela Rivers and flows southwesterly to its confluence with the Mississippi River in Cairo, Illinois. The river basin stretches across a 203,940 square mile area, including parts of an additional eight states; New York, Maryland, Virginia, North Carolina, Tennessee, Georgia, Alabama, and Mississippi (Figure 3.1). Numerous tributaries feed the Ohio including the Allegheny, Monongahela, Kanawha, Wabash, Green, Cumberland, and Tennessee Rivers. The Kanawha River is West Virgina's largest inland waterway and drains approximately one-third of West Virginia as well as western portions of Virginia and North Carolina. It is formed

at the confluence of the New and Gauley rivers near Gauley Bridge. It empties into the Ohio River in Point Pleasant, West Virginia, approximately 13 miles north of the Project (WVE 2022).

Approximately ten percent of the US population resides in the basin, equating to more than 30 million people, five million of which rely on the river as a source of drinking water (ORSANCO 2020). The single largest user group of Ohio River water is the utility industry. Additionally, the river provides habitat for fish, mussels, and other aquatic life (FERC 2014; ORF 2022).

Forestry and agriculture are the dominant land uses in the project vicinity. The Ohio River is used primarily for navigation and transportation, recreation, domestic and industrial water supply, cooling water for steam electric plants, and receiving water for domestic and industrial wastewater discharges (FERC 2014).

The climate is generally described as "continental," typified by warm summers and cold winters. However, periods of mild temperatures above freezing occur almost every winter, and periods of dry, cool weather punctuate more prevalent stretches of hot, humid weather during the summer (FERC 2014).

Figure 3.1 Project Location

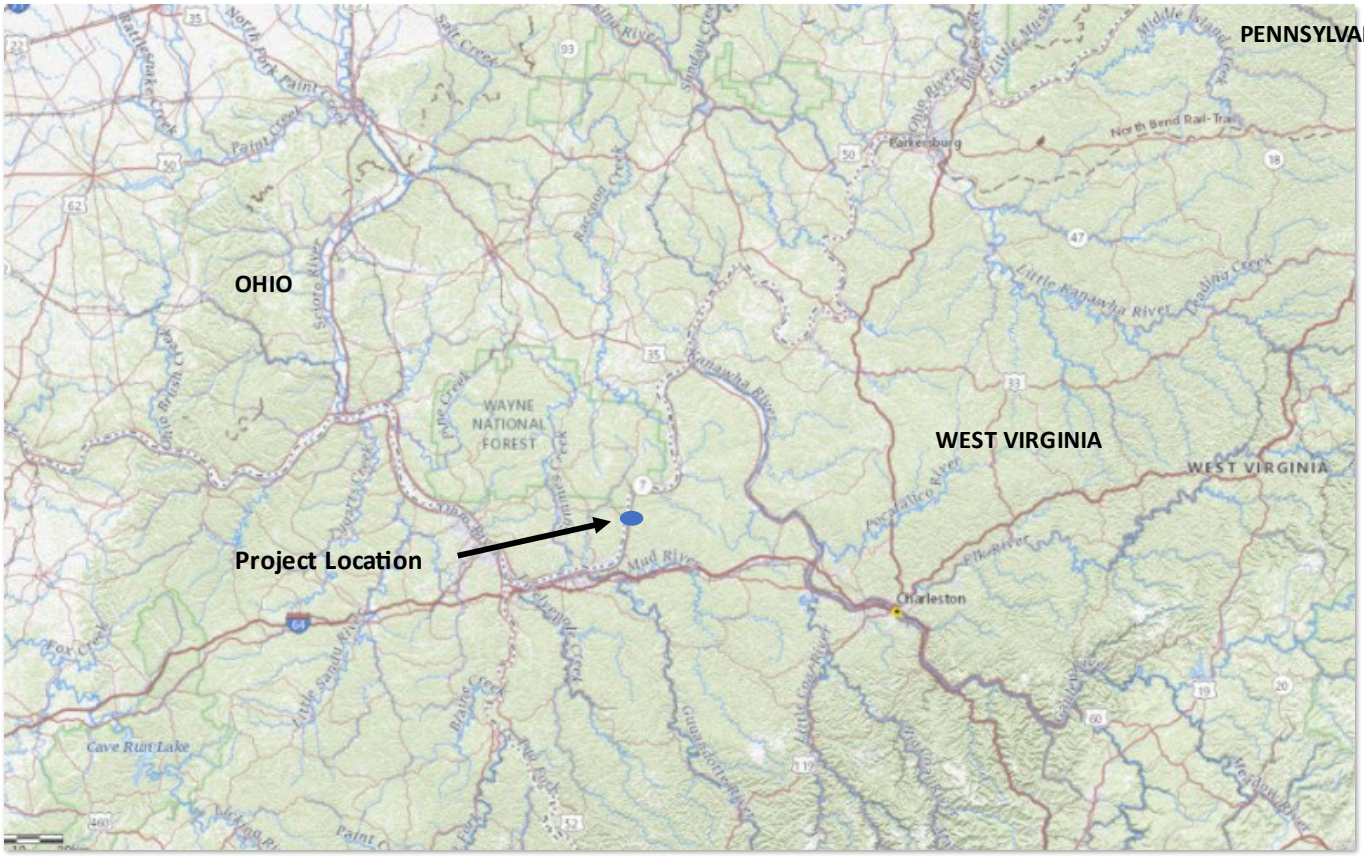


Figure 3.1 General Location of Proposed Project
Robert C. Byrd Hydroelectric Project

4.0 PROJECT LOCATION, FACILITIES, AND OPERATIONS

The proposed Project is located at the R.C. Byrd L&D, formerly called Gallipolis L&D, on the Ohio River near the Town of Gallipolis, in Gallia County, Ohio and Town of Gallipolis Ferry, Mason County, West Virgina. This facility is owned and operated by the USACE, Huntington District, and is therefore not proposed to be a formal project facility. The reservoir operation and river flow control will remain under USACE.

The R.C. Byrd L&D is located at river mile 279.2 below Pittsburgh, PA and 9 miles below the City of Gallipolis, OH. The dam was placed into service on August 25, 1937, as part of a series of L&D to allow navigation year-round. Two larger parallel lock chambers were activated on January 30, 1993, replacing the historic locks which allows for modern-sized tows and barges.

The historic locks were decommissioned and abandoned in-place in 1993 and contain two reinforced concrete navigational channels. Double closure cell structures block river flow in the abandoned locks and allow USACE additional access to R. C. Byrd Spillway gates. The gated dams are constructed to permit increased control over the water level in the navigation pool upriver of the dam.

The dam's primary physical elements are further described in the following table:

Table 4.1 Physical Elements

Robert C. Byrd Locks and Dam	
Year Placed into Operation	1937
Location	Mason County, WV
Water Body Ohio River	Ohio River
Latitude	38.680°N
Longitude	82.179° W
Gates	8
Main Lock Dimensions	110 ft. by 1,200 ft.
Auxiliary Lock Dimensions	110 ft. by 600 ft.
Overall Length	1,116 ft.
Surface Area	12,600 acres

There are no existing hydroelectric facilities at the proposed project site. The proposed development of the site involves the construction of a new 22-megawatt (MW) hydropower facility within the historic decommisioned and abandoned lock.

The dam, as described above, consists of two operational locks and a reinforced concrete dam with eight steel radial arm spillway gates called Tainter gates. This type of spillway permits increased control over the water level in the navigation pool upriver of the dam. As the gates are raised or lowered to control the amount of discharge. The upstream impoundment is maintained at a relatively constant level for an authorized depth of at least nine feet throughout its length. However, the dam cannot be operated to control the flood flows. An incidental benefit derived from the pool formed by the dam is the availability of a source of municipal and industrial water.

The site utilizes two operational locks. The primary lock is 1,200 ft. long and 110 ft. wide, and the auxiliary lock is 600 ft. long and 110 ft. wide. The walls and floors of the locks are of reinforced concrete construction. Located at each end of the lock chambers are two miter gates. The primary lock is accompanied by a central control building that contains office space, electrical controls, and other equipment related to the operation of the L&D.

The R.C. Byrd L&D form one impoundment pool that spans river miles 237.5 through 279.2 on the Ohio River for an approximate total of 41.7 miles. This pool extends upstream to the Racine L&D near the Town of Racine in Meigs County, Ohio. The normal pool elevation of the impoundment created by the dam is 537.0 feet North American Vertical Datum of 1988 (NAVD88). The normal elevation of the lower pool, downstream of the dam, is 514.0 ft., (NAVD88). The surface area of the upper pool at normal pool elevation is believed to be 12,600 acres.

The reservoir is normally referred to as a navigational pool. The dam and its associated pool are controlled and operated by the USACE, Huntington District. The proposed hydroelectric Project will be operated in a run-of-river mode consistent with USACE L&D river operations that maintains the upstream and downstream navigation channel at all times. Because the reservoir is impounded by the USACE facility, it is not considered part of the proposed hydroelectric project. The creation of new reservoirs or changes to the impoundments is not proposed.

4.1 Proposed Facilities

A conceptual plan of proposed facilities is provided in Figure 4.1. The hydroelectric Project would include an intake, the powerhouse, the discharge from the powerhouse, a powerhouse-

substation and transmission lines from the powerhouse-substation to an existing substation. As noted, the USACE L&D and reservoir would not be project components.

Figure 4.1 Proposed Project Features

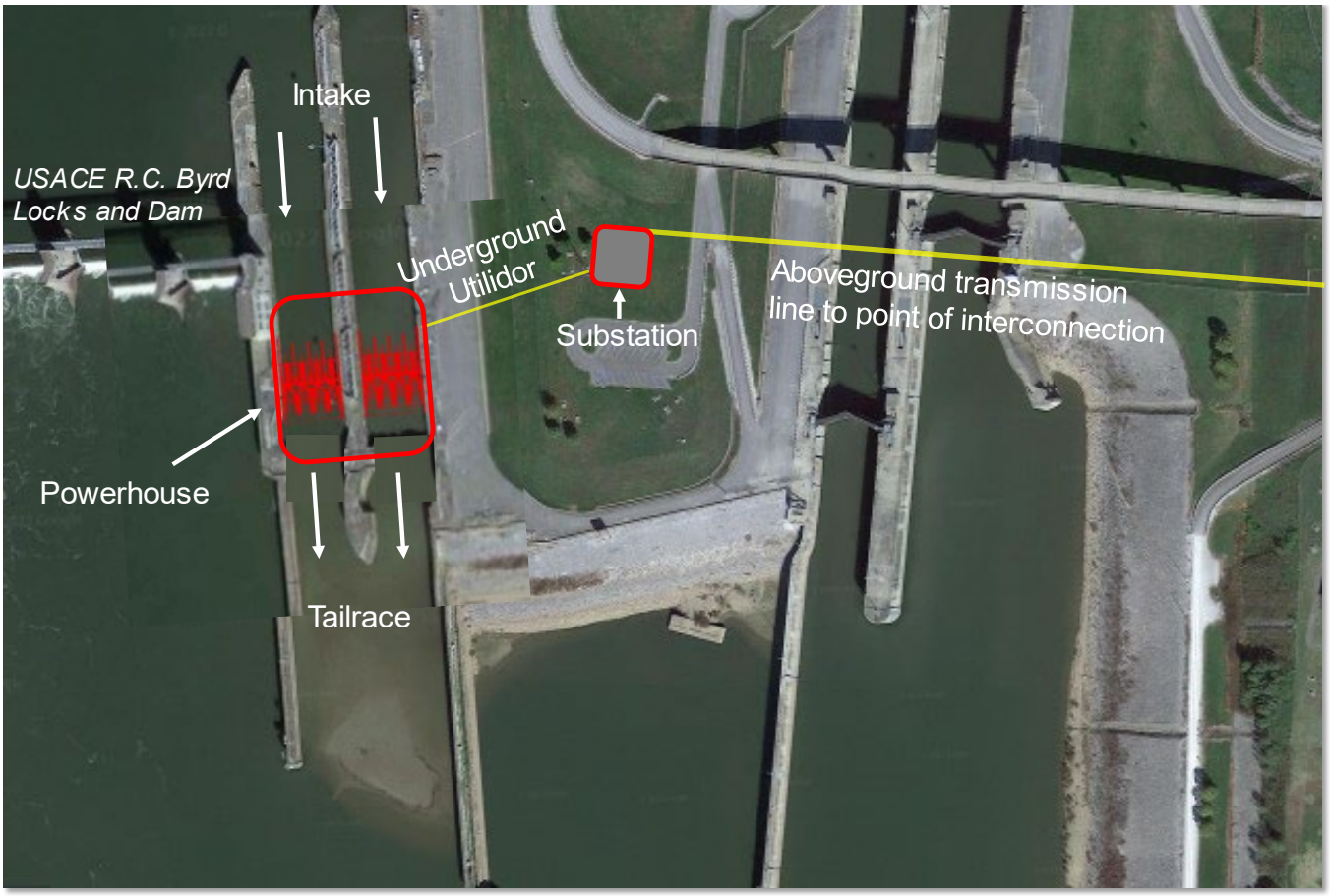


Figure 4.1 Proposed Project Features
Robert C. Byrd Hydroelectric Project

CURRENT HYDRO

4.1.1 Powerhouse

The proposed hydroelectric powerhouse will be constructed of reinforced concrete, approximately 300 ft. wide by 180 ft. long, and will be designed to fit within the two parallel abandoned R.C. Byrd locks. The top of powerhouse will be approximately level with the top of the abandoned lock wall, at 556.0 ft. (NAVD88). The powerhouse will contain eight identical Kaplan pit turbine-generators (four in each lock) with a combined hydraulic capacity of 13,280 cubic foot per second (cfs) and a combined net power capacity of 22,000 kW. The powerhouse

will contain controls and ancillary electrical and mechanical systems, and erection space. The powerhouse will be connected to a powerhouse-substation via an underground utilidor to powerhouse-substation on the USACE property.

The powerhouse overall capacity factor is anticipated to be approximately 67%. The minimum river flow at which the powerhouse can begin operations is 1,660 cfs with one unit and the powerhouse hydraulic capacity is 13,280 cfs, with all 8 turbines. Each turbine is expected to generate about 2.75 MW at maximum hydraulic capacity and maximum net head of 20.5 ft. The expected annual average generation of the Project is 130 GWh.

The Powerhouse top level or roof will be designed to allow the USACE unrestricted accessibility for its operations and maintenance activities across the historic, decommissioned abandoned lock.

4.1.2 Intake and Tailrace Channel

The proposed intake channel will be located upstream of the powerhouse within each abandoned lock and will convey flow from the upper pool to the powerhouse. The new intakes will each measure approximately 150 ft. in width and 100 to 200 ft. in length and consist of an armored channel. Powerhouse trash racks will prevent large debris from entering the turbine system.

The proposed tailrace will convey water exiting the powerhouse back into the river channel downstream of the USACE dam. The approx. 150-ft. wide by approximately 300-ft. long tailrace will consist of an armored channel. Stone riprap will be placed along the banks beyond the existing reinforced concrete lock structures and in areas of higher water velocity to prevent scouring and erosion where required.

Figure 4.2 Proposed Project Boundary

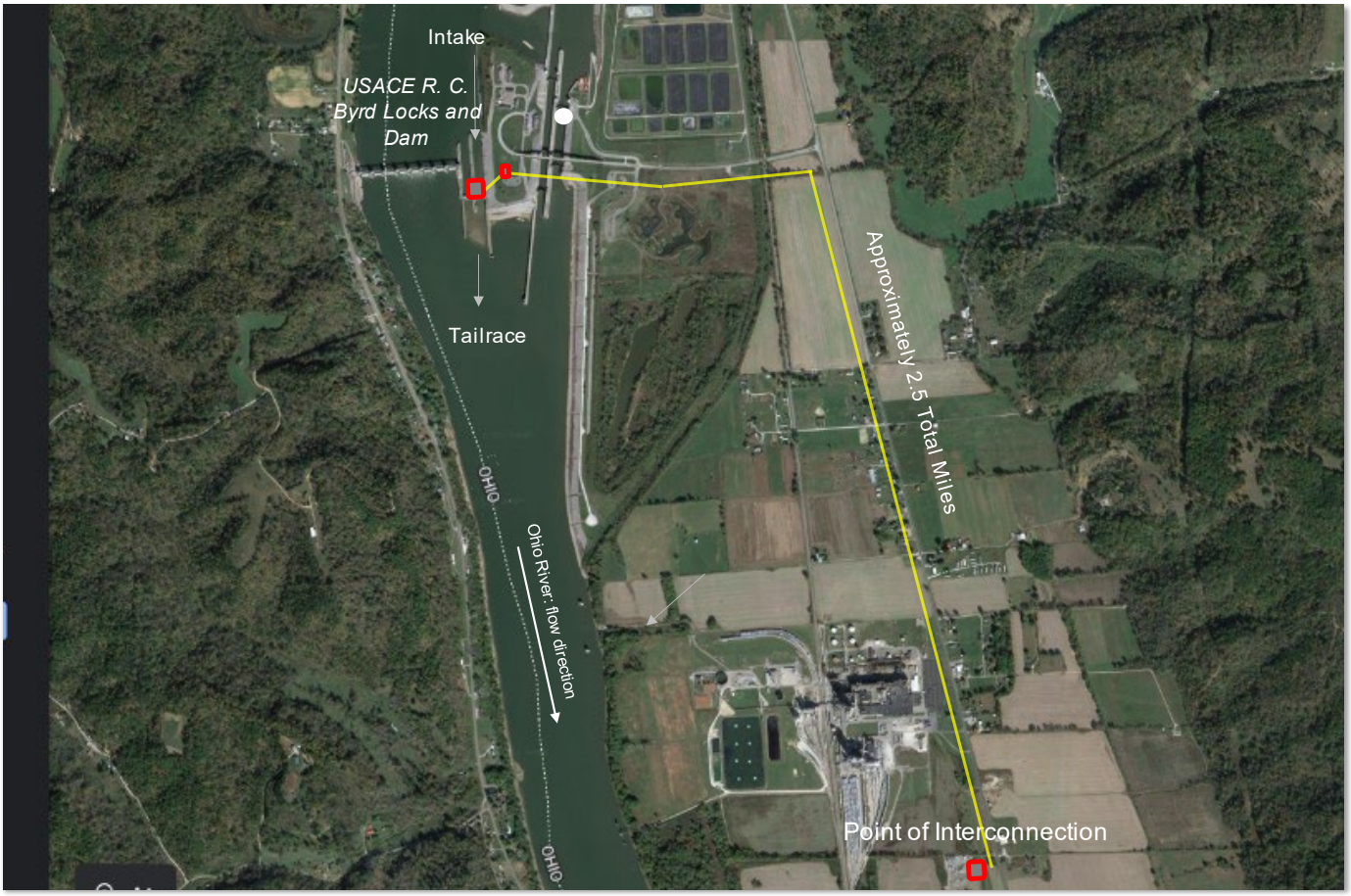


Figure 4.2 Proposed Project Boundary
Robert C. Byrd Hydroelectric Project

CURRENT HYDRO

4.1.3 Transmission Facilities

The Applicant identified existing transmission infrastructure in the vicinity of the proposed project area, specifically an existing substation Apple Grove, WV. A new approximately 2.5 miles long 69 kW transmission line is proposed to run from the powerhouse-substation along Robert Byrd Road to WV State Route 2 and then south connecting into Apple Grove substation (figure 4.2).

A proposed three-phase step-up transformer (4,160 kV to 69 kV) will be located in a new powerhouse-substation on the R. C. Byrd L& D property. The powerhouse-substation will be approximately 150 ft. wide by 150 ft. long. The Apple Grove powerhouse-substation will be located within a separate approximately 300 ft. by 400 ft. lot. The lot will also house a warehouse

(approximately 60 ft. x 40 ft.), a control building (approximately 60 ft. x 40 ft.), and a yet-to-be-defined parking area.

A proposed approximately 250-ft. long underground 4.16 kV utilidor will connect the powerhouse with the powerhouse-substation on the USACE property.

The Applicant will study alternatives for energy transmission and interconnection and use that information to define exact length, route and voltage of this new transmission line, which will likely partially overlay easements along the existing roads of Robert Byrd Road and WV State Route 2. A conceptual single-line diagram can be found in Appendix C

4.1.4 Site Access

The Applicant proposes access to the powerhouse and powerhouse-substation from the Robert Bryd Road off West Virgina Route 2, in the town of Gallipolis Ferry, WV.

4.2 Capacity and Energy Production

The proposed hydroelectric turbine-generator configuration has a hydraulic capacity of 13,280 cfs and a net proposed power capacity of 22 MW. The estimated average annual energy generation is 130 GWh, with a capacity factor of about 67%. The hydraulic net head used for estimating capacity and energy output is the historical gross head measured at the gages minus estimated head losses. Maximum net head at nominal flows is estimated to be 20.5 ft.

The month with the highest estimated average energy generation is July. The month with the lowest estimated average energy generation is March, which is a function of higher spring flows and lower available net head. Dependable capacity for a small hydropower project that operates as run-of-river is calculated based on the ability to consistently produce power during months of highest demand and lowest available resources (in this case, hydraulic flow). (USACE, 1985) In the case of the Ohio River, because RC Byrd L&D is one installation among an interconnected system of dams and hydropower projects, no single value of capacity factor has been calculated based on limiting factors such as low flows or low gross head. For this project, dependable capacity has been calculated as the product of 22 MW (installed capacity) and the capacity factor for each month and is displayed in Table 4.2.

Table 4.2 Monthly Average Energy Production

Average energy generation	kWh	Capacity Factor	Dependable Capacity (Installed Capacity x Capacity Factor)
January	10,072,192	68%	15.0 MW
February	8,051,450	49%	10.8 MW
March	6,843,260	42%	9.2 MW
April	8,139,886	51%	11.3 MW
May	10,635,349	65%	14.3 MW
June	12,239,640	77%	17.0 MW
July	13,436,814	82%	18.1 MW
August	13,329,375	81%	17.9 MW
September	12,167,711	77%	16.9 MW
October	13,037,897	80%	17.5 MW
November	12,153,373	77%	16.8 MW
December	9,963,461	61%	13.4 MW
Annual	130,070,407	67%	14.9 MW

4.3 Current and Proposed Project Operations

The reservoir is normally referred to as a navigational pool. The dam and its associated upstream and downstream pools are controlled and operated by the USACE, Huntington District.

The Project will be operated in a run-of-river mode, consistent with the USACE navigation channel operations and river flow management. The Ohio River flow and reservoir levels will

remain under the control of the USACE Huntington District. The project's construction and operation is not anticipated to affect the RC Byrd L&D barge transportation operations.or USACE operations and maintenance of the R. C. Byrd L&D facilities.

The USACE will continue to be responsible for establishing daily or seasonal river ramping rates, flushing flows, reservoir operations, and flood control operations.

Normal Operations

During normal operations, the project will utilize cfs to generate hydroelectric energy, using all installed turbine-generators. The remaining flow will pass through the dam's spillway, according to the USACE's operational regime. According to the available hydrologic data, the available stream flow exceeds the proposed powerhouse hydraulic capacity 13,280 cfs 90% of the time.

4.3.1 Low Water Operations

If less than 13,280 cfs of streamflow is available, powerhouse operation continues, regulated by the powerhouse controls, curtailing flow or shutting down individual turbines according to turbine limitations. The minimum powerhouse hydraulic unit flow can be regulated to 500 cfs, which is 38% of nominal flow for one turbine. However, it is unlikely that the actual Ohio River flow will be below 5,000 cfs at RC Byrd.

4.3.2 High Water Operations

During high water periods, the facility's power output can decrease due to lower available net head between the upstream and downstream pool levels. This reduction in hydraulic head is the reason that the plant capacity factor tends to be lower during early spring than during summer months. Depending on final selection of turbine unit model and size, the powerhouse high-water curtailment net head is about 6.5 ft of net head.

The majority of the river flow passes over the spillway, following USACE's operational regime.

4.4 Other Project Information

4.4.1 Delivery of Water for Non-Power Uses

Not applicable.

4.4.2 Proposed Project Boundary

The proposed project boundary encloses the intake and tailrace channels, powerhouse, a 150 ft. by 150 ft. powerhouse-substation, and parking area on USACE property. The proposed transmission line from the powerhouse-substation will travel via existing easements along Lock Access Road to WV State Route 2 and south along RT. 2 to the Apple Grove substation, for a total of 2.5 miles (Figure 4.2 above). The total area enclosed by the project boundary is approximately 5.0 acres.

5.0 DESCRIPTION OF EXISTING ENVIRONMENT

5.1 Geology and Soils

5.1.1 Existing Geological Features

The Ohio River basin primarily lies in three physiographic provinces: the Appalachian Plateau, Central Lowlands and Interior Low Plateau. The Appalachian Plateau Province located in the eastern portion of the Ohio River basin is characterized by rugged topography resulting largely from the erosion of flat-lying rocks. The permeable sand and gravel deposits in the valleys of the drainage system provide moderate groundwater supplies. The area has extensive forest cover, generally poor-quality soils, narrow valleys, steep stream gradients, flash floods during the rainy season and low stream flows during dry seasons.

The R. C. Byrd L&D are situated in the Marietta section of the Kanawha (Allegheny) section of the Appalachian Plateau Physiographic Province. This area is characterized by stream-dissected uplands. Valley walls are sharply cut, rising to heights of 300 to 500 feet in some places (USACE, 1981).

5.1.2 Soils

The majority of soils in and around the Project area are silt loams associated with moderate slopes (one to six percent) and steeply sloping soils, such as the Gilpin-Steinsburg-Upshur association and Berks-Upshur association (USACE Environmental Impact Statement, 1981). The Project is located in the Appalachian Plateau Physiographic Province in the Allegheny Plateau Section. The Project is specifically located on the Little Switzerland Plateau, which varies in elevation from 540 feet to 1400 feet. Landslides are somewhat common in this region. To the north is the Glaciated Allegheny Plateau and to the south is the Valley and Ridge region (Brockman, 1998).

The topography of the area is dominated by rounded hills and ridges, with some steeper slopes near the Ohio River. Geology is unglaciated fine-grained red shales, siltstones and sandstones, with limestone and bituminous coal deposited in the Pennsylvanian Era. The Pennsylvanian rocks are underlain by gently sloping beds of Mississippian marine-deposited limestone and Devonian continental-deposited red bed clastic sedimentary rock units. Project area soils are identified using the United States Department of Agriculture (USDA) web soil survey tool. The area in and

around RC Byrd L&D is primarily udorthents, smoothed urban land complex (Figure 5.1 and Table 5.1).

Figure 5.1 Project Area Soils

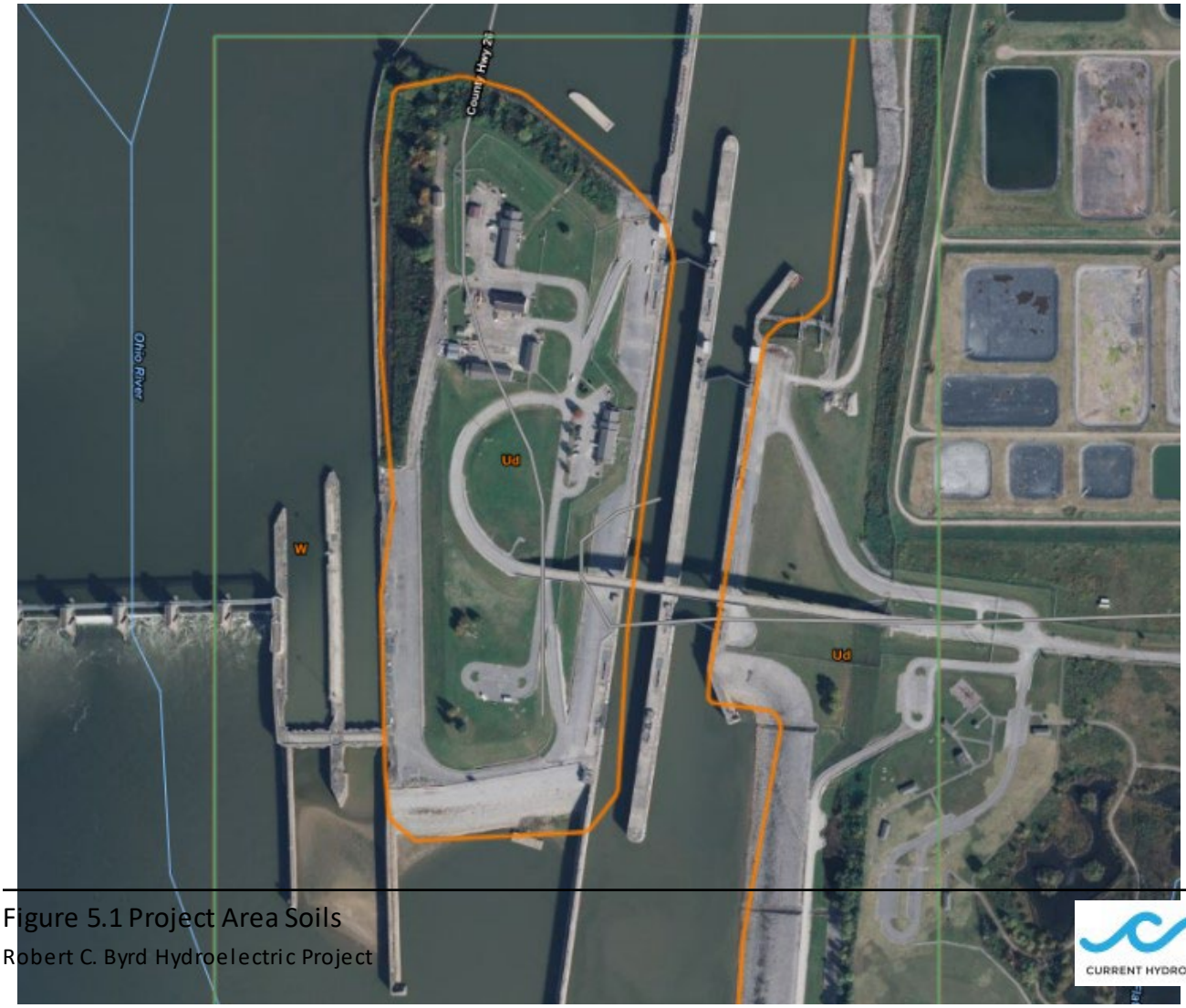


Figure 5.1 Project Area Soils
Robert C. Byrd Hydroelectric Project

CURRENT HYDRO

Table 5.1 Project Vicinity Soil Names, Descriptions and Area

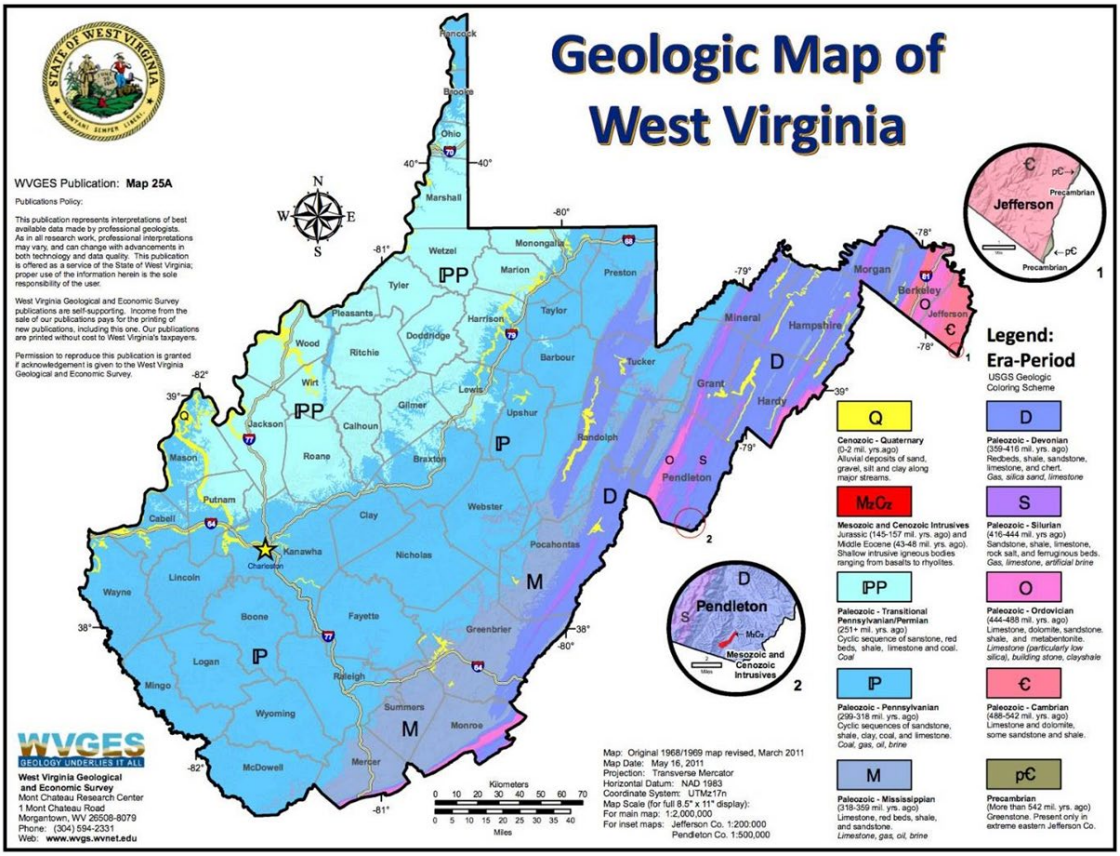
Soil Unit Symbol	Unit Name and Description	Percentage
W	Water	53.4
Ud	Udorthents, smoothed-urban land complex	46.6

5.1.3 Bedrock Geology

The bedrock geology of the general region is dominated by rounded hills and ridges, with some steeper slopes near the Ohio River. Geology is unglaciated fine-grained red shales, siltstones and sandstones, with limestone and bituminous coal deposited in the Monongahela Group during the Pennsylvanian Era. The Pennsylvanian rocks are underlain by gently sloping beds of Mississippian marine-deposited limestone and Devonian continental-deposited red bed clastic sedimentary rock units. The Ohio River channel is defined as Quaternary Alluvium.

Information provided by the USACE indicates that existing or potential geological hazards (such as high seismicity, unfavorable faults, subsidence, solution cavities, active or abandoned mines, large landslides, and unstable soil masses) are not present in the Project vicinity. In addition, the near surface soils generally consist of cohesive materials that are expected to have low erodibility (AMP 2011).

Figure 5.2 Geologic Map of West Virginia



5.1.4 Reservoir Shoreline and Streambank Conditions

The shoreline in the immediate vicinity of the Project impoundment is predominantly surrounded by urbanized and other industrial land uses and other highly developed landscapes, including residences, and in some locations, a thin band of deciduous tree cover, shrubs, lawn, and weeds can be found along the riverbank. Fine-grained sediments are commonly located on the riverbanks near lock and dam structures in the Ohio River.

5.2 Water Resources

5.2.1 Existing Environment

The proposed RC Byrd Project site is located in West Virginia in the Ohio River Basin, one of the nation's largest watersheds and a vital water resource for natural and human-developed environments. The Ohio River is formed at the confluence of the Allegheny and Monongahela Rivers at Pittsburgh, Pennsylvania, and flows 981 miles to where it empties into the Mississippi River. The Ohio River provides warm-water habitat for native large-river aquatic biota, is a major source of drinking water and a source of water supply for manufacturing and power generation, receives and assimilates municipal and industrial wastewater discharges, is used extensively for fishing, recreational boating, and other recreational activities, and serves as a major commercial transportation route by virtue of its extensive series of L&Ds.

The major tributaries feeding the R.C. Byrd Pool are the Kanawha River, which enters the Ohio River at RM 265.7 with a drainage area of 12,200 square miles, and Raccoon Creek which enters at RM 276.0 and has a drainage area of 684 square miles. The major tributaries that enter the upper Greenup Pool are Guyandotte River (RM 305.2, drainage area 1,670 sq mi), Symmes Creek (RM 308.7, drainage area 356 sq mi), and Twelvepole Creek (RM 313.2, drainage area 440 sq mi) (ORSANCO, 2010).

The Byrd Pool has a surface area of 12,600 acres and approximately 147 miles of shoreline. The normal upper pool elevation is 537.0 ft. (NAVD88); the normal lower pool elevation is 514.0 ft NAVD88 (upper pool of Greenup Dam), and the normal lift is 23.0 feet. The average channel depth for the entire Ohio River is approximately 24 feet and is generally at least 9 feet. Dissolved oxygen (DO) levels have been observed on relatively infrequent occasions below state standards. However, due to the relatively shallow depth and free flowing nature of the river, no substantial DO stratification has been observed (Wellner and Dinger, 1989).

The Ohio River Valley Water Sanitation Commission (ORSANCO), an interstate water pollution control agency representing eight states and the Federal government, was established in 1948 to promote interstate cooperation and consistency in the control of water pollution within the Ohio River Basin. ORSANCO carries out a variety of programs that focus on the Ohio River main stem. The following descriptions of water resources are based largely on information and data developed by ORSANCO.

5.2.2 Existing Instream Flow Uses

Ohio State Water quality standards designate beneficial uses for water bodies in the 23 major drainage basins in Ohio. The Ohio River is designated as warm water, public water supply, agricultural water supply, industrial water supply, and bathing waters. The Ohio River is used as a water supply for over five million people and serves as warm water fish habitat and as a source of recreation (OHEPA 2021).

5.2.3 Water Use

In the 18th century, the Ohio River Basin became a key transportation route leading to the establishment of such cities as Pittsburgh, Pennsylvania; Cincinnati, Ohio; and Louisville, Kentucky. The first federally built lock and dam was completed at Davis Island, approximately five miles south of Pittsburgh, in 1885. The Ohio River Basin's water resources are currently managed to serve both conjunctive and competing beneficial uses within the basin, as well as demands downstream of the basin. Current uses include water supply for municipal and industrial (M&I), agricultural, hydropower, navigation, barge transportation, water quality, flood control, fish and wildlife habitat, and recreation (PDCNR 2017). Companies that utilize the Ohio River for operations include utilities, chemical plants, petroleum companies, terminal and storage services, barge and tow companies, marine repair and services, and manufacturing companies. Electrical utilities located on the Ohio River constitute over five percent of the nation's power generating capacity. Major industrial uses include coal mining, oil and gas production, construction, transportation projects, forestry, agriculture, and recreation.

Consumptive or non-consumptive demands are demand categories for these various uses. Consumptive uses or "out-of-stream" uses are water withdrawals that return only a portion or no portion of withdrawn water back to the Ohio River Basin. Examples of consumptive uses are Municipal and Industrial (M&I) and agricultural water supplies. M&I water demands include all water uses, both publicly supplied and self-supplied, residential, commercial, governmental/institutional, industrial, manufacturing, and other demands such as unaccounted-

for water use (system losses and firefighting) (PDEP 2006). Total daily withdrawals are approximately 50 billion gallons with over 2 billion gallons being consumed.

The majority of land in the Ohio River Basin is a mix of urban and industrial, row crops and intensive agriculture, pasture and forested. Agriculture and forest land use classes occupied 37.39 and 51.55 percent of the landscape, respectively, in the Ohio River Basin in 2001. In 2001, 8.9 percent of the Ohio River Basin was urban (USEPA 2014).

5.2.4 State and Federally Approved Water Quality Standards

The ORSANCO is an interstate commission that operates programs to improve water quality in the Ohio River basin. ORSANCO includes membership from eight states in the Ohio River Basin, as well as five federal agencies (National Oceanic and Atmospheric Administration [NOAA], USACE, United Stated Environmental Protection Agency [USEPA], United States Fish and Wildlife Service [USFWS], and United States Geology Survey [USGS]). Under the terms of an interstate agreement known as the Ohio River Valley Water Sanitation Compact, Article VII recognizes individual member states' authority to adopt water use designations and water quality standards that are no less stringent than the ORSANCO standards for the Ohio River mainstem. Within this portion of the Ohio River, ORSANCO, Ohio EPA, and WVDEP establish designated uses for the Ohio River and include fish and other aquatic life; contact recreation; public, agricultural, industrial, and wildlife water supply; water transport; cooling and power; and fish consumption. ORSANCO issued a 2019 Revision of the Pollution Control Standards and established numerous water quality criteria that are identified and established to protect designated uses (ORSANCO 2019). The entire Ohio River is designated as impaired for fish consumption because of high levels of PCBs and dioxin (ORSANCO 2017).

In West Virginia, water quality criteria for the Ohio River are found in West Virginia's Code of State Regulations (CSR §47-2, et seq. ([2016]) and in Ohio are found in the Ohio Administrative Code (OAC) 3745-1-32. Numeric water quality criteria exist for DO concentrations and are the same for ORSANCO, WVDEP, and Ohio EPA; however, the narratives associated with the reported DO criteria are slightly discrepant. The average DO concentrations for the protection of warm water aquatic life habitats shall be at least 5.0 mg/L for each calendar day; the minimum DO concentration shall not be less than 4.0 mg/L; and from April 15 to June 15, a minimum DO concentration of 5.0 mg/L shall be maintained at all times (ORSANCO 2021).

Water temperature criteria vary throughout the year and are based on daily maximum water temperature, period average, and instantaneous maximum temperatures. As of 2019, water

temperature criteria for the Ohio River differ slightly for the ORSANCO, WVDEP, and Ohio EPA. Water temperature criteria are summarized in Table 5.2 and Table 5.3.

Table 5.2 ORSANCO's Daily Maximum Water Temperature Criteria

Degrees Fahrenheit (°F) in the Ohio River between Ohio River Miles 0-341

ORSANCO	
Julian Day**	**Daily Maximum Water Temperature**
1-49	47.1 – 0.086 * Julian Day
50-166	26.6 + 0.328 * Julian Day
167-181	87
182-243	89
244-258	87
259-366	160.8 – 0.300 * Julian Day

**Julian Day is the number day of the year (1-366)

Table 5.3 Water Temperature Criteria

Month	Date Range	ORSANCO	Ohio EPA		WVDEP	
		Monthly Max Water Temperature	Period Average	Instantaneous Maximum	Period Average	Instantaneous Maximum
January	1-31	45.7	45.7	47.0	45	50
February	1-29	43.9	43.9	46.3	45	50
March	1-15	51.2	51.2	56.4	51	56
	16-31				54	59
April	1-15	61.2	61.2	66.3	58	64
	16-30				64	69
May	1-15	71.2	71.2	76.5	68	73
	16-31				75	80
June	1-15	78.8	78.8	81.0	80	85
	16-30	87.0	87.0	87.0	83	87
July	1-31	89.0	89.0	89.0	84	89
August	1-31	89.0	89.0	89.0	84	89
September	1-15	87.0	87.0	87.0	84	87
	16-30	81.0	81.0	83.1	82	86
October	1-15	74.1	74.1	78.3	77	82

	16-31				72	77
November	1-30	65.0	65.0	69.0	67	72
December	1-31	55.8	55.8	60.0	52	57

degrees Fahrenheit °F

For the first three quarters of the 20th century, DO concentrations in the Ohio River were depressed because of the discharge of raw or inadequately treated sewage. DO conditions began to improve following the promulgation in 1970 of ORSANCO's standard requiring secondary treatment for all sewage (FERC 2014).
The waters above and below the RC Byrd L&D meet their designated uses as warm water habitat and as public water supply but fail to meet their designated uses for recreation and fish consumption (FERC 2014).

The Applicant is committed to maintaining DO levels downstream and is actively investigating aeration alternatives when flows are within the operational range of the Project. Alternatives may include an air injection system in the powerhouse draft tubes and minimum flows over the dam spillway gates. The Applicant will monitor DO and install alarms to draw operational attention to DO saturation thresholds. Notifications will start at 6.5 mg/L as part of a water quality management plan (Section 6.3.9.) with hydropower curtailment prior to saturation dropping below 5.0 mg/L. The USACE maintains the pool elevation to allow for a depth suitable for navigation; the Applicant will not have the ability or authority to operate the powerhouse in anything but run-of- river mode. The USACE determines the total discharge flow from the dam, and the Applicant will use an allocated portion of that flow for power generation.

5.2.4.1 Water Quality Certification

The West Virginia Department of Environmental Protection (WVDEP) Section 401 Water Quality Certification program is authorized by Section 401 of the Clean Water Act (33 U.S.C. § 1341) and the West Virginia Code §22-1-6(d)(6). West Virginia Legislative Rule 47 CSR 5A outlines the application process and criteria for decision by the Secretary of the WVDEP.

For the WVDEP to issue a Section 401 Certification, the project must comply with the State Water Quality Standards (46 CSR 1) and not potentially result in an adverse long-term or short-term impact on water quality. Included with the Water Quality Standards is the Anti-degradation Implementation Rule (60 CSR 5) effective July 2, 2001.

The Applicant will apply for a Water Quality Certification under Section 401 of the Clean Water Act from the West Virginia DEP.

5.2.5 Existing Water Quality Data

USACE and several hydroelectric project operators currently monitor DO at 13 Ohio River stations in hourly increments from May through October. ORSANCO compiled these DO data from 2006 through 2018 and found that overall, daily mean DO measurements were less than the daily mean standard (5.0 mg/L) in less than 1% of the sampling period in the RC Byrd Pool and in 21% of the sampling period in the Greenup Pool upstream of the Greenup Hydroelectric Project, FERC No. 2614 (FERC 2014).

Minimum (instantaneous) DO measurements were less than the minimum standard (5.0 mg/L May 1 through June 15; 4.0 mg/L June 16 through October 31) in less than 1% of days in the RC Byrd Pool and in 3.3% of days in the Greenup Pool. DO data collected upstream and downstream of the Greenup L&D show an increase in the downstream DO in 80 percent of the days recorded from 2006 through 2009, a decrease in 19% of days, and no change in less than 1% of days (ORSANCO 2020).

DO and temperature data from 2014-2018 are presented in ORSANCO report, "Assessment of Ohio River Water Quality Conditions", but are not used to assess support of the aquatic life use. In addition to metals and nutrients/ions, both DO and temperature levels play a role in whether the river can support aquatic life. However, because monitoring for these parameters takes place only for a portion of the year (summer), more emphasis is given to direct measures of biological integrity.

The DO and temperature data are additionally useful in identifying areas of concern for further investigation. DO and temperature in the Ohio River main stem is monitored by ORSANCO, United States Army Corps of Engineers, United States Geological Survey, and electric utility/hydropower agencies at 13 river stations. Measurements are taken in hourly or 30-minute increments depending on the operating agency (Table 5.4) ORSANCO 2020).

Table 5.4 Locations of Monitoring Stations

Station	River Mile	Operating Agency	Frequency	Date of Operation
MONTGOMERY	31.7	USGS	Hourly	2014-2018
HANNIBAL	126.4	USACE	Hourly	2014
WILLOW ISLAND	161.7	Electric Utility	Hourly	2016-2018
RACINE	237.5	Electric Utility	Hourly	2016-2018
IRONTON	325.0	USGS	Hourly	2016-2018
GREENUP	341.0	Electric Utility	Hourly	2014-2016, 2018
MELDAHL	436.2	Electric Utility	Hourly	2016-2018
MARKLAND	531.5	Electric Utility	Hourly	2016-2018
McALPINE	606.8	Electric Utility	Hourly	2016-2018
CANNELTON	720.7	Electric Utility	Hourly	2016-2018
J. T. MYERS	846.0	ORSANCO	30 Min	2014
SMITHLAND	918.5	Electric Utility	Hourly	2014, 2016-2018
OLMSTED	964.6	USGS	Hourly	2014-2017

Table 5.5 Ohio River Dissolved Oxygen Values Below 5.0 mg/L Criteria

Ohio River Station	Mile Point	2014 % Days Below Criteria	2015 % Days Below Criteria	2016 % Days Below Criteria	2017 % Days Below Criteria	2018 % Days Below Criteria	2014-2018 % Days Below Criteria
Montgomery	31.7	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hannibal	126.4	0.0%					0.0%
Willow Island	161.7						
US				0.0%	0.0%	0.0%	0.0%
DS				0.0%	0.0%	0.0%	0.0%
Racine	237.5	0.0%	0.0%	9.7%	0.0%	6.8%	3.1%
Ironton	325.0			0.0%	0.0%	0.0%	0.0%
Greenup	341.0						
US		14.0%	13.6%	0.0%		1.6%	8.7%

DS		2.0%	9.7%	4.4%	n/a	0.0%	4.0%
Meldahl	436.2						
US				0.0%	0.0%	2.4%	0.0%
DS				0.0%	0.0%	1.6%	0.0%
Markland	531.5						
US Hydro		4.0%	21.9%	11.1%	0.0%	2.4%	9.0%
DS Hydro		5.6%	12.8%	5.9%	6.7%	7.1%	6.9%
DS Lock		0.0%	5.9%				1.7%
US Lock		0.0%	1.8%				0.8%
McAlpine	606.8	4.6%	2.4%	19.8%	0.0%	6.6%	6.8%
Cannelton	720.7						
US				0.0%	0.0%	2.4%	0.0%
DS				3.0%	0.0%	0.0%	3.0%
John T. Myers	846.0	0.0%					0.0%
Smithland	919.0						
US		3.7%		0.0%	2.5%	7.1%	3.9%
DS				7.0%	0.0%	4.8%	7.0%
Olmsted	964.6	0.0%	8.4%	2.5%	0.0%		4.0%

blank = insufficient data available

(US = Upstream, DS = Downstream, Hydro = Hydroelectric Facility, Lock = Lock Chamber)

As late as 2021-year end, ORSANCO compiled data on the Ohio River in the vicinity up through October 2021.

Table 5.6 DO Criteria 2018 – 2021

Ohio River Station	Mile Point	2018 % of Days Below Criteria	2019 % of Days Below Criteria	2020 % of Days Below Criteria	2021 % of Days Below Criteria	2018-2021 % of Days Below Criteria
Racine	237.5	6.4	3.1	0	10.4	5
Kyger	260.0	9.6	16.6	13.7	9.6	12
RC Byrd	279.2					

Ironton	325.0	0	0	0	0	0
Greenup	341.0	1.6	1.5	1.6	2.4	1.8

In addition to the above data, ORSANCO collected limited bimonthly DO data at the RC Byrd L&D from 1976 through 2008.

As a component of its licensing studies, The City of Wadsworth also collected water quality data during a freshwater mussel survey in September 2009 and during fish population surveys completed from June through October 2012. The objective of the water quality surveys was to record DO and temperature values upstream and downstream of the RC Byrd L&D and to identify any changes in the parameters upstream to downstream, across the channel, and within the water column. DO concentrations during these sampling periods generally ranged from 5.6 to 5.8 mg/L (WHO 2011).

Also, continuous water quality data (DO, temperature, specific conductance, and turbidity) were collected by Wadsworth from fixed monitoring devices placed upstream and downstream of the R.C. Byrd L&D during the critical DO period of late summer/early fall 2010 (Table 5.7).

Table 5.7 DO and Temperature Data

Location	Monitoring Period	Dissolved Oxygen (mg/l)			Temperature (deg. F)		
		Mean	Min	Max	Mean	Min	Max
Upstream	8/5-10/5/2010	6.2	4.9	7.5	81.1	69.4	86.4
Downstream	9/8-10/6/2010	7.4	6.9	7.9	76.9	69.8	82.3

The monitoring devices recorded DO values upstream ranging from 4.9 to 7.5 mg/L with an average of 6.2 mg/L. Downstream DO values ranged from 6.9 to 7.9 mg/L with an average of 7.4 mg/L. Both upstream and downstream average and minimum DO values comply with the DO standards set by ORSANCO, Ohio EPA, and West Virginia DEP. The data, on average, exhibited a 0.4 mg/L increase in DO downstream of the dam. The slight increase in DO downstream of the dam could be the result of aeration by the dam that the downstream device is capturing because of its proximity (1,000 feet) to the dam (WOH 2011).

The concentration of DO in surface water is controlled by temperature and has both a seasonal and a daily cycle. Cold water can hold more DO than warm water. In winter and early spring, when the water temperature is low, the DO concentration is high. In summer and fall, when the water temperature is high, the DO concentration is low. Based on the data listed in the tables above, DO, and water temperature in the RC Byrd Pool generally comply with the water quality standards set by ORSANCO, Ohio EPA, and West Virginia DEP. Like the RC Byrd L&D, the USACE dams on the Ohio River above the RC Byrd L&D are largely operated as run-of-release projects, and no substantial DO stratification has been observed in the project vicinity. However, DO concentrations in the project area do occasionally drop below the minimum DO standard (typically during the warmest period of the year).

As part of ORSANCO's monitoring program, additional water quality data are collected at multiple locations in the Ohio River on a bimonthly or quarterly basis. ORSANCO measures concentrations of metals, nutrients, suspended solids, total hardness, total organic carbon (TOC), total Kjeldahl nitrogen (TKN), sulfide, chloride, and phenolics. ORSANCO's assessment of river impairment indicates no water quality issues related to any of these other parameters; however, several segments of the Ohio River between the New Cumberland L&D (RM 54.3) and RC Byrd L&D (RM 279.2) are listed under the 2010 303(d) list of impaired waters due to elevated levels of dioxin, iron, and mercury (FERC 2014).

During the months of May through October, ORSANCO collects data from 13 stations, once per day, for DO and temperature, Monday through Friday. The data is compiled into a report that shows the minimum, maximum, and average readings for the acquired DO and temperature readings.

Table 5.8 Ohio River Temperature Criteria Exceedances 2014-2018

Year	Montgomery	Hannibal	Willow Island US	Willow Island DS	Racine	Ironton	Greenup US	Greenup DS
RM	31.7	126.4	161.7	161.8	237.5	325.0	341.0	341.1
2014	0.0%	0.0%			0.0%		0.0%	0.0%
2015	0.0%				0.0%		0.0%	0.0%
2016	0.0%		0.0%	0.0%	0.0%	0.0%	13.0%	0.0%
2017	0.0%		0.0%	0.0%	3.7%	0.0%		
2018	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Totals	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	3.7%	0.0%

(blank = insufficient available data)

Data in Table 5.8 above shows that for the period from 2014-2018, 0.8% of the days exceeded the temperature criteria for Racine location and 3.7% of the days exceeded temperature criteria for the upstream Greenup location. There were no temperature exceedances for the remaining time. The RC Byrd Lock and Dam is located between Racine and Ironton (ORSANCO 2020).

Table 5.9 Ohio River Temperature Criteria Exceedances 2019-2021

Year	Montgomery	Hannibal	Willow Island US	Willow Island DS	Racine	Ironton	Greenup US	Greenup DS
RM	31.7	126.4	161.7	161.8	237.5	325.0	341.0	341.1
2019	0.0%		4%	4%	3.2%	9.6%	10.4%	10.4%
2020	0.0%		0.0%	0.0%	0.8%	0.0%	1.6%	0.0%
2021	0.0%		0.0%	0.0%	0.0%	1.6%	0.0%	0.0%
Totals	0.0%		1.3%					

(blank = insufficient available data)

Data in Table 5.9 above shows that for the period from 2019-2021, 1.3% of the days exceeded the temperature criteria for the Willow Island upstream and downstream, and the Racine

locations and 3.7% of the days exceeded temperature criteria for the Ironton location, and 4% of the days exceeded temperature criteria for the upstream Greenup location, and 3.47% of the days for the downstream Greenup location. There were no temperature exceedances for the remaining time. The RC Byrd Lock and Dam is located between Racine and Ironton (ORSANCO 2022).

ORSANCO's allowable maximum temperature criteria are specified for six separate periods in a year as identified by Julian days. While a number of stations had temperature exceedances, no stations had more than 10% for the entire reporting period. The lower river tends to have greater numbers of exceedances of the temperature criteria for the protection of aquatic life.

5.2.6 Sediment

The Ohio River flows through industrial areas of Ohio and West Virginia in the Project vicinity. Several industrial chemicals such as dioxins and PCBs are found at low concentrations in the river sediments (FERC 2014).

ORSANCO collected PCB and dioxin data in the Ohio River Basin from 1997 through 2004. Dioxin water concentration data were compared against ORSANCO's water quality criterion of 0.000000005 micrograms per liter (µg/L). Every dioxin sample, river-wide, exceeded the water quality criterion. Similarly, PCB levels were compared against the 64 picograms per liter human health criteria set forth in the Pollution Control Standards. All samples were in violation of the PCB criterion, as well. PCB and dioxin data were extrapolated to the entire river because data showed that all samples, at all locations along the river, exceeded the criteria for human health. Within the Ohio River Basin, over 400 industries have been identified as possible sources of PCBs and 120 potential and confirmed dioxin sources have been identified (FERC 2014).

ORSANCO's Ohio River Watershed Pollutant Reduction Program is assisting states and EPA in developing total maximum daily loads (TMDLs) for the Ohio River. A dioxin TMDL and a dioxin TMDL technical support document were completed in September 2000 for an 80-mile stretch of the Ohio River in West Virginia. This TMDL calls for a 74% reduction of the daily dioxin load in the Ohio River. In September 2002, a PCB TMDL was completed for a 277-mile stretch of the Ohio River from East Liverpool, Ohio to Catlettsburg, Kentucky. This TMDL indicates daily PCB loadings must be reduced by as much as 99 percent to meet the applicable ambient water quality standards (FERC 2014).

Besides transporting water, rivers are continually transporting sediments. The transport and deposition of sediment upstream and downstream of the dam vary. The roller gates in the dam are designed to allow water to flow over the top during low-flow conditions. Most of the year the gates are operated to release water from the bottom of the gates. While some sediment storage occurs under low and normal flow conditions, sediment transport occurs under high-flow conditions. The passage of sediments under high-flow conditions results in the need for periodic dredging of the navigation channel downstream of the dam (FERC 2014).

USACE channel maintenance is the primary activity that has the potential to affect aquatic resources within the proposed Project area. The upper approach to the lock chamber does not require frequent dredging; however, the lower approach to the lock chamber is dredged annually and in emergency situations. The lower approach dredge area extends from the West Virginia bank to beyond the lower approach guide wall (a width of approximately 600 feet), from the lock chamber to approximately 3,000 feet downstream of the chamber; approximately 1,600 feet downstream of the lower lock wall. Using a hydraulic dredge, along with a clam shell or mechanical dredge, the USACE removes an average of 73,172 cubic yards of material from this area annually (FERC 2014).

5.3 Fish and Aquatic Resources

5.3.1 Aquatic Resources and Habitats

The physical and chemical changes in the Ohio River watershed over the years have caused changes in the composition and abundance of the fish community, owing to the effects of deforestation, domestic and industrial wastewater discharges, acid mine drainage, and damming of the River (ORSANCO, 2005; USACE, 2006).

Species that thrive in impoundments and reproduce with eggs or larvae that float in the water now dominate the fish community (e.g., emerald shiner, gizzard shad, freshwater drum), whereas fish that require flowing water and clean gravel substrates have declined (e.g., lake sturgeon, paddlefish, and blue sucker). The introduction of non-native species by man (e.g., carp) has also contributed to population shifts. Still, improvements to Ohio River water quality over the last 25 years have led to improved fish populations and species diversity.

River connectivity is important for fish movement to spawning areas and over-wintering areas, for maintenance of fish community diversity along the river, and for upstream replenishment of mussel populations through movement of the fish that serve as hosts for mussel larvae. The high-lift dams on the Ohio River are 16 to 37 feet high, and fish are able pass upstream by locking through with the barge and boat traffic, by swimming

5.3.2 Fish Species and Habitats

Historically, 159 fish species were present in the Ohio River mainstem (ODNR 2003). Ongoing monitoring data collected after the construction of dams in the 1800s to 1900s showed a shift toward species tolerant of siltation and increased turbidity, such as Gizzard Shad, Black Bullhead (Ameiurus melas), Goldeye (Hiodon alosoides), Skipjack Herring (Alosa chrysochloris), and Spotted Bass (Micropterus punctulatus) and a decline in numbers for large river species such as Shovelnose Sturgeon, Paddlefish, Muskellunge, and Blue Sucker (Cycleptus elongatus) (City of New Martinsville 1987). Furthermore, large inputs of domestic sewage, industrial effluents, and acid mine drainage supported the expansion of pollutant-tolerant species, although water quality has improved over the last 25 years due to the Clean Water Act (ODNR 2003; FERC 2015).

Regulated game species under the Eastern Unit include walleye, sauger, saugeye, striped bass, white bass, muskellunge, black and white crappie, and largemouth and smallmouth bass (ODNR 2021). Common carp are also regulated to promote population control through unlimited limits and catch and no-release requirements. Ohio and West Virginia honor other state's fishing licenses along their common borders on the mainstem of the Ohio River and within its banks, embayments, and tributaries.

The state manages the fishery of the upper Ohio River in coordination with the USFWS to implement stocking programs, improve habitat, and increase recreational access and awareness.

Data on the fish community inhabiting the R. C. Byrd and Greenup Pools were collected by ORSANCO and the Ohio River Ecological Research Program (ORERP) using nighttime electrofishing survey methods during various years between 1990 and 2019. The five most abundant fish species collected in these surveys, in descending order, were gizzard shad, emerald shiner, freshwater drum, mimic shiner, and sauger. Combined, these five species represented almost 82 percent of the fish collected in the two Pools.

The most recent fish surveys conducted in the R.C. Byrd Pool took place in 2008, 2013, and 2019 and Greenup Pool in 2006, 2011, 2016, data is reported by the ORSANCO. During the most recent survey in 2019, there were 2,211 fishes caught representing 41 species (Table 5.10). The most abundant species identified was Channel Shiner, Emerald Shiner, and Spotfin Shiner accounting for 41.5%, 12.9%, and 9.3% of the total catch, respectively (ORSANCO 2019).

Table 5.10 Fish species caught in the R. C. Byrd surveys in 2019

Common Name	Scientific Name
Black Buffalo	*Ictiobus niger*
Black Crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*
Bluntnose Minnow	*Pimephales notatus*
Brook Silverside	*Labidesthes sicculus*
Bullhead Minnow	
Channel Catfish	*Ictalurus punctatus*
Channel Shiner	*Notropis wickliffi*
Common Carp	*Cyprinus carpio*
Emerald Shiner	*Notropis atherinoides*
Flathead Catfish	*Pylodictis olivaris*
Freshwater Drum	*Aplodinotus grunniens*
Gizzard Shad	*Dorosoma cepedianum*
Goldfish	
Golden Redhorse	*Moxostoma erythrurum*
Green Sunfish	*Lepomis cyanellus*
Highfin Carpsucker	*Carpiodes velifer*
Hybrid Striped Bass	*Monrone saxatilis x Morone chrysops*
Largemouth Bass	*Micropterus salmoides*
Logperch	*Percina caprodes*
Longear Sunfish	*Lepomis megalotis*
Longnose Gar	*Lepisosteus osseus*
Micropterus sp	*Micropterus sp*

Common Name	Scientific Name
Mooneye	*Hiodon tergisus*
Morone Sp	*Morone sp*
Northern Hog Sucker	*Hypentelium nigricans*
Piedmont Shiner	*Notropis sp.*
River Carpsucker	*Carpiodes carpio*
Sauger	*Sander canadensis*
Saugeye	*Sander vitreus x canadensis*
Silver Chub	*Macrhybopsis storeriana*
Silver Redhorse	*Moxostoma anisurum*
Smallmouth Bass	*Micropterus dolomieu*
Smallmouth Buffalo	*Ictiobus bubalus*
Smallmouth Redhorse	*Moxostoma breviceps*
Spotfin Shiner	*Cyprinella spiloptera*
Spotted Bass	*Micropterus punctulatus*
White Bass	*Morone chrysops*
Yellow Perch	*Perca flavescens*

5.3.3 Fish Passage

The NOAA along with the USFWS provide consultation and guidance to the FERC and Hydroelectric Project operators to minimize adverse impacts on fish passage. Working with the state agencies, USACE, USEPA, and the local resource agencies provides collaborative efforts to develop effective fish passage and entrainment recommendations and solutions for implementation.

5.3.4 Essential Fish Habitat

There is no NOAA designated Essential Fish Habitat located in the upper Ohio River.

5.3.5 Benthic Macroinvertebrates

Macroinvertebrates occur in almost all river and stream types of the United States and around the world. Their communities play a crucial role in the transfer of organic material throughout the aquatic food web. In most freshwater aquatic settings, macroinvertebrate communities are dominated by juvenile aquatic insects, however, mollusks (snails, clams, mussels), crustaceans (scuds, shrimp, crayfish, etc.), and worms (annelids) (Hauer et al 2017). The distribution and overall population density of aquatic macroinvertebrates can be used to characterize the overall quality of the environmental conditions and water quality of an aquatic system (Giutierrez 2003).

5.3.6 Freshwater Mussels

Freshwater mussels (Unionidae) are among the most threatened group of aquatic organisms in the United States. There were an estimated 80 freshwater mussel species in the Ohio River 100 years ago (USACE, 2006). By the 1950s, that number had dropped to 25 to 35 owing to a number of factors, including acid mine drainage and industrial discharges in the upper reaches; dredging, sand and gravel mining; and impoundment.

The Ohio River system harbors a unique and diverse assemblage that may be impacted by Project activities. Mussels are a good biological indicators of water quality and the ecological health of river systems. They are considered ecosystem engineers because they can transform their surroundings and make habitats more suitable for other organisms (Gutierrez 2003, Vaughn et al 2008). They are sensitive to pollution, sedimentation, and variations in temperature and DO fluctuations. Many of these key aquatic organisms have been in decline throughout freshwater systems in the United States. In the Ohio River, the ODNR and USFWS have listed many species of mussels as endangered, threatened, candidates for federal listing, or species of special concern (ODNR 2021). Table 5.11 catalogues the federally listed freshwater mussel species potentially occurring within the RC Byrd Project area and the section of the Ohio River.

The Huntington District has sponsored nine mussel surveys along the right descending bank downstream of R. C. Byrd L&D between 2001 – 2021. All of the mussel surveys show that a diverse mussel community exists along the right descending bank. These surveys have identified 27 live species in this reach of the Ohio River. One point of notable significance is the presence of the federally endangered Plethobasus cyphyus, which was encountered alive in 2009, 2011, 2016, 2017, and 2021 as well as a weathered dead relic shell in 2014. Based on this

sampling effort, the mussel community has remained unchanged. The 2021 data show that the species collected, species diversity, and species evenness were similar to other years' surveys.

During the 2021 survey, a total of 812 live mussels from 20 unionid species were encountered. Live species encountered at the site included Actinonaias ligamentina, Amblema plicata, Cyclonaias pustulosa, Ellipsaria lineolata, Elliptio crassidens, Lampsilis cardium, Lampsilis ovata, Lasmigona complanata, Leptodea fragilis, Ligumia recta, Megalonaias nervosa, Obliquaria reflexa, Plethobasus cyphyus, Pleurobema cordatum, Pleurobema sintoxia, Potamilus alatus, Quadrula quadrula, Reginaia ebenus, Theliderma metanevra, and Truncilla truncata. One species of notable significance is the federally endangered Plethobasus cyphyus. One live individual of this species was collected and measured 67 mm long, 47 mm high, 38 mm wide, weighed 100 g, and was estimated to be eight years old.

Table 5.11 Federally Endangered Ohio River Freshwater mussels

Species	Status	Comments
Rayed bean (*Villiosa fabalis)*	Endangered	Not in the Project Area
White catspaw (*Epioblasma obliquata perobliqua)*	Endangered	Not in the Project Area
Clubshell - *Pleurobema clava*	Endangered	Not in the Project Area
Fanshell - *Cyprogenia stegaria*	Endangered	Not in the Project Area
Pink mucket - *Lampsilis abrupta*	Endangered	Not in the Project Area
Sheepnose mussel - *Plethobasus cyphyus*	Endangered	Found downstream of the project area.
Snuffbox - Epioblasma triquetra	Endangered	Not in the Project Area
Purple cat's paw - *Epioblasma obliquata obliquata*	Endangered	Not in the Project Area
Rabbittsfoot - *Quadrula cylindrica ssp. cylindrica*	Endangered	Not in the Project Area
Northern riffleshell - *Epioblasma torulosa rangiana*	Endangered	Not in the Project Area

5.4 Upland Wildlife and Botanical Resources

5.4.1 Terrestrial Wildlife

The proposed Project area is located in the Southern Unglaciated Allegheny Plateau ecological sub region, approximately six miles from the Chief Cornstalk Wildlife Management area in Southside, West Virginia. The Green Bottom Wildlife Management Area in Glenwood, West Virginia is within twelve miles of the project and includes more than 1,000 acres of forest,

wetland, pasture, and open water adjacent the River. Almost 18 miles northeast is the McClintic Wildlife Management Area featuring 3,655 acres of hardwood forest, wetland, and brushland with 26 ponds for warmwater species (WVE 2022). The Bright McCausland Wildlife Management Area sits a few miles south of the Project area. A private gift to the WVDNR in 2017, it consists of approximately 650 acres of hunting game and migratory waterfowl (WVDNR 2017).

The terrestrial wildlife in this ecoregion is comprised of mammals, including white-tailed deer, gray fox, woodchuck, opossum, gray squirrel, white-footed mouse, and short-tailed shrew. Birds common to this region include wild turkey, ruffed grouse, barred owl, pileated woodpecker, eastern phoebe, blue-gray gnatcatcher, Acadian flycatcher, white-eyed vireo, ovenbird, Kentucky warbler, yellow-breasted chat, and summer tanager. Reptiles and amphibians including the red-spotted newt, dusky salamander, fence lizard, American toad, wood frog, box turtle, snapping turtle, painted turtle, ring neck snake, northern water snake, black rat snake, and copperhead are also commonly found in this region (AMP 2009).

More specifically, the floodplain, riparian, and shoreline areas associated with the Ohio River in this ecoregion provide important habitat for a number of terrestrial wildlife species including mink, muskrat, river otter, and a variety of birds, amphibians, reptiles and insects. Some of the small mammals inhabiting these areas include bats, meadow vole, short-tailed shrew, meadow jumping mouse, white-footed mouse, and deer mouse Water birds and shore birds include loons, grebes, cormorants, geese, ducks, herons, belted kingfisher, spotted sandpiper, bank swallows, and killdeer. Raptors including great horned owl, eastern screech owl, barred owl, red-tailed hawk, Cooper's hawk, sharp-shinned hawk, American kestrel, osprey, bald eagle, broad-winged hawk, and red-shouldered hawk have been documented in these areas Amphibians and reptiles found along the Ohio River include snapping turtles, spiny-soft-shell turtles, painted turtles, map turtles, northern water snake, bull frog, leopard frog, green frog, pickerel frog, grey tree frog, spring peeper, Fowler's toad, and American toad.

The Green Bottom Wildlife Management Area provides habitat for bird species including pied-billed grebe, least bittern, Virginia rail, sora, common moorhen, tree swallow, willow flycatcher, and prothonotary warbler. A variety of migratory bird species including ducks, herons and their allies, shorebirds, vireos, warblers, sparrows, and swans also occur in this wetland area (Kiff, et al., 1986) (AMP 2009)

5.4.2 Mixed Deciduous Forest Habitats

The general Project area is known to contain stands of mixed deciduous forest and interspersed pine plantations typical of those found in the region. The mixed deciduous forests in the Project area are found in the riparian zones located next to the Ohio River and in some local upland locations. These mixed deciduous forest and Pine plantation stands have the potential to support 18-24 bird species and three mammal species. Potential wildlife occurring in this forest type include raptors, shorebirds, woodpeckers, several songbirds, and small mammals. Red-tailed hawk (*Buteo jamaicensis*) could potentially nest along the forested edges within the general Project area, and woodpeckers could use snags in this habitat as feeding and nesting sites. White-tailed deer (*Odocoileus virginianus*) have the potential to use this habitat for rest and daytime cover. Fox squirrel (*Sciurus niger*) and eastern chipmunks (*Tamias striatus*) could use downed logs and snags for foraging and breeding (FERC 1991). Many of the bird species potentially occurring in this habitat are tolerant of disturbed conditions, excluding the red-eyed vireo (*Vireo olivaceus*) and least flycatcher (*Empidonax minimus*), both of which are known to reach their highest densities in mostly undisturbed forest habitats (FERC 1991).

Mixed deciduous forests in the riparian corridors tend to support a greater density and diversity of wildlife than the upland stands because of their proximity to water. In addition, the forested riparian habitats within the general Project area provide an important riparian corridor for the dispersal and migration of various species of migratory songbirds and small mammals. White-tailed deer (*Odocoileus virginianus*) could also use the riparian habitat as travel corridors. Several species of reptiles and amphibians have the potential to exist in riparian areas and corridors (FERC 1991).

5.4.3 Pine Plantation Habitat

Stands of Pine plantations in the vicinity of the Project area are rarer, though they support the fewest number of species. These stands provide bedding areas for wildlife, thermal cover for wintering deer, and foraging and nesting sites for woodpeckers and other bird species (FERC 1991).

5.4.4 Wildlife Resources in the Project Area and Vicinity

The WVDNR lists over 170 species of birds, 50 species of mammals, 48 species of amphibians and 39 species of reptiles that may occur in the FEIS study area. The study area is also in the

pathway used by migratory bird species. It was estimated that 100,000 - 350,000 dabbling ducks and 250,000 - 500,000 diving ducks used this corridor during the fall migration (FERC 1988).

Potential terrestrial wildlife resources within the Project vicinity were identified based on the known habitat types within the Project vicinity and associated species known to exist in these habitats. Many of these species may or may not be present in the immediate project area but are associated with these macrohabitats categorized along the Ohio River.

5.4.5 Mammalian Species

There are over 70 different species of mammals known to exist in West Virginia, many with the potential to exist in the general Project area. The table below provides a summary of common mammals that may be present within the greater Project vicinity (WVDNR 2021).

Table 5.12 Mammal Species in West Virginia

West Virginia Common Mammalian Species	
Carnivores	
Bobcat	Long-Tailed Weasel
Coyote	Least Weasel
Wild Boar	American Mink
Mountain Lion	Raccoon
Black Bear	Coyote
Red Fox	Gray Fox
Rodents	
Eastern Chipmunk	Flying Squirrel (Southern/WV)
Woodchuck	American Beaver
Fox Squirrel	Eastern Harvest Mouse
House Mouse	Woodland Jumping Mouse
Voles	Black Rat
Deer Mouse	Norway Rat
Bats	
Little Brown Bat	Big Brown Bat
Northern Bat	Evening Bat

West Virginia Common Mammalian Species	
Indiana Bat	Eastern Red Bat
Eastern Small-Footed Bat	Hoary Bat
Gray Bat	Silver-Haired Bat
Insectivores (Shrews and Moles)	
Masked Shrew	Northern Short-tailed
Least Shrew	Eastern Mole
Smoky Shrew	Hairy-tailed Mole
Pygmy Shrew	Star-nosed Mole
Rabbits	
Eastern Cottontail Rabbit	Appalachian Cottontail
Marsupials	
Virginia Opossum	
Cervids	
White-Tailed Deer	

5.4.6 Avian Species

West Virginia is home to more than 170 breeding avian species in addition to a host of migratory species. The species listed in the table below were observed during 2010 wetland and vegetation surveys. Not listed is one unidentified hummingbird (FERC 2014).

Species not listed that could appear in the Project vicinity include the ring-necked duck, hooded merganser, lesser scaup, bufflehead, and American black duck (FERC 2014).

Table 5.13 Migratory Birds in Project Area

Migratory Birds with Potential to Occur in the Project Area	
Common Name	**Scientific Name**
Bald Eagle	*Haliaeetus leucocephalus*
Black-billed Cuckoo	*Coccyzus erythropthalmus*
Blue-winged Warbler	*Vermivora pinus*
Canada Warbler	*Wilsonia canadensis*
Cerulean Warbler	*Dendroica cerulea*
Henslow's Sparrow	*Ammodramus henslowii*

Migratory Birds with Potential to Occur in the Project Area	
Common Name	**Scientific Name**
Kentucky Warbler	*Oporornis formosus*
Least Bittern	*Ixobrychus exilis*
Louisiana Waterthrush	*Parkesia motacilla*
Peregrine Falcon	*Falco peregrinus*
Pied-billed Grebe	*Podilymbus podiceps*
Prairie Warbler	*Dendroica discolor*
Prothonotary Warbler	*Protonotaria citrea*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Short-eared Owl	*Asio flammeus*
Upland Sandpiper	*Bartramia longicauda*
Willow Flycatcher	*Empidonax traillii*
Wood Thrush	*Hylocichla mustelina*
Worm Eating Warbler	*Helmitheros vermivorum*

5.4.7 Reptiles

There are a total of 39 reptile species found in West Virginia; 13 turtle, 6 Lizard and 20 snake species (WVDNR 2022). Table 5.14 provides a summary of reptile species that may be present within the Project vicinity. An Eastern box turtle was observed near the proposed Project area during 2010 surveys. Snapping turtles, spiny-softshell turtles, painted turtles, and map turtles also have potential to occur. (FERC 2014; WVDNR 2021). Other reptiles with the potential to occur within the proposed Project boundary include fence lizard, ringneck snake, northern water snake, black rat snake, and copperhead snake (FERC 2014).

Table 5.14 Reptile Species in Project Area

Common Reptiles to Inhabit Lands within W. Va.	
Turtles	
Spotted Turtle	Eastern Box Turtle

Common Reptiles to Inhabit Lands within W. Va.	
Northern Red-bellied Cooter	Northern Map Turtle
Ouachita Map Turtle	Midland Painted Turtle
Red-Eared Turtle	Eastern River Cooter
Skinkpot	Wood Turtle
Eastern Snapping Turtle	Eastern Painted Turtle
Eastern Spiny Softshell	Midland Smooth Softshell
Lizards and Skinks	
Eastern Fence Lizard	Little Brown Skink
Eastern Six-lined Racerunner	Common Five-Lined Skink
Broad-Headed Skink	Northern Coal Skink
Non-venomous Snakes	
Northern Rough Greensnake	Common Watersnake
Mountain Earthsnake	Red Corn Snake
Northern Brownsnake	Eastern Hog-nosed Snake
Northern Red-Bellied Snake	Eastern Smooth Earthsnake
Queensnake	Northern Ring-Necked Snake
Smooth Greensnake	Eastern Wormsnake
Northern Black Racer	Northern Pine Snake
Eastern Ratsnake	Eastern Milksnake
Eastern Black Kingsnake	Eastern Kingsnake
Eastern Gartersnake	Common Ribbonsnake
Venomous Snakes	
Northern Copperhead	
Timber Rattlesnake	

5.4.8 Amphibians

There are 48 species of amphibians in West Viginia (WVNDR 2022). Table 5.15 provides a summary of some amphibian species present in West Virginia that may occur in the Project vicinity.

No amphibians were observed during the 2010 surveys, but FERC staff observed a green frog at the proposed Project area during a March 28, 2012, environmental site visit. Amphibians that have not been identified at the Project but could occur include the red-spotted newt, dusky salamander, American toad, Fowler's toad, wood frog, leopard frog, green frog, pickerel frog, grey tree frog, and spring peeper (FERC 2014).

Table 5.15 provides a summary of amphibian species present in West Virginia (WVDNR 2021).

Table 5.15 West Virginia Amphibian Species

Common Amphibians to Inhabit Lands within West Virginia	
Amphibians	
Eastern Hellbender	Common Mudpuppy
Jefferson Salamander	Spotted Salamander
Marbled Salamander	Small-Mouthed Salamander
Streamside Salamander	Red-Spotted Newt
Northern Dusky Salamander	Allegheny Mountain Dusky Salamander
Seal Salamander	Black Mountain Salamander
Black Bellied Salamander	Eastern Red Backed Salamander
Southern Ravine Salamander	Northern Ravine Salamander
Valley and Ridge Salamander	Shenandoah Mountain Salamander
Cumberland Plateau Salamander	Cheat Mountain Salamander
Wehrle's Salamander	White Spotted Slimy Salamander
Cow Knob Salamander	Northern Slimy Salamander
Four-Toed Salamander	Northern Spring Salamander

Common Amphibians to Inhabit Lands within West Virginia	
Kentucky Spring Salamander	West Virginia Spring Salamander
Midland Mud Salamander	Northern Red Salamander
Green Salamander	Southern Two Lined Salamander
Northern Two Lined Salamander	Long Tailed Salamander
Cave Salamander	Eastern Spadefoot
Eastern American Toad	Fowler's Toad
Gray Treefrog	Upland Chorus Frog
Cope's Gray Treefrog	Northern Spring Peeper
Mountain Chorus Frog	American Bullfrog
Northern Green Frog	Wood Frog
Northern Leopard Frog	Pickerel Frog
Eastern Cricket Frog	Blanchard's Cricket Frog

5.4.9 Botanical Resources

There are more than 2,300 vascular plant species identified in West Virginia, with nearly 700 of these identified in Mason County.

The majority of the Ohio River Corridor Terrestrial Habitat as defined by WVDNR consists of agricultural land and moist broadleaf Appalachian mixed mesophytic forests. Mixed mesophytic forests are the preferred habitat for ancient Tertiary flora species such as Tuliptree (*Liriodendron tulipifera*) and Jack-in-the-pulpit (*Arisaema triphyllum*) (WVDNR 2015; USDA 2022).

Previous surveys have identified vegetation types in proposed Project area are comprised of deciduous woodland, agricultural field, and mowed/maintained areas. Surveys noted that there is potential for three rare plants to occur in the proposed Project area: Maypop (*Passiflora incarnata*); Virginia mallow (*Sida hermaphrodita*); and smooth buttonweed (*Spermacoce glabra*) (FERC 2014).

Table 5.16 Butterfly and Skipper Species in the Project Vicinity

Common Butterflies and Skippers to Inhabit Lands within Ohio	
Butterflies and Skippers	
American Painted Lady	American Copper
Baltimore Checkerspot	American Snout
Black Swallowtail	Banded Hairstreak
Cabbage White	Bronze Copper
Common Buckeye	Clouded Sulphur
Common Wood Nymph	Common Sooty Wing
Eastern Comma	Coral Hairstreak
Eastern Tiger Swallowtail	Eastern Tailed Blue
European Skipper	Edward's Hairstreak
Giant Swallowtail	Frosted Elfin
Great Spangled Fritillary	Gray Hairstreak
Hackberry	Grizzled Skipper
Karner Blue	Harvester
Meadow Fritillary	Little Wood Satyr
Mourning Cloak	Monarch
Pearl Crescent	Orange Sulphur
Persius Duskywing	Peck's Skipper
Question Mark	Purplish Copper
Red-Spotted Purple	Red Admiral
Spicebush Swallowtail	Silver-Spotted Skipper
Summer Azure	Spring Azure
Zebra Swallowtail	Viceroy

5.4.10 Insects, Spiders, and other Invertebrates

Insect, spiders, and other invertebrates are found almost everywhere within the State of West Virgina, where there is a diverse insect fauna comprised of well over 1000 species. Table 5.17 provides a summary of common insect, spider, and invertebrate species that may be present within the Project vicinity.

Table 5.17 Insects, Spiders, and Invertebrates in the Project Vicinity

Common Insects, Spiders, and other Invertebrates to Inhabit Lands within West Virginia	
Insects, Spiders, and other Invertebrates	
American Burying Beetle	Black Widow
Black And Yellow Garden Spider	Bold Jumping Spider
Blacklegged Tick	Common House Spider
Brown Recluse	Damselfly
Crayfish	Field Cricket
Dragonfly	Honeybee
Harvestman	Seventeen-Year Cicada
Katydid	Wolf Spider
Seven-Spotted Lady Beetle	

5.4.11 Botanical Resources

Along the floodplains of the Ohio River in the general Project area, bottomland deciduous hardwood forests are the natural climax community. However, much of this habitat type has been eliminated by industrial, commercial, or residential development. The remaining riparian areas are often less than a few hundred feet in width. This habitat type has a typical four-layer plant structure. Dominant tree species in the overstory tend to be silver maple, sycamore, cottonwood, and black willow; minor tree species include slippery elm, pin oak, river birch, sweet gum, and hickories. Representative species in the lower canopy include hackberry, black locust, American elm, green ash, box elder, pawpaw, buckeye, and black walnut. Shrubs include spicebush, Virginia creeper, poison ivy, dogwoods, black elderberry, and grape species. Herbaceous density and diversity of ground cover varies with the amount of light penetration. Typical ground cover includes wingstem, touch-me-nots, white snakeroot, and a profusion of invasive nonindigenous plant species (USFWS 2020). Table 5.18 provides a summary of botanical species that may be present in these habitats and within the Project vicinity. (The Nature Conservancy)

Table 5.18 Botanical Species in the Project Vicinity

Species	Scientific Name
Silver Maple	*Acer saccharinum*
American Sycamore	*Platanus occidentalis*
Cottonwood	*Populus*
Black Willow	*Salix nigra*
Slippery Elm	*Ulmus rubra*
Pin Oak	*Quercus palustris*
River Birch	*Betula nigra*
Sweet Gum	*Liquidambar styraciflua*
Hickory	*Carya*
Hackberry	*Celtis*
Black Locust	*Robinia pseudoacacia*
American Elm	*Ulmus americana*
Green Ash	*Fraxinus pennsylvanica*
Box Elder	*Acer negundo*
Pawpaw	*Asimina triloba*
Buckeye	*Aesculus glabra*
Black Walnut	*Juglans nigra*
Spicebush	*Lindera benzoin*
Virginia Creeper	*Parthenocissus quinquefolia*
Poison Ivy	*Toxicodendron radicans*
Dogwood	*Cornus*
Black Elderberry	*Sambucus*
Wingstem	*Verbesina alternifolia*
Touch-Me-Not	*Mimosa pudica*
White Snakeroot	*Ageratina altissima*

5.4.12 Invasive Wildlife and Plant Species

Invasive nonindigenous wildlife species are those that have been introduced outside their natural native geographic range as a result of human influence and have the potential to pose a major threat to the natural biodiversity of any ecosystem.

Table 5.19 below, provides a summary of invasive nonindigenous wildlife species identified in the WVDNR's Invasive Species Strategic Plan (WVDNR 2014).

Table 5.19 Summary of Invasive Insect, Aquatic, and Terrestrial Animal Species of West Virginia

Invasive Non-indigenous Species of West Virginia	
Mammals	
Feral cats	*Felis catus*
Feral hogs	*Sus scrofa*
Fish	
Silver Carp	*Hypophthalmichthys molitrix*
Bighead Carp	*Hypophthalmichthys nobilis*
Aquatic Invertebrates	
Virile Crayfish	*O. virilis*
Zebra Mussel	*Dreissena polymorpha*
Rusty Crayfish	*Orconectes rusticus*
Insects	
Brown Marmorated Stink Bug	*Halyomorpha halys*
Gypsy Moth	*Lymantria dispar*
Emerald Ash Borer	*Agrilus planipennis*
Hemlock Woolly Adelgid	*Adelges tsugae*

5.4.13 Invasive Plants and Weeds

While there are a few hundred invasive plant species that have been identified in West Virginia, WVDNR maintains a short list on invasive non-indigenous plants of special concern. These plants have been identified as a more serious threat due to impacts they have on native shrubs,

wetlands, and native grassland communities. Purple loosestrife (*Lythrum salicaria),* for instance, is known to blanket emergent wetlands along the Ohio River (WVDNR 2022).

5.5 Shoreline Wildlife and Botanical Resources

5.5.1 Floodplain and Wetland Species and Habitats of the Project Area and Vicinity

5.5.1.1 Floodplains

Most of the land within the Project Boundary is located within a Special Flood Hazard Area (SFHA), identified in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). Each zone within an SFHA is labeled according to the potential of being inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. SFHA Zone AE, which is defined as areas subject to inundation by a 1 percent annual chance flood event, is the dominant zone within the general Project area and most of the land identified within the Project Boundary. Moderate flood hazard areas are those that are located between the limits of the base flood and have a 0.2 percent annual chance (or 500 year) flood. Both zones are identified in Figure 5.3 below, which present data from the most current FEMA FIRM Maps, where Zone X (shaded with black dots) and Zone AE (shaded in light blue dots) can be seen in relation to the approximate Project Boundary (FEMA 2006a; FEMA 2006b; FEMA 2006c; FEMA 2015).

Figure 5.3 FEMA Flood Zones

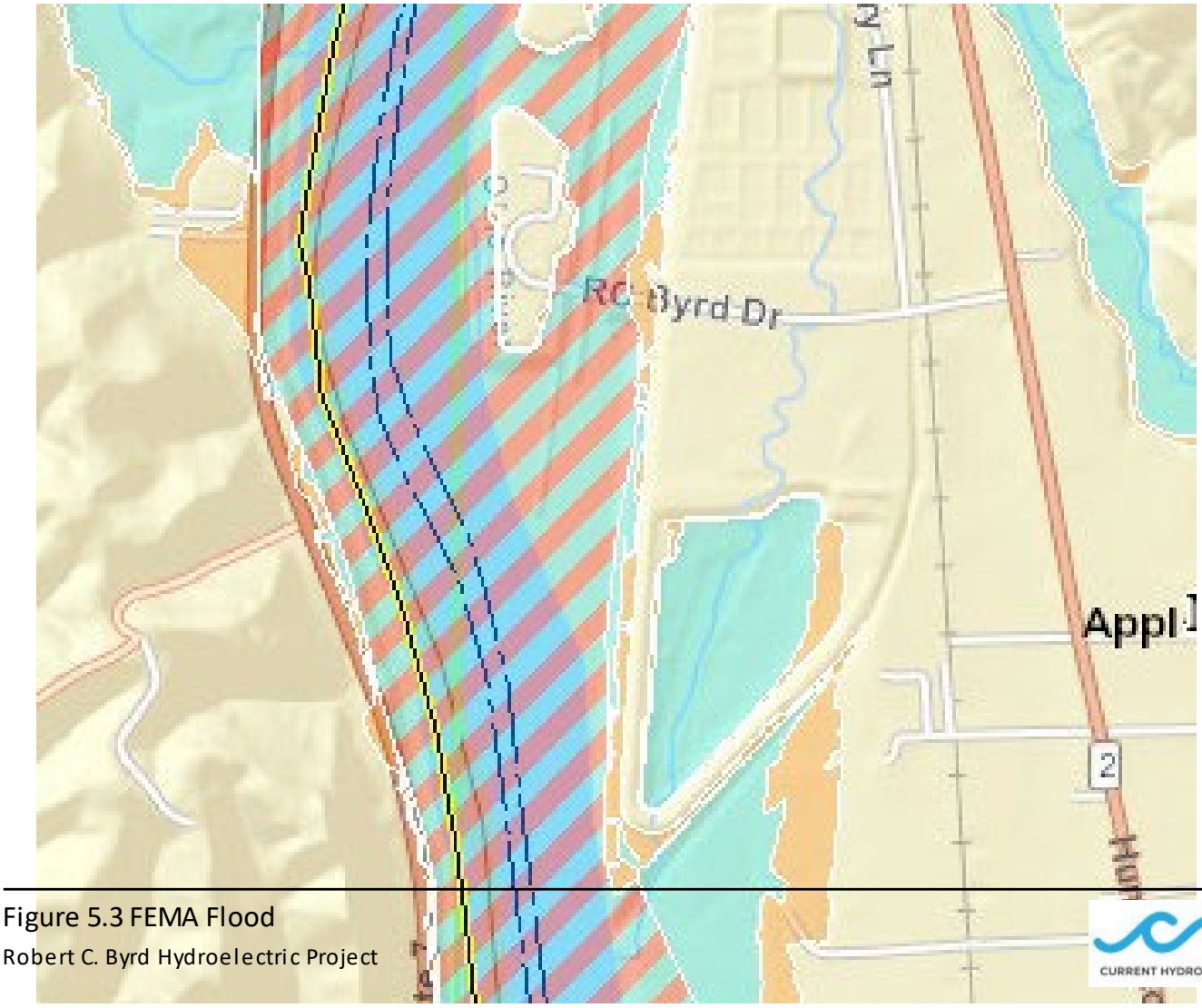


Figure 5.3 FEMA Flood
Robert C. Byrd Hydroelectric Project

5.5.1.2 Wetlands

Wetlands are defined as those lands that are transitional between terrestrial and aquatic systems, where the water table is generally found at or near the surface or the land is covered by shallow water less than 6.6 feet deep, with the following general conditions: (1) the land must periodically support predominantly hydrophytic plant species (wetland plants); (2) the substrate is composed of hydric soils (predominantly undrained); and (3) the substrate is non-soil and saturated with water or covered by shallow water at some time during the growing season (Cowardin 1979).

The Ohio River was historically shallow with numerous islands, gravel bars, channel wetlands (riverine emergent and riverine aquatic bed), and adjacent overflow sloughs surrounded by

bottomland hardwood forests. Wetlands on the Ohio River have been recorded as being of two major types - riverine and palustrine. These wetlands are present in narrow bands around the perimeter of islands located within the channel, in submerged beds around the islands, in pockets of abutting land, and within interior landform depressions, sloughs, overflow channels, and abandoned portions of the riverbed. No formal delineation of wetland, riparian, or littoral habitats has been conducted within the Project Boundary.

The USFWS National Wetlands Inventory (NWI) provides a publicly available resource of abundance, distribution, and characteristics of United States wetlands. Using this, and the results of the Information for Planning and Conservation (IPaC) Trust Resource Report generated for the general Project area, riverine wetlands (R2UBH) may be present within portions of the Project Boundary (Figure 5.4). No impacts to wetlands are expected to result from construction and operation, since no wetlands are known to exist in the immediate vicinity. Construction of the Project powerhouses is expected to permanently impact a small footprint (<0.6 acre) at each site in areas that have likely already experienced disturbance during construction of the locks and dam structures. Temporary impacts can be expected within the temporary construction lot footprints. However, these spaces are temporary and land contours will be returned to their original state following completion of the Projects. The continual Project operation is not expected to impact wetlands not already impounded for USACE operations. See section 6.2.8. for proposed wetlands and water delineation study.

Figure 5.4 Project Wetlands

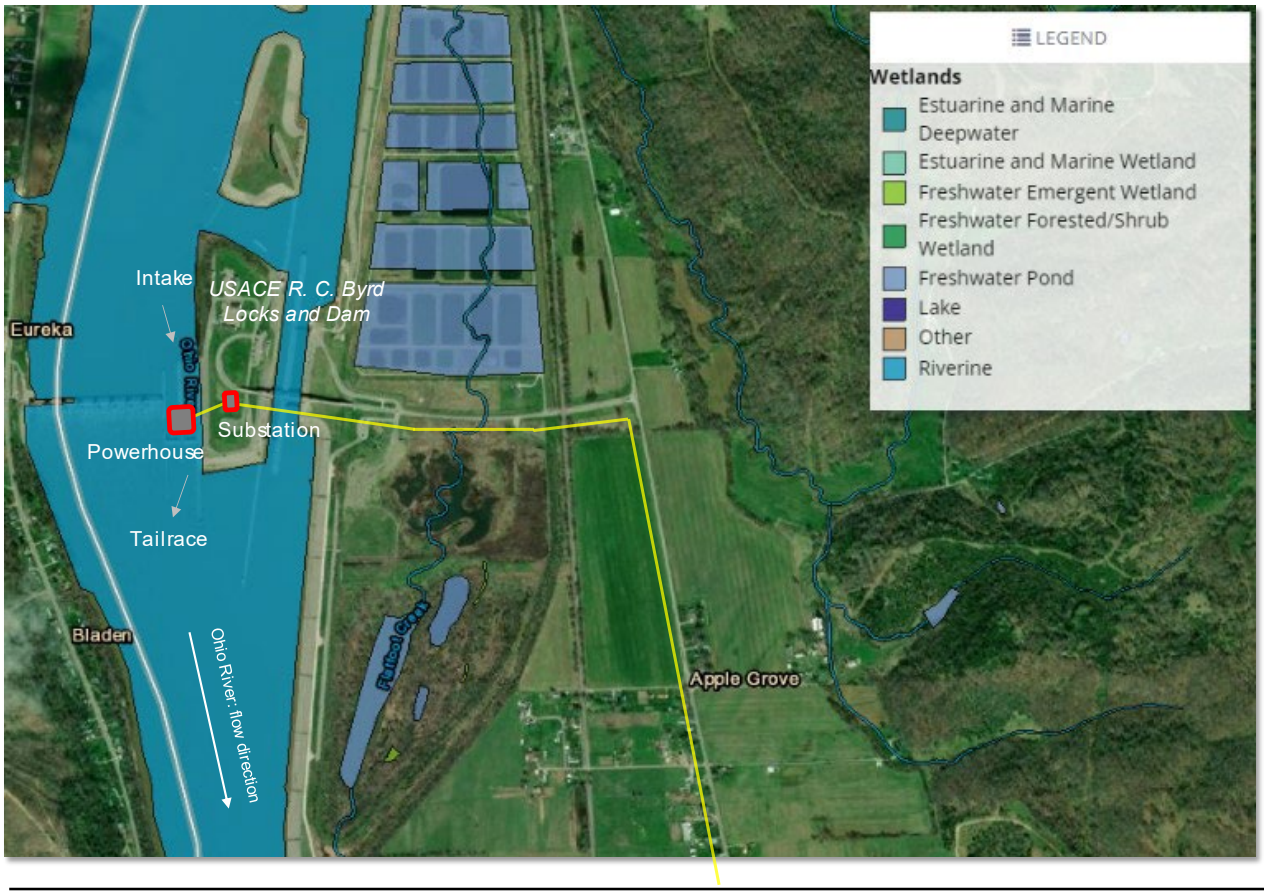


Figure 5.4 Wetlands
Robert C. Byrd Hydroelectric Project

CURRENT HYDRO

5.5.2 Riverine Wetlands (System)

The Riverine Wetland Class is characterized by being found in floodplains and riparian zones including all the wetlands and deep-water habitats contained within the stream or river channels with a well-developed floodplain, except those wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, includes all wetlands and deep-water habitats contained within or habitats with water containing ocean-derived salts in excess of 0.5 ppt (Cowardin 1979 and USFWS 1985).

The Riverine system in the general Project area is defined as being of the Lower Perennial subclass. This subclass is defined as having a low gradient and slow water velocity. There is no tidal influence, with water flowing throughout the year. The substrate consists mainly of sand

and mud with oxygen deficits having the potential to occur. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed.

Dominant vegetation for this type of wetland is spatterdock (Nuphar Sp.), pickerelweed (Pontederia cordata), broadleaf arrowhead (Sagittaria latifolia), water smartweed (Polygonum amphibium), water hemp (Amaranthus Sp.), bur marigold (Bidens Sp.), and wild rice (Zizania Sp.) (USFWS 1985). Dominant fauna of Riverine Wetlands include species that tend to reach their maximum abundance in still water, as well as having common populations of true planktonic organisms. Riverine Wetlands provide critical habitat for many birds, ranging from waterfowl and shorebirds to migratory songbirds; some spending their entire lives in wetland environments, with others utilizing wetlands for breeding, feeding, or resting. Common mammals found to utilize Riverine Wetlands include muskrat, and beavers. Reptiles (i.e., turtles and snakes) and amphibians (i.e., frogs and salamanders) are also important residents (USFWS 1985). A comprehensive list of wildlife potentially occurring within the Project Boundary can be found in Section 5.4 (Upland Wildlife and Botanical Resources) and 5.5 (Shoreline Wildlife and Botanical Resources).

West Virgina designates all wetlands as State Resource Waters. These wetlands support a wealth of wildlife resources, provide diverse habitat, and support complex food chains. Half of the federally listed threatened and endangered species identified in W. Va. depend directly on wetlands, including bog turtles (Clemmys muhlenbergii). Wetlands provide habitat for bald eagles (Haliaeetus leucocephalus) and nesting habitat for many species of migratory songbirds. Some mammals that have the potential to inhabit wetlands include: shrews, moles, mice, rats, lemmings, voles, muskrats, rabbits, beavers, mink, raccoons, black bears, and white-tailed deer (ODNR 2007; ODNR 2013; NRCS 2001).

5.5.3 Riparian and Littoral Species and Habitats of the Project Area and Vicinity

5.5.3.1 Riparian

Riparian zones are areas of land occurring at the land-water interface along watercourses and water bodies, which include floodplains and streambanks. Riparian habitat is distinctly different from surrounding lands due to the unique soils and vegetation characteristics found in this zone, which is strongly influenced by the presence of water. Riparian vegetation is extremely important as it can remove excess nutrients and sediment from surface water runoff as well as shallow groundwater. Riparian vegetation also provides streambank stability and shade to the

watercourses and water bodies it abuts and can control the amount of sunlight attenuating in the water and the resulting temperatures vital to sustaining optimal conditions for aquatic plants, fish, and other animals. Robust riparian cover makes aquatic habitats in the Ohio River Valley suitable for a large number and a high diversity of fish and other aquatic life as compared to the adjacent upland habitats (USDA 1996; FERC 1998).

Riparian vegetation is present in long, narrow stretches along the banks of the Ohio River and is dominated by floodplain forest vegetation consisting of hydrophilic species (e.g., black willow – *Salix nigra*). Ohio defines the riparian zone as the land and vegetation that is situated along the bank of a stream or river. Industrialization and development in the Project vicinity has resulted in the loss of large tracts of riparian vegetation in the surrounding areas that abut the Project Reservoir. Existing Riparian areas in the Project vicinity provide enhanced bank stability and important habitat for local flora and fauna. Most of these remnant tracts of riparian zones appear to be deciduous forested land with approximately 50 percent crown closure (ODNR 2007).

5.5.3.2 Littoral

The littoral zone is the uppermost area located along the perimeter of the Project impoundment located between the high and low water levels and allow full attenuation of sunlight to reach the riverbed. This zone sustains a relatively diverse community, including a large variety of algae species (e.g., diatoms), submerged and floating aquatic plants, grazing snails, clams, insects, crustaceans, fishes, and amphibians. Many of the insect species that inhabit this zone are in their egg or larval stages (e.g., dragonflies and midges). The flora and fauna of the littoral zone also serve as critical components to the local food chain, providing food for larger animals such as turtles, snakes, and ducks (UCMP 2004).

5.6 Threatened and Endangered Species

5.6.1 Existing Environment

This section describes rare, threatened, and endangered species with potential to occur in the Project area within Mason County, West Virginia. The 1973 Endangered Species Act (ESA) is the primary law in the United States for protecting imperiled species that are in danger of becoming extinct. The USFWS classifies animals and plants into two categories: "endangered species" are in danger of extinction throughout the area in which they are usually found, and "threatened species" are those that could become endangered in the near future. The bald eagle was

removed from the ESA list on June 28, 2007. However, bald eagles remain federally protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act.

At the state level, plant and wildlife species in the Project area may also be protected. Depending on their level of vulnerability to extinction, species may be listed as endangered or threatened at the state level. Additionally, a species may be identified as special concern if it does not meet the criteria of endangered or threatened but is particularly vulnerable to becoming threatened under continued or increased stress. Other factors that may initiate a special concern designation include instances where there is concern for a species' status, but insufficient information exists to permit an adequate status evaluation. West Virginia does not currently have state threatened species and endangered species legislation (WVDNR 2021).

5.6.2 Federally Listed Species

A search of the Project boundary using the Information from IPaC tool was used to describe endangered and threatened species that may occur near the Project (USFWS 2022a). Federally listed species were also documented for Mason County using the ECOS Environmental Conservation Online System (USFWS 2022b). Federally listed species that may be present in the Project area, based on known or expected distributions, are listed in Table 5.20. Life history characteristics and range information are described below for each listed species. There is no known critical habitat for any species within the Project area, or in habitats immediately surrounding the project.

Table 5.20 Federally Listed Species that May Occur in Project Area

Common Name	Scientific Name	Federal Status
Indiana bat	Myotis sodalist	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Protection Under Bald and Golden Eagle Protection Act
Monarch Butterfly	*Danaus plexippus*	Candidate

5.6.3 Indiana Bat

The Indiana bat was listed as endangered under the Endangered Species Preservation Act of 1966. It was listed in 1967 as endangered under current ESA regulations. A major cause of the Indiana bat's decline has been human disturbances occurring in winter hibernacula. Indiana bats are especially vulnerable to disturbances at wintering areas, as the species requires specific cave characteristics (i.e., temperature, humidity, and cave structure), and a large percentage of the population roosts in a small number of caves. Additional causes of the species' decline have been the loss of summer habitat, pesticide use, and the spread of white nose syndrome (USFWS 2006). The Indiana bat's current range extends across 23 states in the central and northcentral United States (USFWS 2007).

Indiana bats typically use underground caves as hibernacula during the winter months. Other areas where overwintering occurs include cave-like structures such as abandoned mines. Suitable roosting habitats include extensive vertical areas or passages which provide a variety of roost sites and temperatures and prevent large swings in temperature. Indiana bats generally use hibernacula with stable temperatures that remain between 10ºC and freezing. In the summer, females often roost under peeling bark on dead trees in areas with direct sunlight. Maternity roosts after the breeding season typically occur in riparian zones, bottomland habitats, or on floodplains and wooded wetlands (USFWS 2007).

5.6.4 Northern Long-Eared Bat

The northern long-eared bat was listed as threatened in 2015. The USFWS has not yet established a designation of critical habitat or developed a recovery plan for the species (USFWS 2017). The northern long-eared bat feeds on invertebrates and is known to glean prey from vegetation and water surfaces. The species winters in underground caves and cave -like structures, usually in groups. During the summer months, northern long-eared bats roost singularly or in small colonies in caves, under bark, or in hollows of live and dead trees. Suitable roosting trees have characteristics that include exfoliating bark, cavities, and cracks. Northern long-eared bats have young during late-spring and early-summer, with the offspring weaned approximately one month after birth (USFWS 2015). During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines (ECOS 2022).

5.6.5 Bald Eagle

The bald eagle is a federally protected species under the Bald and Golden Eagle Protection Act. The bald eagle is the second largest bird of prey in North America. Mature adults stand in excess of 3 ft. in height with a wingspan of 6-8 ft. The female bald eagle is larger than the male, weighing as much as 14 pounds. Males generally weigh 7-10 pounds. Mature adults are easily recognized by their large size and contrast of white head and tail with a dark brown body and wings. Bald eagles are long lived (up to 30 years), and become sexually mature at four to six years of age. They mate for life and build large (approximately five ft. in diameter and 3 ft. in depth) nests in open trees near water. Breeding occurs in the spring, with both parents incubating eggs. In winter, bald eagles leave nesting grounds for areas with large expanses of unfrozen water for hunting. Fish and waterfowl are both prey sources, and bald eagles also scavenge (NHFG 2005).

5.6.6 Monarch Butterfly

The Monarch Butterfly is a candidate species and is under consideration for official listing for which there is sufficient information to support listing. In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again.

5.6.7 State Listed Species

West Virgina has no State endangered species legislation; therefore, the only species listed as threatened or endangered in the State are those listed as such by the Federal government. A total of twelve Federally listed species are found in West Virgina and may be present in Mason County.

5.6.8 Rare, Threatened, Endangered and Special Status Botanical Species

There are no known occurrence of rare, endangered, and special status (RTE) botanical species near or within the project boundary.

5.6.9 Special Status Migratory Birds

The IPaC tool also lists migratory birds that are of particular concern, either due to status on the USFWS Birds of Conservation (BCC) list, or because they warrant special attention in a specific area. The IPaC tool identified eleven migratory bird species as potentially occurring at the Project or on lands adjacent to the Project (Table 5.21) (USFWS 2022a).

Table 5.21 USFWS IPaC Migratory Bird List with Potential to Occur at Project

Common Name	Scientific Name	Status[1]
Black-billed cuckoo	Coccyzus erythropthalmus	BCC Rangewide (CON)
Bald Eagle	Haliaeetus leucocephalus	BCC-BCR
Bobolink	Dolichonyx oryzivorus	BCC Rangewide (CON)
Cerulean Warbler	Dendroica cerulea	BCC Rangewide (CON)
Eastern Whip-poor-will	Antrostomus vociferus	BCC Rangewide (CON)
Kentucky Warbler	Oporornis formuosus	BCC Rangewide (CON)
Prairie Warbler	Dendroica discolor	BCC Rangewide (CON)
Prothonotary Warbler	Protonotaria citrea	BCC Rangewide (CON)
Red-headed Woodpecker	Melanerpes erythrocephalus	BCC Rangewide (CON)
Rusty Blackbird	Euphagus carolinus	BCC Rangewide (CON)
Wood Thrush	Hylocichla mustelina	BCC Rangewide (CON)

[1]USFWS Status: BCC Rangewide (CON) = Bird of Conservation Concern throughout its range in the continental USA and Alaska; BCC-BCR= Bird of Conservation Concern only in particular Bird Conservation Regions (BCRs) in the USX

5.6.10 Essential Fish Habitat

Pursuant to the amended Magnuson-Stevens Fishery Conservation and Management Act, Congress mandated that habitats essential to federally managed commercial fish species be identified, and that measures be taken to conserve and enhance habitat. The Magnuson-Stevens Act defines EFH for federally managed fish species as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. There are no current records of federally managed EFH within the project area.

5.7 Recreation and Land Use

5.7.1 Existing Recreation Opportunities and land use

The Ohio River is the center of several recreational activities available to residents of the area and visitors. The USACE Great Lakes and Ohio River Division manages 1.5 million acres of land and water throughout the district. This has provided attraction for recreational activities and land use. Some of the most popular activities along the Ohio River amongst the USACE-controlled projects include boating, fishing, water skiing, sight-seeing, and swimming (USACE 2021).

Most of the fishing in the Ohio River takes place along the tailwaters of dams with some anglers utilizing the islands and embayment's that offer productive fish habitat in the area. Since the ODNR has been conducting fishing surveys in 1992 and 1993, fishing use levels have remained relatively steady in the area. According to the 1992 and 1993 surveys, the ODNR estimated fishing pressure for a 491-stretch of river to be approximately 2.5 angler hours for both years. Popular game species that are fished in the area include black basses, white bass, hybrid bass, catfish, crappie, walleye and sauger (USFWS 2016).

5.7.2 Existing Recreation

The 2018 Ohio Statewide Comprehensive Outdoor Recreation Plan (SCORP) is a recreational assessment with the intent to develop strategies to enhance the resources available in the state of Ohio (ODNR 2018). The state's most popular recreational activities were related to trail activities, as well as scenic driving, bicycling, touring historic/heritage sites and farms, and swimming. Strategic goals identified in the SCORP, related to water-based recreation, included an emphasis on rivers, lakes, and wetlands, with an emphasis on providing access and recreational opportunities related to Ohio's waters and increasing paddling opportunities.

Other activities that have become increasingly popular along the Ohio River include wildlife observation and photography. There are chartered bird watching tours available at the commercial sternwheel service. Improved environmental conditions along the Ohio River resulted in improved wildlife activity thus increasing the popularity of these recreational activities (USFWS 2016, ODNR 2018).

5.7.3 Park and recreation areas within the project area

In June 2007 the fishing access pier was opened to the public at the western end of the R. C. Byrd L&D in Town of Gallipolis, Ohio. The pier meets federally required accessibility standards.

The fishing pier is closed during the winter months to prevent vehicles from entering high water at pier level. A public recreation area is located on the West Virgina side of the river in the town of Gallipolis Ferry. It includes a park with a picnic area, playground and parking. The park is open year-round. Each year the fishing recreation area opens depending on weather conditions or on Memorial Day.

5.7.4 Adjacent Recreation areas

The SCORP indicates that the USACE contributed significantly to the Ohio River's recreation potential with the construction, operation and maintenance of its system of navigational locks and dams. The USACE has provided boat launching, fishing access and picnic facilities at nearly all the lock and dam sites. Public respondents to surveys and questionnaires indicated that of nine types of sites in Ohio where they could have recreated in Ohio in 1997, the Ohio River ranked last in frequency of use. Respondents rated the Ohio River as low priority for investing public resources to improve access compared to purchasing land for recreation, improving existing state facilities and improving recreation facilities in urban areas (AMP 2009).

5.7.5 Other Recreational sites in the RC Byrd Pool

Recreational facilities along the Ohio River near the proposed project provide opportunities for boating, water sports, picnicking, sightseeing, waterfowl hunting, and fishing. Fishing is popular in the RC Byrd pool at the Racine hydroelectric project which is 41.7 miles upstream. In 2008 the ODNR surveyed recreational fishing users at the Racine tailwater, during the March through June period. In total, 37 days were surveyed, and 360 interviews conducted. The total fishing effort (hours) for this period was estimated at 10,594, with greatest effort (4,270) taking place in April and the least (274) taking place in March (AMP 2010). Fishing is considered from fair to excellent in the RC Byrd pool.

The USACE owns two boat ramps with a total of seven launch lanes, which provide access to the Ohio River in the USACE RC Byrd Pool. Two of the ramps are leased to local towns (Mason City Ramp and Point Pleasant Ramp). Eleven other boat ramps are located in towns throughout the pool. The Gallipolis Boat Club provides a boat ramp and marina facilities (6 docks, 142 slips, and 8 privately owned boathouses) to its members. The Tu-Endie-Wei Point Pcorleasant Battle Monument State Park in Point Pleasant, West Virginia (at the confluence of the Ohio and Kanawha Rivers). The Racine boat launch ramp is located at RM 241 in the Village of Racine. The ramp is 4-lanes wide and includes 87 parking spaces. The Village of Syracuse has a public boat launch at RM 246 and accessible via Road 124. The Village of Pomeroy has a public boat launch

ram located at RM 251 with adjacent docks serving several dining establishments. In the Town of Mason West Virginia is at RM 251 there is public boat launch accessible from Road 62. The facility is owned by the USACE and leased to the Town of Mason. The site includes a 1-lane concrete ramp, 25 asphalt parking spaces with courtesy docks and restrooms.

5.8 Aesthetic Resources

5.8.1 Visual Character of the Project Vicinity

RC Byrd L&D is one of 20 L&D on the Ohio River. Open water and recreation areas in this section of the Ohio River provide opportunities for boating, angling, wildlife viewing, hiking, and picnicking.

West Virginia Route 2 in Mason County parallels the River both upstream and downstream of the Project reach on the West Virginia side of the River. Residential areas are also located along this stretch, although many are obscured by woodland habitat (GE 2022).

From WV Rte. 2 to Robert Byrd Road leading to the Project, the aesthetics are primarily spare and industrial, with clear views of the River and the Project visible from a public state-maintained park that is open year-round (GE 2022).

5.8.2 Visual Character of Project Lands and Waters

Mason County West Virgina is bordered by the Kanawha River flowing due east, and the Ohio River along the western border. The county has a decidedly rural landscape, but also includes the small river town of Point Pleasant.

The R.C. Byrd L&D is a large concrete and steel complex that spans the Ohio River, is the principal feature in the area landscape. This complex includes both horizontal and vertical elements. Horizontal elements include the lock walls, dam, elevated walkways, roadways, parking areas, and rip-rapped shorelines. Vertical elements include the dam piers, gates, offices, maintenance structures, and light posts.

Ohio Route 7, part of the Ohio River Scenic Byway, is located along the Ohio shoreline and provides motorists with expansive views of the R.C. Byrd Dam, locks, river, small town of Eureka, and surrounding landscape.

5.9 Cultural Resources

5.9.1 History of the Project Vicinity

The Project's proposed site is located in Gallipolis Ferry, a census-designated place in Mason County, West Virginia. Mason County sits on the western border of West Virginia, bordering the state line at the Ohio River. The Project discharges into the West Virginia side of the Ohio River at the existing USACE-controlled RC Byrd L&D.

5.9.1.1 Settling of Mason County, West Virginia

In 1749, Pierre Joseph Céloron de Blainville declared the French had sovereignty over the Ohio Valley, staking his claim at the confluence of the Ohio and Kanawha Rivers in Point Pleasant, Mason County's seat (MCEDA 2022).

Pre-Civil War, the territory that is modern-day Mason County was formally part of the State of Virginia. Approximately 25 years after de Blainville's declaration, the Battle of Point Pleasant took place, in which Virginian militiamen defeated an Algonquin federation led by Chief Cornstalk, for whom the nearby Chief Cornstalk Wildlife Management Area is named (MCEDA 2022).

Point Pleasant received its official charter in 1794, by which time it was predominantly occupied by white settlers. The surrounding territory, formerly part of Kanawha County, became Mason County in 1804, named for George Mason, member of the Virginia House of Delegates and co-author of the Virginia Declaration of Rights (MCEDA 2022).

The proximity of Mason County to the Ohio River has been integral to industry and tourism over the last few hundred years. Point Pleasant became home to the County's first shipyard in the 1840s, and over the next 50 years, Mason County's population would balloon from a mere few thousand to almost 25,000 by the 1900 census (Britannica 2022; CB 1901).

5.9.1.2 History of the RC Byrd Locks and Dam

The inception of the Ohio River Mainstem Navigation System included the 1885 construction of the David Island dam. By 1907, a system of 54 USACE-controlled L&D were approved for construction. A facility was constructed at the Project location between 1907 and 1912. By 1937, it was decommissioned and replaced with permanent concrete high-lift roller dams providing deeper pools and renamed the Gallipolis dam. It was later renamed the RC Byrd L&D. The lock facilities were replaced by USACE in 1993, and the dam was rehabilitated in 2002 (FERC 2014).

5.9.2 Historic and Archeological Sites in the Project Vicinity

There are no identified sites utilized by local Native Americans known within the Project Boundary. For more information on Tribal Resources, refer to Section 5.11.

In 1992, the RC Byrd L&D were evaluated for inclusion on the National Register of Historic Places and confirmed eligible by the West Virginia Historic Preservation Officer (SHPO) due to its contributions to Ohio River transportation and engineering (FERC 2014).

5.9.3 Prior Cultural Resource Investigations

FERC's 2014 Draft Environmental Assessment of the Robert C Byrd Hydroelectric Project states that a 1977 USACE study identified 27 archaeological sites on the floodplains and terraces of Mason County, West Virginia.

5.10 Socioeconomic Resources

The following section provides a summary of selected socioeconomic factors for Mason County, West Virginia.

5.10.1 General Land Use Patterns

The Project is located in Mason County, West Virginia, part of the Point Pleasant WV-OH Micropolitan Statistical Area.

Mason County encompasses approximately 430 square miles of land that is primarily rural residential and agricultural. The County features one city, Point Pleasant (county seat), five towns, dozens of rural, unincorporated communities, and two census-designated places the Project is in or near – Gallipolis Ferry and Apple Grove.

The portion of the County bordering the Ohio River is characterized as industrial with light industrial features closer to developed municipalities like the City of Point Pleasant. Commercial development is characterized as sparse throughout the County and concentrated to main roadways (WVHMP 2020).

The United States Department of Agriculture estimates that Mason County is home to approximately 876 farms using nearly 125,000 acres of land. The majority of farms in the County are woodland or crop land and are sized at 50 to 179 acres each. West Virginia's updated Hazard

Management Plan asserts that industrial, commercial, and residential trends are stable in the County (USDA 2017; WVHMP 2020).

5.10.2 Population Patterns

The April 2020 Census determined that there were approximately 24,453 full-time residents in Mason County, a nearly 2,000-person decline from the 2010 census. Approximately 21% of the population is aged 65 or older and more than 51% is female. The estimated population density for the County is roughly 61 people per square mile (CD 2022; USCB 2022).

Mason County has a low diversity index, with 97.3% of survey respondents identifying as white, higher than the West Virginia state average of 93.5 percent. The second-highest response indicates two or more races at 1.3%, on par with the state average (USCB 2022; USCB 2022[1)].

5.10.3 Household/Family Distribution and Income

As of July 2019, there were approximately 11,000 households and 13,000 housing units in Mason County, 79.5% of which were owner-occupied. The median value of owner-occupied units in the County is $87,600, beneath the West Virginia state average value of $119,600 (USCB 2022; USCB 2022[1)].

The median household income in Mason County sits at roughly $46,000 in 2019 dollars, marginally below the state average of $46,700. The poverty rate is higher in Mason County than it is across West Virginia as a whole at 15.8 percent. Eighty-six percent of Mason County residents have a high school diploma while just 14.4% have earned a bachelor's degree or higher (USCB 2022; USCB 2022[1)].

5.10.4 Project Vicinity Employment Sources

As of 2019, there were estimated to be 325 employer establishments located inside of Mason County with more 10,000 employed full-time residents working inside and outside of the County (DUSA 2022; USCB 2022).

The primary industries employing residents in and around the County include education, health and social services, manufacturing, and retail. A new steel mill that would create more than 800 new jobs is anticipated in Apple Grove, a few miles south of the Project, with construction scheduled to begin in 2022 (CD 2022; Metro 2022).

5.11 Tribal Resources

5.11.1 Tribal Lands and Interests

There are no federally recognized tribes or reservations in the state of West Virgina. As such, the Applicant is not aware that the Project affects any Native American lands, known Native American traditional cultural properties or religious properties, or National Register-eligible or -listed sites associated with Native American Nations within the Project boundary. However, the Applicant has identified the following tribes as having potential interest in the project:

- Absentee-Shawnee Tribe of Indians of Oklahoma
- Catawba Indian Nation
- Delaware Nation
- Delaware Tribe of Indians
- Eastern Shawnee Tribe of Oklahoma
- Osage Nation Historic Preservation Office
- Miami Tribe of Oklahoma
- Seneca Nation of Indians
- Seneca-Cayuga Nation
- Shawnee Tribe
- Saint Regis Mohawk Tribe
- Tonawanda Band of Seneca

5.11.2 Identification and Consultation with Tribes

Indian Tribes that historically resided in and/or utilized the Project area may have an interest in the licensing of the proposed Project. The Applicant, through its agent Edge Engineering and Science generated a preliminary list of recognized Native American Tribal organization who have shown an interest in projects in this region. Results of desktop review cultural resources will be performed as part of the study plan (Section 6.2.10). As part of the licensing process, the Applicant would consult with SHPO and Tribes under Section 106 of the National Historic Preservation Act. The defined Area of Potential Effect (APE) is currently considered to be the Project Area; however, this can be refined based on consultation with SHPO, Tribes, and other interested parties. Qualified cultural resources consultants would work to identify locations requiring a comprehensive cultural resources survey. The Applicant would consult with SHPO, Tribes, and other interested parties throughout the licensing process regarding inventory needs

as well as appropriate measures for protection and/or mitigation of identified cultural and/or Tribal resources.

6.0 PRELIMINARY LISTING OF POTENTIAL ISSUES, INFORMATIONAL NEEDS, AND MITIGATION BY RESOURCE

6.1 Identified Impacts by Resource

6.1.1 Geology and Soils

Geology and soils in the Project area have been presented in this PAD. The geology and soils in the vicinity of the Project are well-known and will be addressed in the 408 process. No significant impacts are expected.

6.1.2 Water Resources

The Applicant is developing RC Byrd L&D with the philosophy and intention of causing minimal impact to hydraulic, ecological, and recreational resources both at the powerhouse and downstream. This is the motivation for designing a powerhouse that uses maximum flows of 90% flow exceedance at these locations. The Projects will operate according to USACE operational directives and will leave at least 80% of the average Ohio River discharge going over the spillway (see appendix B for annual and monthly flow duration curves). However, there may be localized changes in flow velocity and direction due to small proportions of water released from the powerhouse, rather than exclusively over the dam or via spillway gates and lockage operations. The redirection of even a small portion of water through the powerhouse could cause localized changes in velocity and direction of water flow. These changes can potentially alter aquatic habitat, water quality, sediment movement, and access to existing recreational facilities. These changes will be analyzed in the Project Hydraulics Study and Water Quality Study. Construction is expected to have a minor impact on soils, as excavation and dredging could release sediment into the river. Utilizing the existing locks will reduce project impact and the Applicant does not intend to excavate into the abandoned lock cement floor.

The Applicant's approach spills a larger percentage of the available flow over spillways. Thus, it is expected and intended that the Projects will have minimal effects on Project-area resources and will protect existing uses of the Project-area waters. There may be localized changes in flow velocity and direction due to small proportions of water to be released from the powerhouse, rather than exclusively over the dam or via spillway gates. These changes will be analyzed in the Project Hydraulics Study and Water Quality Study, but lower hydraulic diversion is an important factor when analyzing effects on water quality and most importantly DO.

The Applicant is committed to maintaining DO downstream and will investigate alternatives when flows are within the operational range of the Project. Alternatives may include an air injection system or minimum flows over the Dam gates as ways of providing suitable DO below the Project to meet state water quality standards.

The USACE maintains the pool elevation to allow for a depth suitable for navigation, the Applicant will not have the ability or authority to operate in anything but run-of- river mode. The USACE determines the total discharge flow from the Dam, and the Applicant will use 18% of the average flow for generation.

6.1.3 Fish and Aquatic Resources (Including T&E Species)

The Applicant intends to complete an entrainment study and expects to show very low losses that will not appreciably impact fish populations due to low approach velocity, low powerhouse hydraulic capacity and at least 80% of the average Ohio River discharge going over the spillway. For more details of Fisheries and Fish Entrainment and Impingement Study, refer to section 6.2.3 of this PAD.

Fish can pass both upstream and downstream through the existing lock chambers at RC Byrd L&D. the Applicant will consider alternatives for trash rack designs and discuss engineering and operation with the USFWS and other Stakeholders. Smaller fish are expected to pass safely through the bulb turbines while larger fish would be diverted by the trash racks. USFWS expressed concern for future upstream and downstream American eel passage.

With respect to water quality, the Applicant will make efforts to maintain an instantaneous minimum DO level of 4.0 mg/L, and average DO minimum 5.0 mg/L per day at all times during April 15 – June 15 spawning season. Other target DO levels for optimum habitat and growth, as well as water quality monitoring and modeling, will be considered and discussed. The design of the Project may include an air injection system that will allow for DO to meet state water quality standards. the Applicant will develop a Water Quality Management Plan (WQMP) and is detailed in section 6.3.9. of this PAD.

6.1.4 Wildlife Resources (Including T&E Species)

The proposed Project footprint is small and restricted to the West Virgina side of the River at the eastern end of the USACE dam and transmission line. However threatened and endangered wildlife habitat or species do have the potential to occur within the Project boundary. The FERC Project area will be surveyed for wildlife resources and habitats. However, considering the small

Project area, significant impact on the wildlife resources is not anticipated. If needed, appropriate measures will be taken to mitigate impacts before construction activities commence.

6.1.5 Botanical Resources (Including T&E Species and Riparian, Wetland and Littoral Habitat Resources)

The footprint of the proposed Project is small and restricted to West Virgina of the River at the western end of the USACE dam and transmission line. Threatened and endangered botanical habitat or species have the potential to occur within the Project boundary thus the Project area will be surveyed for botanical resources and habitats. Considering the size of the Project area significant impacts on botanical resources is not expected.

The Project will use a portion of the flow available from the existing USACE project and will not affect any floodplains, wetlands, riparian or littoral habitats. The only exceptions would occur in the area of the actual powerhouse and intake, and the area immediately downstream of the Project. If needed, appropriate measures will be taken to mitigate impacts before construction activities commence.

6.1.6 Recreation and Land Use

Construction and operation of the Project is not expected to have any significant effect on recreation.

6.1.7 Aesthetic Resources

Aesthetic Resources in the area appear to be limited and are not expected to be impacted by the Project.

6.1.8 Cultural Resources

Cultural resources in the area appear to be limited; however, cultural resources clearance will be conducted.

6.1.9 Socioeconomic Resources

The Project is expected to generate 80-100 union jobs and 200-300 supporting positions during two-year construction process. Additionally, the Applicant estimates 7-9 permanent hydropower operations jobs will be needed for the life of the project. The Applicant expects positive socioeconomic benefits from an existing and unused renewable resource.

6.1.10 Tribal Resources

No known Tribal resources are in the Project area or would be impacted by Project construction and operation activities. The desktop and Phase 1 investigation results will be provided to Tribal Groups and WVSHPO and will be address as part of the draft license application.

6.2 Applicant Proposed Studies and Information Gathering Needs by Resource

At this stage in the FERC licensing process, studies are conducted to gather data to assess Project effects addressed later in the DLA portion of the process. In addition to the Project effects assessments, any proposed protection, mitigation, and enhancement measures determined to be necessary will be addressed in the DLA. Based upon comments received, the Applicant will conduct the following ten (10) studies that will be used in its License Application to assess Project effects:

- Project Hydraulics Study
- Fish Assemblage Surveys
- Fisheries and Fish Entrainment and Impingement Studies
- Freshwater Mussel Surveys
- Water Quality Study
- Aquatic Habitat Study
- Terrestrial Habitat and RTE Species Study
- Wetlands and Waters Delineation
- Recreational Resources
- Cultural Resources.

6.2.1 Project Hydraulics Study

The Applicant proposes hydropower development at RC Byrd L&D with the philosophy and intention of causing minimal impact to hydraulic, ecological, and recreational resources both at the powerhouse and downstream. This is the motivation for designing a powerhouse that uses

maximum flows of 90% flow exceedance at these locations. The Projects will operate according to USACE operational directives and will leave at least 70% of the Ohio River water going over the spillway for most of the year (see appendix B for annual and monthly flow duration curves). However, the redirection of even a small portion of water through the powerhouse could cause localized changes in velocity and direction of water flow. These changes can potentially alter aquatic habitat, water quality, sediment movement, and access to existing recreational facilities.

The Applicant will create a two-dimensional, vertically averaged hydraulic model of the study area using software suitable to the application and accepted by stakeholders. The model will be developed with the following questions in mind and validated at high, average, and low flow conditions.

- How will powerhouse diversions change the major flowlines within navigational channels?
- How will flow velocities and lateral flow patterns change at the intake and tailrace areas of the powerhouse?
- Will water surface levels upstream and downstream of the dam be affected?
- Where do important areas of aquatic habitat coincide with predicted velocity or flow direction changes?
- What impact, if any, will powerhouse flows have on sediment transport in key areas within the study area?

6.2.2 Fish Assemblage Surveys

This survey aims to provide a comprehensive assessment of fish populations and current information on the occurrence, abundance, and distribution of fish species in and around the Project area; and provide quality data for use in a desktop fish entrainment analysis. Design of fisheries studies and analysis of corresponding data will pay particular attention to game species and state-protected benthic fishes.

Project-specific fisheries surveys are proposed and include night-time electrofishing and benthic trawling to complement the aggregation of existing fisheries data compiled from various survey techniques. Survey methodologies should target the complete array of fish species found at RC Byrd L&D, including a notable interest dedicated to American Eel (*Anguilla rostrata*) presence.

Under guidelines defined in Appendix A of ORSANCO's Biological Programs Standard

Operating Procedures (SOP) (February 2020), fisheries assessments will occur in the vicinity of RC Byrd. The Applicant will conduct night-time boat electrofishing surveys at six, 0.5-kilometer-long sampling sites located upstream (*n*=3) and downstream (*n*=3) of RC Byrd L&D. Sites will be placed within approximately 1.6 kilometers upstream and downstream. Four sites will be surveyed along the shorelines supporting the hydroelectric operations. Electrofishing is performed at night to maximize gear efficiency and fish capture effectiveness resulting from increased foraging activity of predators that consequently increase prey movements along the littoral zone adjacent to the riverbank. One sampling event will be conducted in mid/late summer (July - September) during suitable survey conditions with regard (but not limited to) water transparency (i.e., Secchi depth), river flows, weather conditions, water temperatures, and safety (e.g., field staff, the general public). Fishes will be netted and placed in a live well for subsequent processing (e.g., identification, enumeration, size class lengths, physical condition), data recording, vouchering (photographic or preserved – as needed), and returned to the river. Characterization of instream habitats will occur using the "Copper-Pole Method" and following Appendix C of ORSANCO's SOP to assign a discrete habitat classification that ultimately accounts for each biotic index's scoring expectations.

Benthic trawling is a survey method used to target benthic fish species that boat electrofishing methods may underrepresent. Benthic trawling will be performed at each of the 12 electrofishing sites associated with the RC Byrd L&D to supplement boat electrofishing survey data and existing datasets. Benthic trawling will occur within the 0.5-kilometer-long sampling sites using an eight-foot mini-Missouri trawl net for sampling small-bodied benthic fishes (Herzog et al. 2009) or equivalent netting. Diurnal sampling will involve three trawls per site, each lasting approximately one minute as the boat travels in a downstream direction with the boat powered in reverse (i.e., bow upstream). One sampling event will be conducted per site in mid/late summer (July - September) during suitable survey conditions with regard (but not limited to) water transparency (i.e., Secchi depth), river flows, weather conditions, water temperatures, and safety (e.g., field staff, the general public). Fishes will be netted and placed in a live well for subsequent processing (e.g., identification, enumeration, size class lengths, physical condition), data recording, vouchering (photographic or preserved – as needed), and returned to the river.

American Eels are a cryptic and elusive species that are not easily captured during standard fisheries collection methods employed in the Ohio River mainstem. To target this species, passive trapping methods (i.e., eel traps) may be a viable option as these collection methods

are productive in other river basins within the U.S. Baited eel traps will be deployed within the tailrace of RC Byrd L&D. A minimum of 5 traps will be set on the bottom of the riverbed and checked every 18-24 hours. To maximize efficiencies, deployment of traps will occur solely in conjunction with fisheries or freshwater mussel surveys instead of independent field studies.

6.2.3 Fisheries and Fish Entrainment and Impingement Studies

The Applicant will conduct a desktop fish impingement and entrainment study. This study will describe the physical characteristics of the proposed Project that may influence fish impingement and entrainment rates, including the intake location and dimensions; the estimated velocity of flow approaching the intake structure; and the clear spacing between trash rack bars. Next, current and future routes for fish movement past the dam and the risks of injury or mortality for each will be identified, considering current and future flow management regimes (i.e., concerning flow allocations for spill and turbines based on river discharge). The analysis will identify individual species and guilds/groups for factors that may influence their vulnerability to entrainment and mortality. The assessment will include an evaluation of the potential for fish impingement and provide estimates of entrainment, turbine passage survival, total Project survival, and monthly and annual fish losses due to turbine entrainment.

The Fish Impingement and Entrainment Study will utilize the existing fish community information, fisheries data collected upstream and downstream in the vicinity of the Project (i.e., Fish Assemblage Study), hydrological data, and design/operational characteristics of the Project to support the analysis of turbine entrainment and mortality for a select list of fish species (typically the most abundant and any considered to be important sportfish by the resource agencies). The Applicant will develop an initial target list of species from all available sources, including ORSANCO's pools survey and AEP's approved list of 82 species at the Racine Pool. The methodology employed will include standard and widely used desktop evaluation and modeling methods that have been accepted by state and federal agencies (including FERC) at projects throughout the U.S. The standard practice has been to utilize the Electric Power Research Institute (EPRI) turbine entrainment and survival database as a model in evaluating the potential for entrainment at a facility. Entrainment data (monthly and annual) will be provided for all target species and presented for up to three size groups (e.g., <250, 250-500, and >500 mm); turbine mortality will be estimated for 2-inch class sizes starting at a length of 2 inches.

For species and life stages that are expected to encounter the intake, impingement risk will be determined based on fish size and available swim speed data. The length at which each species will be too large to pass through the trash rack bar spacings will be determined using body depth and length ratios available in the literature, and the swim speed data will be used to determine if fish that are physically excluded from entrainment can avoid impingement based on the estimated intake approach flow velocities.

Monthly and annual entrainment numbers will be estimated for abundant species and those specifically identified by the resource agencies for inclusion in the analysis. The estimation of entrainment will be conducted with data provided in the EPRI Turbine Entrainment and Survival Database for sites that are similar to the RC Byrd Project with respect to fish community composition, geographic proximity, reservoir size and volume, and turbine flow. Using the data selected from the EPRI database, entrainment rate estimates (i.e., number of fish entrained per a specified volume of generation flow) will be calculated by month for each species and specified size group. Monthly entrainment numbers will be summed to obtain an annual entrainment estimate.

Turbine survival will be calculated using a theoretical blade strike probability and mortality model that is similar to the one described by Franke et al. (1997). This model has been used to estimate turbine survival of fish entrained at more than 30 hydropower projects in the Midwest and Northeast, including three projects on the Upper Mississippi River in Minnesota and the Willow Island Project on the Ohio River. Using the turbine survival component of the EPRI database, the survival rates calculated with the theoretical model will be compared to data from field studies conducted at projects with similar turbine designs as the equipment proposed for RC Byrd Project. Comparison of the theoretical results to field estimates allows for an assessment of consistency with the empirical data (i.e., a measure of model validity).

For each selected species, the turbine survival rates will be applied to entrainment numbers to estimate the total number of fish killed during turbine passage on a monthly and annual basis. A total project survival rate will also be calculated using estimates of the proportion of fish that pass through each available route (e.g., turbines and spill gates) for the range of river flows that occur at the project (and the probability of flow occurrence) and route-specific survival rates (i.e., turbine survival estimates as described previously and literature-based spillway survival rates).

6.2.4 Freshwater Mussel Surveys

Freshwater mussels (Unionidae) are among the most threatened group of aquatic organisms in the United States. The upper Ohio River system harbors a unique and diverse assemblage of freshwater mussels that may be impacted by Project activities. To alleviate freshwater mussel concerns, The Applicant will survey the Project APEs for populations of freshwater mussels. The goal of a mussel survey is to fully and completely assess the mussel populations; determine the presence of rare, threatened, and endangered species; provide information on the occurrence and distribution of mussels; and to establish current and baseline conditions of mussels within 1500 meters downstream of the Project. Anticipated upstream impacts will be limited to a short stretch of suboptimal habitat against the existing dam. Upstream freshwater mussel resources will not be assessed due to safety concerns.

The WVDNR requires that any mussel survey be conducted in a manner consistent with the guidelines provided by the 2022 Protocol which can be found at https://wvdnr.gov/plants-animals/freshwater-mussels/. The selected contractor must employ a malacologist on the 2020 West Virginia Approved Freshwater Mussel Survey List for Group 3 stream consultation. The list is available through the WVDNR website at https://wvdnr.gov/wp-content/uploads/2021/07/CertifiedMusselSurveyors.pdf.
Prior to survey commencement, mussel survey plans and designs will be submitted to WVDNR for approval. Survey plan will be reviewed and coordinated with USFWS. A state scientific collection permit and site-specific amendment will be obtained prior to conducting any survey work. Mussel work will be completed in coordination with WVDNR and USFWS during the approved mussel survey season (May 1 – October 1).

Mussel survey efforts at the proposed Projects on the Ohio River will be completed as a Group 3 project scoping phase for hydropower activity with a minimum of 1.6 kilometers of downstream mixing zone sampled every 100 meters (n=16) with a 100 meter transect length extending perpendicular to flow into the channel. Additionally, 50 meter transects spaced every 25 meters will be placed in the proposed powerhouse construction footprint (n=3). Additional surveys may be required if subsequent modeling determines hydraulic changes will extend farther downstream. In total, searches will be conducted along an estimated 1,900 meters. All collected mussels will be identified to species, measured, photographed for vouchers, and returned to the substrate. If initial survey efforts identify freshwater mussel resources within the Project footprint, they will be relocated downstream prior to construction.

6.2.5 Water Quality Study

The objectives of the water quality study are to ensure the Projects' compliance with state water quality standards, provide early detection for potential deviations in water quality measurements (i.e., DO levels approaching 5.0 milligrams per liter [mg/L]), and provide the mechanisms to correct these deviations. The Applicant's goal is to maintain DO levels downstream of the Project. Operational procedures will include alarm procedures below 6.5 mg/L followed by a combination of a powerhouse draft tube air injection system and flows through the Dam spillway gates to provide suitable DO concentrations downstream.

Multiple water quality parameters could be assessed at RC Byrd L&D although water temperatures and DO concentrations will be the primary parameters of interest at this stage of the permitting process. Additionally, continuous monitoring of these two parameters will occur for one year prior to construction to establish baseline conditions and to generate background water quality data used to further document existing conditions. One water quality monitoring station will be placed above the dam and one below the dam. The APE precise locations of each monitoring station (within each of the general areas noted above) will be determined in coordination with USACE. Additionally, USACE Huntington district's operational order requires upstream and downstream DO and Temperature monitoring for the life of the project.

Continuous DO and temperature probes will be deployed and monitored at each L&D Project from May 1, 2022, through October 31, 2022. DO and temperature measurements will be recorded every 15 minutes and are accessible to ORSANCO and the public. Data loggers will be maintained and calibrated on a routine basis to address potential fouling of data and other malfeasances with the probe's operation. DO and water temperature data will be collected from the Project intake and tailrace areas. Project operations information will be compared to concurrent water quality data to identify influential trends within the Project area.

6.2.6 Aquatic Habitat Study

To ensure hydroelectric operations are consistent with the USACE prescribed water level management strategies for RC Byrd L&D, the applicant will delineate physical habitat characteristics throughout the downstream Project hydraulic footprint. A habitat field survey is proposed to delineate aquatic littoral and demersal habitat in terms of substrate and cover. Major habitat and shoreline types will be delineated with the data used to evaluate Project effects on aquatic resources in the area. Habitat suitability is defined primarily by substrate, cover, and depth, and will assist in characterizing the benthic community. Each of these habitat parameters will be assigned specific attributes to be used for field delineation. These will generally include:

- substrate: fines (sediment, organic detritus, mud etc.), sand, gravel, cobble, boulder, bedrock, anthropogenic rubble (concrete, rip-rap rock, etc.)
- cover type: object cover (i.e., boulder, woody debris, riprap, etc.), overhead cover (overhanging limbs, structures, etc.); vegetative cover (emergent, submergent)
- cover density: absent, low, moderate, high
- depth (at normal pool): surface to substrate (ft)

Downstream depths and velocities will be mapped during hydraulic modeling and physical habitat characteristics will be delineated via SCUBA diving during mussel survey efforts. Divers will record substrate sizes / categories (Wentworth 1922), depth, and type and amount of cover. Habitat will be recorded along survey transects spaced 100 meters apart (perpendicular to stream flow) and extending 1,600 meters downstream from the proposed Project locations. Instream littoral habitats will also be assessed during fisheries studies using the "Copper-Pole Method" as described in Appendix C of ORSANCO's SOP.

Habitat surveys and delineations will occur during summer months with base riverine flows to provide adequate underwater visibility, observations of cover under consistent conditions, and accurate measurements of depth relative to substrate. Additionally, by mid-summer, annual aquatic vegetation beds have reached their peak yearly growth limits. Reporting of the habitat characteristics and potential influence of modified flow dynamics will include consideration of sensitive aquatic species within the tailraces and expected impacts to their habitats. Reports will be augmented with detailed maps from hydraulic modeling efforts that depict areas where increased velocities may be expected to scour suitable benthic habitats.

6.2.7 Terrestrial Habitat and RTE Species Study

A terrestrial field study within the APE will be conducted to describe and document general wildlife habitat types and conditions, rare and invasive plant species, and habitat for federally protected bats. The primary goals of terrestrial studies include establishment of baseline conditions and identification of sensitive or ecologically valuable habitat types (i.e., old growth forest). A comprehensive understanding of baseline conditions will maximize the effectiveness of restoration efforts and species-specific mitigation measures (i.e., bat boxes) following ground disturbance.

The Project locations lies within the known range of the federally protected Indiana Bat (*Myotis sodalis*) and the proposed Northern Long-Eared Bat (*Myotis septentrionalis;* NLEB). Projects within

range of the Indiana bat and NLEB must initiate formal consultation with USFWS by requesting information regarding known records of state and federally listed bats in the vicinity of the proposed Project (i.e., identify known occupied habitat). Following results of the formal consultation process terrestrial site assessments may/can occur. This includes coordination with USFWS, and WVDNR to ensure bat roosting trees and/or maternity roosts are not adversely impacted by a Project from loss of summer habitat (e.g., forests) or winter hibernacula (e.g., caves, mines) due to construction or operation.

If the Projects occur outside of known, listed bat capture buffers, an area-based presence and absence survey using mist nets (i.e., 9 net-nights) may be necessary to proceed with tree felling during time of year restrictions. Indiana bats and NLEB live in trees during the summer and live underground in winter. Determining the presence of portals to underground voids (such as caves or mines) is necessary to properly complete ESA compliance for federally listed bats.

The Project proposal has a relatively small footprint, all other terrestrial habitat delineations (i.e., rare and invasive plants surveys) will be performed by qualitatively assessing the entire Project footprint. Surveyors will use submeter Global Positioning System (GPS) units to accurately mark all species or areas of interest.

6.2.8 Wetland and Waters Delineation

Sensitive wetland features may exist within the proposed powerhouse footprints or associated construction staging yards. The Applicant proposes to conduct a desktop review and field study to document the location and extent of jurisdictional wetlands/waters of the U.S. (WOTUS) within the Project study areas including all areas that may be temporarily or permanently displaced during construction and/or operation in the APE. Completion of wetland surveys would aid the Applicant in designing Project features that would minimize impacts on jurisdictional wetlands/waters of the US and inform the design of appropriate mitigation if necessary. The study will also seek to advance the gathering of information needed to support the USACE Section 404 process.

Qualified wetland delineators based within the region will conduct wetland delineations in accordance with the procedures set forth in the USACE 1987 Wetland Delineation Manual, applicable Regional Supplement, and any applicable District-specific, EPA, or state designated requirements. Prior to conducting the field surveys, the team will obtain and review available aerial photography, Natural Resource Conservation Service (NRCS) soil surveys, USFWS National Wetland Indicator (NWI) maps, and county hydric soils lists to identify the number, type, size,

and location of potential wetlands and waterbodies within the Project area. Following initial desktop review, wetland delineators will conduct field surveys to ensure any changes to previously documented resources as well as any new resources within the APE are recorded. Documented waterbody boundaries will be recorded with submeter GPS technology, following standardized survey protocols and collecting all applicable data and forms.

6.2.9 Recreational Uses

The Applicant proposes to conduct a desktop review to document the location and extent of recreation within the Project study areas including recreation activities that may be impacted during construction and/or operation. Given the construction of the facility structures (e.g., a new intake, powerhouse, tailrace, transmission) for the RC Byrd will occur exclusively on federal lands in the restricted area, impacts on recreationalists in the Study Area will be generally short-term, associated with construction related noise and potentially increased traffic. The Applicant will consult with state and local governments and appropriate interests to better ascertain recreational conditions, future plans, and potential Project impacts as well as opportunities to facilitate recreation in the Project. The Applicant will consult throughout the licensing process regarding recreation needs as well as appropriate measures for protection and/or mitigation of identified recreational resources.

6.2.10 Cultural Resources

Cultural resources are defined as physical evidence or place of past human activity: site, object, landscape, structure; or a site, structure, landscape, object or natural feature of significance to a group of people traditionally associated with it. A historic property is any cultural resource that is either listed on or considered eligible for listing on the National Register of Historic Places (NRHP). For this Project, it is anticipated that archaeological sites and historic buildings and structures are the resource types considered most relevant and are therefore the focus of the goals and objectives described below.

In advance of completing any archaeological fieldwork within the direct APE, a desktop archival review will be used to collect data on known cultural resources within a 1-mile radius. The data collected will be limited to that on file at the respective state SHPO office. This will provide information on all previous archaeological, architectural, and National Register-listed properties including previously conducted cultural resources investigations in West Virginia.

In general, the direct APE has been significantly altered by construction of RC Byrd L&D structures. Little to no greenfield or undisturbed areas will be affected by construction or operation of the Projects. However, should initial consultations result in a determination that a Phase I archaeological survey is needed, this work will be completed in accordance with regulations implementing the Section 106 review process (36 CFR 800), Section 101(b)(4) of the National Environmental Policy Act of 1969, the ACHP's Section 106 Archeology Guidelines, the Archaeological Resources Protection Act (ARPA) of 1979 which applies to projects on federal or tribal land, and if applicable, 43 CFR Part 10 of the Native American Graves and Repatriation Act (NAGPRA), which applies to human remains, sacred objects, and items of cultural patrimony (described as "cultural items" in the statute) located on federal or tribal lands or in the possession and control of federal agencies or certain museums.

If required, all fieldwork including site delineation and recordation, shall conform to guidelines for conducting archaeological surveys and investigations in West Virginia as established by the WVSHPO. In general, the Phase I archaeological survey would follow standardized methodology for areas located on landforms with less than 20% slope and with less than 50% surface visibility and includes the excavation of shovel tests at 15-meter intervals along systematically spaced transects. A maximum of one transect of shovel tests will be placed in each workspace to ensure that information concerning the subsurface conditions is recorded for each location. All shovel tests will be refilled immediately, and no test pits will remain open overnight. Shovel test locations will be plotted with an iPad using the Collector application and a submeter GPS receiver. Shovel tests will be approximately 50 by 50 centimeters in size. Ground surface inspection will be conducted in those areas where surface visibility exceeds 50 percent, there is visible ground disturbance, and/or slope is greater than 20 percent. Data will be consolidated into a letter report.

The need for archaeological field investigations beyond Phase I survey will be determined following the completion of an initial approved scope of work and in consultation with the FERC, USACE, SHPOs, Tribes, and other stakeholders participating in the Section 106 consultation process.

The results of the desktop archival review (described above) will be used to develop a proposed scope of work for field investigations. As required following initial agency and stakeholder consultations, The Applicant will carry out an approved scope of work to identify historic architectural resources within the Project's indirect APE to evaluate the NRHP eligibility of historic

buildings and structures within the Project's APE pursuant to both SHPO's state guidelines and requirements. The Applicant will conduct additional property-specific research on historic buildings and structures within the indirect APE and complete the requisite state inventory forms for newly identified properties (if any) and provide information to WVSHPO sufficient to determine the NRHP eligibility.

6.3 Studies and Resource Protection Plans Proposed to be Completed After Receipt of FERC License, but Prior to Construction

The Applicant intends to conduct various studies and prepare several resource protection plans after the FERC License is issued, but before the start of Project construction. Each of these studies or plans are discussed below, along with the rationale for conducting them later in the Project development process.

The Applicant will expect resource protection plans will be required as a condition of its FERC License for the Projects. Study results will be issued for agency and stakeholder review and comment before filing with FERC. FERC will require that the studies and or plans be completed before authorizing construction to begin. Further, if any of the studies indicate that resource protection or mitigation measures are necessary, such measures will be developed in consultation with affected resource agencies and stakeholders

6.3.1 Invasive Species Survey and Invasive Species Management Plan

The Applicant will conduct an Invasive Species Survey in the area of the new powerhouse, transmission line, and substation. This study will be undertaken post-licensing, before commencing construction. The Prior License holder performed a previous Invasive Species analysis of the Proposed RC Byrd site and is summarized herein. The new survey will be followed by the development of an Invasive Species Management Plan that will apply to initial Project construction and future activities at the Project.

6.3.2 Avian Protection

The Applicant will develop an Avian Protection Plan for the Project. The Plan will be developed consistent with Avian Power Line Interaction Committee (APLIC) and the USFWS guidelines and will identify protection measures that will be incorporated in the Project design. The Plan will also address measures that will be implemented in the future in association with transmission

facility maintenance activities. A previous Avian Study was performed for the prior RC Byrd FERC License and is summarized herein.

6.3.3 Transmission Line Maintenance

The Applicant will develop a Transmission Line Corridor Management Plan. This plan will detail procedures to be implemented to control vegetation along any newly created transmission line corridors developed as part of the FERC-licensed Project.

6.3.4 Erosion and Sedimentation Control Plan

During construction, an Erosion and Sedimentation Control Plan will be required by the Commission, the USACE, and the States, under their respective regulatory approval processes. Prior to the start of construction, the Applicant will develop the plan in consultation with these agencies. The plan will address the relevant erosion and sedimentation control requirements of all agencies in one document. This plan will include all provisions to minimize erosion and sedimentation disturbance during Project construction and stabilize banks post-construction. In addition, a sediment testing and management plan will be included that is compliant with applicable State regulations.

6.3.5 Historic Properties Management Plan

The Applicant will submit a historic properties management plan (HPMP) within one year of issuance of this license. The HPMP will include any appropriate proposal to restore areas temporarily affected by construction to protect aesthetic resources. The plan will be accepted by FERC and WVSHPO before engaging in any ground-disturbing activities or taking any other action that may affect any historic property within the project's area of potential effects.

6.3.6 Mussel Relocation Plan

The Applicant is committed to protecting freshwater mussels in the project. If freshwater mussel populations are encountered, they will be relocated to a suitable habitat. The plan and relocation area will be developed in consultation with the USFWS and WVDNR and accepted prior to any ground disturbing activities in the project APE.

6.3.7 Indiana Bat Protection Plan

The Applicant will work with WVDNR to develop a comprehensive Indian Bat protection plan. The plan will ensure that no endangered Indian bats are harmed during construction and operation of the RC Byrd project.

6.3.8 Water Control Plan

Before the start of construction, the Applicant will prepare a Water Control Plan (WCP). The WCP will address both the control of ground water as well as surface water. The WCP will include the design of all diversion, collection and retention structures; pumping and conveyance equipment; and operating controls.

6.3.9 Water Quality Management Plan

The Applicant will develop a water quality plan (WQMP) with the following provisions: (1) identification of the locations of monitoring sites; (2) a description of the type of instruments to be used to monitor water quality; (3) a schedule for monitoring turbidity levels, water temperature, and DO levels during project construction; (4) continuous, real-time monitoring of water temperature and DO levels downstream of the project from June 1 through September 30 each year following the commencement of project operation; (5) annual reporting for each year that monitoring is conducted; and (6) if monitoring indicates deviations from the water quality requirements of the license issued for the project during project construction or operation, filing a report with the Commission describing the deviation and implementation of any corrective actions.

The WQMP will apply to all aspects of the work including, but not limited to clearing operations, all excavation, drilling, fills, and road work. Silt fences, hay bales, sediment ponds, ditches, interceptor dikes, buffer zones, graveling after grading, and other such techniques, action or devices will be constructed and maintained, or performed as necessary to comply with this Plan.

6.3.10 Relevant Qualifying Federal and State or Comprehensive Waterway Plans of West Virginia

The Project is situated on the West Virginia side of the Ohio River and will use the USACE R. C. Byrd L&D which spans the river. The Commission's Library of Comprehensive Plans contains 22 Plans for West Virginia. Each plan is listed separately with a brief explanation for its inclusion as an applicable qualifying comprehensive plan.

1. Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (Anguilla rostrata). (Report No. 36). April 2000.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a species not present in the proposed Project's waterway.
2. Forest Service. 1993. George Washington National Forest revised land and resource management plan. Department of Agriculture, Harrisonburg, Virginia. •
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the Project is not located.
3. Forest Service. 1988. Monongahela National Forest land and resource management plan. Department of Agriculture, Elkins, West Virginia. June 1988. •
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the Project is not located.
4. National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the Project is not located.
5. National Park Service. 2013. Chesapeake Bay public access plan. Annapolis, Maryland. January 2013.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the Project is not located.
6. Ohio River Basin Commission. 1978. Upper Ohio main stem comprehensive coordinated joint plan. Cincinnati, Ohio. January 1978.
    - The Applicant has determined that this Plan is no longer relevant to the proposed Project because it is out of date.
7. Ohio River Basin Commission. 1978. Middle Ohio main stem comprehensive coordinated joint plan. Cincinnati, Ohio. January 1978.
    - The Applicant has determined that this Plan is no longer relevant to the proposed Project because it is out of date.
8. Ohio River Basin Commission. 1977. Kanawha River Basin comprehensive coordinated joint plan. Cincinnati, Ohio. July 1977.
9. Ohio River Basin Commission. 1977. Big Sandy & Guyandotte River Basins comprehensive coordinated joint plan. Cincinnati, Ohio. January 1977.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the Project is not located.

10. U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C
    - Fisheries USA is the recreational fisheries policy of the USFWS. The policy is committed to the objectives of usability, sustainability, and action and defines the USFWS's stewardship role in management of the nation's recreational fishery resources.
    - The USFWS's goals include the following: ensure and enhance the quality, quantity, and diversity of the recreational fishing opportunities; develop and enhance partnerships between governments and the private sector for conserving and managing recreational fisheries; cooperate to maintain a healthy recreational fisheries industry.
    - The Project will not conflict with the Fisheries USA policy and the goals of the USFWS with respect to recreational fishing opportunities. The Applicant is committed to working in cooperation with the USFWS and West Virginia to design its Project to avoid or mitigate significant effects on recreational fishing opportunities. The Applicant will evaluate potential projects effects on existing fishing opportunities in the Project Area during the development of its RRMP.
11. West Virginia Department of Natural Resources. 1976. Wildlife Resources Division strategic plan, 1975-1985. Charleston, West Virginia.
    - The Applicant has determined that this Plan is no longer relevant to the proposed Project because it is out of date.
12. West Virginia Department of Natural Resources. 1977. Today's plan for tomorrow's wildlife: a strategic plan for fish, game, and nongame management, 1975-1985. Charleston, West Virginia.
    - The Applicant has determined that this Plan is no longer relevant to the proposed Project because it is out of date.
13. West Virginia Department of Natural Resources. 1982. Little Kanawha River Basin plan. Charleston, West Virginia.
14. West Virginia Department of Natural Resources. 1983. Greenbrier River Basin plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
15. West Virginia Department of Natural Resources. 1983. New River Basin plan. Charleston, West Virginia.

- The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.

16. West Virginia Department of Natural Resources. 1984. Elk River Basin plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
17. West Virginia Department of Natural Resources. 1984. Gauley River Basin plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
18. West Virginia Department of Natural Resources. Soil Conservation Service of the Department of Agriculture. 1985. Lower Kanawha River Basin, Volume III: problems, concerns, alternative solutions, and a suggested plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
19. West Virginia Department of Natural Resources. 1986. Big Sandy River Tug Fork Basin plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
20. West Virginia Department of Natural Resources. 1987. Guyandotte River Basin plan. Charleston, West Virginia.
    - The Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.
21. West Virginia Department of Natural Resources. 1988. Ohio River Basin plan. Charleston, West Virginia.
    - Applicant has determined that this Plan is not relevant to the proposed Project because it pertains to a geographical area in which the proposed Project is not located.

22. West Virginia Governor's Office of Community and Industrial Development. West Virginia State Comprehensive Outdoor Recreation Plan (SCORP): 1982-1992. Charleston, West Virginia.
    - The Applicant has determined that this Plan is no longer relevant to the proposed Project because it is out of date.

6.3.11 Additional Resource Plans for Applicant's Proposed Project on the Ohio River

In conducting its research and outreach to identify relevant Comprehensive Plans, the Applicant has attempted to identify additional plans which may be relevant to the proposed project as Resource Plans, but which have not been certified by the Secretary of the Commission as Comprehensive Plans.

1. Statewide Comprehensive Outdoor Recreation Plan-SCORP- State of West Virginia. 2015-2020. West Virginia Development Office (www.wvcommerce.org/scorp)53
    - The goal of the SCORP is to guide outdoor recreation land acquisition, facility development, programming, and management and to encourage healthy lifestyles in West Virginia.
    - The Applicant will work in cooperation with West Virginia Development Office to ensure that the Project will be consistent with the objectives and recommendations of the 2015- 2020 West Virginia SCORP. The Applicant will evaluate potential project effects on existing recreational opportunities in the Project area during the development of its RRMP.
2. Ohio Department of Natural Resources. Ohio Statewide Comprehensive Outdoor Recreation Plan (SCORP). A plan for the future. Columbus, Ohio 2013
    - The goal of the SCORP is to guide outdoor recreation land acquisition, facility development, programming, and management and to encourage healthy lifestyles in Ohio.
3. West Virginia Department of Natural Resources 2015. Division of Natural Resources Proposed State Wildlife Action Plan.

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FERC 1988: Federal Energy Regulatory Commission - Office of Hydropower Licensing: Hydroelectric Development in the Upper Ohio River Basin - Final Environmental Impact Statement, Docket No. ELSS-19-114, September 1988

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FERC 2014: Federal Energy Regulatory Commission – Draft Environmental Assessment for Hydropower License, Robert C Byrd Hydroelectric Project P -12796-004. Issued July 2014.

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APPENDIX A

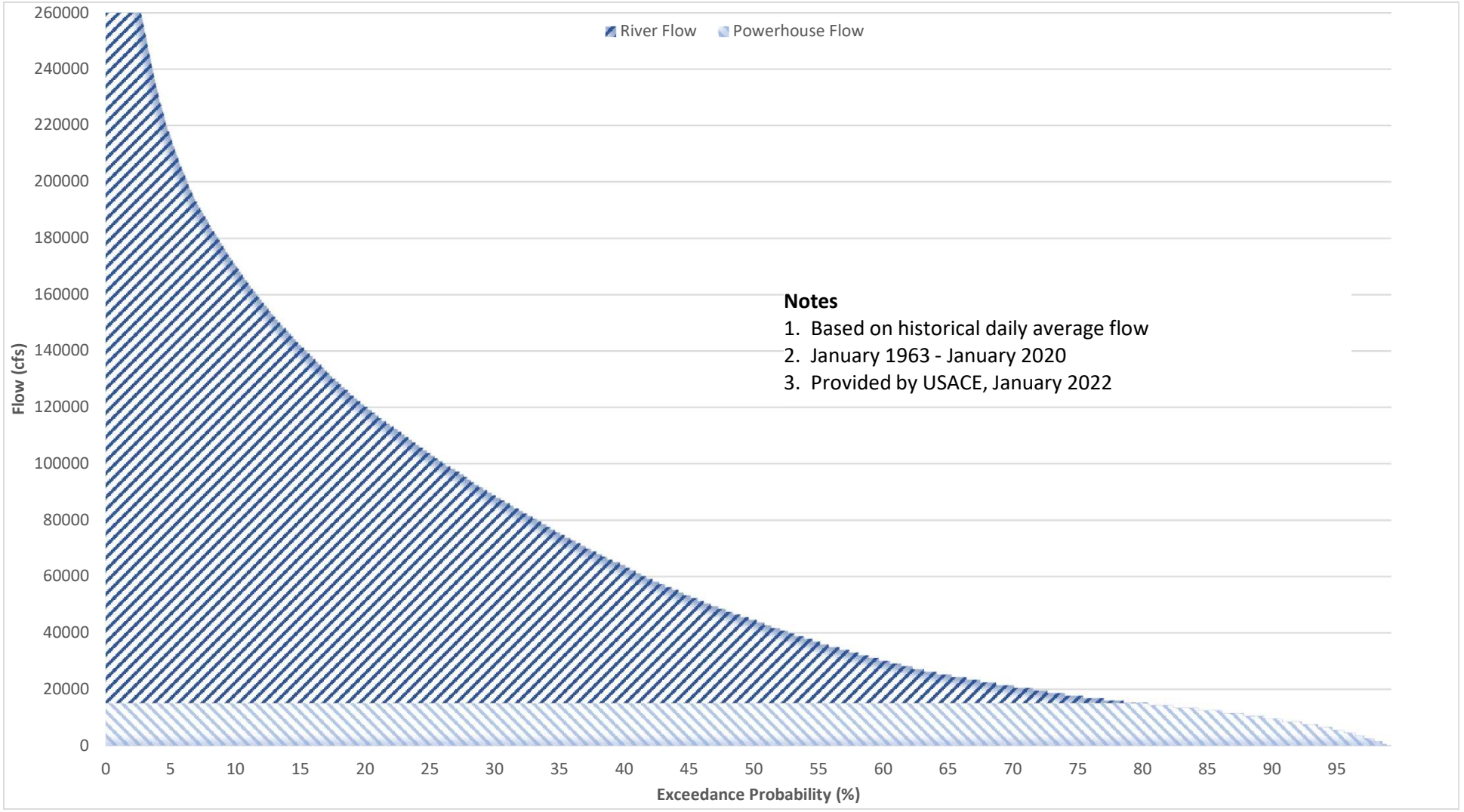
AGENCY CONSULTATION

Date	Project	Agency / Stakeholder	Agency/ Stakeholder Participants	Other participants	Type of Consultation	Summary of Consultation
6/24/2021	Pike / NC / RCB	USFWS	Richard McCorkle	Current Hydro	Informal Phone Call	10-minute discussion of USFWS Qualified Freshwater Mussel Surveyors: https://www.fws.gov/northeast/pafo/pdf/Mussel_qualified_00082020.pdf
6/29/2021	Pike / NC / RCB	Edge Engineering & Science	Casey Swecker		Informal Phone Call	Mr. Swecker is USFWS Qualified Freshwater Mussel Surveyor. Since 6/29/21: Discussion of a practicable approach to a Mussel Survey and Aquatic Habitat Study in the vicinity of all three projects.
3/11/2021	NC / Pike / RCB	USACE	Julia Butzler	Joel Herm	Phone Calls and Email Exchanges	Since March 2021 multiple exchanges in regard to USACE As-builts, tech sharing agreement, security clearances for site visits, maps and drawings. Further requests for environmental studies conducted by the Corps.
6/25/2021	NC / Pike / RCB	Bureau of Indian Affairs	Eastern Regional Office	Jan Borchert	Email Outreach	Informal request for support in identifying Tribal Nations affected by the project.
7/20/2021	Pike / NC / RCB	USFWS	Richard McCorkle	Jan Borchert	Informal Phone Call	10-minute discussion of permitting plan and proposed use of TLP
1/18/2022	Pike / NC / RCB	FERC	John Smith and Janet Norman	Joel Herm and Norm Bishop	Phone Call	Discussion on FERC process for all 3 projects.
1/26/2022	Pike / NC / RCB	USFWS	Janet Norman	Joel Herm	Phone Call	Discussion with USFWS on fish passage and collaborating on hydropower design with USFWS
2/23/2022	RCB	USACE	Major Kelley, Belinda Weikle, Matt Coakly and Rachel Phillips	Joel Herm and Roy Powers	Teams	Collaboration with USACE on hydropower Partnership Program.
3/2/2022	Pike / NC / RCB	ORSANCO	Jason Heath, Ryan Argo and Sam Dinkins	Roy Powers, John Spaeth and Mitchell Kriege	GoToMeeting	First meeting with ORSANCO to discuss proposed study plans and how Current Hydro can align studies with ORSANCO's research. Mitchell and John from Edge Engineering and Science joined the meeting on behalf of Current Hydro. Discussed DO consideration and other water quality concerns in the Ohio River.

APPENDIX B

FLOW DURATION CURVES

Back To Index



Robert C Byrd Locks and Dam

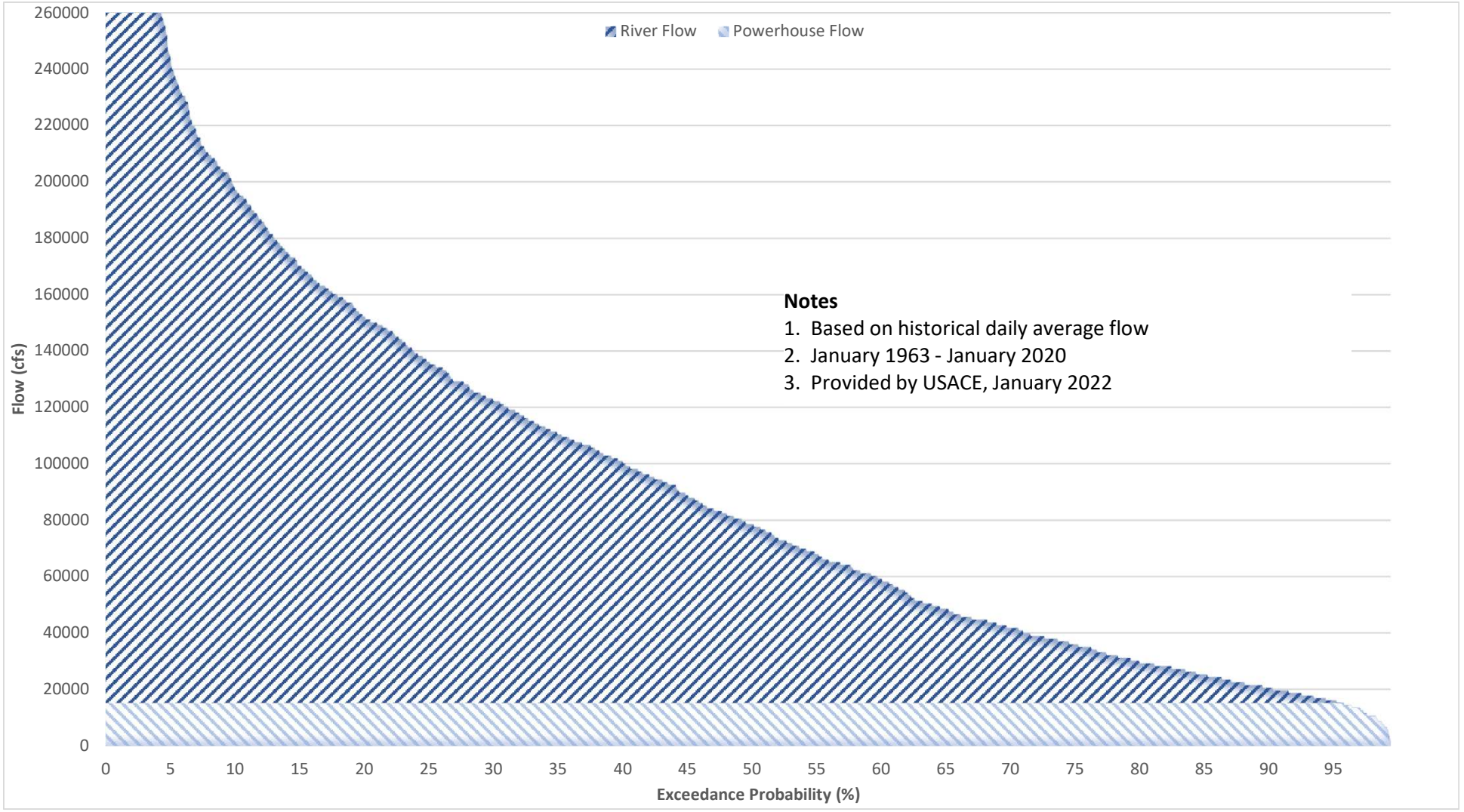
CURRENT HYDRO

Figure 2: Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

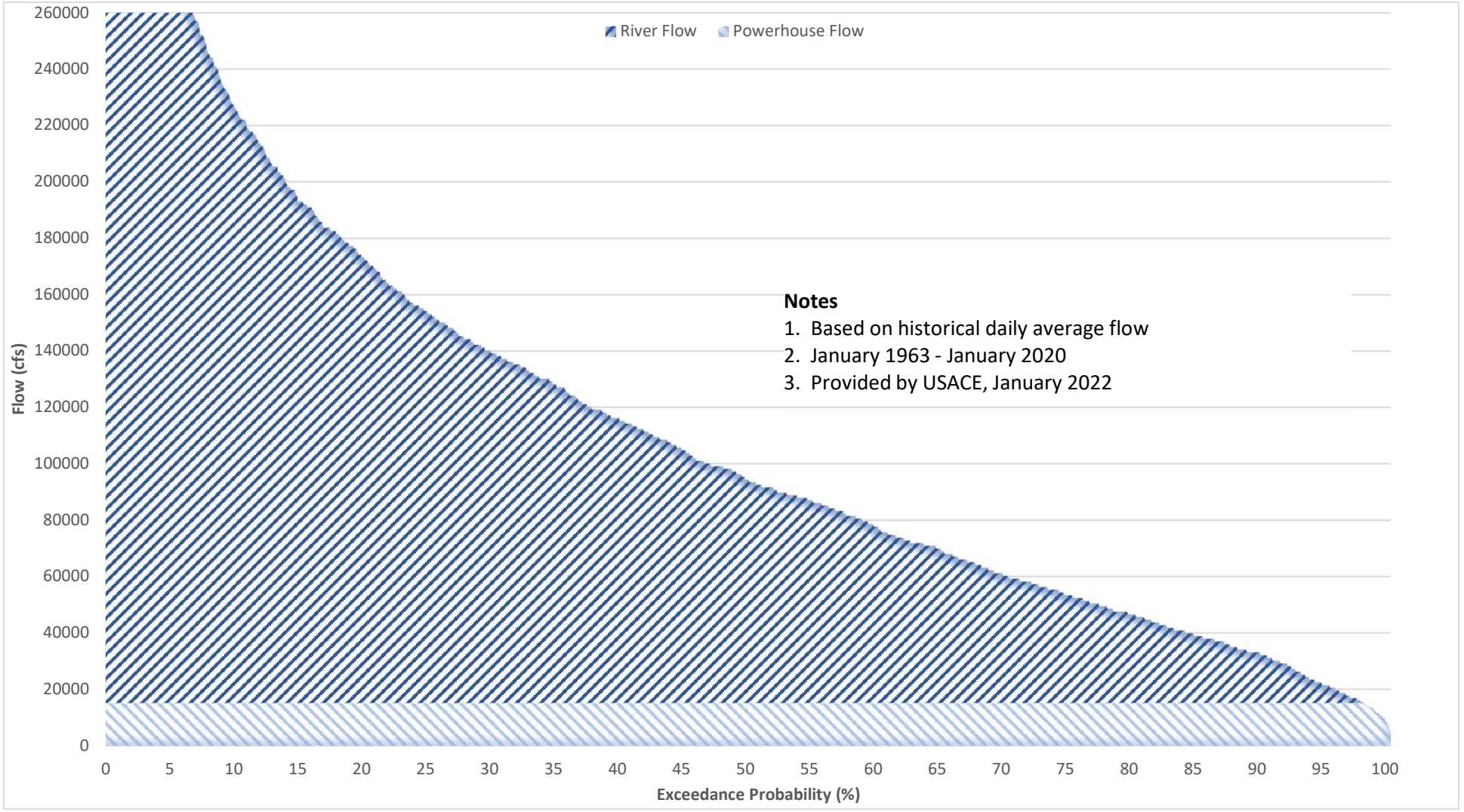
CURRENT HYDRO

Figure 3: January Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

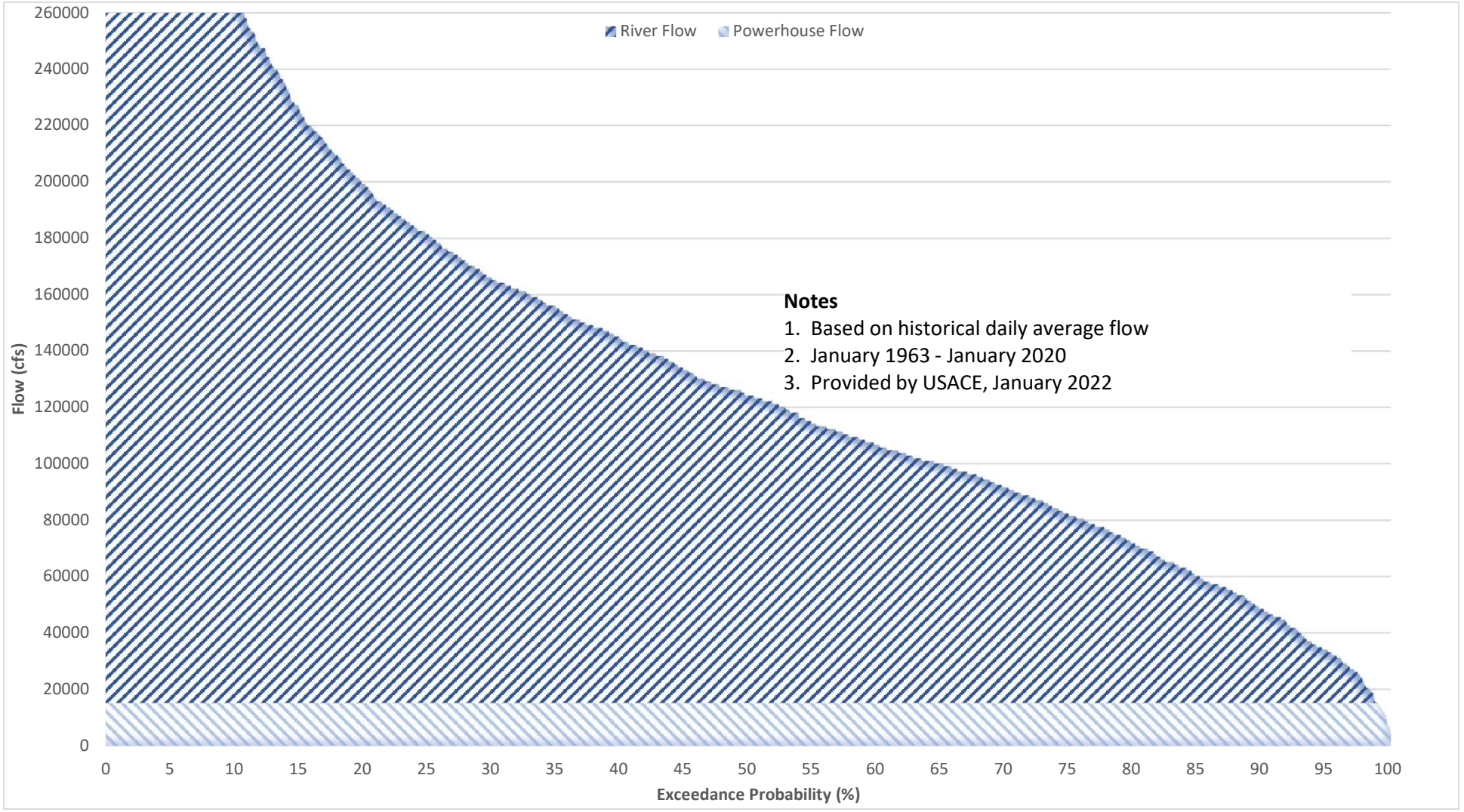
CURRENT HYDRO

Figure 4: February Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

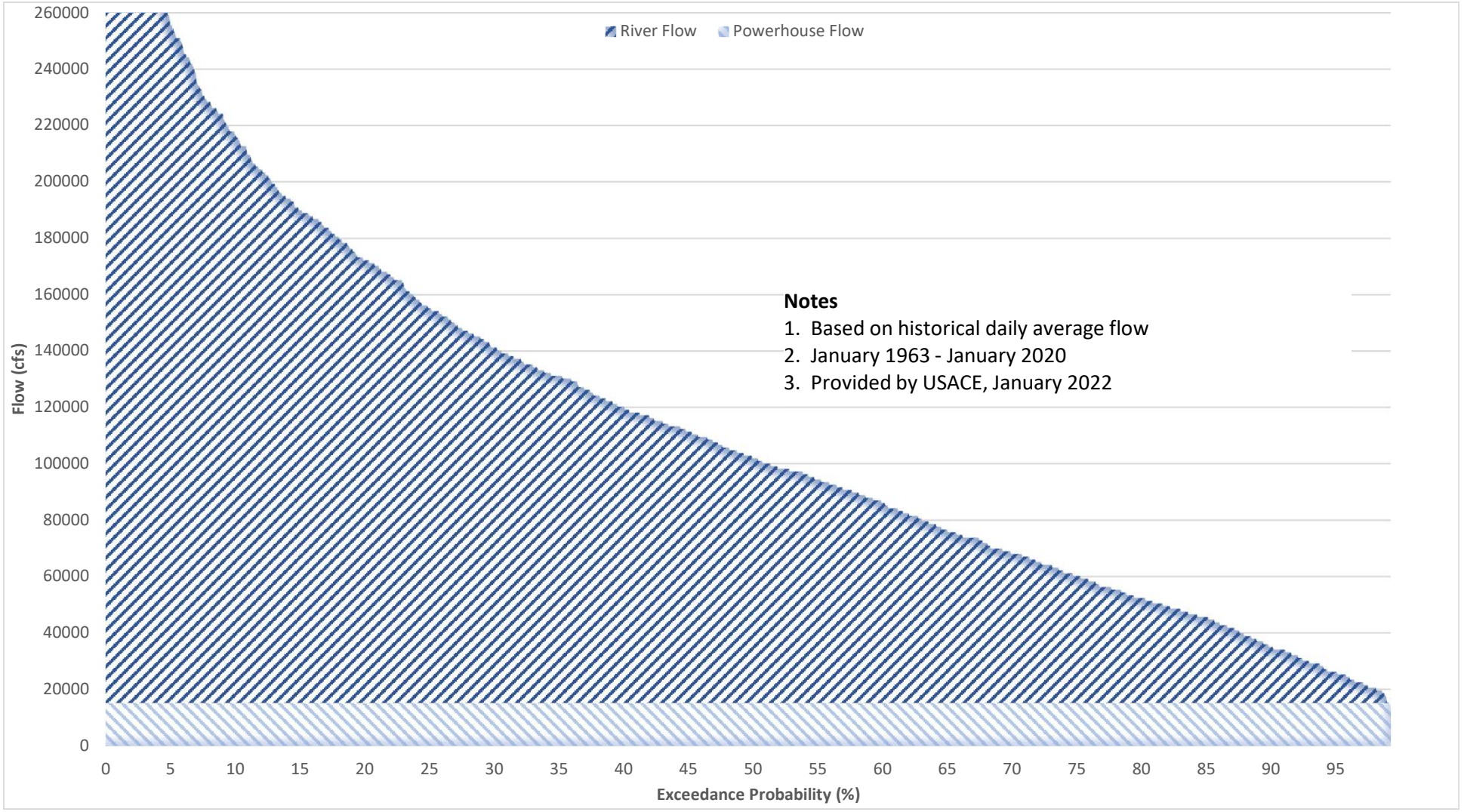
CURRENT HYDRO

Figure 5: March Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

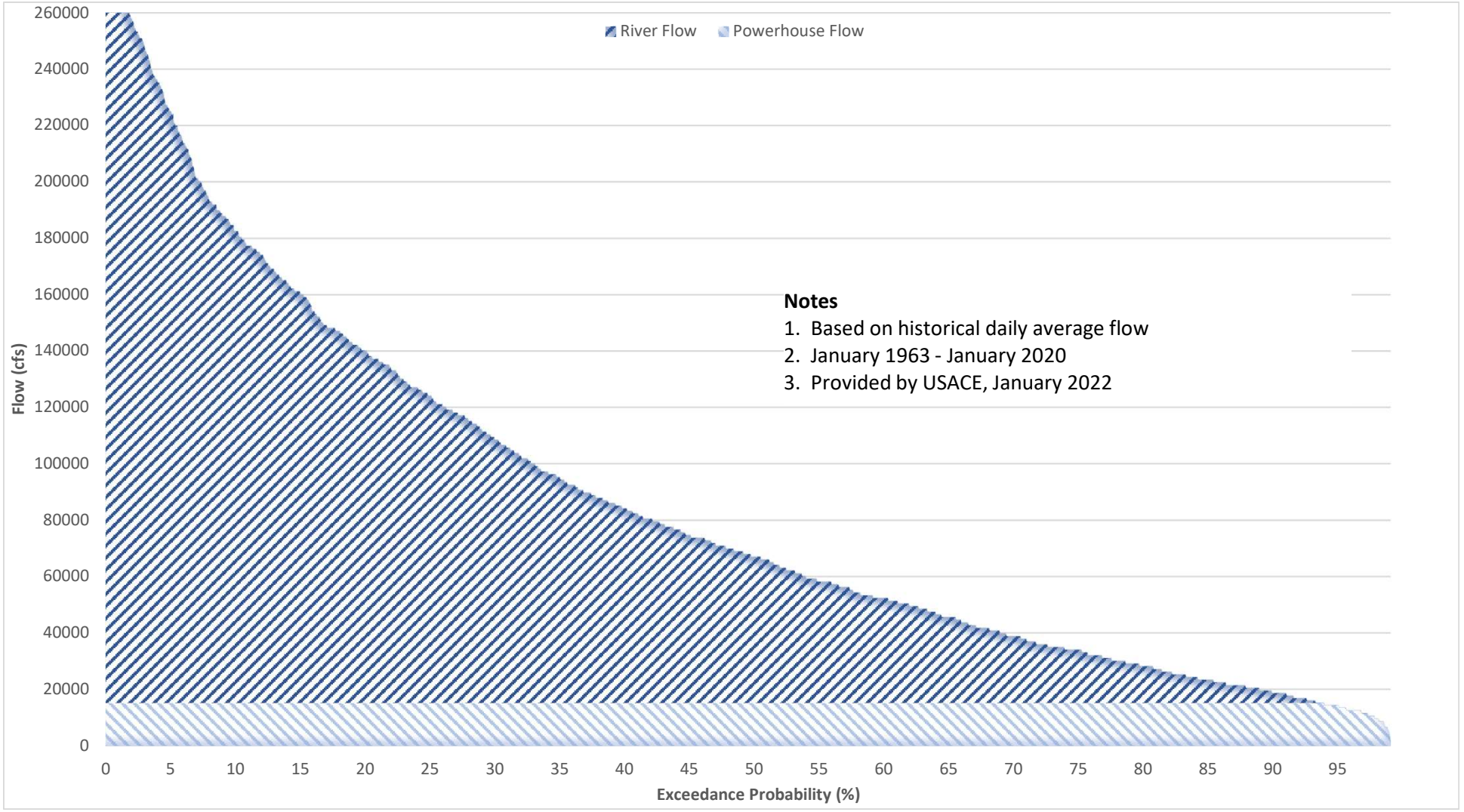
CURRENT HYDRO

Figure 6: April Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

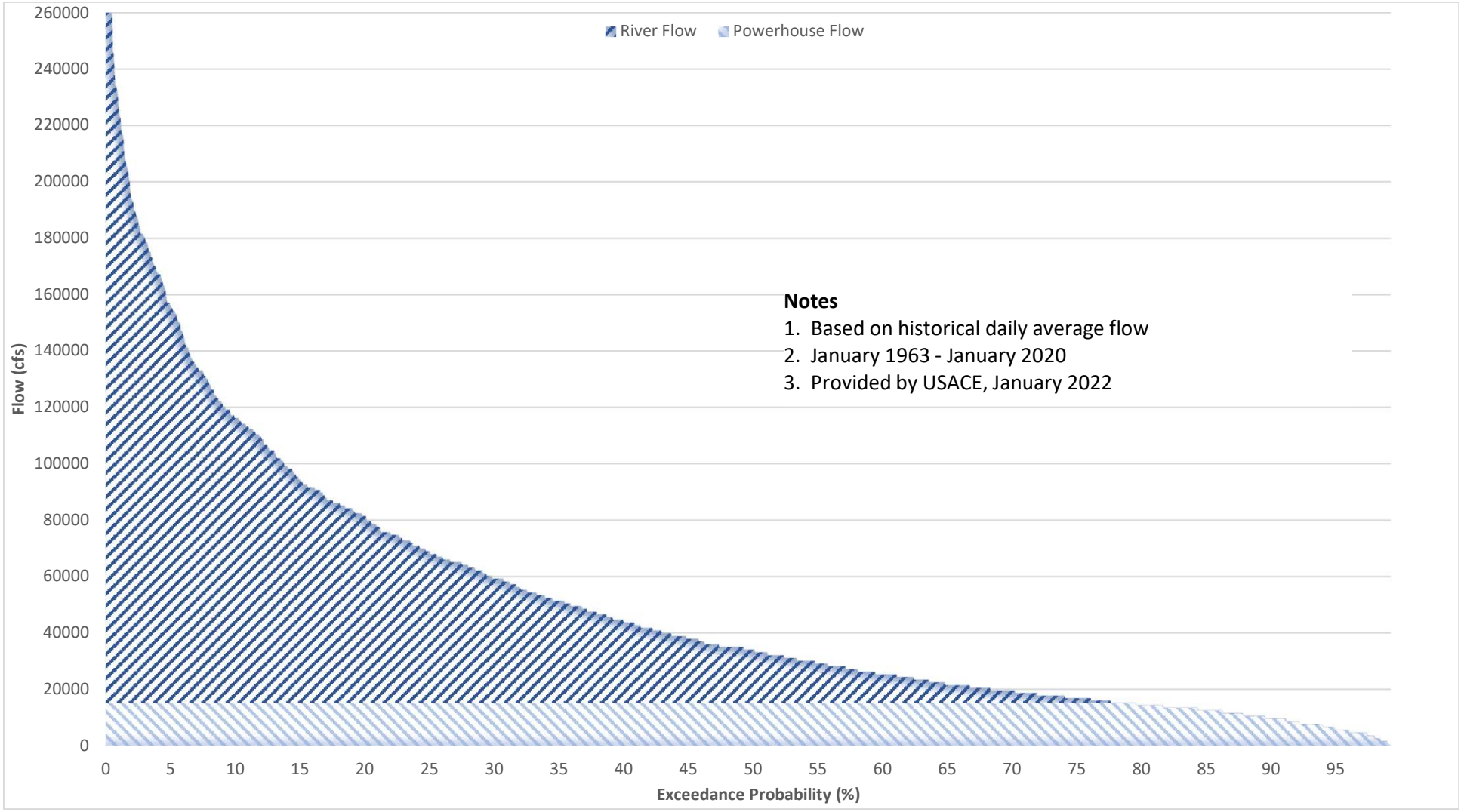
CURRENT HYDRO

Figure 7: May Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

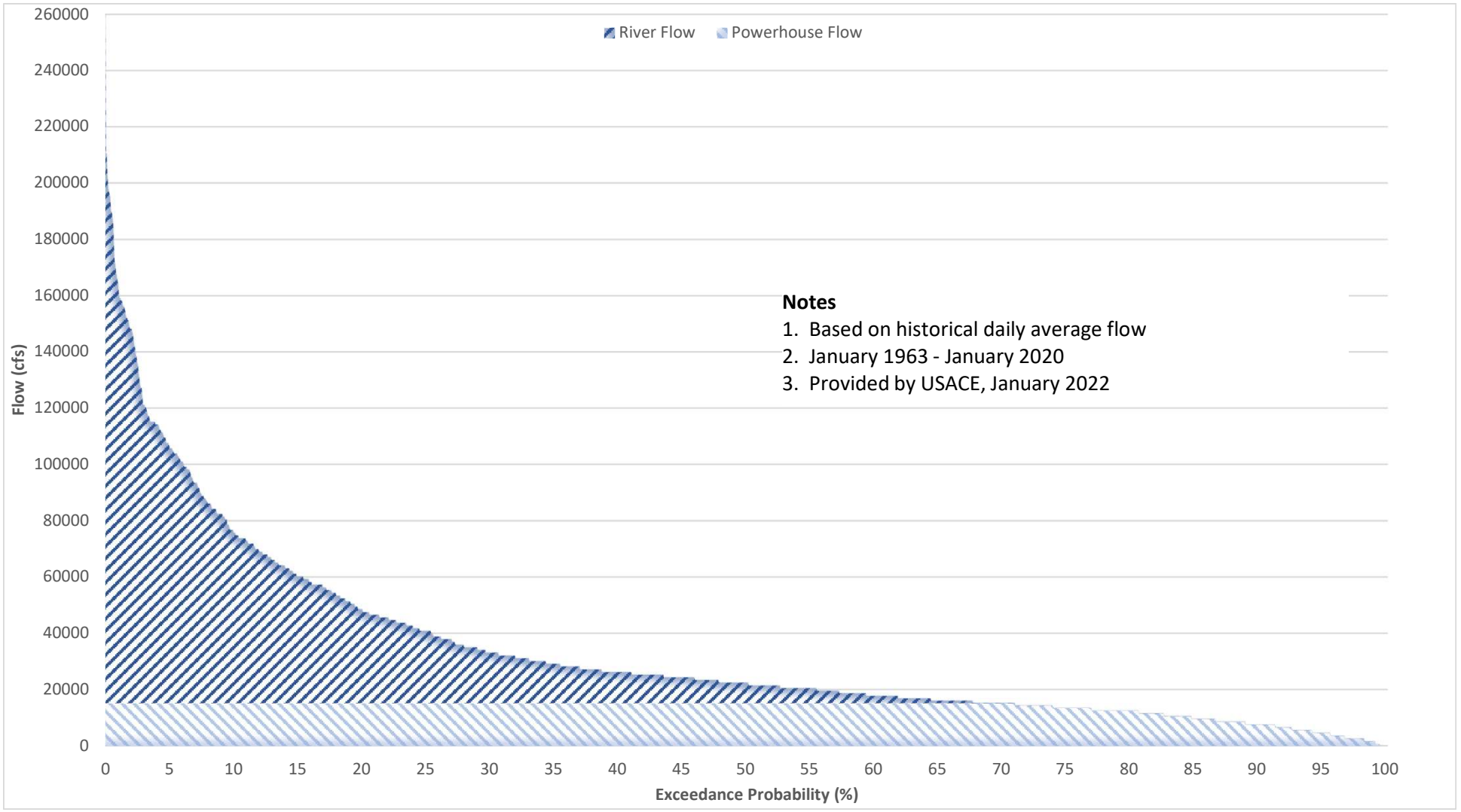
CURRENT HYDRO

Figure 8: June Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

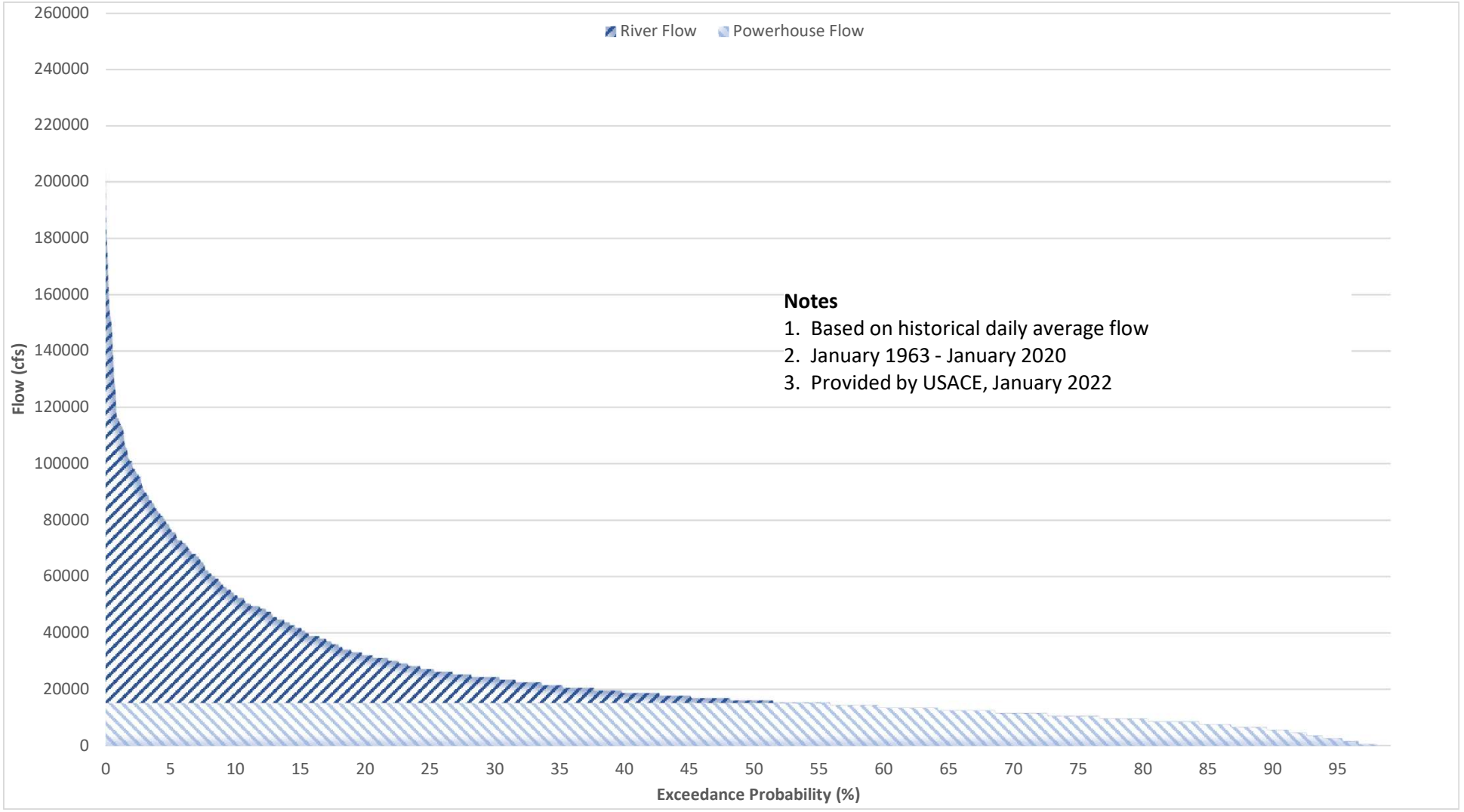
CURRENT HYDRO

Figure 9: July Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

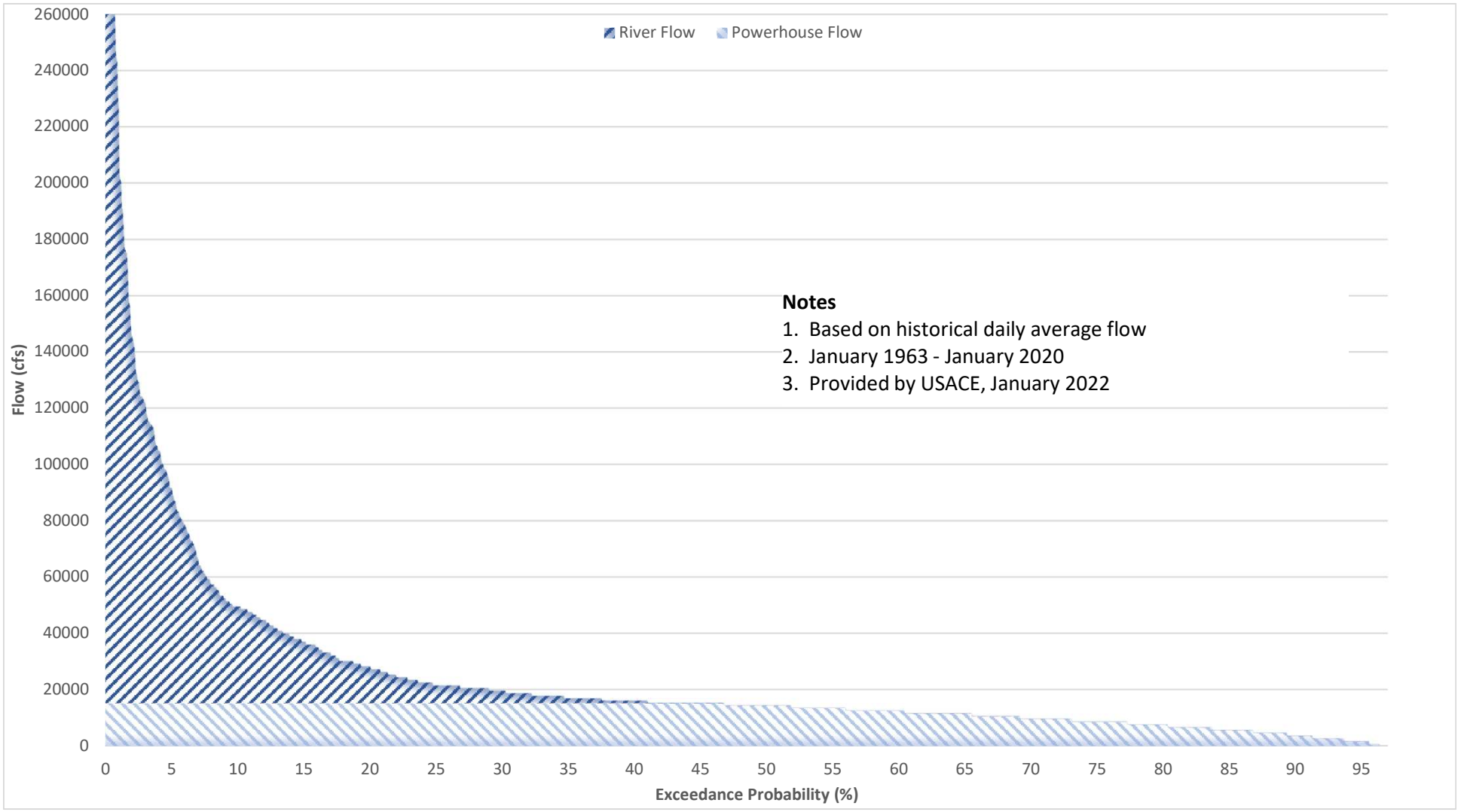
CURRENT HYDRO

Figure 10: August Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

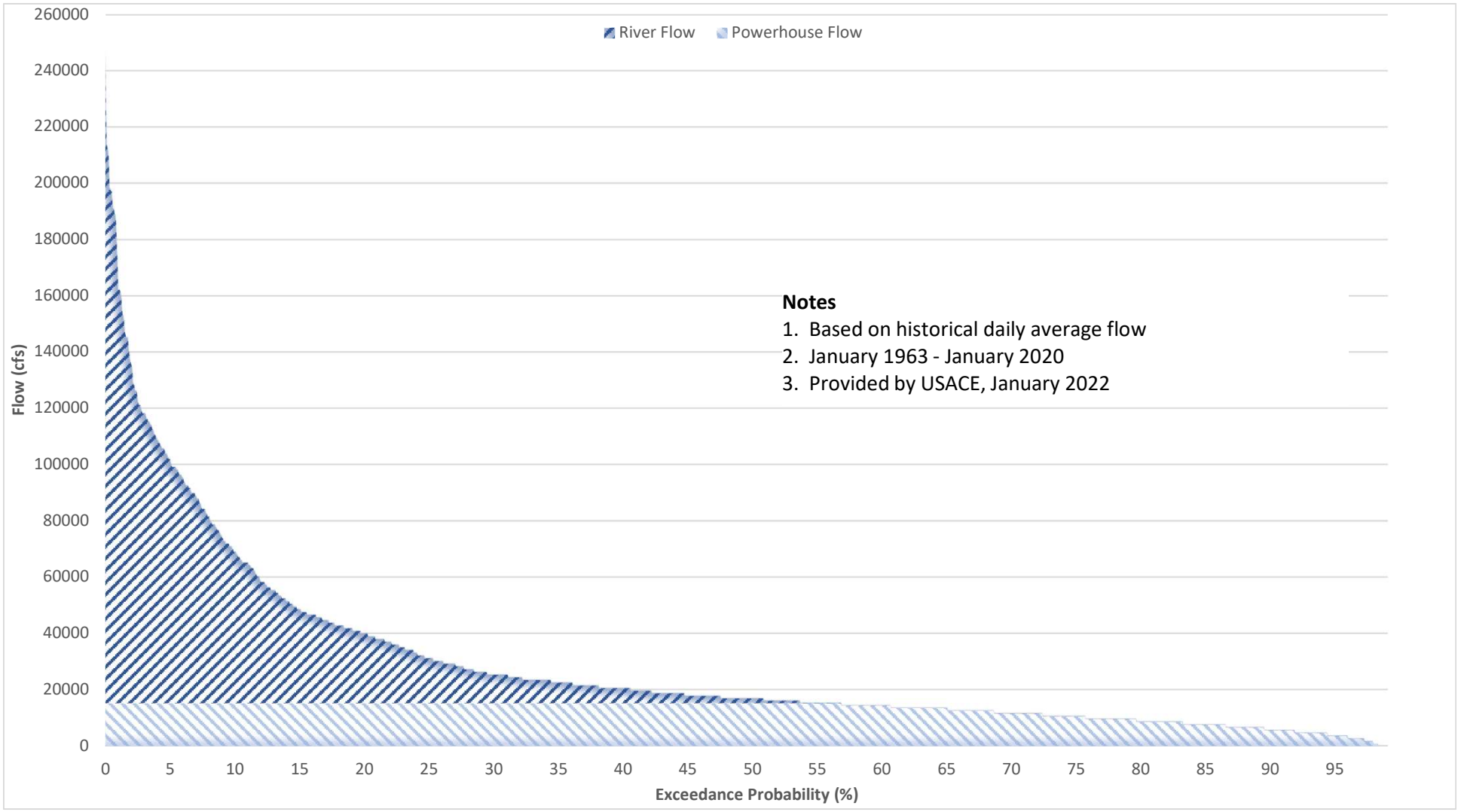
CURRENT HYDRO

Figure 11: September Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

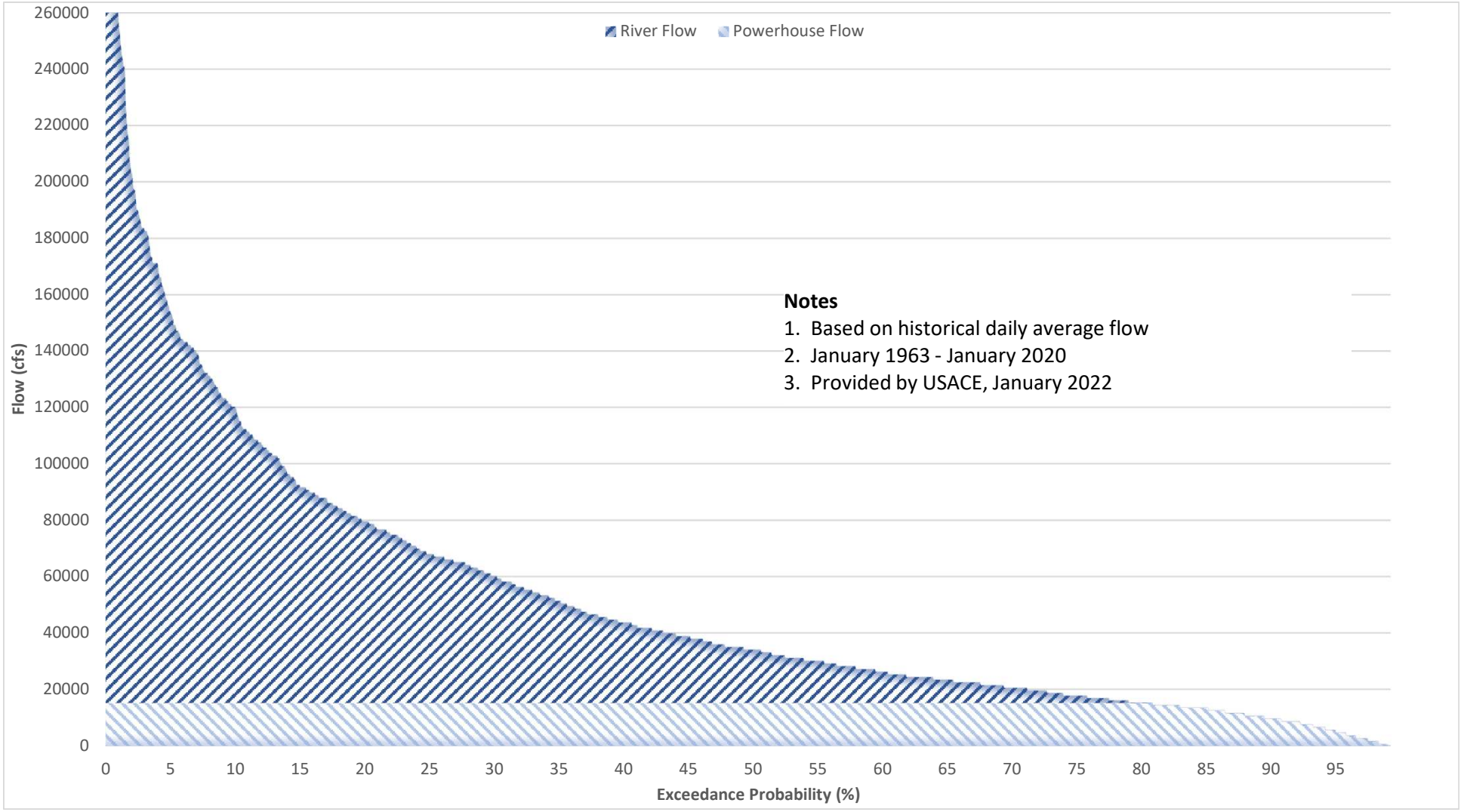
CURRENT HYDRO

Figure 12: October Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

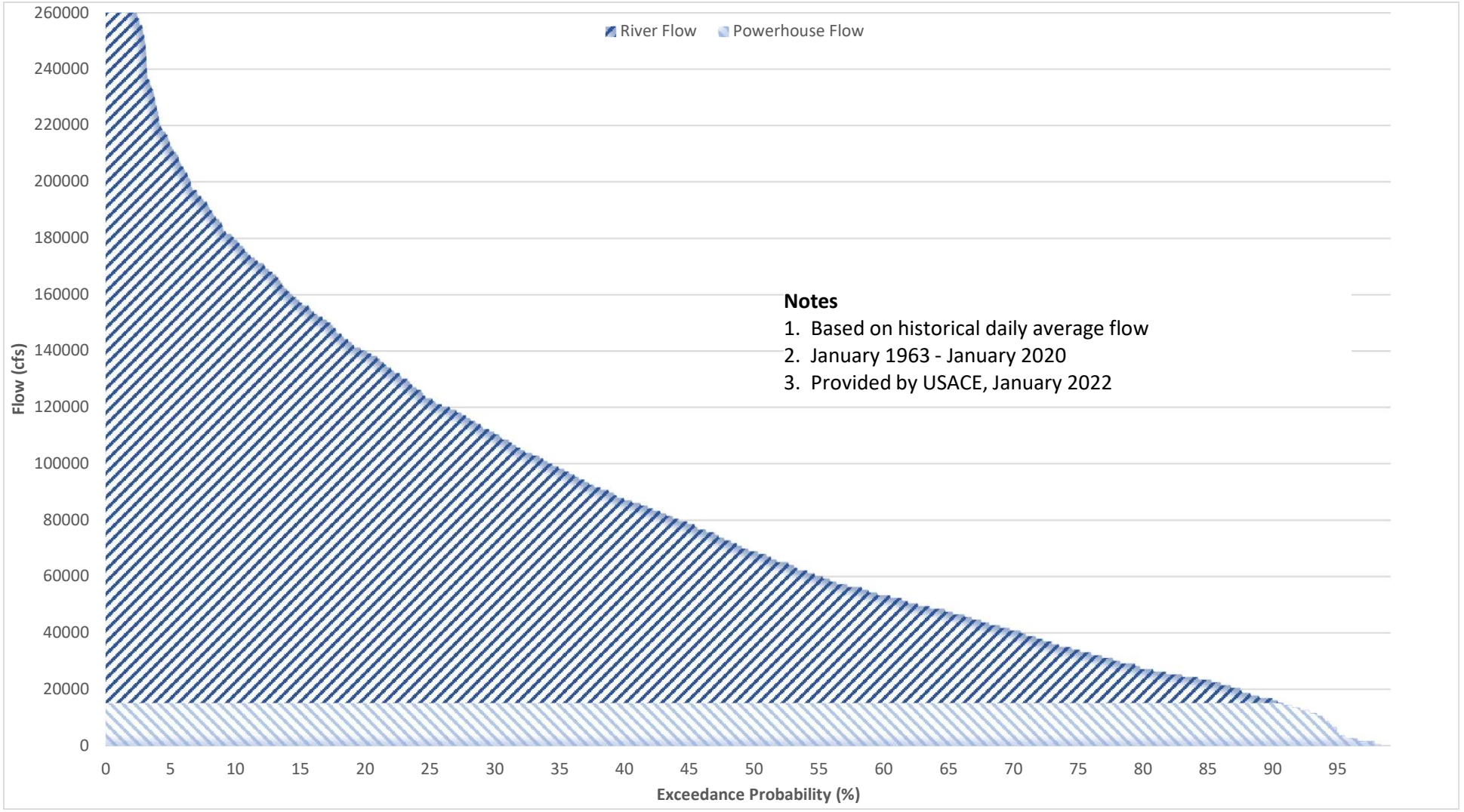
CURRENT HYDRO

Figure 13: November Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

Back To Index



Robert C Byrd Locks and Dam

CURRENT HYDRO

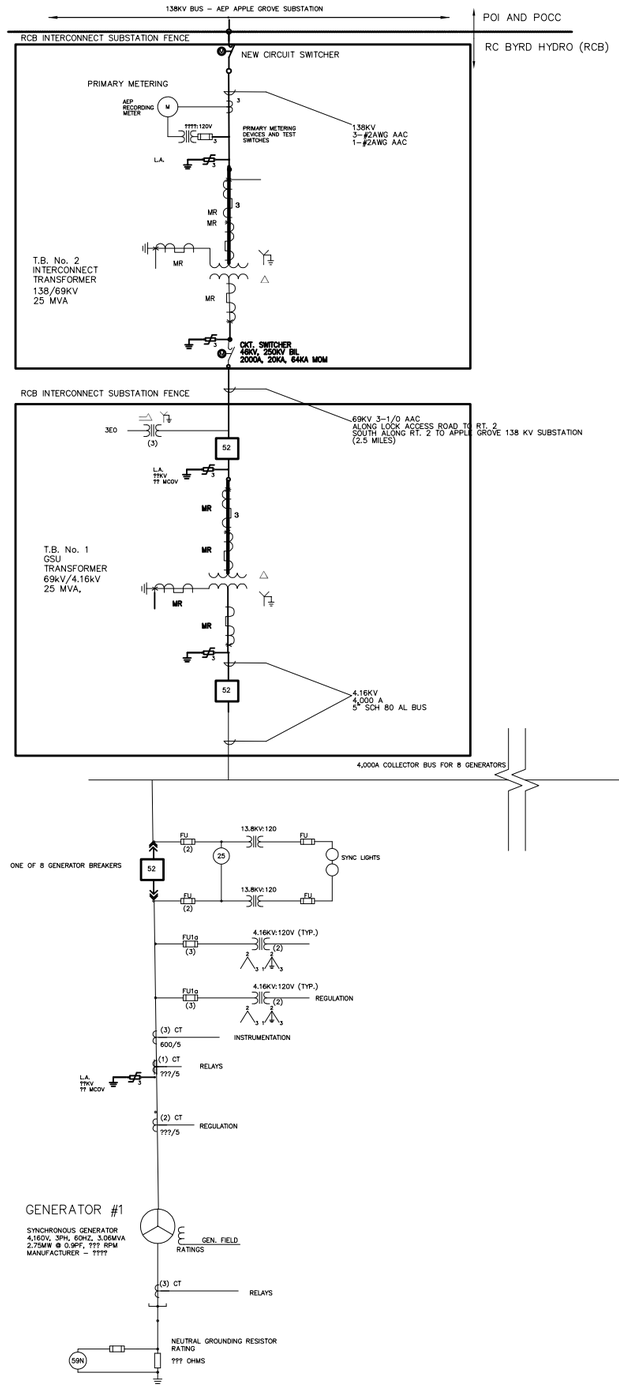
Figure 14: December Flow Duration Curve

Date: February 10, 2022

Prepared by: LMGonzalez

APPENDIX C

SINGLE LINE DIAGRAM



LEGEND

- FUSE
- RESISTOR
- GROUND
- POTHEAD OR EQUIVALENT
- CONNECTION
- CROSS OVER (NO CONNECTION)
- CAPACITOR
- (3) PT — FUSED POTENTIAL TRANSFORMER, RATIO, (QUANTITY) 500/100
- (3) CT 600/5 — CURRENT TRANSFORMER, RATIO, (QUANTITY)
- BUSHING TYPE CURRENT TRANSFORMER
- 42 — LOW VOLTAGE 600V CONTACTORS
- T.S. — TEST SWITCH
- SC — SURGE CAPACITOR
- #F / #P — MOLDE CASE BREAKER F=FRAME, RATED AMPS P=PLUG, RATED AMPS
- #F — INSULATE CASE BREAKER F=FRAME, RATED AMPS PROGRAMMABLE TRIP OUT DRAWOUT STABS
- FUSED CUT OUT
- STICK OPERATED DISCONNECTING SWITCH
- MANUALLY GANG OPERATED DISCONNECTING SWITCH
- FUSED SWITCH
- THERMAL OVERLOAD
- OPEN IN DEENERGIZED CONDITION
- CLOSED IN DEENERGIZED CONDITION

LEGEND (CON'T)

- DEVICE DISCONNECTING OR DRAWOUT CAPABILITY
- WYE
- GROUNDED NEUTRAL
- DELTA
- OPEN DELTA
- OPEN DELTA
- MOV ARRESTER
- LIGHTNING ARRESTER
- MOTORIZED GANG OPERATED DISCONNECTING SWITCH WITH ARCING HORNS
- MANUALLY GANG OPERATED DISCONNECTING SWITCH WITH ARCING HORNS
- 25 AUX — AUXILIARY RELAY
- 30 — PLC ALARM
- 49Q — GENERATOR THERMAL RELAY (RTD'S)
- 38Q — BEARING TEMPERATURE DETECTOR
- 27 59 — UNDER/OVER VOLTAGE RELAY WITH INSTANTANEOUS OVER VOLTAGE TRIP
- 81 27/U — OVER/UNDER FREQUENCY RELAY
- 51V — OVER CURRENT RELAY W/VOLTAGE RESTRAINT
- 32 — REVERSE POWER RELAY,
- 40 — LOSS OF EXCITATION RELAY, BASLER TYPE BE1-GPS100
- 25 — SYNCHRONIZER RELAY
- 46 — NEGATIVE SEQUENCE RELAY BASLER BE1-GPS100
- 65 — GOVERNOR
- 20 — ELECTRICALLY OPERATED VALVE
- 51N — NEUTRAL OVERCURRENT RELAY
- 42 — CONTACTOR
- 47 — OUT OF SEQUENCE
- 90 — REGULATOR
- 2 — TIMER

LEGEND (CON'T)

- 50 — INSTANTANEOUS OVERCURRENT RELAY
- 86 — G – GENERATOR, T – TRANSFORMER } HAND RESET LOCKOUT RELAY ELECTROSWITCH LOR
- 34 — KOYO PLC PROGRAM SEQUENCER
- 59N — ZERO SEQUENCE GROUND FAULT VIA RESISTOR GROUNDED NEUTRAL
- KW H — WATT HOUR METER, VIP DIGITAL, CTR 600/5 PTR 500/100 3 PHASE – 3 WIRE 2 ELEMENT PRIMARY READING W/027 PULSE INITIATOR
- VS AS — INSTRUMENT SWITCHES, GENERAL ELECTRIC TYPE SBM
- A — AMMETER
- VMB, VMC — AC VOLTMETER
- FMB, FMC — FREQUENCY METER SCALE 55–65HZ 120V
- VAR — VARMETER 2 ELEMENT 3 WIRE – 3 PHASE FOR USE WITH 500/100V PT'S AND 600/5 AMP CT'S
- W — WATT METER SCALE 0–1000KW 2 ELEMENT, 3 PHASE – 3 WIRE FOR USE WITH 500/100 PT'S AND 600/5A CT'S
- WH — WATT/WATTHOUR TRANSDUCER VIP DIGITAL METER
- VAR — VAR TRANSDUCER
- ATG — CURRENT TRANSDUCER
- VTG — VOLTAGE TRANSDUCER (GENERATOR)
- FTG — FREQUENCY TRANSDUCER (GENERATOR)
- A F — FIELD AMMETER
- V F — FIELD VOLTMETER
- V — VOLTMETER
- –1 –2 — SUBSCRIPT NUMBER or LETTER AFTER IEEE DEVICE NUMBER INDICATES TRANSFORMER PROTECTION

PRELIMINARY

CERTAIN ITEMS DEPICTED ARE REPRESENTATIVE OF DESIGN REQUIREMENTS. DEVICE SPECIFICATIONS MAY REQUIRE ADJUSTMENT TO REFLECT ACTUAL EQUIPMENT SELECTED.

Project:Robert C. Byrd Hydroelectric Project

Project Number : FERC No. 15094

River basin : Ohio River

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PO Box 224
Rhinebeck, NY 12572

Kiewit Infrastructure Co.
470 Chestnut Ridge Road
Woodcliff Lake, NJ 07677

Utility Engineering, PLLC
2728 East Lake Road
Skaneateles, NY 13152

ROBERT C. BYRD HYDRO

Interconnection

CONCEPT ONE–LINE

Author	CJC
Reviewer	CJC
Last saved	29 MARCH 2022

Revisions

E - X