Lake Lynn Generation, LLC
Two Bethesda Metro Center, Suite 1330
Bethesda, MD 20814

Via eFiling

August 29, 2019
Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Re: Lake Lynn Hydroelectric Project (FERC No. 2459)
Notice of Intent to File License Application, Filing of Pre-Application Document, and Request to Use the Traditional Licensing Process

Dear Secretary Bose,

Pursuant to Section 15(b)(1) of the Federal Power Act, 16 U.S.C. §808(b)(1), Lake Lynn Generation, LLC (Lake Lynn) is electronically filing with the Commission a Notice of Intent to File a License Application (NOI) for the relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459) (Project). The current license for the Project expires November 30, 2024. Accompanying the NOI is a Pre-Application Document (PAD) for the Project, and a request to use the Traditional Licensing Process (TLP).

In accordance with the Commission's regulations at 18 CFR Sections 5.5(c) and 5.6(a)(1), Lake Lynn is providing copies of the NOI and PAD via email to all affected resource agencies, Indian tribes, and potentially interested parties as set forth on the attached distribution list. As required by 18 CFR §5.3(d)(1), Lake Lynn is concurrently providing copies of the TLP Request to all affected resource agencies, Indian tribes, and potentially interested parties. For those entities where no email address is available, Lake Lynn is mailing the NOI, TLP Request, and PAD on CD.

As required by 18 CFR §5.3(d)(2), Lake Lynn is publishing notice of the TLP Request simultaneously with the publication of notice of availability of the NOI and PAD in *The Herald-Standard* and *The Dominion Post*, two daily newspapers of general circulation in the counties where the Project is located. As required by 18 CFR §5.3(d)(1), comments regarding the request to use the TLP to relicense the Project must be filed with the Commission within 30 days of this filing (by September 28, 2019) and must reference FERC Project No. 2459.

Lake Lynn understands that the Commission will issue a public notice of the NOI and PAD and issue a Notice of Commencement no later than 60 days after the filing of the NOI and PAD. If the Commission approves the use of the TLP, Lake Lynn will hold a Joint Agency Meeting and Site Visit of the Project between 30 and 60 days from the Commission's approval to use the TLP (anticipated to be in late October 2019). Parties' written comments on the PAD and study requests must be filed with the Commission, with a copy to Lake Lynn, within 60 days of the Joint Agency Meeting.

Appendix H of the PAD includes the detailed drawings of the Project works (Exhibit F drawings). Information contained in these drawings is deemed as Critical Energy Infrastructure Information (CEII) under 18 CFR §388.113 and thus Appendix H has been stricken from the public version of the PAD. Lake Lynn is filing Appendix H under the Commission's e-filing guidelines for filing CEII.

In accordance with Section 5.5(e) of the Commission's regulations, 18 CFR §5.5(e), Lake Lynn respectfully requests that the Commission authorize Lake Lynn to conduct consultation with the West Virginia State Historic Preservation Office and Pennsylvania State Historic Preservation Office, pursuant to Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. §470(f), and the NHPA implementing regulations at 36 CFR Part 800.

Pursuant to the Federal Endangered Species Act (ESA), 16 USC §1536, Lake Lynn requests that FERC designate Lake Lynn as its nonfederal representative for the Project for the purpose of informational consultation with the U.S. Fish and Wildlife Service, pursuant to Section 7 of the ESA and the joint agency ESA implementing regulations at 50 CFR Part 402.

Please do not hesitate to contact me at (804) 739-0654 or by email at jsmet@cubehydro.com if you have any questions concerning this matter.

Sincerely,
Lake Lynn Generation, LLC

Jody J Smet

Jody Smet
Director, FERC Licensing and Compliance

Attachments: Notice of Intent to File License Application
Pre-Application Document
Request to Use the Traditional Licensing Process

cc: David Fox, Lake Lynn
Joyce Foster, TRC
Distribution List

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Lake Lynn Generation, LLC   FERC Project No. 2459

NOTICE OF INTENT TO FILE
APPLICATION FOR NEW LICENSE

Pursuant to 18 CFR §5.5, Lake Lynn Generation, LLC (Licensee or Applicant) notifies the Federal Energy Regulatory Commission (Commission or FERC) of its intention to file an Application for a New License for the Lake Lynn Hydroelectric Project (Project), FERC Project No. 2459. The current Project license was issued on December 27, 1994 and expires on November 30, 2024. Accordingly, the Licensee will file an Application for New License no later than November 30, 2022.

The following information is provided consistent with the requirements of 18 CFR §5.5.

1. Existing Licensee's name and address:

Applicant's Name:	Lake Lynn Generation, LLC
Corporate Office:	2 Bethesda Metro Center, Suite 1330 Bethesda, MD 20814
Telephone:	804-739-0654

2. FERC Project Number:

The FERC Project No. is 2459.

3. License Expiration Date:

November 30, 2024

4. Unequivocal Statement of Intent:

Lake Lynn Generation, LLC intends to file an Application for New License for relicensing the Lake Lynn Project utilizing the Commission's Traditional Licensing Process (TLP). The Applicant's request and justification for using the TLP is attached hereto.

5. Principal Project Works:

The Lake Lynn Project consists of the following: (a) a 125-foot-high by 1,000-foot-long concrete gravity-type dam with a 624-foot-long spillway controlled by 26 Tainter gates, each 17 feet (ft) high by 21 ft long; (b) a reservoir with a surface area of 1,700 acres and containing about 72,000 acre-ft of water at full pool elevation of 870 ft National Geodetic Vertical Datum (NGVD); (c) a log boom and trash racks at the intake facility; (d) eight 12-foot by 18-foot gated penstocks of reinforced concrete; (e) a 72-foot by 165-foot by 68-foot-high brick powerhouse containing four identical Francis generating units with a total rated capacity of 51.2 MW; (f) dual 800-foot-long, 138-kV transmission lines; and (g) appurtenant facilities. In 2018, the Licensee completed a turbine replacement and upgrade of Unit 2.

6. Project Location:

State or Territory: West Virginia and Pennsylvania
Counties: Monongalia County, West Virginia and Fayette County, Pennsylvania
City: Morgantown, West Virginia (nearest city)
Waterway: Cheat River

7. Installed Project Capacity:

51.2 MW

8. Names and Mailing Addresses of Entities Listed in 18 CFR §5.5(b)(8):

(i) Every county in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

The Lake Lynn Project is located on the Cheat River near the City of Morgantown in Monongalia County, West Virginia and Fayette County, Pennsylvania. The Project does not use any Federal facilities and occupies no Federal lands.

County Name: Monongalia County, West Virginia
Address: 243 High Street
Morgantown, WV 26505

County Name: Fayette County, Pennsylvania
Address: 61 East Main Street
Uniontown, PA 15401

(ii.a) Every city, town, or similar political subdivision in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

The Lake Lynn Project is not located within any town or city. The Project does not use any Federal facilities and occupies no Federal lands.

(ii.b) Every city, town, or similar political subdivision that has a population of 5,000 or more people and is located within 15 miles of the existing Project dam.

Each of the following cities has a population of 5,000 or more people (2015 US Census Bureau estimates and 2010 US Census Bureau data), and is located within 15 miles of the Project dam:

City of Morgantown, West Virginia
389 Spruce Street
Morgantown, WV 26505

City of Uniontown, Pennsylvania
20 North Gallatin Avenue
Uniontown, PA 15401

Georges Township, Pennsylvania
Municipal Building
1151 Township Drive
Uniontown, PA 15401

North Union Township, Pennsylvania
North Union Township Town Office
7 South Evans Station Road
Lemont Furnace, PA 15456

South Union Township, Pennsylvania
Supervisors Office
151 Township Drive
Uniontown, PA 15401

(iii.a) Every irrigation district, drainage district, or similar special purpose political subdivision in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

There are no irrigation districts, drainage districts, or similar special purpose political subdivisions that meet these criteria. The Project does not use any Federal facilities and does not occupy any Federal lands.

(iii.b) Every irrigation district, drainage district, or similar special purpose political subdivision that owns, operates, maintains, or uses any Project facility or any Federal facility that is or is proposed to be used by the Project.

There are no irrigation districts, drainage districts, or similar special purpose political subdivisions that meet these criteria. The Project does not use any Federal facilities and does not occupy any Federal lands.

(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, this notification.

Other political subdivisions in the general area of the Project that there is reason to believe would likely be interested in or affected by this NOI include:

Borough of Point Marion, Pennsylvania
426 Morgantown Street
Point Marion, PA 15474

Springhill Township
198 Lake Lynn Road
Lake Lynn PA 15451

(v) Affected Indian Tribes.

FERC has identified the following Tribes as potentially affected Tribes:

Delaware Nation, Oklahoma
Delaware Tribe of Indians
Osage Nation

The Licensee has identified the following Tribes in addition to those identified by FERC which may have an interest in the Project area, which have been included on the Project Distribution List:

Absentee-Shawnee Tribe of Oklahoma
Cayuga Nation
Cherokee Nation
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Oneida Indian Nation
Oneida Indian Nation of Wisconsin
Onondaga Nation
Seneca-Cayuga Tribe of Oklahoma
Seneca Nation of Indians
Shawnee Tribe
Stockbridge-Munsee Band of the Mohican Nation of Wisconsin
St. Regis Mohawk Tribe
Tonawanda Band of Seneca
Tuscarora Nation
United Keetoowah Band of Cherokee Indians in Oklahoma

See attached Project mailing list for addresses.

(vi) Other interested resource agencies or stakeholders.

See attached Project mailing list.

LAKE LYNN HYDROELECTRIC PROJECT
FERC PROJECT NO. 2459
REQUEST TO USE THE TRADITIONAL LICENSING PROCESS

Lake Lynn Generation, LLC (Licensee or Lake Lynn), Licensee for the Lake Lynn Hydroelectric Project (Project), is including in this filing a request to use the Federal Energy Regulatory Commission's (FERC or Commission) Traditional Licensing Process (TLP) to relicense the Project. Justification for this request, as required by 18 CFR §5.3, is provided below. Any comments on this request to use the TLP must be filed with the Commission within 30 days of the filing date of this request with FERC, by September 28, 2019.

(A) Likelihood of Timely License Issuance

Through use of the TLP, Lake Lynn anticipates that FERC will be able to complete the timely issuance of a new Project license. Many of the resource agencies and stakeholders who will participate in the Project relicensing are already familiar with the Project and are involved with the ongoing implementation of protection, mitigation, and enhancement (PM&E) measures under the existing License. In accordance with the existing FERC License, Lake Lynn has been surveying shoreline erosion, conducting biomonitoring activities, monitoring water quality, and collecting recreation use data since the issuance of the existing FERC License in 1994.

Through outreach during the development of the Pre-Application Document (PAD), Lake Lynn, resource agencies, and other stakeholders have already begun identifying potential issues related to the relicensing. There are a limited number of issues that are likely to be raised at the Project. The stakeholders' familiarity with the Project and the amount of available data should allow for the timely issuance of the Project license on or before the expiration date of the existing license.

As described in Section 2 (Process Plan and Schedule) of the PAD for the Project, Lake Lynn intends to complete and distribute the Draft License Application for the Project by November 30, 2021. This schedule will allow Lake Lynn sufficient time to consult with the resource agencies and other stakeholders regarding study plans, collect and analyze the necessary field data, and incorporate the study results into the Final License Application.

(B) Complexity of the Resource Issues

The proposed Project is an existing FERC-licensed project of a conventional hydro design that has well-known and understood minimal impacts. The Project was last relicensed in 1994 and underwent a full environmental review at that time. In accordance with the existing License, the Licensee has been monitoring and evaluating potential Project impacts over the past 24 years which has produced an extensive amount of available resource information.

The Project continues to operate as a dispatchable peaking hydroelectric facility with storage capability. The existing FERC License requires that the Licensee operate the Project to maintain

Cheat Lake between 868 and 870 feet (ft) National Geodetic Vertical Datum (NGVD) from May 1 through October 31, between 857 and 870 ft from November 1 to March 31 and between 863 ft and 870 ft from April 1 to April 30, each year. The existing FERC License requires the Licensee release a minimum flow of 212 cubic feet per second (cfs) from the dam with an absolute minimum flow of 100 cfs regardless of inflow.

Lake Lynn does not expect the resource issues to be complex since no changes to Project facilities or operations are proposed. Due to the extensive information that has been collected at the Project over the past 24 years and the limited geographic scope of the potential Project impacts, a relatively straightforward relicensing process is envisioned to generate the information needed to support the development of a complete license application. A list of identified resource issues and how these would be addressed in the study program is included in Section 6 of the PAD.

Lake Lynn believes that any additional remaining resource issues will be identified through the Joint Agency Public Meeting and Site Visit, which is proposed to be held in December 2019 in the vicinity of the Project, and through subsequent consultation activities. All interested parties on the attached mailing list will be invited to attend the Joint Agency Public Meeting and Site Visit and a notice will be published in a newspaper of general circulation for each county in which the Project is located.

(C) Level of Anticipated Controversy

Many of the resource agencies and stakeholders that will be involved in the Project relicensing are already familiar with the Project and involved with the implementation of ongoing resource monitoring and implementation of PM&E measures. Consultation with Project stakeholders has been steady throughout the implementation of the existing License, and Lake Lynn expects this will continue seamlessly through relicensing and into implementation of a new License. Based on PAD due diligence, Lake Lynn anticipates relicensing issues will include potential impacts to aquatic habitats, recreational access, lake carrying capacity, and shoreline management. Lake Lynn is not anticipating a large number of new stakeholders or interest in the relicensing process beyond the resource agencies and others who have been involved with the implementation of the PM&E measures under the existing License. Lake Lynn anticipates limited controversy associated with the relicensing of the Project.

Given the low complexity of issues already identified at the Project, it is not currently anticipated that the relicensing process will result in any significant controversy that cannot be resolved within the TLP. Lake Lynn believes that the TLP will enable it to reach agreement with the resource agencies and stakeholders on PM&E measures for the Project, as may be determined necessary.

In addition, during the development of the PAD, Lake Lynn requested comments on the use of the TLP. No one objected to or raised concerns about the use of the TLP. The Pennsylvania Fish and Boat and Commission (PFBC) supported the use of the TLP (see Appendix B of the PAD).

(D) Relative Cost of the Traditional Process Compared to the Integrated Process

Lake Lynn believes that the TLP is the most efficient relicensing process to use for the Lake Lynn Project. Given the extensive amount of existing information and data available on Project resources that has been collected in accordance with the existing FERC License, the limited geographic scope of the Project boundary, the limited number of anticipated issues, and the low level of controversy anticipated, Lake Lynn believes that the TLP is better suited to the Project from a cost standpoint than the Integrated Licensing Process (ILP). Experience to date at other Projects nationwide demonstrates that the ILP is more costly to licensees and stakeholders compared to the TLP. Lake Lynn believes that given the circumstances at this Project and the current involvement of resource agencies and stakeholders in the PM&E measures implemented under the existing FERC License, the TLP will be more efficient than the ILP. Lake Lynn will continue to consult with the resource agencies and other stakeholders regularly throughout relicensing, especially during critical phases in the process, such as study planning and implementation.

The TLP is also likely to be more efficient for the resource agencies and stakeholders expected to participate in the relicensing since many of the resource agencies are currently involved in the ongoing monitoring efforts under the existing FERC License. Additionally, the timelines and more flexible nature of the TLP will provide Lake Lynn, resource agencies, and stakeholders more flexibility to schedule meetings and develop pre-filing documentation. This flexibility will better allow all parties to coordinate these activities with the ongoing monitoring efforts and associated activities under the existing FERC License. Such flexibility will help reduce the overall cost of the relicensing effort for the Licensee, resource agencies, and stakeholders.

Use of the ILP for this Project would be expected to result in significantly greater and unnecessary expenditures by all parties to support the more formal and complex ILP study scoping process and the additional documentation required by the ILP.

(E) The Amount of Available Information and Potential for Significant Disputes over Studies

The Project was most recently relicensed in 1994 and underwent a full environmental review at that time. As described in detail in the PAD and briefly summarized below, the Licensee has been conducting various, ongoing resource monitoring efforts over the past 24 years. These monitoring efforts have produced an extensive amount of Project data:

- Shoreline Erosion Surveys
  - Initial erosion survey conducted along the entire Cheat Lake shoreline in 1995 with follow-up shoreline erosion surveys every three years.
  - Annual shoreline erosion surveys of the Cheat Lake Park shoreline.

- Water Quality Monitoring
  - Since 1997, hourly DO, pH, water temperature, and conductivity have been recorded from April 1 through October 31 every year.
- Biomonitoring
  - Numerous aspects of fish and aquatic resources have been monitored in consultation with U.S. Department of Interior, West Virginia Division of Natural Resources, and PFBC since 1997 (see Table 5.9 in the PAD for a detailed summary of these efforts).
- Recreation Use Data
  - Recreation use data was collected from 2000 through 2017.
  - Recreation use data collection is planned for 2020 in accordance with the 2018 Recreation Plan Update.

It is anticipated the PAD will provide resource agencies and stakeholders with the information necessary to clarify any Project related issues or concerns, and to identify any additional study or data needs to be addressed by Lake Lynn through the TLP.

It is Lake Lynn's intent to conduct its pre-filing consultation in a manner that addresses and resolves, to the extent possible, any differences of opinion with regard to the design and implementation of any necessary studies. Given the productive exchange of data to date under the existing FERC License and the collective understanding of the relative scope of potential impacts that need to be studied, Lake Lynn does not anticipate significant disputes over any necessary studies.

(F) Other Factors Believed by the Applicant to be Pertinent

In conclusion, Lake Lynn believes that for the relicensing of this relatively small, straightforward Project, the TLP will provide the most efficient, effective, and least burdensome process for relicensing the Project. For all of the foregoing reasons, Lake Lynn respectfully requests that the Commission grant this request and authorize Lake Lynn to use the TLP for the relicensing of the Project. Lake Lynn believes that this justification provides good cause for the Commission to grant this request to use the TLP and appreciates the Commission's consideration of this request.

As required by 18 CFR §5.3(d)(1), Lake Lynn is concurrently providing copies of this request to all affected resource agencies, Indian tribes, and potentially interested parties. As required by 18 CFR §5.3(d)(2), Lake Lynn is publishing notice of this request simultaneously with the publication of notice of availability of the NOI and PAD in *The Herald-Standard* and *The Dominion Post*, two daily newspapers of general circulation in the counties where the Project is located.

CERTIFICATE OF SERVICE

I hereby certify that I caused to be served, either by U.S. First Class Mail or by electronic mail, the Notice of Intent to File Application for New License upon all interested parties designated on the attached service list in the Lake Lynn Project, Project No. 2459, in accordance with Rule 2010 of the Rules of Practice and Procedure, 18 CFR §385.2010.

August 29, 2019

Jody J Smet

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Jody Smet
Director, FERC Licensing and Compliance
Lake Lynn Generation, LLC

LAKE LYNN HYDROELECTRIC PROJECT, FERC No. 2459
INTERESTED PARTIES MAILING LIST

Lake Lynn Generation, LLC
Lake Lynn Project (P-2459)
Distribution List

ELECTED OFFICIALS

Governor Jim Justice
West Virginia Office of the Governor
State Capitol
1900 Kanawha Blvd. E
Charleston, WV 25305

Patrick Morrisey
West Virginia Office of the Attorney General
State Capitol Complex, Bldg. 1, Room E-26
Charleston, WV 25305

The Honorable Joe Manchin III
United States Senate
306 Hart Senate Office Building
Washington D.C. 20510

The Honorable Shelley Capito
United States Senate
172 Russell Senate Office Building
Washington, DC 20510

The Honorable David McKinley
United States House of Representatives
2239 Rayburn HOB
Washington, DC 20515

Governor Tom Wolf
Commonwealth of Pennsylvania
Office of the Governor
508 Main Capitol Building
Harrisburg, PA 17120

Josh Shapiro
Pennsylvania Office of the Attorney General
16th Floor, Strawberry Square
Harrisburg, PA 17120

The Honorable Pat Toomey
United States Senate
248 Russell Senate Office Building
Washington, DC 20510

The Honorable Bob Casey
United States Senate
393 Russell Senate Office Building
Washington, DC 20510

The Honorable Guy Reschenthaler
United States House of Representatives
531 Cannon House Office Building
Washington, DC 20515

FEDERAL AGENCIES

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Chesapeake Bay Field Office
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Director
Federal Emergency Management Agency
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Washington, DC 20472

STATE

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West Virginia Division of Natural Resources
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Susan Pierce
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West Virginia Division of Culture and History
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Charleston, WV 25305
susan.m.pierce@wv.gov

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Regional Director, Southwest Regional Office
Pennsylvania Department of Environmental Protection
400 Waterfront Drive
Pittsburgh, PA 15222-4745

Secretary Cindy Adams Dunn
Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
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Harrisburg, PA 17105

Heather Smiles
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Pennsylvania Fish and Boat Commission
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Olivia Braun
Pennsylvania Game Commission
2001 Elmerton Avenue
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Cheryl Nagle
PA Historical and Museum Commission
State Historic Preservation Office
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Harrisburg, PA 17120-0093
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MUNICIPAL

Rennetta McClure
County Administrator
Monongalia County Commission
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rmcclure@moncommission.com

Vincent Vicites
Chairman, County Commissioner
Fayette County, PA
61 East Main Street
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vvicites@fayettepa.org

Albert Gallatin Municipal Authority
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Point Marion, PA 15474-0211

Borough of Point Marion, PA
426 Morgantown Street
Point Marion, PA 15474

Springhill Township
198 Lake Lynn Rd.
Lake Lynn PA 15451

TRIBAL

US Bureau of Indian Affairs
Eastern Regional Office
545 Marriott Drive, Suite 700
Nashville, TN 37214

Absentee-Shawnee Tribe of Oklahoma
Edwina Butler-Wolfe, Governor
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Shawnee, OK 74801

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Delaware Nation, Oklahoma
Deborah Dotson, President
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Delaware Tribe of Indians
Chester "Chet" Brooks, Chief
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Bartletsville, OK 74006
cbrooks@delawaretribe.org

Eastern Shawnee Tribe of Oklahoma
Glenna Wallace, Chief
PO Box 350
Seneca, MO 64865

Oneida Indian Nation
Raymond Halbritter, Nation Representative
2037 Dream Catcher Plaza
Oneida, NY 13421
info@oneida-nation.org

Oneida Indian Nation of Wisconsin
Tehassi Hill, Chair
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N7210 Seminary Rd
Oneida, WI 54155-0365

Onondaga Nation
Sidney Hill, Chief
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Nedrow, NY 13120
admin@onondaganation.org

Osage Nation
Geoffrey Standing Bear, Principal Chief
627 Grandview Avenue
PO Box 779
Pawhuska, OK 74056

Seneca Nation of Indians
Rickey Amstrong, Sr., President
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Salamanca, NY 14779

Seneca-Cayuga Tribe of Oklahoma
William L. Fisher, Chief
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wfisher@sctribe.com

Shawnee Tribe
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Miami OK 74355
cassie@shawnee-tribe.com

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

Stockbridge-Munsee Band of the Mohican Nation of Wisconsin
Shannon Holsey, Tribal President
N8476 MohHeConNuck Road
Bowler, WI 54416
shannon.holsey@mohican-nsn.gov

Tonawanda Band of Seneca
Roger Hill, Chief
P.O. Box 795
7027 Meadville Road
Basom, NY 14013
tonseneca@aol.com

Tuscarora Nation
Leo Henry, Chief
2006 Mt. Hope Road
Lewiston, NY 14092

Eastern Band of Cherokee Indians
Richard Sneed, Principal Chief
P.O. Box 1927
Cherokee, NC 28719

Cherokee Nation
Principal Chief Bill John Baker
P.O. Box 948
Tahlequah, OK 74465

United Keetoowah Band of Cherokee Indians in Oklahoma
Chief Joe Bunch
P.O Box 746
Tahlequah, OK 74465

Absentee-Shawnee Tribe of Oklahoma
Devon Frazier, THPO
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Oneida Indian Nation
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Oneida Indian Nation Legal Dept.
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Oneida Indian Nation of Wisconsin
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N7210 Seminary Rd
Oneida, WI 54155-0365

Onondaga Nation
Tony Gonyea, Faithkeeper 4040
Route 11
Administrative Building
Nedrow, NY 13120

Osage Nation
Dr. Andrea Hunter, THPO
627 Grandview Avenue
Pawhuska, OK 74056

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St. Regis Mohawk Tribe
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Stockbridge-Munsee Band of the Mohican
Nation of Wisconsin
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LAKE LYNN GENERATION, LLC

PRE-APPLICATION DOCUMENT
FOR THE LAKE LYNN HYDROELECTRIC PROJECT
(FERC No. 2459)

Submitted by:

Lake Lynn Generation, LLC
2 Bethesda Metro Center, Suite 1330
Bethesda, Maryland 20814

Prepared by:

TRC
Richmond, Virginia

August 2019

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

ADA	Americans with Disabilities Act
AE	Allegheny Energy Supply Co. LLC
Allegheny	Allegheny Power Service Corporation
AMD	Acid Mine Drainage
BBC	Brooks Bird Club
BCC	Bird of Conservation Concern
BIA	Bureau of Indian Affairs
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CLEAR	Cheat Lake Environment and Recreation Association
Commission	Federal Energy Regulatory Commission or FERC
CPDC	Commonwealth of Pennsylvania Department of Conservation
CPUE	Catch per unit of effort
CRGIS	Cultural Resources Geographic Information System
CSRV	Cumberland and Southern Ridge Valley
CWA	Clean Water Act
DLA	Draft License Application
DOI	United States Department of Interior
DSSMP	Dam Safety Surveillance and Monitoring Plans
DSSMR	Dam Safety Surveillance and Monitoring Reports
EA	Environmental Assessment
EA Engineering	EA Engineering, Science, and Technology, Inc.
eDNA	Environmental DNA
EFH	Essential Fish Habitat
^{o}F	Fahrenheit
FERC	Federal Energy Regulatory Commission or Commission
FFPC	Free Flow Power Corporation
FLA	Final License Application
FOIA	Freedom of Information Act
FOC	Friends of the Cheat
FPA	Federal Power Act
ft	Feet
IPaC	Information for Planning and Conservation
kV	Kilovolt
Lake Lynn	Lake Lynn Generation, LLC or Licensee

DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

License Application	Application for New License submitted to FERC no less than two years in advance of expiration of an existing license.
Licensee	Lake Lynn Generation, LLC or Lake Lynn
LSA	Land Scope America
Marshall	Marshall University
MONCPC	Monongalia County Comprehensive Planning Commission
MS	Microsoft
MW	Megawatt
MWh	Megawatt hours
N.D.	No Date
NGO	Non-governmental Organization
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	United States Department of Agriculture Natural Resources Conservation Service
NRHP	National Register of Historic Places
NVA	Nature Viewing Area
NWI	National Wetlands Inventory
NWSRS	National Wild and Scenic Rivers System
OTC	Oxytetracycline
PAD	Pre-Application Document
PADCNR	Pennsylvania Department of Conservation and Natural Resources
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PHMC	Pennsylvania Historical and Museum Commission
PM&E	Protection, mitigation, and enhancement
PNDI	Pennsylvania Natural Heritage Inventory
PNHP	Pennsylvania Natural Heritage Program
POTW	Publicly Owned Treatment Works
Project	Lake Lynn Hydroelectric Project FERC Project No. 2459
Relicensing Participants	Individuals and entities that are actively participating in a proceeding.
RMP	Recreation Management Plan
RTE	Rare, threatened, and endangered

DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

SCORP	State Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Office
TLP	Traditional Licensing Process
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USACEPD	United States Army Corps of Engineers Pittsburgh District
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WVDACH	West Virginia Department of Arts, Culture and History
WVDCTR	West Virginia Department of Commerce Travel and Recreation
WVDEP	West Virginia Department of Environmental Protection
WVDNR	West Virginia Division of Natural Resources
WVDO	West Virginia Development Office
WVExplorer	West Virginia Explorer
WVGES	West Virginia Geological and Economic Survey
WVSHPO	West Virginia State Historic Preservation Office
WVSP	West Virginia State Parks
WVU	West Virginia University
WWF	Warm Water Fishes

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1.0 INTRODUCTION

The Licensee, Lake Lynn Generation, LLC (Lake Lynn), hereby files with the Federal Energy Regulatory Commission (FERC or Commission) the required Notice of Intent (NOI) and Pre-Application Document (PAD) for relicensing the existing Lake Lynn Hydroelectric Project (Project) (FERC Project No. 2459). The Project is located on the Cheat River on the Pennsylvania and West Virginia border and is operated to produce hydroelectric power.

Accompanying the NOI for this relicensing is Lake Lynn's request to FERC to use FERC's Traditional Licensing Process (TLP). As required by FERC regulations (18 Code of Federal Regulations [CFR] §5.3), this PAD is being filed simultaneously with the NOI and the request to use the TLP. The PAD will be distributed to state and federal resource agencies, local governments, Native American tribes, and members of the public likely to be interested in the relicensing (collectively, Relicensing Participants), which are listed in Appendix A. In accordance with 18 CFR §5.3(d)(2), the Licensee will publish notice of the filing of the NOI, PAD, and the request to use the TLP no later than the filing date in a newspaper of general circulation in each county in which the Project is located.

The PAD summarizes the engineering, operational, socioeconomics, and environmental information pertaining to the Project that is reasonably available at the time the NOI is filed. The PAD supplies information to help identify and evaluate potential impacts to Project area resources resulting from continued Project operation. This evaluation will be documented in the License Application to be prepared by Lake Lynn and filed with FERC.

In compliance with FERC's regulations governing the content of the PAD, Lake Lynn has contacted appropriate state and federal resource agencies, Native American tribes, and interested public parties who may have an interest with the Project's relicensing and requested any relevant information, studies, and data on topics such as water quality, fisheries, wetlands, wildlife, recreation, and cultural resources. Appendix B contains the complete record of stakeholder outreach and agency consultation in support of the preparation of this PAD.

As set forth in 18 CFR §5.8, FERC will issue a public notice for the NOI, PAD, and TLP request within 60 days of Lake Lynn's filing of this NOI and PAD. A joint meeting will be held 30-60 days following FERC's public notice. The joint meeting will provide Relicensing Participants the opportunity to better understand the Project and to engage in a questions and answer session with Lake Lynn.

1.1 Background

The Project is located on the Cheat River, in Monongalia County, West Virginia near the City of Morgantown, and in Fayette County, Pennsylvania near the Borough of Point Marion, Pennsylvania. The Project currently operates under a license issued by FERC that expires November 30, 2024. In accordance with FERC regulations, the Licensee must file an application for new license for the Project on or before November 30, 2022.

1.2 Agent for the Licensee

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

Jody Smet
Lake Lynn Generation, LLC
2 Bethesda Metro Center, Suite 1330
Bethesda, Maryland 20814
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Tel: 804-739-0654

David Fox
Lake Lynn Generation, LLC
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Bethesda, Maryland 20814
dfox@cubehydro.com
Tel: 240-482-2707

Copies of all relicensing correspondence should also be sent to:

Joyce Foster
TRC Companies
179 Clarks Lane
Aylett, Virginia 23009
jfoster@trccompanies.com
Tel: 804-769-1667

1.3 PAD Content

This PAD follows the content and form requirements of 18 CFR §5.6 (c) and (d), with minor changes in format for enhanced readability. The PAD contains all the information required by 18 CFR §5.6 (c) and (d) for distribution to state and federal resource agencies, local governments, Native American tribes, non-governmental organizations (NGOs), members of the public, and others likely to be interested in the relicensing proceeding. Appendix H of the PAD contains drawings of Project works (Exhibit F drawings) that meet the definition of Critical Energy Infrastructure Information (CEII) as defined in 18 CFR §388.113. Consistent with FERC's CEII regulations, Appendix H has been removed from the public version of the PAD and the Licensee is separately filing Appendix H under the Commission's e-filing guidelines for CEII.

The PAD is organized as follows:

Table of Contents; List of Tables; List of Figures; List of Appendices; and Definitions of Terms, Acronyms, and Abbreviations.

Section 1.0 – Introduction and Background Information.

Section 2.0 – Process Plan and Schedule, Communications Protocol, and TLP Flow Chart.

Section 3.0 – General Description of the Watershed, per 18 CFR §5.6(d)(3)(xiii).

Section 4.0 – Description of Project Location, Facilities, and Operation, per 18 CFR §5.6(d)(2).

Section 5.0 – Description of the Existing Environment by Resource Area, per 18 CFR §5.6(d)(3)(ii)-(xii).

Section 6.0 – Description of Project Effects, Issues, Study and Information Needs, Resource Measures, and Existing Plans, per 18 CFR §5.6(d)(3) and (4).

Appendices

1.4 References

None.

2.0 PLANS, SCHEDULE AND PROTOCOLS

FERC's regulations provide hydropower licensees with process options for the relicensing of existing projects. Accompanying this PAD is the NOI to relicense the Lake Lynn Project. The Licensee is also requesting use of the TLP for this relicensing proceeding. For relicenses the TLP requires applicants to complete and document a three-stage pre-filing consultation process as described in 18 CFR §16.8. The steps include:

First Stage

- Applicant issues NOI, PAD, request to use TLP, and newspaper notice;
- Commission approves use of TLP;
- Applicant conducts joint meeting and site visit;
- Resource agencies and tribes provide written comments; and
- Agencies, tribes, or applicant request dispute resolution on studies with the Commission.

Second Stage

- Applicant completes reasonable and necessary studies;
- Applicant provides Draft License Application (DLA) and study results to resource agencies and tribes;
- Resource agencies, tribes, and Relicensing Participants comment on the DLA; and
- Applicant conducts meeting if substantive disagreements exist.

Third Stage

- Applicant files Final License Application (FLA) with Commission and sends copies to agencies and tribes.

The TLP requires that federal, state, and local agencies, Native American tribes, NGOs, and the public be consulted. The TLP can also be enhanced to allow more interaction between the Licensee and Relicensing Participants than the regulations require. The TLP also requires that the Licensee document the entire process including any information received from agencies, tribes or other Relicensing Participants, as well as records of communications. To keep Relicensing Participants informed of the process, the Licensee will maintain records of the relicensing and other information, which, with the exception of CEII, which will be available to the public upon written request to the Licensee Agent.

2.1 Process Plan and Schedule Through Filing of the License Application

Figure 2.1 FERC Traditional Licensing Process Flow Chart, prepared by FERC, illustrates the major milestones in the TLP pursuant to 18 CFR §16.8. The Licensee's proposed TLP Schedule is shown in Table 2.1 and Appendix C.

The FLA must be filed no later than two years before license expiration (i.e., by November 30, 2022), but may be filed earlier. Because there is some adaptability in the dates given, the TLP Process Plan and Schedule is subject to change throughout the relicensing process.

As noted in Section 1.0, FERC will issue a public notice and comment on the NOI, PAD, and TLP request within 30 days of Lake Lynn's filing of this PAD. A joint meeting will be held 30-60 days following FERC's public notice.

2.2 Proposed Communications Protocols

The Licensee anticipates that the primary means of communication will be meetings, formal documents, email, and telephone. The contact information for the Licensee is provided in Sections 1.2 and 2.2.3.

2.2.1 General Communications

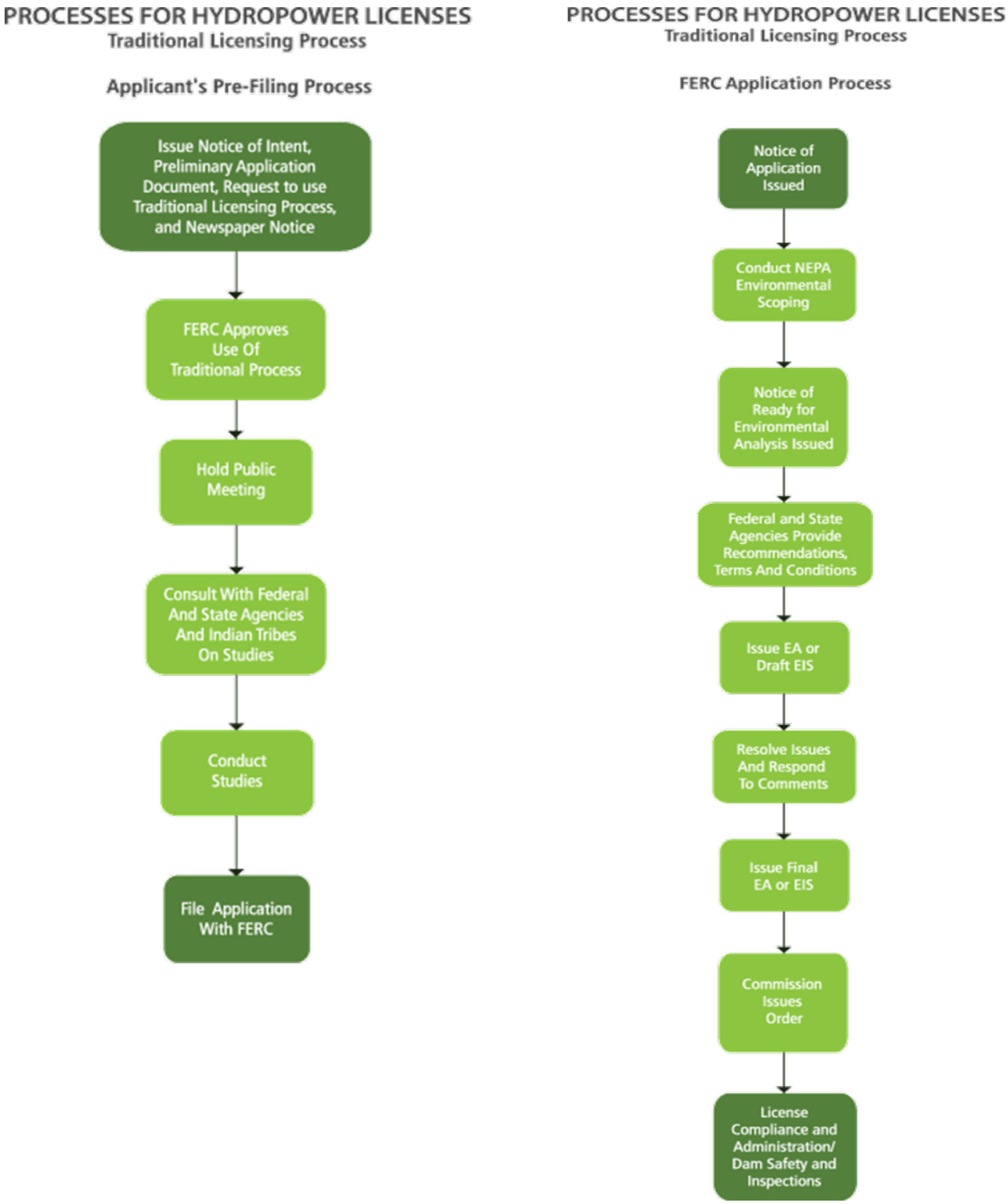
Communications include the distribution of documents, written correspondence, emails, and notes from individual and conference telephone calls. The Licensee's goal is to keep open communications during the relicensing process and provide Relicensing Participants with easy access to information related to the relicensing.

Table 2.1. Relicensing Schedule Using the Traditional Licensing Process for the Lake Lynn Project

Activity	Responsibility	Timeframe and Regulations	Dates[1]
File NOI, PAD, and Request to use TLP and publish Public Notice in newspaper	Lake Lynn	5 to 5½ years prior to license expiration	August 29, 2019
File verification of Public Notice with FERC	Lake Lynn	Within two weeks of filing the NOI, PAD, and Request to use the TLP	September 12, 2019
Comments on TLP Request	FERC, Relicensing Participants	Within 30 days of NOI/PAD/TLP request filing and newspaper notice	September 28, 2019
FERC issues Notice of Commencement	FERC	Within 60 days of PAD/NOI/TLP request filing	October 28, 2019
FERC approves use of TLP	FERC	Within 60 days of PAD/NOI/TLP request filing	October 28, 2019
Notify FERC of Joint Meeting and publish Notice in newspaper	Lake Lynn	At least 15 days in advance of meeting	November 19, 2019
Joint Meeting for consultation with agencies, tribes and interested public	Lake Lynn	30-60 days following FERC approval of TLP	December 4, 2019
Comments and Study Requests	Relicensing Participants	Due 60 days after Joint Meeting	February 2, 2020
Study Plan Development	Lake Lynn	Ongoing following Joint Meeting	December 5-March 1, 2020
Conduct Field Studies	Lake Lynn	One season of field studies	April 1-November 1 2020
DLA and Study Results	Lake Lynn	Produced following conclusion of studies	November 30, 2021
Comments on DLA	Relicensing Participants	90-day comment period	February 28, 2022
FLA filed with FERC	Lake Lynn	2 years prior to license expiration	November 30, 2022
FERC issues Public Notice of Application	FERC	Within 14 days of FLA submittal	December 14, 2022
FERC Issues New License on or before License Expiration Date	FERC		November 30, 2024

[1] If the due date falls on a weekend or a holiday, the due date is the subsequent business day.

Figure 2.1. FERC Traditional Licensing Process Flow Chart



Source: FERC, 2005a and FERC, 2005b

2.2.2 Meetings

The Licensee recognizes there are several agencies, tribes, groups and individuals that may want to participate in the relicensing process. The Licensee will work with Relicensing Participants to develop meeting and site visit schedules that include practical locations and times to accommodate the majority of participants. In general, the Licensee will schedule meetings and site visits between the hours of 9:00 a.m. and 5:00 p.m. and meetings near Morgantown, West Virginia.

To the extent possible, the Licensee will notify Relicensing Participants at least two weeks in advance of the next planned meeting. At that time, the Licensee will provide a meeting agenda via email and/or by mail. The Licensee will also distribute any documents or other information that will be the subject of meeting discussions.

2.2.3 Documents

The Licensee will maintain copies of all mailing lists, announcements, notices, communications, and other documents related to the relicensing of the Project, which will be available upon request from the Licensee's Agent. Anyone may obtain documents by contacting Jody Smet, Lake Lynn Generation, LLC, 2 Bethesda Metro Center, Suite 1330, Bethesda, Maryland 20814; by telephone at (804) 739-0654; or by email at jsmet@cubehydro.com.

The Licensee prefers to receive or distribute all documents electronically in either PDF or an appropriate Microsoft (MS) Office format. Email electronic documents to jsmet@cubehydro.com. Hard copy documents may be mailed to Jody Smet, Lake Lynn Generation, LLC, 2 Bethesda Metro Center, Suite 1330 Bethesda, Maryland 20814. All applicable documents received will be incorporated into the consultation record for the relicensing and made available for distribution to the public.

2.2.3.1 Restricted Documents

Certain Project-related documents are restricted from public viewing in accordance with FERC regulations as CEII. CEII (18 CFR §388.113) information is anything related to the design and safety of dams and appurtenant facilities, and that information which is necessary to protect national security and public safety, are restricted. Anyone seeking CEII information should file a CEII request with FERC. FERC's website at https://www.ferc.gov/legal/ceii-foia/ceii/eceii.asp contains additional details related to CEII requests.

Information related to protecting sensitive archaeological or other culturally important information is restricted under Section 106 of the National Historic Preservation Act and is filed with FERC as Privileged. Anyone seeking this information must file a Freedom of Information Act (FOIA) request with FERC. Instructions for FOIA are available on FERC's website at https://www.ferc.gov/legal/ceii-foia/foia.asp.

2.2.3.2 Study Requests

In developing the PAD, the Licensee has collected and summarized readily available information regarding the Lake Lynn Project and its effects on the human and natural environments. In addition, since the Project was relicensed in 1994, the license application prepared by a previous Licensee and the Environmental Assessment (EA) prepared by FERC, in conjunction with the subsequent resource monitoring conducted by the Licensee since the License was issued, contain significant information regarding Project resources and the effects of Project operations on those resources. The Licensee has relied on this information and has updated it, where possible, to reflect changes in resource conditions and updated information since 1994. The PAD indicates areas where environmental resource information is missing or may require updating with respect to the licensing of the Project. In those cases, Relicensing Participants may request reasonable and necessary studies or investigations. The FERC relicensing process requires specific information from parties requesting studies related to the relicensing. Requested studies must be reasonable and necessary and must conform to FERC’s study criteria as specified in 18 CFR §5.9(b) of FERC's regulations. The criteria require that a study request must:

- Describe the goals and objectives of each study proposal and the information to be obtained;
- If applicable, explain the relevant resource management goals of the agencies or tribes with jurisdiction over the resource to be studied;
- If the requestor is a not resource agency, explain any relevant public interest considerations in regard to the proposed study;

- Describe existing information concerning the subject of the study proposal, and the need for additional information;
- Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements;
- Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge; and
- Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

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

Study requests must be filed with FERC within 60 days following the site visit and joint meeting. In addition, Relicensing Participants should email study requests in MS Word or PDF format to Jody Smet at jsmet@cubehydro.com.

2.2.3.3 Document Distribution

Whenever possible, the Licensee will distribute all documents electronically in standard MS Word or PDF format. Some documents may be distributed in hard copy for convenience or by request. Distribution of information will follow the guidelines presented in (Table 2.2).

Table 2.2. Project Relicensing Document Distribution

Document	Method	Distribution
PAD Letter of Inquiry	Email or U.S. Mail	Agencies and NGOs
NOI, TLP Request, and PAD	Email or U.S. Mail	Agencies, Municipalities, and Relicensing Participants
Joint Meeting Notice	Initial meetings by Email or U.S. Mail, Newspapers. Thereafter by Email or U.S. Mail, and/or newspaper	Interested Parties
Meeting Agendas	Email or U.S. Mail	Relicensing Participants
Meeting Summaries	Email or U.S. Mail	Relicensing Participants
DLA	Email or U.S. Mail	Relicensing Participants
PAD support documents	Email or U.S. Mail; available at Licensee's office	On Request

2.2.3.4 Mailing Lists

A mailing list of all Relicensing Participants will be used throughout the relicensing process (Appendix A). The list will include either or both standard U.S. Post Office addresses and available email addresses for distributing notices and documents for public review (Table 2.3).

After the Licensee files the FLA (scheduled for 2022), FERC will establish an official Service List (Table 2.3) for parties who formally intervene in the proceeding at that time. Intervention is a formal legal process in the FERC regulations. Additional information may be found on FERC's website at https://www.ferc.gov. Once FERC establishes a Service List, any written documents filed with FERC must also be sent by the originator to the Service List. A Certificate of Service must be included with documents filed with FERC.

Table 2.3. Project Relicensing Mailing List

Entity	Type	Description
FERC and Licensee	Project Mailing List	A mailing list of Relicensing Participants, which will be used throughout the relicensing proceedings for the Project.
FERC	Project Service List	A mailing list of parties that have formally intervened in the relicensing proceeding, prepared and maintained by FERC after it accepts the License Application.

2.2.4 Telephone

The Licensee anticipates that routine telephone calls among Relicensing Participants will be treated informally, with no specific documentation.

It is anticipated that FERC will distribute to the Project mailing list summaries of any substantive telephone calls in which it participates prior to acceptance of the License Application. FERC will provide prior public notice of any substantive or decisional telephone calls in which it participates after the Commission formally accepts the License Application.

2.3 References

Federal Energy Regulatory Commission (FERC). 2005a. Traditional Licensing Process Applicant's Pre-Filing Process Flowchart. [Online] URL: https://www.ferc.gov/resources/processes/flow/hydro-1.asp.

Federal Energy Regulatory Commission (FERC). 2005b. Traditional Licensing Process FERC Application Process Flowchart. Available online: https://www.ferc.gov/resources/processes/flow/hydro-2.asp.

3.0 GENERAL DESCRIPTION OF WATERSHED

3.1 Overview

The Lake Lynn Project is located on the Cheat River in Monongalia County, West Virginia, and Fayette County, Pennsylvania. The Cheat River is an 84-mile-long tributary of the Monongahela River, a 128-mile-long river located on the Allegheny Plateau in north-central West Virginia and southwestern Pennsylvania. The Project is located about 3.7 miles upstream of the confluence with the Monongahela River.

The entire 128 miles of the Monongahela River is controlled and maintained for navigation by a series of nine locks and dams owned and operated by the United States Army Corps of Engineers (USACE) (FERC, 2016). Four of these dams (Opekiska, Hildebrand, and Morgantown in West Virginia and Point Marion in Pennsylvania) are located on the Monongahela River upstream of the confluence with the Cheat River.

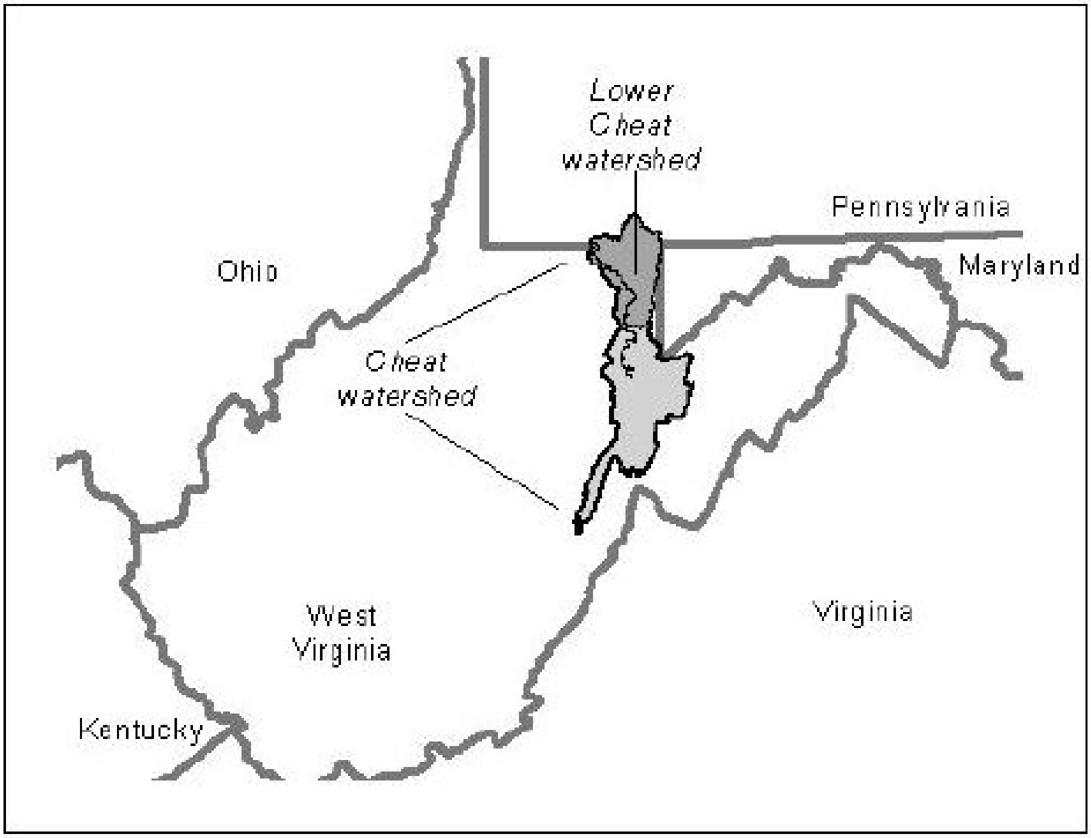
Grays Landing, the closest USACE lock and dam downstream of the Project, is located on the Monongahela River in Pennsylvania approximately 11 miles downstream of the Project. In August 2017, FERC issued a 50-year license for the construction of a hydropower project at the USACE Grays Landing Lock and Dam (Gray's Landing Hydroelectric Project, FERC No. 13763), with project construction schedule to commence by August 2021. Maxwell, Charleroi, Locks and Dam 3, and Braddock are located in Pennsylvania further downstream of Grays Landing (Pennsylvania Fish and Boat and Commission [PFBC], 2011 and FERC, 2016).

The headwaters of the Cheat River originate deep within the wilderness of the Monongahela National Forest (Friends of the Cheat [FOC], 2019b). The Cheat River is formed at Parsons, West Virginia by the confluence of Shavers Fork and Black Fork. Shavers Fork is an 88.5-mile-long river which rises in north-central Pocahontas County at Thorny Flat, the highest peak of Cheat Mountain. It flows for much of its length through the Monongahela National Forest. The headwaters flow through the Town of Spruce and then generally flow north-northwest though Randolph and Tucker Counties, where the valley is between Cheat Mountain (west) and Shavers Mountain (east). Settlements along the course of the river include Cheat Bridge and the un-incorporated towns of Bemis, Bowden, and Porterwood. Shavers Fork joins Black Fork at

Parsons. Black Fork is a short stream about four miles in length formed by the confluence of the Dry Fork and the Blackwater River. Formed in the town of Hendricks, Black Fork generally flows northwest through the towns of Hambleton and Parsons, West Virginia where it joins Shavers Fork to form the Cheat River. From Parsons, West Virginia, the Cheat River flows 84 miles north to its confluence with the Monongahela River at Point Marion, Pennsylvania. The Cheat River flows through Cheat Canyon, a 10.5-mile long forested gorge at the western edge of the Allegheny Mountains, located between the town of Albright, in Preston County, and Cheat Lake in Monongalia County, West Virginia. The river flows between relatively steep slopes on either side, rising from 870 to 1,200 feet (ft) (FERC, 1994).

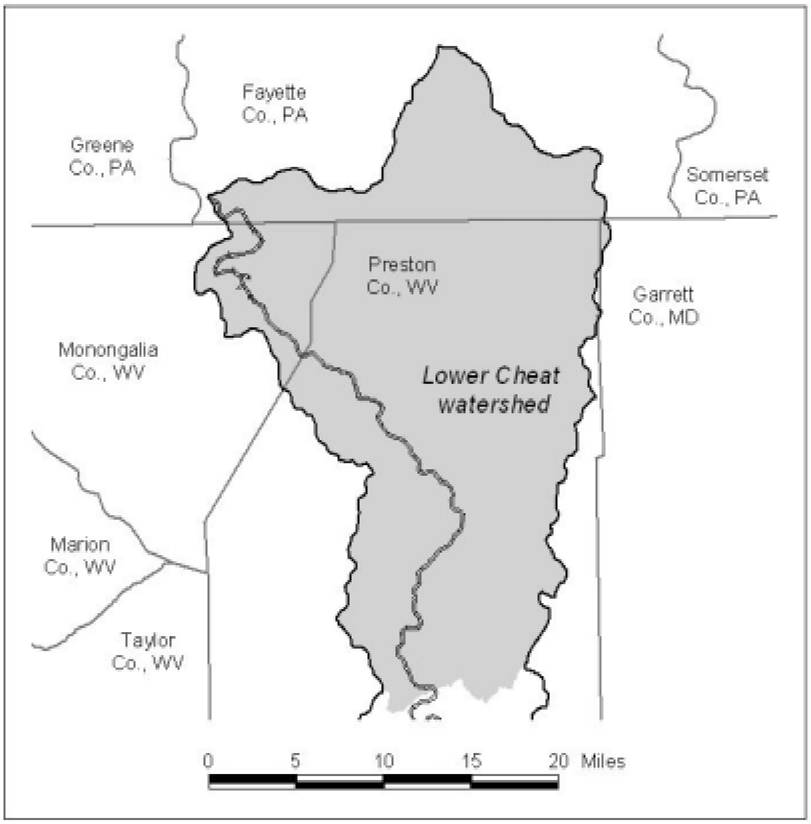
The Cheat River drains the largest uncontrolled watershed in the eastern United States. The Cheat River watershed (Figure 3.1) is approximately 100 miles long with an average width of about 15 miles and a drainage area of 1,426 square miles. The Lower Cheat River watershed is located almost entirely in Tucker, Monongalia, Pocahontas, Preston, and Randolph Counties in West Virginia, while 7% lies in Fayette County, Pennsylvania, and a small fraction lies in Garrett County, Maryland (Figure 3.2). The average elevation for the watershed is approximately 2,270 ft above mean sea level. The highest elevation is 4,845 ft, located on Back Allegheny Mountain in the Shavers Fork headwaters. The climate in the area is characterized by relatively cold winters and moderately hot, showery summers. The average annual temperature is 47 degrees Fahrenheit (^{o}F) and the average annual precipitation for the Cheat River watershed is 51 inches per year (West Virginia Department of Environmental Protection [WVDEP], 2013).

Figure 3.1. Cheat River Watershed



Source: Downstream Strategies, LLC, 2005

Figure 3.2. Cheat River Watershed Location



Source: WVDEP, 2005

3.2 Major Land Uses

Land use in the Cheat River basin is dominated by forested area (86%), while 8% of the land cover is classified as developed, 5% is planted/cultivated area, and less than 1% is defined as impervious surface area (WVDEP, 2013). The watershed is sparsely populated and very rural. The tributaries that form Black Fork, the principal tributary to the Cheat River, rise in sparsely settled mountainous terrain, much of which is part of the Monongahela National Forest. Additionally, the watershed encompasses portions of the following state and federal public lands:

- *Wildlife Management Areas*: Beaver Dam (37,674 acres), Blackwater (58,978 acres), Cheat (80,771 acres), Little Indian Creek (1,036 acres), Otter Creek (68,782 acres), Potomac (139,786 acres), and Snake Hill (3,092 acres);
- *State Parks*: Blackwater Falls (446 acres), Canaan Valley (6,014 acres), and Cass Scenic Railroad (11 miles long);
- *State Forest*: Coopers Rock (12,747 acres);
- *National Forest*: Monongahela (900,000 acres); and
- *National Wildlife Refuge*: Canaan Valley.

3.3 Topography

Topography in the Cheat River basin is characterized by mountainous ridges and deep, wide valleys. The Cheat River basin lies within three geographic ecoregions, the Central Appalachian Forest, the Cumberland and Southern Ridge Valley (CSRV), and the Western Allegheny Plateau.

Most of the Cheat River basin (54%) occupies the Central Appalachians ecoregion, known for its mountainous terrain, cooler climate and biologically diverse habitat (WVDEP, 2013). In the Central Appalachian Forest ecoregion, the Cheat River basin falls within the Western Allegheny Mountains, the Northern High Allegheny Mountains, and the Southern High Allegheny Mountains and the elevation of the basin ranges from 1,800 ft in Preston County, West Virginia to 4,800 ft in Pocahontas County, West Virginia, deep within the Monongahela National Forest (Land Scope America [LSA], 2019a).

Nearly 45% of the basin is contained within the CSRV ecoregion, characterized by its parallel mountain ridgelines and lowland valleys (WVDEP, 2013). The Cheat River basin lies within the

Cumberland Mountains, a subregion of the CSRV. The Cumberland Mountains stretch from the southern part of West Virginia to Tennessee. The area is characterized as extremely rugged, mountainous terrain ranging from 570 ft to over 4,400 ft in elevation. The Cumberlands section of the CSRV ecoregion is composed of a high plateau and low mountains, which represent the western-most extension of the Southern Appalachian mountain chain (LSA, 2019b).

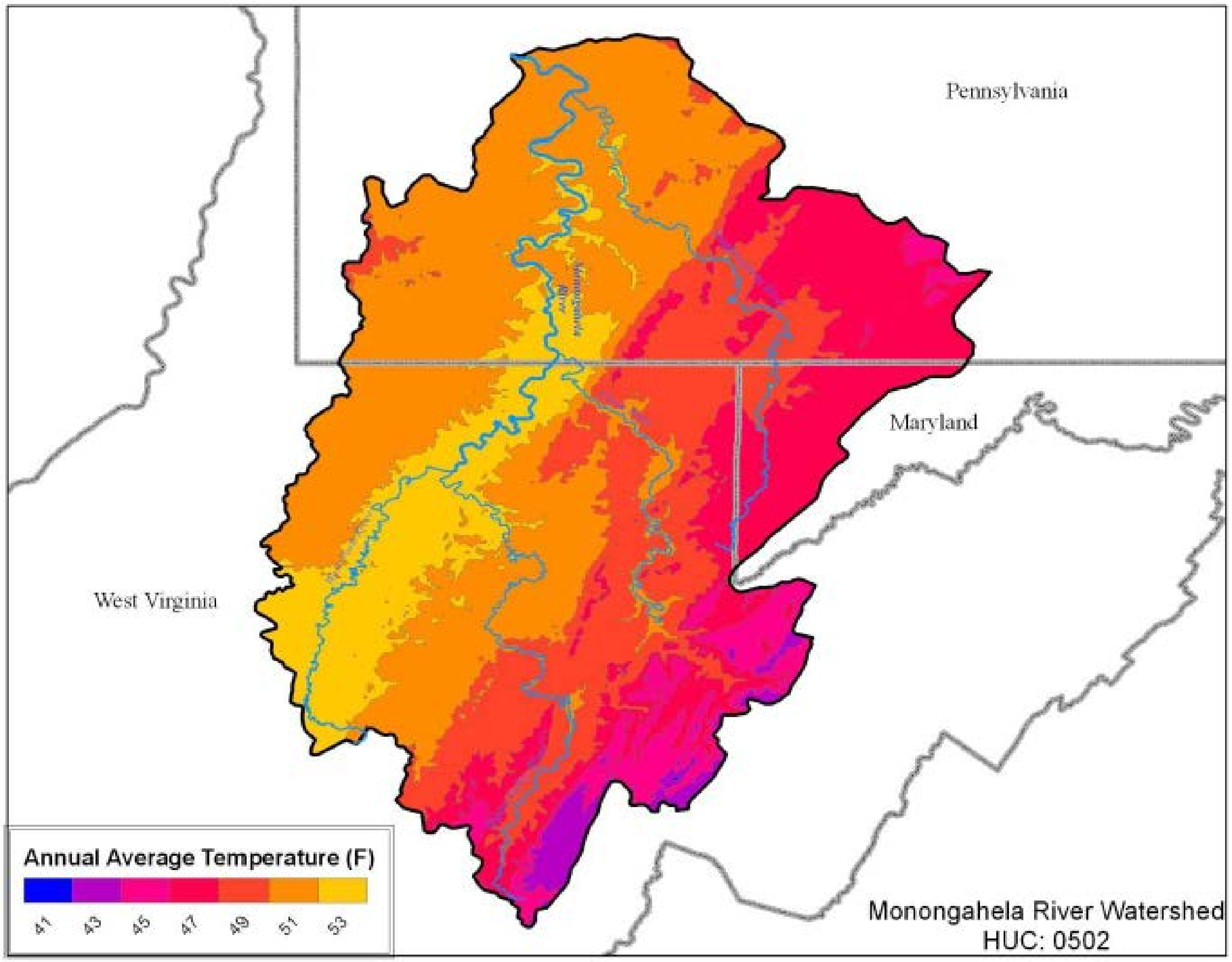
Approximately 1% of the basin lies within the Western Allegheny Plateau ecoregion, which is characterized by rounded hills and wide fertile valleys of mixed oak forests and agricultural lands (WVDEP, 2013). This ecoregion encompasses 26 million acres spanning east to west from New York to Ohio (LSA, 2019c). The glaciated plateau is divided into two major drainage basins: one that gathers flow west into Lake Erie and the other that feeds the Ohio River and points south towards the Gulf of Mexico. Elevation within the Cheat River basin in this ecoregion lies around 650 ft (LSA, 2019c).

3.4 Climate

The Monongahela River watershed exhibits a humid continental climate. Humid continental climate is found over large areas of land in the temperate regions of the mid-latitudes. This climate is signified by variable weather patterns and a seasonal large temperature variation due to its position between polar and tropical air masses. The average annual temperatures of the Monongahela River watershed are lowest in the mountainous regions located in the southeastern area of the region (Figure 3.3). Dominant airflow patterns are from the west most of the year. During the summer, low pressure cyclonic systems dominate with southern winds and heavy precipitation. From June through November, northeasterly moving hurricanes and tropical storms occasionally produce heavy rains and winds in the region (United States Army Corps of Engineers Pittsburgh District [USACEPD], 2012).

The climate of the Cheat River watershed is characterized by moderately cold winters and moderately hot, showery summers. The average annual precipitation for the Cheat River watershed is 51 inches per year. The average annual temperature is 47^{o}F and ranges from 41 to 53^{o}F (WVDEP, 2013). July temperatures range from 62^{o}F to 84^{o}F, and January temperatures from 22^{o}F to 39^{o}F (Allegheny Power Service Corporation [Allegheny], 1991).

Figure 3.3. Monongahela River Watershed Annual Average Temperature (F)



Source: USACEDP, 2012

3.5 Water Use

The upper Monongahela River basin rivers, including the Cheat River, were historically used as a wastewater receiving body for mining and gas extraction wastewater, treated industrial and municipal wastewater, and storm water discharge (Free Flow Power Corporation [FFPC], 2014 and PFBC, 2011). These rivers have historically displayed severe water pollution issues due to mining activities. However, as a result of the introduction of water pollution controls over the past fifty years, these rivers have experienced improvements to water quality (PFBC, 2011).

Today, the Cheat River is primarily utilized for recreational activities, such as fishing and whitewater kayaking. The forks and tributaries of the Cheat River are known to provide a diverse selection of paddling options from steep creeks to flatwater floats (FOC, 2019a).

The Monongahela River lock and dams were constructed to create a terraced system of navigation pools to facilitate commercial navigation (FFPC, 2014 and PFBC, 2011). The USACE maintains a nine-foot navigation channel from the pool created by the Opekiska lock and dam to the confluence of the Monongahela and Allegheny Rivers, which leads to the navigable Ohio River and Mississippi River system (FFPC, 2014 and PFBC, 2011). Commercial navigation on the Monongahela River primarily consists of barge traffic for transport of coal for electrical generation and aggregates such as rock and gravel. The sole authorized purpose for USACE's management of the lock and dams is for navigation. Incidental benefits include public recreation, conservation of fish and wildlife, and stewardship of public lands. The lock and dam system that facilitates commercial river navigation impedes upstream movement for many fish species considered to be migratory (PFBC, 2011).

3.6 References

Allegheny Power Service Corporation (Allegheny). 1991. Lake Lynn Hydro Station FERC Project No. 2459 – Final Federal Energy Regulatory Commission License Application. Available online: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1421832. Accessed: June 4, 2019.

Downstream Strategies, LLC. 2005. Watershed Based Plan for the Lower Cheat River Watershed. Available online: http://dep.wv.gov/WWE/Programs/nonptsource/WBP/Documents/WP/CheatRiver_WBP.pdf. Accessed: August 5, 2019.

Federal Energy Regulatory Commission (FERC). 1994. Order Issuing New License Major Project: Lake Lynn Project (FERC No. 2459). 63 FERC ¶ 62,253. Issued December 27, 1994.

Federal Energy Regulatory Commission (FERC). 2016. Multi-Project Environmental Assessment for Hydropower License: Opekiska Lock and Dam Hydroelectric Project, FERC Project No. 13753-002 and Morgantown Lock and Dam Hydroelectric Project, FERC Project No. 13762-002, West Virginia; Point Marion Lock and Dam Hydroelectric Project, FERC Project No. 13771-002, Grays Landing Lock and Dam Hydroelectric Project, FERC Project No. 13763-002, Maxwell Locks and Dam Hydroelectric Project, FERC Project No. 13766-002, Monongahela Locks and Dam 4 Hydroelectric Project, FERC Project No. 13767-002, Pennsylvania. September 2016.

Free Flow Power Corporation (FFPC). 2014. Point Marion Lock & Dam Hydroelectric Project FERC Project No. 13771 Final License Application. February 2014.

Friends of the Cheat (FOC). 2019a. Recreation. Available online: https://www.cheat.org/recreation/. Accessed August 5, 2019.

Friends of the Cheat (FOC). 2019b. Watershed Profile. Available online: https://www.cheat.org/about/watershed-profile/. Accessed February 27, 2019.

Land Scope America (LSA). 2019a. Central Appalachian Forest Ecoregion. Available online: http://www.landscope.org/explore/natural_geographies/ecoregions/Central%20Appalachian%20Forest/. Accessed: February 28, 2019.

Land Scope America (LSA). 2019b. Cumberlands and Southern Ridge and Valley Ecoregion. Available online: http://www.landscope.org/explore/natural_geographies/ecoregions/Cumberlands%20and%20Southern%20Ridge%20and%20Valley/. Accessed: February 28, 2019.

Land Scope America (LSA). 2019c. Western Allegheny Plateau Ecoregion. Available online: http://www.landscope.org/explore/natural_geographies/ecoregions/Western%20Allegheny%20Plateau/Western%20Allegheny%20Plateau%20Ecoregion/. Accessed: February 28, 2019.

Pennsylvania Fish and Boat and Commission (PFBC). 2011. Three Rivers Management Plan: A Strategy for Managing Fisheries Resources of the Allegheny, Monongahela and Ohio Rivers. Prepared by Pennsylvania Fish and Boat Commission, Bureau of Fisheries, Fisheries Management Division Area 8, Somerset, Pennsylvania. Available online: https://www.fishandboat.com/Fish/Fisheries/ThreeRivers/Documents/ThreeRiversMgmtPlan.pdf. Accessed: May 24, 2019.

United States Army Corps of Engineers Pittsburgh District (USACEPD). 2012. Monongahela River Watershed Initial Watershed Assessment. September 2011, Revised February 2012. Pg. 23-24.

West Virginia Department of Environmental Protection (WVDEP). 2005. Watershed Based Plan for the Lower Cheat River Watershed. Available online: https://dep.wv.gov/WWE/Programs/nonptsource/WBP/Documents/WP/CheatRiver_WBP.pdf. Accessed: February 28, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2013. West Virginia Watersheds: A Closer Look. Available online: https://dep.wv.gov/WWE/wateruse/WVWaterPlan/Documents/WatershedACloserLookNovember2013.pdf. Accessed: February 27, 2019.

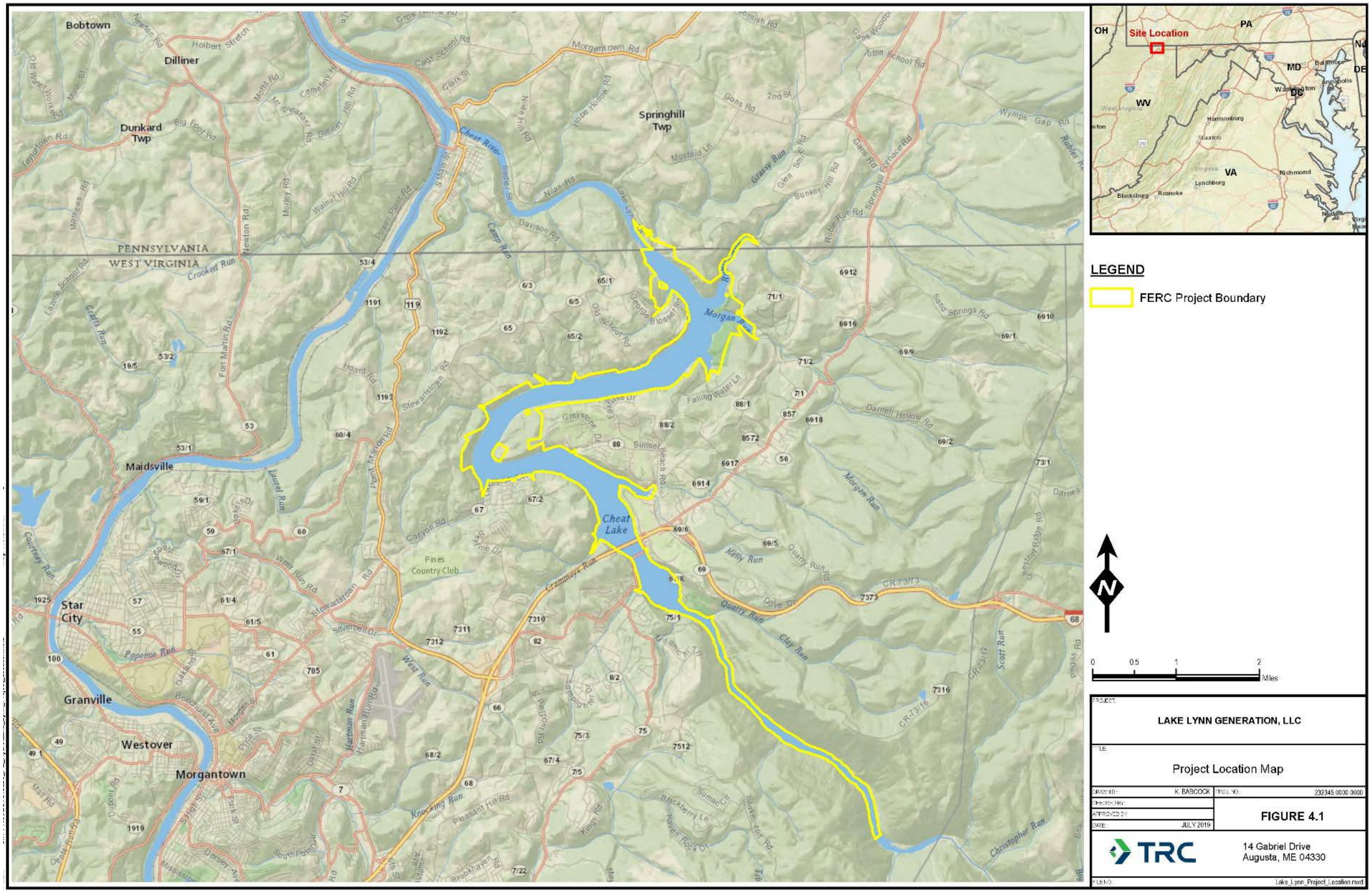
4.0 PROJECT LOCATION, FACILITIES, AND OPERATION

4.1 Overview

The Lake Lynn Project is located on the Cheat River in Monongalia County, West Virginia and Fayette County, Pennsylvania, approximately 10 miles northeast of Morgantown, West Virginia. The Project is located about 3.7 miles upstream of the confluence with the Monongahela River. The Project was purchased by Lake Lynn from FirstEnergy subsidiaries Allegheny Energy Supply Co. LL (AE) in February 2014. The FERC License for the Project was transferred to Lake Lynn on February 21, 2014.

The Project location is shown in Figure 4.1.

Figure 4.1. Lake Lynn Project Location



4.2 Project Facilities

The Project is a 51.2-megawatt (MW) single-development project that began commercial operations in 1926. Project works consist of (a) a 125-foot-high by 1,000-foot-long concrete gravity-type dam with a 624-foot-long spillway controlled by 26 Tainter gates, each 17 ft high by 21 ft long; (b) a reservoir with a surface area of 1,729 acres and containing about 72,000 acre-ft of water at full pool elevation of 870 ft National Geodetic Vertical Datum (NGVD); (c) a log boom and trash racks at the intake facility; (d) eight 12-foot by 18-foot gated penstocks of reinforced concrete; (e) a 72-foot by 165-foot by 68-foot-high brick powerhouse containing four identical Francis generating units with a total rated capacity of 51.2 MW; (f) dual 800-foot-long, 138-kilovolt (kV) transmission lines; and (g) appurtenant facilities. In 2018, the Licensee completed a turbine replacement and upgrade of Unit 2.

Table 4.1. Lake Lynn Project (FERC No. 2459) Specifications

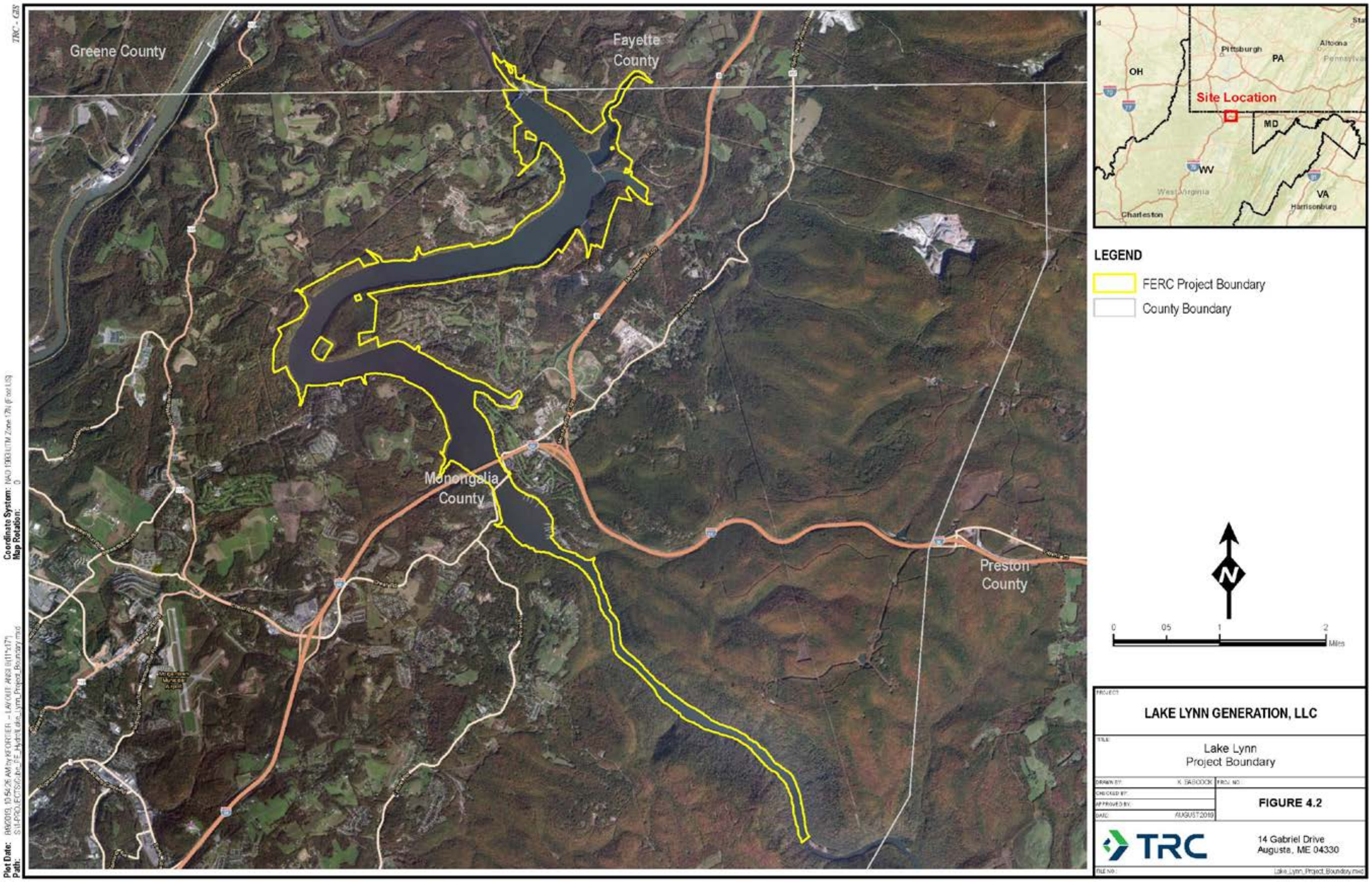
Lake Lynn Project Description	Number or Fact
General Information	
FERC Number	2459
License Issued	12/27/1994
License Expiration Date	11/30/2024
Current Licensed Capacity	51.2 MW
Actual Installed Capacity	51.2 MW
Project Location	Cheat River, Monongalia County, West Virginia, and Fayette County, Pennsylvania
Drainage Area	1,411 square miles
Dam	
Dam Height	125 ft
Length of Dam	1,000 ft long with a 624 ft long spillway controlled by 26 Tainter gates
Minimum Flow at Dam	212 cfs, or inflow, whichever is less During extremely low flow periods, the Licensee provides an absolute minimum flow of 100 cfs
Impoundment	
Maximum Impoundment Elevation	877 ft NGVD
Normal Full Pool Elevation	870 ft NGVD

Lake Lynn Project Description	**Number or Fact**
Length of Impoundment	13 miles
Surface Area of Impoundment	1,729 acres
Gross Storage of Impoundment	72,000 acre-ft
Powerhouse	
Date of Construction	1926
Operation Type	Run-of-river peaking with storage capability
Powerhouse Dimensions	72-ft by 165-ft and 68-ft tall
Turbine Generators	Four Francis turbine units connected to four generators
Project Generation	
Total Hydraulic Capacity	9,700 cfs
Average Annual Generation	126,639 megawatt hours (MWh) (2009-2018)
Transformers and Transmission Lines	
Number Transformers	2
Transmission Line Length from Transformer to Tap	dual 800-foot-long, 138-kV transmission lines

4.3 Project Boundary

The FERC-licensed Project boundary for the Project is shown in Figure 4.2.

Figure 4.2. Lake Lynn Project Boundary



4.4 Current and Proposed Project Operation

The Project is operated as a dispatchable peaking hydroelectric facility with storage capability. The facility's ponding capability varies by season and allows for peaking. The Project produces a long-term average generation of 140,352 MWh of clean electricity annually, which is enough to power 13,495 homes (Cube Hydro Partners, 2019). The current FERC License requires that the Licensee operate the Project to maintain Cheat Lake between 868 and 870 ft NGVD from May 1 through October 31, between 857 and 870 ft from November 1 through March 31, and between 863 ft and 870 ft from April 1 through April 30, each year. The current FERC License requires the Licensee release a minimum flow of 212 cfs from the dam with an absolute minimum flow of 100 cfs regardless of inflow.

The Licensee is not proposing any changes to Project operations.

4.5 Other Project Information

4.5.1 Current License Requirements

FERC issued a new license for the Project by Order dated December 27, 1994. The license was for a term of 30 years terminating November 30, 2024. The license authorized the continued operation of the Project in accordance with standard FERC license articles (Articles 1-23, and Articles 201-202, 418, and 502). Articles 401-417 and 501 were also included in the Order Issuing License (FERC, 1994). The existing FERC License for the Project is included in Appendix D. The License Articles are briefly summarized below for convenience only; the actual License Articles should be read for a complete understanding of the Article's intent.

- Article 401 requires the Licensee to file an erosion control plan prior to any ground breaking at the West Penn Beach site (e.g, Cheat Lake Park). Article 401 also requires the License to file a similar erosion control plan before commencing any other scheduled land-disturbing or land-clearing activities.
- Article 402 requires the Licensee to complete an initial survey of erosion along the Cheat Lake shoreline. Article 402 also requires the Licensee to conduct annual shoreline erosion surveys of the Cheat Lake Park shoreline extending from the dam to the Cheat Haven

peninsula and visual shoreline erosion surveys of the entire Cheat Lake shoreline to identify new areas of erosion every three years.

- Article 403 requires the Licensee to maintain Cheat Lake between 868 and 870 ft NGVD from May 1 through October 31, between 857 and 870 ft from November 1 through March 31, and between 863 ft and 870 ft from April 1 through April 30, each year.
- Article 404 requires the Licensee to release a minimum flow of 212 cfs from the dam with an absolute minimum flow of 100 cfs regardless of inflow.
- Article 405 requires the Licensee to file a plan to continuously monitor dissolved oxygen levels, temperature, pH, and conductivity of Cheat Lake and the area downstream of the Project.
- Article 406 requires the Licensee to notify the resource agencies within a fixed time period when the dissolved oxygen levels in the tailrace drop below 5.0 mg/l.
- Article 407 requires the Licensee to fund the installation of a United States Geological Survey (USGS) flow gaging station on the river downstream of the dam but upstream of the confluence with the Grassy Run.
- Article 408 requires the Licensee to consult with the Albert Gallatin Municipal Authority, the Cheat Neck Water Company, and the Lakeview Resort on notification requirements during extreme water level changes in Cheat Lake.
- Article 409 requires the Licensee to consult with the Albert Gallatin Municipal Authority regarding any relationship between Project operations and turbidity at the Authority’s new intake.
- Article 411 requires the Licensee to file a biological monitoring plan for the Project waters including Cheat Lake, embayment, tailrace, and the Cheat River downstream to the backwater of the Monongahela River. Article 411 also requires the Licensee to update the plan every three years and to meet every three years with the United State Department of Interior (DOI), West Virginia Division of Natural Resources (WVDNR), and PFBC.
- Article 412 requires the Licensee to file a fishery enhancement plan.

- Article 413 requires the Licensee to file a plan to minimize any adverse impacts to aesthetics associated with the development of the Cheat Lake Park area.
- Article 414 requires the Licensee to consult with the West Virginia State Historic Preservation Office (WVSHPO) prior to any ground breaking at the Cheat Lake Park recreational area.
- Article 415 requires the Licensee to revise and refile the existing recreation and land management plan.
- Article 416 requires the Licensee to commence construction of the recreational facilities within two years after license issuance and approval of the recreation plan.
- Article 417 requires the Licensee to file a recreation plan update every three years after license issuance.

4.5.2 Compliance History of the Project

The Licensee has maintained compliance with the FERC License. The Licensee completes all necessary inspections, as required, and takes corrective actions to address comments and recommendations arising from any such inspections in a timely manner.

4.5.3 Project Safety

The Project dam is classified by FERC as a high hazard dam and therefore is required to file an Emergency Action Plan with the Commission. A Dam Safety Surveillance and Monitoring Plan (DSSMP) has been developed for the Project, which details the methods the Licensee uses to monitor the safety and soundness of water retaining structures. The DSSMP is kept on file with the Commission. The Licensee also files with the Commission an annual Dam Safety Surveillance and Monitoring Report (DSSMR) documenting dam safety monitoring results from the previous year. The 2018 DSSMR concluded that the Project is performing adequately, there were no adverse findings or apparent dam safety concerns, and the current monitoring program is appropriate for the Project (Lake Lynn, 2019).

The FERC Division of Dam Safety and Inspections also inspects the Project every three years. The Commission's New York Regional Office staff inspected the Project in 2017 (FERC, 2017).

No dam safety concerns were observed. The Project is safe and adequate under the terms and conditions of the existing license and would continue to be under a new license.

The Licensee provides safety signage and warning devices in accordance with a Public Safety Plan for the Project[1] to protect public safety. Safety signs, recreation access signs, boat barriers, parking signs, no trespassing signs, and fencing have been installed and maintained within the Project boundary, as necessary, to help ensure public safety.

4.5.4 Summary of Project Generation and Flow Records

Project generation for the past ten years (2009-2018) for the Project development is provided in Table 4.2. Flow statistics for the Project development is provided in Section 5.2.3. Flow duration curves for the Project development are provided in Appendix E and discussed in Section 5.2.3.2.

4.5.5 Delivery of Water for Non-Power Uses

There are no deliveries of water for non-power uses.

4.5.6 Average Annual Energy and Dependable Capacity

The average annual energy output of the Project for the past ten years (2009-2018) is shown in Table 4.2. The annual and monthly gross generation at the Project are also shown in Table 4.2.

[1] An updated Public Safety Plan for the Project was filed with FERC on April 2, 2019.

Table 4.2. Lake Lynn Project Gross Generation by Month (MWh) 2009-2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	10-yr Avg
Jan	17,665.0	14,357.0	6,384.0	18,676.0	17,890.0	11,468.0	8,898.0	6,593.0	24,499.0	11,795.0	13,822.5
Feb	14,208.0	5,170.0	22,129.0	12,717.0	14,288.0	18,089.0	9,984.0	21,701.0	13,235.0	22,257.0	15,377.8
Mar	8,451.0	25,338.0	27,725.0	16,416.0	16,647.0	14,124.0	24,096.0	11,582.0	19,043.0	11,894.0	17,531.6
Apr	20,382.0	7,996.0	28,991.0	5,181.0	17,753.0	10,511.0	21,587.0	10,689.0	21,448.0	17,022.0	16,156.0
May	15,658.0	13,183.0	15,546.0	15,388.0	12,661.0	11,833.0	2,621.0	23,497.0	14,873.0	20,514.0	14,577.4
Jun	9,582.0	5,014.0	6,227.0	879.0	8,771.0	5,620.0	12,393.0	7,918.0	5,953.0	11,218.0	7,357.5
Jul	1,430.0	525.0	5,049.0	3,504.0	8,314.0	2,351.0	10,885.0	5,251.0	10,158.0	3,394.0	5,086.1
Aug	17,665.0	14,357.0	6,384.0	18,676.0	17,890.0	11,468.0	8,898.0	6,593.0	24,499.0	11,795.0	3,907.2
Sept	14,208.0	5,170.0	22,129.0	12,717.0	14,288.0	18,089.0	9,984.0	21,701.0	13,235.0	22,257.0	3,152.1
Oct	8,451.0	25,338.0	27,725.0	16,416.0	16,647.0	14,124.0	24,096.0	11,582.0	19,043.0	11,894.0	6,692.1
Nov	20,382.0	7,996.0	28,991.0	5,181.0	17,753.0	10,511.0	21,587.0	10,689.0	21,448.0	17,022.0	8,837.5
Dec	15,658.0	13,183.0	15,546.0	15,388.0	12,661.0	11,833.0	2,621.0	23,497.0	14,873.0	20,514.0	14,141.2
Total	118,067.0	89,670.0	172,695.0	100,951.0	146,009.0	113,997.0	108,524.0	115,977.0	135,118.0	165,382.0	126,639.0

4.5.7 Net Investment

As of May 31, 2019, the total equity in Lake Lynn Generation, LLC, i.e. the “current net investment” in the Project, was $107.753M.

4.6 References

Cube Hydro Partners. 2019. Managed Assets. Available online at: http://www.cubehydropartners.com/portfolio/. Accessed August 2, 2019.

Lake Lynn Generation, LLC. 2019. Lake Lynn Hydroelectric Project (P-2459) 2018 Dam Safety Surveillance and Monitoring Report. April 1, 2019.

Federal Energy Regulatory Commission (FERC). 1994. Order Issuing New License - Major Project: Lake Lynn Project (FERC No. 2459). 69 FERC ¶ 62,253. Issued December 27, 1994.

Federal Energy Regulatory Commission (FERC). 2017. Dam Safety Inspection Report for the Period September 28, 2016 to September 20, 2017 for the Lake Lynn Project (FERC No. 2459). 2017.

5.0 DESCRIPTION OF EXISTING ENVIRONMENT

5.1 Geology and Soils

5.1.1 Overview

Most of the Cheat Lake shoreline is steep with areas of bedrock and large cobbles. The only flat land in the Project boundary is located at Cheat Lake Park and along a terraced area near the Sunset Beach Marina (Lake Lynn, 2019).

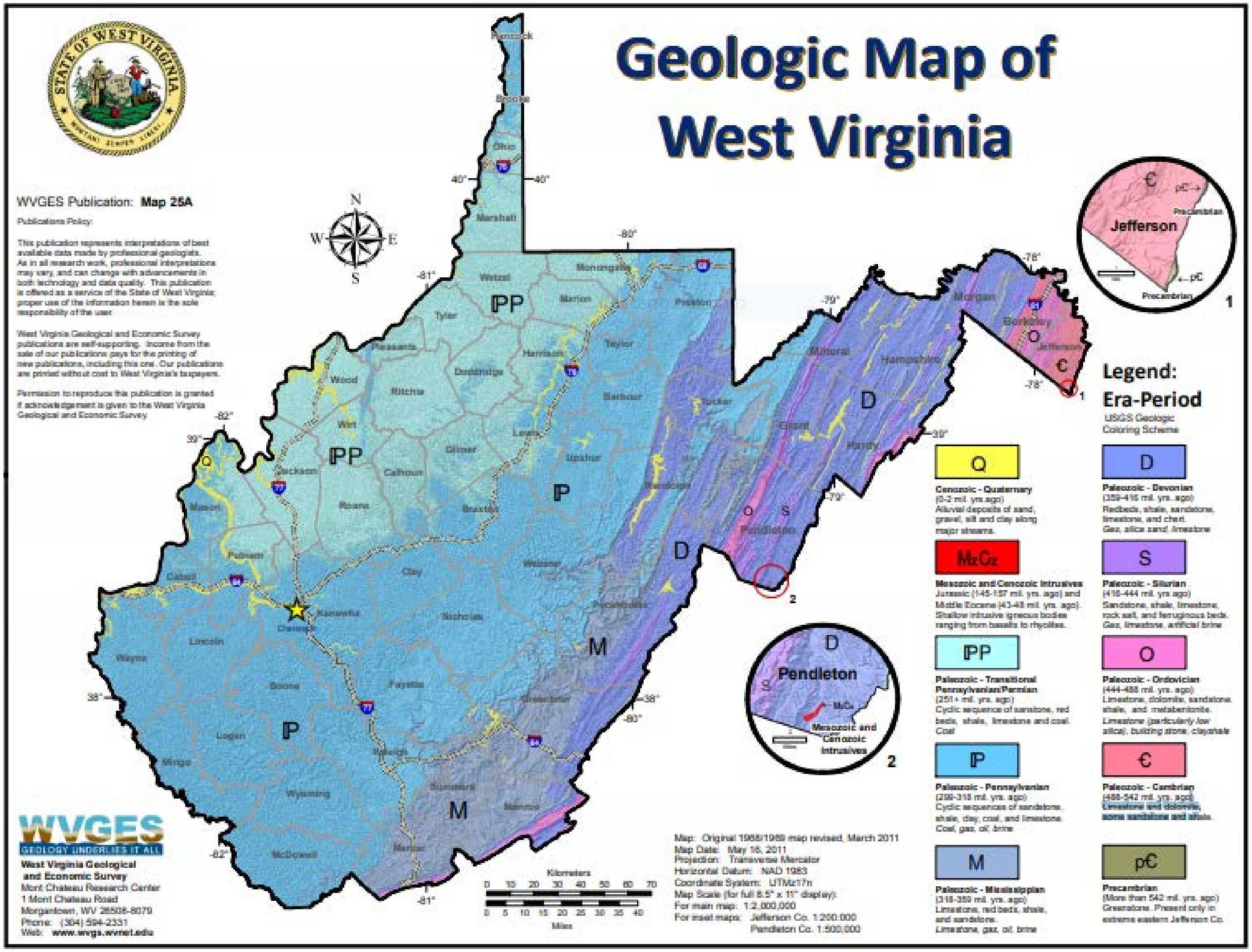
The Licensee conducted an initial erosion survey along the entire Cheat Lake shoreline in 1995 and has conducted follow-up shoreline erosion surveys of the entire shoreline every three years since 1995 to identify new areas of erosion along the Cheat Lake shoreline. Additionally, the Licensee has conducted annual shoreline erosion surveys of the Cheat Lake Park (formerly West Penn Beach) shoreline extending from the Project dam to the Cheat Haven peninsula since 1995. These surveys are conducted in accordance with Article 402 of the existing FERC License and will continue until a new FERC license is issued.

5.1.2 Existing Geological Features

Figure 5.1 shows the geologic relationship of the Project area to the rest of West Virginia. The majority of bedrock exposed at the surface in West Virginia is sedimentary in origin, deposited during the Paleozoic Era (545 to 230 million years ago). Very few igneous or metamorphic rocks are exposed at the surface due to deep burial beneath the thick Paleozoic cover. The oldest exposed rock in the State, in the tip of the eastern panhandle, is the Precambrian Catoctin Greenstone, a metamorphosed lava which erupted 800 million years ago. During the Cambrian and Ordovician periods, the State was covered by a sea that deposited limestone, shales, siltstones, and minor sandstones. These rocks are now exposed at the surface in the eastern panhandle (West Virginia Geological and Economic Survey [WVGES], 2017). The next tectonic event, the Devonian Acadian Orogeny, formed a new set of mountains to the northeast. Erosion of these mountains produced sediment deposited across the State from the late Devonian into the Pennsylvanian. Regression of the Devonian sea led to the deposition of continental red beds over much of the State at the end of the Devonian. The sea returned in the Mississippian and thick limestones of the commercially important Greenbrier Group were deposited (WVGES, 2017). During the Late Mississippian, the sea regressed from West Virginia leaving a low-lying, swampy Pennsylvanian terrain which produced thousands of feet of mainly non-marine sandstone, shale, and coal (WVGES, 2017). These geologic features are a predominant feature in the Project area. During the latest Mississippian and into the Permian, the Appalachian Orogeny produced the Appalachian Mountains. After the end of the Appalachian Orogeny in the early Mesozoic, the Atlantic Ocean began opening to the east. Although erosion of the Appalachians produced clastic sediment throughout the Mesozoic and into the present day, no sedimentary rock layers remain from these time periods. However, the extensive deformation of bedrock allowed the intrusion of numerous Mesozoic and Cenozoic igneous rocks in east-central West Virginia, especially Pendleton County (WVGES, 2017). Glaciers of the Pleistocene Ice Age never reached West Virginia. However, two large, ice-dammed lakes formed in the present Monongahela and Teays valleys, forming lake deposits, changes to the State's drainage, and alluvial deposits in the major river valleys, notably the newly-formed Ohio River. These are the only Cenozoic (younger than 70 million years) sedimentary deposits in the State (WVGES, 2017).

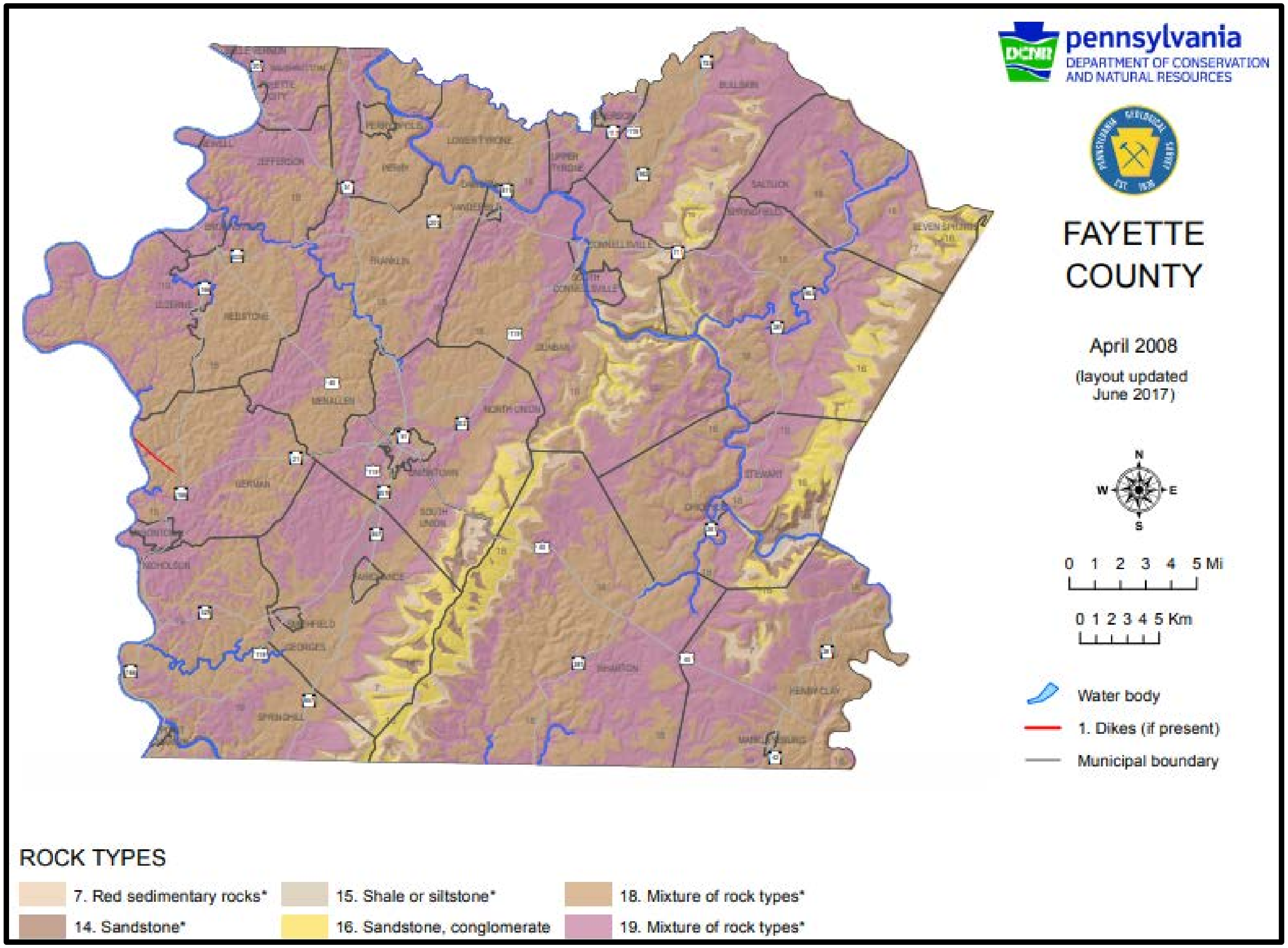
The northern portion of the Project located in Pennsylvania is located on similar bedrock geologic features consisting of Pennsylvanian terrain (Figure 5.2) (CPDC, 2017).

Figure 5.1. Geologic Map of West Virginia



Source: WVGES, 2017

Figure 5.2. Rock Types of Fayette County, Pennsylvania



Source: CPDC, 2017

5.1.3 Soils

Based on a review of the United States Department of Agriculture Natural Resources Conservation Service's (NRCS) Web Soil Survey, the predominant soil types within the Project area are loamy in nature (NRCS, 2019). Specifically, the most common soil types within the Project area include:

- Dekalb very stony loam, 35 to 65% slopes (12.2% of Project area);
- Culleoka-Westmoreland silt loams, 35 to 65% slopes (4.4% of the Project area);
- Gilpin silt loam, 35 to 65% slopes (4.3% of the Project area);
- Dekalb very stony loam, 15 to 35% slopes (2.8% of the Project area); and
- Monongahela silt loam, 8 to 15% slopes (2.5% of the Project area).

Appendix F-1 includes additional information about the predominant soil types in the Project area.

5.1.4 Impoundment Shoreline Conditions

Unconsolidated cobbles and boulders are common along the Cheat Lake shoreline. Relief in the Project area is on the order of 300 to 400 ft, with the Cheat River flowing between relatively steep slopes on either side, rising from 870 ft to about 1,200 ft. The only flat land in the Project boundary is located at Cheat Lake Park and along a terraced area near the Sunset Beach Marina (Lake Lynn, 2019).

5.1.5 Erosion

In accordance with Article 402 of the existing FERC License, the Licensee conducted an initial erosion survey along the entire Cheat Lake shoreline in 1995 and has conducted follow-up shoreline erosion surveys every three years since 1995 to identify new areas of erosion along the Cheat Lake shoreline. Additionally, the Licensee has conducted annual shoreline erosion surveys of the Cheat Lake Park shoreline extending from the dam to the Cheat Haven peninsula.

During the most recent annual shoreline erosion survey conducted in 2018, the License visually inspected and photographed a total of 16 shoreline erosion monitoring stations where historic erosion has been observed. Results of the 2018 survey are summarized in Table 5.1. The 2018 shoreline erosion survey did not identify any new areas of active erosion, and previously identified areas of active erosion, which are monitored annually, all exhibited minimal annual changes in erosion levels (Table 5.1). Therefore, no additional erosion monitoring stations were added to the annual survey protocol. Shoreline construction and reinforcement were conducted in 2018 at two monitoring stations, Stations 4 and 5.

Table 5.1. 2018 Annual Shoreline Erosion Survey Results

Shoreline Monitoring Station I.D.	Habitat	Bank Height	Bank Slope[1]	Monitoring Station Section Length	Historic Erosion[2]	Annual Change[3]
1	Wooded	3' to 4'	Moderate	80'	Moderate	Minimal
2	Wooded	1' to 4'	Low	60'	Minimum	Minimal
3	Wooded	2' to 4'	Moderate	80'	Moderate	Minimal
4	Scrub Grasses	2' to 4'	Moderate	40'	Minimum	Minimal
5	Wooded	4' to 8'	Steep	60'	Moderate	Minimal
6	Wooded	4' to 8'	Steep	50'	Moderate	Minimal
7	Wooded	4' to 8'	Low	80'	Moderate	Minimal
8	Scrub Grasses	2' to 4'	Steep	80'	Moderate	Minimal
10	Wooded	1' to 4'	Steep	80'	Moderate	Minimal
11	Scrub Grasses	2' to 4'	Low	120'	Moderate	Minimal
12	Scrub Grasses	2' to 4'	Moderate	60'	Moderate	Minimal
13	Wooded	2' to 4'	Steep	150'	Minimum	Minimal
23	Wooded	2' to 4'	Moderate	90'	Moderate	Minimal
24	Wooded	2' to 4'	Moderate	90'	Moderate	Minimal
26	Wooded	2' to 5'	Moderate	60'	Moderate	Minimal
27	Wooded	2' to 5'	Steep	60'	Moderate	Minimal

Source: Lake Lynn, 2019
Notes:
[1] Bank slope descriptions were divided into three ranges:
- Low - Slope indicates an angle of 15% or less.
- Moderate - Slope indicates an approximate slope angle of 15 to 40%.
- Steep - Designation indicates a slope angle greater than 45%.

[2] The historic level of erosion previously observed during past survey events was classified in the following categories:
- Minimal - Situation where small-localized areas along the bank or toe show exposed faces.
- Moderate - Includes bank instability exposing large areas of soil along the bluff.
- Severe - Describes exposed bluff and toe faces, slumping banks and/or exposure of tree root systems.

[3] The change in erosion observed this survey event in relation to the past year's survey event was in the following categories:
- Minimal – No appreciable change in condition.
- Moderate – Some additional erosion and bank deterioration is apparent.
- Significant – Clear evidence of significant additional erosion and bank deterioration is apparent.

The most recent triennial shoreline erosion survey of the entire Cheat Lake shoreline was conducted in 2017. The survey did not identify any new areas of erosion.

5.1.6 References

Commonwealth of Pennsylvania Department of Conservation (CPDC) and Natural Resources Bureau of Topographic and Geologic Survey. 2017. Available online: https://www.dcnr.pa.gov/Geology/GeologyOfPA/Pages/default.aspx. Accessed: June 4, 2019.

Lake Lynn Generation, LLC (Lake Lynn). 2019. 2018 Annual Shoreline Erosion Survey Report. Available online: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=14750271. Accessed: June 4, 2019.

United States Department of Agriculture Natural Resources Conservation Service (NRCS). 2019. Web Soil Survey. Available online: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm. Accessed: June 6, 2019.

West Virginia Geological and Economic Survey (WVGES). 2017. Geologic Map of West Virginia. Available online: http://www.wvgs.wvnet.edu/www/maps/geomap.htm. Accessed: June 4, 2019.

5.2 Water Resources

5.2.1 Overview

The Project is located on the Cheat River approximately 3.7 miles above the point where the Cheat River discharges into the Monongahela River (Allegheny, 1991). In accordance with License Article 405 of the existing Project License, since 1997 the Licensee has used monitors to continuously monitor and record hourly dissolved oxygen, pH, water temperature, and conductivity from April 1 through October 31 of every year at three locations in conjunction with USGS gages located in Cheat Lake, the Project tailrace, and downstream of Grassy Run. The Licensee reports dissolved oxygen exceedances of the water quality standard to FERC and the resource agencies and files an annual monitoring report for the Project. Water quality samples are also collected in conjunction with the Biomonitoring Plan.

5.2.2 Drainage Area

The Cheat River basin encompasses portions of Monongalia, Preston, Tucker, Randolph, and Pocahontas Counties in West Virginia, and Fayette County in Pennsylvania, and a small part of Garrett County, Maryland. The basin is approximately 100 miles long and has an average width of about 15 miles with a total drainage area of 1,411 square miles (FERC, 1995). The Cheat River is the second largest tributary to the Monongahela River with the Youghiogheny being the largest (Allegheny, 1991).

5.2.3 Streamflow, Gage Data, and Flow Statistics

This section describes the monthly minimum, mean, and maximum flows in cubic feet per second (cfs) at the Project, and the methods used to develop these flow statistics.

5.2.3.1 USGS Gaging Stations

The USGS currently operates several gaging stations on the Cheat River in West Virginia and Pennsylvania in the Project vicinity (Table 5.2 and Figure 5.3).

Table 5.2. USGS Gages Located on the Cheat River in the Project Vicinity

USGS Gage Number	Gage Name	Location	Drainage Area	Coordinates
USGS Gage. 03071690	Nilan Gage	Cheat River approximately 2.5 miles downstream of the Project dam at Nilan, Pennsylvania	1,422 square miles	39°43’54” 79°53’25”
USGS Gage 03071605	Davidson Gage	Cheat River, in the Project tailwater approximately 650 downstream of the dam at Davidson, Pennsylvania	1,420 square miles	39°43’20.39” 79°51’32.13”
USGS Gage 03071600	Lake Lynn Gage	Just below the Project dam at Lake Lynn, Pennsylvania	1,411 square miles	39°43’15” 79°51’20”
USGS Gage 03071590	Stewartstown Gage	Cheat River, just upstream of the Project dam at Stewartstown, West Virginia	1,411 square miles	39°43’12” 79°51’21”
USGS Gage 03070260	Albright Gage	Cheat River, upstream of the Project boundary at Albright, West Virginia	1,044 square miles	39°29’41” 79°38’41”
USGS Gage 03069500	Parsons Gage	Cheat River, furthest upstream from the Project at Parsons, West Virginia	722 square miles	39°07’17.6” 79°40’31.9”

Source: USGS, 2019a; USGS, 2019b; USGS, 2019c; USGS, 2019d; USGS, 2019e; USGS, 2019f

Notes: [1] In accordance with License Articles 404 and 407 of the existing FERC License and the Project Minimum Release Flow Gauging Plan (Lake Lynn, 2014 and Lake Lynn, 2015), the Licensee uses water surface elevations from the Lake Lynn gage to calculate flows in the Cheat River downstream of the dam.

5.2.3.2 Methods Used to Develop Flow Estimates

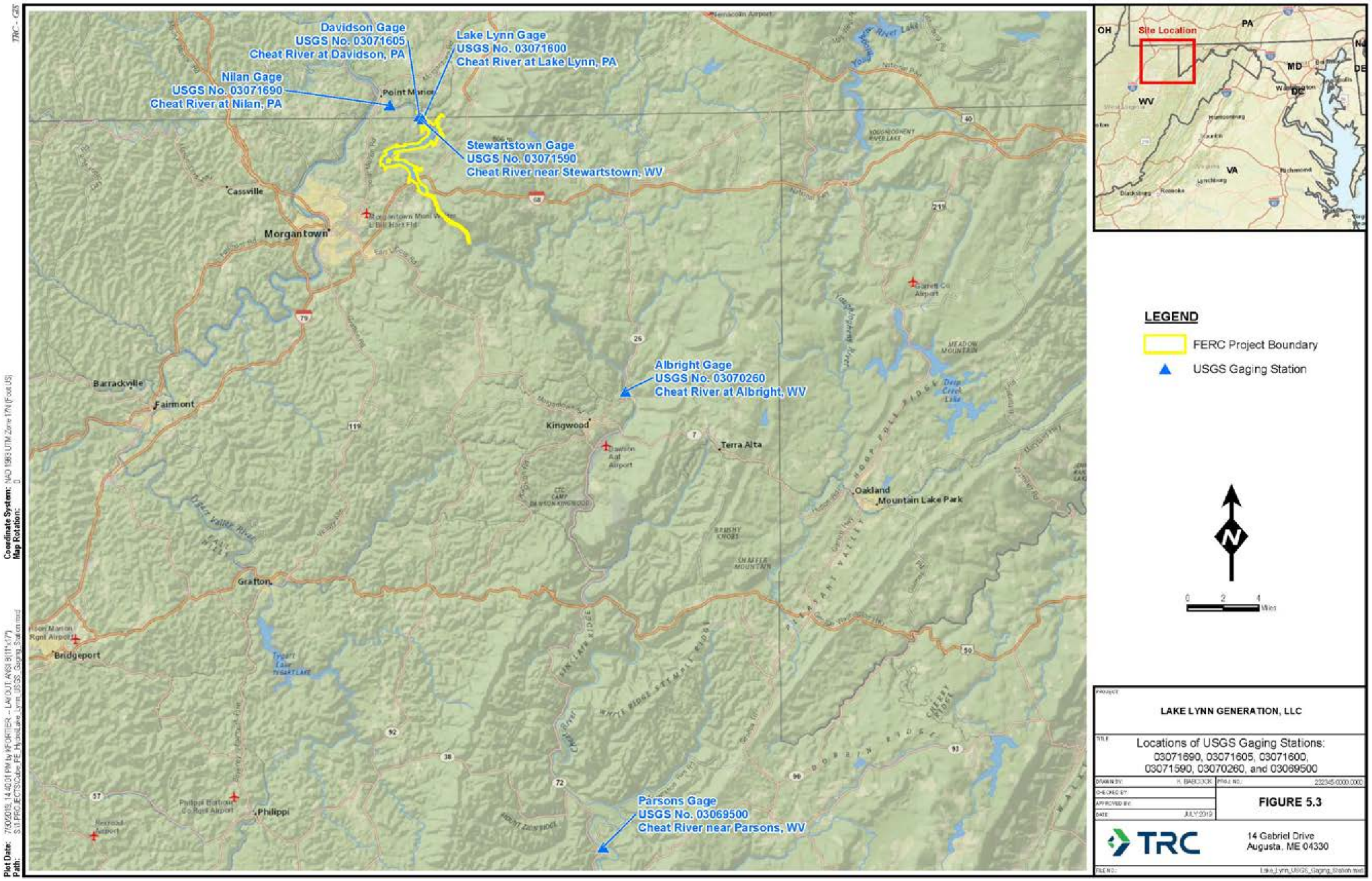
Flows at the Project were estimated using elevation data from the Lake Lynn gage (USGS Gage No. 03071600)[2] (USGS, 2019c). The Lake Lynn gage records the tailrace water surface elevations, which correspond to flows in the Cheat River downstream of the dam (Lake Lynn, 2014 and Lake Lynn, 2015). Determination of flow and compliance with Article 404 of the existing FERC License requirements for minimum release flow of 100 to 212 cfs are established utilizing tailwater pool elevation monitoring equipment and the stage discharge rating included in the updated Project Minimum Release Flow Gauging Plan (Lake Lynn, 2015) and the Project Instream Flow Study (EA Engineering, Science, and Technology, Inc. (EA Engineering), 2014).

Although the dataset for the Lake Lynn gage is available beginning in 2010, the period of record used to the develop the monthly flow duration curves provided in Appendix E is 2016 through July 2019. The Instream Flow Study conducted in 2014 determined a need to recalibrate the

[2] All the elevation (stage) data was assumed to reference the vertical datum NAVD88, with the gauge zero level of 776.63 feet.

gage (EA Engineering, 2014). Thus, the start date for the period of record used to develop the monthly flow duration curves provided in Appendix E is 2016.

Figure 5.3. USGS Gaging Stations



5.2.3.3 Flow Statistics

The minimum, mean, and maximum annual and monthly flows at the closest USGS gage to the Project where flow data is measured is tabulated in Table 5.3.

Table 5.3. Estimated Flow Statistics (in cfs) for the Lake Lynn Project at the Albright Gage

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lake Lynn Project at the Albright Gage (based on 23 years of USGS gage records, 1996-2018)													
Min	1,545	1,885	2,506	1,271	856.4	386.3	561.2	376.1	141.0	377.8	793.1	1,467	2,058
Mean	3,060	4,140	4,770	3,810	3,470	1,830	1,520	1,230	1,180	1,580	2,390	3,630	2,677
Max	5,706	8,124	8,344	7,116	5,669	3,435	3,168	3,882	4,668	3,682	4,383	5,547	3,568

Source: USGS, 2019a

5.2.3.4 Peak Streamflow

Peak streamflow statistics are available at some of the USGS gages in the vicinity of the Project. Peak streamflow data is not available at the Lake Lynn gage (USGS, 2019c). Peak streamflow data are available at the Albright gage (Figure 5.3) from December 1997 through July 19, 2017 (USGS, 2019a). During this period, at the Albright gage, a peak streamflow of 49,800 cfs occurred on July 29, 2017 (USGS 2019a). Peak streamflow data are available at the Parsons gage (Figure 5.3) from July 6, 1984 through July 29, 2017 (USGS, 2019e). During this period, at the Parsons gage, a peak streamflow of 170,000 cfs occurred on November 5, 1985 (USGS, 2019e).

5.2.4 Existing and Proposed Uses of Water

To the best of the Licensee's knowledge, there are no active water withdrawals located within the Project boundary. Project waters are not used for irrigation, domestic water supply, or industrial purposes, except for hydropower generation at the Project. Discharges within the Cheat River watershed are described later in this section.

The WVDEP issues individual National Pollution Discharge Elimination System (NPDES) permits to both publicly-owned and privately-owned wastewater treatment facilities. Publicly owned treatment works (POTWs) are relatively large facilities with extensive wastewater collection systems, whereas private facilities are usually used in smaller applications such as subdivisions and shopping centers. The Licensee has an NPDES permit at Cheat Lake Park (the Lake Lynn Recreational Facility, Information System ID WVG551086) (USEPA, 2019). Other NPDES discharges into the Project waters (Cheat Lake) include (USEPA, 2019):

- Albert Gallatin Municipal Authority (one individually-permitted POTW for two outlets) (Information System ID WVG640067) (WVDEP, 2011 and USEPA, 2019);
- Morgan Run Marina & Residence (Information System ID WVR100682);
- SCL, PSD, LLC (or the Summit at Cheat Lake) (Information System ID WV0105945);
- Emma Kaufmann Camp (Information System ID WVG550032);
- Canyon PSD (POTW) (Information System ID WV0032158);
- Lakeside Estates (Information System ID WV0085600);
- Morgantown Utility Board Cheat Lake (POTW) (Information System ID WV0083071);
- Lakeview Manor Homeowners Association (Information System ID WV0035271);
- Ices Ferry Bridge (Information System ID WVR104871); and
- Mont Chateau Research Center (Information System ID WV0080306).

5.2.5 Existing Instream Flow Uses

Instream uses of water at the Project, other than for hydroelectric generation, are generally limited to recreation, including boating and angling in the Cheat River and Cheat Lake. There are no other known entities with water rights, or entities with water rights applications, within the Project boundary.

5.2.6 Water Quality Standards

Water quality standards applicable to Cheat Lake are regulated by the WVDEP consistent with the Clean Water Act (CWA). The water quality standards applicable to Cheat Lake and the West Virginia portion of the Cheat River are outlined in the Requirements Governing Water Quality Standards Rule – Title 47CRS2 (WVDEP, 2019). The Cheat River and Cheat Lake in West Virginia is designated as Category A (Water Supply, Public) and Category C (Water Contact Recreation) (WVDEP, 2016). In West Virginia, Cheat Lake is managed as a “Cool water lake” for the support of cool water fish species, such as walleye and trout. Selected water quality standards applicable to the West Virginia portion of the Project are summarized in Table 5.4.

Table 5.4. Selected West Virginia Water Quality Standards Applicable to Cheat Lake[1]

Parameter	Human Health	
	Category A: Water Supply, Public	Category C: Water Contact Recreation
Dissolved Oxygen	No less than 5 mg/l at any time	No less than 5 mg/l at any time
Temperature	N/A	N/A
pH	No values below 6.0 nor above 9.0. Higher values due to photosynthetic activity may be tolerated.	No values below 6.0 nor above 9.0. Higher values due to photosynthetic activity may be tolerated.
Fecal coliform	Maximum allowable level of fecal coliform content for Water Contact Recreation (either MPN or MF) shall not exceed 200/100 ml as a monthly geometric mean based on not less than 5 samples per month; nor to exceed 400 /100 ml in more than 10% of all samples taken during the month.	Maximum allowable level of fecal coliform content for Water Contact Recreation (either MPN or MF) shall not exceed 200/100 ml as a monthly geometric mean based on not less than 5 samples per month; nor to exceed 400 /100 ml in more than 10% of all samples taken during the month.
Turbidity	No point or non-point source to West Virginia's waters shall contribute a net load of suspended matter such that the turbidity exceeds 10 NTU's over background turbidity when the background is 50 NTU or less, or have more than a 10% increase in turbidity (plus 10 NTU minimum) when the background turbidity is more than 50 NTUs. This limitation shall apply to all earth disturbance activities and shall be determined by measuring stream quality directly above and below the area where drainage from such activity enters the affected stream. Any earth disturbing activity continuously or intermittently carried on by the same or associated persons on the same stream or tributary segment shall be allowed a single net loading increase.	No point or non-point source to West Virginia's waters shall contribute a net load of suspended matter such that the turbidity exceeds 10 NTU's over background turbidity when the background is 50 NTU or less, or have more than a 10% increase in turbidity (plus 10 NTU minimum) when the background turbidity is more than 50 NTUs. This limitation shall apply to all earth disturbance activities and shall be determined by measuring stream quality directly above and below the area where drainage from such activity enters the affected stream. Any earth disturbing activity continuously or intermittently carried on by the same or associated persons on the same stream or tributary segment shall be allowed a single net loading increase.

[1] WVDEP 47CSR2 dated July 8, 2016 (WVDEP, 2016)

Water quality standards for the Project tailwater are regulated by the PADEP consistent with the CWA. The water quality standards applicable to Project tailwater are outlined in the Pennsylvania Code Chapter 93 Water Quality Standards[3]. In Pennsylvania, the Cheat River is designated as Warm Water Fishes (WWF) to allow for the maintenance and propagation of fish species and additional flora and fauna which are indigenous. Selected water quality standards applicable to the Pennsylvania portion of the Project (Project tailwater) are summarized in Table 5.5.

[3] Available online: https://www.pacode.com/secure/data/025/chapter93/chap93toc.html. Accessed July 3, 2019.

Table 5.5. Selected Pennsylvania Water Quality Standards Applicable to the Project Tailwater

Parameter	WWF Designation
Dissolved Oxygen (mg/l)	7-day average 5.5 mg/l; minimum 5.0 mg/l.
Temp (ºC)	Maximum temperatures in the receiving water body January 1-31: 40 ºF February 1-29: 40 ºF March 1-31: 46 ºF April 1-15: 52 ºF April 16-30: 58 ºF May 1-15: 64 ºF May 16-31: 72 ºF June 1-15: 80 ºF June 16-30: 84 ºF July 1-31: 87 ºF August 1-15: 87 ºF August 16-30: 87 ºF September 1-15: 84 ºF September 16-30: 78 ºF October 1-15: 72 ºF October 16-31: 66 ºF November 1-15: 58 ºF November 16-30: 50 ºF December 1-31: 42 ºF
pH	From 6.0 to 9.0 inclusive
Bacteria	N/A for WWF

[1] Source: Pennsylvania Code Chapter 93. Water Quality Standards (2019)

5.2.7 Existing Water Quality

Under section 303(d) of the CWA, states are required to submit lists of waters that cannot meet water quality standards (known as the 303(d) list). CWA Section 305(b) water quality assessment data are used to develop the lists of impaired waters. Historically, water quality throughout the Cheat River watershed had been negatively impacted by acid mine drainage (AMD), which is not related to the Project or Project operations. Cheat Lake is listed as impaired for methylmercury, which is not a Project-related impact. Portions of the Cheat River in the Project vicinity (see Table 5.6) is listed as a 303(d) impaired water for iron, aluminum, and pH by the WVDEP (WVDEP, 2016), however, these impairments are not Project-related impacts. Portions of the Cheat River upstream from the Project are listed as impaired for biological and fecal coliform (see Table 5.6) (WVDEP, 2016).

The Cheat River is not listed as impaired by the PADEP (PADEP, 2018).

Table 5.6. West Virginia Section 303(d) List for the Cheat River

Parameter	Location
Fecal Coliform	Cheat River, river mile (RM) 19.5 – 44.2
Methylmercury	Cheat Lake, entire lake
CNA-Biological	RM 27.6 to headwaters
Iron	Cheat River, RMs 1.85, 4.07, 7.70, 8.39
Aluminum	Cheat River, RMs 1.85, 4.07, 7.70, 8.39
pH	Cheat River, RMs 1.85, 4.07, 7.70, 8.39

Note: Total maximum daily loads (TMDLs) have been developed for iron, aluminum, and pH on the Cheat River.[4]

Water Quality Data

In accordance with License Article 405 of the existing Project License, the Licensee has collected water quality monitoring data every year since 1997 for the period April 1 through October 31. The Licensee uses monitors to continuously monitor and record hourly dissolved oxygen, pH, water temperature, and conductivity at three locations in conjunction with USGS gages located in Cheat Lake, the Project tailrace, and downstream of Grassy Run: USGS Gage No. 03071590 Stewartstown Gage, USGS Gage No. 03071605 Davidson Gage, USGS Gage No. 03071690 Nilan Gage (previously USGS Gage 03071700 Point Marion Gage).

A summary of water quality data collected from the three monitors (Figure 5.3) from 2008 to 2018 is summarized in Table 5.7 (the full data set is provided in Appendix F-3). The Licensee reports dissolved oxygen water quality standard exceedances to FERC and the resource agencies and files an annual monitoring report with FERC.

Periods of low dissolved oxygen levels were generally found in the late summer and early fall for most years (September and early October), particularly at the Cheat Lake monitor.

[4] Biological impairments resolved by the implementation of an approved pollutant specific total maximum daily load.

Table 5.7. USGS Gage/Licensee Water Quality Data

Monitor/Gage	Water Temperature (°C)	pH	Dissolved Oxygen (mg/l)	Specific Conductance (µS/m at 25ºC)
USGS Gage No. 03071590 Stewartstown Gage (Cheat Lake Site 07)	3.2 - 26.7	6.4 - 7.3	1.0 - 12.8	48 - 205
USGS Gage No. 03071605 Davidson Gage (Tailrace Site 08)	3.5 - 27.4	6.3 - 7.4	3.4 - 14.0	52 - 178
USGS Gage No. 03071690 Nilan Gage (Downstream Site 09 - from 2013 – Oct/Nov 2017)	6.0 – 27.2	5.3 – 7.4	3.1 – 13.0	54 - 217
USGS Gage 03071700 Point Marion Gage (Downstream Site 09 – site discontinued by USGS in September 2015[1])	0.2 – 27.5	4.0 – 8.3	5.5 – 15.2	61 – 681

Source: USGS, 2019f; USGS, 2019b; USGS, 2019d; and USGS, 2019g
[1] Data available through September 2015.

In addition to water quality measurements obtained by the Licensee, the WVDEP monitors and reports ambient water quality at two locations on the Cheat River, one near the Project dam and the other on the river upstream of the Project. The two station codes for these monitoring stations are MC-0001-3.5 and MC-0001-30 and are shown on Figure 5.4 (WVDEP, 2017). Data for each station from 2009 to 2019 is summarized in Table 5.8. The minimum recorded dissolved oxygen at the WVDEP Station MC-0001-3.5 (near the Project dam) did not fall below the water quality standard.

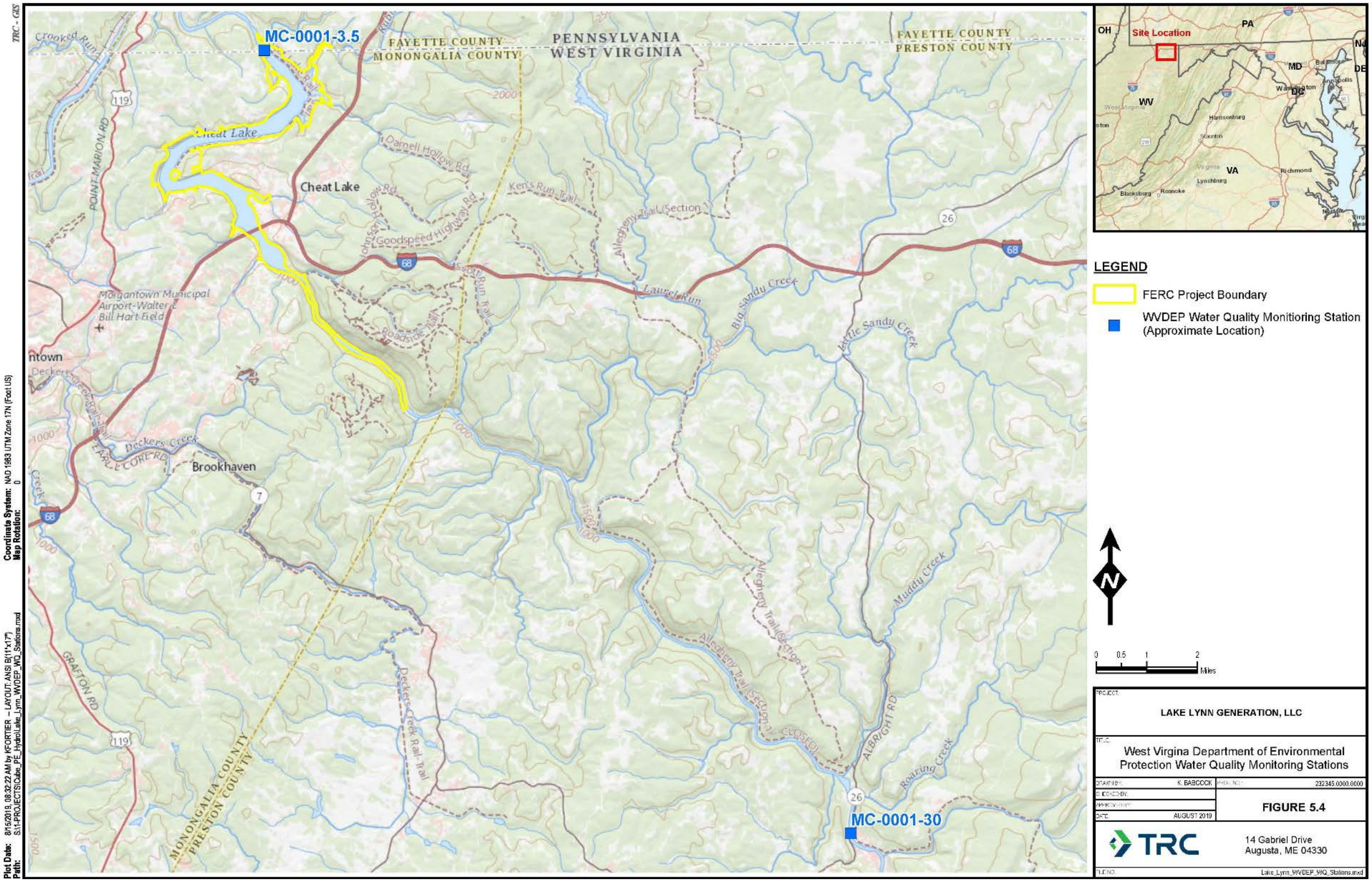
No Cheat River water quality monitoring data was readily available from the PADEP.

Table 5.8. WVDEP Ambient Water Quality Data

Parameter	MC-0001-3.5	MC-0001-30
Dissolved Oxygen (mg/L)	5.31 – 15.41	6.15 – 14.98
Temperature (ºC)	0.22 – 27.0	-0.07 – 29.03
pH	5.48 – 8.12	5.02 – 8.15
Conductivity (µS/m)	58.0 – 166.0	50.0 – 168.0
Fecal Coliform (colonies)	0 – 2,400[1]	2 – 9,000[2]
Total ammonia nitrogen (mg/l)	0.02 – 0.05	0.02 – 0.05

Source: WVDEP, 2017 and WVDEP, 2019 personal communication
[1] Average number of colonies is 81.8 units.
[2] Average number of colonies is 290.9 units.

Figure 5.4. WVDEP Ambient Water Quality Monitors



Source: WVDEP, 2017

5.2.8 References

Allegheny Power Service Corporation (Allegheny). 1991. Lake Lynn Hydro Station FERC Project No. 2459 – Final Federal Energy Regulatory Commission License Application. Available online: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1421832. Accessed: June 4, 2019.

EA Engineering, Science, and Technology, Inc. (EA Engineering). 2014. Instream Flow Study: Lake Lynn Hydroelectric Project. December 2014.

Federal Energy Regulatory Commission (FERC). 1995. Order Issuing New License to Continue to Operate/Maintain 51.2 Megawatt Lake Lynn Hydroelectric Project P-2459. Available online: http://elibrary.ferc.gov:0/idmws/doc_info.asp?document_id=7809. Accessed: June 6, 2019.

Lake Lynn Generation, LLC. 2014. Lake Lynn Hydro Station – FERC Project No. 2459 Minimum Release Flow Gauging Plan – License Article 407. Available online: http://elibrary.ferc.gov:0/idmws/doc_info.asp?document_id=14394453. Accessed: June 5, 2019.

Lake Lynn Generation, LLC. 2015. Lake Lynn Hydro Station – FERC Project No. 2459 Article 407 Minimum Release Flow Gauging Plan (Updated). July 28, 2015.

Pennsylvania Department of Environmental Protection (PADEP). 2018. Draft 2018 Pennsylvania Integrated Water Quality Monitoring and Assessment Report. Available online: https://www.dep.pa.gov/Business/Water/CleanWater/WaterQuality/IntegratedWatersReport/Pages/2018-Integrated-Water-Quality-Report.aspx. Accessed: July 3, 2019.

Pennsylvania Code. (2019). Chapter 93 Water Quality Standards. Available online: https://www.pacode.com/secure/data/025/chapter93/chap93toc.html. Accessed: July 3, 2019.

USEPA. 2019. Envirofacts. FRS Facility Query. Available online: https://www.epa.gov/frs/frs-query#facility. Accessed: July 2, 2019.

United States Geologic Survey. 2018. WV 2016 Section 303(D) List Key. Available online: https://dep.wv.gov/WWE/watershed/IR/Documents/IR_2016_Documents/USEPA_Approved_303d%20List%20Only.pdf. Accessed: July 3, 2019.

United States Geologic Survey (USGS). 2019a. USGS 03070260 Cheat River at Albright, West Virginia. Available online: https://waterdata.usgs.gov/usa/nwis/uv?03070260. Accessed: June 5, 2019.

United States Geologic Survey (USGS). 2019b. USGS 03071605 Cheat River at Davidson, Pennsylvania. Available online: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=03071605. Accessed: June 12, 2019.

United States Geologic Survey (USGS). 2019c. USGS 03071600 Cheat River at Lake Lynn, Pennsylvania. Available online: https://waterdata.usgs.gov/usa/nwis/uv?03071600. Accessed: June 5, 2019.

United States Geologic Survey (USGS). 2019d. USGS 03071690 Cheat River at Nilan, Pennsylvania. Available online: https://waterdata.usgs.gov/nwis/dv?referred_module=sw&site_no=03071690. Accessed: July 2, 2019.

United States Geologic Survey (USGS). 2019e. USGS 03069500 Cheat River near Parsons, West Virginia. Available online: https://waterdata.usgs.gov/usa/nwis/uv?03069500. Accessed: June 5, 2019.

United States Geologic Survey. 2019f. USGS 03071590 Cheat River near Stewartstown, West Virginia. Available online: https://waterdata.usgs.gov/wv/nwis/uv?site_no=03071590. Accessed: July 2, 2019.

United States Geologic Survey. 2019g. USGS 03071700 Cheat River at Point Marion, Pennsylvania. Available online: https://nwis.waterdata.usgs.gov/usa/nwis/qwdata/?site_no=03071700. Accessed: July 2, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2011. Final USEPA Approved Report – Total Maximum Daily Loads for Selected Streams in the Cheat River Watershed, West Virginia. Available online: https://cheat.org/wpcontent/uploads/2012/12/Cheat_Final_TMDL_Public_Report_1_20_11.pdf. Accessed: June 7, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2016. Title 47, Series 2 Water Quality Standards. Available online: https://dep.wv.gov/WWE/Programs/wqs/Documents/47CSR2%20070816.pdf. Accessed: June 7, 2019.

West Virginia Division of Environmental Protection (WVDEP). 2017. Ambient Water Quality Data Report – Chart. Available online: https://apps.dep.wv.gov/dwwm/wqdatac/. Accessed: June 12, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2018. WV 2016 Section 303(D) List Key. Available online: WVDEP. 2018. WV 2016 Section 303(D) List Key. Available online: https://dep.wv.gov/WWE/watershed/IR/Documents/IR_2016_Documents/USEPA_Approved_303d%20List%20Only.pdf. Accessed: July 3, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2019. Water Quality Standards. Available online: https://dep.wv.gov/WWE/Programs/wqs/Pages/default.aspx/. Accessed: June 7, 2019.

West Virginia Department of Environmental Protection (WVDEP). 2019 personal communication. Email providing water quality data. June 7, 2019.

5.3 Fish and Aquatic Resources

5.3.1 Overview

There is a long history of biomonitoring at the Project. The Licensee has intensively monitored numerous aspects of fish and aquatic resources at the Project in accordance with Article 411 of the current FERC License and several variations of the Aquatic Biomonitoring Plan (Biomonitoring Plan) developed under Article 411. The geographic scope of the Biomonitoring Plan includes Cheat Lake, Cheat Lake embayments (e.g., Rubles Run and Morgans Run), Cheat Lake tailwater, and the Cheat River downstream of the dam to the confluence with the Monongahela River. The Biomonitoring Plan was developed in consultation with DOI, WVDNR, and PFBC and has been updated periodically.

In December 1995, the Licensee filed the initial 1995 Biomonitoring Plan with FERC and conducted the initial, post-license biomonitoring in 1997 and 1998. Subsequently, the Licensee submitted modifications to the Biomonitoring Plan in September and December 2004 and conducted additional biomonitoring at the Project during the 2005 through 2009 monitoring period. The Licensee conducted biomonitoring during the period 2011 through 2015. During this time, the Licensee documented the biomonitoring results in reports submitted to FERC. The Licensee submitted the most recent Biomonitoring Plan in 2018 for the period 2018 through 2020 and is currently conducting biomonitoring in accordance with the 2018 Biomonitoring Plan. The 2018 Biomonitoring Plan focuses on four tasks: aquatic habitat enhancement and monitoring; American eel environmental DNA (eDNA) testing; an angler creel survey; and continued water quality monitoring in accordance with the Water Quality Monitoring Plan filed under Article 405 of the Project license.

Table 5.9 summarizes the comprehensive biomonitoring conducted by the Licensee over the course of the extensive 22-year study period from 1997 through 2019 and includes biomonitoring planned for 2020.

Table 5.9. Summary of Licensee Biomonitoring Activities from 1997-2020

Type	‘97	‘98	‘99	‘00	‘01	‘02	‘03	‘04	‘05	‘06	‘07	‘08	‘09	‘10	‘11	‘12	‘13	‘14	‘15	‘16	‘17	18	‘19	‘20
Fish Biomonitoring (downstream of Cheat Lake)	X	X			X				X						X			X	X					
Benthic Biomonitoring (downstream of Cheat Lake)	X	X			X				X			X			X			X	X					
Water Quality Monitoring (downstream of Cheat Lake)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish Biomonitoring (Cheat Lake and embayments)	X	X			X				X			X			X			X	X					
Walleye Population Monitoring and Stock Assessment									X	X	X	X	X		X			X	X					
Monitoring Adult Walleye Movement									X	X	X		X			X	X	X	X					
Water Quality Monitoring (Cheat Lake)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	f	X	X	X	X
Aquatic Vegetation Mapping															X	X	X		X					
Bathymetric Mapping (Cheat Lake)															X	X	X		X					
Aquatic Enhancement and Monitoring																						X	X	TBD
American Eel eDNA Testing																						X	X	
Angler Creel Survey																								X

5.3.2 Fish Resources and Habitats

5.3.2.1 Inland Fish Species

The Cheat River supports both warm water and cool water fish species. Popular game species include largemouth bass, smallmouth bass, trout, crappie, walleye, and channel catfish. In accordance with the current FERC License for the Project, biological monitoring has been conducted in Cheat Lake and the Cheat Lake tailwater since 1997. WVDNR conducted surveys from 2005 through 2009 and West Virginia University (WVU) conducted surveys from March 2001 through December 2015. The studies consisted of sampling water quality, physical habitat, and biota (fish and benthic macroinvertebrates) using sampling methods and locations established as part of the 2005 through 2009 biomonitoring program (Wellman et al., 2008). The studies have found improvements in aquatic resources.

Cheat River and Cheat Lake Tailwater

From 2005 through 2009 surveys were conducted in the Cheat Lake tailwater (tailwater) (first 1 mile) and in the Cheat River downstream of the tailwater area. Cheat Lake tailwater and Cheat River surveys were conducted using a variety of techniques: night boat electrofishing, PRAM electrofishing, and gill netting. Surveys were conducted in May and October during periods of low water. Tailwater surveys were conducted at eight different locations (Figure 5.5) and river surveys were conducted at three different locations (Figure 5.6). Boat electrofishing surveys were conducted at night at tailwater stations T1, T3, and T5 and river stations R1, R2, and R3. Catch per unit of effort (CPUE) was based on fish per hour. Gill net surveys were conducted at tailwater stations T2 and T4 and river stations R1, R2, and R3. PRAM electrofishing surveys were conducted to collect juvenile fish in the Cheat Lake tailwater at stations T1, T3, T5, and T6 (Smith & Welsh, 2015).

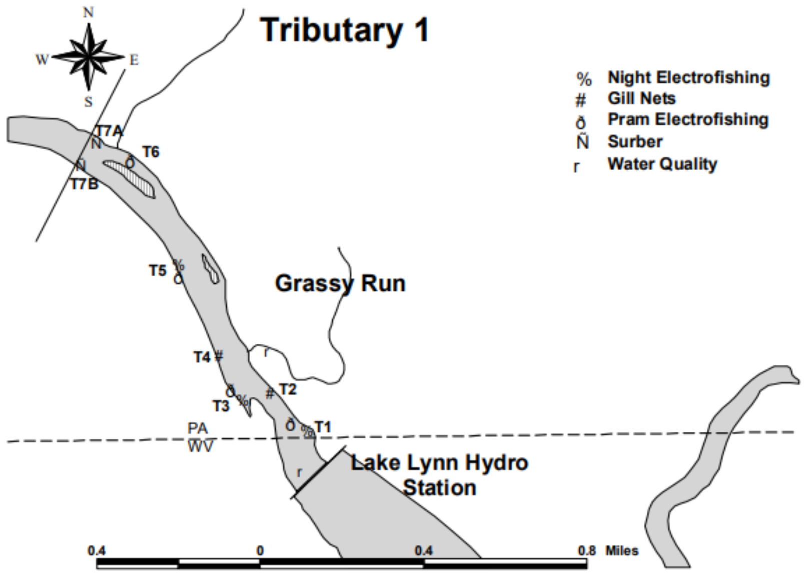
During 2011 and 2014, fish were sampled downstream of Cheat Lake in the tailwater and navigable river reaches. Fish were collected using nighttime boat electrofishing, daytime PRAM electrofishing, and gill netting surveys consistent with those conducted during the 2005 through 2009 period. The PRAM electrofishing surveys were conducted three times during each study year at four tailwater locations (T1, T3, T5, and T6) (Figure 5.5). Nighttime boat electrofishing was conducted twice during each study year at three tailwater locations (T1, T3, and T5) (Figure 5.5) and three river locations (R1, R2, and R3) (Figure 5.6). Gill netting was conducted twice during each study year at two tailwater locations (T2 and T2) and three river locations (R1, R2, and R3). A total of 3,352 fishes were collected during 2011 and 2014. Species richness (51 species total) and fish abundance (1,825 in 2011, 1,527 in 2014) in 2011 and 2014 was among the highest recorded since biomonitoring began. Boat electrofishing and PRAM electrofishing captured fishes in higher abundance (1,254 – 1,903 individuals) and a higher number of species (16 – 35 species) than gill netting (195 individuals, 12 – 19 species) (Table 5.10). Additionally, six species of fish (channel darter, variegate darter, chain pickerel, popeye shiner, muskellunge, and striped shiner) were captured for the first time since biomonitoring surveys were initiated. Abundance of several sportfish and non-game fish species also increased compared to previous studies. Some of the most abundant species collected included emerald shiner, smallmouth bass, golden redhorse, mimic shiner, and channel catfish (Smith & Welsh, 2015).

Table 5.10. Fish Species Richness Temporal for Cheat Lake Tailwater and Cheat River Summarized by Gear Type

		Species Richness							
Region	Gear	1990	1997	1998	2001	2005	2008	2011	2014
Cheat Tailwater	Night Boat Electrofishing	.	15	19	24	18	25	14	20
	Biomonitoring Gill Nets	.	8	15	13	14	14	9	5
	PRAM electrofishing	.	18	14	25	16	17	16	30
Cheat River	Night Boat Electrofishing	23	20	24	26	22	25	29	31
	Biomonitoring Gill Nets	17	7	14	10	16	17	16	11
TW & River	Night Boat Electrofishing	24	22	28	28	25	31	30	37
	Biomonitoring Gill Nets	17	11	19	16	19	20	19	12
	All gears	28	32	35	37	36	39	35	44

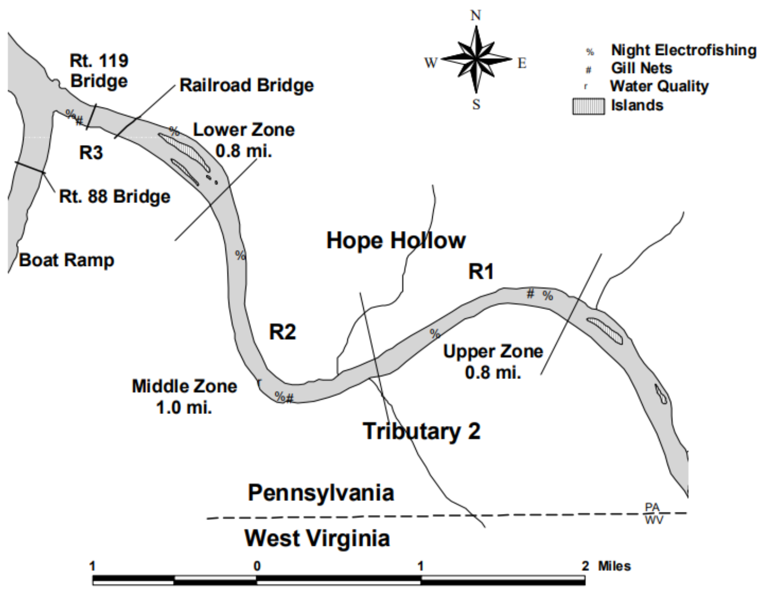
Source: WVDNR, 2004

Figure 5.5. Location of the 2005-2009 Biomonitoring Stations for the Cheat River Tailwater Downstream of the Lake Lynn Station



Source: WVDNR 2004

Figure 5.6. Location of the 2005-2009 Biomonitoring Stations for the Cheat River Downstream of the Lake Lynn Station



Source: WVDNR, 2004

Cheat Lake and Embayment

From 2005 through 2009, fish surveys were conducted in Cheat Lake and in the two main Cheat Lake embayments (embayment). Surveys were conducted by night boat electrofishing and gill netting in May and October during periods of low water. Electrofishing surveys were conducted at Cheat Lake stations L1 – L6 (Figures 5.8 and 5.9) and embayment stations E1 and E2 (Figure 5.7) (WVDNR, 2004).

From 2011 through 2015, fish were sampled in Cheat Lake at eight locations, consistent with those sampled in previous surveys. Fishes were collected two times (spring and fall) a year using nighttime boat electrofishing and gill netting (gill netting was not conducted in 2013 or 2015). A total of 8,338 fishes representing 35 species were collected from 2011 through 2015. Boat electrofishing captured more species of fishes (33 species total) at higher abundances (7,499 individuals) than gill netting (22 total species, 839 individuals) (Table 5.11). Species richness increased substantially in the riverine zone which had a low of 8 species in 1990 and an average of 23 species captured during the 2011 through 2015 study. Additionally, abundances of several sportfish and non-game fish species increased compared to previous studies. Sportfish species in highest abundance during the study included bluegill, smallmouth bass, largemouth bass, yellow perch, and channel catfish. Non-game fish species highest in abundance included emerald shiner, mimic shiner, logperch, brook silverside, and gizzard shad (Smith & Welsh, 2015).

Walleye Population Monitoring and Stock Assessment

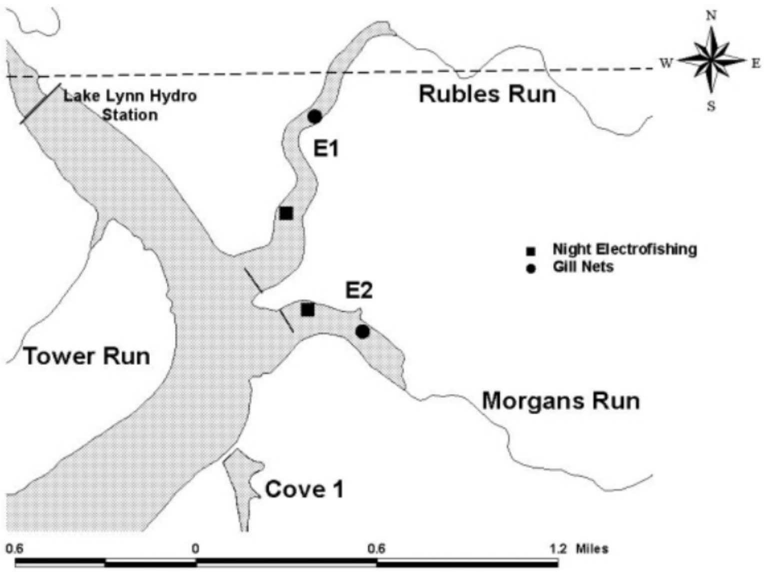
Walleye stocking assessments and walleye surveys took place during the 2005 through 2009 biomonitoring surveys in Cheat Lake and the Cheat Lake embayments. Walleye were stocked in Cheat Lake from 1999 - 2002 to establish a reproducing population. Success of the population was undetermined until the 2005 biomonitoring surveys. Fingerling walleye marked with oxytetracycline (OTC) were produced in a WVDNR hatchery and stocked in Cheat Lake in the late spring of 2005. During the stocking assessment task, otoliths were removed from all appropriate-size individuals to determine if OTC marks were present. In addition, walleye collected from the Cheat Lake tailwater and the Monongahela River were checked for OTC marks. Additional surveys were conducted in late spring and early summer to collect age-0 walleye to check individuals for OTC marks to determine if natural reproduction occurred. Walleye were also collected from Cheat Lake throughout the year with gill nets and boat electrofishing (Smith & Welsh, 2015).

From 2012 through 2015, walleyes were targeted via gill net sampling in Cheat Lake at six locations (L1, L2, L2A, L2B, L4, and L5). Walleye stocking assessment surveys were conducted in the spring (March and April) and fall (November) from 2012 through 2015. Additionally, age, growth, and diet of Cheat Lake walleyes was collected in stocking assessment surveys and during a separate study on Cheat Lake channel catfish. From 2012 through 2015, a total of 764 fishes were captured during walleye stocking assessment surveys, including 118 walleyes. Channel catfish, white bass, walleye and black crappie were the most abundant species in walleye stocking assessment surveys. Age and growth analysis of walleyes using a von Bertalannfy growth model suggested that female walleyes in Cheat Lake grow quickly and reach large maximum sizes compared to males. Diet contents of captured walleyes suggested that yellow perch are in important prey to Cheat Lake walleyes. Yellow perch were present in 67% of walleye stomachs and were the largest prey item consumed (Smith & Welsh, 2015).

Monitoring Adult Walleye Movement

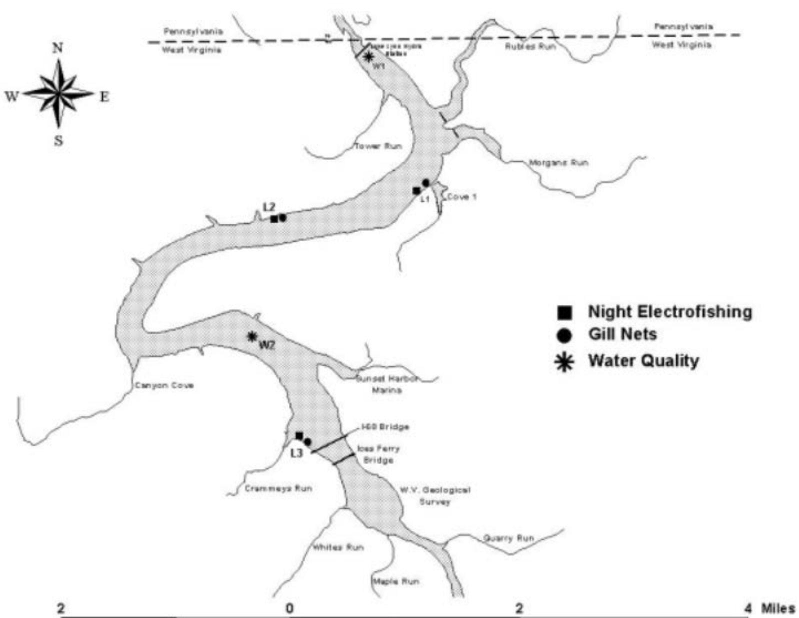
From 2012 through 2015, seasonal movements and distribution of Cheat Lake walleyes were monitored using acoustic telemetry. Walleye movements were analyzed for patterns associated with pre-spawn migration, spawning locations, post-spawn migration, and non-spawning movements. Walleye movements and distributions varied with season and environmental conditions. Pre-spawn migrations were primarily associated with elevated water temperatures during late winter/early spring. Spawning likely occurred from mid-March through early-April dependent on water temperatures in a given year. Spawning locations of walleyes within Cheat Lake were restricted to the uppermost one kilometer below the first riffle/run complex. Post-spawning migrations were most influenced by season and fish sex. Most females made post-spawn migrations to the main portion of Cheat Lake in April, while most males made post-spawn migrations in the fall. Walleyes made large non-spawning movements during periods of elevated river discharge and water temperatures (Smith & Welsh 2015).

Figure 5.7. Location of the 2005-2009 Biomonitoring Stations for the Cheat Lake Embayments



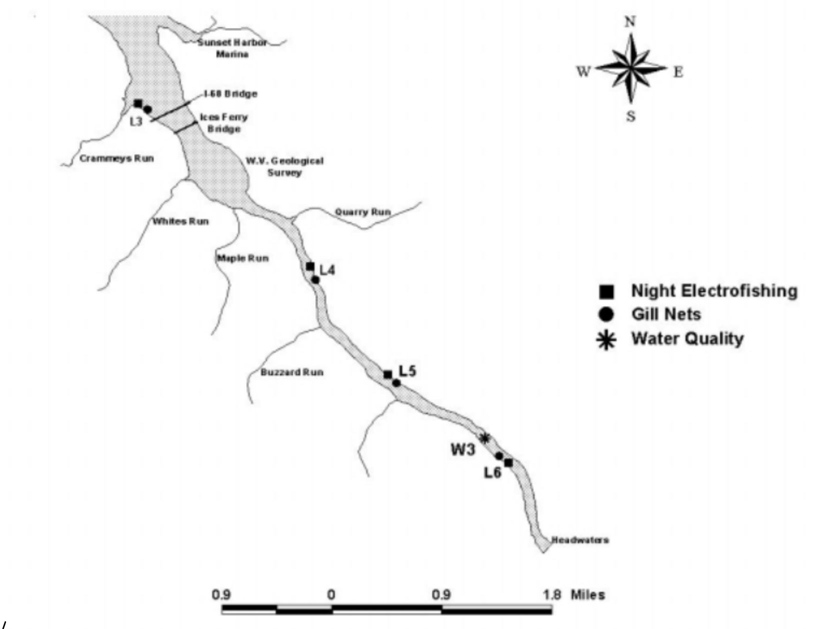
Source: WVDNR, 2004

Figure 5.8. Location of the 2005 - 2009 Biomonitoring stations for Lower Cheat Lake



Source: WVDNR, 2004

Figure 5.9. Location of the 2005 - 2009 Biomonitoring Stations for Upper Cheat Lake and Cheat River



../

Source: WVDNR, 2004

Table 5.11. Temporal Trends in Fish CPUE of Boat Electrofishing

	Boat Electrofishing								
Species	1990	1997	1998	2001	2005	2008	2011	2014	Grand Total
Banded Darter	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50	0.11
Black Crappie	0.22	0.00	0.11	0.00	0.00	0.50	2.50	3.75	0.81
Bluegill	8.44	15.08	11.56	30.11	12.50	186.00	10.50	27.25	36.59
Bluntnose Minnow	0.22	0.00	0.00	9.11	10.50	14.25	7.75	0.75	5.38
Brook Silverside	4.00	5.00	4.89	11.33	6.00	37.25	11.25	5.75	10.58
Brown Bullhead	5.11	0.00	0.56	0.00	0.00	0.00	0.50	0.00	0.59
Common Carp	0.89	2.67	2.56	2.33	3.50	1.25	0.25	0.75	1.88
Emerald Shiner	7.11	21.67	20.56	25.67	5.00	7.25	125.50	22.25	29.30
Chain Pickerel	0.00	0.00	0.00	0.00	0.00	0.00	0.25	3.00	0.37
Channel Catfish	0.22	0.42	0.22	1.00	0.75	3.00	1.00	2.00	1.05
Channel Darter	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.06
Gizzard Shad	0.00	0.00	0.22	2.44	1.00	0.75	5.75	0.00	1.31
Golden Redhorse	0.00	0.92	1.67	1.33	4.25	4.25	19.50	40.00	8.39
Golden Shiner	0.00	0.00	0.11	0.11	0.00	0.50	0.00	0.00	0.10
Greenside Darter	0.00	0.00	0.00	0.33	0.00	0.00	0.00	1.25	0.20
Green Sunfish	0.22	0.00	0.33	2.11	1.75	19.50	1.25	10.50	4.21
Flathead Catfish	0.00	0.25	0.33	0.00	0.25	0.00	0.00	0.25	0.14
Freshwater Drum	0.44	0.58	0.56	0.78	0.75	1.00	0.50	3.00	0.93
Hybrid Striped Bass	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.03
Hybrid Sunfish	1.56	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.19
Johnny Darter	0.00	0.00	0.11	0.44	0.00	3.25	0.00	1.75	0.67
Largemouth Bass	2.44	2.75	3.89	3.67	8.50	4.50	9.50	17.50	6.39
Logperch	0.00	1.42	3.33	3.11	10.75	1.50	2.25	14.00	4.52
Longnose Gar	0.00	0.00	0.00	0.22	0.00	0.50	0.25	1.25	0.27
Mimic Shiner	0.89	0.00	0.00	33.78	5.50	54.50	12.75	29.50	17.55
Northern Hogsucker	0.00	0.00	0.33	0.00	0.50	0.25	0.00	0.25	0.17

Northern Pike	0.22	0.08	0.22	0.11	0.75	0.00	0.00	0.00	0.17
Popeye Shiner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.03
Pumpkinseed	4.67	1.75	2.33	1.22	0.50	3.75	0.50	0.50	1.81
Quillback	0.00	0.33	0.00	0.00	0.00	0.00	0.75	0.25	0.15
Rainbow Darter	0.00	0.00	0.22	0.00	0.00	0.00	0.00	2.50	0.32
River Carpsucker	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.04
Rock Bass	0.67	0.42	3.33	2.11	0.25	6.50	2.00	11.25	3.32
Rosyface Shiner	0.00	0.00	0.00	0.00	30.25	3.50	0.00	0.00	3.86
Sauger	0.00	0.67	2.44	1.78	1.75	1.50	4.25	4.50	2.17
Smallmouth Redhorse	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.06
Silver Redhorse	1.56	0.25	0.78	0.00	0.00	0.25	0.00	11.25	1.61
Silver Shiner	0.00	0.00	0.00	0.00	0.00	5.00	0.00	6.25	1.29
Smallmouth Bass	0.44	6.42	5.78	4.78	5.00	18.50	27.00	35.50	12.41
Spottail Shiner	0.22	1.67	1.00	0.00	0.00	0.00	0.00	0.25	0.41
Spotted Bass	0.22	0.75	0.00	1.00	2.25	4.75	3.25	8.75	2.45
Spotfin Shiner	0.22	0.00	0.00	0.67	7.25	9.00	0.50	0.25	2.08
Walleye	0.00	0.00	0.00	1.00	0.00	0.50	6.25	2.00	1.17
Warmouth	0.22	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.05
White Bass	0.00	0.00	0.00	0.00	0.00	0.00	3.50	0.00	0.40
White Sucker	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.03
White Crappie	0.00	0.33	0.00	0.67	0.00	0.00	0.00	0.00	0.15
Yellow Bullhead	0.44	0.08	0.11	0.33	0.00	0.00	0.00	0.50	0.18
Yellow Perch	9.56	7.92	24.22	14.00	1.75	0.25	1.25	22.75	11.25

Source: WVDNR 2004

Aquatic Vegetation Mapping

Aquatic vegetation has been shown to provide valuable habitat in rivers, lakes, and reservoirs for fish and other aquatic organisms (Smith & Welsh, 2015). Cheat Lake has historically had limited aquatic vegetation. The Licensee worked with WVDNR and WVU to document the distribution and relative abundance of aquatic vegetation in Cheat Lake (Smith & Welsh, 2015). Significant patches of aquatic vegetation were located in 22 separate areas in Cheat Lake. Overall Cheat Lake has limited coverage of aquatic vegetation (Smith & Welsh, 2015).

The documented areas of aquatic vegetation and the relative abundance are shown in Figure 5.11 in Section 5.6.2.

Aquatic Habitat Enhancement and Monitoring

The 2018 Biomonitoring Plan includes an aquatic habitat enhancement and monitoring task to provide habitat for early spawning fish species, walleye and yellow perch, in the early spring when Cheat Lake levels may fluctuate. The aquatic habitat enhancement structures were installed in March 2019. The Licensee is working with WVDNR and WVU to conduct pre-spawn, spawn, and post-spawn monitoring. Following the completion of the 2019 monitoring period, the Licensee will consult with the federal and state resource agencies to determine if additional enhancement and/or monitoring is warranted in 2020.

Angler Creel Survey

In accordance with the 2018 Biomonitoring Plan, the Licensee will conduct a creel survey (a sampling survey that targets recreational anglers) in 2020 to document a baseline of recreational fishing effort and success. The initial survey will provide valuable information about the CPUE for yellow perch specifically. Additional information provided by the survey would include angler effort, fish harvest data for gamefish species, and size distribution of gamefish species. Areas to be surveyed include upper Cheat Lake (Ice's Ferry Bridge access and private boat docks upstream of Ice's Ferry Bridge), middle Cheat Lake (Sunset Marina boat ramp and dock), and lower Cheat Lake (winter boat ramp at Cheat Lake Park and fishing piers at Morgan Run and Ruble Run).

5.3.2.2 Catadromous and Diadromous Species

The American eel (*Anguilla rostrata*) is a catadromous species meaning it has a life cycle in which young hatch in the marine environment (Sargasso Sea, south Atlantic) and as juveniles (silver eel) travel inland up streams and rivers to grow and mature. After developing in fresh and brackish water for 7 to 20 years, sexually mature adult eels (yellow eel) return to the Sargasso Sea to spawn and die (Hartel et al., 2002).

This catadromous life history of the American eel necessitates long migrations up and down rivers to successfully complete their life cycle. Barriers to migration such as dams can be problematic for the eel. However, American eels are remarkable climbers and can travel over land during wet conditions rendering only larger dams as migration impediments. There is no known occurrence of the American eel in the Cheat River basin, however, on the west slope of the Appalachian Mountains American eels have been collected in the Ohio River basin from the Kanawha, New, and Greenbrier Rivers. American eels have also been known to occur throughout the Potomac River watershed, which borders the Cheat River watershed (United States Fish and Wildlife Service [USFWS], 2015).

In accordance with Article 411 of the current FERC license, the Licensee developed the 2018 Aquatic Biomonitoring Plan in consultation with DOI, WVDNR, and PFBC. The 2018 Biomonitoring Plan includes testing the Project tailwater for American eel eDNA to determine whether American eels are present. In accordance with the 2018 Biomonitoring Plan, the Licensee worked collaboratively in 2018 with USFWS to plan the eDNA sampling program, select sampling locations, and conduct one sampling event of four samples during the third quarter of 2018. The Licensee collected samples during the first quarter of 2019. American eel DNA was not found in any of the samples tested in 2018 or during the first quarter of 2019. The Licensee collected samples during the second quarter of 2019 and the results are pending. The Licensee plans to collect the final samples during the fourth quarter of 2019 to complete the American Eel eDNA testing component of the 2018 Biomonitoring Plan.

5.3.2.3 Fish Passage

There are no fish passage measures or facilities at the Project.

5.3.3 Aquatic Invertebrate Resources and Habitats

Benthic macroinvertebrate surveys were conducted in the Cheat Lake tailwater in 1997, 1998, 2001, 2005, 2008, 2011, 2014, and 2015. The most recent benthic macroinvertebrate surveys were conducted in 2014 and 2015 at stations T7a and T7b (Figure 5.5) at minimum flow (212 cfs) in May and October. Each station included replicates evenly distributed from the shore to the mid-section of the river.

During 2011 and 2014, benthic macroinvertebrates were sampled downstream of Cheat Lake in the tailwater and navigable river reaches. Benthic macroinvertebrates were collected twice during each study year using a standard Surber sampler at three tailwater locations (T1, T7a, and T7b) (Figure 5.5) consistent with previous studies. A total of 6,338 benthic macroinvertebrates were collected during 2011 and 2014. The most abundant taxa were those in the caddisfly family Hydropsychiidae. Both benthic macroinvertebrate taxa richness (29 taxa total) and abundance were higher during 2011 (2,278 individuals) and 2014 (4,110 individuals) compared to previous studies. Several sensitive mayfly and stonefly taxa (i.e., *Isonychia sp., Leuctra sp., Taeniopteryx sp.*) were collected for the first time since biomonitoring began (Smith & Welsh, 2015).

All mussels are sedentary, utilizing benthic habitats throughout their life cycle. Mussels require areas where running water has a high oxygen content and supplies a rich food source of organic particles and micro-organisms (WVDNR, 2003). Ortmann (1919) historically noted the Cheat River supported 17 different species of freshwater mussels (Table 5.12) as referenced in *A Field Guide to Pennsylvania's Freshwater Mussel*s (PFBC, 2018).

Table 5.12. Mussels of the Cheat River

Common Name	Scientific Name	Regulatory Status
Mucket	*Actinonaias ligamentina*	--
Elktoe	*Alasmidonta marginata*	--
Threeridge	*Amblema plicata*	--
Cylindrical Papershell	*Anodontoides ferussacianus*	--
Purple Wartyback	*Cyclonaias tuberculate*	--
Spike	*Eurynia dilatate*	--
Longsolid	*Fusconaia subrotunda*	--
Plain Pocketbook	*Lampsilis cardium*	--
Wavyrayed Lampmussel	*Lampsilis fasciola*	--
Flutedshell	*Lasmigona costata*	--
Black Sandshell	*Ligumia recta*	--
Clubshell	*Pleurobema clava*	SE[1] & FE[2]
Round Pigtoe	*Pleurobema sintoxia*	--
Kidneyshell	*Ptychobranchus fasciolaris*	--
Pimpleback	*Cyclonaias pustulosa*	--
Creeper	*Strophitus undulates*	--
Rainbow	*Villosa iris*	--

[1] Federally Endangered
[2] State Endangered
Source: PFBC, 2018

5.3.4 References

Hartel, K.E., D.B. Halliwell and A.E. Launer. 2002. Inland Fishes of Massachusetts. Massachusetts Audubon Society, 208 South Great Road, Lincoln MA. 2002.

Pennsylvania Fish and Boat Commission Division of Environmental Services (PFBC). 2018. A Guide to Pennsylvania's Freshwater Mussels. Available online: https://pa.fisheries.org/wp-content/uploads/2018/02/Mussel-ID-workshop-field-guide-2-9-18.pdf. Accessed: June 3, 2019.

Smith, D., and S. Welsh. 2015. Biological Monitoring of Aquatic Communities of Cheat Lake, and Cheat River Downstream of the Lake Lynn Hydro Station, 2011 – 2015. Division of Forestry and Natural Resources West Virginia University.

United States Fish and Wildlife Service. 2015. American Eel Biological Species Report. Supplement to: Endangered and Threatened Wildlife and Plants; 12-Month Petition Finding for the American Eel (Anguilla rostrata).

Wellman, D., F. Jernejcic, and J. Hedrick. 2008. Biological monitoring of aquatic communities of Cheat Lake, and Cheat River downstream of the Lake Lynn Hydro Station, 2008.

West Virginia Division of Natural Resources (WVDNR). 2003. Freshwater Mussels. Available online: http://www.wvdnr.gov/Wildlife/Mussels.shtm. Accessed: May 20, 2019.

West Virginia Division of Natural Resources (WVDNR). 2004. Biological Monitoring of Aquatic Communities of Cheat Lake, and Cheat River Downstream of the Lake Lynn Hydro-station, 2005 – 2009.

5.4 Wildlife Resources

5.4.1 Overview

The Cheat River corridor provides habitat for many species of wildlife, including over 200 resident and transient bird species, over 50 mammal species, and 37 amphibian species with the potential to occur in the Project area.

5.4.2 Wildlife Resources and Habitats

5.4.2.1 Mammals

West Virginia is home to over 70 different wild mammals (WVDNR, 2001). Pennsylvania is home to 64 different wild mammals (Pennsylvania Game Commission [PGC], 2019). The Cheat River corridor provides habitat to over 50 mammal species. The species potentially occurring within forested portions of the Project area include: white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), striped skunk (*Mephitis mephitis*), and black bear (*Ursus americanus*). Those potentially occurring within open areas or grassland habitats of the Project area include: eastern cottontail rabbits (*Sylvilagus floridana*) and rodents such as the meadow-jumping mouse (*Zapus hudsonius*). Beaver (*Castor Canadensis),* fisher (*Martes pennant),* and river otter (*Lutra Canadensis*) were eradicated, but were reintroduced in the 1930s, 1969, and 1985, respectively (WVDNR, 2001).

Big game hunting in the Project area is limited to white-tailed deer. Small game mammals common in the Project area include squirrel, racoon, gray fox, red fox, beaver, mink, and muskrat. Squirrel is the number one game species in West Virginia by numbers. Commonly hunted game birds include turkey, grouse, woodcock, wood duck, mallards and geese.

The WVDNR searchable database, the WVDNR Mammals of West Virginia Field Checklist, and the Pennsylvania Mammal Atlas were utilized to generate a list of mammal species that could occur in the Project vicinity (within a 5-mile radius of the Project dam) (Table 5.13) (WVDNR, 2001; WVDNR, 2003; and PGC, 2019).

Table 5.13. Mammal Species that Potentially Occur in the Project Vicinity

Order	Family	Common Name	Scientific Name
Didelphimorphia	Didelphidae	Virginia Opossum	*Didelphis virginiana*
Insectivora	Soricidae	Long-tailed Shrew	*Sorex dispar*
		Masked Shrew	*Sorex cinereus*
		Northern Short-tailed Shrew	*Blarina brevicauda*
		Pygmy Shrew	*Sorex hoyi*
		Smoky Shrew	*Sorex fumeus*
		Southeastern Shrew	*Sorex longirostris*
	Talpidae	Eastern Mole	*Scalopus aquaticus*
		Hairy-tailed Mole	*Parascalops breweri*
		Star-nosed Mole	*Condylura cristata*
Chiroptera	Vespertilionidae	Big Brown Bat	*Eptesicus fuscus*
		Eastern Pipistrelle	*Pipistrellus subflavus*
		Eastern Red Bat	*Lasiurus borealis*
		Hoary Bat	*Lasiurus cinereus*
		Indiana Bat [1]	*Myotis sodalist*
		Northern Long-eared Bat [2]	*Myotis septentrionalis*
		Silver-haired Bat	*Lasionycteris noctivagans*
		Virginia Big-eared Bat [1]	*Corynorhinus townsendii*
Rodentia	Castoridae	American Beaver	*Castor canadensis*
	Dipodidae	Meadow Jumping Mouse	*Zapus hudsonius*
		Woodland Jumping Mouse	*Napaeozapus insignis*
	Erethizontidae	Common Porcupine	*Erethizon dorsatum*
	Muridae	Allegheny Wood Rat	*Neotoma magister*
		Black Rat	*Rattus*
		Deer Mouse	*Peromyscus maniculatus*
		Golden Mouse	*Ochrotomys nuttalli*
		House Mouse	*Mus musculus*
		Meadow Vole	*Microtus pennsylvanicus*
		Muskrat	*Ondatra zibethicus*
		Norway Rat	*Rattus norvegicus*
		Rock Vole	*Microtus chrotorrhinus*
		Southern Bog Lemming	*Synaptomys cooperi*
		Southern Red-backed Vole	*Clethrionomys gapperi*
		White-footed Mouse	*Peromyscus leucopus*
		Woodland Vole	*Microtus pinetorum*
Lagomorpha	Leporidae	Appalachian Cottontail	*Sylvilagus obscurus*
		Eastern Cottontail	*Sylvilagus floridana*
		Snowshoe Hare	*Lepus americanus*
Carnivora	Canidae	Coyote	*Canis latrans*
		Gray Fox	*Urocyon cinereoargenteus*
		Red Fox	*Vulpes*
	Felidae	Bobcat	*Lynx rufus*
	Mephitidae	Eastern Spotted Skunk	*Spilogale putorius*
		Striped Skunk	*Mephitis*
	Mustelidae	Fisher	*Martes pennant*

Order	Family	Common Name	Scientific Name
		Least Weasel	*Mustela nivalis*
		Long-tailed Weasel	*Mustela frenata*
		Mink	*Mustela vison*
		Fisher	*Martes pennant*
		River Otter	*Lutra canadensis*
Artiodactyla	Cervidae	White-tailed Deer	*Odocoileus virginianus*

Source: WVDNR, 2001; WVDNR, 2003; PGC, 2019
[1]Federally Endangered
[2]Federally Threatened

5.4.2.2 Birds

There are over 200 resident and transient bird species found in the Cheat River corridor. The Birds of West Virginia Field Checklist (BBC N.D.), and the Sibley Guide to Birds Second Edition (Sibley, 2014) was utilized to generate a list of bird species that could occur in the Project vicinity (within a 5-mile radius of the Project dam) (Table 5.14).

Table 5.14. Bird Species that Potentially Occur in the Project Vicinity

Family	Common Name	Scientific Name
Gaviidae	Loon, Common	*Gavia immer*
	Loon, Red-throated	*Gavia stellata*
Podicipedidae	Grebe, Horned	*Podiceps auritus*
	Grebe, Pied-billed	*Podilymbus podiceps*
Pelecanidae	Pelican, American White	*Pelecanus erythrorhynchos*
Phalacrocoracidae	Cormorant, Double-crested	*Phalacrocorax auritus*
Ardeidae	Heron, Great Blue	*Ardea herodias*
	Heron, Green	*Butorides virescens*
	Egret, Cattle	*Bubulcus ibis*
	Egret, Great	*Ardea alba egretta*
	Bittern, American	*Botaurus lentiginosus*
	Bittern, Least	*Ixobrychus exilis*
	Swan, Mute	*Cygnus olor*
	Night-heron, Black-crowned	*Nycticorax hoactii*
Anatidae	Goose, Canada	*Branta canadensis*
	Mallard	*Anas platyrhynchos*
	Gadwall	*Anas strepera*
	Pintail, Northern	*Anas acuta*
	Teal, Green-winged	*Anas crecca carolinensis*
	Teal, Blue-winged	*Anas discors orphna*
	Wigeon, American	*Anas americana*
	Shoveler, Northern	*Anas clypeata*
	Duck, American black	*Anas rubripes*

Family	Common Name	Scientific Name
	Duck, Wood	*Aix sponsa*
	Canvasback	*Aythya valisineria*
	Redhead	*Aythya americana*
	Duck, Ring-necked	*Aythya collaris*
	Scaup, Lesser	*Aythya affinis*
	Goldeneye, Common	*Bucephala clangula*
	Bufflehead	*Bucephala albeola*
	Merganser, Common	*Mergus merganser*
	Merganser, Hooded	*Lophodytes cucullatus*
	Duck, Ruddy	*Oxyura jamaicensis*
Cathartidae	Vulture, Turkey	*Cathartes aura*
	Vulture, Black	*Coragyps atratus*
	Osprey	*Pandion haliaetus*
Accipitridae	Harrier, Northern	*Circus cyaneus*
	Hawk, Sharp-shinned	*Accipiter striatus velox*
	Hawk, Cooper's	*Accipiter cooperii*
	Goshawk, Northern	*Accipiter gentilis*
	Hawk, Red-tailed	*Buteo jamaicensis*
	Hawk, Red-shouldered	*Buteo lineatus*
	Hawk, Broad-winged	*Buteo platypterus*
	Hawk, Rough-legged	*Buteo lagopus johannis*
	Eagle, Bald	*Haliaeetus leucocephalus*
	Eagle, Golden	*Aquila chrysaetos*
Falconidae	Falcon, Peregrine	*Falco peregrinus*
	Kestrel, American	*Falco sparverius*
	Merlin	*Falco columbarius*
Phasianidae	Grouse, Ruffed	*Bonasa umbellus*
	Pheasant, Ring-necked	*Phasianus colchicus*
	Turkey, Wild	*Meleagris gallopavo silvestris*
Odontophoridae	Bobwhite, Northern	*Colinus virginianus*
Rallidae	Gallinule, Common	*Gallinula galeata*
	Coot, American	*Fulica americana*
	Rail, Virginia	*Rallus limicola*
	Sora	*Porzana carolina*
	Moorhen, Common	*Gallinula chloropus cachinnans*
Charadriidae	Plover, Semipalmated	*Charadrius semipalmatus*
	Killdeer	*Charadrius vociferus*
Scolopacidae	Yellowlegs, Greater	*Tringa melanoleuca*
	Yellowlegs, Lesser	*Tringa flavipes*
	Sandpiper, Upland	*Bartramia longicauda*
	Sandpiper, Solitary	*Tringa solitaria*
	Sandpiper, Spotted	*Actitis macularia*
	Sandpiper, Semipalmated	*Calidris pusilla*
	Sandpiper, Least	*Calidris minutilla*
	Sandpiper, Pectoral	*Calidris melanotos*
	Sandpiper, White-rumped	*Calidris fuscicollis*

Family	Common Name	Scientific Name
	Dunlin	*Calidris alpina*
	Snipe, Wilson's	*Gallinago delicata*
	Woodcock, American	*Scalopax minor*
Laridae	Gull, Bonaparte's	*Chroicocephalus philidelphia*
	Gull, Ring-billed	*Larus delawarensis*
	Gull, herrington	*Larus argentatus*
Columbidae	Pigeon, Rock	*Columba livia*
	Dove, Mourning	*Zenaida macroura*
Cuculidae	Cuckoo, Yellow-billed	*Coccyzus americanus*
	Cuckoo, Black-billed	*Coccyzus erythropthalmus*
Tytonidae	Owl, Barn	*Tyto alba*
Strigidae	Owl, Long-eared	*Asio otus*
	Owl, Short-eared	*Asio flammeus*
	Owl, Great Horned	*Bubo virginianus*
	Owl, Barred	*Strix varia*
	Owl, Northern Saw-whet	*Aegolius acadicus*
	Screech-Owl, Eastern	*Megascops asio*
Caprimulgidae	Whip-poor-will, Eastern	*Antrostomus vociferus*
	Nighthawk, Common	*Chordeiles minor*
Apodidae	Swift, Chimney	*Chaetura pelagica*
Trochilidae	Hummingbird, Ruby-throated	*Archilochus colubris*
Alcedinidae	Kingfisher, Belted	*Megaceryle alcyon*
Picidae	Woodpecker, Red-headed	*Melanerpes erythrocephalus*
	Woodpecker, Red-bellied	*Melanerpes carolinus*
	Sapsucker, Yellow-bellied	*Sphyrapicus varius*
	Woodpecker, Downy	*Picoides pubescens*
	Woodpecker, Hairy	*Picoides villosus*
	Flicker, Northern	*Colaptes auratus*
	Woodpecker, Pileated	*Dryocopus pileatus*
Tyrannidae	Flycatcher, Olive-sided	*Contopus cooperi*
	Wood-Pewee, Eastern	*Contopus virens*
	Flycatcher, Yellow-bellied	*Empidonax flaviventris*
	Flycatcher, Acadian	*Empidonax virescens*
	Flycatcher, Willow	*Empidonax traillii*
	Flycatcher, Alder	*Empidonax alnorum*
	Flycatcher, Least	*Empidonax minimus*
	Phoebe, Eastern	*Sayornis phoebe*
	Flycatcher, Great Crested	*Myiarchus crinitus*
	Kingbird, Eastern	*Tyrannus tyrannus*
Laniidae	Shrike, Loggerhead	*Lanius ludovicianus*
	Shrike, Northern	*Lanius excubitor*
Vireonidae	Vireo, White-eyed	*Vireo griseus*
	Vireo, Blue-headed	*Vireo solitarius*
	Vireo, Yellow-throated	*Vireo flavifrons*
	Vireo, Warbling	*Vireo gilvus*
	Vireo, Philadelphia	*Vireo philadelphicus*

Family	Common Name	Scientific Name
	Vireo, Red-eyed	*Vireo olivaceus*
Corvidae	Jay, Blue	*Cyanocitta cristata*
	Raven, Common	*Corvus corax*
	Crow, American	*Corvus brachyrhynchos*
	Crow, Fish	*Corvus ossifragus*
Alaudidae	Lark, Horned	*Eremophilla alpestris*
Hirundinidae	Martin, Purple	*Progne subis*
	Swallow, Tree	*Tachycineta bicolor*
	Swallow, Bank	*Tachycineta thalassina*
	Swallow, N. Rough-winged	*Stelgidopteryx serripennis*
	Swallow, Cliff	*Petrochelidon pyrrhonota*
	Swallow, Barn	*Hirundo rustica*
Paridae	Chickadee, Carolina	*Poecile carolinensis*
	Chicadee, Black-capped	*Poecile atricapillus*
	Titmouse, Tufted	*Baeolophus bicolor*
Sittidae	Nuthatch, Red-breasted	*Sitta canadensis*
	Nuthatch, White-breasted	*Sitta carolinensis*
Certhiidae	Creeper, Brown	*Certhia americana*
Troglodytidae	Wren, Carolina	*Thryotherus ludovicianus*
	Wren, House	*Troglodytes aedon*
	Wren, Winter	*Troglodytes hiemalis*
	Wren, Marsh	*Cistothorus palustris*
Regulidae	Kinglet, Golden-crowned	*Regulus satrapa*
	Kinglet, Ruby-crowned	*Regulus calendula*
Sylviidae	Gnatcatcher, Blue-gray	*Polioptila caerulea*
Turdidae	Bluebird, Eastern	*Sialia sialis*
	Veery	*Catharus fuscescens*
	Thrush, Gray-cheeked	*Catharus minimus*
	Thrush, Swainson’s	*Catharus ustulatus*
	Thrush, Hermit	*Catharus guttatus*
	Thrush, Wood	*Hylocichla mustelina*
	Robin, American	*Turdus migratorius*
Mimidae	Catbird, Gray	*Dumetella carolinensis*
	Mockingbird, Northern	*Mimus polyglottos*
	Thrasher, Brown	*Toxostoma rufum*
Sturnidae	Starling, European	*Sturnus vulgaris*
Motacillidae	Pipit, American	*Anthus rubescens*
Bombycillidae	Waxwing, Bohemian	*Bombycilla garrulus*
	Waxwing, Cedar	*Bombycilla cedrorum*
Calcariidae	Longspur, Lapland	*Calcarius lapponicus*
	Bunting, snow	*Plectrophenax nivalis*
Parulidae	Ovenbird	*Seiurus aurocapilla*
	Warbler, Worm-eating	*Helmitheros vermivorum*
	Waterthrush, Louisiana	*Parkesia motacilla*
	Waterthrush, Northern	*Parkesia noveboracensis*
	Warbler, Black-and-white	*Mniotilta varia*

Family	Common Name	Scientific Name
	Warbler, Golden-winged	*Vermivora chrysoptera*
	Warbler, Blue-winged	*Vermivora cyanoptera*
	Warbler, Orange-crowned	*Oreothlypis celata*
	Warbler, Tennessee	*Oreothlypis peregrina*
	Warbler, Nashville	*Oreothlypis ruficapilla*
	Warbler, Connecticut	*Oporornis agilis*
	Warbler, Kentucky	*Geothlypis, Formosa*
	Warbler, Mourning	*Geothlypis philadelphia*
	Yellowthroat, Common	*Geothlypis trichas*
	Warbler, Hooded	*Setophaga citrina*
	Redstart, American	*Seophaga ruticilla*
	Warbler, Cape May	*Setophaha tigrina*
	Warbler, Cerulean	*Setophaga cerulea*
	Parula, Northern	*Setophaga americana*
	Warbler, Magnolia	*Setophaga magnolia*
	Warbler, Blackburnian	*Setophaga fusca*
	Warbler, Yellow	*Setophaga petechia*
	Warbler, Chestnut-sided	*Setophaga pensylvanica*
	Warbler, Black-throated Blue	*Setophaga caerulescens*
	Warbler, Blackpoll	*Setophaga striata*
	Warbler, Bay-breasted	*Setophaga castanea*
	Warbler, Pine	*Setophaga pinus*
	Warbler, Prairie	*Setophaga discolor*
	Warbler, Palm	*Setophaga palmarum*
	Warbler, Yellow-throated	*Setophaga dominica*
	Warbler, Yellow-rumped	*Setophaga coronata*
	Warbler, Black-throated Green	*Setophaga virens*
	Warbler, Wilson's	*Cardellina pusilla*
	Warbler, Canada	*Cardellina canadensis*
	Chat, Yellow-breasted	*Icteria virens*
Emberizidae	Towhee, Eastern	*Pipilo erythrophthalmus*
	Sparrow, American Tree	*Spizella arborea*
	Sparrow, Field	*Spizella pussila*
	Sparrow, Chipping	*Spizella passerina*
	Sparrow, Savannah	*Passerculus sandwichensis*
	Sparrow, Vesper	*Pooecetes gramineus*
	Sparrow, Grasshopper	*Ammodramus savannarum*
	Sparrow, Henslow's	*Ammodramus henslowii*
	Sparrow, Fox	*Passerella iliaca*
	Sparrow, Song	*Melospiza melodia*
	Sparrow, Lincoln's	*Melospiza lincolnii*
	Sparrow, Swamp	*Melospiza georgiana*
	Junco, Dark-eyed	*Junco hyemalis*
	Sparrow, White-crowned	*Zonotrichia leucophrys*
	Sparrow, White-throated	*Zonotrichia albicollis*
Cardinalidae	Tanager, Summer	*Piranga rubra*

Family	Common Name	Scientific Name
	Tanager, Scarlet	*Piranga olivacea*
	Cardinal, Northern	*Cardinalis*
	Grosbeak, Rose-breasted	*Pheucticus ludovicianus*
	Bunting, Indigo	*Passerina cyanea*
Icteridae	Blackbird, Rusty	*Euphagus carolinus*
	Grackle, Common	*Quiscalus quiscula*
	Blackbird, Red-winged	*Agelaius phoeniceus*
	Cowbird, Brown-headed	*Molothrus ater*
	Bobolink	*Dolichonyx oryzivorus*
	Meadowlark, Eastern	*Sturnella magna*
	Oriole, Orchard	*Icterus spurius*
	Oriole, Baltimore	*Icterus galbula*
Fringillidae	Finch, Purple	*Haemorhous purpureus*
	Finch, House	*Haemorhous mexicanus*
	Crossbill, Red	*Loxia curvirostra*
	Redpoll, Common	*Acanthis flammea*
	Siskin, Pine	*Spinus pinus*
	Goldfinch, American	*Spinus tristis*
Passeridae	Sparrow, House	*Passer domesticus*

Source: BBC N.D.; Sibley, 2014

5.4.2.3 Amphibians

Thirty-seven (37) resident amphibian species that could occur in the Cheat River habitats. Marshall University's (Marshall) Guide to Amphibians and Reptiles in West Virginia was utilized to generate a list of amphibians and reptiles that potentially occur in the Project vicinity (within a 5-mile radius of the Project dam) (Table 5.15).

Table 5.15. Amphibians and Reptiles that Potentially Occur in the Project Vicinity

Family	Common Name	Scientific Name
Salamandridae	Newt, Red Spotted	*Notophthalmus viridescens*
Ambystomatidae	Salamander, Jefferson	*Ambystoma jeffersonianum*
	Salamander, Spotted	*Ambystoma maculatum*
	Salamander, Marbled	*Ambystoma opacum*
Plethodontidae	Salamander, Green	*Aneides aeneus*
	Salamander, Northern Dusky	*Desmognathus fuscus*
	Salamander, Seal	*Desmognathus monticola*
	Salamander, Allegheny Mountain Dusky	*Desmognathus ochrophaeus*
	Salamander, Northern Spring	*Gyrinophilus porphyriticus*
	Salamander, Four-toed	*Hemidactylium scutatum*
	Salamander, Northern Two-lined	*Eurycea bislineata*
	Salamander, Long-tailed	*Eurycea longicauda*
	Salamander, Eastern Red-backed	*Plethodon cinereus*

Family	Common Name	Scientific Name
	Salamander, Northern Slimy	*Plethodon glutinosus*
	Salamander, Northern Ravine	*Plethodon richmondi*
	Salamander, Cheat Mountain[1]	*Plethodon nettingi*
	Salamander, Wehrle's	*Plethodon wehrlei*
	Salamander, Northern Red	*Pseudotriton r. ruber*
Bufonidae	Toad, Eastern American	*Bufo americanus*
	Toad, Fowler's	*Bufo fowleri*
Hylidae	Peeper, Northern Spring	*Pseudacris crucifer*
	Frog, Mountain Chorus	*Pseudacris brachyphona*
	Treefrog, Gray	*Hyla chrysoscelis*
Ranidae	Bullfrog, American	*Rana catesbeiana*
	Frog, Northern Green	*Rana clamitans melanota*
	Frog, Northern Leopard	*Lithobates pipiens*
	Frog, Pickerel	*Rana palustris*
	Frog, Wood	*Rana sylvatica*
Chelydridae	Turtle, Common Snapping	*Chelydra serpentine serpentina*
	Turtle, Eastern Painted	*Chrysemys picta*
	Turtle, Northern Map	*Graptemys geographica*
	Turtle, Eastern Box	*Terrapene carolina*
Kinosternidae	Turtle, Common Musk	*Kinosternon odoratus*
Phrynosomatidae	Lizard, Northern Fence	*Sceloporus undulatus*
Scincidae	Skink, Common Five-lined	*Eumeces fasciatus*
Colubridae	Racer, Northern black	*Coluber constrictor*
	Snake, Northern Ringneck	*Diadophis punctatus edwardsii*
	Ratsnake, Black	*Elaphe obsoleta*
	Snake, Eastern Hognose	*Heterodon platirhinos*
	Snake, Eastern Milk	*Lampropeltis Triangulum*
	Snake, Northern Water	*Nerodia sipedon*
	Snake, Smooth Green	*Opheodrys vernalis*
	Snake, Queen	*Regina septemvittata*
	Snake, Northern Red-bellied	*Storeria o. occipitomaculata*
	Gartersnake, Eastern	*Thamnophis sirtalis*
Viperidae	Copperhead, Northern	*Agkistrodon contortrix*
	Rattlesnake, Timber	*Crotalus horridus*

Source: Marshall, 2019
[1]Federally Threatened

5.4.3 References

Brooks Bird Club (BBC). N.D. Birds of West Virginia Field Checklist. Available Online: http://www.wvdnr.gov/publications/PDFFiles/bird%20checklist2.pdf. Accessed: May 31, 2019.

Marshall University (Marshall). 2019. Amphibians and Reptiles in West Virginia. Available online: https://www.marshall.edu/herp/WVHERPS.HTM. Accessed: June 3, 2019.

Pennsylvania Game Commission (PGC). 2019. Pennsylvania Mammal Atlas. Available online: http://www.pamammalatlas.com/. Accessed June 19, 2019.

Sibley, D.A. 2014. The Sibley Guide to Birds: Second Edition. Alfred A. Knopf, New York. March 2014.

West Virginia Division of Natural Resources (WVDNR). 2001. Mammals of West Virginia: A field Checklist. Available online: http://www.wvdnr.gov/Wildlife/PDFFiles/mammalsbrochure.pdf. Accessed: May 31, 2019.

West Virginia Division of Natural Resources (WVDNR). 2003. Mammals of West Virginia. Available online: http://www.wvdnr.gov/wildlife/wdpintro.shtm. Accessed: May 31, 2019.

5.5 Botanical Resources

5.5.1 Overview

Botanical resources in the Project area are typical of the Cheat River basin and are consistent with the land uses in the Project vicinity. The Licensee is not proposing any vegetation clearing at the Project and no impacts to botanical resources are anticipated.

5.5.2 Plant Communities

Shorelines along some of West Virginia's rivers, including the Cheat River, host riverscour prairies. Riverscour prairies occur along the banks of high energy rivers, often at constrictions where rapids occur. During floods, violent flows uproot or damage any trees that manage to become established, creating habitats that are open and sunny. Although these habitats are frequently flooded, they may also become extremely hot and dry for extended periods during the growing season. The sites often have complex microtopography which contributes to high plant species diversity (WVDNRa, undated).

Riverscour prairies at low to middle elevations in West Virginia are often dominated by warm season grasses, including big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*), and Indiangrass (*Sorghastrum nutans*). These same species grow in the tallgrass prairies of the American Midwest. Some riverscour prairies have significant cover by shrubs such as silky dogwood (*Cornus amomum*), winterberry (*Ilex verticillata*), and smooth azalea (*Rhododendron arborescens*). There are usually some scattered, flood-battered sycamores (*Platanus occidentalis*) or river birches (*Betula nigra*), but these rarely reach tree size. There is often a great diversity of herbs (heliophytes), with high representation of grasses and composites. Herbs include blue wild indigo (*Baptisia australis*), trumpetweed (*Eupatorium fistulosum*), early goldenrod (*Solidago juncea*), riverbank goldenrod (*Solidago simplex* var. *racemosa*), Monongahela Barbara's buttons (*Marshallia grandiflora*), blue mistflower (*Conoclinium coelestinum*), Indian hemp (*Apocynum cannabinum*), flowering spurge (*Euphorbia corollata*), and balsam ragwort (*Packera paupercula*) (WVDNRa, undated).

The Project lies within the Southern Unglaciated Allegheny Plateau Ecoregion and the Allegheny Mountains Ecoregion, as defined by the United States Forest Service (USFS) (USFS, 2008). The most common tree species in the Southern Unglaciated Allegheny Plateau Ecoregion include: yellow-poplar (*Liriodendron tulipfera*), white oak (*Quercus alba*), hickory (*Carya spp*.), black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), red maple (*Acer rubrum*), and chestnut oak (*Quercus montana*) (USFS, 2008). In the Allegheny Mountains Ecoregion, the most common tree species include: red maple, northern red oak (*Quercus rubra*), yellow-poplar, sugar maple (*Acer saccharum*), black cherry (*Prunus serotine*), and chestnut oak (USFS, 2008).

5.5.3 Invasive Plants and Noxious Weeds

Invasive plants are species intentionally or accidentally introduced by human activity into a region in which they did not evolve and cause harm to natural resources, economic activity, or humans. Invasive plants proliferate and displace native plant species, reduce wildlife habitat, and alter natural processes. According to the WVDNR, there are 633 non-native species located within the State of West Virginia. The WVDNR has developed an extensive list of invasive species inclusive of invasiveness ranking. This comprehensive list is included in Appendix F-2. (WVDNRb, undated). Similarly, the Pennsylvania Department of Conservation and Natural Resources (PADCNR) also maintains a list of invasive species with different threat rankings. This list is also available in Appendix F-2 (PADCNR, undated).

Invasive species commonly present within the Project area include Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*) (FOC, 2019), the Tree of Heaven (*Ailanthus altissima*), and Oriental bittersweet (*Celastrus orbiculatus*) (Studio for Creative Inquiry, Carnegie Mellon, 2002).

5.5.4 References

Friends of the Cheat (FOC). 2019. Watershed Restoration. Available online: https://www.cheat.org/our-work/watershed-restoration/. Accessed: June 11, 2019.

Pennsylvania Department of Conservation and Natural Resources (PADCNR). Undated. Available online: http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20033694.pdf. Accessed: June 10, 2019.

Studio for Creative Inquiry, Carnegie Mellon. 2002. Vegetation Survey of Monongahela River Phase 2 – 2001. Available online: http://www.cmu.edu/studio. Accessed: July 2, 2019.

U.S. Forest Service. 2008. West Virginia’s Forests 2008. Available online: https://www.fs.fed.us/nrs/pubs/rb/rb_nrs61.pdf. Accessed: June 10, 2019.

West Virginia Division of Natural Resources (WVDNRa). Undated. Riverscour Prairies. Available online: http://www.wvdnr.gov/Wildlife/Factsheets/Riverscour.shtm. Accessed: June 10, 2019.

West Virginia Division of Natural Resources (WVDNRb). Undated. Invasive Plants in West Virginia. Available online: http://www.wvdnr.gov/Wildlife/InvasiveWV.shtm. Accessed: June 10, 2019.

5.6 Riparian, Wetland and Littoral Habitat

5.6.1 Overview

This section discusses wetland, riparian, and littoral habitats in the Project vicinity. The primary source of the information used for this discussion is the USFWS National Wetlands Inventory (NWI) (USFWS, 2019). The USFWS NWI is a publicly available geospatial dataset that provides detailed information on the abundance, characteristics, and distribution of wetlands and deepwater habitats[5].

Wetlands and deepwater habitats can be essential breeding, rearing, and feeding grounds for many species of fish and wildlife. They may also perform important flood protection and pollution control functions. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. Cowardin et. al. (1979) defines five major Systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine. The first four of these include both wetland and deepwater habitats, but the Palustrine includes only wetland habitats (Cowardin et. al., 1979).

Wetlands provide a multitude of ecological, economic, and social benefits. They provide habitat for fish, wildlife and plants - many of which have a commercial or recreational value - recharge groundwater, reduce flooding, provide clean drinking water, offer food and fiber, and support cultural and recreational activities (USFWS, 2019).

5.6.2 Riparian, Wetland and Littoral Habitats

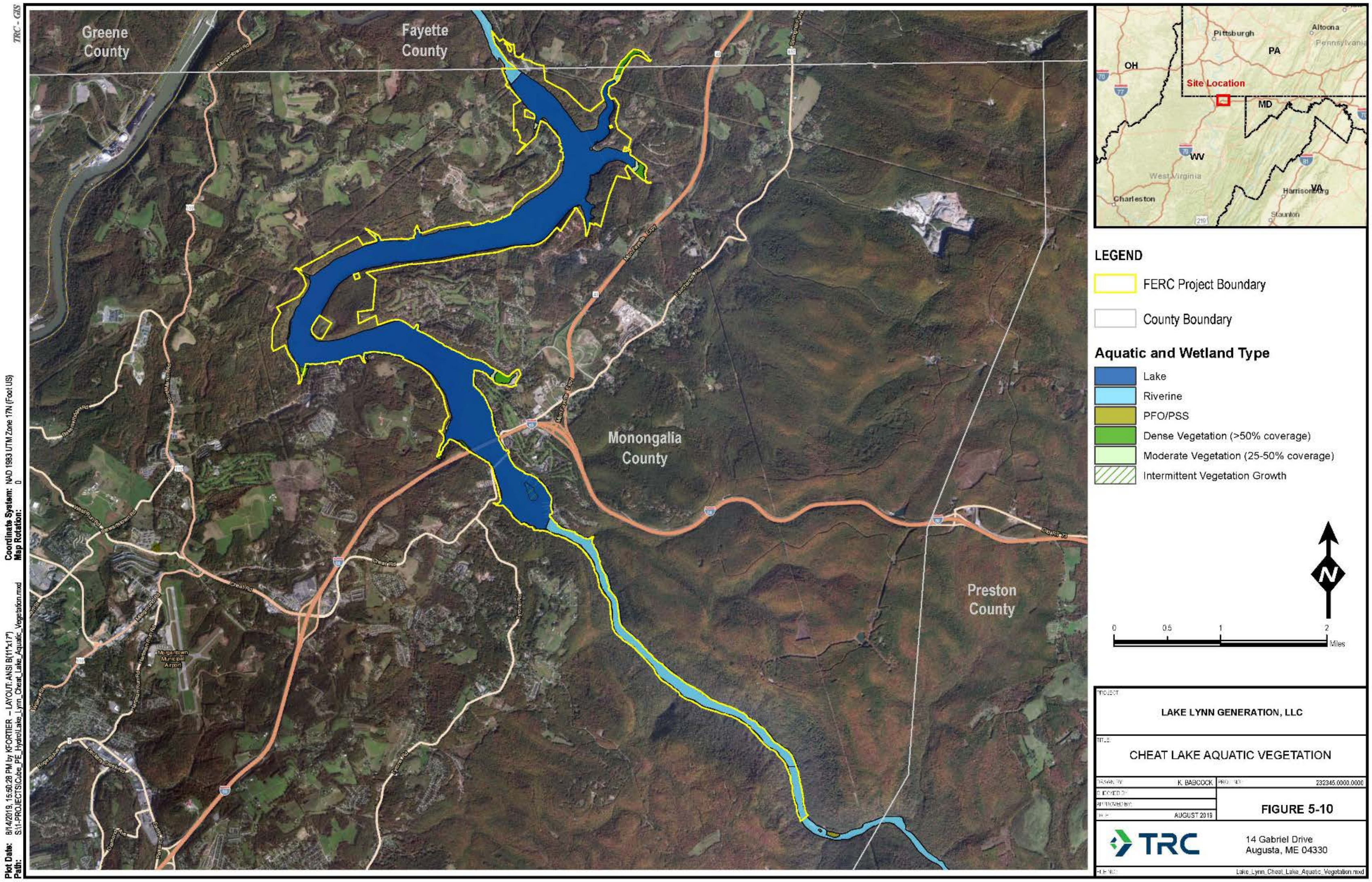
Wetlands that occur at the Project are limited in size and quantity due to the surrounding steep and sloping topography (Figure 5.11) (USFWS, 2019). Wetlands at the Project are generally found in small pockets and are primarily confined to Cheat Lake tributaries and the three large

[5] USFWS NWI information is acquired primarily through interpreting aerial photographs, and not by conducting field surveys; therefore, it provides an estimate of acreage and location but is not conclusive.

embayments (Allegheny, 1991). Several tributaries feed into the Cheat River upstream and downstream of the Project, including Christopher Run (upstream), Scott Run (upstream), and Grassy Run (downstream). There are a few narrow wetland areas along the river and downstream of the Project dam. Approximately 241 acres of riverine habitat are located within the Project boundary. There is 1,473.94 acres of lake within the Project boundary. A 0.30-acre palustrine forested wetland island and a 2.93-acre palustrine forested wetland are located on the edge of the river outside the Project boundary approximately four miles upstream of Cheat Lake. A 1.10-acre palustrine forested wetland island and a 1.49-acre palustrine forested wetland island are located downstream of the Project dam (approximately one and four miles, respectively) (USFWS, 2019).

As discussed in detail in Section 5.3.2.1, the Licensee worked cooperatively with WVDNR and WVU to map aquatic vegetation in Cheat Lake. Twenty-two separate areas of aquatic vegetation were documented along with the relative abundance. These areas of aquatic vegetation are shown in Figure 5.10.

Figure 5.10. National Wetlands Inventory Wetlands and Aquatic Vegetation inside the Project Boundary



5.6.3 References

Allegheny Power Service Corporation (Allegheny). 1991. Lake Lynn Hydro Station FERC Project No. 2459 – Final Federal Energy Regulatory Commission License Application. Available online: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1421832. Accessed: June 4, 2019.

Cowardin, L.M., V.C. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. United States Fish and Wildlife Service, Washington, D.C. 131 pp.

United States Fish and Wildlife Service (USFWS). 2019. National Wetlands Inventory: Surface Waters and Wetlands. Available online: https://www.fws.gov/wetlands/data/mapper.html. Accessed: June 10, 2019.

5.7 Rare, Threatened, Endangered and Special Status Species

5.7.1 Overview

The potential presence of rare, threatened, and endangered (RTE) species and candidate or special status species at the Project was determined by reviewing USFWS, WVDNR, and Pennsylvania Natural Heritage Program (PNHP) RTE species lists. The USFWS, WVDNR, PNHP searchable databases were utilized to generate a list of federally and/or state listed RTE species, which are known to occur, or have the potential to occur, at the Project. The results of these searches are summarized in the following sections.

5.7.2 Rare, Threatened and Endangered Resources and Habitats

Table 5.16 lists RTE species with the potential to occur at the Project. The USFWS Information for Planning and Conservation (IPaC) tool allows for RTE searches within a specified project area. A site-specific IPaC search identified four endangered or threatened species with the potential to occur at the Project, Indiana Bat (*Myotis sodalist*), Northern Long-eared Bat (*Myotis septentrionalis),* Flat-spired Three-toothed Snail (*Triodopsis platysayoides*), and Running Buffalo Clover (*Trifolium stoloniferum)* (Table 5.16) (USFWS, 2019e). The habitat requirements and general habitat information for each of these species are provided in Table 5.17.

West Virginia does not currently have state threatened and endangered species legislation (WVDNR, 2019). No state-listed RTE species were identified on the publicly available portion of the Pennsylvania Natural Heritage Program database (PNHP, 2019).

Table 5.16. RTE Species with the Potential to Occur at the Project

Common Name	Scientific Name	Legal Status[1]
Mammals		
Indiana Bat	*Myotis sodalis*	FE
Northern Long-eared Bat	*Myotis septentrionalis*	FT
Snail		
Flat-spired Three-toothed Snail	*Triodopsis platysayoides*	FT
Flowering Plants		
Running Buffalo Clover	*Trifolium stoloniferum*	FE

Source: USFWS, 2019e; USFWS, 2019c; WVDNR, 2019; PNHP, 2019
[1]Definitions of Federal Legal Status: FE = Federal Endangered. FT = Federal Threatened

Table 5.17. Habitat Requirements of Federally and/or State Listed RTE Species

Common Name	Scientific Name	Habitat Requirements/ Information
Indiana Bat	*Myotis sodalis*	Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures, under 50°F but above freezing. After hibernation, Indiana bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana bats also forage in or along the edges of forested areas (USFWS, 2019b).
Northern Long-eared Bat	*Myotis septentrionalis*	Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds (USFWS, 2019d).
Flat-spired Three-toothed Snail	*Triodopsis platysayoides*	The flat-spired three-toothed snail is found only in West Virginia, in a restricted area of the Cheat River Gorge with sandstone cliffs, outcroppings and large boulders. The snail lives in cracks and crevices in the rocks and surrounding leaf litter (USFWS, 2019a).
Running Buffalo Clover	*Trifolium stoloniferum*	The running buffalo clover is a perennial herbaceous vascular plant with creamy-white flower heads and leaves divided into three rounded leaflets, similar in appearance to the familiar Dutch clover of suburban lawns. The habitat for the running buffalo clover includes Forest - Hardwood, Forest/Woodland, Grassland/herbaceous, Savanna, Suburban/orchard, and Woodland–Hardwood. The running buffalo clover's habitat most commonly is mesic woodlands in partial to filtered sunlight, where there is a pattern of moderate periodic disturbance for a prolonged period, such as mowing, trampling, or grazing. It is most often found in regions underlain with limestone or other calcareous bedrock, but not exclusively (NatureServe Explorer, 2019). It is known or believed to occur in Monongalia County, West Virginia (USFWS, 2019f).

The IPaC tool also lists migratory birds that are of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in the specified location. Within the Project boundary, the IPaC tool identified seventeen (17) species of migratory birds that are of concern with the potential to occur at the Project (Table 5-18) (USFWS, 2019e).

Table 5.18. USFWS IPaC Migratory Bird List with the Potential to Occur at the Project

Common Name	Scientific Name	Status[1]
Bald Eagle	*Haliaeetus leucocephalus*	Non-BCC, Vulnerable
Black-billed Cuckoo	*Coccyzus erythropthalmus*	BCC Rangewide (CON)
Black-capped Chickadee	*Poecile atricapillus practicus*	BCC - BCR
Bobolink	*Dolichonyx oryzivorus*	BCC Rangewide (CON)
Canada Warbler	*Cardellina canadensis*	BCC Rangewide (CON)
Cerulean Warbler	*Dendroica cerulea*	BCC Rangewide (CON)
Eastern Whip-poor-will	*Antrostomus vociferous*	BCC Rangewide (CON)
Golden Eagle	*Aquila chrysaetos*	Non-BCC, Vulnerable
Henslow's Sparrow	*Ammodramus henslowii*	BCC Rangewide (CON)
Kentucky Warbler	*Oporornis formosus*	BCC Rangewide (CON)
Long-eared Owl	*Asio otus*	BCC Rangewide (CON)
Northern Saw-whet Owl	*Aegolius acadicus*	BCC - CCR
Praire Warbler	*Dendroica discolor*	BCC Rangewide (CON)
Red-headed Woodpecker	*Melanerpes erythrocephalus*	BCC Rangewide (CON)
Rusty Blackbird	*Euphagus carolinus*	BCC Rangewide (CON)
Wood Thrush	*Hylocichla mustelina*	BCC Rangewide (CON)
Yellow-bellied Sapsucker	*sphyrapicus varius*	BCC - CCR

Source: USFWS, 2019e

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

5.7.3 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires the eight Regional Fishery Management Councils, in collaboration with the National Oceanic and Atmospheric Administration (NOAA), to give heightened consideration to Essential Fish Habitat (EFH) in resource management decisions. Congress defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth and maturity." The designation and consideration of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities.

There is no EFH in the vicinity of the Project (NOAA, 2019).

5.7.4 References

National Oceanic and Atmospheric Administration (NOAA). 2019. Essential Fish Habitat. Available online: https://www.habitat.noaa.gov/protection/efh/efhmapper/. Accessed: May 30, 2019.

NatureServe Explorer. 2019. Trifolium stoloniferum Running Buffalo Clover. Available online: http://explorer.natureserve.org/servlet/NatureServe?searchName=Trifolium+stoloniferum Accessed July 20, 2019.

Pennsylvania Natural Heritage Program (PNHP). 2019. Pennsylvania Conservation Explorer Pennsylvania Natural Diversity Inventory (PNDI). Available online: https://conservationexplorer.dcnr.pa.gov/. Accessed July 20, 2019.

United States Fish and Wildlife Service (USFWS). 2019a. Flat-spired three-toothed Snail. Available online: https://www.fws.gov/northeast/pdf/Flatspired.pdf. Accessed: May 30, 2019.

United States Fish and Wildlife Service (USFWS). 2019b. Indiana Bat Fact Sheet. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/inbafctsht.html. Accessed: May 30, 2019.

United States Fish and Wildlife Service (USFWS). 2019c. Listed species believed to or known to occur in West Virginia. Available online: https://ecos.fws.gov/ecp0/reports/species-listed-by-state-report?state=WV&status=listed. Accessed: May 30, 2019.

United States Fish and Wildlife Service (USFWS). 2019d. Northern Long Eared Bat Fact Sheet. Available Online: https://www.fws.gov/Midwest/endangered/mammals/nleb/nlebFactSheet.html. Accessed: May 30, 2019.

United States Fish and Wildlife Service (USFWS). 2019e. Information for Planning and Consulting (IPaC): Explore Location. Available online: https://ecos.fws.gov/ipac/location/CS44QT46HNCPHIB5JVLDRKSUX4/resources. Accessed July 20, 2019.

United States Fish and Wildlife Service (USFWS). 2019f. ECOS (Environmental Conservation Online System) Species Profile for Running Buffalo Clover. Available Online: https://www.fws.gov/Midwest/endangered/mammals/nleb/nlebFactSheet.html. Accessed: July 2019.

West Virginia Division of Natural Resources (WVDNR). 2019. Rare, Threatened and Endangered Species. Available online: http://www.wvdnr.gov/Wildlife/Endangered.shtm. Accessed: July 20, 2019.

5.8 Recreation and Land Use

5.8.1 Overview

Cheat Lake and the Cheat River are popular destinations for boating, fishing, and other water sport activities. Cheat Lake is quickly becoming one of the best bass fisheries in the state. Cheat Lake is known for largemouth bass, smallmouth bass, crappie, yellow perch, white bass, and channel catfish. Known for excellent fishing of sauger, walleye, and smallmouth bass, the Project tailwater attracts hundreds of anglers each year (West Virginia Department of Commerce Travel and Recreation [WVDCTR], 2017).

Project recreation sites provide fishing, boating, nature viewing, picnicking, and hiking/biking opportunities. The Project provides a tailrace fishing platform, a trail along Cheat Lake, a picnic area, boat docks, boat launches, and a fish cleaning station.

In accordance with Article 417 of the current FERC License and the Project Recreation and Land Management Plan filed in accordance with Article 415, the Licensee collected recreation use data every year at the Project from 2000 through 2017 and filed Recreation Plan Updates summarizing recreation use data every three years from 2003 through 2018. Recreation use monitoring conducted by the Licensee over the 17-year period demonstrate a high level of recreation use at the Project, but the public recreation sites have continued to be utilized at less than 50% of capacity.

5.8.2 Project Vicinity Recreation Opportunities

There are several renowned recreation areas, including Coopers Rock State Forest, Snake Hill Wildlife Management Area, Little Indian Creek Wildlife Management Area, and Monongahela National Forest, within the Project vicinity that provide opportunities for hiking, biking, fishing, hunting, camping, and scenic views.

- Coopers Rock State Forest is located approximately 14 miles from the Project. Coopers Rock State Forest consists of a series of sandstone cliffs above the Cheat River Gorge. The State Forest provides camping sites; picnic sites; trails for hiking, biking, and running; and three ski trails (West Virginia State Parks [WVSP], 2019).

- Snake Hill Wildlife Management Area is located approximately 15 miles from the Project. The 3,092-acre Snake Hill Wildlife Management Area traverses gently rolling highlands and steep slopes on the canyon of the Cheat River and provides opportunities for hunting and fishing (WVExplorer, 2019b).
- Little Indian Creek Wildlife Management Area is located approximately 22 miles from the Project. The 1,036-acre Little Indian Creek Wildlife Management Area ranges across open field and mixed hardwood forests, parts of which have been established on reclaimed surface mine. This Management Area provides opportunities for hunting (WVExplorer, 2019a).
- Monongahela National Forest, located in Parsons, West Virginia, is approximately 100 miles from the Project. The Monongahela National Forest encompasses one of the most ecologically diverse areas in the United States and provides visitors with scenic vistas, country roads, flowing streams, and abundant plant and animal life. Monongahela National Forest is a working forest providing timber, water, grazing, minerals, and public recreational opportunities, including hiking, camping, and scenic driving (USFS, 2019).

5.8.3 Existing Project Recreation Facilities

Project recreation sites provide fishing, boating, nature viewing, picnicking, and hiking/biking opportunities. Existing Project recreation sites are summarized in the Table 5.19 and shown in Figure 5.11 and described in detail in the following sections.

Table 5.19. Commission Approved Recreation Facilities at the Lake Lynn Project

Recreation Site Name	Recreation Facilities
Cheat Lake Park	Hilltop and shoreline picnic areas, parking areas, playground area, car-top/winter boat launch, 3 restroom facilities, security/maintenance station, day-use boat docks, swimming beach, fish cleaning station, fishing platforms, access to the Cheat Lake Trail, 80 vehicle parking spaces (50 paved; 30 gravel), 5 Americans with Disabilities Act (ADA) parking spaces
Cheat Lake Trail	4.5-mile hiking/biking trail (ADA accessible), 15 vehicle parking spaces, additional parking at Cheat Lake Park, interpretive signs
Tailrace Recreation Area	Fishing platform, bank fishing opportunities, 20 vehicle parking spaces (including 2 ADA accessible spaces), portable ADA toilet
Sunset Beach Marina Public Boat Launch	Boat launch, 60 boat trailer parking spaces
Cheat Haven Peninsula Nature Viewing Area	Nature trail, bike rack, picnic table
Morgan and Manning Run embayments Nature Viewing Area	Nature trail
Nature Viewing Area Across from Cheat Haven	Nature trail
Towers Run Nature Viewing Area	Pull-off parking, nature trail

5.8.3.1 Cheat Lake Park

Cheat Lake Park consists of an area of about 46 acres primarily situated on a peninsula between two embayments (Rubles Run and Morgans Run) of Cheat Lake. Recreation facilities at Cheat Lake Park include a hilltop and shoreline picnic area, parking areas, a playground area, a car-top/winter boat launch, three restroom facilities, a security/maintenance station, day-use boat docks, swimming beach, a fish cleaning station, fishing platforms, and access to the Cheat Lake Trail. Cheat Lake Park is accessible from a paved parking area, which can accommodate up to 50 vehicles. A second gravel parking area also provides overflow parking for up to 30 vehicles. A paved roadway provides access from the parking and hilltop picnic area to the facilities along the shoreline of Cheat Lake. A short-term and Americans with Disabilities Act (ADA) accessible parking area for the car-top/winter boat launch and bicycle or picnic loading/unloading area is situated near the shoreline area. This parking area provides five parking spaces, without time restrictions, for persons with disabilities.

Photo 1: Cheat Lake Park – Playground Area

Photo 2: Cheat Lake Park – Boat Launch

5.8.3.2 Cheat Lake Trail

The Cheat Lake Trail is a 4.5-mile hiking/biking trail that extends from a parking area near the Project powerhouse to its southern terminus at the Cheat Haven Wildlife Habitat and Nature Viewing Area. The trail is 10-ft wide, constructed of compacted limestone fines, and ADA accessible. A parking lot near the substation at the Project accommodates 15 vehicles. The trail passes through the Cheat Lake Park and can also be accessed from parking lots located at Cheat Lake Park. Interpretive signs are installed at several historical sites along the Cheat Lake Trail. These signs include a map of the trail and facilities at Cheat Lake Park. Additionally, there are mile-markers every half-mile throughout the length of the trail.

Photo 3: Cheat Lake Trail – Over Northern Causeway from Cheat Lake Park

Photo 4: Cheat Lake Trail - Terminus

5.8.3.3 Tailrace Recreation Area

The Project Tailrace Recreation Area provides public access to the Lower Cheat River below the Project dam for fishing. The area includes a fishing platform[6] as well as bank fishing opportunities. Access to the fishing platform is provided from Lake Lynn Road along the river. A gravel parking area at the Tailrace Recreation Area can accommodate approximately 20 vehicles and includes two ADA accessible spaces. Both the fishing platform and parking area are illuminated. An ADA compliant pedestrian ramp connects the parking area with the fishing platform. The fishing platform can accommodate approximately 20 fishermen and has handrails constructed with barrier free cutouts to provide handicap accessibility. An existing roadway provides easy foot access from the parking lot to the riverbank. A portable ADA toilet has been provided for the public's convenience. To enhance public safety, visual and audible alarms are present to provide notification of flow increases from the hydroelectric facility and warn the public to exit the water. In addition to the fishing platform, eight rock pile structures were installed in September 2000 to provide fish habitat in the first river mile downstream of the tailrace.

Photo 5: Tailrace Fishing Platform

[6] The fishing platform was closed January 2017 through July 2019 due to a concrete failure but has been reopened.

5.8.3.4 Public Boat Launching Facility at Sunset Beach Marina

A free public boat launch and associated parking area are provided at Sunset Beach Marina for boating access to Cheat Lake. The parking area at Sunset Beach Marina can accommodate up to approximately 60 boat trailers at one time. This boat launch facility is available year-round when the lake level is above 865’ NGVD. Lake Lynn maintains the surface elevation of Cheat Lake at certain levels throughout the year, as described in Section 4.4.

5.8.3.5 Wildlife Habitat and Nature Viewing Areas

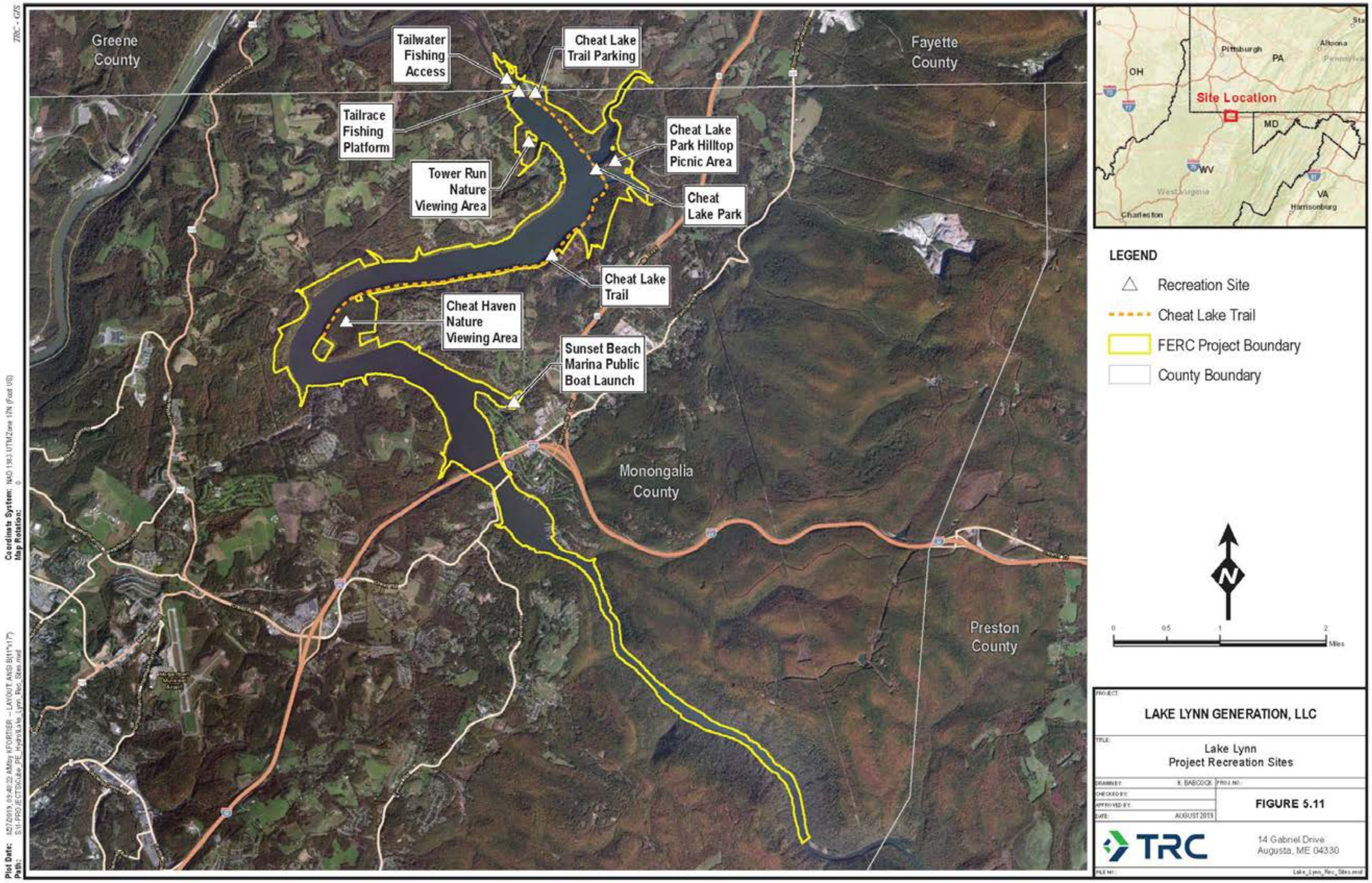
In addition to the developed recreation sites, four parcels of Project lands have been designated as nature viewing areas (NVAs) by the Licensee. These areas are open for certain public recreation uses and there are no plans to develop these areas in the future. These areas include the following:

- 40 acres between Morgan and Manning Run embayments
- 140-acre Cheat Haven Peninsula
- 12-acre parcel across the lake from Cheat Haven - accessible by boat
- 25 acres Towers Run

The 140-acre Cheat Haven Peninsula area was designed to allow hikers to leave the Cheat Lake Trail and hike along the 1-mile trail through the woods. A bike rack and picnic table are provided at the end of the trail for use by trail users. A three-sided shelter is also provided at the end of the trail. The designated walking trail aids in reducing habitat destruction in the NVA.

The Towers Run area was identified in the original Recreation Plan as a hunting area. On October 7, 1997, FERC issued an “Order Approving Hunting Area Management Plan and Amending Recreation and Land Management Plan” at the request of the former Licensee, AE, and local landowners. In that Order, it was agreed by FERC and WVDNR that the Towers Run area is not conducive to hunting because of the number of nearby property owners and the small size of the parcel. Therefore, hunting continues to be prohibited in this area.

Figure 5.11. Project Recreation Sites and Facilities



5.8.4 Project Recreation Use

In accordance with Article 417 of the current FERC License, the Licensee collected recreation data at the Project from 2000 through 2017 and filed Recreation Plan Updates summarizing recreation use every three years from 2003 through 2018. Generally, recreation use remained about the same over this 17-year monitoring period. The most recent Recreation Plan Update was filed with FERC in 2018 and was based on an evaluation of recreation use data collected by the Licensee 2015 through 2017.

Recreation use estimates based on the most recent data and Recreation Plan Update are summarized in Table 5.20. Total overall use at the Project recreation sites increased between 2015 and 2017. It is estimated that a total of 30,196 visitors used the Cheat Lake Park (including Cheat Lake Trail) and Tailrace Recreation Area facilities in 2015, 38,929 in 2016, and 46,410 in 2017 (Lake Lynn, 2018). Total overall recreation use was lowest during the 2015 recreation season.

Table 5.20. Visitors at Lake Lynn Project During the 2015 – 2017 Period

Day Type	2015	2016	2017	2017 (Adjusted)	Average Annual	Total (Counted)
I. Cheat Lake Park						
Non-Peak Weekend	13,539	17,575	18,925	22,710	17,661	50,039
Peak Weekend	2,900	3,884	4,177	5,012	3,869	10,961
Total All Days	29,456	38,056	38,385	46,062	37,375	105,897
II. Tailrace Recreation Area						
Non-Peak Weekend	279	318	86	103	241	683
Peak Weekend	45	56	35	42	48	136
Total All Days	740	873	290	348	672	1,903
All Sites						
Non-Peak Weekend	13,818	17,893	19,011	22,813	17,902	50,722
Peak Weekend	2,945	3,940	4,212	5,054	3,917	11,097
Total All Days	30,196	38,929	38,675	46,410	38,047	107,800

Source: Lake Lynn, 2018

Compared to the 2015 Recreation Plan Update for the period 2012-2014, recreation use in the 2015-2017 period was relatively similar. The average annual recreation use at Cheat Lake Park increased from the 2012-2014 period to the 2015-2017 period, however, the average annual recreation use at the Tailrace Recreation Area decreased from the 2012-2014 period to the 2015-2017 period (Figure 5.12) (Lake Lynn, 2018).

The average annual use on non-peak weekends[7] at Cheat Lake Park (including Cheat Lake Trail) and Tailrace Recreation Area facilities was 17,902. The average annual use on peak weekends[7] at the Cheat Lake Park (including Cheat Lake Trail) and the Tailrace Recreation Area facilities was 3,917. Average daily use during the peak weekends was greater than the average daily use during the non-peak weekends (Table 5.20) (Lake Lynn, 2018).

Table 5.21 shows a breakdown of recreation use by use-type or area during the 2015-2017 period, including the average annual use.

Table 5.21. Visitors by Most Popular Use at Recreation Sites on all Recreation Days During the 2015 – 2017 Periods

Site	2015	2016	2017	2017 (Adjusted)	Average Annual	Total (Counted)
I. Cheat Lake Park						
1. Cheat Lake Trail	17,800	22,240	21,987	26,384	21,892	62,027
2. Fishing From Boats	6,402	9,351	11,360	13,632	9,569	27,113
3. Playground	2,823	3,834	3,090	3,708	3,440	9,747
II. Tailrace Recreation Area						
1. Fishing (Access Platform)	603	692	4	4.8	458	1,299
2. Fishing (Banks)	113	176	281	337.2	201	570
3. Fishing (Boating)	24	5	5	6	12	34

Source: Lake Lynn, 2018

[7] Peak weekend days are defined as Memorial Day weekend days (Saturday through Monday), Fourth of July weekend days (Saturday, Sunday, federal holiday date), and Labor Day weekend days (Saturday through Monday). Non-peak weekend days include all other weekend days (Saturday and Sunday).

Table 5.21 and Figure 5.13 displays the total recreation use by area at the three most highly used locations at Cheat Lake Park (Lake Lynn, 2018). As shown, the use-types with the highest use levels at Cheat Lake Park include the Cheat Lake Trail use, fishing from boats in Cheat Lake, and the playground area use. Average annual use of the Cheat Lake Trail during the period of 2015-2017 for all recreation days was 21,892. Average annual use of fishing from boats at Cheat Lake Park during the period of 2015-2017 for all recreation days was 9,569. Average annual playground use during the period of 2015-2017 for all recreation days was 3,440.

Within the Tailrace Recreation Area, the use-types with the highest use were fishing platform use followed by fishing from the banks (Table 5.21, Figure 5.14) (Lake Lynn, 2018). Figure 5.14 displays total recreation use by area at the Tailrace Recreation Area between 2015 and 2017. In the Tailrace Recreation Area, total recreation use was highest 2016, with a decline in use in 2017[8] (Table 5.21).

At the Sunset Beach Marina, boat trailer counts were made at the site during the 2017 recreation season from May 13 through September 30 (Lake Lynn, 2018). The results are shown in Table 5.22. The average number of boat trailers counted in a single day during peak weekend days was 57, during non-peak weekend days was 39, during weekdays was 20, and during all days surveyed was 27.

Table 5.22. Sunset Beach Marina Boat Trailer Parking

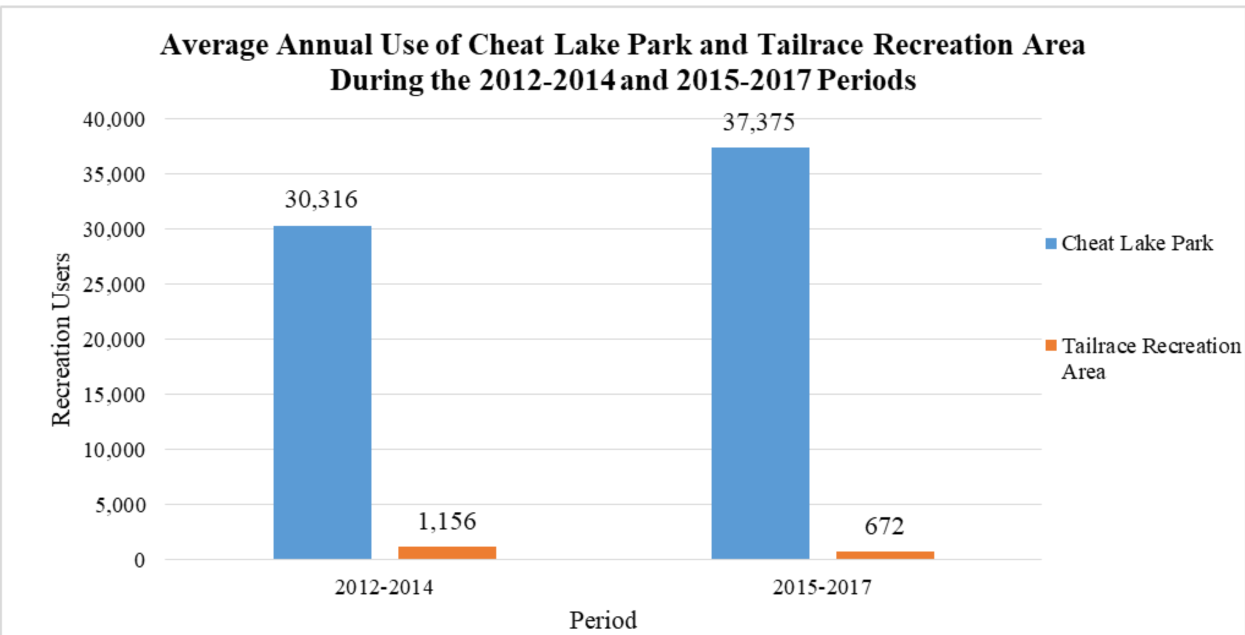
Day Type	Average Count By Day Type
Non-Peak Weekend Days	39
Peak Weekend Days	57
Weekdays	20
Total All Days	27

Source: Lake Lynn, 2018

[8] The overall decline in use of the Tailrace Recreation Area in 2017 is likely due to the January 2017 closure of the tailrace fishing platform. Although the fishing platform was closed in January 2017, results of the recreation counts demonstrated that considerable fishing still occurs at the Tailrace Recreation Area along the banks.

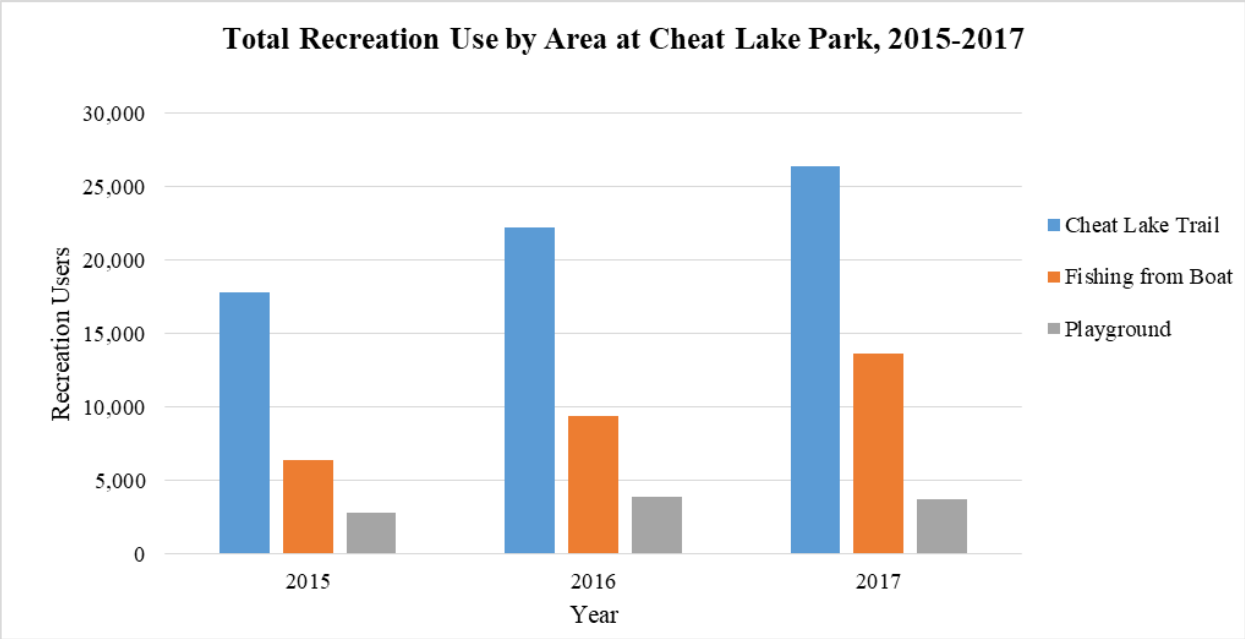
Based on the most recent FERC Form 80 (2015), all of the Project recreation facilities continue to be utilized at less than 50% of capacity. The facilities that have the highest utilization based on their capacity are the boat launches with 46% utilization. Boat trailer data collected in 2017 for the Sunset Beach Marina provides a similar estimate of capacity with an average daily boat trailer count of 27 and a vehicle/trailer parking capacity of 60 (45% of capacity). All other Project recreation facilities have less than a 25% capacity utilization. The Cheat Lake Trail, the most used Project recreation facility, has a 20% capacity utilization. Nothing in the recreation use data collected in 2015, 2016, and 2017 suggest any significant changes in recreation facility capacity. Based on the review of the available facilities, annual use numbers generated in 2015, 2016 and 2017, and the FERC Form 80 capacity utilization rates, the existing facilities, as operated, are adequate to meet the current demonstrated demand for recreation use at the Project (Lake Lynn, 2018).

Figure 5.12. Average Annual Use of Cheat Lake Park and Tailrace Recreation Area



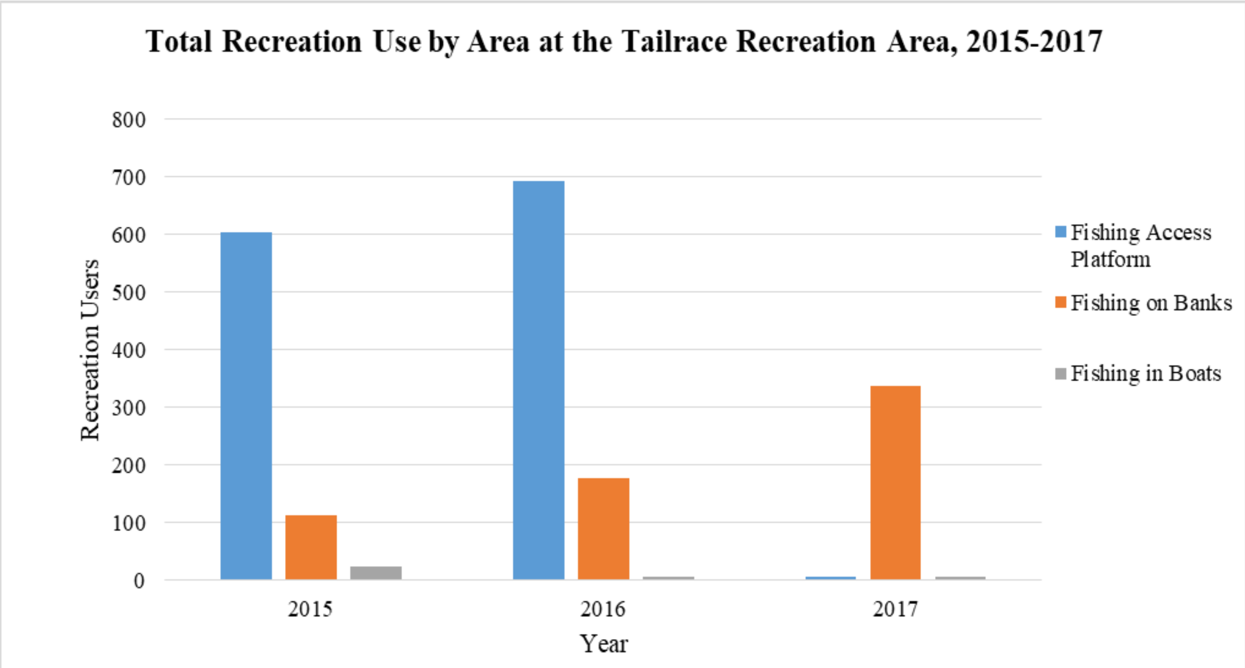
Source: Lake Lynn, 2018

Figure 5.13. Total Recreation Use by Area at the Three Most Highly Used Locations at Cheat Lake Park



Source: Lake Lynn, 2018

Figure 5.14. Total Recreation Use by Area at the Tailrace Recreation Area



Source: Lake Lynn, 2018

5.8.5 Boating Carrying Capacity Study

The Licensee conducted a Cheat Lake boating carrying capacity study in 2017. An inventory of active boat use at Cheat Lake was conducted from an aircraft on July 15, 2017, which resulted in a count of 42 boats in use on Cheat Lake [9] (Strager Consulting, 2017). A second survey, from a boat while driving around Cheat Lake, was conducted on August 13, 2017 and resulted in a count of 291 boats in use on Cheat Lake[10] (Strager Consulting, 2017).

Counts of docked (or moored) boats and trailered boats were conducted (Strager Consulting, 2017). The docked boat count occurred on July 19, 2017 and resulted in a count of 1,226 moored or docked boats (414 at 204 private docks, and 804 at 4 marinas) (Strager Consulting, 2017). Trailered boat counts were conducted at the Sunset Beach Marina on four dates (6/24/2017, 7/22/2017, 8/5/2017, and 8/12/2017) with an average count of 69 trailered boats (Strager Consulting, 2017).

A desktop literature review was conducted to determine the recommended boating carrying capacity for lakes. This review found a wide range of suggested boating space standards. The carrying capacity based on safety is derived from the traditional "space standards" approach for assessing boating carrying capacity[11] (Strager Consulting, 2017). The literature review found that, as a general rule, the National Park Service (NPS) adopted a range of 9 to 18 acres per boat as a guideline for safe boating on open water[12] (Strager Consulting, 2017). Using the more conservative 9 acres per boat, the size of the lake (1,598 acres) divided by 9 acres results in a conservative estimate of carrying capacity of 177 boats (Strager Consulting, 2017). The boating carrying capacity study resulted in two significantly different numbers of active boat use. The aerial survey produced a boat use estimate of 42 boats, which is below the carrying capacity.

[9] The weather during the survey was overcast with a temperature of 71 degrees Fahrenheit. The previous two days before the aerial survey the watershed experienced a total of 3.1 inches of rain leaving the lake very muddy and debris filled.
[10] The weather during the survey was sunny and 82 degrees Fahrenheit, and the lake water conditions were clear.
[11] Bureau of Outdoor Recreation 1970 "Outdoor Recreation Space Standards." Graefe, A.R., F.R. Kuss, and J.J. Vaske.
[12] 1987 "The Carrying Capacity of Lake Powell: A Management Analysis of Capacity for Boater Recreation." Technical Report prepared by the National Park Service: Glen Canyon National Recreation Area and Rocky Mountain Regional Office. Stankey, G.H., D.N. Cole, R.C. Lucas, M.E. Peterson, and S.S. Frissell.

The second survey produced a boat use estimate of 291 boats, which exceeds the carrying capacity standard used for assessment in the study.

The Licensee is aware that boating use on Cheat Lake may be approaching capacity and will not issue any new permits for private piers or boat docks or until after relicensing. WVDNR is the agency responsible for establishing boating safety regulations in West Virginia, but based on the Licensee's understanding, WVDNR does not have an established boating carrying capacity standard that would be applicable to Cheat Lake. The Licensee's authority is limited to permitting structures in Cheat Lake and does not have the authority to enforce regulations.

5.8.6 Recreation Needs Identified in Management Plans

As discussed in Section 5.8.4 and the 2018 Recreation Plan Update, the Project recreation facilities continue to be utilized at less than 50% of capacity. Based on the review of the available facilities, annual use numbers generated in 2015, 2016 and 2017, and the most recent FERC Form 80 capacity utilization rates, the existing facilities, as operated, are adequate to meet the current demonstrated demand for recreational use at the Project.

As part of the due diligence efforts to collect relevant information for the PAD (see Section 1 and Appendix B), some stakeholders made recommendations specific to recreation and recreation protection mitigation, and enhancement (PM&E) measures that are discussed further in Section 6.2.7.

According to the 2015 West Virginia Statewide Comprehensive Outdoor Recreation Plan (SCORP), parks and public outdoor public recreation are integral parts of the State's Leisure and Hospitality industry. Consistent with national trends and prior State SCORP surveys, walking continues to be the first choice of West Virginia residents for physical activity and the availability of trails to walk on was either a first or second facility priority (West Virginia Development Office [WVDO], 2015). Moreover, the availability of trails was important to rural West Virginians (WVDO, 2015).

According to the 2014 Pennsylvania SCORP, the top five outdoor recreation activities for Pennsylvanians are walking, visiting historic sites, scenic driving, picnicking and swimming

(PADCNR, 2014). Swimming and fishing are the most popular water-based activities while walking, scenic driving, dog walking and bicycling are the most popular activities occurring on roads and trails (PADCNR, 2014). The Pennsylvania SCORP reported that local parks and recreation areas are the top destination choice for Pennsylvanians (PADCNR, 2014). The Pennsylvania SCORP reports that Pennsylvanians seem to be most satisfied with the number and condition of golf courses, ice-fishing areas, waterfowl hunting areas, downhill skiing/snowboarding areas and baseball/softball fields, however, some want more of certain recreational facilities and areas, such as on-road bike lanes, natural/wild areas, rental cabins and dog parks.

5.8.7 Land Use and Management of Project Lands

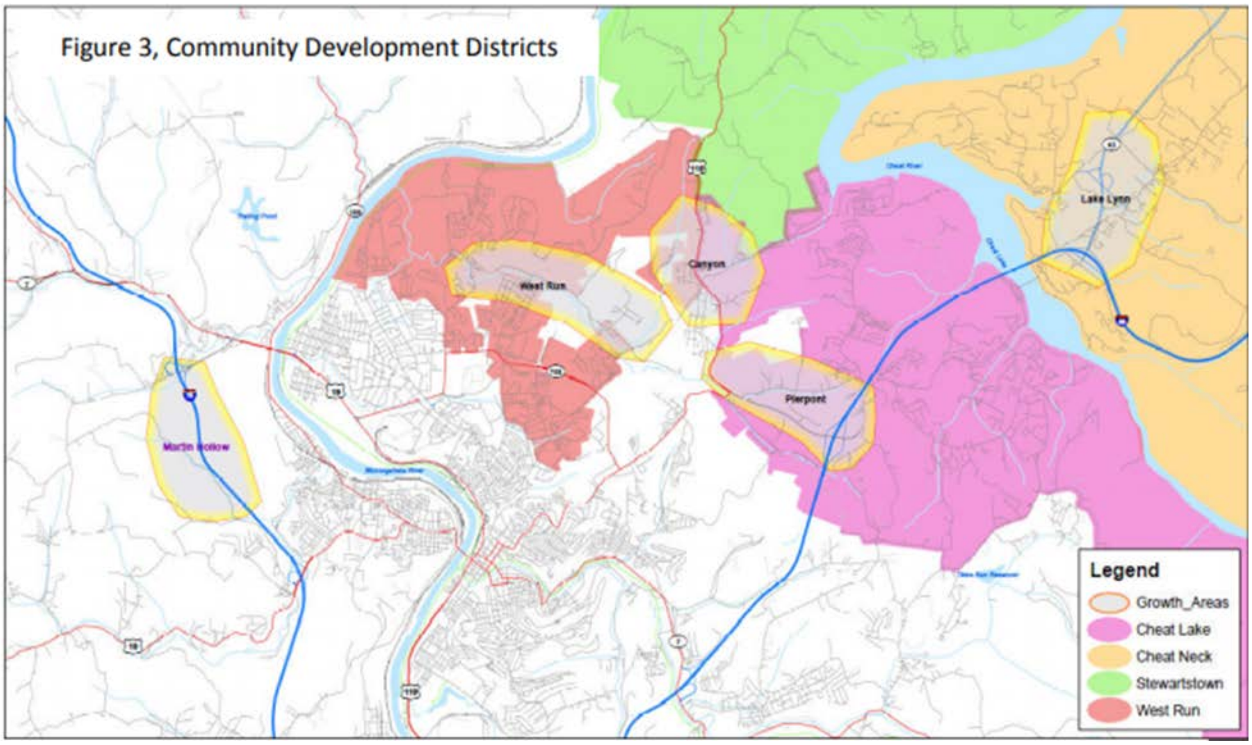
The predominant land uses in the vicinity of the Project are residential, commercial, and recreational. According to the Monongalia County Comprehensive Plan (2013), Monongalia contains four Community Development Districts, areas where development pressures are strong: Stewartstown, West Run, Cheat Lake, and Cheat Neck. The Lake Lynn Project falls in the Cheat Neck, Cheat Lake, and Stewartstown Community Development Districts (Figure 5.15). Monongalia County contains five major land use categories: Residential, Commercial, Industrial, Mixed, and Office and Research Parks (Monongalia County Comprehensive Planning Commission [MONCPC], 2013).

Land use and land cover inside the Project boundary and acreages for each are shown in Figure 5.16. The Project boundary generally follows the normal full pool elevation of the impoundment, except for several nature viewing areas, and includes certain lands immediately surrounding the Project facilities including the dam, powerhouse, access roads, and appurtenant facilities.

The Licensee historically granted leases and permits (“privilege permits”) for private recreation access to Project lands and waters in accordance with the standard land use article in the FERC License. There are approximately 200 privilege permits around the Cheat Lake shoreline that allow holders to install and maintain boat docks. Each permit holder is responsible for the installation and maintenance of any boat docks and the property; however, permits must be approved by the Licensee prior to any improvements being conducted at a privilege permit site. Currently, the Licensee is not issuing any new permits for private piers or boat docks and will not issue any new permits until after relicensing.

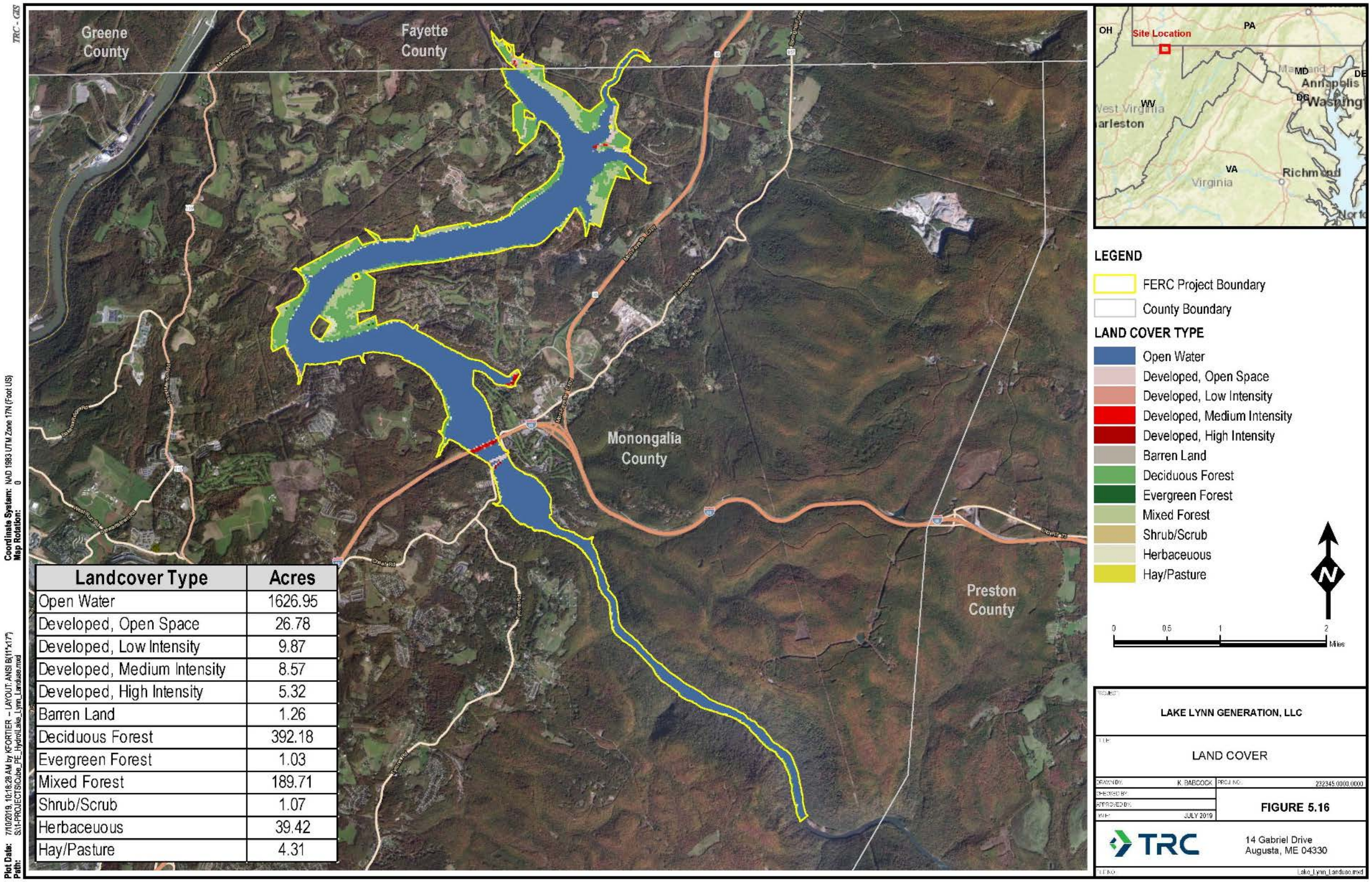
A shoreline inventory was conducted in 2013 to inventory boat docks along the Cheat Lake shoreline. The inventory includes historical comparison photos for 2009, 2011, and 2013 (Strager Consulting, 2013).

Figure 5.15. Monongalia County Community Development Districts



Source: MONCPC, 2013

Figure 5.16. Land Cover in Project Area



Landcover Type	Acres
Open Water	1626.95
Developed, Open Space	26.78
Developed, Low Intensity	9.87
Developed, Medium Intensity	8.57
Developed, High Intensity	5.32
Barren Land	1.26
Deciduous Forest	392.18
Evergreen Forest	1.03
Mixed Forest	189.71
Shrub/Scrub	1.07
Herbaceuous	39.42
Hay/Pasture	4.31

5.8.8 References

Lake Lynn Generation, LLC (Lake Lynn). 2018. Lake Lynn Hydroelectric Project 2018 Recreation Plan Update. April 2018.

Monongalia County Comprehensive Planning Commission (MONCPC). 2013. Comprehensive Plan for Stewartstown, West Run, Cheat Lake, and Cheat Neck Planning Districts: Monongalia County, West Virginia. February 6, 2013. Available Online: http://moncpc.org/wp-content/uploads/2017/03/MonongaliaCountyComprehensivePlan02062013.pdf. Accessed: June 10, 2019.

Pennsylvania Department of Conservation and Natural Resources (PADCNR). 2014. Pennsylvania's Statewide Comprehensive Outdoor Recreation Plan, 2014-2019. December 2014. Available Online: http://www.paoutdoorrecplan.com. Accessed: June 1, 2019.

Strager Consulting. 2013. Final Report 2013 Inventory and Recreational Boating Assessment for Cheat Lake, West Virginia. November 20, 2013

Strager Consulting. 2017. Final Report Boating Carrying Capacity Study for Cheat Lake, West Virginia. August 23, 2017.

United States Department of Agriculture Forest Service (USFS). 2019. Monongahela National Forest. Available Online: https://www.fs.usda.gov/mnf/. Accessed: April 4, 2019.

West Virginia Department of Commerce Travel and Recreation (WVDCTR). 2017. West Virginia Tourism. Available Online: https://wvtourism.com/. Accessed: April 4, 2019.

West Virginia Explorer (WVExplorer). 2019a. Attractions in West Virginia: Little Indian Creek Wildlife Management Area. Available Online: https://wvexplorer.com/attractions/wildlife-management-areas/little-indian-creek-wildlife-management-area/. Accessed: April 4, 2019.

West Virginia Explorer (WVExplorer). 2019b. Attractions in West Virginia: Snake Hill Wildlife Management Area. Available Online: https://wvexplorer.com/attractions/wildlife-management-areas/snake-hill-wildlife-management-area/. Accessed: April 4, 2019.

West Virginia State Parks (WVSP). 2019. Coopers Rock State Forest. Available Online: https://wvstateparks.com/park/coopers-rock-state-forest/. Accessed: April 4, 2019.

West Virginia Development Office (WVDO). 2015. State of West Virginia State Comprehensive Outdoor Recreation Plan (SCORP): 2015-2020. Charleston, West Virginia. Available Online: https://wvcad.org/resources#. Accessed: June 1, 2019.

5.9 Aesthetic Resources

5.9.1 Visual Character of Project Lands and Waters

Cheat Lake and the Cheat River are popular destinations for water recreation activities. The 1,730-acre picturesque Cheat Lake attracts thousands of users each year (WVDNR, 2011). Most views of the Project are aesthetically pleasing, providing views of Cheat Lake. None of the Project waters are designated as Wild and Scenic Rivers (National Wild and Scenic Rivers System [NWSRS], 2019).

There are no scenic highways or byways providing views of the Project or located within the Project boundary. However, there are several roads that provide limited views of the Project waters. Cheat Lake Road runs along the northeast side of the Project boundary near the powerhouse and the tailrace of the dam. This road provides a view of the Project dam and tailrace area in addition to a parking area for the Tailrace Fishing Area. Several other roads provide limited views of Cheat Lake that change with the seasons. As the deciduous trees lose their leaves, the views become less obstructed, and areas with no view in summer may offer limited or clear views of the Project in winter.

Photo 6: View of Lower Cheat Lake from the Cheat Lake Trail

Photo 7: View of Upper Cheat Lake

5.9.2 Nearby Scenic Attractions

Scenic views are abundant in the Project vicinity. Cheat Lake and Cheat Lake Trail are scenic attractions within the Project boundary (see Section 5.8.3 and Photo 6).

As discussed in Section 5.8.2, Snake Hill Wildlife Management Area, Coopers Rock State Forest, and Monongahela National Forest, located in the Project vicinity, provide notable scenic views. Snake Hill Wildlife Management Area traverses gently rolling highlands and steep slopes on the canyon of the Cheat River (WVExplorer, 2019). Coopers Rock State Forest offers scenic views of the canyon section of the Cheat River (WVSP, 2019). Additionally, Monongahela National Forest is noted for its rugged landscape with notable views of rivers, blueberry thickets, highland bogs, and open areas with exposed rocks. Olson Observation Tower, located within Monongahela National Forest, provides 360-degree views of Monongahela National Forest as well as the Cheat River (WVDCTR, 2017).

5.9.3 References

National Wild and Scenic Rivers System (NWSRS). 2019. West Virginia Rivers. Available Online: https://www.rivers.gov/west-virginia.php. Accessed: April 5, 2019.

West Virginia Department of Commerce Travel and Recreation (WVDCTR). 2017. West Virginia Tourism. Available Online: https://wvtourism.com/. Accessed: April 4, 2019.

West Virginia Division of Natural Resources (WVDNR). 2011. The Recovery of Cheat Lake: A Success Story. Available Online: https://docs.wixstatic.com/ugd/ec6de6_e68c97639dd0442b863f6a6d9a2c051d.pdf. Accessed: March 29, 2019.

West Virginia Explorer (WVExplorer). 2019. Attractions in West Virginia: Snake Hill Wildlife Management Area. Available Online: https://wvexplorer.com/attractions/wildlife-management-areas/snake-hill-wildlife-management-area/. Accessed: April 4, 2019.

West Virginia State Parks (WVSP). 2019. Coopers Rock State Forest. Available Online: https://wvstateparks.com/park/coopers-rock-state-forest/. Accessed: April 4, 2019.

5.10 Cultural Resources

5.10.1 Overview

The Licensee is aware of two potentially significant cultural resources within the Project boundary – the railroad bed along the Cheat Lake Trail (a linear historic archaeological site) and the Lake Lynn powerhouse and dam (potentially eligible for the National Register of Historic Places [NRHP]). However, during the previous relicensing of the Project, the WVSHPO indicated that continued operation of the Project would not affect any known historic or archaeological sites within the Project area. Prior to construction of the Cheat Lake Trail, the WVSHPO stated that the trail would have no effect on any historic properties at the Project.

5.10.2 Summary of Cultural Resource Investigations

During the previous relicensing of the Project, the WVSHPO indicated that continued operation of the Project would not affect any known historic or archaeological sites within the Project area. The WVSHPO stated that although the Lake Lynn powerhouse and dam are eligible for the NRHP, they would not be affected because no changes were proposed that would alter them. The WVSHPO also requested that the Licensee consult with the WVSHPO and prepare a plan, based on the consultation, describing the appropriate course of action prior to undertaking construction or engaging in any ground disturbing activities. No cultural resource investigations of the Project were performed during the previous relicensing (Allegheny, 1991).

The Licensee conducted a Phase I Cultural Resource Survey for Cheat Lake Park and the Cheat Lake Trail in 1995 and an addendum in 1998 prior to construction of Cheat Lake Park and Cheat Lake Trail (Christine Davis Consultants, Inc., 1996 and Christine Davis Consultants, Inc., 1998). The Phase I Cultural Resources Survey identified the following sites:

- 19th and 20th century foundations,
- six millstones,
- a coal tipple, and
- a railroad right-of-way.

In response to the Phase I Cultural Resource Survey for the Cheat Lake Park and the Cheat Lake Trail, the WVSHPO stated that the railroad bed is a linear historic archaeological site but the proposed Cheat Lake Trail would have no effect on any historic properties at the Project (WVSHPO, 1996 and WVSHPO, 1998). The Pennsylvania Historical and Museum Commission **(**PHMC) stated that no NRHP-eligible or listed historic or archaeological properties were located within the proposed Project area in Pennsylvania (PHMC, 1996).

In July 1998, FERC approved the Cultural Resource Management Plan (FERC, 1998), which comprised of the Phase I Survey and addendum filed on April 26, 1996 and April 13, 1998, respectively, and reminded the Licensee that pursuant to License Article 414, the License must consult with the appropriate SHPO and prepare a cultural resources management plan for Commission approval prior to engaging in any ground-disturbing activity.

During the due diligence data collection efforts for this PAD, the PHMC noted that there was a potential NRHP-eligible above-ground resource in the Project area (PHMC, 2019).

The publicly available data from the NRHP interactive map (NPS, 2014), the WVSHPO Interactive Map (WVSHPO, 2019), and the West Virginia Department of Arts, Culture and History (WVDACH) NRHP Nominations (WVDACH, 2019) were reviewed and no NRHP-eligible or potentially eligible cultural resource sites were identified within the Project boundary.

5.10.5 References

Allegheny Power Service Corporation (Allegheny). 1991. Lake Lynn Hydro Station FERC Project No. 2459 – Final Federal Energy Regulatory Commission License Application. Available online: http://elibrary.ferc.gov:0/idmws/file_list.asp?document_id=1421832. Accessed: June 4, 2019.

Christine Davis Consultants, Inc. 1996. Phase I Cultural Resource Survey: Cheat Lake Recreational Project, Monongalia County, West Virginia. Prepared for Allegheny Power System. April 1996.

Christine Davis Consultants, Inc. 1998. Addendum Report: Phase I Cultural Resource Survey Cheat Lake Recreational Project, Monongalia County, West Virginia. Prepared for Allegheny Power. March 1998.

Federal Energy Regulatory Commission (FERC). 1998. Order Approving Cultural Resource Management Plan. 84 FERC ¶ 62 024. July 8, 1998.

National Park Service U.S. Department of the Interior (NPS). 2014. National Register of Historic Places. Available online: https://www.nps.gov/maps/full.html?mapId=7ad17cc9-b808-4ff8-a2f9-a99909164466. Accessed: June 4, 2019.

Pennsylvania Historical and Museum Commission (PHMC). 1996. Letter Responding to Phase I Cultural Resources Survey. February 13, 1996.

Pennsylvania Historical and Museum Commission (PHMC). 2019. Letter Responding to PAD Information Request Letter [File No. ER 1989-1217-051-MM]. June 19, 2019.

West Virginia Department of Arts, Culture and History (WVDACH). 2019. National Register of Historic Places and Nominations. Available online: http://www.wvculture.org/shpo/nr/index.html. Accessed: June 4, 2019.

West Virginia State Historic Preservation Office (WVSHPO). 1996. Letter Responding to Phase I Cultural Resources Survey. March 11, 1996.

West Virginia State Historic Preservation Office (WVSHPO). 1998. Letter Responding to Phase I Cultural Resources Survey Addendum. May 26, 1998.

West Virginia State Historic Preservation Office (WVSHPO). 2019. West Virginia State Historic Preservation Office Interactive Map. Available online: https://mapwv.gov/shpo/viewer/index.html. Accessed: June 4, 2019.

5.11 Socioeconomic Resources

5.11.1 Overview

The Project is located on the Cheat River in Monongalia County, West Virginia near the City of Morgantown, and along the Fayette County, Pennsylvania border, near the Borough of Point Marion. Monongalia County is in north-central West Virginia while Fayette County is in southwestern Pennsylvania.

The following sections provide a summary of selected socioeconomic characteristics for the City of Morgantown in Monongalia, West Virginia, and for the Borough of Point Marion in Fayette County, Pennsylvania, as they are available. The selected socioeconomic characteristics of the Project region discussed include land use patterns, population patterns, and sources of employment.

5.11.2 General Land Use Patterns

The area immediately surrounding the Project is primarily urban in West Virginia and rural in Pennsylvania. Land use is further described in Section 5.8.7. Table 5.23 summarizes the rural and urban nature in the City of Morgantown and the Borough of Point Marion in Fayette County, Pennsylvania, as well as the State of West Virginia and Commonwealth of Pennsylvania, for comparative purposes.

Table 5.23. Population Patterns in Urban and Rural Areas, 2010

	City of Morgantown	Borough of Point Marion	Monongalia Co.	Fayette Co.	West Virginia	Pennsylvania
Urban	99%	0%	74%	52%	48%	77%
Rural	1%	100%	26%	48%	52%	23%

Source: U.S Census Bureau, 2019a

5.11.3 Population Patterns

Table 5.24 summarizes the population in the Project region in 2010 and 2017 as well as recent population patterns. It is estimated that over a seven-year period the population of the City of Morgantown increased marginally by 0.01% while the Borough of Point Marion decreased by 5.26%. The population of Monongalia County, West Virginia, increased by 7.82% while the growth rate of West Virginia decreased by 0.87%. The growth rate in Fayette County, Pennsylvania, decreased by 2.52% while the growth rate of Pennsylvania increased marginally by 0.69%. The land area of Fayette County is larger than the area of Monongalia County. The population density is highest in the City of Morgantown, West Virginia.

Table 5.24. Population Statistics for the Project Region

	City of Morgantown	Borough of Point Marion	Monongalia Co.	Fayette Co.	West Virginia	Pennsylvania
Population (2010)	29,660	1,159	96,189	136,606	1,852,994	12,702,379
Population (2017)	30,099	1,098	103,715	133,160	1,836,843	12,790,505
% Change 2010 to 2017	0.01%	-5.26%	7.82%	-2.52%	-0.87%	0.69%
Land Area in sq. mi., 2010	6.84	0.47	360.06	798.31	24,230.04	46,054.34
Population per sq. mi., 2010	4,284.5	2,945.0	267.1	172.8	77.1	283.9

Source: U.S. Census Bureau, 2019b

5.11.4 Economic Indicators and Employment

Income, poverty, and employment data from the American Community Survey (based on a 5-year survey of 2013 to 2017 U.S. Census Bureau data) is available in Table 5.25.

Table 5.25. Economic Characteristics of the Project Region

	City of Morgantown	Borough of Point Marion	Monongalia Co.	Fayette Co.
Median Household Income	$37,900	$51,875	$49,624	$41,632
Mean Household Income	$62,851	$60,568	$72,145	$57,195
Per Capita Income	$24,120	$28,105	$29,285	$24,247
Persons Below the Poverty Level	35.5%	16.1%	21.3%	18.8%
Population in Labor Force	54.3%	59.0%	59.7%	53.0%
Unemployment Rate	9.1%	3.7%	3.6%	3.9%

Source: U.S. Census Bureau, 2019c

Table 5.26 summarizes employment by industry in the Project area. Educational services, and health care and social assistance has the highest employment rate surrounding the Project area.

Table 5.26. Employment by Industry in the Project Area

	City of Morgantown	Borough of Point Marion	Monongalia Co.	Fayette Co.
Agriculture, forestry, fishing and hunting, and mining	1.7%	8.3%	3.7%	3.4%
Construction	3.1%	2.8%	5.3%	7.5%
Manufacturing	5.7%	10.4%	5.6%	12.1%
Wholesale trade	1.7%	1.1%	1.8%	2.2%
Retail trade	11.3%	16.0%	10.7%	13.7%
Transportation and warehousing, and utilities	1.3%	4.9%	3.2%	6.9%
Information	1.8%	1.6%	1.4%	1.3%
Finance and insurance, and real estate and rental and leasing	3.9%	0.7%	3.9%	3.6%
Professional, scientific, and management, and administrative and waste management services	10.0%	6.7%	9.7%	6.4%
Educational services, and health care and social assistance	36.7%	30.6%	35.8%	25.7%
Arts, entertainment, and recreation, and accommodation and food services	16.9%	10.4%	10.9%	9.4%
Other services, except public administration	2.6%	3.0%	3.0%	4.4%
Public administration	3.4%	3.7%	4.9%	3.4%

Source: U.S. Census Bureau, 2019c

5.11.5 References

U.S. Census Bureau. 2019a. 2010 Census Summary File 1, Urban and Rural West Virginia and Pennsylvania; Monongalia and Fayette Counties. Available online: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_SF1_H002&prodType=table. Accessed: February 28, 2019.

U.S. Census Bureau. 2019b. General Population and Housing Characteristics West Virginia and Pennsylvania; Monongalia and Fayette Counties. Available online: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml. Accessed: February 28, 2019.

U.S. Census Bureau. 2019c. Selected Economic Characteristics: 2013-2017 American Community Survey 5-Year Estimates. Available online: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF.

5.12 Tribal Resources

In accordance with their normal practice for consulting with Native American tribes in anticipation of project relicensing, FERC sent letters on June 27, 2019 to several Native American tribes inviting participation in the relicensing process for the Project: Delaware Nation (FERC, 2019a), Delaware Tribe of Indians (FERC, 2019b), and Osage Nation (FERC, 2019c). FERC requested a response by August 2, 2019. As of the filing date of this PAD, FERC has not received any responses from any of the Native American tribes regarding these Projects.

Lake Lynn sent an Information Request to several Native American tribes inviting participation in the relicensing process for the Project (Table 5.27) (Lake Lynn, 2019). The letter was distributed on May 20, 2019 and requested a response within 30 days of the letter. As of the filing date of this PAD, Lake Lynn has received a response from two Native American tribes. The Cherokee Nation indicated that the Project was outside of its Area of Interest. Although no specific tribal interests have been identified, the Licensee will continue to communicate with the Native American tribes listed in Table 5.27 throughout the relicensing process.

During preparation of this PAD, the Licensee contacted the Bureau of Indian Affairs (BIA) and requested any information on tribal resources or tribal interests in the vicinity of the Project. As of the filing date of this PAD, the Licensee has not received a response from the BIA regarding the Project. The Licensee is not aware that the Project affects any Native American tribal lands, tribal cultural sites, or tribal interests.

Table 5.27. Tribes Potentially Interested in the Project Relicensing

Tribe
Absentee-Shawnee Tribe of Oklahoma
Cayuga Nation
Cherokee Nation
Delaware Nation, Oklahoma
Delaware Tribe of Indians
Eastern Band of Cherokee Indians
Eastern Shawnee Tribe of Oklahoma
Oneida Indian Nation
Oneida Indian Nation of Wisconsin
Onondaga Nation
Osage Nation
Seneca Nation of Indians
Seneca-Cayuga Tribe of Oklahoma
Shawnee Tribe
St. Regis Mohawk Tribe
Stockbridge-Munsee Band of the Mohican Nation of Wisconsin
Tonawanda Band of Seneca
Tuscarora Nation
United Keetoowah Band of Cherokee Indians in Oklahoma

5.12.1 References

Federal Energy Regulatory Commission (FERC). 2019a. 2019, June 27. Delaware Nation. Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459.

Federal Energy Regulatory Commission (FERC). 2019b. 2019, June 27. Delaware Tribe of Indians. Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459.

Federal Energy Regulatory Commission (FERC). 2019c. 2019, June 27. Osage Nation. Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459.

Lake Lynn Generation, LLC. 2019. Consultation with Tribes for the Lake Lynn Hydroelectric Project FERC Project No. 2495. May 20, 2019.

6.0 PROJECT EFFECTS, ISSUES, STUDIES, MEASURES, AND PLANS

6.1 Known or Potential Project Effects

This section identifies any known or likely effects of licensing the continued operation of the existing Project. For the purposes of this PAD, Project effects are any new changes to the natural and human environment attributable to licensing the continued operation of the Project.

6.1.1 Primary Project Effects

6.2 Preliminary Issues, Studies, and Measures by Resource

This section identifies issues associated with the potential effects of relicensing and continued Project operations, initial study plan recommendations, and current and Licensee-proposed PM&E measures.

Based on the robust nature of the studies performed in support of issuing the Project's existing FERC License, as well as the PM&E measures, including ongoing monitoring in accordance with the Project's existing FERC License, Lake Lynn believes that there is a sufficient amount of existing data for the majority of the resource areas to support the relicensing process. In particular, given that the Project's existing FERC License was issued following the 1986 Electric Consumers Protection Act amendment to the Federal Power Act, the Project underwent a comprehensive environmental analysis to establish Project-specific PM&E measures and in support of the Commission's National Environmental Protection Act analysis. This analysis was later supplemented through a number of post-license issuance study and monitoring activities associated with water quality, erosion, biomonitoring, and recreation use. These monitoring activities will continue during the relicensing process in accordance with the existing FERC License.

Lake Lynn will consult with resource agencies, tribes, and other Relicensing Participants to determine if there is a need for additional relevant information and then identify studies necessary to obtain the relevant information.

Potential Issues – Identification of issues is a key step in the relicensing process because any specific concerns or questions arising from the proposed continued Project operations will need to be addressed in the context of the relicensing proceeding. The Licensee has attempted to identify all the known issues that have a nexus to licensing continued Project operations. As discussed in Section 1.0, the Licensee has contacted appropriate state and federal resource agencies, Native American tribes, and interested public parties who may have an interest with the Project's relicensing to identify relevant information and issues. Appendix B contains the complete record of stakeholder outreach and agency consultation in support of the preparation of this PAD.

Proposed Study Plans – Where noted, the Licensee has included recommendations for studies that it anticipates will be necessary. The Licensee is requesting the use of the TLP. Under the TLP, no formal study plan is required to be prepared or filed. However, if there are studies requested for this relicensing that are consistent with FERC's study criteria and comply with the requirements of 18 CFR §5.9(b), the Licensee will prepare a study plan for the Project and consult with the agencies and other Relicensing Participants on the scope of the studies.

Continued or Proposed PM&E Measures – The issues identified for each resource area may warrant specific PM&E measures. Since the Project was relicensed in 1994, many resource PM&E measures are already in place and required by the current Project license or undertaken voluntarily by the Licensee. Existing relevant information and additional information obtained through studies will be used to determine if additional PM&E measures are warranted.

6.2.1 Geology and Soils

6.2.1.1 Potential Issues and Project Effects

As discussed in Section 5.1.1 and 5.1.5, the Licensee has, in accordance with Article 402 of the existing FERC License, conducted shoreline erosion surveys of the entire Cheat Lake Shoreline every three years during the past 24 years (since 1995) to identify new areas of erosion along the Cheat Lake shoreline. Since 1995, the Licensee has also conducted annual shoreline erosion surveys of the Cheat Lake Park shoreline extending from the Project dam to the Cheat Haven peninsula. A total of 16 shoreline erosion monitoring stations where historic erosion has been observed were visually inspected during the most recent annual shoreline erosion survey conducted in 2018. No new areas of active erosion were identified, and previously identified areas of active erosion all exhibited minimal annual change in erosion levels.

6.2.1.2 Proposed Studies

The Licensee will continue to conduct shoreline erosion surveys in accordance with the existing FERC License during the relicensing process. The information collected will be used in the development of the License Application. No new studies are being proposed specific to geologic or soil resources.

6.2.1.3 Continued or Proposed PM&E Measures

The Licensee will continue to conduct shoreline erosion surveys in accordance with the existing FERC License during the relicensing process. No new PM&E measures related to geology or soils are proposed.

6.2.2 Water Resources

6.2.2.1 Potential Issues and Project Effects

In accordance with License Article 405 of the existing Project License, since 1997 the Licensee has used monitors to continuously monitor and record hourly dissolved oxygen, pH, water temperature, and conductivity from April 1 through October 31 every year at three locations in conjunction with USGS gages located in Cheat Lake, the Project tailrace, and downstream of Grassy Run. The Licensee reports dissolved oxygen exceedances of the water quality standard to FERC and the resource agencies and files an annual monitoring report for the Project. Water quality samples are also collected in conjunction with the Biomonitoring Plan.

Recent data for the Cheat River in the vicinity of the Project and Cheat Lake suggest that water quality conditions upstream and downstream of the Project dam generally meet state standards for dissolved oxygen, pH, and water temperature. Data collected by the Licensee at stations in Cheat Lake, the Project tailwater, and downstream from the Project boundary show periodic instances during the late summer and early fall months (September and early October) of low dissolved oxygen levels, particularly at the Cheat Lake monitor, for most years.

6.2.2.2 Proposed Studies

The Licensee has collected a robust water quality data set at three stations continuously on an hourly basis from April 1 through October 31 every year since 1997. This data has been reported to FERC annually under the current FERC License. The Licensee will continue to collect and report water quality data in accordance with the existing FERC License during the relicensing process. The water quality data will be used in the development of the License Application. No new studies related to water resources are proposed.

6.2.2.3 Continued or Proposed PM&E Measures

The Licensee will continue to collect and report water quality data in accordance with the existing FERC License during the relicensing process. This robust data set will be used in the development of the License Application. No new PM&E measures related to water resources are proposed.

6.2.3 Fish and Aquatic Resources

6.2.3.1 Potential Issues and Project Effects

As discussed in Section 5.3, there is a long history of biomonitoring at the Project. The Licensee has intensively monitored numerous aspects of fish and aquatic resources at the Project in accordance with Article 411 of the current FERC License and several variations of the Biomonitoring Plan developed under Article 411 in consultation with DOI, WVDNR, and PFBC. Table 5.9 in Section 5.3 summarizes the comprehensive biomonitoring conducted by the Licensee over the 22-year study period from 1997 through 2019 and includes biomonitoring planned for 2020.

No issues or effects related to Project operation have been identified related to relicensing. The 2018 Biomonitoring Plan includes an aquatic habitat enhancement and monitoring task that is currently ongoing and will provide habitat for early spawning fish species, walleye and yellow perch, in the early spring when Cheat Lake levels may fluctuate. Following the completion of the 2019 monitoring period, the Licensee will consult with the Resource Agencies to determine if additional enhancement and/or monitoring is warranted in 2020.

6.2.3.2 Proposed Studies

As discussed in Sections 5.3 and 6.2.3.1, the Licensee has conducted extensive biomonitoring efforts in cooperation with federal and state resource agencies. The Licensee will continue to conduct biomonitoring activities in accordance with the existing FERC License and the Biomonitoring Plan during the relicensing process. The information collected will be used in the development of the License Application. No new studies specific to fish or aquatic resources are proposed.

6.2.3.2 Continued or Proposed PM&E Measures

The Licensee will continue to collect and report on activities conducted under the Biomonitoring Plan in accordance with the existing FERC License during the relicensing process. No new PM&E measures related to aquatic resources are proposed.

6.2.4 Terrestrial Wildlife Resources (Including Wetland and Riparian Habitat Resources)

6.2.4.1 Potential Issues and Project Effects

As discussed in Section 5.6.2, NWI mapping found that the Project is comprised almost exclusively of lake areas (Cheat Lake) and open water riverine areas (Cheat River and tributaries), with a small palustrine forested wetland island and a palustrine forested wetland located on the edge of the river approximately four miles upstream of Cheat Lake, outside the Project boundary. Two small palustrine forested wetland islands island are located downstream of the Project dam (approximately one and four miles). Because the Project will continue to operate as it does under its current FERC License, the continued operation of the Project is not expected to have any effect on wetland or riparian habitat or wildlife resources.

6.2.4.2 Proposed Studies

No studies are proposed specific to wildlife resources or wetlands.

6.2.4.3 Continued or Proposed PM&E Measures

There are no existing PM&E measures required relative to wildlife resources or wetland habitat and none are proposed.

6.2.5 Terrestrial Botanical Resources

6.2.5.1 Potential Issues and Project Effects

No issues have been identified relative to terrestrial botanical resources and no ground disturbance is proposed.

6.2.5.2 Proposed Studies

No studies are being proposed specific to terrestrial botanical resources.

6.2.5.3 Continued or Proposed PM&E Measures

There are no existing PM&E measures relative to terrestrial botanical resources, and none are proposed.

6.2.6 Rare, Threatened and Endangered Species

6.2.6.1 Potential Issues and Project Effects

As discussed in Section 5.7, searches of the USFWS IPaC database identified several federally listed species that may occur in the vicinity of the Project. Because no changes in Project operations or facilities are proposed, the potential impact to RTE species is minimal. However, since the Project was last licensed, additional species have been added to the RTE species lists and documenting the presence/absence of listed species within the FERC Project boundary may be necessary to understanding the potential for Project effects on these species or their habitats.

6.2.6.2 Proposed Studies

The Licensee proposes to conduct presence/absence surveys for RTE species that are likely to occur within the FERC Project boundary. The study area will be traversed to describe and field-verify the presence or absence of RTE species within the Project boundary.

6.2.6.3 Continued or Proposed PM&E Measures

There are no existing PM&E measures required relative to RTE species, and none are proposed.

6.2.7 Recreation and Land Use

6.2.7.1 Potential Issues and Project Effects

As part of the due diligence efforts to collect relevant information for the PAD (see Section 1 and Appendix B), the Licensee requested information and comments from Relicensing Participants. Cheat Lake Environment and Recreation Association (CLEAR) and FOC identified the following issues and recommended PM&Es related to recreation and shoreline management (see Appendix B):

- Cheat Lake is approaching boating carrying capacity;
- Marinas and private docks on Cheat Lake place buoys at varying distances from the end of their docks creating safety concerns;
- Cheat Lake Beach sand maintenance issues;
- Accumulation of large woody debris on the shoreline of the Cheat Lake Beach at Cheat Lake Park;
- Vegetation clearing by private landowners along the Cheat Lake Trail;
- Permanent structures are located along the Cheat Lake shoreline;
- Memorandum of Understanding and Advisory Council on Recreation, Safety & Security is needed;
- Cheat Lake Park and trail operation and maintenance;
- Boat noise/speed;
- Create public access to the upper reaches of Cheat Lake by improving an existing gated road in Snake Hill Wildlife Management Area along Buzzard Run; and
- Investigate extending the southern end of the Cheat Lake Trail to a newly developed trailhead to improve the connectivity to the future route of the Sheepskin Trail.

As discussed in Section 5.8.5, the Licensee is aware that boating use on Cheat Lake may be approaching capacity and will not issue any new permits for private piers or boat docks or until after relicensing. WVDNR is the agency responsible for establishing boating safety regulations in West Virginia, but based on the Licensee's understanding, WVDNR does not have an established boating carrying capacity standard that would be applicable to Cheat Lake. The

Licensee's authority is limited to permitting structures in Cheat Lake and the Licensee does not have the authority to enforce regulations.

6.2.7.2 Proposed Studies

The Licensee proposes to conduct a field inventory of the existing Project recreation sites. The inventory will identify the amenities or facilities at each site and will include photographs of the sites, an evaluation of the overall condition of each site, and general observations on site use and accessibility.

The Licensee also proposes to collect recreation use data in 2020 and file the next Recreation Plan update by March 31, 2021, consistent with FERC's Order dated August 10, 2018 modifying and approving the 2018 Recreation Plan Update.

As discussed in Section 5.3.2.2, in accordance with the 2018 Biomonitoring Plan the Licensee will conduct a creel survey (a sampling survey that targets recreational anglers) in 2020 to document a baseline of recreational fishing effort and success. Information collected during the survey will provide useful information on recreational angling.

6.2.7.3 Continued or Proposed PM&E Measures

The Licensee will continue to provide public access and use of Project lands and waters as appropriate and consistent with Project purposes. The Licensee proposes to prepare a Recreation Facilities Management Plan (RMP) that outlines operation and maintenance of existing recreation facilities. The Licensee proposes to consult every 10 years with appropriate stakeholders on the need to revise the RMP and revise the RMP if changes are needed.

6.2.8 Aesthetic Resources

6.2.8.1 Potential Issues and Project Effects

No issues have been identified relative to aesthetic resources. There are no scenic highways or byways or National Wild and Scenic Rivers located within the Project boundary or adjacent to the Project boundary.

6.2.8.2 Proposed Studies

No aesthetic studies are proposed.

6.2.8.3 Continued or Proposed PM&E Measures

No measures have been identified and none are proposed related to aesthetic resources.

6.2.9 Cultural Resources

6.2.9.1 Potential Issues and Project Effects

The Licensee is aware of two potentially significant cultural resources within the Project boundary – the railroad bed along the Cheat Lake Trail (a linear historic archaeological site) and the Lake Lynn powerhouse and dam (potentially eligible for the NRHP). The Licensee is not proposing any ground disturbing work or any changes to the dam or powerhouse that would alter the powerhouse or dam.

6.2.9.2 Proposed Studies

The Licensee will consult with the WVSHPO and submit the Project information for a formal review. The Licensee will also consult with the PHMC and the Cultural Resources Geographic Information System (CRGIS) and submit the Project to the SHPO for review.

6.2.9.3 Continued or Proposed PM&E Measures

No PM&E measures have been identified and none are proposed.

6.2.10 Socioeconomic Resources

6.2.10.1 Potential Issues and Project Effects

No issues have been identified relative to socioeconomic resources.

6.2.10.2 Proposed Studies

No socioeconomic studies are proposed.

6.2.10.3 Continued or Proposed PM&E Measures

No PM&E measures relative to socioeconomic resources have been identified and none are proposed.

6.2.11 Tribal Resources

6.2.11.1 Potential Issues and Project Effects

As outlined in Section 5.12, the Licensee and FERC have identified Native American tribes that may have an interest in the relicensing of the Project. These Tribes have been contacted by the Licensee and several have been contacted by FERC to determine their interest in participating in the relicensing. To date, one Tribe has responded, and no tribal interests or issues have been identified.

6.2.11.2 Proposed Studies

No studies are proposed.

6.2.11.3 Continued or Proposed PM&E Measures

No PM&E measures have been identified and none are proposed. The Licensee will continue to provide the Tribes with information on the Project relicensing as the process moves forward.

6.3 Potentially Relevant Comprehensive Waterway and Resource Management Plans

Section 10(a) of the Federal Power Act (FPA), 16 USC §803(a)(2)(A), requires FERC to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. On

April 27, 1988, FERC issued Order No. 481-A revising Order No. 481, issued October 26, 1987, establishing that FERC will accord FPA Section 10(a)(2)(A) comprehensive plan status to any Federal or state plan that:

- is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- specifies the standards, the data, and the methodology used; and
- is filed with the Secretary of the Commission.

Based on FERC's May 2019 revised list of comprehensive plans for the State of West Virginia and the Commonwealth of Pennsylvania, there are twenty-one (21) plans that are potentially relevant to the Project (Table 6.1).

Table 6.1. Potentially Relevant Comprehensive Waterway and Resource Management Plans

Resource	Comprehensive Plan
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). (Report No. 36). April 2000.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.
Aquatic Resources	U.S. Fish and Wildlife Service. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 1996. Interstate fishery management plan for weakfish. (Report No. 27). May 1996.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*). (Report No. 31). July 1998.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic striped bass. (Report No. 34). January 1998.

Resource	Comprehensive Plan
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.
Aquatic Resources	Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.
Aquatic Resources	National Marine Fisheries Service. 1998. Final Recovery Plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.
Aquatic Resources/Wildlife Resources	West Virginia Division of Natural Resources. 1982. Monongahela River Basin plan. Charleston, West Virginia.
Wildlife Resources	U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.
Wildlife Resources	West Virginia Division of Natural Resources. 2015 West Virginia State Wildlife Action Plan. Charleston, West Virginia. September 1, 2015.
Wildlife Resources	Forest Service. 1988. Monongahela National Forest land and resource management plan. Department of Agriculture, Elkins, West Virginia. June 1988.
Water Quality and Quantity	Pennsylvania Department of Environmental Resources. 1983. Pennsylvania State water plan. Harrisburg, Pennsylvania. January 1983. 20 volumes.
Water Quality and Quantity	Pennsylvania Department of Environmental Resources. 1988. Pennsylvania 1988 water quality assessment. Harrisburg, Pennsylvania. April 1988.
Recreation Resources/Water Quality and Quantity	National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.
Recreation Resources/Water Quality and Quantity	Pennsylvania Department of Environmental Resources. 1990. The Pennsylvania scenic rivers program scenic rivers inventory. Harrisburg, Pennsylvania. April 1990.
Recreational Resources	West Virginia Governor's Office of Community and Industrial Development. West Virginia State Comprehensive Outdoor Recreation Plan: 1988-1992. Charleston, West Virginia.
Recreational Resources	Pennsylvania Department of Environmental Resources. 1986. Pennsylvania's recreation plan, 1986-1990. Harrisburg, Pennsylvania.

6.4 References

FERC. 2019. List of Comprehensive Plans. Office of Energy Projects. Available online: https://www.ferc.gov/industries/hydropower/gen-info/licensing/complan.pdf. Accessed: June 7, 2019.

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APPENDICES

Appendix A: Lake Lynn Hydroelectric Project Distribution List
Appendix B: Summary of Contacts and Consultation
Appendix C: Process Plan and Schedule
Appendix D: Current FERC License
Appendix E: Flow Duration Curves
Appendix F: Information and Data Sources Cited in the PAD
- Appendix F-1: NRCS Web Soil Survey for Project Area
- Appendix F-2: West Virginia and Pennsylvania Lists of Invasive Species
- Appendix F-3: Water Quality Data

Appendix G: Exhibit G Maps
Appendix H: CEII – Exhibit F Drawings (filed separately with FERC)

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APPENDIX A

LAKE LYNN HYDROELECTRIC PROJECT DISTRIBUTION LIST

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APPENDIX B

SUMMARY OF CONTACTS AND CONSULTATION

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Summary of Contacts and Consultation

This is a summary of consultation with Federal and state resource agencies, Native American tribes, and non-governmental organizations (NGOs) specific to the preparation of this Pre-Application Document (PAD). Supporting documentation, as referenced in the table below, follows this summary.

Agency Consultation and Information Requests: The Licensee contacted Federal and state resource agencies and NGOs to: (a) provide an introduction to the Project, (b) provide notice to these parties of the upcoming Project licensing proceeding, (c) request information for the development of PAD, and (d) gain insights into use of the Traditional Licensing Process (TLP). All communication is summarized in the following table.

Literature Searches: The Licensee conducted searches of publicly available databases to supplement information within its own files. The end of each major section of the PAD includes a list of references used to prepare that section of the PAD and includes references that contain existing, relevant, and reasonably available information identified by the Licensee during preparation of the PAD.

Summary Contacts and Consultation

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
May 20, 2019	Licensee	Project Distribution List	Letter requesting information for the PAD and input on the use of the TLP for the relicensing of the Project (Information Request for the PAD)	Email/Letter for those without email addresses
June 10, 2019	Licensee	Duane Nichols, Cheat Lake Environment & Recreation Association (CLEAR)	Provided a summary comparing/contrasting the TLP vs. the Integrated Licensing Process (ILP).	Email
June 12, 2019	Licensee	Project Distribution List	Reminder of due date for responses to the Information Request for the PAD	Email/Letter for those without email addresses

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
June 12, 2019	Licensee	Anita Carter, Greystone-on-the-Cheat	Clarified that the Information Request for the PAD was directed to Greystone-on-the-Cheat. Ms. Carter forwarded the Information Request for the PAD to the appropriate contacts in the organization and confirmed that she should continue to be listed as the main contact for the organization.	Telephone Call
June 18, 2019	Nicholas Murray, West Virginia Department of Environmental Protection (WVDEP)	Licensee	Email providing water quality data from WVDEP stations (online database retrieval tool was not working)	Email
June 19, 2019	Elizabeth Toombs, Tribal Historic Preservation Officer Cherokee Nation	Licensee	In response to Information Request for the PAD, stated that Monongalia County and Fayette County are outside the Cherokee Nation's Area of Interest, thus, they defer to federally-recognized Tribes that have an interest in this land base.	Email
June 19, 2019	Amanda Pitzer, Friends of the Cheat (FOC)	Licensee	In response to Information Request for the PAD, emailed questions about docket number and filing comments in FERC docket.	Email
June 19, 2019	Licensee	Amanda Pitzer, FOC	Responded to Amanda Pitzer's email indicating that comments/information should be submitted directly to Jody Smet and that copies of submittals received will be included with the PAD that will be filed with FERC. Instructions were also provided for filing comments in the FERC docket.	Email
June 19, 2019	Janet Norman, U.S Fish and Wildlife Service (USFWS)	Licensee	In response to Information Request for the PAD, Ms. Norman contacted Licensee to discuss IPaC process.	Email and Voicemail

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
June 19, 2019	Licensee	Janet Norman, USFWS	Explained that the IPaC was completed informally for the PAD and that no formal consultation had been requested through the IPaC review process. Ms. Norman requested a shapefile of the Project area used for the IPaC.	Telephone Call
June 19, 2019	Jacob Harrell, West Virginia Division of Natural Resources (WVDNR)	Licensee	In response to Information Request for the PAD, requested clarification that this request is related to information for the PAD and that study requests would be submitted at a later date.	Email
June 19, 2019	Licensee	Jacob Harrell, WVDNR	Responded that the information request is related to information for the PAD.	Email
June 19, 2019	Douglas C. McLearen, Chief Division of Environmental Review (Cheryl Nagle), PA SHPO, PA Historical and Museum Commission	Licensee	In response to Information Request for the PAD, stated that a preliminary review of the Project indicates that there may be National Register-eligible aboveground resources in the Project area and that in order to facilitate the review process, surveys must be conducted to identify these resources before final plans are developed.	Emailed letter
June 20, 2019	Licensee	Janet Norman, USFWS	Provided Licensee contact information and an update on availability of shapefile for the Project area.	Email
June 20, 2019	Janet Norman, USFWS	Licensee	Acknowledged receipt of Licensee contact information.	Email

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
June 20, 2019	Heather Smiles, PFBC	Licensee	In response to Information Request for the PAD, stated that the PFBC agrees with the use of the TLP. Ms. Smiles stated that PFBC has been involved in the review of biological monitoring information and has had opportunities to provide comments on future monitoring; and therefore, does not have any additional information requests at this time.	Email
June 20, 2019	Mike Strager and Duane Nichols, CLEAR	Licensee	In response to Information Request for the PAD, provided issues and recommendations relating to carrying capacity, buoys, Cheat River beach sand, large woody debris, vegetation clearing, debris clean-up, and permanent structures along the shoreline.	Email
June 20, 2019	Duane Nichols, CLEAR	Licensee	In response to Information Request for the PAD, requested various recreation, safety, and security measures for inclusion in the relicensing of the Lake Lynn Project and for incorporation into the operation and maintenance of the facility and surroundings.	Email
June 20, 2019	Stratford Douglas, Friends of the Cheat (Board Member and Treasurer) and American Whitewater (Lifetime Member)	Licensee, FERC	Stratford Douglas, Friends of the Cheat (Board Member and Treasurer) and American Whitewater (Lifetime Member) proposed recreation access and improvements to Upper Cheat Lake through Buzzards Road improvements.	Email; filed in FERC Docket

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
June 20, 2019	Garrett Thompson Recreation and Lands Manager, FOC	Licensee, FERC	In response to Information Request for the PAD, requested improvement of recreational opportunities that should be considered as part of this next re-licensing process, including public access to the upper reaches of Cheat Lake and extending the southern end of Cheat Lake Trail.	Emailed letter; filed in FERC Docket
June 21, 2019	Daniel Miller, Rotary Club of Cheat Lake	Licensee, FERC	Stated that he would like to see an extension of the pedestrian trail system especially from the dam to the Monongahela River, and along other areas to connect to other trails.	Email, filed in FERC Docket
June 25, 2019	Licensee	Janet Norman, USFWS	As follow-up to call on June 19, provided shapefile for the Project boundary used for IPaC.	Email
June 26, 2019	Olivia Braun, Pennsylvania Game Commission (PGC)	Licensee	In response to Information Request for the PAD, requested Project mapping that illustrates the location and boundary of the Project area as well as any proposed improvements that may be proposed as part of the relicensing effort.	Email
June 27, 2019	Licensee	Olivia Braun, PGC	Provided a figure of the Project boundary and clarified that, at this time, the Licensee is not proposing any changes or improvements at the Project.	Email
June 27, 2019	FERC	Delaware Nation; Delaware Tribe of Indians; Osage Nation	FERC letter to Tribal Leaders inviting participation in the relicensing process for the Lake Lynn Hydroelectric Project.	Letter

Contact Date	Correspondence From	Correspondence To	Description	Contact Format
July 2, 2019	Olivia Braun, Environmental Planning & Habitat Protection Division, Bureau of Wildlife Habitat Management, Pennsylvania Game Commission	Licensee	In response to Information Request for the PAD, provided comments noting that, at this time, given that no activities are proposed, the PGC does not have any information to provide for inclusion in the PAD.	Email
July 8, 2019	Licensee	Jacob Harrell, WVDNR	Email communications inquiring whether WVDNR has any concerns about the proposed use of the TLP.	Email
July 8, 2019	Jacob Harrell, WVDNR	Licensee	Email communications indicating that WVDNR would not object.to the TLP and that the Licensee does a fairly good job at working with the resource agencies.	Email
July 9, 2019	Licensee	Janet Norman, USFWS	As follow-up to call on June 19, and June 25 email, follow-up to confirm that there were no issues with the shapefile for the Project boundary provided on June 25.	Email
July 10, 2019	Erin Thompson, Delaware Nation	Licensee	In response to Information Request for the PAD, stated that the proposed Project location does not endanger cultural or religious sites of interest to the Delaware Nation. Requested that if any artifacts are discovered that the Licensee contact their office within 24 hours.	Emailed letter

Foster, Joyce

From: Blair, Michelle A.
Sent: Monday, May 20, 2019 3:06 PM
To: Absentee-Shawnee Tribe of Oklahoma; Amanda Pitzer; Anita Carter; Betty Wiley; Bob Irvin; Bonney Hartley; Brett Barnes; Brian Bridgewater; Brice Obermeyer; Bryan Printup; Cassie Harper; Clint Halftown; Colleen McNally-Murphy; Coopers Rock State Forest; Cosmo Servidio; Curtis Schreffler; Dana Kelly; Danny Bennett; Darren Bonaparte; David Wellman; Delaware Nation, Oklahoma; Delaware Tribe of Indians; Duane Nichols; Eastern Shawnee Tribe of Oklahoma; Edgewater Marina; Ella Belling; Heather Smiles; Jacob Harrell; Jay Toth; Jesse Bergevin; John

To: Spain; Kevin Colburn; Kevin Mendik; Laura Misita; Megan Gottlieb; Mike Strager; Oneida Indian Nation; Oneida Tribe of Indians of Wisconsin; Onondaga Nation; Rennetta McClure; Richard McCorkle; Sean P McDermott; Shannon Holsey; Shaun Wicklein; Steve Moyer; Steve Moyer (smoyer@tu.org); Stuart Welsh; Sunset Beach Marina; Susan Bachor; Susan Pierce; Tonawanda Band of Seneca; Tonya Tipton; Vincent Vicites; William Fisher; William Tarrant
Cc: jsmet@cubehydro.com; Foster, Joyce
Subject: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)
Attachments: LLG PAD Info-TLP Request Letter_5-20-19.pdf

Good afternoon-

Attached is an Information Request for the Pre-Application Document for the FERC relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459).

Please provide your comments within 30 days of this letter. If you have any questions regarding this request please contact Jody Smet at jsmet@cubehydro.com or Joyce Foster at jfoster@trccompanies.com.

Thank you,
Michelle

Michelle Blair
Project Coordinator

3

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4

Lake Lynn Generation, LLC
Two Bethesda Metro Center, Suite
1330 Bethesda, MD 20814

May 20, 2019

DISTRIBUTION LIST

RE: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Dear Recipient:

The current Federal Energy Regulatory Commission (FERC) license for the Lake Lynn Hydroelectric Project (Project) expires on November 30, 2024. The Project is owned and operated by Lake Lynn Generation, LLC (LLG). In accordance with FERC's regulations, LLG must file a Notice of Intent (NOI) to relicense the Project with FERC between May 30, 2019 and November 30, 2019. At the same time, LLG is required to file a Pre-Application Document (PAD) for the Project. The PAD will provide FERC, agencies, local governments, and interested parties with existing, relevant, and reasonably available information that pertains to the Project. The information will then be used to identify potential issues and help identify any information needs and related study plans for the relicensing.

The Project is located on the Cheat River in Monongalia County, West Virginia and Fayette County, Pennsylvania approximately 8 miles northeast of Morgantown, West Virginia and about 3.7 miles upstream of the confluence of the Cheat River with the Monongahela River. The Project dam is located in Monongalia County, West Virginia, while most of the tailrace area is in Fayette County, Pennsylvania. Major features of the Project include a 1,000-foot long concrete gravity dam, a 624-foot long spillway, a powerhouse near the east abutment of the dam with four generating units, and a reservoir that is approximately 13 miles long with a surface area of approximately 1,700 acres. The Project operates as a daily peaking facility and the current Project license requires that the Project release into the Cheat River a minimum flow of 212 cubic feet per second (cfs), or inflow to the Project reservoir, whichever is less, with an absolute minimum release flow of 100 cfs regardless of reservoir inflow, evaporation or other withdrawals. The current Project license also requires that the Licensee maintain the Project reservoir at a surface elevation between 868 feet National Geodetic Vertical Datum (NGVD) and 870 feet NGVD from May 1 to October 31, between 857 feet NGVD and 870 feet NGVD from November 1 to March 31, and between 863 feet NGVD and 870 feet NGVD from April 1 to April 30.

We are writing to initiate additional information gathering for the Project and to request your input. The purpose of this letter is to request your assistance in identifying existing relevant and reasonably available information, which cannot be obtained online, that describes either the existing environmental conditions at the Project or any known or potential effects of continuing Project operations. Project resources that will be described in the PAD, and which we would be interested in information about, include water use and water quality, fish and aquatics, wildlife resources, terrestrial resources, rare species, recreation use and facilities, and cultural and tribal resources. We will compile this information with information already in our possession for incorporation into the PAD. Your response to this request for information within 30 days would be appreciated.

In addition, LLG plans to request FERC approval to use FERC's Traditional Licensing Process (TLP) for the relicensing instead of the Integrated Licensing Process (ILP) (FERC's default process for relicensing) because we believe the TLP will be the most efficient, effective, and least burdensome process for relicensing the Project. Both the TLP and ILP processes provide opportunities for agency/stakeholder/public engagement and input. The TLP is more streamlined and less complex with fewer process steps and; therefore, is less demanding of agency/stakeholder's time and resources. The TLP does not have a strict timeline and provides more flexibility for completion of the various steps of the licensing process. The Project is an existing FERC-licensed project with existing requirements for minimum flow and reservoir surface elevation that has well-known and understood impacts. There is a large amount of resource information and data available for the Project based on monitoring and reporting efforts that have occurred since the most recent relicensing of the Project in 1995, including shoreline erosion surveys, water quality monitoring (including dissolved oxygen, temperature, pH, and conductivity in Cheat Lake and downstream of the Project), recreation use monitoring, and information collected and reported in accordance with the Biological Monitoring Plan. The resource agencies that will be involved in the relicensing process for the Project have knowledge of the Project from the various resource monitoring and reporting efforts that have occurred under the existing FERC license. LLG and the agencies are aware of the issues likely to be raised during the relicensing. LLG does not anticipate that the relicensing will involve complex issues, study needs, or controversy that cannot be resolved with a properly implemented cooperative TLP.

Please provide your comments within 30 days of this letter on the use of the TLP for the relicensing of this Project.

We thank you in advance for providing any pertinent information that meets the criteria for inclusion in the PAD. We look forward to working with you throughout the process. If you have any questions regarding the Project or the relicensing process, please contact either me at jsmet@cubehydro.com or Joyce Foster at TRC Companies at jfoster@trccompanies.com.

Sincerely,

Jody J Smet

Jody Smet
Lake Lynn Generation, LLC

Lake Lynn Generation, LLC
Lake Lynn Project (P-2459)
Distribution List May 20, 2019

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Foster, Joyce

From: Jody Smet <jsmet@cubehydro.com>
Sent: Monday, June 10, 2019 10:40 AM
To: Foster, Joyce
Subject: FW: Lake Lynn Relicensing - Relicensing Process ILP v. TLP

Jody J. Smet, AICP
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(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

From: Jody Smet
Sent: Thursday, May 30, 2019 10:45 AM
To: 'Duane Nichols' <duane330@aol.com>
Subject: Lake Lynn Relicensing - Relicensing Process ILP v. TLP

Duane,

I'm sorry that we did not connect on Tuesday, and I understand that you were out yesterday. I have a pretty full day today, so I wanted to email you about your question in case we don't find a time to connect today. The following bullets compare/contrast the Integrated Licensing Process (ILP) and the Traditional Licensing Process (TLP). The ILP is FERC's default process, but we are considering requesting FERC's approval to use the TLP, and are interested in your, and others', feedback.

- The TLP and ILP differ mainly in how they coordinate the applicant's pre-filing activities (i.e., before filing the license application), especially study plan development, with National Environmental Policy Act (NEPA) review
- The ILP combines pre-filing consultation with FERC's scoping in accordance with NEPA while these are conducted sequentially in the TLP
- Both the TLP and ILP provide opportunities for stakeholder and public participation throughout the process (and before the filing of the license application)
- The ILP has strict deadlines for FERC, stakeholders, and the applicant. The TLP provides more flexibility for the applicant and stakeholders to complete various steps in the licensing process because it does not have a strict timeline. Although strict deadlines imposed by the ILP may be helpful to keep participating stakeholders on task, these deadlines may also prove unworkable under some circumstances.

- The ILP process is more complex with more process steps and, therefore, is more demanding of stakeholder's time and resources. The TLP has less required process steps.
- The ILP has a structured, intensive, and time-constrained study plan development process and study review process. Although the TLP does not have a required study plan development process, we intend for the Lake Lynn relicensing to be collaborative with stakeholders.
- FERC staff is involved early and throughout the ILP while FERC involvement in the TLP is later (after the license application is filed). However, FERC is available for guidance throughout the TLP.
- Of the 19 hydro projects licensed by FERC in the past 4 years in PA and WV, 12 of those used the TLP and 7 used the ILP. Therefore, the WV and PA resource agencies are more likely to be familiar with the TLP.

Please let me know if you would like to discuss further and we can schedule a time to talk.

Thanks,

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654
(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

Foster, Joyce

From: Blair, Michelle A.
Sent: Wednesday, June 12, 2019 9:53 AM
To: Absentee-Shawnee Tribe of Oklahoma; Amanda Pitzer; Anita Carter; Betty Wiley; Bob Irvin; Bonney Hartley; Brett Barnes; Brian Bridgewater; Brice Obermeyer; Bryan Printup; Cassie Harper; Clint Halftown; Colleen McNally-Murphy; Coopers Rock State Forest; Cosmo Servidio; Curtis Schreffler; Dana Kelly; Danny Bennett; Darren Bonaparte; David Wellman; Delaware Nation, Oklahoma; Delaware Tribe of Indians; Duane Nichols; Eastern Shawnee Tribe of Oklahoma; Edgewater Marina; Ella Belling; Heather Smiles; Jacob Harrell; Jay Toth; Jesse Bergevin; John

To: Spain; Kevin Colburn; Kevin Mendik; Laura Misita; Megan Gottlieb; Mike Strager; Oneida Indian Nation; Oneida Tribe of Indians of Wisconsin; Onondaga Nation; Rennetta McClure; Richard McCorkle; Sean P McDermott; Shannon Holsey; Shaun Wicklein; Steve Moyer; Steve Moyer (smoyer@tu.org); Stuart Welsh; Sunset Beach Marina; Susan Bachor; Susan Pierce; Tonawanda Band of Seneca; Tonya Tipton; Vincent Vicites; William Fisher; William Tarrant
Cc: jsmet@cubehydro.com; Foster, Joyce
Subject: REMINDER: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)
Attachments: LLG PAD Info-TLP Request Letter_5-20-19.pdf

Importance: High

Good morning -

Attached is an Information Request for the Pre-Application Document for the FERC relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459).

As a reminder, please provide your comments within 30 days of this letter (by June 20). If you have any questions regarding this request please contact Jody Smet at jsmet@cubehydro.com or Joyce Foster at jfoster@trccompanies.com.

Thank you,
Michelle

Michelle Blair
Project Coordinator

14 Gabriel Drive, Augusta, ME 04330
T 207.620.3845 | **F** 207.621.8226 | mblair@trccompanies.com
LinkedIn | Twitter | Blog | TRCcompanies.com

Lake Lynn Generation, LLC
Two Bethesda Metro Center, Suite
1330 Bethesda, MD 20814

May 20, 2019

DISTRIBUTION LIST

RE: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Dear Recipient:

The current Federal Energy Regulatory Commission (FERC) license for the Lake Lynn Hydroelectric Project (Project) expires on November 30, 2024. The Project is owned and operated by Lake Lynn Generation, LLC (LLG). In accordance with FERC's regulations, LLG must file a Notice of Intent (NOI) to relicense the Project with FERC between May 30, 2019 and November 30, 2019. At the same time, LLG is required to file a Pre-Application Document (PAD) for the Project. The PAD will provide FERC, agencies, local governments, and interested parties with existing, relevant, and reasonably available information that pertains to the Project. The information will then be used to identify potential issues and help identify any information needs and related study plans for the relicensing.

The Project is located on the Cheat River in Monongalia County, West Virginia and Fayette County, Pennsylvania approximately 8 miles northeast of Morgantown, West Virginia and about 3.7 miles upstream of the confluence of the Cheat River with the Monongahela River. The Project dam is located in Monongalia County, West Virginia, while most of the tailrace area is in Fayette County, Pennsylvania. Major features of the Project include a 1,000-foot long concrete gravity dam, a 624-foot long spillway, a powerhouse near the east abutment of the dam with four generating units, and a reservoir that is approximately 13 miles long with a surface area of approximately 1,700 acres. The Project operates as a daily peaking facility and the current Project license requires that the Project release into the Cheat River a minimum flow of 212 cubic feet per second (cfs), or inflow to the Project reservoir, whichever is less, with an absolute minimum release flow of 100 cfs regardless of reservoir inflow, evaporation or other withdrawals. The current Project license also requires that the Licensee maintain the Project reservoir at a surface elevation between 868 feet National Geodetic Vertical Datum (NGVD) and 870 feet NGVD from May 1 to October 31, between 857 feet NGVD and 870 feet NGVD from November 1 to March 31, and between 863 feet NGVD and 870 feet NGVD from April 1 to April 30.

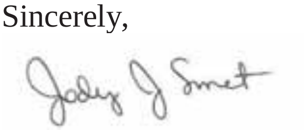
We are writing to initiate additional information gathering for the Project and to request your input. The purpose of this letter is to request your assistance in identifying existing relevant and reasonably available information, which cannot be obtained online, that describes either the existing environmental conditions at the Project or any known or potential effects of continuing Project operations. Project resources that will be described in the PAD, and which we would be interested in information about, include water use and water quality, fish and aquatics, wildlife resources, terrestrial resources, rare species, recreation use and facilities, and cultural and tribal resources. We will compile this information with information already in our possession for incorporation into the PAD. Your response to this request for information within 30 days would be appreciated.

In addition, LLG plans to request FERC approval to use FERC's Traditional Licensing Process (TLP) for the relicensing instead of the Integrated Licensing Process (ILP) (FERC's default process for relicensing) because we believe the TLP will be the most efficient, effective, and least burdensome process for relicensing the Project. Both the TLP and ILP processes provide opportunities for agency/stakeholder/public engagement and input. The TLP is more streamlined and less complex with fewer process steps and; therefore, is less demanding of agency/stakeholder's time and resources. The TLP does not have a strict timeline and provides more flexibility for completion of the various steps of the licensing process. The Project is an existing FERC-licensed project with existing requirements for minimum flow and reservoir surface elevation that has well-known and understood impacts. There is a large amount of resource information and data available for the Project based on monitoring and reporting efforts that have occurred since the most recent relicensing of the Project in 1995, including shoreline erosion surveys, water quality monitoring (including dissolved oxygen, temperature, pH, and conductivity in Cheat Lake and downstream of the Project), recreation use monitoring, and information collected and reported in accordance with the Biological Monitoring Plan. The resource agencies that will be involved in the relicensing process for the Project have knowledge of the Project from the various resource monitoring and reporting efforts that have occurred under the existing FERC license. LLG and the agencies are aware of the issues likely to be raised during the relicensing. LLG does not anticipate that the relicensing will involve complex issues, study needs, or controversy that cannot be resolved with a properly implemented cooperative TLP.

Please provide your comments within 30 days of this letter on the use of the TLP for the relicensing of this Project.

We thank you in advance for providing any pertinent information that meets the criteria for inclusion in the PAD. We look forward to working with you throughout the process. If you have any questions regarding the Project or the relicensing process, please contact either me at jsmet@cubehydro.com or Joyce Foster at TRC Companies at jfoster@trccompanies.com.

Sincerely,



Jody Smet
Lake Lynn Generation, LLC

Lake Lynn Generation, LLC
Lake Lynn Project (P-2459)
Distribution List May 20, 2019

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The Honorable Shelley Capito
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The Honorable David McKinley
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The Honorable Bob Casey
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The Honorable Guy Reschenthaler
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Cheat Lake, WV 26508

Edgewater Marina
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john.spain@ferc.gov

PHONE LOG

Date: June 12, 2019

Participants: Joyce Foster, TRC for Licensee
Anita Carter, Greystone-on-the Cheat

Subject: Lake Lynn Project Relicensing – Information Request for the PAD

Prepared by: Joyce Foster

Conversation Summary:

Joyce Foster returned a call from Anita Carter. Ms. Carter received the Information Request for the PAD and wanted to clarify that this was intended for Greystone-on-the Cheat. Joyce explained that the letter/email was sent to her as the contact for the Greystone-on-the Cheat. Ms. Carter indicated that she is forwarding the letter to the President of the Greystone-on-the-Cheat but asked that we keep her on the list as the main contact for the association. Joyce stated that copies of what is filed with FERC and other communications with stakeholder will be sent to her as the contact.

Foster, Joyce

From: Murray, Nick S <Nick.S.Murray@wv.gov>
Sent: Tuesday, June 18, 2019 9:23 AM
To: Effler, Hayley
Cc: Foster, Joyce
Subject: RE: WV ambient water quality
Attachments: Cheat River TRC.xlsx; Blank Facts Sheet Form TRC.docx

Hayley,

Please see that attached spreadsheet and Word document. This is data from our database for all years of data from these sites. It was just as easy to select all years as the last 10.

Please feel free to contact me again with any questions,

Nicholas Murray
Environmental Resource Specialist Supervisor
WV DEP - Watershed Assessment Branch
601 57th Street S.E.
Charleston WV 25304
Office:(304)926-0499 Ext 1034
Cell: (304) 389-8716

From: Elizabeth Toombs
To: jsmet@cubehydro.com; Foster, Joyce
Subject: FERC 2459, Lake Lynn Hydroelectric Project
Date: Wednesday, June 19, 2019 11:54:31 AM

Good Morning, Ms. Smet and Ms. Foster:

The Cherokee Nation recently received a review request for the Relicensing of the Lake Lynn Hydroelectric Project in Monongalia County, West Virginia and Fayette County, Pennsylvania. Both Monongalia County and Fayette County are outside the Cherokee Nation's Area of Interest. Thus, this Office respectfully defers to federally recognized Tribes that have an interest in this landbase.

Thank you for the opportunity to comment upon this proposed undertaking. Please contact me if there are any questions or concerns.

Wado,

Elizabeth Toombs, Tribal Historic Preservation Officer
Cherokee Nation
Tribal Historic Preservation Office
PO Box 948
Tahlequah, OK 74465-0948
918.453.5389

From: Amanda Pitzer <amanda@cheat.org>
Sent: Wednesday, June 19, 2019 3:05 PM
To: Robert Flickner <rflickner@cubehydro.com
Cc: Garrett Thompson <gthompson@cheat.org
Subject: FERC docket number

Hi Bob,

FOC wants to submit comments on the pre-application but the docket # (2459) doesn't include a letter at the beginning, so the e-file system won't work for us.

Do we have the correct docket number? Do we use e-file or send them directly to you?

Sincerely,

Amanda

--
Amanda J. Pitzer
Executive Director
Friends of the Cheat

NEW ADDRESS EFFECTIVE IMMEDIATELY!
1343 North Preston Highway, Kingwood, WV 26537

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www.cheat.org
www.cheatriverwatertrail.org
www.cheatfest.org

From:	Foster, Joyce
To:	amanda@cheat.org
Cc:	Jody Smet; Robert Flickner - MAH; gthompson@cheat.org
Subject:	RE: FERC docket number
Date:	Wednesday, June 19, 2019 4:39:00 PM
Attachments:	image003.png

Good afternoon,

Your request to Bob Flickner was forwarded to me since I am the consultant assisting with the FERC relicensing process for the Lake Lynn Hydroelectric Project. Since this request is for information or data that you would like to see included in the Pre-application Document (PAD) and comments on the use of the Traditional Licensing Process, please submit this directly to Jody Smet (the Licensee's FERC Licensing Director for the Lake Lynn Project) at jsmet@cubehydro.com and me at jfoster@trccompanies.com. Copies of submittals received will be included with the PAD that will be filed with the Federal Energy Regulatory Commission (FERC) in the Project docket.

If you would also like to file a copy of your response in the FERC docket, you can use the link below to register with FERC for an account: https://www.ferc.gov/docs-filing/eregistration.asp?csrt=5854337081307807941. Once you have registered for a FERC account, you can file comments using the link below and referencing the FERC project number, using the prefix "P-" (e.g., use P-2459) in the submission: https://www.ferc.gov/docs-filing/efiling.asp?csrt=5854337081307807941.

We look forward to working with you throughout the relicensing process. If you have any questions regarding the Project or the relicensing process, please feel free to contact Jody Smet at jsmet@cubehydro.com or me at jfoster@trccompanies.com.

Thanks,

Joyce Foster
Planner

TRC

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

---

From: Amanda Pitzer <amanda@cheat.org>
Sent: Wednesday, June 19, 2019 3:05 PM
To: Robert Flickner <rflickner@cubehydro.com>
Cc: Garrett Thompson <gthompson@cheat.org>
Subject: FERC docket number

Hi Bob,

FOC wants to submit comments on the pre-application but the docket # (2459) doesn't include a letter at the beginning, so the e-file system won't work for us.

Do we have the correct docket number? Do we use e-file or send them directly to you?

Sincerely,

Amanda

--
Amanda J. Pitzer
Executive Director
Friends of the Cheat

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www.cheat.org
www.cheatriverwatertrail.org
www.cheatfest.org

From: "Norman, Janet" <janet_norman@fws.gov>
Date: June 19, 2019 at 6:06:25 PM GMT+2
To: <jsmet@cubehydro.com>
Subject: Ipac consultation done?

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Jody,
I don't have your phone number, and was hoping to talk to you regarding the Lake Lynn re-licensing information search. Wanted to go over some of the specifics of the Ipac process, if we can?
Here is my phone, below, and I will be back in the office by 1pmish.
Thanks.
Janet

--
Janet Norman
Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21401
Office: 410-573-4533
Fax: 410-269-0832
Janet_Norman@fws.gov
www.fws.gov/chesapeakebay

PHONE LOG

Date: June 19, 2019

Participants: Joyce Foster, TRC for Licensee
Janet Norman, USFWS

Subject: Lake Lynn Project Relicensing – Information Request for the PAD

Prepared by: Joyce Foster

Conversation Summary:

Joyce Foster returned a call I spoke to Janet Norman. Ms. Normal asked if the Licensee completed the IPaC review as an official consultation (with log in to receive a consultation number) or as unofficial. Joyce explained that TRC performed the IPaC review as unofficial for the PAD. Ms. Norman asked if we could provide her with the Shapefile for the Project area that was used for the IPaC review. Joyce indicated that she would provide her with a Project boundary shapefile, once the revised file was available. Ms. Norman requested the Licensee's contact information/phone number.

From: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Sent: Wednesday, June 19, 2019 2:57 PM
To: Jody Smet <jsmet@cubehydro.com>
Subject: Information request: Lake Lynn

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Jody,

Just for clarification purposes on our end, regarding the information request for the Lake Lynn Hydroelectric Project, this request is for information from WVDNR to use in informing the NOI/PAD, correct? There may be some confusion here that the request is for studies that we might request for the relicensing, though I think that would come after the PAD has been submitted and following the first scoping meeting. I want to make sure I have this correct.

Thanks,

Jacob Harrell

Coordination Unit
WVDNR – Wildlife Resources Section
1110 Railroad Street
Farmington, WV 26571
(304)704-9328
Jacob.D.Harrell@wv.gov

Foster, Joyce

From: Jody Smet <jsmet@cubehydro.com>
Sent: Wednesday, June 19, 2019 3:41 PM
To: Harrell, Jacob D
Cc: Foster, Joyce
Subject: RE: Information request: Lake Lynn

Jacob,

Good to hear from you. This request is just for information or data that you would like to see included in the PAD; study requests will come a little later in the process.

Thanks for checking,

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654
(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

CUBE HYDRO CAROLINAS

this message. If you have received this email in error, please notify the sender immediately and delete the original message. Neither the sender nor the company for which he or she works accepts any liability for damage caused by any virus transmitted by this email

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From: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Sent: Wednesday, June 19, 2019 2:57 PM
To: Jody Smet <jsmet@cubehydro.com>
Subject: Information request: Lake Lynn

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Thanks,

Jacob Harrell

Coordination Unit

WVDNR – Wildlife Resources Section
1110 Railroad Street
Farmington, WV 26571
(304)704-9328
Jacob.D.Harrell@wv.gov

From: Webber, Tina <twebber@pa.gov>
Sent: Wednesday, June 19, 2019 12:52 PM
To: jfoster@trccompanies.com
Cc: Jody Smet <jsmet@cubehydro.com>
Subject: C_19891217051MM.pdf

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Thank you for contacting the Pennsylvania State Historic Preservation Office (SHPO) for project review in accordance with state and federal laws. Our response is attached to this email. A hard copy will not follow in the mail unless requested. If this review requires a response, please mail to the address below; we cannot accept electronic submissions. This message is being sent on behalf of the SHPO review staff. If you have any questions about this review, please contact the appropriate reviewer. A list of reviewers by region and discipline is available at: http://www.phmc.pa.gov/Preservation/Project-Review/Pages/Contact-Information.aspx

If you have questions regarding our review for above ground, please contact Cheryl Nagle at chnagle@pa.gov.

__Tina Webber__/Clerk Typist II
PHMC/PA State Historic Preservation Office
400 North Street, 2nd Floor/Harrisburg, PA 17120-0093
Phone: (717) 705-4036/Fax: (717) 772-0920
twebber@pa.gov

Pennsylvania has a new statewide historic preservation plan! Check it out and learn how we can work together to make sure #preservationhappenshere in Pennsylvania every day.

June 19, 2019

Jody Smet
Lake Lynn Generation, LLC
Two Bethesda Metro Center, Suite 1330
Bethesda, MD 20814

Re: File No. ER 1989-1217-051-MM
FERC No. 2459: Information Request for Pre-Application Document for Relicensing of Lake Lynn Hydroelectric Project, Lake Lynn, Fayette County

Dear Ms. Smet:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Above Ground Resources

A preliminary review of this project indicates that there may be National Register-eligible above ground resources in the project area. In order to facilitate the review process, the agency, or applicant acting on their behalf, must conduct surveys to identify these resources before final plans are developed. For more information on survey strategies and methodologies, please consult the *Guidelines for Architectural Investigations in Pennsylvania* and/or other relevant guidelines available here:
http://www.phmc.pa.gov/Preservation/About/Pages/Forms-Guidance.aspx.

Archaeological Resources

There is a high probability that archaeological resources are located in this project area. In our opinion, the activity described in your proposal should have no effect on such resources. Should the scope of the project be amended to include additional ground disturbing activity this office should be contacted immediately and a Phase I Archaeological Survey may be necessary to locate all potentially significant archaeological resources.

If you need further information in this matter, please contact Cheryl L. Nagle at chnagle@pa.gov or (717) 772-4519.

Sincerely,

Douglas C. McLearen, Chief
Division of Environmental Review

DCM/tmw

Foster, Joyce

From: Foster, Joyce
Sent: Thursday, June 20, 2019 8:48 AM
To: janet_norman@fws.gov
Cc: Jody Smet
Subject: Lake Lynn Project (FERC No. 2459) - Ipac consultation done

Janet,

As follow-up to our conversation related to the Lake Lynn Project FERC relicensing, I will send you the Shapefile for the Project that we used for the IPaC unofficial resource/species

list as soon as it is available, hopefully later today. Our GIS staff is currently correcting an error in the Project area polygon and we will rerun the IPaC unofficial review using this corrected Shapefile.

As we discussed, I am also sending you the contact information for Jody Smet, the Project Licensee:

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654
(C) 804-382-1764
jsmet@cubehydro.com

As I mentioned, I am the consultant assisting with the relicensing process. My contact information is below:
Joyce Foster
TRC
804-769-1667 (office)
804-338-5110 (cell)
jfoster@trccompanies.com

We are looking forward to working with you.

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

Begin forwarded message:

> **From:** "Norman, Janet" <janet_norman@fws.gov>
> **Date:** June 19, 2019 at 6:06:25 PM GMT+2
> **To:** <jsmet@cubehydro.com>
> **Subject: Ipac consultation done?**

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Hi Jody,

I don't have your phone number, and was hoping to talk to you regarding the Lake Lynn re-licensing information search. Wanted to go over some of the specifics of the Ipac process, if we can?
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Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21401
Office: 410-573-4533
Fax: 410-269-0832
Janet_Norman@fws.gov
www.fws.gov/chesapeakebay

Foster, Joyce

From: Norman, Janet <janet_norman@fws.gov>
Sent: Thursday, June 20, 2019 11:18 AM
To: Foster, Joyce
Cc: Jody Smet
Subject: Re: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation done

Terrific, thank you Joyce.

I appreciate the follow up information.

Janet

On Thu, Jun 20, 2019 at 8:48 AM Foster, Joyce <JFoster@trccompanies.com> wrote:

> Janet,
>
> As follow-up to our conversation related to the Lake Lynn Project FERC relicensing, I will send you the Shapefile for the Project that we used for the IPaC unofficial resource/species list as soon as it is available, hopefully later today. Our GIS staff is currently correcting an

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Jody J. Smet, AICP

Director, FERC Licensing and Compliance

(O) 804-739-0654

(C) 804-382-1764

jsmet@cubehydro.com

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Joyce Foster

TRC

804-769-1667 (office)

804-338-5110 (cell)

jfoster@trccompanies.com

We are looking forward to working with you.

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009

T 804.769.1667 | **C** 804.338.5110

LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

Begin forwarded message:

From: "Norman, Janet" <janet_norman@fws.gov>
Date: June 19, 2019 at 6:06:25 PM GMT+2
To: <jsmet@cubehydro.com>
Subject: Ipac consultation done?

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Janet

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Janet Norman

Biologist

U.S. Fish and Wildlife Service

Chesapeake Bay Field Office

177 Admiral Cochrane Dr.

Annapolis, MD 21401

Office: 410-573-4533

Fax: 410-269-0832

Janet_Norman@fws.gov

www.fws.gov/chesapeakebay

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Janet Norman
Biologist
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177 Admiral Cochrane Dr.
Annapolis, MD 21401
Office: 410-573-4533
Fax: 410-269-0832
Janet_Norman@fws.gov
www.fws.gov/chesapeakebay

Foster, Joyce

From: Blair, Michelle A.
Sent: Thursday, June 20, 2019 1:58 PM
To: Foster, Joyce; jsmet@cubehydro.com
Subject: FW: [External] REMINDER: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

From: Smiles, Heather A <hsmiles@pa.gov>
Sent: Thursday, June 20, 2019 1:52 PM
To: Blair, Michelle A. <mblair@trccompanies.com>
Subject: RE: [External] REMINDER: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Michelle,

The PFBC agrees with the use of the Traditional Licensing Process (TLP) for the relicensing of the Lake Lynn Hydroelectric Project. Additionally, the PFBC has been involved in the review of biological monitoring information and has had opportunities to provide comments on future monitoring. Therefore, the PFBC does not have any additional information requests at this time.

Thanks in advance,

Heather A. Smiles | Chief, Division of Environmental Services
PA Fish and Boat Commission
595 East Rolling Ridge Drive | Bellefonte, PA 16823
Phone: 814.359.5194
Email: hsmiles@pa.gov
www.fishandboat.com

From: Blair, Michelle A. <mblair@trccompanies.com>
Sent: Wednesday, June 12, 2019 9:53 AM
To: Absentee-Shawnee Tribe of Oklahoma <106NAGPRA@astribe.com>; Amanda Pitzer

<amanda@cheat.org>; Anita Carter <greystone.poa@hotmail.com>; Betty Wiley <betty.w304@gmail.com>; Bob Irvin <birvin@americanrivers.org>; Bonney Hartley <bonney.hartley@mohican-nsn.gov>; Brett Barnes <bbarnes@estoo.net>; Brian Bridgewater <Brian.L.Bridgewater@wv.gov>; Brice Obermeyer <bobermeyer@delawaretribe.org>; Bryan Printup <bprintup@hetf.org>; Cassie Harper <cassie@shawnee-tribe.com>; Clint Halftown <clint.halftown@gmail.com>; Colleen McNally-Murphy <colleen@hydroreform.org>; Coopers Rock State Forest <coopersrocksf@wv.gov>; Cosmo Servidio <cosmo.servidio@epa.gov>; Curtis Schreffler <clschref@usgs.gov>; Dana Kelly <dkelly@delawarenation.com>; Danny Bennett <Danny.A.Bennett@wv.gov>; Darren Bonaparte <darren.bonaparte@srmt-nsn.gov>; David Wellman <David.I.Wellman@wv.gov>; Delaware Nation, Oklahoma <ec@delawarenation.com>; Delaware Tribe of Indians <cbrooks@delawaretribe.org>; Duane Nichols <duane330@aol.com>; Eastern Shawnee Tribe of Oklahoma

<estochief@hotmail.com>; Edgewater Marina <edgewater@cheatlakedocks.com>; Ella Belling <ella@montrails.org>; Smiles, Heather A <hsmiles@pa.gov>; Jacob Harrell <Jacob.D.Harrell@wv.gov>; jay.toth@sni.org; Jesse Bergevin <jbergevin@oneida-nation.org>; John Spain <john.spain@ferc.gov>; Kevin Colburn <kevin@americanwhitewater.org>; Kevin Mendik <Kevin_Mendik@nps.gov>; Laura Misita <lmisita@oneida-nation.org>; Megan Gottlieb <Megan.K.Gottlieb@usace.army.mil>; Mike Strager <mstrager@gmail.com>; Oneida Indian Nation <info@oneida-nation.org>; Oneida Tribe of Indians of Wisconsin <cwilliam@oneidanation.org>; Onondaga Nation <admin@onondaganation.org>; Rennetta McClure <rmcclure@moncommission.com>; Richard McCorkle <richard_mccorkle@fws.gov>; Sean P McDermott <Sean.McDermott@noaa.gov>; Shannon Holsey <shannon.holsey@mohican-nsn.gov>; Shaun Wicklein <smwickle@usgs.gov>; Steve Moyer <steve_moyer@tu.org>; Steve Moyer (smoyer@tu.org) <smoyer@tu.org>; Stuart Welsh <swelsh@wvu.edu>; Sunset Beach

Marina <info@sunsetbeach-marina.com>; Susan Bachor <sbachor@delawaretribe.org>; Susan Pierce <susan.m.pierce@wv.gov>; Tonawanda Band of Seneca <tonseneca@aol.com>; Tonya Tipton <tonya@shawnee-tribe.com>; Vincent Vicites <vvicites@fayettepa.org>; William Fisher <wfisher@sctribe.com>; William Tarrant <wtarrant@sctribe.com>
Cc: jsmet@cubehydro.com; Foster, Joyce <JFoster@trccompanies.com>
Subject: [External] REMINDER: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)
Importance: High

ATTENTION: *This email message is from an external sender. Do not open links or attachments from unknown sources. To report suspicious email, forward the message as an attachment to CWOPA_SPAM@pa.gov.*

Good morning -

Attached is an Information Request for the Pre-Application Document for the FERC relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459).

As a reminder, please provide your comments within 30 days of this letter (by June 20). If you have any questions regarding this request please contact Jody Smet at jsmet@cubehydro.com or Joyce Foster at jfoster@trccompanies.com.

Thank you,
Michelle

Michelle Blair
Project Coordinator

14 Gabriel Drive, Augusta, ME 04330
T 207.620.3845 | **F** 207.621.8226 | mblair@trccompanies.com
LinkedIn | Twitter | Blog | TRCcompanies.com

Foster, Joyce

From: Michael Strager <mstrager@wvu.edu>
Sent: Thursday, June 20, 2019 2:23 PM
To: Blair, Michelle A.
Cc: Jody Smet; Foster, Joyce; Duane Nichols
Subject: RE: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)
Attachments: Notes from CLEAR for Cube Hydro FERC license 6-20-19.docx

Hi Michelle,

Thanks for the invitation to submit information for the PAD.

Attached is the submission from myself and Duane Nicholas who represent the Cheat Lake Environment and Area Recreation (CLEAR).

Mike Strager
102 Lake Pointe
Morgantown, WV 26508
mstrager@gmail.com
304-276-3334

From: Blair, Michelle A. [mailto:mblair@trccompanies.com]
Sent: Monday, May 20, 2019 3:06 PM
To: Absentee-Shawnee Tribe of Oklahoma <106NAGPRA@astribe.com>; Amanda Pitzer <amanda@cheat.org>; Anita Carter <greystone.poa@hotmail.com>; Betty Wiley <betty.w304@gmail.com>; Bob Irvin <birvin@americanrivers.org>; Bonney Hartley <bonney.hartley@mohican-nsn.gov>; Brett Barnes <bbarnes@estoo.net>; Brian Bridgewater <Brian.L.Bridgewater@wv.gov>; Brice Obermeyer <bobermeyer@delawaretribe.org>; Bryan Printup <bprintup@hetf.org>; Cassie Harper <cassie@shawnee-tribe.com>; Clint Halftown <clint.halftown@gmail.com>; Colleen McNally-Murphy <colleen@hydroreform.org>; Coopers Rock State Forest <coopersrocksf@wv.gov>; Cosmo Servidio <cosmo.servidio@epa.gov>; Curtis Schreffler <clschref@usgs.gov>; Dana Kelly <dkelly@delawarenation.com>; Danny Bennett <Danny.A.Bennett@wv.gov>; Darren Bonaparte <darren.bonaparte@srmt-nsn.gov>; David

Wellman <David.I.Wellman@wv.gov>; Delaware Nation, Oklahoma <ec@delawarenation.com>; Delaware Tribe of Indians <cbrooks@delawaretribe.org>; Duane Nichols <duane330@aol.com>; Eastern Shawnee Tribe of Oklahoma <estochief@hotmail.com>; Edgewater Marina <edgewater@cheatlakedocks.com>; Ella Belling <ella@montrails.org>; Heather Smiles <hsmiles@pa.gov>; Jacob Harrell <Jacob.D.Harrell@wv.gov>; Jay Toth <jay.toth@sni.org>; Jesse Bergevin <jbergevin@oneida-nation.org>; John Spain <john.spain@ferc.gov>; Kevin Colburn <kevin@americanwhitewater.org>; Kevin Mendik <Kevin_Mendik@nps.gov>; Laura Misita <lmisita@oneida-nation.org>; Megan Gottlieb <Megan.K.Gottlieb@usace.army.mil>; Mike Strager <mstrager@gmail.com>; Oneida Indian Nation <info@oneida-nation.org>; Oneida Tribe of Indians of Wisconsin <cwilliam@oneidanation.org>; Onondaga Nation <admin@onondaganation.org>; Rennetta McClure <rmcclure@moncommission.com>; Richard McCorkle <richard_mccorkle@fws.gov>; Sean P McDermott

<Sean.McDermott@noaa.gov>; Shannon Holsey <shannon.holsey@mohican-nsn.gov>; Shaun Wicklein <smwickle@usgs.gov>; Steve Moyer <steve_moyer@tu.org>; Steve Moyer (smoyer@tu.org) <smoyer@tu.org>; Stuart Welsh <swelsh@wvu.edu>; Sunset Beach Marina <info@sunsetbeach-marina.com>; Susan Bachor <sbachor@delawaretribe.org>; Susan Pierce <susan.m.pierce@wv.gov>; Tonawanda Band of Seneca <tonseneca@aol.com>; Tonya Tipton <tonya@shawnee-tribe.com>; Vincent Vicites <vvicites@fayettepa.org>; William Fisher <wfisher@sctribe.com>; William Tarrant <wtarrant@sctribe.com>
Cc: jsmet@cubehydro.com; Foster, Joyce <JFoster@trccompanies.com>
Subject: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

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Thank you,
Michelle

Michelle Blair
Project Coordinator

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Prepared Input for the Pre-Application Document for the Lake Lynn Hydroelectric Project

June 20, 2019

Submitted by:

Mike Strager – Vice President, Cheat Lake Environment and Area Recreation, 102 Lake Pointe, Morgantown, W 26508, mstrager@gmail.com, 304-276-3334

Duane Nichols – President, Cheat Lake Environment and Area Recreation, 330 Dream Catcher Circle, Morgantown, WV 26508, duane330@aol.com, 304-599-8040

This document highlights issues noted by the Cheat Lake Environment and Area Recreation (CLEAR). CLEAR has been active since 1994 promoting recreational and environmental improvements for Monongalia County's largest open-water resource. We appreciate the opportunity to provide our input for Cube Hydro to address in the relicensing process of the Lake Lynn Hydroelectric Project (FERC No. 2459).

Issues of Concern and Recommendations:

ISSUE #1:
A 2017 Carrying Capacity Study for Cheat Lake, WV was completed for Cube Hydro and concluded that there were a total of 1,226 boats moored on docks at Cheat Lake. This includes the four marinas and 204 private docks. In addition, to these boats on the lake, the Sunset Beach Marina has a public boat ramp which was surveyed throughout the summer of 2017 and found an average of 69 boats brought to the lake for use on a typical summer weekend day.

The traditional approach to calculate a boating carrying capacity for lakes is from published literature in the outdoor recreation, parks and conservation, and National Park Service Literature as well as EPA Environmental Impact Statements and lake management planning. The boating carrying capacity for Cheat Lake focused on the safety carrying capacity of the lake. The carrying capacity based on safety is derived from the traditional "space standards" approach for assessing boating carrying capacity (Bureau of Outdoor Recreation 1970). This approach specifies the amount of space needed for safe boat operation (expressed in acres of surface area per boat, or acres per boat). The National Park Service has adopted a range of 9 to 18 acres per boat as a guideline for safe boating on open water (NPS 1987). Considering the steep topography which creates narrow lines of sight, two bridges, and the fact that Cheat Lake is on average less than a quarter mile wide (measured from 30 random transects), the most restrictive 18 acres per boat could be justifiably used in the study.

The total boat-able or navigable acres of water for Cheat Lake is 1,598 acres (calculated with a Geographic Information Systems and 1:4,800 scale hydrography). According to this factor, the boating capacity of Cheat Lake maxes out at 88 boats in use at one time using the 18 acres per boat ratio or 177 boats using the less restrictive 9 acres per boat use area. These numbers are simply found for boating capacity by dividing the number of water surface acres by the "acres per boat" standard.

Based on the observed total of 291 boats in use on August 13, 2017 (a typical summer boating weekend day), the lake was greatly over its carry capacity and was therefore a safety issue. In addition, the total number of boats moored at the lake plus and average of 69 trailered on a warm summer weekend day only requires 13.6 % of boats to be in use before the 177 boat carrying capacity is reached.

RECOMMENDATION:
The reason the number of boats used in operation is important is because it directly impacts safety on the lake. Too many permitted boat docks create potentially dangerous situations especially when the lake is unlimited horsepower and without speed limits. While the WV Division of Natural Resources Office of Enforcement monitors the lake for safe operation, their job becomes much more difficult with an unsafe number of boats are permitted for use on the lake by Cube Hydro. Since Cube Hydro is responsible for boat dock permits at both marinas and personal access sites around the lake it is strongly suggested Cube Hydro does not allow any more permits and keeps this policy into the future. Yearly inspections and surveys are also recommended to insure the number of boats moored at the lake are all permitted ones. Another possible suggestion is to charge out of state boaters a higher use fee to operate at the lake.

ISSUE #2:
Many of the marinas and private docks on Cheat Lake randomly place buoys at varying distances from the end of their docks. These buoys are not consistent around the lake and therefore are not taken seriously by boaters and can cause issues regarding right of ways and safe travel at the lake.

RECOMMENDATION:
Cube Hydro should contact the marinas and private dock owners to let them know all buoys should extend 100 feet from the end of the dock to be consistent with US Army Corps of Engineers national waterway policy and guidelines.

ISSUE #3:
The Cheat Lake Beach needs new sand to maintain a quality beach for the community. The last two years sand has been added that was not sufficient enough for coverage and was also the wrong type. The sand chosen was too fine and ended up washing into the lake.

RECOMMENDATION:
After research at six local lake beaches in our area, it is suggested to buy <u>concrete sand</u> for our beach. This sand is lighter in color and coarser than previously applied. This sand applied at Jennings Randolph lake has lasted the past 3 years on a slope that is much steeper than our beach. Note the picture to the right. Because this sand is coarser it does not wash away and doesn't cloud the water once in the lake. This will save Cube Hydro in the long run with less maintenance and applications.

The sand can be purchased from Fairfax Materials, Inc in Oakland Maryland. A quote and information for them is listed below. It is old so a new quote from them would be necessary.

FAIRFAX MATERIALS, INC.
8490 GARRETT HIGHWAY
OAKLAND, MARYLAND 21550

Central Dispatch: (301) 334-8101 (800) 325-8663
Sales - Oakland: (301) 334-8184 / Scherr: (304) 749-8889
Sales Fax - Oakland: (301) 334-9381 / Scherr: (304) 749-8988

QUOTATION - Page 1 of 1

C.O.D. SALES [CASH]
N/A

Quoted: 06/01/2016
Firm Date: 12/31/2016

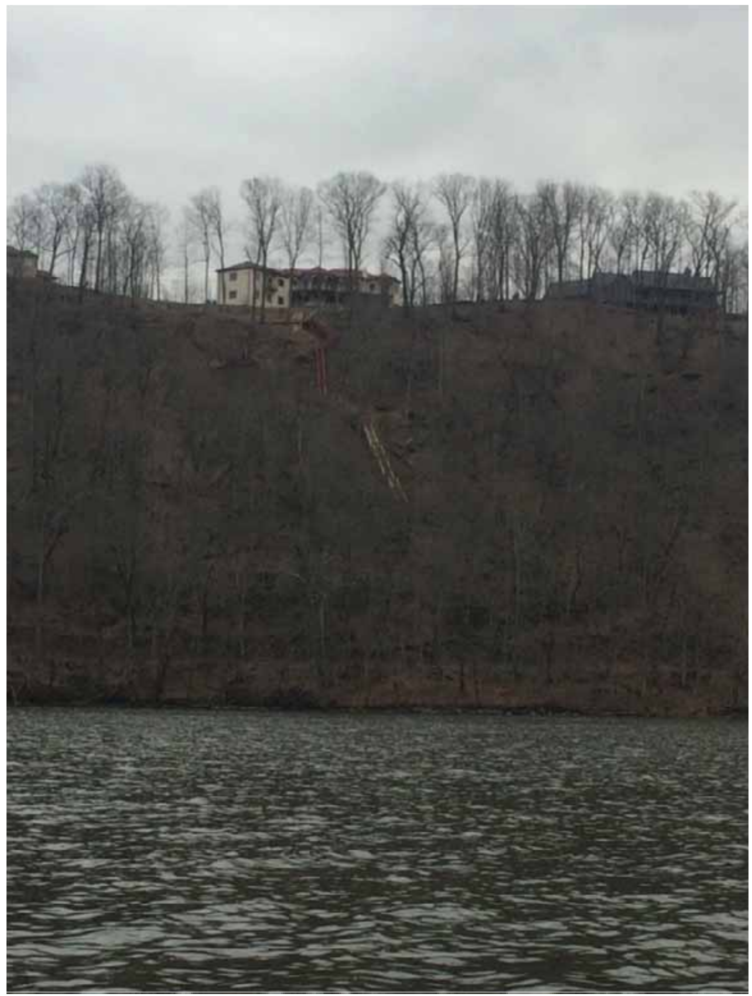
Attention: MIKE

Project: CHEAT LAKE BEACH SAND [CHELAK]
CUSTOMER NOT ON FILE - COD SALE ONLY.

Plant	Product Description	Est. Qty.	Mat'l FOB Plant	Freight	Total	
THOMAS QUARRY	CONCRETE SAND (SS)	100.00	$18.90	$12.70	$31.60	Per Ton
THOMAS QUARRY	FUEL SURCHG-DELIV	0.00	$0.00	$0.00	$0.00	Per Ton
THOMAS QUARRY	TAILGATED/SPREADER BOX	0.00	$40.00	$0.00	$40.00	Per Load

ISSUE #4:
Large woody debris on the shoreline of the Cheat Lake Beach at the Cheat Lake Park and Trail is unsightly and potentially dangerous for swimmers and small children.

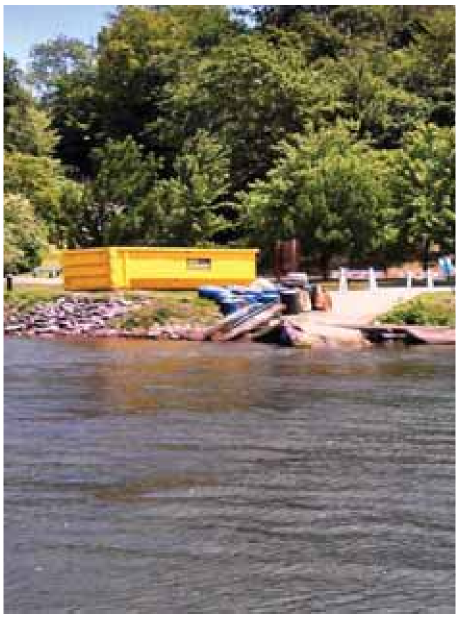
RECOMMENDATION:
The maintenance crew or contracted group needs to remove the large wood that floats to the beach at least every Friday during the summer.

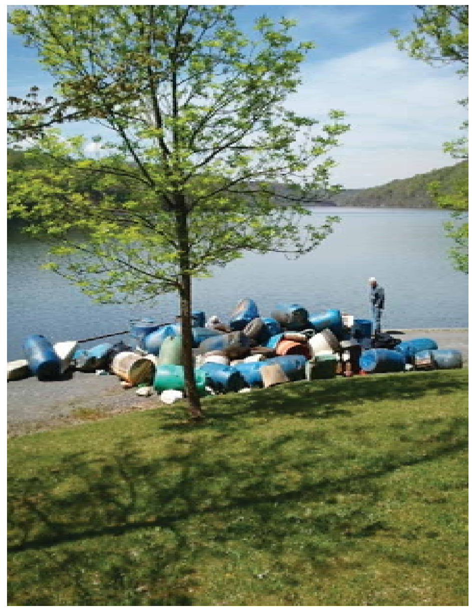


ISSUE #5:
Rail trail closings result from slides that occur along the trail in both directions from the Cheat Lake Park. This is a function of the steep terrain and impacts to the land cover. However, many land owners that believe they own the land down to the rail trail have illegally cleared the natural vegetation and increased the chance of land slides. The picture to the right is of a house building a path and steps down to the rail trail. This house is in the Falling Water development just upstream from the swimming beach location.

RECOMMENDATION:
Cube Hydro needs to inform all adjacent land owners to the Cheat Lake Park and Trail to avoid trespassing and disturbing any of the natural vegetation or elevation to the rail trail. In addition, a shoreline management plan should be implemented to reduce erosion and unsightly development along the riparian area of the lake. It could be recommended that all trees 12in in diameter or larger be preserved for stability and aesthetics of the shoreline riparian area.

ISSUE #6:
For the past 6 years the CLEAR organization has volunteered its time to clean up the lake from large debris that poses boating hazards as well as is aesthetically unpleasant. The pictures show the amount and types of debri that CLEAR has picked up using a work boat that own in an annual sweep of the lake. Some years these cleanups have occurred multiple times. This work is necessary to keep Cheat Lake cleaner and safer.

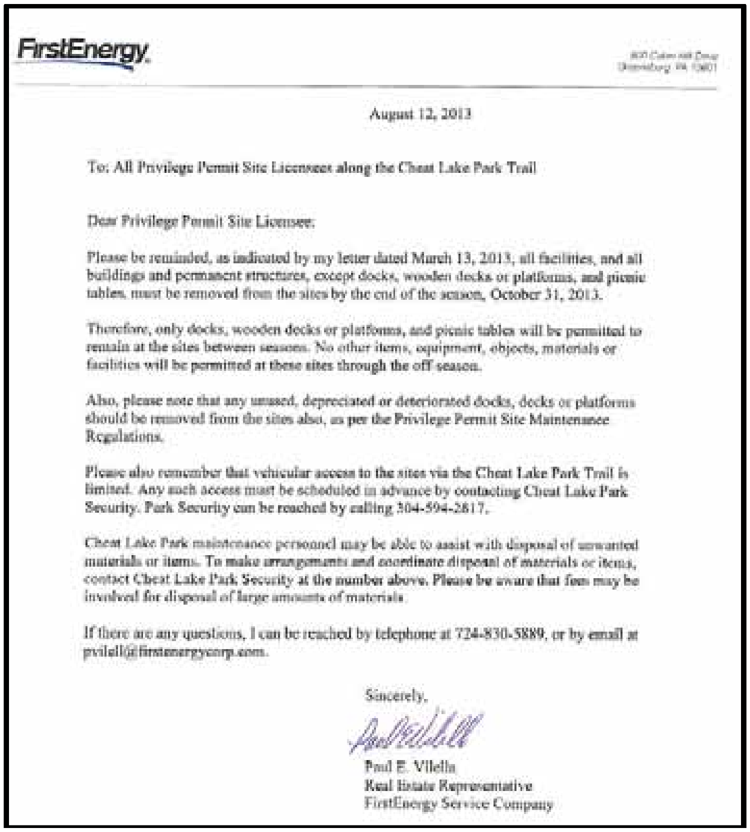




RECOMMENDATION:
CLEAR plans to continue with these annual clean ups and would like Cube Hydro to cooperate by disposing of the trash we collect from the lake. In years past we have collected the debris and deposited it at the winter boat ramp for hauling. Some years there has been a large dumpster placed at this location to help in the removal.

ISSUE #7

In August of 2013, the Operating Company at Cheat Lake sent the letter below to all permit site licensees along the Cheat Lake Park Trail. It required leases to remove all permanent structures that were not docks from the leased areas. To this date, there remains many sites that have not been cleaned up and that continue to be use for overnight camping which is not allowed. Many of the sites are as shown in the pictures below are on Cube Hydro property illegally.



FirstEnergy

August 12, 2013

To: All Privilege Permit Site Licensees along the Cheat Lake Park Trail

Dear Privilege Permit Site Licensee:

Please be reminded, as indicated by my letter dated March 13, 2013, all facilities, and all buildings and permanent structures, except docks, wooden decks or platforms, and picnic tables, must be removed from the sites by the end of the season, October 31, 2013.

Therefore, only docks, wooden decks or platforms, and picnic tables will be permitted to remain at the sites between seasons. No other items, equipment, objects, materials or facilities will be permitted at these sites through the off season.

Also, please note that any unused, depreciated or deteriorated docks, decks or platforms should be removed from the sites also, as per the Privilege Permit Site Maintenance Regulations.

Please also remember that vehicular access to the sites via the Cheat Lake Park Trail is limited. Any such access must be scheduled in advance by contacting Cheat Lake Park Security. Park Security can be reached by calling 304-594-2817.

Cheat Lake Park maintenance personnel may be able to assist with disposal of unwanted materials or items. To make arrangements and coordinate disposal of materials or items, contact Cheat Lake Park Security at the number above. Please be aware that fees may be involved for disposal of large amounts of materials.

If there are any questions, I can be reached by telephone at 724-830-5889, or by email at pvilell@firstenergycorp.com.

Sincerely,

Paul E. Vilella
Real Estate Representative
FirstEnergy Service Company

RECOMMENDATION:

The sites along the rail trail need to be cleaned up and restored to original condition and the sites being used at random locations around the lake should be cleaned up and vacated.

Foster, Joyce

From: Duane Nichols <duane330@aol.com>
Sent: Thursday, June 20, 2019 3:39 PM
To: jsmet@cubehydro.com; Foster, Joyce
Cc: duane330@aol.com
Subject: CLEAR - Nichols - Lake Lynn 2459 - June 20, 2019
Attachments: Submission of CLEAR -Prelicense Document- 6-20-19.docx

Submission of Cheat Lake Environment & Recreation Association, 330 Dream Catcher Circle, Morgantown, WV 26508. Duane Nichols, President; Michael Strager, Vice President, Ann Chester, Secretary, Donna Weems, Treasurer. June 20, 2019

RE: Relicensing Process for Lake Lynn Hydroelectric Project (FERC No. 2459).

The following essential topics are requested to become part of the relicensing of the Lake Lynn Project and then incorporated into the operation and maintenance of the facility and surroundings.

1. Memorandum of Understanding (MOU) on Recreation, Safety & Security is needed with other local entities, viz. Monongahela County (Chestnut Ridge County Camp), West Virginia University (WVU Research Forest), WV Division of Natural Resources (Coopers Rock State Forest), WV Division of Natural Resources (fishing facilities, fishing regulation, fish research w/ WVU), et al.

2. Cheat Lake Park & Trail: Operation of Trail (security per MOU, security gate, year-round trail availability, rest-room availability), Maintenance of trail (trail surface, erosion, subsidence, tree removal), Signage (install & maintain signage on WV 857 for Park & Trail, maintain or improve current signage), Extension of Trail (integrate with Sheepskin Trail in Pennsylvania, integrate with slate dump at south end via construction of natural science destination)

3. Cheat Lake Swimming Beach (sand selection & supply, limit rip-rap, safety & security per MOU, extend swimming beach and/or picnic area to day-use boat docks, remove woody debris from beach shoreline and new picnic area), Establish separate dog swimming area and disallow dogs at children's beach)

4. Cheat Lake Boat Docks & Boating Activities (prepare & distribute guidebook on dock leasing & dock maintenance, publicize name & contact detail for information officer, establish

limitation on number of boats, boat horsepower, boat noise level, boat speed). Note: State Law can prevail.

5. Local Annual Update/Briefing on Lake Lynn Operations & Challenges w/ Q&A (public meeting at Cheat Lake Fire Hall, for example)

6. Lake Lynn Dam & Related Issues (Publicize statement on integrity of dam built ca. 1927, do not permit water withdraw activities from Lake, do not permit horizontal drilling near or under Lake, do not permit underground storage of hydrocarbons near or under Lake.

7. Lake Lynn Advisory Council on Recreation, Safety & Security (establish advisory council to include representatives of County, State and Federal agencies as well as voluntary local group(s).

Submitted by Duane Nichols, President, CLEAR, 330 Dream Catcher Circle, Morgantown, WV 26508. 304-599-8040. WV Day: June 20, 2019.

Submission of Cheat Lake Environment & Recreation Association, 330 Dream Catcher Circle, Morgantown, WV 26508.   Duane Nichols, President; Michael Strager, Vice President, Ann Chester, Secretary, Donna Weems, Treasurer. June 20, 2019

RE: Relicensing Process for Lake Lynn Hydroelectric Project (FERC No. 2459).

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7. Lake Lynn Advisory Council on Recreation, Safety & Security (establish advisory council to include representatives of County, State and Federal agencies as well as voluntary local group(s).

Submitted by Duane Nichols, President, CLEAR, 330 Dream Catcher Circle, Morgantown, WV 26508. 304-599-8040. WV Day: June 20, 2019.

Foster, Joyce

From: Stratford Douglas <stratdouglas@gmail.com>
Sent: Thursday, June 20, 2019 4:37 PM
To: Foster, Joyce; jsmet@cubehydro.com
Cc: Charlie Walbridge; Kevin Colburn; Garrett Thompson; Amanda Pitzer
Subject: Proposed Recreational Enhancement, Lake Lynn Relicensing
Attachments: BuzzardRunCheatLakeAccessProposal.docx

Dear Ms Foster and Ms. Smet:

Attached you'll find a proposal for a recreational enhancement that I would like to see in included in the PAD and comments in the Traditional Licensing Process for the Lake Lynn Hydroelectric Project, P-2459.
Thanks for your consideration.

Stratford Douglas
1024 Snake Hill Road
Morgantown, WV 26508
724-605-5329

PS, here is a text version that does not rely on the figures found in the MS-Word version.

The upper end of the Cheat Lake (Lake Lynn) reservoir is remote and beautiful, and difficult to access from the shore. There is an unimproved dirt road (currently gated) on state-owned public land (Snake Hill Wildlife Management Area) that could provide access to a point roughly 3 kilometers south (upstream) of any access point to the lake. The proposed access point is a level area of approximately 6 acres on the shoreline.

By improving this access road and adding a small parking lot, the Lake Lynn licensee could add significant recreational opportunity for fishermen to access quiet and remote areas. It would also make it much more feasible for boaters to access 3.8 miles of remote, wild, and easy (class II) white water in the Lower Cheat Canyon, a section that is rarely run at present because of access difficulties.

Whitewater Access Value. Class II whitewater is suitable for novice kayakers, canoeists, and

stand-up paddleboards (SUPs). The Lower Cheat consists of 3.8 miles of Class II whitewater located adjacent to the Morgantown metropolitan area, situated in a wild and remote-feeling 1200 foot deep canyon. The Lower Cheat Canyon is rarely run at present, primarily because of the 4.5 mile flat water paddle across Cheat Lake to the nearest public take-out point.
The proposed recreational enhancement at Buzzard Run Road would shorten the flat water paddle to the take-out from 4.5 miles to 1.9 miles, which will make the whitewater trip much more attractive.

Fishing Access Value. Fishermen wishing to reach the upper section of Cheat Lake currently must do so by boat. The proposed access improvement would allow fishermen to use the area near the parking lot, and it would also allow them access to an existing trail on public land that follows the course of the Cheat River from the end of Buzzard Run Road to approximately 6 miles to the next access point upstream at Jenkinsburg in Preston County.

The Proposed Project. We propose improvements to an existing one-lane road (“Buzzard Run Road”), 1.4 miles long, moderately sloped, and easily accessible by SUV, that connects the proposed take-out to Snake Hill Road. Buzzard Run Road forms the border of the Snake Hill Wildlife Management Area for much of its length. (Google Maps incorrectly shows it following Buzzard Run to the lake; in fact it reaches the lake at the mouth of an unnamed stream farther south.)

We propose improving the existing Buzzard Run Road by adding proper drainage, gravel and, where possible, one or two turnouts to allow for light two-way traffic. In addition, we propose development of a small parking lot in the six-acre flat lakeside area at the bottom of this existing road. For boating access we propose a concrete ramp near the mouth of the

unnamed tributary. It may be appropriate to add a fishing pier as well.

It may be of interest to note that this very same improvement was proposed by Allegheny Power in a public meeting concerning previous relicensing proceeding, in 1999. At that time it was proposed as an alternative to the Cheat Lake Trail that was subsequently built at the park at Morgan Run. We believe that the time for this project has come.

Stratford Douglas:
Friends of the Cheat (Board Member and Treasurer)
American Whitewater (Lifetime Member)

Recreational Access to Upper Cheat Lake through Buzzard Run Road Improvements

The upper end of the Cheat Lake (Lake Lynn) reservoir is remote and beautiful, and difficult to access from the shore. There is an unimproved dirt road (currently gated) on state-owned public land (Snake Hill Wildlife Management Area) that could provide access to a point roughly 3 kilometers south (upstream) of any access point to the lake. The proposed access point is a level area of approximately 6 acres on the shoreline.

By improving this access road and adding a small parking lot, the Lake Lynn licensee could add significant recreational opportunity for fishermen to access quiet and remote areas. It would also make it much more feasible for boaters to access 3.8 miles of remote, wild, and easy (class II) white water in the Lower Cheat Canyon, a section that is rarely run at present because of access difficulties.

Whitewater Access Value. Class II whitewater is suitable for novice kayakers, canoeists, and stand-up paddleboards (SUPs). The Lower Cheat consists of 3.8 miles of Class II whitewater located adjacent to the Morgantown metropolitan area, situated in the 1200 foot deep canyon shown in the picture at right. The Lower Cheat Canyon is rarely run at present, primarily because of the 4.5 mile flat water paddle across Cheat Lake to the nearest public take-out point.

The proposed recreational enhancement at Buzzard Run Road would shorten the flat water paddle to the take-out from 4.5 miles to 1.9 miles, which will make the whitewater trip much more attractive.

Fishing Access Value. Fishermen wishing to reach the upper section of Cheat Lake currently must do so by boat. The proposed access improvement would allow fishermen to use the area near the parking lot, and it would also allow them access to an existing trail on public land that follows the course of the Cheat River from the end of Buzzard Run Road to approximately 6 miles to the next access point upstream at Jenkinsburg in Preston County.

The Proposed Project. We propose improvements to an existing one-lane road ("Buzzard Run Road"), 1.4 miles long, moderately sloped, and easily accessible by SUV, that connects the proposed take-out to Snake Hill Road. Buzzard Run Road follows approximately the route shown in black on the map. It forms the border of the Snake Hill Wildlife Management Area for much of its length. (Google Maps incorrectly shows it following Buzzard Run to the lake; in fact it reaches the lake at the mouth of an unnamed stream farther south.)

We propose improving the existing Buzzard Run Road by adding proper drainage, gravel and, where possible, one or two turnouts to allow for light two-way traffic. In addition, we propose development of a small parking lot in the six-acre flat lakeside area at the bottom of this existing road. For boating access we propose a concrete ramp near the mouth of the unnamed tributary. It may be appropriate to add a fishing pier as well.

It may be of interest to note that this very same improvement was ***proposed by Allegheny Power*** in a public meeting concerning previous relicensing proceeding, in 1999. At that time it was proposed as an alternative to the Cheat Lake Trail that was subsequently built at the park at Morgan Run. We believe that the time for this project has come.

Stratford Douglas
1024 Snake Hill Road
Morgantown, WV 26508
stratdouglas@gmail.com
724-605-5329

Friends of the Cheat (Board Member, Treasurer)
American Whitewater (Lifetime Member)

Stratford Douglas, Morgantown, WV.
The upper end of the Cheat Lake (Lake Lynn) reservoir is remote and beautiful, and difficult to access from the shore. There is an unimproved dirt road (currently gated) on state-owned public land (Snake Hill Wildlife Management Area) that could provide access to a point roughly 3 kilometers south (upstream) of any access point to the lake. The proposed access point is a level area of approximately 6 acres on the shoreline.

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It may be of interest to note that this very same improvement was proposed by Allegheny Power in a public meeting concerning previous relicensing proceeding, in 1999. At that time it was proposed as an alternative to the Cheat Lake Trail that was subsequently built at the park at Morgan Run. We believe that the time for this project has come.

Stratford Douglas:
Friends of the Cheat (Board Member and Treasurer)
American Whitewater (Lifetime Member)
Attachments area

Document Content(s)

Foster, Joyce

From: Garrett Thompson <gthompson@cheat.org>
Sent: Thursday, June 20, 2019 11:01 PM
To: jsmet@cubehydro.com; Foster, Joyce
Cc: Amanda Pitzer; Stratford Douglas
Subject: Friends of the Cheat - Comments on Lake Lynn Re-licensing
Attachments: FOC_Comments_P-2459-005.docx

Dear Ms. Smet and Ms. Foster,

Attached you'll find a letter I submitted via the FERC e-filing system, on behalf of Friends of the Cheat, commenting on opportunities for recreational enhancement to be considered during the re-licensing of the Lake Lynn Hydroelectric Project, docket # P-2459-005. Thank you for your consideration.

Sincerely,

Garrett Thompson
Recreation and Lands Manager, Friends of the Cheat
1343 N. Preston Hwy, Kingwood WV, 26537

Friends of the Cheat
1343 North Preston Highway | Kingwood, West Virginia 26537 | (304) 329-3621

June 20, 2019

RE: *Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. P-2459-005)*

Dear Ms. Foster and Ms. Smet,

On behalf of Friends of the Cheat, I'd like to start by thanking you for the opportunity to submit comments to be included as part of the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project.

For 25 years, Friends of the Cheat (FOC) and our River of Promise (ROP) partners have worked diligently to restore water quality to the Cheat River and Cheat Lake through reclamation of mine lands and the remediation of acid mine drainage (AMD). Irresponsible mining had left the Cheat and nine of its lower tributaries severely damaged by AMD. Walleye were extirpated by the late 1940s. Historic data collected by WV Division of Natural Resources (DNR) show mean lake pH levels less than 5 between the 1950s and early 1990s. A few pollution tolerant fish species including bullhead catfish and white suckers sought refuge in the lake's sheltered embayments. Massive pollution releases from the T&T mine into Muddy Creek in 1994 and 1995 dropped the pH of the lake to 4. As a result, the Cheat River was named one of America's Most Endangered Rivers in 1995 by the national organization American Rivers. These events catalyzed the formation of Friends of the Cheat and the River of Promise task force.

The efforts of FOC and our ROP partners, most notably the US Office of Surface Mining (OSM) and WV Department of Environmental Protection (DEP), have restored water quality to the Cheat River main stem and Cheat Lake. Over 200 land reclamation and water treatment projects have been implemented with millions of dollars of funds resulting in millions of pounds of AMD pollution removed from the Cheat's tributaries. The river and lake have not seen a pH depression below 6 since 2011 and the main stem has been removed from the state's list of impaired waters for pH impairment. The removal of iron (ferrous hydroxide or "yellow boy") as well as aluminum and manganese is visibly noticeable by reduced staining of rocks near the water's edge as well as armoring of fiberglass boat bottoms, which was a prevalent problem through the '90s.

Improved water quality has fostered the rebound of Cheat Lake's fishery. DNR reports a dramatic recovery of species richness (27-34 species per year) including abundant sportfish such as largemouth and smallmouth bass, yellow perch, and walleye. Fishing tournaments now attract anglers from across the country which benefits the local economy. FOC is particularly excited about the walleye, which research shows are spawning up into the northern reaches of the Cheat Canyon.

With a drainage area of roughly 1400 square miles all flowing down to Cheat Lake, not only does the Cheat River constitute a critical piece of the region's ecosystem, it is also home to a large human population that lives, works and plays within the drainage. Friends of the Cheat recognizes that opportunities to recreate and connect with nature and the outdoors can not only improve the quality of life for a region's citizens, but it also leads to the engagement with and appreciation of our resources that can help prevent them from being squandered and abused. Cheat Lake and the surrounding area already

Friends of the Cheat

Friends of the Cheat
1343 North Preston Highway | Kingwood, West Virginia 26537 | (304) 329-3621

provides a plethora of outdoor activities; including paddling, boating, fishing, hiking, cycling, birding and more. Cube Hydro has already improved and created recreation opportunities around Cheat Lake. FOC and key partners have identified several opportunities for additional improvement of recreational opportunities that we believe should be considered as part of this next re-licensing process.

FOC is aware and supportive of the proposal to create a public access to the upper reaches of Cheat Lake by improving an existing gated road in Snake Hill Wildlife Management Area along Buzzard Run. This would provide another trailhead for hikers to enter the WMA, fishermen to access this upper section of the lake usually only reachable by boat, and would provide an egress opportunity for whitewater paddlers running the Lower Cheat Canyon. Despite being located in close proximity to the Cheat Lake and Morgantown metropolitan areas, and providing a wonderfully scenic and exciting float through class 2 rapids in a deep canyon, this section is infrequently paddled. This is mostly due to the 4.5 mile paddle across Cheat Lake to the nearest existing public access at the Ices Ferry bridge, which can be a laborious task in short maneuverable whitewater craft that are well suited for the rapids upstream, not to mention the danger of encounters with fast moving power boats. The creation of a new public access by improving Buzzard Run Road would shorten this flatwater paddle to 1.9 miles and thereby make this whitewater trip much more attractive.

Commented [A1]: Could also mention safety/power boats

Another opportunity for recreation enhancement in the Cheat Lake area would be to improve access and connectivity of both ends of the existing Cheat Lake Trail. Currently the trail follows the eastern shoreline of Cheat Lake for 4.4 miles and provides opportunities for walking, running, biking and fishing. The north end of the trail can be accessed via a trailhead and steep flight of stairs off of Morgan Run Road. The south end of the trail dead ends abruptly. With the future route of the Sheepskin Trail passing by just to the north, and local businesses, residential neighborhoods, and Coopers Rock State Forest to the south, there lies an opportunity to work towards increased connectivity of these trail system. By doing so, we can enhance the value of these isolated trail sections in such a way that their value becomes greater than the sum of their parts. We recommend that possibilities to extend the southern end of the Cheat Lake Trail, around the peninsula where it currently terminates, to a newly developed trailhead be thoroughly investigated, as well as the streamlining of the northern terminus to avoid the steep stairs and improve the connectivity to the future route of the Sheepskin Trail.

Thank you for this opportunity to comment on the upcoming relicensing of the Lake Lynn Hydroelectric Project.

Sincerely,

Garrett Thompson
Recreation & Lands Manager
Friends of the Cheat

Working to restore, preserve, and promote the outstanding natural qualities
of the Cheat River Watershed since 1994

Foster, Joyce

From: Jody Smet <jsmet@cubehydro.com>
Sent: Friday, June 21, 2019 1:59 PM
To: Foster, Joyce
Subject: Fwd: Cheat Lake trails

Begin forwarded message:

From: Dan Miller <DMiller@potesta.com>
Date: June 21, 2019 at 3:44:36 PM GMT+2
To: "jsmet@cubehydro.com" <jsmet@cubehydro.com>
Cc: Garrett Thompson <gthompson@cheat.org>
Subject: Cheat Lake trails

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Dear Cube Hydro,

I submitted a comment on the FERC web site about your permit renewal. Last year I met with David Fox during a meeting with Friends of the Cheat to discuss how local organizations can partner with Cube Hydro to enhance the recreational aspects of the lake. As a member of the Rotary Club of Cheat Lake we have a mutual interest in expanding the pedestrian trails to connect with other existing trails. I hope you will focus on this aspect of recreation and partner with the local groups who live and recreate around this beautiful resource.

Regards,
Dan

Daniel J. Miller, Ph.D.
Senior Scientist

Potesta & Associates, Inc.
125 Lakeview Drive
Morgantown, WV 26508

Office; 304-225-2245 ext.2005
Mobile: 681-285-8159
Fax: 304-225-2246
email: dmiller@potesta.com
www.potesta.com

and seal. If you have received this information in error, please notify the sender immediately.

Daniel Miller, Morgantown, WV.
I would like to see an extension of the pedestrian trail system especially from the dam to the Monongahela River, and along other areas to connect to other trails.

Document Content(s)

Foster, Joyce

From: Foster, Joyce
Sent: Tuesday, June 25, 2019 8:14 AM
To: Norman, Janet
Cc: Jody Smet
Subject: RE: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation
Attachments: Lake_Lynn_Project_Boundary_revised 6-24-2019.zip

Janet,

As follow-up to our communication last week, attached is the corrected Shapefile that we used to re-run the IPaC unofficial review for the Lake Lynn Project (FERC No. 2459. Please let us know if you have any questions or issues with the attachment.

Thanks,

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

From: Norman, Janet [mailto:janet_norman@fws.gov]
Sent: Thursday, June 20, 2019 11:18 AM
To: Foster, Joyce <JFoster@trccompanies.com>
Cc: Jody Smet <jsmet@cubehydro.com>
Subject: Re: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation done

Terrific, thank you Joyce.

I appreciate the follow up information.

Janet

On Thu, Jun 20, 2019 at 8:48 AM Foster, Joyce <JFoster@trccompanies.com> wrote:

> Janet,
>
> As follow-up to our conversation related to the Lake Lynn Project FERC relicensing, I will send you the Shapefile for the Project that we used for the IPaC unofficial resource/species list as soon as it is available, hopefully later today. Our GIS staff is currently correcting an error in the Project area polygon and we will rerun the IPaC unofficial review using this corrected Shapefile.

As we discussed, I am also sending you the contact information for Jody Smet, the Project Licensee:

Jody J. Smet, AICP

Director, FERC Licensing and Compliance

(O) 804-739-0654

(C) 804-382-1764

jsmet@cubehydro.com

As I mentioned, I am the consultant assisting with the relicensing process. My contact information is below:

Joyce Foster

TRC

804-769-1667 (office)

804-338-5110 (cell)

jfoster@trccompanies.com

We are looking forward to working with you.

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009

T 804.769.1667 | **C** 804.338.5110

LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

Begin forwarded message:

From: "Norman, Janet" <janet_norman@fws.gov>
Date: June 19, 2019 at 6:06:25 PM GMT+2
To: <jsmet@cubehydro.com>
Subject: Ipac consultation done?

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Jody,

I don't have your phone number, and was hoping to talk to you regarding the Lake Lynn re-licensing information search. Wanted to go over some of the specifics of the Ipac process, if we can?

Here is my phone, below, and I will be back in the office by 1pmish.

Thanks.

Janet

> --
>
> Janet Norman
>
> Biologist
>
> U.S. Fish and Wildlife Service
>
> Chesapeake Bay Field Office
>
> 177 Admiral Cochrane Dr.
>
> Annapolis, MD 21401

> Office: 410-573-4533
>
> Fax: 410-269-0832
>
> Janet_Norman@fws.gov
>
> www.fws.gov/chesapeakebay

--
Janet Norman

Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21401
Office: 410-573-4533
Fax: 410-269-0832
Janet_Norman@fws.gov
www.fws.gov/chesapeakebay

From:	Braun, Olivia
To:	Foster, Joyce
Subject:	Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project
Date:	Wednesday, June 26, 2019 8:44:21 AM

Good Morning Joyce,

The PGC is in receipt of your letter dated May 20, 2019 and would like to request some additional information about the project so that we may provide information for your pre-application document. At your earliest convenience, please provide the PGC with project mapping that clearly illustrates the location and boundary of the project area as well as any proposed improvements that may be proposed as part of the relicensing efforts. Once we receive this information, we will be in a better position to reply to you letter.

Many thanks and please feel free to contact me with any questions,

Olivia A. Braun
Environmental Planner
Environmental Planning & Habitat Protection Division
Bureau of Wildlife Habitat Management
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110
Phone: 717-787-4250, Ext. 3128
olbraun@pa.gov

Foster, Joyce

From: Foster, Joyce
Sent: Thursday, June 27, 2019 11:20 AM
To: Braun, Olivia
Cc: Jody Smet
Subject: RE: Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project
Attachments: Lake_Lynn_Project_Boundary_revised.pdf

Good morning,

Attached is a figure that shows the Project boundary and Project area for the Lake Lynn Hydroelectric Project. Please let us know if you need anything else or have any questions. Since this request is for information or data you would like to see included in the Pre-application Document, at this time the Licensee is not proposing any changes or improvements at the Project.

Thank you,

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
[LinkedIn](#) | [Twitter](#) | [Blog](#) | [TRCcompanies.com](#)

Please note that our domain name and email addresses have changed

---

From: Braun, Olivia [mailto:olbraun@pa.gov]
Sent: Wednesday, June 26, 2019 8:44 AM
To: Foster, Joyce <JFoster@trccompanies.com>
Subject: Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project

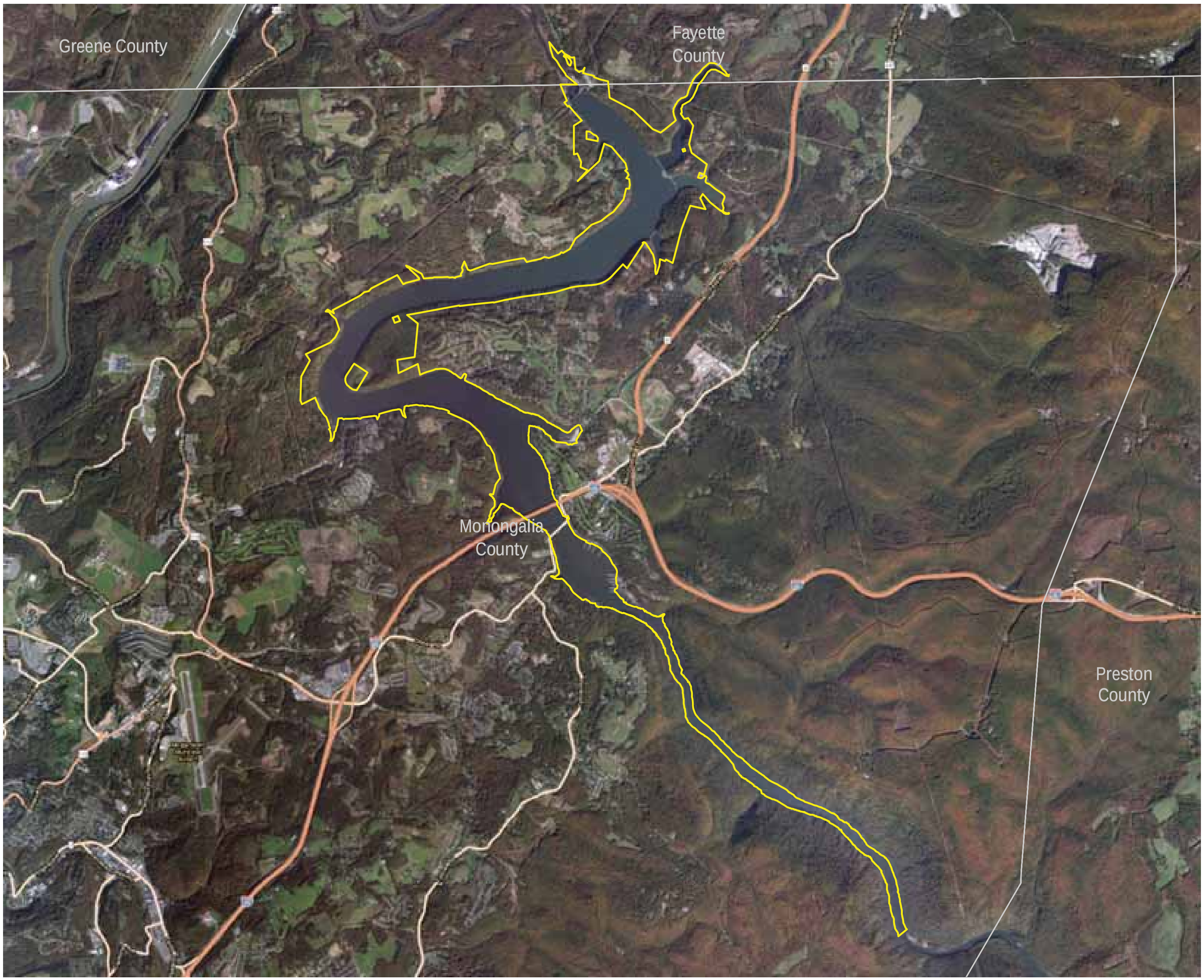
Good Morning Joyce,

The PGC is in receipt of your letter dated May 20, 2019 and would like to request some additional information about the project so that we may provide information for your pre-application document. At your earliest convenience, please provide the PGC with project mapping that clearly illustrates the location and boundary of the project area as well as any proposed improvements that may be proposed as part of the relicensing efforts. Once we receive this information, we will be in a better position to reply to you letter.

Many thanks and please feel free to contact me with any questions,

Olivia A. Braun
Environmental Planner
Environmental Planning & Habitat Protection Division
Bureau of Wildlife Habitat Management
Pennsylvania Game Commission

2001 Elmerton Avenue
Harrisburg, PA 17110
Phone: 717-787-4250, Ext. 3128
olbraun@pa.gov



LEGEND

FERC Project Boundary

County Boundary

0 0.5 1 2 Miles

PROJECT:

CUBE LAKE LYNN RELICENCING PROJECT

TITLE:

Lake Lynn
Project Boundary

DRAWN BY:	K. BABCOCK	PROJ. NO.:
CHECKED BY:		
APPROVED BY:		
DATE:	JUNE 2019	

TRC

6 Ashley Drive
1st Floor
Scarborough, ME 04074

FILE NO.: Lake_Lynn_Project_Boundary.mxd

Plot Date: 6/27/2019, 09:44:15 AM by JFREDENBURG -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Cube_PE_Hydro\Lake_Lynn_Project_Boundary.mxd

Coordinate System: NAD 1983 UTM Zone 17N (Foot US)
Map Rotation: 0

TRC - GIS

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON D.C. 20426
(June 27, 2019)

OFFICE OF ENERGY PROJECTS

Project No. 2459-000
Lake Lynn Hydroelectric Project
Lake Lynn Generation, LLC

Deborah Dotson, President
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

Reference: Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459

Dear President Dotson,

The Federal Energy Regulatory Commission (Commission) invites your participation in the relicensing process for the existing Lake Lynn Hydroelectric Project No. 2459 (Lake Lynn Project). The Commission's relicensing process is an opportunity for both the licensee and interested agencies, tribes, and other stakeholders to consider the project's existing operation and protection, mitigation, and enhancement measures, and evaluate the need for any changes or additional measures to be implemented over the term of any new license issued for the project. The 51.2-megawatt Lake Lynn Project is located on the Cheat River in Monongalia County, West Virginia, and Fayette County, Pennsylvania. We anticipate that Lake Lynn Generation, LLC (Lake Lynn Generation), the licensee for the project, will file a notice of intent and Pre-Application Document by November 30, 2019, to initiate the pre-filing process, and file an application for a new license by November 30, 2022.

It is very important that a tribe whose interests could be affected by the relicensing of the existing Lake Lynn Project participate early in the process so that tribal issues are addressed. For this reason, please inform us if you have an interest in participating in the relicensing process for the project.

In addition, please indicate if you would like to meet with Commission staff to discuss the Commission's licensing process, how your Tribe can participate to the fullest extent possible, your interests and concerns in the affected area, and how to establish procedures to ensure appropriate communication between Commission and tribal staffs.

The meeting can be limited to Commission and your Tribal staff, or can be open to other tribes[1] or Lake Lynn Generation.

If at all possible, we would appreciate your response by August 02, 2019. The Commission strongly encourages electronic filing. Please file your response using the Commission's eFiling system at http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY). In lieu of electronic filing, please send a paper copy to: Secretary, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426. The first page of any filing should include docket number **P-2459-000**.

If you have any questions or comments, please contact Emily Carter at (202) 502-6512 or Emily.Carter@ferc.gov. Ms. Carter will contact you shortly to follow-up on this letter.

Sincerely,

John B. Smith, Chief
Mid-Atlantic Branch
Division of Hydropower Licensing

cc:

Kim Penrod, Cultural Resources Manager
Delaware Nation
Via email

Harold Peterson
Bureau of Indian Affairs - Eastern Region
545 Marriott Drive, Suite 700
Nashville, TN 37214

---

[1] Commission staff is also inviting the Delaware Tribe of Indians and the Osage Nation to participate in the relicensing process.

Document Content(s)

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON D.C. 20426
(June 27, 2019)

OFFICE OF ENERGY PROJECTS

Project No. 2459-000
Lake Lynn Hydroelectric Project
Lake Lynn Generation, LLC

Chief Chester Brooks
Delaware Tribe of Indians
170 NE Barbara
Bartlesville, OK 74006

Reference: Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459

Dear Chief Brooks,

The Federal Energy Regulatory Commission (Commission) invites your participation in the relicensing process for the existing Lake Lynn Hydroelectric Project No. 2459 (Lake Lynn Project). The Commission's relicensing process is an opportunity for both the licensee and interested agencies, tribes, and other stakeholders to consider the project's existing operation and protection, mitigation, and enhancement measures, and evaluate the need for any changes or additional measures to be implemented over the term of any new license issued for the project. The 51.2-megawatt Lake Lynn Project is located on the Cheat River in Monongalia County, West Virginia, and Fayette County, Pennsylvania. We anticipate that Lake Lynn Generation, LLC (Lake Lynn Generation), the licensee for the project, will file a notice of intent and Pre-Application Document by November 30, 2019, to initiate the pre-filing process, and file an application for a new license by November 30, 2022.

It is very important that a tribe whose interests could be affected by the relicensing of the existing Lake Lynn Project participate early in the process so that tribal issues are addressed. For this reason, please inform us if you have an interest in participating in the relicensing process for the project.

In addition, please indicate if you would like to meet with Commission staff to discuss the Commission's licensing process, how your Tribe can participate to the fullest extent possible, your interests and concerns in the affected area, and how to establish procedures to ensure appropriate communication between Commission and tribal staffs.

The meeting can be limited to Commission and your Tribal staff, or can be open to other tribes[1] or Lake Lynn Generation.

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Sincerely,

John B. Smith, Chief
Mid-Atlantic Branch
Division of Hydropower Licensing

cc:

Dr. Brice Obermeyer, Historic Preservation
Delaware Tribe of Indians
Via email

Harold Peterson
Bureau of Indian Affairs - Eastern Region
545 Marriott Drive, Suite 700
Nashville, TN 37214

---

[1] Commission staff is also inviting the Delaware Nation and the Osage Nation to participate in the relicensing process.

Document Content(s)

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON D.C. 20426
(June 27, 2019)

OFFICE OF ENERGY PROJECTS

Project No. 2459-000
Lake Lynn Hydroelectric Project
Lake Lynn Generation, LLC

Chief Geoffrey Standing Bear
Osage Nation
627 Grandview Ave.
Pawhuska, OK 74056

Reference: Consultation with Tribes for the Lake Lynn Hydroelectric Project No. 2459

Dear Chief Standing Bear,

The Federal Energy Regulatory Commission (Commission) invites your participation in the relicensing process for the existing Lake Lynn Hydroelectric Project No. 2459 (Lake Lynn Project). The Commission's relicensing process is an opportunity for both the licensee and interested agencies, tribes, and other stakeholders to consider the project's existing operation and protection, mitigation, and enhancement measures, and evaluate the need for any changes or additional measures to be implemented over the term of any new license issued for the project. The 51.2-megawatt Lake Lynn Project is located on the Cheat River in Monongalia County, West Virginia, and Fayette County, Pennsylvania. We anticipate that Lake Lynn Generation, LLC (Lake Lynn Generation), the licensee for the project, will file a notice of intent and Pre-Application Document by November 30, 2019, to initiate the pre-filing process, and file an application for a new license by November 30, 2022.

It is very important that a tribe whose interests could be affected by the relicensing of the existing Lake Lynn Project participate early in the process so that tribal issues are addressed. For this reason, please inform us if you have an interest in participating in the relicensing process for the project.

In addition, please indicate if you would like to meet with Commission staff to discuss the Commission's licensing process, how your Tribe can participate to the fullest extent possible, your interests and concerns in the affected area, and how to establish procedures to ensure appropriate communication between Commission and tribal staffs.

The meeting can be limited to Commission and your Tribal staff, or can be open to other tribes[1] or Lake Lynn Generation.

If at all possible, we would appreciate your response by August 02, 2019. The Commission strongly encourages electronic filing. Please file your response using the Commission's eFiling system at http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY). In lieu of electronic filing, please send a paper copy to: Secretary, Federal Energy Regulatory Commission, 888 First Street NE, Washington, DC 20426. The first page of any filing should include docket number **P-2459-000**.

If you have any questions or comments, please contact Emily Carter at (202) 502-6512 or Emily.Carter@ferc.gov. Ms. Carter will contact you shortly to follow-up on this letter.

Sincerely,

John B. Smith, Chief
Mid-Atlantic Branch
Division of Hydropower Licensing

cc:

Dr. Andrea Hunter, THPO
Osage Nation Historic Preservation Office
Via email

Harold Peterson
Bureau of Indian Affairs - Eastern Region
545 Marriott Drive, Suite 700
Nashville, TN 37214

[1] Commission staff is also inviting the Delaware Nation and the Delaware Tribe of Indians to participate in the relicensing process.

Document Content(s)

From:	Braun, Olivia
To:	Foster, Joyce
Cc:	Jody Smet
Subject:	RE: [External] RE: Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project
Date:	Tuesday, July 02, 2019 7:59:47 AM
Attachments:	image001.png

Hi Joyce,

Thanks so much for this information – it was very helpful. At this time, given that no activities are proposed the PGC does not have any information to provide for inclusion in the Pre-Application Document. However, the PGC would suggest that if/when projects are identified for completion within the Pennsylvania portions of the project area that a Pennsylvania Natural Heritage Inventory (PNDI) search be completed to ensure that coordination with the PGC (or other jurisdictional agencies as necessary) could be identified and initiated as early as possible.

To initiate a PNDI review, please visit www.naturalheritage.state.pa.us and click on the "Conservation Explorer" link on the bottom left hand side of the page. Upon completion, a receipt will be generated which will summarize search result each of the four jurisdictional agencies. If the Search Results section states that "Further Review is Required" for the PGC, then please refer to the "What to Send to Jurisdictional Agency" section of the receipt for a "Check-list of Minimum Materials" that should be submitted to the PGC.

The PGC appreciates the opportunity to provide comments at this early stage of the relicensing process. If you have any questions, please feel free to contact me.

Best,

Olivia A. Braun
Environmental Planner
Environmental Planning & Habitat Protection Division
Bureau of Wildlife Habitat Management
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110
Phone: 717-787-4250, Ext. 3128
olbraun@pa.gov

From: Foster, Joyce <JFoster@trccompanies.com>
Sent: Thursday, June 27, 2019 11:20 AM
To: Braun, Olivia <olbraun@pa.gov>
Cc: Jody Smet <jsmet@cubehydro.com>
Subject: [External] RE: Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project

Good morning,

Attached is a figure that shows the Project boundary and Project area for the Lake Lynn Hydroelectric Project. Please let us know if you need anything else or have any questions. Since this request is for information or data you would like to see included in the Pre-application Document, at this time the Licensee is not proposing any changes or improvements at the Project.

Thank you,

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

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From: Braun, Olivia [mailto:olbraun@pa.gov]
Sent: Wednesday, June 26, 2019 8:44 AM
To: Foster, Joyce <JFoster@trccompanies.com>
Subject: Lake Lynn Generation, LLC - Relicensing of the Lake Lynn Hydroelectric Project

Good Morning Joyce,
The PGC is in receipt of your letter dated May 20, 2019 and would like to request some additional information about the project so that we may provide information for your pre-application document. At your earliest convenience, please provide the PGC with project mapping that clearly illustrates the location and boundary of the project area as well as any proposed improvements that may be proposed as part of the relicensing efforts. Once we receive this information, we will be in a better position to reply to you letter.

Many thanks and please feel free to contact me with any questions,

Olivia A. Braun
Environmental Planner
Environmental Planning & Habitat Protection Division
Bureau of Wildlife Habitat Management
Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110
Phone: 717-787-4250, Ext. 3128
olbraun@pa.gov

Foster, Joyce

From: Jody Smet <jsmet@cubehydro.com>
Sent: Monday, July 08, 2019 3:25 PM
To: Foster, Joyce
Subject: FW: Information request: Lake Lynn

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654

(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

CUBE HYDRO
CAROLINAS

From: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Sent: Monday, July 8, 2019 2:55 PM
To: Jody Smet <jsmet@cubehydro.com>
Subject: RE: Information request: Lake Lynn

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Jody,

We have a lot of experience with the ILP. No experience with the ALP, but in reviewing projects in other states that have employed this process, we do like the emphasis the ALP

has on developing solutions and building those open-channel relationships between licensees and stakeholders. That collaborative nature seems to resolve conflicts much more amicably than other processes. At least, that is how it appears. For the ILP, we really like the defined structural components which does make it fairly easy for us to know what to expect and what to plan for. FERC's involvement through the ILP can be nice, as well. We find that the TLP works just as well as the ILP, but I feel that disputes and disagreements tend to take a little longer than they should to resolve and so sometimes things get drawn out, at least that is our experience with a few of the projects that had elected to go this route. This is not to say that this project would have a lot of disputes or disagreements that would slow down the relicensing process, but it may be something to think about. Ultimately, I don't know what the best route would be in this situation, but the WVDNR wouldn't be opposed to either one. The end result is always the same, the only difference is the path used to get there. I feel that Cube Hydro does a fairly well job at working with the resource agencies and hopefully this relationship can be maintained throughout the relicensing process.

From: Jody Smet <jsmet@cubehydro.com>
Sent: Monday, July 08, 2019 2:07 PM
To: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Subject: RE: Information request: Lake Lynn

Okay, I'm curious about your preference for the ILP or ALP? Just more experience with it, or do you feel it offers benefits over the ILP?

I appreciate your support either way.

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654
(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

CUBE HYDRO
CAROLINAS

From: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Sent: Monday, July 8, 2019 2:04 PM
To: Jody Smet <jsmet@cubehydro.com>
Subject: RE: Information request: Lake Lynn

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Jody,

The WVDNR would prefer that the ILP or ALP be used, but is perfectly comfortable with the TLP. If you guys want to go the TLP route, then we wouldn't object.

Thanks,

Jacob Harrell

From: Jody Smet <jsmet@cubehydro.com>
Sent: Wednesday, July 03, 2019 4:30 PM
To: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Subject: RE: Information request: Lake Lynn

Jacob,

A question for you – does WVDNR have any concerns about the relicensing process proposal – Traditional Licensing Process?

Jody J. Smet, AICP
Director, FERC Licensing and Compliance
(O) 804-739-0654
(C) 804-382-1764
jsmet@cubehydro.com (Please note new email address)

From: Harrell, Jacob D <Jacob.D.Harrell@wv.gov>
Sent: Wednesday, June 19, 2019 2:57 PM
To: Jody Smet <jsmet@cubehydro.com>
Subject: Information request: Lake Lynn

Jody,

Just for clarification purposes on our end, regarding the information request for the Lake Lynn Hydroelectric Project, this request is for information from WVDNR to use in informing the NOI/PAD, correct? There may be some confusion here that the request is for studies that we might request for the relicensing, though I think that would come after the PAD has been submitted and following the first scoping meeting. I want to make sure I have this correct.

Thanks,

Jacob Harrell

Coordination Unit

WVDNR – Wildlife Resources Section
1110 Railroad Street
Farmington, WV 26571
(304)704-9328
Jacob.D.Harrell@wv.gov

Foster, Joyce

From: Foster, Joyce
Sent: Tuesday, July 09, 2019 12:17 PM
To: Norman, Janet
Cc: Jody Smet
Subject: FW: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation
Attachments: Lake_Lynn_Project_Boundary_revised 6-24-2019.zip

Janet,

I am following up to make sure you were able to open the attached Shapefile and that it was what you needed. Please let us know if you need anything else.

Thanks,

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

From: Foster, Joyce
Sent: Tuesday, June 25, 2019 8:14 AM
To: Norman, Janet <janet_norman@fws.gov>
Cc: Jody Smet <jsmet@cubehydro.com>
Subject: RE: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation

Janet,

As follow-up to our communication last week, attached is the corrected Shapefile that we used to re-run the IPaC unofficial review for the Lake Lynn Project (FERC No. 2459. Please let us know if you have any questions or issues with the attachment.

3

Thanks,

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009
T 804.769.1667 | **C** 804.338.5110
LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

4

From: Norman, Janet [mailto:janet_norman@fws.gov]
Sent: Thursday, June 20, 2019 11:18 AM
To: Foster, Joyce <JFoster@trccompanies.com>
Cc: Jody Smet <jsmet@cubehydro.com>
Subject: Re: [EXTERNAL] Lake Lynn Project (FERC No. 2459) - Ipac consultation done

Terrific, thank you Joyce.

I appreciate the follow up information.

Janet

On Thu, Jun 20, 2019 at 8:48 AM Foster, Joyce <JFoster@trccompanies.com> wrote:

> Janet,
>
> As follow-up to our conversation related to the Lake Lynn Project FERC relicensing, I will send you the Shapefile for the Project that we used for the IPaC unofficial resource/species list as soon as it is available, hopefully later today. Our GIS staff is currently correcting an error in the Project area polygon and we will rerun the IPaC unofficial review using this corrected Shapefile.
>
> As we discussed, I am also sending you the contact information for Jody Smet, the Project Licensee:

Jody J. Smet, AICP

Director, FERC Licensing and Compliance

(O) 804-739-0654

(C) 804-382-1764

jsmet@cubehydro.com

7

As I mentioned, I am the consultant assisting with the relicensing process. My contact information is below:

Joyce Foster

TRC

804-769-1667 (office)

804-338-5110 (cell)

jfoster@trccompanies.com

8

We are looking forward to working with you.

Joyce Foster
Planner

179 Clarks Lane, Aylett, VA 23009

T 804.769.1667 | **C** 804.338.5110

LinkedIn | Twitter | Blog | TRCcompanies.com

Please note that our domain name and email addresses have changed

Begin forwarded message:

From: "Norman, Janet" <janet_norman@fws.gov>
Date: June 19, 2019 at 6:06:25 PM GMT+2
To: <jsmet@cubehydro.com>
Subject: Ipac consultation done?

CAUTION: This email originated from outside your organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hi Jody,

I don't have your phone number, and was hoping to talk to you regarding the Lake Lynn re-licensing information search. Wanted to go over some of the specifics of the Ipac process, if we can?

Here is my phone, below, and I will be back in the office by 1pmish.

Thanks.

Janet

--

Janet Norman

Biologist

U.S. Fish and Wildlife Service

Chesapeake Bay Field Office

177 Admiral Cochrane Dr.

Annapolis, MD 21401

Office: 410-573-4533

Fax: 410-269-0832

Janet_Norman@fws.gov

www.fws.gov/chesapeakebay

--

Janet Norman
Biologist
U.S. Fish and Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Dr.
Annapolis, MD 21401
Office: 410-573-4533
Fax: 410-269-0832
Janet_Norman@fws.gov

www.fws.gov/chesapeakebay

Foster, Joyce

From: Blair, Michelle A.
Sent: Wednesday, July 10, 2019 11:29 AM
To: Foster, Joyce
Subject: Fwd: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)
Attachments: MISC-PA and WV-0619-002.pdf

Get Outlook for iOS

From: Erin Thompson <ethompson@delawarenation-nsn.gov>
Sent: Wednesday, July 10, 2019 11:26:53 AM
To: Blair, Michelle A.
Subject: RE: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Please see attached consultation letter.

Thank you,
Erin

Erin Thompson

Delaware Nation Historic Preservation Director
31064 SH 281
P.O. Box 825
Anadarko, OK 73005
405-247-2448 ex. 1403
ethompson@delawarenation-nsn.gov

From: Dana Kelly <dkelly@delawarenation-nsn.gov>
Sent: Wednesday, June 19, 2019 2:46 PM
To: Erin Thompson <ethompson@delawarenation-nsn.gov>
Subject: FW: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Dana Kelly
Historic Preservation
106/ Archive Assistant
Delaware Nation
31064 S HWY 281
P.O. Box 825
Anadarko, OK 73005
Phone: 405-247-2448 ext. 1407
Email: dkelly@delawarenation-nsn.gov

From: Blair, Michelle A. <mblair@trccompanies.com>
Sent: Monday, May 20, 2019 2:06 PM
To: Absentee-Shawnee Tribe of Oklahoma <106NAGPRA@astribe.com>; Amanda Pitzer <amanda@cheat.org>; Anita Carter <greystone.poa@hotmail.com>; Betty Wiley <betty.w304@gmail.com>; Bob Irvin <birvin@americanrivers.org>; Bonney Hartley <bonney.hartley@mohican-nsn.gov>; Brett Barnes <bbarnes@estoo.net>; Brian Bridgewater <Brian.L.Bridgewater@wv.gov>; Brice Obermeyer <bobermeyer@delawaretribe.org>; Bryan Printup <bprintup@hetf.org>; Cassie Harper <cassie@shawnee-tribe.com>; Clint Halftown <clint.halftown@gmail.com>; Colleen McNally-Murphy <colleen@hydroreform.org>; Coopers Rock State Forest <coopersrocksf@wv.gov>; Cosmo Servidio <cosmo.servidio@epa.gov>; Curtis Schreffler <clschref@usgs.gov>; Dana Kelly <dkelly@delawarenation.com>; Danny Bennett <Danny.A.Bennett@wv.gov>; Darren Bonaparte <darren.bonaparte@srmt-nsn.gov>; David

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Shaun Wicklein <smwickle@usgs.gov>; Steve Moyer <steve_moyer@tu.org>; Steve Moyer (smoyer@tu.org) <smoyer@tu.org>; Stuart Welsh <swelsh@wvu.edu>; Sunset Beach Marina <info@sunsetbeach-marina.com>; Susan Bachor <sbachor@delawaretribe.org>; Susan Pierce <susan.m.pierce@wv.gov>; Tonawanda Band of Seneca <tonseneca@aol.com>; Tonya Tipton <tonya@shawnee-tribe.com>; Vincent Vicites <vvicites@fayettepa.org>; William Fisher <wfisher@sctribe.com>; William Tarrant <wtarrant@sctribe.com>
Cc: jsmet@cubehydro.com; Foster, Joyce <JFoster@trccompanies.com>
Subject: Information Request for the Pre-Application Document for Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Good afternoon-

Attached is an Information Request for the Pre-Application Document for the FERC relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459).

Please provide your comments within 30 days of this letter. If you have any questions regarding this request please contact Jody Smet at jsmet@cubehydro.com or Joyce Foster at jfoster@trccompanies.com.

Thank you,
Michelle

Michelle Blair
Project Coordinator

14 Gabriel Drive, Augusta, ME 04330
T 207.620.3845 | **F** 207.621.8226 | mblair@trccompanies.com
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The Delaware Nation
Historic Preservation Department
31064 State Highway 281
Anadarko, OK 73005
Phone (405)247-2448

July 10, 2019

To Whom It May Concern:

The Delaware Nation Historic Preservation Department received correspondence regarding the following referenced project(s).

Project: Relicensing of the Lake Lynn Hydroelectric Project (FERC No. 2459)

Our office is committed to protecting tribal heritage, culture and religion with particular concern for archaeological sites potentially containing burials and associated funerary objects.

The Lenape people occupied the area indicated in your letter during prior to European contact until their eventual removal to our present locations. According to our files, the location of the proposed project does not endanger cultural, or religious sites of interest to the Delaware Nation. **Please continue with the project as planned** keeping in mind during construction should an archaeological site or artifacts inadvertently be uncovered, all construction and ground disturbing activities should immediately be halted until the appropriate state agencies, as well as this office, are notified (within 24 hours), and a proper archaeological assessment can be made.

Please note the Delaware Nation, the Delaware Tribe of Indians, and the Stockbridge Munsee Band of Mohican Indians are the only Federally Recognized Delaware/Lenape entities in the United States and consultation must be made only with designated staff of these three tribes. We appreciate your cooperation in contacting the Delaware Nation Cultural Preservation Office to conduct proper Section 106 consultation. Should you have any questions, feel free to contact our offices at 405-247-2448 ext. 1403.

Erin N. Thompson

Erin Thompson
Director of Historic Preservation
Delaware Nation
31064 State Highway 281
Anadarko, OK 73005
Ph. 405-247-2448 ext. 1403
ethompson@delawarenation-nsn.gov

APPENDIX C

PROCESS PLAN AND SCHEDULE

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Traditional Licensing Process for the Project

Activity	Responsibility	Timeframe and Regulations	Dates[1]
File NOI, PAD, and Request to use TLP and publish Public Notice in newspaper	Lake Lynn	5 to 5½ years prior to license expiration	August 29, 2019
File verification of Public Notice with FERC	Lake Lynn	Within two weeks of filing the NOI, PAD, and Request to use the TLP	September 12, 2019
Comments on TLP Request	FERC, Relicensing Participants	Within 30 days of NOI/PAD/TLP request filing and newspaper notice	September 28, 2019
FERC issues Notice of Commencement	FERC	Within 60 days of PAD/NOI/TLP request filing	October 28, 2019
FERC approves use of TLP	FERC	Within 60 days of PAD/NOI/TLP request filing	October 28, 2019
Notify FERC of Joint Meeting and publish Notice in newspaper	Lake Lynn	At least 15 days in advance of meeting	November 19, 2019
Joint Meeting for consultation with agencies, tribes and interested public	Lake Lynn	30-60 days following FERC approval of TLP	December 4, 2019
Comments and Study Requests	Relicensing Participants	Due 60 days after Joint Meeting	February 2, 2020
Study Plan Development	Lake Lynn	Ongoing following Joint Meeting	December 5-March 1, 2020
Conduct Field Studies	Lake Lynn	One season of field studies	April 1-November 1 2020
DLA and Study Results	Lake Lynn	Produced following conclusion of studies	November 30, 2021
Comments on DLA	Relicensing Participants	90-day comment period	February 28, 2022
FLA filed with FERC	Lake Lynn	2 years prior to license expiration	November 30, 2022
FERC issues Public Notice of Application	FERC	Within 14 days of FLA submittal	December 14, 2022
FERC Issues New License on or before License Expiration Date	FERC		November 30, 2024

[1] If the due date falls on a weekend or a holiday, the due date is the subsequent business day.

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APPENDIX D

CURRENT FERC LICENSE

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

West Penn Power Company | Project No. 2459—005
West Virginia and Pennsylvania

ORDER ISSUING NEW LICENSE
(MAJOR PROJECT)

DEC 27 1994

INTRODUCTION

On December 20, 1991, West Penn Power Company (WPP) filed an application under Part I of the Federal Power Act (FPA) for a new license to continue to operate and maintain the 51.2-megawatt (MW) Lake Lynn Hydroelectric Project, located on the Cheat River, in Monongalia County, West Virginia, and Fayette County, Pennsylvania.1/

BACKGROUND

Notice of the application has been published. The following entities filed timely motions to intervene on the following dates: the Sierra Club (Monongahela Group), September 24, 1993; the Cheat Lake Recreation and Environmental Association (CLEAR), September 27, 1993; the League of Women Voters of Monongahela County, September 29, 1993; the West Virginia Division of Natural Resources (WVDNR), September 30, 1993; the West Virginia Division of Environmental Protection (WVDEP), September 30, 1993. No organization or individual filed a motion to intervene in opposition to the project. All comments received have been fully considered in determining whether, or under what conditions, to issue this license.2/

On June 24, 1994, the Commission's staff issued a draft environmental assessment (DEA) for this project. Comments on the

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1/ The Cheat River is a tributary of the Monongahela River, a navigable waterway of the United States. Power produced from the project is fed directly into an interstate grid. Since the project is located on a river over which Congress has jurisdiction under the Commerce Clause, affects interstate commerce through its connection to an interstate power grid, and was constructed after 1935, it is required to be licensed pursuant to Section 23(b)(1) of the FPA.

2/ In addition to the intervenors, the other comments received were from the U.S. Department of the Interior--Fish and Wildlife Service (DOI), the U.S. Army Corps of Engineers (COE), the Albert Gallatin Municipal Authority (AGMA), the Pennsylvania Department of Environmental Regulation (PDER), the West Virginia University (WVU) Student Administration, the WVU Sierra Student Coalition, and local residents.

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DEA have been addressed in the final environmental assessment (EA), which is attached to and made a part of this license. The staff also prepared a safety and design assessment (S&DA) for this project, which is available in the Commission's public file.

PROJECT DESCRIPTION

The existing constructed project consists of a concrete gravity dam 125 feet high and 1,000 feet long with an integral power plant near the east abutment. The power plant has four generators with a total generating capacity of 51.2 megawatts (MW). The dam impounds a reservoir about 13 miles long covering about 1,700 acres and containing about 72,000 acre-feet when full. A more detailed project description is contained in the ordering paragraph (B)(2).

The project's original license, issued on July 3, 1962, permitted the Licensee to operate the project as a daily peaking facility and to use all inflow to generate hydropower. That is, there was no requirement to provide any release flow during non-generating periods to protect aquatic resources downstream of the project.

WPP proposes the following enhancements related to project operation: (1) provide a variable minimum flow release of 212 cubic feet per second (cfs), 100 cfs, or net reservoir inflow during nonoperating periods to enhance the quality of water, fish, and other aquatic life; (2) develop a 46-acre multiple-use barrier-free recreation facility and a 4-mile hiking/biking trail; (3) develop a barrier-free fishing area in the tailrace portion of the project; (4) provide a barrier-free public boat launch and parking area along the reservoir shore; (5) designate four "wildlife habitat/nature viewing areas" on parcels owned by WPP; and (6) submerge brush piles to enhance fish habitat during winter draw-downs within Rubles Run and Morgan Run (two deep embayments separated by a small peninsula--located about 1 mile upstream of the project along the reservoir's eastern shore).

APPLICANT'S PLANS AND CAPABILITIES

In accordance with Sections 10 and 15 of the FPA, the staff evaluated WPP's record as a Licensee for these areas: (1) conservation efforts; (2) compliance history and ability to comply with the new license; (3) safe management, operation, and maintenance of the project; (4) ability to provide efficient and reliable electric service; (5) need for power; (6) transmission line improvements; (7) project modifications; and (8) compliance record. I accept the staff's finding in each of these areas.

Here are the findings:

1. Section 10(a)(2)(C): Conservation Efforts

WPP and its affiliates periodically evaluate prospective conservation, load management, and demand-side management strategies. In 1986, Allegheny Power Service Corporation, as an agent of WPP, evaluated more than 80 candidate devices and techniques, publishing the results of the report APS Demand-Side Alternatives. By implementing selected programs through 1999, WPP intends to reduce demand at the time of the annual peak by about 69 MW from that which might have occurred otherwise.

WPP has made a satisfactory good faith effort to comply with Section 10(a)(2)(C) of the FPA and to support the objectives of the Electric Consumers Protection Act of 1986.

2. Section 15(a)(2)(A): Ability to Comply with the New License

WPP's license application shows its ability to comply with the articles, terms, and conditions of any license issued, and with other applicable provisions of this part of the FPA.

WPP has or can acquire the resources and expertise necessary to carry out its plans and comply with all articles, terms and conditions of a new license.

3. Section 15(a)(2)(B): Safe Management, Operation, and Maintenance of the Project

Under Part 12 of the Commission's regulations, WPP filed the fifth Part 12 Safety Inspection Report on August 28, 1992. WPP also has an emergency action plan on file at the power plant office. WPP conducts regular tests of the emergency action plan and all personnel receive emergency training. The Safety Inspection Report and emergency action plan are adequate.

WPP shows regard for public safety by installing fences and gates at the powerhouse and dam to deter unauthorized access, placing warning signs at dangerous areas, and installing safety barriers at the dam to keep boaters away from the spillway.

The project is safe for continued use and operation. WPP's proposal would not adversely affect the project's operation and safety.

4. Section 15(a)(2)(C): Ability to Provide Efficient and Reliable Electric Service

WPP's operating plans show its ability to give efficient and reliable electric service. WPP is operating the project efficiently and reliably.

WPP's record of lost generation because of unscheduled outages shows that the outages were minimal and lost generation is not a significant part of the project's annual generation.

5. Section 15(a)(2)(D): Need for Power

Considering the short- and long-term need for power generated by the project and the cost of alternative replacement power in the region if WPP does not get a new license for the project, we conclude that: (1) the project power helps meet a part of the Allegheny Power System's regional power needs, and (2) the project produces about 129.4 GWh of energy annually. Replacing the project power would cost WPP about $5.0 million based on 38.6 mills/kWh.

The Allegheny Power System's short- and long-term need for power justifies licensing the Lake Lynn Project.

6. Section 15(a)(2)(E): Existing and Planned Transmission Services

WPP does not see any need to change the transmission network affected by the project operation.

Whether the Commission issues a license for the project or not, the existing transmission service is sufficient and no changes are necessary.

Considering the Licensee's transmission system with respect to the application for new license, licensing the project to continue operations would have no significant effect on the existing or planned transmission system.

7. Section 15(a)(2)(F): Project Modifications

WPP has no plans to make any major engineering modifications at the project.

Installing additional generating units is not necessary at this time. Furthermore, the project as presently constructed, and as WPP proposes to operate it, fully develops and uses the economical hydropower potential of the site.

8. Section 15(a)(3)(A) and (B): Compliance Record

WPP's record of compliance with the existing license is not fully satisfactory. Among other things, the Licensee failed to file a timely Emergency Action Plan or Update (five times), Part 12 Safety Report (two times), Part 8 Recreation Resource materials, revised Exhibit G drawings (two times), revised

Exhibit F drawings (two times), and a state Water Quality Certificate. These instances of noncompliance occurred between January 1971 and May 1990.

This compliance record, although less than satisfactory, does not warrant the denial of WPP's application for a new license. However, because of the Licensee's compliance history, special monitoring must be set up to ensure that the Licensee complies with the terms and conditions of the new license. Therefore, Article 501 will require the Licensee to develop and file for Commission approval a Hydropower Compliance Management Program that will ensure compliance with the terms and conditions of the new license and allow the Commission to monitor progress toward compliance.

WATER QUALITY CERTIFICATION

Under Section 401(a)(1) of the Clean Water Act,3/ the Commission may not issue a license for a project unless either the license applicant obtains water quality certification from the certifying agency of the state in which the project discharge will originate, or the certifying agency waives certification. Section 401(a)(1) states that certification is deemed waived if the certifying agency fails to act on a water quality certification request within a reasonable period of time, not to exceed one year.

On September 19, 1991, WPP filed with WVDNR an application for Section 401 water quality certification for the Lake Lynn Project. WVDNR denied the application for certification on March 9, 1992 for failure to comply with state regulatory requirements.

On May 11, 1992, WPP filed a second application for water quality certification. On June 8, 1992, WVDNR notified WPP that the second application was incomplete and requested that WPP provide more information. Effective July 1, 1992, authority to grant water quality certification in West Virginia was transferred from the WVDNR to the newly created West Virginia Department of Environmental Protection (WVDEP). In a letter dated May 10, 1993, WVDEP denied the second WPP application for certification.

WPP filed a third application for certification with WVDEP on June 23, 1993. In a subsequent letter to WPP dated October 18, 1994, WVDEP indicated that it had granted water quality certification for the project, subject to 15 specific conditions being included in any new Commission license for the project. However, because WVDEP did not act on the application within a

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3/ 33 U.S.C. § 1341.

year of its June 23, 1993, filing date, the certification requirements of Section 401 of the CWA for the Lake Lynn Project are deemed by the Commission to be waived. 4/ Therefore, I do not consider inclusion in the license of the conditions proposed in WVDEP's October 18, 1994 letter to be mandatory. However, in the exercise of the Commission's responsibilities under FPA Section 10(a), the Commission staff has examined WVDEP's 15 proposed license conditions and recommended adoption or partial adoption of several of the proposed conditions. The Commission staff's findings and recommendations with respect to WVDEP's 15 proposed license conditions are summarized in Section IV.C of the EA. I concur with staff's recommendations. The requirements of those WVDEP proposed conditions recommended in the EA for whole or partial inclusion in the project license are reflected in Articles 401, 403, 404, 405, 406, 411, and 415 of the license.5/

COASTAL ZONE MANAGEMENT PROGRAM

The Lake Lynn Project is not located in the state-designated coastal zone management area.

RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Section 10(j)(1) of the FPA requires the Commission to include license conditions based on recommendations of federal and state fish and wildlife agencies submitted pursuant to the Fish and Wildlife Coordination Act for the protection, mitigation, and enhancement of fish and wildlife resources.

Section 10(j)(2) of the FPA also states that whenever the

4/ Section 16.8(f)(7)(ii) of the Commission's regulations, 18 C.F.R. § 16.8(f)(7)(ii), states that the certifying agency is deemed to have waived the certification requirement if it has not acted by one year after receiving the request.

5/ WVDEP's condition no. 2 (peaking and reservoir elevations) was adopted in Articles 403 and 404; condition no. 4 (water quality, biological studies, and minimum flows) in Articles 404, 405 and 411; condition nos. 7 (West Penn Beach area public fishing access recreation site), 8 (development of project area 26 for recreation), 9 (public boat launch site), 11 (recreation development plan), 12 (tailrace area public fishing access/recreation area site), 13 (substation area parking), 14 (tailrace area recreation use survey), and 15 (tailrace area recreation development plan) in Articles 15 and 17; and condition no. 10 (reservoir recreation use survey) in Article 417. Condition nos. 1 and 3 (project operating plan); 5 (construction of storm water/nonpoint source program contacts); and 6 (turbine entrainment study) were not adopted.

Commission believes that a fish and wildlife agency recommendation may be inconsistent with the purposes and requirements of the FPA, the Commission and the agencies shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agencies.

Staff made a preliminary determination by letters dated July 13, 1994, that certain DOI, PFBC, and WVDNR recommendations were inconsistent with the purpose and requirements of Part I of the FPA and other applicable law, and conflicted with the comprehensive planning standards of Section 10(a) of the FPA. Staff also made a preliminary determination that certain fish and wildlife agency recommendations were outside the scope of Section 10(j) and that they should be considered under Section 10(a) of the FPA.6/

In response to the determinations, staff received comment letters from DOI (August 5, 1994), WVDNR (August 22, 1994), PFBC (August 23, 1994), and WPP (August 5, 1994). All of the agencies requested, and subsequently attended, a negotiation meeting with Commission staff on September 13, 1994, in Ligonier, Pennsylvania. Representatives of WPP also participated in the meeting.

Staff and the agencies at the September 13, 1994, meeting examined both additional evidence in support of the recommendations found by staff to be inconsistent with 10(j) and possible alternatives to such recommendations. As a result of these discussions, a number of staff's recommendations for the project have been modified as reflected in the EA. Based on the evidence examined at the meeting and the rest of the record in the proceeding, including the EA, I have made the following determinations with respect to the agency recommendations found by staff to be inconsistent with Section 10(j):

1. Run-of-the-river Operation. Both DOI and PFBC had recommended that the project be operated in a run-of-the-river mode. In the DEA, staff concluded that run-of-the-river operation is not feasible because the economic costs would exceed the environmental benefits of the project. 7/ The DEA recommended a continued peaking operation with 212 cubic feet per second (cfs) minimum release flow, and limited reservoir fluctuations. When reservoir inflow drops below 212 cfs, the staff recommended that the minimum flow release should equal reservoir inflow.

6/ See EA section VII.

7/ See Final EA section VI and Tables 11 and 12.

In the subsequent 10(j) negotiations DOI agreed that such a mode would not be ideal at Lake Lynn when river flow drops to the lowest levels, and PFBC stated that although it still prefers a run-of-the-river operation, something other than run-of-the-river is acceptable in the short term, provided there is an opportunity to reconsider run-of-the-river operation as the fishery improves.

The EA recommends a continued peaking operation with a 212 cubic feet per second (cfs) minimum release flow, and limits on reservoir fluctuations. When reservoir inflow drops below 212 cfs, the staff recommends that the minimum flow release be equal to reservoir inflow. I concur with the EA's findings. Article 404 of this license requires a 212 cfs minimum release whenever the reservoir water level is stable or increasing, and an absolute minimum release flow of 100 cfs.

2. Water Quality Monitoring and Gauging. In the DEA, staff recommended two additional permanent/continuous water quality monitoring stations--one upstream of the Lake Lynn dam and one immediately downstream of the dam. As stated in the EA (Section V.C.2), additional water quality data (i.e., farther downstream of the dam) may be obtained from COE and the Environmental Protection Agency (EPA). Staff also recommended installation of two USGS flow-gauging stations--one in the reservoir headwaters area and one downstream of the dam.

PFBC had originally recommended continuous water quality monitoring at four locations in the reservoir and river. At the September 13 meeting, PFBC stated that with only 13 grab samples per year from the backwater of the Monongahela River, there are no assurances of when water quality samples would be collected. Therefore, PFBC stated that the staff-recommended sampling program in the DEA provided no reasonable way to measure the project's water quality impacts downstream of the most acidic tributaries.

The WVDNR also indicated support for more water quality monitoring downstream of the dam (especially below the acid tributaries) as well as water quality profile sampling in the reservoir. DOI stated that it concurred with PFBC and WVDNR.

Staff and the agencies agreed that a reasonable compromise would be to require one additional water quality monitoring station, to be placed at a site downstream of the acid tributaries. This measure would improve the collection of river pH data and help relate project operations to downstream water quality, as required by Article 405 of this license. The EA (Section V.C.2) discusses this issue and recommends the additional water quality monitoring station.

3. Effects of Peaking and Lake Level Fluctuations. In the

DEA, staff recommended reservoir water level elevations of 863-870 feet NGVD from April 1 to April 30, 868-870 feet from May 1 to October 31, and 857-870 feet from November 1 to March 31. The staff also recommended placement of submerged brush piles in the two principal reservoir embayments (Rubles Run and Morgan Run) to reduce adverse impacts to the fisheries from winter draw-downs. At the meeting, staff stated that winter draw-downs are related to peaking power operation, below-normal reservoir inflows, and a need for reservoir storage because of occasional flood flows.

The PFBC and WVDNR stated that they had no major objections to the reservoir water levels recommended in the DEA. The DOI had originally recommended only that WPP study the effects of peaking and lake level fluctuations and develop a plan to mitigate adverse impacts. In the DEA, staff indicated that this recommendation was partially adopted. In response, the DOI stated that it still objected, in particular, to the project's 13-foot winter draw-down based on (1) adverse impacts to winter recreation use of the reservoir, and (2) adverse impacts on the reservoir fishery. DOI stated that it is unreasonable for the DEA to attribute the 13-foot draw-down to flood control, and that the brush piles are insufficient fisheries mitigation for the winter draw-downs.

The EA (Section V.C.2) recommends and Article 403 of this license requires increasing the minimum reservoir water level elevation to 863 feet NGVD in April based on the potential to benefit fish spawning in the reservoir, while also maintaining storage capacity during high spring inflows. Staff maintains that modifying the allowable winter drawdowns any further would adversely affect the beneficial (although incidental) flood control capability of the Lake Lynn project, as well as the project economics, making the DOI's recommendation inconsistent with Section 10(a) of the FPA.

4. Dissolved Oxygen Requirements. The staff concluded in the DEA that low dissolved oxygen (DO) levels are not a serious water quality issue at this project. Staff recommended WPP monitor DO; but did not propose that WPP maintain any specific DO standards. The PFBC had originally recommended that the Commission require a minimum DO level consistent with previously licensed hydroelectric projects in the Upper Ohio River Basin (6.5 mg/L). The PFBC did not state any specific concerns about recorded DO levels at the Lake Lynn project; but during negotiations, the PFBC stated that DO could decline at the Lake Lynn project in the future.

The WVDNR stated that DO is not currently a problem, but recommended a plan to address DO if it does drop below desired levels. The DOI stated concern about consistent DO standards and added that profile DO sampling in the reservoir would be an appropriate requirement of the new license.

To accommodate PFBC's and WVDNR's concerns, the EA (Section V.C.2) recommends that if water quality monitoring shows any DO readings below 5.0 mg/L, WPP would notify the Commission and the resource agencies within 10 days to evaluate the low DO reading(s). Then, if required by the Commission, WPP would develop and file a plan to achieve compliance in consultation with DOI, WVDEP, WVDNR, and PFBC. That requirement is included in Article 406 of this license.

5. Minimum Release Flows. The DEA recommended a minimum release flow of 212 cfs or reservoir inflow, whichever is less.

The PFBC had previously recommended variable minimum releases, such as 450 cfs, 212 cfs, 100 cfs, etc., triggered by specific reservoir level/inflow. The PFBC stated that it believes this sort of plan still needs to be evaluated, although it did not put forth any specific operating plans--either in its 10(j) recommendations or in response to the DEA.

Staff evaluated variable minimum release alternatives in the EA, including consideration of environmental benefits (Sections V.C.2 and V.C.3) and economic effects (Section VI.B). Those evaluations indicated that the variable minimum release flow options were inconsistent with the balancing objectives of Section 10(a). Staff, however, did revise the minimum release flow recommended in the DEA to include an absolute minimum release of 100 cfs, as required by Article 404 of this license.

6. Fish Entrainment and Mortality Impacts. The DEA stated, and staff emphasized, that there is not any reliable information to either confirm or disprove loss of fish through turbine entrainment. The DEA notes that (based on field studies) the fish population of the main reservoir appears to be very low. The DEA recommended that WPP conduct a biological monitoring program to establish a baseline, with the possibility of reopening the license to address site-specific turbine entrainment impacts and/or compensation for lost fish.

The PFBC had no comments on the fish entrainment issue. The WVDNR stated that it eventually wants to look at the issue further, but has no immediate concern about relicensing. The DOI had originally recommended that WPP "be required to adequately address the fish entrainment issue in full detail to ensure that existing and potential future fishery resources will be protected from injury/mortality." In response, the DEA recommended the approach outlined above--to collect biological data first, then reopen the license if warranted. During the 10(j) meeting, the DOI stated that it believes entrainment impacts could be a problem, and should be studied further before a new license is issued.

Staff maintained that it does not see merit in detailed studies of the entrainment issue until there is more data available about the reservoir fishery. Staff indicated that proceeding with detailed entrainment studies now would substantially delay relicensing, with a corresponding delay in the benefits to be provided by a minimum release flow and the other enhancements. Furthermore, staff noted that DOI's original recommendation was not specific as to the types of studies to be undertaken.

Therefore, staff concluded that DOI's recommendation at the meeting--to delay license issuance--would unnecessarily prevent achievement of other beneficial use objectives. Staff maintained that the project should be relicensed without completion of further studies. The EA (Section V.C.3) discusses this issue and notes that the license could be reopened in the future to address the entrainment issue based on the results of the biological monitoring program required by Article 411.

7. Restriction of Peaking. The DEA did not evaluate a specific alternative to restrict or eliminate peaking during the fish spawning and fry periods (recommended by PFBC). The recommendation was considered in general by staff; but the considerations were not fully documented in the DEA. Staff explained that they would like to know more about the applicable time period(s) and the specific fish species in question.

The PFBC originally recommended only that a plan be developed to restrict or eliminate peaking during the fish spawning and fry periods. At the 10(j) meeting, the PFBC acknowledged that there is a need to define the alternative more specifically, and agreed to provide further information on fish spawning and fry periods for further consideration in the EA. The WVDNR had no comments on this issue. The DOI concurred with the PFBC, and urged further review of the IFIM study results.

In the EA (Section V.C.3 and Appendix B), staff provide an analysis of alternatives to restrict or modify peaking during the fish spawning and fry periods, including consideration of environmental benefits (Section V.C.3) and economic effects (Section VI.B). Staff concluded that further restrictions on peaking, including run-of-the-river operation, would result in increased costs with little potential for biological benefit, and therefore concluded that the recommendation is inconsistent with the balancing provisions of Section 10(a).

8. Inconsistencies on Issues Outside of 10(j). The Commission staff also determined that a number agency and entity recommendations for license conditions were outside the scope

Section 10(j) and did not warrant adoption.8/ I have examined these recommendations and the Commission staff comments on them in the EA. I concur with the EA's finding that under Section 10(a) these recommendations are unwarranted and would not be in the public interest for the reasons given in Section VII of the EA.

COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project.

Under Section 10(a)(2), federal and state agencies filed a total of 25 comprehensive plans that apply to West Virginia and Pennsylvania, of which staff identified 4 plans that are applicable.9/ No conflicts were found.

COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a)(1) of the FPA, 16 U.S.C. 797 (e) and 803(a)(1), require the Commission, in acting on applications for license, to give equal consideration to the power and development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgement will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration. For the reasons discussed below, we conclude that the Lake Lynn Project does not conflict with any planned or authorized development and is best adapted to comprehensive development of the waterway for beneficial public uses.

A. RECOMMENDED ALTERNATIVE

Staff considered several environmental enhancement measures including: run-of-the-river operation, minimum release flows,

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8/ These recommendations included additional studies before license issuance; the scheduling of meetings, reporting, and plan updates; certain details regarding recreational enhancements; and a recommendation to prepare a drought contingency or water utilization plan.

9/ For a list of these plans, see Section VI of the attached EA.

flow ramping, recreational enhancements, and fisheries habitat enhancements.

Based upon staff's independent analysis of the environmental and economic effects of the alternatives, I have selected the applicant's proposed environmental enhancement measures, with additional staff-recommended enhancements, as the preferred alternative. I have selected this alternative because implementation of these measures will: enhance water quality, fisheries, and recreational resources; and will increase public access to the reservoir and river in the project area.

The required enhancement measures will include:

(1) providing a minimum reservoir release flow of 212 cfs when reservoir inflow is greater than or equal to 212 cfs; at other times the minimum release flow will equal inflow to the reservoir but will never be less than 100 cfs;

(2) installing and maintaining three water quality monitoring stations;

(3) conducting a biological monitoring program, including reports every 3 years to the Commission and the resource agencies;

(4) developing plans to evaluate and possibly construct fish attractive/protective structures within an area 200 yards or more down-stream of the dam;

(5) constructing, operating, and maintaining various proposed recreational facilities, with additional enhancements as recommended by staff;

(6) providing consistent notification to the Albert Gallatin Municipal Authority (AGMA) of reservoir water level changes greater than 10 feet;

(7) installing one stream gage down-stream of the dam and a reservoir water level probe up-stream of the dam to ensure accurate compliance monitoring;

(8) preparing a formal agreement to coordinate fluctuating flows with the U.S. Army Corps of Engineers (COE)

B. DEVELOPMENTAL AND NONDEVELOPMENTAL USES OF THE WATERWAY

The project will generate an estimated 125.8 gigawatt-hours (GWh) annually of relatively low-cost electricity from a renewable energy resource for use by WPP customers. Positive, long-term benefits to water quality, aquatic habitat, area aesthetics, and recreational resources also will result from operating the project with the required enhancement measures. Though the cost of these measures will reduce the existing power benefits of the project, the project will still have net benefits over the new license term compared to the least-cost alternative.

The primary costs associated with the required enhancements will be: (1) operation of the project with a minimum release flow, resulting in the loss of about 3,620 MWh in annual generation at an annual levelized cost of about $446,000; and (2) development of new recreational facilities and fisheries enhancements at an annual levelized cost of about $773,000;

In total, the required enhancement measures will reduce the project's levelized annual net benefits from about $12,100,000 to about $10,881,000, or by about $1,219,000.

Based on review of the agency comments filed on this project, and on staff's independent analysis and assessment of the project pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, I find that the Lake Lynn Project with the required environmental enhancement measures is best adapted to a comprehensive plan for the proper use, conservation, and development of the Cheat River and other project-related resources.

TERM OF LICENSE

In 1986, the Electric Consumers Protection Act modified Section 15 of the FPA to specify that any license issued under Section 15 shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years.

Generally, we issue 30-year relicenses for projects that include no substantial new construction or power-generating expansion. We issue relicenses for 40 years or more for projects that include substantial new construction or capacity increases. We issue licenses of longer duration to ease the economic impact of the new costs and to encourage better comprehensive development of the renewable power-generating resource. For the same reason, we may issue longer duration licenses for projects that include substantial or costly environmental mitigation and enhancement measures. Licenses of longer duration in these instances encourage license applicants (1) to be better environmental stewards, and (2) to propose more balanced and comprehensive development of the nation's river basins.

WPP does not propose new hydropower development at the project. In light of the relatively modest environmental mitigation and enhancement costs involved, the new license for the Lake Lynn Project will be for a term of 30 years, effective the first day of the month in which this license is issued.

SUMMARY OF FINDINGS

The EA issued for this project includes background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with engineering safety standards. The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the S&DA prepared for the Lake Lynn Project and available in the Commission's public file for this project.

I conclude that the Lake Lynn Project does not conflict with any planned or authorized development, and it is best adapted to the comprehensive development of the Cheat River for beneficial public uses.

THE DIRECTOR ORDERS

(A) This license is issued to the West Penn Power Corporation (Licensee) for a period of 30 years, effective the first day of the month in which it is issued. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) The following section of Exhibit A filed December 20, 1991:

Section 3.0, pages 2 through 3, entitled "Powerhouse and Turbine-Generating Equipment;" and Section 7.0, page 3, entitled "Transmission Lines.

(2) All lands, to the extent of the Licensee's interests in those lands, shown by the following exhibits, which were included in the application for new license, filed on December 20, 1991.

Exhibit No.	FERC Drawing No. 2459-	Showing
F-1	37	Plan and elevation - dam & powerhouse
F-2	38	Sections - powerhouse
F-3	39	Plan and sections of bridge and east bulkhead
F-4	40	Section - spillway
G-1	41	Project area map
G-2	42	Project area map
G-3	43	Project area map

(3) Project works, consisting of (a) a 125-foot-high by 1,000-foot-long concrete gravity-type dam with a 624-foot-long spillway controlled by 26 Taintor gates, each 17 feet high by 21 feet long; (b) a reservoir with a surface area of 1,700 acres and containing about 72,000 acre-feet of water at full pool elevation of 870 feet National Geodetic Vertical Datum (NGVD); (c) a log boom and trash racks at the intake facility; (d) eight 12-foot by 18-foot gated penstocks of reinforced concrete; (e) a 72-foot by 165-foot by 68-foot-high brick powerhouse containing four identical generating units with a total rated capacity of 51.2 MW; (f) dual 800-foot-long, 138-kV transmission lines; and (g) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of exhibits A, F, and G, recommended for approval.

(4) All of the structures, fixtures, equipment or facilities used to operate or maintain the project, all portable property that may be employed in connection with the project, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibits A, F, and G described above are approved and made part of the license.

(D) This license is subject to the articles set forth in Form L-10 (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting the Interests of Interstate or Foreign Commerce", and the following additional articles:

Article 201. The Licensee shall pay the United States an annual charge, effective the first day of the month in which this license is issued, for the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, as determined by the Commission. The authorized installed capacity for that purpose is 68,270 horsepower.

Article 202. Pursuant to Section 10(d) of the Act, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The Licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment.

To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the Licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The Licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The Licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10 year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

<u>Article 401.</u> The Licensee shall, within 6 months of license issuance, file with the Commission an erosion control plan that specifically addresses construction of the proposed West Penn Beach Recreation Area. The Licensee shall also file similar plans at least 90 days before the start of any other scheduled land-disturbing or land-clearing activities. The erosion control plans shall include measures to control dust and erosion, to stabilize slopes, and to minimize the quantity of sediment and other potential air or water pollutants likely to result from site access, project construction, spoil-disposal, and project operation.

The erosion control plan(s), at a minimum, shall include:

(1) descriptions, functional design drawings, and topographic map locations of control measures;

(2) an implementation schedule; and

(3) provisions for the Licensee's periodic review

and revision of the plan.

The Licensee shall prepare the plan after consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), the West Virginia Division of Environmental Protection (WVDEP), and the Pennsylvania Fish and Boat Commission (PFBC). The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on geological, soil, and groundwater conditions at the site.

The Commission may require changes to the plan. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 402. The Licensee shall, within one year of license issuance, complete an initial survey of shoreline erosion along the entire reservoir shoreline. The Licensee shall also conduct: (1) annual follow-up shoreline erosion surveys of the West Penn Beach shoreline area extending from the dam to the Cheat Haven peninsula, and (2) triennial follow-up shoreline erosion surveys (i.e., every 3 years) of the entire reservoir shoreline. The Licensee shall file shoreline erosion survey reports with the Commission describing survey findings and any planned shore protection measures or measures implemented since the last report.

The Licensee shall be fully responsible for funding and implementing appropriate shore protection measures along the West Penn Beach shoreline area extending from the dam to the Cheat Haven peninsula, and for other shoreline areas as required by the Commission. The Licensee shall provide the results of its erosion surveys to WVDNR, other agencies, and property owners upon request.

The Commission may change the schedule for shoreline erosion surveys and reports. The Commission may require changes to the reports. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the reports are approved. Upon Commission approval, the Licensee shall implement the measures stipulated in the reports including any changes required by the Commission.

Article 403. The Licensee shall maintain the project reservoir at a surface elevation between 868 feet National Geodetic Vertical Datum (NGVD) and 870 feet NGVD from May 1 to October 31, between 857 feet NGVD and 870 feet NGVD from November 1 to March 31, and between 863 feet NGVD and 870 feet

NGVD from April 1 to April 30. The minimum and maximum surface elevations may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods for project maintenance purposes. If the reservoir surface elevations are so modified, the Licensee shall notify the Commission and the West Virginia Division of Natural Resources as soon as possible, but no later than 10 days after each such incident.

To ensure compliance with reservoir surface elevation requirements, the Licensee shall install a level monitor in the project reservoir that records reservoir surface elevation hourly. The Licensee shall provide this data to the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), the West Virginia Division of Environmental Protection (WVDEP), the Pennsylvania Fish and Boat Commission (PFBC), and the Commission within 30 days of any request. The Licensee shall submit a report annually to the DOI, WVDNR, WVDEP, PFBC, and the Commission summarizing the reservoir surface elevation data.

<u>Article 404</u>. The Licensee shall release from the Lake Lynn Hydroelectric Project into the Cheat River a minimum flow of 212 cubic feet per second (cfs), or inflow to the project reservoir, whichever is less--with an absolute minimum release flow of 100 cfs regardless of reservoir inflow, evaporation or other withdrawals. The Licensee shall maintain the 212 cfs minimum release whenever the reservoir water level (measured hourly per Article 403) is stable or increasing. When the reservoir water level is decreasing, the Licensee may reduce the minimum release flow by increments of not more than 25 cfs per hour in order to achieve a stable reservoir water level.

The minimum release flow from the dam shall be measured at the U.S. Geological Survey (USGS) gauge to be installed in the area immediately down-stream of the dam (see Article 407). The reservoir water level shall be measured at the level monitor to be installed in accordance with Article 403.

The minimum release flow may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon agreement between the Licensee and the West Virginia Division of Environmental Protection (WVDEP). If the flow is so modified, the Licensee shall notify the Commission and the WVDEP as soon as possible, but no later than 10 days after each such incident.

<u>Article 405</u>. Within 1 year of license issuance, the Licensee shall file with the Commission, for approval, a plan to continuously monitor dissolved oxygen (DO) levels, temperature, pH, and conductivity of the Cheat River in the project reservoir and down-stream of the project.

The water quality monitoring plan shall describe the installation and maintenance of three water quality monitoring stations, to be located: (1) on the reservoir, (2) in the tailrace area up-stream of Grassy Run, and (3) down-stream of Grassy Run and other principal tributaries known to contain acid mine drainage.

The purpose of this monitoring plan is to evaluate water quality trends and determine compliance with state water quality standards for dissolved oxygen, temperature, and pH in the reservoir and tailrace area down-stream of the dam.

The monitoring plan shall include a schedule for:

(1) implementation of the program;

(2) consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), the West Virginia Division of Environmental Protection (WVDEP), and the Pennsylvania Fish and Boat Commission (PFBC) concerning the results of the monitoring; and

(3) filing the results, agency comments, and Licensee's response to agency comments with the Commission.

The Licensee shall, at a minimum, summarize the water quality data and provide flow release data in an annual report to the Commission and the DOI, WVDNR, WVDEP, and PFBC. The Licensee shall also arrange to meet once every 3 years with the resource agencies (coordinated with triennial biological and recreational plan revisions) to review the effect of operations on water quality and fisheries.

The Licensee shall prepare the plan after consultation with the DOI, WVDNR, WVDEP, and PFBC.

The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the DOI, WVDNR, WVDEP, and PFBC to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 406. If the water quality monitoring required under Article 405 shows any dissolved oxygen levels of less than 5.0 mg/L in the project tailrace area, the Licensee shall notify the Commission and the following resource agencies as soon as possible but no later than 10 days after each such incident: the Department of Interior (DOI); the West Virginia Division of Natural Resources (WVDNR); the West Virginia Division of Environmental Protection (WVDEP); and the Pennsylvania Fish and Boat Commission (PFBC). The Licensee shall then cooperate with the Commission and the agencies to evaluate the low DO reading(s).

Following the notification, if then requested by the WVDEP, and subject to Commission review and approval, the Licensee shall within 6 months of the request, file with the Commission a plan to maintain a tailrace dissolved oxygen level of 5.0 mg/L or greater. The compliance plan shall consider possible reason(s) for the low dissolved oxygen reading(s), and evaluate such provisions as shutting down the hydropower operations, releasing spill flows, or artificial aeration of turbine and spillway flows.

The Licensee shall prepare the plan after consultation with the DOI, WVDNR, WVDEP, and the PFBC. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on site-specific conditions.

The Commission may require changes to the compliance plan, if needed. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the plan complies with the requirements of this article.

Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 407. The Licensee shall, within 1 year of license issuance, fund the installation of one (1) United States Geological Survey (USGS) flow gauging station on the Cheat River down-stream of the dam but up-stream of the river's confluence with Grassy Run. The Licensee shall consult with USGS and the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), the West Virginia Division of Environmental Protection (WVDEP), and the Pennsylvania Fish and Boat Commission (PFBC) about appropriate location. The gauging station shall be equipped with telemetry to allow the Licensee to adjust minimum reservoir releases daily in low flow periods.

Article 408. The Licensee shall, within 6 months of license issuance, consult with the Albert Gallatin Municipal Authority

(AGMA), the Cheat Neck Water Company (CNWC), and the Lakeview Resort on notification requirements during extreme reservoir water level changes. The Licensee shall, within 2 years of license issuance, prepare, execute, and file with the Commission formal agreements of notification with all companies that request notification.

Article 409. If on the basis of its turbidity data the Albert Gallatin Municipal Authority (AGMA) contends that a relationship exists between high turbidity at its new intake and project operations, the Licensee shall consult with and cooperate with AGMA regarding the nature of that relationship. If the monitoring data demonstrate that turbidity problems are caused by project operations, the Licensee shall cooperate with AGMA in identifying potential alternatives to reduce turbidity in the intake water. Alternatives to be considered shall include relocating or shielding the AGMA intake and/or notifying AGMA of project startup and operations. (Notification may allow AGMA to temporarily cease withdrawals during high turbidity conditions.) In the event that the water intake is relocated or otherwise physically modified, the Licensee shall cooperate reasonably with AGMA during any construction.

Article 410. The Licensee shall; within 6 months of license issuance, prepare, execute, and file with the Commission a formal and mutually acceptable agreement with the U.S. Army Corps of Engineers (COE) regarding notification of operating plans. The agreement must include notification procedures and flow release schedules to adequately address the COE's concern about sudden water level changes down-stream in the Monongahela River at the Maxwell Lock and Dam facility.

Article 411. Within 1 year of license issuance, the Licensee shall file with the Commission, for approval, a biological monitoring plan for the Lake Lynn project waters, including the main reservoir, reservoir embayments, tailrace area, and the Cheat River down-stream of the dam extending to the backwater segment of Monongahela River. This plan shall be prepared in consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), and the Pennsylvania Fish and Boat Commission (PFBC). The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The intent of the plan will be to monitor aquatic resources, including fish and benthic organisms. The biological monitoring plan shall also consider, in general, the status of upland and wetland habitat areas and the possible effects resulting from implementing minimum flows and target reservoir levels.

The biological monitoring plan shall be updated every three years. The Licensee shall also arrange to meet at least every three years with the DOI, WVDNR, and PFBC (coordinated with triennial water quality meetings and recreational plan revision) to review the effect of the project on biological resources.

Article 412. Within 2 years of license issuance, the Licensee shall file with the Commission, for approval, a fishery enhancement plan. The plan shall include a schedule for: (1) implementation of the plan; (2) consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), and the Pennsylvania Fish and Boat Commission (PFBC); and (3) filing the results, agency comments, and Licensee's response to agency comments with the Commission.

The enhancement plan shall include plans to submerge brush piles, cribbing, weighted half-logs, and/or other fish attractant devices on hard substrate to provide more usable habitat and enhance fisheries resources in the reservoir. The types and locations should be developed in consultation with the DOI, WVDNR, and PFBC. Proposed locations for the devices shall include the Rubles Run and Morgan Run embayments, located about one mile up-stream of the dam. The exact placement of such devices shall be based on the objectives of providing additional cover, food resources, and spawning substrate and to offset loss of habitat from reservoir drawdowns, particularly the 13-foot winter drawdown.

The fishery enhancement plan shall also consider the potential use of fish attractant devices such as inverted V-deflectors or wing deflectors to provide additional refuge, flow protection, and benthic habitat in the upper segment of the Cheat River at least 200 yards down-stream of the dam.

The Licensee shall prepare the plan after consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), and the Pennsylvania Fish and Boat Commission (PFBC). The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the three fisheries agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 413. The Licensee shall, within 6 months of license issuance, file a plan to minimize any adverse aesthetic impacts associated with the West Penn Beach site development. The plan shall be filed as a component of the revised recreation plan required by Article 415 and must include, at a minimum, specific proposals to:

(1) Minimize destruction of the area's natural vegetation

(2) Blend the recreational development into the existing landscape character

(3) Revegetate, stabilize, and landscape new construction areas and slopes damaged by erosion (see also Article 401)

(4) Light the recreation area at night so as to provide reasonable safety and convenience—but also to minimize adverse impacts from the lighting to adjacent property owners

The Licensee shall prepare the plan after consultation with the Department of Interior (DOI) and the West Virginia Division of Natural Resources (WVDNR). The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the DOI and WVDNR, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission may require changes to the plan. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the plan is approved.

Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 414. The Licensee shall take the following actions for the protection of cultural resources before engaging in any ground disturbing activities, or if cultural properties are found during operations or construction:

(1) Consult with the WV State Historic Preservation Office (SHPO).

(2) Based on consultations with the WV SHPO, prepare a plan describing the appropriate course of action and a schedule for carrying it out.

(3) File the plan for Commission approval.

(4) Take the steps necessary to protect the properties until notified by the Commission that all these requirements have been satisfied.

Article 415. The Licensee shall, within 6 months of license issuance, revise and refile the existing recreation and land management plan.

The Licensee shall prepare the plan after consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), the Pennsylvania Fish and Boat Commission (PFBC), Monongalia County, law enforcement officials, and agencies having land management or planning/zoning authority in the area. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the revised recreation and land management plan, which shall reflect the following recreation enhancements:

(1) West Penn Beach Recreation Area. This shall be a multi-purpose recreational facility encompassing about 46 acres on the West Penn Beach peninsula between Morgan Run and Rubles Run, as illustrated on Attachment T, filed by the Licensee April 26, 1993. The proposal shall accommodate about 400 peak-period visitors and include the following facilities:

a. A main parking lot for about 50 vehicles, an overflow lot for 30 more vehicles, and a 5-space parking lot for the disabled with a drop-off area near the tip of the peninsula.

b. A picnic area loop, to be located farther inland beyond the overflow parking lot. The hillside loop will include 30 picnic sites, each with room for 2 or 3 vehicles for a total of 60 to 90 additional parking spaces. Each picnic site shall include a table and fire grill.

c. Three modern rest room buildings, a children's play area, 5 to 10 picnic tables, and 4 to 8 benches.

d. Two carry-in boat launch docks to be located (1) at the tip of the peninsula, and (2) along a nearby area inside Rubles Run.

(2) Hiking and Biking Trail. The hiking and biking trail shall be barrier-free and about 4 miles long and shall connect with areas north and south the West Penn Beach peninsula. The trail shall also be accessible from the peninsula in accordance with requirements of the Americans with Disabilities Act (ADA). The trail shall follow the former grade of the Baltimore and Ohio Railroad along the reservoir shore and terminate down-stream about 600 feet from the dam, and up-stream at the Cheat Haven Peninsula. The trail shall be posted for use by non-motorized vehicles only. A stairway shall be provided at the down-stream end of the trail (near the dam) that will provide access between the trail and a public parking area for at least 15 cars to be located above the grade of the trail near the project substation.

Pedestrian bridges shall connect main shore areas to segments of trail built along the former railroad grade causeways while also allowing boat access into the embayments. Improvements to the causeways shall include 5 to 10 picnic tables, 6 to 12 park benches, and about 500 feet of fishing jetties. The causeways shall be adequately lit for nighttime use.

(3) Wildlife Habitat/Nature Viewing Areas. Four wildlife habitat/nature viewing areas shall be provided and maintained on Licensee-owned land as follows, with locations corresponding to those indicated in the land management plan filed with the license application:

a. The area known as "Cheat Haven" shall be managed as a day use wildlife habitat/nature viewing area. Cheat Haven shall be accessible either from the hiking and biking trail or by boat.

b. "Area 12" shall be generally preserved as a natural area. Area 12 shall be accessible by boat.

c. "Area 18" shall include 20 day-use dock slips, a rest room building, and 4 to 10 picnic sites in the area adjacent to the proposed hiking and biking trail. Each picnic site shall include a table and fire grille. The remainder of Area 18 shall be left undeveloped, with the exception of several primitive camp sites. The revised recreation plans shall describe the number of primitive campsites to be developed, how camper information will be provided, and measures to prevent overuse, security problems, and conflicts between camping and other recreation uses. The Licensee shall also provide fire rings at each primitive campsite and provide convenient access to firewood and refuse/recycling receptacles.

d. "Area 26" shall be designated as a wildlife habitat/ nature viewing and hunting area. The Licensee shall mark and/or develop a primitive trail system, provide refuse/recycling receptacles and collection, and ensure reasonable parking by monitoring use and expanding parking area capacity if needed.

(4) Public Boat Launch. The Licensee shall designate and manage a public boat launch site at the Sunset Beach harbor. The Licensee shall provide adequate parking at the Sunset Beach site to accommodate average demand for all users during an off-peak summer weekend (i.e., parking may reach or exceed capacity on holiday weekends).

(5) Tailrace Fishing Recreation Area. The Licensee shall provide a shore-fishing recreation area in the project tailrace area. This development shall, at minimum, include the following features:

(1) a 100-foot fishing platform to be located along the east side of the tailrace accessible according to the standards of the Americans with Disabilities Act (ADA);

(2) a public parking area for 15 vehicles;

(3) a pedestrian ramp, containing rest areas with benches, connecting the parking area to the fishing platform;

(4) portable toilets or a rest room; and

(5) a system of visual and audible alarms to furnish sufficient notification of increased or decreased flow releases from the project.

(6) Other Recreational Enhancements. The Licensee shall:

a. Designate as enforceable no-wake boating zones the following areas: the Rubles Run and Morgan Run embayments and the entire area of the main reservoir extending from a point about 2,000 feet up-stream from the tip of the West Penn Beach peninsula to the dam about 1 mile down-stream of the peninsula. The Licensee shall develop a plan, in cooperation with state and local law enforcement, for posting and enforcing the no-wake zone. (The Licensee shall not be responsible for addressing law enforcement as it applies to boats under way on the reservoir.)

b. Employ staff responsible for security on project lands and for working with local law enforcement. The professional security staff shall be on duty (at minimum) during daylight hours on weekends and holidays beginning with the Memorial Day weekend and extending through Labor Day.

c. Develop and maintain shore fishing access trails extending at least 1,000 feet along each side of the West Penn Beach Peninsula. These trails need not be ADA-compliant because reasonable access for the disabled will be provided elsewhere.

d. Provide a fish cleaning station along one of the causeways convenient to the West Penn Beach Peninsula. The station shall be equipped with an independent waste disposal system to ensure that fish cleaning waste is physically removed from the area and properly disposed of. The Licensee shall include plans for building and operating this system.

Article 416. Within 2 years of license issuance, and after Commission approval of the revised recreation plan required by Article 415, the Licensee shall commence construction and provide for the operation and maintenance of (1) the West Penn Beach Recreation Area, (2) the hiking and biking trail, (3) the wildlife habitat/nature viewing areas, (4) the public boat launch facility at the Sunset Beach harbor, (5) the tailrace fishing recreation area, and (6) the other recreation enhancements described further in Article 415.

Article 417. The Licensee shall file a recreation plan update with the Commission every 3 years following issuance of the license. The plan update must be prepared in consultation with the Department of Interior (DOI), the West Virginia Division of Natural Resources (WVDNR), and the Pennsylvania Fish and Boat Commission (PFBC), Monongalia County, local communities, law enforcement, residents, local or regional interest groups, and any other agencies having land management or planning/zoning authority in the area.

The Licensee shall arrange to meet with the DOI, WVDNR, and PFBC every three years to evaluate recreational facilities in the project area. The Licensee shall, as part of the ongoing recreation planning process, monitor recreation use of the project area to determine whether existing recreation facilities are meeting recreation needs. Monitoring studies, at a minimum, shall include the collection of annual recreation use data.

The triennial recreation plan updates shall include:

(1) annual recreation use figures;

(2) a discussion of the adequacy of the Licensee's recreation facilities at the project site to meet recreation demand;

(3) a description of the methodology used to collect all study data;

(4) if there is a need for additional facilities, a recreation plan proposed by the Licensee to accommodate recreation needs in the project area;

(5) documentation of agency consultation and agency comments on the report after it has been prepared and provided to the agencies;

(6) consideration of the following project-specific issues:

a. safety and security;

b. navigational problems such as shallow water or heavy boat traffic;

c. swimming use, considering such issues as demand for swimming, commonly used sites, any problem areas, and the advantages and disadvantages of establishing permanent swimming sites;

d. user demand patterns for boat launching and other activities at Sunset Beach, Area 26, and other alternate boat launch site locations; if parking or capacity problems at Sunset Beach are not easily resolved, the Licensee shall evaluate development of alternate boat launch sites;

e. the viability of continuing the primitive camping and privileged permit lease lot programs (including modifications to address demand, user conflicts, or other issues); and

(7) specific descriptions of how the agencies' comments are accommodated by the plan updates.

The Licensee shall include with the triennial recreation plan updates documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the DOI, WVDNR, and PFBC, and specific descriptions of how those agencies' comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the action items identified in the plan, including any changes required by the Commission.

Article 418. (a) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the Licensee may grant permission without prior Commission approval are:

(1) landscape plantings;

(2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings;

(3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and

(4) food plots and other wildlife enhancement.

To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall:

(1) inspect the site of the proposed construction;

(2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site; and

(3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline.

To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The Licensee may convey easements or rights-of-way across, or leases of, project lands for:

(1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained;

(2) storm drains and water mains;

(3) sewers that do not discharge into project waters;

(4) minor access roads;

(5) telephone, gas, and electric utility distribution lines;

(6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary;

(7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and

(8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir.

No later than January 31 of each year, the Licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed. If no conveyance was made during the prior calendar year, the Licensee shall so inform the Commission and the Regional Director in writing no later than January 31 of each year.

(d) The Licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for:

(1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained;

(2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained;

(3) other pipelines that cross project lands or waters but do not discharge into project waters;

(4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained;

(5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina;

(6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and

(7) other uses, if: (i) the amount of land conveyed for a particular use is five acres

or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year.

At least 60 days before conveying any interest in project lands under this paragraph (d), the Licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the Licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the

Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the Licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

Article 501. The Licensee, within 4 months of issuance of this license, shall file a Hydropower Compliance Management Program (HCMP) for Commission approval. The HCMP shall include the following elements for each license requirement:

(a) The identification of, and schedule for, each action necessary to complete the license requirement;

(b) A schedule for the start and completion of the consultation process with each resource agency required to be consulted for each action necessary to complete the license requirement; and

(c) The identification of specific individuals in each agency that need to be consulted on each action necessary to complete the license requirement.

Seven copies of all submissions under this article must be filed with the Secretary of the Commission. One copy of each submission must also be filed with any agency consulted under element (b) above.

The Commission reserves the right to require the Licensee to make modifications to the HCMP and to take other measures necessary to ensure compliance by the Licensee with the terms and conditions of the license.

Article 502. If the Licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

(E) The Licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(F) This order is issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. section 385.713. The filing of a request to rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The Licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Fred E. Springer
Director, Office of Hydropower Licensing

Form L-10
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING THE INTERESTS OF INTERSTATE OR FOREIGN COMMERCE

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Con- struction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant
to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial
sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in

Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission any direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Commission may prescribe for the purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the pro- ject boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 22. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 23. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

FINAL
ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE

Lake Lynn Hydro Project

FERC Project No. 2459—West Virginia

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 North Capitol Street, NE
Washington, D.C. 20426

DEC 27 1994

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SUMMARY

West Penn Power Company (WPP) proposes to continue operation of the Lake Lynn Hydroelectric project on the Cheat River in the north-central portion of West Virginia near the border of the Commonwealth of Pennsylvania (see Figure 1). The project has an installed capacity of 51.2 megawatts (MW), and produces an average of about 130 gigawatt-hours (GWh) annually.

In addition to WPP's proposal, the Federal Energy Regulatory Commission considered two alternatives: (1) WPP's proposal with additional environmental recommendations, and (2) no action. No action would consist of continued operation of the project under the terms and conditions of the existing license with no change to the environmental setting or project operation.

We recommend that WPP implement the project as proposed, incorporating the following additional measures:

- Provide a minimum reservoir release flow of 212 cfs when reservoir inflow is greater than or equal to 212 cfs. At other times the minimum release flow should equal inflow to the reservoir but should never be less than 100 cfs. Minimum release flows are proposed to apply regardless of reservoir evaporation and other withdrawals.

- Install and maintain three water quality monitoring stations—one on the reservoir, one in the tailwater area below the dam, and one at a site down-stream of the acid tributaries. The stations should continuously monitor pH, dissolved oxygen, conductivity, and temperature.

- Conduct a routine biological monitoring program, including reports every 3 years to the Commission and the resource agencies. The monitoring should include, at a minimum, fish and benthic organism sampling above and below the dam (including the tailrace area) and in the embayments at the West Penn Beach peninsula.

- If so ordered by the Commission, develop a plan in consultation with the U.S. Department of Interior (DOI), West Virginia Department of Natural Resources (WVDNR), and Pennsylvania Fish and Boat Commission (PFBC) concerning the need for fish entrainment and mortality evaluations or an enhancement program.

- Develop plans to evaluate and construct fish attractive/protective structures within an area 200 yards or more down-stream of the dam. This feature

would provide refuge for fish from high flows and enhance benthic habitat.

- Develop recreation enhancements similar to those originally proposed by WPP with only minor variations. (West Penn Beach Recreation Area, tailrace fishing area, trails, and a boat launch.)

- Provide consistent notification to AGMA of reservoir water level changes greater than 10 feet. If, after relicensing, AGMA contends that a relationship exists between high turbidity and project operations, we recommend that WPP consult with and cooperate with AGMA regarding the exact nature of that relationship. We also recommend that WPP cooperate with AGMA as appropriate in identifying potential alternatives to reduce turbidity in the intake water; however, WPP would not be required to modify its operations or to implement/fund any protective measures.

- Install one stream gage down-stream of the dam and a reservoir water level probe up-stream of the dam to ensure accurate monitoring of reservoir water level up-stream of the dam and minimum release flows below the dam.

- Continue to coordinate details of project operation with the U.S. Army Corps of Engineers (COE) by preparing a formal agreement. The agreement should address notification procedures regarding project startup or flow release schedules.

Under Section 10(a)(2) of the Federal Power Act (FPA), federal and state agencies filed 24 comprehensive plans that address various resources in West Virginia and Pennsylvania. Four of those plans are relevant to this project. The proposed project would not conflict with any of the plans.

Under Section 10(j) of the FPA, we made a preliminary determination that some of the recommendations of the federal and state fish and wildlife agencies are not consistent with the purposes and requirements of Part I of the Act. Section 10(j) of the Act requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations, some of which remain inconsistent with those of the agencies. All agency recommendations identified in Section VII of the Draft Environmental Assessment that were determined to be inconsistent with Section 10(j) were discussed at a meeting in an attempt to resolve differences (see Section VII--Consistency with Fish and Wildlife Recommendations).

Based on our independent environmental analysis, we conclude that issuance of a license for the Lake Lynn Project, with our additional environmental recommendations, is not a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING
DIVISION OF PROJECT REVIEW

Lake Lynn Hydroelectric Project
FERC Project No. 2459—West Virginia

INTRODUCTION

The Federal Energy Regulatory Commission issued the Lake Lynn project Draft Environmental Assessment (DEA) for comment on June 24, 1994. In response, we received eight comment letters. Those commentors are listed in Section IV.E—Comments on the Draft Environmental Assessment. Staff reviewed all timely-filed comment letters. The sections of the DEA that have been modified as a result of comments received are identified in the staff responses to the right of the letters of comment in Appendix B.

I. APPLICATION

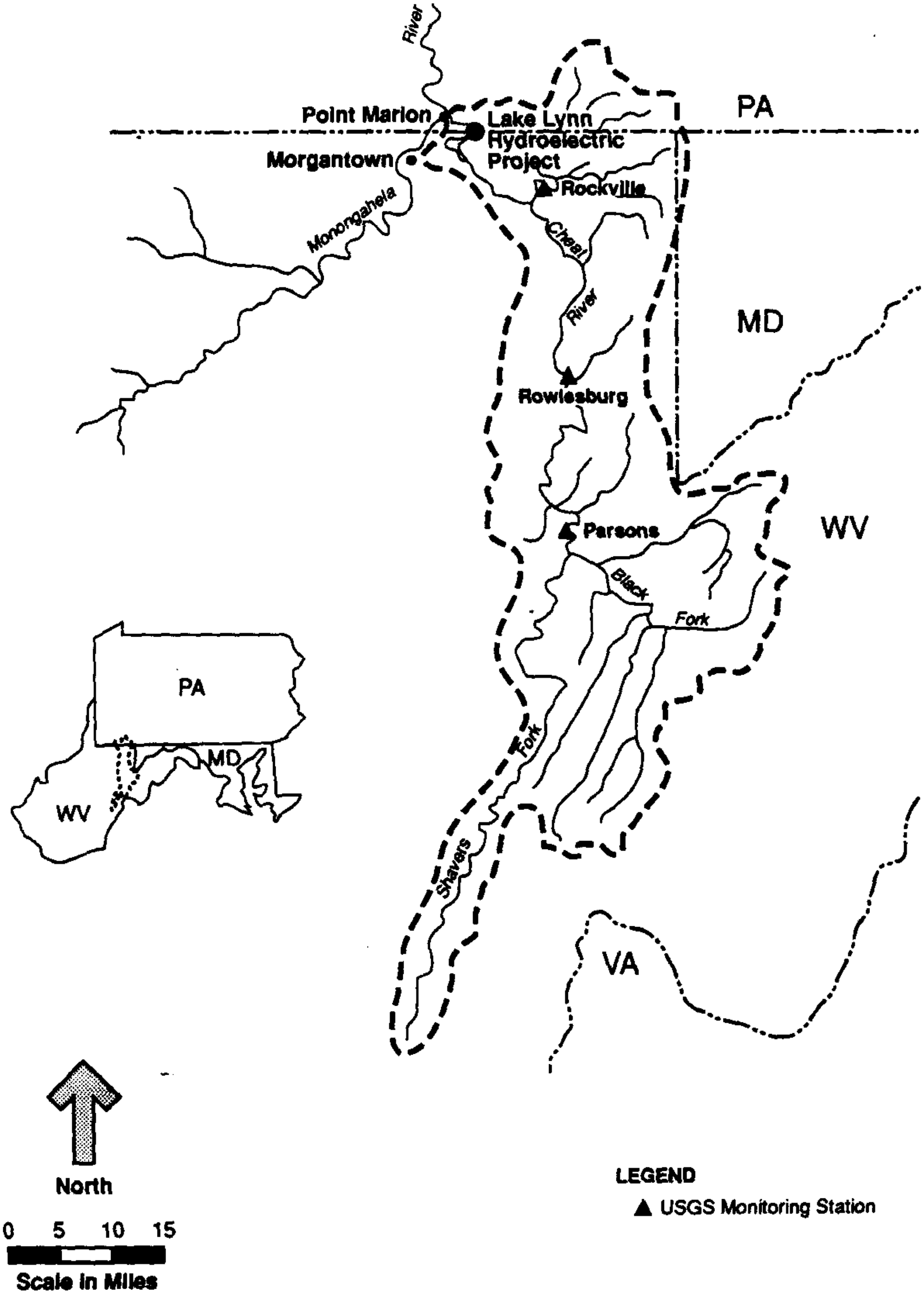
On December 20, 1991, West Penn Power Company (WPP), filed an application for a new license for the existing Lake Lynn Hydroelectric Project, a major project that produces 51.2 megawatts (MW) of electricity. The project is located on the Cheat River, 8 miles northeast of Morgantown, West Virginia (Figure 1). It does not occupy any lands of the United States.

II. PURPOSE AND NEED FOR ACTION

A. Purpose

This environmental analysis assesses the impacts associated with construction and operation of the project, alternatives to the proposed project, and makes recommendations to the Commission on whether to issue a license, and if so, recommends terms and conditions to become a part of any license issued. The Federal Power Act provides the Commission with the exclusive authority to license nonfederal water power projects on navigable waterways and federal lands.

In deciding whether to issue any license, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purpose of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the protection of



SOURCE: Allegheny Power Service Corp.

FIGURE 1

Lake Lynn Hydroelectric Project – Cheat River Basin

SOURCE: Allegheny Power Service Corp.

recreational opportunities, and the preservation of other aspects of environmental quality.

B. Need for Power

The North American Electric Reliability Council (NERC) annually forecasts electric supply and demand for the region and nation. Each forecast covers a 10-year period. NERC published its latest forecast in *Electric Supply & Demand 1993-2002, Summary of Electric Utility & Demand Projections* (June 1993). NERC is divided into 9 regions encompassing the 48 contiguous states and Canada. Alaska constitutes the 10th region. The Lake Lynn project is within the East Central Area Reliability Coordination Agreement (ECAR) region. Table 1 summarizes the annual supply and demand projections for both ECAR and the 48 states over the next 10-year period.

Even with the Lake Lynn project operating, demand is projected to grow faster than generating capacity and capacity margins will decrease. The project provides average annual generation of 129,400 MWh to ECAR. The long-term contribution of the project, combined with the projected increase in load and decrease in capacity margin, confirm the need for the project's generating capacity.

The electricity generated by the project will benefit the region by providing some of the needed regional power. The continued economic operation of the Lake Lynn Hydroelectric Project will prevent potential increases in the use of fossil-fueled electrical generating plants. This will conserve nonrenewable energy sources and reduce the potential for increased air pollution (see Section VI).

WPP is a wholly owned subsidiary of Allegheny Power System, Inc. (APS). All power produced by the Lake Lynn Hydroelectric Project is dispatched as needed to serve more than 625,000 WPP customers and more than 1.25 million APS customers.

III. PROPOSED ACTION AND ALTERNATIVES

A. Applicant's Proposal

1. Project Description

The Lake Lynn Hydroelectric Project on the Cheat River was constructed between 1912 and 1926. Construction began in 1912, halted in July 1913, resumed 12 years later in 1925, and was completed in 1926. The reservoir, dam, and powerhouse are within Monongalia County, West Virginia, while most of the tailrace area is in Fayette County, Pennsylvania. The reservoir is about 13 miles long and is developed with residential and recreation-based uses (Figure 2).

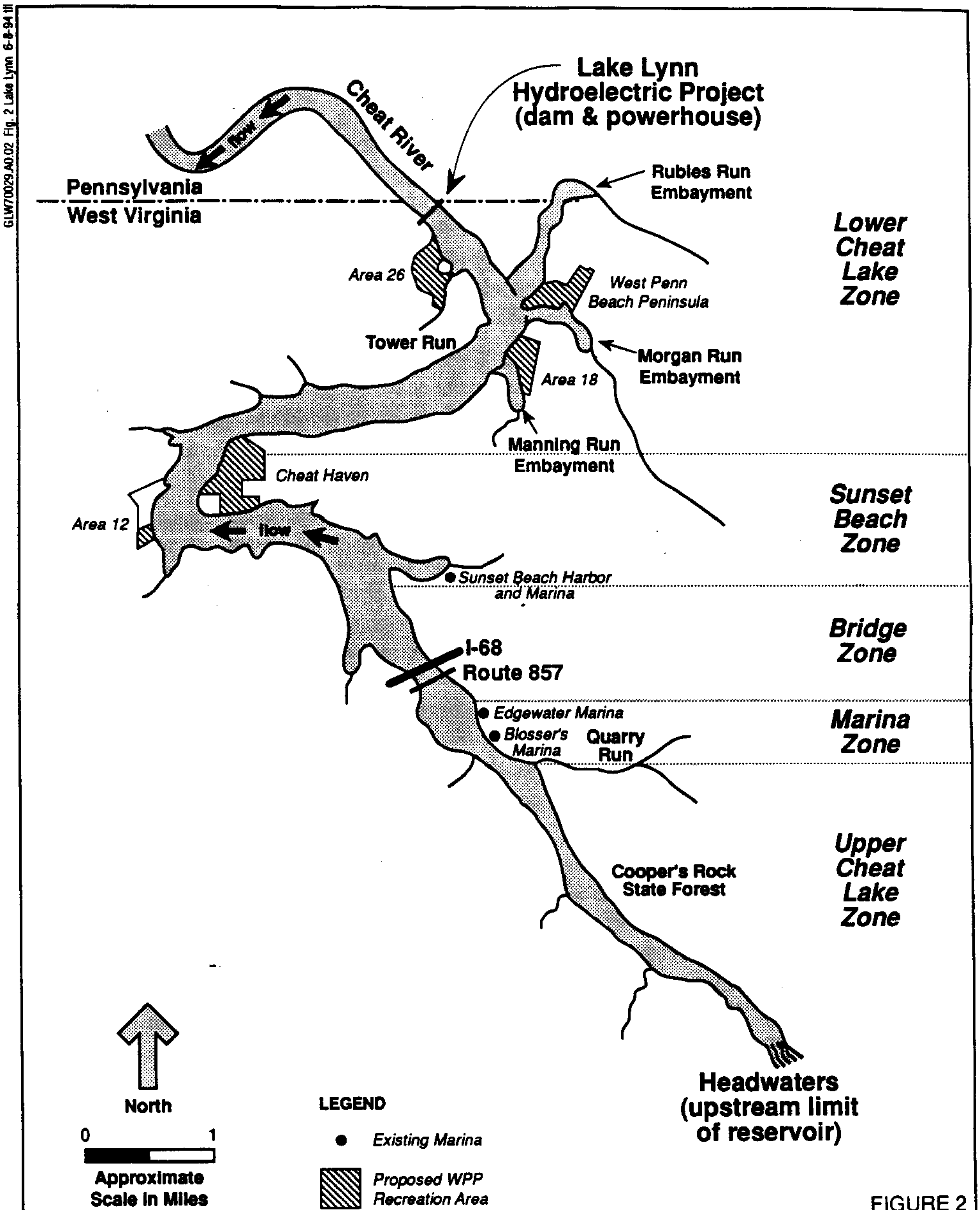


FIGURE 2
Lake Lynn Reservoir (Cheat Lake)
SOURCE: Allegheny Power Service Corp. (modified by staff)

Table 1. Projected electric power supply and demand.

Year	Load (Thousand MWh)	Peak Demand (MW)	Planned Capacity (MW)	Capacity Margin (%)
		ECAR Region		
1993	468,804	82,409	100,027	19.5
1994	478,768	84,151	101,122	18.9
1995	486,736	85,488	101,164	17.9
1996	495,107	86,764	101,895	17.4
1997	502,779	87,957	102,573	16.8
1998	511,017	89,116	103,916	16.8
1999	518,893	90,402	104,916	16.5
2000	526,057	91,636	106,672	16.7
2001	533,452	92,910	108,137	16.7
2002	540,936	94,291	109,882	16.6
AAGR %	1.6	1.5	1.0	
		United States (48)		
1993	3,059,969	571,074	697,432	20.8
1994	3,124,750	581,765	707,942	20.6
1995	3,184,591	592,142	716,548	20.2
1996	3,239,741	602,074	726,565	20.0
1997	3,294,811	612,668	734,826	19.6
1998	3,354,889	623,062	743,437	19.3
1999	3,423,124	633,538	753,438	19.0
2000	3,479,197	644,796	762,774	18.7
2001	3,542,291	655,636	769,891	18.1
2002	3,603,399	667,260	778,783	17.6
AAGR %		1.7	1.2	

AAGR = Average Annual Growth Rate

The Lake Lynn hydroelectric project (Figure 3) consists of (a) a 125-foot-high by 1,000-foot-long concrete gravity-type dam with a 624-foot-long spillway controlled by 26 Taintor gates, each 17 feet high by 21 feet long; (b) a reservoir with a surface area of 1,700 acres and containing about 72,000 acre-feet of water at full pool elevation of 870 feet National Geodetic Vertical Datum (NGVD); (c) a log boom and trash racks at the intake facility; (d) eight 12-foot by 18-foot gated penstocks of reinforced concrete; (e) a 72-foot by 165-foot by 68-foot-high brick powerhouse containing four identical generating units with a total rated capacity of 51.2 MW; (f) dual 800-foot-long, 138-kV transmission lines; and (g) appurtenant facilities.

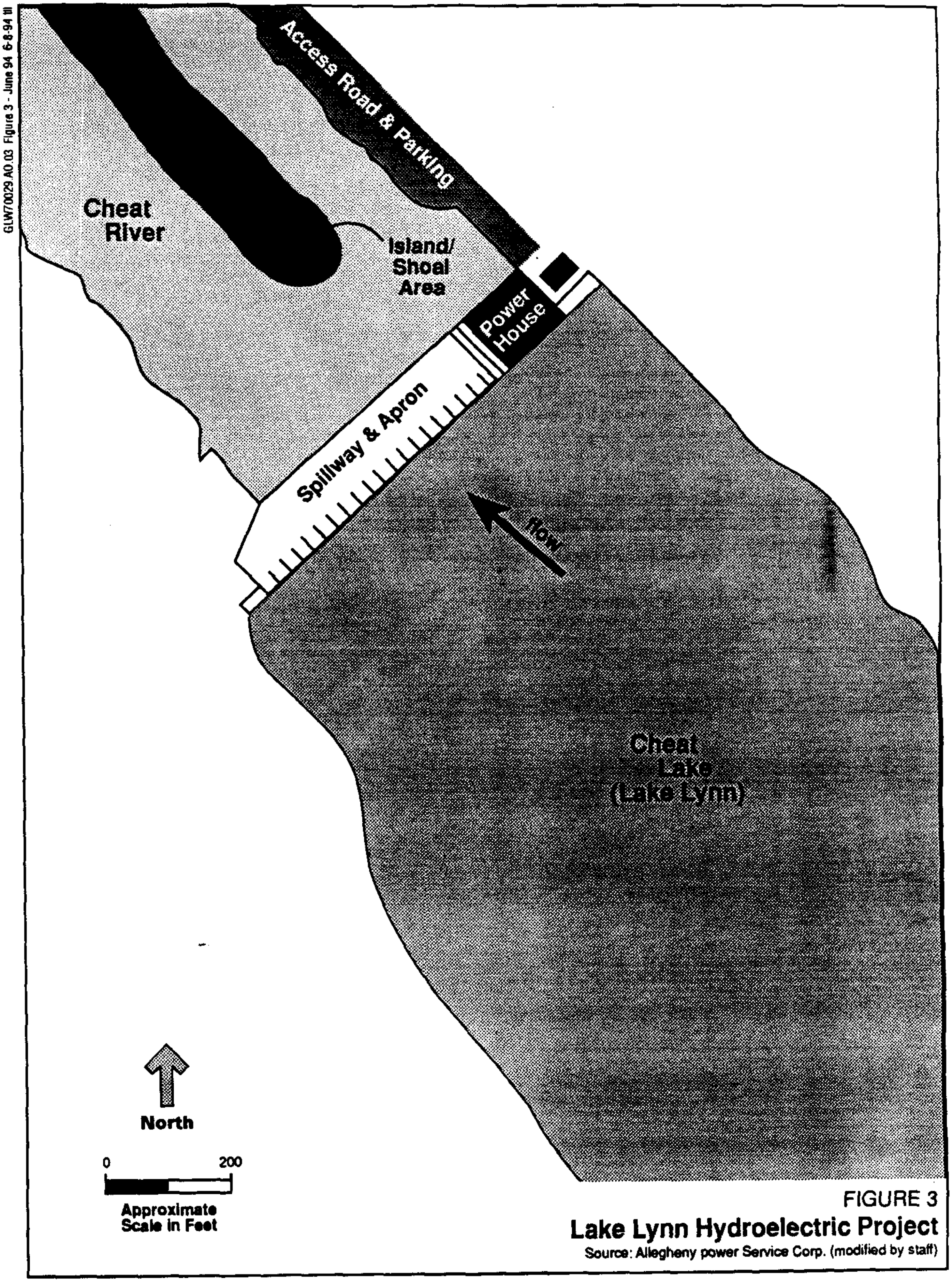


FIGURE 3
Lake Lynn Hydroelectric Project
Source: Allegheny power Service Corp. (modified by staff)

The Lake Lynn project is operated to optimize peak demand period generating. The plant is capable of responding to load changes more rapidly than other generating plants in the APS system. As APS's sole source of significant black-start capability, it is extremely valuable for restarting the system during a blackout. (A power plant with black-start capability may be started up without any electrical power available at the time of startup.) The plant also provides exceptional direct control load regulation capability and local voltage support. The ability to perform these functions gives the plant a high capacity value relative to other power plants in the system.

WPP owns the property surrounding the reservoir—about 450 to 500 acres. Much of the project boundary is coterminous with the reservoir, although there are some areas where land holdings extend beyond the project boundary. Lands outside the project boundary include the West Penn Beach peninsula, land along the shore up-stream and down-stream of that peninsula, a portion of the Cheat Haven peninsula, and land around the dam and powerhouse. WPP provides public access and lease agreements for the private use of its reservoir lands. Recreation opportunities include fishing, hunting, camping, and picnicking.

2. Proposed Environmental Measures

WPP proposes the following enhancements related to project operation:

- Provide a variable minimum flow release of 212 cubic feet per second (cfs), 100 cfs, or net reservoir inflow during nonoperating periods to enhance the quality of water, fish, and other aquatic life.

- Develop a 46-acre multiple-use barrier-free recreation facility and a 4-mile hiking/biking trail centered at the West Penn Beach peninsula, between the Rubles Run and Morgan Run embayments.

- Develop a barrier-free fishing area in the tailrace portion of the project.

- Install visual and audible alarms in the tailrace to notify recreationists of changes in operations (increased or decreased flow releases).

- Provide a barrier-free public boat launch and parking area on Cheat Lake at the Sunset Beach marina site.

- Designate four "wildlife habitat/nature viewing areas" on parcels owned by WPP.

- Submerge brush piles in the Rubles Run and Morgan Run embayments to enhance fish habitat during winter draw-downs.

We discuss these proposals in the individual resource sections.

B. Modifications to Proposed Project Operations or Facilities

The alternative to licensing the project as proposed is to license the project with modifications and other resource protection and enhancement measures. The following additional enhancement measures are proposed by various agencies and environmental groups:

- Continue project operation as a peaking power plant with a minimum release of 212 cfs at all times, regardless of reservoir inflow, from April 1 to October 31. [West Virginia Division of Natural Resources—WVDNR]

- Maintain a minimum release of 212 cfs from November 1 to March 31 if inflow is 212 cfs or more, with no accounting for evaporation or other reservoir withdrawals. [WVDNR]

- Provide a minimum release of 1,100 cfs when inflow equals or exceeds that amount, decreasing in 100-cfs increments in response to decreasing inflows to an ultimate minimum release of 212 cfs. [Pennsylvania Fish and Boat Commission—PFBC]

- Operate the project in an instantaneous run-of-river mode, [U.S. Department of Interior—DOI] or switch to a run-of-river operation following documentation of consistent reproduction and recruitment of fish in the Cheat River down-stream of the dam. [PFBC]

- Prepare a "drought contingency or water utilization plan" to establish priorities for water use to avoid future conflicts. [WVDNR]

- Maintain the reservoir pool at 868 to 870 feet NGVD from April 1 to October 31 and maintain it at 857 to 870 feet from November 1 to March 31. [WVDNR]

- Monitor the reservoir and tailwater pH, dissolved oxygen, and temperature. [DOI, WVDNR, PFBC]

- Address the potential for fish entrainment and mortality by completing detailed post-licensing studies. [DOI, WVDNR]

- Develop a plan to avoid, mitigate, or compensate the State of West Virginia for fish mortality impacts if and when turbine entrainment studies are completed and if negative impacts are documented. [WVDNR]

- Conduct biological monitoring studies to evaluate the effectiveness of the post-licensing minimum release flow and other environmental enhancements on aquatic organisms. [WVDNR]

- Implement various specific recreational improvements that do not warrant listing herein because, although they involve substantial investment, the estimated cost differences are negligible compared to the applicant's proposal. [WVDNR, PFBC, Cheat Lake Environmental and Recreation Alliance—CLEAR]

- Provide fish attraction structures in the tailwater near the fishing platform and other down-stream areas. These could consist of rock piles 15 to 30 feet from shore or stone deflectors extending out from shore. [PFBC]

- Provide consistent notification to the Albert Gallatin Municipal Authority (AGMA) of reservoir water level changes greater than 10 feet. Ensure adequate monitoring of up-stream reservoir inflow and all withdrawals. Address conditions causing turbidity up-stream of the dam at the water intake. [AGMA]

- Continue to coordinate details of project operation with the U.S. army Corps of Engineers (COE), providing notification of planned flow releases. [COE]

We discuss each recommendation in the individual environmental resource section.

C. No-Action Alternative

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives. We discuss the alternative of license denial and project decommissioning below in Section III.D.

D. Alternatives Considered but Eliminated from Detailed Study

We considered several other alternatives to the applicant's relicensing proposal but eliminated them from detailed study because they are not reasonable in the circumstances of this case. They are:

- Federal takeover and operation of the project
- Issuing a nonpower license
- Decommissioning the project
- Ponding and pulsing operation

We do not consider federal takeover pursuant to Section 14 of the FPA to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

Issuing a nonpower license would not provide long-term resolution of the issues presented. A nonpower license is a temporary license that the Commission will terminate whenever it determines another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. In this case, no agency has suggested its willingness or ability to do so. No party has sought a nonpower license, and we have no basis for concluding that the project should no longer be used to produce power. Thus, a nonpower license is not a realistic alternative to relicensing in these circumstances.

Project decommissioning could be accomplished with or without dam removal. Either alternative would involve denial of the relicense application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that dam removal would be appropriate in this case, and we have found no basis for recommending it. The reservoir is an important recreational resource, and the dam is the critical civil structure required to maintain it. Thus dam removal is not a reasonable alternative to relicensing the project with appropriate mitigation and enhancement measures. Furthermore we believe that the operator should retain a reasonable economic incentive and a return on investment. This will secure a commitment to maintain the dam in good repair and ensure the reservoir's long-term management, including maintenance of recreation facilities, protection from flooding, and measures to enhance biological resources.

The second decommissioning alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency willing and able to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated project decommissioning, nor have we found any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we do not consider removal of the electric generating equipment to be a reasonable alternative.

The DOI recommended that ponding and pulsing operations be considered as alternatives. The DOI provided no basis or justification for its recommendation and did not include any further information concerning those alternatives. We believe those alternatives generally represent variations on a peaking mode of operation, and are therefore addressed in our detailed analyses of WPP's proposal and other peaking alternatives.

IV. CONSULTATION AND COMMENTS

A. Agency Consultation

The Commission's regulations require the prospective applicant to consult with the appropriate resource agencies before filing a license application. After an application is accepted, the Commission issues a public notice and seeks formal comments in accordance with federal statutes. All comments become a part of the record and are considered during analysis of the project.

The Commission issued public notice of WPP's application for new license for the project on July 27, 1993.

The following entities commented on the application by the March 28, 1994, deadline specified in our notice that the application was ready for environmental analysis.

Commenting Entity	Date of Letter
Mr. Richard Sabat	March 10, 1994
U.S. DOI	March 18, 1994
PFBC	March 23, 1994
WVDNR	March 24, 1994
League of Women Voters of Morgantown and Monongalia County	March 28, 1994

WPP responded to their comments and recommendations in its letter dated May 11, 1994.

B. Interventions

Besides providing comments, organizations and individuals may petition to intervene and become a party to any subsequent proceedings. The following entities filed a motion to intervene in the proceeding.

Intervenor	Date of Motion
Sierra Club, Monongahela Group	September 24, 1993
Cheat Lake Recreation and Environmental Association (CLEAR)	September 27, 1993
League of Women Voters	September 29, 1993
WVDNR	September 30, 1993
WVDEP	September 30, 1993

All five motions have been granted.

C. Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act (CWA),1/ the Commission may not issue a license for a project unless either the license applicant obtains water quality certification from the certifying agency of the state in which the project discharge will originate, or the certifying agency waives certification. Section 401(a)(1) permits the Commission to deem certification waived if the certifying agency fails to act on a water quality certification request within a reasonable period of time, not to exceed 1 year.

On September 19, 1991, WPP filed with WVDNR an application for Section 401 water quality certification for the Lake Lynn Project. WVDNR denied the application for certification on March 9, 1992 for failure to comply with state regulatory requirements.

On May 11, 1992, WPP filed a second application for water quality certification. On June 8, 1992, WVDNR notified WPP that the second application was incomplete and requested that WPP provide more information. Effective July 1, 1992, authority to grant water quality certification in West Virginia was transferred from the WVDNR to the newly created West Virginia Department of Environmental Protection (WVDEP). In a letter dated May 10, 1993, WVDEP denied the second WPP application for certification.

WPP filed a third application for certification with WVDEP on June 23, 1993. In a subsequent letter to WPP dated October 18, 1994, WVDEP indicated that it had granted water quality certification for the project, subject to 15 specific conditions being included in any new Commission license for the project. However, because WVDEP did not act on the application within one year of its June 23, 1993 filing date, the certification requirements of Section 401 of the CWA for the Lake Lynn Project are deemed by the Commission to be waived.

1/Commission staff is aware of PUD No. 1 of Jefferson County v. Washington Department of Ecology, (U.S. Sup. Ct. No. 92-1911, May 31, 1994). As appropriate, the license order in this proceeding will address the relevance of the issues discussed in Jefferson County.

Therefore, we do not consider inclusion in the license of the conditions proposed in WVDEP's October 18, 1994 letter to be mandatory. However, in the exercise of the Commission's responsibilities under FPA Section 10(a), the Commission staff has examined WVDEP's 15 proposed license conditions and recommended adoption or partial adoption of several of the proposed conditions. The Commission staff's findings with respect to WVDEP's proposed 15 proposed license conditions are discussed below.

Condition 1 recommends that WPP file an operating plan within one year of license issuance that would ensure the maintenance or improvement of dissolved oxygen levels in the Cheat River down-stream of the project. WVDEP recommends that this plan contain provisions to shut down the hydropower station, inject air/oxygen or take any other steps necessary to maintain dissolved oxygen concentrations at or above levels that would occur if the water was passed through the dam gates. We do not recommend that Condition 1 become a part of the license because, historically, there do not appear to have been any problems with low dissolved oxygen at the Lake Lynn Project. Instead, we propose that WPP notify the agencies and the Commission if tailrace dissolved oxygen levels should ever fall below the current state standard of 5.0 mg/L, and then file a compliance plan if required by the Commission (see Section V.C.2 and staff responses to DEA comment letters in Appendix B).

Condition 2 recommends that WPP operate a peaking power plant, with reservoir water level elevations to be maintained within the following ranges: 868 to 870 feet NGVD from May 1 to October 31; 857 to 870 feet NGVD from November 1 to March 31; and 863 to 870 feet NGVD from April 1 to April 30. We recommend that Condition 2 become a part of the license (see Section V.C.2).

Condition 3 recommends that WPP develop and implement a "project operation plan" within 1 year of license issuance to minimize impacts to the existing reservoir and down-stream uses. We do not recommend that Condition 3 become a part of the license because the overall plan of operation is set forth by the terms of the proposed license (see Section V.C.2); therefore, the filing of a general project operation plan is unnecessary. We also note that our recommendations include WPP's filing of several specific plans, including plans for water quality monitoring, biological monitoring, fisheries enhancement, erosion control, aesthetics, and recreation--as well as various reports, plan updates, and additional plans after relicensing.

Condition 4 recommends that WPP:

- Within 1 year of license issuance, develop and implement a plan to continuously monitor pH, dissolved oxygen, temperature, and conductivity in the reservoir and tailrace. We recommend this item become a part of the license (see Section V.C.2).

- Provide an absolute minimum release flow of 212 cfs during all times of the year to reduce the acidity of tailrace water and enhance biological production. We do not recommend that this item become a part of the license because of concerns about maintaining the2 reservoir water level elevation at the desired recreation pool. We recommend a 212 cfs minimum release, or reservoir inflow, whichever is less, with an absolute minimum release of 100 cfs (see Section V.C.2).

- Conduct biological studies within the first year after relicensing and every three to five (3 to 5) years thereafter, as deemed necessary by WVDEP, WVDNR, DOI, and other agencies. We generally recommend that this item become a part of the license; the initial biological monitoring plan is recommended for filing within 1 year of license issuance, with plan updates and agency meetings recommended every 3 years (see Section V.C.3).

- Schedule triennial meetings with the WVDEP, WVDNR, DOI, and other agencies to evaluate the effectiveness of the minimum release flow and water quality monitoring. We recommend that this item become a part of the license (see Section V.C.3).

Condition 5 recommends that WPP contact WVDEP relative to the requirements of the Construction Storm Water/Nonpoint Source Program, which requires a National Pollutant Discharge Elimination System (NPDES) permit for construction disturbances of grater than three acres. We do not recommend that Condition 5 become a part of the license because the NPDES permit process is separate from the project relicensing process. We agree that WPP should apply for an NPDES permit and any other applicable permits before undertaking major construction activities. However, a license article is not needed in this case because we recommend the filing of an erosion control plans before commencement of any construction activities (see Section V.C.1).

Condition 6 recommends that WPP design, coordinate, and implement a turbine entrainment study, if deemed necessary by the WVDNR and the DOI. We do not recommend that Condition 6 become a part of the license because the Commission would reserve authority to require a turbine entrainment study. The Commission may require such a study on its own or based on agency recommendations (see Section V.C.3).

Condition 7 recommends that WPP construct, operate, and maintain a permanent public fishing access/recreation site at the West Penn Beach area (see Figure 2), including several specific recreation features (listed in the October 18, 1994, letter). We recommend that Condition 7 become a part of the license. We believe that minor differences between the proposed license onditions and the WVDEP recommendations (i.e., parking capacity, placement of fish attractors) can be resolved through recommended consultations before site development (see Section V.C.8).

Condition 8 recommends that WPP develop the area identified as Area 26 (see Figure 2), for public recreation, including several specific recreation features (listed in the October 18, 1994, letter). We recommend that Condition 8 become a part of the license. We believe that minor differences between the proposed license conditions and the WVDEP recommendations (i.e., parking capacity, trail characteristics, fish attractors, and access for the handicapped) can be resolved through recommended consultations before site development (see Section V.C.8).

Condition 9 recommends that WPP construct, operate, and maintain a free public boat launch, or make provisions to provide this service. The October 18, 1994, letter specifically states that this or another boat ramp must also be usable by fishermen in the winter when the reservoir water level elevation fluctuates between 857 and 870 feet NGVD. We partially recommend that Condition 9 become a part of the license. We would not require that any ramp provided by WPP be usable by fishermen in the winter. There is no evidence that this need exists (see Section V.C.8); furthermore, it is our understanding that WVDEP's recommendation may include an interest in providing access to the reservoir's ice, which we consider an unsafe form of recreation.

Condition 10 recommends that WPP conduct a reservoir recreation use survey within 3 years of completing the recreational developments, with survey design to be approved by the WVDNR. The WVDEP also recommends that reviewing agencies be given authority to require additional improvements based on this survey. We recommend that Condition 10 become a part of the license, except that we would not give the agencies sole authority to require additional improvements; the Commission would retain that authority, with consideration of input from the agencies (see Section V.C.8).

Condition 11 recommends that WPP, after consulting with WVDNR and DOI, and within 6 months of license issuance, file a reservoir recreation development plan for resource agency approval. We recommend that Condition 11 become a part of the license; specifically, we recommend that one recreation development plan (i.e., for all facilities specified in the license) be filed with the Commission for approval within 6 months of license issuance, including documentation of consultation with resource agencies (see Section V.C.8).

Condition 12 recommends that WPP construct, operate, and maintain permanent public fishing access/recreation site at the project tailrace area, including several specific recreation features (listed in the October 18, 1994, letter). We recommend that Condition 12 become a part of the license. We believe that minor differences between the proposed license conditions and the WVDEP recommendations (i.e., shore walkways, fish attractors, and boating access) can be resolved through recommended consultations before site development (see Section V.C.8).

Condition 13 recommends that WPP construct and maintain a parking lot for at least 15 cars on a site located adjacent to the project substation/transformer yard, with stairs connecting to the main reservoir trail (to be developed along the former railroad right-of-way). We recommend that Condition 13 become a part of the license (see Section V.C.8).

Condition 14 recommends that WPP conduct a tailrace area recreation use survey within 3 years of completing the recreational developments, with survey design to be to be approved by the WVDEP and WVDNR. The WVDEP also recommends that reviewing agencies be given authority to require additional improvements based on this survey. We recommend that Condition 14 become a part of the license, except that we would not give the agencies sole authority to require additional improvements; the Commission would retain that authority, with consideration of input from the agencies (see Section V.C.8).

Condition 15 recommends that WPP, after consulting with WVDEP, WVDNR, DOI, and PFBC, and within 6 months of license issuance, file a tailrace area recreation development plan for resource agency approval. We recommend that Condition 15 become a part of the license; specifically, we recommend that one recreation development plan (i.e., for all facilities specified in the license) be filed with the Commission within 6 months of license issuance, including documentation of consultation with resource agencies (see Section V.C.8).

D. Scoping

We issued a Scoping Document on September 15, 1993, describing the environmental issues we felt should be analyzed in detail, as well as issues that should not be analyzed based on input received through the project application process. We visited the site and conducted scoping meetings on October 4, 5, and 6, 1993. The site visit was attended by resource agencies, environmental, and citizen groups. About 43 people attended the agency scoping meeting held Tuesday afternoon, October 5, 1993, in Morgantown. The public meeting was held that evening in Morgantown, and 47 people attended.

Twenty-five letters were received from agencies and individuals in response to the Scoping Document. Comments from those entities have been considered and are discussed in this EA as appropriate.

E. Comments on the Draft Environmental Assessment

Respondents commenting on the DEA were:

Respondent	Date of Letter
West Penn Power Company	August 5, 1994
U.S. Fish and Wildlife Service	August 4, 1994
Pennsylvania Fish and Boat Commission	August 23, 1994
West Virginia Division of Natural Resources	August 22, 1994
West Virginia Division of Environmental Protection	August 1, 1994
Cheat Lake Environment and Recreation Association	August 4, 1994
Sierra Club	August 4, 1994
Coopers Rock Foundation	August 6, 1994

V. ENVIRONMENTAL ANALYSIS

A. General Description of the Locale

1. Cheat River Basin

The Cheat River Basin is about 100 miles long with an average width of about 15 miles and a drainage area of 1,411 square miles. The second largest tributary to the Monongahela River, the Cheat River is formed by the merging of Shavers Fork and Black Fork rivers. The Cheat River flows between relatively steep slopes on either side, rising from 870 to 1,200 feet. The hydroelectric project is about 3.7 miles up-stream of the confluence of the Cheat River with the Monongahela River, forming a 13-mile reservoir (Figure 2).

The climate of the region is characterized by moderately cold winters and moderately hot, showery summers. Average annual precipitation for the region is about 40 inches. July temperatures range from 62°F to 84°F, and January temperatures from 22°F to 39°F.

Monongalia County (West Virginia) and Fayette County (Pennsylvania), where the project is located, have a combined 1990 population of 220,860. With a population of about 26,000, Morgantown is the largest city near the project. Its population has declined about 6 percent since 1980. The river basin is primarily rural, with residential and recreation development around the lake. Several large residential subdivisions are adjacent to the project. There are also some working coal mines and abandoned strip mines in the area.

WPP typically holds property rights up to the normal high water mark, and often owns a strip of additional land (10 to 15 feet elevation beyond the normal high water mark). In total we estimate that WPP owns more than 500 acres of land around the project dam and reservoir. This includes several large tracts for general public recreation use (see Section V.C.8). WPP has also issued about 200 privilege permits to individuals for use of lease plots of WPP-owned reservoir shore property, where many individuals construct docks. Several adjacent property owners have also negotiated dock/shore easements to cross and use the applicant's property.

2. Proposed and Existing Hydropower Development

There are no other existing or proposed hydropower projects in the Cheat River Basin.

B. Scope of Cumulative Impact Analysis

Water quality is important to regional fisheries and recreation. Furthermore, historic coal mining activities have resulted in the discharge of untreated mine waste and highly acidic water in some Cheat River tributaries. The acidic mine drainage has had a detrimental effect on productivity and diversity of aquatic life in both the reservoir and the down-stream reach of the Cheat River. Because of the importance of water quality to the river's aquatic environment, it is an issue that warrants a cumulative impact analysis (see Section V.C.2).

C. Proposed Action

In this section, we describe the general environmental setting in the project locale and the effects the project may have on environmental resources, and make recommendations to enhance the affected environmental resources.

1. Geological Resources

Affected Environment: The project lies within the Appalachian Plateau Physiographic Province. The area's ridge-and-valley topography is formed by a series of bedrock folds. The Lake Lynn dam is near the axes (low point) of one such fold, known as the Connellsville Syncline. As a result, the area's bedrock generally dips down toward the river valley from both sides. Bedrock structures are generally more horizontal down-stream of the dam. The local bedrock consists primarily of sandstone and shale, with intermittent coal beds and some limestone. Much of the bedrock is covered with alluvium composed of sand, gravel, silt, and clay. Even so, several outcrops are seen along the reservoir's shore, including very high cliffs found along the steep slopes of upper Cheat Lake. Unconsolidated cobbles and some boulders are common along both the reservoir shoreline and within the river bed down-stream of the dam.

Slopes on each side of the reservoir rise from a few hundred to more than 1,200 feet total elevation above the water, with much steeper and higher slopes found in the area farthest up-stream. The only flat land in the project area is found along the Cheat River flood plain down-stream of the dam and along reservoir shore terrace areas near the Sunset Beach harbor and marina.

Only a few shoreline areas on Cheat Lake or down-stream of the dam exhibit erosion. This is generally due to the natural protection provided by bedrock or cobbles along the shore in most of the shoreline areas. The small amount of reservoir shoreline erosion that does exist results in locally unstable slopes and increased suspended sediment concentrations. Most of the erosion observed by Commission staff during a site visit occurs along developed shoreline areas on the east side of the reservoir, especially at the Sunset Beach peninsula on the south side of Sunset Beach harbor (see the discussion of land use, Section V.C.8). Erosion of a soil bank there exposed tree roots and bare soil along a sheer bank about 10 feet high. A flat grassy terrace with residences on it is located on top of the bank. A few residences have elaborate retaining or protective walls and docks along the shore to protect against further erosion.

The West Penn Beach peninsula (see Figure 2) is an area of stable, well-vegetated land with moderate or steep slopes. Shoreline erosion is not prominent there, but some bare soil is exposed on shore because of frequent recreation use (see the discussion of land use, Section V.C.8).

Periods of very high river flow will result in riverine erosion up-stream and deposition down-stream. This process causes formation of exposed or shallow sandy areas in the upper reservoir.

Environmental Impacts and Recommendations: Wind- and boat-generated waves are primary factors creating the observed erosion along the shoreline. This is evidenced by the most noticeable erosion at the tip of the Sunset Beach peninsula. Active erosion of the slope occurs when it is exposed to a combination of waves generated from a prevailing westerly wind and boat wakes. Water level fluctuations caused by peaking project operation also contributes to erosion by occasionally increasing the water level to its maximum on days when waves can cause shoreline erosion.

Because of WPP's plan to develop a major recreation area, the West Penn Beach peninsula is another key location with potential for bank erosion. Development of the recreational area would involve land clearing, grading, and revegetation. The proposed no-wake zone would help to reduce long-term shoreline erosion if properly enforced (Section V.C.8).

The Pennsylvania Department of Environmental Resources (PDER) recommended that an erosion and sedimentation control plan be filed for construction of the West Penn Beach recreational development. The PDER and the WVDEP stated that this is required by the National Pollutant Discharge Elimination System (NPDES) permit application process per Section 402(p) of the Clean Water Act. We recognize WPP's requirement to comply with the NPDES permitting process. Under that program, for any earth disturbance greater than 3 acres, WPP must apply for and obtain a

NPDES permit from WVDEP. For disturbances of less than 3 acres, an erosion and sediment control plan must be submitted to WVDEP for review.

Mr. Richard Sabat suggested that WPP participate in dredging an area of the reservoir near the bridges to ensure navigable water depths.

To minimize erosion effects during construction of the 46-acre West Penn Beach Recreation Area or before the start of any other land-disturbing or land-clearing activities, we recommend that WPP file a plan to control erosion, slope instability, and sedimentation. The Commission's review and approval of the erosion control plan would be separate from the NPDES permit application process. However, the plan could be used in the NPDES process.

We further recommend that WPP visually survey the following areas for erosion and slope instability and report findings to the Commission according to these schedules: (1) the West Penn Beach area shoreline extending from the dam to the Cheat Haven peninsula, to be surveyed annually; and (2) the remainder of the reservoir shoreline, to be surveyed every 3 years. If specific areas of active shoreline erosion are identified, we recommend that WPP cooperate with WVDNR, WVDEP, and property owners to address adverse effects such as unstable slopes or suspended sediments. We will recommend that WPP be required to participate fully in funding and implementing appropriate shore protection measures along the West Penn Beach Recreation Area shoreline, but that WPP not be required to fund or implement shore protection measures at other locations. We will also recommend that WPP be required to provide the results of its surveys to WVDNR, other agencies, and property owners upon request.

We have not found sufficient evidence that dredging is needed at any specific location in the reservoir. Most areas are easily navigated, and shallow water is rare when the reservoir is at full pool (868 to 870 feet NGVD). Therefore, we will not recommend that dredging be required as a condition of the license.

Unavoidable Adverse Impacts: Some continued minor erosion is expected in the Sunset Beach harbor area. Construction of the West Penn Beach Recreation Area will also result in some temporary erosion and sedimentation, but it will be minimized by implementing an erosion and sedimentation control plan.

2. Water Resources

Affected Environment: The maximum depth of the Lake Lynn project reservoir is 106 feet. At full pool (870 feet NGVD), Lake Lynn (Cheat Lake) has a surface area of 1,729 acres and a storage capacity of 72,000 acre-feet. The Cheat River flows about 3.7 miles down-stream of the dam to its confluence with the

Monongahela River. The Cheat River is typically 400 to 500 feet wide below the dam.

At the project site the Cheat River has a drainage area of 1,411 square miles. The terrain is fairly steep, which produces flashy hydrologic responses to precipitation. The lower lake area has three flooded embayments: Rubles Run, Morgan Run, and Manning Run.

a. River Flow and Project Operations

Mean monthly inflow to Lake Lynn is 3,454 cfs. Mean monthly flows vary from a low of 1,110 cfs in September to 5,588 cfs in March. Appendix A contains a table that summarizes the mean, 20 percent, and 80 percent exceedance flows for the Cheat River at Lake Lynn and a graph of the annual flow duration data.

The Lake Lynn Hydroelectric Project is operated in a peaking mode. The minimum flow required to operate one unit for power generation is 1,100 cfs. Maximum hydraulic capacity through four turbines is 9,700 cfs. Leakage through the units is about 12 cfs. Water is withdrawn for power generation from a depth 45 feet below full pool.

Water diverted through the hydropower units is used exclusively for hydropower generation and then returned to the Cheat River. Table 2 lists three other entities that withdraw water from Lake Lynn and their annual water consumption.

Table 2. Consumptive uses of Lake Lynn water (Source: WPP Response to Schedule A, AIR of June 21, 1993).

Withdrawal Source	Withdrawal
Albert Gallatin Municipal Authority	77 mg[a] (0.33 cfs)[b]
Cheat Neck Water Company	66 mg (0.28 cfs)
Lakeview Resort	40 mg (0.17 cfs)

[a] Annual volume, million gallons.
[b] Average withdrawal rate, cubic feet per second.

b. Flooding

The Cheat River has exhibited the potential for producing major floods. The flood of record occurred in 1985 and had an estimated peak flow of 150,000 cfs. The largest previous flood occurred in 1954 with an estimated peak flow of 131,000 cfs. The estimated probable maximum flood (PMF) is 477,000 cfs. Because of the presence of both commercial and residential development in the Cheat River valley, the potential for loss of life and significant property damage is high for any near PMF magnitude flood.

c. Water Quality Standards

The Cheat River is subject to West Virginia water quality standards up-stream of the dam, including the dam discharge and immediate tailwaters; therefore West Virginia is the Section 401 certification state for the dam discharge. Pennsylvania water quality standards apply to the river farther down-stream. Water quality in the reservoir and in the Cheat River down-stream of the dam is greatly influenced by acid mine drainage from tributaries and drainages on the west shore of the reservoir and on both sides of the Cheat River down-stream of the dam. The acid mine drainage has very low pH levels. Based on surveys conducted in 1990 and 1991 as a part of WPP's application, reservoir and tailrace water quality meets both West Virginia and Pennsylvania standards for all parameters except pH in the reservoir and down-stream of the dam and dissolved oxygen in the reservoir hypolimnion (uniform temperature) in summer and fall.

d. Temperature

The reservoir stratifies between May and September, with temperatures at the reservoir bottom being about 15°F less than water temperature at the surface. There is a slight (1° to 3°F) increase in water temperature between the up-stream limits of the reservoir and the main reservoir. Data provided by WPP indicate that hydropower operations do not affect water temperature in the tailrace (RMC 1992).

e. Dissolved Oxygen

Dissolved oxygen levels in the reservoir and tailrace were above 5.0 mg/L (the West Virginia and Pennsylvania state standard) except in the reservoir hypolimnion. During the 1990 survey, dissolved oxygen in the reservoir ranged from 6.2 mg/L in late summer to 13.1 mg/L in mid-winter. Dissolved oxygen was generally well-mixed throughout the water column except from mid-summer to mid-fall when the reservoir was stratified. Bottom and near-bottom dissolved oxygen (typically more than 50 feet deep) was below 1.0 mg/L 40 percent of the time in late August through early October. Other than in the hypolimnion in summer and fall, dissolved oxygen concentrations were typically much greater than the 5.0 mg/L standard. There was no discernable difference between headwater dissolved oxygen and surface dissolved oxygen in the main reservoir (RMC 1992).

Dissolved oxygen concentrations in the tailrace are in compliance with the state standard. Mean dissolved oxygen ranged from 6.1 to 11.2 mg/L in the 1990 survey (RMC 1992). Dissolved oxygen in the tailrace displays typical seasonal and daily variations. Although operation of the Lake Lynn project affects tailrace dissolved oxygen, it was never below 5.0 mg/L during the 1990 and 1991 surveys. Tailrace dissolved oxygen tends to increase slightly during winter and spring when power generation begins. However, it tends to decrease during summer and fall during power generation when the reservoir is stratified and the release water has a depressed dissolved oxygen.

Typical daily power plant operation also affects tailrace dissolved oxygen. Dissolved oxygen in penstock water is typically lower than in the reservoir because of stagnation or warming as the water stays in the penstock for many hours to allow startup when demand warrants. Therefore dissolved oxygen concentrations down-stream typically decrease when the water is released (RMC 1992). Changes in dissolved oxygen resulting from operations can be up to 2.5 mg/L, but the changes did not drop tailrace dissolved oxygen below 5.0 mg/L during the 1990 and 1991 water quality surveys (RMC 1992).

f. pH Levels

The 1990 and 1991 water quality surveys demonstrated that pH in the lake, most tributaries, and the tailrace is often below the minimum state standard of 6.0. Reservoir pH typically is in the 5.0 to 6.0 range, with higher values in the embayments (5.8 to 7.4) and lower values in the upper lake. Seasonal pH is lowest in summer and fall and highest in spring. Tributaries along the west shore of the reservoir contribute most of the acidic water to the reservoir. Western shore tributaries exhibit pH values as low as 1.5 to 2.0.

Down-stream of the dam, Cheat River pH is generally lower than in the reservoir because of the low pH tributaries below the dam. This is especially apparent when no flow is released. Down-stream pH was lowest in the spring and summer and highest in the fall. Hourly pH values are less than 5.0 20 percent of the time in summer and 14 percent of the time in spring. Spring and summer pH display wide daily fluctuations—as much as 2.3 units within a day. Condenser release and water released for power generation both tend to raise pH in the tailrace because the releases dilute the effects of low pH tributary flows below the dam.

Environmental Impacts and Recommendations:

a. Reservoir Level

Table 3 summarizes water surface area and storage volume data for several key reservoir elevations:

Table 3. Water surface area and storage volume data for the Lake Lynn reservoir (Source: WPP application).

Elevation (ft NGVD)	Approximate Water Surface Area (acres)	Approximate Storage Volume (acre-ft)
857	1,550	54,000
863	1,600	60,000
868	1,700	70,000
870	1,729	72,000

The storage volume produced by the historical maximum winter draw-down (857 feet NGVD) provides an incidental flood control benefit by allowing WPP to capture peak flows in the reservoir, thereby reducing peak flow releases down-stream of the dam. The historical draw-down has also simplified operations during the spring flood season because the reservoir is drawn down to the crest of the dam, allowing the spillway gates to remain fully open during this period.

WPP proposes to maintain minimum reservoir elevations of 868 feet NGVD from May 1 to October 31 and 857 feet from November 1 to March 31. WPP proposes to maintain a minimum reservoir elevation of 863 feet from April 1 to 30, recognizing the potential benefit of higher water levels on early reservoir fish spawning (see Section V.C.3.a.) while still providing storage capacity to capture typically higher April flows. WPP also proposes to retain its ability, following notification of reservoir marinas, to draw the reservoir down to 857 feet at any time during the year because of the rare but foreseeable event of extremely high inflows, or because of an emergency need for power generation.

DOI recommends that the facility be operated in a strict run-of-river mode (instantaneous outflow equals instantaneous inflow) in an effort to reestablish reservoir and Cheat River fisheries. WVDNR recommends a modified peaking operation, with reservoir level fluctuations from 857 to 870 feet allowed from November 1 to March 31 and reservoir levels of 868 to 870 feet from April 1 to October 31.

We conclude that WPP's proposed minimum April elevation would adversely affect WPP's ability to manage flood flows in two ways: (1) it would eliminate about 6,000 acre-feet, or about 1/3 of the usable storage between elevations of 857 and 870 feet, and (2) it would require that spillway gates be kept closed or partially closed during periods of normal inflow, requiring WPP to manually open some gates in response to flood emergencies. From April 1 to 30, Cheat River inflow is still fairly high (see

Appendix A). April has the highest 80 percent exceedance flow of any month.

Recommendations by DOI and WVDNR would have even greater impacts on flood control operations at the project. DOI's run-of-river recommendation would eliminate all excess capacity to capture peak flows, and the incidental flood control benefits. WVDNR's recommendation for April would eliminate 90 percent of the storage between elevations 857 and 870 for that month.

b. Minimum Flow Releases

WPP proposes to release 200 cfs (plus 12 cfs leakage) when reservoir level is greater than 870 feet NGVD, except when net reservoir inflow is less than 212 cfs. In that case, WPP proposes to release net reservoir inflow. When reservoir level is less than 870 feet, WPP proposes to release either 100 cfs or net reservoir inflow according to the schedule shown in Table 4. DOI recommends run-of-river operation. WVDNR recommends a minimum flow of 212 cfs at all times regardless of reservoir inflow. Therefore WVDNR recommends sacrificing stable reservoir levels in the summer to provide the minimum 212-cfs instream flow. PFBC recommends a minimum release of 1,100 cfs or inflow, whichever is less, down to an absolute minimum release (regardless of inflow) of 212 cfs. Further, PFBC recommends that WPP be required to operate in a run-of-river mode "upon documentation of consistent fish reproduction and recruitment in the Cheat River down-stream of the dam."

Table 4. WPP proposed reservoir releases (Source: WPP letter May 11, 1994).

Period	**Reservoir Level (ft NGVD)**	**Net Reservoir Inflow (cfs)[a]**	**Minimum Release (cfs)**
May 1 to October 31	870	212 or more	212
		less than 212	net reservoir inflow[a]
	868-870	not a factor	100
	868 or less	more than 100	100
		100 or less	net reservoir inflow[a]
November 1 to March 31	870	212 or more	212
		less than 212	net reservoir inflow[a]
	857-870	212 or more	212
		less than 212	100
	857 or less	more than 100	100
		100 or less	net reservoir inflow[a]
April 1 to April 31	870	212 or more	212
		less than 212	net reservoir inflow[a]
	863-870	212 or more	212
		less than 212	100
	863 or less	more than 100	100
		100 or less	net reservoir inflow[a]

[a] WPP defines net reservoir inflow as total reservoir inflow minus evaporative losses and water withdrawals.

COE recommends that WPP notify the operator at the Maxwell Lock and Dam on the Monongahela River every day (preferably late afternoon) regarding Lake Lynn's anticipated operating schedule for the next day. AGMA recommends that WPP notify water withdrawal companies when reservoir water level changes exceeding 10 feet are expected.

WPP's proposed minimum release plan is dependent on season, reservoir level, inflow, evaporation, and water withdrawals. The complicated nature of this proposal would make compliance monitoring difficult. The plan would also allow WPP to dictate the minimum release by controlling the reservoir levels (i.e., by generating power) to keep the pool elevation below certain set points. We do not concur with WPP that maintaining the reservoir water level elevation as close as possible to 870 feet is necessary for "emergency capacity" (868 to 870 feet is historically the highest range for normal operations, with power generation possible well below that range). For these reasons we do not agree with WPP's proposed plan.

One of the principal reasons for considering minimum flows down-stream of the dam is that higher pH reservoir water would dilute lower pH tributary inflows to the Cheat River down-stream of the dam, leading to improved pH conditions in the river. WPP commissioned a computer modeling study on the effect of flow releases on pH in the Cheat River down-stream of the dam (EEM 1993). Figure 4 summarizes predicted results of increasing minimum release flows on pH in the Cheat River just down-stream of Grassy Run (about 2,000 feet down-stream of the dam).

The modeling analysis demonstrated that pH would improve substantially by providing minimum flow releases as low as 100 cfs. Median pH would increase slowly with increasing minimum release flows for flows greater than 200 cfs. However, minimum daily pH would improve measurably with minimum flow releases up to 1,000 cfs. The incremental benefit of higher minimum release flows would decrease significantly above 500 cfs. Up to 500 cfs, every 100-cfs increase in minimum release flows would increase the minimum daily pH by at least 0.1 unit. Above 500 cfs, a 100-cfs increase in minimum flow release would raise the minimum daily pH by an average of 0.03 unit. Based on water quality alone, a minimum release rate of 1,000 cfs would provide the greatest benefit to pH values in the Cheat River down-stream of the dam. This release rate would allow WPP to generate power while releasing because 1,000 cfs is the minimum flow required to operate one unit. Considering the relative improvement in pH per unit of flow released, a release rate of 400 to 500 cfs would optimize the improvement in water quality per unit flow released (Figure 4).

Under certain conditions (Table 4), WPP proposes to subtract water withdrawals and evaporation from the proposed minimum release rate to determine the minimum release flow for a given day. Table 5 summarizes rainfall volume directly on the reservoir, evaporation from the reservoir, and water withdrawals from the reservoir on an average monthly basis. In an average precipitation year, the volume of rainfall directly on the lake annually exceeds the volume lost to withdrawal and evaporation. For July, August, and September the sum of net water into the lake (excluding runoff from the river basin) is zero. Although July and September show net losses of water, the amount is small and within the limits of accuracy of the approximations used in this analysis. Further, when the volumes of withdrawal and

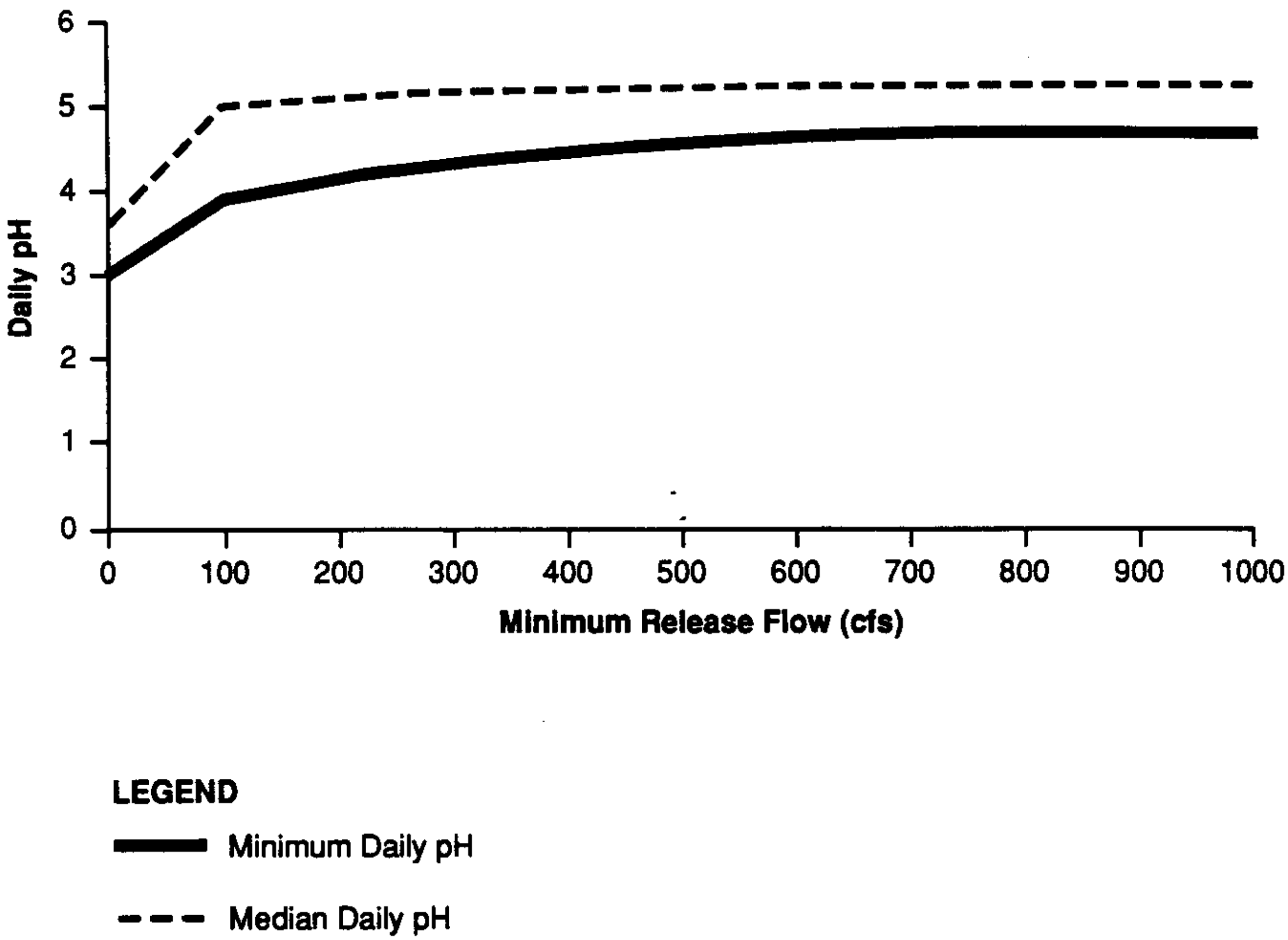


FIGURE 4

Modeled 1992 daily pH in Cheat River 2,000 ft. down-stream of Lake Lynn project

(Source: Energy & Environmental Management, Inc. October 1993).

evaporation (i.e., further excluding direct rainfall input) are subtracted from 212 cfs, the resulting minimum release flows range from 202 to 209 cfs. The level of flow control accuracy with Taintor gates does not allow WPP to distinguish between 202 and 212 cfs. Therefore, we conclude there is little merit in subtracting evaporation and withdrawal losses from total inflow.

Table 5. Lake Lynn water balance.

Month	Rain Volume (mg)[a]	Evaporation Volume (mg)	Water Withdrawals (mg)	Net Water to Reservoir (excluding inflow)	Sum of Evaporation and Withdrawal (cfs)
January	172	52	9	110 mg (5.5 cfs)	-3.0
February	160	60	9	91 mg (5.0 cfs)	-3.6
March	206	83	9	114 mg (5.7 cfs)	-4.6
April	173	111	12	50 mg (2.6 cfs)	-6.3
May	237	150	20	66 mg (3.3 cfs)	-8.5
June	197	156	25	16 mg (0.8 cfs)	-9.3
July	190	169	25	-4 mg (-0.2 cfs)	-9.7
August	194	158	25	11 mg (0.5 cfs)	-9.1
September	157	146	18	-7 mg (-0.4 cfs)	-8.6
October	163	119	11	33 mg (1.6 cfs)	-6.5
November	174	88	9	77 mg (4.0 cfs)	-5.0

Month	Rain Volume (mg)[a]	Evaporation Volume (mg)	Water Withdrawals (mg)	Net Water to Reservoir (excluding inflow)	Sum of Evaporation and Withdrawal (cfs)
December	244	69	9	165 mg (8.2 cfs)	-3.9
Total	2,268	1,361	183	724 mg (3.1 cfs)	-6.5

Notes:

Rainfall—NOAA monthly precipitation at Coopers Rock State Forest adjusted to annual precipitation total of 48.3 inches at Lake Lynn reported in WPP's Final License Application, December 1991.

Evaporation—Annual evaporation of 29 inches reported in Final License Application, December 1991 and surface area of 1,729 acres; monthly distribution based on USGS data for a comparable lake (USGS 1973).

Water withdrawal data from WPP Schedule A response to AIR of June 21, 1993; monthly distribution assumed by staff.
[a]million gallons.

We do not recommend allowing WPP to subtract evaporation and withdrawal from the minimum reservoir releases. Although this might result in some draw-down in extreme drought years below our recommended summertime minimum reservoir water level at 868 feet NGVD, the result of draw-down would be minor because of the low magnitude of evaporative losses and withdrawals. In addition, any future proposal to withdraw 1 million gallons per day (mgd) or more from the reservoir would require Commission approval (current withdrawals are well below 1 mgd). In the event that a proposal requests a withdrawal from the reservoir of 1 mgd or more, the Commission may recommend a drought contingency plan, which could include modified operational parameters for the Lake Lynn project.

We understand that WPP is informally notifying the COE at Maxwell Lock and Dam of operating plans. We recommend that WPP and COE prepare a formal agreement that is mutually acceptable to both parties. The agreement should address notification procedures concerning project startup and flow release schedules. We also recommend that WPP consult with AGMA, CNWC, and Lakeview Resort on notification requirements during extreme reservoir water level changes. A formal agreement of notification should be arranged with companies that request notification.

Based on balancing water quality, fisheries, power production, and economic considerations (see Section VI), we recommend a minimum reservoir release of 212 cfs when inflow is greater than or equal to 212 cfs. At all other times, the minimum release should equal 100 cfs or inflow to the reservoir whichever is greater.

c. Ramping Rates

WPP proposes no ramping rates, citing the economic losses it would incur if ramping were required. The DOI requested that the EA consider ramping as one alternative to the proposed operation. The COE requested ramping in early correspondence but has since stated that ramping is not critical as long as minimum releases are provided and WPP continues to notify Maxwell Lock and Dam daily regarding anticipated operating plans. No other resource agencies requested ramping recommendations. Our recommendation for a formal agreement between WPP and COE regarding notification will adequately address the COE's concern about sudden level changes down-stream in the Monongahela River. The primary potential benefit of ramping would be for enhancement of fisheries resources in the Cheat River down-stream of the project. This issue is discussed in detail in Section V.C.3.d.

d. Water Quality Monitoring

WPP continuously monitors pH, dissolved oxygen, temperature, and conductivity of reservoir outflow during nonwinter months. The DOI recommends that WPP validate the water quality model that predicted benefits of various minimum releases. The DOI also recommends that WPP establish, operate, and maintain three permanent water quality monitoring stations at the forebay, the upper riverine portion of the Cheat River below the dam, and the lower Cheat River segment in the Monongahela River backwater zone. WVDNR recommends that WPP develop a plan to continuously monitor pH, dissolved oxygen, and temperature in the reservoir and tailwater, to develop a plan to address future potential measures for raising dissolved oxygen if it becomes a problem, and to schedule biennial meetings with the resource agencies to evaluate the effectiveness of minimum releases on water quality. PFBC recommends that WPP develop a plan to monitor the reservoir and river at four locations, require a minimum dissolved oxygen release, and meet with resource agencies annually. AGMA expressed concern regarding reservoir turbidity near the generating units (the location of its consumptive water intake) when the project is operating.

Water quality in the reservoir and tailwater is very good with the exception of pH and hypolimnetic dissolved oxygen. No violation of state dissolved oxygen standards occurred during the 1990-91 water quality studies. However, because water is withdrawn from a depth of 45 feet, there is potential for released water to fall below 5.0 mg/L when the reservoir is strongly stratified. Values of pH in the reservoir and tailwaters continue to be below both West Virginia and Pennsylvania standards. Because the water quality in the reservoir and tailwaters does not meet all water quality standards, we agree that water quality monitoring is warranted. However, we do not recommend that WPP implement measures to prevent dissolved oxygen degradation down-stream at this time because there are no documented tailwater dissolved oxygen problems.

The COE has a water quality monitoring station on the lower Cheat River in the Monongahela River backwater section. In addition, data on reservoir and Cheat River backwater water quality are also available from EPA's STORET data retrieval system, although there is no continuous monitoring station at either location. A water quality monitoring station in the reservoir and a station immediately down-stream of the dam would provide the necessary information for the resource agencies to assess effects of operation on water quality. We recommend that WPP install and maintain three water quality monitoring stations: one on the reservoir, one in the tailwater area, and one at a site below the tailwater area and down-stream of the acid tributaries. Data from the existing WPP monitor down-stream of the dam do not adequately characterize the effect of operations on water quality. Data should be collected both up-stream and down-stream of the dam to assess the effect on water quality, especially dissolved oxygen. The stations should continuously monitor pH, dissolved oxygen, conductivity, and temperature. We recommend that WPP prepare a monitoring plan, in consultation with the WVDNR, WVDEP, PFBC, and DOI, before establishing the continuous monitoring stations.

The water quality monitoring plan must include measures to help determine if dissolved oxygen levels below state standards are present and under what circumstances such low levels may occur. If any sampling shows dissolved oxygen below 5.0 mg/L of dissolved oxygen (the current West Virginia and Pennsylvania standards), we recommend that WPP be required to notify the resource agencies and the Commission within 10 days. If then requested by the WVDEP (and subject to Commission review and approval) WPP would be required to file with the Commission a plan to maintain a tailrace dissolved oxygen level of 5.0 mg/L or greater. WPP would be required to develop the compliance plan in consultation with DOI, WVDEP, WVDNR, and PFBC. Following Commission review and approval, WPP should be required to implement the plan.

We also recommend that WPP summarize the water quality data and provide flow release data in an annual report to the Commission and WVDNR, WVDEP, PFBC, and DOI. WPP should meet once every 3 years with the agencies (coordinated with triennial fisheries and recreational meetings) to review the effect of operations on water quality and fisheries. The Commission may, at any time, adjust the schedule for subsequent water quality reports and meetings.

We believe that continuous water quality monitoring in the reservoir and below the dam will provide the resource agencies with sufficient data to determine the effect of minimum releases on water quality. We reviewed WPP's modeling study and conclude the methods and results are appropriate and reasonable. Therefore, an independent validation study of WPP's water quality modeling is unnecessary.

AGMA states that occasional increases in turbidity in its raw water are related to operation of the hydroelectric facility. AGMA further stated that it is lowering the elevation of its intake to better accommodate water level fluctuations in the reservoir. AGMA did not provide any specific operating or turbidity data to substantiate the frequency or severity of this problem. Given the proximity of the AGMA intake to the powerhouse, it is possible that localized hydraulic conditions related to plant startup or operation could resuspend bottom sediments, leading to localized increases in turbidity. To date, data are not available to document relationships between project operations and turbidity conditions.

In its comments on the DEA, WPP stated that AGMA extended its water intake another 20 feet into the lake, periodically monitors intake water turbidity, and is upgrading to a new larger-capacity water treatment plant. AGMA completed these improvements after it filed the referenced comments. Therefore, if on the basis of its own turbidity data AGMA still contends that a relationship exists between high turbidity at its new intake and project operations, we recommend that WPP consult with and cooperate with AGMA regarding the nature of that relationship. If the monitoring data demonstrate that turbidity problems are caused by project operations, we further recommend that WPP cooperate with AGMA in identifying potential alternatives to reduce turbidity in the intake water. Alternatives could include relocating or shielding the AGMA intake or notifying AGMA of project startup and operations.

We recommend that WPP notify AGMA of project startup, drawdowns, or other relevant operations that may affect turbidity at the intakes. Notification would allow AGMA to temporarily cease withdrawals during high turbidity conditions. This might be a reasonable resolution to AGMA's concerns if AGMA has sufficient raw or finished water storage capacity to allow it to temporarily cease withdrawal from the reservoir. Regardless of the possible relationship, we currently do not believe that WPP should be required to file a plan, modify its operations, or implement/fund any protective measures.

e. Chemical Treatment of Reservoir Releases to Improve pH

WPP stated that treating reservoir releases to raise the pH of released water would be prohibitively costly and thus infeasible. DOI recommended in early correspondence that WPP treat reservoir releases to raise the pH.

Several techniques are available to restore acidic lakes (EPA 1990). Tributary water could be treated directly to raise the incoming pH both to the reservoir and down-stream of the dam. The reservoir itself could be treated with limestone alum to raise the reservoir pH. Flow releases from the reservoir could be treated at the dam. And finally, the watershed could be treated with limestone to neutralize the acidic runoff before it reaches tributaries.

We do not recommend requiring WPP to treat either the watershed or the tributaries because the Lake Lynn hydroelectric plant does not adversely affect pH in the reservoir. In addition, the sources of acid inflow are located outside the project boundary. The lake itself could be treated by adding limestone to the surface water. The limestone would dissolve slowly, causing a gradual increase in reservoir pH. The effects typically last about twice the retention time, but the retention time in Cheat Lake is only 10 days on average. Therefore, we do not recommend this treatment method because the effects would only be short-term. Repeated treatment of the lake would be prohibitively costly and could negatively affect recreation if the lake had to be closed periodically for lime treatment. Direct treatment of reservoir releases would be prohibitively costly because of the large volume of flow released.

Hydropower operations do not adversely affect pH in the reservoir. Acidic water will continue to enter the reservoir until the sources (abandoned and active mines) are controlled. WPP will improve down-stream pH considerably by providing minimum release flows. We do not recommend that WPP be required to provide chemical treatment of the watershed, tributaries, reservoir, or the lake.

f. Compliance Monitoring

WPP proposed no specific measures for compliance monitoring. DOI, WVDNR, and PFBC also recommend no specific compliance monitoring. AGMA recommends an up-stream flow gage on the Cheat River to measure inflow.

There are two USGS gages on the Cheat River: one 40 miles up-stream of Lake Lynn near Rowlesburg, West Virginia, and one 80 miles up-stream of Lake Lynn near Parsons, West Virginia. There is also a USGS gage at Rockville, West Virginia, on Big Sandy Creek, the largest tributary to the Cheat River between Rowlesburg and Cheat Lake. To estimate inflow, WPP adjusts and adds flows at the Rowlesburg and Rockville gages.

During low flow conditions when reservoir releases would be determined daily based on inflow to the reservoir, a more accurate measurement of Cheat River inflow to the reservoir would be needed. We recommend that WPP develop a low flow release system based on reservoir levels, down-stream flow in the Cheat River, and controlled Taintor gate operation. Specifically, we recommend that WPP fund the installation, maintenance, and data storage for one USGS flow gauging station on the Cheat River down-stream of the dam but up-stream of the Grassy Run confluence. WPP should consult with USGS, DOI, WVDNR, WVDEP, and PFBC concerning the exact down-stream gauge location. The gauging station should be equipped with telemetry to allow WPP to adjust minimum reservoir releases daily during low flow periods.

WPP obtained minimum reservoir releases of 200 and 450 cfs during the 1992 IFIM study through Taintor gate manipulation. Before the IFIM study, WPP calibrated the Taintor gates to the low flows. WPP obtained minimum releases of 1,100 cfs by operating one generating unit at the lowest feasible gate setting. We recommend that WPP monitor down-stream flows at the recommended new USGS gage rather than using Taintor gates to measure minimum recommended flow releases. Taintor gates have a much lower accuracy than down-stream flow gauging. The release flow at times would be less than 100 cfs. It is difficult to assure accuracy with the Taintor gates at such low flows. The down-stream flow gage can be used to adjust the Taintor gate setting until the desired minimum release is achieved.

Because of the limited storage volume of the reservoir and the potential for rapid, substantial flow increases in the Cheat River, reservoir levels fluctuate rapidly. To ensure compliance with reservoir level limitations and to monitor fluctuations during low flow periods when a minimum release must be maintained, we recommend that WPP install a level monitor that records reservoir level hourly. The reservoir level information should be made available to DOI, WVDNR, WVDEP, and PFBC when requested and should be summarized in an annual report to those agencies and the Commission.

The DEA had recommended, in addition to the down-stream USGS gaging station, an up-stream USGS gage to be located on the Cheat River as close to the headwaters as possible. In its comments on the DEA, WPP raised concerns about the reasonableness of the up-stream gauge. When asked to provide additional information, WPP, in a letter dated September 26, 1994, explained that the total estimated cost to install an up-stream gage would be about $760,000 (including the cost to rebuild about 2.5 miles of access road to reach the most feasible site). WPP also expressed concern about the reliability and the usefulness of the up-stream flow gage for project operations and compliance monitoring (for more information, see WPP's letter commenting on the DEA in Appendix B).

We have concluded that WPP has considerable experience operating the reservoir and regulating highly variable reservoir inflows (in the past, without the benefit of an up-stream flow gage). Therefore, given the alternative compliance monitoring methods described above, we concur with WPP that an up-stream gage is not needed for compliance monitoring, and that it would be prohibitively expensive compared to our new recommendations.

Cumulative Impacts:

Historically, acid mine drainage adversely affected the water quality of the Cheat River basin. Abandoned mines are thought to contribute to this problem more so than a limited number of active mines because discharges from active mines are now more tightly regulated. Today, anecdotal evidence such as reports of improved sport fishing in Cheat Lake suggests that water quality is improving, although the water is still more acidic than normal. For example, acidic discharges from tributaries down-stream of the dam adversely affect water quality down-stream of the dam, particularly without release flows of less acidic reservoir water. Our recommended minimum reservoir releases would improve Cheat River water quality down-stream of the dam, thus enhancing aquatic habitat and expanding opportunities for recreation and fishing in the Cheat River basin.

Unavoidable Adverse Impacts:

Provision of the recommended minimum releases at the dam, including a 100-cfs absolute minimum release, could cause lower reservoir levels in drought years compared to historical operations. We considered this potential effect based on historical data showing the maximum number of days in any month from May through October where reservoir inflow dropped below 100 cfs. For this analysis, we assumed a starting reservoir water level elevation of 868 feet NGVD.

Historical daily river flow data in the license application (1978 through 1990) show that reservoir inflow can often be expected to drop below 100 cfs between July and September. Assuming a 100-cfs minimum release, the estimated minimum reservoir water level elevations for record dry periods are:

Month	Estimated Min. Reservoir Level
July	867.7 feet NGVD
August	867.5
September	867.1

Additional draw-down may be expected if a monthly drought occurs that is more severe than any on record. The primary adverse effect of such draw-downs would be on boating in the marinas. Specifically, WPP has stated that a draw-down to 867 feet NGVD would impede navigation at the Sunset Beach Harbor. Even so, we believe that such draw-down effects would be rare and that the predicted water level elevations would remain within an acceptable range for the assumed drought condition.

Run-of-river operation would eliminate draw-down effects but increase flooding impacts by reducing spring flood storage capacity. WPP's proposed April minimum reservoir elevation would also increase flooding, but to a much lesser extent than the run-of-river and modified peaking operations recommended by DOI, WVDNR, and PFBC.

3. Fisheries Resources

Affected Environment: About 33 fish species inhabit Cheat Lake (RMC 1991). Dominant species are bluegill, brook silverside, bluntnose minnow, and largemouth bass. Primary gamefish are rainbow trout, northern pike, channel catfish, rock bass, green sunfish, pumpkinseed, bluegill, smallmouth bass, largemouth bass, black crappie, and yellow perch. Other fish known to inhabit the reservoir are gizzard shad, central stoneroller, common carp, river chub, golden shiner, emerald shiner, spottail shiner, spotfin shiner, mimic shiner, creek chub, white sucker, northern hogsucker, silver redhorse, golden redhorse, yellow bullhead, brown bullhead, rainbow darter, johnny darter, and logperch. The greatest numbers and biomass were collected from the three embayment areas (RMC 1991).

About 30 fish species inhabit the lower Cheat River below the hydroelectric facility (RMC 1991). Dominant species are bluegill, gizzard shad, and yellow perch. Primary gamefish include northern pike, channel catfish, rock bass, green sunfish, pumpkinseed, warmouth, bluegill, smallmouth bass, spotted bass, largemouth bass, black crappie, yellow perch, walleye, sauger, and freshwater drum. Other fish known to inhabit this reach of the river are common carp, golden shiner, emerald shiner, spottail shiner, spotfin shiner, mimic shiner, bluntnose minnow, silver redhorse, golden redhorse, yellow bullhead, brown bullhead, brook silverside, and johnny darter.

Aquatic habitat characteristics in Cheat Lake are principally lacustrine (relating to, formed in, or growing in lakes). Steep banks preclude the development of littoral areas (shallow waters sometimes found between the shore and open water) within the main channel. The aquatic vegetation that grows in littoral areas contributes significantly to the productivity and metabolism of the entire lake ecosystem. Usable protective habitat is generally sparse except in the embayment areas. Embayments support large littoral habitat areas with substantial growths of submerged vegetation. Predominant vegetation in the embayments is pipewort, sago pondweed, brittle naiad, and water starwort. Other cover available includes limited woody debris, deadfalls, and private boat docks.

Aquatic habitat in the lower Cheat River is limited. Substrate in the upper 1.1 miles is relatively uniform consisting of small to large cobbles (RMC 1993). Minor deposits of finer alluvia occur at the mouth of Grassy Run. Aquatic vegetation is sparse in the upper reach with the principal type being water starwort. Aquatic habitat in the lower 2.6 miles varies considerably. Upper portions are relatively shallow (less than 8 feet deep) with a cobble/boulder bottom. Several small shoals with occasional boulders are interspersed along the right bank. Some submerged vegetation occurs along each shoreline. The central portion of the lower reach 2.6 miles is up to 21 feet deep. Gravel/cobble shoals exist adjacent to and down-stream of tributaries. Submerged aquatic vegetation, principally burreed, is present along shallower shore zones. The Cheat River becomes relatively deep near its confluence with the Monongahela River. A large gravel shoal spans the channel southwest of a large island. Patches of yellow cowlily extend along the left bank of the river up-stream of this shoal. Mid-river depths approach 20 feet down-stream of the island. Left-bank near-shore areas below the island are heavily vegetated with milfoil and starwort. The narrow, vegetated littoral areas are bordered by steep drops to the main river channel. The right-bank shoreline is deeper and lacks vegetation.

Core (1959) reviewed historical information on aquatic biota within the project area, considering investigations of Cheat Lake from 1926 through 1957. Results indicated degradation of water quality and biota from acid mine drainage. Research conducted by West Virginia University in the 1970's documented continued acid mine drainage water quality problems. Little information is available on fish and benthic macroinvertebrates in the reservoir before 1970. Information from recent surveys conducted by WVDNR is not available at this time. Historical information on the biota of Cheat River below Lake Lynn Hydro project is also scarce. Schwartz (1957) collected 50 species of fish throughout the Cheat River basin, but none was collected below the Lake Lynn dam.

Primary benthic (i.e., bottom-dwelling) organisms in Cheat Lake and the lower Cheat River include aquatic worms, midges, alderflies, and biting flies. The benthic community is very limited and dominated by organisms that are tolerant of poor water quality conditions because of the low pH.

Water quality has limited aquatic life production in Cheat Lake and the river down-stream of the project (see Section V.C.2.b.). Embayment pH has been much higher, above state standards, resulting in greater fish populations. Baker (1990) reported the effects of pH changes on fish communities. In general, a change from 6.5 to 6.0 decreases reproductive success in acid-sensitive species such as fathead minnows. A further reduction from 6.0 to 5.5 will cause a loss of sensitive species of minnows and dace and reduce reproductive success in other species such as walleye. Reduction from 5.5 to 5.0 causes a loss of major fish species such as walleye, rainbow trout, smallmouth bass, and nongame species such as creek chub. Finally, reduction from 5.0 to 4.5 causes loss of most fish species. Few fish species are able to survive and reproduce below 4.5 (e.g., central mudminnow, yellow perch, and in some waters, largemouth bass). Thus, fish and benthic production in the main lake and the river below the dam are limited by pH.

Environmental Impacts and Recommendations: Operation of the Lake Lynn project potentially affects the aquatic organisms of the Cheat River in several ways:

- Daily fluctuations and winter draw-down of the reservoir water levels affect resident fish and benthic populations by dewatering some of the littoral habitat, particularly in the embayments.

- Passage through the project turbines may affect the reservoir's resident fish populations by unnaturally displacing or killing individuals.

- Lack of continuous flow below the dam other than leakage reduces potential fish habitat.

- Rapid fluctuations or cessation of discharge may affect resident instream fish and benthic populations by reducing available habitat, and alternately scouring and dewatering the river bottom and stranding fish.

a. Reservoir Fluctuations and Late Winter Draw-downs

WPP proposes to operate the project within a 2-foot water level fluctuation (868 to 870 feet NGVD) in Cheat Lake from May 1 through October 31. Water sometimes may be drawn down further to avoid rare but foreseeable flood impacts. WPP has agreed to maintain a pool elevation between 863 and 870 feet NGVD between April 1 and 30. WPP also plans to include a late-winter draw-down of the impoundment that would decrease the water level 13 feet to capture spring runoff and reduce potential flooding. DOI recommends strict run-of-river operation to minimize potential effects of water level fluctuations on fish and other aquatic resources in the reservoir. WVDNR recommends a modified peaking operation, where pool elevation is maintained between 868 and 870 feet NGVD from April 1 through October 31, and between 857 and 860 feet from November 1 to March 31.

Fluctuating water levels can affect fish populations by altering the abundance, type, and availability of prey or habitat (Ploskey 1983). Small short-term fluctuations in water level have little effect on nutrients, plants, or benthic organisms. A small percentage of total lake shore area would be exposed by the daily fluctuations (about 30 acres or 2 percent of total acreage at full pool, see Table 3). In the main lake, little usable littoral habitat would be affected because of steeply sloped reservoir banks. Littoral areas of embayments, the most productive fish habitat in the reservoir, could have a higher proportion of habitat affected. These areas provide increased food resources, protective habitat, and potential spawning areas for fish. Thus the relatively small fluctuations (within 2.0 feet) that occur daily in the reservoir would not have significant adverse effects on fisheries resources in the main lake but could have a greater effect on embayment fisheries.

Winter draw-down to 857 feet exposes about 180 acres of additional shoreland compared to the full pool of 868 feet. This reduces the total reservoir water surface area by about 11 percent of total acreage at full pool (see Table 3). Maximum draw-down also substantially reduces available fish and benthic habitat in the embayments by dewatering spawning substrate and reducing aquatic vegetation used for nurseries by larval fish and benthic organisms.

Addition of fish attractor devices such as submerged brush piles (proposed by WPP), cribbing, or weighted half-logs on hard substrate would provide more usable habitat and enhance fisheries resources in embayments. Placement of such devices adjacent to littoral areas would offset some loss of habitat from summer and winter draw-downs. Use of such structures in the main lake would be impractical because of the steep topography along the main channel banks. Placement and maintenance of these devices in the main lake would be difficult. To reduce the adverse effects of draw-downs on the resident fish population, we recommend that these types of structures be placed in embayments at depths greater than the maximum 13-foot winter draw-down. The types and locations should be developed in consultation with the DOI and WVDNR, and a plan should be submitted to the Commission for review and approval.

WPP's proposed April minimum water level elevation of 863 feet NGVD would enhance early fish spawning habitat (i.e., provide an additional 50 acres of water surface area), while retaining two-thirds of the reservoir storage volume between the elevations of 857 and 870 feet. WVDNR's recommended minimum April elevation of 868 feet would provide 100 acres of water surface area in addition to WPP's proposal but would eliminate 90 percent of the reservoir's storage volume between those elevations. The WVDNR proposal would also require that WPP leave the Taintor gates closed during a month with very high flood potential (see Section V.C.2.a.). Considering the competing needs for increased spawning habitat and the real potential for flood flows in April, we recommend WPP's proposed April minimum water level elevation of 863 feet NGVD.

b. Minimum Flow Releases Below the Lake Lynn Dam

The Cheat River channel down-stream of the Lake Lynn dam is a potentially valuable aquatic resource that could be enhanced by maintaining a minimum instream flow. Lack of continuous flow down-stream of the dam eliminates potential spawning and rearing habitat for resident fish and benthic organisms in that reach of the river. Water quality (pH less then 6.0) is also an important aspect to be considered in relation to minimum flows and fishery enhancement (see Section V.C.2.b.).

Depending on time of year, water level elevation, and net reservoir inflow, WPP proposes a minimum flow release of 200 cfs (plus 12 cfs leakage), 100 cfs, or net reservoir inflow (see Table 4). The DOI, WVDNR, and PFBC propose other minimum flow releases as described in Section V.C.2. In addition, PFBC specifically recommended restriction of peaking during the fish spawning and fry periods.

We considered two key issues in our analyses of minimum flow releases to the lower Cheat River. First, providing instream flows at all times would increase usable habitat for fish and aquatic life in the river. Second, the minimum releases would also provide relief from acid mine water drainage and low pH. Our analyses regarding pH are provided in Section V.C.2.b. Our fisheries habitat analysis is provided below.

WPP conducted instream flow incremental method (IFIM) studies to derive an optimum flow that would enhance the availability of fisheries habitat (RMC 1993). The results of the IFIM study show that improvement in available habitat for important species (smallmouth bass, sauger, channel catfish, and gizzard shad) would be optimized for all life stages as minimum flow is increased from zero to 212 cfs.

In preparing this FEA we considered in more detail the potential fisheries benefits of various flows and of a run-of-river operation. Specifically, we looked at how restriction of peaking during the fish spawning and fry periods might enhance the fishery by providing flows that would correspond to optimum flows for the spawning and fry life stages of target species (based on results of the IFIM study). In doing so, we decided that the greatest restriction of peaking would be to operate the project in a run-of-river mode for a part of the year.

We have found that operating the project in an instantaneous run-of-river mode would help ease the rate of flow change as compared to peaking. It would not, however, eliminate widely variable flows and flows much greater than the optimal range for the key spawning and fry life stages. Our review of historic Cheat River flow data showed that reservoir inflows often shift upward or downward by several hundred cfs—or even several thousand cfs—within 1 day. Furthermore, anticipated normal spring flows are often far above the optimum for the spawning and fry life stages of target species. Such high flows (which would sometimes exceed those released by the peaking operation) would result in a flushing effect that would negate any gains that might be made during periods of low flow. It is also important to note that this flow-based limitation of the river's habitat below the dam would be in addition to the substantial limitations imposed by pH. The limitations posed by low pH would remain even with the benefits of minimum release flows intended, in part, to increase pH (as discussed further below).

A peaking mode of operation appears to be consistent with managing the wide range of natural river flows experienced at the Lake Lynn project. And although continued peaking would result in rapid release flow fluctuations, it would help moderate the adverse effects of the extremely high flows that must be released more often under a run-of-river operation, as well as extremely low flows (which would insufficiently dilute the acid runoff).

Although WPP- and agency-proposed minimum flows would improve physical habitat availability, pH conditions would continue to limit aquatic life productivity until the effects of acid mine drainage were reduced in the watershed. For example at a flow of 212 cfs, pH would improve dramatically over existing base flow values but would still be below the minimum level of 5.7 for smallmouth bass (Clady 1977; Paragamian 1979), below the optimum range of 7.9 to 8.1 for sauger and walleye (Funk and Pflieger 1975), and below 6.0, which induces reproductive failures (Anthony and Jorgensen 1977) and reduces recruitment (Spangler 1977). The pH would also remain too low for perch, which can function in low pH as adults but exhibit reproductive failure at pH less than 5.5 (Ryan and Harvey 1979). Increases in minimum flow up to 1,000 cfs would improve the median pH in the Cheat River to 5.28, but that would still be below minimum pH levels for reproduction and recruitment of important fish species.

In conclusion, we recommend increased minimum release flows for the purpose of diluting acid and enhancing the river's general habitat potential down-stream of the dam. However, we do not recommend modified flows specifically aimed at enhancing the spawning and fry life stages because there is little potential for additional benefit. For further discussion, refer to our responses to comments received from DOI and PFBC in Appendix B.

The economic effects of each of the minimum instream flow releases investigated and the run-of-river operations and the relative effectiveness of each alternative minimum flow in protecting fishery resources are presented in Section VI.B. We recommend, based on all these factors, a minimum release of 212 cfs or reservoir inflow when inflow is less than 212 cfs, with an absolute minimum release flow of 100 cfs.

c. Rapid Fluctuations or Cessation of Discharges

Rapid fluctuations in discharge down-stream from hydroelectric projects can adversely affect fish and aquatic communities (Bain et al. 1988). Rapidly fluctuating flows create alternating flowing and stagnant habitat conditions that may cause localized loss of habitat for resident fish species. The effects of fluctuations on adult fish is probably small because adult fish can readily avoid unfavorable conditions. Young fish, fish eggs, and benthic organisms can be subjected to scouring flows during startup and stranding in dewatered shallow areas during shutdown periods. Even larger fish can be stranded in stagnant pools during shutdown periods. Fish stranded in stagnant pools can be subject to stress from increasing temperatures and lowering dissolved oxygen, and also to increased predation by birds or other riparian wildlife.

WPP's proposed peaking operation would continue to cause scour effects at high flows. When the project operated at or near full hydraulic capacity, the scouring effects described above would occur in the upper 1.1-mile reach regardless of the rate of change of flow released (i.e., regardless of ramping provisions). Effects in the lower 2.6 miles are and would remain much less severe compared to the upper reach. The lower reach has more refuge habitat for all life stages of key fish species. Thus, fish and other aquatic organisms displaced from the up-stream reach would tend to populate the lower reach.

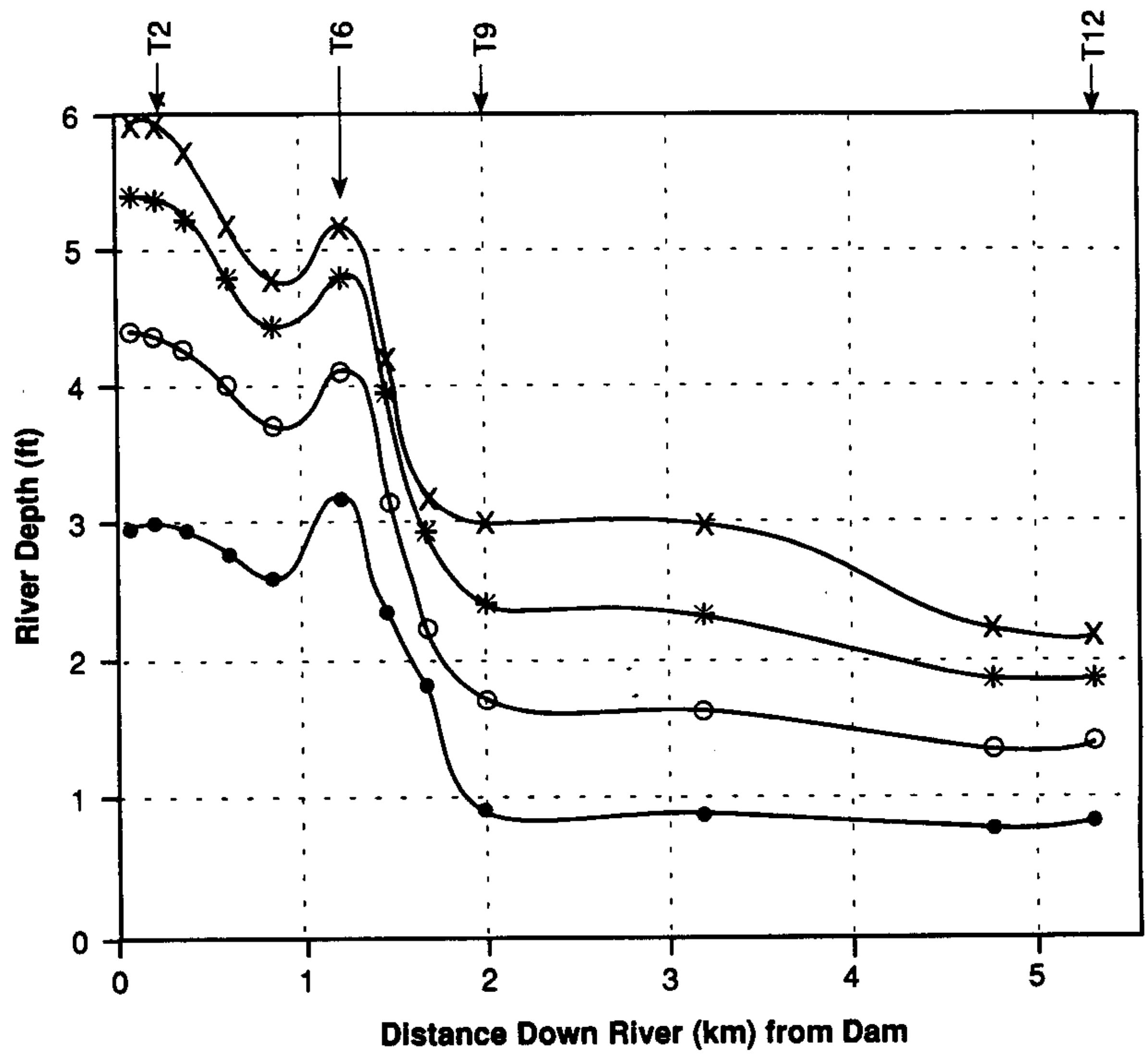
When the Lake Lynn project turbines are not operating, several large shoals are left exposed. The tailrace area remains filled with water to a depth of 10 to 12 feet at current base flow conditions when the turbines are shut down, and several other small isolated pools may contain fish stranded by a sudden decrease in flow. WPP's proposed operation would minimize adverse effects during receding flows. The reduced effect during receding flow would be due to the minimum release of 100 to 212 cfs, which would prevent stagnation of pools and keep most of the river channel wetted during nongenerating periods.

DOI recommends that the Lake Lynn project be operated in a run-of-river mode to reduce sudden changes in water flow and to stabilize habitat conditions to enhance fish and benthic production. PFBC also recommends that, upon documentation of consistent reproduction and recruitment of fish in the Cheat River down-stream of the dam, the hydroelectric facility be operated in a run-of-river mode.

WPP does not propose to ramp its turbines, citing the economic losses it would incur if ramping were required. DOI requested that the EA consider ramping as an alternative to the proposed peaking operation. The COE requested ramping in early correspondence but has since stated that ramping is not critical as long as minimum releases are provided and WPP continues to notify Maxwell Lock and Dam daily regarding anticipated operating plans. No other resource agencies specifically addressed ramping recommendations.

Because of continued scouring effects at high flows, we conclude that ramping during increasing flow periods would not significantly benefit the fisheries if a peaking operation is maintained. Up-ramping would also have significant economic impact because it would preclude the load-following characteristics of the existing peaking operation. This would eliminate much of the usefulness of the Lake Lynn project, which provides a cost-effective source of power within APS's own system for periods of peak demand (see Sections VI.A and VI.B).

GLW70029.A0.03 Figure 5 6-8-94 tt



Legend

●—●	1 Units	Unit No. 1 flow = 2,040 cfs
O—O	2 Units	Units No. 1 & 2 flows = 4,000 cfs
✱—✱	3 Units	Units No. 1, 2 & 3 flows = 5,920 cfs
X—X	4 Unit	Units No. 1, 2, 3 & 4 flows = 7,910 cfs

FIGURE 5

Water depth below Lake Lynn as a function of Lake Lynn operations

Source: WPP

However, flow could be ramped down after the turbines are shut down by operating the spillway gates. This does not inhibit the plant's ability to follow and respond to load changes and thus the economic loss is much less than with up-ramping (see Section VI.B.). We developed a down-ramping plan based on the following analyses and criteria:

- River depth down-stream of the dam is a function of discharge and distance from the dam (Figure 5). In the upper mile the river channel is relatively narrow and depth is more sensitive to flow changes than farther down-stream.

- River depth changes are important when depth is less than 2 feet.

- When depth is less than 2 feet, depth should not change faster than 1 foot per hour.

- At flows above 4,500 cfs, river depth is always more than 2 feet and flow thus can be varied at any rate.

- If the flow rate is between 500 and 4,500 cfs, depths will be less than 2 feet in the lower reach and control the rate at which depth may vary. Flow change of 2,000 cfs will change depth by about 1 foot in the reach; therefore, flow can be decreased from 4,500 to 500 cfs in a period of 2 hours, or at the rate of 2,000 cfs per hour.

- At flows less than 500 cfs, depths in the upper reach below the dam will fall below 2 feet and begin to control the allowable rate of decrease. A decrease of 300 cfs in that reach will change the depth by 1 foot; therefore reducing flow from 500 to 200 cfs should be accomplished over a period of 1 hour.

The ramping plan we developed and evaluated is summarized in Table 6.

Table 6. Down-ramping rates developed and evaluated by Commission staff.

Operating Mode	Release Flow (cfs)	Maximum Change
Increasing Flow	All	No restriction
Decreasing Flow	500-200	300 cfs/hr
	4,500-500	2,000 cfs/hr
	Above 4,500	No restriction

Because the effects of scour at high flow would continue with any peaking operation, we recommend that WPP develop an enhancement plan in consultation with WVDNR, PFBC, and DOI if this operating mode is to be maintained. This plan should explore the potential use of fish attractant devices such as inverted V or wing deflectors to provide additional refuge, flow protection, and benthic habitat in the upper segment of the river. Such devices should not be installed within 200 yards of the dam because of potential hydraulic complexities that could develop, leading to shoreline erosion and eddying of rocks that could cause structural damage to project facilities. (This process would consist of eddying of the high-velocity tailrace discharge because of the fish attractors, in turn moving rocks that would serve to worsen erosional effects.)

From a fisheries perspective, run-of-river operation would provide a greater enhancement of the Cheat River down-stream of the project than a modified peaking operation. If the peaking operation is maintained, our ramping plan would enhance the fisheries but would have minimal incremental benefit because most down-ramping impacts would be reduced substantially by the minimum reservoir release during nongenerating periods.

Considering all project factors, including project economics, water quality, and fisheries enhancement, we recommend that there be no ramping requirements. We conclude that the fishery down-stream of the dam is limited primarily because of low pH. The recommended fish attractant structures will provide protection from the highest flows, while the minimum flows will enhance pH conditions (see Section VI.B).

d. Biological Monitoring Plan

WPP proposes to develop a biennial biological monitoring plan. That plan would be submitted to the DOI, WVDNR, and PFBC for comment before implementation.

The WVDNR recommends a biological monitoring program to evaluate the effectiveness of a minimum release flow, including its effect on reservoir pH. The PFBC recommends that WPP develop a biological monitoring plan to document fish reproduction, recruitment, population changes, and abundance and diversity of benthic macroinvertebrates in the Cheat River down-stream of the dam.

We recommend that a fisheries monitoring plan be developed and implemented for Lake Lynn Project waters, including the main reservoir, reservoir embayments, tailwater area, and farther down-stream in the Cheat River. The plan should be prepared in consultation with the DOI, WVDNR, and PFBC and submitted to the Commission for review and approval. The intent would be to monitor aquatic resources, including fish and benthic organisms. Future improvements in aquatic resources would serve as the basis for other potential enhancements, including evaluation of potential turbine entrainment and fish mortality.

e. Fish Entrainment and Turbine Mortality

No studies exist that specifically consider the fish entrainment and mortality impacts resulting from the Lake Lynn project. We have concluded that low fish populations (particularly in the reservoir area nearest to the dam) and low susceptibility of the dominant species make fish entrainment unlikely and make prelicensing entrainment studies unwarranted. But WPP also states that it would be willing to discuss entrainment issues at triennial meetings with fish and wildlife agencies (DOI, WVDNR, PFBC), particularly if resident fish populations continue to improve.

WVDNR recommended that a prelicensing turbine entrainment study be conducted if deemed necessary by WVDNR and DOI. WVDNR also recommended that if negative impacts are documented, WPP develop a plan to avoid, mitigate, or compensate the State of West Virginia for fish mortality impacts. DOI recommended that WPP adequately address the fish entrainment issue in full detail to ensure that existing and potential fishery resources will be protected from injury/mortality in the future due to entrainment. We believe that an entrainment study at this time would not provide useful information because of poor existing conditions, and therefore recommend that entrainment studies be deferred until lake and river water quality (i.e., pH) and fisheries show measurable improvement.

If water quality conditions improve and the lake's fisheries respond with comparable improvement, we recommend that the Commission then order WPP to prepare a plan to evaluate the effects of turbine entrainment on the lake and Cheat River fisheries. The Commission may require this plan on its own or based on a recommendation from WVDNR, DOI, or PFBC. To determine whether lake conditions improve sufficiently, we recommend that WPP develop and implement monitoring plans for water quality and fisheries (see Sections V.C.2.d. and V.C.3.d.).

Unavoidable Adverse Impacts: Continued peaking operation and winter draw-down of the reservoir would adversely affect aquatic resources in comparison to agency-recommended run-of-river operation. Such effects would be minor if the pH of project waters remained at levels that inhibit biological productivity. Our analyses also show that highly variable river flows occur naturally within the Cheat River at the Lake Lynn project. These characteristics, which would have to be maintained under an instantaneous run-of-river operation, highlight the importance of comparing peaking and run-of-river based on season and fisheries impacts, looking at specific species and life stages.

4. Terrestrial Resources

Existing Environment: Flora near the project area is typical of the region. The predominant vegetation is mixed mesophytic forest, with large undisturbed areas visible along the reservoir and river shore areas. Wetlands in Cheat Lake are generally found in small pockets and are primarily confined to tributaries and the three large embayments. Several areas down-stream of the dam are palustrine forested wetlands dominated by broad-leaved deciduous trees.

Wildlife resources in the project area include white-tailed deer, fox, beaver, and other small mammals. The State of West Virginia is also introducing otter to the region as part of its wildlife management plan. Commonly hunted game birds include turkey, grouse, woodcock, wood duck, mallard, and geese. Many species of reptiles and amphibians are also found throughout the area.

Eight state rare plant species are recorded in the project area (seven in West Virginia, one in Pennsylvania). Five state special concern bivalves (clams) are recorded in nearby riverine areas of Pennsylvania and may be present down-stream of the dam.

Environmental Impacts and Recommendations: WPP has not proposed any specific measures intended to preserve or enhance upland habitat areas. There are also no specific resource agency or public recommendations relating directly to protection of upland and wetland habitat areas or wildlife. The project, as proposed by WPP, would result in some loss of upland habitat along with some provisions to protect areas from future development. Development of the West Penn Beach Recreation Area would fragment the upland habitat of about 46 acres of land. However, establishment of wildlife habitat and nature viewing areas such as Cheat Haven and Area 26 will help to preserve and protect those other areas.

While we have no specific recommendations related to upland habitat, a standard license article would require that WPP retain ownership of its project lands unless the Commission approves changes in ownership. This would help to limit land development and further loss of natural habitat. We also recommend measures to minimize destruction of the area's natural vegetation in the interest of aesthetics at the West Penn Area Beach Recreation (see Section V.C.6).

a. Minimum Release Flows

As discussed previously, the recommended minimum release flow (212 cfs or reservoir inflow, with an absolute minimum of 100 cfs) would have a positive effect on the down-stream fishery because of improved water quality and greater availability of water. This enhancement measure would also apply to small areas of wetland vegetation down-stream of the dam and secondarily enhance habitat for other plants and animals, including state concern bivalves.

b. Reservoir Water Level

The proposed increased minimum reservoir level in April would provide more water in the embayments and other inlet areas where wetland vegetation establish in the spring and summer. This would improve the probability of early wetland area growth and increase feeding and brood habitat for waterfowl.

Unavoidable Adverse Impacts: The upland habitat losses associated with the proposed West Penn Beach Recreation Area development are minor considering the amount of remaining upland habitat within the project boundary.

5. Federally Listed Threatened and Endangered Species

WVDNR identified one federally listed threatened species, the flat spired three-toothed land snail, near Cheat Lake. The eastern small-footed bat and the green salamander also occur near Cheat Lake and are under review by DOI for threatened and endangered status.

The flat spired three-toothed land snail is found only in Preston and Monongalia Counties, West Virginia, near Coopers Rock. It generally inhabits leaf litter at the base of the cliffs along the gorge on both sides of the river (in the upper Cheat Lake area).

The green salamander is a cliff-dwelling species whose habitat includes narrow crevices on rock faces. The rocks need to be damp but not wet and situated where the atmosphere is humid and well protected from the sun and direct rain. Green salamanders can also be found under stones, logs, or loose bark and occasionally inhabit trees. The eastern small-footed bat can be found in caves, mine-tunnels, crevices in rocks, or buildings in or near forested areas. It feeds while flying low among trees or over brush.

Because the habitats of the three species identified above are terrestrial in nature and not directly associated with project waters (reservoir or river), the habitats and consequently the species themselves would not be affected by project operations. The only land-disturbing activities associated with this project would be associated with development of the West Penn Beach Recreation Area and the hiking and biking trail. Because those areas do not include rocky areas and cliffs (as are found along upper Cheat Lake), the habitats of the three species would not be affected.

Unavoidable Adverse Impacts: None.

6. Aesthetic Resources

Affected Environment: The project area lies in a deep valley of northern West Virginia well known for its scenery. Coopers Rock State Forest, along the reservoir's up-stream shore to the east, is so named because it features a well-known main rocky overlook from which visitors enjoy panoramic views of the Cheat River valley. According to WPP, nearly 400,000 persons visited Coopers Rock State Forest in 1984. This makes it one of the most popular of West Virginia's State Forests (estimated total visits to all eight state forests are in the range of 800,000 to 1 million per year).

Views of Cheat Lake are also prominent along I-68 as it descends into the valley and crosses a segment of the reservoir that elicits high viewer interest (see Figure 2). The bridge crossing area's most vivid features are its topography, dense woodlands, and the concentration of attractive buildings and the marinas all located along the east shore.

As discussed in Section V.8, Cheat Lake is highly desired for boating, and access to reservoir views is probably a key reason. Without a boat, most of the reservoir shoreline is inaccessible. Thus boaters have a unique opportunity to observe the variety of scenes offered by the reservoir. These vary from the deep canyon-like setting in upper Cheat Lake to the more open and gentle topography down-stream in the lower reservoir and embayments. While many shoreline areas are completely undeveloped, residences, marinas, and lease lot docks provide points of interest for boaters viewing the shoreline.

The area down-stream of the dam is characterized by very little land development and activity. Lack of river flow during normal periods of project nonoperation changes the area's aesthetics compared to the same scene with flowing water. The effects of acid water are also apparent, with rocks along the river often discolored by a yellowish-orange film, sometimes referred to as "yellow boy" staining.

Environmental Impacts and Recommendations: WPP proposes to manage the reservoir water level within the same summer and winter ranges as the existing operation (summer, 868 to 870 feet; winter, 857 to 870 feet), except in April when the proposed minimum water level (863 feet) is 6 feet above WPP's current April minimum.

The proposed higher April water level would enhance springtime reservoir aesthetics compared to the existing operation by reducing areas of dewatered shoreline. We concur with WPP's recommended summertime minimum water level elevation of 868 to 870 feet based on fishery, recreation, and aesthetic considerations.

The recommended minimum flow release of 212 cfs (or reservoir inflow if less than 212 cfs, with an absolute minimum of 100 cfs) would noticeably enhance the Cheat River's aesthetics down-stream of the dam. River flow would be more constant throughout the year and generally equal reservoir inflow during low-flow periods, thus simulating a more natural run-of-river flow. The Cheat River down-stream of the dam would continue to receive far less recreation use than the reservoir, based in part on a less scenic environment. Therefore, we find no reason to modify the recommended minimum flow release because of aesthetics.

WPP's proposal to develop the proposed 46-acre West Penn Beach Recreation Area would have the most prominent visual impact associated with the proposed project. The development would replace a lightly used rustic site with a fully developed and intensively used public park. However, we recommend its development based on the area's many recreation needs (see Section V.C.8).

The West Penn Beach development would be visually compatible with its environment, but the aesthetics of the development should be explored further before construction. We recommend that WPP file a plan to minimize the adverse aesthetic impacts of the West Penn Beach site development. The plan may be filed as a component of the revised recreation plan and should include specific proposals to:

- Minimize destruction of the area's natural vegetation
- Blend the recreational development into the existing landscape character
- Revegetate, stabilize, and landscape new construction areas and slopes damaged by erosion (also, see Section V.C.1)
- Light the recreation area at night so as to provide reasonable safety and convenience, but also to minimize adverse effects on adjacent property owners

The Commission may require that similar planning be applied to other proposed developments as identified through revised recreation plans.

Unavoidable Adverse Impacts: The visual change associated with the West Penn Beach Recreation Area development is unavoidable. However, that change would be offset by improved recreation and management of the improved recreation site.

7. Cultural Resources

Affected Environment: In its letter of May 22, 1990, the West Virginia State Historic Preservation Office (SHPO) indicated that continued operation of the project would not affect any known historic or archaeologic sites within the project area. It stated that although the Lake Lynn powerhouse and dam are eligible for the National Register of Historic Places, they would not be affected because no changes are proposed that would alter them.

Environmental Impacts and Recommendations: The powerhouse and dam would not be affected by the proposed changes to project operations. However undiscovered properties in the project area could be affected adversely by future activities. The SHPO requested that it be notified if there is any ground disturbance for boat ramps or other construction activities.

We recommend that WPP take the following actions before undertaking construction of the West Penn Beach Recreation Area or engaging in any other ground disturbing activities, or if cultural properties are found during construction or operations:

- Consult with the SHPO.
- Based on consultations with the SHPO, prepare a plan describing the appropriate course of action and a schedule for carrying it out.
- File the plan for Commission approval.
- Take the steps necessary to protect the properties until notified by the Commission that all these requirements have been satisfied.

8. Recreation and Other Land and Water Uses

Existing Environment: About 60 percent, or 234,000 acres of Monongalia County is forested, and most of that land is classified as commercial forest. Until about 50 years ago, the area was generally rural and the land adjacent to the lake consisted of small farms and forest. Today most of the farmland is gone, generally because of residential growth, but much of the reservoir shore remains forested.

Cheat Lake is one of 11 reservoirs in West Virginia larger than 500 acres. Of the other 10, only Mt. Storm Lake shares the problems of acidic mine drainage (WVDNR 1975). Cheat Lake is also unique because of its proximity to major cities, including Morgantown and Pittsburgh.

West Virginia's *Statewide Comprehensive Outdoor Recreation Plan 1993-1997* (SCORP) evaluates a region that includes Monongalia County and 5 contiguous counties in northern West Virginia. The SCORP planning region includes a total 1990 population of 253,304. It contains 111 county and local parks, 5 state parks, 9 state wildlife areas (including 7 fishing sites), 1 state forest (Coopers Rock), 1 COE recreation site

(Tygart River Lake), and part of 1 national forest (Monongahela). The SCORP also reports that the region is served by 797 camping sites, 12 PGA-certified golf courses, and 4 licensed whitewater boating companies.

a. Reservoir Land Use and Recreation

Cheat Lake is the largest lake in Monongalia County, providing recreational opportunities for about 381,000 persons in the county and seven contiguous counties. The major recreational facilities on the reservoir are the Lakeview Resort and Conference Center and three marinas that serve primarily motorboats. The reservoir provides a very attractive residential and leisure area setting, with a variety of residential sites clustered around its northern half and occasional residences found along the upper Cheat Lake shoreline. WPP typically owns shoreland up to the normal high water mark, and in some places owns additional land. Most adjacent private owners have dock/ shore easements with WPP, allowing them rights to cross and use WPP property.

The following paragraphs generally describe Cheat Lake's existing recreation and other uses identified by five different zones within the project area beginning at the up-stream end of the reservoir (see Figure 2).

The upper Cheat Lake zone features a narrow canyon area and Coopers Rock State Forest along the eastern 3 miles of shoreline between the headwaters and Quarry Run. There is no residential development in the state forest along the east shore, whereas the west shore includes several private homes within the first mile up-stream of Quarry Run. The 12,713-acre state forest is managed for timber, forestry research, and watershed and wildlife protection. It also offers a scenic overlook as its main attraction as well as hiking, camping, and picnicking. The steep shore area of the state forest has no official trail system and is rarely accessed by hikers. The area is used for recreation primarily by boaters who stop to picnic and swim along the east shore. This activity sometimes results in intensive but generally nonregulated recreation use, and particularly at a beach/sandbar formed by the 1985 flood just up-stream of Quarry Run along the east side of the lake.

The marina zone includes the Edgewater Marina and Blosser's Marina along the east shore. There are several private residences on the east shore as well. The Mont Chateau building is south (up-stream) of the marinas and overlooks the reservoir from high on the ridge. Formerly a state park lodge, Mont Chateau is now a state office building. The shore area at Mont Chateau is used regularly for public swimming. The west shore of the reservoir in the marina area is developed much less densely than the east shore and includes several private home sites and at least one cluster of small cabins.

The bridge zone is easily recognized because the State Route 857 and I-68 bridges cross the reservoir there. The State Route 857 bridge clears the normal full-pool water surface by no more than 8 to 10 feet. This may account for why very large boats are generally not seen on the reservoir. The lake shore slopes are more gentle in the bridge area, providing a good location for the bridges and for the most intensive development area along the reservoir shore. A condominium or townhouse development stands on the east shore between the two bridges, and almost all available land along the east shore north of the I-68 bridge to Sunset Beach Harbor is developed with single family homes on 1/2- to 1-acre lots. The Lakeside Resort and public golf course is just east of the residential area along the lakeshore. Development is more scattered along the west shore and is often not visible from the reservoir. Many of the private properties along the shoreline include boat docks, but virtually none of the shore in the area is developed for public recreation.

The Sunset Beach zone features a harbor lined with residential sites along the reservoir's east side. It includes a marina, a boating products and boat rental store, and a restaurant. Most of the land adjacent to Sunset Beach harbor is rather flat compared to other reservoir shore areas and almost entirely developed with residences of various types. New condominiums (some recently constructed) overlook the harbor from the south side. The land area north of the harbor slopes steeply upward to a broad peninsula featuring several large hillside houses in the Greystone Estates residential development and golf course.

The tip of the peninsula includes an undeveloped wooded area known as Cheat Haven. WPP owns most of the area, the exception being a small, treeless area along the reservoir shore—a former industrial slate dump site (according to USGS mapping) at the south terminus of the former Baltimore and Ohio Railroad route. The former dump area appears to be completely overgrown with native grasses and some small trees. The shoreline opposite the Sunset Beach harbor (along the reservoir's west shore) is mostly undeveloped.

The lower Cheat Lake and embayment zone includes the Lake Lynn dam and hydroelectric plant and three embayments along the reservoir's east side (Rubles Run, Morgan Run, and Manning Run). The West Penn Beach Peninsula is between the two larger embayments (Rubles Run and Morgan Run) and forms the center of WPP's proposed West Penn Beach Recreational Area development.

There are few permanent buildings along the east shoreline between Cheat Haven and Manning Run. The shoreline does, however, include several WPP-owned lease lots. The lease lots are divided into small lake frontage plots identified by posted numbers. While conditions vary, some lease lots include fairly elaborate docks. The lease areas are accessible by boat only, as road access is either inconvenient or nonexistent, and they are used primarily for day use recreation and camping. The former grade of the Baltimore and Ohio Railroad is prominent in this area and runs behind the small lease lot areas along the shore. WPP proposes to improve the railroad grade for use as a public hiking and biking trail.

The lower Cheat Lake zone is not as developed as the up-stream zones, but it is subject to regular recreation use, particularly by boaters. The former railroad grade was constructed along causeways in front of each embayment, with openings that provide water flow. Rubles Run may be accessed easily by most boats used on Cheat Lake, whereas Morgan Run is accessible only to smaller boats. Manning Run is connected to the reservoir through a culvert under the former railroad grade passable only by canoe. Visitors may also reach the embayments along minor roads—particularly the West Penn Beach peninsula, where 10 to 15 cars can be parked informally on WPP property. The site access road is connected to State Route 857, the main secondary (two-lane) highway along the northeast shore of the reservoir.

About 10 to 20 residences are scattered along the Morgan Run and Rubles Run shore and bluff areas. A private campground at the head of Morgan Run appears to serve mostly long-term trailer camp sites. WPP also provides for several dock lease sites along the north shore of Morgan Run. The Morgan Run lease sites are easily accessed by car, and there is reasonable room for parking along the adjoining access road.

The peninsula between Rubles Run and Morgan Run is an area that shows evidence of regular, unmanaged recreation use. It includes several well-worn paths and fire pits found at locations both next to the water and up on the bluff.

b. Cheat River Land Use and Recreation

Access to the Cheat River below the dam is gained on a local road that runs parallel along the east side of the river and then north to Highway 119 in Point Marion, about 3 miles down-stream. A local road also connects along a winding route toward the east, linking with State Route 857 about 5 miles from the dam. The former grade of the Baltimore and Ohio Railroad continues along the river's east shoreline down-stream of the dam. The former railroad grade area next to the dam is secured by fence. WPP uses the area for project operation and maintenance. The project substation is well above the railroad grade area and farther east.

There are only a few buildings immediately adjacent to the Cheat River below the dam. However, the villages of Lake Lynn and Nilan are just above the east river bank and about 1/2 and 2 miles down-stream of the dam, respectively. Point Marion is at the Cheat River's confluence with the Monongahela River, about 3 miles down-stream of the dam. During a site visit (October

1993), we noted evidence of recreation use in several areas below the dam, including well-worn paths, fire pits, and pullouts along the road. WPP has maintained several no trespassing and operational warning signs. About 1 mile below the dam, the riverbed widens to nearly 1,000 feet and is very rocky. We estimate this segment of river (the most shallow area below the dam) may be navigated by canoe only when release flows exceed about 4,000 cfs.

There are no designated recreation areas in the project area down-stream of the dam. Information compiled by WPP indicates that normal, unmanaged recreation uses include fishing, boating and swimming. Most of these activities are likely to occur in the Monongahela River backwater closer to Point Marion.

c. Project Area Recreational Use and Needs Data

In 1990, WPP completed a recreation use study consisting of four components. Three of the components relied on interviews with active recreation groups and individuals in the project area, while the fourth used a mail survey sent to WPP reservoir lease holders. In early 1993, WPP supplemented the 1990 use information in response to a Commission request.

The Cheat Lake Environment and Recreation Association (CLEAR) prepared the *Cheat Lake Needs Assessment* (preliminary report February 1993). That study used statistical techniques to collect and analyze data from randomly selected respondents. CLEAR collected data for the study using in-home interviews and mail-back questionnaires.

We reviewed the WPP and CLEAR reports and summarize some of the information obtained below. Table 7 lists the primary purpose of recreation groups interviewed in the project area in 1990. Pleasure boating and water skiing are seen as important recreation activities and together accounted for about 63 percent of the planned recreation hours reported in the WPP user surveys. In 1993, WPP analyzed the 1990 data further, estimated total use, and then broke that down into reservoir use by private land owner (20 percent) and reservoir and down-stream river use by the general public (80 percent). These estimates (see Table 8) further highlight the importance of boating activities.

Table 9 lists the primary types of watercraft by recreation group and shows predominant use of larger motorized boats. However, while about 93 percent of surveyed WPP leaseholders reported motorboats or pontoon boats as primary watercraft, 49 percent reported a canoe as secondary watercraft. Also, 27 percent of leaseholders reported jet skis for secondary use, with 20 percent reporting jon boats (fishing dinghies).

Table 7. Primary purpose of trip by recreational groups interviewed at Cheat Lake and the Cheat River below Lake Lynn Hydro Station, 1990 (Source: APS 1991).

	Recreation Groups		People			Planned Recreational Hours		
Purpose	No.	%	No.	No./Group	%	No.	Hours/Group	%
Pleasure boating	161	47.6	517	3.2	45.6	617	3.8	43.9
Water-skiing	70	20.7	260	3.7	22.9	265	3.8	18.9
Fishing	29	8.6	58	2.0	5.1	132	4.6	9.4
Swimming	12	3.6	36	3.0	3.2	34	2.8	2.4
Picnic	11	3.2	52	4.7	4.6	68	6.2	4.8
Camping	7	2.1	21	3.0	1.8	134	19.1	9.5
Other	48	14.2	189	3.9	16.7	155	3.2	11.0
Totals	338		1,133	3.4		1,405	4.2	

Table 8. Estimated total recreation use breakdown in Lake Lynn project area, 1990 (Source: APS 1993).

	Private Use (Lake Only)		Public Use (Lake and Down-stream Cheat River)		Combined Public and Private Use	
Activity	No. of Visitors	% Usage	No. of Visitors	% Usage	No. of Visitors	% Usage
Boating	36,800	46	182,400 (900)	57	219,200	55
Water-skiing	8,800	11	73,600	23	82,400	21
Swimming	8,000	10	9,600 (960)[a]	3	17,600	4
Relaxing	16,000	20	---	0	16,000	4
Nature observation	1,600	2	---	0	1,600	~0
Fishing	1,600	2	16,000 (1,362)	5	17,600	4
Picnicking	3,200	4	16,000	5	19,200	5

Activity	Private Use (Lake Only) No. of Visitors	Private Use (Lake Only) % Usage	Public Use (Lake and Downstream Cheat River) No. of Visitors	Public Use (Lake and Downstream Cheat River) % Usage	Combined Public and Private Use No. of Visitors	Combined Public and Private Use % Usage
Camping	0	0	6,400	2	6,400	2
Other	4,000	5	16,000	5	20,000	5
Total	80,000		320,000 (3,222)		400,000	

Note: Numbers in parentheses represent public use of Cheat River below the dam.
[a] Includes estimated use by Point Marion residents of Cheat River near its confluence with Monongahela River.

Table 9. Primary watercraft used for recreation at Cheat Lake, 1990 (Source: APS 1991).

Boat Type	Number	%
Motorboat	258	82.4
Pontoon boat	32	10.2
Canoe	9	2.9
Jet ski	8	2.6
Jonboat (motorized or rowable dinghy)	5	1.6
Sail boat	1	0.3
Total	313	100

Some of the other areas of interest addressed through user survey data and estimates include:

- **Recreation User Place-of-Residence.** About 57 percent of the recreation user hours estimated by WPP in 1990 involved West Virginia residents, nearly all from the Morgantown area. Pennsylvania residents accounted for about 39 percent of the remaining use, with roughly half from the Pittsburgh area. Only about 4 percent of the project area's use is believed to stem from residents of other states.

- **Cheat Lake Fishing Preferences.** About 42 percent of the leaseholders had no preference for fish species while fishing on Cheat Lake, but 29 percent specifically sought largemouth bass. Of those remaining 22 percent sought bullhead, crappie, sunfish, or channel catfish, and 7 percent had no response (WPP 1990).

- **Boating "Problem Areas."** About 69 percent of users reported "too many boats" as an adverse condition on Cheat Lake. About 85 percent of those who cited this problem specifically want to avoid the marinas and upper Cheat Lake (the narrow canyon area) because of excessive boat traffic (WPP 1990).

- **Marina Slip Usage.** In 1992, WPP reported marina boat slip capacity and occupancy as follows:

Marina	Total Slips	Occupied Slips	Percent Occupied
Sunset Beach	160	79	49%
Edgewater	170	120	71%
Blossers	108	85	79%
Total	438	264	60%

WPP estimated that overall boating use declined about 11 percent from 1990 to 1992, reflecting unfavorable weather and a poor economy (WPP 1993).

- **Opposition to a New Fishing Boat Launch Site.** About 59 percent of those who oppose a new boat launch site oppose it because they feel it would either add to or cause overcrowding. About 13 percent oppose the plan because they feel there are too few fish in the reservoir. About 7 percent feel existing access is adequate, and about 21 percent offer no reasons to oppose the plan or no comment (WPP 1990).

- **Location of a New Fishing Boat Launch Site.** About 35 percent of those surveyed feel that a new boat launch site should be provided in the bridge or marina areas, 19 percent feel it could be anywhere, 13 percent favor backwaters, and 11 percent favor a site near the dam. Most of the remaining 22 percent offered no comment (WPP 1990).

- **Willingness to Pay for Recreation Facilities.** The CLEAR surveys included questions about willingness to support user fees for use of Cheat Lake recreational facilities. The data definitely indicate a willingness to pay modest user fees. For example, about 60 percent of respondents were very likely to support a $10 to $20 annual user fee for development of reservoir recreational areas, and about 20 percent were somewhat likely. In addition, about 60 percent were either very likely or somewhat likely to support an annual fee of $21 to $30. The CLEAR survey also showed good potential to support daily user fees, with about 63 percent very likely to support a $1 day-use fee and 59 percent very likely to support $2.

The information compiled by WPP and CLEAR concerning general recreational needs show several similarities concerning recreational problems and needed facilities and services. These studies also concur that overall recreation demand will increase. Another source, the West Virginia SCORP, forecasts a slight (1 percent) decline in the area's resident population between 1990 and 1997, but it also predicts an older population base and a modestly increasing demand for developed recreational facilities. The SCORP states that priority recreational activities in the region include several that are especially relevant to the reservoir, including boating access, bicycling, developed campgrounds, and freshwater swimming.

Table 10 shows the specific recreational needs considered in the CLEAR Needs Assessment along with WPP's proposed enhancements as identified in the license application and discussed further below. According to CLEAR, the 10 recreational facilities or measures with the highest perceived importance (listed in order) are:

- Security/safety patrols
- Public rest rooms
- Swimming/beach access
- Picnic areas/facilities
- Quality access roads
- Wildlife refuge areas
- Hiking trails
- Nature preserve areas
- Canoeing/paddleboating
- Boat launch facilities

Table 10. Comparison of potential recreation needs and applicant's proposed plan (Sources: CLEAR and WVU Travel Research Group 1993; APS 1991-93).

Recreational Facility	Significant Gap Between High Importance Rating and Low Availability Rating[a]	WPP Proposes New or Expanded Facility(ies)	Comments
Boat launch facilities		•	Respondents indicated high availability.

Recreational Facility	Significant Gap Between High Importance Rating and Low Availability Rating[a]	WPP Proposes New or Expanded Facility(ies)	Comments
Boat dock facilities		•	Respondents indicated high availability.
Swimming/ beach access	•		
Cycling trails	•	•	WPP proposes a main reservoir trail.
Hiking trails	•	•	WPP proposes a main reservoir trail.
Concession areas			
Camping facilities	•	•	WPP proposes primitive campsites.
Canoeing/ paddle-boating	•	•	WPP proposes a carry-in boat access.
Wildlife refuge	•	•	WPP proposes preservation of natural areas.
Public rest rooms	•	•	
Picnic areas/ facilities	•	•	WPP proposes more than 30 picnic sites.
Hotel/lodge facilities			

Recreational Facility	Significant Gap Between High Importance Rating and Low Availability Rating[a]	WPP Proposes New or Expanded Facility(ies)	Comments
Fishing areas		•	WPP proposes a variety of shore fishing opportunities.
Recreational facilities	•	•	WPP proposes a wide variety of facilities.
Water-skiing			Respondents indicated high availability.
No-wake zones	•	•	WPP proposes no-wake zone for the embayments and adjacent reservoir.
Nature preserve	•	•	WPP proposes preservation of natural areas.
Quality access roads	•		
Security/ safety patrols	•		

[a] Based on the *Cheat Lake Needs Assessment* prepared by CLEAR and WVU, February 1993. FERC staff labeled a difference in rating scores "significant" if it equaled 10 percent or more.

Comments received during public scoping for this EA reinforced, in particular, the perceived need for safety and security patrols and a public boat launch site.

Environmental Impacts and Recommendations: WPP proposed several recreational enhancements in its license application, including development of the West Penn Beach Recreation Area (with a main reservoir trail), a public boat launch site, a fishing area at the dam's down-stream tailrace, and four wildlife habitat/nature viewing areas. The proposals and general land management issues discussed below include expected impacts, agency and public input, and staff recommendations.

a. Land Use Planning and Management

In its application, WPP filed detailed recreation use data and enhancement plans, including maps, drawings, and descriptions of various proposals. WPP proposes to install, operate, and maintain all proposed recreational facilities. However, WPP states that it may in time turn operation of its recreational facilities over to an outside entity. In addition, WPP proposes to update the current recreation plans every 3 years throughout the term of the license, with review to be provided by interested agencies.

WVDNR recommends that WPP file reservoir and tailrace recreation area plans for Commission approval within 6 months of relicensing. WVDNR wants the plans to include detailed drawings of all permanent recreation features; locations of fish attractor devices along the reservoir and river shores; trail system details; construction schedules; and comments from the WVDNR and other agencies consulted. WVDNR also recommends that WPP design and conduct reservoir and tailrace area recreation use surveys within 3 years of completing all proposed recreational developments, with the survey design to be approved by WVDNR. WVDNR recommends that it and other reviewing agencies be given authority to require additional improvements based on the results of the recreation use survey.

PFBC recommends that revised recreation plans be required, as necessary, to accommodate increasing use, with the results (i.e., recreation surveys and revised recreation plans) provided to resource agencies for review.

The League of Women Voters of Morgantown and Monongalia County recommends formation of a master plan and planning authority, and public review of any WPP proposal to transfer land ownership within the project boundary. In scoping comments, CLEAR recommends that WPP establish an identifiable management entity to assume responsibility for the operation and overall safety and security of all lake users. CLEAR also recommends that WPP work with the Monongalia County Commission, state and local agencies, and various interest groups in the development of a master plan that will address quality-of-life factors in the Cheat Lake area. The WVU Student Administration and the Sierra Student Coalition recommend formation of an advisory board for managing the reservoir.

J. Weems, a local resident, recommends that WPP contribute to an endowment or trust fund to subsidize law enforcement on and around the reservoir.

We acknowledge the importance of continuous and coordinated planning to the long-term management and enjoyment of Cheat Lake and the river down-stream of the dam. Potential overuse and overdevelopment of the reservoir shoreline are fundamental concerns, with such secondary adverse impacts as reduced boater safety, general congestion, and reduced security and enjoyment of the reservoir resource. As a result, we encourage WPP's continued involvement in community and regional planning forums. But, as conditions of the new license, we specifically recommend that WPP:

- Revise and refile the existing recreation and land management plan within 6 months of relicensing (per WVDNR's recommendation). The revised plan should reflect additional recreation enhancement details as required by the license.

- Update the recreation plan and submit it to the Commission every 3 years. The plan must report on recreation survey results, problem areas, and any WPP recommendations. The plan must demonstrate efforts to coordinate and cooperate with DOI, WVDNR, PFBC, Monongalia County, local communities, law enforcement, residents, any other agencies having land management or planning/zoning authority in the area, and local or regional interest groups. The Commission may, at any time adjust the schedule for plan updates.

- Retain ownership of all lands owned within the project boundary (i.e., the Commission must approve any proposed changes of ownership).

- Employ staff responsible for security at various WPP recreation sites and for working with local law enforcement. The professional security staff should be on duty at least during daylight hours on weekends and holidays beginning with the Memorial Day weekend and extending through Labor Day. The ongoing recreation planning process should specifically address security issues and recommend adjustments to WPP staff to meet the needs identified at shore recreation areas operated by WPP. This recommendation is not intended to address law enforcement as it applies to boats under way on the reservoir, except for assisting local law enforcement in posting the proposed no-wake zone (see further discussion under Subsection b. below).

A mandated leadership role for WPP in master planning would be beyond the scope of WPP's responsibility in managing recreational resources. (WPP will remain responsible for managing only those lands within the project boundary.) Our recreation management recommendations would ensure that WPP is actively and appropriately engaged in ongoing resource planning and management in the project vicinity.

b. West Penn Beach Recreation Area

WPP proposes to develop a multi-purpose recreational facility encompassing about 46 acres on the West Penn Beach peninsula. The $3.27 million WPP proposal should accommodate about 400 peak-period visitors. The plan includes:

- **Auto Access and Parking.** A main parking lot for about 50 vehicles is proposed for the top of the bluff overlooking the reservoir and embayments, with a second remote overflow lot for 30 more vehicles. The main parking lot would connect to a 5-space parking lot and dropoff area near the tip of the peninsula; its use would be restricted to the disabled and those loading or unloading car-top boats. Parking would also be developed within the hillside picnic area loop, planned for a site farther inland beyond the overflow parking lot. The hillside loop would include 30 picnic sites, each with room for 2 or 3 vehicles for a total of 60 to 90 additional parking spaces.

  Thus WPP proposes 145 to 175 parking spaces at the West Penn Beach Recreation Area. Without the picnic area parking, the number of parking spaces is 85, including the 5 reserved exclusively for the disabled at the peninsula's tip.

- **Peninsula Recreation Facilities.** The peninsula between Morgan Run and Rubles Run would include modern rest rooms with running water, a children's play area, and numerous picnic tables and benches.

- **Picnic Area.** A hillside road loop is planned for an inland area (beyond the overflow parking lot) and would provide 30 picnic sites, each with parking and its own table and fire grill. A second modern rest room building would also be provided.

- **Main Trail and Shore Fishing Access.** WPP would construct a 4-mile hiking and biking trail, connecting with areas north and south of the West Penn Beach peninsula. It would follow the former railroad grade and terminate down-stream about 600 feet from the dam and up-stream at the Cheat Haven Peninsula. WPP wants to maintain a secure work area along the former railroad grade next to the dam's east side. However, WPP also plans to provide a public parking area above the trail next to the substation, connected to the trail by a stairway.

  The main trail would be land-accessible only from the West Penn Beach peninsula and would be posted for use by nonmotorized vehicles only. Pedestrian bridges would connect main shore areas to segments of trail built along the former railroad grade causeways while allowing boat access into the embayments. Improvements to the causeways would include numerous picnic tables, park benches, and about 500 feet of fishing jetties. WPP plans to enhance fish habitat by bundling and submerging brush cleared during construction of the facility.

Although primarily a day-use area, the causeways would be adequately lit for nighttime use. WPP would also provide a fish cleaning station in the area.

- **Day-use Boat Dock.** WPP plans to provide 20 day-use dock slips, a third modern rest room building, and picnic sites along the abandoned railroad bed just south of the Morgan Run embayment. This plan is contingent upon reaching a final acquisition agreement with a private property owner at the proposed site.

- **No-wake Zone.** WPP proposes that the Rubles Run and Morgan Run embayments and the area extending across the lake from a point about 2,000 feet up-stream from the tip of the West Penn Beach peninsula and extending down-stream to the dam be designated as a no-wake zone. That zone represents roughly the entire down-stream 1 mile of the reservoir.

WPP estimates the proposed West Penn Beach Recreation Area would provide accommodations for about 300 picnickers, 175 vehicles, and 20 power boats at a time. Accommodations also include provisions for about 100 people to fish from the jetties and additional opportunities for bank fishing and dispersed activity along the main trail. The area includes access for the physically disabled through van-accessible designated parking spots located near the tip of the peninsula. From that small paved lot, disabled visitors would gain access to rest room facilities and paved paths leading to picnic sites, fishing jetties, and the car-top boat courtesy dock in accordance with the guidelines of the Americans with Disabilities Act (ADA).

WVDNR's recommendations are similar to WPP's proposal, but WVDNR does not suggest a picnic area loop. WVDNR recommends trails for fishing access along the embayments and that an independent waste disposal system be used at the fish cleaning station. WVDNR also recommends that WPP extend the main reservoir trail to connect the West Penn Beach Area with the tailrace fishing recreation site.

CLEAR recommends that WPP attempt to improve water quality in the northwest portion of Cheat Lake and designate an area there or some other site that might be used as a swimming beach where conditions support bathing. The WVU Student Administration recommends development of a supervised swimming area as water quality allows.

The League of Women Voters of Morgantown and Monongalia County recommends that WPP provide swimming at several sites, a small boat launching site in Morgan Run Bay, and additional picnic area capacity.

We generally concur with WPP's proposed development plan for the West Penn Beach Recreation Area (i.e., auto access and parking, recreation facilities, picnic areas, main trail and shore fishing access, day-use boat dock, and the no-wake zone as previously described). In the following paragraphs, however, we discuss our findings with regard to agency recommendations or other proposed modifications to the West Penn Beach Recreation Area plan.

We concur with the WVDNR recommendation to develop shore fishing access trails along embayments because the areas would be used even without trails. We recommend that WPP clear and maintain embayment shoreline trails extending at least 1,000 feet along each side of the West Penn Beach Peninsula. We would not require that the embayment trails be ADA-compliant because reasonable access for the disabled would be provided to the main 4-mile shoreline trail.

We recommend that WPP continue to maintain a secure work area next to the dam. We also recommend that WPP provide a parking area at the down-stream end of the trail and stairway access to improve trail access and allow hikers to gain access to the tailrace area from the main trail.

We recommend an independent waste disposal system at the fish cleaning station. This is necessary to ensure that fish cleaning waste is removed from the area and properly disposed of. The revised recreation plan should explain WPP's plan for building and operating this system.

We do not recommend that WPP develop or improve a swimming area at the West Penn Beach site, the Mont Chateau shore area, or any other location—primarily because of safety concerns. We also believe the need for swimming access and the many related factors warrant further discussion. We note, for example, that most areas of Cheat Lake are very deep—even close to shore—and boating use is heavy, causing several safety and access concerns. We acknowledge that swimming is a priority recreation need and agree with continued efforts to evaluate swimming area supply and demand. Specifically, we recommend that WPP describe areas commonly used for swimming, including estimates of the number of persons participating in swimming, within its revised recreation plans. These plans should address the roles of both informal and formal swimming sites in meeting the area's demand and should identify known problems at these locations (i.e., safety, access, littering, water quality). We recommend that WPP be required to document the advantages and disadvantages of providing permanent swimming areas in its revised plans; however, we do not see the need to establish or maintain public swimming areas unless required in the future by the Commission.

We do not recommend any additional picnic area capacity beyond that proposed by WPP. The WPP plan provides an adequate number of picnic sites, and measures to monitor use and revise the recreation plan would sufficiently address any future capacity problems. While we would not require a small boat launching area in Morgan Run Bay, we concur that there will be a need for a more sheltered boat launch area. Instead of Morgan Run, we recommend expanding WPP's proposed carry-in boat launch site to also include an area inside Rubles Run. This would ensure shelter from waves (especially with a northwesterly wind) for those who wish to launch in this area while continuing to provide a launch on the main reservoir for convenience and additional dock space. We also believe the additional dock space in Rubles Run would enhance shore protection, provide good access to the embayment itself, and help reduce potential conflicts between carry-in boaters and those hiking or biking on the main trail.

c. Public Boat Launch Site

WPP proposes a boat launch ramp with a parking area for free public use on Cheat Lake. Late in 1993, WPP reported having reached a tentative agreement with the owner of the Sunset Beach Marina to use the existing facilities. WPP plans to expand the existing Sunset Beach site parking as needed to meet demand. The boat launch site would be equipped to accommodate the disabled in accordance with ADA guidelines.

The proposed free boat launch at the Sunset Beach site would meet the public demand for expanded and free boater access to Cheat Lake. The site would take advantage of the existing harbor, which offers a safe protected area for launching boats and navigating in traffic. Use of the Sunset Beach site would also result in a minimal change in land use and aesthetics compared to a new site. The Sunset Beach site offers excellent linkage to support facilities (i.e., the fuel dock, marine supply store, boat maintenance services, and restaurant) and is convenient to main highways (State Route 857 and I-68). Potential negative impacts at the Sunset Beach site would stem from a likely overall increase in recreation use. If not properly addressed, overuse of the site would result in:

- Regular problems with over-capacity parking and road facilities, resulting in conflicts between different parking needs and potential traffic and safety problems, including connections to State Route 857

- Conflicts between various users, including marina slip renters, boat launch users, restaurant/retail customers, and nearby residents

- Difficulty in expanding parking and launch ramp capacity as demand warrants. (The overall site is constrained by private ownership and has limited opportunities for expansion without high cost or affecting existing residences and businesses.)

WVDNR recommends, as a possible alternative to Sunset Beach, the Area 26 parcel, which WPP plans as a wildlife habitat/nature viewing area (see Figure 2). Specifically, WVDNR recommends that WPP develop sufficient free parking for 50 vehicles and boat trailers, provide (or make provisions to provide) a free public launching area for large boats, and develop trails that connect the road to the shoreline. WVDNR also recommends that the Area 26 development include all appropriate public safety measures and provide for barrier-free access.

The Area 26 parcel is not highly constrained by land ownership and existing development. A large plot of applicant-owned land (about 25 acres) is available there, compared to almost none at the Sunset Beach site. Therefore, new parking and other use areas may be developed by clearing forest land. Moderate to steep slopes may pose a disadvantage, but they should not preclude development of a reasonable boat launch site. A key advantage of the Area 26 boat launch site compared to Sunset Beach is the minimal potential for capacity problems and conflicts between various users. The key disadvantages are poor linkage to support facilities (i.e., fuel dock, marine supply store, boat maintenance services, and restaurant) and very poor roadway access compared to the Sunset Beach site. The adverse effects of building the Area 26 boat launch site (compared to Sunset Beach) are:

- Greater initial cost to construct the parking area and boat launch ramp

- Destruction of woodland habitat and potential loss of a designated wildlife habitat/nature viewing and hunting area

- A major change in land use, replacing a passive, generally undeveloped public recreation site with a developed and active recreation site with a high potential for growth and diversification (some demand for ancillary land-based recreation activities should be expected, including picnicking, hiking, and shore fishing)

- Aesthetic impacts and other conflicts for existing residences (i.e., trespassing, noise, and security/ privacy issues)

Based on these comparisons, we recommend that WPP provide a public boat launch at the Sunset Beach site. The Sunset Beach site is superior to Area 26 in terms of roadway access, support facilities, and addressing preferences of those surveyed concerning possible locations for a new boat launch site.

Capacity problems are almost certain to arise at the Sunset Beach marina site, unless WPP expands the parking area as proposed, modifies the overall site layout, or otherwise acts to limit demand. As a guideline for parking capacity, we recommend that WPP provide adequate parking at the Sunset Beach site to accommodate average demand for all users during an off-peak summer weekend (i.e., parking may reach or exceed capacity on holiday weekends).

We recommend that user demand patterns at Sunset Beach, Area 26, and other alternate boat launch site locations be surveyed regularly. We recommend that WPP evaluate alternative sites every 3 years and consider whether more boat launching capacity is needed. If WPP finds that the anticipated parking capacity problems at Sunset Beach are not easily resolved, we recommend that WPP assess alternative sites, including Area 26. Future plans may call for evaluating the possible advantages of developing a boat launch site restricted to smaller boats (i.e., by trailer weight or boat length). This would be consistent with previous WPP investigations of a "fishing boat" launch site and would provide greater flexibility in proposing alternate sites. (We understand, for example, that locations near the I-68 bridge may be feasible for a small boat launch site.)

d. Tailrace Fishing Recreation Area

WPP proposes a tailrace fishing platform along the shore on the east side of the dam at an estimated cost of $290,000. Access to the platform would be gained from the public road along the river. An existing parking area would be used to accommodate about 25 vehicles. A 330-foot-long pedestrian ramp, containing two rest areas with benches, would connect the parking area to the 100-foot-long fishing platform.

The platform would be lit for nighttime use and would accommodate about 20 anglers at a time. The platform would be cantilevered about 18 inches over the water to reduce the possibility of fish being abraded against the wall during landing. A flight of stairs would allow easy access from the tailrace platform to the riverbank area immediately down-stream. An ADA-compliant portable chemical toilet would be provided for the convenience of users of the area. Additionally, a self-registration box would be placed to assess the needs of area users. Should sufficient need develop, WPP proposes to install a fish cleaning station convenient to the tailrace parking lot. However, should the area remain unused, WPP reserves the right to eventually eliminate the portable toilet.

In addition to the portable toilet, visitors with disabilities would be accommodated by one van-accessible parking spot. Both the pedestrian ramp and fishing platform would conform with ADA guidelines. The fishing platform handrails would be constructed with breaks to allow fishing from wheelchairs.

To enhance safety for recreational users in this area, WPP would provide both visual and audible alarms to furnish sufficient notification of increased or decreased flow releases from the project. Directional sirens would be installed upon the dam and down-stream riverbank capable of being heard at least 1 mile down-stream. The sirens would sound two tones, one for turbine operation and another for releases from the dam's Taintor gates. To accommodate the hearing impaired, large red flashing lights would be mounted adjacent to each siren. WPP envisions placing the siren/light combinations about 1,000 feet apart. Recreational users would never be more than 500 feet from the nearest warning device. According to WPP, such a system should permit deaf individuals, with a measure of prudence, to wade safely. The warning devices would be operated for a period of 5 minutes before a significant increase or decrease in flow from the dam would occur.

WPP also plans to remove the "no trespassing" signs and to erect new signs that would provide information about the operation of the warning devices. The signs would warn recreational users of potential hazards associated with the tailrace area.

WVDNR's and PFBC's recommendations for the tailrace fishing recreation site are similar to the WPP proposal. WVDNR also proposes that WPP provide walkways along the river shore and drinking water. Both WVDNR and PFBC recommend that WPP provide an instream reef or fish attracting structures in the tailrace area. PFBC specifies that these could consist of rock piles 15 to 30 feet from shore or stone deflectors extending out from shore. Both agencies recommend a small boat access site for an area below the parking lot.

In the DEA, we recommended that WPP defer development of its proposed tailrace fishing recreation area until biological monitoring provides adequate evidence that it is warranted. However, during recent consultations with DOI, WVDNR, and PFBC, we confirmed those agencies' strong consensus to proceed with tailrace development based on the area's good potential for shore fishing and other recreation. Therefore, we conclude that the tailrace development should be planned and implemented according to the same schedule as all other project recreation enhancements, with construction to begin no later than 2 years after license issuance. This will ensure that the recreation enhancements are implemented concurrently with the potential improvements to the down-stream fishery due to minimum release flows.

Regarding details of the tailrace development, we generally concur with WPP's proposal. We do not recommend additional walkways along the shore or the proposed small boat access because these features would only add to potential safety and maintenance problems with few additional benefits. The walkways may encourage recreation use in areas affected by rapidly increasing flows and water depths without increasing potential fishing access for users. Boating access to this river segment should not be encouraged because of changing flows that would cause safety problems during periods of rapidly increasing flow and because boats would be stranded in shallow water during periods of minimum flow. The recommended fish attractant structures, to be located about 200 yards down-stream of the dam, would also add to boating safety concerns. Furthermore, boating opportunities on the Cheat River below the dam would be very limited because of changing flows and shallow water about 1 mile down-stream, where about 4,000 cfs is needed to navigate a canoe. Finally, considerable opportunities to enjoy boating are available in the reservoir and in the Cheat River backwater and Monongahela River down-stream of the project area.

Based on the limitations of down-stream boating, we concur with WPP's proposal to place signage adjacent to the uppermost of the fish attractant structures, designating the river segment between it and the dam a boat exclusion zone. In addition, we recommend that WPP's recreation plan updates describe and evaluate any demand for boating down-stream of the dam, as well as any existing and potential future problems related to boating.

We recommend that WPP develop plans and construct the fish attractive/protective structures within an area about 200 yards or more down-stream of the dam. This feature would provide refuge from high flows and rapid flow increases and enhance invertebrate habitat (see Section V.C.3). We do not recommend that a fish attracting structure be located in the tailrace because such structures tend to increase eddying, which could in turn lead to bank erosion and undermining of the dam.

We expect a fairly low initial level of recreation use at the tailrace fishing area; therefore, we will not require that drinking water be provided.

e. Wildlife Habitat/Nature Viewing Areas and Other Recreation

WPP plans to designate and preserve natural habitat in four separate land areas to be known as wildlife habitat and nature viewing areas. The four areas are identified in WPP's current land management plan as Area 18, Cheat Haven, Area 12, and Area 26 (see Figure 2).

Area 18 consists of more than 40 acres of land, some of which would be occupied by the main reservoir trail, boat slips, picnic sites, and rest rooms along the reservoir shore. WPP proposes to designate the rest of this parcel, between the Morgan and Manning Run embayments, as a wildlife habitat/nature viewing and primitive camping area. WPP states that the Manning Run embayment, because of its inaccessibility by motorized boats, provides an excellent habitat for waterfowl and wading birds, as well as a quiet spot for wildlife viewing.

Cheat Haven is a 140-acre parcel on the large peninsula 3 miles up-stream of the West Penn Beach Peninsula. WPP proposes Cheat Haven as the up-stream limit of the main trail and as a day-use wildlife habitat/nature viewing area. Cheat Haven would be accessible either from the hiking/biking trail or by boat.

Area 12 is the smallest of WPP's proposed wildlife habitat/ nature viewing areas (about 12 acres) and is located across the lake from the Cheat Haven parcel. It is accessible only by boat and is planned for preservation as a natural area.

Area 26 is on the west side of the reservoir opposite the West Penn Beach Peninsula and just down-stream, on the far side of Tower Run. WPP proposes to designate Area 26 a wildlife habitat/nature viewing and hunting area. The 25-acre parcel is generally wooded and includes an unpaved public road on which current users may park, and an unimproved trail system. Three seasonal residences are located on private property next to Area 26 along the northwest side of Tower Run Bay, and several year-round private residences are located along the opposite side of the bay. Based on future use, WPP plans to consider expanded parking.

WVDNR recommends that WPP provide parking and develop trails at Area 26 that connect the road to the shoreline.

In scoping comments, CLEAR and the WVU Sierra Student Coalition recommend that WPP assist with efforts to establish a trail system in the Cheat Canyon/Coopers Rock area. Specifically, CLEAR and the Sierra Student Coalition believe WPP should consider an exchange of land or an alternate site for the Cheat Haven wildlife habitat and nature viewing area. Instead they recommend trail development in the canyon area of upper Cheat Lake—possibly to include the Coopers Rock State Forest. The WVU Student Administration recommends that WPP provide firewood for camping areas, refuse/recycling receptacles, and sustainable wildlife areas.

We concur with WVDNR's general recommendation for Area 26. Because automobile access is available, adequate parking and regular site maintenance should be provided in the future. Therefore, we recommend that WPP mark or develop a primitive trail system, provide refuse/recycling receptacles and collection, ensure reasonable parking by monitoring use, and slowly expanding parking capacity if needed. This type of management would ensure that Area 26 is maintained as a site with good long-term potential as a nature preservation and hunting area. We also recommend that WPP continue to evaluate the need for a public boat launch site, with Area 26 to be considered as one possible location.

We believe the proposed trail system and wildlife habitat and nature viewing areas (including Cheat Haven) constitute a reasonable coordinated plan that would help to preserve wildlife habitat and provide for the enjoyment of the public. In addition, we find that the trails proposed by WPP may be developed much more easily and with less impact on and better access for the disabled than a trail system in the canyon area could be. A standard license article would require that WPP retain ownership of lands within the project boundary unless the Commission approves changes in ownership. As such, we specifically recommend against WPP selling or otherwise transferring ownership of land for the purposes of installing a trail system within the canyon area, as proposed by CLEAR and the WVU Sierra Student Coalition.

We agree that WPP should supply firewood and provide refuse/ recycling receptacles for its proposed primitive camping facility in Area 18. Fire rings should also be provided at each campsite. Recreation plan updates should include more information on the primitive campsites, including the number of sites, camper information services, and measures to prevent overuse, other user conflicts, or security problems. We also recommend that updated plans address the viability of continuing the primitive camping and privileged permit lease lot programs (including modifications to address demand, user conflicts, or other issues).

Unavoidable Adverse Impacts: The recreational improvements would provide benefits by enhancing recreational use of the reservoir and probably in the tailrace area over time. This would increase recreational access, including boater access to already heavily used boating facilities.

The proposed recreational developments would replace existing unmanaged recreational uses with more highly developed and managed recreational facilities, particularly near the West Penn Beach peninsula. This would result in some loss of passive recreational opportunities and reduced privacy for some land owners and lease lot permit holders. Impacts would include locally increased boating activity in some shoreline areas, more traffic along access roads (especially at the West Penn Beach Peninsula), and an influx of hikers and bicyclists using the main reservoir trail and some secondary trail systems.

9. Socioeconomics

Existing Environment: Monongalia and Fayette counties, where the project is located, have a combined 1990 population of 220,860. The City of Morgantown, with a population of about 26,000, is the largest city near the project. Its population has declined about 6 percent since 1980.

WVU is the largest employer in the City of Morgantown, employing about 6,700 people. Other major employers in the area include Consolidation Coal Company (mining), the County Board of Education, and the Monongalia Health System, Inc. Tourism is a fast-growing industry in Monongalia County and the Northern West Virginia region. Some of the major tourism attractions in or near Monongalia County include Coopers Rock State Forest, whitewater rafting, and WVU football games.

Many residential developments and recreation sites are clustered around Cheat Lake. There are several areas near the lake where new homes are under construction or were recently completed (October 1993). The growth near the reservoir can be attributed to the attractiveness of waterfront living. The recreational opportunities and scenic values have attracted both permanent and summer residents from outside the area to this locale.

Environmental Impacts and Recommendations: The socioeconomic impacts of WPP's proposed project include:

- Anticipated improvements in water, fishery, and recreational resources, with secondary benefits for the area's economy, possibly to include increased tourism

- Continued economic operation of the Lake Lynn hydropower project, providing many benefits for the local and regional economy and contributing to the project area's long-term stability

These effects are discussed further within other appropriate sections of this EA. Neither WPP nor the agencies or the public propose specific measures related to general socioeconomics.

Unavoidable Adverse Impacts: None.

D. No-Action Alternative

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

VI. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the recreational, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with its electric energy and other developmental values. In deciding whether and under what conditions to issue a hydropower license, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

A. Recommended Alternative

From our evaluation of WPP's proposal, reviewing recommendations from resources agencies and the public, and assessing the environmental and economic effects of the project and its alternatives, we conclude that the proposed project—with our recommended enhancement measures would offer the greatest public benefits from the waterway.

The existing project with the recommended enhancement measures would provide several benefits. An estimated 125,830 MWh of relatively low-cost electricity worth about $4.86 million[2] would continue to be generated annually from a clean, domestic, reliable, and renewable energy resource. The electricity generated by our recommended modified peaking operation would be equivalent to the energy produced by burning about 209,000 barrels of oil or about 58,300 tons of coal annually in a steam-electric power plant.

We recommend the following additional measures to protect and enhance the environment:

- Provide a minimum reservoir release flow of 212 cfs when reservoir inflow is greater than or equal to 212 cfs. At all other times the minimum release flow should equal 100 cfs or inflow to the reservoir, whichever is greater. These minimum release flows are proposed to apply regardless of reservoir evaporation and other withdrawals.

- Install and maintain three water quality monitoring stations—one on the reservoir, one in the tailwater area below the dam, and one at a site down-stream of the acid tributaries. The stations should continuously monitor pH, dissolved oxygen, conductivity, and temperature. We recommend that WPP (1) prepare a monitoring plan, with review and input from the DOI, WVDNR, WVDEP, and PFBC before establishing the stations; (2) summarize the results, including flow release data, in an annual report to the Commission, DOI, WVDNR, WVDEP, and PFBC; and (3) meet once every 3 years with those agencies (coordinated with triennial fisheries and recreational meetings) to review the effect of operations on water quality and fisheries.

[2]125,830 kWh at 38.6 mills/kWh.

- Conduct a routine biological monitoring program, including reports every 3 years to the Commission and the DOI, WVDNR, and PFBC. The monitoring should include, at minimum, fish and benthic organism sampling above and below the dam (including the tailrace area) and in the embayments at the West Penn Beach peninsula.

- If so ordered by the Commission after the license is issued, develop a plan in consultation with the DOI, WVDNR, and PFBC concerning the need for fish entrainment and mortality evaluations or an enhancement program. The timing and need for a plan would be triggered by an agency request to the Commission based on results of the water quality and biological monitoring programs.

- Develop a plan to evaluate the effectiveness of fish attractive/protective structures within an area 200 yards or more down-stream of the dam. This would provide refuge for fish from high flows and enhance benthic habitat. We specifically do not recommend fish attractive devices in the tailrace area because of the potential for such devices to alter hydraulic conditions near the dam or powerhouse that may in turn lead to erosion or other damage to project structures.

- Develop recreation enhancements similar to those originally proposed by WPP. (We recommend only minor variations of the applicant's proposal.) Defer construction of the tailrace fishing recreational area only if so ordered by the Commission after the license is issued.

- Provide notification to AGMA of all planned reservoir water level changes greater than 10 feet. If, after relicensing, AGMA contends that a relationship exists between high turbidity and project operations, we recommend that WPP consult with and cooperate with AGMA regarding the exact nature of that relationship. As appropriate, we also recommend that WPP cooperate with AGMA in identifying potential alternatives that AGMA can implement to reduce turbidity in the intake water.

- Install one stream gage down-stream of the dam and a reservoir water level probe up-stream of the dam to ensure accurate monitoring of reservoir water level up-stream of the dam and minimum release flows below the dam.

- Continue to coordinate details of project operation with the COE by preparing a formal agreement. The agreement should address notification procedures concerning project startup and flow release schedules.

B. Developmental and Nondevelopmental Uses of the Waterway

In making our recommendations we weighed economic and developmental values against environmental and other nondevelopmental values of the Cheat Lake reservoir and the Cheat River. We analyzed the economic effects of the following seven alternatives (Alternatives 3-A, 3-B, and 3-C were added to our analysis because of resource agency comments on the DEA):

- **Alternative 1.** No action.
- **Alternative 2.** WPP's proposal—this is based on minimum releases equivalent to 100 cfs or net reservoir inflow (whichever is less) 50 percent of the time and 212 cfs or net reservoir inflow (whichever is less) 50 percent of the time.
- **Alternative 3.** Staff proposal A—release 212 cfs or reservoir inflow (if inflow is less than 212 cfs) and develop recreational enhancements (including the tailrace fishing area). The release of 212 cfs is based on providing maximum improvement of the fisheries habitat area per unit of flow.
- **Alternative 3-A.** Same as Alternative 3 except it would require an absolute minimum release flow of 100 cfs. The 100-cfs absolute minimum release is proposed to ensure that acid inflows from tributaries below the dam would continue to be reasonably diluted when reservoir inflow is less than 100 cfs.
- **Alternative 3-B.** Same as Alternative 3-A except it would also require absolute minimum release flows of 450 cfs for April and May, and 212 cfs for June. The higher minimum release flows are proposed for further dilution of acid to benefit the down-stream fisheries during a key portion of the fish spawning and fry life stages.
- **Alternative 3-C.** Same as Alternative 3-A except it would require run-of-river operation in April, May, and June. The run-of-river operation is proposed to benefit the down-stream fisheries during a key portion of the fish spawning and fry life stages.
- **Alternative 4.** Staff proposal B—release 212 cfs or reservoir inflow (if inflow is less than 212 cfs), add down-ramping, and develop recreational enhancements (including the tailrace fishing area). This alternative is based on providing flow down-ramping to reduce adverse fisheries impacts from rapidly decreasing water depths.

- **Alternative 5.** PFBC proposal—release 1,100 cfs or reservoir inflow (if inflow is less than 1,100 cfs) and develop recreational enhancements (including the tailrace fishing area).

- **Alternative 6.** DOI/PFBC proposal—operate the project in an instantaneous run-of-river mode (reservoir instantaneous outflow equals instantaneous inflow) and develop recreational enhancements (including the tailrace fishing area).

- **Alternative 7.** Staff proposal C—release 450 cfs or reservoir inflow (if inflow is less than 450 cfs), include down-ramping, and develop recreational enhancements (including the tailrace fishing area). This alternative is based on providing maximum improvement in pH per unit of flow released.

The results of our economic analysis, taking into consideration the environmental enhancements, are summarized in Table 11.

Alternative 1 is the baseline no-action case, with no required minimum release flow, no ramping, and no recreational development. Alternatives 2 through 7 represent different operating plans based on WPP's proposed enhancements (Alternative 2), resource agency recommendations (Alternatives 5 and 6), and Commission staff proposals (Alternatives 3, 4, and 7). Alternatives 2 through 7 include the full complement of recreation development as recommended by WPP, the agencies, and the Commission staff. We did not evaluate alternative cases without the recreation development because we agree that the total amount of capital investment in recreation facilities ($3.56 million for all cases) is appropriate to provide for a variety of recreation needs within the project boundary. Furthermore, minor changes in the recreation investment, such as deleting the estimated cost of the tailrace fishing development (about $290,000), have minimal effect on overall project economics.

The energy generation effects of alternative minimum flow releases are summarized in Table 12. This shows that annual generating capacity and net benefits decrease as the amount of the flow release increases. Our recommended flow release scenario (Alternative 3-A) provides an annual levelized net benefit of $10.9 million compared to $12.1 million for the existing project under the no-action alternative. Our recommended flow release provides the best balance between power generation and the enhancement of aesthetic, recreation, wildlife, and fishery resources.

Alternative 1 (no action), which assumes no changes (i.e., environmental or recreational enhancements), provides the highest net benefit. The existing Lake Lynn project does not have a high undepreciated debt relative to revenue that would make it economically beneficial.

Alternative 2, WPP's proposal, has additional fixed costs of about $3.6 million for recreation facilities and decreased generation of 2.5 GWh. These factors would combine to increase the cost of energy by about 6.4 mills/kWh or 20 percent.

Alternative 3, which assumes a minimum release flow of 212 cfs or reservoir inflow (whichever is less), would result in decreased generation of 3.6 GWh. This would raise the cost of energy by about 7.0 mills/kWh or 22 percent.

Alternative 3-A adds an absolute minimum release flow of 100 cfs. This would have a minimal effect on project economics, resulting in decreased generation of about 50 MWh. The overall economics would be essentially the same as under Alternative 3. Our analysis also shows that maintaining flows down-stream of the dam above 100 cfs would measurably benefit water quality by preventing very low pH from occurring during periods of low flow.

Alternative 3-B adds absolute minimum release flows of 450 cfs in April and May and 212 cfs in June. This would result in decreased generation of 4.6 GWh and would raise the cost of energy 7.8 mills/kWh or 25 percent. As discussed in Section V.C.3, however, the potential benefits of this option are minimal because median pH levels are still expected to be below the minimum levels for reproduction and recruitment of important fish species.

Alternative 3-C adds run-of-river operation during April, May, and June. This alternative would result in decreased generation of 5.0 GWh and would raise the cost of energy 9.7 mills/kWh or 31 percent. As with Alternative 3-B, this alternative would not clearly provide benefits to fish down-stream of the dam during the fish spawning and fry life stages. The limitations of variable flows, including extreme high flows (as well as pH limitations) would not be resolved.

Alternative 4 adds flow down-ramping to Alternative 3. This alternative would reduce generation by about 10.2 GWh and would require purchase of more replacement power at a cost of $315,000 a year above Alternative 1. The effect would be to raise the cost of generation by 11.4 mills/kWh or 36 percent. With a continued peaking operation, the down-ramping considered under Alternative 4 would enhance the fisheries, but it would have minimal incremental benefit because most down-ramping benefits would be reduced substantially by the minimum reservoir release during nongenerating periods. In addition, the effects of scour at high flow would continue.

Table 11. Lake Lynn Hydroelectric Project summary of economic analysis (Source: Staff).

Alternative	Present Value of Cost	Present Value of Power	Net Benefits
1	38,530	152,599	114,069
2	45,401	149,829	104,428
3	45,803	148,627	102,824
3-A	45,815	148,398	102,583
3-B	46,310	130,450	84,150
3-C	48,430	120,800	72,370
4	48,367	140,232	91,865
5	51,810	38,798	-13,012
6	57,705	37,744	-19,961
7	50,277	93,675	43,398

Note: All costs in $1,000 1994 dollars
Short-term construction cost escalation:
2.5 percent
Long-term operations and maintenance escalation:
3.0 percent
Discount rate (cost of money): 10 percent
Economic life: 30 years

Table 12. Lost generation at Lake Lynn as a function of minimum flow based on data from 1987-91 (Source: Staff).

Minimum Flow (cfs)	Annual Lost Generation (MWh)
212[a]	3,570
212/100[a,b]	3,620
450/212/100[a,c]	4,620
450[a]	7,045
1,100[a]	15,345
Run-of-River[d]	18,400

[a] Assumes that operation of the facility reflects maintaining minimum flow releases at the set value. When inflow exceeds the minimum flow, the project is operated as in the past; i.e., ponding the excess water within the seasonal pool elevations constraints and releasing flow in excess of the minimum flow to generate electricity.
[b] Assumes absolute minimum release of 100 cfs.
[c] Assumes absolute minimum releases of: 450 cfs in April and May; 212 cfs in June; and 100 cfs from July through March.
[d] Assumes all inflow is passed through the lake. Generation occurs when inflows exceed 1,100 cfs. No excess water exists for pondage. With outflow and inflow set equal, then little or no change occurs in the lake pool elevation.

Under Alternative 5, the minimum flow of 1,100 cfs would reduce the dependable capacity to zero since no generation would be possible for about 72 percent of the time according to the annual flow-duration curve. In addition to energy replacement, load regulation costs would also be incurred by the utility and rate payers. These costs would raise the cost of generation by 16.6 mills or 52 percent. In this case, the cost of operation would exceed income, reducing the project's net benefit to less than zero.

Under Alternative 6, run-of-river operation would further raise energy replacement and load regulation costs and reduce energy generation. This would raise the cost of generation by about 75 percent. This case would also result in negative net benefits.

Under Alternative 7, the minimum flow of 450 cfs with down-ramping would reduce generation by 13.6 GWh and dependable capacity from 51.2 to 25.6 MW. The net effect would raise the cost of generation by 14.5 mills/kWh, or 46 percent.

Alternative 7 assumes a minimum down-stream flow of 450 cfs when reservoir inflow is equal to or greater than 450 cfs and also includes down-ramping.

Under Alternative 7, the 450-cfs minimum flow is in the range of flows where generation and net present value decrease rapidly with increases in minimum flow. Figure 6 shows that annual generation drops from 129 to 116 GWh between zero and 450 cfs. The relationships between minimum flow and present value of power, cost, and net value are shown in Figure 7. These figures represent the long-term project benefits (in terms of power produced), the costs of operating the project, and the difference between the two, or the net benefit. The levelized annual net benefit decreases from $12.1 million to $10.9 million ($1.2 million or about 10 percent) between zero and 212 cfs. The levelized net benefit drops from $12.1 million to $4.6 million ($7.5 million or 62 percent) between zero and 450 cfs. Most of the drop occurs between 212 and 450 cfs ($6.3 million). Therefore it can be seen that increasing minimum flow from 212 to 450 cfs would reduce the project's levelized net annual benefit by about $6.3 million, or 52 percent.

Conversely, it can be seen from Figure 4 that the greatest incremental increase in pH in the Cheat River below the dam occurs as minimum flow increases from zero to 100 cfs. Furthermore, even with the highest release flows, pH conditions will continue to limit aquatic life productivity until such time as acid mine drainage impacts are reduced in the watershed. For example, while increasing the minimum flow up to 1,000 cfs would improve the median pH to 5.28, this would still be below minimum pH levels for reproduction and recruitment of target fish species (5.5 to 6.0). Another key factor related to minimum flow releases is the effect on usable fisheries habitat, which will improve most as flows increase from the 12 cfs leakage to 212 cfs. Lesser improvements are derived as flows increase beyond 212 cfs.

Table 13 summarizes the project's dependable capacity for each alternative considered. We conclude that based on the assumptions and method of analysis used, Alternatives 1, 2, 3, 3-A, 3-B, 3-C, and 4 all appear economically beneficial. Alternatives 5 and 6 cannot be justified economically. Alternatives 3-B, 3-C, 4, and 7 do not sufficiently balance developmental and nondevelopmental uses of the waterway because they would result in incrementally substantial economic costs with very little incremental environmental enhancement.

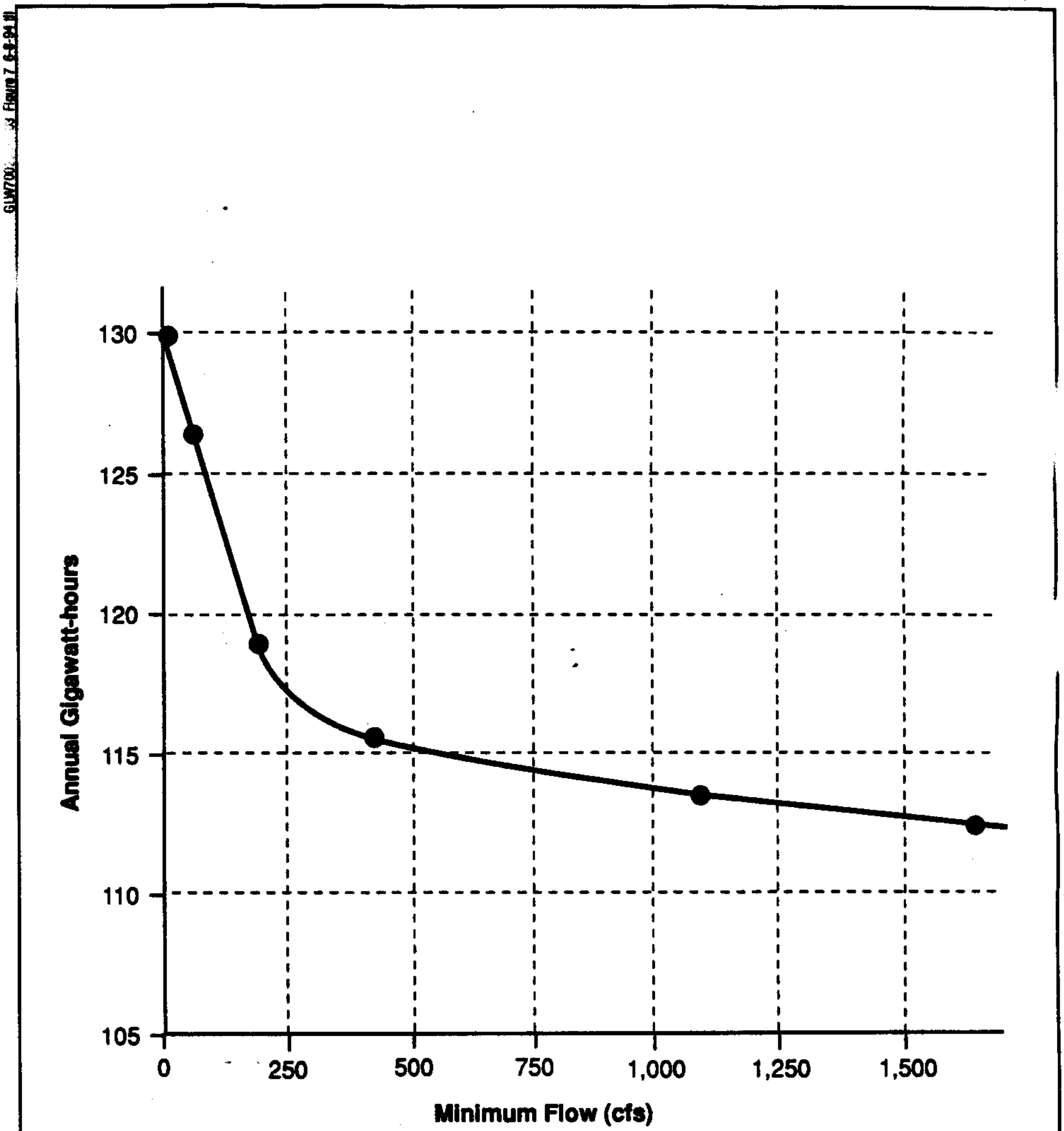


FIGURE 6
Minimum flow vs. annual generation
Source: Commission Staff

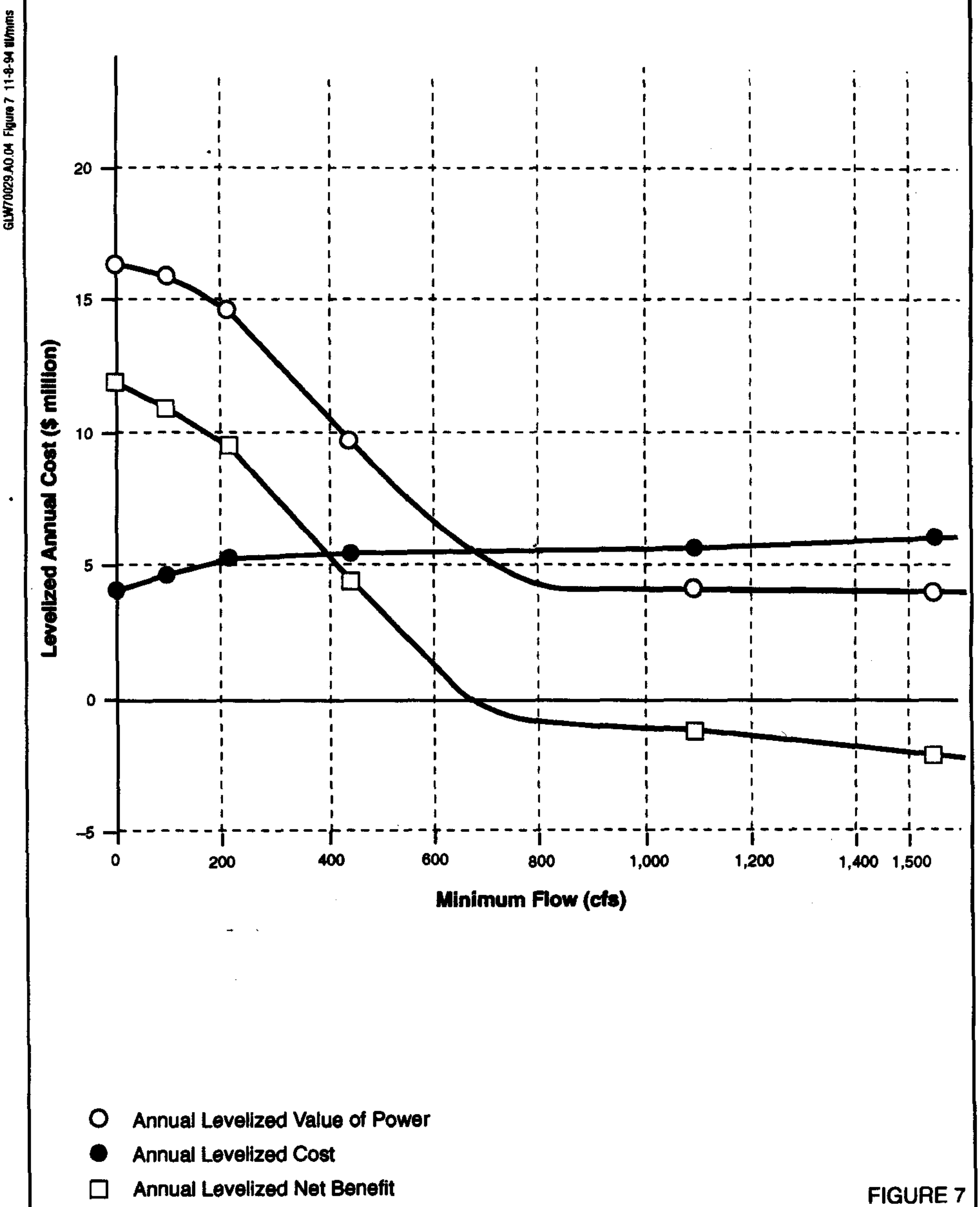


FIGURE 7
Project economics
Source: Commission Staff

Table 13. Dependable capacity for each alternative.

Alternative	Dependable Capacity (MW)
1. No action	51.2
2. WPP's proposal	50.3
3. Release 212 cfs or reservoir inflow	49.9
3A. Add 100 cfs absolute minimum release	49.9
3B. Release 450 cfs April and May; 212 June	41.5
3C. Run-of-river in April, May, and June	37.0
4. Add down-ramping to Alternative 3	47.0
5. Release 1,100 cfs or reservoir inflow	0
6. Instantaneous run-of-river	0
7. Release 45 cfs or reservoir inflow (with down-ramping)	25.6

We conclude that, at a levelized annual cost of $6.3 million, or 52 percent of the current annual levelized benefit it would not be beneficial to increase minimum flows from 212 to 450 cfs for the purpose of diluting the acidic mine drainage. We recommend Alternative 3-A, which provides a minimum flow of 212 cfs or reservoir inflow (if inflow is less than 212 cfs) without ramping, and with an absolute minimum release flow of 100 cfs.

C. Pollution Abatement

The Lake Lynn project annually generates about 129.4 GWh of electricity on average. This amount of hydropower generation, when contrasted with the generation of an equal amount of energy by fossil-fuel facilities, avoids the unnecessary emission of substantial quantities of atmospheric pollutants. Assuming that the 129.4 GWh of hydropower generation would be replaced by an equal amount of coal-fired generation, generating electric power equivalent to that produced by the Lake Lynn project would require the combustion of about 54,300 tons of pulverized bituminous coal annually.

Without pollution control and assuming the sulfur content of the coal to be 1.0 percent, the following approximate quantities of atmospheric pollutants would be produced annually:

Oxides of sulfur	1,100 tons
Oxides of nitrogen	500 tons
Carbon monoxide	25 tons
Carbon dioxide	125,000 tons

Removing the oxides of sulfur and nitrogen from the flue gas produced by the combustion of fossil fuels increases the cost of generating electricity. State-of-the-art pollution technology is capable of removing about 95 percent of the oxides for sulfur and 60 percent of the oxides of nitrogen from the uncontrolled flue gases. Estimates of these control costs are about $500 per ton for oxides of sulfur and $385 per ton for oxides of nitrogen removed. The cost of removing 95 percent of the 1,100 tons of oxides of sulfur would be about $550,000. The cost of removing 60 percent of the 500 tons of oxides of nitrogen would be about $193,000.

Table 14 shows the pollutants that would be produced by a coal-fired power plant generating power equal to the amount of energy lost annually by implementing alternative environmental measures recommended for the Lake Lynn project. It includes reference to various minimum release flows and down-ramping, as discussed above in Section VI.B. Other recommendations provided by the agencies (not included in Table 14) included run-of-river operation (DOI and PFBC) and a minimum release of 1,100 cfs. Those recommendations would render the Lake Lynn project economically infeasible; therefore, we may assume the existing project's entire annual capacity of 129.4 GWh would be lost, with a corresponding release of air pollutants as described above.

D. Consistency with Comprehensive Plans

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), 25 comprehensive plans were filed by federal and state agencies that address various resources in West Virginia and Pennsylvania. Of those, we identified four as being relevant to the project.[3] The project complies fully with these comprehensive plans.

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[3]West Virginia Division of Water Resources, *Monongahela River Basin Plan, 1982*, Charleston, WV; West Virginia Governor's Office of Economic and Community Development, *Statewide Comprehensive Outdoor Recreation Plan, 1980-1985* and *1988-1992*, Charleston, WV; West Virginia Division of Natural Resources, *Today's Plan for Tomorrow's Wildlife: a Strategic Plan for Fish, Game, and Nongame Management, 1975-1985*, Charleston, WV; Pennsylvania Department of Environmental Resources, *Pennsylvania's Recreation Plan, 1986-1990*, Harrisburg, PA.

Table 14. Pollutants that would be produced by a coal-fired power plant providing energy generation equivalent to annual energy losses from environmental measures recommended for the Lake Lynn project.

Recommended by	Annual Energy Cost in GWh	Tons of Coal Required	Pollutants Released (Tons)			
			Oxides of Sulfur	Oxides of Nitrogen	Carbon Monoxide	Carbon Dioxide
Staff (212 cfs)	3.57	1,500	29	13	1	3,450
Staff (212 cfs with down-ramping)	10.17	4,300	83	38	2	9,800
Staff (450 cfs with down-ramping)	13.60	5,700	111	51	3	13,100

VII. CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS

Under the provisions of the FPA and as amended by the Electric Consumers Protection Act of 1986, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of such resources affected by the project.

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

In July 1994, Commission staff made a preliminary determination that certain fish and wildlife agency recommendations were outside the scope of Section 10(j) and that they should be considered under Section 10(a) of the FPA. In response to the determinations, staff received comment letters from DOI, WVDNR, PFBC, and WPP. All of the resource agencies requested, and subsequently attended, a negotiation meeting with Commission staff on September 13, 1994, in Ligonier, Pennsylvania. Representatives from WPP also participated. All fish and wildlife concerns and other concerns discussed in their comment letters were addressed at the meeting. The issues that remain unresolved with the agencies are discussed below.

Pursuant to Section 10(j) of the FPA, we are making a preliminary determination that some of the recommendations of the federal and state fish and wildlife agencies (or parts thereof) are inconsistent with the purpose and requirements of Part I of the FPA or other applicable laws because they conflict with the comprehensive planning and public interest standards of Section 4(e) and 10(a) of the FPA. This is because these recommendations, or parts of these recommendations, would cost more to implement than the value of their potential benefits. Following negotiations, the following 12 resource agency recommendations remain at least partially inconsistent with Section 10(j):

- Run-of-river operation [DOI]
- Run-of-river operation [PFBC]
- Study the effects of peaking and lake level fluctuations [DOI]
- A plan to prevent dissolved oxygen degradation [WVDNR]
- A proposed minimum release [WVDNR]

- Minimum reservoir water levels for April [WVDNR]
- A fish entrainment and mortality plan [WVDNR]
- Measures to address fish entrainment and mortality [DOI]
- A water quality monitoring plan [PFBC]
- A minimum dissolved oxygen level requirement [PFBC]
- A minimum release requirement [PFBC]
- A plan to eliminate or restrict peaking operation during spawning and fry periods [PFBC]

Recommendations considered to be outside the scope of Section 10(j) are considered under Section 10(a) of the FPA and are addressed in the specific resource sections of this report. Table 15 summarizes all the fish and wildlife agency recommendations, shows whether they are within 10(j), and whether they are adopted under the staff-recommended alternative.

Table 15. Analysis of fish and wildlife agency recommendations (Source: Staff).

Agency	Recommendation	Within Scope of 10(j)	Conclusion
DOI	Compare in the EA impacts of existing operation, peaking, R-O-R, ponding, pulsing, and ramping.	No. Not specific measure to protect fish and wildlife	Partially adopted—EA considers these alternatives.
DOI	Modify Section 4.1 of Scoping Document.	No. Not specific measure to protect fish and wildlife.	Not adopted.
DOI	Compare impacts of project operations.	No. Not specific measure to protect fish and wildlife.	Partially adopted—EA discusses and compares alternatives.

Agency	Recommendation	Within Scope of 10(j)	Conclusion
DOI	Validate water quality model results through field studies.	No. Not specific measure to protect fish and wildlife.	Not adopted-Completed modeling is reasonable.
DOI	Establish at least three permanent pH water quality monitoring stations.	Yes.	Adopted.
DOI	Study effects of peaking and lake level fluctuations and develop a plan to mitigate adverse impacts.	Yes.	Partially adopted—EA discusses project impacts. Monitoring will help document future project impacts.
DOI	Address the fish entrainment issue in full detail to ensure that existing and potential future fishery resources will be protected from injury/mortality.	Yes.	Partially Adopted-Monitoring will help determine potential for an entrainment problem.
DOI	Run-of-river operation.	Yes.	Not adopted because economic costs would exceed benefits.
WVDNR	Monitor dissolved oxygen and develop plan to prevent its degradation.	Yes.	Partially adopted—recommend DO monitoring; develop a plan to bring the project into compliance if state standards not met.

Agency	Recommendation	Within Scope of 10(j)	Conclusion
WVDNR	Develop a plan for continuous monitoring of pH, dissolved oxygen, and water temperature in the reservoir and tailrace.	Yes.	Adopted.
WVDNR	212-cfs minimum release from 4/1 to 10/31. Maintain from 11/1 to 3/31 if inflow is 212 cfs or more.	Yes.	Partially adopted—Maintain 212 cfs or reservoir inflow (whichever is less) with absolute minimum of 100 cfs.
WVDNR	Releases below minimum allowed only if prescribed in a WVDEP- and WVDNR-approved water quality plan.	No. Reserv. of authority.[a]	Not adopted—Allowance for lesser discharge is provided for.
WVDNR	Evaluate effect of 212 cfs on reservoir pH.	Yes.	Adopted.
WVDNR	Evaluate reservoir pH every 3 to 5 years as prescribed and approved by F&W agencies.	No. Reserv. of authority.[a]	Not adopted—Commission will approve any changes in reporting requirements.
WVDNR	Schedule meetings with F&W agencies and others every 2 years to evaluate effectiveness of minimum flow release, pH, and dissolved oxygen monitoring plans.	No. Not specific measure to protect fish and wildlife.	Partially adopted—recommend meetings every 3 years.
WVDNR	Minimum reservoir levels—868 to 870 ft NGVD from 4/1 to 10/31, 857 to 870 ft from 11/1 to 10/31 with a minimum flow of 212 cfs.	Yes.	Partially adopted—Recommend April reservoir level of 863 to 870 ft.

Agency	Recommendation	Within Scope of 10(j)	Conclusion
PFBC	Adopt run-of-river operation.	Yes.	Not adopted because economic costs would exceed benefits.
PFBC	Require a minimum dissolved oxygen level consistent with previously licensed hydroelectric projects in the Upper Ohio River Basin.	Yes.	Not adopted—Low DO has not been a problem. DO will be monitored, and compliance plan filed if needed.
PFBC	Develop a biological monitoring plan.	Yes.	Adopted.
PFBC	Meet annually with resource agencies to review water quality and monitoring results.	No: Not specific measure to protect fish and wildlife.	Partially adopted—Annual water quality report; meet every 3 years.
PFBC	1,100-cfs minimum release when inflow equals or exceeds that amount, and decreasing in 100-cfs increments in response to decreasing inflows to an absolute minimum of 212 cfs.	Yes.	Not adopted because economic costs would exceed benefits.
PFBC	Prepare plan to restrict or eliminate peaking during the fish spawning and fry periods.	Yes.	Not adopted-economic costs would exceed potential benefits.
PFBC	Revise recreation plans, as necessary, to accommodate increasing use.	No. Not specific measure to protect fish and wildlife.	Partially adopted—Revise plans every 3 years.

Agency	Recommendation	Within Scope of 10(j)	Conclusion
WVDNR	Prepare a drought contingency or water utilization plan.	No. Not specific measure to protect fish and wildlife.	Not adopted-Plan is not needed given current withdrawals; Commission must review any new plan to withdraw 1 mgd or more.

[a] Recommendations made by fish and wildlife agencies that call for reserved authority to regulate areas within Commission jurisdiction under the license are outside the scope of Section 10(j).

Our reasons for not adopting Section 10(j) recommendations are explained in the individual resource sections and summarized below.

DOI and PFBC recommend that the project operate in a run-of-river mode. Run-of-river would provide greater environmental benefits than continued peaking. However, under the present project facilities configuration and economics, the costs associated with run-of-river operations outweigh the environmental benefits. Run-of-river operation would not allow economically feasible operation of the project. We recommend a modified peaking operation with limits on reservoir fluctuation and minimum flows (see Section V.C.2).

DOI also proposes that WPP study the effects of peaking and lake level fluctuations and develop a plan to mitigate adverse effects. DOI suggests that a run-of-river alternative would constitute such a plan. As discussed above, we believe run-of-river operation is inconsistent with the comprehensive planning standard of Section 10(a) of the FPA. Furthermore, we believe the effects of peaking and lake level fluctuations are fully discussed in this EA. We also recommend continuous water quality and biological monitoring, which will help document the effectiveness of our recommended enhancements and further identify any adverse project effects (see Sections V.C.2 and V.C.3).

The WVDNR recommendation that WPP develop a plan to prevent dissolved oxygen degradation is inconsistent with the comprehensive planning standard of Section 10(a) because dissolved oxygen degradation is not currently a problem. Therefore, the cost of developing such a plan, given currently acceptable dissolved oxygen levels, would exceed the level of benefits provided. We note, for example, that while Lake Lynn operations affect dissolved oxygen in the tailrace, dissolved oxygen was never below the 5.0 mg/L West Virginia and Pennsylvania state standard during the 1990 and 1991 water quality surveys commissioned by WPP. We recommend no immediate measures to address dissolved oxygen degradation; but we do recommend continuous monitoring of dissolved oxygen and other water quality factors, and would require notification of agencies and the Commission if any dissolved oxygen levels of less than 5.0 mg/L are detected. Then, if requested by WVDEP, and subject to Commission approval, WPP would file a plan to bring the project into compliance with a 5.0 mg/L dissolved oxygen level (see Section V.C.2).

We did not adopt WVDNR's constant 212-cfs minimum release flow because of its potential to result in draw-down of the reservoir below the minimum target elevation (868 feet NGVD) during key months of the recreation season. Historically, it is not uncommon for WPP to release only about 12 cfs leakage for several consecutive days in July, August, or September and still create little or a very slow increase in reservoir water level. During a drought, reservoir inflow may be much less than 212 cfs and—depending on the drought's duration—the reservoir could be drawn down below the target elevation with a 212-cfs minimum release.

Releasing a flow equal to reservoir inflow when inflow drops below 212 cfs (roughly 10 percent of the time, on average, throughout the year) represents a reasonable plan for balancing impacts on various resources. This would result in a river flow below the dam that simulates the river's natural flow during dry periods while also maintaining the reservoir water level. We also evaluated an absolute minimum release flow of 100 cfs. Our analysis of that alternative shows that this additional measure would result in some added risk of reservoir draw-down, but we believe the draw-down will still be within an acceptable range. Therefore, because of the importance of maintaining the target reservoir water level for recreation, we consider the WVDNR minimum release flow inconsistent with Section 10(a) of the FPA and recommend release of 212 cfs or reservoir inflow, whichever is less, and an absolute minimum release flow of 100 cfs (see Section V.C.2).

We did not fully adopt WVDNR's proposed minimum water level elevations because the proposed April minimum water level (868 feet NGVD) would reduce flood storage capacity to near zero and provide only a minimal increase in wetted surface area. Therefore the 868-foot minimum water level is not in the public interest and is inconsistent with Section 10(a). We recommend a minimum of 863 feet for April to balance environmental enhancement effects with a need for springtime flood control (see Section V.C.2).

The fish entrainment and mortality avoidance, mitigation, or compensation plan proposed by WVDNR is inconsistent with Section 10(a) because the need to proceed with such a program has not yet been determined. There is no substantial evidence to support the development of such a plan, and the WVDNR did not raise objections to this conclusion during the 10(j) negotiations.

Similarly, we have concluded that the DOI's recommendation to adequately address the fish entrainment issue in full detail is inconsistent with Section 10(a). We maintained during the 10(j) negotiations that there is no merit in detailed studies of the entrainment issue until there is more data available about the reservoir fishery. Proceeding with detailed entrainment studies now would substantially delay relicensing, with a corresponding delay in the benefits to be provided by a minimum release flow and the other enhancements. Furthermore, we note that DOI's original recommendation was not specific as to the types of studies to be undertaken.

Therefore, staff concluded that DOI's recommendation (which was clarified during negotiations to mean a delay in the license issuance) would unnecessarily prevent achievement of other beneficial use objectives. Staff maintained that the project should be relicensed without completion of further studies. Section V.C.3 discusses this issue and notes that the license could be reopened in the future to address the entrainment issue based on the results of the biological monitoring program.

The PFBC recommendation for water quality monitoring at four locations in the reservoir and river is inconsistent with Section 10(a) of the FPA because it would not result in any additional potential fish and wildlife benefits. While we agree that water quality monitoring is warranted, existing monitoring may be effectively supplemented by three new WPP water quality monitoring stations, which we do recommend. The proposed water quality monitoring plan will allow for an improved understanding of the water quality benefits of minimum release flows, particularly the effects on pH. Such effects may be adequately determined with the recommended three water quality monitoring stations--one to be located in the reservoir, one in the tailrace area, and one to be located down-stream of the acid tributaries. A fourth water quality monitoring station is not needed (see Section V.C.2).

The PFBC recommendation to require a minimum dissolved oxygen level of 6.5 mg/l is inconsistent with Section 10(a) because it would result in unnecessary costs. Dissolved oxygen degradation is currently not a problem, and dissolved oxygen levels in the tailrace should be enhanced by the proposed minimum release flow. We recommend continuous monitoring of dissolved oxygen; but we do not recommend an operating plan to prevent dissolved oxygen degradation. The monitoring program will alert the PFBC of any future problems, and if dissolved oxygen levels fall below 5.0 mg/L, we would require a plan to bring the project into compliance with that standard (see Section V.C.2).

The PFBC 1,100-cfs minimum flow was not adopted because its costs would exceed its benefits making it inconsistent with the comprehensive planning and balancing provisions of Section 10(a). The PFBC recommendation that the project operate in a run-of-river mode upon documentation of consistent fish reproduction and recruitment down-stream of the dam is also inconsistent with Section 10(a) because the increased energy costs are not justified by the questionable benefits to fish down-stream of the dam. This makes the recommendations inconsistent with the comprehensive planning and balancing provisions of Section 10(a) (see Section VI.B).

The PFBC proposal to prepare a plan to eliminate or restrict peaking operations during the fish spawning and fry periods is inconsistent with both Section 10(a) and Section 4(e). In summary, the desired benefits to fish spawning cannot be produced under any operating plan because of low pH, which is the major controlling factor over the potential for fish spawning. We have also concluded that operating the project in a run-of-river mode would not eliminate widely variable flows and flows much greater than the optimal range for the spawning and fry life stages of key fish species. Our analyses of water quality, fisheries, and economics show that releasing higher minimum flows would not improve pH or flow conditions sufficiently to provide a clear benefit for fish spawning and fry habitat (Sections V.C.2, V.C.3, VI.B, and our responses to agency comments in Appendix B). This would remain true even with the highest considered minimum release flow of 1,100 cfs (or reservoir inflow if less than 1,100 cfs). Therefore, we recommend that peaking operations continue with a minimum release flow and continuous water quality monitoring.

Furthermore, we recommend the installation of fish attractant structures down-stream of the dam to provide additional refuge, flow protection, and benthic habitat in the upper segment of the Cheat River. We recognize that there is some potential for pH to improve in the future with corresponding benefits for the fishery. If such improvement occurs, the proposed water quality and biological monitoring programs will confirm it. Reopening the license to reevaluate the potential fishery benefits of minimum release flows and alternative operations may then be considered.

Fish and wildlife agency recommendations considered outside the scope of Section 10(j) and not fully adopted are summarized below.

The WVDNR recommended that WPP meet with resource agencies every two years to evaluate the effectiveness of the minimum flow release and the results of water quality monitoring. The PFBC recommended meeting every year to review water quality monitoring and biological monitoring results. We recommend that WPP prepare and file a report on water quality annually. Furthermore, we recognize the comprehensive nature of ongoing resource planning associated with this project and the need for reasonable time to implement monitoring programs, environmental enhancements, and the recreation program. For example, we anticipate it will take several years to finalize plans and implement the proposed fish attractive structure down-stream of the dam, or to develop the West Penn Beach Recreation area. Therefore, we recommend meetings every three years, which also corresponds to the triennial filing of revised recreation plans. Of course, the agencies and WPP are also free to meet at any mutually agreeable interval, but we recommend that the license require meetings every three years. The Commission may change the frequency of the recommended meetings at any time, based on project-specific issues.

The DOI recommends that the EA compare the impacts of various operational alternatives, including the existing operation, alternate peaking operations, run-of-river, ponding, pulsing, and ramping. The DOI also recommends modifying Section 4.1 of the Scoping Document to reflect these alternatives. We partially adopted these recommendations because the EA discusses and compares the alternatives to varying degrees. We did not revise Section 4.1 of the Scoping Document because that document was issued to solicit early input on the DEA and was not intended for revision and reissuance (see Sections III and VI.A-B).

The DOI recommendation to validate water quality results through field studies was not adopted because our review of WPP's modeling study indicated that the methods used were appropriate and reasonable. Furthermore, we found that pH values from samples collected in the field may be highly variable. Maximum pH values from field samples should not be compared to the maximum daily mean pH values produced by the model. We conclude the water quality model is sufficient for comparing alternatives and predicting pH values. As a license condition, we will recommend a continuous water quality monitoring program that will provide data showing the effects of minimum release flows and other operational changes (see Section V.C.2).

The WVDNR recommends that WPP evaluate reservoir pH every three to five years as prescribed by fish and wildlife agencies and that WPP be allowed to provide release flows below the minimum only if prescribed in a WVDEP- and WVDNR-approved water quality plan. These recommendations were not adopted because Section 10(j) does not allow fish and wildlife agencies to reserve the authority to prescribe the terms for project monitoring and operations. We recommend continuous water quality monitoring with reports due annually and coordination meetings with DOI, WVDNR, and PFBC every three years. Our recommendations would allow for release flows below the 212 cfs minimum when reservoir inflow is less than 212 cfs (see Section V.C.2).

The WVDNR recommendation that WPP conduct a turbine entrainment study if requested by fish and wildlife agencies was partially adopted. If water quality improves, the fish and wildlife agencies may file a request with the Commission to proceed on a plan to evaluate the effects of turbine entrainment. The Commission will retain authority to require and monitor such an evaluation (see Section V.C.3).

Although recreational recommendations are beyond the scope of Section 10(j), the specific WVDNR and PFBC recommendations for recreational improvements were considered under Section 10(a) and partially adopted. While we agreed with almost all the agencies' specific recreational recommendations, some aspects are refined. The key recommended fish and wildlife agency recreation details that are not adopted are as follows (see Section V.C.8):

- We do not recommend requiring a boat launch facility in the tailrace area as recommended by WVDNR and PFBC because of safety concerns and because of limited potential for boating down-stream of the project based on water depths.

- We do not recommend requiring that WPP provide trails along the shore as recommended by WVDNR because fishing access will be adequately provided for at the tailrace and because of potential trail safety and maintenance problems due to fluctuating flows and water levels.

- We do not recommend requiring that WPP provide drinking water in the tailrace fishing area as recommended by WVDNR because of anticipated limited recreational demand, at least initially (we recommend that WPP monitor recreation use and make additional improvements as warranted or as directed by the Commission).

- We do not recommend requiring development of a boat launch facility at Area 26 as recommended by WVDNR because WPP's proposed Sunset Harbor boat launch would provide for reasonable public boat launch access with minimal capital cost.

- We do not recommend allowing WVDNR or PFBC to authorize or mandate WPP-sponsored recreational planning efforts or implementation of recreation improvements because this authority is reserved to the Commission.

We believe these recreation resource inconsistencies are minor. Based on our recommendations, WPP would be required to prepare revised recreation plans and to consult with DOI, WVDNR, PFBC, and the Commission every three years. That ongoing planning process will provide ample opportunity for input and allow for modifications of the current plan in response to changing needs (see Section V.C.8).

We did not adopt the WVDNR recommendation that WPP prepare a drought contingency or water utilization plan. Such plans to ration water for consumptive uses are not specific measures to protect fish and wildlife. Our analysis shows that current reservoir withdrawals for consumptive use are minimal. Furthermore; the recommended minimum release flow of 212 cfs or reservoir inflow, with an absolute minimum release of 100 cfs, is responsive to periods of low flow because 212 cfs is exceeded more than 90 percent of the time. In addition, the Commission must approve any proposed additional withdrawal from the reservoir exceeding 1 mgd. In such a case, the Commission may require a drought contingency plan, which could include modified operational parameters for the Lake Lynn project (see Section V.C.2).

Recommendations submitted by other agencies or individuals (i.e., not state or federal fish and wildlife agencies) are listed in Table 16. Our corresponding conclusions are listed in the table and addressed in the appropriate resource sections. These recommendations are not subject to evaluation under Section 10(j) of the FPA, but we have considered them under Section 10(a).

Table 16. Analysis of other agency and individual comments.

Agency or Individual	Recommendation	Conclusion
Richard Sabat	Dredge an area near the bridges.	Not adopted—Insufficient evidence that dredging is needed.
League of Women Voters, Morg./Mon. Co.	Make recreational improvements.	Partially adopted (see Section V.C.8).
Albert Gallatin Muncip. Authority	Provide notification of all planned reservoir water level changes greater than 10 feet. Ensure adequate monitoring of up-stream reservoir inflow and all withdrawals. Address conditions causing turbidity up-stream of the dam at the water intake.	Partially adopted (see Section V.C.2).

Agency or Individual	Recommendation	Conclusion
PDER	Construct WPB Rec. Area (requires an NPDES permit per Section 402(p) of the CWA).	Not adopted—erosion and sedimentation control plan required. NPDES is a separate process.
Jonathon Weems	Maintain current practice limiting draw-down to 2 feet from 5/1 to 11/1, based on recreation use (boating).	Adopted (see Sections V.C.2 and V.C.8).
Jonathon Weems	Contribute to an endowment or trust fund to subsidize law enforcement on and around the lake.	Partially adopted—WPP to employ security staff (see Section V.C.8).
CLEAR	Establish a management entity responsible for the operation and overall safety and of lake users.	Not adopted—insufficient authority over private marinas and state-owned land.
CLEAR	Assist efforts to establish trail system in the Cheat Canyon/ Cooper's Rock area; consider opportunity to exchange land, such as land at Cheat Haven for involvement in the Cheat Canyon trail development.	Not adopted—WPP's overall plan is adequate.
CLEAR	Evaluate reservoir water quality for swimming. Improve water quality in the northwest portion of Cheat Lake, and designate a swimming beach when conditions will support bathing.	Partially adopted—Commission staff does not recommend development of a swimming area. We recommend that WPP continue to evaluate swimming needs (see Section V.C.8).

Agency or Individual	Recommendation	Conclusion
CLEAR	Assist Monongalia County in development of a master plan.	Partially adopted—WPP is to consult with the County when updating the recreation plan.
WVU Student Admin. and Sierra Student Coalition	Recreational improvements; formation of an advisory board for managing the reservoir.	Partially adopted—advisory board participation will not be mandated (see Section V.C.8).
COE	Coordinate details of project operation with the COE, providing notification of planned flow releases.	Adopted.

VIII. FINDING OF NO SIGNIFICANT IMPACT

Implementing the protection and enhancement measures described in this EA would ensure that the environmental effects of continued project operation would be insignificant.

On the basis of our independent analysis, issuance of a license for this project, with our environmental recommendations, would not constitute a major federal action significantly affecting the quality of the human environment.

IX. LITERATURE CITED

Anthony, D. D., and C. R. Jorgensen. 1977. Factors in the declining contribution of walleye *Stizostedion vitrem vitrem* to the fisheries of Lake Nipissing, Ontario 1960-76. *J. Fish. Res. Board Can.* 34(10): 1703-09.

Bain, M. B., J. T. Finn, and H. E. Booke. 1988. Streamflow regulation and fish community structure. *Ecology* 69(2):382-92.

Baker, J., et al. 1990. Biological effects of changes in surface water acid-base chemistry. State-of-Sci/Technol. Rep. 13, Natl. Precipitation Assessment Program, Washington, DC.

Clady, M. 1977. Abundance and production of young largemouth bass, smallmouth bass, and yellow perch in two infertile Michigan lakes. *Trans. Am. Fish. Soc.*, 106:56-63.

CLEAR, WVU Travel Research Group. 1993. Cheat Lake Needs Assessment—Preliminary Report. 36 pp. February 1993.

Core, E. L. 1959. Biological investigations of Cheat Lake. WVU, Morgantown. 39 pp.

Energy & Environmental Management, Inc. 1993. *Computer Modeling of Effectiveness of Flow Releases on Water Quality Below Lake Lynn Hydro Station.* October 1993.

Funk, J. L., and W. L. Pflieger. 1975. Courtois Creek, a smallmouth bass stream in the Missouri Ozarks. In H. Clepper, ed. *Black Bass Biology and Management.* Sport Fish Inst. Washington, DC. Pp. 224-37.

Paragamian, V. L. 1979. Population dynamics of the smallmouth bass in Maquoketa River and other Iowa streams. Iowa Conserv. Comm. Annu. Rep. Project F-89-R-2, No. 602-1. 56 pp.

Pennsylvania Department of Environmental Resources. 1986. *Pennsylvania's Recreation Plan, 1986-1990.*

Ploskey, G. R. 1983. *A Review of the Effects of Water-Level Changes on Reservoir Fisheries and Recommendations for Improved Management.* Technical Report E-83-3, prepared by the Fish and Wildlife Service, U.S. Department of Interior, for the U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi.

RMC (RMC Environmental Services, Inc.). 1993. *Results of an Instream Flow Study for the Lower Cheat River at the Lake Lynn Hydro Project.*

———. 1992. *Report on the Water Quality of the Lake Lynn Hydro Station Forebay and Tailrace during 1991.* Prepared for Allegheny Power Service Corporation. June 1992.

———. 1991. *Report on Aquatic Studies and Recreation Relative to Relicensing of Lake Lynn Hydro Station.* FERC project No. 2459. 144 pp.

Ryan, P. M., and H. H. Harvey. 1979. Growth responses of yellow perch, *Perca flavescens* (Mitchell) to lake acidification in the La Cloche Mountain lakes of Ontario. *Env. Biol. Fish.* 5(2): 97-108.

Schwartz, F. J. 1990. *Depth and Storage Capacity Changes in Cheat Lake, West Virginia during the 64-Year Period 1926-1990.* Institute of Marine Science, University of North

Carolina, Morehead City, NC. Unpublished manuscript. 16 pp.

———. 1957. *The Cheat River Basin: Past, Present, and Future*. West Virginia University, Morgantown. Unpublished manuscript. 145 pp.

Spangler, G. R., N. R. Payne, and G. K. Winterton. 1977. Percids in the Canadian waters of Lake Huron. *J. Fish. Res. Board Can.* 34(10): 1839-48.

U.S. EPA. 1990. *The Lake and Reservoir Restoration Guidance Manual*. Prepared by the North American Lake Management Society for the U.S. EPA, EPA-440/4-90-006. August 1990.

USGS. 1973. *Evaporation from Lake Michie, North Carolina 1961-1971*. Water Resources Investigation 38-73.

West Penn Power Company (WPP). 1993. Report correcting deficiencies and providing additional information, Lake Lynn Hydroelectric Project, FERC No. 2459. November 1993.

———. 1993. Report correcting deficiencies and providing additional information, Lake Lynn Hydroelectric Project, FERC No. 2459. April 1993.

———. 1993. Report correcting deficiencies and providing additional information, Lake Lynn Hydroelectric Project, FERC No. 2459. February 1993.

———. 1992. Report correcting deficiencies and providing additional information, Lake Lynn Hydroelectric Project, FERC No. 2459. August 1992.

———. 1991. Application for a New License for a Major Water Power Project. Lake Lynn Hydroelectric Project. FERC No. 2459. December 1991.

West Virginia Governor's Office of Community and Industrial Development. 1993. *West Virginia State Comprehensive Outdoor Recreation Plan*. 93 pp.

WVDNR. 1975. *Today's Plan for Tomorrow's Wildlife: A Strategic Plan for Fish, Game, and Nongame Management, 1975-1985*. 60 pp.

———. 1982. *Monongahela River Basin Plan*. 416 pp.

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CH2M HILL Staff

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APPENDIX A
CHEAT RIVER FLOW DURATION DATA

APPENDIX A
CHEAT RIVER FLOW DURATION DATA

This appendix presents flow duration data for the Cheat River at the Lake Lynn Hydroelectric Project. Table A-1 summarizes the mean, 20 percent, and 80 percent exceedance flows. Figure A-1 is a graph of the annual flow duration data.

Table A-1. Cheat River flow at Lake Lynn (Source: APS Final License Application, December 1991).

Month	Mean	20% Exceedance	80% Exceedance
January	3,645	5,114	1,025
February	5,223	7,443	1,226
March	5,588	7,890	2,115
April	4,850	6,612	2,363
May	4,221	5,865	1,524
June	2,673	4,009	635
July	2,215	2,748	489
August	1,465	1,946	205
September	1,110	1,667	261
October	1,945	2,727	304
November	3,935	5,210	1,036
December	4,684	6,100	1,716

20% exceedance flow: 20% of the time in a given month the Cheat River flow will exceed the value reported.

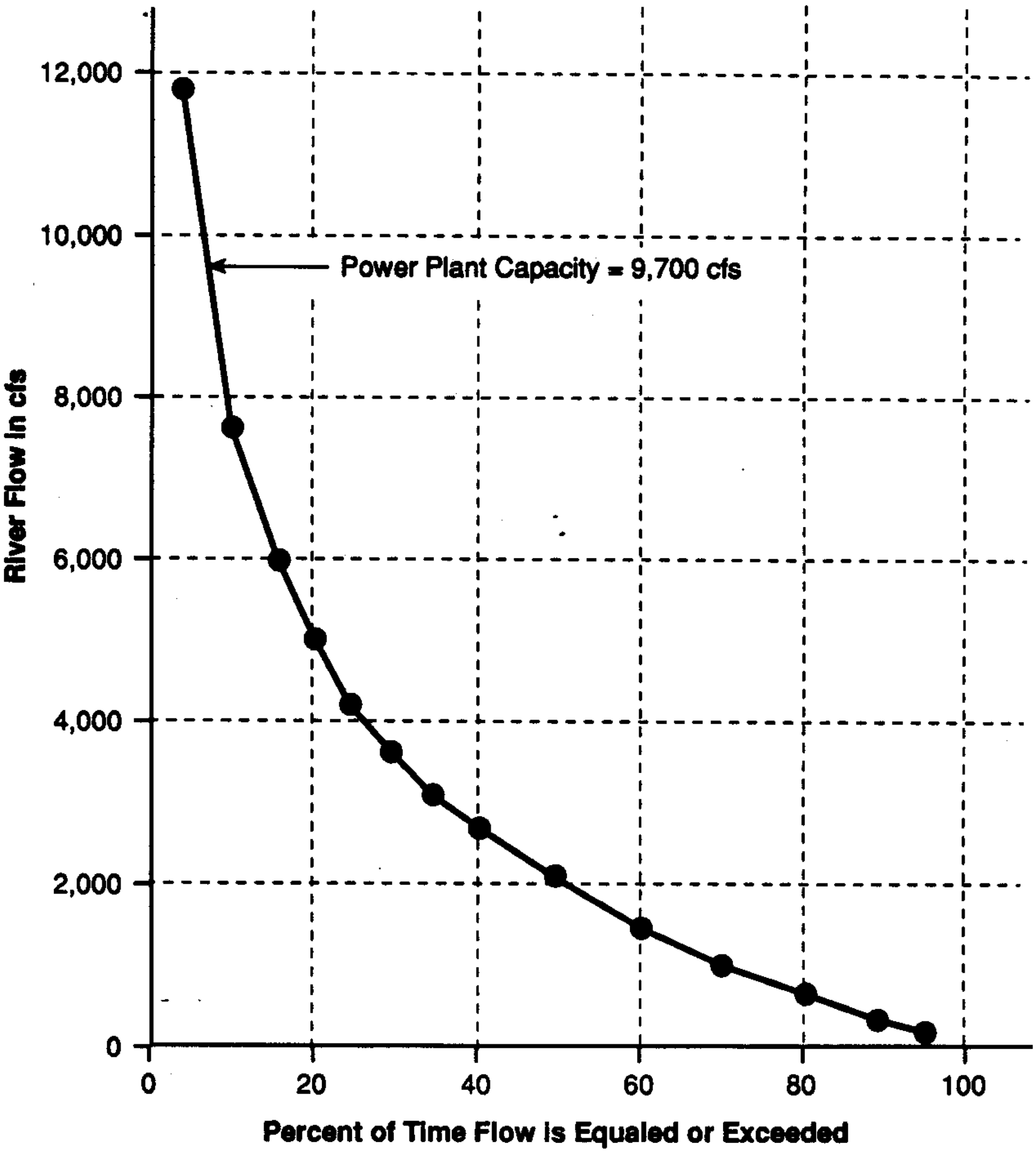

FIGURE A-1
Cheat River at Lake Lynn
Annual Flow Duration 1977-1990

APPENDIX B
STAFF RESPONSES TO LETTERS OF COMMENT ON THE DEA

FILED
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94 AUG -8 AM 11:39
FEDERAL ENERGY
REGULATORY
COMMISSION

Allegheny Power System

WILLIAM E. COSTELNOCK
Director, Power Engineering

Bulk Power Supply
800 Cabin Hill Drive
Greensburg, PA 15601-1689 (412) 838-6728

August 5, 1994

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
Mail Code: DPCA, HL 21.3
825 North Capitol Street, N.E.
Washington, DC 20426

Dear Ms. Cashell:

WEST PENN POWER COMPANY
LAKE LYNN HYDRO STATION
FERC PROJECT NO. 2459-005
COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT

The Federal Energy Regulatory Commission (FERC), by letter dated June 24, 1994, distributed the Draft Environmental Assessment for West Penn Power Company's (WPP) Lake Lynn Hydro Station, FERC Project No. 2459-005, and solicited public comment on it. Allegheny Power Service Corporation, as agent for WPP, hereby files its comments regarding the above document.

This submittal consists of the original and eight copies of this letter and attached comments. By copy of this letter, all agencies on the attached Lake Lynn mailing list have received this submittal.

If you have any questions regarding this submittal, please contact Mr. William E. Cannon at our Cabin Hill office, telephone (412) 830-5609.

Very truly yours,

W. E. Costelnock

WC:slb
Attachment

CC: T. K. Henderson
J. Hunter - FERC, Washington, DC
D. L. Shumway - FERC, Washington, DC
A. J. Sidoti - FERC, New York, NY
Agencies on Attached List

WEST PENN POWER COMPANY
LAKE LYNN HYDRO STATION
FERC PROJECT NO. 2459-005
COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT

The Federal Energy Regulatory Commission (FERC), by letter dated June 24, 1994, distributed the Draft Environmental Assessment (DEA) prepared relative to West Penn Power Company's (WPP) license renewal application for the Lake Lynn Hydro Station, FERC Project No. 2459, and solicited comments on it. This document provides the comments of Allegheny Power Service Corporation (APSC), as agent for WPP, regarding the DEA. These comments are as follow:

1 1. Page 3, Section II.B, Paragraph 2, WPP is one of the three operating companies which make up what is commonly referred to as the integrated Allegheny Power System (APS). APSC is another subsidiary which provides services to the three APS operating companies. As such, Paragraph 2 should be changed to read "WPP is a wholly owned subsidiary of the Allegheny Power System, Inc. All power produced by the Lake Lynn Hydroelectric Project is dispatched as needed to serve WPP's more than 625,000 customers and the Allegheny Power System's more than 1.25 million customers".

2 2. Page 3, Section III.A.1, Paragraph 3, Sentence 2, should read "As APS's", not "As APSC's".

3 3. Page 4, Section A.1, Paragraph 4, should read "a portion of the Cheat Haven peninsula", not "the Cheat Haven peninsula".

4 4. Page 10, Section V.A.1, Paragraph 1, second and fourth sentences, should read "Monongahela River", not "Monongalia River". Monongalia is, however, the name of the county.

5 5. Page 13, Section V.C.1, Paragraph 12, reads "We will require that WPP participate fully in funding and implementing appropriate shore protection measures at the West Penn Beach Recreation Area, but we will not require that WPP implement shore protection measures at the Sunset Beach harbor". Throughout the life of Cheat Lake, all private landowners, lessees, and licensees occupying the lake's shorelines have traditionally maintained their shoreline frontages, if work was even needed, at their own expense. Those individuals located within the Sunset Beach harbor (cove), have been no different, and WPP has no reason to believe that this ethic will not continue in the future. WPP therefore does not feel it is appropriate for the FERC to now order WPP to assist these private lakeside occupants with funding for shoreline protection and therefore requests that Paragraph 12 be changed to read "We will require that WPP participate fully in funding and implementing appropriate shore protection measures at the West Penn Beach Recreation Area, but we will not require that WPP fund or implement shore protection measures at the Sunset Beach harbor".

Letter from West Penn Power, dated August 5, 1994

Response 1. We modified text in Section II.B. to indicate that West Penn Power is a wholly owned subsidiary of Allegheny Power System, Inc.

Response 2. We corrected appropriate text throughout the document.

Response 3. We modified text in Section III.A.1. to reflect that WPP's land holdings include part of the Cheat Haven peninsula.

Response 4. We corrected text in Section V.A.1 to say "Monongahela River."

Response 5. We modified text in Section V.C.1 to clarify our recommendation that WPP would be required to participate fully in funding and implementing appropriate shore protection measures at the West Penn Beach Recreation Area but would not be required to fund or implement shore protection measures at the Sunset Beach harbor.

6 6. Pages 16 and 17, Section a., Reservoir Level, alludes to the flood control capabilities of the Lake Lynn Dam. Similarly, Page 30, Section a., Paragraph 5, refers to "flood storage volume", and Page 80, Paragraph 1 discusses "flood storage capacity". While acknowledging that the dam could play a limited role in minimizing downstream flows, WPP must point out that the dam was not designed for, nor can it reasonably be utilized for, flood control purposes.

7 7. Page 20, Section b., Paragraph 6, and Page 25, Section f., recommend that WPP's compliance with the minimum flow requirements be maintained through WPP's funding of two new United States Geological Survey (USGS) gauging stations. The reason given for these installations is that "it is difficult to assure accuracy with the taintor gate at such low {minimum} flows". FERC envisions a system in which "the {upstream and downstream} gauging stations should be equipped with telemetry to allow WPP to adjust minimum reservoir releases daily in low flow periods". The theory behind such a system is that the difference between the upstream and downstream USGS gauges can be used to adjust one of the station's taintor gates to comply with the minimum flow requirements. To ensure compliance with lake level limitations, FERC also recommends the installation of a probe to monitor and record lake level hourly.

APSC has had previous experience interconnecting a USGS gauging station with a data acquisition system as a means of providing minimum flow information at The Potomac Edison Company's Millville Hydro Station, FERC Project No. 2343. This system, which utilized only one USGS gauge, was constantly troublesome, usually inaccurate, and eventually abandoned in favor of a revised system based upon a level probe located near the dam. The problem was not with the USGS gauge, but rather in devising a reliable system to transfer the signal, interpret the data, then control flow rates. APSC anticipates similar problems trying to devise a system using two gauges. Because the most critical issue here is WPP's compliance with the minimum flow requirement during periods when the river inflow is less than 212 cfs, APSC also has concerns relating to the ability of stream gauging stations to accurately measure such low flows in the bed of such a large river.

APSC hereby offers an alternative system it contends will serve the multiple needs of accurately providing the required minimum flow, simplicity, ease of maintenance, and cost effective operation. We agree with the need to monitor lake level elevation. This can be done using a WPP provided level probe located on the dam. Should WPP fund the installation, maintenance and data storage of a new USGS gauging station downstream of the dam but upstream of the first tributary, Grassy Run, flows released from the reservoir to the lower Cheat River can be quantified. Should the station, regardless of whether it was generating or merely passing a minimum flow, be providing greater than 212 cfs, as measured by the downstream gauge, then it would be in compliance with the minimum flow requirement. The only time that WPP's compliance with the minimum flow requirement could be in question would be if the downstream USGS gauge was recording less than 212 cfs. There would be only three possible reasons that the USGS gauge would be recording less than 212 cfs:

Response 6. The DEA may have overstated the importance of the project for flood control, which is an incidental function of the hydroelectric project. Thus we have made several minor changes in the FEA text.

Response 7. We have reviewed WPP's proposed method of operation and concur that it would be sufficient for compliance with a new license. The proposed license articles will include specific flow and water level parameters that must be monitored to ensure compliance with required minimum releases and reservoir water level elevations.

We support our previous analysis in Section V.C.2 of both the DEA and the FEA and continue to recommend that WPP not subtract estimated reservoir evaporation and withdrawal from the minimum release.

7 Cont.

(1) there was less than 212 cfs of river inflow available for release to the Cheat River below the dam; (2) the station was failing to provide the required minimum flow; or (3) the gauge was disabled. The best way to document compliance would be to assess lake level. If the lake were rising, that would logically indicate that the station was holding back an excessive amount of water; but if the lake level were stable or possibly falling, then the station could not possibly be failing to provide the required minimum flow. Should WPP's compliance be in question, a side-by-side analysis of the downstream USGS stage level data and the data from WPP's proposed dam-mounted lake level probe could be compared. The lake level probe could record hourly.

WPP feels that the above plan can provide minimum flow control as accurately or more so than that which would be provided by the FERC recommended plan based upon the installation of two USGS gauges. WPP's plan would eliminate the need for placing a gauge in the rugged Cheat Canyon upriver of the lake, but below other tributaries. Access problems would constantly hamper the installation and maintenance of a gauge in the Cheat Canyon.

It is known that operation of the station's turbines can produce a small surging effect within portions of the lake near the dam. This could produce an inaccurate probe reading. However, during the extremely dry periods when the full minimum flow could not be provided, it is unlikely that the station would be operating, given WPP's previously stated desire to maintain lake levels for the purpose of emergency capacity. Waves driven across the fetch of the lake could also occasionally produce false lake level readings, but we contend that any reasonable average of lake level probe readings would serve to document compliance. WPP's plan does effectively discount any water losses due to evaporation or consumptive withdrawals from the lake. WPP quantified these losses in its Response to Schedule A of June 21, 1993, submitted to FERC by APSC letter dated November 17, 1993. Current total losses sum to an approximate maximum of 6.8 cfs. However, the Cheat Neck Water Company may soon cease withdrawing approximately 66 million gallons per year from the lake for reasons to be discussed later in this document. Page 20, Section b., Paragraph 6 of the DEA states that, by FERC's own assessment, "... we conclude there is little merit in subtracting evaporation and withdrawal losses from total inflow". Conversely, WPP also feels that there should be little detriment to subtracting evaporation and withdrawal losses from total outflows either.

The DEA states "Taintor gates have a much lower accuracy than downstream flow gauging". WPP contends that the required taintor gate openings, being of controlled, fixed dimensions, can be easily calculated using the variables of lake level (head) and desired flow rate to an equivalent or higher level of accuracy than can be achieved by the use of USGS gauges alone. Although desiring to keep its options open regarding the specific method for providing the required minimum flow, WPP currently proposes to use an automated taintor gate, adjusted daily, in conjunction with the downstream USGS gauge and lake level probe systems. In summation, WPP feels this will provide both the most accurate, reliable, and cost-effective minimum flow control system.

8

8. Page 21, Section V.b., Paragraph 7, states "If water withdrawal increases substantially in the future, it may become necessary to develop alternative drought contingency plans". This issue was first raised by the West Virginia Department of Natural Resources' (WVDNR) recommendation that WPP prepare a drought preparedness plan for Lake Lynn. WPP reiterates its response to that recommendation, as previously stated by its Response to Schedule A of June 21, 1993, submitted to FERC by APSC letter dated November 17, 1993. WPP stated that "WVDNR does not have the legal authority to regulate utilization of water or to cause others to develop or implement such a plan for public waters. Various legislative bills have been introduced in the West Virginia Legislature over the past years to grant WVDNR the authority to regulate water consumption and utilization. Enactment of such authority has never occurred in part because the Legislature, WPP believes, does not feel that water consumption needs to be regulated within the State. WPP therefore reiterates its contention that the company does not have the legal authority to develop or implement a water utilization plan for public waters".

9

9. Page 21, Section b., Paragraph 8, and Page 24, Section d., Paragraph 6, discuss the periodic turbidity problems experienced by the Albert Gallatin Municipal Authority (AGMA). AGMA has reported that it feels the turbidity level of its raw intake water has sometimes been affected by WPP's operation of the hydro station. FERC recommends that WPP periodically monitor turbidity in the vicinity of AGMA's intakes and, should the data indicate hydro station operations do in fact influence AGMA's turbidity levels, that a plan be developed to minimize the problem.

AGMA has recently indicated that they currently collect turbidity samples from their raw intake water a minimum of two to three times per day. Should the intake water be particularly turbid, such as following major storms, they may even sample hourly. The requirement that WPP monitor turbidity in the vicinity of AGMA's intakes would simply result in a duplication of effort, and WPP therefore requests that this not be required by the license articles.

AGMA also indicated that it has recently extended its intakes another 20 feet into the lake and is currently engaged in starting up a new, larger capacity water treatment plant. As their previous treatment plant was operating beyond its capacity, it is quite likely that the new plant will solve any turbidity related problems they may have experienced. Additionally, AGMA can store approximately two days worth of water.

The Cheat Neck Water Company (CNWC), similar to many other small, rapidly growing municipal water systems, is currently exploring the possibility of interconnecting with a larger municipal water authority, in this case, the Morgantown Utility Board. If such an arrangement can be finalized, it is anticipated that Cheat Neck would no longer withdraw water from Lake Lynn.

Letter from West Penn Power, dated August 5, 1994

Response 8. We have modified the text in Section V.C.2 to clarify that withdrawals greater than 1 million gallons per day (mgd) from the reservoir would require Commission approval. In such a case, the Commission could require a drought contingency plan that may in turn include modified operational parameters at the Lake Lynn project, but would not regulate other withdrawals.

Response 9. We have revised text in Section V.C.2 to reflect that we expect AGMA (not WPP) will continue to collect intake water samples and test for turbidity. Given AGMA's recent extension of its intakes another 20 feet into the lake and the start-up of a new water treatment plant, we recommend that WPP consult with AGMA only if (on the basis of its turbidity data) AGMA still contends a relationship may exist between high intake turbidity and project operations. Those consultations would attempt to resolve the nature of the relationship, if any, between Lake Lynn Project operations and intake water turbidity. We further recommend that WPP cooperate with AGMA toward identifying potential alternatives to reduce turbidity in the AGMA intake water.

9 Cont. WPP will continue to inform AGMA, CNWC, and the Lakeview Resort of any lake drawdowns which may jeopardize their intakes. WPP does not propose to modify its operations to accommodate improperly located intake structures.

10 10. Page 32, Section c., Paragraph 6, Sentence 3, should read "within APS's own", not "within APSC's own".

11 11. Page 33, Section c., Paragraph 8, and Page 59, Section d., Paragraph 9, require WPP to develop an enhancement plan in consultation with the agencies leading to the potential installation of fish attractant/protection structures within the uppermost 1.1 miles of the tailrace area. WPP requests that the FERC further define the designs, materials, and total number of structures it feels would be appropriate.

12 12. Page 52, Section a., Paragraph 6, Point 4, recommends that WPP "Employ staff responsible for security on project lands and for working with local law enforcement". WPP has continuing concerns regarding the potential liabilities and costs of providing a "project lands" security force. WPP will, however, provide for security at the planned West Penn Beach recreation area. This security will be provided during daylight hours on weekends and holidays from Memorial Day weekend through Labor Day only. Now that the scope of the planned recreational enhancements has been reasonably defined, it is WPP's intention to seek an appropriate management entity for them. This entity will be expected to provide the required security measures.

13 13. Page 55, Section b., Paragraph 8, recommends the installation of a separate waste disposal system for the fish cleaning station WPP proposed for the West Penn Beach development. WPP, having concerns for the safety of such cleaning stations, desires retention of the ability to explore all possible options for the safe, sanitary disposal of fish wastes prior to finalizing an agreement to install such a system.

14 14. Page 59, Section d., recommends deferring the tailrace fishing area, which WPP has previously offered, until such time as adequate evidence verifies the existence of a fishery able to tolerate reasonable levels of fishing pressure. To aid in the development of such a fishery, the FERC has recommended that WPP install fish attraction/protection structures in the tailrace area starting approximately 200 yards downstream of the dam. WPP feels this is a logically derived approach. WPP intends to place signage adjacent to the uppermost of these structures to designate the river area between it and the dam as a boat exclusion zone. WPP requests that the final license articles specifically designate WVDNR and the Pennsylvania Fish and Boat Commission (PFBC) with the responsibility for enforcing this exclusion zone.

15 15. Page 60, Section e., Paragraph 1, which reads "Cheat Haven, Area 2, ..." should be changed to "Cheat Haven, Area 12, ..."

Letter from West Penn Power, dated August 5, 1994

Response 10. As noted in Response 2, we corrected the appropriate text throughout the document.

Response 11. As stated in the FEA (Section V.C.3), we recommend that WPP develop a plan for the reservoir and down-stream fish attraction structures in conjunction with DOI, WVDNR, and PFBC and submit it to the Commission for approval.

In PFBC's letter to WPP of August 25, 1994, PFBC addresses the issue of placement of the fish attraction/protection structures in the Cheat River down-stream of the Lake Lynn Hydro Station. We believe that letter is a reasonable foundation for further action (i.e., development of a fish enhancement plan).

Response 12. The recommended security force is primarily intended for security at the West Penn Beach Recreation Area, including the associated hiking/biking trail. However, we intend that the security force also be available for oversight at the tailrace fishing recreation area, the Sunset Beach boat launch, and the Wildlife and Nature Viewing Areas. We will not require that security personnel be present at all locations at all times; therefore, there will be some flexibility for security personnel to move between various WPP recreation sites.

Response 13. We believe our recommendation for an independent waste disposal system is consistent with public safety. Therefore we did not modify the text.

Response 14. Based on our meeting of September 13, 1994, with WVDNR, PFBC, DOI, and WPP, we have changed our recommendation to defer development of the tailrace fishing area. We now recognize the merit of developing the tailrace fishing recreation area as soon as possible after relicensing for a variety of public recreation uses (see Section V.C.8). As stated in the FEA, we will not require any accommodation of boating in the tailrace area, and we concur with WPP's concerns about boating safety and its proposal to establish a down-stream boating exclusion zone.

WPP will have the primary responsibility to enforce the boat exclusion zone, which can be achieved in part by the proposal to place signage adjacent to the fish attractant structures. We recognize that WVDNR and PFBC are generally responsible for boating regulations in the respective states and expect that WPP may notify them of specific problems with boating safety.

Response 15. We corrected the referenced text in Section V.C.8.

1 Cont.

It is proposed that the Cheat Haven property could be the key to the successful purchase of the west side of the Cheat Canyon. More specifically, it is proposed that proceeds from the sale of the Cheat Haven property be used to help secure this much larger piece of property for public use. This action will create a great deal of public goodwill and do far more for the public good than retaining the Cheat Haven property. This proposal is supported by CLEAR, the WVDNR, The Nature Conservancy and this Foundation. The transaction could be undertaken directly by West Penn Power or the land could be transferred to the Coopers Rock Foundation with a clause that it would be used only for this purpose.

This proposed reduction of the total holdings of WPP would better allow WPP to focus their energies and monies on their remaining holdings, while helping create a major increase in public lands around the lake. It was noted in the Assessment that WPP should not consider any changes in land holdings. It is our belief that this is an unduly severe limit to the potential of WPP doing the most good for the greatest number of people.

We appreciate the opportunity to make this proposal and hope it will receive positive consideration.

Sincerely,

George W. Longenecker

George W. Longenecker
President

COOPERS ROCK FOUNDATION, INC.
POST OFFICE BOX 505
MORGANTOWN, WV 26507-0505

August 6, 1994

ORIGINAL

FILED OFFICE OF THE SECRETARY
10 AM 9:43
FEDERAL ENERGY REGULATORY COMMISSION

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

RE: Lake Lynn Hydroelectric Project No. 2459

Dear Ms. Cashell:

I am writing on behalf of the Coopers Rock Foundation Board of Directors.

1 On pages 40-41 under **a. Reservoir Land Use and Recreation**, in the paragraph describing the "Upper Cheat Lake zone.." there is an obvious omission of any description of the west side of the canyon. This four mile area along the lake to the confluence of the river is presently undeveloped. There is no road or railroad traversing the canyon. The west side of the canyon is immediately opposite the Coopers Rock overlook and constitutes a major portion of its immediate viewshed. A conservative estimate indicates that in excess of 400,000 people come to experience this view annually, making the view a major recreational feature. On the west side are three major rock outcroppings equaling or superior to the Coopers Rock overlook. Located on this property are several colonies of the flat-spired three-toothed land snail which has been identified as a threatened species. It is found nowhere else in the world except in the Cheat Canyon. The majority of the area on the west side of the canyon is part of a 2500 acre tract which is in a single private ownership. This tract is presently for sale. If this land were purchased by a developer, many negative impacts could occur. Development of this area would create a reduction in the numbers of those who now find Coopers Rock State Forest a desirable place to visit. Such development would add significantly to the siltation of the lake and a lowering of water quality. Development in this area could also contribute to the extinction of the threatened snail species.

Our Foundation, The Nature Conservancy, the West Virginia DNR and the Governor's office have all been pursuing the possible purchase of this property in order to protect it and allow public use of the land. The State of West Virginia has appropriated $400,000 to go toward this purchase. The Coopers Rock Foundation has raised about $70,000 in contributions and pledges from private individuals in the region for this purpose. The State has identified some excess land which could possibly be swapped to help effect the deal. However all this will not be enough to meet the asking price.

The goals of the Environmental Assessment For Hydropower License include "the protection, mitigation of damage to, and enhancement of, fish and wildlife . ., the protection of recreational resources and the preservation of other aspects of environmental quality." The Coopers Rock Foundation is in agreement that most of the proposals are appropriate for meeting these goals. We wish to make aa additional proposal concerning the property known as Cheat Haven.

Letter from Coopers Rock Foundation, Inc., dated August 6, 1994

Response 1. We believe that the Cheat Haven parcel is an integral part of the proposed recreational development along the shoreline surrounding the West Penn Beach peninsula. Although it may not share the characteristics of the upper canyon in terms of natural habitat, it has high recreational value in a location where public access to reservoir shorelands is at a premium. We will not recommend that the Commission require WPP to contribute to the Foundation's cause as a condition of relicense; but this does not preclude the foundation from pursuing WPP's assistance.

We recognize your interest in maintaining the natural environment of the west side of Cheat Canyon. But we do not believe it is reasonable for the Commission, in the context of this hydropower relicensing action, to require WPP to transfer parcels/portions of its land holdings to secure the referenced west side of the canyon property. We will continue to recommend that WPP retain ownership of all lands currently owned within the project boundary, unless changes are specifically approved by the Commission.

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3 Cont. acquisition or land swaps should be evaluated to enhance the recreational and environmental status of the area.

4 • A recreation management plan should be part of EA in order to assure adequate recreational opportunities are provided before a license is issued. Such a recreation plan should emphasize public access and expanded nonmotorized use of land and water areas. It should also emphasize cooperation with appropriate state and local authorities in the management of these recreation facilities.

5 • Lack of an existing management authority or denial of responsibility by WPP is not sufficient reason for not constructing a recreational beach at the so-named West Penn Beach. WPP should evaluate, and if needed take measures to improve, water quality at various locations along West Penn Beach so that swimming can occur. We recommend that WPP, in cooperation with state and local regulatory authorities, work to achieve this goal.

Thank you for the opportunity to comment on this EA.

Sincerely,

Natasha S. Diamond

Natasha Diamond
Conservation Chair
Monongahela Group

Letter from the Sierra Club, West Virginia Chapter, dated August 4, 1994

Response 4. We recommend (Section V.C.8) that WPP revise and refile the existing recreation and land management plan within 6 months of relicensing. The recreation management plan was filed with the project application and is discussed in the DEA. The revised plan reflects additional recreation enhancement details as required by the license. The plan must also demonstrate efforts to coordinate and cooperate with DOI, WVDNR, PFBC, Monongalia County, local communities, law enforcement, residents, and local or regional interest groups.

Response 5. We recognize your interest in developing a swimming area at the West Penn Beach Recreational Area. However, because of safety and access concerns we do not recommend that WPP immediately develop or improve a swimming area. We believe that the need for swimming access and the many related factors require further discussion. We recommend that WPP describe areas commonly used for swimming within its revised recreational plans, and continue to evaluate swimming potential.

SIERRA CLUB
WEST VIRGINIA CHAPTER
P.O. Box 4142
Morgantown, WV 26504

Aug 4, 1994

FILED
OFFICE OF THE SECRETARY
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FEDERAL ENERGY
REGULATORY COMMISSION

ORIGINAL

Lois Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, NE
Washington, DC 20426

RE: Lake Lynn Hydroelectric Project No. 2459

Dear Ms Cashell:

Please consider the following comments regarding the above project.

1 • Water quality is inadequately addressed in the draft Environmental Assessment. Lake shore erosion should be controlled over the entire lakefront, not just on WPP owned properties. WPP can control bank erosion from boat wakes by management of boat motor size and speed. Waste water effluents and acid mine drainage should be monitored to protect drinking water drawn from the lake. WPP should control sources of these pollutants coming from WPP properties.

2 • We support the adoption of Alternative 7 (maintenance of 450 cfs plus ramping) to assure safety of down river users and to optimize water quality and fisheries.

3 • We support the proposed recreation facilities at West penn Beach, the wildlife viewing areas, and the trail from West Penn Beach to the Cheat Haven area; however, these facilities under utilize the outstanding recreational possibilities of the Cheat Lake area. The EA should more fully evaluate opportunities to extend trails to other public lands, eg. Coopers Rock State Forest, and to acquire additional public access recreational lands. In order to fully develop a prime recreational facility, a foot trail should be developed around the entire lake front. Since this lakefront is owned by WPP, such a trail is a reasonable component of a long term recreation plan. Land

"Not blind opposition to progress, but opposition to blind progress."

Letter from the Sierra Club, West Virginia Chapter, dated August 4, 1994

Response 1. We believe that the DEA adequately addresses water quality and erosion issues. We will recommend that WPP be required to install three new water quality monitoring stations: one in the reservoir, one in the tailrace area, and one at a site down-stream of the acid tributaries. The monitoring stations, in coordination with responsible agencies and a number of other reporting and enforcement mechanisms, will be used to evaluate and regulate water quality.

We understand your concern for boat generated waves that may be a factor in creating shoreline erosion, but WPP is not the party responsible for the regulation of boat size and speed on Cheat Lake. We have recommended that WPP conduct an annual shoreline erosion survey of the West Penn Beach area, and a triennial survey of the entire reservoir shoreline during the first 9 years following issuance of the license. We do not recommend that WPP be required to participate in the funding of shore protection measures, except where required for the West Penn Beach development area or at other sites affected by construction activities.

Response 2. Based on an independent and comprehensive evaluation of alternatives, we believe that Alternative 3-A (minimum release of 212 cfs or reservoir inflow, with an absolute minimum release of 100 cfs) as explained in the FEA provides the most reasonable balance between efficient power production and environmental enhancements.

Response 3. Based on staff's experience with recreation enhancements associated with hydropower relicensing, we conclude that WPP has taken on an ambitious future role in the recreation planning and the development of shore areas along Cheat Lake. That role will be mandated by the new license. We will not, however, recommend that the Commission require WPP to extend trails to public lands beyond the trail system recommended in the FEA. We have recommended that WPP monitor recreation use and update the recreation plan and submit it to the Commission every 3 years for at least the first 9 years after relicensing. As stated in our response to the Cooper's Rock Foundation, we will recommend that the project license require WPP to retain ownership of all lands currently owned within the project boundary, unless changes are specifically approved by the Commission (Section V.C.8 of the FEA).

4 (con't) trail system up the Cheat Canyon, as a major effort toward eco-tourism. Working in concert with environmental groups, state and county government, West Penn Power should assess, as part of its master plan, the opportunity to exchange land resources when such exchange can increase the overall recreational and ecological opportunities of the area. This position statement refers to the concern over limited access and habitat potential for the Cheat Haven peninsula.

FERC Conclusion: *"Not adopted-WPP's overall plan is adequate"*

We continue to view the area assigned by WPP as the "Cheat Haven Wildlife Habitat & Nature Viewing Area" as being nothing more than an effort by WPP to label this acreage in an attempt to avoid discussion of its value relative to other reasonable options. We feel that we have made the case as to why this is not realistically a "nature area" primarily due its relatively small acreage and isolated location from large tracts of natural woodlands. Furthermore, WPP's proposed single, dead-end trail design—to and from a given point, is generally considered as the least favored method of trail design by planners of parks and nature preserves.

We ask that FERC reconsider their position of rejecting out-of-hand the possibility that this property might be exchanged for other suitable acreage when such a transfer would increase the overall net recreational and environmental opportunities of the Cheat Lake area. We call attention *to a statement in the FERC Hydroelectric Project Relicensing Handbook, page 54: "The Commission will be looking at comprehensive resource planning. Opportunities may exist for basin wide as well as site specific mitigation and enhancement. Enhancement refers to that set of measures that utilizes the projects potential to increase resource values beyond the level that exists at the time of the application."*

- Consider land trade alternatives to improve the overall recreational and ecological value of the total project.
- Plans for managing this and other wildlife viewing areas need to identify the desired wildlife and habitat types, how these habitats will be developed, and how the areas will be maintained for users.
- Consider connectivity of trail systems and enhanced access to other public lands as part of land-trade alternatives.

ADDITIONAL COMMENTS

5 In addition to the above, previously-stated positions, we believe the environmental assessment should include a revised economic impact analysis of the alternatives. Table 11 of the DEA identifies the costs of each of the alternatives that are evaluated. However, the only benefit considered is power generation. Economic benefits from fisheries, recreation, water supplies, tourism, etc. are not considered in the analysis but are essential to properly evaluate the alternatives. FERC Hydroelectric Project Relicensing Handbook, page 17, states that *"FERC's decision will strike a balance between maintaining economically provided electric power to rate payers and providing other public benefits.*

Letter from Cheat Lake Environment and Recreation Association, dated August 4, 1994

Response 4. We continue to support our analysis that the trails proposed by WPP may be developed much more cost effectively and with less adverse effect on the environment, and with better access for the disabled, than a trail system in the canyon area (DEA p. 61). Furthermore, trail construction in the canyon area raises concerns about slope stability and protection of sensitive natural habitat in the canyon area, as well as potential for higher construction costs and less trail safety than will be offered by the West Penn Beach development and associated trails.

Response 5. The environmental assessment is an independent analysis that evaluates the economics of power generation to ensure that electric power can be provided economically. We cannot always put dollar benefits on some environmental enhancements, because we do not have good dollar values for all types of enhancements. However, we do describe these benefits in qualitative terms throughout the EA.

While it is sometimes difficult to put a numeric value on something like enhanced access to public recreation, the costs of these enhancements (i.e. the 3.27 million West Penn Beach Recreation Area) may be representative of at least some of the value of the benefits. Therefore, we believe there is no conflict between the analysis provided and the balancing of economics. The environmental enhancements that we evaluated have necessarily reduced the power benefits; and this applies to the recommended alternative (Alternative 3-A), which reduces levelized annual net benefits by about $1.2 million compared to Alternative 1--the existing project (see Section VI.B of the FEA).

2 con't)

- The impact of sewage *discharges* on lake water quality and subsequent recreational potential from West Penn recreational developments and from other non-WPP development in the region must be adequately addressed. These impacts directly contribute to dissolved oxygen deficiencies and impair fisheries. This concern includes the obvious discharge of dishwater, garbage and human waste within close proximity to the water at the privileged permit holder campsites.
- Management of boating density should be the responsibility of WPP because of their provision of a free public boat launch site. While we should support expanded public access, boating density should be better managed to assure safety and if necessary, limited to prevent conflicts with other lake users or prevent environmental impacts such as noise pollution, oil pollution, wakes, etc.

WEST PENN BEACH RECREATION AREA DEVELOPMENT

3 **CLEAR Position:** (Adopted November 1, 1993 by the Board of Directors) West Penn Power should evaluate water quality throughout the lake as to the suitability for swimming. *If possible*, and needed, WPP should attempt to improve the water quality of the Northeast portion of Cheat Lake, and designate an area that might be used as a swimming beach when such conditions will support bathing. As an alternative, or in addition to this beach, WPP should establish a more appropriate swimming beach area elsewhere on the lake and develop it for this purpose.

FERC Conclusion: *"Partially adopted-Commission staff does not recommend development of a swimming area. We recommend that WPP continue to evaluate swimming needs".*

Broadwater areas *attract swimmers*. Cheat Lake is, in fact, a popular swimming area. Although there is very limited access for swimmers, considerable demand for this type of activity can be witnessed on any warm day, and especially during weekends in June, July and August. Drowning accidents seem to be an almost annual occurrence in Cheat Lake. By failing to provide for supervised swimming areas, WPP and FERC are not acting in a responsible manner.

Safe swimming is best realized at a *designated bathing facility*, with a safe area, and with lifeguards enforcing good discipline. Swimming will continue to grow in popularity at Cheat Lake, with or without a designated area. However; the best interest of public safety will be addressed by the property owners—West Penn Power, when they realize the need to plan and supervise this activity at designated bathing areas.

Swimming is clearly a key element of water-based *recreation and provides a focus for* tourism, and hence economic development of the region. The environmental assessment fails to consider the economic significance and recreational importance of swimming to the local tourism industry in its evaluation of recreational enhancements.

- WPP should establish an appropriate swimming beach area on the lake and develop it for this purpose. The headwaters have natural sandbars and *higher water quality, and* should be evaluated as alternatives for use as swimming areas.

CHEAT HAVEN WILDLIFE HABITAT AND VIEWING AREA

4 **CLEAR Position:** (Adopted November 1, 1993 by the Board of Directors) West Penn Power has the opportunity to assume an environmental leadership role in assisting with efforts to establish a

Letter from Cheat Lake Environment and Recreation Association, dated August 4, 1994

Response 3. We continue to support the recommendation (DEA p. 55) not to develop or improve a swimming area at this time because of safety and access concerns. We will recommend that WPP, however, evaluate water quality throughout the reservoir, including its appropriateness for swimming. We also recommend that WPP describe areas commonly used for swimming and estimate the number of swimmers using various sites within its recreation plan updates and continue to evaluate the potential for swimming enhancements.

2
(con't)

FERC Conclusion: *"Not adopted-applicant need only concentrate on recreational uses within the project boundary."*

There was no intent in our position that WPP should assist the county in the development of a county-wide master plan. Our concern is that because the Cheat Lake area represents a considerable portion of the county's overall recreational demand and use, it is appropriate and prudent that WPP recognize that its development plans impact the overall county-wide recreational scheme. Appropriate interaction between WPP and the County Commissioners and county planning officials, regarding WPP plans for development, is a responsible approach, and should be encouraged, rather than discouraged, by FERC. In fact the FERC Hydroelectric Project Relicensing Handbook, page 92 specifically directs the applicant to consult *"with agencies having land management or planning/zoning authority in the area."*

Particular concerns remain as to West Penn Power's unwillingness to adequately address many planning areas. Their history of inaction in this regard reinforces our concern over their willingness to cooperate in planning activities and should be recognized by FERC. We recommend the following changes in the Draft EA:

- A master plan should be approved prior to issuance of a long term license.
- Camping: FERC Hydroelectric Project Relicensing Handbook, page 89 states that the applicant must provide: *"Evaluation of recreational needs in the area and a determination of whether the need can be accommodated by existing facilities or by additional recreational facilities at the project."*. The CLEAR NEEDS ASSESSMENT conducted in 1993 determined camping needs were not being adequately met in the project boundaries.

    1. Primitive recreation sites (privileged permit holders) should be incorporated in the overall recreation master plan. **The designation of certain sites for exclusive long-term use by permit holders is an inappropriate land use strategy to address public demands for camping.**
    2. The Primitive camping plan is unsuitable at area 18 due to excessive slope. Camping should relocated to a site with better access and topography, and modified to consider other opportunities.

- Planning for erosion control such as boat wakes and bankside development within the project boundaries is totally inadequate and must be extended to include the effects on the shoreline lakewide. The claim that erosion is a problem in only two locations is incorrect. Weekend boating activities cause extensive regions of high turbidity from shore erosion through much of the lake area. In addition, slumping of shoreline is a problem along extensive stretches. The FERC Hydroelectric Project Relicensing Handbook, page 86 states *"if there are existing areas of continuing erosion or slope instability, include a plan to stabilize these areas. This plan should include a narrative describing the type of control measures to be used, and a topographic map showing the specific locations of the proposed control measures.,"*
- West Penn Power must address remediation of water quality problems. e.g.: sedimentation, acid drainage, sewage loading, especially from current and future developments on West Penn Power lands.
- West Penn Power should identify and propose measures to mitigate excessive noise and aesthetic impacts from recreational usage on the lake.
- Current and future public water supply needs should be addressed, particularly during periods of droughts and excessive draw downs.

Letter from Cheat Lake Environment and Recreation Association, dated August 4, 1994

authority, and when WPP proposes or implements plans, it is in turn regulated by the Commission and others. In the FEA we specifically clarify that we will recommend that WPP be required to evaluate and minimize adverse water quality impacts associated with its recreational developments.

We will not recommend that WPP be required to comprehensively regulate boating density on Cheat Lake. WPP will be responsible for managing the free public boat launch site to be provided at Sunset Beach. Until more capacity is developed, limitations on the Sunset Beach parking supply and similar capacity limits at other marinas and boat launches should keep boat usage at the historic peak level. In consultation with agencies and interest groups, we will recommend that WPP also be required to report on boating use patterns and propose or report on changes in periodic recreation plan updates.

1 (con't)

visitor safety are inadequate and do not address even the existing safety issues. Safety is a fundamental responsibility of a managing authority and should be discussed as such in the EA.

As to the statement in the Draft Environmental Assessment suggesting that WPP has "insufficient authority over private marinas and state-owned land", we suggest that this is not consistent with the current trend toward cooperative operation and management that might be possible via establishment of a governmental/private sector management entity. It also is contrary to the following statement in the FERC Hydroelectric Project Relicensing Handbook (1990): *"The applicant must provide a description of the shoreline and reservoir management plans, and their relation to adjacent uses of land and resources."* Page 92.

Certainly the creation of a special Park District or Environmental Authority as a political subdivision of the State of West Virginia is a possibility. This type of entity could have considerable control of the geographic area assigned to it, so far as regulation and enforcement. It could also have the authority to tax the property within its geographic jurisdiction to assist with its ongoing operating expenses. Further, it would be assigned legal responsibility for the safe operation of activities at Cheat Lake—addressing a current concern of WPP as to the provision of supervised swimming areas. It seems that such a special district or authority would fit in well at Cheat Lake, and it appears logical that WPP would be very interested in becoming involved in initial discussion of this process. If WPP were to be an active part of this type of management structure, it would, by its very governmental nature, permit a broad approach to solving many of the identified problems of the area. It could also be established to undertake the management of the recreational aspects of Cheat Lake without any authority involving production of power. It is a concept that is worth pursuing, and we feel that discussion of this alternative should be incorporated into the EA by FERC.

Notwithstanding, we feel that unless West Penn addresses the manner in which they intend to manage Cheat Lake, CLEAR will actively promote the creation of a special district or authority, which will have considerable authority and impact on the area. We would invite West Penn's input and cooperation, and hope that FERC will be inclined to support interactive discussion between WPP and parties involved in this action:

Our concerns about WPP's proposed "management plan" are:

- Concept for management authority is inadequate and should be addressed in detail, to include:

1. Identify the entity that will promulgate rules and regulations for use.
2. Identify proposed management structure, such as primary site manager, on site staffing, and maintenance requirements
3. Provide plans for visitor safety, both on land and water.
4. Identify possible integration with other management entities.

MASTER PLANNING

2

CLEAR Position: (Adopted November 1, 1993 by the Board of Directors) West Penn Power and the Monongalia County Commission should work together in addressing the many social, economic, environmental, educational, recreational, and other related variables that affect the quality of life of the Cheat Lake area in the development of a master plan. This effort should include cooperation with appropriate state agencies, citizens groups, concerned environmental groups, and adjacent governmental agencies having jurisdiction in the watershed.

Letter from Cheat Lake Environment and Recreation Association, dated August 4, 1994

Response 2. A requirement that WPP consult "with agencies having land management or planning/zoning authority in the area" is reasonable for future consultations and that language has been added to the FEA and we will also recommend that it be included in the license. To the extent that the relicensing process itself requires consultation with appropriate agencies, we are satisfied that WPP completed such preconsultation.

WPP's history with regard to recreation development and planning prior to this relicensing is irrelevant to the current environment because the previous license did not require such recreational development and planning activities. (Refer to Section V.C.8. for a detailed description of the recreation development and planning activities that would be required after relicensing).

Several details of the post-license project operation may be adjusted to respond to changing circumstances. Therefore, we will not delay issuance of the license until completion of a master plan. The enhancements to be implemented after relicensing will address several well-established needs of the area and therefore are generally consistent with local plans. Several of the details listed in your comments will be addressed through the required recreation plan update process. This will include reviewing the viability of privileged permit holdings and the primitive camp sites in Area 18 or elsewhere. Section V.C.8 of the FEA now includes these as specific points to evaluate in plan updates.

Commission staff have considerable experience with shoreline erosion issues at hydroelectric projects and the associated reservoirs. Considering the slopes along much of Cheat Lake, we are generally impressed with the shore's stability and specifically noted a scarcity of bare soils or actively eroding shoreline. We have modified our recommendation from the DEA (Section V.C.1) to provide a broader picture of erosion issues associated with the reservoir. Specifically we will require WPP to conduct (1) an annual shoreline erosion survey of the West Penn Beach area and (2) a triennial survey of the entire reservoir shoreline during the first 9 years following issuance of the new license. We were previously unaware of slumping shoreline at numerous locations, and we believe the required surveys will help to clarify this issue. We will not recommend, however, that WPP be required to participate in the funding of shore protection measures, except where required for the West Penn Beach development area or at other sites affected by WPP construction activities.

We do not recommend that WPP comprehensively address acid mine drainage, sewage loading, noise impacts, aesthetic impacts, or public water supply issues. These issues are beyond WPP's

CHEAT LAKE ENVIRONMENT AND RECREATION (CLEAR) ASSOCIATION RESPONSE REGARDING THE FERC COMMENTS OF WEST PENN POWER'S D E A

"Congress signaled that it wants the FERC to give the environment, recreation, and fish and wildlife the same level of attention it gives to power and developmental objectives,....."—FERC Hydroelectric Project Relicensing Handbook, April, 1990 page 57.

CLEAR is in total agreement with the Congress, as we hope FERC is inclined to be. We feel that our four position statements, as addressed below, are in complete concert with this policy statement.

MANAGING AUTHORITY FOR CHEAT LAKE

1

CLEAR Position: (Adopted November 1, 1993 by the Board of Directors) West Penn Power must address the administration and management of not just the West Penn Power owned lakeside facilities it plans to develop, but must establish an identifiable management entity to assume responsibility for the overall safety and security of all lake users. This administrative entity might be exclusively by the Power Company, or might include semi-government involvement via the establishment of a park district or park authority, in cooperation with county and/or state government.

FERC Conclusion: *"Not adopted—insufficient authority over private marinas and state-owned land."*

The only reference to addressing the management concern for Cheat Lake by West Penn Power in the Draft Environmental Assessment was that it currently plans to assume this responsibility itself. It does suggest that in the future, consideration might be given towards turning over this responsibility to some other entity.

We suggest that this is vague and very incomplete. A "management plan" usually consists of two distinct functions, and assigns responsibility for each of these. These functions are:

1. A *governing entity*—Identification of the person, or group of persons, responsible for the formulation of the policy and rules relating to the area. The Draft EA needs to address **WHO** will undertake this essential function and **WHERE** public concerns should be directed.

2. A *managing entity*—Identification of the person responsible for the day-to-day operation of the facility or area under the guidelines established by the governing entity. The public needs to know **WHO** will undertake this function **HOW** this person can be contacted.

These are the most basic of requirements of a management plan, and it is most unusual that at the very least FERC does not require WPP to address this, even if WPP chooses to self-operate the recreational aspects of Cheat Lake for the immediate future.

The Hydroelectric Project Relicensing Handbook specifically requires identification of safety features to protect the public engaged in recreation. (section 4.3, page 90). Provisions for

Letter from Cheat Lake Environment and Recreation Association, dated August 4, 1994

Response 1. The general recommendations made in the DEA are consistent with WPP's scope of responsibility and adequately address the need for administration and management of project lands. We recognize your concerns for identifying a management authority and, as stated in the DEA, WPP will be responsible for managing its lands and recreational uses on its lands (p. 52). The recreation management requirements outlined in the DEA will ensure that WPP is actively and appropriately engaged in ongoing resource planning and management in the project area. However, although we endorse the goal of government and private sector cooperation, we will not recommend that WPP be required to establish a political subdivision of the state or a pseudo-governmental authority as a term of its hydropower license.

As stated in the DEA (p. 52), we will recommend that WPP be required to revise and refile the existing recreation and land management plan within 6 months of relicensing and update the plan every 3 years, with plan updates to include information about recreation use, any problem areas, and recommendations. We will also recommend that WPP be required to provide staff responsible for recreation area security and for working with local law enforcement. These requirements would make WPP responsible to the Commission for demonstrating continuous and cooperative efforts in the area of recreation management; however, these requirements are not expected to eliminate the need for other recreation management authorities. (The states of West Virginia and Pennsylvania, for example, are responsible for boater registration and enforcement of fishing regulations, giving them management authority in areas where WPP has none.) We recognize that you have several valid concerns about recreation and land management, and we will recommend that the license require WPP to coordinate and cooperate with local and regional interests groups when updating the recreational plan.

CLEAR
Cheat Lake Environment and Recreation Association
P. O. Box 211, Morgantown, WV 26507-0211

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FEDERAL ENERGY REGULATORY COMMISSION

August 4, 1994

ORIGINAL

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
Mail Code: DPCA, HL 21.3
825 North Capitol Street, N.E.
Washington, D.C. 20426

Dear Ms. Cashell:

Cheat Lake Environment and Recreation (CLEAR) Association
Lake Lynn Hydroelectric Project
FERC Project No. 2459-005
DEA REPLY COMMENTS

We are pleased to offer the following comments regarding the Draft Environmental Assessment of the Lake Lynn Hydroelectric Project.

In the environmental assessment the WVU Division of Forestry was listed as an interviener. Please note that the request for interviener status was made by Steve Hollenhorst, Ph.D. on behalf of CLEAR and not the WVU Division of Forestry. We request that CLEAR, not the WVU Division of Forestry, be listed in the future.

All entities on the Lake Lynn mailing list will be mailed a copy of this document.

Should you have any questions regarding this submittal, please contact me at 304-293-2321.

Sincerely,

Ann Chester

Ann Chester
President

AUG 0 1994

9 Page 25. Section V. C.2. Water Resources-Environmental Impacts and Recommendations. f. Compliance Monitoring - WVDEP agrees with the FERC recommendation that WPP fund the installation, maintenance, and data storage for a USGS flow gaging station on the Cheat River in the reservoir headwaters and below the dam (upstream of Grassy Run). As mentioned above, minimum flow maintenance is directly related to water quality, therefore any license article written to include consultation requirements for gage station locations must include a requirement to also consult with WVDEP. Flow information and water level monitor data should be made available to WVDEP as well as the agencies discussed in the EA.

Thank you for the opportunity to provide comments on the EA. Should you have any questions, please feel free to contact Ms. Barbara Taylor (WVDEP, Office of Water Resources, 2006 Robert C. Byrd Drive, Beckley, West Virginia 25801-8320; 304/256-6850) of my staff.

Sincerely,

Office of Water Resources

Mark A. Scott

Mark A. Scott, Chief

cc: WVDNR-Wildlife Resources, Elkins
WVDEP-Regulatory Review Program
WVDEP-Beckley
U.S. Fish and Wildlife Service, Elkins

Letter from West Virginia Division of Environmental Protection, dated August 1, 1994

Response 9. We have revised Section V.C.2.f to include the WVDEP in consultation for gage station locations.

Ms. Lois Cashell
RE: Lake Lynn Hydropower Project, FERC No. 2459
August 1, 1994
Page 3

7 Cont.

In the discussion regarding water quality monitoring it is indicated that WPP would not be required to implement any practices to prevent DO degradation downstream.

West Virginia's Code of State Rules, 46 C.S.R. 1, Requirements Governing Water Quality Standards, Section 2.4 defines High Quality Waters as "...those waters whose quality is equal to or better than the minimum levels necessary to achieve the national water quality goal uses..." WVDEP, in accordance with guidance from the U. S. Environmental Protection Agency and the West Virginia Environmental Quality Board, approaches a high quality water determination based on each individual water quality parameter.

As the RMC study has shown, DO is well above the minimum level (5.0 mg/l) necessary to achieve national goals. Consequently, when evaluating tailwater DO conditions the minimum state standard is not applicable as it is superseded by provisions of WV Code of State Rules, 46 C.S.R. 1, Section 4.1.e which state that "... the existing trout and other high quality waters of the state must be maintained at their existing high quality..." FERC must therefore evaluate maintenance of existing DO conditions. Therefore, WPP should be required to develop a plan to monitor DO and mitigate the occurrence of DO at levels that are less than existing conditions.

8

WVDEP agrees with FERC's recommendation that WPP prepare a water quality monitoring plan and consult with WVDNR, PFBC, and DOI before establishing the continuous monitoring stations. However, WVDEP is the state water quality regulatory and 401 water quality certifying agency, WV State Code §§22-1-7(5) and 22-1-6(6), and should therefore be party to any consultation regarding all aspects of water quality monitoring or management, including coordination with the licensee on monitoring stations. Further, WVDEP recommends that water quality monitoring equipment be installed at the U.S. Geological Survey (USGS) gage station recommended for the reservoir headwaters. Once the expense is incurred to construct a gaging station that includes a telemetry component, the remaining cost to install a continuous water quality monitor is nominal. The continuous monitor should record DO, temperature, pH, and conductivity.

An upstream monitor will provide improved characterization of inflow to the reservoir and potentially allow the licensee to minimize downstream impacts should a critical condition occur above the lake (i.e. chemical spill, acid inflow, etc.,). In early discussions on this issue, WPP was hesitant to construct a monitoring station solely for water quality due to access problems, vandalism, etc. However, that is no longer the case if a gage station will be constructed, access will be required and security will be part of the gage station structure. Information from all water quality monitoring locations should be readily available to resource and regulatory agencies either through electronic access or upon request.

Letter from West Virginia Division of Environmental Protection, dated August 1, 1994

Response 8. We have modified the text (Section V.C.2) to include WVDEP as a party to consultations regarding water quality monitoring and management.

As explained in the FEA (Section V.C.2), we will not require WPP to construct an upstream USGS gage station because of prohibitive cost and because not having it will not preclude WPP's ability to document compliance with minimum flow requirements. We recommend that WPP monitor flow compliance with a reservoir level probe and a USGS gage station downstream of the dam. Nevertheless, we continue to recommend that WPP install three water quality monitoring stations, one of which will be in the project reservoir. WPP will determine the location of the reservoir water quality monitoring station in consultation with the WVDEP and other appropriate agencies.

2 West Virginia, consequently sediment control plans or NPDES permits are the jurisdiction of WVDEP.

3 The EA further includes a FERC recommendation that WPP cooperate with WVDNR to address adverse effects such as unstable slopes or suspended sediments. As stated in the EA, Section IV.C., water quality functions were transferred from WVDNR to WVDEP July 1,1992. WVDEP - Office of Water Resources is responsible for water quality management including that of nonpoint source pollution. Agency evaluation and recommendations for remediation of unstable slopes resulting in water quality impacts must also include coordination with WVDEP.

4 Page 14, Section V. C.2.c., Water Quality Standards - The EA states that the Cheat River is subject to West Virginia water quality standards upstream of the dam and Pennsylvania water quality standards downstream of the dam. Some clarification of this statement is required. The reservoir as well as the dam discharge and immediate tailwaters lie within the boundary of West Virginia and are subject to compliance with West Virginia water quality standards. These standards will be reflected in the State's 401 Water Quality Certification.

5 Page 17-22, Section V. C.2. Water Resources-Environmental Impacts and Recommendations, b. Minimum Flow - The WVDEP agrees with the FERC recommendation to disallow WPP's proposal to subtract evaporation and water withdrawal from total inflow. WVDEP encourages FERC to further consider a previous recommendation from WVDNR to require WPP to develop a drought contingency or water management plan. Development of such a plan would ensure maintenance of reservoir elevations as well as protect downstream resources with minimum impact on lake resources.

6 With respect to the 212 cfs minimum flow, WVDEP will consider the benefits of a minimum flow as compared to run-of-river prior to issuance of State 401 Water Quality Certification. However, WVDEP is concerned that 212 cfs as currently proposed will be required only when inflow to the reservoir is 212 cfs or greater. Studies conducted by RMC Environmental Services (RMC) for WPP resulted in recommendations that 100 cfs would result in substantial water quality benefits. In order to consider granting a minimum flow for the Lake Lynn project, WVDEP must consider the best circumstances for water quality and aquatic life improvement. For example, if establishment of a minimum flow of 212 cfs (for flows equal or greater than 212cfs) is to be acceptable, an absolute minimum of at least 100 cfs must be instituted.

7 Page 22-24, Section V. C.2. Water Resources-Environmental Impacts and Recommendations, d. Water Quality Monitoring - Page 15 of the Dissolved Oxygen (DO) discussion indicates that 1990 studies by RMC documented a mean DO range from 6.1 to 11.2 mg/l. WVDEP would contend that such conditions would likely represent existing conditions.

Letter from West Virginia Division of Environmental Protection, dated August 1, 1994

Response 3. We recommend (Section V.C.1) that WPP also cooperate with WVDEP to address adverse effects.

Response 4. We corrected the text (Section V.C.2) to reflect that water quality standards up-stream of the dam, the dam discharge, and immediate tailwaters are subject to West Virginia standards.

Response 5. We recommend in the FEA (Section V.C.2) that if any proposal is put forth to withdraw more than 1 mgd from the reservoir, the Commission may require a drought contingency plan that may include modified operational parameters for the Lake Lynn project.

Response 6. We modified the text as appropriate throughout the FEA to recommend a minimum release of 212 cfs or reservoir inflow, with an absolute minimum release of 100 cfs when inflow to the reservoir is less than 100 cfs.

Response 7. We recommend that WPP develop and implement a water quality monitoring plan. The plan would help to determine if low DO is an occasional problem and under what circumstances it may become a problem. Studies show that the dissolved oxygen conditions in the Cheat River stay well within applicable state standards. Furthermore the minimum release flow required by the new license should enhance DO down-stream of the dam. If any water quality monitoring results show that tailwater dissolved oxygen levels are below the state standard, WPP would be required to notify the Commission and the appropriate resource agencies to evaluate the low dissolved oxygen reading. Then if required by the Commission, WPP would develop and implement a plan in conjunction with WVDEP and other agencies to achieve compliance (see Section V.C.2).

ORIGINAL

DEPARTMENT OF COMMERCE, LABOR & ENVIRONMENTAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
1201 Greenbrier Street
Charleston, WV 25311-1088

Gaston Caperton
Governor
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David C. Callaghan
Director
Ann A. Spaner
Deputy Director

August 1, 1994

Ms. Lois D. Cashell
Secretary
Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 North Capitol Street, NE
Washington, DC 20426

RE: Draft Environmental Assessment
for Hydropower License:
Lake Lynn Hydropower Project,
FERC No. 2459 - West Virginia

Dear Ms. Cashell.

The West Virginia Division of Environmental Protection, Office of Water Resources (WVDEP) has reviewed the above-referenced environmental assessment (EA) and provides the following comments and recommendations. The comments are assembled to correspond with the EA outline.

1 <u>Page 8, Section IV, B. Interventions</u> - The West Virginia Division of Natural Resources (WVDNR) is listed as filing a motion to intervene on September 30, 1993. The motion to intervene filed by West Virginia and dated September 29, 1993 was a joint filing for both the WVDNR and WVDEP. WVDEP and WVDNR are two separate agencies which have been collectively represented by West Virginia's Attorney General. Consequently, both agencies should be referenced in the EA as intervenors and parties to any proceedings related to Federal Energy Regulatory Commission (FERC) Project No. 2459.

2 <u>Page 12, Section V, C.1., Environmental Impacts and Recommendations</u> - West Penn Power (WPP) will be required to apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from WVDEP for any earth disturbance greater than 3 acres in size. For disturbances of less than 3 acres, an erosion and sediment control plan must be submitted to WVDEP for review and approval. West Penn Beach recreation area is within the boundaries of

Letter from West Virginia Division of Environmental Protection, dated August 1, 1994

Response 1. We noted in the FEA (Section IV.B) that WVDEP filed a motion to intervene on September 30, 1993.

Response 2. We revised the text in the FEA (Section V.C.1) to reflect that for any land disturbances within the boundaries of West Virginia greater than 3 acres, WPP will need to apply for and obtain an NPDES permit from WVDEP; for disturbances less than 3 acres an erosion and sediment control plan must be submitted to WVDEP for review and approval.

3 Cont.

(describe in the EA) of maintaining an April pool level between elevations 863-870 instead of the 868-870 recommended in WVDNR's March 24, 1994 correspondence. We recognize the public's pressure on WPP to regulate flood flows whenever possible, and feel their proposal is appropriate and justified.

4

4) Fish Mortality Impacts -- Contrary to the DEA (page 34, paragraph 7, sentence 1), the WVDNR did not request that a turbine study be conducted at the Lake Lynn project. WVDNR correspondence of March 24, 1994, did request, however, that WPP conduct a turbine entrainment study if deemed necessary by WVDNR and the U.S. Fish and Wildlife Service (FWS). It was further stated that the need for any such study should be decided after reviewing water quality and biological monitoring data (i.e., to be collected pursuant to a water quality monitoring plan) at biennial meetings. The WVDNR has no objection to the FERC's recommendation of making these review meetings triennially as long as emergency meetings may be scheduled at any time if felt necessary by FERC, WVDNR, and/or FWS.

Thank you for the opportunity to comment on these fish and wildlife related issues. We recommend that the FERC schedule a meeting with the pertinent parties as soon as possible so that these issues may be resolved.

Sincerely,

Charles B. Felton, Jr.
Director

CBF/mcw

cc: Dan Cincotta/WVDNR

Letter from West Virginia Division of Natural Resources, dated August 22, 1994

Response 4. We clarified the text in Section V.C.3 to state that a turbine entrainment study would be conducted if deemed necessary by the Commission, based on new information or a recommendation from WVDNR or DOI.

1 Cont. stratified." The WVDNR contends that this is sufficient evidence to require the licensee to prepare a plan to investigate methods to preclude low DO conditions in the tailwater, including plant shutdown (i.e., passing water through the tainter gates). The WVDNR contends that your staff's alternative recommendations are not acceptable and maintains that the West Penn Power Company (WPP) should prepare such a plan.

2 2) Minimum Flow Releases -- The WVDNR reiterates a compromise discussion in our August 2, 1994 correspondence. The DEA states that West Penn Power Company (WPP) will be required to release a minimum flow greater than or equal to 212 cfs except when reservoir inflow is less than 212 cfs. In those instances, the minimum discharge shall equal the reservoir inflow. The WVDNR requested, in its March 24, 1994 correspondence, that 212 cfs be provided at all times to protect the biological integrity of the river below the dam. The WVDNR contends that FERC's requirement in the DEA will negate benefits derived from requiring minimum downstream flows because acid water conditions are most seriously impacting during low flow periods (as documented by WPP reports). In an effort to balance reservoir and downstream uses, the WVDNR recommends that the minimum flow not fall below 100 cfs during periods when inflow to the reservoir is less than 212 cfs. This discharge limit was chosen because it is the minimum value identified by WPP in their water quality modeling as providing substantial water quality benefits. The WVDNR contends that this recommendation will not significantly impact reservoir recreationists or aquatic communities and will maintain biological benefits obtained from minimum releases in the tailwaters.

3 3) Recreation Pool Elevation During April -- The WVDNR did not respond to WPP's compromise proposal

Letter from West Virginia Division of Natural Resources, dated August 22, 1994

Response 2. We modified the text as appropriate throughout the FEA to recommend that the minimum flow not fall below 100 cfs when inflow to the reservoir is less that 100 cfs. Please refer to the discussion presented under "Unavoidable Adverse Impacts" in Section V.C.2 regarding potential effects on reservoir level.

Response 3. We have reviewed and noted your comment.

1) The rationale behind the findings by FERC that the recommendations made by the PFBC and other agencies were inconsistent with the Federal Power Act.

2) Expansion of the water quality monitoring plan to allow reasonable evaluations of the effect of operation of the project on Cheat River water quality throughout the term of the license.

3) Additional alternatives analysis of minimum release requirement/operating modes including such things as:

    a) varying minimum release levels (e.g. 450 cfs/212 cfs or 450 cfs/212 cfs/100 cfs) triggered by pool level/inflow,

    b) varying release levels during spawning and incubation periods for fish, and

    c) development of water quality/fish population criteria that would trigger operational/spill requirements more protective of the fishery.

4) Development of alternative conditions in the license which would be triggered by improvements of water quality and the fishery which would not necessitate the reopening of the license.

5) Issues outside of 10(j), such as development of the tailrace fishing area.

We look forward to your response to the above matters.

Sincerely,

Leroy M. Young, Fisheries Biologist
Division of Environmental Services

LMY:srh

cc: Service List
Thomas Dean - FERC
R. Polin - COE, Pittsburgh
C. Kulp - USFWS
C. B. Felton, Jr. - WVDNR
W. Gast, T. Proch - DER
Arway, Snyder, Lorson, Qualters, Ansell - PFBC

3 Cont.

b) As pH improves to levels which may allow reproduction and recruitment of fish, continued peaking operation of the project will largely disallow the instream flow requirements of the earliest life stages of fish from being met.

4 Another alternative which we had proposed was restriction of peaking during the fish spawning and fry life stages. This alternative has not been evaluated by your agency, although we feel it is a viable option, particularly when water quality improves to a level to permit successful spawning and recruitment. Furthermore, we do not feel that peaking alternatives have been adequately evaluated. Superior to the proposed alternative would be variable minimum flows (e.g. 450 cfs, 212 cfs) which would be triggered by changes in reservoir pool level or inflow. An absolute minimum level for the releases must be established to prevent or greatly reduce the potential for severe water quality degradation during low flow events. It is obvious that pH declines rapidly at releases below 212 cfs, and particularly below 100 cfs. It is poor balancing, in our view, to allow flows to drop below such levels, even if only on relatively infrequent occasions.

5 There is no mention of how pool level fluctuations were taken into account in the balancing that was done. Is it the view of FERC that there is no flexibility in pool control during the relatively infrequent occasions that flows would drop below 212 cfs? What exactly is the magnitude and frequency of reductions in pool levels that the 212 cfs release and other alternatives would cause? How would these events affect recreation in the reservoir?

6 You have opined that if pH did improve in the future, the proposed water quality and biological monitoring programs would confirm it and "Reopening the license to reevaluate the potential fishery benefits of minimum release flows and alternative operations may then be considered". We feel this nebulous wording encourages much conflict in the future. Efforts should be made during this 10(j) process to specify the conditions under which reopening the license could occur. Actually, it would be better, in our view, to condition the current license to allow alternative operating conditions which would not require the license to be reopened.

Summary

As suggested in your letter, we feel a meeting and/or telephone conference call is in order to attempt to resolve the outstanding 10(j) issues. This meeting/conference call should address the following issues at a minimum:

Letter from Pennsylvania Fish and Boat Commission, dated August 23, 1994

Response 4. In the FEA we evaluate options to restrict peaking or modify minimum releases in April, May, and June. Refer to Sections VI.A and VI.B of the FEA and our response to the DOI letter, comment No. 2 (regarding run-of-river operation).

Response 5. We consider reservoir recreation, and therefore maintenance of the summer recreation pool water level, a very important objective of any reasonable alternative. As explained in the FEA, we now recommend an absolute minimum release of 100 cfs when reservoir inflow is less that 100 cfs. Compared to releasing a flow equal to reservoir inflow when inflow is less than 100 cfs (as recommended in the DEA), our new recommendation adds some additional risk of draw-downs below the desired pool. Refer to the discussion presented under "Unavoidable Adverse Impacts," in Section V.C.1 of the FEA.

Response 6. We recognize your concern about identifying specific "triggers" that would result in changes in project operation, but the standard reopener is the mechanism the Commission uses to review the terms of project operation after a license is issued. As unforeseen circumstances may arise that affect various resources, we maintain that the standard reopener is preferable to specific triggers.

2 Cont. growth of warm- and coolwater fish species. The dissolved oxygen levels were not only to be maintained immediately downstream of the licensed projects but also throughout the receiving pool downstream of each project. The obvious inconsistency between such requirements on those projects in the Upper Ohio River Basin licensed by FERC in 1989 and the requirements on this Upper Ohio River Basin project make no sense to us. We stand by our previous recommendations and request an explanation of the rationale for such disparate dissolved oxygen requirements for projects in the same river basin. One of these projects, the proposed Point Marion Look and Dam Project, is located on the Monongahela River just five miles from Lake Lynn.

3 3 & 4. We had requested a variable minimum release flow beginning at 1,100 cfs, when reservoir inflow equalled or exceeded that mount, and decreasing in 100 cfs increments in response to decreasing inflows to an ultimate minimum release of 212 cfs. You have recommended a minimum release of 212 cfs when inflow is greater than or equal to this amount. At other times you have recommended a release equal to the inflow.

We are opposed to the alternative you have selected for the following reasons:

a) Improvement of water quality downstream of the dam is critical to the restoration of an aquatic community which has been devastated in the past, in large part as the result of operation of the Lake Lynn Project. Since the effect of short term improvements on water quality can be negated by occasional low pH events, improvement of minimum pH levels should weigh heavily in decision making related to the relicensing of this project. This is especially important in the present case since the potential exists to raise pH to levels which are near the minimum values necessary for several fish species. As noted in the draft EA, minimum pH values increase by at least 0.1 unit for each 100 cfs increase in minimum flows up to about 500 cfs. You have indicated that a release rate of 400 - 500 cfs would optimize the improvement of water quality per unit flow released and that a release of 1,000 cfs would provide the greatest benefit to pH values. It is likely that pH could increase substantially over the term of the license as AMD problems abate. Your proposal not only provides significantly lower minimum pH levels compared to other alternatives over the long term, but also allows for the regular occurrence of acute pH events which will adversely impact the aquatic community any time inflows drop below 212 cfs.

Letter from Pennsylvania Fish and Boat Commission, dated August 23, 1994

Response 3. We modified the text as appropriate throughout the FEA to recommend a minimum flow release of 212 cfs or reservoir inflow, with an absolute minimum release of 100 cfs. This new flow recommendation should help to maintain improved water quality down-stream of the dam during periods of low flow.

1 Cont.

monitoring program, one sample per month from the STORET program), coupled with continuous monitoring in the tailrace, will, you believe, "provide the resource agencies with sufficient data to determine the effect of minimum releases on water quality.

Operation of the Lake Lynn Hydropower Project continuously results in abnormal flows in the Cheat River. These flows serve to influence water quality and adversely influence the aquatic community continuously in Pennsylvania's portion of the river. It is highly unlikely that 13 grab samples per year from the backwater of the Monongahela River coupled with continuous monitoring upstream of the AMD degraded tributaries downstream of the dam will allow the resource agencies to determine the effect of minimum releases on water quality. Among the reasons for this are the following:

a) No monitoring will be conducted in the area most severely affected by the interaction of AMD and altered flows from Lake Lynn (area upstream of the Monongahela River backwater and downstream of the AMD impacted tributaries.

b) The STORET and COE water quality monitory efforts are not designed to monitor the effects of Lake Lynn releases on water quality. Many, if not all, of the 13 samples collected each year could occur when generation was occurring rather than during minimum releases. Thus little or no information on the effect of minimum releases on water quality would be provided.

c) It is unreasonable to believe that 13 samples collected per year will adequately define water quality in such a dynamic system as the lower Cheat River.

d) There is insufficient empirical data to validate the results of the water quality modelling predictions over the long term.

While the PFBC would entertain other alternatives to continuous monitoring in the strictest sense downstream of the tailrace, we feel that more sampling then that recommended in the EA is necessary and reasonable.

2

2. We had requested that a minimum dissolved oxygen level consistent with that prescribed by FERC for previously licensed projects in the Upper Ohio River Basin be prescribed for the Lake Lynn Project. This level (6.5 mg/l) was judged as recently as 1989 by FERC to be necessary to prevent adverse impacts on

Letter from Pennsylvania Fish and Boat Commission, dated August 23, 1994

Response 2. There are several differences between the Lake Lynn project and the Upper Ohio River Projects. Lake Lynn is an existing project whereas some of the Upper Ohio River projects referred to were new hydroelectric projects at existing dams when licensed by the Commission. Therefore there was concern about loss of spillway flows to turbines, whereas the Lake Lynn project is proposed for a new minimum spillway release flow during nonoperating periods, thus enhancing tailrace dissolved oxygen.

The recommended alternative for the Upper Ohio River projects was based in part on the goal of maintaining dissolved oxygen levels throughout the basin at pre-project conditions. This is accomplished by licensing each project in such a way that each would not cause dissolved oxygen concentrations to fall below 6.5 mg/L in river locations where individual projects could affect dissolved oxygen. That requirement specifically recognizes that there are several other factors causing depleted dissolved oxygen within the river basin, including major wastewater discharges in the Pittsburgh vicinity.

The Lake Lynn project was not evaluated within the basin-wide context of the other Upper Ohio River projects. We studied it based on the balance of all resources associated with the Lake Lynn project reservoir, the river down-stream of the dam, and the economic effects of enhancements on a single project. Therefore, we continue to recommend that if the tailwater dissolved oxygen drops below 5.0 mg/L (the state standards), WPP must notify the Commission and the appropriate resource agencies within 10 days to evaluate the low dissolved oxygen reading. Then if required by the Commission, WPP would develop a plan in consultation with PFBC and other agencies to achieve compliance, and implement the plan.

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH & BOAT COMMISSION
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823-9616
(814) 359-5147

August 23, 1994

John H. Clements, Acting Director
Division of Project Review
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

Re: Lake Lynn Hydroelectric Project
(FERC Project No. 2459)
10(j)

Dear Mr. Clements:

I am writing in response to your July 13, 1994 letter regarding relicensing of the Lake Lynn Hydroelectric Project (Project No. 2459) and resolution of issues related to Section 10(j) of the Federal Power Act. In this letter, you have indicated that you do not agree with four of the recommendations which were made by the Pennsylvania Fish and Boat Commission (PFBC) on the draft environmental assessment (EA) for the project and that some of our recommendations are, in your view, inconsistent with the comprehensive planning and public interest standards of Section 4(e) and 10(a) of the Act.

We will respond to each of the items you have raised, although we would at the same time request detailed information on the criteria which were used by your agency to make a determination that our recommendations were inconsistent with the Act.

1 1. We requested that a water quality monitoring plan be developed which would document, at a minimum, water temperature, pH, and dissolved oxygen levels in the reservoir, immediate tailrace, the free flowing region downstream of the acid mine drainage (AMD) impacted tributaries and the backwater from the Monongahela River. Your alternative recommendations are that the licensee install continuous monitors in the reservoir and tailrace, but not downstream of any of the AMD degraded tributaries. You note that the US Army Corps of Engineers (COE) has a water quality monitory station in the lower Cheat River and data is also available from the lower Cheat from EPA's STORET data retrieval system. This information (one grab sample per year from the COE

Letter from Pennsylvania Fish and Boat Commission, dated August 23, 1994

Response 1. We modified the FEA (Section V.C.2) to include one additional water quality monitoring station to be placed at a site down-stream of the acid tributaries. This should address the concern for improved river pH data and help relate project operations to down-stream water quality.

3 Cont.

project has been and will be licensed, in part, for flood control benefits, we request that FERC staff provide us with a description of what downstream resources have been and will be protected by fluctuating the pool 13 feet during late fall, winter and early spring periods. The FWS has never had much of a concern with the licensee's operation of the project that fluctuates Lake Lynn by two feet (870-868-870) because no adverse impact to the lake lynn fishery has ever been demonstrated. Therefore, in lieu of a reasonable answer to the 13 foot pool fluctuation, the FWS recommends that the Lake Lynn Hydro Project be relicensed to only fluctuate the lake by no more than a two feet (870-868-870 NGVD) year-round. In addition, we agree with the FERC staff recommendation "... that a fisheries monitoring plan be developed and implemented for the Lake Lynn Project waters, including the main reservoir, reservoir embayments, tailwater area, and farther down-stream in the Chest River."

4 4. We request that FERC staff explain the disparity between the statement on page 65 of the DEA "The release of 212 cfs is based on providing maximum improvement of the fisheries habitat area per unit of flow" and the statement on page 78 "Run-of-river provides the greatest environmental benefits."

5 5. DOI did not recommend that entrainment studies be deferred (page 35 DEA). DOI's letter of March 18, 1994 indicated that "the Service recommends that the licensee be required to adequately address the fish entrainment issue in full detail to ensure that existing and potential fishery resources will be protected from injury/mortality in the future due to entrainment."

Thank you for the opportunity to comment on the relicensing of this project at this stage of your process. We look forward to the first Section 10 (j) conference with your staff.

Sincerely,

Charles J. Kulp

Charles J. Kulp
Supervisor

Letter from the U.S. Department of the Interior, Fish, and Wildlife Survey, dated August 4, 1994

Response 3. The winter draw-down is necessary to maintain peaking power operation with below-normal but variable reservoir inflows. We acknowledge that the DEA may have overstated the importance of the project for flood control, which is an incidental function of the project. Nevertheless WPP has stated that it must retain its ability, following notification of reservoir marinas, to draw the reservoir down as much as 13 feet (to 857 feet NGVD) at any time partially because of the rare but foreseeable event of extremely high flows. Such flows, particularly if combined with ice, may pose a threat to the Lake Lynn project and to other improved property on the reservoir and below the dam.

WPP has rarely drawn the reservoir down as low as 857 feet because of the Cheat Neck Water Company's minimum intake elevation of 862 feet. In addition there is no economic incentive to draw the reservoir down to an extreme low elevation unless a major inflow is anticipated. In such a case, the inflow would quickly offset the draw-down, ensuring that the maximum draw-down would occur over a very brief period of time.

Response 4. We believe that both statements are reasonable. The first deals with fisheries benefit measured in terms of usable habitat area per unit of release flow below the dam (based on the IFIM study). The second deals with fisheries benefit based on comparison with a peaking mode of operation. Nevertheless, we modified the text in Section VII for clarity.

Response 5. We modified the text in Section V.C.3 as appropriate.

we must conclude that the proper habitat (deep holes with overhead cover) is simply not provided in the river segment down-stream of the Lake Lynn project.

Although a peaking mode of operation results in rapid release flow fluctuations, it will help moderate the adverse effects of extremely high flows (which must be released under a run-of-river alternative). The 100-cfs absolute minimum release (which we now recommend) would ensure continued dilution of acidic waters during periods of very low flow (i.e., when reservoir inflow is less than 100 cfs). A peaking operation will also allow for anticipation of high flows, which are sometimes absorbed in the reservoir and then released more gradually than is possible with a strict run-of-river operation. Put simply, a peaking mode of operation seems to be consistent with managing the wide range of natural river flows experienced at the Lake Lynn project. Run-of-river operation, in contrast, would require very frequent adjustment of release flows and power generation to match the highly variable natural river flow.

Finally, we believe both the DEA and the FEA sufficiently discuss the negative economic consequences of run-of-river operation. Given our findings and little potential for measurable benefits to the spawning and fry life stages (because of the combination of low pH and flows outside of the optimum ranges), we maintain that a strict run-of-river operation could not provide the best balance between continued efficient power generation and the enhancement of aesthetic, recreation, wildlife, and fishery resources at the Lake Lynn project. We also believe the results of the recommended biological monitoring program will help to further determine the relationship between the fishery and project operations.

In response to the comment about the fishery down-stream of the dam being limited by low pH, we cite several independent references regarding the limitations on aquatic life productivity imposed by low pH on p. 31 of the DEA. Of course, other factors also place limitations on the fishery; but in our conclusions, we are simply stating a fact that focuses on the viability of the existing fishery and the potential to enhance it.

As stated on p. 33 of the DEA, we recommend that WPP, in consultation with DOI, WVDNR and PFBC, develop a plan for the fish attractant structures down-stream of the dam.

profile of all steady state flow releases to determine project operation impacts on the lower Cheat River pH values.

2 2. FERC staff does not agree with the Department of the Interior's recommendation that the licensee should operate the Lake Lynn Project in a strict run-of-river mode. Licensee's IFIM Study results for the riverine segment of the lower Cheat River suggest that any a peaking, ponding or pulsing mode of operation, including the licensee's proposal and FERC's staff recommendation of 212 cfs continuous flow, plus peaking, has a significant adverse impact on the spawning, fry and young juvenile life stages of the evaluation species. The habitat duration curves in Section 9 of the study report show the basic difference between the licensee's existing and proposed peaking operation and the run-of-river alternative. Transitions in the amount of effective WUA for the life stages of the evaluation species in the peaking mode are abrupt and the effective WUA is only available briefly during an operation cycle (Figures 9-4 to 9-19). Conversely, the run-of-river mode shows that the transition between flows is smooth and the amount of effective WUA is available on a more constant basis providing greater habitat stability for evaluation species to fulfill their life stages (Figures 9-22 to 9-25).

In addition, the dual flow analyses in Section 10 of the study report show the significant adverse impact that the licensee's existing/proposed peaking mode of operation has on smallmouth bass/sauger spawning and fry life stages. As an example, Table 10-2 shows that for smallmouth bass spawning, the 212-2,040 cfs peaking cycle provides only 28.7 percent of the WUA available compared to the median May flow of 2,842 cfs, and that the 212-9,700 cfs peaking cycle provides only 2.3 percent of the WUA available at the same May median flow. For sauger spawning, the 212-2,040 cfs peaking cycle provides only 26 percent of the WUA available compared to a median April flow of 4,135 cfs. The 212-9,700 cfs peaking cycle provides only 1.7 percent of the WUA available at the same April median flow. Similar WUA non-suitability occur for smallmouth bass and sauge fry life-stages in the riverine segment of the lower Cheat River as illustrated in Figures 10-21 A and 10-22 A. of the study report. Based on available information, we do not believe there is much chance that any one of the four evaluation species used in the licensee's IFIM study will be able to fulfill their spawning and fry stages of their life cycle requirements in the riverine segment of the lower Cheat River if the project is allowed to continue operation in a peaking, ponding or pulsing mode. FERC staff concludes, considering all project factors, that the fishery downstream of the dam is limited primarily because of low pH and not aquatic habitat. The FWS requests empirical evidence that the fishery below the dam is primarily limited by low pH under steady state flow conditions from 100 cfs to 1,100 cfs in 100 cfs increments. In addition, FERC staff recommends fish attraction structures that would provide fish and other organisms protection from the highest flows (9700 cfs), while minimum flows (212 cfs) will enhance pH conditions. The FWS also requests the opportunity to review and comment on FERC staff's plans, designs, dimensions and locations for their recommended fish attractant structures in the Cheat River downstream of the dam.

3 3. FERC staff does not agree with the Department of the Interior's recommendation to require the licensee to study the effects of peaking and water level fluctuations and develop a plan (i.e.,run-of-river) that will mitigate significant adverse impacts of project-related operations on the reservoir fishery. To date, the FWS has not been given a reasonable answer(s) as why the licensee was allowed permission to fluctuate Lake Lynn 13 feet (870-857-870 NGVD) from November 1 to April 30. If the Lake Lynn

Letter from the U.S. Department of the Interior, Fish, and Wildlife Survey, dated August 4, 1994

Response 2. We do not recommend an instantaneous run-of-river operation because it would result in an unacceptable balance between project economics and the expected benefits to the fishery down-stream of the dam.

In preparing this FEA we looked further at the potential fisheries benefits under a run-of-river operation. We found that releases equal to reservoir inflow would not prevent extreme high flows during the spawning and fry periods for target species. We found in our review of historical river flow data in the project application (1978 to 1990) that, each spring, Lake Lynn inflows can shift upward or downward by several hundred cfs--or even several thousand cfs--within 1 day. Therefore, although instantaneous run-of-river operation would help ease the rate of flow change as compared to peaking operation, it would not eliminate widely variable flows and flows much greater than the optimal range for spawning and fry in the key months of April and May.

Based on our review of Lake Lynn project hydrology and the IFIM study, the high natural river flow typical of April and May is a key constraint to providing benefits during the spawning and fry life stages. The 50-percent exceedance flow is about 4,000 cfs for April and 2,800 cfs for May. The 90-percent exceedance flow for April is about 1,800 cfs and 1,200 cfs for May. Our review of flow data for 1978 to 1990 showed record low flows of 922 cfs in April (April 23, 1983) and 771 cfs in May (May 14, 1983). Even those record low flows--and certainly normal and high flows--are well above the optimum flow of about 200 cfs for smallmouth bass spawning and fry in the upper river segment. The IFIM study also concluded that for smallmouth bass fry, the weighted usable area (WUA) declined to the same level as the base flow (12 cfs) WUA when flow exceeded only about 300 cfs.

Similar relationships hold for the other target species and life stages in both the upper and lower river segments. Channel catfish fry benefit from increased WUA up to about 700 cfs (the highest optimum level for fry of any target species), with loss of WUA as the flow increases further. In fact, the only target species that may benefit from the high range of spring season release flows under a run-of-river alternative in the upper river segment is sauger. The optimum WUA for sauger is about 2,000 cfs and WUA decreases gradually from there as flows go higher. Still, river flows well above 2,000 cfs would negate the sauger spawning benefits because of flushing effects; and this would certainly occur in the spring with a strict run-of-river operation (sauger tend to spawn early in the season). Even in June the 50-percent exceedance flow is about 1,400 cfs, which is still above the optimal spawning flow of about 300 cfs for the late-spawning gizzard shad. And although channel catfish may spawn in June or July,

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
~~Suite 322~~
315 South Allen Street
State College, Pennsylvania 16801-4850

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REGULATORY COMMISSION

August 4, 1994

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Dear Ms. Cashell:

The United States Fish and Wildlife Service has reviewed the Federal Energy Regulatory Commission's June 24, 1994 Draft Environmental Assessment and the July 13, 1994 Section 10 (j) document regarding the relicensing of the Lake Lynn Hydroelectric Project No. 2459. We have the following comments. 005

1 1. FERC staff does not agree with the Department of the Interior's recommendation that the licensee should be required to establish, operate, and maintain a permanent pH monitoring station in the backwater segment of the lower Cheat River. FERC's letter of June 21, 1993 instructed the licensee to "... redesign your study, in consultation with the U.S. Fish and Wildlife (FWS), WVDNR, Pennsylvania Fish Commission (PFC), Pennsylvania Department of Environmental Resources (PDER) and the Corps, to address all important water quality parameters over a range of flows sufficient to evaluate operations with minimum flows and run-of-river operations." In response, the licensee's revised their report Computer Modeling of Effectiveness of Flow Releases on Water Quality Below Lake Lynn Hydro Station (October 1983) which indicated that "Time constraints did not allow for the collection of water quality data," but indicated that computer simulations can serve the same purpose and were used here to estimate in-stream pH values up to 8000 cfs. In addition, the licensee indicated that project releases above 100 cfs do not exhibit a significant pH water quality improvement. Moreover, the licensee suggested that increasing flows above their recommended 212 cfs release toward a run-of-river mode of operation would only marginally improve pH values and would not be cost efficient and is not recommended because of the high inefficiency.

We believe it is likely that the predicted model results have underestimated the benefits of an increased steady state flow mode of operation, at least up to a steady state flow of 1,100 cfs. The licensee's computer modeling of the 1992 Water Year predicted a maximum mean daily pH value of 5.97 in the backwater segment of the lower Cheat River at flows from 100 cfs to 8,000 cfs. In contrast, the Corps' Cheat River water quality station at rivermile 0.3 in the backwater segment recorded pH values of up 7.12. In addition, EPA's Data Retrieval System referenced in Table 4.1-8 of the licensee's 1991 Report on Aquatic Studies indicate that pH values of up to 7.6 have been monitored between rivermile 0.1 0.5 in the backwater area. Therefore, we recommend that the license be required to validate their model by adequate pH field sampling under steady state flow conditions field studies. In addition to field study validation, we recommend that the licensee be required to establish, operate and maintain a pH monitoring station at an appropriate location in the backwater segment of the lower Cheat River. The station should be set up to monitor the cross-sectional

Letter from the U.S. Department of the Interior, Fish, and Wildlife Survey, dated August 4, 1994

Response 1. We believe there is no conflict between the pH values from water samples collected in the field and the maximum daily mean value used in the model. Recognizing that field conditions may be highly variable, grab sample pH values of 7.12 or 7.6 should not be compared to a maximum daily mean pH value of 5.92. We evaluated the usefulness of the water quality model for comparing alternatives and predicting pH values and concluded that it was sufficient. Therefore we do not believe that further data validation is necessary.

We revised our water quality monitoring recommendations in Section V.C.2. We now recommend one additional water monitoring station to be placed at a site down-stream of the acid tributaries, possibly in the backwater segment of the lower Cheat River. The exact location will be determined based in part on agency comments on the water quality monitoring plan, which WPP must file after issuance of a new license. We believe the recommended pH monitoring will improve river pH data and help to relate project operations to down-stream water quality in the Cheat River.

16

16. Page 61, Section e., Paragraph 9, states that "Therefore we do not recommend that WPP sell or otherwise transfer ownership of land within the project boundary (i.e., Cheat Haven for lands within the canyon area)". While understanding the intent of this statement, WPP requests that it be clarified by the inclusion of "... for the purposes of installing a trail system within the canyon area". There are other cases where such property transfers may be made in both the best interests of WPP and the public, such as the exchanges currently being negotiated to facilitate the installation of the proposed hiking/biking trail. The FERC required notification/approval process will continue to apply to all property transactions.

WPP and APSC reserve the right to modify, add to, or delete the comments provided herein prior to issuance of an acceptable final Environmental Assessment. Submittal of these comments is not intended as a waiver of any rights or privileges to which WPP and/or APSC may be entitled by law, equity, practice, or court order.

WPP appreciates the opportunity to provide these comments and knows that the FERC will give them serious and complete consideration before issuing the final Environmental Assessment.

Letter from West Penn Power, dated August 5, 1994

Response 16. We clarified the text in Section V.C.8 of the FEA to include the clause "for the purpose of installing a trail system within the canyon area."

Document Content(s)

APPENDIX E

FLOW DURATION CURVES[13]

[13] See Section 5.2.3.2 for a description of the methodology used to develop the flow duration curves included in this Appendix.

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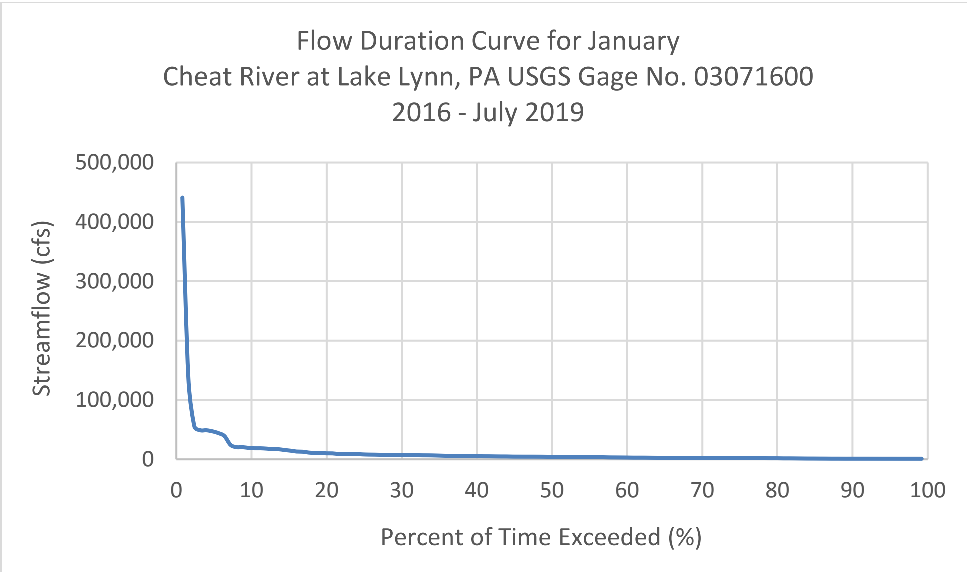
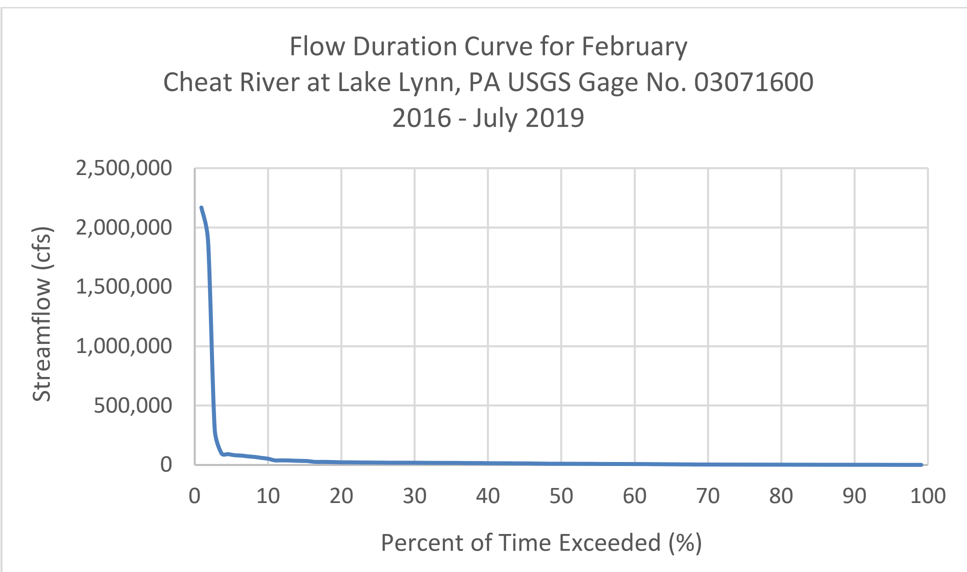
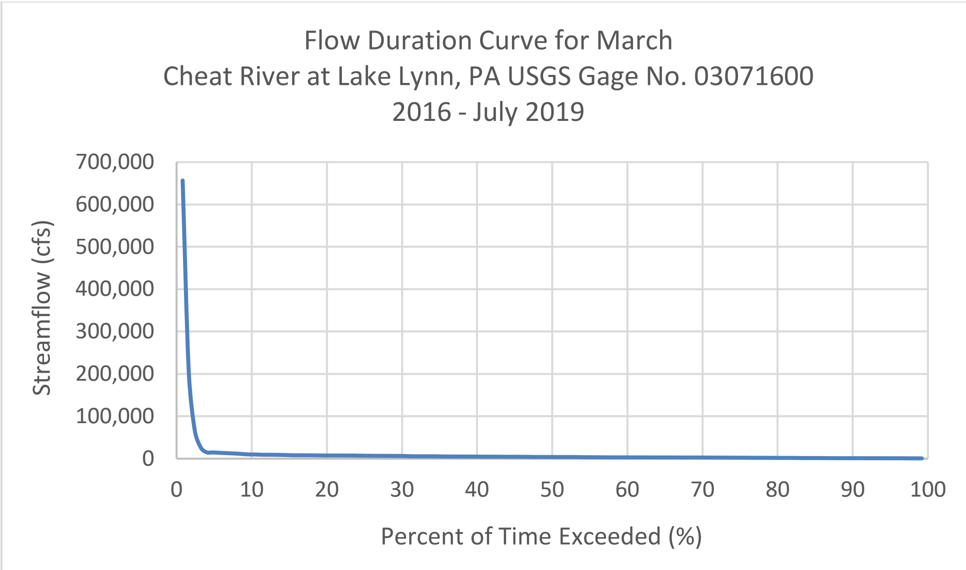
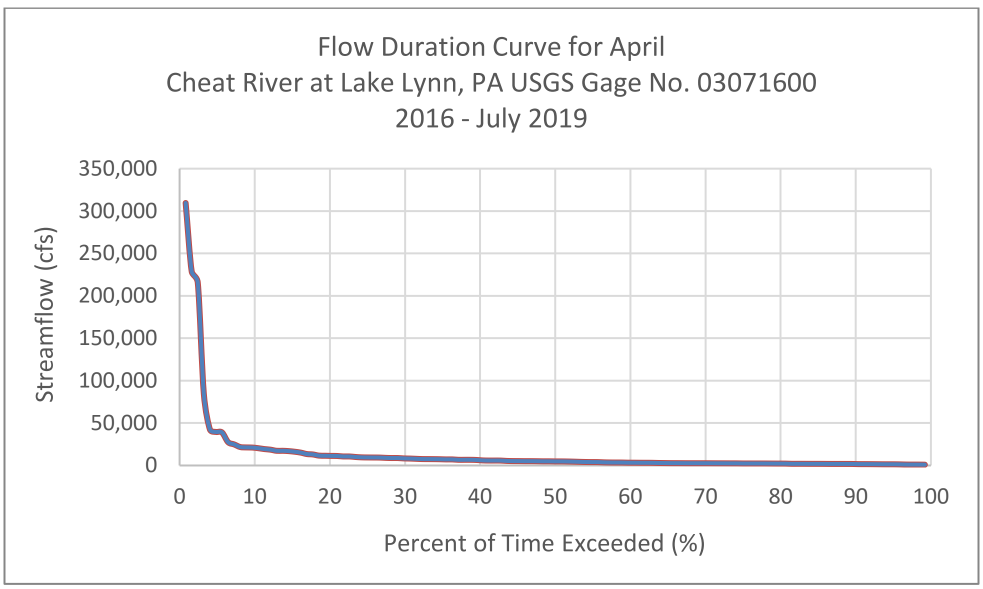
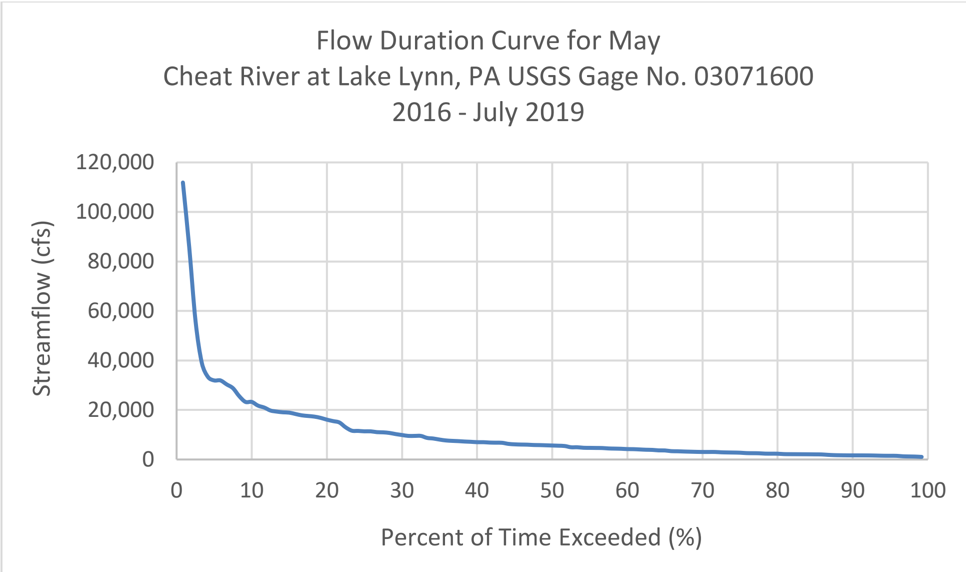
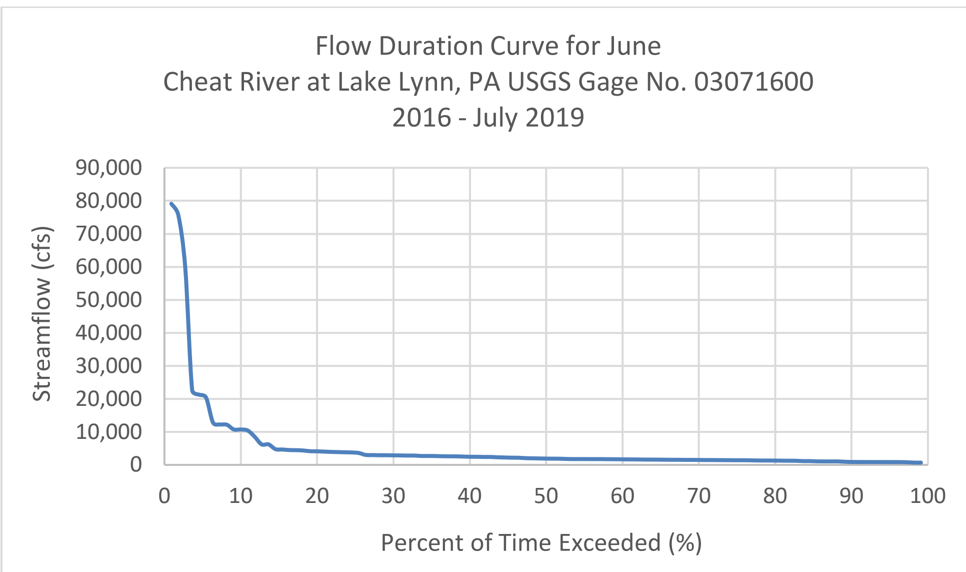

Flow Duration Curve for January
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
500,000
400,000
300,000
200,000
100,000
0
0 10 20 30 40 50 60 70 80 90 100
Percent of Time Exceeded (%)

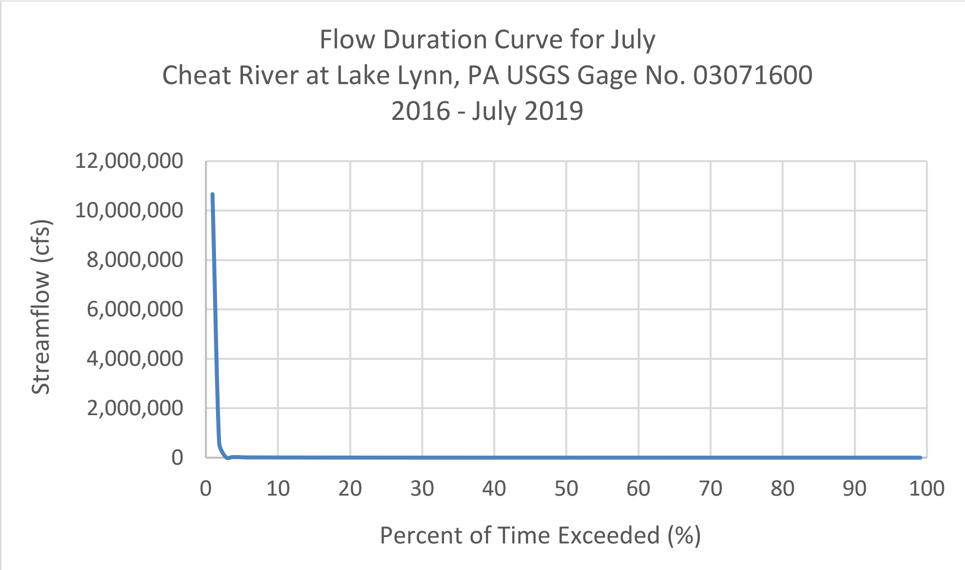

Flow Duration Curve for February
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
0 10 20 30 40 50 60 70 80 90 100
Percent of Time Exceeded (%)

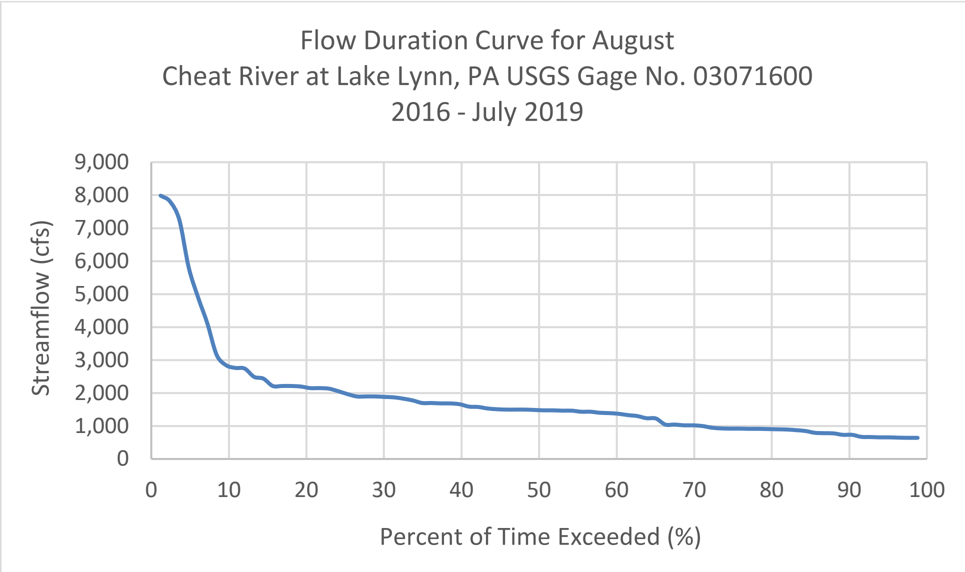

Flow Duration Curve for March
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)

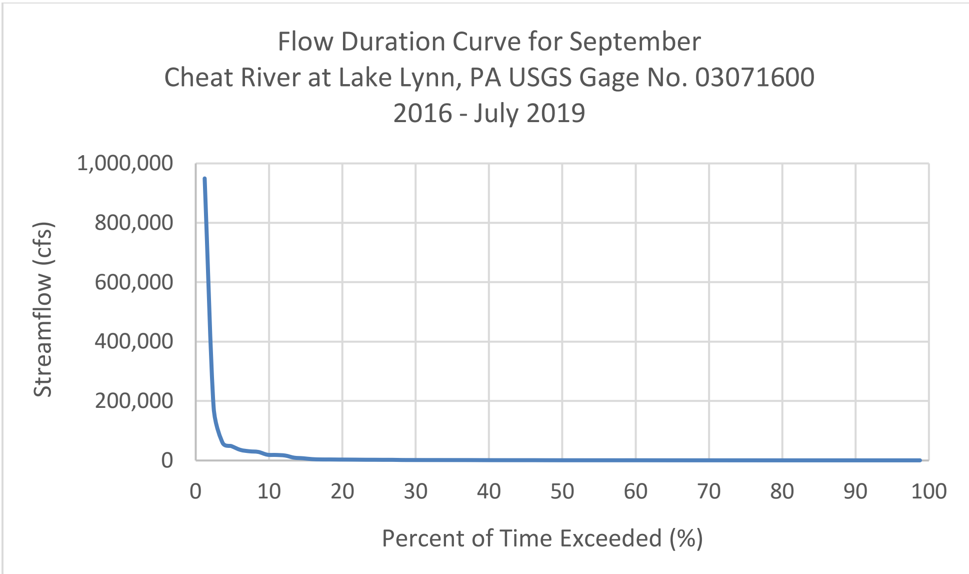

Flow Duration Curve for April
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)

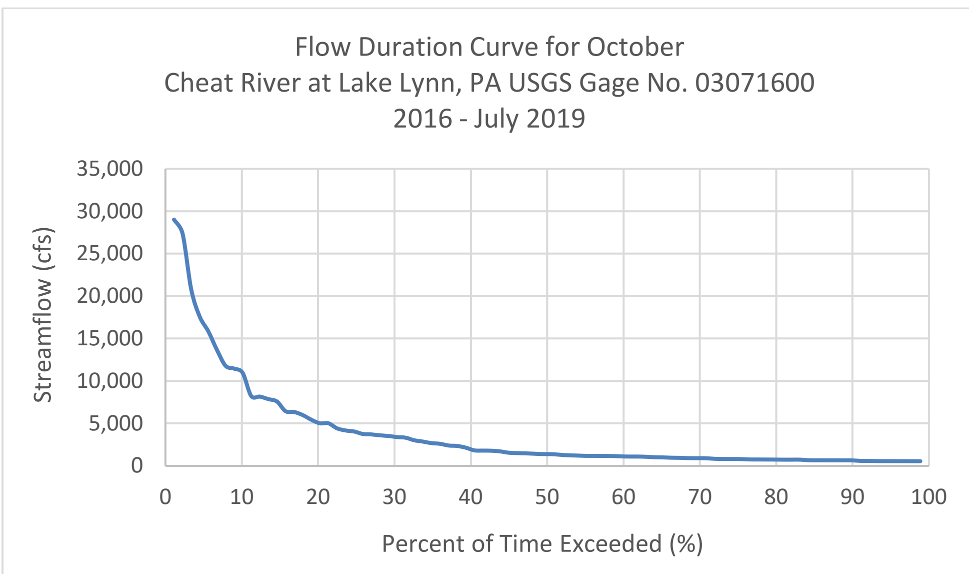

Flow Duration Curve for May
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
120,000
100,000
80,000
60,000
40,000
20,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)

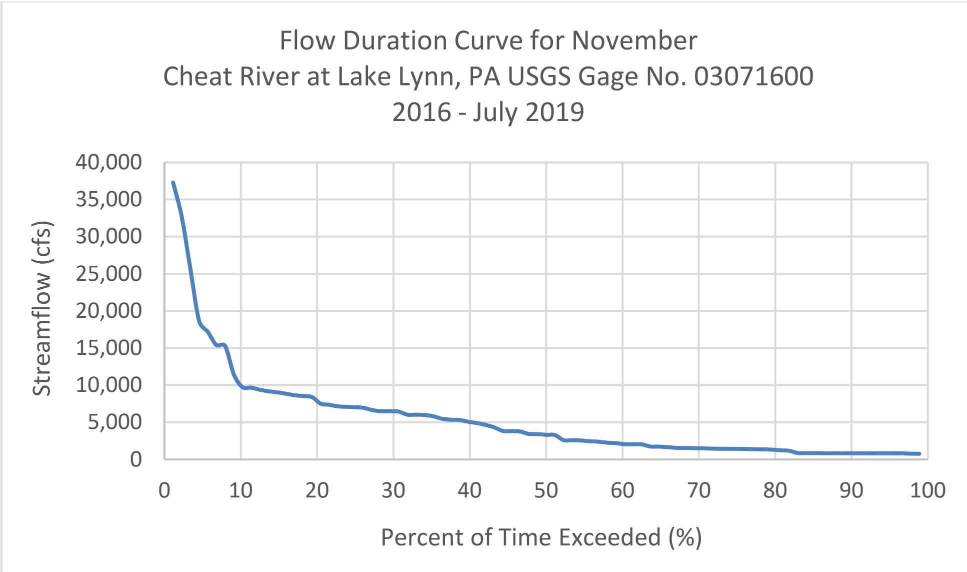

Flow Duration Curve for June
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)

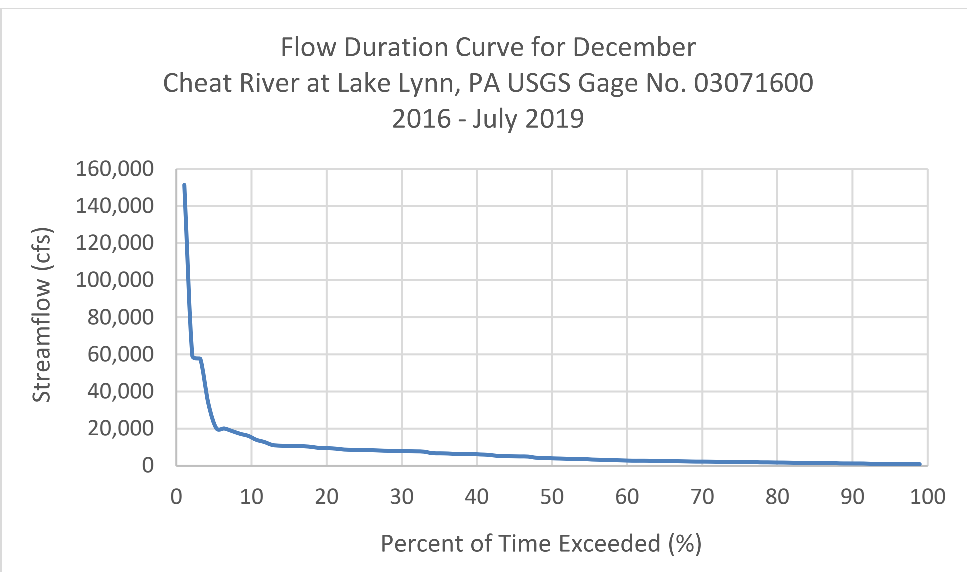

Flow Duration Curve for July
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)


Flow Duration Curve for August
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)


Flow Duration Curve for September
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
1,000,000
800,000
600,000
400,000
200,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)


Flow Duration Curve for October
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)


Flow Duration Curve for November
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)


Flow Duration Curve for December
Cheat River at Lake Lynn, PA USGS Gage No. 03071600
2016 - July 2019
Streamflow (cfs)
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded (%)

APPENDIX F

INFORMATION AND DATA SOURCES CITED IN THE PAD

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APPENDIX F-1

NRCS WEB SOIL SURVEY FOR PROJECT AREA

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Marion and Monongalia Counties, West Virginia

DdF—Dekalb very stony loam, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: k87j
Mean annual precipitation: 39 to 48 inches
Mean annual air temperature: 51 to 55 degrees F
Frost-free period: 138 to 163 days
Farmland classification: Not prime farmland

Map Unit Composition

Dekalb and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dekalb

Setting

Landform: Hillsides, benches, ridges
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Gravelly residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: channery loam
H2 - 4 to 16 inches: channery loam
H3 - 16 to 25 inches: very channery sandy loam
R - 25 to 29 inches: unweathered bedrock

Properties and qualities

Slope: 35 to 65 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: Very Rocky, Acid Soils (RA3)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 20 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Fayette County, Pennsylvania
Survey Area Data: Version 14, Sep 19, 2018

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 12, Sep 10, 2018

Marion and Monongalia Counties, West Virginia

CwF—Culleoka-Westmoreland silt loams, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: k879
Elevation: 240 to 460 feet
Mean annual precipitation: 39 to 48 inches
Mean annual air temperature: 51 to 55 degrees F
Frost-free period: 138 to 163 days
Farmland classification: Not prime farmland

Map Unit Composition

Culleoka and similar soils: 55 percent
Westmoreland and similar soils: 25 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Culleoka

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Loamy residuum weathered from limestone, sandstone, and shale

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 27 inches: channery silty clay loam
H3 - 27 to 34 inches: very channery silty clay loam
R - 34 to 38 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B

Other vegetative classification: Limy Hills (LH3)
Hydric soil rating: No

Description of Westmoreland

Setting

Landform: Hillslopes, ridges
Landform position (two-dimensional): Backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy residuum weathered from limestone, sandstone, and shale

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 40 inches: silty clay loam
H3 - 40 to 66 inches: very channery silty clay loam
R - 66 to 70 inches: unweathered bedrock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 40 to 66 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Fertile Hills (FH3)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 20 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Fayette County, Pennsylvania
Survey Area Data: Version 14, Sep 19, 2018

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 12, Sep 10, 2018

Marion and Monongalia Counties, West Virginia

GaF—Gilpin silt loam, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2sng1
Elevation: 800 to 2,320 feet
Mean annual precipitation: 38 to 50 inches
Mean annual air temperature: 45 to 49 degrees F
Frost-free period: 126 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Acid fine-loamy residuum weathered from shale and siltstone and/or fine-grained sandstone

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 3 inches: silt loam
E - 3 to 7 inches: silt loam
Bt - 7 to 24 inches: channery silt loam
C - 24 to 31 inches: extremely channery silt loam
R - 31 to 41 inches: bedrock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 25 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dekalb

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Very Rocky, Acid Soils (RA3)
Hydric soil rating: No

Rayne

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ernest

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Fayette County, Pennsylvania
Survey Area Data: Version 14, Sep 19, 2018

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 12, Sep 10, 2018

Marion and Monongalia Counties, West Virginia

GaF—Gilpin silt loam, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2sng1
Elevation: 800 to 2,320 feet
Mean annual precipitation: 38 to 50 inches
Mean annual air temperature: 45 to 49 degrees F
Frost-free period: 126 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Gilpin and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilpin

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Acid fine-loamy residuum weathered from shale and siltstone and/or fine-grained sandstone

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 3 inches: silt loam
E - 3 to 7 inches: silt loam
Bt - 7 to 24 inches: channery silt loam
C - 24 to 31 inches: extremely channery silt loam
R - 31 to 41 inches: bedrock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 25 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Dekalb

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: Very Rocky, Acid Soils (RA3)
Hydric soil rating: No

Rayne

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ernest

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Fayette County, Pennsylvania
Survey Area Data: Version 14, Sep 19, 2018

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 12, Sep 10, 2018

Marion and Monongalia Counties, West Virginia

MgC—Monongahela silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2rfbj
Elevation: 580 to 1,300 feet
Mean annual precipitation: 37 to 54 inches
Mean annual air temperature: 41 to 62 degrees F
Frost-free period: 130 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Monongahela and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Monongahela

Setting

Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fine-loamy alluvium derived from sandstone and siltstone

Typical profile

Ap - 0 to 8 inches: silt loam
BA - 8 to 12 inches: silt loam
Bt - 12 to 22 inches: silt loam
Btx - 22 to 51 inches: clay loam
BC - 51 to 65 inches: gravelly clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 18 to 30 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Other vegetative classification: Acid Loams (AL3)

Hydric soil rating: No

Minor Components

Allegheny

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Purdy

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Gilpin

Percent of map unit: 5 percent
Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Fayette County, Pennsylvania
Survey Area Data: Version 14, Sep 19, 2018

Soil Survey Area: Marion and Monongalia Counties, West Virginia
Survey Area Data: Version 12, Sep 10, 2018

APPENDIX F-2

WEST VIRGINIA AND PENNSYLVANIA LISTS OF INVASIVE SPECIES

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Invasive Plant Species of West Virginia

WVDNR Natural Heritage Program, P.O. Box 67, Elkins, WV 26241
Version Mar 2009

Invasiveness ranking

1 Highly invasive species exhibit the most invasive tendencies in natural areas and native plant habitats. They may disrupt ecosystem processes and cause major alterations in plant community composition and structure. They establish readily in natural systems and spread rapidly.

2 Moderately invasive species may have minor influence on ecosystem processes, alter plant community composition, and affect community structure in at least one layer. They may become dominant in the understory layer without threatening all species found in the community. These species usually require a minor disturbance to become established.

3 Occasionally invasive species generally do not affect ecosystem processes but may alter plant community composition by outcompeting one or more native plant species. They often establish in severely disturbed areas. The disturbance may be natural or human origin, such as icestorm damage, windthrow, or road construction. These species spread slowly or not at all from disturbed sites.

Threat	Scientific Name	Common Name
1	***Acer platanoides***	**Norway Maple**
1	***Ailanthus altissima***	**Tree-Of-Heaven**
1	***Alliaria petiolata***	**Garlic Mustard**
1	***Arthraxon hispidus***	**Small Carpgrass**
1	***Berberis thunbergii***	**Japanese Barberry**
1	***Bromus tectorum***	**Cheatgrass**
1	***Celastrus orbiculata***	**Asian Bittersweet**
1	***Centaurea stoebe ssp. micranthos***	**Spotted Knapweed**
1	***Coronilla varia***	**Purple Crown-Vetch**
1	***Dioscorea oppositifolia***	**Chinese Yam**
1	***Elaeagnus umbellata var. parvifolia***	**Autumn Olive**
1	***Euonymus alata***	**Winged Euonymus, Winged Spindletree**
1	***Euonymus fortunei***	**Winter Creeper**
1	***Hydrilla verticillata***	**Hydrilla**
1	***Iris pseudacorus***	**Yellow Iris**
1	***Lespedeza cuneata***	**Chinese Bushclover**
1	***Ligustrum vulgare***	**European Privet**
1	***Lonicera japonica***	**Japanese Honeysuckle**
1	***Lonicera maackii***	**Amur Honeysuckle**
1	***Lonicera morrowii***	**Morrow's Honeysuckle**
1	***Lonicera tatarica***	**Tatarian Honeysuckle**
1	***Lythrum salicaria***	**Purple Loosestrife**
1	***Microstegium vimineum***	**Japanese Stiltgrass**
1	***Phalaris arundinacea***	**Reed Canarygrass**
1	***Phellodendron japonicum***	**Cork Tree**
1	***Phragmites australis***	**Common Reed**
1	***Polygonum cuspidatum***	**Japanese Knotweed**
1	***Polygonum perfoliatum***	**Asiatic Tearthumb**
1	***Pueraria montana var. lobata***	**Kudzu**
1	***Pyrus calleryana***	**Bradford Pear**
1	***Rosa multiflora***	**Multiflora Rose**
1	***Rubus phoenicolasius***	**Wine Raspberry**
1	***Schedonorus phoenix***	**Tall Fescue**
1	***Schedonorus pratensis***	**Meadow Fescue**

Threat	Scientific Name	Common Name
1	***Sorghum halepense***	**Johnson Grass**
1	***Vinca minor***	**Lesser Periwinkle**
2	*Aegopodium podagraria*	Bishop's Goutweed
2	*Akebia quinata*	Fiveleaf Akebia
2	*Ampelopsis brevipedunculata*	Amur Peppervine
2	*Arctium minus*	Lesser Burdock
2	*Barbarea vulgaris*	Garden Yellow-Rocket
2	*Bromus commutatus*	Meadow Brome
2	*Bromus inermis ssp. inermis var. inermis*	Smooth Bromegrass
2	*Bromus japonicus*	Japanese Brome
2	*Bromus secalinus*	Rye Brome
2	*Bromus sterilis*	Poverty Brome
2	*Carduus nutans ssp. macrolepis*	Nodding Plumeless-Thistle
2	*Centaurea nigrescens*	Wocheiner Knapweed
2	*Chelidonium majus var. majus*	Celandine
2	*Cirsium arvense*	Canada Thistle
2	*Cirsium vulgare*	Bull Thistle
2	*Conium maculatum*	Poison-Hemlock
2	*Cynoglossum officinale*	Gypsy-Flower
2	*Daucus carota*	Queen Anne's-Lace
2	*Dipsacus fullonum*	Fuller's Teasel
2	*Dipsacus laciniatus*	Laciniate Wild Teasel
2	*Duchesnea indica*	Indian-Strawberry
2	*Echium vulgare*	Viper's Bugloss, Bluethistle, Bluedevil
2	*Elaeagnus angustifolia*	Russian-Olive
2	*Frangula alnus*	Glossy False Buckthorn
2	*Glechoma hederacea*	Ground-Ivy
2	*Hesperis matronalis*	Mother-Of-The-Evening
2	*Hieracium caespitosum*	Meadow Hawkweed
2	*Holcus lanatus*	Common Velvetgrass
2	*Hypericum perforatum*	Common St. John's-Wort
2	*Hypochaeris radicata*	Hairy Cat's-Ear
2	*Lespedeza bicolor*	Japanese Bushclover
2	*Leucanthemum vulgare*	Oxeye Daisy
2	*Ligustrum obtusifolium*	Border privet
2	*Linaria vulgaris*	Butter-And-Eggs
2	*Lolium perenne ssp. multiflorum*	Perennial Ryegrass
2	*Lonicera ×bella*	Bell's Honeysuckle
2	*Lonicera standishii*	Standish's Honeysuckle
2	*Lysimachia nummularia*	Creeping Jenny
2	*Melilotus officinalis*	Sweetclover
2	*Myriophyllum aquaticum*	Parrot's-Feather
2	*Myriophyllum spicatum*	Eurasian Water-Milfoil
2	*Ornithogalum nutans*	Drooping Star Of Bethlehem
2	*Ornithogalum umbellatum*	Star Of Bethlehem
2	*Pastinaca sativa*	Parsnip
2	*Paulownia tomentosa*	Princess-Tree
2	*Perilla frutescens*	Beefsteak Plant
2	*Poa compressa*	Canada Bluegrass
2	*Poa pratensis ssp. pratensis*	Kentucky Bluegrass
2	*Poa trivialis*	Rough Bluegrass
2	*Polygonum caespitosum var. longisetum*	Oriental Lady's-Thumb
2	*Polygonum sachalinense*	Giant Knotweed
2	*Potamogeton crispus*	Curly Pondweed
2	*Ranunculus ficaria var. bulbifera*	Lesser Celandine
2	*Rhamnus cathartica*	Common Buckthorn

Threat	Scientific Name	Common Name
2	*Rorippa nasturtium-aquaticum*	Watercress
2	*Rumex acetosella*	Common Sheep Sorrel
2	*Sedum sarmentosum*	Stonecrop
2	*Spiraea japonica var. fortunei*	Japanese Spiraea
2	*Stellaria media*	Common Chickweed
2	*Stellaria media ssp. media*	Common Chickweed
2	*Stellaria media ssp. pallida*	Common Chickweed
2	*Ulmus pumila*	Siberian Elm
2	*Verbascum thapsus*	Great Mullein
3	*Achillea millefolium var. occidentalis*	Western Yarrow
3	*Acinos arvensis*	Mother-Of-Thyme, Basil-Thyme
3	*Agrostemma githago*	Corn Cockle
3	*Agrostis canina*	Velvet Bent Grass
3	*Agrostis capillaris*	Colonial Bentgrass
3	*Agrostis gigantea*	Giant Bentgrass
3	*Agrostis stolonifera*	Creeping Bentgrass
3	*Ajuga reptans*	Blue Bugle
3	*Albizia julibrissin*	Silktree
3	*Allium vineale ssp. vineale*	Wild Garlic, Crow Garlic
3	*Alternanthera philoxeroides*	Alligator weed
3	*Anthoxanthum odoratum ssp. odoratum*	Sweet Vernal Grass
3	*Arrhenatherum elatius*	Tall Oatgrass
3	*Arrhenatherum elatius var. elatius*	Tall Oat-Grass
3	*Artemisia annua*	Annual Wormwood
3	*Artemisia vulgaris var. vulgaris*	Common Mugwort
3	*Arundo donax*	Giant Reed
3	*Berberis vulgaris*	European Barberry
3	*Broussonetia papyrifera*	Paper-Mulberry
3	*Buglossoides arvensis*	Corn Gromwell
3	*Cardamine impatiens*	Bittercress
3	*Carduus acanthoides*	Spiny Plumeless-Thistle
3	*Carduus crispus*	Curled Thistle
3	*Centaurea cyanus*	Garden Cornflower
3	*Centaurea jacea*	Brown Knapweed
3	*Centaurea nigra*	Black Knapweed, Spanish-Buttos
3	*Centaurea solstitialis*	Yellow Starthistle
3	*Cerastium fontanum ssp. vulgare*	Common Mouse-Ear Chickweed
3	*Cerastium glomeratum*	Sticky Mouse-Ear Chickweed
3	*Chenopodium album var. album*	Lamb's Quarters
3	*Chenopodium ambrosioides var. ambrosioides*	Mexican Tea
3	*Cichorium intybus*	Chicory, Blue Sailors
3	*Commelina communis*	Asiatic Dayflower
3	*Commelina communis var. communis*	Asiatic Day-Flower
3	*Convolvulus arvensis*	Field Bindweed
3	*Cosmos bipinnatus*	Common Cosmos
3	*Cruciata pedemontana*	Piedmont Bedstraw
3	*Cynodon dactylon*	Bermuda Grass
3	*Dactylis glomerata ssp. glomerata*	Orchard Grass
3	*Datura stramonium*	Jimson Weed
3	*Dianthus armeria*	Deptford-Pink
3	*Egeria densa*	Brazilian water-weed
3	*Eleusine indica*	Goose Grass, Yard Grass
3	*Elymus repens*	Creeping Wild Rye
3	*Epilobium hirsutum*	Hairy Willow-Herb
3	*Eragrostis cilianensis*	Stinkgrass
3	*Eragrostis curvula*	Weeping Lovegrass

Threat	Scientific Name	Common Name
3	*Euphorbia esula var. esula*	Leafy Spurge
3	*Euphorbia lathyris*	Caper Spurge, Mole Plant, Wolf's-Milk
3	*Foeniculum vulgare*	Sweet Fennel
3	*Galium mollugo*	False Baby's-Breath
3	*Hedera helix*	English Ivy
3	*Hemerocallis fulva*	Common Day Lily
3	*Hemerocallis lilioasphodelus*	Yellow Day Lily
3	*Hibiscus syriacus*	Rose-Of-Sharon, Shrubby Althea
3	*Hieracium ×floribundum*	Smooth Hawkweed
3	*Hieracium aurantiacum*	Devil's Paintbrush
3	*Hieracium pilosella var. pilosella*	Mouse-Ear Hawkweed
3	*Hieracium piloselloides*	Tall Hawkweed
3	*Humulus japonicus*	Japanese Hop
3	*Ipomoea coccinea*	Red Morning-Glory
3	*Ipomoea hederacea*	Ivy-Leaved Morning-Glory
3	*Ipomoea purpurea*	Morning-Glory
3	*Kummerowia stipulacea*	Korean Bushclover
3	*Kummerowia striata*	Japanese-Clover
3	*Lactuca saligna*	Willow Lettuce
3	*Lamium amplexicaule*	Henbit
3	*Lamium purpureum var. purpureum*	Purple Dead-Nettle
3	*Lapsana communis*	Nipplewort
3	*Leonurus cardiaca ssp. cardiaca*	Motherwort
3	*Lepidium campestre*	Cream-Anther Field Pepperwort
3	*Lepidium densiflorum var. densiflorum*	Dense Peppergrass
3	*Lepidium perfoliatum*	Clasping Pepperwort
3	*Lepidium ruderale*	Stinking Pepperweed
3	*Ligustrum sinense*	Chinese privet
3	*Lonicera fragrantissima*	Sweet Breath Of Spring
3	*Lotus corniculatus*	Garden Bird's-Foot-Trefoil
3	*Malva moschata*	Musk Mallow
3	*Malva neglecta*	Common Mallow
3	*Malva sylvestris*	High Mallow
3	*Malva verticillata*	Whorled Mallow, Curled Mallow
3	*Marrubium vulgare*	White Horehound
3	*Medicago lupulina*	Black Medic
3	*Mentha ?×verticillata*	Whorled Mint
3	*Mentha ×gracilis*	Small-Leaved Mint
3	*Mentha ×piperita*	Peppermint
3	*Mentha ×rotundifolia*	Roundleaf Mint
3	*Mentha aquatica*	Water Mint
3	*Mentha spicata*	Spearmint
3	*Microthlaspi perfoliatum*	Perfoliate Pennycress
3	*Miscanthus sinensis*	Chinese Silver Grass
3	*Morus alba*	White Mulberry
3	*Murdannia keisak*	Aneilema
3	*Muscari botryoides*	Grape Hyacinth
3	*Myosoton aquaticum*	Giant Chickweed
3	*Najas minor*	Brittle Waternymph
3	*Nepeta cataria*	Catnip
3	*Papaver dubium*	Scarlet Poppy
3	*Pennisetum glaucum*	Pearl-Millet
3	*Phalaris canariensis*	Canary Grass
3	*Phleum pratense*	Timothy
3	*Phyllostachys aureosulcata*	Golden Bamboo
3	*Phyllostachys nigra*	Black Bamboo

Threat	Scientific Name	Common Name
3	*Picea abies*	Norway Spruce
3	*Poa annua*	Annual Bluegrass
3	*Polygonum aviculare*	Yard Knotweed
3	*Polygonum convolvulus var. convolvulus*	Black Bindweed
3	*Polygonum orientale*	Prince's Feather
3	*Polygonum persicaria*	Spotted Lady's-Thumb
3	*Populus alba*	White Poplar
3	*Potentilla recta*	Sulphur Cinquefoil
3	*Prunella vulgaris*	Common Self-Heal
3	*Prunus avium*	Sweet Cherry
3	*Prunus mahaleb*	Perfumed Cherry
3	*Ranunculus acris var. acris*	Tall Buttercup, Meadow Buttercup
3	*Ranunculus arvensis*	Corn Crowfoot
3	*Ranunculus bulbosus*	Bulbous Buttercup
3	*Ranunculus flammula var. filiformis*	Greater Creeping Spearwort
3	*Ranunculus repens*	Creeping Buttercup
3	*Ranunculus sardous*	Hairy Buttercup
3	*Raphanus raphanistrum*	Wild Radish
3	*Rhodotypos scandens*	Jetbead, White Kerria
3	*Rorippa sylvestris*	Creeping Yellowcress
3	*Rosa canina*	Dog Rose
3	*Rosa eglanteria*	Sweetbrier
3	*Rubus illecebrosus*	Strawberry-Raspberry
3	*Rumex crispus ssp. crispus*	Curly Dock
3	*Salix alba*	White Willow
3	*Saponaria officinalis*	Bouncing-Bet
3	*Senecio vulgaris*	Common Groundsel
3	*Senna obtusifolia*	Coffeeweed
3	*Setaria faberi*	Giant Foxtail-Grass
3	*Setaria italica*	Foxtail Millet
3	*Setaria verticillata*	Bristly Foxtail
3	*Setaria viridis var. viridis*	Green Foxtail
3	*Silene latifolia ssp. alba*	White Campion
3	*Sisymbrium altissimum*	Tall Hedge-Mustard
3	*Sisymbrium officinale*	Hedge Mustard
3	*Solanum dulcamara var. dulcamara*	Bittersweet
3	*Sonchus arvensis ssp. uliginosus*	Field Sowthistle
3	*Sonchus asper ssp. asper*	Spiny Sow Thistle
3	*Sonchus oleraceus*	Common Sowthistle
3	*Stellaria graminea*	Lesser Stitchwort
3	*Torilis arvensis ssp. arvensis*	Hedge Parsley
3	*Tragopogon dubius*	Meadow Goat's-Beard
3	*Trapa natans*	Water chestnut
3	*Trifolium arvense*	Rabbit-Foot Clover
3	*Trifolium aureum*	Yellow Hop Clover
3	*Trifolium campestre*	Low Hop Clover
3	*Trifolium dubium*	Small Hop Clover
3	*Trifolium hybridum*	Alsike Clover
3	*Trifolium incarnatum*	Crimson Clover
3	*Trifolium pratense*	Red Clover
3	*Trifolium repens*	White Clover
3	*Trifolium resupinatum*	Reversed Clover
3	*Tussilago farfara*	Colt's-Foot
3	*Typha ×glauca*	Cattail
3	*Urtica dioica ssp. dioica*	Stinging Nettle
3	*Veronica arvensis*	Corn Speedwell

Threat	Scientific Name	Common Name
3	*Veronica beccabunga*	European Brooklime
3	*Veronica chamaedrys*	Bird's-Eye Speedwell
3	*Veronica filiformis*	Filiform Speedwell
3	*Veronica hederifolia*	Ivyleaf Speedwell
3	*Veronica longifolia*	Long-Leaved Speedwell
3	*Veronica officinalis var. officinalis*	Common Speedwell, Gypsyweed
3	*Veronica persica var. persica*	Bird's Eye Speedwell
3	*Veronica polita*	Field Speedwell
3	*Veronica serpyllifolia ssp. serpyllifolia*	Thyme-Leaved Speedwell
3	*Viburnum opulus var. opulus*	Guelder-Rose
3	*Vicia cracca ssp. cracca*	Vetch
3	*Vicia grandiflora*	Large-Flowered Vetch
3	*Vicia hirsuta*	Vetch
3	*Vicia sativa ssp. nigra*	Common Vetch
3	*Vicia sativa ssp. sativa*	Spring Vetch
3	*Vicia sepium var. sepium*	Bush Vetch
3	*Vicia tetrasperma*	Four-Seeded Vetch
3	*Vicia villosa ssp. varia*	Hairy-Fruit Vetch
3	*Vicia villosa ssp. villosa*	Hairy Vetch
3	*Wisteria floribunda*	Japanese Wisteria
3	*Wisteria sinensis*	Chinese Wisteria
3	*Xanthium spinosum*	Spiny Cocklebur

A pressing problem

Recognition of the problem of invasive plants is growing, at the same time as threats to native ecosystems are mounting. Identifying invasive plants and understanding the potential damage they can cause is essential to limiting their spread and protecting native ecosystems. Recent publications discussing invasive plant control and a good field guide can help identify invasive plants. By increasing awareness invasive plants, they can be easily recognized and their spread across the Commonwealth can be slowed.

For more information

PA DCNR Invasive Plants Page, www.dcnr.pa.gov/Conservation/WildPlants/InvasivePlants/Pages/default.aspx

PA Department of Agriculture, www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/NIPPP/Pages/default.aspx

PA DCNR Invasive Plant Management for Land Managers, http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20033074.pdf

Invasive Plant Identification, https://www.nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf

Contact local experts

Penn State University Cooperative Extension Office Directory, www.extension.psu.edu/extmap.html

PA DCNR Service Foresters, http://www.dcnr.pa.gov/Conservation/ForestsAndTrees/ManagingYourWoods/Pages/default.aspx

Invasive plant maps

iMap Invasives: https://www.imapinvasives.org/

EDDMaps Mid-Atlantic Early Detection Network: http://www.eddmaps.org/midatlantic/

What is an invasive plant?

“**Invasive**” is a name for plant species that are not native to the state, grow aggressively, spread quickly, and displace native vegetation. Invasive plants are generally undesirable because they are difficult and costly to control and can dominate entire habitats, making them environmentally destructive in certain situations. Some invasive plants have been found to pose extremely high risk to ecosystems throughout the Commonwealth are deemed "noxious weeds" by the PA Department of Agriculture, whom can then mandate control of these particular species.

Most invasive plants were transported from other continents either intentionally or by accident and are often referred to as “exotic,” “introduced,” or “non-native” invasives. These non-native species typically have no co-adapted pests or diseases present in our ecosystems, further aiding their ability to out-compete native vegetation.

This brochure lists the most troublesome invasive plants that occur in Pennsylvania and impact native plant communities. These plants have been observed acting aggressively on DCNR lands or are classified as invasive in bordering states. DCNR has grouped these species in three categories based on their perceived ecological threat.

Characteristics of invasive plants

Invasive plants can be trees, shrubs, vines, grasses, or flowers. They typically can reproduce rapidly by roots, seeds, shoots, or all three.

Invasive plants tend to:

- not be native to North America
- mature quickly
- spread rapidly by roots or shoots
- produce seeds that disperse and sprout easily
- exploit and colonize disturbed ground
- be generalists that can grow in a variety of habitat conditions

www.dcnr.pa.gov

Invasive Plants

In Pennsylvania

Japanese stiltgrass spreading into the forest

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

Effects of Invasive Plants

Invasives out-compete native plants for growing space, light, and nutrients and are a major factor in the decline of native plant communities. Some invasive plants also secrete chemicals into the ground making soils inhospitable to native plants.

Endangered, rare and threatened native plants are especially at risk because they often occur in small populations making them particularly vulnerable to competition. Plants like kudzu, purple loosestrife, and garlic mustard are displacing native plants and degrading habitat for native insects, birds and animals. While wildlife often forage on invasive plant fruit and seed, it rarely provides adequate nutrition.

Avoid Using Invasive Plants

Some invasive plants came to our area by accident but others were brought here and planted in gardens or landscaping. Invasive plants, even when grown in a cultivated yard, can spread, escape into native ecosystems, and cause landscape maintenance weeding problems for years to come. In urban and suburban areas, there is a good chance that the worst weeds on your property are escaped invasives like Japanese honeysuckle, multiflora rose, Japanese knotweed, and oriental bittersweet. Even in yards, gardens, fields, and parks these plants are very expensive to control.

The best insurance against future problems is to avoid the use of known invasive plants and educate others about the use of invasive plants in landscaping. This brochure lists many of the plants that are invasive in Pennsylvania. Plants on this list should be avoided because they can escape cultivation and aggressively move into surrounding ecosystems.

What can I do?

Minimize landscape disturbance. Invasive plants thrive on bare soil and disturbed ground where the native plant community has been displaced. The key to controlling invasives is to protect and preserve healthy native plant communities.

Scout your property annually for invasives or other problems. Annual checkups on your own property help you recognize changes that make be taking place—such as the introduction of a new invasive plant— before they become problematic. Effective scouting or monitoring ensures problems are found while they are still small and easily controlled. Invasive plant populations can be reported to state-wide mapping services like EDDMaps and iMapInvasives.

Replace invasive plants with native species. One way to avoid invasive plants is to choose plants that are native to your area. Natives often are adapted to a specific ecological niche and have natural controls (pests, disease, climate) that keep them in balance.

Invasives exploit bare soil and empty niches. When you remove an invasive plant, unless there is another plant substituted, the invasive will tend to come back (either by seed or resprouting). What grows at a site in the future depends largely on what is planted there now. It is important to fill that niche with desirable plants.

Treatment Considerations

Early detection of invasive populations minimizes control cost and effort. Smaller populations of invasive plants can typically be hand-pulled or cut with minimal effort. Large, established populations typically take many years of concerted effort to achieve eradication.

Remove invasives first where their densities are low. Removing smaller, satellite populations reduces further spread of invasive plants across a landscape. Working from small populations towards the perceived highest density allows for more treatment success over time. Invasive plant control works best where there is a functioning native plant community still in place, which can recolonize the empty niche.

Have plan for maintenance over time. Monitoring and treatment can only be successful over the long term if plans are in place to ensure new populations don't become established after initial treatments are complete.

Clean all equipment thoroughly. Invasive plant materials and seeds can be spread on equipment. Thoroughly clean all lawn mowers and landscaping equipment to reduce new infestations.

Undertake invasive treatments carefully. Effective treatment options typically can include mechanical removal by hand pulling or cutting as well as the use of herbicides. Herbicide treatments must be carried out using label instructions. The appropriate personal, protective equipment should always be worn. Consider hiring certified, trained individuals to carry out large herbicide treatments. Appropriate timing, dosage, and chemical choice is necessary to ensure effective herbicide treatments. Consult the DCNR Invasives website and other appropriate resources to ensure the most effective herbicide treatment.

Rank 1- Severe Threat. Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation. Includes species that are or could become widespread in Pennsylvania.

Severe Threat

Ailanthus altissima	Tree-of-Heaven	TREE	
Alliaria petiolata	Garlic Mustard	FLOWER	
Ampelopsis glandulosa	Porcelain Berry	VINE	
Aralia elata	Japanese Angelica Tree	TREE	
Berberis thunbergii & B. vulgaris	Japanese & European Barberrys	SHRUBS	
Celastrus orbiculatus	Oriental Bittersweet	VINE	
Conium maculatum	Poison Hemlock	FLOWER	PA Noxious Weed
Fallopia japonica, F. sachalinensis & F. x bohemica	Japanese, Giant & Hybrid Knotweeds	FLOWER	
Ficaria verna	Lesser Celandine	FLOWER	
Frangula alnus	Glossy Buckthorn	TREE	
Galega officinalis	Goatsrue	FLOWER	FEDERAL and PA Noxious Weed
Heracleum mantegazzianum	Giant Hogweed	FLOWER	FEDERAL and PA Noxious Weed
Humulus japonicus	Japanese Hops	VINE	
Lonicera fragrantissima, L. maackii, L. morrowii, L. x bella, L. standishii & L. tatarica	Sweet Breath, Amur, Morrow's, Beautiful, Standish & Tartarian Honeysuckles	SHRUBS	
Lonicera japonica	Japanese Honeysuckle	VINE	
Lythrum salicaria	Purple Loosestrife	FLOWER	
Microstegium vimineum	Japanese Stiltgrass	GRASS	
Oplismenus hirtellus	Wavyleaf Basketgrass	GRASS	
Persicaria perfoliata	Mile-a-Minute	VINE	PA Noxious Weed
Phragmites australis ssp australis	Common Reed	GRASS	
Pueraria montana var. lobata	Kudzu	VINE	PA Noxious Weed
Rhamnus cathartica	Common Buckthorn	TREE	
Rhodotypos scandens	Jetbead	SHRUB	
Rosa multiflora	Multiflora Rose	SHRUB	PA Noxious Weed
Spiraea japonica	Japanese Spiraea	SHRUB	
Typha angustifolia & T. x glauca	Narrow-Leaved & Hybrid Cattails	GRASS	
Vincetoxicum nigrum & V. rossicum	Black & Pale Swallow-Worts	VINE	

Rank 2- Significant Threat. Exotic plant species that possess characteristics of invasive species but are not presently considered to spread as easily and aggressively into native plant communities as those species listed as Rank 1.

Significant Threat

Acer platanoides	Norway Maple	TREE	
Albizia julibrissin	Mimosa	TREE	
Alnus glutinosa	European Black Alder	TREE	
Arthraxon hispidus	Small carpetgrass	GRASS	
Buddleja davidii	Butterfly Bush	SHRUB	
Centaurea jacea, C. nigra & C. stoebe	Brown, Black & Spotted Knapweeds	FLOWER	
Chelidonium majus	Greater Celandine	FLOWER	
Cirsium arvense	Canada Thistle	FLOWER	PA Noxious Weed
Cirsium vulgare	Bull Thistle	FLOWER	PA Noxious Weed
Elaeagnus angustifolia & E. umbellata	Russian & Autumn Olives	SHRUB	
Euonymus alatus	Winged Euonymus	SHRUB	
Euonymus fortunei	Wintercreeper	VINE	
Hesperis matronalis	Dames Rocket	FLOWER	
Iris pseudacorus	Yellow Flag Iris	FLOWER	
Lespedeza bicolor & L. cuneata	Shrubby & Chinese Bushclovers	SHRUBS	
Ligustrum japonicum, L. obtusifolium, L. sinense & L. vulgare	Japanese, Border, Chinese & Common Privets	SHRUBS	
Pastinaca sativa	Wild Parsnip	FLOWER	
Paulownia tomentosa	Empress Tree	TREE	
Perilla frutescens	Beefsteak Plant	FLOWER	
Phalaris arundinacea	Reed Canary Grass	GRASS	
Phellodendron amurense, P. japonicum & P. lavallei	Amur, Japanese & Lavella Corktrees	TREES	
Phyllostachys aurea, P. aureosulcata & P. bambusoides	Golden, Yellow Groove & Giant Timber Bamboo	GRASS	
Poa trivialis	Rough Bluegrass	GRASS	
Pyrus calleryana	Callery Pear	TREE	
Rubus phoenicolasius	Wineberry	SHRUB	
Securigera varia	Crown-vetch	FLOWER	
Tetradium daniellii	Bee-Bee Tree	TREE	
Viburnum dilatatum, V. plicatum & V. sieboldii	Linden, Doublefile & Siebold Viburnums	SHRUBS	
Wisteria floribunda & W. sinensis	Japanese & Chinese Wisterias	VINES	

Rank 3- Lesser Threat. Exotic plant species that spread in or near disturbed areas, and are not presently considered a major threat to undisturbed native plant communities.

Lesser Threat

Aegopodium podagraria	Goutweed	FLOWER	
Anthriscus sylvestris	Wild Chervil	FLOWER	
Artemisia vulgaris	Mugwort	FLOWER	
Bromus japonicus, B. sterilis & B. tectorum	Japanese, Poverty & Downy Bromes	GRASS	
Broussonetia papyrifera	Paper Mulberry	TREE	
Cardamine impatiens	Narrowleaf Bittercress	FLOWER	
Carduus acanthoides & C. nutans	Spiny-Plumeless & Musk Thistles	FLOWER	PA Noxious Weed (Musk)
Datura stramonium	Jimsonweed	FLOWER	
Epilobium hirsutum & E. parviflorum	Hairy & Smallflower Willow-Herbs	FLOWER	
Hedera helix	English Ivy	VINE	
Hemerocallis fulva	Orange Day-Lily	FLOWER	
Lysimachia nummularia	Moneywort	FLOWER	
Miscanthus sinensis	Chinese Silvergrass	GRASS	
Morus alba	White Mulberry	TREE	
Pachysandra terminalis	Japanese Pachysandra	FLOWER	
Persicaria longiseta	Bristled Knotweed	FLOWER	
Schedonorus arundinaceus	Tall Fescue	GRASS	
Sorghum bicolor ssp. x. drummondii	Shattercane	GRASS	PA Noxious Weed
Sorghum halepense	Johnson Grass	GRASS	PA Noxious Weed
Stellaria media	Common Chickweed	FLOWER	
Viburnum opulus	Guelder Rose	SHRUB	
Vinca major & V. minor	Bigleaf & Common Periwinkles	FLOWER	

This brochure lists plants that have been observed to be acting as invasive species on DCNR lands or are known to be invasive in nearby states.
Species are grouped into three categories based on their perceived threat to forest and wetland habitats.
This list is available for download at: http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20033302.pdf

APPENDIX F-3

WATER QUALITY DATA

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The Watershed Assessment Section has collected water samples, and performed habitat assessments across the state as part of our responsibility to understand the quality of our state's waters. These assessments evaluate the condition of water quality, and the conditions that affect them. Below is a list of common water quality parameters with basic definitions.

Water Temperature. Water temperature is important to aquatic life, as it affects growth rate, reproduction and survival of the fish, insects and other organisms. High water temperatures are particularly harmful and usually indicate problems associated with human activity. According to West Virginia's water quality regulations, water temperature should never exceed 70 degrees in trout streams or 87 degrees in most warmwater streams (bass, catfish, etc.).

Dissolved Oxygen. Dissolved oxygen is a measurement of the oxygen molecules that are available for aquatic organisms to breathe. When the amount of oxygen becomes too low, the animals in the stream suffocate. One common cause for low dissolved oxygen in a stream is untreated or poorly treated sewage. Bacteria feeding on this sewage multiply rapidly and consume oxygen in the process. If enough sewage and bacteria are present, the oxygen levels in the stream become so low that the fish and other organism cannot survive. Fertilizers used on lawns and crops can also cause dissolved oxygen problems in streams and ponds. Rainfall can wash excess fertilizers into the water causing algae to grow in large numbers. Algae, like all other green plants, produce oxygen when exposed to sunlight. However, after sundown, the algae no longer produce oxygen and start to **use** it. When algal populations are dense enough, they can consume so much oxygen that the fish can die. Violations of West Virginia's water quality regulations occur when the amount of dissolved oxygen falls below 6 parts per million on trout streams and 5 parts per million on warmwater streams.

Specific Conductance/Conductivity. Conductivity measures the ability of water to conduct electricity. The conductivity of water increases as more substances are added to it. West Virginia does not have any regulations for conductivity. However, high conductivity readings would indicate the need for additional water quality testing. An example of water with high conductivity would be sea water. Sea water has a large amount of dissolved salt, which in turn raises the conductivity.

Fecal Coliform Bacteria. Fecal coliform bacteria are found in the intestinal tracts of all mammals. While a few of these bacteria are found in any stream, large numbers suggest poorly treated or untreated sewage is being discharged into the stream. High values may also result from unrestricted livestock access to the stream or from pet or wildlife feces. Fecal coliform levels become a concern when they exceed 400 colonies.

pH. The pH is a measurement of the amount of acids or bases in the water. The range of pH is 0-14. Acidic liquids have a low pH number; substances with a high pH are basic or alkaline. Common household acids are orange juice (pH=4.2) and vinegar (pH=2.8). Common bases are baking soda (pH=8.3) and bleach (pH=12.7). If a substance is neither basic nor acidic it, is considered to be neutral and will have a pH around 7. West

Virginia water quality regulations require the pH in streams to be between 6.0 and 9.0. Sometimes mining activities expose coal seams that contain acidic compounds. These acids can seep into the streams through rainwater or ground water, resulting in violations of the water quality criteria.

Acidity and alkalinity, calcium. Acidity and Alkalinity are related to pH. Alkalinity measures the ability of the water to reduce the effect of acids. All streams have certain chemicals that have the ability to neutralize acids. Some streams have more of these chemicals than others, and therefore, are able to resist a pH change from acidic sources. The most common compound in West Virginia that contributes to alkalinity is calcium carbonate (limestone). Acidity is the measure of acid in the water. Water with a high acidy is unhealthy for aquatic life. Acidity, alkalinity and pH are taken into consideration as a group to evaluate the condition of a stream.

Metals (aluminum, barium, beryllium, iron, copper, lead, potassium, sodium, zinc, magnesium, manganese, selenium). Metals in the streams are actually in the form of salts, rather than visible metals such as aluminum cans. Sources can be from clays and soils in sediments, mine drainage, and industrial discharges and emissions. Metals can cause various problems. Under certain conditions, dissolved metals are transformed into a fluffy solid called a flocculant. Flocculants can cause discoloration, and interfere with the growth and development of aquatic life. Flocculants can also cause problems by filling up gaps where aquatic insects live in the stream bed. Some metals are tested for forms that are dissolved in the water column. Knowing the levels of dissolved metals is important, because these forms can be more toxic to aquatic life than their solid counterparts.

Sulfate. Sulfate is normally related to mine drainage or other dirt-disturbing activities. It is released from exposed rock and coal seams. Sulfate can be present even when acidity and pH are low. The presence of sulfates can be an indication that mining has occurred in the watershed.

Hardness. Many people are familiar with the effect water hardness has on the ability for soap to form bubbles. If you have hard tap water, more soap is needed for laundry and other cleaning purposes. Hardness is actually a measurement of the amount of calcium and magnesium in the water. Hardness can affect the toxic properties of some metals, such as cadmium, lead, nickel, silver, and zinc. As hardness decreases, the same metal concentration can be more toxic to aquatic life. Lower hardness relates to “soft water”. Higher hardness values yield “hard water”. Hardness values encountered in West Virginia streams range from 1 to 2157 milligrams per liter.

Chloride. Chloride is usually not present in high levels. When it is present, it usually indicates problems with oil and gas extraction. However, some areas of West Virginia have naturally shallow saltwater zones. Oil and gas drillers often penetrate brine layers (salty groundwater) deep underground. Drillers are required to collect and properly dispose any brines encountered. Chloride can also be a problem in the winter, when the ice removers used on roads get washed into streams. Elevated chlorides have also been found in a few underground mine discharges.

Nitrate/Nitrite, Total Kjedahl (pronounced "kell-doll") Nitrogen, and Phosphorus. These three analyses are closely related. They indicate nutrient enrichment and essentially act as fertilizers. The main components of manufactured fertilizer are nitrogen, potash, and phosphate (a form of phosphorus). When these chemicals enter a stream, they can increase algal growth (which makes rock slick), reduce the amount of dissolved oxygen, and make the stream smell badly. Increases in these compounds can also be linked to treated or untreated sewage discharges.

Total Suspended Solids and Total Dissolved Solids. This is a measurement of the amount of solids (mud, clay, and soil) in the water. Total suspended solids can also relate to discharges from sewage treatment plants. There are no water quality standards for total suspended solids and total dissolved solids.

Chlorophyll A. Measuring the concentration of chlorophyll-a provides a reasonable estimate of algal biomass. Chlorophyll-a is the green pigment that is responsible for a plant's ability to convert sunlight into the chemical energy needed to fix CO_2 into carbohydrates. Algae can vary both spatially and temporally in an aquatic system. Most algae that are planktonic are subjected to internal lake currents, wind, and temperature/density relationships of the water. These can all influence spatial and temporal locations of algae in the water column and throughout the lake.

SURVEY_TYPE	SAMPLE_ID	STREAM_NAME	ANCODE	MILE_POINT	WQ_SAMPLE_DATE	WQ_SAMPLE_TIME	DISTANCE_DESCRIPTION	Temp_Q	Temperature	pH_Q	PH	Lab pH_Q	Lab PH	DO_Q	DO
Ambient Network	102679	Cheat River	WVMC	3.5	11-Mar-19	3:30:00 PM									
Ambient Network	101488	Cheat River	WVMC	3.5	16-Jan-19	3:00:00 PM			2.48		6.98				14.04
Ambient Network	100850	Cheat River	WVMC	3.5	13-Nov-18	4:30:00 PM	Right Bank		6.98		7.05				11.86
Ambient Network	100849	Cheat River	WVMC	3.5	22-Oct-18	3:00:00 PM	Mid-Stream		12.77		6.75				10.11
Ambient Network	99513	Cheat River	WVMC	3.5	05-Sep-18	6:00:00 PM	Right Bank		25.14		6.7				8.74
Ambient Network	99313	Cheat River	WVMC	3.5	08-Aug-18	3:45:00 PM	Right Bank		24.13		6.72				8.18
Ambient Network	98747	Cheat River	WVMC	3.5	26-Jun-18	9:00:00 AM	Mid-Stream		22.01		6.66				7.94
Ambient Network	98746	Cheat River	WVMC	3.5	22-May-18	10:30:00 AM	Right Bank		17.43		6.61				10.31
Ambient Network	97619	Cheat River	WVMC	3.5	02-Apr-18	5:00:00 PM	Right Bank		7.84		6.58				11.43
Ambient Network	96038	Cheat River	WVMC	3.5	15-Jan-18	4:00:00 PM	Right Bank		2.04		6.89				13.15
Ambient Network	95905	Cheat River	WVMC	3.5	05-Dec-17	9:30:00 AM	Right Bank		5.59		6.55				12.91
Ambient Network	95664	Cheat River	WVMC	3.5	08-Nov-17	9:45:00 AM	Right Bank		11.55		7.02				8.96
Ambient Network	94802	Cheat River	WVMC	3.5	04-Oct-17	3:30:00 PM	Mid-Stream		20.94		6.91				8.69
Ambient Network-Duplicate	94803	Cheat River	WVMC	3.5	04-Oct-17	3:30:00 PM									
Ambient Network-Duplicate	93216	Cheat River	WVMC	3.5	23-Aug-17	9:45:00 AM									
Ambient Network	93215	Cheat River	WVMC	3.5	23-Aug-17	9:45:00 AM	Right Bank		23.18		6.8				6.56
Ambient Network	92309	Cheat River	WVMC	3.5	28-Jun-17	11:45:00 AM	Right Bank		20.91		6.88				10.18
Ambient Network	91471	Cheat River	WVMC	3.5	25-Apr-17	9:30:00 AM	Right Bank		14.42		6.93				10.63
Ambient Network	91089	Cheat River	WVMC	3.5	08-Mar-17	1:45:00 PM	Right Bank		6.66		7.42				13.04
Ambient Network-Duplicate	91090	Cheat River	WVMC	3.5	08-Mar-17	1:45:00 PM									
Ambient Network	96961	Cheat River	WVMC	3.5	21-Feb-17	3:15:00 PM	Right Bank		6.12		6.3				9.71
Ambient Network-Duplicate	96962	Cheat River	WVMC	3.5	21-Feb-17	3:15:00 PM									
Ambient Network	90421	Cheat River	WVMC	3.5	18-Jan-17	3:30:00 PM	Right Bank		6.18		6.4				12.92
Ambient Network	89473	Cheat River	WVMC	3.5	30-Nov-16	11:45:00 AM	Mid-Stream		7.89	I					11.86
Ambient Network	89472	Cheat River	WVMC	3.5	02-Nov-16	1:20:00 PM	Right Bank		14.69		6.9				10.96
Ambient Network	88039	Cheat River	WVMC	3.5	16-Aug-16	7:10:00 PM	Right Bank		27		7.18				7.45
Ambient Network	86938	Cheat River	WVMC	3.5	13-Jul-16	11:20:00 AM	Right Bank		23.63		6.63				7.85
Ambient Network	86909	Cheat River	WVMC	3.5	22-Jun-16	6:40:00 PM	Right Bank		22.51		7.44				
Ambient Network	86165	Cheat River	WVMC	3.5	12-May-16	9:30:00 AM	Right Bank		13.5		6.75				13.27
Ambient Network-Duplicate	86166	Cheat River	WVMC	3.5	12-May-16	9:30:00 AM									
Ambient Network	85674	Cheat River	WVMC	3.5	29-Mar-16	1:30:00 PM	Right Bank		10		6.66				11.98
Ambient Network	85208	Cheat River	WVMC	3.5	17-Feb-16	5:15:00 PM			0.75		6.89				14.03
Ambient Network	84263	Cheat River	WVMC	3.5	09-Dec-15	4:00:00 PM	Right Bank		7.4		6.75				11
Ambient Network	83896	Cheat River	WVMC	3.5	09-Nov-15	4:00:00 PM	Mid-Stream		13.87		7.18				9.03
Ambient Network-Duplicate	83897	Cheat River	WVMC	3.5	09-Nov-15	4:00:00 PM									
Ambient Network	83860	Cheat River	WVMC	3.5	21-Oct-15	4:00:00 PM			16.95		6.99			X	
Ambient Network	82901	Cheat River	WVMC	3.5	16-Sep-15	10:30:00 AM	Mid-Stream		23.56		6.99				7.81
Ambient Network	81877	Cheat River	WVMC	3.5	05-Aug-15	4:30:00 PM	Mid-Stream		25.96		6.27				8.39
Ambient Network-Duplicate	81878	Cheat River	WVMC	3.5	05-Aug-15	4:30:00 PM									
Ambient Network	81849	Cheat River	WVMC	3.5	08-Jul-15	4:55:00 PM	Right Bank		20.23		6.79				8.01
Ambient Network	81279	Cheat River	WVMC	3.5	10-Jun-15	10:00:00 AM	Mid-Stream		22.1		7.08				9.41
Ambient Network	80395	Cheat River	WVMC	3.5	28-Apr-15	3:15:00 PM	Right Bank		10.16		7.09				10.12
Ambient Network	79917	Cheat River	WVMC	3.5	24-Mar-15	9:30:00 AM	Right Bank		6.37	M	8.12				13.28
Ambient Network	79605	Cheat River	WVMC	3.5	03-Feb-15	5:00:00 PM	Right Bank		0.66		6.89				13.29
Ambient Network	79066	Cheat River	WVMC	3.5	23-Dec-14	10:00:00 AM	Right Bank		3.57		7.03				12.8
Ambient Network-Duplicate	79067	Cheat River	WVMC	3.5	23-Dec-14	10:00:00 AM									
Ambient Network	78614	Cheat River	WVMC	3.5	29-Oct-14	1:00:00 PM	Right Bank		12.13		7.24				11.07
Ambient Network-Duplicate	78615	Cheat River	WVMC	3.5	29-Oct-14	1:00:00 PM									
Ambient Network	78613	Cheat River	WVMC	3.5	01-Oct-14	4:30:00 PM	Right Bank		20.99		7.25				9.27
Ambient Network	78413	Cheat River	WVMC	3.5	15-Sep-14	4:45:00 PM	Right Bank		22.26		6.22				5.65
Ambient Network	77726	Cheat River	WVMC	3.5	27-Aug-14	8:30:00 AM	Mid-Stream		22.42		6.9				9.55
Ambient Network	77725	Cheat River	WVMC	3.5	04-Aug-14	2:00:00 PM	Right Bank		22.09		7.15				6.4
Ambient Network	77155	Cheat River	WVMC	3.5	23-Jun-14	7:30:00 PM	Right Bank		22.49		6.78				7.61
Ambient Network	76786	Cheat River	WVMC	3.5	21-May-14	10:50:00 AM	Right Bank		13.11		6.47				9.63
Ambient Network	76395	Cheat River	WVMC	3.5	05-Mar-14	11:00:00 AM	Right Bank		1.16		6.3				13.56
Ambient Network-Duplicate	76396	Cheat River	WVMC	3.5	05-Mar-14	11:00:00 AM									
Ambient Network	76112	Cheat River	WVMC	3.5	05-Feb-14	1:30:00 PM			0.22		7.48				12.65
Ambient Network	75974	Cheat River	WVMC	3.5	13-Jan-14	4:40:00 PM	Right Bank		0.54		6.78				13.61

Ambient Network-Duplicate	75975	Cheat River	WVMC	3.5	13-Jan-14	4:40:00 PM								
Ambient Network	75864	Cheat River	WVMC	3.5	26-Dec-13	4:00:00 PM	Right Bank		5.47		7.26			12.43
Ambient Network	75011	Cheat River	WVMC	3.5	30-Oct-13	11:30:00 AM	Right Bank		14.69		7.13			9.71
Ambient Network	71837	Cheat River	WVMC	3.5	29-Aug-13	11:00:00 AM	Right Bank		20.62		6.95			8.26
Ambient Network	69773	Cheat River	WVMC	3.5	29-Jul-13	3:45:00 PM	Right Bank		23.19		6.99			5.35
Ambient Network	68004	Cheat River	WVMC	3.5	25-Jun-13	10:05:00 AM	Mid-Stream		21.44		6.59			7.49
Ambient Network	67551	Cheat River	WVMC	3.5	29-May-13	4:00:00 PM	Right Bank		17.93		6.26			8.25
Ambient Network	64414	Cheat River	WVMC	3.5	02-Apr-13	4:30:00 PM	Right Bank		5.76		6.42			9.3
Ambient Network	63550	Cheat River	WVMC	3.5	26-Feb-13	10:30:00 AM	Right Bank		1.89		6.56			11.54
Ambient Network	62683	Cheat River	WVMC	3.5	09-Jan-13	9:00:00 AM	Right Bank		1.64		6.49			12.41
Ambient Network-Duplicate	61943	Cheat River	WVMC	3.5	27-Nov-12	3:30:00 PM								
Ambient Network	61942	Cheat River	WVMC	3.5	27-Nov-12	3:30:00 PM	Right Bank		5.37		6.83			11.23
Ambient Network	61478	Cheat River	WVMC	3.5	23-Oct-12	2:50:00 PM	Right Bank		16.03		6.94			9.88
Ambient Network	61293	Cheat River	WVMC	3.5	11-Sep-12	10:30:00 AM	Mid-Stream		24.25		7.01			7.1
Ambient Network	60842	Cheat River	WVMC	3.5	02-Aug-12	9:30:00 AM	Right Bank		24.91		7.32			6.85
Ambient Network-Duplicate	60843	Cheat River	WVMC	3.5	02-Aug-12	9:30:00 AM								
Ambient Network	59960	Cheat River	WVMC	3.5	26-Jun-12	2:30:00 PM	Mid-Stream		23.49		6.66			5.31
Ambient Network	59856	Cheat River	WVMC	3.5	24-May-12	10:40:00 AM	Mid-Stream		18.89		6.66			9.57
Ambient Network	59855	Cheat River	WVMC	3.5	03-May-12	11:00:00 AM	Right Bank		15.38		6.92			10.03
Ambient Network-Duplicate	59189	Cheat River	WVMC	3.5	06-Mar-12	9:45:00 AM								
Ambient Network	59188	Cheat River	WVMC	3.5	06-Mar-12	9:45:00 AM	Right Bank		7.7		6.93			11.99
Ambient Network	58468	Cheat River	WVMC	3.5	23-Jan-12	3:45:00 PM	Right Bank		2.48		7.3			12.12
Ambient Network	58283	Cheat River	WVMC	3.5	14-Dec-11	9:30:00 AM	Right Bank		4.78		7.08			12.17
Ambient Network	58052	Cheat River	WVMC	3.5	15-Nov-11	10:20:00 AM	Right Bank		9.28		6.26			9.52
Ambient Network	57678	Cheat River	WVMC	3.5	31-Oct-11	4:00:00 PM	Right Bank		9.85		6.01			10.57
Ambient Network	57225	Cheat River	WVMC	3.5	26-Sep-11	5:30:00 PM	Right Bank		19.24		6.37			8.87
Ambient Network	55899	Cheat River	WVMC	3.5	15-Jun-11	10:55:00 AM	Right Bank		24.14		6.92			7.89
Ambient Network	54137	Cheat River	WVMC	3.5	23-Feb-11	12:00:00 PM	Right Bank		3.71		6.4			13.36
Ambient Network	54136	Cheat River	WVMC	3.5	02-Feb-11	1:45:00 PM	Right Bank		0.4		5.78			14.15
Ambient Network	53461	Cheat River	WVMC	3.5	21-Dec-10	10:50:00 AM	Right Bank		0.61		6.5			15.41
Ambient Network	52250	Cheat River	WVMC	3.5	20-Oct-10	3:45:00 PM	Right Bank		15.51		7.29			8.41
Ambient Network-Duplicate	52251	Cheat River	WVMC	3.5	20-Oct-10	3:45:00 PM								
Ambient Network	51351	Cheat River	WVMC	3.5	24-Aug-10	5:00:00 PM	Mid-Stream		26.55		7.79			7.99
Ambient Network	50451	Cheat River	WVMC	3.5	28-Jun-10	3:45:00 PM	Right Bank		26.15		7.35			6.86
Ambient Network	49688	Cheat River	WVMC	3.5	12-Apr-10	2:20:00 PM	Right Bank		15.03		7.13			10.75
Ambient Network	49460	Cheat River	WVMC	3.5	01-Mar-10	4:35:00 PM	Right Bank		0.43		5.48			15.35
Ambient Network	48687	Cheat River	WVMC	3.5	16-Dec-09	3:10:00 PM	Right Bank		2.17		6.57			13.62
Ambient Network-Duplicate	48688	Cheat River	WVMC	3.5	16-Dec-09	3:40:00 PM								
Ambient Network	48131	Cheat River	WVMC	3.5	28-Oct-09	12:00:00 PM	Right Bank		12.11		7.02			9.85
Ambient Network	47241	Cheat River	WVMC	3.5	10-Aug-09	4:50:00 PM	Right Bank		23.12		7.21			6.67
Ambient Network	46901	Cheat River	WVMC	3.5	22-Jul-09	11:55:00 AM	Right Bank		24.1		7.54			7.6
Ambient Network-Duplicate	46353	Cheat River	WVMC	3.5	26-May-09	4:30:00 PM								
Ambient Network	46352	Cheat River	WVMC	3.5	26-May-09	5:15:00 PM	Right Bank		17.83		6.22			9.25
Ambient Network	45365	Cheat River	WVMC	3.5	13-Apr-09	6:00:00 PM	Mid-Stream		9.48		6.27			11.77
Ambient Network	44624	Cheat River	WVMC	3.5	19-Feb-09	9:45:00 AM	Right Bank		4.47		7.42			12.82
Ambient Network	43647	Cheat River	WVMC	3.5	10-Dec-08	4:10:00 PM	Right Bank		2.56		7.14			12.27
Ambient Network	43022	Cheat River	WVMC	3.5	29-Oct-08	10:50:00 AM	Mid-Stream		15.63		7.04			6.43
Ambient Network-Duplicate	41980	Cheat River	WVMC	3.5	14-Aug-08	10:15:00 AM								
Ambient Network	41979	Cheat River	WVMC	3.5	14-Aug-08	10:15:00 AM	Right Bank		23.37		7.15			7.93
Ambient Network	41110	Cheat River	WVMC	3.5	24-Jun-08	3:45:00 PM	Right Bank		20.97		6.93			7.31
Ambient Network	39701	Cheat River	WVMC	3.5	16-Apr-08	10:30:00 AM	Right Bank		9.9		7.33			11.59
Ambient Network	39392	Cheat River	WVMC	3.5	20-Feb-08	12:45:00 PM	Right Bank		2.92		6.38		I	
Ambient Network	38026	Cheat River	WVMC	3.5	04-Dec-07	11:00:00 AM	Right Bank		5.28		6.55			13.15
Ambient Network	37219	Cheat River	WVMC	3.5	30-Oct-07	11:15:00 AM	Right Bank		15.6		6.6			8.61
Ambient Network	36195	Cheat River	WVMC	3.5	14-Aug-07	6:30:00 PM	Right Bank		23.95		6.82			6.19
Ambient Network-Duplicate	36196	Cheat River	WVMC	3.5	14-Aug-07	6:30:00 PM	Right Bank							
Ambient Network-Duplicate	34717	Cheat River	WVMC	3.5	02-Jul-07	12:45:00 PM								
Ambient Network	34716	Cheat River	WVMC	3.5	02-Jul-07	12:45:00 PM	Mid-Stream		26.03		6.69		I	
Ambient Network	34044	Cheat River	WVMC	3.5	10-Apr-07	6:15:00 PM	Mid-Stream		10.23		6.73		I	

Ambient Network	33718	Cheat River	WVMC	3.5	21-Feb-07	8:30:00 AM	Right Bank		1.6		6.68				13.65
Ambient Network	32489	Cheat River	WVMC	3.5	19-Dec-06	1:30:00 PM	Right Bank		6.12		5.5			I	
Ambient Network	31955	Cheat River	WVMC	3.5	01-Nov-06	1:40:00 PM	Right Bank		9.5		6.49				9.97
Ambient Network	31331	Cheat River	WVMC	3.5	16-Aug-06	1:30:00 PM	Right Bank		26.87		6.84				7.74
Ambient Network-Duplicate	29955	Cheat River	WVMC	3.5	29-Jun-06	12:15:00 PM	Right Bank								
Ambient Network	29954	Cheat River	WVMC	3.5	29-Jun-06	12:15:00 PM	Right Bank		18.16		6.83				9.09
Ambient Network	29303	Cheat River	WVMC	3.5	04-Apr-06	3:00:00 PM	Right Bank		10.45		6.72				11.17
Ambient Network	28970	Cheat River	WVMC	3.5	22-Feb-06	2:00:00 PM	Right Bank		3.55		6.24				13.44
Ambient Network	28294	Cheat River	WVMC	3.5	12-Dec-05	3:45:00 PM	Right Bank		2.8		6.63				14.67
Ambient Network	26944	Cheat River	WVMC	3.5	06-Sep-05	3:20:00 PM	Right Bank		26.15		7.03				7.3
Ambient Network	26092	Cheat River	WVMC	3.5	01-Jun-05	2:20:00 PM	Right Bank		15.85		6.57				13.54
Ambient Network	24817	Cheat River	WVMC	3.5	17-Feb-05	9:45:00 AM	Right Bank								
Ambient Network	24816	Cheat River	WVMC	3.5	17-Feb-05	9:45:00 AM	Right Bank		4.59		7.04				13.8
Ambient Network	23967	Cheat River	WVMC	3.5	16-Dec-04	11:10:00 AM	Right Bank		6.17		6.85				12.69
Ambient Network	23968	Cheat River	WVMC	3.5	16-Dec-04	11:10:00 AM	Right Bank								
Ambient Network	21606	Cheat River	WVMC	3.5	15-Sep-04	4:15:00 PM	Right Bank		20.35		6.84				9.74
Ambient Network	23519	Cheat River	WVMC	3.5	15-Sep-04	4:25:00 PM									
Ambient Network	20796	Cheat River	WVMC	3.5	15-Jun-04	1:40:00 PM	Right Bank		19.48		6.82				8.04
Ambient Network	20771	Cheat River	WVMC	3.5	24-Mar-04	2:45:00 PM			5.8		7.06				13.45
Ambient Network	17563	Cheat River	WVMC	3.5	08-Dec-03	2:00:00 PM	Right Bank		4.52		7.76				13.25
Ambient Network-Duplicate	17564	Cheat River	WVMC	3.5	08-Dec-03	2:00:00 PM	Right Bank								
Ambient Network	17562	Cheat River	WVMC	3.5	10-Sep-03	1:15:00 PM	Right Bank		19.55		7.54				8.47
Ambient Network	17561	Cheat River	WVMC	3.5	30-Jul-03	3:30:00 PM	Right Bank		23.01		6.42				7.56
Ambient Network	17560	Cheat River	WVMC	3.5	10-Mar-03	9:25:00 AM	Right Bank		4.4		7.57				12.56
Ambient Network	12044	Cheat River	WVMC	3.5	11-Dec-02	10:00:00 AM	Right Bank		2.51		7.51				12.86
Ambient Network	12043	Cheat River	WVMC	3.5	25-Sep-02	12:30:00 PM	Right Bank		23.16		7.48				9.05
Ambient Network	12042	Cheat River	WVMC	3.5	12-Jun-02	9:10:00 AM	Right Bank		23.41		7.44				8.47
Ambient Network	12041	Cheat River	WVMC	3.5	12-Mar-02	12:00:00 PM	Right Bank		5		7.6				13.9
Ambient Network	6024	Cheat River	WVMC	3.5	03-Dec-01	11:40:00 AM	Right Bank		11.2		7.4				11.6
Ambient Network	6023	Cheat River	WVMC	3.5	12-Sep-01	2:10:00 PM	Right Bank		25.8		7.4				8.6
Ambient Network	6022	Cheat River	WVMC	3.5	27-Jun-01	12:25:00 PM	Right Bank		25.3		7.2				7.7
Ambient Network	6021	Cheat River	WVMC	3.5	22-Mar-01	12:15:00 PM	Right Bank		5.9		7.2				11.3
Ambient Network	4763	Cheat River	WVMC	3.5	18-Dec-00	10:45:00 AM	Right Bank		2.7		6.7				10.8
Ambient Network	4762	Cheat River	WVMC	3.5	12-Sep-00	10:50:00 AM	Right Bank		24.5		7.2				6.5
Ambient Network	4761	Cheat River	WVMC	3.5	14-Jun-00	9:06:00 AM	Right Bank		21.2		7				7.9
Ambient Network	4760	Cheat River	WVMC	3.5	27-Mar-00	8:30:00 AM	Right Bank		9.2		6.2				10.4
Ambient Network	4663	Cheat River	WVMC	3.5	13-Dec-99	10:30:00 AM	Right Bank		5.2		6.8				11.5
Ambient Network	4662	Cheat River	WVMC	3.5	31-Aug-99	10:20:00 AM	Right Bank		23.2		6.8				7.9
Ambient Network	4661	Cheat River	WVMC	3.5	29-Jun-99	8:19:00 AM	Right Bank		23.6		7				7.4
Ambient Network	4660	Cheat River	WVMC	3.5	16-Mar-99		Left Bank		2.2		6.3				12.4
Ambient Network	6255	Cheat River	WVMC	3.5	03-Dec-98	12:14:00 PM	Right Bank		10.9		6.9				10
Ambient Network	6254	Cheat River	WVMC	3.5	31-Aug-98	9:00:00 AM	Right Bank		25.3		6.8				7.6
Ambient Network	6253	Cheat River	WVMC	3.5	22-Jun-98	1:52:00 PM	Right Bank								
Ambient Network	6252	Cheat River	WVMC	3.5	31-Mar-98	8:01:00 AM	Right Bank		12.1		6.3				10
Ambient Network	6151	Cheat River	WVMC	3.5	11-Dec-97	10:05:00 AM	Right Bank		4.8		6.7				10.6
Ambient Network	6150	Cheat River	WVMC	3.5	01-Sep-97		Right Bank		21.2		6.8				8.4
Ambient Network	6149	Cheat River	WVMC	3.5	06-Jun-97	1:35:00 PM	Right Bank		17.39		6.6				8
Ambient Network	6148	Cheat River	WVMC	3.5	25-Mar-97	11:26:00 AM	Right Bank		7.9		7.2				8.5
Ambient Network	5636	Cheat River	WVMC	3.5	10-Dec-96	11:15:00 AM	Right Bank		4.9		7.5				10.2
Ambient Network	5635	Cheat River	WVMC	3.5	19-Sep-96	1:10:00 PM	Right Bank		16		6.6				8.6
Ambient Network	5634	Cheat River	WVMC	3.5	18-Jun-96	9:10:00 AM	Right Bank		22.7		7.5				8.7
Ambient Network-Duplicate	91472	Cheat River	WVMC	3.5											

Specific Conductance_Q	Specific Conductance	Lab Specific Conductance_Q	Lab Specific Conductance	Fecal Coliform_Q	Fecal Coliform	E Coli_Q	E Coli	Hot Acidity_Q	Hot Acidity	Cold Acidity_Q	Cold Acidity	Alkalinity_Q
								<	5			J
	97				7			<	5			
	72				200			<	5			J
	94			E	60			<	5			
	100			<	10			<	5			
	110			E	34			<	5			
	101				47			O<	5			O
	65				112			<	5			
	60				0			<	5			J
	58				220			<	5			J
	105			E	4			<	5			
	93				760			<	5			
	131			<	2			<	5			
				<	2			<	5			
				E	2			<	5			
	124			<	2			<	5			
	90				220			<	5			
	108			E	133			<	5			
	93				48			<	5			J
					54			<	5			J
	84			E	14			<	5			J
				E	4			<	5			J
	68				40			<	5			J
	129			Q				<	5			
	133			E	30			<	5			
	132				240			<	5			
	81			E	30			<	5			
	121			E	33			<	5			
	73			E	33			<	5			
				E	38			<	5			
	110			Q				<	5			J
	127			E	13			<	5			J
	85				107			<	5			
	140			E	7			<	5			
				E	9			<	5			
	129			E	4			<	5			
	140			E	50			<	5			
	106			E	14			<	5			
				E	2			<	5			
	86				80			<	5			
	150			E	26.7			<	5			
	82			E	13			<	5			
	94			<	10			<	5			
	124			<	2			<	5			
	89			E	23			<	5			
				E	22			<	5			
	78				44			<	5			
					40			<	5			
	144			E	10			<	5			
	132			E	4			<	5			
	141			E	106.3			<	5			
	137			E	14			<	5			
	122			E	13			<	5			
	64			E	273			<	5			
	110			<	2			<	5			
				<	2			<	5			
	151			E	14			<	5			
	112			<	2			<	5			

				<	2		<	5		
	76				46		<	5		
	152				2		<	5		
	98				720		<	5		
	95				200		<	5		
	78			E	31		<	5		
	103			E	11		<	5		
	131			<	2		<	5		
	118			<	2		<	5		
	121			<	2		<	5		
				E	9		<	5		
	77			E	5		<	5		
	136			E	4		<	5		
	118			E	5		<	5		
	101			E	18		<	5		
				E	9		<	5		
	132			E	14		<	5		
	81			E	29		<	5		
	119			E	5		<	5		
				E	32		<	5		
	70			E	32		<	5		
	83			E	4		<	5		
	80			E	34		<	5		
	108			E	4		<	5		
	85				236		<	5		
	103				42		<	5		
	125			E	16		<	5		
	98			E	32		<	5		
	140			<	2		<	5		
	110			E	10		<	5		
	123			<	2		<	5		
				<	2		<	5		
	158			<	4		<	5		
	120			E	20			1		
	96			<	10		<	5		
	166			<	10		<	5		
	75			E	20		<	5		
				E	20		<	5		
	88				740		<	5		
	112				34		<	5		
	136			E	7		<	5		
			115		2400		<	5		
	111		114		10		<	5		
	87		100		14		<	5		
	88		98	E	2		<	5		
	139		148		2		<	5		
	188		194	<	10		<	5		
			136		10		<	5		
	125		136	<	10		<	5		
	110		116		21		<	5		
	67		111		5		<	5		
	118		127	<	2		<	5		
	98		106		164		<	5		
	133		144		73		<	5		
	97		101		73		<	5		
			101		60		<	5		
			133		5		<	5		
	142		133	<	2		<	5		
	119		128		13		<	5		

	151		157	<	10		<	5		
	105		125	<	10		<	5		
	97		102		200		<	5		
	125			<	10		<	5		
					790		<	5		
	77				330		<	5		
	116				30		<	5		
	131			<	10		<	5		
	88				82		<	5		
	147			<	10		<	5		
	84		87	<	10		<	5		
	103				10		<	5		
	92			E	162		<	5		
	108			E	45		<	4.97		<
	93				460		<	4.97		
	77			HE	50		H<	1		H
	106			N	10		<	1		
							<	4.97		
	78				155			3		
	148				27		<	1		
	98			<	10			2		
	109			<	10			3		
	139			<	10			9		
	125			<	2		<	5		
	128			E<	2		<	1		
	204			E	2		<	1		
	140			OE	2		<	1		
	122			<	2		<	5		
	93			<	2			2		
	92				142			1		
X					4		<	1		
	114				84		<	1		
	99			<	2			2		
	117				71			4		
	198				56		<	2		
	130			E	26		<	2		
	111			<	2		<	2		
	187			H			<	1		
	157			<	2		<	1		
					214		<	1		
				<	2		<	1		
	93				2		<	1		
	131			<	10		<	1		
	102			N	46.6		<	1		
	81				1		<	1		
	77				7			15		
	81				1400		<	1		
	169				16			3		
				E	125		<	5		

Alkalinity	Lab Hardness_Q	Lab Hardness	Hardness_Q	Hardness	Sulfate_Q	Sulfate	Bromide Total_Q	Bromide Total	Chloride Total_Q	Chloride Total	TSS_Q	TSS	TDS_Q	TDS	P Total_Q	P Total	OrthoPO4 Total_Q
12.3						22	<	0.05		3.71	J	2		48		0.011	
13.9			C	39.76		22.3	<	0.05		2.8	<	2		57		0.0128	
12.2			C	30.38		13.2	<	0.05	J	1.4	J	5		43		0.0183	
18.3			C	41.51		17.9	<	0.05	J	1.56	<	2		66		0.0146	
22.9			C	45		17	<	0.05	J	1.99	<	2		67		0.0108	
22.8			C	48.99		22.2	<	0.05	J	2.18	J	4		62		0.0167	
21.7			C	41.1		17.9	<	0.05	J	2.19	<	2	O	62		0.0195	
14.4			C	26.4		11	<	0.05	J	1.37	<	2		34		0.0151	
9.4			C	22.99		10.9	<	0.05	J	2.31	<	2		37		0.0199	
9.7			C	22.58		7.79	<	0.05		3.07		30		33		0.0444	
13.7			C	40.83		25.5	<	0.05	J	2.4	<	2		84		0.0101	
14.5			C	34.12		27.2	<	0.05	J	2.27		9		57		0.0281	
18.8			C	54.12		34.6	<	0.05		2.74	<	2		83		0.0096	
18.4			C	53.37		35.5	<	0.05		2.82	<	2		78		0.008	
16.2			C	48.47		47.5	<	0.05	J	1.99	<	2		77		0.0182	
16.3			C	49.13		48.4	<	0.05	J	1.95	<	2		81		0.0176	
15.4			C	35.78		18.2	<	0.05	J	1.98		8		63		0.028	
13.2			C	42.82		28.6	<	0.05		2.96	J	3		66		0.0125	
10.6			C	46.41		22.7	<	0.05		3.14		6		70		0.0186	
10.9			C	43.84		22.5	<	0.05		3.16	J	2		60		0.018	
9.6			C	32.62		20.4	<	0.05		3.29		6		56		0.0161	
8.7			C	32.62		20.3	<	0.05		3.25		5		48		0.0165	
11			C	26.07		12.8	<	0.05		2.75	J	4		43		0.0151	
18.4			C	51.71		33.2	<	0.05		3.17	<	2		76		0.0079	
20.9			C	53.45		30.3	<	0.05		3.5	J	4		80		0.0112	
22.1			C	51.63		29.8	<	0.05		3.35	<	2		93		0.0086	
17.7			C	36.36		18.1	<	0.05	J	2.15	J	4		57		0.0147	
17			C	50.87		30	<	0.05		2.79	J	5		83		0.0111	
12.6			C	32.28		18.1	<	0.05	J	1.85		7		52		0.018	
12.7			C	32.03		18.3	<	0.05	J	1.89		7		53		0.0121	
11.9			C	42.89		36.8	<	0.05		3.66		6		84		0.0075	
9.4			C	55		47.9	<	0.05		4.9	J	3		93		0.0087	
14.5			C	36.43		21.7	<	0.025		2.7	J	3		53		0.0184	
21			C	64.31		45.4	<	0.025		3.91	<	2		100		0.0191	
20.7			C	64.56		45.3	<	0.025		3.62	<	2		96		0.0086	
21.6			C	60.49		39.3	<	0.025		3.54	<	2		86		0.0139	
19.7			C	66.71		42.8	<	0.025		2.89	<	2		90		0.019	
18			C	43.57		27.2	<	0.025		2.23		2		80		0.0117	
17			C	43.15		25.1	<	0.025		2.13	<	2		70		0.0091	
15			C	37.01		19.1	<	0.025		2.28		2		76		0.0181	
16			C	64.21		47.1	<	0.025		3.45	<	2		97		0.007	
13			C	34.44		20.1	<	0.025		2.59		11		55		0.0101	
6			C	35.75		28.5	<	0.025		3.32		3		56		0.0064	
14			C	44.89		28.6	<	0.025		7.9	<	2		74		0.0058	
13			C	32.94		17.9	<	0.025		2.97		2		55	R	0.0057	
13			C	32.94		18.1	<	0.025		3	<	2		52	R	0.008	
15			C	34.19		14.5	<	0.025		2.3	<	2		61	R	0.013	
17			C	32.78		14.7	<	0.025		2.34	<	2		57	R	0.008	
20			C	55.76		37	<	0.025		3.89		2		90		0.004	
19			C	51.53		31.7	<	0.025		3.5	<	2		82		0.004	
21			C	56.76		33.9	<	0.025		3.87	<	2		90		0.015	
20			C	53.53		33.2	<	0.025		4.16		2		114		0.062	
19			C	49.21		30.7	<	0.025		3.74		6		77		0.041	
12			C	25.23		12.8	<	0.025		1.93		11		43		0.071	
9			C	40.89		30.1	<	0.025		4.4	<	2		65		0.024	
9			C	40.64		30.1	<	0.025		4.33	<	2		61		0.024	
12			C	50.94		37.7	<	0.025		10.6		7		97		0.045	
12			C	44.39		28	<	0.025		4.68	<	2		72		0.035	

12		C	44.14		28.1	<	0.025		4.74		2		72		0.04	
12		C	28.14		13.7	<	0.025		3.95		3		53		0.049	
21		C	67.63		43.4	<	0.025		3.76		2		94		0.044	
16		C	42.83		21	<	0.025		2.4		20		68		0.042	
20		C	38.6		16.9	<	0.025		3.02		7		53		0.028	
15		C	32.29		13.8	<	0.025		2.11	<	2		44		0.044	
14		C	37.51		23.8	<	0.025		3.33		6		83		0.03	
11		C	47.04		31.9	<	0.025		8.34		2		57		0.012	
11		C	47.46		30.6	<	0.025		6		3		74		0.006	
11		C	46.8		30	<	0.2		5	<	2		70		0.02	
12		C	33.87		17.3	<	0.2		2	<	2		56		0.013	
12		C	33.62		17.2	<	0.2		2		3		58		0.013	
25		C	61.09		30.4	<	0.2		4	<	2		100		0.008	
24		C	47.49		24.5	<	0.2		3	<	2		80		0.011	
24		C	44.18		17	<	0.1		2	<	2		76		0.017	
24		C	47.25		17	<	0.1		2	<	2		71		0.016	
18		C	57.44		36	<	0.1		3	<	2		106		0.01	
16		C	32.46		17	<	0.1		2		3		79		0.013	
15		C	53.37		31	<	0.1		4	<	2		69		0.014	
11		C	29.55		14	<	0.1		2		9		61		0.024	
11		C	29.96		14	<	0.1		2		7		66		0.041	
12		C	33.44		18	<	0.1		3		3		45		0.016	
12		C	32.03		17	<	0.1		2		3		60		0.034	
16		C	39.83		26	<	0.1		2		3		73		0.062	
13		C	32.94		19	<	0.1		2	<	2		82		0.018	
17		C	51.31		24	<	0.2		3		3		75		0.021	
14		C	56.84		34	<	0.2		4	<	2		72		0.007	
9		C	38.34		25	<	0.1		6		9		75		0.011	
11		C	52.94		38	<	0.1		8	<	2		102		0.006	
11		C	48.8		32	<	0.1		5	<	2		72		0.008	
18		C	56.44		36	<	0.1		4	<	2		74		0.013	
17		C	56.69		35	<	0.1		4	<	2		67		0.011	
20		C	73.61		49				4	<	2		102		0.007	
14		N	44		28				3.1		12		74		0.003	
9		C	44.98		31				3		3		44		0.012	
9		C	62.48		50				10	<	2		107	<	0.003	
12		C	33.46		18				2		4		69		0.013	
10		C	34.87		18				2		4		130		0.013	
14		C	32.54		20				3		8		57		0.035	
18		C	46.81		24				3		3		70		0.01	
13		C	63.4		41				3	<	2		73		0.004	
9		C	48.71		33				3		4		65		0.011	
8		C	47.8		34				2	<	2		65		0.013	
10		C	37.26		20				3		2		45		0.006	
8		C	37.51		22				4		5		79		0.015	
13.9		N	58		35				6		3		65		0.018	
19.1		N	86		56				4	<	2		172		0.012	
15.3					33				3	<	2				0.015	
15.7					32				3	<	2				0.015	
15.1		N	55		28				2	<	2				0.01	
11.6		N	46		25				3		2				0.01	
6.5		N	52		34				4	<	2			<	0.003	
11.9		N	46		23				3		6				0.01	
17.9		N	58		34				3	<	2				0.021	
17.6		N	40		18				3		3				0.015	
17.5		N	41		18				3		3				0.012	
15.9		N	58		34				3	<	2				0.019	
15.7		N	41		34				3	<	2				0.03	
9.3		N	52		33				4		2				0.01	

8.9			N	65		46				5	<	2			<	0.003	
11.4			N	50		34				2	<	2			<	0.003	
13.4			N	44		21				3		3				0.01	
16.9			N	59		35				3	<	3				0.01	
14.2			N	39		16				2		22				0.058	
12.9			N	37		15				2		12				0.06	
8.7			N	52		34				4	<	3				0.005	
5.6			N	56		43				5	<	3				0.007	
10			N	38		23				4	<	3			<	0.003	
19.7			N	69		38				3	<	3				0.015	
11.2			N	43		19				3	<	3				0.026	
7.7			N	47.5		25.2				5.19	<	3				0.013	
10.7			N	44.70000076		21.1				2.64	<	3				0.012	
4.86			N	42.5		21.2				1.96		7			<	0.012	
6.97			N	35.8		15.8				1.96		3			<	0.1	
10			N	24	H	15				2.7	H	4			H<	0.01	
10			N	37		27				2.3	<	2			N<	0.01	
19.6			N	41		24.9				2.75	<	2.39			<	0.1	
12			N	26		15				1.2		6			N	0.1	
10			N	53		40				1.7		4			N	0.07	
7			N	39		24				3.59		4			N	0.01	
8			N	41		25				2.56		1			N<	0.01	
13			N	59		38				2.56		8			N	0.02	
6.85			N	44.7		31				2.04		3			<	0.1	
7			N	43		30				4.64	<	1			<	0.01	
13			N	75		65				8.44		1			<	0.01	
15			C	58.14		38				2.6	<	1			<	0.01	
14			C	41.67		48.3				5.09	<	5			<	0.02	
9			N	33.5		31				4.5		2			N<	0.01	
10			N	37.2		21				5.3		1			N	0.19	
13			N	51.8		35				1.6		1			N	0.04	
9			N	41.5		32				1.8		3			<	0.01	
6			N	33		32				2.7		6			HN	1.44	
10			N	45		32				3		2			N<	0.03	
11.8			N	73.3		87.3			<	5	<	5			<	0.02	
11.7			N	47		40.1			<	5					<	0.02	
8.11			N	48		37			<	5					<	0.02	
19.1			N	68		66				3.1	<	5			<	0.02	
15			N	65		54				2.8	<	5			<	0.02	
13.9			N	35		19				1.6		20			<	0.02	
9.6			N	30		21				2.71	<	5				0.0246	
12			N	30		31				4	<	5				0.07	
15			N	49		90				2		7			<	0.02	
10			N	44		31				1	<	5				0.03	
11			N	32		21				2	<	5			<	0.02	
25			N	34		24				1	<	5			<	0.02	
15			N	33		22				2		16				0.03	
9			N	57		49				2	<	5			<	0.02	
12.8			C	43.15		28.3	<	0.05		3	J	3		67		0.0136	

OrthoPO4 Total	OrthoPO4 Dissolved_Q	OrthoPO4 Dissolved	NO2-NO3-N_Q	NO2-NO3-N	NO2-N Total_Q	NO2-N Total	NO3-N Total_Q	NO3-N Total	TKN_Q	TKN	N Total_Q	N Total	Ammonia-N_Q	Ammonia-N	DOC_Q
				0.406					J	0.092			<	0.02	
				0.414					J	0.124	CJ	0.54	<	0.02	
				0.374						0.177	C	0.55	<	0.02	
				0.283						0.152	C	0.44	<	0.02	
				0.139						0.203	C	0.34	<	0.02	
				0.127						0.265	C	0.39	J	0.03	
				0.163						0.218	C	0.38		0.07	
				0.163						0.204	C	0.37	<	0.02	
				0.318						0.164	C	0.48	<	0.02	
				0.491						0.364	C	0.86	<	0.02	
				0.33						0.166	C	0.5	J	0.03	
				0.281						0.245	C	0.53	<	0.02	
				0.226						0.279	C	0.5		0.05	
				0.219						0.265	C	0.48		0.06	
				0.198						0.239	C	0.44	N	0.11	
				0.2						0.263	C	0.46	N	0.11	
				0.24						0.355	C	0.6		0.06	
				0.346						0.22	C	0.57		0.07	
				0.388						0.2	C	0.59	J	0.04	
				0.387						0.2	C	0.59	J	0.04	
				0.405						0.177	C	0.58	<	0.02	
				0.407						0.125	C	0.53	<	0.02	
				0.443						0.21	C	0.65	<	0.02	
				0.179						0.26	C	0.44		0.11	
				0.24						0.26	C	0.5		0.09	
				0.239						0.3	C	0.54	J	0.02	
				0.181						0.29	C	0.47	J	0.04	
				0.191						0.27	C	0.46		0.12	
				0.185						0.27	C	0.46	J	0.03	
				0.185						0.22	C	0.4	J	0.03	
				0.289						0.31	C	0.6		0.12	
				0.428						0.21	C	0.64		0.09	
				0.439						0.18	C	0.62	<	0.02	
				0.143						0.33	C	0.47		0.13	
				0.14						0.37	C	0.51		0.15	
				0.13						0.46	C	0.59		0.2	
				0.229						0.42	C	0.65		0.05	
				0.153						0.73	C	0.88		0.05	
				0.409						0.41	C	0.82		0.06	
				0.193						0.3	C	0.49		0.07	
				0.18						0.29	C	0.47		0.1	
				0.271						0.22	C	0.49		0.06	
				0.346						0.18	C	0.53		0.1	
				0.419						0.22	C	0.64		0.09	
				0.37						0.19	C	0.56		0.02	
				0.414						0.1	C	0.51		0.02	
				0.274					<	0.05	C<	0.32			
				0.274					<	0.05	C<	0.32			
				0.282						0.14	C	0.42		0.05	
				0.329						0.22	C	0.55		0.04	
				0.217						0.2	C	0.42		0.05	
				0.331						0.29	C	0.62		0.07	
				0.3						0.05	C	0.35		0.1	
				0.359					<	0.4	C<	0.76	<	0.25	
				0.492					<	0.5	C<	0.99	<	0.5	
				0.487					<	0.5	C<	0.99	<	0.5	
				0.551						0.6	C	1.15	<	0.5	
				0.472					<	0.5	C<	0.97	<	0.5	

	0.469	
	0.437	
	0.176	
	0.277	
	0.293	
	0.255	
	0.239	
	0.389	
	0.475	
	0.426	
	0.384	
	0.38	
	0.21	
	0.346	
	0.256	
	0.252	
	0.205	
	0.303	
	0.3	
	0.541	
	2.19	
	0.509	
	0.43	
	0.304	
	0.379	
	0.295	
	0.161	
	0.437	
	0.461	
	0.505	
	0.252	
	0.226	
	0.167	
	0.24	
	0.254	
	0.498	
	0.415	
	0.422	
	0.302	
	0.235	
	0.266	
	0.431	
	0.349	
	0.71	
	0.411	
	0.43	
	0.25	
	0.3	
	0.31	
	0.24	
	0.33	
	0.48	
	0.44	
	0.29	
	0.4	
	0.4	
	0.2	
	0.2	
	0.5	

<	0.5	C<	0.97	<	0.5	
<	0.5	C<	0.94	<	0.5	
	1	C	1.18	<	0.5	
	0.9	C	1.18	<	0.5	
	0.8	C	1.09	<	0.5	
	0.6	C	0.86	<	0.5	
<	0.5	C<	0.74	<	0.5	
	0.6	C	0.99	<	0.5	
	0.9	C	1.38	<	0.5	
	0.8	C	1.23	<	0.5	
	1	C	1.38	<	0.5	
	1	C	1.38	<	0.5	
<	0.5	C<	0.71	<	0.5	
<	0.5	C<	0.85	<	0.5	
	0.5	C	0.76	<	0.5	
<	0.5	C<	0.75	<	0.5	
	0.6	C	0.8	<	0.5	
	0.8	C	1.1	<	0.5	
	0.6	C	0.9	<	0.5	
	0.6	C	1.14	<	0.5	
	0.6	C	2.79	<	0.5	
	0.5	C	1.01	<	0.5	
	0.5	C	0.93	<	0.5	
	0.5	C	0.8	<	0.5	
<	0.5	C<	0.88	<	0.5	
	0.8	C	1.1	<	0.5	
<	0.5	C<	0.66	<	0.5	
<	0.5	C<	0.94	<	0.5	
	0.8	C	1.26	<	0.5	
<	0.5	C<	1	<	0.5	
	0.9	C	1.15	<	0.5	
	0.6	C	0.83	<	0.5	
	0.6	C	0.77	<	0.5	
<	0.1	C<	0.34	<	0.06	
	0.8	C	1.05	<	0.5	
<	0.5	C<	1	<	0.5	
	0.6	C	1.02	<	0.5	
	0.9	C	1.32	<	0.5	
<	0.5	C<	0.8	<	0.5	
<	0.5	C<	0.74	<	0.5	
<	0.5	C<	0.77	<	0.5	
<	0.5	C<	0.93	<	0.5	
<	0.5	C<	0.85	<	0.5	
<	1	C<	1.71	<	0.5	
<	1	C<	1.41	<	0.5	
	0.6	C	1.03	<	0.5	
	0.8	C	1.05		0.5	
	1	C	1.3	<	0.5	
	0.8	C	1.11	<	0.5	
	1	C	1.24	<	0.5	
	0.9	C	1.23	<	0.5	
	0.5	C	0.98	<	0.5	
	0.5	C	0.94	<	0.5	
	0.8	C	1.09		0.5	
<	1	C<	1.4	<	0.5	
	1	C	1.4	<	0.6	
<	1	C<	1.2	<	0.5	
<	1	C<	1.2	<	0.5	
<	1	C<	1.5	<	0.5	

	0.6	
	0.4	
	0.4	
	0.2	
	0.3	
	0.3	
	0.4	
	0.5	
	0.6	
	0.3	
	0.5	
	0.657	
	0.577	
	0.5	
	0.49	
H	0.61	
	0.64	
	0.58	
	0.31	
	0.33	
	0.69	
	0.47	
	0.31	
	0.32	
	0.53	
	0.24	
	0.32	
	0.36	
	0.32	
	0.29	
	0.28	
	0.12	
	0.42	
	0.37	
	0.36	
	0.328	
	0.611	
	0.332	
	0.371	
	0.342	
	0.44	
	0.37	
	0.352	

	<	1	C<	1.6	<	0.5	
	<	1	C<	1.4	<	0.5	
	<	1	C<	1.4	<	0.5	
	<	1	C<	1.2	<	0.5	
	<	1	C<	1.3	<	0.5	
	<	1	C<	1.3	<	0.5	
	<	1	C<	1.4	<	0.5	
	<	1	C<	1.5	<	0.5	
	<	1	C<	1.6	<	0.5	
	<	1	C<	1.3	<	0.5	
	<	1	C<	1.5	<	0.5	
	<	1	C<	1.66	<	0.5	
	<	1	C<	1.58	<	0.5	
		0.74	C	1.24	<	0.05	
		2.46	C	2.95		0.28	
	H	0.27	HC	0.88	H<	0.06	
		0.19	C	0.83		0.06	
		1.03	C	1.61		0.11	
		0.18	C	0.49	<	0.06	
		0.68	C	1.01		0.31	
		0.17	C	0.86	<	0.06	
		0.39	C	0.86		0.37	<
		0.23	C	0.54	<	0.06	<
	<	1	C<	1.32	<	0.1	
		0.65	C	1.18	<	0.06	<
		0.45	C	0.69		0.12	<
		0.26	C	0.58	<	0.06	
	<	0.5	C<	0.86	<	0.5	<
		0.58	C	0.9	<	0.06	
		1.94	C	2.23		1.16	<
		0.45	C	0.73	<	0.06	<
	<	0.1	C<	0.22	<	0.06	<
		1.03	C	1.45	<	0.06	
		0.24	C	0.61		0.14	
	<	0.5	C<	0.83	<	0.5	
	<	0.5	C<	1.11	<	0.5	
	<	0.5	C<	0.83	<	0.5	
	<	0.5	C<	0.87	<	0.5	
	<	0.5	C<	0.84	<	0.5	
	<	0.5	C<	0.94	<	0.5	
0.47	<	0.5			<	0.5	
0.41	<	0.5			<	0.5	
0.4	<	0.5			<	0.5	
0.5		0.6			<	0.5	
	<	0.5	C<	0.87	<	0.5	
0.31		0.8			<	0.5	
0.3	<	0.5			<	0.5	
		0.21	C	0.56		0.07	

DOC	Ag Dissolved_Q	Ag Dissolved	Al Total_Q	Al Total	Al Dissolved_Q	Al Dissolved	As Total_Q	As Total	B Total_Q	B Total	Ba Total_Q	Ba Total	Be Total_Q	Be Total	Ca Total_Q	Ca Total	Cd Dissolved_Q	Cd Dissolved
	<	0.00005		0.336		0.045	J	0.0026	J	0.007		0.025	J	0.00013		11.8	<	0.0005
	<	0.00005		0.316		0.05	J	0.00167	J	0.008		0.027	J	0.00015		11.8	<	0.001
	<	0.00005		0.284		0.08	<	0.0016		0.008		0.026	<	0.00012		9.2	<	0.001
	<	0.00005		0.276		0.088	<	0.0016		0.011		0.03	<	0.00012		12.5	<	0.001
	<	0.00005		0.097		0.038	<	0.0016		0.011		0.03	<	0.00012		13.9	<	0.001
	<	0.00005		0.197		0.042	<	0.0016		0.011		0.037	T<	0.00012		15	<	0.001
	<	0.00005		0.234		0.057	<	0.0016		0.01		0.035	T<	0.00012		12.5	<	0.001
	<	0.00005		0.283		0.089	<	0.0016		0.008		0.024	T<	0.00012		8.1	<	0.001
	<	0.00005		0.535		0.118	<	0.0016	<	0.003		0.022	J	0.00011		6.9	<	0.001
	<	0.00005		0.846		0.073	<	0.005	J	0.007		0.031	J	0.00013		6.9	<	0.001
	<	0.00005		0.337		0.047	<	0.005		0.009		0.027	J	0.00018		11.9	<	0.001
	<	0.00005		0.396		0.094	<	0.005		0.01		0.029	J	0.00012		10.2	<	0.001
	<	0.00005		0.049		0.027	<	0.005		0.012		0.037	J	0.00003		15.9	<	0.001
	<	0.00005		0.04		0.023	<	0.005		0.012		0.037	J	0.00003		15.6	<	0.001
	<	0.00005		0.217		0.068	<	0.005		0.01		0.033	J	0.00014		14.3	<	0.001
	<	0.00005		0.219		0.07	<	0.005		0.01		0.033	J	0.00011		14.4	<	0.001
	<	0.00005		0.457		0.04	<	0.005		0.012		0.033	J	0.00007		10.7	<	0.001
	<	0.00005		0.326		0.081	<	0.005	J	0.008		0.034	J	0.0001		12.2	<	0.001
	<	0.00005		0.483		0.062	<	0.005		0.009		0.029	J	0.0002		14.3	<	0.001
	<	0.00005		0.453	J	0.015	<	0.005		0.009		0.028	J	0.00047		13.6	<	0.001
	<	0.00005		0.484		0.039	<	0.0016	J	0.007		0.025	J	0.00015		9.6	<	0.001
	<	0.00005		0.499		0.04	<	0.0016	J	0.006		0.025	J	0.00016		9.6	<	0.001
	<	0.00005		0.372		0.097	<	0.005	J	0.007		0.024	J	0.00006		7.8	<	0.001
		0.0003		0.254		0.056	<	0.005		0.011		0.032	J	0.00012		15.1	<	0.001
	<	0.00005		0.167		0.052	<	0.005		0.014		0.035	J	0.00009		15.8	<	0.001
	<	0.00005		0.047		0.036	<	0.005		0.012		0.037	J	0.00007		15.4	<	0.001
	<	0.00005		0.191		0.075	<	0.005		0.01		0.031	J	0.00006		11.1	<	0.001
	<	0.00005		0.179		0.051	<	0.005		0.01		0.038	J	0.00017		14.6	<	0.001
	<	0.00005		0.382		0.098	<	0.005		0.008		0.027	J	0.0001		9.3	<	0.001
	<	0.00005		0.358		0.093	<	0.005		0.008		0.027	J	0.00011		9.2	<	0.001
	<	0.00005		0.367		0.039	<	0.005	J	0.008		0.028	<	0.00002		11.9	<	0.001
	<	0.00005		0.22		0.042	<	0.005		0.01		0.031	J	0.00009		15.1	<	0.001
	<	0.00007		0.292		0.104	<	0.005		0.01		0.027		0.00009		10.3	<	0.001
	<	0.00007		0.129		0.03	<	0.005		0.013		0.039		0.00005		18.5	<	0.00009
	<	0.00007		0.13		0.04	<	0.005		0.013		0.039		0.00006		18.6	<	0.00009
	<	0.00007		0.127		0.087	<	0.005		0.013		0.043		0.00006		17.3	<	0.00009
	<	0.00007		0.018		0.006	<	0.005		0.015		0.043		0.00002		18.8	<	0.00009
	<	0.00007		0.137		0.054	<	0.005		0.015		0.032		0.00007		12.5	<	0.00009
	<	0.00007		0.135		0.053	<	0.005		0.012		0.032		0.00007		12.5	<	0.00009
	<	0.00007		0.28		0.074	<	0.005		0.009		0.029		0.00011		10.7	<	0.00009
	<	0.00007		0.064		0.023	<	0.005		0.011		0.04		0.00004		17.8	<	0.00009
	<	0.00007		0.333		0.063	<	0.005		0.006		0.025		0.00013		10	<	0.00009
	<	0.00007		0.336		0.022	<	0.005		0.007		0.026		0.00016		9.7	<	0.00009
	<	0.00007		0.26		0.024	<	0.005		0.013		0.028		0.00012		12.7	<	0.00009
	<	0.00007		0.357		0.086	<	0.005		0.015		0.025		0.00012		9.4	<	0.00009
	<	0.00007		0.354		0.08	<	0.005		0.014		0.025		0.00012		9.4	<	0.00009
	<	0.00007		0.218		0.101	<	0.005		0.022		0.027		0.00007		9.9	<	0.00009
	<	0.00007		0.214		0.104	<	0.005		0.024		0.026		0.00007		9.5	<	0.00009
	<	0.00007		0.046		0.021	<	0.005		0.035		0.038		0.00024		15.9	<	0.00009
	<	0.00007		0.086		0.041	<	0.005		0.035		0.036		0.00003		14.7	<	0.00009
	<	0.00007		0.214		0.061	<	0.005		0.028		0.038		0.00006		16.3	<	0.00009
	<	0.00007		0.139		0.052	<	0.005		0.03		0.038	<	0.00001		15.5	<	0.00009
		0.0003		0.262		0.043	<	0.005		0.029		0.036		0.0001		14.1	<	0.00009
	<	0.00007		0.611		0.095	<	0.005		0.021		0.027		0.00029		7.3		0.0001
	<	0.0003		0.156		0.026	<	0.005		0.017		0.026		0.00011		11.1	<	0.0001
	<	0.0003		0.156		0.021	<	0.005		0.017		0.025		0.0001		11	<	0.0001
	<	0.0003		0.236		0.022	<	0.005		0.018		0.036		0.00009		14.3	<	0.0001
	<	0.0003		0.307		0.034	<	0.005		0.017		0.031		0.00011		12.5	<	0.0001

<	0.0003		0.312		0.034	<	0.005		0.018		0.031		0.00011		12.4	<	0.0001
<	0.0003		0.356		0.117	<	0.005		0.02		0.026		0.00009		8.3		0.0002
<	0.0003		0.111		0.035	<	0.005		0.026		0.047		0.00006		19.5	<	0.0001
<	0.0003		0.667		0.076	<	0.005		0.027		0.036		0.00012		12.7	<	0.0001
<	0.0003		0.208		0.056	<	0.005		0.028		0.0329		0.00005		11.5	<	0.0001
<	0.0003		0.192		0.088	<	0.005		0.018		0.028		0.00009		9.8	<	0.0001
<	0.0003		0.236		0.072	<	0.005		0.018		0.029		0.0001		10.9	<	0.0001
<	0.0003		0.21		0.02	<	0.02		0.018		0.031		0.00011		12.9	<	0.0001
<	0.0003		0.22		0.02	<	0.02		0.021		0.03		0.00007		13.4	<	0.0001
<	0.0003		0.21		0.04	<	0.02		0.039		0.03		0.00009		13.3	<	0.0001
<	0.0003		0.32		0.08	<	0.02		0.029		0.026				10.1	<	0.0001
<	0.0003		0.31		0.08	<	0.02		0.025		0.026				10	<	0.0001
<	0.0003		0.07		0.04	<	0.02		0.042		0.039				18.2	<	0.0001
<	0.0003		0.04		0.03	<	0.02		0.03		0.036				14.4	<	0.0001
<	0.0003		0.17		0.09	<	0.02		0.031		0.032				13.9	<	0.0001
<	0.0003		0.16		0.09	<	0.02		0.036		0.034				14.8	<	0.0001
<	0.0003		0.06		0.04	<	0.02		0.03		0.042				16.9	<	0.0001
<	0.0003		0.27		0.12	<	0.02		0.038		0.026				9.7	<	0.0001
<	0.0003		0.22		0.05	<	0.02		0.01		0.035				15.6	<	0.0001
<	0.0003		0.52		0.09	<	0.02		0.006		0.028				8.7	<	0.0001
<	0.0003		0.58		0.08	<	0.02		0.006		0.028				8.7	<	0.0001
<	0.0003		0.42		0.09	<	0.02		0.007		0.029				9.6	<	0.0001
<	0.0003		0.39		0.1	<	0.02		0.006		0.028				9.2	<	0.0001
<	0.0003		0.41		0.06	<	0.02		0.006		0.032				11.5	<	0.0001
	0.0003		0.42		0.09	<	0.02		0.01		0.032				9.4	<	0.0001
<	0.0003		0.28		0.09	<	0.02		0.017		0.044				15.6	<	0.0001
<	0.0003		0.15		0.05	<	0.02		0.011		0.04				16	<	0.0001
<	0.0003		0.53		0.07	<	0.02		0.006		0.031				10.9	<	0.0001
<	0.0003		0.13		0.03	<	0.02		0.009		0.028				15.1	<	0.0001
<	0.0003		0.31		0.04	<	0.02		0.006		0.03				14.1	<	0.0001
	0.132		0.13		0.07	<	0.02		0.017		0.035				16.5	<	0.00011
<	0.00027		0.13		0.07	<	0.02		0.01		0.036				16.6	<	0.00011
<	0.00027		0.03		0.03	<	0.02		0.013		0.044				21.4	<	0.00011
<	0.01		0.12	<	0.05	<	0.001	<	0.1	<	0.1					<	0.005
<	0.00027		0.49		0.04	<	0.02		0.01		0.029				12.9		0.0002
<	0.00027		0.07	<	0.02	<	0.02		0.01		0.031				17.6	<	0.00011
<	0.00027		0.42		0.1	<	0.02		0.006		0.027				10.1	<	0.00011
<	0.00027		0.44		0.1	<	0.02		0.006		0.028				10.5	<	0.00011
<	0.00027		0.22		0.09	<	0.02		0.01		0.027				9.9	<	0.00011
<	0.00027		0.19		0.1	<	0.02		0.014		0.03				13.8	<	0.00011
<	0.00027		0.07		0.03				0.018		0.04				18.3	<	0.00011
<	0.0003		0.3		0.04	<	0.02		0.011		0.033				13.9	<	0.0003
<	0.0003		0.29		0.02	<	0.02		0.009		0.033				13.7	<	0.0003
<	0.0003		0.34		0.03	<	0.02		0.026		0.029				10.8	<	0.0003
<	0.0003		0.48		0.05	<	0.02		0.011		0.03				10.9	<	0.0003
<	0.00031		0.35		0.06	<	0.02									<	0.00037
<	0.00031		0.02	<	0.02	<	0.02									<	0.00037
<	0.00031		0.13		0.02	<	0.02									<	0.00037
<	0.00031		0.13		0.02	<	0.02									<	0.00037
<	0.00031		0.22		0.05	<	0.02									<	0.00037
<	0.00031		0.32		0.02	<	0.02									<	0.00037
<	0.00031		0.16	<	0.02	<	0.02									<	0.00037
<	0.00031		0.53		0.03	<	0.02									<	0.00037
<	0.00031		0.24		0.06	<	0.02									<	0.00037
<	0.00031		0.25		0.07	<	0.02									<	0.00037
<	0.00031		0.3		0.08	<	0.02									<	0.00037
<	0.00031		0.07		0.03	<	0.02									<	0.00037
<	0.00031		0.06	<	0.02	<	0.02									<	0.00037
<	0.00031		0.38		0.03	<	0.02									<	0.00037

	<	0.00031		0.08	<	0.02	<	0.02									<	0.00037
	<	0.00031		0.3	<	0.02	<	0.02									<	0.00037
	<	0.00031		0.34		0.06	<	0.02									<	0.00037
	<	0.00031		0.07		0.04	<	0.025									<	0.00037
	<	0.00031		1.36		0.05	<	0.025									<	0.00037
	<	0.00031		0.91		0.05	<	0.025									<	0.00037
		0.0004		0.21		0.02	<	0.025									<	0.00037
	<	0.00031		0.12	<	0.02	<	0.025									<	0.00037
	<	0.00031		0.43		0.11	<	0.025									<	0.00037
	<	0.00031		0.05		0.02	<	0.025									<	0.00037
	<	0.00031		0.27		0.04	<	0.025									<	0.00037
					<	0.02												
	<	0.0003		0.336	<	0.02	<	0.025									<	0.0003
	<	0.0003		0.429		0.035	<	0.025									N<	0.00037
						0.047												
		0.00116		0.24		0.14		0.000237									<	0.000097
						0.2												
		0.00238		0.41		0.23	<	0.00014									<	0.000194
	<	0.001		0.43		0.16	<	0.001									<	0.0005
	<	0.0002		0.5		0.11	<	0.0005									<	0.00005
	<	0.0002		0.63	J	0.09	<	0.00185									<	0.00028
	<	0.0002		0.91		0.08	<	0.001									<	0.0005
	<	0.001		0.13	<	0.05	<	0.001									<	0.0005
	<	0.0002		1.04		0.07	<	0.001									<	0.0005
1	<	0.001		0.24		0.11	<	0.001									<	0.0005
1	<	0.001		0.07	<	0.05	<	0.001									<	0.0005
3.41	<	0.00022		0.43		0.1	<	0.00185									<	0.00028
1	<	0.0002		0.08	<	0.05	<	0.001									<	0.0005
1	<	0.0002	<	0.05	<	0.05	<	0.001									<	0.0005
6.8	<	0.0002		0.07	<	0.05		0.001								17.1	<	0.0005
1	<	0.002		0.18	<	0.1	<	0.005								12.4	<	0.002
2.1	<	0.001		0.412	<	0.02	<	0.01									<	0.001
1	<	0.004		0.628		0.034	<	0.01									<	0.0003
1	<	0.004		0.109		0.054	<	0.002									<	0.0001
1	<	0.004		0.181	<	0.03	<	0.002									<	0.0001
2.2	<	0.004		0.109	<	0.03	<	0.002									<	0.0003
3.8	<	0.0002		0.37													<	0.0005
2.31	<	0.005	<	0.1													<	0.001
1.93	<	0.005	<	0.1													<	0.001
			<	0.1														
			<	0.05														
			<	0.05														
				0.399														
				0.396														
				0.31														
				0.26														
				0.27														
				0.52														
				0.52														
				0.99														
				0.24														
	<	0.00005		0.376		0.037	<	0.005		0.01		0.033	J	0.00012		12.5	<	0.001

Cu Dissolved_Q	Cu Dissolved	Fe Total_Q	Fe Total	Fe Dissolved_Q	Fe Dissolved	Hg Total_Q	Hg Total	K Total_Q	K Total	Mg Total_Q	Mg Total	Mn Total_Q	Mn Total	Na Total_Q	Na Total	Ni Dissolved_Q	Ni Dissolved
<	0.002		0.44		0.03				0.6		2.7		0.086		2.6	<	0.005
<	0.002		0.35		0.04				0.6		2.5		0.067		2	<	0.005
<	0.002		0.39		0.08				0.8		1.8		0.051		1.4	<	0.005
<	0.002		0.39		0.13				1		2.5		0.077		1.8	<	0.005
<	0.002		0.2		0.08				1.1		2.5		0.049		2.4	<	0.005
<	0.002		0.41		0.09				1		2.8		0.12		2.2	<	0.005
<	0.002		0.43		0.14				0.8		2.4		0.161		2.2	<	0.005
<	0.002		0.32		0.09				0.5		1.5		0.047		1.3	<	0.005
<	0.002		0.45		0.07				0.5		1.4		0.039		1.8	<	0.005
<	0.002		1.37		0.09				0.9		1.3		0.095		2	<	0.005
<	0.002		0.34		0.04				0.9		2.7		0.073		2.2	<	0.005
<	0.002		0.59		0.09				0.7		2.1		0.066		1.6	<	0.005
<	0.002		0.07	J	0.02				0.9		3.5		0.053		2.5	<	0.005
<	0.002		0.07	J	0.02				0.9		3.5		0.057		2.4	<	0.005
<	0.002		0.27		0.07				0.8		3.1		0.136		1.9	<	0.005
<	0.002		0.27		0.08				0.8		3.2		0.136		1.9	<	0.005
<	0.002		0.6		0.04				0.9		2.2		0.088		1.9	<	0.005
<	0.002		0.38		0.09				0.8		3		0.127		2.5	<	0.005
<	0.002		0.54		0.06				0.6		2.6		0.075		2.4	<	0.005
<	0.002		0.5	J	0.02				0.6		2.4		0.072		2.2	<	0.005
<	0.002		0.65	J	0.02				0.6		2.1		0.068		2.2	<	0.005
<	0.002		0.67		0.03				0.6		2.1		0.067		2.2	<	0.005
<	0.002		0.37		0.06				0.6		1.6		0.04		1.8	<	0.005
<	0.002		0.33		0.05				0.9		3.4		0.134		2.7	<	0.005
<	0.002		0.22		0.06				1.2		3.4		0.104		3	<	0.005
<	0.002		0.09		0.04				0.8		3.2		0.056		2.5	<	0.005
<	0.002		0.28		0.12				0.6		2.1		0.064		1.7	<	0.005
<	0.002		0.31		0.07				0.6		3.5		0.154		2.6	<	0.005
<	0.002		0.42		0.08				0.6		2.2		0.077		1.8	<	0.005
<	0.002		0.38		0.07				0.6		2.2		0.069		1.8	<	0.005
<	0.002		0.44		0.03				0.6		3.2		0.101		2.6	<	0.005
<	0.002		0.29		0.08				0.6		4.2		0.116		3.6	J	0.007
<	0.001		0.37		0.09				1.1		2.6		0.057		2.4	<	0.005
<	0.001		0.25		0.06				0.9		4.4		0.16		3.4	<	0.005
<	0.001		0.24		0.06				0.9		4.4		0.16		3.4	<	0.005
<	0.001		0.33		0.09				1.1		4.2		0.42		3	<	0.005
<	0.001		0.04	<	0.01	<	0.0001		1.2		4.8		0.089		3.4	<	0.005
<	0.001		0.23		0.1				0.5		3		0.104		2	<	0.005
<	0.001		0.23		0.1				0.5		2.9		0.103		2	<	0.005
<	0.001		0.41		0.1	<	0.0001		0.7		2.5		0.104		2	<	0.005
<	0.001		0.09		0.01				0.9		4.8		0.213		3	<	0.005
	0.001		0.36		0.05				0.6		2.3		0.068		2.1	<	0.005
<	0.001		0.52		0.07				0.6		2.8		0.093		2.5		0.006
<	0.001		0.26		0.02				0.6		3.2		0.082		4.9	<	0.005
<	0.001		0.33		0.06				0.6		2.3		0.051		2.3	<	0.005
<	0.001		0.33		0.06				0.6		2.3		0.051		2.3	<	0.005
<	0.001		0.26		0.09				0.9		2.3		0.037		2.2	<	0.005
<	0.001		0.25		0.09				0.9		2.2		0.036		2	<	0.005
<	0.001		0.09		0.02				1		3.9		0.139		3.2	<	0.005
<	0.001		0.14		0.06				1		3.6		0.096		3	<	0.005
<	0.001		0.3		0.08				1		3.9		0.111		3.4	<	0.005
	0.002		0.21		0.07				1		3.6		0.165		3.3	<	0.005
<	0.001		0.42		0.05				0.8		3.4		0.161		3.1	<	0.005
<	0.001		0.69		0.1				1.7		1.7		0.052		1.5	<	0.005
<	0.003		0.22		0.03				0.6		3.2		0.09		3.2		0.005
<	0.003		0.22		0.03				0.6		3.2		0.089		3.1		0.005
<	0.003		0.52		0.04				0.8		3.7		0.178		6.5		0.006
<	0.003		0.45		0.07				0.7		3.2		0.12		3.5	<	0.005

<	0.003		0.46		0.07				0.7		3.2		0.119		3.5		0.005
<	0.003		0.34		0.08			<	0.5		1.8		0.046		2.6	<	0.005
<	0.003		0.24		0.04				0.9		4.6		0.296		3.1	<	0.005
<	0.003		0.83		0.1				0.9		2.7		0.151		2.2	<	0.005
<	0.003		0.38		0.11				0.7		2.4		0.097		2.3	<	0.005
<	0.003		0.22		0.09				0.5		1.9		0.054		1.8	<	0.005
<	0.003		0.3		0.06				0.6		2.5		0.107		2.4	<	0.005
<	0.003		0.24	<	0.02				0.6		3.6		0.102		5.2	<	0.005
<	0.003		0.28	<	0.02				0.6		3.4		0.096		3.8		0.006
<	0.003		0.27	<	0.02				0.6		3.3		0.103		3.6		0.006
<	0.003		0.34		0.06				0.7		2.1		0.077		2	<	0.005
<	0.003		9.95		0.06			<	0.5		2.1		0.073		2	<	0.005
<	0.003		0.27		0.07				0.8		3.8		0.299		3		0.05
<	0.003		0.1		0.05				0.8		2.8		0.033		2.6	<	0.005
<	0.003		0.23		0.11				0.7		2.3		0.039		1.9	<	0.005
<	0.003		0.24		0.1				0.7		2.5		0.043		2.1	<	0.005
<	0.003		0.12		0.04				0.7		3.7		0.177		2.5	<	0.005
<	0.003		0.3		0.1				0.5		2		0.069		1.5	<	0.005
<	0.003		0.29		0.04				0.6		3.5		0.14		2.8	<	0.005
<	0.003		0.54		0.07				0.6		1.9		0.05		1.7	<	0.005
<	0.003		0.64		0.06				0.6		2		0.056		1.7	<	0.005
<	0.003		0.44		0.05				0.5		2.3		0.062		2.2	<	0.005
<	0.003		0.44		0.07				0.5		2.2		0.063		1.4	<	0.005
<	0.003		0.5		0.06				0.6		2.7		0.128		1.7	<	0.005
<	0.003		0.46		0.08				0.7		2.3		0.074		1.6		
<	0.003		0.38		0.13				1.3		3		0.202		6.6	<	0.005
<	0.003		0.32		0.09				0.7		4.1		0.227		2.2	<	0.005
<	0.003		0.61		0.06				0.7		2.7		0.106		4.3	<	0.005
<	0.003		0.17		0.03				0.6		3.7		0.118		4.8		0.006
<	0.003		0.27		0.03				0.7		3.3		0.091		3.2	<	0.005
<	0.003		0.18		0.09				0.9		3.7		0.117		2.5	<	0.005
<	0.003		0.22		0.1				0.9		3.7		0.119		2.4	<	0.005
<	0.003		0.09		0.03				0.9		4.9		0.071		2.6	<	0.005
<	0.02		0.19	<	0.05				0.82				0.08		2.39	<	0.04
<	0.003		0.52		0.02				0.5		3.1		0.107		1.9		0.005
<	0.003		0.18		0.07				0.6		4.5		0.129		4.8		0.008
<	0.003		0.44		0.05			<	0.5		2		0.072		1.2	<	0.005
<	0.003		0.47		0.05			<	0.5		2.1		0.075		1.3	<	0.005
<	0.003		0.22		0.06				0.6		1.9		0.021		1.2	<	0.005
	0.006		0.28		0.11				1.2		3		0.096		2.6	<	0.005
<	0.003		0.14		0.04				0.6		4.3		0.168		1.9	<	0.005
<	0.003		0.38		0.05			<	0.5		3.4		0.121		1.3		0.007
<	0.003		0.36	<	0.02			<	0.5		3.3		0.17		1.2		0.007
<	0.003		0.35	<	0.02			<	0.5		2.5		0.077		1.9	<	0.005
<	0.003		0.49		0.03		0.0000019				2.5		0.091		2.2	<	0.005
<	0.003		0.42		0.06		0.0000006						0.16			<	0.04
<	0.003		0.36		0.06		0.0000005						0.683			<	0.04
<	0.003		0.23		0.03								0.119			<	0.04
<	0.003		0.23		0.03								0.115			<	0.04
<	0.003		0.31		0.04		0.00000225						0.217			<	0.04
<	0.003		0.33	<	0.02		0.00000068						0.142			<	0.04
<	0.003		0.22		0.03	R	0.00000023						0.132			<	0.04
<	0.003		0.7	<	0.02	<	0.0001						0.126			<	0.04
<	0.003		0.37		0.07	<	0.0001						0.228			<	0.04
<	0.003		0.34		0.08	<	0.0001						0.129			<	0.04
<	0.003		0.34		0.03	<	0.0001						0.132			<	0.04
<	0.003		0.11	<	0.02	<	0.0001						0.184			<	0.04
<	0.003		0.11	<	0.02	<	0.0001						0.177			<	0.04
<	0.003		0.35	<	0.02	<	0.0001						0.184			<	0.04

<	0.003		0.21		0.09	<	0.0001						0.187			<	0.04
<	0.003		0.29	<	0.02	<	0.0001						0.132			<	0.04
<	0.003		0.37		0.05	<	0.0001						0.133			<	0.04
<	0.003		0.15		0.07	<	0.0001						0.164			<	0.04
<	0.003		2.36		0.05	<	0.0001						0.175			<	0.04
<	0.003		1.42		0.05		0.0002						0.121			<	0.04
<	0.003		0.24	<	0.02		0.0002						0.136			<	0.04
<	0.003		0.25		0.08	<	0.0001						0.201			<	0.04
<	0.003		0.44		0.08	<	0.0001						0.091			<	0.04
<	0.003		0.12		0.02	<	0.0001						0.169			<	0.04
<	0.003		0.31		0.02	<	0.0001						0.1			<	0.04
<	0.003		0.406	<	0.02	<	0.0001						0.121			<	0.04
<	0.003		0.507		0.023	<	0.0001						0.118			<	0.04
	0.00101		0.31		0.12	<	0.000093						0.11				0.00287
<	0.00191		0.42		0.09	<	0.000093						0.14				0.00106
<	0.001		0.45	<	0.05	<	0.0002						0.07			<	0.02
<	0.0008		0.7	<	0.05	<	0.0002						0.14			<	0.02
<	0.000251		0.58	<	0.018	J	0.000114						0.14				0.0069
	0.003		0.98	<	0.05	<	0.0002						0.09			<	0.02
<	0.001		0.34	<	0.05	<	0.0002						0.32			<	0.02
<	0.001		1.21	<	0.05	<	0.0002						0.1			<	0.02
<	0.001		0.29	<	0.05		0.0002						0.15			<	0.02
<	0.001		0.11	<	0.05	<	0.0002						0.14			<	0.02
	0.00161		0.33	<	0.018	<	0.000101						0.16				0.007
<	0.001		0.15	<	0.05	<	0.0002						0.17			<	0.04
<	0.001		0.24	<	0.05	<	0.0002						0.35			<	0.02
<	0.001		0.12	<	0.05		0.0003				3.75		0.21			<	0.02
<	0.002		0.24	<	0.02	<	0.0005				2.6		0.15			<	0.04
<	0.008		0.502	<	0.02	<	0.0002						0.116			<	0.03
<	0.005		1.12		0.041	<	0.0002						2.1			<	0.03
<	0.005		0.156	<	0.02	<	0.0002						0.071			<	0.03
<	0.005		0.325		0.03	<	0.0002						0.137			<	0.03
	0.006		0.286	<	0.02	<	0.0002						0.135			<	0.03
	0.001		0.41			<	0.0002						0.21			<	0.04
<	0.005		0.0553			<	0.0002						0.141			<	0.005
<	0.005		0.0829				0.00023						0.0849			<	0.005
			0.402			<	0.0002						0.165				
			0.138			<	0.0002						0.266				
			0.0571			<	0.0002						0.0848				
			0.69			<	0.0002						0.134				
			0.489			<	0.0002						0.113				
			0.43			<	0.0005						0.14				
			0.25			<	0.0005						0.11				
			0.29			<	0.0005						0.15				
			0.63			<	0.0005						0.1				
			0.48			<	0.0005						0.092				
			0.89			<	0.0005						0.12				
			0.16			<	0.0005						0.23				
<	0.002		0.41	J	0.02				0.8		2.9		0.124		2.5	<	0.005

Pb Dissolved_Q	Pb Dissolved	Se Total_Q	Se Total	Sr Total_Q	Sr Total	Zn Dissolved_Q	Zn Dissolved	WATERLEVEL	TURBIDITY	PRECIP_CUR	PRECIP_PAST	MAJOR_RAIN	PEAK_RUNOFF
<	0.00054	<	0.001		0.033		0.006						
<	0.00054	<	0.001		0.034		0.006	Normal	Clear	None	Flurries	No	
<	0.00054	<	0.001		0.027	J	0.003	Above Normal	Slight Turbidity	None	Rain		
<	0.00054	<	0.001		0.038	<	0.002	Normal	Slight Turbidity	None	None		
<	0.00054	<	0.001		0.04	<	0.002	Above Normal	Slight Turbidity	None	None		Unknown
<	0.00054	<	0.001		0.047	<	0.002	Above Normal		None	Rain		
<	0.00054	<	0.001		0.038	<	0.002	Above Normal	Slight Turbidity	None	None		
<	0.00054	<	0.001		0.026	<	0.002	Above Normal	Clear	Light Rain	None		
<	0.00054	<	0.001		0.021	J	0.003	Above Normal	Moderate Turbidity	None	Rain	Yes	Unknown
<	0.00054	<	0.001		0.021	<	0.002	Above Normal	Moderate Turbidity	None	None	No	
<	0.00054	<	0.001		0.038	J	0.004	Normal	Clear	Light Rain	Light Rain	No	
<	0.00054	<	0.001		0.032	<	0.002	Above Normal	Moderate Turbidity	None	Light Rain	Yes	1 to 2 Days
<	0.00054	<	0.001		0.052	<	0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001		0.051	<	0.002						
<	0.00054	<	0.001		0.045	J	0.002						
<	0.00054	<	0.001		0.045	<	0.002	Above Normal	Clear	None	Rain		
<	0.00054	<	0.001		0.032	<	0.002	Above Normal	Moderate Turbidity	None	None		Unknown
<	0.00054	<	0.001		0.038		0.006	Above Normal	Slight Turbidity	None	Light Rain	No	
<	0.00054	<	0.001		0.032		0.005	Above Normal	Moderate Turbidity	None	Rain		
<	0.00054	<	0.001		0.03	J	0.004						
<	0.00054	<	0.001		0.029		0.007	Above Normal	Slight Turbidity	None	None	Yes	Unknown
<	0.00054	<	0.001		0.029		0.007						
<	0.00054	<	0.001		0.026	J	0.003	Above Normal	Slight Turbidity	None	Light Rain		
<	0.00054	<	0.001		0.048	J	0.003	Normal	Clear	Light Rain	Light Rain	No	
<	0.00054	<	0.001		0.049	<	0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001		0.05	<	0.002	Normal	Clear	Light Rain	Thunderstorms	No	Unknown
<	0.00054	<	0.001		0.035	<	0.002	Below Normal	Clear	None	Unknown	No	Unknown
<	0.00054	<	0.001		0.046	J	0.002			None	Brief storm	No	
<	0.00054	<	0.001		0.029	J	0.003	Above Normal	Slight Turbidity	None	Rain	Yes	Unknown
<	0.00054	<	0.001		0.028	J	0.003						
<	0.00054	<	0.001		0.037		0.007	Above Normal	Slight Turbidity	None	Light Rain	No	
<	0.00054	<	0.001		0.041		0.014	Above Normal	Clear	None	Rain/Snow		
<	0.00054	<	0.001		0.031		0.002	Above Normal	Slight Turbidity	None	None		
<	0.00054	<	0.001		0.055	<	0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001		0.056	<	0.002						
<	0.00054	<	0.001		0.054	<	0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001			<	0.002	Normal	Clear	None	Unknown	No	Unknown
<	0.00054	<	0.001		0.039	<	0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001		0.039	<	0.002						
<	0.00054	<	0.001			<	0.002	Normal	Moderate Turbidity	Light Rain	Light Rain	No	Unknown
<	0.00054	<	0.001				0.002	Normal	Clear	None	None	No	
<	0.00054	<	0.001				0.004	Above Normal	Clear	None	Unknown		Unknown
<	0.00054	<	0.001				0.013	Normal	Clear	None	Snow	No	Unknown
<	0.00054	<	0.001				0.008	Above Normal	Clear	None	Unknown		
<	0.00054	<	0.001				0.004	Above Normal	Clear	None	Sprinkles	No	
<	0.00054	<	0.001				0.004						
<	0.00054	<	0.001				0.002	Normal	Clear	None	Showers	No	Unknown
<	0.00054	<	0.001			<	0.002						
<	0.00054	<	0.001			<	0.002	Normal	Clear	None	Light Rain	No	
<	0.00054	<	0.001			<	0.002	Above Normal	Clear	None	None		
<	0.00054	<	0.001			<	0.002	Normal	Slight Turbidity	None	None		
<	0.00054	<	0.001			<	0.002	Above Normal	Clear	None	Rain		Unknown
<	0.00054	<	0.001			<	0.002	Normal	Clear	None	None	No	Unknown
<	0.00054	<	0.001			<	0.002	Above Normal	Moderate Turbidity	None	Unknown	Yes	Unknown
<	0.000711	<	0.001				0.011	Above Normal	Clear	None	None	No	
<	0.000711	<	0.001				0.011						
<	0.00071	<	0.001				0.009	Above Normal	Slight Turbidity	Light Rain	Rain	Yes	Unknown
<	0.00071	<	0.001				0.008	Above Normal		Light Rain	None	No	

<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.00071	<	0.001	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.001	<	0.0006	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.000711	<	0.001	
<	0.005	<	0.001	
<	0.005	<	0.001	
<	0.005	<	0.001	
<	0.005	<	0.001	
<	0.005	<	0.001	
<	0.005	<	0.001	
<	0.001		0.001	
<	0.001	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	
<	0.0005	<	0.001	

	0.008						
<	0.005	Above Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	Light Rain	No	Unknown
<	0.005	Flooding	High Turbidity	None	Heavy Rain	Yes	Unknown
<	0.005	Above Normal	Slight Turbidity	None	None	Yes	Unknown
<	0.005	Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	None	No	
	0.01	Above Normal	Clear	None	Light Rain	No	Unknown
	0.009	Normal	Clear	None	None	No	
	0.011	Normal	Clear	None	None	No	
<	0.005						
<	0.005	Normal	Clear	None	Sleet/Snow	No	
<	0.005	Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	Rain	No	
<	0.005						
	0.008	Normal	Clear	None	None	No	
<	0.005	Below Normal	Clear	None	Rain	No	
<	0.005	Above Normal	Clear	None	Unknown	Yes	Unknown
<	0.005						
<	0.005	Above Normal	Slight Turbidity	None	Snow	Yes	Unknown
	0.005	Above Normal	Slight Turbidity	None	Brief Storm	No	
<	0.005	Normal	Slight Turbidity	Light Rain	None	No	
<	0.005	Normal	Clear	Light Rain	Light Rain	No	
<	0.005	Above Normal	Slight Turbidity	None	None		Unknown
<	0.005	Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	None	No	
<	0.005	Above Normal		None	Snow/Rain	No	Unknown
	0.01	Above Normal	Clear	Flurries	Light Rain	No	
<	0.005	Normal	Clear	None	None	No	
<	0.005	Normal	Clear	None	None	No	> 24 Hours
<	0.005						
<	0.005	Normal	Clear	None	Showers	No	> 24 Hours
<	0.005	Normal	Clear	None	Light Rain	No	> 24 Hours
	0.007	Normal	Clear	None	None	No	> 24 Hours
	0.015	Below Normal	Clear	None	Flurries	No	> 24 Hours
<	0.005	Normal	Slight Turbidity	None	Snow Showers	No	> 24 Hours
<	0.005						
<	0.005	Above Normal	Moderate Turbidity	None	Rain	No	> 24 Hours
<	0.005	Normal	Slight Turbidity	None	Thunderstorms	No	Unknown
<	0.005	Normal	Clear	None	None	No	> 24 Hours
	0.007						
	0.007	Normal	Slight Turbidity	Rain	Showers	No	Unknown
<	0.005	Below Normal	Slight Turbidity	Drizzle	Showers	Yes	Unknown
	0.01	Normal	Slight Turbidity	Snow	Snow	No	Unknown
		Above Normal	Slight Turbidity	Light Rain	Rain	Yes	4 to 12 Hours
<	0.005	Below Normal	Clear	None	Snow	No	Unknown
<	0.005						
<	0.005	Normal	Slight Turbidity	None	None	Yes	> 24 Hours
<	0.005	Normal	Clear	None	Unknown	Yes	> 24 Hours
	0.008	Normal	Clear	None	None	Yes	> 24 Hours
	0.012	Below Normal	Clear	Snow	Snow	No	Unknown
	0.007	Above Normal	Slight Turbidity	Snow	Snow	Yes	12 to 24 Hours
<	0.005	Below Normal	Slight Turbidity	None	None	Yes	> 24 Hours
<	0.005	Above Normal	Moderate Turbidity	None	None	Yes	Unknown
<	0.005						
<	0.005						
<	0.005	Below Normal	Clear	None	Unknown	No	Unknown
	0.007	Normal	Moderate Turbidity	None	None		Unknown

<	0.0005	<	0.001				0.02	Above Normal	Clear	None	Rain		12 to 24 Hours
<	0.0005	<	0.001				0.012	Normal	Clear	None	Unknown		Unknown
<	0.0005	<	0.001			<	0.005	Above Normal	Moderate Turbidity	Light Rain	Rain		Unknown
<	0.0005	<	0.001			<	0.005	Normal	Clear	None	None		Unknown
<	0.0005	<	0.001			<	0.005						
<	0.0005	<	0.001			<	0.005	Above Normal	High Turbidity	None	Rain		12 to 24 Hours
<	0.0005	<	0.001				0.01	Normal	Clear	None	None		Unknown
<	0.0005	<	0.001				0.018	Below Normal	Clear	None	Showers		12 to 24 Hours
<	0.0005	<	0.001					Below Normal	Moderate Turbidity	None	Snow		Unknown
<	0.0005	<	0.001			<	0.005	Below Normal	Clear	None	None		> 24 Hours
<	0.0005	<	0.001			<	0.005	Normal	Clear	None	None		> 24 Hours
<	0.0005	<	0.001				0.008	Above Normal	Slight Turbidity	None	Snow		Unknown
<	0.0005	<	0.001				0.007	Normal	Slight Turbidity	None	None		Unknown
<	0.000089						0.00182	Above Normal	Moderate Turbidity	None	None		
<	0.000178	<	0.00126			<	0.000726	Above Normal	Moderate Turbidity	None	None		
<	0.001						0.006	Normal	Slight Turbidity	None	None		
<	0.0007					<	0.005	Below Normal	Clear	None	None		
<	0.000534					<	0.018	Below Normal	Clear	None	None		
<	0.001					<	0.005	Above Normal	Slight Turbidity	None	None		
<	0.001					<	0.005	Above Normal	Clear	None	None		
<	0.001					<	0.005	Above Normal	Slight Turbidity	None	None		
<	0.001						0.01	Normal	Clear	Heavy Rain			
<	0.001					<	0.005	Below Normal	Clear	Broken Clouds Cover			
<	0.000534					<	0.018						
<	0.001						0.013	Below Normal	Clear	Overcast			
<	0.001					<	0.005	Below Normal	Clear	None			
<	0.001					<	0.005	Below Normal	Clear	None			
<	0.005						0.022	Below Normal	Clear	None			
<	0.001						0.012	Above Normal	Slight Turbidity	None			
<	0.001					<	0.002	Above Normal	Slight Turbidity	Light Snow			
<	0.0005						0.024	Normal	Clear				
<	0.0005						0.004	Below Normal	Slight Turbidity				
<	0.001						0.012	Above Normal	Clear				
<	0.001						0.006	Normal	Clear				
<	0.005					<	0.02	Below Normal	Clear				
<	0.005					<	0.02	Below Normal	Clear				
								Above Normal	Clear				
								Below Normal	Clear				
								Below Normal	Clear				
								Above Normal	Extreme Turbidity				
								Below Normal	Clear				
								Above Normal	Slight Turbidity	Moderate Haze, Moderate Drizzle			
								Normal	Clear				
								Above Normal	Clear	Light Haze			
								Normal	Slight Turbidity				
								Above Normal	Slight Turbidity	Light Haze			
								Above Normal	High Turbidity				
								Normal	Clear	Heavy Haze			
<	0.00054	<	0.001		0.036	J	0.004						

FLOW_STATUS	MAP_LOCATION	POR_LAT_DEG	POR_LAT_MIN	POR_LAT_SEC	POR_LON_DEG	POR_LON_MIN
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Unknown	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Unknown	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Falling	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Rising	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Unknown	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Unknown	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Unknown	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Falling	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Falling	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Falling	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51

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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Rising	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Falling	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51

Rising	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
Baseflow	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
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	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51
	(MC-01) Right Bank Sampling Downstream the Lake Lynn Dam & Upstream Grassy Run & Lake Lynn Fayette County, PA	39	43	17.18	79	51

POR_LON_SEC	WATER_SUBSAMPLE_NOTES	Watershed
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SURVEY_TYPE	STREAM_NAME	ANCODE	MILE_POINT	WQ_SAMPLE_DATE	WQ_SAMPLE_TIME	FLOW	DISTANCE_DESCRIPTION	Temp_Q	Temperature	pH_Q	PH	Lab pH_Q	Lab PH	DO_Q
Ambient Network	Cheat River	WVMC	30	11-Mar-19	2:15:00 PM									
Ambient Network	Cheat River	WVMC	30	16-Jan-19	4:20:00 PM	1210	Mid-Stream		1.07		6.99			
Ambient Network	Cheat River	WVMC	30	13-Nov-18	3:00:00 PM	3880	Mid-Stream		5.93		6.87			
Ambient Network	Cheat River	WVMC	30	22-Oct-18	1:30:00 PM	3380	Mid-Stream		9.38		6.21			
Ambient Network	Cheat River	WVMC	30	05-Sep-18	4:30:00 PM	895	Mid-Stream		29.03		7.32			
Ambient Network	Cheat River	WVMC	30	08-Aug-18	5:00:00 PM	1080	Mid-Stream		26.12		7.31			
Ambient Network-Duplicate	Cheat River	WVMC	30	08-Aug-18	5:00:00 PM									
Ambient Network	Cheat River	WVMC	30	26-Jun-18	7:45:00 AM		Mid-Stream		20.69		6.94			
Ambient Network	Cheat River	WVMC	30	21-May-18	5:00:00 PM		Mid-Stream		19.94		6.57			
Ambient Network	Cheat River	WVMC	30	03-Apr-18	11:15:00 AM				7.25		6.66			
Ambient Network	Cheat River	WVMC	30	21-Feb-18	4:40:00 PM		Right Bank		9.96		6.32			
Ambient Network	Cheat River	WVMC	30	15-Jan-18	3:00:00 PM		Right Bank		0.06		7.42			
Ambient Network	Cheat River	WVMC	30	05-Dec-17	8:00:00 AM	634	Mid-Stream		4.99		6.58			
Ambient Network	Cheat River	WVMC	30	08-Nov-17	8:30:00 AM	11100	Right Bank		9.72		6.84			
Ambient Network	Cheat River	WVMC	30	04-Oct-17	2:15:00 PM	101			21.29		7.5			
LTMS/Ambient Network	Cheat River	WVMC	30	13-Sep-17	2:30:00 PM		Mid-Stream		20.34		7.56			
Ambient Network	Cheat River	WVMC	30	23-Aug-17	8:45:00 AM		Right Bank		24.26		7.21			
Ambient Network	Cheat River	WVMC	30	28-Jun-17	10:30:00 AM	1120	Mid-Stream		19.37		7.2			
Ambient Network	Cheat River	WVMC	30	25-Apr-17	8:00:00 AM	3320	Mid-Stream		11.32		6.96			
Ambient Network	Cheat River	WVMC	30	07-Mar-17	4:00:00 PM		Mid-Stream		6.73		7.44			
Ambient Network	Cheat River	WVMC	30	17-Jan-17	4:30:00 PM		Mid-Stream		7.31		6.66			
Ambient Network	Cheat River	WVMC	30	29-Nov-16	4:15:00 PM	795	Mid-Stream		6.37	I		O	7.15	
Ambient Network	Cheat River	WVMC	30	01-Nov-16	4:00:00 PM	594	Mid-Stream		14.67		6.77			
LTMS/Ambient Network	Cheat River	WVMC	30	12-Sep-16	2:00:00 PM		Mid-Stream		28.93		7.82			
Ambient Network	Cheat River	WVMC	30	18-Aug-16	10:30:00 AM		Right Bank		26.7		7.71			
Ambient Network	Cheat River	WVMC	30	13-Jul-16	1:40:00 PM	941	Mid-Stream		26.07		7.31			
Ambient Network	Cheat River	WVMC	30	21-Jun-16	4:45:00 PM		Mid-Stream		26.98		7.8			
Ambient Network	Cheat River	WVMC	30	12-May-16	8:00:00 AM		Mid-Stream		15.07		6.54			
Ambient Network	Cheat River	WVMC	30	29-Mar-16	8:15:00 AM	2030	Mid-Stream		10.25		6.87			
Ambient Network	Cheat River	WVMC	30	17-Feb-16	10:30:00 AM	10600	Right Bank		-0.03		7.18			
Ambient Network	Cheat River	WVMC	30	09-Dec-15	9:00:00 AM	1370	Mid-Stream		4.59		6.15			
Ambient Network	Cheat River	WVMC	30	09-Nov-15	5:00:00 PM	321	Mid-Stream		10.24		7.05			
Ambient Network	Cheat River	WVMC	30	21-Oct-15	5:00:00 PM	222	Mid-Stream		12.23		7.02			X
LTMS/Ambient Network	Cheat River	WVMC	30	16-Sep-15	5:00:00 PM	411	Mid-Stream		21.89		7.74			
LTMS/Ambient Network-Duplicate	Cheat River	WVMC	30	16-Sep-15	5:00:00 PM		Mid-Stream		21.89		7.74			
Ambient Network	Cheat River	WVMC	30	04-Aug-15	6:15:00 PM	352	Mid-Stream		26.66		7.16			
Ambient Network	Cheat River	WVMC	30	08-Jul-15	3:10:00 PM	2690	Mid-Stream		22.14		6.99			
Ambient Network	Cheat River	WVMC	30	10-Jun-15	8:45:00 AM		Mid-Stream		22		7.3			
Ambient Network	Cheat River	WVMC	30	28-Apr-15	11:30:00 AM		Mid-Stream		9.62		6.1			
Ambient Network	Cheat River	WVMC	30	24-Mar-15	10:15:00 AM	3290	Right Bank		6.46	M	8.15			
Ambient Network	Cheat River	WVMC	30	03-Feb-15	4:00:00 PM	5130	Right Bank		0.46		6.56			
Ambient Network	Cheat River	WVMC	30	23-Dec-14	8:25:00 AM	1750	Mid-Stream		2.76		6.71		7.03	
Ambient Network	Cheat River	WVMC	30	29-Oct-14	11:30:00 AM	1320	Mid-Stream		12.65		7.68			
Ambient Network	Cheat River	WVMC	30	30-Sep-14	5:15:00 PM				20.41		7.04			
LTMS/Ambient Network-Duplicate	Cheat River	WVMC	30	24-Sep-14	3:30:00 PM		Mid-Stream		20.17		7.72			
LTMS/Ambient Network	Cheat River	WVMC	30	24-Sep-14	3:30:00 PM		Mid-Stream		20.17		7.72			
Ambient Network	Cheat River	WVMC	30	15-Sep-14	6:00:00 PM		Mid-Stream		20.18		7.35			
Ambient Network	Cheat River	WVMC	30	26-Aug-14	4:00:00 PM		Mid-Stream		24.72		7.25			
Ambient Network	Cheat River	WVMC	30	04-Aug-14	3:40:00 PM		Mid-Stream		26.13		7.67			
Ambient Network	Cheat River	WVMC	30	24-Jun-14	8:00:00 AM	1140	Mid-Stream		22.82		7.23			
Ambient Network	Cheat River	WVMC	30	21-May-14	9:20:00 AM	2210	Mid-Stream		15.84		6.49			
Ambient Network	Cheat River	WVMC	30	05-Mar-14	9:00:00 AM		Right Bank		0.02		5.8		6.74	
Ambient Network-Duplicate	Cheat River	WVMC	30	06-Feb-14	10:30:00 AM									
Ambient Network	Cheat River	WVMC	30	06-Feb-14	10:30:00 AM		Right Bank		2.3		7.39			
Ambient Network	Cheat River	WVMC	30	14-Jan-14	8:25:00 AM		Right Bank		3.19		6.32			
Ambient Network	Cheat River	WVMC	30	27-Dec-13	8:40:00 AM		Mid-Stream		1.42		6.37			
Ambient Network	Cheat River	WVMC	30	06-Nov-13	4:00:00 PM		Right Bank		10.04		7.07			
LTMS/Ambient Network	Cheat River	WVMC	30	16-Oct-13	12:00:00 PM		Mid-Stream		17.79		7.74			

Ambient Network	Cheat River	WVMC	30	29-Aug-13	9:45:00 AM				17.42		6.66			
Ambient Network	Cheat River	WVMC	30	29-Jul-13	5:00:00 PM		Mid-Stream		23.93		7.41			
Ambient Network	Cheat River	WVMC	30	25-Jun-13	9:00:00 AM		Mid-Stream		25.46		7.17			
Ambient Network	Cheat River	WVMC	30	29-May-13	3:00:00 PM		Right Bank		20.69		6.66			
Ambient Network	Cheat River	WVMC	30	02-Apr-13	5:30:00 PM		Mid-Stream		5.97		6.58			
Ambient Network-Duplicate	Cheat River	WVMC	30	02-Apr-13	5:30:00 PM									
Ambient Network	Cheat River	WVMC	30	26-Feb-13	9:00:00 AM		Mid-Stream		3.11	L	6.11		7.05	
Ambient Network	Cheat River	WVMC	30	08-Jan-13	3:00:00 PM		Right Bank		1.35		6.52			
Ambient Network	Cheat River	WVMC	30	27-Nov-12	2:20:00 PM		Mid-Stream		3.66		6.66			
Ambient Network	Cheat River	WVMC	30	23-Oct-12	1:05:00 PM	460	Mid-Stream		13.65		7.33			
Ambient Network	Cheat River	WVMC	30	11-Sep-12	9:30:00 AM	348	Mid-Stream		19.91		7.73			
LTMS/Ambient Network	Cheat River	WVMC	30	15-Aug-12	9:20:00 AM		Right Bank		24.34		7.8			
Ambient Network	Cheat River	WVMC	30	01-Aug-12	11:20:00 AM	2690	Left Bank		23.8		7.61			
Ambient Network	Cheat River	WVMC	30	26-Jun-12	12:30:00 PM	202	Mid-Stream		24.73		7.59			
Ambient Network	Cheat River	WVMC	30	24-May-12	9:15:00 AM	1580	Right Bank		20.33		7.11			
Ambient Network	Cheat River	WVMC	30	03-May-12	9:45:00 AM	7000	Right Bank		16.24		6.98			L
Ambient Network	Cheat River	WVMC	30	06-Mar-12	8:30:00 AM	4200	Right Bank		2.7		6.66			
Ambient Network	Cheat River	WVMC	30	23-Jan-12	4:45:00 PM	3640	Right Bank		4.92		7.26			
Ambient Network	Cheat River	WVMC	30	14-Dec-11	8:15:00 AM	2190	Right Bank		2.62		6.52			
Ambient Network	Cheat River	WVMC	30	15-Nov-11	9:00:00 AM	912	Right Bank		10.03		6.42			
Ambient Network	Cheat River	WVMC	30	31-Oct-11	5:15:00 PM	4030	Right Bank		7.97		6.03			
Ambient Network	Cheat River	WVMC	30	27-Sep-11	8:30:00 AM	805	Mid-Stream		20.89		6.92			I
LTMS/Ambient Network	Cheat River	WVMC	30	30-Aug-11	1:10:00 PM	531	Mid-Stream		23.6		7.48			
Ambient Network	Cheat River	WVMC	30	15-Jun-11	8:45:00 AM	594	Mid-Stream		19.99		7.42			
Ambient Network	Cheat River	WVMC	30	23-Feb-11	10:30:00 AM	9110	Right Bank		3.48		6.17			
Ambient Network	Cheat River	WVMC	30	02-Feb-11	9:00:00 AM	2380	Right Bank		-0.07		6.17			
Ambient Network-Duplicate	Cheat River	WVMC	30	02-Feb-11	9:00:00 AM									
Ambient Network	Cheat River	WVMC	30	21-Dec-10	9:15:00 AM		Right Bank		-0.07		5.02		7.08	
Ambient Network	Cheat River	WVMC	30	20-Oct-10	5:40:00 PM		Right Bank		13.05		7.71			
LTMS/Ambient Network-Duplicate	Cheat River	WVMC	30	18-Aug-10	10:00:00 AM		Mid-Stream							
LTMS/Ambient Network	Cheat River	WVMC	30	18-Aug-10	10:00:00 AM		Mid-Stream		25.79		7.79			
Ambient Network	Cheat River	WVMC	30	18-Aug-10	12:00:00 PM		Right Bank		25.59		7.49			
Ambient Network	Cheat River	WVMC	30	09-Jun-10	6:30:00 PM		Right Bank		18.94		7.28			
Ambient Network	Cheat River	WVMC	30	12-Apr-10	3:30:00 PM		Right Bank		15.37		7.02			
Ambient Network	Cheat River	WVMC	30	01-Mar-10	3:25:00 PM		Right Bank		0.41		5.63			
Ambient Network	Cheat River	WVMC	30	08-Dec-09	4:40:00 PM		Right Bank		3.17		6.29			
Ambient Network	Cheat River	WVMC	30	28-Oct-09	10:45:00 AM		Right Bank		10.92		7.11			
LTMS/Ambient Network	Cheat River	WVMC	30	11-Aug-09	2:20:00 PM		Mid-Stream		25.4		7.35			
Ambient Network	Cheat River	WVMC	30	10-Aug-09	6:00:00 PM		Right Bank		26.1		7.59			
Ambient Network	Cheat River	WVMC	30	21-Jul-09	4:20:00 PM		Right Bank						7.34	
Ambient Network-Duplicate	Cheat River	WVMC	30	21-Jul-09	5:20:00 PM								7.37	
Ambient Network	Cheat River	WVMC	30	20-May-09	5:15:00 PM		Thalweg		19.88		7.3			
Ambient Network	Cheat River	WVMC	30	15-Apr-09	10:40:00 AM		Right Bank		8.22		6.73			
Ambient Network-Duplicate	Cheat River	WVMC	30	15-Apr-09	11:00:00 AM									
Ambient Network	Cheat River	WVMC	30	10-Dec-08	2:30:00 PM		Mid-Stream		3.35		7.3			
Ambient Network	Cheat River	WVMC	30	29-Oct-08	9:00:00 AM		Mid-Stream		7.66		7.58			
Ambient Network-Duplicate	Cheat River	WVMC	30	29-Oct-08	9:00:00 AM									
LTMS/Ambient Network	Cheat River	WVMC	30	12-Aug-08	3:30:00 PM		Mid-Stream		23.04		7.67			
Ambient Network	Cheat River	WVMC	30	18-Jun-08	3:30:00 PM		Mid-Stream		18.63		7.46			
Ambient Network	Cheat River	WVMC	30	16-Apr-08	12:00:00 PM		Mid-Stream		12.94		7.01			
Ambient Network	Cheat River	WVMC	30	20-Feb-08	10:45:00 AM		Mid-Stream		1.69		6.76			
Ambient Network	Cheat River	WVMC	30	18-Dec-07	9:55:00 AM		Mid-Stream		2.46		6.17			
Ambient Network-Duplicate	Cheat River	WVMC	30	01-Nov-07	8:30:00 AM		Mid-Stream							
Ambient Network	Cheat River	WVMC	30	01-Nov-07	8:30:00 AM		Mid-Stream		9.65		7.22			
LTMS/Ambient Network/TMDL-Benthic	Cheat River	WVMC	30	15-Aug-07	9:15:00 AM		Mid-Stream		21.91		7.2			
Ambient Network	Cheat River	WVMC	30	02-Jul-07	11:15:00 AM		Mid-Stream		23.22		7.32			I
TMDL-Final	Cheat River	WVMC	30	19-Jun-07	1:20:00 PM		Right Bank		33.41		7.18			
TMDL-Secondary	Cheat River	WVMC	30	30-May-07	1:45:00 PM		Right Bank		27.24		7.26			
TMDL-Secondary	Cheat River	WVMC	30	24-Apr-07	12:20:00 PM		Right Bank		14.69		6.65			

Ambient Network	Cheat River	WVMC	30	10-Apr-07	5:00:00 PM		Right Bank		7.37		6.91			H
TMDL-Secondary	Cheat River	WVMC	30	06-Mar-07	11:10:00 AM		Right Bank		1.12		6.83			H
Ambient Network	Cheat River	WVMC	30	20-Feb-07	3:45:00 PM		Right Bank		0.21		7.25			
TMDL-Secondary	Cheat River	WVMC	30	06-Feb-07	12:00:00 PM		Right Bank		1.58		6.7		7.03	
TMDL-Secondary	Cheat River	WVMC	30	10-Jan-07	4:30:00 PM		Right Bank		3.07		6.79		6.95	
Ambient Network	Cheat River	WVMC	30	19-Dec-06	12:15:00 PM		Mid-Stream		6.11		6.01			I
TMDL-Secondary	Cheat River	WVMC	30	05-Dec-06	12:15:00 PM		Right Bank		2.48		6.55			
TMDL-Secondary	Cheat River	WVMC	30	16-Nov-06	8:55:00 AM		Right Bank		9.17		6.34			
Ambient Network	Cheat River	WVMC	30	01-Nov-06	12:30:00 PM		Right Bank		11.66		6.55			
TMDL-Secondary	Cheat River	WVMC	30	17-Oct-06	5:45:00 PM		Right Bank		11.03		7.43			
TMDL-Secondary	Cheat River	WVMC	30	27-Sep-06	12:15:00 PM		Right Bank		19.18		7.69			
TMDL-Duplicate	Cheat River	WVMC	30	27-Sep-06	12:15:00 PM		Right Bank							
Deployables-Initial Installation/Final Retrieval	Cheat River	WVMC	30	07-Sep-06	12:39:00 PM		Left Bank		19.06		6.89			
TMDL-Secondary (Lat Profile)	Cheat River	WVMC	30	30-Aug-06	11:30:00 AM		Left Bank		25.05		7.6			
TMDL-Secondary (Lat Profile)	Cheat River	WVMC	30	30-Aug-06	11:30:00 AM		Mid-Stream		24.59		7.62			
TMDL-Secondary (Lat Profile)	Cheat River	WVMC	30	30-Aug-06	11:30:00 AM		Right Bank		24.69		7.66			
Ambient Network-Duplicate	Cheat River	WVMC	30	16-Aug-06	12:00:00 PM		Mid-Stream							
Ambient Network	Cheat River	WVMC	30	16-Aug-06	12:00:00 PM		Mid-Stream		31.84		7.49			
TMDL-Initial (Lat Profile)	Cheat River	WVMC	30	29-Jun-06	10:30:00 AM		Left Bank		17.39		7.2			
TMDL-Initial (Lat Profile)	Cheat River	WVMC	30	29-Jun-06	10:30:00 AM		Mid-Stream		17.46		7.25			
TMDL-Initial (Lat Profile)	Cheat River	WVMC	30	29-Jun-06	10:30:00 AM		Right Bank		17.25		7.13			
Ambient Network	Cheat River	WVMC	30	29-Jun-06	10:45:00 AM		Mid-Stream		17.31		7.24			
Ambient Network	Cheat River	WVMC	30	04-Apr-06	1:00:00 PM		Right Bank		11.4		6.88			
Ambient Network	Cheat River	WVMC	30	22-Feb-06	12:30:00 PM		Right Bank		1.47		6.6			
Ambient Network	Cheat River	WVMC	30	12-Dec-05	1:45:00 PM		Right Bank		1.34		6.16			
Multiplate-Retrieval	Cheat River	WVMC	30	13-Sep-05	12:00:00 PM		Right Bank		35.63		7.81			
Ambient Network	Cheat River	WVMC	30	06-Sep-05	1:40:00 PM		Mid-Stream		29.65		7.29			
Multiplate-Installation	Cheat River	WVMC	30	19-Jul-05	10:50:00 AM		Right Bank		24.14		7.52			
Ambient Network	Cheat River	WVMC	30	01-Jun-05	12:30:00 PM		Mid-Stream		18.6		6.9			
Ambient Network	Cheat River	WVMC	30	15-Feb-05	12:20:00 PM		Mid-Stream							
Ambient Network	Cheat River	WVMC	30	15-Feb-05	12:20:00 PM		Mid-Stream		6.19		6.5			
Ambient Network	Cheat River	WVMC	30	16-Dec-04	9:30:00 AM		Mid-Stream		0.05		8.21			I
Ambient Network	Cheat River	WVMC	30	16-Dec-04	9:30:00 AM		Mid-Stream							
Ambient Network	Cheat River	WVMC	30	15-Sep-04	5:30:00 PM				22.07		7.27			
Ambient Network	Cheat River	WVMC	30	15-Sep-04	5:40:00 PM									
Ambient Network	Cheat River	WVMC	30	15-Jun-04	12:00:00 PM		Right Bank		21.27		7.27			
Ambient Network	Cheat River	WVMC	30	24-Mar-04	4:00:00 PM		Right Bank		4.68		6.95			
Ambient Network	Cheat River	WVMC	30	08-Dec-03	3:20:00 PM		Mid-Stream		1.98		7.75			
Ambient Network	Cheat River	WVMC	30	10-Sep-03	2:30:00 PM		Mid-Stream		21.21		7.34			
Ambient Network	Cheat River	WVMC	30	30-Jul-03	4:50:00 PM		Mid-Stream		23.75		6.51			
Ambient Network	Cheat River	WVMC	30	10-Mar-03	10:45:00 AM		Mid-Stream		3.71		7.57			
Ambient Network	Cheat River	WVMC	30	11-Dec-02	11:30:00 AM	957			1.47		7.48			
Ambient Network	Cheat River	WVMC	30	25-Sep-02	2:30:00 PM	444			25.8		7.87			
Ambient Network	Cheat River	WVMC	30	12-Jun-02	11:30:00 AM	796	Thalweg		29.35		7.52			
Ambient Network	Cheat River	WVMC	30	12-Mar-02	10:45:00 AM	937	Thalweg		9.01		7.7			
Ambient Network	Cheat River	WVMC	30	03-Dec-01	9:20:00 AM		Mid-Stream		11.6		7.6			
Ambient Network	Cheat River	WVMC	30	12-Sep-01	3:40:00 PM		Thalweg		32.16		7.6			
Ambient Network	Cheat River	WVMC	30	27-Jun-01	2:00:00 PM		Thalweg		31.1		7.2			
Ambient Network	Cheat River	WVMC	30	22-Mar-01	1:30:00 PM		Mid-Stream		5.3		6.9			
Ambient Network	Cheat River	WVMC	30	18-Dec-00	9:12:00 AM		Thalweg		2.3		6.7			
Ambient Network	Cheat River	WVMC	30	12-Sep-00	9:40:00 AM		Thalweg		26.5		7.2			
Ambient Network	Cheat River	WVMC	30	14-Jun-00	7:33:00 AM		Thalweg		29.2		6.9			
Ambient Network	Cheat River	WVMC	30	27-Mar-00	7:05:00 AM		Thalweg		9.2		6.2			
Ambient Network	Cheat River	WVMC	30	13-Dec-99	9:05:00 AM		Mid-Stream		5		6.9			
Ambient Network	Cheat River	WVMC	30	31-Aug-99	8:35:00 AM		Thalweg		24.6		7.2			
Ambient Network	Cheat River	WVMC	30	29-Jun-99	7:05:00 AM		Thalweg		28.5		7.3			
Ambient Network	Cheat River	WVMC	30	16-Mar-99	6:40:00 AM		Mid-Stream		3.3		6.3			
Ambient Network	Cheat River	WVMC	30	03-Dec-98	1:53:00 PM		Mid-Stream		7.45		7			
Ambient Network	Cheat River	WVMC	30	31-Aug-98	7:58:00 AM		Mid-Stream		32.2		7			

Ambient Network	Cheat River	WVMC	30	22-Jun-98	2:50:00 PM		Mid-Stream							
Ambient Network	Cheat River	WVMC	30	31-Mar-98	6:53:00 AM		Mid-Stream		13.8		6.3			
Ambient Network	Cheat River	WVMC	30	11-Dec-97	8:30:00 AM		Mid-Stream		3.9		6.9			
Ambient Network	Cheat River	WVMC	30	03-Sep-97	7:45:00 AM		Mid-Stream		32.4		7			
Ambient Network	Cheat River	WVMC	30	06-Jun-97	2:45:00 PM		Mid-Stream		16.7		6.7			
Ambient Network	Cheat River	WVMC	30	25-Mar-97	12:49:00 PM		Mid-Stream		8.7		7			
Ambient Network	Cheat River	WVMC	30	10-Dec-96	12:50:00 PM		Mid-Stream		2.4		7.4			
Ambient Network	Cheat River	WVMC	30	19-Sep-96	11:40:00 AM		Mid-Stream		15.6		6.6			
Ambient Network	Cheat River	WVMC	30	18-Jun-96	7:40:00 AM		Mid-Stream		27		7.5			
WAP	Cheat River	WVMC	30	18-Jun-96	5:00:00 PM									
Ambient Network	Cheat River	WVMC	30	12-Mar-96	11:27:00 AM		Mid-Stream		2.8		7.8			
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jun-95	10:56:00 AM				22.5		7.4		7.06	
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-May-95	10:16:00 AM				14.6		7.5		6.97	
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Apr-95	11:04:00 AM				15.8		7.3		6.84	
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Mar-95	10:03:00 AM				8.7		7.7		6.74	
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Feb-95	12:30:00 PM				3.3		6.8		6.65	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jan-95	10:13:00 AM				3.4		7.2		8.09	
Ambient Network (LEGACY)	Cheat River	WVMC	30	07-Dec-94	9:59:00 AM				10.1		7		7.01	
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-Nov-94	11:05:00 AM				15.8		7.5		7.03	
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Oct-94	11:00:00 AM				23.2		7.6		6.76	
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Sep-94	11:28:00 AM				25.6		8			
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Aug-94	11:42:00 AM				18.1		7.2			
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Jul-94	10:55:00 AM				30.1		7.3		7.24	
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-Jun-94	12:45:00 PM				34.9		7.3		6.34	
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-May-94	10:00:00 AM				14.2		6.8		6.53	
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Apr-94	11:00:00 AM				9.8		7.5		6.44	
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Mar-94	10:35:00 AM				2.1		6.6		5.76	
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Feb-94	12:14:00 PM				0		6.3		5.65	
Ambient Network (LEGACY)	Cheat River	WVMC	30	25-Jan-94	10:23:00 AM				1		6.9		7.03	
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Dec-93	11:12:00 AM				5.1		7.9		6.49	
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Nov-93	10:24:00 AM				5.1		8		7.23	
Ambient Network (LEGACY)	Cheat River	WVMC	30	05-Oct-93	11:45:00 AM				17.1		7.7		7.17	
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Sep-93	11:15:00 AM	138			30		7.5		5.78	
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-Aug-93	10:09:00 AM	104			31		4.3		4.54	
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Jul-93	11:55:00 AM	129			33		6.6		5.6	
Ambient Network (LEGACY)	Cheat River	WVMC	30	07-Jul-93	11:40:00 AM	304			33.9		7		6.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-May-93	11:43:00 AM	1420			17.5		6		4.87	
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Apr-93	11:50:00 AM	6640			8.2		6.8		5.93	
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Mar-93	11:31:00 AM	4120			3.6		6.5		6.04	
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Feb-93	10:42:00 AM	506			6.9		5.6		5.19	
Ambient Network (LEGACY)	Cheat River	WVMC	30	26-Jan-93	11:00:00 AM	3340			1.3		6.9		6.41	
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Nov-92	11:02:00 AM				12.6		6.8			
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Oct-92	11:55:00 AM				27.5		6.7		6.07	
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Sep-92	12:52:00 PM				28		6.3		6.43	
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Aug-92	12:44:00 PM				22.7		6.3		6.19	
Ambient Network (LEGACY)	Cheat River	WVMC	30	07-Jul-92	12:09:00 PM				24.9		6.9		6.66	
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Jun-92	12:30:00 PM				18.2		6.5		6.65	
Ambient Network (LEGACY)	Cheat River	WVMC	30	05-May-92	10:20:00 AM	2530			12.3		6.8		6.3	
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Apr-92	11:40:00 AM	2410			12.6		5.7		5.22	
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-Mar-92	11:19:00 AM	3870			7.4		6		5.73	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Feb-92	11:16:00 AM	1130			2.5		6.4		5.53	
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jan-92	12:40:00 PM	2440			4.8		6.6		6.13	
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-Dec-91	10:45:00 AM	46768			9.8		6.9		6.45	
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Nov-91	10:10:00 AM	680			17.4		7		6.91	
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Oct-91	10:25:00 AM				29		7.6		6.91	
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Sep-91	12:05:00 PM	388			31.4		7.5		7.02	
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Aug-91	11:13:00 AM	765			29.3		7.5		6.81	
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Jul-91	11:30:00 AM	660			34.3		7.4		7.01	
Ambient Network (LEGACY)	Cheat River	WVMC	30	05-Jun-91	10:25:00 AM				28.3		7.3		7.2	

Ambient Network (LEGACY)	Cheat River	WVMC	30	08-May-91	11:30:00 AM				17.2		7.1		6.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-91	10:54:00 AM	3100			13.3		7.5		5.87	
Ambient Network (LEGACY)	Cheat River	WVMC	30	05-Mar-91	11:40:00 AM	9100			4.2		7.4		6.41	
Ambient Network (LEGACY)	Cheat River	WVMC	30	05-Feb-91	10:23:00 AM				4.1		6.7		5.63	
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Jan-91	11:40:00 AM	3490			4.5		6.2		5.19	
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Dec-90	11:14:00 AM	1060			7.7		7.1		6.09	
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Nov-90	10:50:00 AM	726			10.7		7.2		6.29	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Oct-90	10:55:00 AM	726			24		7		6.37	
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Sep-90	12:07:00 PM	1190			17.3		7.5		6.58	
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Aug-90	11:32:00 AM	855			25.6		7.1		6.37	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jul-90	11:26:00 AM	607			27.5		6.2		5.36	
Ambient Network (LEGACY)	Cheat River	WVMC	30	26-Jun-90	1:35:00 PM	461			29.5		8.1		6.7	
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-May-90	11:08:00 AM	2440			19.7		6.9		6.34	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-90	11:37:00 AM	9830			8.7		7.5		6.67	
Ambient Network (LEGACY)	Cheat River	WVMC	30	26-Mar-90	11:20:00 AM	1550			10.9		7.3		6.26	
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Feb-90	11:18:00 AM	1040			7.6		6.4		5.23	
Ambient Network (LEGACY)	Cheat River	WVMC	30	31-Jan-90	12:15:00 PM				6.3		6.8		6.18	
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Dec-89	11:53:00 AM				8.3		6.6		5.53	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Nov-89	10:55:00 AM	4240			12.8		7		6.31	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-Oct-89	11:19:00 AM	1900			19		7		6.55	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Sep-89	12:53:00 PM				20.8		7.9		6.39	
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Aug-89	12:15:00 PM				29.4		6.9		6.58	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Jul-89	11:10:00 AM	6730			19.5		7		6.47	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jun-89	10:11:00 AM	1190			22.2		6.7		6.14	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-May-89	9:30:00 AM	8120			10.6		5.9		6.53	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-89	12:37:00 PM	2310			6.6		6.2		6.29	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Mar-89	10:40:00 AM	1850			7.5		5		4.93	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Feb-89	12:09:00 PM	6310			5.9		6.1		6.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Jan-89	11:05:00 AM	6510			5.4		4.9		5.29	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Dec-88	12:07:00 PM	671			10.4		6.4		6.06	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Nov-88	11:50:00 AM	1470			15.7		6.8		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Oct-88	12:44:00 PM	160			30		6.1		6.45	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	28-Sep-88	11:28:00 AM	2200			17.2		6.9		6.88	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Aug-88	11:45:00 AM	55			32.3		5.1		5.28	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	25-Jul-88	12:10:00 PM	216			31.4		6.7		6.78	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	28-Jun-88	9:36:00 AM	125			31.3		4.5		4.62	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	25-May-88	11:03:00 AM	4560			14.1		6		6.73	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Apr-88	10:00:00 AM	1920			8.4		6.7		6.54	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Mar-88	10:52:00 AM	1130			9.9		5.2		5.61	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Feb-88	11:28:00 AM	6460			6.1		5.9		6.41	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Jan-88	11:15:00 AM	25800			1.1				6.64	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Dec-87	10:45:00 AM	1810			9.7				6.02	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Nov-87	10:40:00 AM				14		6.9		6.85	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-Oct-87	11:13:00 AM				22.1		6.8		6.86	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Sep-87	10:50:00 AM	350			28.1		7.3		7.07	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Aug-87	10:11:00 AM				34.6		5.1		5.02	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	28-Jul-87	9:53:00 AM	92			36.1		4.5		4.58	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Jun-87	10:10:00 AM	970							7.05	
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-May-87	10:20:00 AM	970							6.57	
Ambient Network (LEGACY)	Cheat River	WVMC	30	31-Mar-87	9:35:00 AM				10.8				6.62	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Mar-87	12:10:00 PM								6.8	
Ambient Network (LEGACY)	Cheat River	WVMC	30	24-Feb-87	10:40:00 AM				7		6.3		6.56	
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jan-87	11:20:00 AM				6.6		6.2		6.66	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Dec-86	11:48:00 AM				9.1		5.8		6.22	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Nov-86	2:30:00 PM				9.9		6.2		6.71	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Oct-86	9:45:00 AM				17.4		6.7		7.02	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Sep-86	11:09:00 AM				27.8		6.9		7.21	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Aug-86	12:17:00 PM	500			30.5		6.8		7.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jul-86	11:30:00 AM	2300			23.2		7		6.9	N

Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Jun-86	10:40:00 AM				26.2		6.9		7.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-May-86	10:09:00 AM				15.5		6.9		7.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Apr-86	12:43:00 PM				7.9		6.8		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Mar-86	11:15:00 AM				4.5		6.6		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Feb-86	9:30:00 AM				5.8		6.8		6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jan-86	10:15:00 AM				0		7		7.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Dec-85	10:18:00 AM				5.4		5.5		5.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Nov-85	11:04:00 AM				10.2		6.4		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Oct-85	10:50:00 AM	140			17.8				6.7	
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Sep-85	10:40:00 AM	427			32.4		6.9		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Aug-85	10:35:00 AM	176			34.3		6.7		6.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Jul-85	10:50:00 AM	16600			17.1		6.9		6.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Jun-85	10:40:00 AM	3540			19.2		6.2		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-May-85	8:05:00 AM	778			23		6.3		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Apr-85	11:40:00 AM	1820			6.2		6.1		5.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Mar-85	11:14:00 AM	11400			5.2		6.2		6	
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Feb-85	10:15:00 AM	3030			0.4		6.7		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Jan-85	10:25:00 AM	1730			3.3		5.6		6.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Dec-84	10:28:00 AM	4000			5.9		6.2		6.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Nov-84	12:34:00 PM	5480			3.9		6.9		7.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	30-Oct-84	8:30:00 AM	7110			15.5		5.9		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Sep-84	10:36:00 AM	436			28.9		6.9		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Aug-84	10:52:00 AM	15700			18.9		6.3		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jul-84	10:59:00 AM	16900			17.3		7.04		7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jun-84	8:30:00 AM	264			33.5		4.2		4.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-May-84	9:22:00 AM	1870			10.3		5.5		5.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-84	10:41:00 AM				10.7		5.8		5.5	
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Mar-84	11:50:00 AM				7.6				6.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Feb-84	2:00:00 PM				4.8		5.8		5.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Dec-83	12:00:00 PM	5110							5.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Oct-83	8:40:00 AM	48			31.4		4		4.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Sep-83	8:39:00 AM	125			30.5		4.5		5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Aug-83	10:02:00 AM	116			33.1		4		5.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jul-83	8:50:00 AM	166			28.4		5		5.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jun-83	8:30:00 AM	403			27.3		4.5		5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-May-83	8:35:00 AM	1790			15.2		5.4		5.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Apr-83	7:19:00 AM	4560			7.8		6.1		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Mar-83	11:20:00 AM	2720			7.1		3.3		5.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Feb-83	12:45:00 PM	3710			7.8		6.4		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Jan-83	10:45:00 AM	691			9.4		4.4		5.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Dec-82	11:00:00 AM	1330			8.1		7.2		6.1	
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Nov-82	10:00:00 AM	1160			12.4		6.6		7.1	
Ambient Network (LEGACY)	Cheat River	WVMC	30	20-Oct-82	8:00:00 AM	950			16.1		6.1		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Sep-82	8:23:00 AM	227			33		6.5		6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Aug-82	10:40:00 AM	1170			23.2		6.7		6.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jul-82	7:43:00 AM	778			24.5		6.4		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Jun-82	8:35:00 AM	4000			17.2		6		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-May-82	8:35:00 AM	592			24.5		5.5		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Apr-82	10:28:00 AM	3840			10.5		6.3		6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Mar-82	11:00:00 AM				7.9		5.9		6.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Feb-82	9:10:00 AM	4880			6		6.7		6.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	26-Jan-82	1:45:00 PM	2800			0.4		6.7		5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Nov-81	11:00:00 AM	766			11.8		5.7		6.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Oct-81	11:45:00 AM	223			24		4.4		5.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Sep-81	8:50:00 AM	3573			18.9		5.6		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Aug-81	9:05:00 AM	503			27.5		4.8		5.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jul-81	7:11:00 AM	608			23.4		6		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Jun-81	9:30:00 AM	2370			23				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-May-81	1:00:00 PM	7006			14		7.1		6.7	N

Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Apr-81	12:30:00 PM	3503			12.2		6.1		6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Mar-81	12:15:00 PM	1763			7.3		4.9		5.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Feb-81	12:45:00 PM	6148			7		7.1		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-Jan-81	2:20:00 PM	515			8		6.7		5.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Dec-80	4:00:00 PM	1728		C	6		6.6		5.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Nov-80	3:30:00 PM	10370		C	6		6.8		6.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Oct-80	7:30:00 AM	191			19.6		5.9		6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	30-Sep-80	8:45:00 AM	325			25.2		6.1		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Aug-80	11:30:00 AM	1566			22.4		5.3		5.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Jul-80	12:30:00 PM	683		C	35		6.8		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Jun-80	4:30:00 PM	6496		C	17		6.9		6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-May-80	12:45:00 PM	15428		C	16				6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Apr-80	12:00:00 PM	2020		C	17				5.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Mar-80	12:00:00 PM	4048		CT	4		4.8		6.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Feb-80	9:14:00 AM	510		C	7.3		4.9		5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Jan-80	7:46:00 AM	868		C	2		6.7		6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Dec-79	9:06:00 AM	1079	Mid-Stream	C	10		6.5		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Nov-79	9:22:00 AM	2912	Mid-Stream	C	9		6.1		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Oct-79	6:49:00 AM	16190	Mid-Stream	C	8.5		6.9		6.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Sep-79	6:11:00 AM	1334	Mid-Stream	C	20.5		6.8		7.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Aug-79	7:47:00 AM		Mid-Stream	C	23.1		5		7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jul-79	6:08:00 AM		Mid-Stream	C	25.7		4.7		7.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jun-79	5:27:00 AM		Mid-Stream	CT	19.8		4.9		7.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-May-79	7:47:00 AM		Mid-Stream	C	19		4.6		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-79	7:18:00 AM		Mid-Stream	C	5.9		6.2		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Mar-79	8:20:00 AM		Mid-Stream	C	6		5.5		5.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Feb-79	8:00:00 AM		Mid-Stream	C	1		4.5		7.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Jan-79	8:30:00 AM		Mid-Stream	C	0.5		6.5		5.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Dec-78	8:10:00 AM		Mid-Stream	C	2		4.8		5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Nov-78	9:55:00 AM		Mid-Stream	C	27		4.7		4.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Oct-78	9:15:00 AM		Mid-Stream	C	28		4.4		4.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Sep-78	9:35:00 AM		Mid-Stream	C	36		6.4		5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Aug-78	10:00:00 AM		Mid-Stream							
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Jul-78	9:20:00 AM		Mid-Stream	C	22		6.1		7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jun-78	2:20:00 PM		Mid-Stream	C	24		6.7		7.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-May-78	11:45:00 AM		Mid-Stream	C	15		6.6		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-78	12:30:00 PM		Mid-Stream	C	18		5.1		5.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Mar-78	3:15:00 PM		Mid-Stream	C	2		6.1		6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Feb-78	1:15:00 PM		Mid-Stream	CT	3.1				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Jan-78	2:30:00 PM		Mid-Stream	CT	6.4		6.7		5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Dec-77	3:30:00 PM			C	4.44444		7.1		4.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Nov-77	1:45:00 PM			C	8.05556		6.9		6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Oct-77	1:00:00 PM			C	13.8889		6.5		7.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Sep-77	2:20:00 PM			C	28.8889		6.5		5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Aug-77	1:10:00 PM			C	28.8889		7.2		7.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Jul-77	1:10:00 PM			C	27.7778		6.7		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jun-77	2:45:00 PM			C	26.1111		7.1		7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-May-77	2:15:00 PM			C	13.6111				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Apr-77	2:10:00 PM			C	17.7778		5		4.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Mar-77	4:00:00 PM			C	10.5556		6.4		7.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	08-Feb-77	2:00:00 PM			C	9.72222		5.2		5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jan-77	12:30:00 PM			C	10				5.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	07-Dec-76	3:00:00 PM			C	2.5		6.3		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Nov-76	12:30:00 PM			C	8.33333		6.5		5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	12-Oct-76	7:10:00 AM			C	11.9444		6.4		5.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Sep-76	1:35:00 PM			C	36.1111		6.4		9.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Aug-76	12:30:00 PM			C	30		6.5		7.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jul-76	12:30:00 PM			C	22.5		7.3		7.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jun-76	3:35:00 PM			C	28.8889		6.7		6.1	N

Ambient Network (LEGACY)	Cheat River	WVMC	30	11-May-76	4:45:00 PM		C	19.4444		6.6		6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Apr-76	4:10:00 PM		C	10.8333		7		6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Mar-76	2:45:00 PM							5.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	13-Jan-76	3:00:00 PM		C	3.88889				5.1	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Dec-75	2:10:00 PM		C	5.55556				6.6	
Ambient Network (LEGACY)	Cheat River	WVMC	30	28-Oct-75	2:35:00 PM		C	15.5556				6.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	09-Sep-75	2:30:00 PM		C	27.7778				6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Jul-75	4:00:00 PM		C	31.6667				6.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	02-Jun-75	2:30:00 PM		C	20.5555				6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Apr-75	3:30:00 PM		C	12.2222				6.4	
Ambient Network (LEGACY)	Cheat River	WVMC	30	25-Feb-75	3:20:00 PM		C	9.44444				6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	14-Jan-75	12:05:00 PM		C	4.44444				4.6	
Ambient Network (LEGACY)	Cheat River	WVMC	30	03-Dec-74	12:30:00 PM		C	6.11111				7.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Oct-74	3:55:00 PM		C	15.2778				6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Sep-74	10:30:00 AM		C	21.6667				5.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Jul-74	3:55:00 PM		C	33.6111				4.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Jun-74	3:20:00 PM		C	18.8889				6.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Apr-74	2:01:00 PM		C	12.7778				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	26-Feb-74	1:15:00 PM		C	4.16667				5.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	15-Jan-74	2:00:00 PM		C	7.22222				4.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Nov-73	2:35:00 PM		C	15.8333				7.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Oct-73	1:45:00 PM		C	22.5				7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	21-Aug-73	2:00:00 PM		C	26.6667				6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	24-Jul-73	2:30:00 PM		C	31.6667				7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-Apr-73	3:00:00 PM		C	18.8889				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Mar-73	3:05:00 PM		C	11.6667				6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Jan-73	3:25:00 PM		C	6.11111				5.2	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-Oct-72	2:50:00 PM		C	16.6667				6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Aug-72	2:25:00 PM							6.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Jul-72	2:55:00 PM		C	26.6667				4.6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	23-May-72	2:10:00 PM		C	23.3333				6.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	11-Apr-72	2:00:00 PM		C	12.7778				5.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	27-Mar-72	2:45:00 PM		C	8.88889				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-Jan-72	12:25:00 PM		C	6.66667				4.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Nov-71	2:30:00 PM		C	7.22222				5.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Oct-71	2:05:00 PM		C	26.1111				4.8	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Jul-71	2:15:00 PM		C	33.8889				4.7	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	10-May-71	2:00:00 PM		C	14.4444				6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	29-Mar-71	3:05:00 PM		C	10				6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	22-Feb-71	1:35:00 PM		C	7.22222				6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	04-Jan-71	10:55:00 AM		C	1.11111				4.3	
Ambient Network (LEGACY)	Cheat River	WVMC	30	16-Nov-70	12:40:00 PM		C	10.5556				6.3	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	28-Sep-70	1:40:00 PM		C	20.5555				6.4	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	17-Aug-70	2:35:00 PM		C	35				6.9	
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Jul-70	2:10:00 PM		C	28.8889				5.5	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	18-May-70	1:50:00 PM		C	19.4444				6	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	06-Apr-70	2:45:00 PM		C	6.11111				4.9	N
Ambient Network (LEGACY)	Cheat River	WVMC	30	19-Jan-70	12:35:00 PM		C	0.555556				4.9	N

DO	Specific Conductance_Q	Specific Conductance	Lab Specific Conductance_Q	Lab Specific Conductance	Fecal Coliform_Q	Fecal Coliform	E Coli_Q	E Coli	Hot Acidity_Q	Hot Acidity	Cold Acidity_Q	Cold Acidity	Alkalinity_Q
									<	5			J
14.61		81				2			<	5			
11.2		70			E	90			<	5			
9.91		79			E	20			<	5			
8.43		78			E	50			<	5			
8.22		76				46			<	5			
					E	42			<	5			
10.71		78				53			O<	5			O
9.24		57				47			<	5			
11.33		59			E	50			<	5			
8.8		65			E	20			<	5			J
13.6		61				33			<	5			J
11.44		100			E	2			<	5			
9.3		59				980			<	5			
9.2		168				60			<	5			
9.53		94							<	5			
6.55		128			E	3200			<	5			
10.04		77			E	30			<	5			
10.72	N	72			E	33			<	5			
12.37		82			E	13			<	5			
12.89		65			E	93			<	5			J
11.28		79			E	14			<	5			
13.01		100			E	47			<	5			
8.42		160							<	5			
8.08		144			E	309			<	5			
7.88		72			E	20			<	5			
		76			E	112			<	5			
12.72		70			E	73			<	5			
11.73		71			E	10			<	5			
13.73		55			E	130			<	5			
11.2		71			E	132			<	5			
10.33		90			E	7			<	5			
		92			E	2			<	5			
8.23		91			E	10			<	5			
8.23		91			E	20			<	5			
6.95		109			E	39.7			<	5			
7.63		72				400			<	5			
9.74		81			E	20			<	5			
8.96		66			E	9			<	5			
14.2		65			E	10			<	5			
13.77		67				46			<	5			
13.42		77			E	200			<	5			
11.16		73				60			<	5			
9.67		158			E	30			<	5			
8.77		136							<	5			
8.77		136							<	5			
8.64		119				42			<	5			
8.69		86			E	25			<	5			
7.9		99				40			<	5			
9.12		96			E	73			<	5			
9.07		70			E	36			<	5			
13.5		76			E	2			<	5			
					E	73			<	5			
		50				52			<	5			
12.01		67				9000			<	5			
13.38		68			E	20			<	5			
9.39		78			E	36			<	5			
9.67		107							<	5			

8.96		50			E	2400		<	5			
7.21		85			E	190		<	5			
6.59		86			E	44		<	5			
9.36		80			E	14		<	5			
9.5		61			E	11		<	5			
					E	18		<	5			
10.98		85			E	9		<	5			
12.31		91				540		<	5			
11.49		75			E	18		<	5			
8.88		97			<	2		<	5			
7.81		100			E	43		<	5			
8.2		105			E	218		<	5			
6.99		84				1160		<	5			
6.15		109			E	31		<	5			
9.22		86			E	7		<	5			
6.6		57			E	291		<	5			
13.38		66			E	2		<	5			
10.95		76						<	5			
12.42		78			E	23		<	5			
8.29		98				65		<	5			
11.55		72				31		<	5			
		104				125		<	5			
8.82		94				80		<	5			
8.6		90				50		<	5			
13.57		56			E	1200		<	5			
13.76		133				200		<	5			
					E	125		<	5			
14.98		87		96	<	10		<	5			
10.94		85			E	7		<	5			
						44		<	5			
8.11		99			E	31		<	5			
7.4		98			E	27		<	5			
7.85		99			E	109		<	5			
10.56		78			<	10		<	5			
14.86		97			E	20		<	5			
14.05		75			<	10		<	5			
10.65		76				125		<	5			
8.2		94						<	5			
7.66		96				819		<	5			
				142		100		<	5			
				142		100		<	5			
8.84		77		86		74		<	5			
11.31		80		81		95		<	5			
				80		2900		<	5			
12.62		114		123		520		<	5			
11.93		193		202	<	10		<	5			
				202	<	10		<	5			
8.84		121		132		70		<	5			
9.27		71		75	E	400		<	5			
10.67		99		80	<	2		<	5			
13.56		72		87		16		<	5			
12.94		74		76	E	40		<	5			
				85		40		<	5			
11.38		79		86		37		<	5			
8.26		81		82		55		<	5			
		73		73	<	2		<	5			
5.39		104		106		70		<	5			
9		96		96		3		<	5			
6.6		78		76		5		<	5			

15.4		89	93	<	2	<	5	
24.48		91	80		3	<	5	
14.21		110	112	<	10	<	5	
13.79		136		<	6	<	3	
13.97		74			70	<	3	
		94	103	<	10	<	5	
14.48		81			40	<	3	
11.4		73		N<	5.94	<	3	
10.13		67	75		100	<	5	
13.69		103	116		1700	<	5	
14.38		118	122		19	<	5	
			121		14	<	5	
10.24		71						
8.62		118	121		42	<	5	
8.58		117	121		310	<	5	
8.01		120	121		320	<	5	
					40	<	5	
7.48		117			18	<	5	
9.44		62	68		400	<	5	
9.91		61	66		300	<	5	
9.82		61	66		440	<	5	
9.91		61			790	<	5	
10.64		75			127	<	5	
13.81		81		<	10	<	5	
14.7		91			20	<	5	
6.58		135	128			<	5	
7.72		103			10	<	5	
8.43		80						
13.13		77	79	<	10	<	5	
13.21		70			24	<	5	
		80		<	10	<	5	
11.2		90		E	20	<	4.97	
8.64		77		E	120	<	4.97	
14.27		73		HE	2	H<	1	H
13.65		97		<	2	<	1	
9.03		80			70	<	1	
10.2		73			520	<	1	
14.36		69			10	<	1	
15.33		99		<	10		3	
8.37		177			64		7	
7.6		95		E<	2	<	5	
12.8		88		E<	2	<	1	
11		138		E<	2	<	1	
7.3		147		OE	16	<	1	
7		86		<	2	<	5	
11.3		70		E	4	<	1	
11.2		60			175	<	1	
6.4	X				240	<	1	
6.7		120			4		3	
9.8		74		<	2		2	
11.6		62			25	<	1	
7.2		191			50	<	2	
6.5		169			340	<	2	
12.5		84		<	2	<	2	
10.5		96		H		<	1	
6.5		129			35	<	1	

					68	<	1
9.1				<	2		3.36
11	68				35	<	1
6.8	125				30	<	1
8.6	67				60	<	1
8.6	70				1	<	1
11.5	77				5		6
9	63				650	<	1
7.7	135				49	<	1
					20000		
13.7	104			H			1
8.5	106	N	94.1		130	<	1
9.7	81	N	76.6	<	10	<	1
9.2	86	N	89.5	<	10	<	1
	73		60		100	<	1
12.5			95	<	10	<	1
12.2	74	N	60.9	<	10	<	1
10.1	65	N	64.2		320	<	1
9.8	99	N	89.3		10	<	1
8	205	N	185.9	<	100	<	1
					40		3
9.2	66		57		450		
8	81	N	79.9		100	<	1
6.7	99	N	79.4		90	<	1
9.1	83	N	73.4		30		2
10.6	67	N	54.6	<	10	<	1
12.9	87			<	10		2
13	82			<	10		9
13.1	91				10	<	1
11.6	70				10	<	1
13	95		91			<	1
8.5	122	N	101.7	<	10	<	1
7.2	161	N	101.7	<	10	<	1
7.2	274		229	<	10	<	1
6.8	199		152		30	<	1
7.3	147	N	122.2		60	<	1
	88	N	74.6	<	10	<	1
11.1	60	N	48.3		50	<	1
12.3	90	N	64.8	<	10	<	1
11.8	115	N	92.3	<	10	<	1
13.4	80	N	65.1	<	10	<	1
10.6	95	N	77.2	<	10	<	1
7.7	169	N	131.1	<	10	<	1
7.3	115	N	93.4	<	10	<	1
8	94	N	67.8		70	<	1
7.7	80		63		30		5
8.4	90	N	73.5	<	10	<	1
9.7	67	N	544.4		50	<	1
10.1	91	N	83.7		10		10
11.2	79	N	69.5	<	10		13
12.7	103	N	90.5	<	10		6
11.2	95	N	66.7		30		6
10.4	60	N	57.1				22
9.3	111	N	95.2		10		1
7.6	127	N	95.1		10		2
7.1	97	N	85.5		20	<	1
7	78	N	69.2		40	<	1
6.8	103	N	90.6		70	<	1
7.6	158					<	1

9.2		100				10		9
		84				10		10
12.5		73				850	<	1
12.4		97				10		8
12.4		95			<	10		27
10.4		111				50		18
11.2		101			<	100	<	1
8.1		141				100		1
8.9		117				200		6
7.9		85				300		14
7.3		183				450		17
10.8		128			<	10		5
8.6		87	N	62.6		30		15
10.4		92	N	61.5		40		11
10.7		88	N	69.2	<	10		28
12.1		117	N	92.8	<	10		27
11.2		77	N	57.3	<	100		27
11.1		132		122	<	10	<	1
9.5		105		95		40		21
8.7		90		73		10		18
		89		68		80		30
7		119		114	<	100	<	1
8.7		79		66		690		19
9		93	N	84.7		20		24
10.1		66	N	57.7		20		19
10.9		82	N	68.8	<	10		20
10.9	N	83.5	N	83.5	<	10		15
10.9		81		68	<	10		5
11.6		89	N	92.3	<	10		21
11		98		112	<	10		17
10.3		74		89	<	10		8
6.6		188		160	<	10		5
8.6				62		60		8
6.2		267		195	<	10		31
6.2		105		84		30		7
6.5		200		165		10		26
9.2		67		47		80		13
9.4		81		62		20		4
10.3		104		86		20		60
10.2		82		66		230		11
11.7		70		66		220		13
10.3		97		82	<	10		17
9.5		92		73		40		19
8.1		117		106		20		10
6.9				96	<	10		15
5.8		235		220	<	10		29
5.7		240		190	<	10		44
				82	<	10		9
				72	<	10		19
9.9		82		65		40		20
				55		30		14
		107		84	<	10	<	1
11.2		110		98	<	10		2
10.7		94		80	<	10		27
10.6		73		70		100		14
8.5		99		86		130		16
6.8				120		10		15
6.6		119		110		20		21
7.8		75		64		390		15

6.8		106		95		50		<	1		
8.5		67		58		550		<	1		
10.8		76		65	<	10		<	1		
11.3		56		40		80		<	1		
11.6		66		55		50		<	1		
13.4		119		100	<	10		<	1		
11.8		104		90	<	10		<	1		
9.9		95		70		20		<	1		
		165		150		30		<	1		
6.5		127		110		30		<	1		
6		126		110	<	100			22		
		80		70		3880			49		
8.2		98		98		450			30		
10.9				90	<	1			31		
12		88		75	<	1			21		
		38		55		10			30		
14		78		94	<	10			12		
13.1		94		120		10			54		
12.5		77		84	N<	10			25		
11.6		51		54	N	170			20		
9.1		48		42	N	360			55		
7.3		93		94	N<	100			14		
8.5		57		50	N	600			23		
9.2		60		50	N	1100			19		
6		153		120	N<	10			25		
8.3				70	N	10			8		
				70	N<	10			13		
11.1		50		55	N	10			9		
9.2		87		75	N<	10			28		
				60					10		
5.8		203		190	N<	10			14		
6.1		181		180	N<	10			11		
5.8		141		120	N<	10			9		
6.3		126		100	N<	10			8		
6.9		117		110	N<	10			10		
9.3		72		82	N<	10			12		
11		57		50	N	10			4		
8.1				70	N<	10			16		
9		88		80	N<	10			13		
8.2		130		120	N<	10			10		
				65	N<	10		<	1		
				70	N	90		<	1		
9.2		62		67	N	20		<	1		
6		113		90					7		
7.5		55		70	N	240		<	1		
7.2		88		80	N	20			1		
8.7		48		50	N	90		<	1		
7.5		88		80	N<	10			6		
11.3		55		50	N	110			20		
10.5		61		60	N<	10			28		
10.7		70		70	N<	10			28		
11.6		55		75	N<	10			11		
10.4		90		88					17		
7.8		121		108					29		
8.1		85		82	N	80			21		
6.8		108		84	N<	10			21		
7.5		95		90					22		
8.2		100		80	N<	100			69		
8.9		80		70					6		

9.2				75					6			
10.5				75					8			
12.7		62		60	N	10			4			
12.1		90		110	N<	10			9			
12.1		63		77	N<	10			4			
11.3		50		55	N	570			5			
8.1		132		130	N<	10			4			
7.4		106		110	N<	10		<	1			
7.8		74		95	N<	100			9			
8		110		90	N<	10			7			
9.5		70		55	N	400			12			
9.2		90		60	N	280			7			
9.1		110		75	N<	10			8			
12.5		57		50	N<	10			5			
10.7		105		100	N<	10			8			
13.5		100		80	N<	10			4			
11.9		95		80	N<	10			5			
10.1		80		60	N<	10		<	1			
10.4		65		55	N	170		<	1			
7.7		90		70	N	10		<	1		3	
7.5		80		58	N	50			2		3	
7.9		100		80	N<	10			4		3	
8.6		75		50	N	20			1		4	
8.2		79		90	N<	10			5		5	
11.6		66		60	N<	10			4		2	
12.4		95		70	N<	10			9		7	
13.2		88		70	N<	10			3		4	
13.2		80		75	N<	10			13		15	
12.1				75	N<	10			9		12	
7.8		170		140	N<	10			18		18	
7.7		200		160	N<	10			21		14	
6.8		150		120	N<	10			5		6	
7.3					N<	10			20		7	
7.2				80	N<	10			5		5	
10		70		80	N<	10			2		3	
9		100		90	N<	10			10		7	
13.3		90		82	N<	10			5		2	
15.2		125		100	N<	10			12		17	
11.9		160		102	N<	10			10		8	
13.6		95		130	N<	10			14		20	
12.6		120		100	N<	10			4		4	
10.3				90	N	70			6		4	
7.6		150		130	N<	10			7		7	
8.1		140		120	N	90			3		3	
7.3		115		120	N	970			5		4	
7.8		100		100	N<	10			7		5	
6.7		95			N<	10			8		7	
9.5		105		110	N<	10			14		13	
10.6		90		65	N<	10			7		3	
11.3		130		120	N<	10			11		12	
11.8		130		120	N<	10		<	1		9	
12		110		90	N	10			12		8	
9.9		120		100	N<	10			11		10	
9.9		95		70	N	10			8		4	
6.9		350		150	N<	10			9			
7.3		110		100	N	10			3		2	
7.9		100		110	N	200			2		4	
6.7		150		110	N<	10			11		4	

8.1		110	
10.6		100	
9.9			
11.3			
9.2			
5.8			
6.5			
7.6			
10.3			
9.5			
9.4			
8			
6.9			
8.9			
10			
7.8			
6.8			
7.5			
7.8			
7.3			
7.7			
10.7			
12			
9.9			
7.1			
7.8			
8.6			
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90	N<	10	
90	N<	10	
98	N<	10	
100	N<	10	
60	N<	10	
82	N<	10	
100	N<	10	
108			
61	N	70	
77	N<	10	
58	N<	10	
100	N<	10	
88	N<	10	
100	N<	10	
98	N<	10	
130	N<	10	
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70	N<	10	
98	N<	10	
110	N<	10	
100	N	20	
70	N<	10	
96	N	70	
84	N<	10	
51	N<	10	
108	N<	10	
69	N	40	
98	N<	10	
116	N<	10	
72	N<	10	
69	N<	10	
70			
126	N<	10	
104	N	170	
110	N<	10	
140	N<	10	
64	N<	10	
73	N<	100	
75	N<	100	
141	N	100	
70	N<	100	
102	N	400	
102	N	130	
142	N<	10	
94	N<	10	
92	N<	10	
103	N<	100	

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Alkalinity	Lab Hardness_Q	Lab Hardness	Hardness_Q	Hardness	Sulfate_Q	Sulfate	Bromide Total_Q	Bromide Total	Chloride Total_Q	Chloride Total	TSS_Q	TSS	TDS_Q	TDS	P Total_Q	P Total	OrthoPO4 Total_Q
12.1						8.34	<	0.05		2.81		10		38		0.0185	
15.2			C	33.54		14.8	<	0.05	J	2.1	<	2		41		0.011	
13.6			C	29.56		11.1	<	0.05	J	1.46	J	2		48		0.0102	
17.3			C	30.72		11.8	<	0.05	J	1.23	<	2		51		0.0116	
25.2			C	37.46		8.62	<	0.05	J	1.12	<	2		55		0.011	
21.6			C	33.56		10.4	<	0.05	J	1.32	<	2		40		0.0129	
21.6			C	33.56		10.2	<	0.05	J	1.27	<	2		54		0.0112	
21.1			C	29.9		9.35	<	0.05	J	1.45	<	2	O	46		0.0131	
15.5			C	23.92		8.45	<	0.05	J	1.21		7		51		0.0135	
13.5			C	24.08		10.7	<	0.05	J	1.67		9		38		0.0204	
11.4			C	27.15		12.6	<	0.05	J	2.26		11		43		0.0173	
11.2			C	24.08		9.91	<	0.05	J	2.25		9		33		0.0199	
14.9			C	38.69		21.9	<	0.05	J	1.78	<	2		79		0.0066	
13.8			C	22.33		11.2	<	0.05	J	1.46		26		38		0.0316	
16.5			C	68.15		52.3	<	0.05		3.14	<	2		106		0.0059	
18.6			C	38.44		33.7	<	0.05	J	2.08	J	2		53		0.0072	
21.8			C	49.32		42.1	<	0.05	J	1.79		17		66		0.0439	
16.8			C	29.15		11.1	<	0.05	J	1.48	<	2		44		0.0114	
14.9			C	28.31		12.4	<	0.05	J	1.69	J	2		41		0.0085	
14.2			C	41.28		17.4	<	0.05		2.8	<	2		54		0.0088	
12.4			C	26.4		11.4	<	0.05	J	2.21		6		40		0.0144	
15			C	31.63		15.8	<	0.05	J	2.41	<	2		55		0.008	
19.1			C	38.27		18.2	<	0.05	J	2.35	<	2		59		0.0066	
21.1			C	62.59		40.9	<	0.05		2.73	J	4		94	J	0.005	
25.9			C	59.45		34	<	0.05		2.88	J	3		117		0.0119	
19.9			C	32.31		13.2	<	0.05	J	1.56	J	2		38		0.0106	
18.1			C	34.04		13.1	<	0.05	J	1.76	<	2		58		0.01	
17			C	29.64		13.8	<	0.05	J	1.83		15		50		0.0235	
14.7			C	28.64		15.9	<	0.05	J	2.16	J	2		35		0.0089	
12.7			C	28.39		10.5	<	0.05		3.04		64		53		0.0338	
15.4			C	30.96		15.8	<	0.025		1.97		6		51		0.0168	
19			C	41.51		22.4	<	0.025		2.24	<	2		57		0.0125	
18.9			C	43.99		25.3	<	0.025		2.16	<	2		61		0.0111	
22.7			C	45.49		18.8	<	0.025		2.31	<	2		55		0.0186	
21.8			C	45.24		18.2	<	0.025		2.04	<	2		51		0.0145	
21.8			C	45.24		25.2	<	0.025		2.49	<	2		72		0.0066	
16			C	33.87		12.4	<	0.025		1.63	<	2		53		0.0144	
17			C	35.44		16.9	<	0.025		2.14	<	2		62		0.0083	
13			C	30.63		14.7	<	0.025		3.22		71		53		0.0151	
10			C	25.89		13.8	<	0.025		2.05	<	2		38		0.006	
13			C	25.23		10.6	<	0.025		3.11		7		48		0.012	
14			C	28.8		14.4	<	0.025		1.91	<	2		43	R	0.0053	
17			C	32.21		13.8	<	0.025		1.87	<	2		44	R	0.008	
17			C	62.83		46.8	<	0.025		3.61	<	2		97		0.006	
19			C	55.94		37.2	<	0.025		3.28	<	2		86	<	0.004	
19			C	57.1		36.8	<	0.025		3.31		2		90	<	0.004	
21			C	47.97		26.4	<	0.025		2.83	<	2		71	<	0.004	
16			C	37.35		22.7	<	0.025		2.17		4		62	<	0.004	
18			C	40.76		21.1	<	0.025		2.5	<	2		88		0.056	
18			C	39.76		22	<	0.025		2.48	<	2		71		0.04	
15			C	27.06		14.1	<	0.025		1.83		3		44		0.037	
15			C	31.05		14.2	<	0.025		3.73	<	2		51		0.04	
10			C	21.66		7.54	<	0.025		2.11		142		42		0.083	
10			C	21.66		7.72	<	0.025		2.2		136		41		0.074	
13			C	27.73		11	<	0.025		3.01		3		44		0.04	
13			C	27.31		12.2	<	0.025		2.61		6		43		0.044	
17			C	35.53		14	<	0.025		2.45	<	2		45		0.05	
23			C	48.24		26	<	0.025		2.56		2		77	<	0.01	

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17.6
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C	30.37	5.97	<
C	34.45	12.7	<
C	36.2	16.2	<
C	30.14	15.6	<
C	24.65	8.68	<
C	24.9	8.56	<
C	34.78	15.2	<
C	37.19	19.2	<
C	32.71	17.4	<
C	44	17.9	<
C	44.34	14.9	<
C	43.09	18	<
C	35.38	10	<
C	50.57	26	<
C	35.45	17	<
C	27.81	8	<
C	27.48	12	<
C	30.71	14	<
C	32.21	16	<
C	36.28	23	<
C	27.73	13	<
C	45.17	23	<
C	44.42	22	<
C	43.75	21	<
C	25.73	10	<
C	53.04	32	<
C	53.95	26	<
C	42.01	23	<
C	39.69	19	<
C	45.91	20	
C	47.08	20	
C	47.99	20	
C	33.71	18	
C	36.78	20	
C	39.6	20	
C	31.97	13	
C	42.49	13	
C	47.49	18	
C	40.77	16	
C	68.66	33	
C	67.75	32	
C	28.23	17	
C	31.8	15	
C	32.05	14	
N	51	25	
N	89	69	
N	86	64	
C	55.7	29	
N	30	14	
N	35	13	
N	36	16	
N	32	14	
N	35	13	
N	35	13	
C	35.62	12	
N	32	12	
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0.025	1.17		184	51		0.177
0.025	2.1	<	2	46		0.019
0.025	2.13	<	2	46		0.037
0.025	2.1		2	71		0.026
0.025	2.81		7	48		0.017
0.025	2.81		8	46		0.016
0.025	4	<	2	54		0.007
0.2	3	<	2	53	<	0.003
0.2	2	<	2	52		0.008
0.2	3	<	2	60		0.012
0.2	3	<	2	65		0.01
0.1	2	<	2	64	<	0.01
0.1	2		15	63		0.037
0.1	2	<	2	76		0.012
0.1	2		5	80		0.014
0.1	2		31	36		0.02
0.1	2		10	67		0.014
0.2	3		4	39	<	0.003
0.1	2	<	2	58		0.014
0.1	3	<	2	65		0.006
0.1	2		20	44		0.016
0.1	3	<	2	71		0.011
0.1	2		3	68	<	0.01
0.1	2	<	2	59		0.012
0.2	3		35	51		0.024
0.1	9		29	83		0.047
0.2	9		19	87		0.042
0.1	3	<	2	67		0.005
0.1	2	<	2	49		0.009
	2	<	2	73	<	0.01
	2	<	2	66	<	0.01
	2	<	2	89		0.005
	2		3	58		0.026
	3		2	30		0.011
	5		4	69		0.006
	2	<	2	54		0.007
	2	<	2	45		0.01
	2	<	2	80		0.007
	2		3	53		0.017
	3		3	69		0.017
	3		5	70		0.017
	2		3	47		0.008
	3		3	76		0.007
	2		2	51		0.019
	6		11	66		0.073
	4	<	2			0.008
	4	<	2			0.007
	2	<	2			0.012
	2		5			0.027
	2	<	2			0.008
	3		2			0.004
	2	<	2			0.011
	2	<	2			0.011
	2	<	2			0.012
	2	<	2			0.01
	2	<	2			0.013
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		<	2			
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N	38		18	
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N	43		23	
			38	
			19	
N	40		23	
			23	
			23	
N	33		13	
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			24	
			24	
N	56		28	
N	54		28	
			10	
			10	
			10	
N	29		10	
N	33		16	
N	35		19	
N	38		20	
C	55.54		31	
N	44		21	
N	38		16	
N	30.5		13.5	
N	35.79999923		16	
N	36.7		13.5	
N	32.8		7.8	
N	21	H	12	
N	33		19	
N	32		16	
N	24		12	
N	25		12	
N	39		19	
N	78		45	
N	34.7		16.4	
N	31		29	
N	50		36	
C	58.28		38	
C	30.47		27.3	
N	26.29999923		19	
N	20.8		9	
N	40		18	
N	42.2		36	
N	27		20	
N	27		14	
N	70		58.1	
N	47		54.5	
N	33		23	
N	35		25	
N	50		38	

	3		2			0.012	
			8				
	5		2			0.003	
		<	3				
		<	3				
	2	<	2		<	0.003	
		<	3				
		<	3				
	2	<	2			0.009	
			22				
			4				
			4				
		<	3				
		<	3				
		<	3				
	3	<	3			0.013	
	3	<	3			0.009	
			12				
			12				
			13				
	2		53			0.026	
	4	<	3			0.004	
	3	<	3			0.007	
	3	<	3		<	0.003	
	3	<	3		<	0.02	
	3	<	3			0.03	
	2	<	3			0.015	
	3.66		6.4			0.014	
	2.73	<	3			0.006	
	1.36	<	3		<	0.012	
	1.51	<	3		<	0.1	
	2.2	H	2		HN	0.02	
	2.3		3		N<	0.01	
	1.8		4		N	0.09	
	1.1		20		N	0.17	
	2.09		5		N	0.03	
	15.2		2		N<	0.01	
	4.28		26		N	0.09	
	1.48	<	3		<	0.1	
	2.41		3			0.02	
	7.52		2		<	0.01	
	2.9		2		<	0.01	
	3.52	<	5		<	0.02	
	3.1		3		N<	0.01	
	2.5		1		N	0.07	
	1.3		2		N	0.04	
	1.9		1		<	0.01	
	1.5		7		HN	1.4	
	1.4		2		N<	0.3	
<	5	<	5		<	0.02	
<	5	<	5		<	0.02	
<	5		6		<	0.02	
	3.2	<	5		<	0.02	
	3.1	<	5		<	0.02	

15.6	N	25	14		1.6		11	<	0.02
10	N	20	12		1.63	<	5		0.0267
14	N	25	15		3		13	<	0.02
16	N	44	42		2		5	<	0.02
12	N	26	17	<	1	<	5	<	0.02
11	N	29	17		1	<	5	<	0.02
24	N	34	22		1	<	5	<	0.02
14	N	29	13		1		9	<	0.02
17	N	44	33		2		5	<	0.02
8			24				13	<	0.02
11			17.8			<	1		0.008
5			18.34				3	O	0.007
6			17.4				6		0.004
4			16.6				7		0.005
15			33.8				4		0.006
8			19.54				10		0.004
9			16.5				11		0.011
14			23.7				12		0.003
4			73.8				6		0.006
10			54				2		0.004
			14.6				20		0.013
12			20.7				6	<	0.001
13			23.6				7		0.007
7			22.3				7		0.009
3			19.8			<	1		0.005
4			28				1		0.006
2			26				3		0.008
6			26.8				7		0.006
3			20.4				5		0.007
5			24.1				8		0.006
10			26.4				7		0.003
7			39.4				6		0.011
1			101.2				5		0.003
2			67.2				14		0.001
15			37.4				5		0.005
5			25.1				88		0.004
3			12.5				16		0.017
5			22.2				8		0.006
1			28.7				6		0.011
4			16.8				10		0.008
4			21.4			<	1		0.009
3			52			<	1		0.004
5			28.7				10		0.008
6			24.9				6		0.008
10			18.3				10		0.033
56			22.7			<	1		0.005
6			16.4				2		0.013
1			28.7				10		0.006
4			22.1				4		0.006
4			30.5				9		0.006
6			27				32		0.026
8			16.2				278		0.111
12			27.6			<	1		0.001
12			33.4				4		0.002
12			20.1				7		0.005
10			14.8				12		0.009
11			27.8				2		0.013
11			44.6				2		0.003

8	23.8	<	1		0.007
4	19.6		3		0.011
4	15.4		42		0.041
2	24.9	<	1		0.007
4	26.6		44		0.011
4	25.6		33		0.027
4	25.6		8		0.004
8	41		7		0.017
8	20.2	<	1		0.008
4	17.6		7		0.02
2	53		52		0.068
8	28.8		3		0.01
6	18.2		2		0.009
6	17.5		18		0.031
5	19.8		10		0.007
1	34.5		9		0.01
3	17.9		12		0.008
3	39	<	1		
6	19.8		18		0.026
10	21.8	<	1		0.008
5	18.8		4		0.012
5	75		1		0.006
9			88		0.079
20			6		0.011
5			21		0.021
3			12		0.007
1			2		0.011
4			14		0.008
2		<	1		0.01
2			9		0.006
9			4		0.007
3			13		0.012
10			4		0.011
1	96		5		0.006
10	28	<	1		0.01
1	60		5		0.008
8	18		12		0.013
6	22		7		0.008
2	30		18		0.01
5	24		52		0.0739999
8	20		125		0.102
5	30		12		0.017
10	22		6		0.012
8			4		
10	30		5		
2	90		1		0.008
1	92		3	<	0.01
14	24		6		
5	28		30		0.02
6	23		33		0.025
8	14		4		0.033
56	27		10		0.004
34	37	<	1		0.013
3	29		8		0.025
10	20		14		0.009
10	29				0.034
10	43	<	1	<	0.001
23	31		3		0.013
16	20		15		0.044

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			26	
			15	
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			13	
			36	
			34	
			29	
			62	
			37	
			43	
			35	
			36	
			40	
			30	
			15	
			28	
			42	
			35	
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N	10		15	
N	10		32	
N	8		15	
N	28		24	
N	48		44	
N	34		22	
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N	62		46	
N	68		48	
N	50		27	
N	28		18	
N	46		24	
N	36		22	
N	54		44	
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N	38		17	
N	32		20	
N	42		42	
N	50		19	
N	60		30	
N	84		12	
			35	
N	42		18	
N	40		20	
			24	
N	46		28	
N	48		36	
N	54		50	
			33	
N	42		44	
N	48		36	
N	38		34	
N	46		24	

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				37		
				5		
				52		
				37		
				16		
				2		
				23		
				11		
				11		
			<	1		
				227		
				84		
				8		
				5		
				24		
				2		
				7		
				16		
		51		33	N	58
		6		8	N	72
		1		54	N	54
		2		255	N	34
		9	<	1	N	88
		2		12	N	66
		2		8	N	46
		5		31	N	30
		7		4	N	53
				15	N	9
		6	<	1	N	126
		7	<	1	N	131
		4		1	N	97
		5		4	N	91
		4	<	1	N	83
		4		16	N	61
		3		7	N	46
		3		7	N	56
		5		11	N	49
		3	<	1	N	73
		2	<	1	N	31
		2		9	N	56
		4		8	N	60
		3				
		1		9	N	52
		7		6	N	64
		1				
		2	<	1	N	43
		2		14	N	52
		4		15	N	53
		4		44	N	37
		3		21	N	49
		2		10	N	60
		5		7	N	88
		3		37	N	71
		4	<	1	N	63
		3		7	N	66
		2		22	N	35
		4		53	N	69

	0.028	
	0.06	
	0.05	
	0.085	
	0.06	
	0.02	
	0.065	
	0.055	
	0.025	
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	0.005	
	0.015	
	0.075	
	0.01	
	0.01	
	0.185	
	0.02	
	0.012	
	0.028	
	0.12	
	0.042	
	0.007	
	0.082	
	0.02	
	0.025	
	0.01	
	0.012	
	0.015	
	0.016	
	0.008	
	0.008	
	0.011	
	0.003	
	0.008	
	0.011	
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	0.006	
	0.011	
	0.023	
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	0.01	
	0.007	
	0.023	
	0.01	
	0.11	
	0.01	
	0.099	
	0.014	
	0.048	
	0.01	
	0.035	
	0.025	
	0.061	
	0.075	
	0.02	
	0.016	

6	N	26	22		4		26	N	53	0.03	
4	N	34	31		3		12	N	50	0.009	
7	N	28			3		82	N	60		
4	N	56	46		3		14	N	84	0.03	
5	N	64	33		3		5	N	62	0.015	
10	N	32	21		3		189	N	49	0.05	
6	N	68	59	<	1	<	1	N	82	0.056	
19	N	56	36		2		1	N	66	0.023	
5	N	32	26		3		10	N	65	0.03	C
9	N	56	43		3		2	N	61	0.015	
11	N	38	18		3		28	N	46	0.043	
7	N	32	25		1		261	N	78	0.0919999	
4	N	36	36		4		14	N	59	0.013	
10	N	32	20		2		3	N	36	0.025	
2	N	50	44		5		2	N	63	0.021	
5	N	38	32		1		18	N	80	0.012	
5	N	36	34		2		3	N	87	0.016	
9	N	36	22		4		6	N	27	0.036	
8	N	32	15		2		21	N	47	0.053	
9	N	42	29		3		7	N	68	0.037	
11			21				11	N	53	0.025	
7	N	48	30		1		2	N	45	0.017	
9	N	34	24		1		11	N	30	0.025	
7			28		1		9	N	59	0.053	
6	N	30	20		1		2			0.019	
5	N	48	26		1		18	N	61	0.01	
6			24		5		42	N	45	0.02	
3			31		3		11	N	64	0.021	
1	N	38	30		7		14	N	51	0.005	
1			70		8		5	N	84	0.01	
1	N	98	80		6		3	N	129	0.015	
13			28		6		5	N	76	0.025	
			23							0.043	
3			31		4		21	N	59	0.082	
5	N	40	34		2		9	N	61	0.03	
5	N	28	23				19	N	54	0.025	
4	N	32	33		2		13	N	76	0.019	
7	N	42	26		3		435			0.064	
1	N	36	43		2		15	N	67	0.027	
2			40		4		9	N	64	0.12	
2	N	38	60		5		17			0.065	
8	N	68	48		5		13	N	74	0.024	
4	N	30	44		4		35	N	67	0.049	
1	N	52	66		2		10	N	82	0.015	
8	N	52			4		10	N	64	0.019	
7	N	50	41		2		74	N	64	0.147	
3	N	48	31		4		13	N	59	0.061	
2			24		5		9	N	46	0.168	C
6			36		3		37	N	58	0.05	C
1	N	30	22		5		25	N	33	0.076	C
4	N	50	45		5		2	N	80	0.017	C
6	N	44	42				76			0.028	C
4	N	32	27		5		130	N	49	0.032	C
2	N	38	37		3		148				
2	N	48	22		4		26	N	47	0.022	C
5			51		12		3	N	77	0.008	C
13	N	66	26		5		14	N	73	0.087	C
10			20		6		60			0.024	C
4	N	46	34		5		11	N	80	0.01	C

19	N	62	36	6	1	N	66	0.006	C
7	N	36	24	6	17	N	59	0.018	C
5	N	46	38	5	19	N	73	0.025	C
7	N	38		5	65	N	60	0.065	C
10	N	34	9	5	12			0.02	N
10	N	32	13	7	2	N	55	0.07	N
6	N	38	40	5	80			0.118	N
14	N	52	39	5	93	N	68	0.35	N
14	N	18	16	3		N	48	0.035	N
13	N	32	30	9	145	N	67	0.06	N
14	N	20	22	9	30			0.2	N
2	N	24	36	2	37	N	59	0.018	N
8	N	36	27	7	12	N	59	0.023	
15	N	42	23	6	10	N	67	0.011	
12	N	28	24	11		N	68	0.024	
8	N	46	43	9	14	N	81	0.001	
12	N	40	18	4	37	N	45		
5	N	26	25	8	19	N	52		
10	N	26	30	10	35	N	60		
8	N	54	34	10	23	N	63		
14	N	48	27	8	116	N	82		
15	N	46	37	7	29	N	65		
9			25	9	18	N	54		
13			32	12	41	N	76		
11	N	80	30	8	25	N	65		
9	N	10	17	6	15	N	40		
8	N	62	39	12	16	N	65		
18	N	32	20	5	16	N	52		
9	N	36	30	6					
4	N	32	40	5	10	N	68		
10	N	28	25	3	19	N	50		
5	N	26	25	4					
5	N	26	28	3	20	N	52		
4	N	38	55	10	16	N	82		
5	N	38	40	8					
14	N	40	45	14	27	N	75		
5	N	42	46	13	9	N	81		
11	N	28	19	7	23	N	45		
8	N	30	19	12	14	N	61		
8	N	22	26	4	89	N	53		
	N	48	47	6	55	N	95		
6	N	40	23	3	10	N	59		
8	N	40	38	6	114	N	72		
11	N	36	24	4	7	N	76		
5	N	46	46	6	10	N	91		
5	N	32	29	2	18	N	62		
3	N	36	36	4	21	N	59		
3	N	32	40	6	14	N	78		

OrthoPO4 Total	OrthoPO4 Dissolved_Q	OrthoPO4 Dissolved	NO2-NO3-N_Q	NO2-NO3-N	NO2-N Total_Q	NO2-N Total	NO3-N Total_Q	NO3-N Total	TKN_Q	TKN	N Total_Q	N Total	Ammonia-N_Q	Ammonia-N	DOC_Q
				0.428						0.179			<	0.02	
				0.369					J	0.101	CJ	0.47	<	0.02	
				0.323					J	0.099	CJ	0.42	<	0.02	
				0.225						0.132	C	0.36	<	0.02	
				0.087						0.235	C	0.32	<	0.02	
				0.063					<	0.075	C<	0.14	<	0.02	
				0.063						0.151	C	0.21	<	0.02	
				0.114						0.133	C	0.25	<	0.02	
				0.127						0.155	C	0.28	<	0.02	
				0.288						0.18	C	0.47	<	0.02	
				0.31						0.134	C	0.44	<	0.02	
				0.453						0.193	C	0.65	<	0.02	
				0.17					J	0.077	CJ	0.25	<	0.02	
				0.259						0.352	C	0.61	<	0.02	
				0.127						0.179	C	0.31	<	0.02	
				0.154						0.13	C	0.28			
				0.126						0.223	C	0.35	<	0.02	
				0.082						0.232	C	0.31	<	0.02	
				0.256						0.18	C	0.44	<	0.02	
				0.268					J	0.11	CJ	0.38	<	0.02	
				0.404						0.15	C	0.55	<	0.02	
				0.223						0.15	C	0.37	<	0.02	
				0.056						0.18	C	0.24	<	0.02	
				0.07						0.19	C	0.26	<	0.02	
				0.097						0.2	C	0.3	<	0.02	
				0.063						0.15	C	0.21	<	0.02	
				0.09						0.58	C	0.67	<	0.02	
				0.158						0.26	C	0.42	<	0.02	
				0.23						0.14	C	0.37	<	0.02	
				0.412						0.21	C	0.62	<	0.02	
				0.272						0.2	C	0.47	<	0.02	
				0.013						0.12	C	0.13	<	0.02	
				0.024						0.18	C	0.2	<	0.02	
				0.036						0.2	C	0.24	<	0.02	
				0.037						0.2	C	0.24	<	0.02	
				0.058						0.23	C	0.29	<	0.02	
				0.104						0.42	C	0.52		0.02	
				0.062						0.26	C	0.32		0.04	
				0.21						0.18	C	0.39		0.03	
				0.301						0.11	C	0.41		0.02	
				0.456						0.18	C	0.64	<	0.02	
				0.327						0.11	C	0.44	<	0.02	
				0.215					<	0.05	C<	0.26			
				0.134						0.1	C	0.23		0.05	
				0.123					<	0.05	C<	0.17			
				0.121					<	0.05	C<	0.17			
				0.173						0.2	C	0.37	<	0.02	
				0.246						0.12	C	0.37	<	0.02	
				0.155						0.18	C	0.34	<	0.02	
				0.207						0.08	C	0.29	<	0.02	
				0.29					<	0.4	C<	0.69	<	0.25	
				0.412					<	0.5	C<	0.91	<	0.5	
				0.511					<	0.5	C<	1.01	<	0.5	
				0.52					<	0.5	C<	1.02	<	0.5	
				0.42					<	0.5	C<	0.92	<	0.5	
				0.416					<	0.5	C<	0.92	<	0.5	
				0.107						0.5	C	0.61	<	0.5	
				0.031						0.8	C	0.83	<	0.5	

0.336		1	C	1.34	<	0.5
0.131		0.5	C	0.63	<	0.5
0.101		0.6	C	0.7	<	0.5
0.162	<	0.5	C<	0.66	<	0.5
0.43		0.9	C	1.33	<	0.5
0.432		0.6	C	1.03	<	0.5
0.418	<	0.1	C<	0.52	<	0.5
0.333		0.8	C	1.13	<	0.5
0.263		1	C	1.26	<	0.5
0.055	<	0.5	C<	0.56	<	0.5
0.106	<	0.5	C<	0.61	<	0.5
0.132	<	0.5	C<	0.63		
0.167		0.5	C	0.67	<	0.5
0.097		0.6	C	0.7	<	0.5
0.212		0.6	C	0.81	<	0.5
0.316		0.8	C	1.12	<	0.5
0.432		0.6	C	1.03	<	0.5
0.47		0.5	C	0.97	<	0.5
0.427		0.5	C	0.93	<	0.5
0.194	<	0.5	C<	0.69	<	0.5
0.312		0.6	C	0.91	<	0.5
0.108		0.5	C	0.61	<	0.5
0.208		0.8	C	1.01	<	0.5
0.169	<	0.5	C<	0.67	<	0.5
0.405		0.6	C	1	<	0.5
0.682	<	0.5	C<	1.18	<	0.5
0.685		0.5	C	1.18	<	0.5
0.42		0.6	C	1.02	<	0.5
0.035		0.6	C	0.64	<	0.5
0.037		0.9	C	0.94	<	0.5
0.036		0.6	C	0.64	<	0.5
0.038		0.6	C	0.64	<	0.5
0.321		0.6	C	0.92	<	0.5
0.194	<	0.5	C<	0.69	<	0.5
0.505	<	0.5	C<	1	<	0.5
0.312		0.6	C	0.91	<	0.5
0.222	<	0.5	C<	0.72	<	0.5
0.086		0.6	C	0.69	<	0.5
0.082	<	0.5	C<	0.58	<	0.5
0.144		1	C	1.14	<	0.5
0.141	<	0.5	C<	0.64	<	0.5
0.172	<	0.5	C<	0.67	<	0.5
0.482	<	1	C<	1.48	<	0.5
0.448	<	1	C<	1.45	<	0.5
0.49		0.6	C	1.09	<	0.5
0.38	<	0.5	C<	0.88	<	0.5
0.35		0.5	C	0.85	<	0.5
0.23		0.8	C	1.03	<	0.5
0.25		0.8	C	1.05	<	0.5
0.28		1	C	1.28	<	0.5
0.45	<	0.5	C<	0.95	<	0.5
0.39		0.5	C	0.89	<	0.5
0.24	<	0.5	C<	0.74	<	0.5
0.25	<	0.5	C<	0.75	<	0.5
0.2	<	1	C<	1.2	<	0.5
0.2		1	C	1.2	<	0.5

	0.5		<	1	C<	1.5	<	0.5	
	0.7		<	1	C<	1.7	<	0.5	
	0.4		<	1	C<	1.4	<	0.5	
	0.4		<	1	C<	1.4	<	0.5	
	0.2		<	1	C<	1.2	<	0.5	
	0.2		<	1	C<	1.2	<	0.5	
	0.3		<	1	C<	1.3	<	0.5	
	0.5		<	1	C<	1.5	<	0.5	
	0.5		<	1	C<	1.5	<	0.5	
	0.6		<	1	C<	1.6	<	0.5	
<	0.3		<	1	C<	1.3			
<	0.3		<	1	C<	1.3	<	0.5	
<	0.3		<	1	C<	1.3	<	0.5	
	0.616		<	1	C<	1.62	<	0.5	
	0.578		<	1	C<	1.58	<	0.5	
	0.35			0.5	C	0.85	<	0.05	
	0.45			1.41	C	1.86		0.18	
H	0.66		H	0.11	HC	0.77	H<	0.06	
	0.54			0.12	C	0.66	<	0.06	
	0.34		<	0.1	C<	0.44	<	0.06	
	0.27			0.57	C	0.84		0.08	
	0.56			0.29	C	0.85	<	0.06	
	0.49			0.22	C	0.71	<	0.06	
	0.14		<	0.1	C<	0.24		0.19	<
	0.35		<	1	C<	1.35	<	0.1	
	0.42			0.74	C	1.16	<	0.06	<
	0.21		<	0.1	C<	0.31	<	0.06	<
	0.2			0.39	C	0.59		0.18	
	0.33		<	0.5	C<	0.83	<	0.5	
	0.3			0.69	C	0.99	<	0.06	
	0.23			0.52	C	0.75		0.14	<
	0.24			0.54	C	0.78	<	0.06	<
	0.07		<	0.1	C<	0.17	<	0.06	<
	0.66			0.99	C	1.65	<	0.06	<
	0.41			0.27	C	0.68		0.16	
	0.254								
	0.181		<	0.5	C<	0.68	<	0.5	
	0.535		<	0.5	C<	1.04	<	0.5	
	0.5		<	0.5	C<	1	<	0.5	
	0.298		<	0.5	C<	0.8	<	0.5	

	0.32		<	0.5	C<	0.82	<	0.5
	0.364		<	0.5	C<	0.86	<	0.5
		0.52	<	0.5			<	0.5
		0.26	<	0.5			<	0.5
		0.32		0.7			<	0.5
		0.49	<	0.5			<	0.5
	0.37		<	0.5	C<	0.87	<	0.5
		0.26		0.5			<	0.5
		0.23	<	0.5			<	0.5
	0.54		<	0.5	C<	1.04	<	0.5
	0.3							
O	0.32							
	0.36			0.12	C	0.48		
	0.4			0.16	C	0.56		
	0.46		<	0.1	C<	0.56		
	0.6			0.23	C	0.83		
	0.38			0.21	C	0.59		
	0.15			0.18	C	0.33		
	0.16		<	0.1	C<	0.26		
O	0.15		<	0.1	OC<	0.25		
				0.1				
	0.16		<	0.1	C<	0.26		
	0.29		<	0.1	C<	0.39		
	0.2		O	0.13	OC	0.33		
	0.27		<	0.1	C<	0.37		
	0.4		<	0.1	C<	0.5		
	0.47		<	0.1	C<	0.57		
	0.49		<	0.1	C<	0.59		
	0.42			0.14	C	0.56		
	0.24			0.1	C	0.34		
	0.29		<	0.1	C<	0.39		
O	0.13			0.11	OC	0.24		
	0.19			0.1	C	0.29		
	0.24			0.19	C	0.43		
	0.43			0.19	C	0.62		
	0.36			0.17	C	0.53		
	0.47			0.2	C	0.67		
	0.69			0.13	C	0.82		
	0.49			0.24	C	0.73		
	0.5			0.14	C	0.64		
	0.47			0.18	C	0.65		
	0.19			0.12	C	0.31		
	0.21			0.32	C	0.53		
	0.22			0.12	C	0.34		
	0.19			0.39	C	0.58		
	0.2			0.1	C	0.3		
	0.32			0.18	C	0.5		
	0.41			0.16	C	0.57		
	0.47			0.19	C	0.66		
	0.55			0.11	C	0.66		
	0.54			0.26	C	0.8		
	0.8			0.24	C	1.04		
	0.3		<	0.1	C<	0.4		
	0.12			0.1	C	0.22		
	0.21			0.14	C	0.35		
	0.32			0.1	C	0.42		
	0.42		<	0.1	C<	0.52		
	0.34		<	0.1	C<	0.44		

0.41		0.13	C	0.54
0.52		0.13	C	0.65
0.68		0.28	C	0.96
0.7		0.13	C	0.83
0.59		0.18	C	0.77
0.62		0.24	C	0.86
0.47		0.2	C	0.67
0.27		0.2	C	0.47
0.41		0.18	C	0.59
0.35		0.32	C	0.67
0.44		0.54	C	0.98
0.33		0.3	C	0.63
0.5		0.28	C	0.78
0.43		0.21	C	0.64
0.62		0.11	C	0.73
0.61		0.22	C	0.83
0.75		0.25	C	1
0.29		0.11	C	0.4
0.21		0.13	C	0.34
0.17		0.26	C	0.43
0.19		0.29	C	0.48
0.25		0.58	C	0.83
0.21	<	0.01	C<	0.22
0.35		0.11	C	0.46
0.38		0.01	C	0.39
0.51		0.09	C	0.6
0.52		0.12	C	0.64
0.49		0.05	C	0.54
0.38		0.06	C	0.44
0.36		0.06	C	0.42
0.22		0.08	C	0.3
0.43		0.26	C	0.69
0.06		0.06	C	0.12
0.41		0.15	C	0.56
0.07	<	0.01	C<	0.08
0.33		0.15	C	0.48
0.55		0.07	C	0.62
0.67		0.06	C	0.73
0.71		0.21	C	0.92
0.94		0.59	C	1.53
0.78		0.15	C	0.93
0.57	<	0.01	C<	0.58
0.44		0.08	C	0.52
0.38		0.2	C	0.58
0.46		0.15	C	0.61
0.42		0.04	C	0.46
0.69		0.14	C	0.83
0.72		0.32	C	1.04
0.6		0.26	C	0.86
0.73		0.09	C	0.82
0.62		0.04	C	0.66
0.61		0.12	C	0.73
0.24		0.17	C	0.41
0.17		0.04	C	0.21
0.22		0.18	C	0.4
0.65		0.16	C	0.81

	0.77	
	0.84	
	0.87	
	0.92	
	0.85	
	1.27	
	0.93	
	0.81	
	0.59	
	0.35	
	0.36	
	0.6	
	0.83	
	0.76	
	0.69	
	0.8	
	0.69	
	0.52	
	0.59	
	0.62	
	0.38	
	0.08	
	0.32	
	0.47	
	0.27	
	0.45	
	0.66	
	0.76	
	0.78	
	0.61	
	0.1	
	0.31	
	0.29	
	0.31	
	0.42	
	0.58	
	0.71	
	0.86	
	0.74	
	0.57	
	0.54	
	0.5	
	0.26	
	0.21	
	0.39	
	0.25	
	0.49	
	0.51	
	0.77	
	0.98	
	0.98	
	0.96	
	0.72	
	0.75	
	0.57	
	0.55	
	0.55	
	0.73	

	0.09	C	0.86			
	0.16	C	1.03			
	0.16	C	1.08			
	0.28	C	1.13			
	0.1	C	1.37			
	0.07	C	1			
	0.1	C	0.91			
	0.05	C	0.64			
	0.03	C	0.38			
	0.16	C	0.52			
	0.99	C	1.59			
	0.52	C	1.35			
	0.05	C	0.81			
	0.06	C	0.75			
	0.08	C	0.88			
	0.21	C	0.9			
	0.18	C	0.7			
	0.17	C	0.76			
	0.2	C	0.82			
	0.5	C	0.88		0.02	
	0.14	C	0.22		0.03	
	0.38	C	0.7		0.07	
	0.92	C	1.39		0.07	
	0.02	C	0.29		0.02	
	0.1	C	0.55		0.02	
	0.48	C	1.14		0.04	
	0.3	C	1.06		0.06	
	0.04	C	0.82		0.04	
					0.05	
	0.2	C	0.3		0.08	
	0.2	C	0.51		0.15	
	0.24	C	0.53		0.07	
	0.14	C	0.45		0.06	
	0.2	C	0.62		0.04	
	0.26	C	0.84		0.02	
	0.16	C	0.87		0.03	
	0.22	C	1.08		0.05	
	0.44	C	1.18		0.04	
	0.22	C	0.79		0.03	
	0.53	C	1.07		0.03	
	0.22	C	0.72		0.03	
	0.18	C	0.44		0.03	
	0.18	C	0.39		0.05	
	0.31	C	0.7		0.04	
	0.22	C	0.47		0.04	
	0.09	C	0.58		0.04	
	0.1	C	0.61		0.05	
	0.13	C	0.9		0.07	
	0.17	C	1.15		0.02	
	0.07	C	1.05		0.04	
	0.04	C	1		0.04	
	0.1	C	0.82		0.04	
	0.17	C	0.92		0.06	
	0.16	C	0.73		0.03	
	0.41	C	0.96		0.04	
	0.22	C	0.77		0.02	
	0.3	C	1.03		0.02	

	0.78	0.1	C	0.88		0.02
	1.03	0.6	C	1.63		0.22
	0.74	0.26	C	1		0.04
	0.69	0.45	C	1.14		0.12
	0.88	0.21	C	1.09		0.05
	0.16	0.1	C	0.26		0.09
	0.27	0.17	C	0.44		0.02
0.12	0.61	0.36	C	0.97		0.06
	0.33	0.27	C	0.6		0.28
	0.55	0.47	C	1.02		0.06
	0.57	0.19	C	0.76		0.08
	0.65	0.15	C	0.8		0.05
	0.86	0.29	C	1.15		0.03
	0.71	0.4	C	1.11		0.07
	0.6	0.14	C	0.74		0.06
	0.44	0.23	C	0.67		0.08
	0.52	0.17	C	0.69		0.1
	0.41	0.22	C	0.63		0.07
	0.29	0.1	C	0.39		0.1
	0.3	0.17	C	0.47		0.12
	0.25	0.12	C	0.37		0.06
	0.31	0.2	C	0.51		0.1
	0.42	0.13	C	0.55		0.18
	0.59	0.17	C	0.76		0.12
	0.55	0.14	C	0.69		0.07
	0.62	0.28	C	0.9		0.06
	0.89	0.1	C	0.99		0.05
	0.59	0.18	C	0.77		0.07
	0.3	0.09	C	0.39		0.05
	0.32	0.15	C	0.47		0.06
	0.36	0.17	C	0.53		0.02
	0.31	0.15	C	0.46		0.06
	0.31	0.13	C	0.44		0.09
	0.42	0.39	C	0.81		0.06
	0.48	0.2	C	0.68		0.04
	0.64	0.23	C	0.87		0.03
	0.94	0.15	C	1.09		0.07
	0.66	0.25	C	0.91		0.06
	0.8	0.27	C	1.07		0.11
	0.63	0.2	C	0.83		0.05
	0.46	0.43	C	0.89		0.17
	0.42	0.45	C	0.87		0.11
	0.18	0.12	C	0.3		0.06
	0.23	0.1	C	0.33		0.06
	0.3	0.28	C	0.58	<	0.04
	0.33	0.25	C	0.58		0.02
0.16	0.39	0.65	C	1.04		0.06
0.06	0.51	0.21	C	0.72		0.08
0.04	0.64	0.12	C	0.76		0.06
0.03	0.58	0.24	C	0.82		0.07
0.05	0.54	0.18	C	0.72		0.1
0.11	0.61	0.25	C	0.86		0.04
0.04	0.43	0.67	C	1.1		0.04
0.02	0.09	0.3	C	0.39		0.04
0.05	0.23	0.58	C	0.81		0.12
0.04	0.38	0.61	C	0.99		0.04
0.02	5.5	0.26	C	5.76		0.06

0.02			0.33					0.31	C	0.64		0.04		
0.03			0.52					0.44	C	0.96		0.09		
0.03			0.45					0.21	C	0.66		0.04		
0.07			0.56					0.12	C	0.68		0.04		
0.013			0.37					0.18	C	0.55		0.03		
0.038			0.18					0.38	C	0.56		0.1		
0.095			0.27					0.56	C	0.83		0.07		
0.24			0.18									0.14		
0.11			0.38					0.2	C	0.58		0.05		
0.043			0.43					0.27	C	0.7		0.09		
0.013			0.26					0.2	C	0.46		0.04		
0.01								0.26				0.07		
						0.6		0.25				0.04		
						0.13		0.15			<	0.03		
						0.54		0.18			<	0.03		
			0.008			0.97		0.1	C	0.11	<	0.03		
						0.1								
					<	0.05								
						0.6								
						0.12								
					<	0.2								
						0.5								
						1								
						0.7								
						4.3								
						2.2								
						2.7								
						0.35								
						0.5								
						0.26								
						0.36								
						0.25								
					<	0.05								
						0.4								
						1.03								
						0.41								
						0.15								
					<	0.05								
						0.25								
						0.4								
						0.4								
						0.35								
						0.6								
						0.2								
						0.18								
						0.82								
						0.54								
						0.45								

DOC	Ag Dissolved_Q	Ag Dissolved	Al Total_Q	Al Total	Al Dissolved_Q	Al Dissolved	As Total_Q	As Total	B Total_Q	B Total	Ba Total_Q	Ba Total	Be Total_Q	Be Total	Ca Total_Q	Ca Total	Cd Dissolved_Q	Cd Dissolved
	<	0.00005		0.278		0.077	J	0.0019	J	0.006		0.023	<	0.00012		7.4	<	0.0005
	<	0.00005		0.255		0.043	<	0.0016		0.01		0.024	<	0.00012		10.3	<	0.001
	<	0.00005		0.184		0.064	<	0.0016		0.009		0.025	<	0.00012		9.2	<	0.001
	<	0.00005		0.218		0.077	<	0.0016		0.01		0.025	<	0.00012		9.5	<	0.001
	<	0.00005		0.215		0.164	<	0.0016		0.009		0.027	<	0.00012		12.2	<	0.001
	<	0.00005		0.24		0.174	<	0.0016		0.01		0.026	T<	0.00012		10.8	<	0.001
	<	0.00005		0.237		0.164	<	0.0016		0.01		0.026	T<	0.00012		10.8	<	0.001
	<	0.00005		0.191		0.102	<	0.0016		0.009		0.026	T<	0.00012		9.5	<	0.001
	<	0.00005		0.248		0.079	<	0.0016		0.008		0.023	T<	0.00012		7.6	<	0.001
	<	0.00005		0.42		0.072	<	0.0016	<	0.003		0.023	J	0.0001		7.5	<	0.001
	<	0.00005		0.431		0.092	<	0.0016	J	0.007		0.026	J	0.0001		8.4	<	0.001
	<	0.00005		0.37		0.103	<	0.005	J	0.008		0.024	J	0.00011		7.5	<	0.001
	<	0.00005		0.406		0.045	<	0.005		0.01		0.026	J	0.0002		11.7	<	0.001
	<	0.00005		0.433		0.1	<	0.005		0.009		0.024	J	0.00008		6.8	<	0.001
	<	0.00005		0.169		0.094	<	0.005		0.018		0.043	J	0.00007		20.2	<	0.001
				0.351		0.118				0.013		0.029	J	0.00018		11.6		
	<	0.00005		0.773		0.087	<	0.005		0.011		0.037	J	0.00024		15.3	<	0.001
	<	0.00005		0.254		0.119	<	0.005		0.009		0.024	J	0.00008		9.2	<	0.001
	<	0.00005		0.256		0.072	<	0.005		0.009		0.025	J	0.0001		8.7	<	0.001
	<	0.00005		0.3		0.039	<	0.005		0.009		0.024	J	0.00019		13.4	<	0.001
	<	0.00005		0.323		0.079	<	0.005	J	0.007		0.024	J	0.00006		8.1	<	0.001
	<	0.00005		0.347		0.082	<	0.005		0.01		0.023	J	0.00013		9.7	<	0.001
	<	0.00005		0.345		0.08	<	0.005		0.011		0.027	J	0.0001		11.7	<	0.001
		0.0002		0.275		0.213	<	0.005		0.018		0.039	<	0.00002		18.8	<	0.001
	<	0.00005		0.26		0.145	<	0.005		0.015		0.04	J	0.00076		18.2	<	0.001
	<	0.00005		0.225		0.148	<	0.005		0.009		0.028	J	0.00009		10.3	<	0.001
	<	0.00005		0.3		0.172	<	0.005		0.01		0.028	J	0.00013		10.5	<	0.001
	<	0.00005		0.323		0.07	<	0.005		0.009		0.029	J	0.00006		8.9	<	0.001
	<	0.00005		0.246		0.07	<	0.005		0.008		0.024	J	0.00005		8.5	<	0.001
	<	0.00005		1.19		0.094	<	0.005		0.018		0.037	J	0.00035		8.4	<	0.001
	<	0.00007		0.326		0.08	<	0.005		0.009		0.024		0.00012		9.1	<	0.001
	<	0.00007		0.306		0.064	<	0.005		0.011		0.026		0.00017		12.5	<	0.00009
	<	0.00007		0.411		0.079	<	0.005		0.011		0.027		0.00014		13	<	0.00009
	<	0.00007		0.27		0.155	<	0.005		0.013		0.029		0.00012		13.6	<	0.00009
	<	0.00007		0.265		0.156	<	0.005		0.013		0.029		0.00009		13.5	<	0.00009
	<	0.00007		0.285		0.178	<	0.005		0.017		0.031		0.0001		13.5	<	0.00009
	<	0.00007		0.309		0.117	<	0.005		0.01		0.029		0.00009		10.1	<	0.00009
	<	0.00007		0.228		0.102	<	0.005		0.009		0.026		0.0001		10.4	<	0.00009
	<	0.00007		0.495		0.06	<	0.005		0.007		0.029		0.00012		9.3	<	0.00009
	<	0.00007		0.321		0.07	<	0.005		0.007		0.023		0.00014		7.4	<	0.00009
	<	0.00007		0.384		0.067	<	0.005		0.013		0.025		0.00017		7.3	<	0.00009
	<	0.00007		0.297		0.059	<	0.005		0.016		0.023		0.00011		8.4	<	0.00009
	<	0.00007		0.227		0.085	<	0.005		0.023		0.026		0.00008		9.6	<	0.00009
	<	0.00007		0.212		0.112	<	0.005		0.04		0.039		0.00007		18.4	<	0.00009
	<	0.00007		0.341		0.125	<	0.005		0.03		0.034		0.00012		16.3	<	0.00009
	<	0.00007		0.346		0.115	<	0.005		0.031		0.035		0.00028		16.6	<	0.00009
	<	0.00007		0.394		0.152	<	0.005		0.027		0.032		0.00012		14.1	<	0.00009
	<	0.00007		0.451		0.183	<	0.005		0.024		0.03		0.00014		11	<	0.00009
	<	0.00007		0.405		0.206	<	0.005		0.025		0.029	<	0.00001		12.2	<	0.00009
		0.0082		0.309		0.08	<	0.005		0.025		0.033		0.00013		11.8	<	0.00009
	<	0.00007		0.242		0.068	<	0.005		0.021		0.024		0.00008		8.2		0.0001
	<	0.0003		0.248		0.075	<	0.005		0.024		0.024		0.00009		9.3	<	0.0001
	<	0.0003		1.4		0.068	<	0.005		0.026		0.037		0.00013		6.2	<	0.0001
	<	0.0003		1.37		0.074	<	0.005		0.018		0.038		0.0002		6.2	<	0.0001
	<	0.0003		0.316		0.09	<	0.005		0.016		0.025		0.0001		8.3	<	0.0001
	<	0.0003		0.301		0.075	<	0.005		0.023		0.026		0.00008		8.3		0.0002
	<	0.0003		0.281		0.111	<	0.005		0.02		0.025		0.00007		10.6	<	0.0001
	<	0.005		0.353		0.104	<	0.0014		0.021		0.032		0.00011		14.7	<	0.001

<	0.0003	3.88		0.148	<	0.005	0.041	0.082		0.00031	8.7	<	0.0001
<	0.0003	0.253		0.15	<	0.005	0.022	0.027		0.00033	10.5	<	0.0001
<	0.0003	0.248		0.126	<	0.005	0.018	0.03		0.0001	11.2	<	0.0001
<	0.0003	0.302		0.13	<	0.005	0.017	0.025		0.00011	9.1	<	0.0001
<	0.0003	0.29		0.07	<	0.02	0.016	0.024	<	0.00005	7.4	<	0.0001
<	0.0003	0.3		0.07	<	0.02	0.015	0.025		0.00006	7.5	<	0.0001
<	0.0003	0.29		0.06	<	0.02	0.048	0.026		0.00007	10.3	<	0.0001
<	0.0003	0.4		0.05	<	0.02	0.023	0.027	<	0.00005	11.1	<	0.0001
<	0.0003	0.41		0.09	<	0.02	0.027	0.023			9.8	<	0.0001
<	0.0003	0.23		0.09	<	0.02	0.026	0.03			13.5	<	0.0001
<	0.0003	0.22		0.13	<	0.02	0.03	0.033			13.8	<	0.0001
		0.21		0.18						0.00006	13.3		
<	0.0003	0.31		0.1	<	0.02	0.031	0.034			11.2	<	0.0001
<	0.0003	0.37		0.23	<	0.02	0.03	0.035			15.8	<	0.0001
<	0.0003	0.4		0.14	<	0.02	0.021	0.029			10.9	<	0.0001
<	0.0003	1		0.09	<	0.02	0.009	0.036			8.5	<	0.0001
N	0.079	0.4		0.09	<	0.02	0.008	0.026			8.2	<	0.0001
<	0.0003	0.31		0.06	<	0.02	0.008	0.028			9	<	0.0001
<	0.0003	0.34		0.07	<	0.02	0.007	0.028			9.6	<	0.0001
<	0.0003	0.41		0.05	<	0.02	0.008	0.028			10.9	<	0.0001
<	0.0003	0.5		0.08	<	0.02	0.01	0.03			8.3	<	0.0001
<	0.0003	0.32		0.11	<	0.02	0.009	0.036			13.8	<	0.0001
<	0.005	0.32		0.12	<	0.02	0.01	0.032			13.5	<	0.001
<	0.0003	0.34		0.12	<	0.02	0.01	0.031			13.4	<	0.0001
<	0.0003	0.94		0.1	<	0.02	0.006	0.03			7.5	<	0.0001
<	0.0003	1.18		0.02	<	0.02	0.019	0.036			15.8	<	0.0001
<	0.0003	1.19	<	0.02	<	0.02	0.019	0.036			16	<	0.0001
<	0.0003	0.23		0.04	<	0.02	0.007	0.027			12.7	<	0.0001
<	0.00027	0.22		0.08	<	0.02	0.009	0.026			12.1	<	0.00011
<	0.00027	0.2		0.12	<	0.02	0.008	0.032			14.1	<	0.00011
<	0.00027	0.21		0.13	<	0.02	0.009	0.032			14.4	<	0.00011
<	0.00027	0.21		0.14	<	0.02	0.011	0.033			14.6	<	0.00011
T<	0.00027	0.39		0.09	<	0.02	0.009	0.03			10.2	<	0.00011
<	0.00027	0.37		0.07	<	0.02	0.009	0.026			11.1	<	0.00011
<	0.00027	0.58		0.04	<	0.02	0.011	0.026			11.9	<	0.00011
<	0.00027	0.24		0.09	<	0.02	0.018	0.025			10	<	0.00011
<	0.00027	0.42		0.08	<	0.02	0.016	0.034			12.4	<	0.00011
T<	0.00027	0.23		0.11	<	0.02					14.4	<	0.00011
<	0.00027	0.38		0.15	<	0.02	0.01	0.029			12.7	<	0.00011
<	0.00027	0.38		0.14	<	0.02	0.015	0.041			20.9	<	0.00011
<	0.00027	0.39		0.14	<	0.02	0.015	0.04			20.7	<	0.00011
<	0.0003	0.35		0.07	<	0.02	0.008	0.025			8.5	<	0.0003
<	0.0003	0.25		0.03	<	0.02	0.012	0.027			9.6	<	0.0003
<	0.0003	0.26		0.04	<	0.02	0.012	0.027			9.7	<	0.0003
<	0.00031	1.07		0.03	<	0.02						<	0.00037
<	0.00031	0.1	<	0.02	<	0.02						<	0.00037
<	0.00031	0.1		0.02	<	0.02						<	0.00037
<	0.00031	0.32		0.11	<	0.02					16.7	<	0.00037
<	0.00031	0.39	<	0.02	<	0.02							0.00043
<	0.00031	0.25		0.04	<	0.02						<	0.00037
<	0.00031	0.38		0.03	<	0.02						<	0.00037
<	0.00031	0.41		0.07	<	0.02						<	0.00037
<	0.00031	0.22		0.08	<	0.02						<	0.00037
<	0.00031	0.22		0.08	<	0.02						<	0.00037
<	0.00031	0.22		0.11	<	0.02					10.8	<	0.00037
<	0.00031	0.27		0.11	<	0.02						<	0.00037
		0.28		0.21									
		0.29		0.16									
		0.35		0.06									

	<	0.00031		0.4		0.05	<	0.02		<	0.00037
				0.54		0.06					
	<	0.00031		0.31		0.02	<	0.02		<	0.00037
				0.385		0.073					
				0.337		0.111					
	<	0.00031		0.46		0.03	<	0.02		<	0.00037
				0.299		0.109					
				0.341	<	0.065					
	<	0.00031		0.21		0.08	<	0.02		<	0.00037
				0.97		0.04					
				0.28		0.09					
				0.28		0.1					
				0.27		0.12					
				0.23		0.1					
				0.24		0.11					
	<	0.00031		0.38		0.18	<	0.025		<	0.00037
	<	0.00031		0.36		0.18	<	0.025		<	0.00037
				0.65		0.11					
				0.56		0.1					
				0.54		0.09					
	<	0.00031		0.51		0.08	<	0.025		<	0.00037
	<	0.00031		0.27		0.08	<	0.025		<	0.00037
	<	0.00031		0.31	<	0.02	<	0.025		<	0.00037
	<	0.00031		0.37		0.04	<	0.025		<	0.00037
				0.28		0.23			16.8		
	<	0.00031		0.28		0.15	<	0.025		<	0.00037
	<	0.00031		0.31		0.06	<	0.025		<	0.00037
						0.035					
	<	0.0003		0.411		0.028	<	0.025			0.001
	<	0.0003		0.391		0.028	<	0.025		N<	0.00037
						0.038					
	<	0.00028		0.39		0.19	<	0.00007		<	0.000097
						0.21					
		0.0025		0.39		0.27	<	0.00014		<	0.000194
	<	0.001		0.24		0.19	<	0.001		<	0.0005
	<	0.0002		0.36		0.08	<	0.0005		<	0.0005
	<	0.0002		0.49		0.07	<	0.001		<	0.0005
	<	0.001		0.47		0.08	<	0.001		<	0.0005
	<	0.0002		0.48		0.06	<	0.001		<	0.0005
1.7	<	0.001		0.56		0.05	<	0.001		<	0.0005
1	<	0.001		0.34		0.09	<	0.001		<	0.0005
2.82	<	0.00022		0.36		0.16	<	0.00185		<	0.00028
1		0.0002		0.49	<	0.05	<	0.001		<	0.0005
1	<	0.0002		0.3	<	0.05	<	0.001		<	0.0005
1.3	<	0.0002		0.3		0.15		0.001	17.6	<	0.0005
1.7	<	0.002		0.31		0.14	<	0.005	9.4	<	0.002
1.7	<	0.001		0.365	<	0.02	<	0.01		<	0.001
1	<	0.004		0.385		0.067	<	0.01		<	0.0003
1	<	0.004		0.454		0.114	<	0.002		<	0.0001
1	<	0.004	<	0.03	<	0.03	<	0.002		<	0.0001
1	<	0.004		0.372	<	0.03	<	0.002		<	0.0003
5	<	0.0002		0.4						<	0.0005
2.42	<	0.005	<	0.1						<	0.001
1.95	<	0.005	<	0.1						<	0.001
				0.409							
				0.221							
			<	0.05							

	0.285	
	0.368	
	0.69	
	0.4	
	0.41	
	1.2	
	0.48	
	0.6	
	0.47	
	1.1	
	0.74	
	0.7	
	0.48	
	0.48	
	0.64	
	0.78	
	0.66	
	0.52	
	0.54	
	0.2	
	0.155	
	0.48	
	0.4	
	0.38	
	0.2	
	0.6	
	0.74	
	0.86	
	0.04	
	0.652	
	0.722	
	0.542	
	0.304	
	0.17	
	0.232	
	0.14	
	0.68	
	0.258	
	0.684	
	1.06	
	0.78	
	0.8	
	0.03	
	0.8	
	0.922	
	0.76	
	0.178	
	0.292	
	0.472	
	0.764	
	0.248	
	1.068	
	4.48	
	0.452	
	0.43	
	0.492	
	0.58	
	0.056	
	0.408	

0.67
0.606
0.54
0.73
1.5
0.26
0.75
0.27
0.536
1.16
0.522
0.74
1.3
0.56
0.97
0.75
0.88
1.1
0.67
0.49
0.44
2.444
0.8
0.8
0.708
1.46
0.94
1.4
0.78
0.416
0.41
0.34
0.28
0.424
0.88
0.48
0.562
0.966
0.7
2.6
0.83
0.454
0.478
0.6
2.24
0.404
0.626
1
0.82
0.74
0.96
1
0.72
1.26
0.364
0.528
0.752

0.432				
0.896				
0.652				
0.728				
0.908				
0.08				
1.784				
1.28				
0.228				
0.42				
0.476				
3.504				
1.852				
0.696				
1.016				
0.844				
0.548				
0.74				
0.972				
0.84				
0.36	<	0.03	<	0.04
	<	0.03		
0.69	<	0.03	<	0.04
		0.023		
	<	0.002	<	0.04
	<	0.002		
0.78	<	0.002	<	0.04
	<	0.002		
0.22	<	0.002		0.08
		0.052		
0.64		0.026	<	0.04
0.76	<	0.002	<	0.04
	<	0.002		

0.96	<	0.002		0.046
		0.046		
0.4	<	0.002	<	0.04
		0.002		
	<	0.002		
0.64	<	0.002	<	0.04
	<	0.002		
0.64	<	0.002	<	0.04
		0.017		
0.92	<	0.002	<	0.04
	<	0.002		
0.62				
0.6				
1.16				
0.64	<	0.002		
0.64				
0.94				
3.26	<	0.002		
1				
1.16				
0.92	<	0.002		
0.88				
0.07				
0.52	<	0.002		
0.52				
0.8				
1.28				
0.92	<	0.002		
0.6				
0.8				
1.28	<	0.002		
1.06				
1.1				
0.18	<	0.002		
1.72				
0.68				
0.24	<	0.002		

			0.58														
			0.58														
			0.96			<	0.002										
			1.16			<	0.002										
			0.64														
			0.8			<	0.002										
			4.8														
			1.88			<	0.002										
			0.64														
			1.84			<	0.002										
			0.6														
			1.68														
			0.76														
			0.3														
			1.6														
			0.98														
		<	0.1														
			0.249														
			0.2			<	0.002										
			1.28			<	0.002										
							0.011										
<	0.004															<	0.002
<	0.002															<	0.002
<	0.004															<	0.002
<	0.004															<	0.002
<	0.004																0.006
<	0.01															<	0.001
<	0.001																0.001

Cu Dissolved_Q	Cu Dissolved	Fe Total_Q	Fe Total	Fe Dissolved_Q	Fe Dissolved	Hg Total_Q	Hg Total	K Total_Q	K Total	Mg Total_Q	Mg Total	Mn Total_Q	Mn Total	Na Total_Q	Na Total	Ni Dissolved_Q	Ni Dissolved
<	0.002		0.36		0.06				0.5		1.4		0.025		1.9	<	0.005
<	0.002		0.31		0.04				0.5		1.9		0.025		1.6	<	0.005
<	0.002		0.23		0.07				0.6		1.6		0.026		1.4	<	0.005
<	0.002		0.29		0.1				0.7		1.7		0.02		1.4	<	0.005
<	0.002		0.24		0.11				0.9		1.7		0.019		1.5	<	0.005
<	0.002		0.24		0.09				0.7		1.6		0.027		1.5	<	0.005
<	0.002		0.24		0.09				0.7		1.6		0.026		1.4	<	0.005
<	0.002		0.24		0.11				0.6		1.5		0.018		1.4	<	0.005
<	0.002		0.31		0.08				0.5		1.2		0.03	J	1.2	<	0.005
<	0.002		0.48		0.05				0.5		1.3		0.033		1.4	<	0.005
<	0.002		0.54		0.09				0.6		1.5		0.031		1.7	<	0.005
<	0.002		0.5		0.08				0.6		1.3		0.037		1.5	<	0.005
<	0.002		0.41		0.03				0.7		2.3		0.027		1.8	<	0.005
<	0.002		0.64		0.1				0.7		1.3		0.048	J	1	<	0.005
<	0.002		0.06	<	0.01				1.1		4.3		0.025		3	J	0.005
<	0.002		0.3		0.04				0.7		2.3		0.021		2		
<	0.002		1.49		0.06				1		2.7		0.085		1.8	J	0.011
<	0.002		0.32		0.13			J	0.5		1.5		0.03		1.4	<	0.005
<	0.002		0.28		0.06				0.5		1.6		0.023		1.4	<	0.005
<	0.002		0.33		0.03			J	0.4		1.9		0.027		2	<	0.005
<	0.002		0.35		0.04				0.6		1.5		0.026		1.6	<	0.005
<	0.002		0.33		0.05				0.5		1.8		0.021		1.8	J	0.007
<	0.002		0.26		0.03				0.8		2.2		0.029		1.9	<	0.005
<	0.002		0.09	J	0.01				1		3.8		0.021		2.6	<	0.005
<	0.002		0.18		0.04				0.9		3.4		0.042		2.5	<	0.005
<	0.002		0.23		0.09				0.5		1.6		0.014		1.3	<	0.005
<	0.002		0.3		0.11			J	0.4		1.9		0.025		1.4	<	0.005
<	0.002		0.44		0.07				0.6		1.8		0.065		1.7	<	0.005
<	0.002		0.26		0.05				0.5		1.8		0.019		1.7	<	0.005
<	0.002		1.93		0.07				0.7		1.8		0.147		2.2	<	0.005
<	0.001		0.42		0.06				0.7		2		0.043		1.9	<	0.005
<	0.001		0.32		0.03				0.6		2.5		0.019		2.1	<	0.005
<	0.001		0.42		0.03				0.8		2.8		0.02		2	<	0.005
<	0.001		0.27		0.06	<	0.0001		1		2.8		0.015		2.5	<	0.005
<	0.001		0.27		0.06	<	0.0001		1		2.8		0.015		2.5	<	0.005
<	0.001		0.2		0.04				0.6		2.8		0.019		1.9	<	0.005
<	0.001		0.38		0.09	<	0.0001		0.6		2.1		0.034		1.6	<	0.005
<	0.001		0.18		0.04				0.6		2.3		0.024		1.7	<	0.005
<	0.001		0.67		0.04				0.7		1.8		0.065		1.9	<	0.005
<	0.001		0.34		0.07			<	0.5		1.8		0.025		1.5	<	0.005
<	0.001		0.43		0.05				0.6		1.7		0.033		2.4	<	0.005
<	0.001		0.3		0.05				0.5		1.9		0.02		1.6	<	0.005
<	0.001		0.2		0.05				0.7		2		0.015		1.8	<	0.005
<	0.001		0.09		0.01				1		4.1		0.044		3.3		0.006
<	0.001		0.2		0.02	<	0.0001		0.9		3.7		0.04		3.1	<	0.005
<	0.001		0.2		0.01	<	0.0001		0.9		3.8		0.043		3.2	<	0.005
<	0.001		0.29		0.03				0.9		3.1		0.033		2.7	<	0.005
<	0.001		0.37		0.06				0.8		2.4		0.038		2.1	<	0.005
<	0.001		0.28		0.07				0.7		2.5		0.03		2.4	<	0.005
<	0.001		0.32		0.06				0.7		2.5		0.028		2.3	<	0.005
<	0.001		0.29		0.05				0.8		1.6		0.02		1.5	<	0.005
<	0.003		0.28		0.06				0.6		1.9		0.025		2.6	<	0.005
<	0.003		2.23		0.04				0.8		1.5		0.136		1.6	<	0.005
<	0.003		2.25		0.06				0.8		1.5		0.145		1.6	<	0.005
<	0.003		0.3		0.06				0.6		1.7		0.023		2.3	<	0.005
<	0.003		0.35		0.05			<	0.5		1.6		0.026		1.7	<	0.005
<	0.003		0.3		0.09				0.8		2.2		0.014		2.1	<	0.005
<	0.003		0.3		0.02				0.7		2.8		0.022		2.2	<	0.005

<	0.003	5.51		0.18				1.4	2.1	0.397	1	<	0.005
<	0.003	0.24		0.06				0.6	2	0.024	1.8	<	0.005
<	0.003	0.21		0.06				0.5	2	0.019	1.9	<	0.005
<	0.003	0.29		0.05				0.5	1.8	0.026	1.7	<	0.005
<	0.003	0.35		0.05			<	0.5	1.5	0.029	2	<	0.005
<	0.003	0.33		0.05				0.5	1.5	0.027	2.1	<	0.005
<	0.003	0.31		0.05				0.5	2.2	0.027	2.7	<	0.005
<	0.003	0.44		0.03			<	0.5	2.3	0.036	2.1	<	0.005
<	0.003	0.38		0.05			<	0.5	2	0.029	1.8	<	0.005
<	0.003	0.23		0.05				0.7	2.5	0.019	2.1	<	0.005
<	0.003	0.17		0.04				0.7	2.4	0.016	2.4	<	0.005
<	0.003	0.2		0.07				0.7	2.4	0.02	2.3		
<	0.003	0.47		0.08				0.7	1.8	0.06	1.9	<	0.005
<	0.003	0.24		0.06				0.7	2.7	0.024	2.4	<	0.005
<	0.003	0.31		0.04				0.5	2	0.032	1.4	<	0.005
<	0.003	1.2		0.08				0.6	1.6	0.134	1.3	<	0.005
<	0.003	0.48		0.06			<	0.5	1.7	0.037	1.4	<	0.005
<	0.003	0.32		0.04			<	0.5	2	0.032	2	<	0.005
<	0.003	0.4		0.06			<	0.5	2	0.03	1.4	<	0.005
<	0.003	0.45		0.03			<	0.5	2.2	0.033	1.9	<	0.005
<	0.003	0.64		0.09				0.6	1.7	0.044	1.4		
<	0.003	0.28		0.06				0.6	2.6	0.023	1.9	<	0.005
<	0.003	0.36		0.11				0.6	2.6	0.034	1.9	<	0.005
<	0.003	0.43		0.15				0.5	2.5	0.03	1.7	<	0.005
<	0.003	1.2		0.07				0.7	1.7	0.083	1.8	<	0.005
<	0.003	1.44	<	0.02				1	3.3	0.092	5.2	<	0.005
<	0.003	1.44	<	0.02				1	3.4	0.092	5.1	<	0.005
<	0.003	0.22		0.05			<	0.5	2.5	0.032	2.2	<	0.005
<	0.003	0.24		0.04				0.6	2.3	0.016	1.3	<	0.005
<	0.003	2.12		0.31				0.6	2.6	0.068	1.8		0.04
<	0.003	0.22		0.04				0.6	2.7	0.041	1.8	<	0.005
<	0.003	0.21		0.06				0.6	2.8	0.033	1.6	<	0.005
<	0.003	0.48		0.09			<	0.5	2	0.046	1.6	<	0.005
<	0.003	0.4		0.03			<	0.5	2.2	0.03	1.7	<	0.005
<	0.003	0.67		0.04			<	0.5	2.4	0.03	2.5	<	0.005
<	0.003	0.22		0.05			<	0.5	1.7	0.022	1.3	<	0.005
<	0.003	0.71		0.1				0.9	2.8	0.111	1.9	<	0.005
<	0.003	0.24		0.03				0.7	2.8	0.023	1.6	<	0.005
<	0.003	0.4		0.05				0.6	2.2	0.031	1.6	<	0.005
<	0.003	0.27	<	0.02				0.6	4	0.042	1.9	<	0.005
<	0.003	0.28	<	0.02				0.6	3.9	0.041	1.9	<	0.005
<	0.003	0.4		0.05			<	0.5	1.7	0.027	1	<	0.005
<	0.003	0.27	<	0.02			<	0.5	1.9	0.027	1.4	<	0.005
<	0.003	0.28		0.03			<	0.5	1.9	0.027	1.5	<	0.005
<	0.003	1.9		0.02		0.0000085				0.166		<	0.04
<	0.003	0.1	<	0.02		0.0000045				0.094		<	0.04
<	0.003	0.1	<	0.02		0.0000044				0.094		<	0.04
	0.017	0.32		0.04					3.4	0.045		<	0.04
<	0.003	0.55		0.1		0.00000378				0.034		<	0.04
<	0.003	0.27		0.03		0.00000104				0.021		<	0.04
<	0.003	0.38		0.03		0.00000079				0.04		<	0.04
<	0.003	0.54		0.06		0.00000161				0.055		<	0.04
<	0.003	0.23		0.06	<	0.0001				0.015		<	0.04
<	0.003	0.23		0.06	<	0.0001				0.015		<	0.04
<	0.003	0.47		0.05	<	0.0001			2.1	0.021		<	0.04
<	0.003	0.28		0.04	<	0.0001				0.022		<	0.04
		0.18		0.04						0.023			
		0.18		0.03						0.022			
		0.33		0.03						0.026			

<	0.003	0.45		0.04	<	0.0001			0.039	<	0.04
		0.58		0.08					0.055		
<	0.003	0.35		0.04	<	0.0001			0.046	<	0.04
		0.422		0.077					0.07		
		0.358		0.049					0.05		
<	0.003	0.42	<	0.02	<	0.0001			0.036	<	0.04
		0.286		0.074				<	0.003		
		0.242		0.045					0.019		
<	0.003	0.17		0.04	<	0.0001			0.019	<	0.04
		1.44		0.02					0.169		
		0.26	<	0.02					0.03		
		0.27	<	0.02					0.031		
		0.27		0.02					0.037		
		0.24		0.02					0.032		
		0.22		0.02					0.031		
<	0.003	0.33		0.06	<	0.0001			0.044	<	0.04
<	0.003	0.31		0.06	<	0.0001			0.041	<	0.04
		0.79		0.08					0.075		
		0.71		0.08					0.07		
		0.67		0.07					0.066		
<	0.003	0.62		0.06	<	0.0001			0.057	<	0.04
<	0.003	0.24		0.04		0.0002			0.026	<	0.04
<	0.003	0.34		0.02	<	0.0001			0.042	<	0.04
<	0.003	0.4		0.05	<	0.0001			0.046	<	0.04
<	0.003	0.19		0.04			3.3		0.039		
<	0.003	0.31		0.06	<	0.0001			0.037	<	0.04
<	0.003	0.33	<	0.02	<	0.0001			0.03	<	0.04
<	0.003	0.497	<	0.02	<	0.0001			0.044	<	0.04
<	0.003	0.593		0.06	<	0.0001			0.046	<	0.04
<	0.000953	0.29		0.06	<	0.000093	1.98		0.03		0.00273
<	0.00191	0.25		0.09	<	0.000093			0.01		0.000576
<	0.001	0.24	<	0.05	<	0.0002			0.03	<	0.02
<	0.0008	0.5	<	0.05	<	0.0002			0.04	<	0.02
<	0.001	0.48	<	0.05	<	0.0002			0.05	<	0.02
<	0.001	0.73		0.08	<	0.0002			0.04	<	0.02
	0.003	0.84	<	0.05	<	0.0002			0.04	<	0.02
<	0.001	0.66	<	0.05		0.0002			0.07	<	0.02
<	0.001	0.39	<	0.05	<	0.0002			0.04	<	0.02
	0.00128	0.35	<	0.018	<	0.000101			0.02		0.005
<	0.001	0.62	<	0.05	<	0.0002			0.06	<	0.04
<	0.001	0.5		0.07	<	0.0002			0.1	<	0.02
<	0.001	0.2	<	0.05		0.0003	3.48		0.06	<	0.02
<	0.002	0.37		0.048	<	0.0005	1.7		0.033	<	0.04
<	0.008	0.444		0.023	<	0.0002			0.046	<	0.03
<	0.005	0.56		0.067	<	0.0002			0.066	<	0.03
<	0.005	0.758		0.063	<	0.0002			0.063	<	0.03
<	0.005	0.033		0.028	<	0.0002			0.099	<	0.03
<	0.005	0.71		0.078	<	0.0002			0.045	<	0.03
<	0.001	0.46			<	0.0002			0.04	<	0.04
<	0.005	0.0864			<	0.0002			0.053		0.00857
<	0.005	0.0795				0.00051			0.0721	<	0.005
		0.74			<	0.0002			0.0767		
		0.418			<	0.0002			0.0434		
		0.0978			<	0.0002			0.0342		

0.495	<	0.0002		0.051
0.462	<	0.0002		0.0396
0.87	<	0.0005		0.081
0.33	<	0.0005		0.096
0.51	<	0.0005		0.038
0.9	<	0.0005		0.062
0.51	<	0.0005		0.056
0.55	<	0.0005		0.042
0.4	<	0.0005		0.062
1.4				0.058
0.84				0.084
0.5				0.05
0.54				0.058
0.5				0.046
0.6				0.066
0.88				0.122
0.62				0.062
0.46				0.066
0.56				0.072
0.12				0.146
0.185				0.1
0.58				0.066
0.38				0.042
0.38				0.04
0.36				0.066
0.7				0.078
0.14				0.062
1.3			<	0.02
0.02				0.052
0.76				0.074
0.62				0.088
0.48				0.082
0.18				0.094
0.14				0.05
0.12				0.138
0.48				0.626
0.82				0.072
0.49				0.054
0.09				0.74
1.36				0.158
0.82				0.09
0.84				0.104
0.022				0.172
0.522				0.11
0.842				0.106
0.98				0.074
0.472				0.1
0.66				0.06
1.24				0.128
0.96				0.124
0.064				0.054
1.26				0.164
7.28				0.64
0.42				0.054
0.352				0.034
0.308				0.032
0.452				0.044
0.04			<	0.02
0.18				0.096

0.624	0.034
0.71	0.022
0.82	0.35
0.94	0.1
1.8	0.15
1.92	0.196
0.08	0.028
0.06	0.14
0.082	0.082
0.866	0.068
2.24	0.4
0.548	0.088
0.776	0.078
1.4	0.104
0.724	0.076
1.64	0.144
0.984	0.096
0.136	0.2
1.8	0.15
0.65	0.05
0.74	0.06
0.49	0.084
3.64	0.256
0.944	0.118
1.04	0.09
0.796	0.09
2.2	0.178
0.99	0.124
1.444	0.15
1.08	0.18
0.44	0.06
0.616	0.16
0.38	0.046
0.37	0.3
0.5	0.08
0.4	0.202
0.54	0.064
0.65	0.11
1.56	0.17
2.5	0.178
4.4	0.358
0.892	0.144
0.52	0.102
0.45	0.086
0.348	0.404
0.6	0.404
0.656	0.074
0.968	0.102
1.2	0.18
0.76	0.06
1.14	0.12
1.6	0.18
1.7	0.12
1.06	0.04
2.42	0.08
0.448	0.124
0.512	0.06
1.14	0.092

0.544				0.099	
1.712				0.119	
0.804				0.081	
0.996				0.082	
1.57				0.242	
0.256				0.04	
2.88				0.186	
2.084				0.176	
0.172				0.102	
0.3				0.076	
0.42				0.116	
7.44				0.3	
4.76				0.2	
0.784				0.128	
1.36				0.094	
1.016				0.078	
0.732				0.1	
0.828				0.138	
1.236				0.138	
1.028				0.098	
0.408	<	0.0002	0.81	0.073	1.64
0.38				0.172	
1.23	<	0.0002	0.63	0.104	0.85
1.24				0.104	
0.38	<	0.0002	1.45	0.264	13
0.8				0.126	
1.18	<	0.0002	0.75	0.098	1.2
0.74				0.08	
0.2	<	0.0002	1	0.08	2.05
0.58				0.06	
0.96	<	0.0002	0.65	0.088	1.1
2.24	<	0.0002	1.05	0.14	1.1
1.74				0.138	

1.68	<	0.0002	0.6	0.126	1.8
1.24				0.178	
0.5	<	0.0002	0.9	0.088	2
1.26				0.084	
0.86	<	0.0002	0.5	0.104	1.1
1.34				0.116	
0.76	<	0.0002	0.7	0.096	1.4
0.8				0.06	
1.4			0.65	0.138	1.4
1.2				0.176	
0.44			1	0.166	2.5
0.92	<	0.0002	0.7	0.074	
1.6			1.9	0.244	
1.2	<	0.0002	1.1	0.14	1.3
1.34	<	0.0002	1.4	0.112	
1.58	<	0.0002	0.7	0.158	
7.2	<	0.0002	1.2	0.364	3.2
1.64	<	0.0002	0.8	0.188	
1.56	<	0.0002	0.7	0.182	
2.22	<	0.0002	0.65	0.216	1.8
1.32		0.0003		0.148	
0.196	<	0.0002	90	0.164	
0.92	<	0.0002	1.1	0.156	2.2
0.58	<	0.0002	1.2	0.154	
0.292					
0.64			0.8	0.096	1.3
1.24	<	0.0002	0.8	0.11	
1.66	<	0.0002	0.65	0.184	
1.4	<	0.0002	0.7	0.118	1
0.76		0.0004	0.75	0.12	
1.46		0.0001	0.7	0.156	
3.36	<	0.0002	1.3	0.2	1.7
1.9			0.65	0.152	
1.38	<	0.0002	0.95	0.152	
0.66	<	0.0002	1	0.104	2.5
4.14	<	0.0002	0.6	0.128	
1.92		0.00025	1	0.078	
0.28	<	0.0002	4	0.124	2.2

			0.62				0.00032		3.6				0.15				
			1.06				0.0005		5.7				0.116				
			1.08			<	0.0002						0.212		1.5		
			2.18						0.7				0.148		1.8		
			1.04			<	0.0002		0.6				0.08				
			1.52			<	0.0002		0.95				0.116		1.45		
			8.9			<	0.0002		1				0.2				
			8.4				0.0005		0.9				0.2		1.8		
			1.12			<	0.0002		0.7				0.09				
			2.96				0.0003		0.7				0.13		1.3		
			1.52			<	0.0002		0.5				0.11				
			0.24			<	0.0002		0.7				0.12		1.2		
			1.72			<	0.0002		0.8				0.12				
		<	0.02			<	0.0002		1.1				0.01		2		
			2			<	0.0002		1.2				0.12				
			1.41				0.00028		1				0.192		3.2		
			0.04						0.75				0.004		0.8		
			0.02						0.75				0.11		1.6		
			0.52						0.66				0.041		1.7		
			1.38			<	0.0002		0.5				0.146		1.4		
			0.45						0.83				0.14		1.6		
			0.44						1				0.15		1.8		
			0.58						0.6				0.1		1.5		
			0.5						0.98				0.13		2.3		
			0.45			<	0.0002		0.68				0.14		2.1		
			0.29			<	0.0002		0.5				0.09		1.4		
			0.2			<	0.0002		0.63				0.16		3.3		
			0.73						0.7				0.2		1.2		
			1										0.08		0.98		
			1.4										0.12		0.57		
			0.95										0.09		0.9		
			1.4										0.09		0.91		
			2.3										0.1		1.6		
			1.1			<	0.0001		0.8				0.12		2		
			0.45			<	0.0002		0.8				0.14		2.4		
			1.1			<	0.0002		0.5				0.07		1.2		
			1.3			<	0.0002		0.4				0.06		2.5		
			1.7			<	0.0002		0.4				0.1		2.9		
			2.2			<	0.0004		0.6				0.2		2.4		
	0.01		1.1			<	0.0004						0.14				
			9			<	0.001						0.2				
			0.63										0.04				
			0.34										0.19				
			0.95										0.07				
			2.2										0.15				
			1.6										0.13				

Pb Dissolved_Q	Pb Dissolved	Se Total_Q	Se Total	Sr Total_Q	Sr Total	Zn Dissolved_Q	Zn Dissolved	WATERLEVEL	TURBIDITY	PRECIP_CUR	PRECIP_PAST	MAJOR_RAIN	PEAK_RUNOFF	FLOW_STATUS
<	0.00054	<	0.001		0.024	J	0.002							
<	0.00054	<	0.001		0.032		0.005	Normal	Clear	light snow	None	No		Baseflow
<	0.00054	<	0.001		0.029	J	0.003	Above Normal	Clear	None	Rain			Falling
<	0.00054	<	0.001		0.031	<	0.002	Above Normal	Clear	None	None			Falling
<	0.00054	<	0.001		0.034	<	0.002	Normal	Clear	None	None		Unknown	Baseflow
<	0.00054	<	0.001		0.034	<	0.002	Normal	Clear	None	Rain			Baseflow
<	0.00054	<	0.001		0.034	<	0.002							
<	0.00054	<	0.001		0.031	<	0.002	Normal	Clear	None	None			Baseflow
<	0.00054	<	0.001		0.025	<	0.002	Above Normal	Slight Turbidity	None				
<	0.00054	<	0.001		0.023	J	0.004	Above Normal	Moderate Turbidity	None	Rain	Yes	Unknown	Unknown
<	0.00054	<	0.001		0.027	J	0.004	Above Normal	Slight Turbidity	Light Rain	None	Yes	Unknown	Falling
<	0.00054	<	0.001		0.025	J	0.003	Above Normal	Slight Turbidity	None	None	No		Falling
<	0.00054	<	0.001		0.039		0.006	Normal	Clear	None	Light Rain	No		Baseflow
<	0.00054	<	0.001		0.023	<	0.002	Above Normal	Moderate Turbidity	None	Light Rain	Yes	1 to 2 Days	Falling
<	0.00054	<	0.001		0.072	J	0.004	Normal	Clear	None	None	No		Baseflow
<	0.00054	<	0.001		0.042	J	0.003	Normal	Clear	None	None	No	Unknown	Unknown
<	0.00054	<	0.001		0.048	<	0.002	Above Normal	Moderate Turbidity	None	Rain		4 to 12 Hours	
<	0.00054	<	0.001		0.03	<	0.002	Normal	Clear	None	None	No		Baseflow
<	0.00054	<	0.001		0.028	J	0.003	Above Normal	Clear	None	Light Rain	No	Unknown	Unknown
<	0.00054	<	0.001		0.03	J	0.004	Normal	Clear	None	Rain			Baseflow
<	0.00054	<	0.001		0.027	J	0.003	Above Normal	Slight Turbidity	Light Rain	None	No		Unknown
<	0.00054	<	0.001		0.033	J	0.004	Normal	Clear	None	Light Rain	No		Baseflow
<	0.00054	<	0.001		0.038	J	0.004	Normal	Clear	None	None	No		Baseflow
<	0.00054	<	0.001		0.066	<	0.002	Normal	Clear	None	scattered showers	No	Unknown	Falling
<	0.00054	<	0.001		0.059	<	0.002	Above Normal	Clear	None	Rain	No	Unknown	Falling
<	0.00054	<	0.001		0.033	<	0.002	Normal	Clear	None	Unknown	No	Unknown	Baseflow
<	0.00054	<	0.001		0.034	J	0.003	Normal	Clear	None	None			Baseflow
<	0.00054	<	0.001		0.029	J	0.002	Above Normal	Slight Turbidity	None	Rain	Yes	Unknown	Falling
<	0.00054	<	0.001		0.028	J	0.004	Normal	Clear	None	Light Rain	No		Baseflow
<	0.00054	<	0.001		0.024	J	0.003	Above Normal	Moderate Turbidity	None	Rain/Snow			Falling
<	0.00054	<	0.001		0.029		0.002	Above Normal	Clear	None	None			Falling
<	0.00054	<	0.001		0.038	<	0.002	Normal	Clear	Light Rain	None	No		Baseflow
<	0.00054	<	0.001		0.041	<	0.002	Normal	Clear	None	None	No		Baseflow
<	0.00054	<	0.001			<	0.002	Normal	Clear	None	Unknown	No	Unknown	Baseflow
<	0.00054	<	0.001			<	0.002	Normal	Clear	None	None	No	N/A	Baseflow
<	0.00054	<	0.001		0.045		0.002	Normal	Clear	None	None	No		Baseflow
<	0.00054	<	0.001			<	0.002	Normal	Slight Turbidity	Light Rain	Unknown	No	Unknown	Baseflow
<	0.00054	<	0.001				0.002	Normal	Clear	None	None	No	N/A	Baseflow
<	0.00054	<	0.001				0.003	Normal	Clear	None	Unknown		Unknown	Baseflow
<	0.00054	<	0.001				0.006	Above Normal	Clear	None	Snow	No	Unknown	Falling
<	0.00054	<	0.001				0.003	Above Normal	Slight Turbidity	None	Unknown		Unknown	
<	0.00054	<	0.001				0.004	Normal	Clear	None	Sprinkles	No		Baseflow
<	0.00054	<	0.001				0.002	Normal	Clear	None	Showers	No	Unknown	Baseflow
<	0.00054	<	0.001				0.006	Normal	Clear	Light Rain	None			Baseflow
<	0.00054	<	0.001				0.004	Normal	Clear	None	None	No	Unknown	Baseflow
<	0.00054	<	0.001				0.003	Normal	Clear	None	None	No	Unknown	Baseflow
<	0.00054	<	0.001				0.003	Normal	Clear	None	None			Baseflow
<	0.00054	<	0.001				0.002	Above Normal	Slight Turbidity	None	None			Falling
<	0.00054	<	0.001				0.003	Above Normal	Clear	None	Rain		Unknown	Falling
<	0.00054	<	0.001				0.003	Normal	Clear	None	None	No	Unknown	Baseflow
<	0.00054	<	0.001				0.002	Normal	Clear	None	Unknown	Yes	Unknown	Falling
<	0.000711	<	0.001			<	0.005	Above Normal	Slight Turbidity	None	None	No	Unknown	Falling
<	0.00071	<	0.001			<	0.005							
<	0.00071	<	0.001			<	0.005	Above Normal	Moderate Turbidity	Light snow	Rain/Snow	Yes	Unknown	Falling
<	0.00071	<	0.001			<	0.005	Normal	Clear	Light Rain	Light Rain	No		Baseflow
<	0.00071	<	0.001			<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001			<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001			<	0.005	Normal	Clear	None	Unknown	No	Unknown	Baseflow

<	0.00071	<	0.001		<	0.005	Flooding	High Turbidity	None	Heavy Rain	Yes	Unknown	Rising
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	Yes	Unknown	Falling
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	Light Rain			Baseflow
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001		<	0.005							
<	0.00071	<	0.001		<	0.005							
<	0.00071		0.0015		<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001			0.007	Normal	Clear	None	None	No		Baseflow
<	0.00071		0.0011		<	0.005	Normal	Clear	Sleet	None	No		Baseflow
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No		Baseflow
		<	0.001		<	0.005	Normal	Clear	None	Showers	No	Unknown	Baseflow
<	0.00071	<	0.001		<	0.005	Above Normal	Slight Turbidity	None	Rain	No	Unknown	Falling
<	0.00071	<	0.001			0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001		<	0.005	Above Normal	Slight Turbidity	None	Rain	No	Unknown	Falling
<	0.00071	<	0.001		<	0.005	Above Normal	Moderate Turbidity	None	Unknown	Yes		Falling
<	0.00071	<	0.001		<	0.005	Above Normal	Slight Turbidity	None	Snow			
<	0.00071	<	0.001		<	0.005	Above Normal	Clear	None	Brief Storm	No		Falling
<	0.00071	<	0.001		<	0.005	Normal	Clear	Light Rain	None	No		Baseflow
<	0.00071	<	0.001		<	0.005	Normal		Light Rain	Light Rain			Baseflow
<	0.00071	<	0.001		<	0.005	Above Normal	Clear	None	None		Unknown	Falling
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	Light Rain	No		Baseflow
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No	> 24 Hours	Baseflow
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.00071	<	0.001		<	0.005	Above Normal	Slight Turbidity	None	Rain/Snow	No	Unknown	Falling
<	0.00071	<	0.001		<	0.005	Above Normal	Slight Turbidity	Light Rain	Light Rain	No		
<	0.00071	<	0.001		<	0.005							
<	0.00071	<	0.001		<	0.005	Normal	Clear	None	None	No		Baseflow
<	0.000711	<	0.001		<	0.005	Normal	Slight Turbidity	None	None	No	> 24 Hours	Baseflow
<	0.000711		0.0032		<	0.005	Below Normal	Clear	Light Rain	None	No	> 24 Hours	Baseflow
<	0.000711		0.0019		<	0.005	Normal	Clear	Light Rain	None	No	Unknown	Baseflow
<	0.000711	<	0.001		<	0.005	Normal	Clear	Showers	None	No	> 24 Hours	Baseflow
<	0.000711	<	0.001		<	0.005	Above Normal	Slight Turbidity	Drizzle	Rain	No	Unknown	Rising
<	0.000711	<	0.001		<	0.005	Normal	Slight Turbidity	None	None	No	> 24 Hours	Baseflow
<	0.000711	<	0.001		<	0.005	Normal	Slight Turbidity	Flurries	Snow	No	> 24 Hours	Falling
<	0.000711	<	0.001		<	0.005	Normal	Slight Turbidity	None	Showers	No	> 24 Hours	Baseflow
<	0.000711	<	0.001		<	0.005	Above Normal	Moderate Turbidity	Drizzle	Rain	No		Rising
<	0.005		0.0098		<	0.005	Normal	Clear	None	Showers	Yes	> 24 Hours	Baseflow
<	0.005	<	0.001		<	0.005	Normal	Moderate Turbidity	None	Thundershowers	No	Unknown	Rising
<	0.005	<	0.001		<	0.005	Normal	Slight Turbidity	Heavy Rain	None	No	< 1 Hour	Falling
<	0.005	<	0.001		<	0.005							
<	0.005	<	0.001		<	0.005	Normal	Slight Turbidity	None	None	Yes	> 24 Hours	Baseflow
<	0.005	<	0.001		<	0.005	Above Normal	Moderate Turbidity	Rain	Rain	Yes	Unknown	Rising
<	0.005	<	0.001		<	0.005							
<	0.001	<	0.001			0.006	Above Normal	Moderate Turbidity	None	Rain	Yes	4 to 12 Hours	Rising
O<	0.001	<	0.001			0.02	Below Normal	Clear	None	Snow	No	Unknown	Baseflow
O<	0.001	<	0.001			0.02							
<	0.0005	<	0.001		<	0.005	Normal	Clear	None	None	Yes	> 24 Hours	Baseflow
<	0.0005	<	0.001		<	0.005	Normal	Moderate Turbidity	Light Rain	None	Yes	> 24 Hours	Falling
<	0.0005	<	0.001			0.005	Normal	Clear	None	None	Yes	> 24 Hours	Falling
<	0.0005	<	0.001		<	0.005	Normal	Clear	Snow	Snow	No	12 to 24 Hours	Falling
<	0.0005	<	0.001			0.007	Above Normal	Slight Turbidity	None	Unknown	Yes	12 to 24 Hours	Falling
<	0.0005	<	0.001		<	0.005							
<	0.0005	<	0.001		<	0.005	Normal	Clear	Light Rain	Light Rain	Yes	> 24 Hours	Baseflow
<	0.0005	<	0.001		<	0.005	Normal	Slight Turbidity	None	None	Yes	> 24 Hours	Falling
<	0.0005	<	0.001		<	0.005	Below Normal	Clear	None	Unknown	No	Unknown	Baseflow
		<	0.001				Normal	Clear	None	None	No	Unknown	Baseflow
		<	0.001				Normal	Clear	None	None		Unknown	Baseflow
							Normal	Slight Turbidity	None	Rain		4 to 12 Hours	Falling

<	0.0005	<	0.001			0.006	Normal	Clear	None	None		Unknown	Baseflow
							Above Normal	Slight Turbidity	None	Unknown		Unknown	Rising
<	0.0005	<	0.001			0.008	Normal	Clear	None	Unknown		Unknown	Baseflow
		<	0.0009				Normal	Clear	None	None		Unknown	Baseflow
		<	0.0009				Above Normal	Clear	None	Heavy Snow		12 to 24 Hours	Falling
<	0.0005	<	0.001			0.008	Normal	Clear	None	Unknown		Unknown	Baseflow
		<	0.0009				Normal	Clear	None	Unknown		Unknown	Baseflow
		<	0.0009				Normal	Slight Turbidity	Showers	Showers		< 1 Hour	Rising
<	0.0005	<	0.001		<	0.005	Normal	Clear	None	Rain		Unknown	Rising
		<	0.001				Above Normal	High Turbidity	None	Rain		< 1 Hour	Rising
		<	0.001				Normal	Clear	None	None		Unknown	Baseflow
		<	0.001										
							Above Normal	Slight Turbidity					
		<	0.001				Normal	Clear	None	Showers		Unknown	Baseflow
		<	0.001				Normal	Clear	None	Showers		Unknown	Baseflow
		<	0.001				Normal	Clear	None	Showers		Unknown	Baseflow
<	0.0005	<	0.001		<	0.005							
<	0.0005	<	0.001		<	0.005	Normal	Clear	None	None		Unknown	Baseflow
		<	0.001				Above Normal	High Turbidity	None	Showers		4 to 12 Hours	Falling
		<	0.001				Above Normal	High Turbidity	None	Showers		4 to 12 Hours	Falling
							Above Normal	High Turbidity	None	Showers		4 to 12 Hours	Falling
<	0.0005	<	0.001		<	0.005	Flooding	High Turbidity	None	Showers		12 to 24 Hours	Falling
<	0.0005	<	0.001		<	0.005	Normal	Slight Turbidity	None	None		Unknown	Baseflow
<	0.0005	<	0.001			0.006	Normal	Moderate Turbidity	None	Showers		12 to 24 Hours	Baseflow
<	0.0005	<	0.001				Above Normal	Moderate Turbidity	None	Light Snow		> 24 Hours	Baseflow
		<	0.001		<	0.005	Below Normal	Clear	None	None		> 24 Hours	Baseflow
<	0.0005	<	0.001		<	0.005	Below Normal	Clear	None	None		> 24 Hours	Baseflow
							Above Normal	Moderate Turbidity	Light Rain	Showers		1 to 4 Hours	Falling
<	0.0005	<	0.001			0.006	Normal	Clear	None	None		> 24 Hours	
<	0.0005	<	0.001		<	0.005	Above Normal	Moderate Turbidity	None	Unknown		Unknown	
<	0.0005	<	0.001			0.008	Normal		None	None		Unknown	
<	0.000089					0.00291	Normal	Clear	None	None			
<	0.000178	<	0.00126		<	0.000726	Above Normal	Slight Turbidity	None	None			
<	0.001					0.025	Normal	Clear	None	None			
<	0.0007				<	0.005	Normal	Clear	None	None			
<	0.001				<	0.005	Normal	Clear	None	None			
<	0.001				<	0.005	Normal	Slight Turbidity	None	None			
<	0.001				<	0.005	Above Normal	Clear	None	None			
<	0.001					0.007	Normal	Clear	Overcast				
<	0.001				<	0.005	Below Normal	Slight Turbidity	Broken Clouds Cover				
	0.00064				<	0.018	Below Normal	Clear	Broken Clouds				
<	0.001					0.009	Below Normal	Clear	Overcast				
<	0.001				<	0.005	Below Normal	Clear	None				
<	0.001				<	0.005	Below Normal	Clear	None				
<	0.005					0.026	Normal	Clear	None				
<	0.001					0.006	Above Normal	Slight Turbidity	None				
<	0.001				<	0.002	Above Normal	Moderate Turbidity					
<	0.0005					0.003	Above Normal	Moderate Turbidity					
<	0.0005					0.018	Below Normal	Clear					
<	0.001					0.007	Normal	Clear					
<	0.001				<	0.005	Normal	Slight Turbidity					
<	0.005					0.0872	Below Normal	Clear					
<	0.005				<	0.02	Below Normal	Clear					
							Normal	Clear					
							Below Normal	Clear					
							Below Normal	Clear	Moderate Fog				

Above Normal	Slight Turbidity	
Normal	Slight Turbidity	
Above Normal	Moderate Turbidity	Moderate Haze
Normal	Clear	Moderate Rain
Normal	Clear	Light Haze
Normal	Slight Turbidity	
Normal	Clear	
Above Normal	High Turbidity	None
Normal	Clear	Moderate Fog
Normal	Slight Turbidity	
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<	0.02								Moderate Turbidity					
	0.02								Slight Turbidity					
	0.07								Moderate Turbidity					
<	0.02						0.1		Slight Turbidity					
									Slight Turbidity					

MAP_LOCATION	POR_LAT_DEG	POR_LAT_MIN	POR_LAT_SEC	POR_LON_DEG	POR_LON_MIN	POR_LON_SEC
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
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(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
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(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
(MC-32) Mid-Stream Sampling at State Route 26 Bridge between Roaring Creek & UNT/Cheat River RM 30.34 in Albright WV	39	29	41.13	79	38	42.99
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APPENDIX G

EXHIBIT G PROJECT BOUNDARY MAPS

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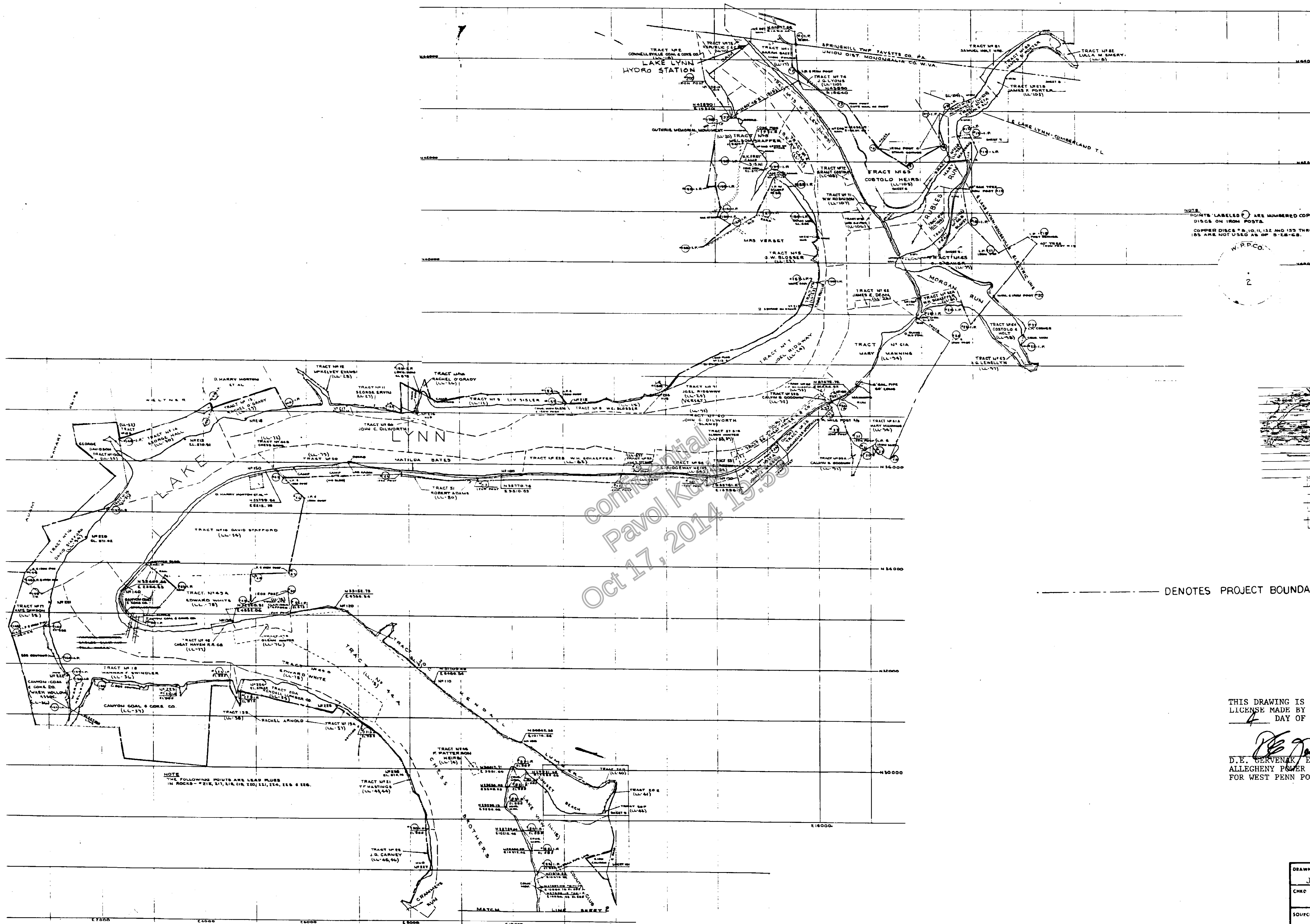

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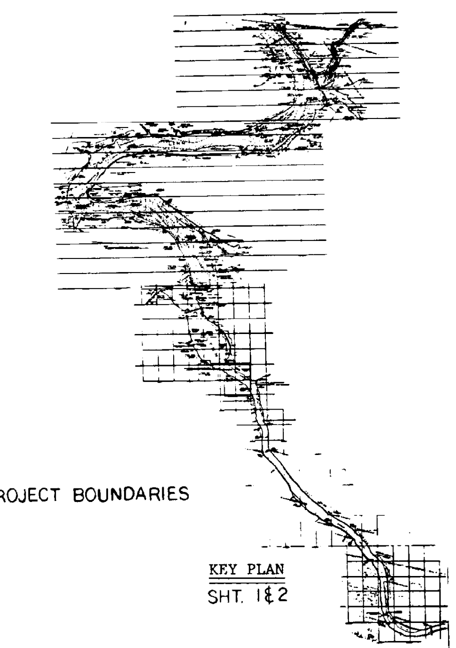

KEY PLAN
SHT. 1&2

THIS DRAWING IS PART OF THE APPLICATION FOR
LICENSE MADE BY THE UNDERSIGNED THIS
4 DAY OF NOV, 1991

D.E. CERVENAK, EXECUTIVE DIRECTOR, OPERATING
ALLEGHENY POWER SERVICE CORPORATION, AGENT
FOR WEST PENN POWER COMPANY

DRAWN JNK	ALLEGHENY POWER SERVICE CORP.
CHKD / DFTG APPD	WEST PENN POWER COMPANY
SOURCE JNK 5/3/91	EXHIBIT "G" LAKE LYNN HYDROELECTRIC STATION MAP OF PROJECT AREA
REVIEWED	FERC PROJ. NO. 2459
APPROVED / DATE	AUTHORIZATION 876039 · SCALE 1"=1000' · DRAWING NUMBER 413-367 · REV

SHEET 1 OF 3

APSC SERIES 4

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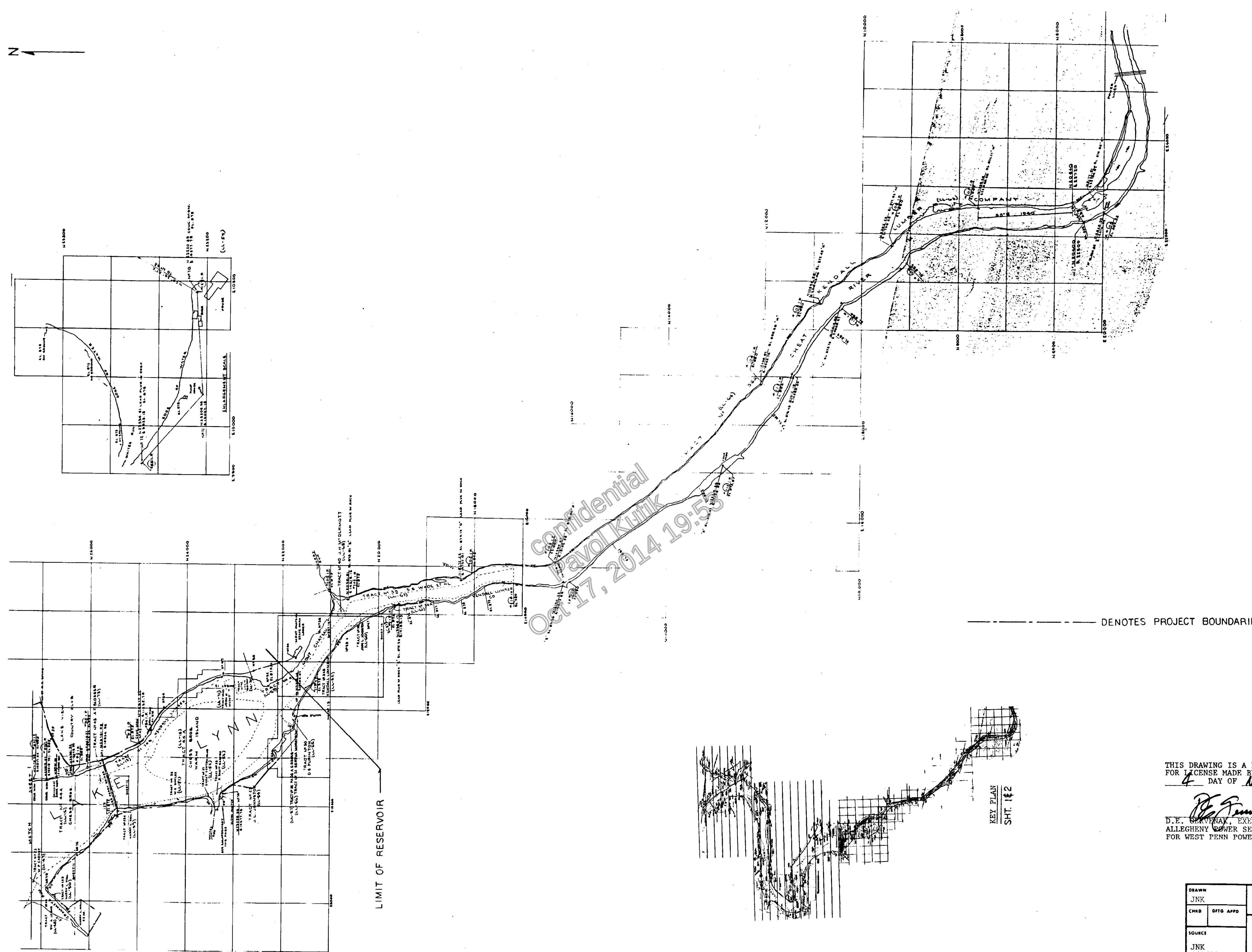


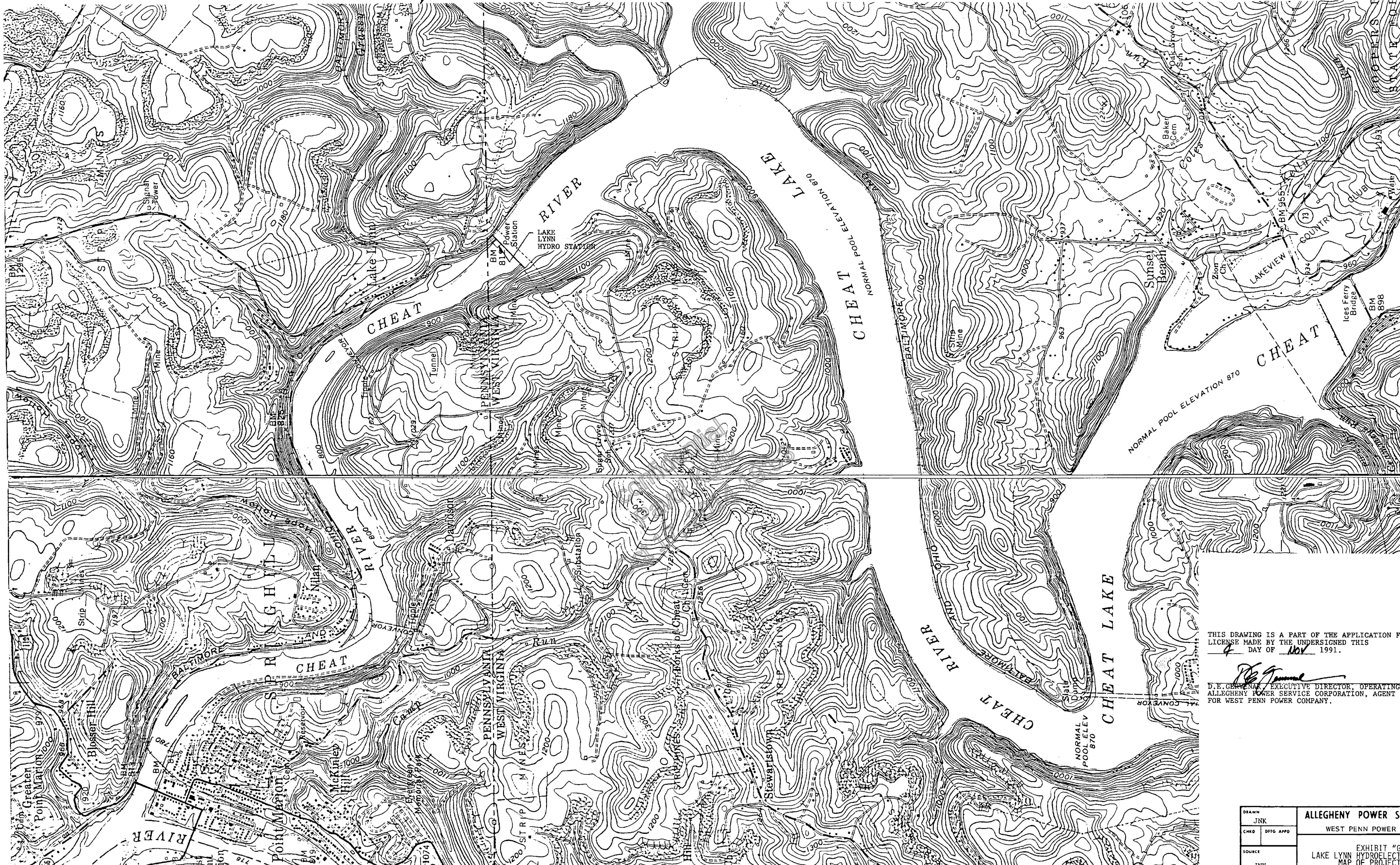
THIS DRAWING IS A PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 4 DAY OF NOV., 1991.

D.E. GERVENAK, EXECUTIVE DIRECTOR, OPERATING
ALLEGHENY POWER SERVICE CORPORATION, AGENT
FOR WEST PENN POWER COMPANY

DRAWN JNK	ALLEGHENY POWER SERVICE CORP.
CHKD / DFTG APPD	WEST PENN POWER COMPANY
SOURCE JNK 5/3/91	EXHIBIT "G" LAKE LYNN HYDROELECTRIC STATION MAP OF PROJECT AREA
REVIEWED	FERC PROJ. NO. 2459
APPROVED / DATE	AUTHORIZATION 876039 / SCALE 1"=1000' / DRAWING NUMBER 413-367 / REV

SHEET 2 OF 3

APSC SERIES 4



THIS DRAWING IS A PART OF THE APPLICATION FOR LICENSE MADE BY THE UNDERSIGNED THIS 4 DAY OF Nov 1991.

D.E. GERVENAK, EXECUTIVE DIRECTOR, OPERATING ALLEGHENY POWER SERVICE CORPORATION, AGENT FOR WEST PENN POWER COMPANY.

DRAWN JNK	ALLEGHENY POWER SERVICE CORP. WEST PENN POWER COMPANY
CHKD / DFTG APPD	EXHIBIT "G" LAKE LYNN HYDROELECTRIC STATION MAP OF PROJECT AREA
SOURCE JNK 5/3/91	
REVIEWED	FERC PROJ. NO. 2459
APPROVED	AUTHORIZATION 876039 · SCALE 1"=1000' · DRAWING NUMBER 413-367 · REV
DATE	

SHEET 3 OF 3

1020 CLEARPRINT A&B SMITH COMPANY PGH. PA

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APPENDIX H

CEII – EXHIBIT F DRAWINGS
(FILED SEPARATELY WITH FERC)

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Critical Energy Infrastructure Information

As a result of security regulations enacted after September 11, 2001, Project documents related to the safety of dams and appurtenant facilities, and that which is necessary to protect national security and public safety, are restricted from public distribution or viewing. This appendix contains drawings of Project works that meet the definition of Critical Energy Infrastructure Information (CEII) as defined in 18 CFR §388.113.[14] Consistent with FERC's CEII regulations, the Appendix H has been stricken from the public version of the PAD.

[14] CEII is specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure (physical or virtual) that (1) relates details about the production, generation, transmission, or distribution of energy; (2) could be useful to a person planning an attack on critical infrastructure; (3) is exempt from mandatory disclosure under the Freedom of Information Act; and (4) gives strategic information beyond the location of the critical infrastructure.

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