NEW CUMBERLAND HYDROELECTRIC PROJECT

FERC PROJECT NO. 15045

DRAFT LICENSE APPLICATION

FOR INITIAL LICENSE – MAJOR PROJECT – EXISTING DAM

VOLUME I OF IV

CURRENT HYDRO

Current Hydro
Post Office Box 224
Rhinebeck, New York 12572

JANUARY 2023

Public

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

AACE	Association of Advancement of Cost Engineering
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
AEP	American Electrical Power
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
COD	Commercial Operation Date
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
HPU	High Pressure Units
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
IPRTF	Interconnection Process Task Force
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
MOU	Memorandum of Understanding
MSL	Mean Sea Level
MW	Megawatt
MWh	megawatt-hour
NAVD88	North American Vertical Datum of 1988
NERC	North American Reliability Council
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
ODNR	Ohio Department of Natural Resources
ORC	Ohio Revised Code

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
PSP	Proposed Study Plan
QC	Quality control
RM	River mile
ROR	Run-of-River (A hydroelectric Project that uses the flow of a stream with little or no reservoir capacity for storing water)
RTO	Regional Transmission Organization
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

EXECUTIVE SUMMARY

Project Overview

Current Hydro, LLC, a domestic limited liability corporation (LLC) (Current Hydro) is seeking to obtain a license from the Federal Energy Regulatory Commission (FERC or Commission) to develop the New Cumberland Hydroelectric Project (Project) at the New Cumberland Locks and Dam (New Cumberland L&D) on the Ohio River in Hancock County, West Virginia. The Applicant for this Project is Current Hydro Project 19, LLC, for which Current Hydro is authorized to act as an agent. Current Hydro Project 19, LLC, and Current Hydro, are collectively referenced in this Application as “Current Hydro” or “Applicant”.

The Applicant is proposing to construct, own, and operate a two-unit 19.99 megawatt (MW) capacity hydroelectric facility U.S. Army Corps of Engineers (USACE) New Cumberland L&D at Ohio River mile (RM) 54.4. The project will use the existing New Cumberland L&D structure which is owned and operated by the USACE (Pittsburg District). The Project will operate in a run-of-river (ROR) mode, with upstream and downstream river management under the control of the USACE and as directed to by the USACE and, as such, the project as proposed will not alter or adversely affect USACE L&D or flood operations. Current Hydro will develop a new renewable energy resource at this existing dam for the region that will have minimal environmental effects.

The Applicant is submitting this Draft License Application (DLA) as required by Title 18 CFR §5.18 and 18 CFR §16.8 of the U.S. Code of Federal Regulations (CFR) for the Project, FERC Project No. 15045. This DLA was prepared under the Commission’s Traditional Licensing Process (TLP) regulations at 18 CFR §4.38 and 18 CFR §4.51. Pursuant to 18 CFR §4.38(d), these documents are also being distributed to resources agencies, Indian tribes, other government offices, and consulted members of the public.

The Project proposed herein was previously licensed to the City of New Martinsville, West Virginia as Project No P-6901 by FERC Order issued September 27, 1989, and which license was surrendered by FERC Order issued October 13, 2009. Current Hydro intends to build and operate a Project that is substantially smaller with reduced impact than the previously licensed New Martinsville Project.

FERC Licensing Process

The Applicant applied for a Preliminary Permit on September 28, 2020, which FERC granted on January 8, 2021, giving the Applicant a 48-month Preliminary Permit for the site. The Preliminary Permit does not authorize Project construction but authorized Current Hydro to study the feasibility of a hydropower project at the New Cumberland L&D and undertake pre-filing portions of the FERC licensing process. The Commission's rules require the Applicant to consult with appropriate state and federal resource agencies and affected Indian tribes, conduct all reasonable studies requested by the agencies, and solicit comments on the Application before it is filed. These entities who participate in the FERC licensing proceeding, as well as non-governmental organizations (NGOs) and members of the public, are collectively referenced in the Application as "Stakeholders".

The FERC licensing process commences with a first stage of pre-filing consultation, through filing of the Pre-Application Document (PAD) and Notice of Intent (NOI). The Applicant submitted a PAD, NOI, and Traditional Licensing Process (TLP) request on August 11, 2021, to FERC and all Stakeholders. FERC granted permission to use the TLP on October 8, 2021. Under the TLP, Applicant is required to hold a Joint Meeting, within 60 days of TLP, to present the Applicant's proposal and potential environmental impact, to review the information provided, to receive input from participants, and to discuss the data to be obtained and studies to be conducted.

A Joint Meeting was held on March 24, 2022, in conjunction with Pike Island Hydroelectric Project, to discuss the PAD and Proposed Study Plan (PSP) with the Stakeholders. The PSP was distributed in advance of the meeting on March 8, 2022, and individuals and representatives were invited in accordance with 18 CFR §4.38 (g). Current Hydro refined the study methodologies in consultation with Stakeholders who provided comments on the PSP.

The second stage of the process includes performing the suite of studies which have been agreed to. The results of studies conducted to date have been compiled in the study reports that are included in Volume II of this Draft License Application. Upon conclusion of the 90-day period for comments on this DLA, Current Hydro will prepare and file a Final License Application (FLA) with the FERC (stage three of the licensing process), which will incorporate responses to Stakeholders comments received and final study reports. The FERC will then review the Application and undertake its environmental review in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. § 4321 et seq.) (NEPA) prior to rendering a licensing decision.

Additional State and Federal Regulatory Processes

There are additional permits or licenses that the Applicant will be required to obtain prior to proceeding with the development of this Project:

- US Army Corps of Engineers (USACE):
  - 404 Permit for work in navigable waters and wetlands (Section 404 of the Clean Water Act (33 USC § 1344)).
  - Section 408 approval to construct at a USACE facility (Section 14 of the River and Harbors Act (33 USC § 408)).

- State of West Virginia
  - Section 401 Water Quality Certification (Section 401 of the Clean Water Act).
  - Other state permits as required for construction in waterways and wetlands.

These additional regulatory processes will require Current Hydro to address many of the same resource effects that must be addressed during the FERC licensing process. To the extent feasible, it is Current Hydro's goal to help support the NEPA process of using an interdisciplinary approach to ensure the integrated use of the natural and social sciences in planning and decision-making which may have an impact on the environment.

Content of the Application

This filing consists of the following Exhibits contained in the three volumes as described below:

Volume 1:	Executive Summary
	Initial Statement
	Exhibit A: Description of Project
	Exhibit B: Project Operations and Resource Utilization
	Exhibit C: Construction History and Proposed Construction Schedule
	Exhibit D: Statement of Costs and Financing
Volume 2:	Exhibit E: Environmental Report
Volume 3:	Exhibit F: General Design Drawings and Preliminary Supporting Design Report
	Exhibit G: Project Map
	(Contains Critical Energy Infrastructure Information)
	(Per regulations filed separately with FERC and dam owner only)
Volume 4:	Cultural Resources Study (Privileged)
	(Per regulations filed separately with FERC, SHPO, and dam owner only)

Volume 3 contains specific information related to the Project that qualifies as Critical Energy Infrastructure Information (CEII) pursuant to 18 CFR §388.113. Therefore, Applicant requests that this portion of the DLA be maintained in a non-public file and withheld from public disclosure in accordance with applicable regulations. Procedures for obtaining access to CEII may be found at 18 CFR 388.113. Requests for access to CEII should be made to the Commission's CEII Coordinator.

Pursuant to 18 CFR §4.32(b)(6), notice of this filing is being published in newspapers of general circulation in the project region. Applicant will file a copy of said notices with the Commission upon publication.

This Application is for an Initial License "Major Project – Existing Dam." Accordingly, this Application has been prepared under applicability definitions at 18 CFR §4.38, and §4.50, and Application content requirements at 18 CFR §4.51.

INITIAL STATEMENT

BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

APPLICATION FOR AN INITIAL LICENSE

MAJOR PROJECT – EXISTING DAM

NEW CUMBERLAND LOCKS AND DAM HYDROELECTRIC PROJECT

FERC PROJECT NO. 15045

(1) Current Hydro LLC and Current Hydro Project 19, LLC, (collectively referred to as "Current Hydro" or "Applicant") respectfully applies to the Federal Energy Regulatory Commission ("FERC" or "Commission") for an initial license for the New Cumberland Locks and Dam Hydropower Project ("New Cumberland Project" or "Project"), FERC Project No. 15045, as described in the attached Exhibits. This Application for New License for Major Project – Existing Dam is filed pursuant to 18 CFR §4.50.

(2) The location of the Project is:

State:	West Virginia
County:	Hancock County, WV
Nearby towns:	New Cumberland, WV Stratton, OH
Stream or other body of water:	Ohio River

(3) The exact name and address of the Applicant(s) are:

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

The exact name and business address of each person authorized to act as agent for the Applicant in this application, are:

Mr. Joel Herm
Chief Executive Officer
Current Hydro
PO BOX 224
Rhinebeck, NY 12572
Phone: (917) 244-3607

Mr. Roy Powers
Chief Operating Officer
Current Hydro
PO BOX 224
Rhinebeck, NY 12572
(914) 805-2522

(4) Current Hydro Project 19 LLC is a domestic limited liability company registered in the State of New York. It is not claiming preference under Section 7(a) of the Federal Power Act.

(5)(i) The statutory or regulatory requirements that affect the Project as proposed, with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing and transmitting power and in any other business necessary to accomplish the purpose of the license under the Federal Power Act are:

- A water quality certificate pursuant to Section 401 of the Clean Water Act is required from the State of West Virginia. The West Virginia Department of Environmental Protection (WV DEP) Division of Water and Waste Management administers the Certification Program
- To the extent not preempted by the Federal Power Act, the Project is subject to the provisions of the West Virginia Water Pollution Control Act (WPCA).
- Permits are required from the USACE, including under Section 408 of the Rivers and Harbors Act of 1899 (Section 404 of P.L. 92-500, and Section 103 of P.L. 92-532) and Section 404 of the Clean Water Act.

(5)(ii) The steps that Applicant has taken or plans to take, to comply with each of the laws cited above, are:

- The Applicant will apply to WV DEP for a Section 401 Water Quality Certificate before, or within 60 days of, the date of FERC issuance of the notice of acceptance and ready for environmental analysis for the Project.

- The Applicant will apply to the USACE Pittsburgh District for approval under Section 408 of the Rivers and Harbors Act and for a Section 404 Permit under the Clean Water Act.
- The Applicant will apply for all other necessary permits during the processing of the license application or when the license is granted.
- The Applicant will comply with the requirements of the laws of the State of West Virginia with respect to the right to engage in the business of developing and transmitting power.

ADDITIONAL INFORMATION REQUIRED BY 18 CFR § 4.32(A)(2)

(1) *Identify every person, citizen, association of citizens, domestic corporation, municipality, or state that has or intends to obtain and will maintain any proprietary right necessary to construct, operate, or maintain the project:*

Current Hydro LLC and Current Hydro Project 19, LLC presently holds, or intends to obtain, all proprietary rights necessary to construct, operate and maintain the proposed Project. Additional parcel information provided in Volume III - Exhibit G this application.

(2) *Identify (providing names and mailing addresses):*

(i) *Every county in which any part of the project, and any Federal facilities that would be used by the project would be located:*

The New Cumberland Locks and Dam Hydroelectric Project is located entirely in Belmont County, OH and Jefferson County, OH. The New Cumberland Locks and Dam, the Federal facility used by the Project, is also located in Ohio County, WV:

Hancock County, West Virginia
Hancock County Clerk
P.O. Box 367
New Cumberland, WV 26047-0367
(304) 564-3311

Jefferson County Commissioners' Office
222 Grandview Ave,
Tiltonsville, OH 43963-1057
(740) 283-4111

The project will utilize the existing USACE locks and dam structures located on the Ohio River. The owner of the existing lock and dam is the United States of America. The project facilities are under the jurisdiction of the USACE. The address for the USACE local office is:

U.S. Army Corp of Engineers
Pittsburgh District
William S. Moorhead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222

(ii) *Every city, town, or similar local subdivision:*

(A) *In which any part of the project, and any Federal facilities that would be used by the project, would be located:*

Stratton, Ohio
136 2nd Avenue
Stratton, OH 43961
(740) 537-1534

New Cumberland, West Virginia
104 N Court Street
New Cumberland, WV 26047
(304) 564-3383

(B) *That has a population of 5,000 or more people and is located within 15 miles of the project dam:*

City of East Liverpool, Ohio
East Liverpool Chamber of Commerce
529 Market Street
East Liverpool, OH 43920
(330)385-0845

City of Steubenville, Ohio
Steubenville City Council
123 South 3rd Street
Steubenville, OH 43952
(740) 283-6000 Ext. 2100

City of Toronto, Ohio
Toronto Area Chamber
214 Main Street
Toronto, OH 43964
(740) 537-4355

City of Weirton, West Virginia
City of Weirton
200 Municipal Plaza
Weirton, WV 26062
(304) 797-8500

(iii) *Every irrigation district, drainage district, or similar special purpose political subdivision:*

(A) *In which any part of the project, and any Federal facilities that would be used by the project, would be located:*

This project, and any Federal facilities that would be used by this project, is not located in any irrigation districts, drainage districts, or similar special purpose political subdivisions.

(B) *That owns, operates, maintains, or uses any project facilities or any Federal facilities that would be used by the project:*

There are no irrigation districts, drainage districts, or similar special purpose political subdivisions that will own, operate, maintain, or use any Project facilities.

(iv) *Every other political subdivision in the general area of the project that there is reason to believe would likely be interested in, or affected by, the application:*

There are no other political subdivisions in the general area of the Project that there is reason to believe would likely be interested in, or affected by, the Application. The following parties, however, may be interested in the project:

Ohio Senators:
Senator Robert Portman
338 Russell Senate Office Building
Washington, DC 20510

Senator Sherrod Brown
713 Hart Senate Office Building
Washington, DC 20510

West Virginia Senators:
Senator Shelley Wellons Moore Capito
172 Russell Senate Office Building
Washington, DC 20510

Senator Joe Manchin III
303 Hart Senate Office Building
Washington, DC 20510

(v) *All Indian tribes that may be affected by the project:*

There are no Indian reservation lands within the Project Boundary or immediate Project vicinity. However, using publicly available information and data contained in the FERC elibrary, the

Applicant has identified the following Indian Tribes that may potentially have an interest in the project:

Bureau of Indian Affairs
1849 C Street N.W., MS 2624 MIB
Washington DC 20240

Absentee-Shawnee Tribe of Indians of Oklahoma
Devon Frazier
Tribal Historic Preservation Officer
2025 S. Gordon Cooper Drive
Shawnee OK 74801

Absentee-Shawnee Tribe of Indians of Oklahoma
John Raymond Johnson
Governor
2025 S. Gordon Cooper Drive
Shawnee OK 74801

Catawba Indian Nation
Wenonah Haire
Tribal Historic Preservation Officer
1536 Tom Steven Road
Rock Hill, SC 29730

Catawba Indian Nation
William Harris
Chief
996 Avenue of the Nations
Rock Hill, SC 29730

Catawba Indian Nation
Caitlin Rogers
Assistant Tribal Historic Preservation Officer
996 Avenue of the Nations
Rock Hill, SC 29730

Cherokee Nation
Elizabeth Toombs
Tribal Historic Preservation Officer
P.O. Box 948
Tahlequah, OK 74465

Cherokee Nation
Chuck Hoskin Jr
Principal Chief
P.O. Box 948
Tahlequah, OK 74465

Delaware Nation
Katelyn Luca
Interim Director
31064 State Highway 281 Building 100
Anadarko, OK 73005

Delaware Nation
Deborah Dotson
Tribal President
31064 State Highway 281 Building 100
Anadarko, OK 73005

Delaware Tribe of Indians
Susan Bachor
Tribal Historic Preservation Officer
126 University Circle, Stroud Hall, Rm. 437
East Stroudsburg, PA 18301

Delaware Tribe of Indians
Brad KillsCrow
Chief

Eastern Band of Cherokee Indians
Richard Sneed
Principal Chief

5100 Tuxedo Blvd
Bartlesville, OK 74006

Eastern Band of Cherokee Indians
Russell Townsend
Tribal Historic Preservations Officer
P.O. Box 455
Cherokee, NC 28719

Eastern Shawnee Tribe of Oklahoma
Glenna Wallace
Chief
P.O. Box 350
Seneca, MO 64865

Miami Tribe of Oklahoma
Douglas Lankford
Chief
P.O. Box 1326
Miami, OK 74355

Osage Nation
Geoffrey Standing Bear
Principal Chief
627 Grandview Avenue
Pawhuska, OK 74056

Seneca-Cayuga Nation
William Tarrant
Cultural President
23701 S 655 Road
Grove, OK 74344

Seneca Nation of Indians
Dr. Joe Stahlman
Tribal Historic Preservation Officer
12837 Route 438
Irving, NY 14081

P.O. Box 1927
Cherokee, NC 28719

Eastern Shawnee Tribe of Oklahoma
Paul Barton
Tribal Historic Preservations Officer
70500 East 128 Rd.
Wyandotte, OK 74370

Miami Tribe of Oklahoma
Diane Hunter
Tribal Historic Preservation Officer
P.O. Box 1326
Miami, OK 74355

Osage Nation
Dr. Andrea Hunter
Tribal Historic Preservation Officer
627 Grandview Avenue
Pawhuska, OK 74056

Seneca-Cayuga Nation
William L. Fisher
Chief
23701 S 655 Road
Grove, OK 74344

Seneca Nation of Indians
Matthew Pagels
President
12837 Route 438
Irving, NY 14081

Shawnee Tribe
Cassie Harper
Tribal Administrator
29 South Highway 69A
Miami, OK 74354

Shawnee Tribe
Tonya Tipton
Tribal Historic Preservation Officer
29 South Highway 69A
Miami, OK 74354

Saint Regis Mohawk Tribe
Darren Bonaparte
Tribal Preservation Officer
71 Margaret Terrance Memorial Way
Akwesasne, NY 13655

Saint Regis Mohawk Tribe
Beverly Kiohawiton Cook
Chief
71 Margaret Terrance Memorial Way
Akwesasne, NY 13655

Wyandotte Nation
Sherri Clemons
Tribal Historic Preservation Officer
64700 E. Hwy 60
Wyandotte, OK 74370

Wyandotte Nation
Billy Friend Chief
64700 E. Hwy 60
Wyandotte, OK 74370

VERIFICATION

This application is executed in the

Commonwealth of	New York
County of	Dutchess
By	Mr. Joel Herm Current Hydro, LLC PO Box 224 Rhinebeck, NY 12572-0224

The undersigned being duly sworn, deposes and says that the contents of this application are true to the best of his knowledge or belief. The undersigned Applicant has signed this application this 13th day of January 2023.

Joel Herm
Chief Executive Officer
Current Hydro, LLC
PO Box 224
Rhinebeck, NY 12572

Subscribed and sworn to me, a Notary Public of the State of New York, this 13th, day of January, 2023.

Notary Public

JACQUELINE N. MARTINS
Notary Public, State of New York
Reg. #01MA6318071
Qualified in Dutchess County
Commission Expires 1/20/23

EXHIBIT A: DESCRIPTION OF THE PROJECT

A.1 Project Location

The proposed New Cumberland Hydroelectric Project (New Cumberland Project or Project) will be located at the existing USACE New Cumberland Locks and Dam (New Cumberland L&D) on the Ohio River at river mile (RM) 54.4, approximately 30 river miles downstream of the confluence of the Ohio River and the Beaver River, 22.7 river miles downstream of the Montgomery L&D and 29.8 upstream of the Pike Island L&D (see Figure A.1-2). The counties of Jefferson County, Ohio, and Hancock, West Virginia, border the dam.

The proposed development of the site includes the construction of a new 19.99 MW hydropower facility at the eastern end (West Virginia side) of the dam.

A.1.1 Existing Non-Project Facilities

The New Cumberland L&D is located on the Ohio River, spanning the Ohio/West Virginia border near the Village of Stratton Ohio, and the City of New Cumberland, West Virginia. The L&D pool is in Jefferson County, Ohio, and Hancock County, West Virginia. This facility is owned and operated by the USACE, Pittsburgh District, and is therefore not proposed to be a formal project facility. The reservoir operation and river flow will remain under USACE control.

The gated dam contains two navigational locks constructed from reinforced concrete. Gated dams permit increased control over the water level in the navigation pool upriver of the dam. The facility's primary physical elements are summarized in the following table:

Table A.1-1 Existing Facility Physical Elements

New Cumberland Locks and Dam	
Year Placed Into Operation	1959
Location	Stratton, OH New Cumberland, WV
Water Body Ohio River	Ohio River
Latitude	40°31'41.57"N
Longitude	80°37'32.67"W
Structural Height	64 ft.
Gates	11
Gate Dimensions	110 ft. by 21.5 ft.

Main Lock Dimensions	110 ft. by 1,200 ft.
Auxiliary Lock Dimensions	110 ft. by 600 ft.
Overall Length	1,315 ft.
Storage Capacity	74,000 acre-ft.

There are no existing hydroelectric facilities at the proposed project site. The proposed development of the site involves the construction of a new 19.99 MW hydropower facility at the eastern end (West Virginia side) of the dam.

The dam, as described above, consists of two operational locks and a reinforced concrete dam with eleven (11) 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 water flowing under them, the upstream impoundment is maintained at a relatively constant level to provide an authorized minimum navigation depth of at least 9 feet throughout its length. However, the dam cannot be operated to control flood flows. An incidental benefit derived from the pool formed by the dam is a reliable source of municipal and industrial water.

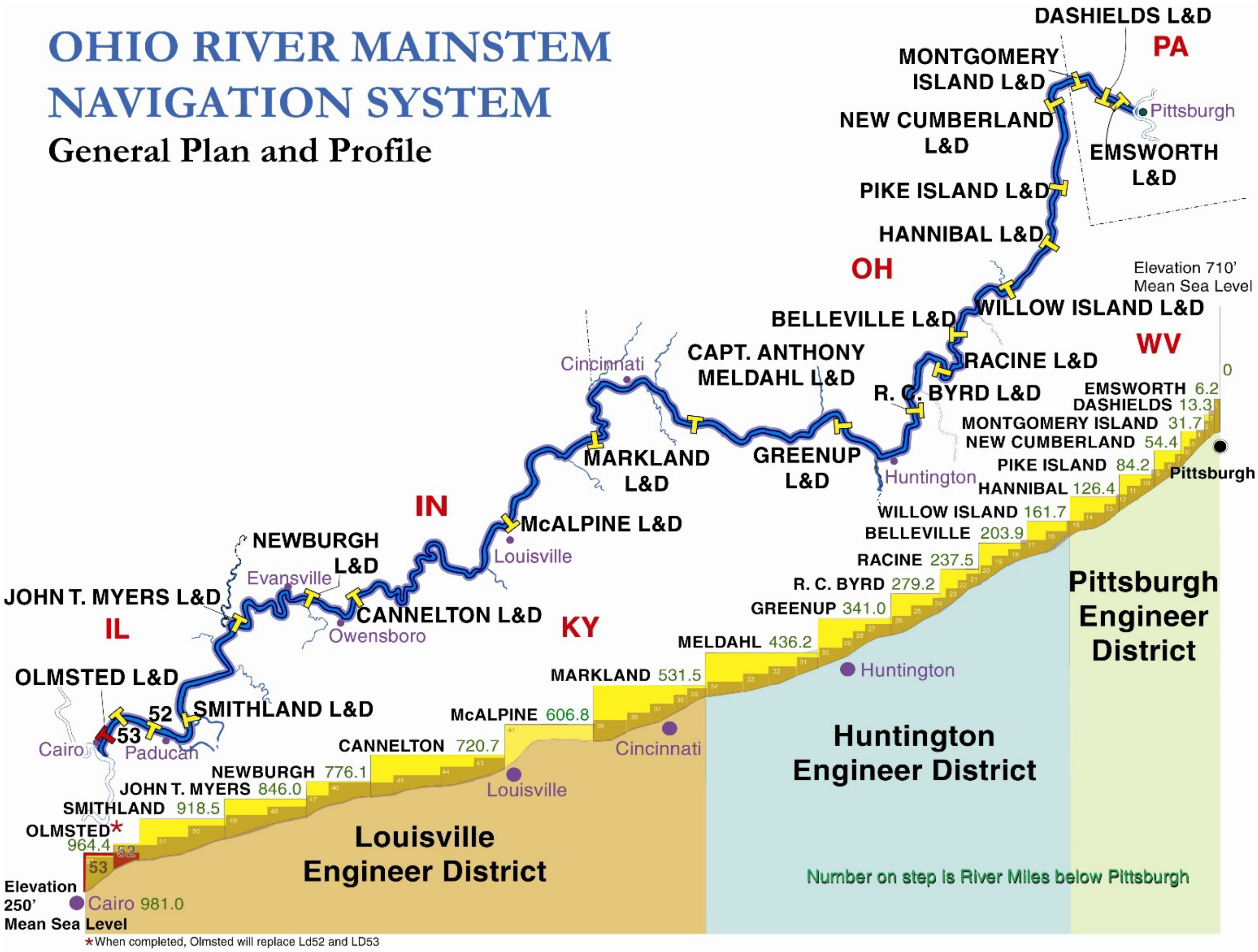
The site utilizes two operational locks. The primary lock is 1,200 ft. long and 110 ft. wide, and the auxiliary lock is 600 ft. long and 110 ft. wide. The walls and floors of the locks are of reinforced concrete construction. Located at each end of the lock chambers are two miter gates. The primary lock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

The New Cumberland L&D form one impoundment pool that spans river miles 31.7 through 54.4 on the Ohio River for an approximate total of 22.7 miles. This pool extends from the New Cumberland L&D in the Village of Yorkville, OH upstream to the Montgomery L&D in Beaver County, Pennsylvania. The normal pool elevation of the impoundment created by the dam is 663.9 ft. North American Vertical Datum of 1988 (NAVD88). The normal elevation of the lower pool, downstream of the dam, is 643.4 ft. NAVD88. All elevations in this Application are in NAVD88. The surface area of the upper pool impoundment at normal pool elevation is believed to be 3,840 acres.

The reservoir is normally referred to as a navigational pool. The dam and its associated pool are controlled and operated by the USACE, Pittsburgh District. The Project will be operated in a run-of-river (ROR) mode that will support the USACE requirement to maintain the navigation channel at all times. The reservoir's storage capacity is believed to be 74,000 acre-ft. Because the reservoir is impounded by the USACE facility, it is not considered part of the proposed hydroelectric project. The creation of a new reservoir is not proposed.

Figure A.1-1 New Cumberland Locks and Dam Photo

Figure A.1-2 Ohio River Navigation System



The Applicant proposes to operate the Project in a ROR mode without storage of flows. Flows available for generation will consist of water released at the New Cumberland L&D according to USACE's pool level and discharge management practices.

A.1.2 Proposed Project Location

The New Cumberland Project is proposed to be located at the existing New Cumberland L&D on the Ohio River in Hancock County, WV, and Jefferson County, OH at River Mile RM 54.4. The Applicant proposes to construct a new powerhouse and associated intake channel and tailrace channel adjacent existing USACE structures on the eastern (left facing downstream) side of the river. The project will include the construction of new intake channel, powerhouse offset of existing abutment wall, tailrace, substation and transmission line. A conceptual plan of proposed facilities is provided in Figure A.1-3.

Figure A.1-3 Proposed Project Facilities

A.2 Physical Composition

The proposed New Cumberland Project would consist of:

(1) a new 101-foot-wide, 186-foot-long reinforced concrete powerhouse to be located along the left bank looking downstream;

(2) a new 89-foot-wide by 350-foot-long intake section with trashracks;

(3) two identical Kaplan pit turbine-generators with a combined capacity of 19.99 MW;

(4) a new 89-foot-wide, 120-foot-long tailrace channel downstream of the powerhouse;

(5) a new 13.8 kV 180 ft underground utilidor crossing under the Norfolk Southern railway and transitioning to 350 ft overhead transmission, up the embankment to the powerhouse substation;

(6) a new approximately 90-foot-wide by 90-foot-long powerhouse substation;

(7) a new 1,050 foot-long, 34.5-kV, three phase overhead transmission line connecting the powerhouse substation to the existing 35KV transmission line, east of Hancock County Bus Garage interconnection point in West Virginia; and

(8) appurtenant facilities.

The height of the proposed powerhouse and intake structure would be 679.0 feet NAVD88. The estimated average annual energy production would be 132.1 gigawatt-hours.

The physical composition and dimensions of existing and proposed facilities are summarized in Table A.2-1.

Table A.2-1 Characteristics of Facility

GENERAL	
Project Location	Hancock County, OH
Nearby Towns	Yorkville, OH
Water Bodies	Ohio River
Latitude/Longitude	40° 9' 3.59'' N / 80° 42' 20.5'' W
Project Drainage Area	23,873 square miles
USGS Flow Gage	Sardis, OH (03114306) Operated by USACE
USGS Gage Drainage Area	26,188 square miles
(2013-2022) Minimum Flow at site	1,815 Cubic Feet Second (cfs)
(1913-2022) Maximum Flow at site	213,194 cfs
(1913-2022) Mean Flow at site	41,859 cfs

USACE EXISTING IMPOUNDMENT	ELEVATION (FT NAVD88)	SURFACE AREA (ACRES)	VOLUME (ACRE-FEET)
Normal Impoundment Elevation (NAVD88)	663.87 ft.	3,840 acres	74,000 ac-ft
Normal Tailwater Level (NAVD88)	643.37 ft.	n/a	n/a

STRUCTURES	**EXISTING**	**PROPOSED**
USACE EXISTING SPILLWAY		
Construction	Reinforced concrete with radial lift tainter gates	No changes
Tainter Gate Length	1,315 ft	No changes
Top of Pier elevation	719 ft	No changes
Tainter Gate Sill elevation	644 ft	No changes
Number of Locks	2	No changes
Number of Spillway Gates	11	No Changes
Gate Dimensions	110 ft wide	No changes
Gate Type	Tainter (radial) 11 – (6 non-submergible and 5 submergible)	No changes
Lock Sill Elevation	628 ft	No changes
Spillway Capacity	209,000	No changes
NEW INTAKE CHANNEL		
Length	n/a	350 ft
Width	n/a	90 ft
Height	n/a	70 ft
NEW POWERHOUSE		
Construction	n/a	Reinforced concrete
Length	n/a	186 ft
Width	n/a	101 ft
Height	n/a	75 ft
Intake Height	n/a	54 ft
Intake Width	n/a	87 ft
Intake Area	n/a	4,600 sq ft
Head Gate	n/a	Vertical wheeled gate
Trash Rack Spacing	n/a	5 in
Stoplogs	n/a	1 Set
Trash Rake	n/a	1

Top of Powerhouse (NAVD88)	n/a	679.0
Bottom of Powerhouse (NAVD88)	n/a	604.5
NEW TAILRACE CHANNEL		
Length	n/a	120 ft
Width	n/a	90 ft
Height	n/a	65
NEW TURBINES		
Unit Type	n/a	Horizontal Pit Kaplan
Number of Units	n/a	2
Runner Diameter	n/a	17 ft (5,200 mm)
Rated Speed	n/a	87 rpm
Rated Flow (One Unit)	n/a	7,098 cfs
Rated kW (Two Units)	n/a	19,999 kW
Rated Head	n/a	19.2 ft
Min. Rated Head	n/a	9.9 ft
Min. Hydraulic Capacity (One Unit)	n/a	1,950 cfs approx. (32% gate)
Max. Hydraulic Capacity (One Unit)	n/a	7,098 cfs
Project Min. Hydraulic Capacity	n/a	1,950 cfs (one unit 32% gate)
Project Max. Hydraulic Capacity	n/a	14,196 cfs
NEW GENERATORS		
Number of Units	n/a	2
Type	n/a	Synchronous, Direct Coupled
Phase	n/a	3
Cycles	n/a	60 hz
Voltage	n/a	13.8 kV
Nameplate Capacity	n/a	19.99 MW
Total Installed Capacity	n/a	19.99 MW
Average Annual Generation	n/a	132,440 MWhrs
Monthly Average Generation	n/a	11,055 MWhrs
Annual Plant Factor	n/a	72.3%
Power Factor	n/a	1.0
NEW TRANSMISSION FACILITIES		
Medium Voltage Buried Cable	n/a	180 ft
Powerhouse Substation Footprint	n/a	90 ft x 90 ft

Transformers	n/a	34.5/13.8KV 25MVA
Overhead Transmission Voltage	n/a	34.5 kV
Overhead Transmission Length	n/a	1,400 ft
Interconnection Point	n/a	34.5 kV - Existing Utility
NEW CONSTRUCTION WORKSPACE		
Access Road	n/a	Connect proposed new 1,300 ft long x 20 ft wide access road to existing Crescent Brick Drive. Improve existing Crescent Brick Drive access road to 30 ft wide.
Laydown Area	n/a	5 acres of laydown area on 2 existing improved lots on Brickyard property.
Operations Offices	n/a	Operations trailers contained within laydown area 5 acre footprint or utilize existing 50 ft x 30 ft structure on Brickyard property east of train tracks.
Temporary Works	n/a	Sheetpile cofferdams above and below left abutment
NEW OPERATION WORKSPACE		
Operations Building	n/a	Existing operations building measuring approximately 50 ft x 30 ft east of train tracks.
Powerhouse / Intake / Tailrace	n/a	See dimensions above
Transmission facilities	n/a	See dimensions above

A.3 Proposed Powerhouse

The proposed hydroelectric powerhouse will be a reinforced concrete structure, approximately 101 ft. by 186 ft. in plan, and will be constructed on the West Virginia side, slightly downstream from the dam, on the left bank facing downstream. The top of the powerhouse structure will be approximately at elevation 679.0 ft (NAVD88). The bottom of the powerhouse will be founded on rock at an approximate elevation of 604.5 ft (NAVD88). The powerhouse will contain two identical Kaplan pit turbine-generators with a combined hydraulic capacity of 14,196 cfs and a combined net power capacity of 19,999 kW. The top of the powerhouse is designed to be lower than the adjacent dam structure, reducing the visibility of this new structure. The powerhouse is designed to be overtopped at approximately the 100-year flood events with appropriate post tension anchoring and watertight hatches.

Excavation for the turbines and draft tubes will extend into bedrock. The powerhouse and tailrace will be founded on rock at an elevation of about 604.5 feet, based on logs of core holes drilled by the USACE.

A steel sheet pile wall extending from the powerhouse to the railway embankment will preclude a seepage path around the new powerhouse on the left embankment. This will be similar to the existing USACE sheet pile wall. The powerhouse will be stable, safe from overturning, sliding, and within the allowable compressive stresses and shear resistances of the foundation for the usual, unusual, and extreme loading cases as defined in the FERC and USACE guidelines.

Four intake gates, two for each turbine and one set of steel draftube stoplogs are designed for the full unbalanced water load to isolate the units from the river. Stoplogs shall be provided in sections suitable for handling with a mobile crane and shall be equipped with rubber seals. The proposed powerhouse trash racks will have a clear spacing of 5 inches to prevent large debris from entering the turbine system.

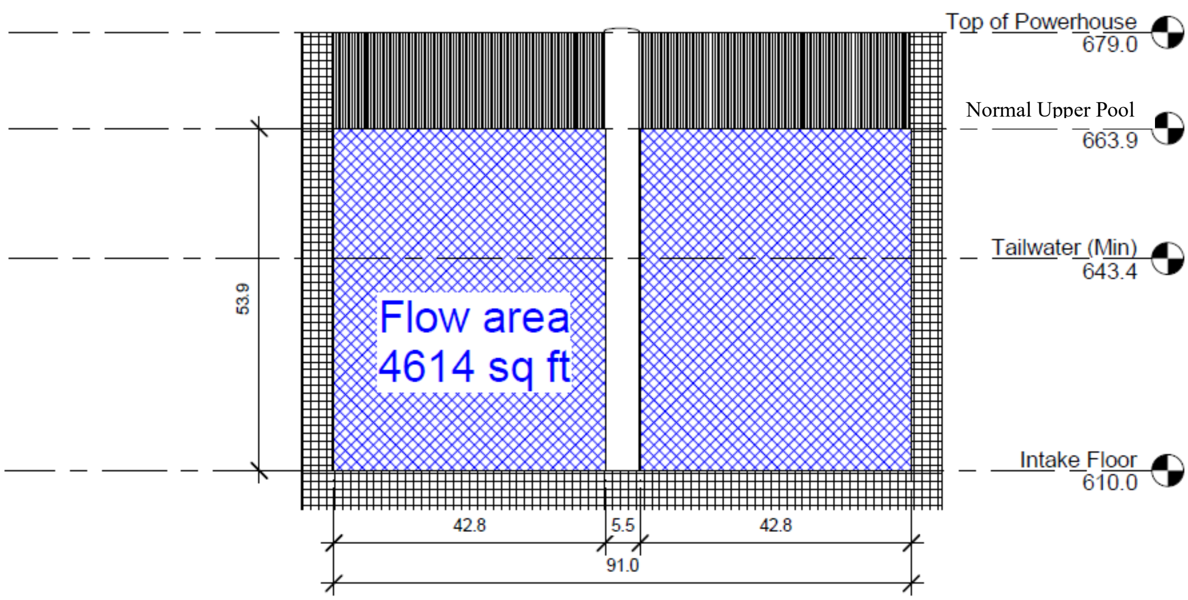
The powerhouse will also contain controls, ancillary electrical and mechanical systems, and erection space. The powerhouse will house a mechanical & electrical equipment gallery and the 13.8 kV isolated phase bus (in conduits).

The Applicant's approach will optimally use the limited available space between the dam and Norfolk Southern railway. Construction of the powerhouse will take place in the dry after installation of temporary and permanent cofferdams, support of excavation walls and dewatering of the site. Provisions will be designed and installed to safely keep the work site dewatered and to ensure that discharge of water will not increase turbidity in the Ohio River.

A.4 Proposed Intake and Tailrace Channels

The proposed intake channel will be located upstream of the powerhouse and will convey flow from the upper pool into the powerhouse. The new intake channel will measure approximately 90-ft. wide by 350-ft. long by 70-ft deep with concrete walls and an armored channel of concrete and stone riprap. The intake channel immediately upstream of the powerhouse will be excavated in soil and rock with an engineered concrete cap that will slope up to meet the existing river channel depth above the dam. Stone riprap will be placed along the banks and in areas of higher velocity to prevent scouring and erosion. The project will have two unit intakes in the powerhouse of a combined width of approximately 87 ft. and 54 ft. in height. The total intake area is approximately 4,600 sq ft and approximately equivalent flow of one existing USACE gate bay in the fully opened position.

Figure A.4-1 Proposed Intake



A.5 Cofferdams

Temporary upstream and downstream cofferdams will be required during construction of the Project. The cofferdams will be circular steel sheet piles filled with granular materials and connected to one another to form a watertight seal. Permanent concrete filled, steel cofferdam cells will be connected to the east (left) riverbank and to existing eastern concrete abutment wall.

Cofferdam designs will be developed by the engineer and/or contractor and will be coordinated with review by the USACE and the FERC. After they are no longer needed, the cofferdam cells and fill materials used in the cofferdams will be removed, except the cells that are integrated into the permanent structure and on the left riverbank.

Construction activities will not impede the USACE discharge capabilities or increase the flood level in regard to the surrounding areas. The top of the cofferdam will be determined based on statistical risk evaluation and no higher than the 100-year flood elevation. The probability of flooding will be evaluated based on 24 months of construction and weighed against costs of project delays and cleanup.

A.6 Generating Equipment

Two horizontal pit Kaplan turbine generators will be installed in the powerhouse. Each turbine will be direct-connected to identical 3-phase, 60-cycle synchronous, 13.8 kV generators. The combined installed capacity of the generating equipment will be 19,999 kW and the number, type, and ratings of the proposed generating equipment are indicated in Table A.2-1 above.

Each turbine will have adjustable pitch propeller blades and adjustable wicket gates. Gates will be able to close against full flow. This will assure Project safety and provide for safe emergency shutdown. The upstream will permit dewatering of the units for maintenance service. The units will be sealed from tailwater when the draft tube gates are lowered.

A.7 Transmission Facilities

The project will have a new generator step up (GSU) substation located near the powerhouse with a footprint of about 90-feet by 90-feet. The 13.8 kV 22.2 MVA generator output will exit the powerhouse underground below the train track subgrade and transition to above ground at the foot of the embankment and transition to above ground up the hillslope into the powerhouse substation. The powerhouse substation will step-up the 13.8 to 35.5 kV via a 34.5/13.8 kV 25 MVA 3-phase single pad-mounted transformer. The substation will contain low-side disconnects, high-side breaker, utility metering and other protective equipment as dictated by the interconnecting utility and a 12-foot by 24-foot control building. A new overhead 34.5 kV transmission line will exit the GSU station and follow an existing distribution line 1,050 feet (owned by the local utility) west across State Route 2 and along Rockyside Road to the new interconnection point substation behind the Hancock County bus garage. The transmission line will transition to underground in (3)1/C 500KCMIL CU in conduit to connect with the 35KV distribution line.

The number, length, voltage, and interconnections of transmission facilities to be included as part of the project are tabulated in Table A.1-2 above, and a single line diagram for the project is shown in Volume III - Exhibit F-10 Powerhouse One Line Diagram.

A.8 Appurtenant Equipment

The powerhouse will contain all new appurtenant equipment and ancillary systems including medium-voltage switchgear, controls, excitation, governors, HPUs for gates and turbines, batteries, and station service electrical systems.

Clean oil, dirty oil, and oil centrifuging cleaning apparatus will be housed in the powerhouse, as well as spare parts, tools, necessary shops and miscellaneous equipment. Piping systems will be embedded or exposed, as needed for the plant.

Separate sumps will be provided for station drainage and for dewatering the unit passages. Water will drain to the sumps by gravity. At least two pumps will be provided for each sump, with water level monitors and controls. Station sump pump discharge lines will be routed to oil separators. All potential sources of oil contaminated water, including drainage from water deluge and water spray fire protection, will be routed to the oil separators for separation, so as to prevent oil from being discharged to either the intake or the tailrace channels. Sewage and domestic wastewater will be pumped to a septic system and waste field, in accordance with State of Ohio requirements.

Auxiliary electrical equipment will include the equipment ancillary to the generators, such as the voltage regulators and solid state exciters, switchgear enclosures, control sensors, relays the isolated phase bus and cables to the main step up transformers, the main step up transformers and SF6 circuit breakers, the high voltage switchgear, station service transformers/motors and motor-control centers for station auxiliaries, lighting inside and outside of the powerhouse, grounding of the powerhouse and the equipment inside and outside the plant, control and annunciation equipment, communication equipment, a network for the 480-volt station service, and necessary protection and auxiliaries. A station battery system will supply direct current for control and protection systems. In the event the plant must be isolated from an outside electric power supply, station emergency electrical service will be supplied from a battery bank and power inverter, which will be part of the Project.

A.9 Lands of the United States

Drawings depicting the Project boundary are included in Exhibit G. The Project powerhouse, appurtenant facilities, and applicable portions of the transmission line will occupy approximately 2.0 acres of lands of the United States, which are controlled by the USACE, less than 1 acre of

Hancock County property, and 6 acres of private land are included within the FERC Project boundary as necessary for Construction and Operation. The Applicant expects that federally-owned lands proposed to be within the FERC Project boundary will be leased by the Applicant from the United States. The right-of-way for the transmission line are included in the FERC Project boundary and any needed easements will be obtained for any portions not located on lands of the United States.

EXHIBIT B: PROJECT OPERATIONS AND RESOURCES UTILZATION

B.1 Existing New Cumberland Impoundment Characteristics

The characteristics of the existing impoundment (also referred to as the New Cumberland Pool) and the existing dam are presented in Table A.1-2 above. The Project proposes to use the water power potential of the existing dam and impoundment. No changes in the operation of the impoundment are proposed. The Project will be operated in accordance with the USACE requirements and the FERC license as a ROR installation and will not require the use of pool storage.

The upstream navigation pool is maintained by the USACE at normal elevation 663.9 feet (NAVD88). At a recurrence interval of about 100 years, the New Cumberland pool level will rise to about elevation 679.5 feet (NAVD88) according to Flood Insurance studies and USACE Highwater Mark studies. The downstream navigation pool is controlled by Pike Island L&D, about 29.8 river miles from the New Cumberland L&D. The USACE maintains the Pike Island pool level at normal elevation 643.3 feet (NAVD88), which is the elevation of the tailwater downstream of the New Cumberland L&D. The tailwater level increases with flow but the New Cumberland pool level remains relatively constant until flow of approximately 210,000 cfs (See Figure B.2-1). At very high total river flows, the pool level rises and the difference in water surface levels upstream and downstream from the New Cumberland L&D will be a few feet or less depending on the magnitude of the flood. The river becomes one sloping stream rather than a series of discrete pools.

B.2 USACE Operation of New Cumberland L&D

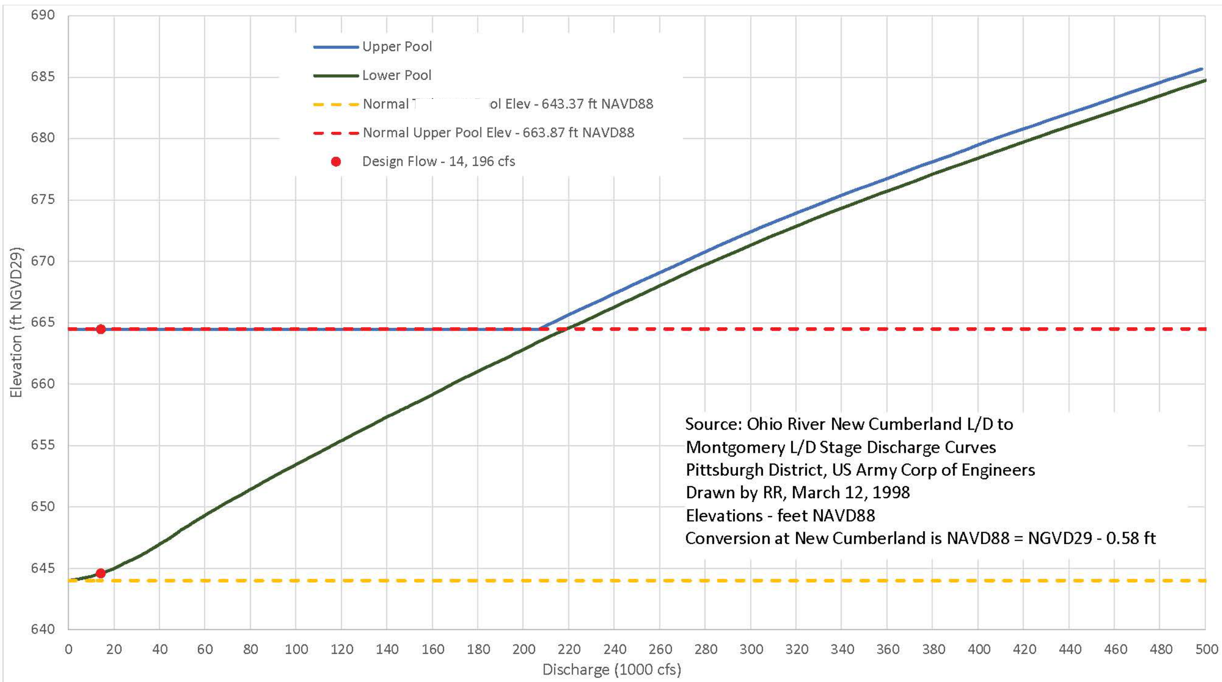
The USACE Pittsburgh District operates 23 locks & dams on the Allegheny, Monongahela & Ohio rivers. The USACE's operation of New Cumberland L&D is part of, and integrated with, its overall operation of the Ohio River system of Locks and Dams. The dams are currently operated by USACE to maintain the minimum depth of the navigation channel at all times. The New Cumberland L&D has two locks and a gated dam, one of two major types of dams in service in the Pittsburgh District. Gated dams are constructed to permit increased control over the water level in the navigation pool upriver of the dam. New Cumberland dam consist of eleven (11) Tainter gates which are controlled by operating mechanisms that move chains to raise and lower the gates around a pivot anchor point in the concrete piers. As the gates are raised or lowered to control the amount of water flowing under them, the upstream pool is maintained at a relatively constant level for an authorized navigation channel depth of at least 9 feet throughout its length. The dam, however, is not designed as a flood control dam and was not designed with any storage ability and therefore cannot be operated to mitigate flood events. An incidental benefit derived from the pool formed by the dam is the availability of a source of municipal and industrial water.

The primary purpose of the New Cumberland L&D is to maintain water levels for navigation on the main channel. At each moveable structure on the dam, gates are positioned to regulate discharge and maintain the desired pool elevation and corresponding navigation channel depth. At each USACE lock and dam site, gate operation sequence and height selection are operated to reduce detrimental scour and shoaling as well as to manage other concerns such as navigation impacts and debris passage. The following table and figure provide pool characteristics, headwater and tailwater rating curves.

Table B.2-1 New Cumberland Impoundment Area-Volume Data

Average Elevation-Area-Volume Data			
	Elevation (ft NVD88)	Surface Area (acres)	Volume (acre-feet)
Normal Pool Elevation	663.9	3,840	74,000

Figure B.2-1 New Cumberland Impoundment Stage-Discharge Curve



New Cumberland Locks and Dam

CURRENT HYDRO

Date: May 31, 2021
Prepared by: LMGonzalez

B.3 Proposed Hydroelectric Project Operation

The primary objective of the Current Hydro's Project's operation is to generate electricity for delivery to the electric power grid. Current Hydro's hydroelectric turbine output will be dispatched (operated) in response to the flow discharge requirements of USACE's daily operation decisions. The actual flow through the turbine will be regulated to meet the discharge volume as requested by USACE to maintain desired pool elevation.

This operation is a "run-of-river" (ROR) regime where the hydroelectric project uses flows equal to reservoir inflow (up to plant capacity) and does not manipulate or alter outflow. However, the Project will be operated in run-of-release mode with no storage of flows, whereby outflow from the Project will equal inflow to the Project made available for generation via normal water flow of the Ohio River, according to USACE's existing water level and discharge management practices. In this case, the proposed project will only use flows made available for release according to daily operation guidelines and directives issued by the USACE as part of their project river management. The proposed hydro project will not impact or change water elevations beyond those maintained by the USACE. The USACE will continue to regulate water elevation and discharge according to their current operation guidelines. However, Current Hydro's hydroelectric turbines and gates will provide an additional means beyond the existing spillway gates for regulating pool level and managing discharge volume.

The New Cumberland reservoir level and daily discharge releases are actively managed solely by the USACE. The proposed hydro project will not interfere with the management of the water resource, nor will it limit the USACE's ability to fulfill its purposes. The proposed project will perform hydro turbine operation and regulation based on USACE daily pool level and discharge instructions that will be defined in an executed USACE Operating Agreement. The USACE Pittsburgh District maintains the New Cumberland Pool (reservoir) elevation when discharging any flow through the dam. The sequence of spillway gate openings is ordinarily in accordance with the Pittsburgh District's Gate Operating Schedules. There are no storage and release activities or procedures proposed as part of the proposed hydro project operation. The Project will coordinate with the USACE in its management of the pool elevation and lock operations in accordance with the USACE Operating Agreement.

B.3.1 Proposed Operation

The proposed operation of the proposed Project considers four (4) river flow range regimes:

1) Total river flows less than 2,450 cfs

2) Total river flows between 2,450 cfs and 14,696 cfs

3) Total river flows between 14,696 cfs and 120,000 cfs

4) Total river flows above 120,000 cfs

For periods when total river flows are less than 2,450 cfs, the project will not operate as the minimum flow for one turbine is 1,950 cfs, plus 500 cfs is reserved for lockages and leakage. The USACE will pass the flow through the existing gates as per its established gate operations schedule. There will not be any change in operation as currently observed for this river flow range. The frequency of such flows is anticipated to occur very rarely, during extreme drought periods (see flow duration curves Figure B.6-1 through B.6-13)

For periods when total river flows are between 2,450 cfs and 14,696 cfs, all available river flows, except those allocated for lockages and leakage (500 cfs), will be passed through the project turbines but may be passed through both the Project and the spillway in a coordinated effort, as may be required by the USACE. The total flow capacity of the Project is approximately 1,950 cfs – 14,196 cfs. The New Cumberland pool elevation is maintained at El. 663.9 and hydropower operation will be coordinated with the USACE to maintain the pool elevation. The frequency of these flows or greater is anticipated to occur nearly 100% of the time.

For periods when total river flows are between 14,696 cfs and 120,000 cfs, the turbines and up to nine USACE-controlled gates pass all flows. Flows up to 14,196 are passed through the turbines and the remainder is passed through one or more of the nine USACE spillway gates per established gate operations to maintain the target pool elevation. The spillway gates are effective at controlling upper pools levels but the lower pool level raises with increasing river flood flows. At 120,000 cfs the lower pool level is approximately at el. 655 and upper pool is maintained at approximately El 664, the proposed Project units are shut down due to loss of operating head at approximately 9.9 ft. of net head. The powerhouse will continue to generate power up to 120,000 cfs but at lower operating heads, lower power output and reduced plant factor (See Figure B.2-1). At approximately 120,000 cfs, the Project does not operate due to the loss of net head. The frequency of flow 14,696-120,000 cfs is anticipated to be greater than 75% of the time.

During large flood events above 120,000 cfs, the water surface elevations upstream and downstream from the New Cumberland L&D will be similar depending on the magnitude of flood, and the Project will be shut down. The presence of the proposed hydroelectric powerhouse will not cause any additional consequences from flood flows. The frequency of this range of flows is anticipated to occur less than 6% of the time

B.3.2 General Operation

The Project will be staffed during the day and will have remote monitoring/operations with local staff available on-call .During high flow or unusual or emergency situations, the project will be will be staffed as needed. There is no need to staff this state-of-the-art plant full-time. The generating units will be started locally by computer or manually, and then monitored and operated by Current Hydro’s regional Operation Center. The generating units can also be started, stopped and regulated locally or by the Operations Center. The plant operators will perform regular inspection and service daily. In addition to a thorough physical inspection of the structures and equipment, the operators will clean the trashracks as needed and perform minor daily service and calibrations as required to maintain the Project. When not on-site, staff will be able to be contacted by the regional Operations Center or by plant alarms to respond.

The facility operating mode will be ROR, utilizing available flows within the operating range of the turbines. Plant adjustment will be performed automatically, with the turbine unit selection and output adjustment following available flows to maintain the USACE discharge directives and pond elevation.

Through the utilization of the intake gates and draft tube stop logs, the Project will be able to be completely isolated from USACE reservoir operations. This will allow hydroelectric Project maintenance or repairs to be performed during almost all discharge circumstances. Current Hydro will coordinate the starting, stopping and regulation of all units in compliance with the anticipated memorandum with the New Cumberland Lockmaster or designee as far in advance as reasonably practical and as soon as possible whenever a generating unit may be subject to a forced outage.

B.4 Operation during Adverse, Mean and High-Water Years

Flows available for generation will consist of normal water flow from the Ohio River according to USACE’s existing water level and discharge management practices. Accordingly, Project operation during adverse, mean, and high-water years will be in direct response to the USACE’s discharge management practices for each event or water year and are characterized below.

B.4.1 Adverse Years

During the lowest river flows there may be insufficient flow to allow hydroelectric generation. During these periods, the units will be shut down and the USACE will pass water as needed downstream directly to the downstream river channel until sufficient flows are available for generation.

B.4.2 Mean (Normal) Years

During mean or normal years, river flows available for generation will be balanced over both units. As flows increase from minimal discharge release and sufficient water becomes available for operating a turbine, the turbine will start generating at its minimum rated capacity. As available flow increases the unit will ramp up and then the second unit will initiate generation until both units are at maximum rated capacity.

B.4.3 High Years

During a large percentage of the year, there will be flows available for generation in excess of the maximum combined hydraulic capacity of the Project's turbines. During extreme high flows and flood conditions the pool level differential will decrease. During periods when the head drops below about nine feet, the unit operation will be curtailed and generation will cease.

B.5 Energy Generation

B.5.1 Average Annual Energy Production

The Project will have an installed capacity of 19.99 MW, an average annual energy production of 132.4 Gigawatt Hours (GWh), and an average monthly energy production of 11.06 GWh.

The annual energy production will vary from year to year, primarily due to variations in precipitation, equipment outages for repairs, and USACE releases. Table B.5-1 presents the energy study data for the Project based on the analysis of USACE daily flow and stage characteristics at Sardis, OH, USGS Gage 03114306, for the period 2013-2022. The USGS gage used (Ohio River above Sardis, OH (03114306)) has a period of record consisting of 15-minute stage and discharge data from October 1, 2Fmw013, to present. The USGS gages located at New Cumberland L&D consist of daily average stage and discharge. Although the Sardis gage is 66 miles south of New Cumberland, Current Hydro felt that the large historical record data set provided by 15-minute interval readings produced a more accurate hydrology model than that from data available at New Cumberland L&Ds. A drainage area ratio of (23,873/26,188) or 0.9116 was used to estimate inflows available. Flows recorded at this gage were adjusted as described in Section B.3 to account for the additional drainage area between the gage site and the Project site. Figure B.5-1 shows average the monthly production of the Project.

B.5.2 Dependable Capacity

Dependable capacity can be expressed as the amount of power that can be reliably generated in a given period with the flows that are available during the drier period of the year, typically late summer for the Ohio River. Because releases from the Project will be determined by the

USACE, the Project's dependable capacity has been assumed to be the capacity the site could provide at the lowest monthly flow that occurred during the period of 2013- 2022, which in this instance equates to the average September flow of 9,421 cfs. At this flow rate, the Project can generate 12.7 MW which represents the dependable capacity of the station.

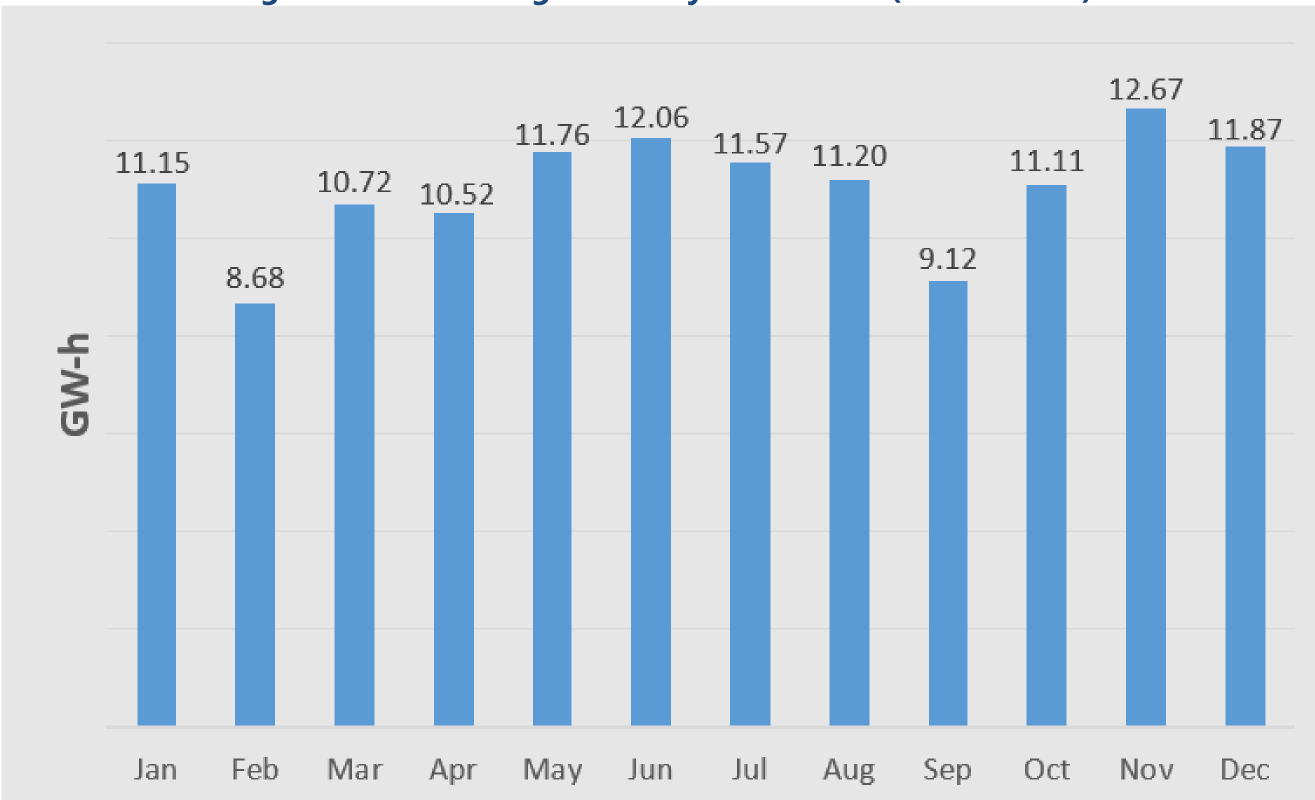
B.5.3 Plant Factor

Based on the projected average annual gross energy during calendar years 2013 through 2022 and the rated plant capacity of 19.99 MW, the estimated annual plant factor for the New Cumberland Project is 72.3%.

Table B.5-1 Energy Study Table New Cumberland Project (2013 – 2022)

ROR/NC	New Cumberland Project							
Month	On Peak Energy (MWh)	Off Peak Energy (MWh)	Total Energy (MWh)	Maximum Power Output (Kw)	Maximum Power Capability (Kw)	Plant Factor	Average Head Pond Elev (ft)	Total Available Flow (cfs)
January	5,622.7	5,524.3	11,147.0	19,833	21,000	72.2%	663.87	13,244
February	4,366.5	4,311.8	8,678.3	19,888	21,000	62.6%	663.87	11,799
March	5,380.1	5,339.1	10,719.2	19,740	21,000	69.7%	663.87	12,794
April	5,298.4	5,218.7	10,517.1	19,828	21,000	70.5%	663.87	13,285
May	5,897.1	5,863.9	11,761.0	19,797	21,000	75.9%	663.87	13,615
June	6,038.3	6,022.9	12,061.2	19,887	21,000	80.0%	663.87	13,393
July	5,795.8	5,779.0	11,574.9	19,879	21,000	73.7%	663.87	11,913
August	5,605.7	5,597.0	11,202.7	19,886	21,000	70.9%	663.87	11,062
September	4,577.5	4,540.1	9,117.5	19,889	21,000	60.0%	663.87	9,421
October	5,557.2	5,557.2	11,114.4	19,890	21,000	70.7%	663.87	11,336
November	6,344.0	6,328.2	12,672.1	19,889	21,000	84.1%	663.87	13,983
December	5,944.3	5,930.2	11,874.5	19,887	21,000	76.7%	663.87	13,627
Annual	66,540.9	66,008.1	132,549.0	19,806	21,000	72.1%	663.87	12,403
Annual Sum	66,428	66,012	**132,440**	-	-	-	-	-
Percent	50.2%	49.8%	100.0%	-	-	-	-	-
Seasonal Minimum	4,367	4,312	8,678	19,740	21,000	60.0%	663.87	9,421
Seasonal Maximum	66,541	66,008	132,549	19,890	21,000	84.1%	663.87	13,983
Average	5,544.9	5,510.5	11,055.4	19,857	21,000	**72.3%**	663.87	12,461

Figure B.5-1 Average Monthly Production (2013 – 2022)



B.6 Streamflow Data

B.6.1 Minimum, Mean, and Maximum Recorded Flows

The minimum, mean, and maximum flows are calculated at the Project based on an analysis of USACE daily flow and stage characteristics at Sardis, OH USGS Gage 03114306, for the period 2013-2022. Flows were then linearly prorated at the Project based on the additional drainage area at the gage to calculate the hydrologic data tabulated for the energy study and presented in flow duration curves in figures B.6-1 through B.6-13, for approximately the past 10 years (water years 2013-2022). USGS defines "water year" as surface-water supply as a 12-month period from October 1 through September 30, of the following year.

Between New Cumberland L&D and Sardis, Ohio (downstream), the drainage area of the Ohio River increases from 23,873 square miles to 26,188 square miles, a drainage area proportionality from the gage location upstream to the Project location (Drainage Area Ratio) of 0.91. Based on a scaled ratio of 0.91, USACE outflow data for the period of 2013 through 2022, the minimum, mean, and maximum flows during this period at New Cumberland L&D are calculated as 1,815 cfs, 41,859 cfs, and 213,194 cfs respectively.

Table B.6-1 New Cumberland Project Flow Data for a Period of 2013-2020

Month	Mean (cfs)	Min (cfs)	Max (cfs)
Jan	57,145	7,751	199,394
Feb	70,210	11,744	266,752
Mar	61,940	13,463	188,149
Apr	62,641	10,947	199,501
May	51,680	9,480	177,265
Jun	35,716	6,139	119,428
Jul	24,995	3,003	118,301
Aug	14,756	1,373	50,367
Sept	18,964	1,815	265,687
Oct	20,100	3,220	91,676
Nov	35,003	8,668	118,458
Dec	50,941	12,549	167,481
Annual	**41,859**	**1,815**	**213,194**

Source: USGS Sardis 2022 Gage 03114306

B.6.2 Flow Duration Curves

Annual and monthly flow duration curves, developed from USACE daily flow and stage characteristics at Sardis, OH USGS Gage 03114306, for the period 2013-2022, are shown in Figures B.6-1 through B.6-13 below.

Figure B.6-1 Annual Flow Duration Curve (2013 – 2022)

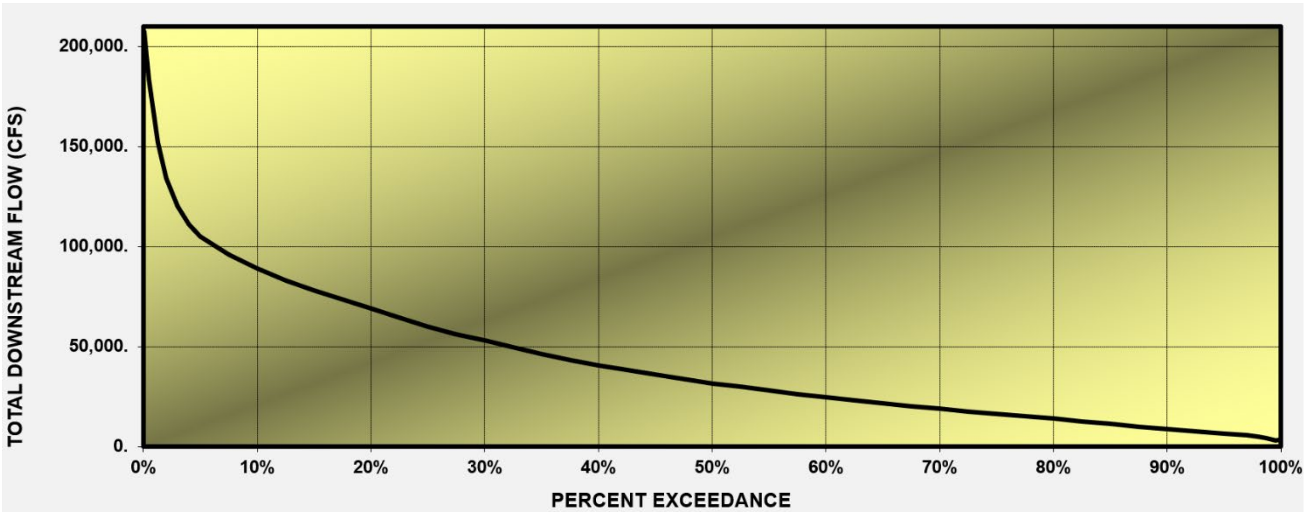


Figure B.6-2 January Flow Duration Curve (2013 – 2022)

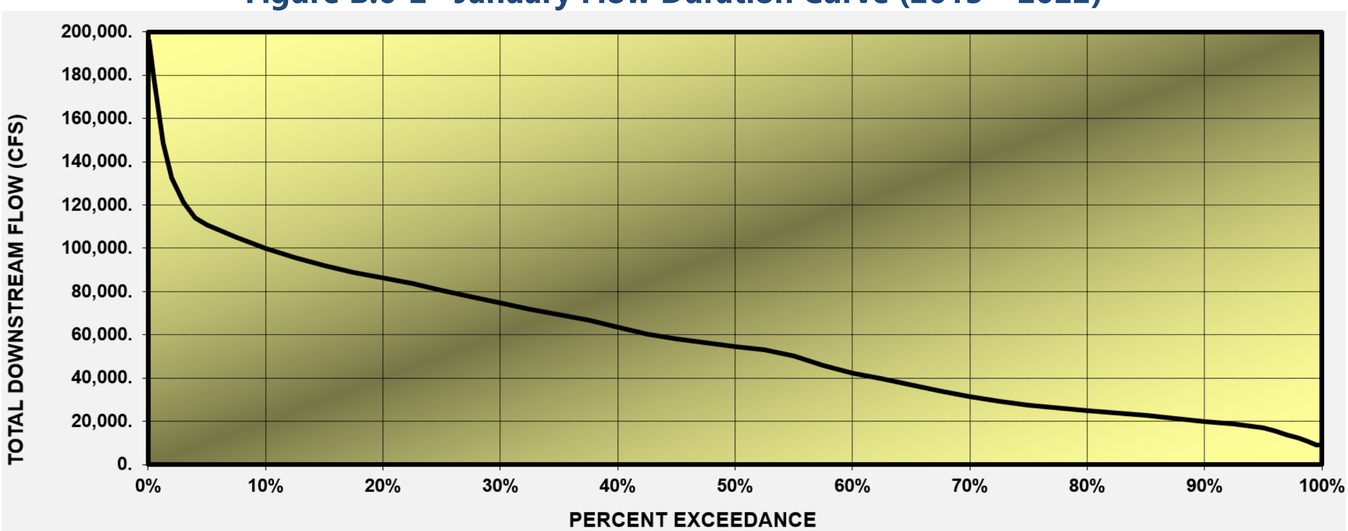


Figure B.6-3 February Flow Duration Curve (2013 – 2022)

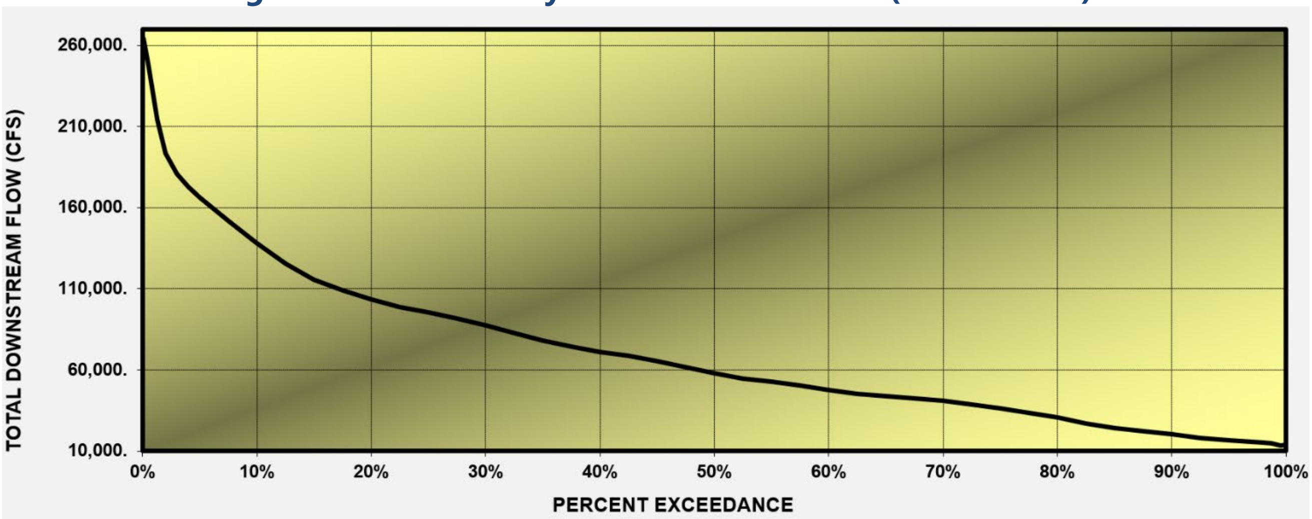


Figure B.6-4 March Flow Duration Curve (2013 – 2022)

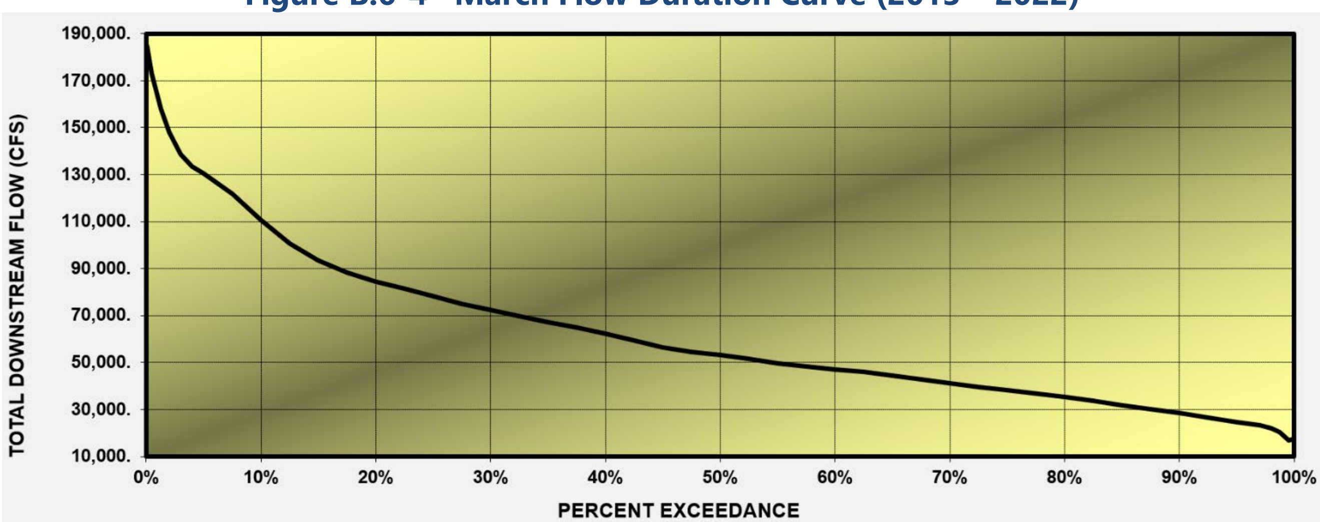


Figure B.6-5 April Flow Duration Curve (2013 – 2022)

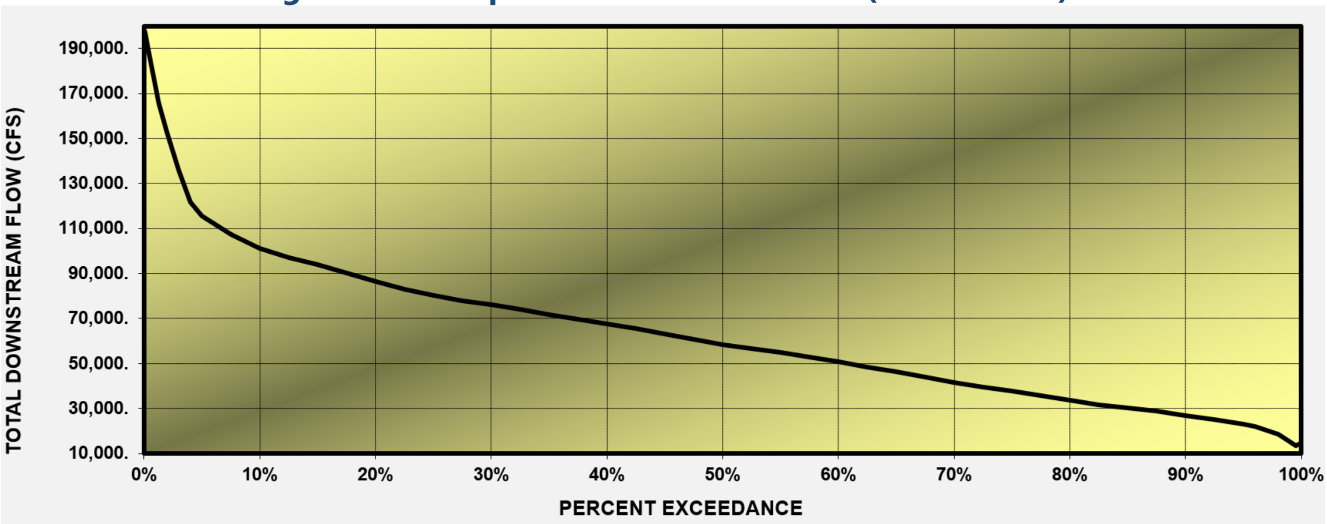


Figure B.6-6 May Flow Duration Curve (2013 – 2022)

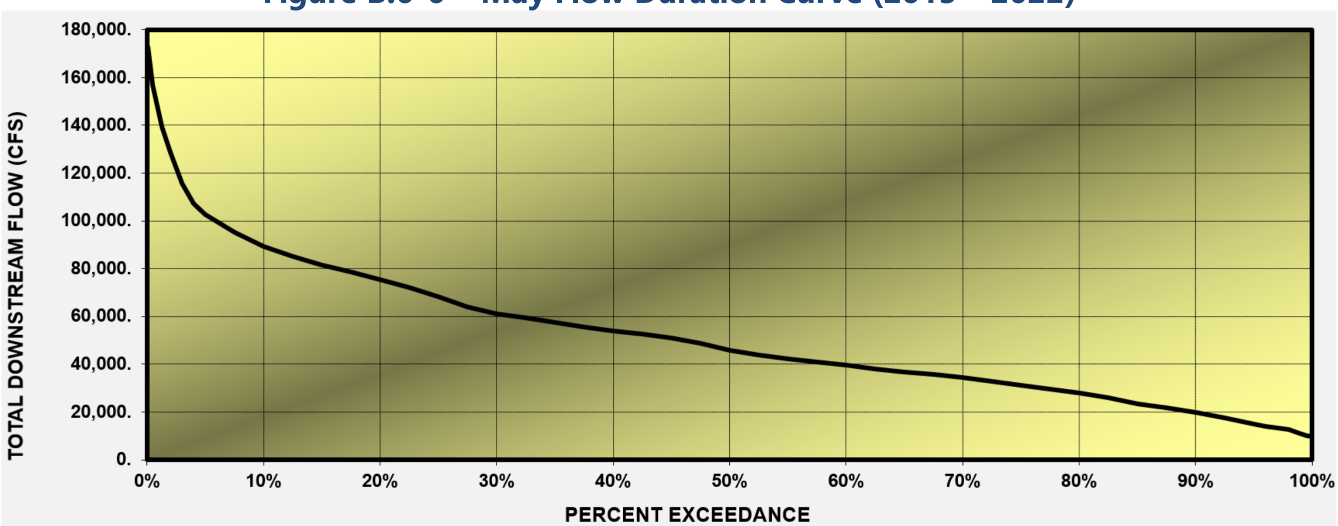


Figure B.6-7 June Flow Duration Curve (2013 – 2022)

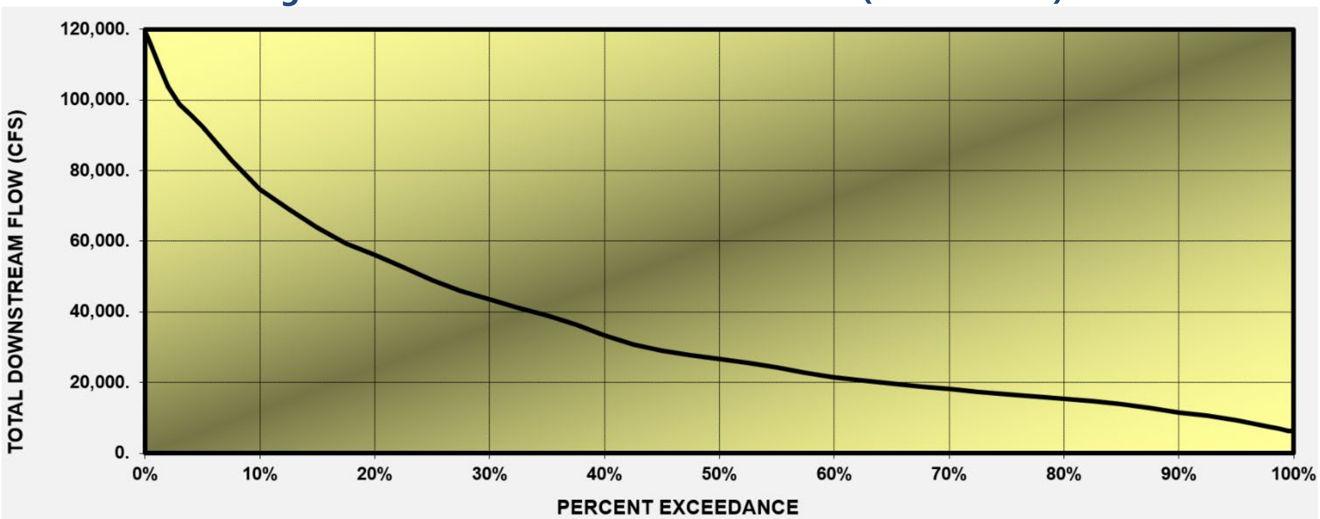


Figure B.6-8 July Flow Duration Curve (2013 – 2022)

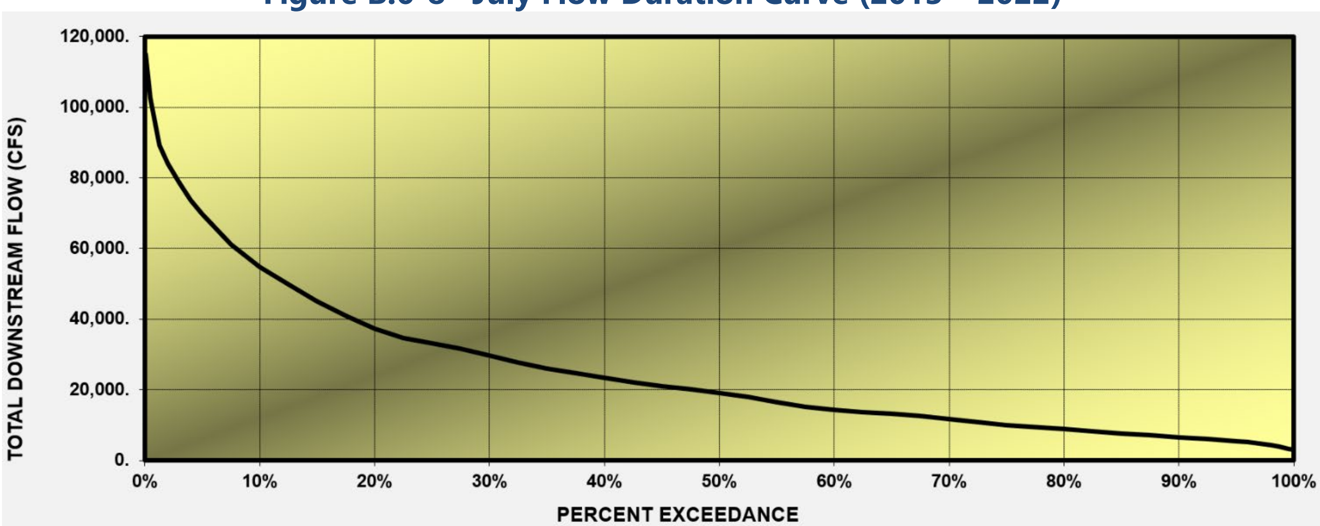


Figure B.6-9 August Flow Duration Curve (2013 – 2022)

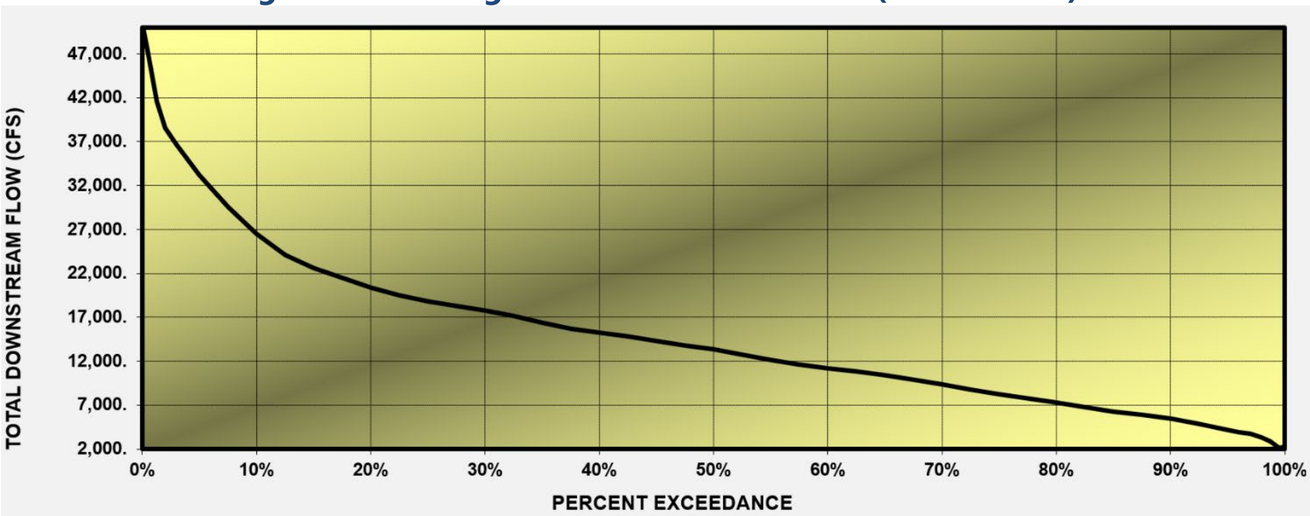


Figure B.6-10 September Flow Duration Curve (2013 – 2022)

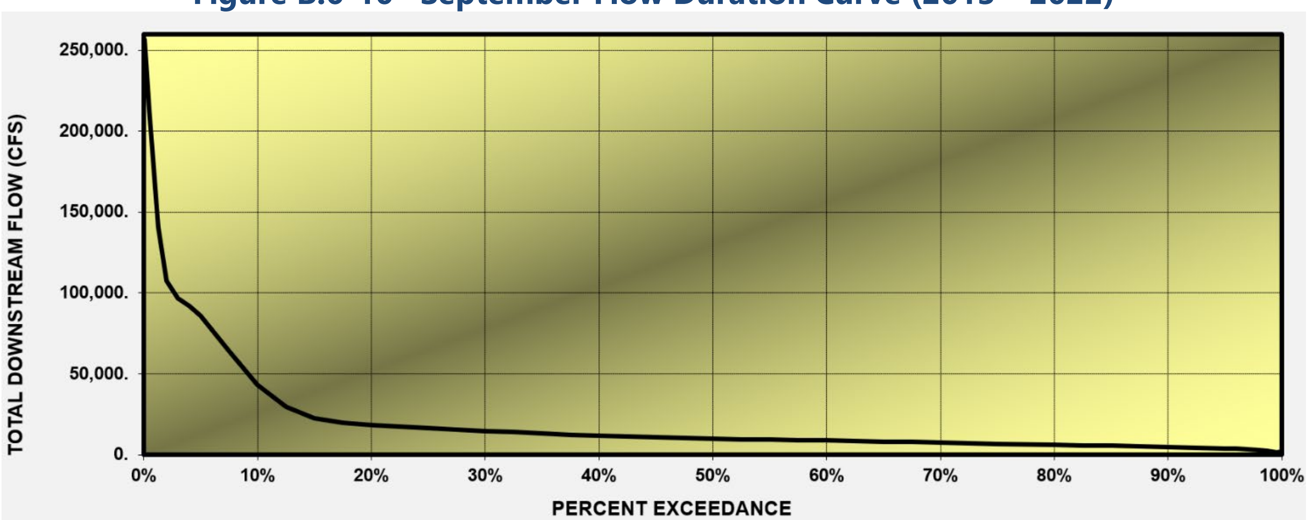


Figure B.6-11 October Flow Duration Curve (2013 – 2022)

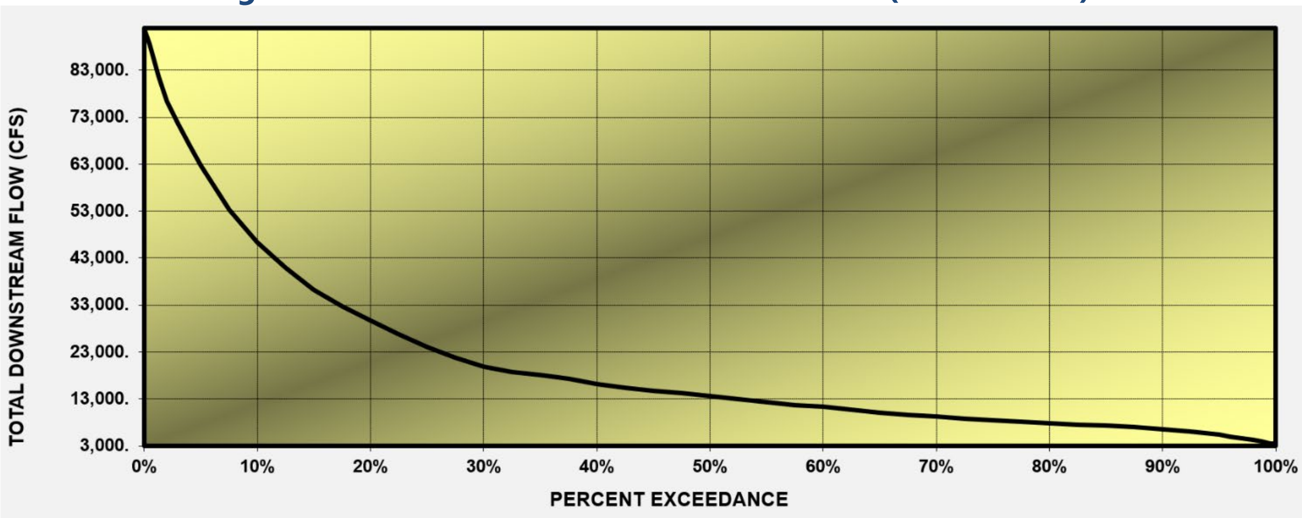


Figure B.6-12 November Flow Duration Curve (2013 – 2022)

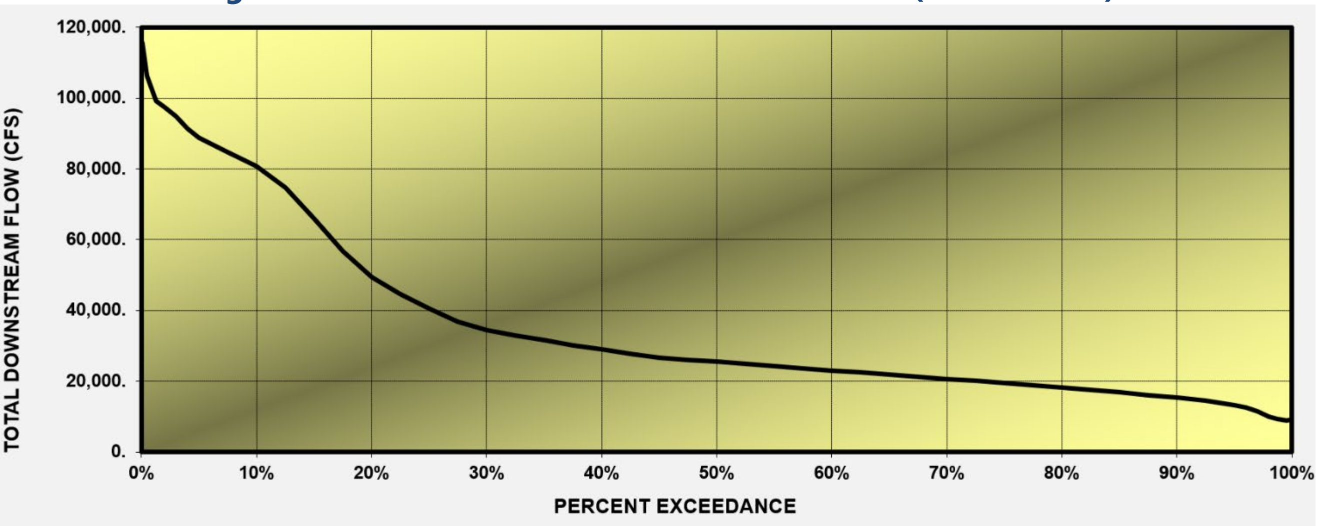


Figure B.6-13 December Flow Duration Curve (2013 – 2022)

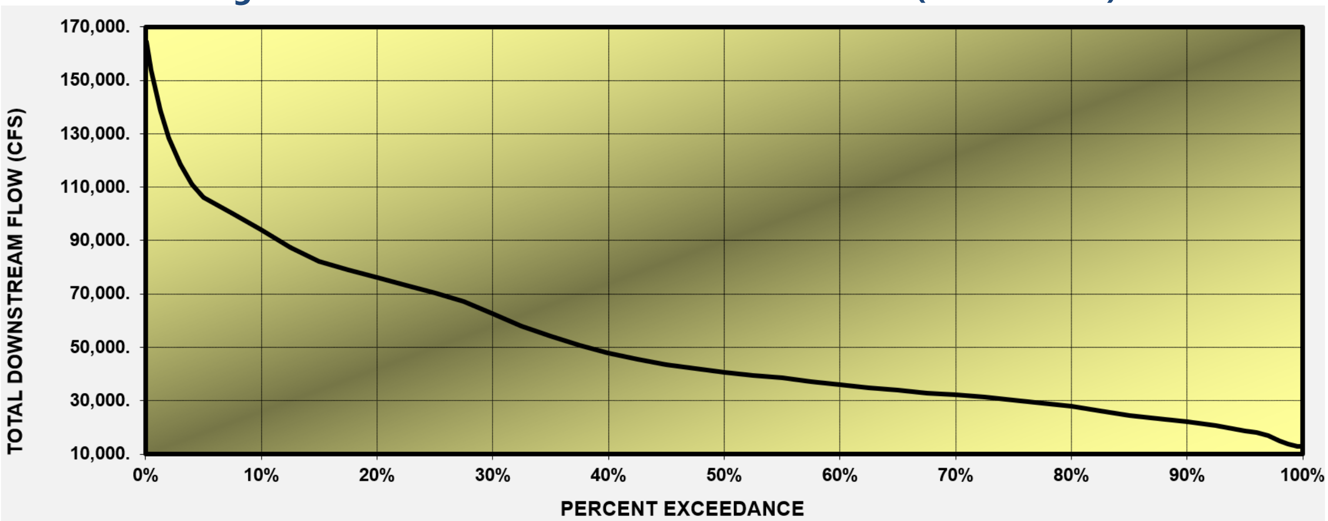


Table B.6-2 Plant Generation Flows

New Cumberland Locks and Dam					
	Average Daily Flow (cfs)	Average Daily Plant Flow (cfs)	Average Daily Spill Flow (cfs)	Percent Plant Flow	Percent Spill Flow
January	57,145	13,215	44,901	23%	77%
February	70,210	11,758	55,766	17%	83%
March	61,940	12,762	48,795	21%	79%
April	62,641	13,256	49,553	21%	79%
May	51,680	13,591	37,319	26%	74%
June	35,716	13,373	24,442	37%	63%
July	24,995	11,890	15,168	48%	52%
August	14,756	10,897	4,024	74%	26%
September	18,964	9,393	9,102	50%	50%
October	20,100	11,169	8,896	56%	44%
November	35,003	13,962	21,104	40%	60%
December	50,941	13,601	37,428	27%	73%
Annual	**41,859**	**12,376**	**29,044**	**30%**	**70%**

B.7 Hydraulic Capacity of the Powerhouse

Below a minimum hydraulic capacity of the powerhouse of approximately 1,950 cfs, the plant does not pass any flow and discharges are made through the dam. The maximum hydraulic capacity of each unit is approximately 7,098 cfs, for a total plant hydraulic capacity of 14,196 cfs. Actual total flows passing through the Project may be restricted by unit availability, debris accumulation, high tailwater conditions, and other factors. Flow more than that required for generation or the available plant capacity is passed over dam.

The pertinent hydraulic capacities and corresponding generator output (at the rated head of the proposed equipment) of the Project are shown in Table B.7-1 below.

Table B.7-1 Project Hydraulic Capacities and Outputs

New Cumberland Project Hydraulics – 2 Units (Net Head - 19.2 feet)				
	One Turbine Discharge (cfs)	Powerhouse Discharge (cfs)	Powerhouse Turbine Output (kW)	Powerhouse Generator Output (kW)
Minimum Wicket Gate	1,950	1,950	1,425	1,419
Best (Efficient) Wicket Gate	5,000	10,000	14,708	15,482
Maximum Wicket Gate	7,098	14,196	21,022	19,999

B.8 Estimated Average Head

Hydraulic turbines are designed to operate over a range of head conditions, with minimum, design, and maximum head. As the net head approaches the minimum and maximum limits, undesirable effects on the equipment may develop, such as cavitation or vibration. Theoretically, each turbine would operate within its Hill chart as close to optimum net head as possible. To maximize generation and minimize damage to the turbine, each turbine is operated within a range of acceptable head conditions. Operations when head conditions are below and above this range are avoided. The Project design minimum operating head is about 9.9-feet. Average head across New Cumberland L&D is approximately 16.2-feet based on USGS stage and flow data from OH River USGS Gage 03114306 Sardis and the USACE theoretical Pike Island headwater and tailwater curves in Exhibit B.2, Figure B.2-1.

Table B.8-1 Project Net Head Estimates

New Cumberland L&D and Project Estimated Net Head (2013-2022 - USGS Data Ohio River Sardis Gage 03114306)				
	Minimum (ft)	Minimum Operating (ft)	Average (ft)	Maximum (ft)
Estimated Net Head	0.5	9.0	16.2	21.0

B.9 Statement of System and Regional Power Needs

Power generated by the Project will be available to meet demand of the American Electric Power (AEP) (utility) sub-region of the PJM Regional Transmission Organization (RTO) and falling under the regulation of the RFC regional entity of the North American Reliability Council (NERC). The Project will be owned and operated by Current Hydro. Energy, including capacity as applicable, will be sold under a power purchase agreement to a utility or another wholesale purchaser of electric generation.

The PJM RTO operates a competitive wholesale electricity market and manages the reliability of its transmission grid. PJM provides open access to the transmission and performs long-term planning for the transmission system, as well as coordinating with neighboring, interconnected RTO systems. In managing the grid, PJM centrally dispatches generation and coordinates the movement of wholesale electricity in all or part of 13 states (Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia) and the District of Columbia. PJM's markets include energy (day-ahead and real-time), capacity and ancillary services (FERC).

According to excerpts from PJM's Annual Report (2021):

As state and federal policymakers respond to increasing consumer preferences for decarbonized generation resources, our generation interconnection queue has followed suit. More than 95% of the generation resources lining up in the PJM interconnection queue are solar, wind, storage or a hybrid combination of variable renewables. Beyond traditional industry practices, which shore up capacity to meet the needs of the grid, resource flexibility is also growing in importance. As more variable resources come onto the system, the role of balancing power systems becomes ever more critical.

PJM remains focused on maintaining essential reliability services. To ensure continued reliability for our rapidly changing grid, PJM anticipates the following trends:

- *Continuing market evolution*
- *Increasing Installed Reserve Margins*
- *Decreasing energy market prices as wind and solar produce electricity at or near zero cost*
- *Requiring flexible generation with responsive ramping capability*
- *Increasing interdependency between regions for backup power across seams*

Thoughtful, collaborative consideration of these forces is required now and in the future, as inverter-based, renewable resources emerge as key players within the generation resource mix.

Transitioning reliably and cost-effectively to a grid that will incorporate many more intermittent renewable resources was a main focus of planning efforts by PJM and its stakeholders in 2021.

As of the end of 2021, 95% of the more than 225,000 MW in PJM's new services queue were proposed solar, wind, storage or hybrid renewable/battery resources.

As the independent planner for the future needs of our bulk electric system, PJM's primary objective is maintaining reliability while transitioning to the grid of the future. This work is informed by our strategic direction and is supported by research, analytical studies and active collaboration with our stakeholders to try and ensure durable solutions.

REGIONAL TRANSMISSION PLANNING FOCUS

In July, FERC issued an Advance Notice of Proposed Rulemaking (ANOPR), titled "Building for the Future Through Electric Regional Transmission Planning and Cost Allocation and Generator Interconnection."

This FERC initiative provided an opportunity for PJM to share four principles it believes should guide any planning reform:

- *Decarbonization policy facilitation*
- *Grid resilience*

- *Consumer protection*
- *Equitable treatment of regional transmission organization (RTO) and non-RTO regions*

In 2021, FERC and state utility regulators also partnered to form the Joint Federal-State Task Force on Electric Transmission. This three-year initiative explores:

- *The need to modernize and expand bulk electric system infrastructure to accommodate the changing resource mix*
- *The barriers to transmission expansion and project siting at local, state and regional levels*
- *The role of technology in expanding transmission capacity*

INTERCONNECTION PROCESS REFORM

As the energy transition accelerates, PJM's interconnection queue has grown significantly; the number of generation project requests that entered the interconnection queue in 2021 was 1,331, nearly triple the number just three years ago.

To streamline planning for new queue requests, PJM and stakeholders worked together to improve the interconnection process. This collaborative and comprehensive work proceeded with the formation of the Interconnection Process Reform Task Force (IPRTF) and a series of workshops to study related policies, including cost-allocation methods.

The broad goal of this collaboration was twofold:

- *Advancing projects through the interconnection process more quickly*
- *Enhancing cost certainty*

By year's end, the IPRTF remained on track to file proposed Open Access Transmission Tariff (Tariff) changes with FERC in the first half of 2022.

B.10 Applicant's Plans for Future Development

Current Hydro has no future plans for development beyond those presented in this license Application.

EXHIBIT C: CONSTRUCTION HISTORY AND PROPOSED CONSTRUCTION SCHEDULE

C.1 Construction History

The Ohio River Basin comprises a large geographic area of the United States east of the Mississippi River - 204,000 square miles and containing nearly 25 million people. It reaches northeast into New York, west to Illinois, and south through the drainage area of the Tennessee River in Georgia, Alabama, and Mississippi. Through the heart of this vast area, the 981-mile-long Ohio River carries the largest volume of water of any of the Mississippi River tributaries. The Ohio is formed by the juncture of the Allegheny and Monongahela rivers at Pittsburgh, Pennsylvania, and empties into the Mississippi at Cairo, Illinois (USACE, 2022).

The U.S. Congress recognized the importance of the inland waterways when, in 1824, it authorized the U.S. Army Corps of Engineers to undertake its first Civil Works mission — the removal of snags and other obstructions to navigation on the Ohio and Mississippi rivers. In addition, the Ohio River's flow was improved by the construction of wing dams or dikes to concentrate flow into the main channel. Despite these efforts, safe navigation was still sporadic and seasonal. In dry months the water was so shallow in places that was fordable only by people and horse-drawn wagons. River men and shippers came to rely on two "rises" or "tides." The fall rise occurred in late October or November, and the spring rise between February and April. Navigation improvements were needed that would provide safe, year-round, dependable means of moving vessels on the river.

After the Civil War, the movement of coal downriver from Pittsburgh increased greatly and the size of coal tows grew in length as powerful steam towboats pushed more and more wooden barges. To accommodate the burgeoning coal trade, the Corps studied means of providing a dependable navigation depth on the Ohio. Following an international investigation of navigation projects, engineer officers concluded that the Ohio could best be improved by constructing a series of locks and dams to create slack water pools.

Federal canalization of the Upper Ohio River for 6-foot navigation started in 1877 with the construction of Davis Island Lock and Dam

The first complete lock and dam project built by the Corps of Engineers on the Ohio was at Davis Island, a few miles below Pittsburgh. This lock and dam opened to traffic in 1885. The project proved its worth, and in 1910 Congress passed the Rivers and Harbors Act. This Act authorized construction of a river length system of locks and dams which would provide a nine-foot navigation depth. When completed in 1929, the "canalization" project consisted of 51 movable dams with wooden wickets and a lock chamber measuring 600 feet by 110 feet. At low water stage, the dams were raised to pool water thus requiring lockage. At high water the wickets were lowered, allowing vessels to avoid the locks through "open river" navigation. The canalization project proved successful for many years, moving millions of tons of goods, and contributing nobly to the American war effort in World War II.

In the 1940s, the transition from steam to diesel-powered towboats enabled tows longer than the 600-foot locks to move on the river, requiring "double locking" when the string of barges had to be locked through in two maneuvers. This was a hazardous and time-consuming operation causing traffic delays resulting in increased costs to the towing industry.

In the 1950s, the Corps undertook the Ohio River Navigation Modernization Program to replace the obsolete system of wicket dams and small locks. Each of the new 18 high-lift concrete and steel dams replaced at least two of the old structures. Each dam consisted of two locks, one 600 feet by 110 feet, the other 1200 feet by 110 feet. Use of the 1200-foot chamber allows the towboat and up to 15 barges to transit the lock in one maneuver. At Smithland Locks and Dam there were twin 1200-foot chambers built creating the only such navigation project in the world at the time. The locks and dams on the Ohio serve a navigation purpose only; they do not provide flood control.

The New Cumberland locks were authorized by the Rivers and Harbors Act dated 3 March 1909, constructed from 1955-63, and were opened 29 November 1959. New Cumberland L&D replaced L&D 9, built by the Corps from 1912-16. L&D 9 had smaller lock chambers with old-style wooden wicket dams which were raised and lowered manually by the lock crews to maintain the required navigation depth in the river. New Cumberland L&D is located at Ohio RM 54.4 below Pittsburgh, Pennsylvania and 4 miles downstream from Vanport, Ohio. New Cumberland L&D is 22.7 river miles downstream of the Montgomery L&D and 29.8 upstream of the Pike Island L&D.

C.2 Proposed Construction Schedule

Current Hydro is working on many aspects of licensing, permitting and construction in parallel to the extent possible. The Applicant is engaged in early contractor involvement, early vendor involvement and early stakeholder involvement. This approach reduces licensing, permitting and construction risk and will also reduce timeline to Commercial Operation Date (COD). The FERC/USACE Memorandum of Understanding (MOU) dated 20 July 2016, outlines the two-phased approach for coordinating the regulatory processes between FERC and the USACE. Realizing the framework for synchronizing three regulatory processes will help Current Hydro get New Cumberland Project to COD by approximately Q2 2027. The Applicant's expeditious timeline is dependent on Current Hydro's success in early stakeholder engagement and timely submission of USACE and state applications, plans, and designs in parallel with the FERC licensing process. The Applicant anticipates the construction of the New Cumberland Project will begin within one year from the issuance date of the FERC license. Construction will be complete within three years from the issuance date of the FERC license.

Table C.2-1 depicts the approximate start and end dates of significant licensing, permitting and construction milestones. The timeline includes the anticipated total months for submittal and review as well as the approximate date for each item or milestone. Some milestones are dependent upon other activities or approvals. Dependent milestone delays may create setbacks in the commencement of construction and COD.

Table C.2-1 Permitting and Construction Milestones

Preconstruction Activities	**7/29/2022**	**1021**	**5/15/2025**
Preliminary Design Engineering	07/29/22	168	01/13/23
FERC Licensing	01/13/23	505	06/01/24
Detailed Engineering	05/28/23	370	06/01/24
Final Engineering	06/01/24	228	01/15/25
USACE 408, 404 and MOU	01/13/23	733	01/15/25
Equipment Procurement	03/01/24	410	04/15/25
Interconnection Agreement	06/01/23	684	04/15/25
Construction Contracts	01/15/25	90	04/15/25
Construction	**5/15/2025**	**805**	**7/29/2027**
Mobilization	05/15/25	70	07/24/25
Dewatering	07/24/25	197	02/06/26
Excavation / Demolition	02/06/26	30	03/08/26

Powerhouse Concrete	03/08/26	282	12/15/26
Powerhouse Mechanical	12/15/26	98	03/23/27
Powerhouse Electrical	03/23/27	15	04/07/27
Substation Electrical	03/23/27	78	06/09/27
Complete Construction	05/15/25	755	06/09/27
Commission Interconnection	06/09/27	13	06/22/27
Commission and Test Units	06/09/27	10	06/19/27
COD	06/19/27	40	07/29/27

EXHIBIT D: STATEMENT OF COSTS AND FINANCING

D.1 Estimate of New Construction Costs

The New Cumberland L&D is an existing water conservation dam owned by the United States of America and operated and maintained by the Pittsburgh District of the USACE. As such, the new development costs shown below are only for those proposed Project features that are associated with hydroelectric development at this site and which do not currently exist.

The estimated cost for each major item, by major categories, are shown in Figure D.1-1 below. These cost estimates are presented in 2022 dollars and are subject to refinement as the Project progresses through the final design and construction phases. The development costs in Table D.1-1 are calculated based on the Association for Advancement of Cost Engineering (AACE) 69R-12 *Class 4* Hydropower Industry Estimate.

Figure D.1-1 AACE Cost Estimate Classification Accuracy Ranges

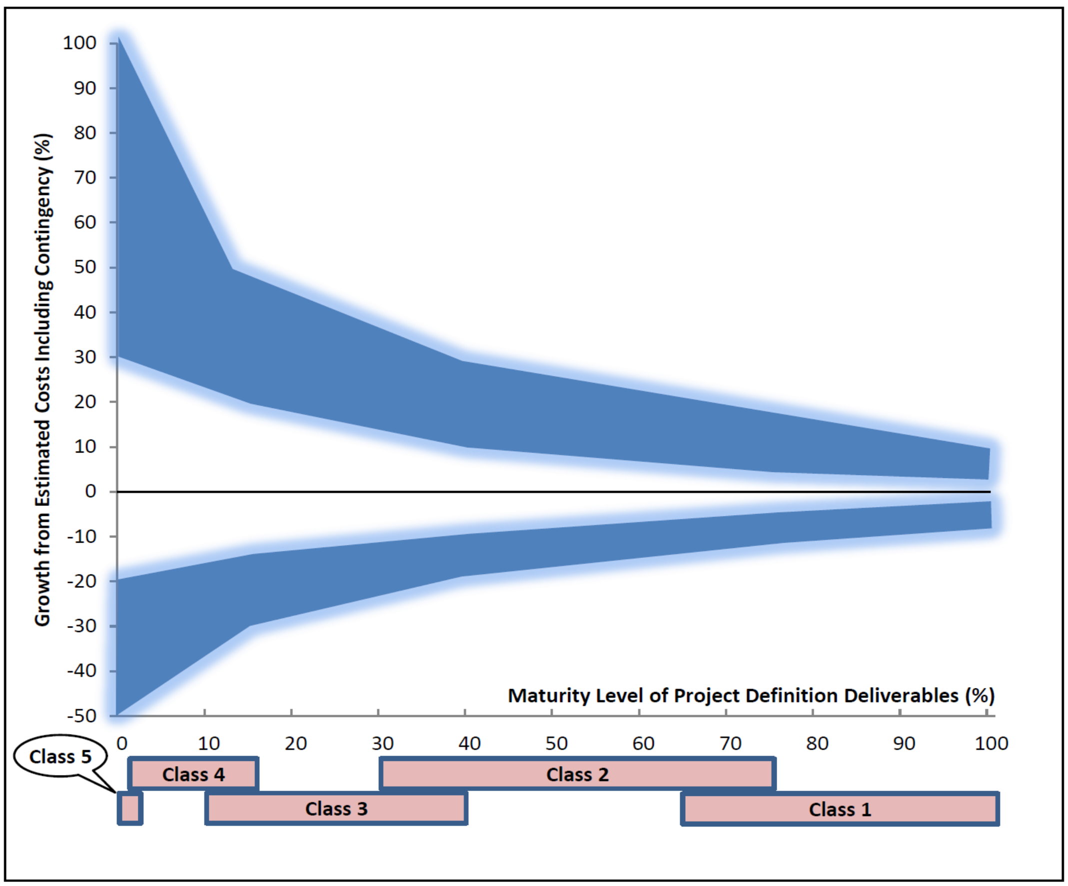


Table D.1-1 Proposed New Development Costs

Estimate of New Construction Costs	
Category	**Total Price (current)**
Engineering / Design	$6,800,000
Mobilization / Demobilization	$29,000,000
Civil Works	$51,000,000
Mechanical Systems	20123000
Electrical Systems	$4,200,000
Taxes	$114,000
Indirect Cost	$16,000,000
Land Rights	$1,000,000
Owners Cost	$1,250,000
Interest During Construction	$7,760,000
	$137,247,000
Escalation (% of Direct Cost)	$7,623,000
Contingency (% of Direct Cost)	$6,768,000

D.2 Approximate Original Costs

The New Cumberland L&D is an existing structure owned by the United States of America and operated and maintained by the Pittsburgh District of the USACE. According to best available information, the facility was completed in 1965. Because the proposed Project will not affect the federal government's ownership of the dam or the USACE's ongoing operational and maintenance responsibilities, Current Hydro has not included such costs in this Exhibit.

D.3 Takeover Cost

The Applicant is applying for an initial license and is not a licensee applying for a new license (or a municipality or state). Therefore, an estimation of fair value, net investment, and severance charges related to Project takeover pursuant to the Federal Power Act, 16 U.S.C. 807 is not applicable. Under Section 14(a) of the FPA, the federal government may take over any project licensed by the Commission upon the expiration of the original license. The Commission may also issue a new license in accordance with Section 15(a) of the FPA. If such a takeover were to occur upon expiration of the current license, the Licensee would have to be reimbursed for the net investment, not to exceed fair value, of the property taken, plus severance damages.

D.4 Estimate of Average Annual Costs

An estimate of average annual cost of the Project, in 2022 dollars, are shown in Table D.4-1 below. This estimate includes costs associated with the projected Project operations and maintenance, as well as local property and real estate taxes, but excludes income taxes, depreciation, and costs of financing.

Table D.4-1 Estimated Average Annual Costs

Operating Budget	
Item	**Annual Cost**
Property Tax	$197,100
Cost of Capital	4.5%
Depreciation	10%
Insurance	$328,500
ISO/RTO expense	$25,000
O+M	$657,000
O+M Contingency	$164,250
License fee (FERC/USACE)	$150,000
Marketing / Oversight	$50,000
Total	$1,571,850

The estimated capital costs and average annual costs for environmental measures proposed to be incorporated within the project are shown in Table D.4-2 below.

Table D.4-2 Estimated Environmental Operating Budget

Environmental Operating Budget	
Item	**Annual Cost**
Water Quality Monitoring	$50,000
Avian Protection Plan	TBD
Transmission Line Corridor Management Plan	$500
Erosion and Sediment Control Plan	$200
Recreation Plan	$25,000

Myotid Bat Conservation Plan	TBD
Historic Properties Management Plan	TBD
Total	$75,700

D.5 Estimate of Annual Value of Power

Power generated by the Project will be available to meet demand of the AEP sub-region of the PJM RTO system and falling under the regulation of the RFC regional entity of the NERC. The Project will be owned and operated by Current Hydro and energy (and capacity as applicable) will be sold under a power purchase agreement to an entity such as a corporation, utility company or other such wholesale purchaser of electric generation.

According to PJM Quarterly State of Market Report January through March 2022, the average price for the PJM wholesale market in 2022 was $54.13/MWh. PJM does not provide wholesale price forecasts but given that the price of electricity is fairly stable in the long-term, a reasonable estimate can be made. The project is projected to generate 132.4 GWh (132,440 MWh) of clean, renewable energy annually. Using the 2022 power price for PJM, the estimate of the average annual value of power is $7,168,977.

D.6 Energy Alternatives

The Project will serve as a clean, renewable energy resource that provides predictable, reliable power. Other electrical baseload energy alternatives include nuclear, natural gas, coal, and oil-fired generation whose fuel and other costs would be significantly higher than that of the proposed Project (See table D.6-1).

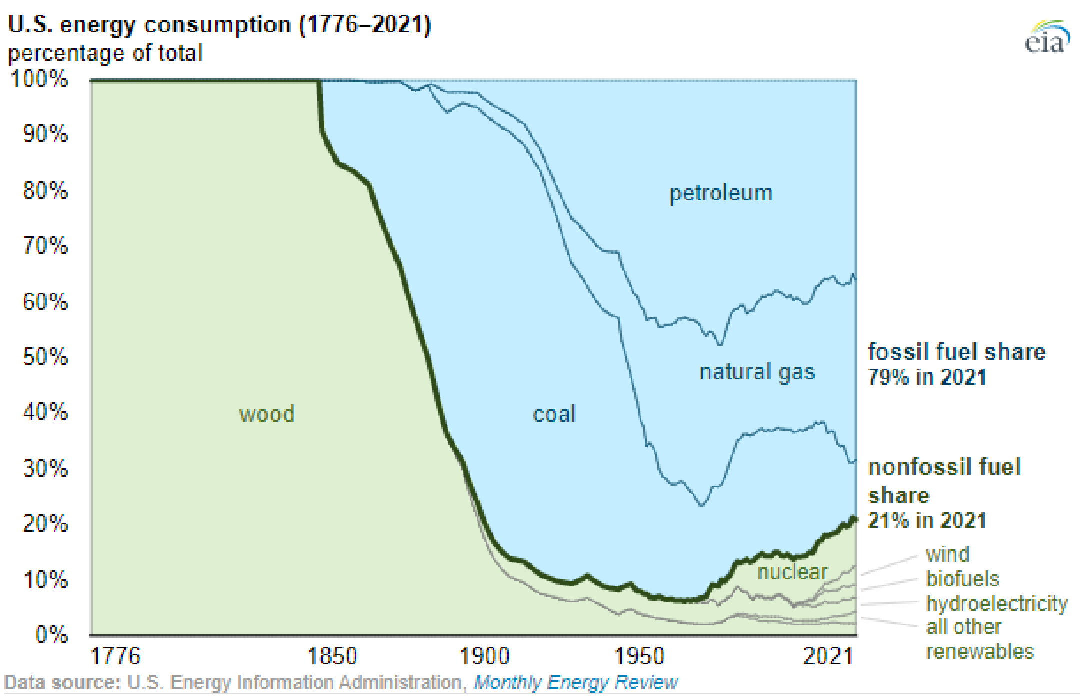
Levelized cost of electricity (LCOE) and levelized represent the average revenue per unit of electricity generated or discharged that would be required to recover the costs of building and operating a generating plant and a battery storage facility, respectively, during an assumed financial life and duty cycle.

Table D.6-1 Value-Cost Ratio for New Resources Entering Service in 2027

Plant type	Average unweighted LCOE[a] or LCOS[a] with tax credits (2021 dollars per megawatthour)	Average unweighted LACE[a] (2021 dollars per megawatthour)	Average value-cost ratio[b]	Minimum[c]	Maximum[c]
Dispatchable technologies					
Ultra-supercritical coal	$82.61	$38.69	0.47	0.40	0.52
Combined cycle	$39.94	$39.54	0.99	0.91	1.03
Advanced nuclear	$81.71	$38.42	0.47	0.41	0.55
Geothermal	$37.62	$45.11	1.20	1.08	1.41
Biomass	$90.17	$39.84	0.45	0.28	0.52
Resource-constrained technologies					
Wind, onshore	$40.23	$34.54	0.88	0.60	1.03
Wind, offshore	$105.38	$36.00	0.34	0.27	0.43
Solar, standalone[d]	$33.83	$32.85	0.98	0.72	1.14
Solar, hybrid[d,e]	$49.03	$45.53	0.93	0.64	1.07
Hydroelectric[e]	$64.27	$37.87	0.60	0.45	0.80
Capacity resource technologies					
Combustion turbine	$117.86	$101.74	0.86	0.61	1.00
Battery storage	$128.55	$101.01	0.79	0.52	0.97

Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022*

Figure D.6-1 U.S. Energy Consumption by Fuel Type



In 2021, for the second consecutive year, U.S. nuclear electricity generation declined. Output from U.S. nuclear power plants totaled 778 million MWh in 2021, or 1.5% less than the previous year. Nuclear’s share of U.S. electricity generation across all sectors in 2021 was similar to its average share in the previous decade: 19%. Six nuclear-generating units with a total capacity of

4,736 MW have retired since the end of 2017. Three more reactors with a combined 3,009 MW of capacity are scheduled to retire in the coming years (Morey, 2022).

Natural gas (LNG) consumption in the U.S. electric power sector has been setting new records in recent months. However, our Short-Term Energy Outlook (STEO) forecasts that natural gas consumption in the electric power sector will decline in 2023 relative to 2022 (Kopalex, 2022). U.S. LNG total baseload export capacity increased from less than 1 billion cubic feet per day (Bcf/d) in 2015 to about 10.78 Bcf/d at the end of 2021. The total peak export capacity in 2021 was about 12.98 Bcf/d. In 2015, total U.S. LNG exports were about 28 Bcf to seven countries. In 2021, U.S. LNG exports reached a record high of about 3,561 Bcf to 45 countries, and LNG exports accounted for 54% of total U.S. natural gas exports. LNG demand is expected to almost double to 700 mln tonnes by 2040, Shell said in its annual LNG market outlook, adding that liquefied gas has a key role to play as a backup in the event of intermittent renewable supply. LNG prices lurched from record lows under $2 per mmBtu in 2020 to record highs of $56 in October 2021 (Rashad & Bousso, 2022).

We expect 6% less U.S. coal-fired generation in 2022 than in 2021, according to our latest Short-Term Energy Outlook (STEO). Although coal-fired generation declined each year between 2014 and 2020, it rose 16% in 2021 because of increased electricity demand and higher natural gas prices following the pandemic. Despite natural gas prices remaining high, coal-fired generation has continued its previous trend of decline this year as a result of constrained coal supply (Hodge, 2022). Due to continued competition from natural gas and renewable resources, 23% of the 200,568 MW of coal-fired capacity currently operating in the United States has reported plans to retire by the end of 2029 (Brown, 2022).

International Energy Outlook 2014 (IEO2014) projects that 33 MMbbl/d of additional liquid fuel supply will be needed in 2040 compared to 2010 to satisfy growing demand for liquid fuels. The largest potential for growth in demand for liquid fuels lies in the emerging economies of China, India, and countries in the Middle East, according to EIA's recently released IEO2014 (Doman, Singer & Murphy, 2022). Operable atmospheric crude oil distillation capacity, our primary measure of refinery capacity in the United States, totaled 17.9 million barrels per calendar day as of January 1, 2022, down 1% from the beginning of 2021. According to our annual Refinery Capacity Report, 2021 was the second consecutive year of decreasing refinery capacity (Hack & Harris, 2022).

Even in a changing power system, hydropower continues to be a significant contributor to system reliability through inertial and primary frequency responses, reactive power support, and black-start capabilities. In addition, in California Independent System Operator (CAISO), hydropower resources have been observed to contribute up to 25% of the total Regulation Reserve (up and down) requirements, as well as up to 60% of the total Spinning Reserve requirements even though hydropower constitutes approximately 15% of installed capacity. Hydropower turbines operate at much wider frequency ride-through bands because of their lower rotational speeds compared to steam turbine speeds. This can imply a greater tolerance to frequency deviations, which implies that a unit may not trip off during system events, such as large generation outages. This characteristic of hydropower can be extremely useful to the grid while dealing with situations leading to cascading outages. (PNNL, 2021)

The New Cumberland Project will provide a resource for PJM with a dependable capacity of 12.7 MW of reliable inertial and primary frequency response. The grid services of reliable hydropower will help stabilize grid frequency with increasing intermittent renewable generation coming online. The changing power system will increasingly depend on hydropower resources to provide essential support services.

D.7 Consequences of Application Denial

The Applicant is applying for an original license to construct a hydroelectric project at an existing USACE water level conservation dam and reservoir. Accordingly, the denial of this Application would not eliminate construction of a new dam and existing non-power attributes of the existing dam would remain. However, should this Application be denied, Current Hydro will be severely damaged and adversely affected as it has invested years of effort and over $2,000,000 in license development activities, including environmental and engineering studies. Additionally, denial of the Application would not be in the public interest as the addition of significant amounts of, clean, renewable energy for the next 50+ years would not occur.

D.8 Source and Extent of Financing

The Applicant intends to fund the licensing and construction phases of the Project through a combination of equity and debt financing in conjunction with any applicable or available tax incentives. Project costs will be paid from revenue derived through Project energy and capacity sales, as well as any applicable or available tax incentives.

D.9 Estimate of Cost to Develop License Application

The cost to develop the License Application is estimated to be the same as the amount representing the damage if Current Hydro's license application is denied: $2,000,000 in 2022 dollars.

D.10 Estimate of On-Peak and Off-Peak Values of Power

On-peak and off-peak values of power within the region are not readily available beyond those identified above. However, the Project will be operated in run-of-release mode with no storage of flows, whereby outflow from the Project will equal inflow to the Project made available for generation via normal water flow of the Ohio River, according to USACE's existing water level and discharge management practices. Pursuant to 18 CFR § 4.51(e)(8), an estimate of the on-peak and off-peak values of power is not applicable for projects which are proposed to operate in a run-of-release mode.

D.11 Estimate Changes in Project Generation

The New Cumberland navigational pool is controlled and operated by the USACE, Pittsburgh District. The Project will be operated in a ROR mode that always maintains the navigation channel. Normal fluctuations in the New Cumberland pool are anticipated and included in the calculation of dependable energy in Exhibit B. If additional bypass flows are required due to unforeseen circumstances, the dependable energy will decrease during low flow months and reduce annual generation and revenue. The hydraulic capacity of the powerhouse only utilizes 28% of the available river flow and as such, should not be required to provide additional bypass flows. Dissolved oxygen levels in the upper Ohio River are consistently above the state and USACE standards (See Volume 2, Exhibit E.5). Changes in Project flows and generation are not expected because of below threshold dissolved oxygen levels. Given the quality and robustness of construction that is planned, the New Cumberland Locks & Dam Hydroelectric Project will generate electricity for at least 50 years. A rigorous maintenance plan is also being prepared which should enable reliable electricity generation in perpetuity.

D.12 References

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EXHIBIT G: PROJECT MAP

Filed separately in Volume III of IV of this Application – Contains Critical Energy Infrastructure Information

PRIVILEGED AND CONFIDENTIAL
CRITICAL ENERGY INFRASTRUCTURE INFORMATION UNDER 18 CFR 388.112(B)

VOLUME 2 EXHIBIT E: ENVIRONMENTAL REPORT

Filed separately as Volume II of IV of this Application

VOLUME 3 EXHIBIT F SUPPORTING DESIGN REPORT – CONTAINS CRITICAL ENERGY INFRASTRUCTURE INFORMATION

See Volume III of IV of this Application – Contains Critical Energy Infrastructure Information

Contains Exhibit G – Project Map

PRIVILEGED AND CONFIDENTIAL

CRITICAL ENERGY INFRASTRUCTURE INFORMATION UNDER 18 CFR 388.112(B)

VOLUME 4 CULTURAL RESOURCES APPENDICIES (PRIVILEGED AND CONFIDENTIAL)

Filed separately as Volume IV of IV of this Application

Contains PRIVILIGED AND CONFIDENTIAL APPENDICES