FINAL Supplemental Watershed Plan No. 3 and Environmental Assessment

for the

Rehabilitation of Floodwater Retarding Structure No. 2A (Roaring Fork Lake) of the Cherrystone Creek Watershed

Pittsylvania County, Virginia

PREPARED BY

USDA Natural Resources Conservation Service

IN COOPERATION WITH

Town of Chatham
Pittsylvania Soil and Water Conservation District
Pittsylvania County Board of Supervisors

August 2019

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FINAL

Supplemental Watershed Plan No. 3 & Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 2A of the Cherrystone Creek Watershed Pittsylvania County, Virginia

Prepared By:
USDA – Natural Resources Conservation Service

In Cooperation With:
Town of Chatham
Pittsylvania Soil and Water Conservation District
Pittsylvania County Board of Supervisors

Authority

The original watershed work plan was prepared, and the works of improvement were installed, under the authority of the Watershed Protection and Flood Prevention Act of 1954. The rehabilitation of Cherrystone Creek Dam No. 2A is authorized by Section 14 of the Watershed Protection and Flood Prevention Act (Public Law 83-566) as enacted by Section 313 of Public Law 106-472, otherwise known as "The Small Watershed Rehabilitation Amendments of 2000".

Abstract

Cherrystone Creek Dam No. 2A, Roaring Fork Lake, does not presently meet Natural Resources Conservation Service (NRCS) criteria for the integrity of a vegetated earth auxiliary spillway. In addition, the principal spillway riser does not meet NRCS seismic stability criteria. The preferred plan is to rehabilitate Cherrystone Creek Dam No. 2A to meet current NRCS criteria and maintain the existing level of downstream flood protection and use for supplemental water supply. The plan is to replace the existing auxiliary spillway with a roller-compacted concrete (RCC) chute over the top of the dam. Replacement of the riser and outlet structure is required. New toe drains will be installed in the embankment. There will be no change in the current levels of flood protection downstream as a result of project activity. Project installation cost is estimated to be $8,183,700 of which $5,536,900 will be paid from the Small Watershed Rehabilitation funds and $2,646,800 from local funds.

Comments and Inquiries

For further information, please contact: John A. Bricker, State Conservationist, USDA - Natural Resources Conservation Service, 1606 Santa Rosa Road, Suite 209, Richmond, Virginia 23229, Phone: (804) 287-1691.

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CHERRYSTONE CREEK WATERSHED AGREEMENT

Supplemental Watershed Plan Agreement
(Supplement No. 3)

between the

Town of Chatham
Pittsylvania Soil and Water Conservation District
Pittsylvania County Board of Supervisors
(herein referred to collectively as "Sponsors")
Commonwealth of Virginia

and the

Natural Resources Conservation Service (formerly Soil Conservation Service)
United States Department of Agriculture
(herein referred to as "NRCS")

Whereas, the Watershed Work Plan Agreement for the Cherrystone Creek Watershed, Commonwealth of Virginia, authorized under the Watershed Protection and Flood Prevention Act (Public Law 83-566, as amended) and executed by the Sponsors named therein and the Soil Conservation Service (now NRCS), pursuant to section 246 of the Department of Agriculture Reorganization Act of 1994, 7 U.S.C. 6862), became effective the 22nd day of July 1965; and

Whereas, Supplement No. 1, which modified the Watershed Plan Agreement, was developed through cooperative efforts of the Sponsors and the Soil Conservation Service (now NRCS) and became effective on the 24th day of May 1976; and

Whereas, Supplement No. 2, which modified the Watershed Plan Agreement, was developed through cooperative efforts of the Sponsors and NRCS and became effective on the ___ day of _____ 2019; and

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for rehabilitation of the works of improvement for the Cherrystone Creek Dam No. 2A located in Pittsylvania County, Commonwealth of Virginia, under the authority of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. Section 1001 to 1008, 1010, and 1012); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a Watershed Work Plan No. 3 - Environmental Assessment for works of improvement for the

rehabilitation of Cherrystone Creek Dam No. 2A, Commonwealth of Virginia, hereinafter referred to as the Plan-EA or plan, which plan is annexed to and made a part of this agreement; and

Whereas, in order to carry out the watershed plan for said watershed, it has become necessary to modify said watershed agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS and the Sponsors, hereby agree on this Supplemental Watershed Plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this Supplemental Watershed Agreement and including the following:

1. **Term.** The term of this agreement is for 50 years after construction is completed and does not commit the NRCS to assistance of any kind beyond the end of the agreement.

2. **Costs.** The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

3. **Water Supply**. Supplemental water supply was added as a project purpose for this dam.

4. **Real property.** The Sponsors will acquire such real property as will be needed in connection with the works of improvement. The amounts and percentages of the real property acquisition costs to be borne by the Sponsors and NRCS are as shown in the Cost-Share table in Section 5 hereof. The Sponsors agree that all land acquired for measures, other than land treatment practices, with financial or credit assistance under this agreement will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency that will continue to maintain and operate the development in accordance with the operation and maintenance agreement.

   NRCS policy regarding minimum landrights for areas upstream of the dam require the local sponsors to acquire an easement for all areas below the top of dam, unless the plan explicitly allows for a lower elevation. An economic and risk analysis was conducted to inform the Sponsors of their associated potential for risk of flood damages. The Pittsylvania County Board of Supervisors will restrict future construction below the elevation of the 100-year, 24-hour flood event (elevation 700.6 feet NAVD88) and acknowledge and accept the risks associated with allowing future construction to occur between the 100-year, 24-hour flood elevation and the top of the dam. The Pittsylvania County Board of Supervisors, being subject to National Flood Insurance Program regulations, will review and reasonably utilize base flood elevations determined for this rehabilitation project and data from other sources as it becomes available as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's Flood Insurance Rate Map meet the standards as specified in the National Flood Insurance Program regulation 44 CFR 60.3(b)(4).

5. **Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The Sponsors hereby agrees to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as further implemented through regulations in 49 C.F.R. Part 24 and 7 C.F.R. Part 21) when acquiring

real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements, they agree that, before any Federal financial assistance is furnished; they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

6. **Cost-share for Rehabilitation Project.** The following table will be used to show cost-share percentages and amounts for Watershed Project Plan implementation.

Works of Improvement	**NRCS**		**Sponsors**		**Total**
Cost-Sharable Items	**Percent**	**Cost**	**Percent**	**Cost**	**Cost**
Rehabilitation of the dam (construction costs):	66%	$4,956,400	34%	$2,590,300	$7,546,700
Relocation, Replacement in-kind:	0%	$0	0%	$0	$0
Relocation, Required Decent, Safe, Sanitary:	0%	$0	0%	$0	$0
Sponsors' Planning Costs:	n/a	n/a	100%	$25,000	$25,000
Sponsors' Engineering Costs:	n/a	n/a	100%	$18,500	$18,500
Sponsors' Project Administration Costs:	n/a	n/a	100%	$35,000	$35,000
Landrights Acquisition Costs:	n/a	n/a	100%	$0	$0
Subtotals: Cost-Sharable Costs: Cost-Share Percentages: [a/]	(65%)	**$4,956,400**	(35%)	**$2,668,800**	**$7,625,200** (100%)
Non Cost-Sharable Items (per PL-83-566 and NRCS policy) [b/]	---	---	---	---	---
NRCS Engineering and Project Administration Costs:	100%	$580,500	n/a	n/a	$580,500
Natural Resource Rights:	n/a	n/a	0%	$0	$0
Federal, State and Local Permits:	n/a	n/a	100%	$3,000	$3,000
Relocation, Beyond Required Decent, Safe, Sanitary	n/a	n/a	0%	$0	$0
Subtotals: Non-Cost-Sharable Costs:	**100%**	**$580,500**	**100%**	**$3,000**	**$583,500**
Total Cost-Sharable Cost:	**n/a**	**$4,956,400**	**n/a**	**$2,668,800**	**$7,626,200**
Total Installation Cost:	**n/a**	**$5,536,900**	**n/a**	**$2,671,800**	**$8,208,700**

a/ The maximum NRCS cost-share is 65% of the cost-sharable items not to exceed 100% of the construction cost. Total eligible project costs include construction, landrights, relocation, project administration, and planning services provided by the Sponsors.

b/ If actual non-cost-sharable item expenditures vary from these estimates, the responsible party will bear the change in costs.

7. **Land treatment agreements.** The sponsors will obtain agreements from owners of not less than 50 percent of the land above each multiple-purpose and floodwater-retarding structure.

These agreements must provide that the owners will carry out farm or ranch conservation plans on their land. The sponsors will ensure that 50 percent of the land upstream of any retention reservoir site is adequately protected before construction of the dam. The sponsors will provide assistance to landowners and operators to ensure the installation of the land treatment measures shown in the watershed project plan. The sponsors will encourage landowners and operators to continue to operate and maintain the land treatment measures after the long-term contracts expire, for the protection and improvement of the watershed.

Approximately 47% of the drainage area above Cherrystone Creek Dam No. 2A is wooded and about 34% is in pasture and hayland. Thus, there is no requirement of the Sponsors to obtain agreements for the protection of the upstream watershed.

8. **Floodplain Management.** Before construction of any project for flood prevention, Pittsylvania County and the Town of Chatham must agree to participate in and comply with applicable Federal floodplain management and flood insurance programs.

9. **Water and mineral rights.** The Sponsors will acquire or provide assurance that landowners or resource users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement. Any costs incurred must be borne by the Sponsors and these costs are not eligible as part of the Sponsors' cost-share.

10. **Permits.** The Sponsors will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement. These costs are not eligible as part of the Sponsors' cost-share.

11. **NRCS assistance.** This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the rehabilitation plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

12. **Additional agreements.** A separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

13. **Amendments.** This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may de-authorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS must promptly notify the Sponsors in writing of the determination and the reasons for de-authorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS must be in accordance with the legal rights and liabilities of the parties when project funding has been de-authorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the Sponsors having specific responsibilities for the measure involved.

14. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, may be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision may not be construed to extend to this agreement if made with a corporation for its general benefit.

15. **Operation and Maintenance (O&M).** The Town of Chatham will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M agreement. An O&M agreement will be entered into before Federal funds are obligated and continue for the project life (50 years after construction). Although the Town of Chatham's responsibility to the Federal Government for O&M ends when the O&M agreement expires upon completion of the evaluated life of measures covered by the agreement, the Town of Chatham acknowledges that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

16. **Emergency Action Plan.** Prior to construction, the Town of Chatham must prepare an Emergency Action Plan (EAP) for this dam where failure may cause loss of life, as required by state and local regulations. The EAP must meet the minimum content specified in NRCS Title 180, National Operation and Maintenance Manual (NOMM), Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. An EAP is required prior to the execution of fund obligating documents for rehabilitation of the structure. The EAP must be reviewed and updated by the Town of Chatham annually.

17. **Nondiscrimination provisions.** In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

    Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

    To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue,

SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov. USDA is an equal opportunity provider, employer, and lender.

By signing this agreement, the recipient assures the U.S. Department of Agriculture that the program or activities provided for under this agreement will be conducted in compliance with all applicable Federal civil rights laws, rules, regulations, and policies.

18. **Certification Regarding Drug-Free Workplace Requirements** (7 CFR Part 3021). By signing this watershed agreement, the Sponsors are providing the certification set out below. If it is later determined that the Sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled Substance means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. Section 812) and as further defined by regulation (21 CFR Sections 1308.11 through 1308.15);

Conviction means a finding of guilt (including a plea of *nolo contendere*) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

Criminal drug statute means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll, or employees of sub-recipients or subcontractors in covered workplaces).

Certification:

A. The Sponsors certify that they will or will continue to provide a drug-free workplace by:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(2) Establishing an ongoing drug-free awareness program to inform employees about—

(a) The danger of drug abuse in the workplace;

(b) The grantee's policy of maintaining a drug-free workplace;

(c) Any available drug counseling, rehabilitation, and employee assistance programs; and
(d) The penalties that may be imposed upon employees for drug abuse violation occurring in the workplace.

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee must --
(a) Abide by the terms of the statement; and
(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction.

(5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice must include the identification number(s) of each affected grant.

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employees who is so convicted--
(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
(b) Requiring such employee to participate satisfactorily in drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6).

B. The Sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies will keep the original of all disclosure reports in the official files of the agency.

19. Certification Regarding Lobbying (7 CFR Part 3018)

A. The Sponsors certify to the best of their knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee

of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned must complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The Sponsors must require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients must certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, of the U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

20. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions (7 CFR Part 3017).

A. The Sponsors certify to the best of their knowledge and belief, that they and their principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (A)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

B. Where the primary Sponsor is unable to certify to any of the statements in this certification, such prospective participant must attach an explanation to this agreement.

21. Clean Air and Water Certification

A. The project Sponsoring organizations signatory to this agreement certify as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is (__), is not (_X_) listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS Assistant State Conservationist for Management and Strategy prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project Sponsoring organizations signatory to this agreement agree as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section 114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt sub-agreement.

C. The terms used in this clause have the following meanings:

(1) The term “Air Act” means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term "Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term "facility" means any building, plant, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a Sponsor, to be utilized in the performance of an agreement or sub-agreement. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location will be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

22. Assurances and Compliance. As a condition of the grant or cooperative agreement, the Sponsors assure and certify that they are in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements, including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as specifically set forth herein.

State, Local, and Indian Tribal Governments: OMB Circular A-87, A-102, A-129, and A-133; 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021, and 3052.

23. Examination of Records. The Sponsors must give the NRCS or the Comptroller General, through any authorized representative, access to, and the right to, examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

24. **Term.** The term of this agreement is for 50 years after construction is completed and does not commit the Sponsors to assistance of any kind to NRCS beyond the end of the agreement.

25. **Sponsors' Assistance.** This agreement is not a fund-obligating document. Financial and other assistance to be furnished by the Sponsors in carrying out the rehabilitation plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

26. **Signatures.**

Town of Chatham
P.O. Box 370
Chatham, Virginia 24531

By: /S/ Will Pace

Title: Town Mayor

Date: September 10, 2019

The signing of this supplemental watershed agreement was authorized by the governing body of the Town of Chatham at a meeting held on June 14, 2019.

/S/ Brenda O. Robertson
Notary # 7128443

Town of Chatham
P.O. Box 370
Chatham, Virginia 24531

Date: September 10, 2019

Pittsylvania Soil and Water Conservation District
19783 U.S. Highway, Suite F
Chatham, Virginia 24531

By: /S/ J. Tom Kelley

Title: Chairman

Date: September 17, 2019

The signing of this supplemental watershed agreement was authorized by the governing body of the Pittsylvania Soil and Water Conservation District at a meeting held on September 16, 2019.

/S/ Brenda O. Robertson
Notary #7128443

Pittsylvania SWCD
19783 U.S. Highway, Suite F
Chatham, Virginia 24531

Date: September 17, 2019

Pittsylvania County
Board of Supervisors
P. O. Box 426
Chatham, Virginia 24531

By: /S/ David Smitherman

Title: County Administrator

Date: September 20, 2019

The signing of this supplemental watershed agreement was authorized by the governing body of the Pittsylvania County Board of Supervisors at a meeting held on September 17, 2019.

/S/ Kaylyn McCluster
Administrative Secretary

Pittsylvania County Board of Supervisors
P. O. Box 426
Chatham, Virginia 24531

Date: September 20, 2019

Natural Resources Conservation Service
United States Department of Agriculture

Approved by:

/S/ John A. Bricker
State Conservationist

Date: September 25, 2019

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SUMMARY OF SUPPLEMENTAL WATERSHED PLAN NO. 3 AND ENVIRONMENTAL ASSESSMENT
for the
Rehabilitation of Cherrystone Creek Watershed Dam No. 2A
Pittsylvania County, Virginia
5th Congressional District

Prepared by: United States Department of Agriculture, Natural Resources Conservation Service (NRCS).

Authorization: The original work plan was prepared, and the works of improvement were installed, under the authority of the Watershed Protection and Flood Prevention Act (Public Law 83-566), as amended (16 U.S.C. Section 1001 et. seq.), 1954. The rehabilitation of Cherrystone Creek Dam No. 2A is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472.

Sponsors: Town of Chatham
Pittsylvania Soil and Water Conservation District
Pittsylvania County Board of Supervisors

Proposed Action: Rehabilitate Cherrystone Creek Watershed Dam No. 2A, Roaring Fork Lake, to meet current Virginia Division of Dam Safety and NRCS safety and performance standards.

Purpose and Need for Action: The Cherrystone Creek Dam No. 2A does not presently meet NRCS standards for the integrity for a vegetated earth auxiliary spillway. The purposes for federal action are to comply with current NRCS and Virginia dam design and safety standards to reduce risks to life and property that could result from a potential catastrophic dam failure; maintain the level of flood protection, that is currently provided by the dam's ability to attenuate floods, to life and property upstream and downstream of the dam; and maintain the use of the reservoir for supplemental water supply. At the request of the sponsors, NRCS approved the addition of supplemental water supply (Municipal and Industrial (M&I)) as a purpose for Cherrystone Creek Dam 2A.

Description of Preferred Alternative: The preferred alternative is to structurally rehabilitate Cherrystone Creek Dam No. 2A to meet current safety and performance standards for a high hazard potential dam, provide sediment storage for 50 years after construction, maintain current level of flood protection downstream, and maintain the use for supplemental water supply. The plan provides for installing a 200-foot-wide Roller-Compacted Concrete (RCC) chute spillway over the top of the dam. The chute will discharge to an RCC stilling basin. The existing auxiliary spillway will be blocked with a berm. The riser footer will be modified to meet seismic criteria. New toe drains will be installed in the embankment. There will be no change in the current levels of flood protection downstream. Although the lake will be drained during construction, there will be no permanent change in the water resource operations or recreational uses of the lake once construction is complete.

Resource Information:

Location: Latitude: 36.847 Longitude: -79.433

8-Digit Hydrologic Unit Number: 03010105

Climate: In Pittsylvania County, in the Piedmont Physiographic Province, the annual average temperature is 54.7°F with an annual summer average of 73.0°F and an annual winter average of 36.4°F. The mean date for the last frost of spring is May 2 with the latest date being May 23. In the fall, the mean date for the first frost is October 10 with the latest frost occurring on November 6. This provides a mean growing season of approximately 161 days. The average annual precipitation is 45.24 inches. This precipitation is well distributed through the year with slightly larger amounts (over 4 inches) occurring in the months of March, May, July, and September. The average annual total snowfall is 4.2 inches.

Watershed Size: Drainage Area of Roaring Fork Lake = 3,677 acres

Land Use:
Woodland: 1,740 acres, 47.3%
Cropland: 418 acres, 11.4%
Developed: 155 acres, 4.2%%
Hay/Pasture: 1,245 acres, 33.9%
Water: 25 acres, 0.7%
Shrub land: 94 acres: 2.5%

Land Ownership: Upstream of dam: 100% private and 0% public
Downstream of dam: 87% private, 13% public

Population and Demographics: According to the U.S. Census Bureau, the population of the Town of Chatham was 987 (2010-2014 American Community Survey (ACS) 5-Year Estimate). Of the total population in the ACS, 76.7% (757) were White and 18.8% (186) were Black or African American. All other racial groups individually were less than 1% of the total population. Together, Whites and Blacks made up 95.5% of the Town's entire population. Hispanics of any race are the second largest minority group with 2.7%, or 27.

The median age of the population of the Town of Chatham is 50.5 while the same number for the entire state of Virginia was 37.6. Residents in the Town of Chatham that were 65 years old or older totaled 24.7% (244). Of the Town population, 85.7% were over the age of 19.

Approximately 85.6% of the residents in the Town had a high school education or higher. Of the residents in the Town that are 25 years of age or older, 14.4% do not have a high school diploma. About 34.9% of the Town residents have some education beyond high school, including 15.1% with a bachelor's degree or higher and 19.7% with graduate or professional degrees.

There are 656 Town of Chatham residents who are 16 years of age or older according to the 2010-2014 ACS. Approximately 68% (446) of the residents 16 years of age or older are considered in the labor force pool. About 32% of the civilian labor force in the Town (210 of 656) was unemployed according to the same source.

The Town of Chatham has a diverse economy. According to the 2010-2014 ACS, five sub-sectors of the local economy employ the civilian workforce: management, professional and related (45.6%); service (13.6%); sales and office (23.9%); production, transportation and material moving (13.1%), construction, extraction, maintenance and repair (1.9%); and other 1.9%. Private

wage and salary employment constitute 58.5% of all employment in the Town of Chatham while public sector jobs (primarily in education) make up 41.5% in Chatham.

Median household income estimated for the Town for the 2010-2014 period was $45,000. This compares to $64,792 per year for the median household income calculated for Virginia. The national figure for median household income per year estimated for the same period was $53,482.

With respect to per capita incomes, Town of Chatham residents are estimated to have had per capita income of $27,849 for the 2010-2014 period. Virginians reported per capita income of $33,958 for the 2010-2014 period, while the same figure for the entire United States was $28,555 for same period. That makes the Town per capita income figure for 2010-2014 82% of the state's level and 97.5% of the national figure.

According to the 2010-2014 Census estimates, the Town of Chatham had 23 families living below the poverty level (9.3%) and a total of 73 people living below the poverty level. That compares to 8.2% for State and 11.5% for the Nation.

The 2010-2014 Census estimates indicate that 76.7% of the 529 housing units within the Town of Chatham were occupied. The median year that Chatham homes were built is 1951. About 72% of all homes were built before 1959.

A majority of the 150 people at risk from a breach event live within the Town of Chatham. There are six structures within the breach inundation zone: four homes, one commercial structure and one barn. Most of the residential property downstream of the dam ranges between $50,000 and $500,000 in total value with an average of about $91,000. The total value of all potentially impacted property (structures) at risk below the dam is an estimated $866,000.

Cherrystone Creek Dam No. 2A reservoir is not designated for public recreational use.

Resource Concerns Identified Through Scoping:

Item/Concern	Rationale
WATER	
Floodplain Management	The Town of Chatham and Pittsylvania County both participate in the National Flood Insurance Program. Maintain current flood protection. Flooding concerns for downtown areas. Concern for impacts to downstream roads and crossings.
Streams, Lakes, and Wetlands	Minimize impacts during construction.
Water quality	Minimize sediment transport and maintain oxygen levels.
AIR	
Air Quality	Air quality may be temporarily impacted during construction.
ANIMALS	
Endangered and Threatened Species	Possible impact to Northern long-eared bat. Check downstream for presence of: Roanoke Bass, Roanoke Logperch and Orangefin Madtom. None identified.
Fish and Wildlife	Maintain normal flow regime during construction period.
PLANTS	
Invasive Species	Invasive species present around dam.
Riparian Areas	Temporary impact anticipated during construction.
HUMAN	
Land Use	Upstream land use is restricted due to operation of the dam.
Local and Regional Economy	Temporary benefit during construction.
Potable Water Supply	Sponsors will use lake for supplemental water supply.
Public Health and Safety	Rehabilitation is needed because the dam does not meet current safety standards.
Recreation	Draining lake would have temporary impact on property owners and guests during construction and fish recovery period.
Social/Cultural Issues	Concerns about flooding if the dam were decommissioned.

Alternative Plans Considered: Three plans were considered and evaluated in detail.

1) *No Federal Action (Sponsors' Rehabilitation)* - The Sponsors have indicated that they will use the plan developed by NRCS to complete the rehabilitation of the dam if Federal funding is not available. The *No Federal Action (Sponsors' Rehabilitation)* alternative would be the same or involve the same components as the preferred alternative: *Structural Rehabilitation with Federal Assistance – Roller-Compacted Concrete (RCC) Chute Spillway over the Dam*.

2) *Structural Rehabilitation with Federal Assistance – Roller-Compacted Concrete (RCC) Chute Spillway over the Dam.* Install a 200-foot-wide RCC armored auxiliary spillway over the dam. The new auxiliary spillway would outlet into an RCC stilling basin at the valley floor. Close the existing auxiliary spillway with an earthen berm.

3) *Structural Rehabilitation with Federal Assistance – Reinforced Concrete Labyrinth Weir over the dam.* Install a 74-foot-wide, 315-foot long, two-cycle labyrinth weir in the embankment of the dam. Outlet the spillway into a Saint Anthony Falls (SAF) basin followed by a 60-foot-long riprap stabilization pad. Close the existing auxiliary spillway with an earthen berm.

All the rehabilitation alternatives will also require the following modifications:

- Retrofit the footer of the riser.
- Install new toe drains.

There will be no change in the current levels of flood protection downstream. There will be no change in the supplemental water supply use as a result of project activity.

The preferred alternative maximizes net benefits with a benefit/cost ratio of 1:1 and is the rehabilitation alternative preferred by the Sponsors.

Project Costs (Dollars)

	PL-83-566 Funds		Other Funds		Total	
Category	**Dollars**	**%**	**Dollars**	**%**	**Dollars**	**%**
Construction	$4,956,400	66%	$2,590,300	34%	$7,546,700	100%
Engineering	$555,500	97%	$18,500	3%	$574,000	100%
Relocation	n/a	n/a	n/a	n/a	n/a	n/a
Real Property Rights	n/a	n/a	$0	100%	$0	100%
Project Administration	$25,000	42%	$35,000	58%	$60,000	100%
Other (permits)	$0	0%	$3,000	100%	$3,000	100%
TOTAL COSTS	**$5,536,900**	**68%**	**$2,646,800**	**32%**	**$8,183,700**	**100%**
Annual O&M (non-Federal)	n/a	n/a	$5,000	100%	$5,000	100%

Project Benefits: Rehabilitation with an RCC-chute spillway will allow the sponsors to meet the requirements for a high hazard potential dam, reduce the potential for loss of life from a dam breach, continue protection of existing infrastructure downstream of the dam, maintain property values around the reservoir and associated recreational opportunities, and maintain the water supply. Net average annual equivalent benefits between the Future with Federal Project and the Future without Federal Project = $0 since the candidate plans to rehabilitate Roaring Fork Lake are identical in scope, substantially equivalent costs and equal effects.

Number of Direct Beneficiaries/Population at Risk: 150 (for Sunny Day breach)

Other beneficial effects:

- Reduces the threat to life for approximately 150 people that live and/or work downstream in the breach inundation area.
- Reduces the risk of a dam breach for six structures within the breach inundation zone.
- Reduces the risk for a breach for the vehicle occupants who utilize four county roads in the breach inundation zone with a cumulative total average daily traffic count of 630 (Cherrystone Lake Road – 130, Hodnetts Mill Road – 270, Moses Mill Road – 110 and Davis Road – 120).
- Maintains the use of the reservoir for supplemental water supply.
- Provides incidental recreational benefits (primarily boating and fishing) to four upstream residences.
- Reduces the threat of loss of access and loss of emergency services for six structures (four residences, one commercial property, and a barn) in a breach event.
- Provides downstream flood protection for the residents in the area, as well as those working, recreating, or traversing within the downstream floodplains, for an additional 50 years.

- Reduces the liability associated with continuing to operate an unsafe dam.
- Maintains existing stream habitat downstream of the dam.
- Removes the large Common carp population from the reservoir which creates high turbidity in the lake and lake outflow, adversely affecting the water treatment plant operations, while improving the reservoir's existing aquatic habitat and maintaining the terrestrial habitat around the reservoir.
- Meets current Virginia Division of Dam Safety and NRCS safety and performance standards.

Benefit to Cost Ratio (current rate): 1.0 to 1.0

Net beneficial effects (National Economic Development or "NED" effects): $0

Funding Schedule: The most likely scenario is for the project to be implemented over two years including the design and construction.

Federal funds: Year 1 - $493,000 for engineering and project administration; $495,600 for construction; **Year 2** - $80,000 for construction supervision and project administration and $4,460,800 for construction.

Non-Federal funds: Year 1 - $21,000 for engineering and administration and $3,000 for permitting costs; $259,000 for construction; **Year 2** - $31,000 for engineering and project administration and $2,331,300 for construction.

Period of Analysis: 52 years (includes 1 year for design and 1 year for construction)

Project Life: 50 years

Environmental Effects/Impacts:

Resource	Impact
Air Quality	Temporary increase in particulate matter on site during construction.
Land Use Changes	None.
Floodplains	Current regulatory floodplain would be maintained.
Fisheries	The reservoir will be drained during construction. This will provide an incidental benefit to both water quality and the fishery since the very large Common carp population will no longer be present. The fishery is expected to fully recover in 3-4 years.
Forest Resources	None.
Wetlands	Temporary effects during construction on 18.1 acres of wetlands.
Water Quality	Turbidity in the lake will be reduced. Sediment loading to Roaring Fork and Cherrystone Creek will decrease. Water treatment costs will decline.
Wildlife Habitat	None.
Prime Farmland	Potential impacts of up to 1.6 acres of farmland of state-wide importance.

Resource	Impact
Cultural Resources	Cherrystone Creek Dam No. 2A and Hodnetts Mill (site 44PY0461) are present in the project area. Both are eligible for National Register consideration due to their age (50+ years old). NRCS recommended to the Virginia Department of Historic Resources that both Cherrystone Creek Dam No. 2A and Hodnetts Mill site be classified as "not eligible."
Threatened and Endangered Species	No effect.
Mitigation	None.

Major Conclusions: To bring this dam into compliance with NRCS and State safety and performance standards, it is necessary to rehabilitate the dam by installing RCC armor over the dam, closing the existing auxiliary spillway, retrofitting the riser footer, and installing toe drains.

There will be no change in the current levels of flood protection downstream. There will be no permanent change in the supplemental water supply operations of the lake after project activity is complete. Most of the environmental impacts are short-term (only during construction) and existing conditions will be restored upon completion of construction.

Areas of Controversy: None

Issues to be Resolved: None

Evidence of Unusual Congressional or Local Interest: No

Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes X No ___

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CHANGES REQUIRING PREPARATION OF A SUPPLEMENT

This supplement only addresses Cherrystone Creek Dam No. 2A, known locally as Roaring Fork Lake. This dam was built in 1969 as a significant hazard potential dam. Due to changes in the downstream watershed, the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management (referred to herein as the Virginia Division of Dam Safety) changed the hazard potential of the dam to high in November 2008. The first conditional certificate for Operation and Maintenance of the structure was issued because the vegetated earthen auxiliary spillway could not pass the Probable Maximum Flood (PMF) in effect at that time without overtopping the dam. The auxiliary spillway does not meet current USDA Natural Resources Conservation Service (NRCS) safety and performance standards for the integrity of a high hazard potential dam. Therefore, the dam does not meet the objectives of the Town of Chatham, the Pittsylvania County Board of Supervisors, and the Pittsylvania Soil and Water Conservation District (Pittsylvania SWCD) (herein referred to as Sponsors), which are to meet the current safety and performance standards, maintain the existing level of flood protection for downstream properties, reduce the risk of loss of human life; and maintain the water supply.

This supplemental Plan-EA documents the planning process by which NRCS provided technical assistance to the Sponsors and the public in addressing resource issues and concerns within the Roaring Fork Lake watershed and complied with the requirements of the National Environmental Policy Act (NEPA).

In accordance with NRCS NEPA Policy, an Environmental Evaluation Worksheet, NRCS-CPA-52 form, was completed for the Cherrystone Creek Dam No. 2A rehabilitation project to determine the requisite level of NEPA documentation to support the proposed action. The NRCS-CPA-52 resulted in a determination that an Environmental Assessment (EA) was required.

PURPOSE AND NEED FOR ACTION

Cherrystone Creek Dam No. 2A was constructed as a significant hazard potential dam and is currently classified as a high hazard potential dam by the Virginia Division of Dam Safety. The dam provides flood protection and supplemental water supply for the Town of Chatham and parts of Pittsylvania County. However, the integrity of the vegetated earth auxiliary spillway does not presently meet NRCS standards for a high hazard dam. The purposes of this supplement are to comply with current NRCS and Virginia dam design and safety standards to reduce risks to life and property that could result from a potential catastrophic dam failure; maintain the level of flood protection, that is currently provided by the dam's ability to attenuate floods, to life and property downstream of the dam; and maintain the use of the reservoir as supplemental water supply.

At the request of the sponsors, NRCS approved, by letter dated March 5, 2019, proceeding with the addition of supplemental water supply (Municipal and Industrial (M&I)) as a purpose for Cherrystone Creek Dam 2A.

There is a need to comply with current state and federal safety and performance standards and to continue to provide the current levels of flood protection and supplemental water supply. There are four homes, one commercial structure, one barn, four roadways, and other property within the breach inundation zone of this structure. The Town's water treatment plant is within the breach zone but outside of the 500-year floodplain with the dam in place. There are no inhabitable structures within the currently effective regulatory 100-year floodplain and one home within the

500-year floodplain (0.2% Chance of Flood Hazard Zone) downstream of the dam. The reservoir is the backup water source for the community with 99 acre-feet per year of water storage currently. Both Site 1 and Site 2A dams discharge into Cherrystone Creek and the Town of Chatham withdraws their raw water directly from the creek about 3 miles downstream of the dams. When additional water is needed, one or more of the water supply gates are opened. The purpose of this federal action is to meet current safety and performance standards and continue to provide the current level of water supply and flood protection in a manner that reduces risk of loss of human life and is both cost effective and environmentally acceptable.

ORIGINAL PROJECT

The original watershed work plan for flood prevention and watershed protection was prepared in 1965 under the authority of the Watershed Protection and Flood Prevention Act (Public Law 83-566). The works of improvement were subsequently installed under the same authority. The Town of Chatham, Pittsylvania County Board of Supervisors, and the Pittsylvania SWCD were the local sponsors. The original watershed work plan included the construction of two single-purpose flood control dams, one multi-purpose dam that would include flood control and water supply storage, a small dike, and 5.5 miles of stream channel improvement. One floodwater retarding structure, Site 2A, and one multi-purpose structure (flood protection and water supply), Site 1, were constructed. All construction was completed by 1969. In 1976, the plan was supplemented to delete one single-purpose flood control dam, 570 feet of dike, and 5.5 miles of channel improvement. The supplemental watershed plan which eliminated all uncompleted works of improvement and closed out the project was executed on May 24, 1976.

The Town of Chatham owns and operates Roaring Fork Lake. The Sponsors applied for NRCS assistance with dam rehabilitation on October 1, 2013. The rehabilitation of Cherrystone Creek Dam No. 2A is authorized by the Public Law 83-566, (as amended), and as further amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).

WATERSHED PROBLEMS

The Sponsors were aware of potential problems with the dam in 2008 when the Virginia Division of Dam Safety changed the hazard class of the dam to high hazard potential and issued a Conditional Operation and Maintenance (O&M) Certificate to the Town of Chatham. The conditional certificate for Cherrystone Creek Dam 2A was issued because the auxiliary spillway did not have sufficient capacity to pass the probable maximum flood (PMF) in effect at that time without overtopping the dam embankment.

Sponsor Concerns: A conditional certificate serves as notification to the Sponsors that the dam no longer meets State requirements and must be modified to meet State law. The dam is at greater risk for a breach in its current condition. In October 2013, the Sponsors requested NRCS assistance to prepare a watershed plan that would identify the improvements necessary to obtain full dam safety certification.

Auxiliary Spillway Integrity (Soil Erodibility): In 2009, Hurt & Proffitt Engineers were retained by Reynolds-Clark under their contract with the Town of Chatham to perform a hazard classification and Emergency Action Plan for Cherrystone Creek Dam No. 2A. The vegetated earth auxiliary spillway did not meet the Virginia Division of Dam Safety criteria for capacity for

the PMP in effect at that time. Further analysis by NRCS indicated that the soil materials in the auxiliary spillway do not meet the NRCS criteria for integrity in the PMF event.

Landrights and Easements: The original landrights obtained for Cherrystone Creek Dam No. 2A provided for the easements necessary to construct, operate, and maintain the dam. Only one easement had an elevation specified. There are four houses upstream of the dam, but all have an elevation higher than the existing top of the dam. The legal counsel for the Sponsors has issued the opinion that easements exist to the 100-year, 24-hour flood elevation.

Floodplain Management: The Sponsors have identified flooding in the floodplain downstream as a primary concern. Pittsylvania County and the Town of Chatham have participated in the National Flood Insurance Program since 1980 and 1979, respectively. Both realize the value that Dam No. 2A provides in flood protection benefits, particularly for the roads. Roaring Fork Lake controls 5.75 square miles (3,677 acres) of the watershed above the affected properties and benefitted area.

Erosion and Sedimentation: As of 2015 when a sediment survey was completed, Roaring Fork Lake had reached 46 years (46%) of its planned 100-year service life. The designed submerged sediment capacity was 116 acre-feet, but the as-built volume was 157 acre-feet due to the removal of extra borrow from the pool area. As of 2015, it is estimated that there were 42 acre-feet of sediment in the pool area, which is about 27% of the as-built sediment storage volume. The reservoir has about 124 years of sediment storage. This material is primarily deposited sediments plus leaf and other organic debris. The actual sediment delivery was less than anticipated during the original design.

Local Concerns: The two Cherrystone Creek Watershed dams were planned and constructed in response to the concerns of the residents after extensive flooding that occurred in the 1950's. The Sponsors also wanted a reliable source of water and included water supply storage in one of the dams. The possibility of decommissioning the dam at Roaring Fork Lake was mentioned at the first public meeting in June 2016 since decommissioning must be considered under the NRCS rehabilitation policy. Although the discussion of decommissioning addressed the mitigation of induced damages, the Sponsors and residents were adamantly opposed to decommissioning because of their concern that flooding would increase in the absence of the dam. One landowner reminded the meeting participants how frequently flooding occurred prior to construction of the two dams. In addition, the riser at Roaring Fork Lake was recently modified to allow supplemental water withdrawals in the event of a drought. The Sponsors did not want to lose this additional source of water.

WATERSHED OPPORTUNITIES

The following is a general list of opportunities that will be recognized through the implementation of this dam rehabilitation plan. Some quantification of these opportunities will be provided in other sections of the report, as appropriate.

- Comply with high hazard potential dam safety and performance standards established by NRCS and the Virginia Division of Dam Safety.
- Reduce the potential for loss of life associated with a failure of this dam.
- Reduce the sponsor liability associated with operation of an unsafe dam.

- Maintain the supplemental water supply for area residents.
- Maintain the existing level of flood protection for downstream homes and infrastructure that is currently provided by the dam's ability to attenuate floods.
- Protect real estate values downstream from the dam and around the lake.
- Improve safety with the prohibition of future construction of inhabitable dwellings upstream of the dam below the elevation of the 100-year, 24-hour event.
- Reduce turbidity in the water by removing the large population of Common carp from the reservoir. This will reduce water treatment costs, while improving the reservoir's existing aquatic habitat.

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

A scoping process was used to identify issues of economic, environmental, cultural, and social importance in the watershed. Watershed concerns of Sponsors, technical agencies, and local citizens were expressed in the scoping meeting and in other planning and public meetings. Factors that would affect soil, water, air, plant, animals, and human resources were identified by an interdisciplinary planning team composed of the following areas of expertise: engineering, biology, economics, resource conservation, water quality, soils, archaeology, and geology.

On June 9, 2016, a Scoping Meeting was held at the Old Dominion Agriculture Complex in Chatham, Virginia with 18 people attending. Table A lists the specific concerns and their relevance to the proposed action to the decision-making process.

The citizens at the first Public Meeting, also held on June 9, 2016, expressed concerns like those at the Scoping Meeting.

Table A – Summary of Scoping for Rehabilitation of Roaring Fork Lake Dam.

Item/Concern	Relevant to the Proposed Action		Rationale
	Yes	**No**	
SOILS			
Prime and Unique Farmland and Farmland of Statewide Importance	X		There are 1.6 acres of farmland of statewide importance within the maximum extent of possible ground disturbance.
WATER			
Floodplain Management	X		The Town of Chatham and Pittsylvania County both participate in the National Flood Insurance Program. Maintain current flood protection. Flooding concerns for downtown areas. Concern for impacts to downstream roads and crossings.
Regional Water Management Plans		X	West Piedmont Planning District does not include Roaring Fork Lake in their Regional Water Supply Plan, but the riser has been modified to allow for water withdrawals.
Sole Source Aquifers		X	None present.
Streams, Lakes, and Wetlands	X		Minimize impacts during construction.
Waters of the U.S./Wetlands (Clean Water Act – 401 and 404)	X		Minimize impacts during construction. There are 18.1 acres of wetlands present that would be temporarily impacted during construction due to lake draw-down during construction.
Water Quality (Clean Water Act – 303(d) and 305(b))	X		Minimize sediment transport. Maintain oxygen levels. Common carp population creates a sediment load in the reservoir and corresponding outflow waters into Roaring Fork and Cherrystone Creek. High costs for water treatment due to turbidity.
Water Resources		X	Addressed under Potable Water
Wild & Scenic Rivers		X	None present.
AIR			
Clean Air Act (Criteria pollutants)	X		Although there would be increased air emissions during construction, Pittsylvania County is in attainment for all Criteria Pollutants.
Clean Air Act (Regional Visibility Degradation)		X	No Class I Areas present.
ANIMALS			
Endangered and Threatened Species		X	Initial review of T&E species indicated potential habitat presence for the Northern long-eared bat (NLEB). Additional research found no known recorded occupied maternity roosts and no NLEB Hibernaculum within 5.5 miles of the maximum extent of ground disturbance.

Item/Concern	Relevant to the Proposed Action		Rationale
Essential Fish Habitat		X	None present.
Fish and Wildlife Habitat	X		The lake will be drained during construction. As a result, there will be temporary impacts to the fish and wildlife species that currently utilize it. Habitat downstream of the dam, will not be affected as normal flow will be maintained.
Invasive Species		X	No invasive animal species were identified in the project area.
Migratory Birds/Bald Eagles/Golden Eagles		X	While habitat was present, no Bald or Golden eagle nests were found during the project site visit. Additionally, no recorded nests are documented within the project area.
PLANTS			
Endangered and Threatened Species		X	No State or Federally listed species were identified.
Invasive Species	X		Common invasive plants were identified within the specified maximum limits of disturbance.
Riparian Areas		X	Temporary impact anticipated during construction.
HUMAN			
Environmental Justice and Civil Rights		X	All residents of the watershed benefit equally.
Historic Properties	X		Hodnetts Mill site and Cherrystone dam are over 50 years old and eligible for National Register consideration.
Land Use	X		Future development in the floodpool will be restricted due to operation of the dam.
Natural Areas		X	None present.
Park Lands		X	None present.
Potable Water Supply	X		Roaring Fork will be used for supplemental water supply.
Public Health and Safety	X		Dam rehabilitation is needed because the dam was built as a significant hazard structure and now it has been classified as a high hazard dam.
Recreation		X	No public recreation.
Scenic Beauty		X	No impact.
Scientific Resources		X	No research sites identified.
Social/Cultural Issues	X		Concerns about flooding if the dam were decommissioned.

AFFECTED ENVIRONMENT

PLANNING ACTIVITIES

Geologic and engineering investigations and analyses were conducted by NRCS engineering staff in Raleigh, NC and Morgantown, WV with assistance from Schnabel Engineering on the principal spillway survey and geologic drilling. This work included a sediment survey, a hydrologic and hydraulic analysis, and a Water Resources Site Analysis Program (SITES) analysis of the dam characteristics. Both the existing conditions and proposed rehabilitation alternatives were evaluated with these tools.

Other planning activities included a topographic survey, land use inventory, natural resources inventories, wetland assessments, and the identification of cultural resources, invasive plants, and threatened and endangered species. Potential alternatives were evaluated for cost-effectiveness and for local acceptability. Both the benefits and the costs of the alternatives were computed and analyzed.

PHYSICAL FEATURES

Project Location: The watershed for Roaring Fork Lake is located entirely within Pittsylvania County, Virginia. The Roaring Fork Lake watershed is 3,677 acres (5.75 square miles). Appendix B shows the location map for this watershed. Roaring Fork Lake is a tributary to Cherrystone Creek, which confluences with the Banister River approximately 8.4 miles downstream of the dam. The Banister River flows through Halifax, Virginia, and drains into the Dan River just east of South Boston, Virginia. The Dan River and Roanoke River flow together near the upstream portion of the John H. Kerr Reservoir (known locally as Buggs Island), which is located on the Virginia/North Carolina border. From there, the water flows through Lake Gaston into the Roanoke River to the Albemarle-Pamlico Sound and out to the Atlantic Ocean off the North Carolina coast.

Topography: Roaring Fork Lake is in the Piedmont Physiographic Province. The topography of the Piedmont is characterized by gently rolling hills and valleys. The elevation in the watershed ranges from about 640 feet at the dam to about 963 feet on the watershed divide just south of the small community of Climax.

Soils: The five major soil map units in the watershed above Cherrystone 2A dam comprise a total of 87.8% or 3,228 acres of the watershed. They consist of Cecil sandy loam, 7 to 15 percent slopes; Cecil sandy clay loam, 2 to 7 percent slopes, severely eroded; Cecil sandy clay loam, 7 to 15 percent slopes, severely eroded; Madison fine sandy loam, 15 to 25 percent slopes; Clifford sandy loam, 2 to 7 percent slopes, according to Web Soil Survey for Pittsylvania County. The evaluated area extends from Cherrystone 2A Dam upstream to include the entire watershed that drains into the lake. The area totals 3,677 acres and includes flood plain, terrace and side slope landscape positions.

The Cecil sandy clay loam covers 1,498 acres (40.7%) of the area, the Madison fine sandy loam 734 acres (19.9%), the Clifford sandy loam 612 acres (16.7%), the Cecil sandy loam 493 acres (13.4%), the Cullen clay loam 107 acres (2.9), the Chenneby-Toccoa complex 92 (2.5%), Water 42 acres (1.1%), and Asher fine sandy loam 20 acres (0.5%). Other smaller soil map units make

up the remainder of the acreage in the watershed. Approximately 64.5% of the soils are on slopes greater than 7%.

Downstream of the dam, the four major soil map units comprise a total of 77.7% or 619 acres. They consist of Chenneby loam, 0 to 2 percent slopes, occasionally flooded; Chenneby-Toccoa complex, 0 to 2 percent slopes, frequently flooded; Wehadkee silt loam, 0 to 2 percent slopes, frequently flooded; and Madison fine sandy loam, 15 to 25 percent slopes, according to Web Soil Survey for Pittsylvania County. The evaluated area extends from Cherrystone 2A Dam downstream to the study area limits. The area totals 796 acres and includes flood plain and side slope landscape positions. The Chenneby loam covers 244 acres (30.7%) of the area, the Chenneby-Toccoa complex 182 acres (22.9%), the Madison fine sandy loam 152 acres (19%), the Wehadkee silt loam 108 acres (13.5%), the Cecil sandy loam 38 acres (4.8%), the Ashlar fine sandy loam 28 acres (3.6%), the Cecil sandy clay loam 21 acres (2.7%), Urban land 15 acres (1.8%), and the Dam 1.6 acres (0.2%). Other smaller soil map units make up the remainder of the acreage in the watershed. Approximately 30.4% of the soils are on slopes greater than 7%.

Geology: The digital representation of the 1993 Geologic Map of Virginia and the Geological Map of Pittsville and Chatham Quadrangle by Marr – 1984 indicates that Cherrystone Creek Dam No. 2A is underlain by rocks of the Early Paleozoic Era and the Triassic Period. The formation with the largest area in the watershed is the Fork Mountain Formation. These mica schists and biotite gneisses are Early Paleozoic-aged and dominate the footprint of the dam. A narrow band of a Triassic-aged Diabase dike is mapped along Cherrystone Road downstream of the dam. This formation trends north and south in the area of the dam and watershed and is described as black, fine to medium-grained diabase. The diabase dikes are intrusive igneous rock and cut through the geologic units in the area. The Leatherwood Granite occurs in small locations near the structure and the watershed. This Ordovician aged formation is usually described as light-colored granites. The floodplains of the valleys are composed of layers of sandy and silty alluvial deposits. These Quaternary-aged deposits are underlain by weathered rock of the formations described above.

Climate: In Pittsylvania County, the annual average temperature is 54.7°F with an annual summer average of 73.0°F and an annual winter average of 36.4°F. The mean date for the last frost of spring is May 2 with the latest date being May 23. In the fall, the mean date for the first frost is October 10 with the latest frost occurring on November 6. This provides a mean growing season of approximately 161 days. The average annual precipitation is 45.24 inches. This precipitation is well distributed through the year with slightly larger amounts (over 4 inches) occurring in the months of March, May, July, and September. The average annual total snowfall is 4.2 inches.

LAND USE

The total drainage area upstream of Roaring Fork Lake is 3,677 acres (5.75 square miles). This area was derived using the ArcGIS Hydrologic Analysis Tools. The Land Cover/Land Use was extracted from the 2015 National Agricultural Statistics Service (NASS) land cover data layer. Table B lists the land use upstream of the dam. This table also lists the land use in the Sunny Day Breach inundation zone below the dam. Appendix C contains the land cover map of the watershed.

Table B - Land Use

Land Cover Type	Drainage Area of Roaring Fork Lake (ac.)	Percent of Total	Sunny Day Breach Inundation Zone (ac.)	Percent of Total
Developed	155	4.2	61	7.6
Cropland	418	11.4	2	0.3
Woodland	1,740	47.3	537	67.5
Hay/Pasture	1,245	33.9	196	24.6
Water	25	0.7	0	0
Shrub Land	94	2.5	0	0
Total	**3,677**	**100.0**	**796**	**100.0**

POTABLE WATER SUPPLY

Cherrystone Creek is a source of public water supply for the Town of Chatham. The portion of the creek above the raw water intake is regulated almost entirely by two reservoirs, Cherrystone Lake (Dam No. 1) and Roaring Fork Lake (Dam No. 2A). Cherrystone Lake has 105 acres of open water and provides 850 acre-feet of water supply storage. Roaring Fork Lake has 16.5 acres of open water and provides 99 acre-feet of water supply storage. In response to a 2014 request from the Town of Chatham for a Virginia Water Protection (VWP) Permit for Surface Water Withdrawal, the Virginia Department of Environmental Quality (DEQ) completed a modeling analysis of the proposed withdrawal rates, water volumes, safe yield, drought of record, and projected population and business growth. NRCS accepts DEQ's expert analysis as evidence that any proposed water supply use from either lake will be acceptable in quantity and quality to meet the anticipated needs. A reference is provided for the VWP Individual Permit Number 15-0262 should more detailed information be needed on water supply issues with these two dams.

Although the Roaring Fork Dam was not constructed for the purpose of water supply, the Sponsors installed a 12-inch diameter water supply gate in the riser so that water from the lake can be used to supplement the supply of water from Cherrystone Lake. NRCS approved the riser modifications in March 2016. At the request of the Sponsors, NRCS approved proceeding with the addition of supplemental water supply (M&I) as a purpose for Cherrystone Creek Dam 2A.

On January 29, 2016, the Virginia Department of Environmental Quality issued a VWP Permit to the Town of Chatham to withdraw up to 1.4 million gallons per day from Cherrystone Creek. In 2017, the Town withdrew about 400,000 gallons per day for approximately 952 water users. The Town provides water to about 1,300 town people and outlying areas in Pittsylvania County, plus 1,000 prisoners at Green Rock Prison. The permit contains some minimum water release requirements, depending on the inflow and the water levels in the two lakes, in addition to the daily water demands of the Town's service area. The permit is valid for 15 years from date of issuance. In addition to several instream and offstream beneficial uses, public water supply use for human consumption is considered the highest priority for Cherrystone Creek.

SOCIAL AND ECONOMIC CONDITIONS

The entire population at risk from a possible breach event live within Pittsylvania County. There are four homes in the Town of Chatham that lie within the breach inundation zone. Additionally,

there are four county roads in the breach inundation zone with a cumulative total average daily traffic count of 630 (Cherrystone Lake Road – 130, Hodnetts Mill Road – 270, Moses Mill Road – 110 and Davis Road – 120).

According to the U.S. Census Bureau, the population of the Town of Chatham was 987 (2010-2014 American Community Survey (ACS) 5-Year Estimate). Of the total population in the ACS, 76.7% (757) were White and 18.8% (186) were Black or African American. All other racial groups individually were less than 1% of the total population. Together, Whites and Blacks made up 95.5% of the Town's entire population. Hispanics of any race are the second largest minority group with 2.7%, or 27.

The median age of the population of the Town of Chatham is 50.5 while the same number for the entire state of Virginia was 37.6. Residents in the Town of Chatham that were 65 years old or older totaled 24.7% (244). Of the Town population, 85.7% was over the age of 19.

Approximately 85.6% of the residents in the Town had a high school education or higher. Of the residents in the Town that are 25 years of age or older, 14.4% do not have a high school diploma. About 34.9% of the Town residents have some education beyond high school, including 15.1% with a bachelor's degree or higher and 19.7% with graduate or professional degrees.

There are 419 Town of Chatham residents who are 16 years of age or older according to the 2010-2014 ACS. Approximately 68% (446) of the residents 16 years of age or older are considered in the labor force pool. About 32% of the civilian labor force in the Town was unemployed according to the same source.

The Town of Chatham has a diverse economy. According to the 2010-2014 ACS, five sub-sectors of the local economy employ the civilian workforce: management, professional and related (45.6%); service (13.6%); sales and office (23.9%); construction, extraction, maintenance and repair (1.9%); and production, transportation and material moving (13.1%); Private wage and salary employment constitutes 58.5% of all employment in the Town of Chatham while public sector jobs (primarily in education) make up 41.5% in Chatham.

Median household income estimated for the Town for the 2010-2014 period was $45,000. This compares to $64,792 per year for the median household income calculated for Virginia. The national figure for median household income per year estimated for the same period was $53,482.

With respect to per capita incomes, Town of Chatham residents are estimated to have had per capita income of $27,849 for the 2010-2014 period. Virginians reported per capita income of $33,958 for the 2010-2014 period, while the same figure for the entire United States was $28,555 for same period. That makes the Town per capita income figure for 2010-2014 82% of the state's level and 97.5% of the national figure.

According to the 2010-2014 Census estimates, the Town of Chatham had 23 families living below the poverty level (9.3%) and a total of 73 people living below the poverty level. That compares to 8.2% for State and 11.5% for the Nation.

The 2010-2014 Census estimates indicate that 76.7% of the 529 housing units within the Town of Chatham were occupied. The median year that Chatham homes were built is 1951. About 72% of all homes were built before 1959.

A majority of the 150 people at risk from a breach event live within the Town of Chatham. There are 6 structures within the breach inundation zone: four homes (2 single family homes, 2 mobile

homes), one commercial structure and one barn. The homes are in or near the Town of Chatham. Most of the residential property downstream of the dam ranges between $50,000 and $500,000 in total value with an average of about $150,000. The total value of residential and commercial property (structures and contents only, excluding land values) at risk below the dam is an estimated $1,298,900.

The four roads in the breach inundation zone include four bridges with an estimated total value of $1,030,000. Approximately 0.9 miles of these county roads would be subject to scour erosion in a breach event.

Recreation

Although not a designated public use recreational reservoir, Cherrystone Creek Site 2A provides incidental recreation to adjacent land owners, including fishing, boating, and bird watching.

SPECIAL ENVIRONMENTAL CONCERNS

SOILS

Prime and unique farmlands, and farmland of statewide importance:

While there is no designated Prime and Unique Farmland protected under the Farmland Protection Policy Act (FPPA) located within the maximum extent of possible ground disturbance of the affected environment, there are up to 1.6 acres of designated Farmland of Statewide Importance that could be disturbed by the proposed action. (See Appendix C for map).

WATER

Clean Water Act

Clean Water Act (CWA) – Sections 303(d) and 305(b) (Water Quality) overview:

> The two separate sections of the CWA, sections 303(d) and 305(b), are discussed together because they both pertain to water quality. Section 303(d) requires States, territories, and Tribes to identify "impaired waters" and to establish total maximum daily loads (TMDLs). A TMDL is a plan regulatory term in the CWA, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

The Final 305(b)/303(d) Water Quality Assessment Integrated Report, was released in April 2018, https://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2016305b303dIntegratedReport.aspx. It summarizes the water quality conditions in Virginia from January 1, 2009 through December 31, 2014. The Report lists 5.96 river miles of Cherrystone Creek, from the Cherrystone Creek Reservoir Dam to the Chatham Sewage Treatment Plant outfall, as a Category 4A, Escherichia coli (E. coli) impaired stream, not supporting recreational use. This designation does not require the development of a Total Maximum Daily Load (TMDL) because the TMDL for E. coli is complete and U.S. EPA approved. The listed contamination sources included livestock (grazing or feeding operations), unspecified domestic waste, wastes from pets, and wildlife other than waterfowl.

Waters of the U.S.

Clean Water Act – Sections 401 (State Administered) and 404 (Federally Administered) overview:

As above, because of their relationship to one another, both Sections 401 and 404 are discussed together. Section 404 established a permit program to regulate the discharge of dredged and fill material into Waters of the U.S. Discharge of dredged or fill material into waters of the U.S. is prohibited unless the action is exempted or is authorized by a permit issued by the U.S. Army Corps of Engineers or by the State.

If a CWA Section 404 permit is required, first the State (or Tribe) in which the activity will occur must certify that the activity will not violate State water quality standards by issuing a Section 401 State Water Quality Certification.

Clean Water Act – Section 402 (State Administered) overview:

Section 402 establishes the National Pollutant Discharge Elimination System (NPDES) Program, also administered by the States. Section 402 requires a permit for sewer discharges and storm water discharges from developments, construction sites, or other areas of soil disturbance.

The Virginia Department of Environmental Quality (DEQ) administers the program as the Virginia Pollutant Discharge Elimination System (VPDES), http://www.deq.virginia.gov/Programs/Water/PermittingCompliance/PollutionDischargeElimination.aspx. The DEQ issues VPDES permits for all point source discharges to surface waters, to dischargers of stormwater from Municipal Separate Storm Sewer Systems (MS4s), and to dischargers of stormwater from Industrial Activities, and Virginia Stormwater Management Program (VSMP) permits to dischargers of stormwater from Construction Activities, http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits.aspx.

Roaring Fork is a tributary to Cherrystone Creek, which is considered to be a water of the U.S. The Permits and Compliance section of this Plan-EA will identify any state or local permitting that may be required based upon the alternatives carried forward for impacts analysis.

Code of Virginia, Title 62.1. Waters of the State Ports and Harbors, Chapter 3.1 State Water Control Law, Article 2.5 – Chesapeake Bay Preservation Act overview:

The Chesapeake Bay Preservation Act (Bay Act), enacted by the Virginia General Assembly in 1988, is designed to improve water quality in the Chesapeake Bay and other waters of the State by requiring the use of effective land management and land use planning. The Bay Act balances state and local economic interests and water quality improvement by creating a unique cooperative partnership between state and Tidewater local governments to reduce and prevent nonpoint source pollution. The Bay Act recognizes that local governments have the primary responsibility for land use decisions, expanding local government authority to manage water quality, and establishing a more specific relationship between water quality protection and local land use decision-making. A list of the applicable 84 localities is available at http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay/ChesapeakeBayPreservationAct/LocalProgramTechnicalAssistance.aspx.

Pittsylvania County is not among the 84 Bay Act localities subject to regulation under the Bay Act. Accordingly, the Bay Act is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Wetlands

Executive Order 11990 – Protection of Wetlands overview:

Executive Order (E.O.) 11990 requires that Federal Agencies take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the beneficial functions of wetlands when "providing federally undertaken, financed or assisted construction and improvements." Wetlands are defined differently within various Federal and State programs and for identification, delineation, and classification purposes. The NRCS wetland protection policy defines wetlands as areas, natural or artificial, that have hydric soil, hydrophytic vegetation, and indicators of wetland hydrology.

There are approximately 18.1 acres of wetlands located within the affected environment of the proposed action.

The Roaring Fork Lake shoreline, inflow, and outflow were field surveyed in May 2017 for wetlands. Palustrine emergent (PEM) wetlands comprise a total of 2.5 acres which include the shorelines and the inflow of the lake. The 15.6 surface acres of the lake are considered to be open water wetlands (OW). No other wetlands were identified in the affected environment. A review of the USFWS wetland mapper website, www.fws.gov/wetlands/Data/Mapper.html, confirmed field observations.

Appendix D contains additional documentation regarding the field investigation methodology.

The Permits and Compliance section will identify any state or local permitting that may be required based upon the alternative carried forward for impacts analysis.

Coastal Zone Management Areas

Coastal Zone Management Act – Section 307 overview:

> Section 307 of the Coastal Zone Management Act specifies that actions or activities within the coastal zone implemented by a Federal agency or on the behalf of or through a Federal agency must be consistent with the State's coastal plan, if they have one, and be in concert with the goals tenets, and objectives of that plan.
>
> Federal Agency Coastal Zone Management Areas (CZMAs) are areas located within or near the officially designated "coastal zone" of a State. The National Oceanic and Atmospheric Administration's (NOAA's) Office of Coastal Zone Management approves coastal programs. The list of Virginia's dedicated CZMAs is available on-line at http://deq.state.va.us/Programs/EnvironmentalImpactReview/FederalConsistencyReviews.aspx#cma.

Pittsylvania County is not located in or near a designated CZMA. Accordingly, the Coastal Zone Management Act is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Floodplain Management

Executive Order 11988 – Floodplain Management Overview:

> The NRCS policy on floodplains (190-GM, Part 410, Subpart B, Section 410.25) reflects the requirement of the E.O. that decisions by Federal agencies must recognize that floodplains have unique and significant public values. The objectives of E.O. 11988 are to avoid, to the extent possible, the long- and short-term adverse impacts associated with occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development where there is a practical alternative.

Pittsylvania County and the Town of Chatham have participated in the National Flood Insurance Program since 1980 and 1979, respectively. Hydrology and hydraulics analyses were performed for this planning effort for areas upstream and immediately downstream of Roaring Fork dam leading to the confluence with Cherrystone Creek. The with and without project conditions do not

change the 100-year discharge significantly and does not affect the existing FEMA Flood Insurance Rate Maps for the area. According to the Special Flood Hazard Area maps (Appendix C), the flood zone A above the dam is within the County Boundary. Based on the SITES analysis, the base flood elevation upstream of the dam was determined to be equal to the elevation of the 100-year, 24-hour storm. Flood zone A and AE below the dam are within portions of the County and Town's Jurisdictional Boundaries. Zone A designates a special flood hazard area that has no base flood elevation data or floodway. Zone AE designates a special flood hazard zones that has base flood elevation data (100-year flood elevations). The Zone AE areas on Cherrystone Creek also have floodways determined. The floodways are the portion of the floodplain designed to convey the base (100-year) flood. The Special Flood Hazard Areas Map for Cherrystone Creek is found in Appendix C. It designates both Zone A and Zone AE for Cherrystone Creek and includes the 0.2% annual chance of flooding area (500-year). The existing Flood Insurance Rate Map and Floodplain Ordinances are based upon the dam in place. There are no inhabitable dwellings in the currently effective regulatory 100-year floodplain but there is one house in the 500-year floodplain downstream of the dam.

Wild and Scenic Rivers

The National Wild and Scenic Rivers Act (Public Law 90-542) overview:

> The National Wild and Scenic Rivers Act was created by Congress to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.

According to the National Wild and Scenic Rivers System website, https://www.rivers.gov, while Virginia has approximately 49,350 miles of river, there are currently no federally designated wild and scenic rivers in the state. Therefore, the National Wild and Scenic Rivers Act is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Virginia Scenic Rivers Act of 1970 (Code of VA, Title 10.1-400) overview:

> Virginia Scenic Rivers Program's intent is to identify, designate and help protect rivers and streams that possess outstanding scenic, recreational, historic and natural characteristics of statewide significance for future generations. In addition to existing designated state scenic rivers, other river segments have been deemed worthy of further study.

According to the Virginia Department of Conservation and Recreation's Scenic Rivers Program website, http://www.dcr.virginia.gov/recreational-planning/srmain, while Virginia has approximately 49,350 miles of river, there are currently no State designated river segments in the affected environment of the project. In addition, there are no recommended river study segments within the project affected environment per the Virginia Outdoors Plan Mapper of Recommended River Study Segments website, http://dswcapps.dcr.virginia.gov/dnh/vop/vopmapper.htm. Therefore, the Virginia Scenic Rivers Act of 1970 is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

AIR

Clean Air Act – General Conformity Rule (Criteria Pollutants) overview:

The U.S. EPA's "Green Book," available online, indicates Pittsylvania County to be in attainment for all criteria pollutants. Therefore, the General Conformity Rule is not applicable to the project's affected environment will not be carried forward for impacts analysis in the Environmental Consequences section.

Clean Air Act – Regional Haze Regulations overview:

> Nationwide there are 156 designated Class I areas across the country, including many well-known national parks and wilderness areas that are given special protection under the Clean Air Act.

Per the EPA's online list of areas protected by the Regional Haze Program, https://www.epa.gov/visibility/list-areas-protected-regional-haze-program, there are two designated Class I areas located in Virginia, neither of which are in proximity to Pittsylvania County. Accordingly, the Regional Haze Regulations are not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Applicable State and Local Air Quality Regulations

Air quality permits are issued to industries and facilities that emit regulated pollutants to ensure that these emissions do not cause harm to the public or the environment. Federal and state regulations to control air pollution are implemented through the air permitting process. Permit applicability determinations and the issuance of permits are performed in the DEQ regional offices, http://www.deq.virginia.gov/Programs/Air/PermittingCompliance.aspx.

The Permits and Compliance section of this Plan will identify any state or local air permitting requirements for the Preferred Alternative.

ANIMALS AND PLANTS

Endangered and Threatened Species and Natural Areas

Endangered Species Act (Federal) Overview:

> Section 7(a) of the Endangered Species Act (ESA) requires the NRCS, in consultation with and with the assistance of the Secretary of the Interior [U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS)], to advance the purposes of the Act by implementing programs for the conservation of endangered and threatened species, and to ensure that NRCS actions and activities do not jeopardize the continued existence of threatened and endangered species or result in the destruction or adverse modification of the species' critical habitat.

NRCS obtained the Official Species List from the USFWS on March 26, 2018 via the online Information, Planning and Conservation (IPaC) system, https://ecos.fws.gov/ipac/. No Federally endangered species were identified and the only threatened species identified as potentially present is the Northern long-eared bat (NLEB) (*Myotis septentrionalis*). Based upon the results of the IPaC results, the NRCS followed up with a search of the Virginia Department of Game and Inland

Fisheries' (VDGIF) on-line NLEB Winter Habitat and Roost Tree ARC GIS System, http://dgif-virginia.maps.arcgis.com/apps/webappviewer/index.html?id=32ea4ee4935942c092e41ddcd19e5ec5. Using the search tool, NRCS found no NLEB hibernacula or maternity roost trees for NLEB within Pittsylvania County. Therefore, as stated in the Final 4(d) rule on the NLEB, since no "known" maternity roost trees or hibernacula have been designated within a ¼ mile radius of the proposed project, any incidental take that may result from the project is exempted by the 4(d) rule and no further action is necessary to comply with the Endangered Species Act prohibitions to protect the NLEB.

Although the NRCS search using the USFWS IPaC system did not indicate the potential presence of the Federally Endangered Roanoke logperch, during the search for State listed threatened or endangered species, the Roanoke logperch was identified in the Virginia Fish and Wildlife Information Service (VaFWIS) database, http://vafwis.org/fwis/, search discussed below. This is attributed to the fact that the VaFWIS database uses a much larger default search area (3 miles from project location) than that of IPaC, which employs a user-defined area of potential impact based upon the actual maximum potential footprint for the project. Consultation with the Virginia Department of Game and Inland Fisheries (VDGIF) specialists was initiated during project scoping. Follow-up efforts did not identify further concerns.

Virginia State Listed Threatened and Endangered Species and Natural Areas

The NRCS must also consult with State entities when considering impacts to species of concern protected by State laws or regulations.

- **Virginia Department of Game and Inland Fisheries (VDGIF) State Listed Threatened and Endangered Species (Animals)**

In December 2017 the NRCS performed a search of the VDGIF's Virginia Fish and Wildlife Information Service (VAFWIS) database, http://vafwis.org/fwis/, to identify potential species that may be present in the affected environment for the proposed action. The results indicated the potential presence of the VDGIF State listed species in Table C.

The VaFWIS database uses a minimum 3-mile habitat search radius from the location of the proposed action. To obtain accurate feedback specific to the affected environment, the NRCS performed follow-up consultation via email with the applicable VDGIF designated resource expert for each of the above species populated by the VaFWIS search. The NRCS provided the coordinates for the proposed project location and requested assistance in determining if the necessary habitat for the applicable species is present within the affected environment, and if the applicable species has been documented as present within the affected environment. Additionally, the NRCS requested information regarding any applicable species specific best management practice recommendations, including any time of year activity restrictions. Consultation with VDGIF specialists was initiated during project scoping. Follow-up efforts did not identify further concerns.

Table C - State Listed Threatened and Endangered Species

Status	Common Name	Scientific Name	VDGIF Response
State Endangered	Roanoke logperch	*Percina rex*	No response to 01/23/18 NRCS email requesting input.
State Threatened	Northern long-eared bat	*Myotis septentrionalis*	Also Federally Listed. Consulted USFWS (email-01/26/18)
State Endangered	Little brown bat	*Myotis lucifugus lucifugus*	No Concerns (email-01/26/18)
State Endangered	Tri-colored bat	*Perimyotis subflavus*	No Concerns (email-01/26/18)
State Endangered	Spirit supercoil	*Paravitrea hera*	No response to 01/23/18 NRCS email requesting input.
State Threatened	Loggerhead shrike	*Lanius ludovicianus*	No documented presence & no suitable habitat (email-01/29/18)
State Threatened	Orangefin madtom	*Noturus gilberti*	No response to 01/23/18 NRCS email requesting input.
State Threatened	Migrant loggerhead shrike	*Lanius ludovicianus migrans*	No documented presence & no suitable habitat (email-01/29/18)

- **Virginia Department of Agriculture and Consumer Services (VDACS) Resources**

  Although the VDACS retains legal authority for the protection of all State Listed plants and insects, http://www.vdacs.virginia.gov/plant-industry-services-endangered-species.shtml, they have a memorandum of agreement in place with the Virginia Department of Conservation and Recreation stipulating that coordination regarding these resources should be initiated through the Virginia Department of Conservation and Recreation, Division of Natural Heritage Resources, http://www.dcr.virginia.gov/natural-heritage/.

- **Virginia Department of Conservation and Recreation (VDCR), Division of Natural Heritage (DNH) - Virginia Natural Heritage Program Resources**

  The Virginia Natural Area Preserves Act, 10.1-209 through 217 of the *Code of Virginia*, was passed in 1989 and codified VDCR's powers and duties related to statewide biological inventory: maintaining a statewide database for conservation planning and project review, land protection for the conservation of biodiversity, and the protection and ecological management of natural heritage resources (the habitats of rare, threatened, and endangered species, significant natural communities, geologic sites, and other natural features). The VDCR-DNH represents the first comprehensive attempt to identify the most significant natural areas in the

Commonwealth through an intensive statewide inventory of plants, animals, natural communities, and other features that are exemplary, rare, or endangered on a global or statewide basis.

Virginia Natural Area Preserves System

The Virginia Natural Area Preserves System was established in the late 1980's to protect some of the most significant natural areas in the Commonwealth. A site becomes a component of the preserve system once dedicated as a natural area preserve by the Director of the DCR. Natural area dedication works in much the same way as a conservation easement by placing legally binding restrictions on future activities on a property. The Natural Area Preserve System includes examples of some of the rarest natural communities and rare species habitats in Virginia.

On February 06, 2018, the NRCS accessed the Virginia Division of Natural Heritage Program's Virginia Natural Area Preserves website, http://www.dcr.virginia.gov/natural-heritage/natural-area-preserves/, and learned there are currently no designated Virginia Natural Area Preserves located in Pittsylvania County. Therefore, the Virginia Natural Area Preserves program is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Virginia Rare Species and Natural Communities

In February 2018, the NRCS completed a search of the Virginia Division of Natural Heritage Program's Rare Species and Natural Community database, http://www.dcr.virginia.gov/natural-heritage/dbsearchtool. The search parameters included all taxonomic groups for all State Conservation Status Rank categories, for all State Legal Status species located in Pittsylvania County, including the eight-digit Watershed HUC for the Bannister River (03010105), and with the Subwatershed twelve-digit HUC for the Cherrystone Creek (RD55). The search results did not identify any species using the aforementioned search criteria within the affected environment. Therefore, the Virginia Rare Species and Natural Communities program is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Essential Fish Habitat

Magnusson-Stevens Fishery Conservation and Management Act overview:

The Magnuson-Stevens Act is the primary law governing marine fisheries management in the U.S. In 1996, the Act was amended to incorporate essential fish habitat (EFH) and rules were published in the Federal Register. It calls for heightened consideration of fish habitat in resource management decisions and direct action to stop or reverse the continued loss of fish habitats. The National Marine Fisheries Service (NMFS) implements and enforces the management measures through fisheries management plans.

Since the affected environment is inland, and does not include saltwater tributaries or marine fisheries, there is no potential essential fish habitat protected under the Magnusson-Stevens Fishery Conservation and Management Act present according to https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper. Therefore, essential

fish habitat is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Migratory Birds

Migratory Bird Treaty Act

The Migratory Bird Treaty Act is the domestic law that affirms or implements the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. It protects all migratory birds and their parts, including eggs, nests, and feathers. Thus, the law makes it unlawful, unless permitted by regulation, for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import, or export any migratory bird, including feathers, parts, nests, or eggs. Migratory birds are essentially all wild birds found in the United States, except the house sparrow, starling, feral pigeon, and resident game birds, such as pheasant, grouse, quail, and wild turkeys.

The affected environment for Cherrystone Creek Dam No. 2A is located within the Atlantic Flyway, the migratory path of waterfowl, shorebirds, pelagic birds, and song birds of the North American East Coast. Each fall the Atlantic Flyway is filled with ducks, geese, brant, swans, hawks, eagles, and other migratory birds. Waterfowl and other birds make several stops on the flyway to rest, feed, and drink before continuing their southern migration. In early spring, birds follow this path northward to their traditional nesting grounds.

Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds (Migratory Birds) overview:

Executive Order 13186 requires the NRCS to consider the impacts of planned actions on migratory bird populations and habitats for all planning activities. The USFWS IPaC System identified the birds in Table D as birds of particular concern because they occur on the USFWS Birds of Conservation Concern (BCC) list in accordance with the Fish and Wildlife Conservation Act, or because they warrant special attention in the project area. In this case, all the IPaC System identified species are listed on the BCC, not because they warrant special attention in the specific project area.

Table D – USFWS Migratory Birds of Conservation Concern

Common Name	**Scientific Name**	**Breeding Season**
Eastern Whip-poor-will	*Anstrostomus vociferus*	May 1 – Aug 20
Kentucky Warbler	*Oporonis formosus*	Apr 20 – Aug 20
Prairie Warbler	*Dendroica discolor*	May 1 – Jul 31
Red-headed Woodpecker	*Melanerpes erythrocephalus*	May 10 – Sep 10
Rusty Blackbird	*Euphagus carolinas*	Breeds elsewhere
Wood Thrush	*Hylocichla mustelina*	May 10 – Aug 31

Bald and Golden Eagle Protection Act

In addition to the Migratory Bird Treaty Act and Executive Order 13186, all Bald and Golden Eagles are further protected under the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides

criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

Bald eagles: Although Bald eagle habitat is present, the NRCS performed a site visit in May of 2017 and no Bald eagle nests were identified within the affected environment. Additionally, according to the Center for Conservation Biology's Bald eagle nest locator at http://www.ccbbirds.org/maps/#eagles, there are no known Bald eagle nest or roosts within the affected environment. The closest recorded nest is more than 35 miles away from the dam.

Golden eagles: Eastern Golden eagle migration is strongly associated with the Appalachian ridgelines. In Virginia, the birds migrate southward between October and early December, and northward during April and May. Wintering eagles spend the months of December through March in the Commonwealth. Within Virginia and the broader Appalachian range, wintering Golden eagles are primarily associated with small forest openings along ridgelines, although they may also be seen soaring over the valleys between ridges. The "mountains" of Virginia physically begin at the Blue Ridge of Virginia. As one of the six southernmost counties in the Southern Piedmont region of Virginia along its southern border with North Carolina, Pittsylvania County is well south of the Appalachian ridgelines and valleys. Since the affected environment does not include the habitat requirements of the Golden eagle, this resource will not be carried forward for impacts analysis in the Environmental Consequences section.

Invasive Species

Executive Order 13112 – Invasive Species

Executive Order 13112 directs Federal agencies to "prevent the introduction of invasive species, provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause." The NRCS policy, 190-GM, Part 414, is consistent with this E.O. and requires that no actions be authorized, funded or carried out that is believed to or is likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere. As defined in the E.O., invasive species are species not native to a particular ecosystem, whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species may include all terrestrial and aquatic life forms, including plants, animals, fungi, and microbial organisms.

- **Invasive Animal and Plant Species:**

In February 2018, an NRCS/Virginia Department of Game and Inland Fisheries (VDGIF) biologist performed an invasive species survey within affected environment (based on the maximum conceivable extent of potential ground disturbing activities for projects of this type). No invasive animals were identified during the field survey. The following common invasive plant species were identified: Chinese privet, Japanese stiltgrass, Honeysuckle, Sericea lespedeza, and Tree of

Heaven. See Appendix C-5 for invasive species map of the project area. Areas with high concentrations of invasive plants are depicted with yellow hash and outlined. Individual red dots with yellow outer circle represent small clumps of the particular invasive plant identified.

Riparian Areas

Natural Resources Conservation Service Policy (GM 190, Part 411 (Amendment 23 – September 2010))

> The NRCS policy (GM 190, Part 411 (Amendment 23 – September 2010)) requires the NRCS to integrate riparian area management into all plans and alternatives. Although Federal law does not specifically regulate riparian areas, portions of riparian areas such as wetlands and other waters of the U.S. may be subject to Federal regulation under provisions of the Food Security Act, Clean Water Act, and State, Tribal, and local legislation.
>
> Riparian areas are ecotones that occur along watercourses and waterbodies. They are distinctly different from the surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by free or unbound water in the soil. Riparian ecotones occupy the transitional area between the terrestrial and aquatic ecosystems. Typical examples include perennial and intermittent streambanks, floodplains, and lake shores.

Riparian areas are present within the project area. These riparian areas are located along the banks of the inflows and perimeter of Roaring Fork Lake. Additional riparian areas are located along the banks of Roaring Fork downstream of dam. Most of the riparian areas along the inflows and perimeter of Roaring Fork Lake are forested. The riparian area along Cherrystone Creek downstream of the dam is a forested corridor and extends to its confluence with the Banister River.

HUMAN

Scenic Beauty

NRCS General Manual, Title 190, Part 410.24

Scenic beauty can be defined as the viewer's positive perceived value of special, unique and memorable physical elements of a landscape. There are no designated State Natural and Scenic Area Preserves located in Pittsylvania County, http://www.dcr.virginia.gov/natural-heritage/natural-area-preserves/. Therefore, Scenic Beauty is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Cultural Resources

National Historic Preservation Act

> In 1966, Congress passed the National Historic Preservation Act (NHPA) which directed all Federal Agencies to establish a preservation program based on a framework outlined in the NHPA, as amended. It also required Federal Agencies to take into account the effects of their undertakings on historic properties.

The term “cultural resources” as used by NRCS is broader than those resources encompassed by the term “historic properties” as defined by the NHPA (16 U.S.C. Section 470 et seq.) and regulations for compliance with section 106 of the NHPA (36 CFR Part 800). Under NHPA, historic properties include any prehistoric or historic district, site, building, structure, or object listed in or eligible for listing in the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. They also include all records, artifacts, and physical remains associated with the NRHP-eligible historic properties. They may consist of the traces of the past activities and accomplishments of people. The term “historic property” also includes properties of religious and cultural importance to an Indian Tribe (including Native Alaskan Villages) or Native Hawaiian organization that meet NRHP criteria. As more broadly used, the term “cultural resources,” covers a wider range of resources than “historic properties,” such as sacred sites, archaeological sites not eligible for the NRHP, and archaeological collections.

Per the Advisory Council on Historic Preservation (ACHP), the Area of Potential Effects (APE) is defined as the geographic area or areas within which a project may directly or indirectly cause changes in the character or use of historic properties, if they exist.

The NRCS determined that the direct impacts APE for this undertaking is confined to the areas of potential ground disturbance (using the maximum possible extent of ground disturbance) that extend beyond the bounds of areas that were previously disturbed during the construction of the original dam. The in-direct APE for this undertaking is the viewshed from any identified historic resource to the proposed undertaking (using the maximum possible extent of ground disturbance).

Figure B-7 depicts the maximum extent of ground disturbance during the proposed dam construction.

Section 106 of the National Historic Preservation Act (NHPA) requires that Federal Agencies consult with the applicable State Historic Preservation Officer, federally recognized Native American Tribes, and other interested parties regarding cultural resources.

In November 2018, the NRCS searched the Virginia Department of Historic Resources (VDHR), Virginia Cultural Resource Information System (V-CRIS), https://vcris.dhr.virginia.gov/vcris/Account/Login?ReturnUrl=%252fvcris, to identify recorded historic properties. The V-CRIS search results did not identify any recorded archaeological or architectural historic resources within the defined direct or indirect APE.

The NRCS conducted a cultural resources survey of the APE on November 5, 2018. Two potentially eligible historic resources were located, one within the direct APE (Cherrystone Creek Dam No. 2A, built in 1969), and one within the indirect APE (Hodnetts Mill site, built in mid-19th century). Neither historic resource was listed/identified in the Virginia Department of Historic Resources, Virginia Cultural Resource Information System (V-CRIS) database. As part of the NRCS survey, the Hodnetts Mill site was recorded as site 44PY0461 in the V-CRIS database. Both the Hodnetts Mill site and Cherrystone Creek Dam No. 2A are eligible for National Register consideration due to their age (50+ years old).

The National Register of Historic Places, https://www.nps.gov/nr/, lists nineteen sites in Pittsylvania County, none of which are located within the defined direct or indirect APE of the undertaking.

Section 106 of the National Historic Preservation Act (NHPA) requires that Federal Agencies consult with the applicable State Historic Preservation Officer, federally recognized Native American Tribes, and other interested parties regarding cultural resources.

To identify Native American tribes, including those no longer resident to Virginia, that might attach religious or cultural significance to historic properties located in the project area, the NRCS searched both the National Park Service's Native American Consultation Database (NACD), https://grantsdev.cr.nps.gov/Nagpra/NACD/, and the Housing and Urban Development Agency's Tribal Directory Assessment Tool (TDAT), https://egis.hud.gov/tdat/. This was done in accordance with 36 CFR 800.2(c)(i) of the ACHP Regulations. The NACD search came back negative while the TDAT search identified only the "Delaware Nation, Oklahoma" as having a claimed interest or consultation contact in Pittsylvania County, Virginia. Consultation will be completed, as required.

On February 2, 2018, the NRCS contacted the Pittsylvania County Historical Society Board of Directors and requested information about any known cultural resources in or near the affected environment. The NRCS asked specifically about Hodnetts Mill, and a Board member stated that Hodnetts Mill was in ruins and not of concern to the Historical Society. The Historical Society reported no historic resources of concern within the defined direct or indirect APE.

National Historic Landmarks Program

The National Parks Services National Historic Landmarks Program are nationally significant historic places designated by the Secretary of the Interior and listed in the National Register of Historic Places because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States.

Per the National Park Service's National Historic Landmarks Program website, https://www.nps.gov/nhl/find/statelists.htm, there is one National Historic Landmark listed in Pittsylvania County, the Pittsylvania County Courthouse, located in the Town of Chatham. The Pittsylvania County Courthouse is not within the direct or indirect APE of the proposed undertaking. Therefore, the National Historic Landmarks Program is not applicable to the project's affected environment and will not be carried forward for impacts analysis in the Environmental Consequences section.

Environmental Justice

Executive Order 12898 – Environmental Justice overview:

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each Federal agency to make environmental justice a part of its mission. Agencies must identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations, low-income populations and Indian Tribes. The primary means to attain compliance with environmental justice considerations is: 1) Assessing the presence of environmental justice communities in a project area that may experience disproportionately high and adverse human health or environmental effects, and 2) The inclusion of low-income minority, Tribal, or other specified populations in the planning process. Additionally, E.O. 12898, established an Interagency Working Group (IWG) on

environmental justice chaired by the EPA Administrator and comprised of the heads of 11 departments or agencies, including the U.S. Department of Agriculture.

United States Department of Agriculture Departmental Regulation 5600-002 – Environmental Justice overview:

The USDA Departmental Regulation (DR) 5600-002 provides detailed determination procedures for NEPA and non-NEPA activities and suggests social and economic effects to consider when assessing whether there are disproportionately high and adverse human health or environmental effects to environmental justice communities in a project area.

An environmental justice and civil rights analyses was conducted for the breach inundation zone and associated nearby areas below the dam (Table E). The estimated population of the delineated area is 753 according to Census projections for 2011-2015. EPA's "EJSCREEN" tool was used to identify environmental justice groups within the benefited area downstream of the dam. Thirty-nine percent of the benefitted downstream population are minorities and 61% are white. Thirty-five percent of the beneficiaries have household incomes at or below $25,000 which is below the $28,440 poverty level for households with four individuals for the 48 contiguous states (per the January 25, 2016 Federal Register notice from the US Department of Health and Human Services). Nineteen percent of the population have less than a high school education. Sixty-six percent own their homes and 34% rent. Of the population age 16 and over, only 44% are in the labor force while 56% are not in the labor force. With respect to environmental indicators assessed using the EJSCREEN tool, the assessed area has values below state and national levels.

These statistics indicate the likely presence of individuals with environmental justice concerns, but rehabilitation of a dam provides benefits to all socioeconomic groups below and above the dam without disparate treatment to any individuals or social groups.

Table E - Indicators and Groups from EPA's Environmental Justice Tool

EPA United States Environmental Protection Agency

EJSCREEN Report (Version 2017)

the User Specified Area, VIRGINIA, EPA Region 3

Approximate Population: 753

Input Area (sq. miles): 5.75

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	8.21	8.36	46	9.26	17	9.14	25
Ozone (ppb)	37.8	37.7	61	37.9	45	38.4	47
NATA* Diesel PM (µg/m³)	0.297	0.769	11	0.92	<50th	0.938	<50th
NATA* Cancer Risk (lifetime risk per million)	37	42	33	42	<50th	40	<50th
NATA* Respiratory Hazard Index	1.2	1.8	26	1.8	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	73	420	49	360	48	590	46
Lead Paint Indicator (% Pre-1960 Housing)	0.51	0.22	88	0.37	70	0.29	76
Superfund Proximity (site count/km distance)	0.055	0.11	45	0.15	34	0.13	46
RMP Proximity (facility count/km distance)	0.042	0.37	3	0.61	2	0.73	3
Hazardous Waste Proximity (facility count/km distance)	0.017	0.064	17	0.11	10	0.093	17
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0	2.7	N/A	100	29	30	40
Demographic Indicators							
Demographic Index	39%	32%	70	30%	73	36%	62
Minority Population	39%	37%	58	31%	67	38%	59
Low Income Population	40%	27%	75	29%	74	34%	63
Linguistically Isolated Population	1%	3%	54	2%	56	5%	45
Population With Less Than High School Education	19%	12%	80	11%	82	13%	75
Population Under 5 years of age	3%	6%	18	6%	19	6%	17
Population over 64 years of age	23%	13%	87	15%	85	14%	87

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

Figure 1. Area evaluated for environmental justice effects.

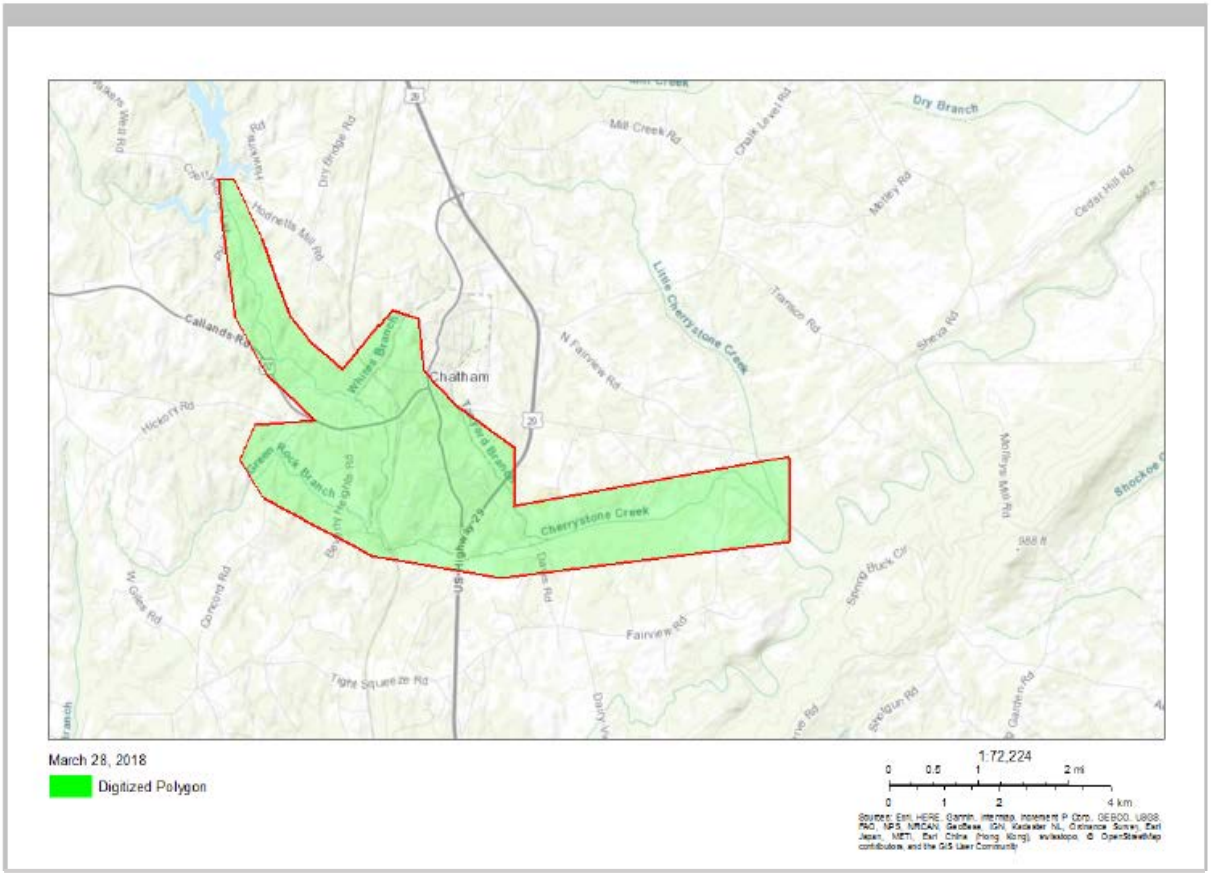
United States Environmental Protection Agency

EJSCREEN Report (Version 2017)

the User Specified Area, VIRGINIA, EPA Region 3

Approximate Population: 753

Input Area (sq. miles): 5.75



DESCRIPTION OF EXISTING DAM

Current Condition of the Dam: The dam and auxiliary spillway have been well maintained with a good stand of grass and no significant woody vegetation on the embankment and auxiliary spillway. No erosion was observed on either the embankment or the auxiliary spillway. In addition, no significant seepage or evidence of stability issues have been observed. The camera survey of the principal spillway pipe was completed on August 23, 2017 and showed no material deterioration. The structural components of the dam were inspected by underwater divers and professional engineers on August 22, 2017. They were found to be in good condition with only minor issues to be addressed during construction.

As-Built Dam Specifications: The dam was constructed in 1969 and "As-Built" drawings are available in the NRCS State Office in Richmond, Virginia. The earthen embankment is about 62 feet high, 400 feet long, and is built with about 84,000 cubic yards of excavated earth and rock. The upstream and downstream embankment slopes are 2.5:1. There is a 10-foot-wide berm on the upstream face of the embankment located slightly above the elevation of the permanent pool. Below the berm, the embankment slope is 3:1. The embankment was constructed with two core zones and an outer shell. The primary core zone extends through the foundation material to rock. The earth-fill used to construct this zone was described as inorganic silts and very fine sands and was obtained from the auxiliary spillway and Borrow Area B at the entrance to the auxiliary spillway. The second core zone, Zone 3, was constructed of weathered mica phyllite from the auxiliary spillway. Zone 2, the outer shell, was constructed from silty sand from the auxiliary spillway. A 30-foot-wide core trench was constructed at the centerline of the dam an average of about 15 feet below natural ground. The embankment has a top width of 20 feet.

The site was surveyed in 2014. All elevations are given in feet using NAVD88 vertical datum. The top of dam was surveyed at elevation 707.4; the normal pool at elevation 674.1; and the auxiliary spillway crest at elevation 699.8.

Principal Spillway: The principal spillway conduit is a 36-inch diameter reinforced concrete pipe, about 358 feet long. The flow into the pipe inlet is controlled by a two-stage reinforced concrete riser with interior dimensions of 3.0 feet and 9.0 feet. The riser is 40 feet high. The first-stage inlet is a rectangular orifice, 27 inches by 13 inches. The second-stage inlet is two 9-foot long weirs. The riser is equipped with a pond drain, 36 inches in diameter. A 12-inch-diameter water supply gate was recently added to the riser. The principal spillway pipe outlets into a stilling basin lined with rock riprap. Roaring Fork enters Cherrystone Creek just a few hundred feet downstream of the dam at a point downstream of Hodnetts Mill Road. The trash rack for the intake orifice is in poor condition and must be replaced. The stem and stem guides for the drain gate are heavily corroded and must also be replaced.

Auxiliary Spillway: The dam's auxiliary spillway is a grassed open channel, with a 200-foot bottom width and 3:1 side slopes. The level control section is 30 feet long. The outlet channel slopes at 3%. The auxiliary spillway outlet crosses Cherrystone Lake Road and enters Cherrystone Creek upstream of Hodnetts Mill Road. When designed as a significant hazard potential dam, the planned annual-chance frequency of use was one percent. The existing annual chance frequency is 60-year event. The one-percent annual-chance (100-year) flood event will flow through the auxiliary spillway at a depth of 0.8 feet. To detain the 100-year flood, the crest of the existing auxiliary spillway would have to be raised 2.4 feet. There are no inhabitable structures currently located in the 100-year floodplain in the area influenced by the dam.

Internal Drain System: An interior toe drain system is installed 100 feet downstream of the centerline of the embankment. Drain fill was also placed as a diaphragm surrounding the principal spillway pipe approximately 12 feet wide and extending 78 feet downstream from the centerline of the trench drain. The drain fill consisted of compacted coarse drain fill with a fine drain fill envelope. Eight-inch diameter perforated corrugated metal collector pipes were installed. The toe drains also outlet into the stilling basin.

Sedimentation: Roaring Fork Lake was designed to store 100 years of submerged sediment in the pool area. The designed submerged sediment storage capacity was 116 acre-feet, but the as-built volume was 157 acre-feet due to the removal of extra borrow from the pool area during construction. The volume of sediment estimated is 42 acre-feet. The available submerged sediment storage volume as of 2015 was 115 acre-feet.

The designed submerged sediment accumulation rate was estimated at 1.16 acre-feet per year for the sediment pool of the reservoir. The calculated historic sedimentation rate from a 2015 survey was 0.93 acre-feet per year. Using the historic rate of sediment deposition, the submerged sediment may impact the flood storage in 124 years.

The designed aerated sediment storage for the structure was 114 acre-feet. The aerated sediment is material deposited above the normal pool. The designed deposition rate for the aerated sediment was 1.14 acre-feet per year. There was very little evidence of aerated sediment at Roaring Fork Lake and no visible gravel bars at the inlets to the lake. The aerated sediment deposition rate is estimated at 0.06 acre-feet per year. The aerated sediment for the 46 years prior to 2015 is estimated at 2.7 acre-feet. Some beaver ponds in the upper watersheds appear to be trapping sediment. There is approximately 111 acre-feet of capacity for aerated sediment remaining. At a deposition rate of 0.06 acre-feet of aerated sediment per year, there is room for over 1,000 more years of aerated sediment deposition.

Land use in the watershed has been changing since settlement. Since the reservoir was planned, cultivated land has disappeared and there appears to be a trend toward more idle land and woodland in this watershed. Roaring Fork Lake is very turbid all the time. Investigation into the source of the turbidity indicated that the cause is the large population of bottom-feeding fish rather than erosion from the upstream watershed or the streambanks.

Appurtenances: To provide supplemental water, the riser has been modified with a 12” water supply gate at elevation 661.3. There is 99 acre-feet of supplemental water supply above this elevation now. As of 2015, there were 115 acre-feet of available submerged sediment storage in the reservoir. By 2071, there will be an additional 52 acre-feet of submerged sediment in the reservoir at the historic sedimentation rate of 0.93 acre-feet/year. (Four years since sediment survey was complete plus 2 years of design and construction plus 50 years of expected reservoir life equals 56 years of additional sediment from 2015.) There will be 63 acre-feet of water storage remaining at that time. However, at the historic rate of sediment deposition, in about 17 years, the submerged sediment in the lake will begin to cover the existing water supply gate. It will be necessary to provide another gate at a higher elevation to continue use as a supplemental water supply while providing the required submerged sediment storage. The Sponsors could maintain the water supply volume for a longer time if the submerged sediment deposition rate was reduced by the installation of practices such as upstream sediment traps.

Identified Deficiencies: During the investigation, NRCS identified three engineering deficiencies associated with the dam.

Embankment Drainage - The existing drainage system is functional. However, the toe drain material is metal and subject to corrosion. This is considered a deficiency.

Riser – The footer of the riser was evaluated for seismic stability and was found to be insufficient. Modification of the footing is required.

Hydraulics – In 2008, the Virginia Division of Dam Safety determined that the hazard class of the dam had changed from significant hazard potential to high hazard potential. Virginia Division of Dam Safety then issued a conditional use certificate for Roaring Fork Lake because the vegetated earthen auxiliary spillway did not have the capacity to pass the required spillway design flood for a high hazard potential dam with the PMP value in use at the time. The dam would overtop and potentially breach. During the planning process, NRCS determined that the auxiliary spillway has the capacity to safely pass the probable maximum precipitation (PMP) event with the new, lower Virginia PMP values developed in 2015. However, NRCS determined that the vegetated earth auxiliary spillway does not have the integrity to pass the design storm without breaching. Integrity is a measure of the resistance to erosion in the soil and rock material in the auxiliary spillway. If water flows through the auxiliary spillway, gullies will develop. If a gully erodes through the upstream side of the auxiliary spillway crest, a dam breach is considered to have occurred. The auxiliary spillway also does not meet the current criteria for stability. Stability is the surface erosion potential and is used as an indicator of the amount of maintenance that could be needed after an auxiliary spillway flow event.

In addition, NRCS found that the dam does not meet the 10-day drawdown requirement during the Principal Spillway Hydrograph event for a vegetated earth auxiliary spillway. For a vegetated earth auxiliary spillway, the flood-retarding capacity must be able to store all the water associated with a 100-year, 1-day/10-day combined storm event and release at least 85% of the water through the principal spillway pipe in less than 10 days. If there is more than 85% of the water remaining after 10 days, the auxiliary spillway crest must be raised. The existing crest of the auxiliary spillway of Roaring Fork Lake is too low based on this criterion. This issue can be addressed by analyzing and evaluating a structural nonerodible spillway.

GENERAL DESCRIPTION OF HOW A DAM FUNCTIONS

The main components of a flood control dam are the earthen embankment; the normal or sediment pool; the retarding pool (floodpool); the principal spillway; and the auxiliary spillway. The embankment is typically a vegetated earth structure that impounds the water.

Sediment pool. The reservoir is designed to store submerged sediment in the area below the elevation of the lowest principal spillway inlet and to detain floodwater in the area between the lowest principal spillway inlet and the crest of the auxiliary spillway. After the dam is completed, water accumulates below the lowest principal spillway inlet to create a lake. As the lake fills with sediment, the amount of water in the lake decreases. When the sediment pool has filled to the elevation of the lowest principal spillway inlet, the pool no longer has permanent water storage, but the designed floodwater detention storage is still intact. If the actual sedimentation rate is greater than the designed sedimentation rate, the sediment storage volume will be filled before the design life of the structure has been reached. The additional sediment would begin to fill the floodwater detention volume above the lowest principal spillway inlet and reduce the available flood storage. Initially, sediment delivered to the reservoir would pass directly through the lowest

principal spillway inlet. Eventually, this inlet would be blocked by debris and sediment and the level of the water would rise to the crest of the auxiliary spillway.

As the floodpool loses storage due to sediment deposition, the auxiliary spillway operates (flows) more often. For a vegetated earthen auxiliary spillway, repeated flows could erode the soil material and eventually cause the spillway to breach. Repeated flows increase the operation and maintenance costs for the Sponsor.

In the case of a water supply reservoir, the submerged sediment pool would fill the water supply storage before it would start filling the floodpool.

Floodpool: The floodpool, which is the water storage area between the principal spillway crest and the auxiliary spillway crest, is designed to detain the water that would accumulate behind the dam in events equal to or smaller than an event with a specific annual recurrence interval. For a typical dam, the auxiliary spillway crest is designed to be at the elevation needed to detain the 100-year event. This storm is the event that has a one percent chance of occurring in any given year. In a bigger flood event, the water level will be higher than the crest of the auxiliary spillway and the excess water will pass around the dam embankment through the auxiliary spillway.

Principal spillway: A principal spillway has three main parts: the riser, the pipe, and the outlet. The riser is typically a concrete tower that controls the level of water in the lake. The principal spillway pipe conveys water through the dam safely. The principal spillway riser and pipe control the day-to-day elevation of the water in the lake and the two components together provide a way to control release of the water in the floodpool. For a two-stage riser, the water flows through the first-stage inlet in the riser until the water rises to the elevation of the second-stage inlet. Then, it flows through both inlets. The water falls to the bottom of the riser before exiting through the principal spillway pipe. The water exits into an outlet structure, typically some sort of stilling basin. Its purpose is to slow the velocity of the water leaving the pipe so it doesn't cause erosion in the stream channel. Most risers have a drain gate at the bottom of the riser that allows the lake to be completely drained.

Auxiliary spillway: There are four parts of an auxiliary spillway. The inlet section is on the side closest to the lake. It has a gentle upward slope toward the middle of the auxiliary spillway. The water that reaches the inlet section has little or no velocity and, therefore, does not cause erosion to occur. The level center section is called the control section. The control section is usually located where the auxiliary spillway crosses the centerline of the top of the dam. The purpose of the control section is to make the water in the auxiliary spillway spread out evenly rather than concentrate into little channels. The third section is called the constructed outlet. Its purpose is to keep the water flowing out of the auxiliary spillway in a controlled manner until the water gets far enough away that it will not cause erosion on the earthen embankment. Once this point is reached, the water is free to go on downstream. The fourth component of an auxiliary spillway is the training dikes. Training dikes are used in conjunction with the outlet section to direct the flow of the water away from the downstream side of the dam embankment. Training dikes can also be used in the inlet section to direct water into the auxiliary spillway.

STATUS OF OPERATION AND MAINTENANCE

Operation and maintenance of the structure is the responsibility of the Town of Chatham and they have done an excellent job of operating and maintaining this structure in accordance with the

operation and maintenance agreement. This has been verified through site assessments. The most recent inspection was conducted October 26, 2017.

STRUCTURAL DATA

The structural data for the as-built condition of the dam and watershed is described in Table F. The sediment data is based upon the 2015 sediment survey.

BREACH ANALYSIS AND HAZARD CLASSIFICATION

Breach Analysis: To determine the downstream inundation zone due to a dam breach, a breach analysis was performed for a Sunny Day breach with the water level at the existing auxiliary spillway crest. The peak breach discharge criteria in TR-60 was used. A "Sunny Day breach" is a dam failure that occurs unexpectedly.

In 2009, the Sponsors contracted for the work to determine the inundation zone that would result from a breach of the dam. NRCS used this hydraulic model to determine the results of the breach analyses shown in Appendix C on the Breach Inundation Map.

The Sponsors have current breach inundation zone maps for the dam that comply with the Virginia Impounding Structures Law and Regulations for high hazard potential dams. These maps show the breach inundation zone that would occur if the dam failed when the water level was at the top of the dam. The Virginia Impounding Structures Regulations requires owners of high hazard potential dams to provide a dam breach inundation zone map to determine hazard classification and develop the Emergency Action Plan (EAP). The purpose of an EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of the dam. The Sponsors must update the EAP annually with assistance from local emergency response officials. The NRCS State Conservationist will ensure that a current EAP is prepared prior to execution of fund-obligating documents for rehabilitation of the structure.

Hazard Classification: Cherrystone Creek Dam No. 2A was originally constructed in 1969 for protecting downstream lands from flooding. It was designed as a significant hazard potential structure with a 100-year design life. Currently, the Virginia Division of Dam Safety has designated Roaring Fork Lake dam as a high hazard potential structure. The breach analysis completed for this Watershed Plan concurs with the current hazard class of the structure.

Table F – As-Built and Existing Structural Data for Roaring Fork Lake

Attribute	As-Built	Existing
Local Name	Roaring Fork Lake	
Site Number	2A	
Year Completed	1969	
Cost	$96,952	
Purpose	Flood control	
Drainage Area, mi^2	5.7	5.75 [3/]
Dam Height, feet	62	64.5
Dam Type	Earthen	
Dam Volume, yds^3	83,735	
Dam Crest Length, ft.	400	
Storage Capacity, ac-ft. [1/]		
Submerged Sediment, ac-ft.	157	115
Aerated Sediment, ac-ft.	114	111
Flood Storage, ac-ft.	1,000	1,070
Surface Area, ac.	16.5	15.9 [3/]
Principal Spillway		
Type	Reinforced Concrete	
Riser Height, ft.	40	
Conduit Size, inches (I.D.)	36	
Stages, no.	2	
Riser Crest Elevation	686.2	686.2
Capacity, cfs	202	
Energy Dissipater	Stilling basin	
Auxiliary Spillway		
Type	Vegetated Earth	
Width, ft.	200	
Capacity, % of PMF	100 [2/]	
Sediment Pool Elevation	673.7	674.1
Water Supply Elevation	NA	NA [4/]
Flood Pool Elevation	699.3	699.8
Top of Dam Elevation	705.9	706.8
Datum	NAVD88	NAVD88

[1/] As-built flood storage volume based on original design and as-built information. Existing volumes calculated from 2015 sediment survey.

[2/] Based upon the new Virginia PMP values, the vegetated earth auxiliary spillway has sufficient capacity to pass the PMP.

[3/] The drainage area and surface area changed due to more accurate survey information.

[4/] Water supply added as a purpose after start of planning process. Information shown in Table 3.

EVALUATION OF POTENTIAL FAILURE MODES

Dams are built for the conditions that existed or could reasonably be anticipated during the time of design. Sometimes these conditions change, resulting in dam failure. Several potential modes of failure were evaluated for Roaring Fork Lake.

Sedimentation: The major land uses in the watershed above the dam are 47.3% Forest, 33.9% Hayland/Pasture, 11.4% Cropland, 4.2% Developed, 2.5% Scrubland, and 0.7% Water. These

uses are not expected to change significantly in the future. The future submerged sediment accumulation rate in Roaring Fork Lake is expected to be the same or less than the historic rate due to the conversion of cropland fields to hayland/pasture fields. Based upon the historic sediment deposition rate of 0.93 acre-feet per year, the remaining submerged sediment storage life of Roaring Fork Lake in 2015 was 124 years. The potential for failure due to inadequate sediment storage capacity is low.

Hydrologic Capacity: Hydrologic failure of a dam occurs when the auxiliary spillway is breached or when the dam is overtopped and fails. Under present NRCS criteria for high hazard potential dams, the auxiliary spillway must have sufficient capacity and integrity to completely pass the full PMF event. The capacity of the auxiliary spillway is sufficient to prevent overtopping of the embankment. The risk of failure from overtopping the dam is low.

Auxiliary spillway Integrity: The auxiliary spillway at Roaring Fork Lake does not have sufficient integrity to withstand the flows from the PMF event and could breach. For this reason, the overall potential for failure through erosion of the auxiliary spillway of Roaring Fork Lake dam is high.

Seepage: Embankment and foundation seepage can contribute to failure of an embankment by removing (piping) soil material through the embankment or foundation. As the soil material is removed, the voids created allow even more water flow through the embankment or foundation, until the dam collapses due to the internal erosion. Seepage that increases with a rise in pool elevation is an indication of a potential problem, as is stained or muddy water or "sand boils" (the up-welling of sediment transported by water through voided areas). Foundation and embankment drainage systems can alleviate the seepage problem by removing the water without allowing soil particles to be transported away from the dam. There are no signs of seepage at the Roaring Fork Lake dam. Therefore, the potential for a seepage failure is low.

Seismic: The structural integrity of an earthen embankment is dependent upon the presence of a stable foundation. Foundation movement through consolidation, compression, or lateral movement can cause the creation of voids within an embankment, separation of the principal spillway conduit joints, or in extreme cases, complete collapse of the embankment. The Cherrystone Creek watershed is not located within an area of significant seismic risk; therefore, there is low potential for seismic activity to cause failure of the dam embankment.

Seismic failure of the riser could have two different results. If the riser fails in a way that does not block the principal spillway pipe, then all the water would drain out of the lake. This would eliminate the pool area, but the dam would continue to provide flood storage. If a riser failure blocked the principal spillway pipe, the water would fill up to the crest of the auxiliary spillway and then flow through it. There would be no stormwater detention and no downstream flood protection. The footer of the riser at Roaring Fork Lake does not meet current criteria for seismic stability. The potential for a seismic failure of the riser is moderate.

Material Deterioration: The materials used in the principal spillway system, the embankment drains, and the pool drainage system are subject to weathering and chemical reactions due to natural elements within the soil, water, and atmosphere. Concrete risers and conduits can deteriorate and crack, metal components can rust and corrode, and leaks can develop. Embankment failure can occur from internal erosion caused by these leaks. A camera survey of the principal spillway pipe was conducted in August of 2017. Only minor problems were observed with any of the material components. As of 2018, the principal spillway system had reached 49% of its planned 100-year service life. The remaining expected life of the principal spillway conduit

is 52 years. There is a reasonable expectation that it will continue to function as planned for that time period. Replacement may be necessary after that time. Therefore, there is low potential for failure due to material deterioration of the principal spillway system. The corrugated metal pipe in the toe drain is corroded and likely to fail. If this occurs, the phreatic surface could rise and there would be an increased risk of a slope stability failure. The potential for failure of the embankment due to a collapse of the toe drain is high.

Conclusion: At the present time, the mostly likely way that the Roaring Fork Lake dam could fail during the PMP event is that the auxiliary spillway could breach. This type of failure could occur at any time during the remaining life of the structure. The site has a high risk for a slope stability failure due to material deterioration of the toe drain. The risk of seismic failure of the embankment is low since the dam is not in a significant seismic zone but the risk of a seismic failure of the riser is moderate due to the configuration of the footer. Materials have a remaining expected life of 52 years. There is adequate submerged sediment capacity for the next 50 years and there is no evidence of seepage.

CONSEQUENCES OF DAM FAILURE

A Sunny Day breach analysis was performed in accordance with the peak breach discharge criteria in Technical Release No. 60, Earth Dams and Reservoirs (TR-60). It was assumed that structural collapse would occur with the water level at the existing auxiliary spillway crest and would result in a release of 65,749 acre-feet of water and sediment, beginning with a wall of water that is 25 feet high. A maximum breach discharge of 88,122 cfs was computed using the criteria in TR-60.

The population at risk is approximately 150 people. The properties and infrastructure potentially affected by a breach of the Roaring Fork Lake Dam includes four homes, one commercial structure, and one barn. Four secondary roads (Cherrystone Lake Road, Hodnetts Mill Road, Moses Mill Road, and Davis Road) would be impacted by a dam failure during an auxiliary spillway breach.

A breach event would cause significant economic damages to the homes, one commercial structure, barn, roads and bridges below the dam. In addition, the loss of the reservoir would result in a loss of supplemental water supply. The residences and business properties at risk in the floodplain subject to a breach of Roaring Fork Lake have structure and content values estimated at $866,000 and $433,000, respectively (total value at risk of $1,298,900). A catastrophic breach would result in an estimated $216,000 in economic damages to existing buildings and their contents. The potentially impacted major bridge, culvert, and road embankment infrastructure is valued at $836,750. Approximately $532,500 in damages to road crossings and $329,000 in scour erosion along 0.9 miles of road could occur in this event. A catastrophic breach of the Roaring Fork Lake dam would result in a total estimated $1,077,000 in damages to the homes, business, barn, and infrastructure.

Other economic damages from a catastrophic breach would be associated public and private clean-up costs, damages to vehicles, lost water supply with the reservoir gone, and increased flood damages in the future for remaining properties due to the absence of the dam and its flood protection effects.

The environmental damages from a dam failure would be significant. In addition to the damage caused by the water, the sediment stored in the pool area would be flushed downstream in the event

of a catastrophic breach. Approximately seven miles of stream channel and floodplain downstream of the dam would be damaged by scouring or deposition. Sediment would be deposited in the floodplain. This would constrict the floodplain and cause additional flooding in subsequent storm events. Deposition of sediment in the floodplain would also restrict normal use of the land which may cause water quality problems in the future. It is unlikely that a catastrophic breach would remove all the fill material used to build the dam. The embankment material remaining after a breach would also eventually erode into the stream, contributing to the downstream sediment deposition. Over time, the sediment could migrate downstream from Cherrystone Creek into the Bannister River.

There is also a potential for stream degradation upstream from the dam site. The abrupt removal of the water and sediment would cause instability in the stream feeding the reservoir. This channel could develop headcuts that would migrate upstream. If a bedrock ledge or other hardened point is encountered in the stream, the headcut would stop proceeding upstream. Downcutting and widening would continue to occur in the lake bed. The residents of the four homes upstream of the dam would lose recreational opportunities and the homes possibly would lose property value.

FORMULATION AND COMPARISON OF ALTERNATIVES

The stated objectives of the Sponsors for the Roaring Fork Dam Rehabilitation Plan are: 1) to bring the dam into compliance with current Virginia Division of Dam Safety and NRCS dam safety and performance standards; 2) to maintain the existing level of flood protection for downstream properties; 3) maintain the water supply; and 4) to address the residents' concerns. These objectives can be met by installing measures which will bring the dam into compliance with State and Federal regulations. Under the Watershed Rehabilitation Provisions of the Watershed Protection and Flood Prevention Act, NRCS is required to consider the technical, social, and economic feasibility of the locally preferred solution and other alternatives identified through the planning process. In addition, NEPA and the National Watershed Program Manual requires the consideration of all reasonable alternatives to the proposed federal action.

The purpose of this supplement is to comply with current NRCS and Virginia dam design and safety standards to reduce risks to life and property that could result from a potential catastrophic dam failure; maintain the level of flood protection, that is currently provided by the dam's ability to attenuate floods, to life and property upstream and downstream of the dam; and maintain the use of the reservoir as supplemental water supply.

FORMULATION PROCESS

Formulation of the alternative rehabilitation plan for Roaring Fork Lake followed procedures outlined in the NRCS *National Watershed Program Manual*. Other guidance incorporated into the formulation process included the NRCS *Principles and Guidelines for Water and Land Related Resources Implementation Studies*, and the *Economics Handbook, Part II for Water Resources*, and other NRCS watershed planning policies. Several alternatives were considered and three useful life (50, 75 and 100 year) options were evaluated as part of a period of analysis determination. Several federal action alternatives were carried through for detailed study. The recommended alternative that maximizes net economic benefits has a 52-year period of analysis,

including a one-year for design and one-year for installation with 50 years of expected useful life. This lifespan was selected based upon the expected future life of the concrete components of the structure.

The formulation process began with formal discussions between the Sponsors, the Virginia Division of Dam Safety, and NRCS. The Virginia Division of Dam Safety conveyed state law and policy associated with a high hazard potential dam. NRCS explained agency policy associated with the Small Watershed Dam Rehabilitation Program and related alternative plans of action. As a result, alternative plans of action were developed based on NRCS planning requirements and the ability of the alternatives to address the initial objective of bringing Cherrystone Creek Dam No. 2A into compliance with current dam safety and design criteria and meet the identified purpose and need. The National Economic Development (NED) Alternative is the federally assisted alternative with the greatest net economic benefits. The alternative plans that must be considered include:

- No Federal Action
- Decommission the Dam
- Non-Structural – Relocate or Floodproof Structures in the Breach Zone
- Rehabilitate the Dam
- National Economic Development (NED) Alternative

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Two of the alternatives considered in the planning process were eliminated from detailed consideration because these alternatives either did not meet the proposed purpose or need for federal action or were logistically impractical to implement.

Decommission Dam: Decommissioning is a mandatory alternative that must be considered under NRCS policy for dam rehabilitation. This option describes an alternative which requires removing the flood detention capacity of the dam by removing the existing embankment down to the valley floor. If the dam were removed, the four homes, one commercial structure, and one barn in the breach zone will no longer be at risk from flooding caused by a breach of the Roaring Fork Lake dam. Cherrystone Lake Road is located immediately downstream of the reservoir and has an average annual daily traffic (AADT) of 130. If the road is damaged in the absence of the dam, the access to emergency services could be delayed. About 33% of the 0.98-mile length of Moses Mill Road is in the FEMA Zone AE (100-year) with the dam in place. Moses Mill Road has 110 AADT. With the dam in place, the water treatment plant is still accessible. However, without the dam, there would be no access to the water treatment plant during an event equal to or greater than the 100-year storm. The water treatment plant is not in the FEMA AE (100-year) or 500-year Special Flood Hazard Zone but the water intake is located on Cherrystone Creek. It would be very difficult and expensive to protect Moses Mill Road from induced damages. Davis Road has 120 AADT and is in the existing FEMA AE (100-year) or 500-year Special Flood Hazard Zone. Additional water depth over the road would occur if the dam were removed.

There are no inhabitable dwellings in the currently effective regulatory 100-year floodplain but there is one house in the 500-year floodplain downstream of the dam.

In 2016, the Town of Chatham hired Dewberry as their consultant to do a water supply study and assist them with the renewal of their water withdrawal permit with the Virginia Department of

Environmental Quality. At that time, the Town installed a 12" water supply gate on the riser tower. The lake now provides 99 acre-feet of supplemental water supply. The modifications to the riser were approved by NRCS in March 2016. In 2019, water supply was officially added to the structure as a secondary purpose under Public Law 83-566. In the absence of the dam, the Town would no longer have the supplemental public water supply from the reservoir.

Removing the dam embankment would require removal of about 83,700 cubic yards of material. After the fill removal, the valley floor would be stabilized and vegetated. The submerged sediment would be stabilized or removed. The function and stability of the stream channel would be restored. Removal of the principal spillway riser, pipe, outlet structure, and water supply structures would also be necessary. Some of these unneeded materials could be buried on site or hauled to an appropriate disposal site. About 25 acres of grass would be planted over the dam, pool, and spoil site. Table G lists some of the major components of decommissioning the dam. The water supply would be replaced by an equivalent surface water impoundment.

The estimated cost of removing the storage capacity of the dam and all appurtenant structures ($5.06 million); mitigating for induced damages to Cherrystone Lake Road, Hodnetts Mill Road, Moses Mill Road, and Davis Road ($710,000); mitigating for the induced structure damages ($437,500); and replacing the supplemental water supply with an equivalent surface water supply ($3.93 million) would cost in excess of $9,638,000. Permits and landrights associated with the acquisition of a replacement water supply site and water supply infrastructure associated with the site are not included. Net incidental recreation lost, as a result of decommissioning, also is not included. Decommissioning the dam is severely opposed locally and unacceptable to the Sponsors.

Table G – Major Components of Decommissioning the Dam

Items of Work	Quantities	Unit cost	Cost
Fill removal and disposal	83,735 CY	$12.00/CY	$1,004,820
Spoil spreading	87,921 CY	$7.00/CY	$615,447
Topsoil spreading	9,792 CY	$30.00/SY	$293,760
Pollution control	Lump Sum	$225,816	$225,816
Seeding and mulching	25 Acres	$3,584/acre	$89,600
Removal of principal spillway pipe, riser, and stilling basin	Lump Sum	$182,325	$182,325
Water diversion	Lump Sum	$150,000	$150,000
Reservoir reclamation	Lump Sum	$1,000,000	$1,000,000
Surveys, Quality Assurance, and other miscellaneous items	Various	$1,495,114	$1,495,114
Total cost of structure removal	---	---	$5,056,882
Mitigation of induced damages to Cherrystone Lake Road and Moses Mill Road	---	---	$710,178
Mitigation of induced damages to six structures downstream of the existing dam	---	---	$437,500
Mitigation for loss of wetlands	---	---	$250,000
Water supply replacement	---	---	$3,934,000
Total cost of decommissioning	---	---	$10,138,609

Roller-Compacted Concrete (RCC) Cutoff Wall in Existing Auxiliary Spillway: NRCS investigated the used of an RCC cutoff wall to address the integrity issue in the existing auxiliary spillway. This alternative was not developed further due to geologic limitations.

Articulated Concrete Block (ACB) Armor in Existing Auxiliary Spillway: NRCS investigated the potential use of ACBs to address the integrity of the vegetated earth auxiliary spillway. This alternative was not developed further because the anticipated velocities in the auxiliary spillway exceeded the limits of ACB usage.

Non-Structural - Relocate or Floodproof Structures: Elevating, flood-proofing, or relocating the six structures in the breach zone of the dam would cost approximately $437,500. Mitigating for induced damages to Cherrystone Lake Road and Moses Mill Road would cost an estimated $710,178. This alternative was not considered in further detail.

DESCRIPTION OF ALTERNATIVE PLANS CONSIDERED

Alternatives Without Federal Assistance

One of the alternatives that must be included in the plan is the "No Action" alternative. For the purposes of the rehabilitation program, the No Action alternative describes the action that the sponsors will take if no federal funds are provided. Since the Roaring Fork Lake dam is a high hazard potential dam that does not meet current safety and performance standards, the Virginia Division of Dam Safety has issued a conditional certificate of operation for the dam. It is reasonable and prudent to expect that the Virginia Division of Dam Safety will soon issue an Administrative Order requiring the Sponsors to bring the dam up to State standards by rehabilitation of the dam or remove the hazard by removing the storage function of the reservoir. The Sponsors would be totally responsible for the cost of rehabilitation or removal of the dam. NRCS would still have the technical responsibility of approving the Sponsors' solution because the floodwater retarding structure is under an Operation & Maintenance Agreement between the local Sponsors and NRCS until 2068.

Now, the potential for an uncontrolled breach and resulting damages is present and will continue until the existing dam safety issues are addressed and resolved.

Without NRCS assistance, the Sponsors would have the following options:

- Hire a consultant, prepare plans to meet NRCS and Virginia standards, and rehabilitate the dam using their own resources.
- Do nothing. In this case, the Virginia Division of Dam Safety may choose to breach the dam and send the Sponsors the bill. This option is likely to be more expensive than if the Sponsors performed the breach. The end results would be the same as those for the next option. This option would not meet the Sponsors' goal of maintaining the supplemental water supply and existing level of flood protection for downstream properties.
- The Sponsors could remove the flood storage capacity of the dam by breaching the dam using a least cost method. This breach would be a minimum size hole in the dam from the top of the dam to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be like those that existed prior to the construction of the dam. The sediment would not be stabilized and would migrate downstream. This course

of action would reduce the Sponsors' dam safety liability but would not eliminate all liability since it would induce flooding downstream. This option would not meet the Sponsors' goal of maintaining existing levels of flood control and supplemental water supply.

No Federal Action (Sponsor's Rehabilitation): In the absence of federal assistance, the Sponsors have indicated that they will rehabilitate the dam to meet the required dam safety and design criteria at their own expense using the alternative proposed by NRCS. For the purposes of this evaluation, the Sponsors' Rehabilitation will be the same as the No Federal Action alternative. The estimated total construction cost would be $7,546,700. The total project cost would be $8,183,700.

Alternatives with Federal Assistance

There are three identified deficiencies with the Cherrystone Creek Dam No. 2A. The retrofit of the riser footer and the installation of new toe drains are included in the cost of each auxiliary spillway rehabilitation alternative.

The lake will be drained to allow the modification to the riser footer. Draining the lake will also remove the carp and white suckers that are contributing to the turbidity in the reservoir.

Issue 1 - Embankment drainage. A new toe drain and filter will be installed downstream of the existing drain. The new drain will be installed with a non-corrosive plastic pipe. The existing drain will remain in service. The new downstream drain will provide all drainage and filtering functions when the original drain fails due to pipe collapse or other cause.

Issue 2 - Retrofit of riser footer. The riser footer will be modified to meet the criteria for seismic stability.

Issue 3 – Inadequate integrity and stability in the vegetated earth auxiliary spillway. NRCS did not identify any practical ways to bring the dam into compliance with a vegetative earth solution. However, there are several alternatives for a structural solution. Since one of the goals of this rehabilitation is to maintain the existing level of downstream flood protection, the crest of the rehabilitated auxiliary spillway will remain at the same elevation as the existing vegetated earth auxiliary spillway. There will be no change in the elevation of the regulatory 100- or 500-year floodplain.

During a 100-year flood event, water will flow in the auxiliary spillway at a depth of 0.8 feet. This frequency of flow is allowed for a structural non-erodible spillway. To store the volume of water associated with the 100-year storm event would require the auxiliary spillway crest to be raised by 2.4 feet. There are no structures in the 100-year regulatory floodplain that would be impacted in this event. Therefore, the Sponsors preferred to maintain the existing auxiliary spillway crest.

Alternative 1 – Roller-Compacted Concrete (RCC) Auxiliary Spillway Chute over the dam. An RCC chute would be installed in the embankment. See figure 2 for an example of this type of structure. The initial flow width on the embankment crest would be 200 feet with 3:1 side slopes. The flow width would converge over the 187-foot length of the chute to a width of 120 feet at the valley floor. The chute would have steps to dissipate flow energy and will outlet into an RCC stilling basin with 28-foot-high walls. The side walls vary from 3:1 at the embankment crest to vertical at the entrance of the stilling basin. The principal spillway pipe would outlet into the stilling basin, which would be graded to direct the base flow into the stream through a notch in the end sill.

The existing auxiliary spillway would be abandoned. Earth material excavated from the dam embankment to construct the RCC chute would be used to block off the existing auxiliary spillway.

The construction cost for this alternative is estimated to be $7,546,700.

Figure 2. Example of a roller-compacted concrete auxiliary spillway in an embankment. This example is shown with vertical side walls.

Alternative 2: Reinforced Concrete Labyrinth Weir over the dam. A labyrinth weir located on the embankment of the dam would have the capacity to pass the required auxiliary spillway flow within a flow area that is only 74 feet wide. The spillway would be 315 feet long. See Figure 3 for an example of this type of structure. The weir would be 14-feet high and would be a two-cycle labyrinth. Each cycle would be 36 feet wide and 73 feet long. The crest would be set at the elevation of the existing auxiliary spillway. The outlet will be a Saint Anthony Falls (SAF) basin followed by a 60-foot-long rock riprap stabilization pad. The existing auxiliary spillway would be closed with an earthen dike. The toe drain replacement, riser retrofit, and labyrinth weir have an estimated construction cost $10,260,000 and a total project cost of $12,260,400.

Figure 3. Example of a 5-Cycle Labyrinth Weir in an Embankment.

NATIONAL ECONOMIC DEVELOPMENT (NED) ALTERNATIVE

Alternative 1, as described above, is the NED plan. For purposes of the rehabilitation program, the NED plan is defined as the federally assisted alternative with the greatest net economic benefits.

The Sponsors have indicated that, in the absence of federal assistance, they would rehabilitate the dam to meet the required dam safety and design criteria at their own expense using the alternative proposed by NRCS. The Sponsors' Rehabilitation is used as the No Federal Action alternative. The No Federal Action - Sponsor's Rehabilitation alternative would be the same in scope, cost, and effects as the Future with Federal Project alternative. The rehabilitation with federal assistance is the most locally acceptable alternative and best serves the Sponsors in achieving the needs and purpose of this rehabilitation. Therefore, installing a roller-compacted concrete chute spillway over the dam is the NED plan and the preferred alternative. Per the Federal Principles and Guidelines document and NRCS National policy, when the Future Without Federal Project is the same as the Future With Federal Project, the local costs avoided are credited as benefits. This renders the federally assisted alternative as having zero net benefits. Net benefits are zero because, by policy, the total project cost is equal to the claimed benefits and the resulting benefit/cost ratio is 1:1. The results displayed in Table H are presented within a zero-based accounting context to highlight the costs and benefits associated with the recommended alternative alone. Within a zero-based accounting framework, the "Total Adverse Annualized" value associated with the Future

Without Federal Project is displayed as the “Total Beneficial Annualized” in the Future With Federal Project column.

COMPARISON OF ALTERNATIVE PLANS

Table H summarizes the effects of each alternative considered. Refer to the Environmental Consequences section for additional information.

Table H - Summary and Comparison of Alternative Plans

Effects	**Future Without Federal Project** **No Federal Action – Sponsor's Rehabilitation**	**Future with Federal Project Rehab. with Federal Assistance** – **Alternative 1 -** Roller-compacted concrete chute spillway in embankment **Selected Plan (NED Plan)**	**Alternative 2 –** Reinforced concrete labyrinth weir in the embankment. Closure of existing auxiliary spillway.
Sponsor Goals	Continue to provide flood protection and water supply storage and comply with safety and performance criteria for a high hazard potential dam.	Continue to provide flood protection and water supply storage and comply with safety and performance criteria for a high hazard potential dam.	Continue to provide flood protection and water supply storage and comply with safety and performance criteria for a high hazard potential dam.
Structural	Upgrade dam to meet dam safety criteria.	Upgrade dam to meet dam safety criteria.	Upgrade dam to meet dam safety criteria.
Total Project Investment Roaring Fork Lake	$8,183,700	$8,183,700	$12,260,400
Total Beneficial Annualized (AAEs[1/])	---	$288,700	$288,700
Total Adverse Annualized (AAEs[1/])	---	$288,700	$446,000
Net Beneficial	---	$0	$0
Benefit/Cost Ratio	---	1.0 to 1.0	0.65 to 1.0
Estimated OM&R[2/]	---	$5,000	$5,000
Clean Water Act	Temporary effects during construction.	Temporary effects during construction.	Temporary effects during construction.
Floodplain Management	No change from existing conditions.	No change from existing conditions.	No change from existing conditions.
Waters of the U.S./Wetlands	Temporary impact during construction to 18.1 acres of open water and fringe wetlands.	Temporary impact during construction to 18.1 acres of open water and fringe wetlands.	Temporary impact during construction to 18.1 acres of open water and fringe wetlands.
Air Quality	Temporary effects during construction.	Temporary effects during construction.	Temporary effects during construction.
Fish and Wildlife	Temporary impacts due to draining the lake during construction.	Temporary impacts due to draining the lake during construction.	Temporary impacts due to draining the lake during construction.
Endangered and Threatened Species	None present.	None present.	None present.
Migratory Birds	Temporary effects during construction.	Temporary effects during construction.	Temporary effects during construction.
Bald Eagles	No effect.	No effect.	No effect.
Invasive Plant Species	Care will be taken during construction to avoid introduction or relocation of invasive plant species.	Care will be taken during construction to avoid introduction or relocation of invasive plant species.	Care will be taken during construction to avoid introduction or relocation of invasive plant species.
Riparian Areas	No change.	No change.	No change.

Effects	Future Without Federal Project No Federal Action – Sponsor's Rehabilitation	Future with Federal Project Rehab. with Federal Assistance – **Alternative 1 -** Roller-compacted concrete chute spillway in embankment **Selected Plan (NED Plan)**	**Alternative 2 –** Reinforced concrete labyrinth weir in the embankment. Closure of existing auxiliary spillway.
Local and Regional Economy	Temporary positive effect on local and/or regional construction companies. Temporary negative effect due to loss of existing access to the lake during construction.	Temporary positive effect on local and/or regional construction companies. Temporary negative effect due to loss of existing access to the lake during construction.	Temporary positive effect on local and/or regional construction companies. Temporary negative effect due to loss of existing access to the lake during construction.
Potable Water Supply	The two Cherrystone Creek reservoirs will be drained at different times to avoid a raw water deficit during construction.	The two Cherrystone Creek reservoirs will be drained at different times to avoid a raw water deficit during construction.	The two Cherrystone Creek reservoirs will be drained at different times to avoid a raw water deficit during construction.
Public Health and Safety	Decrease potential for loss of life compared to the existing structure. Safety and noise concerns will be addressed during construction.	Decrease potential for loss of life compared to the existing structure. Safety and noise concerns will be addressed during construction.	Decrease potential for loss of life compared to existing structure. Safety and noise concerns will be addressed during construction.
Recreation	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years. There is no public recreation.	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years. There is no public recreation.	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years. There is no public recreation.
Cultural Resources	NRCS has recommended "No Effect."	NRCS has recommended "No Effect."	NRCS has recommended "No Effect."
Environmental Justice and Civil Rights	No disparate treatment.	No disparate treatment.	No disparate treatment.
Land Use Changes	A land use ordinance will be enacted to restrict future development below elevation 700.6 upstream of the dam.	A land use ordinance will be enacted to restrict future development below elevation 700.6 upstream of the dam.	A land use ordinance will be enacted to restrict future development below elevation 700.6 upstream of the dam.

[1/] Per 1.7.2 (a) (4) (ii) of the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&G), U.S. Water Resources Council, March 1983, allowing for abbreviated procedures, damage reduction and recreation benefits have not been displayed because they are the same for both alternatives and no net change in benefits occurs when comparing the two candidate plans to each other. The federally assisted alternative is displayed within a zero-based accounting context that credits local costs avoided (Total Adverse Annualized for the Future Without Federal Project scenario) as adverse beneficial effects (Total Beneficial Annualized) consistent with P&G 1.7.2(b)(3). Although the average annual benefits of rehabilitation are $288,700, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting benefit/cost ratio is 1:1. "AAEs" stands for Average Annual Equivalents which are based on a 2.75% discount rate and a 52 year period of analysis (1 year to design, 1 year to install and a 50 year expected useful life).

[2/] "Estimated OM&R" stands for Operation, Maintenance and Replacement Costs.

Note: Regional Economic Development account (RED) concerns were not identified during the scoping process. Therefore, the RED account information is not included.

ENVIRONMENTAL CONSEQUENCES

Alternative plans of action can result in a multitude of effects on resources upstream and downstream of Roaring Fork Lake. This section describes anticipated effects on resource concerns identified by the Sponsors, the public, and agency personnel in the Scoping meeting and the public meetings.

Three alternative plans were considered and evaluated in detail: 1) No Federal Action (Sponsors Rehabilitation), 2) Rehabilitate Dam with the Preferred Alternative (NED Plan), and 3) Rehabilitate Dam with Labyrinth Weir over the dam

The Sponsors have indicated that they will use the plan developed by NRCS to complete the rehabilitation of the dam if Federal funding is not available. The *No Federal Action (Sponsors' Rehabilitation)* alternative would be the same or involve the same components as the *Rehabilitation with Federal Assistance (NED Alternative).* This alternative maximizes net benefits with a benefit/cost ratio of 1:1 and is the rehabilitation alternative preferred by the Sponsors.

SPECIAL ENVIRONMENTAL CONCERNS EXCLUDED FROM CONSEQUENCES ANALYSIS:

- Sole Source Aquifers
- Regional Water Management Plans
- Chesapeake Bay Preservation Act
- Coastal Zone Management Areas
- Wild and Scenic Rivers
- Clean Air Act-General Conformity Rule
- Clean Air Act-Regional Haze Regulations
- Endangered and Threatened Species (Plants and Animals)
- Invasive Animal Species
- Virginia Rare Species and Natural Communities
- Essential Fish Habitat
- Environmental Justice and Civil Rights
- Virginia Natural Area Preserves System
- Parklands
- Recreation
- Scenic Beauty
- Scientific Resources
- National Historic Landmarks Program

SPECIAL ENVIRONMENTAL CONCERNS

SOILS

Prime and unique farmlands, and farmland of statewide importance:

There are up to 1.6 acres of designated Farmland of Statewide Importance that could be disturbed by the proposed action. (See Appendix C for map). However, as per exceptions noted in the 1981 Farmland Protection Policy Act, land committed to water storage does not require the disclosure of impacts on a 1006 form.

WATER

Clean Water Act (CWA) – Sections 303(d) and 305(b) (Water Quality)

Existing Conditions: About 5.96 miles of Cherrystone Creek has been identified as a Category 4A, E. coli impaired, stream. The area below Roaring Fork Lake Dam to the Chatham Sewage Treatment Plant outfall, does not support recreational use. Additionally, the Town of Chatham has identified an issue with turbidity in Roaring Fork Lake that is negatively impacting the raw water for the Town's water supply. At the request of the sponsors, NRCS approved the addition of supplemental water supply (Municipal and Industrial (M&I)) as a purpose for Cherrystone Creek Dam 2A.

No Federal Action (Sponsors' Rehabilitation): There will be a temporary impact on downstream water quality due to a sediment release when the water is drawn down prior to construction. With the required erosion and sediment control measures in place, there should be minimal impacts on water quality during construction. Any water releases from the project area are expected to meet the appropriate water quality standards. Water quality in the reservoir should improve when the carp and white sucker population are removed during rehabilitation activities due to a decrease in turbidity.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Floodplain Management - Executive Order 11988 – Floodplain Management

Existing Conditions: The Cherrystone Creek floodplain is managed by both Pittsylvania County and the Town of Chatham. Each locality has a local floodplain ordinance, which imposes zoning restrictions within the flood zones that is consistent with FEMA and state regulations. Both the Town of Chatham and Pittsylvania County participate in the National Flood Insurance Program. Chatham joined in February 1979, and Pittsylvania County joined in November 1980. They are both in good standing in the program.

No Federal Action (Sponsors' Rehabilitation): Rehabilitation of the Roaring Fork Lake dam will be constructed in accordance with all necessary requirements and restrictions. The existing level of flood protection will be maintained. Existing floodplain management zoning restrictions will not be changed.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Waters of the U.S. / Wetlands – Clean Water Act – Sections 401 (State Administered) and 404 (Federally Administered):

Existing Conditions: There are 18.1 acres of wetlands located within the affected environment of the proposed action. The Roaring Fork Lake shoreline, stream inflow, and outflow were visually surveyed in May 2017 for wetlands. Palustrine emergent wetlands comprise a total of 2.5 acres which include the shorelines and the inflow of the lake. The 15.6 surface acres of the lake are considered to be open water wetlands. No other wetlands were identified in the affected environment.

No Federal Action (Sponsors' Rehabilitation): The reservoir will be temporarily drained to allow construction of the recommended alternative. The construction period is expected to be approximately one year. The open water wetlands and the fringe wetlands associated with the lake will be temporarily impacted during this time but are expected to fully recover naturally after the lake is refilled. Since this is a temporary action, no mitigation will be required.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Clean Water Act – Sections 402 (State Administered) (Discharges of Stormwater from Construction Activities):

Existing Conditions: All areas of the land-based dam features and surrounds are maintained in vegetative cover.

No Federal Action (Sponsors' Rehabilitation): Since land disturbance will exceed one acre, a Virginia Stormwater Management Program Permit (VSMP) (i.e. construction general permit) would be required. With the required erosion and sediment control measures in place, there should be minimal impacts on water quality during construction. Any water releases from the project area are expected to meet the appropriate water quality standards. No long-term negative impacts on water quality from rehabilitation activities are anticipated. The water quality in the lake and downstream of the lake is expected to improve when the carp and white sucker population are removed from the lake during rehabilitation activities.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

AIR

Applicable State and Local Air Quality Regulations

Existing Conditions: According to DEQ, Pittsylvania County is within an attainment area for all criteria pollutants. Air quality in the project area is satisfactory and below the Ambient Air Quality Standard for particulate matter.

No Federal Action (Sponsors' Rehabilitation): During the rehabilitation of the dam, particulate matter will increase during construction activities. A mobile concrete batch plant will be used that will generate dust. Also, open burning of vegetative debris usually takes place during construction. Required permits will be obtained by the contractor. Air pollution abatement actions will mitigate

any potential temporary air quality concerns during construction, and the proposed work is not expected to violate any federal, state, or local air quality standards.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

ANIMALS AND PLANTS

Endangered and Threatened Species and Natural Areas

Existing Conditions: While the Federally Endangered Roanoke logperch was not identified in the USFWS IPaC database, it was identified in the Virginia Fish and Wildlife Information Service database presumably because it uses a larger default search area. The Northern long-eared bat (NLEB), a Federally Threatened species, was identified in the USFWS IPaC database as potentially present.

No Federal Action (Sponsors' Rehabilitation): Regarding potential impacts to the Federally Endangered Roanoke logperch, appropriate resource specialists were contacted regarding potential presence of that species. Follow-up efforts did not identify further concerns. As for the NLEB, the NRCS followed up with a search of the Virginia Department of Game and Inland Fisheries' (VDGIF) on-line NLEB Winter Habitat and Roost Tree ARC GIS System, http://dgif-virginia.maps.arcgis.com/apps/webappviewer/index.html?id=32ea4ee4935942c092e41ddcd19e5ec5. Using the search tool NRCS found no NLEB hibernacula or maternity roost trees for NLEB within Pittsylvania County. Therefore, as stated in the Final 4(d) rule on the NLEB, since no "known" maternity roost trees or hibernacula have been designated within a ¼ mile radius of the proposed project, any incidental take that may result from the project is exempted by the 4(d) rule and no further action is necessary to comply with the Endangered Species Act prohibitions to protect the NLEB. Based on the most current data and consultation with species experts, NRCS has made a "no effect" determination on impacts to both species resulting from the rehabilitation of the dam.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Migratory Birds

Existing Conditions: Roaring Fork Lake could potentially be utilized by several species of migratory birds for feeding, nesting, or resting. No Bald eagle or osprey nests are located within a quarter mile of the project area.

No Federal Action (Sponsors' Rehabilitation): Since the lake will be drained during construction, it will be temporarily unavailable to migratory birds. There are similarly-sized bodies of water throughout the region available for migratory bird use.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Bald Eagles

Existing Conditions: There is existing bald eagle habitat present in the project area. However, there are no known bald eagle nests within 35 miles of the site.

No Federal Action (Sponsors' Rehabilitation): No impacts to Bald eagles are expected by project action. Prior to beginning construction, a field survey will be conducted to verify no nests exist within the project area. Should bald eagle nests be found, all applicable restrictions will be implemented.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Invasive Species - Plants

Existing Conditions: The following common invasive plant species were identified: Chinese privet, Japanese stiltgrass, Honeysuckle, Sericea lespedeza, and Tree of Heaven. See Appendix C-5 for invasive species map of the project area.

No Federal Action (Sponsors' Rehabilitation): During construction, measures will be taken to avoid the spread or introduction of invasive species. All disturbed areas will be vegetated with grass species.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Riparian Areas

Existing Conditions: There are riparian areas around the reservoir and along Cherrystone Creek.

No Federal Action (Sponsors' Rehabilitation): There will be no long-term change to the riparian areas around the reservoir.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Fish and Wildlife

Existing Conditions: Roaring Fork Lake has carp, suckers, crappie, channel catfish, largemouth bass, and sunfish. This reservoir is not open for public use. The lake was stocked by residents. The Virginia Department of Game and Inland Fisheries (VDGIF) determined that the carp and sucker population were causing excessive turbidity in the water.

No Federal Action (Sponsors' Rehabilitation): The reservoir will be completely drained during rehabilitation and the fish population will be lost. The VDGIF indicated that the carp and suckers will not survive in a creek habitat and the population of these fish will be eliminated. The lake fishery is expected to fully recover in a few years due to natural reestablishment or restocking. Water quality is expected to improve due to the removal of the carp and suckers. The Sponsors will encourage residents to restock the lake with only game fish.

Rehabilitation with Federal Assistance – (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

HUMAN

Local and Regional Economy

Existing Conditions: Residents around the reservoir utilize it for recreation. The roads used for commuting to work sites contribute to the local economy.

No Federal Action (Sponsors' Rehabilitation): There would be a temporary positive effect on the local economy during construction.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Potable Water Supply and Regional Water Management Plans

Existing Conditions: The water from the Roaring Fork reservoir is not included in the West Piedmont Planning District's Regional Water Supply Plan because the water supply purpose was not officially added to this structure until March 2019. The water supply intake is about 2.5 miles below the dam and raw water is drawn directly from Cherrystone Creek. Sponsors recently installed a water supply intake on the Roaring Fork reservoir to supplement the base flow of the creek as needed. In March 2019, at the request of the sponsors, NRCS approved the addition of supplemental water supply (M&I) as a purpose for Cherrystone Creek Dam 2A.

No Federal Action (Sponsors' Rehabilitation): There will be a temporary loss of the potential water supply storage from Roaring Fork Lake. The base flow will be conveyed around the dam and will continue to supply Cherrystone Creek.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Public Health and Safety

Existing Conditions: The existing vegetated earth auxiliary spillway does not have the integrity necessary to withstand the Probable Maximum Precipitation event. A breach of the auxiliary spillway could cause a release of the water and sediment stored behind the dam. Approximately 150 people are at risk for loss of life. There are four homes, one commercial structure, and one barn in the breach zone of this dam. Four roads would be affected by a breach.

No Federal Action (Sponsors' Rehabilitation): Under this alternative, the dam would be structurally rehabilitated using current design and safety criteria to provide continued flood protection for 50 years after the rehabilitation project is complete. The level of flood protection provided by the dam would be the same as it is presently since there will be no change to the width of the auxiliary spillway. The threat to loss of life from failure of the dam would be greatly reduced. Access to the site will be restricted during construction.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Recreation

Existing Conditions: Roaring Fork Lake is not open for public use. Residents and their guests utilize the reservoir for swimming, boating and fishing.

No Federal Action (Sponsors' Rehabilitation): The reservoir will be completely drained for about one year to allow rehabilitation of the dam. Boating and fishing opportunities will be lost during the construction period. The lake will be filled following construction and the fishery is expected to fully recover.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Historic Properties

Existing Conditions: Cherrystone Creek Dam No. 2A (1969) is located within the direct Impact Area of Potential Effect (APE) of the undertaking while Hodnetts Mill site is in the indirect APE (viewshed). Both Hodnetts Mill site (mid-19th century) and Cherrystone Creek Dam No. 2A (1969) are eligible for National Register consideration due to their age (50+ years old).

No Federal Action (Sponsors' Rehabilitation): The NRCS completed a National Register eligibility evaluation recommending both Cherrystone Dam No. 2A and the Hodnetts Mill (site 44PY0461) as "not eligible" for the NRHP due to a lack of historic or architectural significance and integrity, per the NRHP eligibility evaluation criteria.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Environmental Justice

Existing Conditions: There is an estimated population of 150 people in the breach zone below the dam. The presence or absence of environmental justice groups within the watershed was assessed using EPA's EJSCREEN tool.

No Federal Action (Sponsors' Rehabilitation): Rehabilitation of the dam will have positive economic and social effects across all residents within the floodplain and above the dam. There will be no disparate treatment. Since vehicle operators also are significant beneficiaries of the proposed rehabilitation, it is reasonable to conclude that protection of the roads and bridges will benefit all racial, ethnic, and socio-economic groups within the watershed and below the dam. Avoiding a dam breach will directly benefit all residents and taxpayers in general within Pittsylvania County, the Town of Chatham, and the Commonwealth of Virginia.

There are no known disparate impacts from the rehabilitation project. It was explained to residents that rehabilitation of the dam would not enhance their downstream flood protection, but simply maintain the designed level of flood protection while reducing the risk to life and property that might occur from a dam breach.

Approximately 150 people are within the breach inundation zone and would benefit directly from the rehabilitation of the dam. There are indirect benefits for the four homeowners who live upstream of the dam and use the area around the reservoir for recreation during the year.

There would also be downstream benefits to the occupants of hundreds of vehicles/day. This is primarily those people affected by impacts to the roads and bridges and includes others who would lose access to emergency services or would be cut off from their residences or jobs.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Land Use Changes

Existing Conditions: The existing auxiliary spillway is 200 feet wide and is in permanent grass vegetation.

No Federal Action (Sponsors' Rehabilitation): The vegetated earth auxiliary spillway will be replaced with a 200-foot-wide RCC chute auxiliary spillway over the top of the dam. The existing auxiliary spillway will be blocked with a berm. Restrictions will be put into place to prevent future development below the elevation of the 100-year auxiliary spillway flow event.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

Social/Cultural Issues

Existing Conditions: Roaring Fork Lake was installed in 1969 for flood control. The Sponsors recently retrofitted the riser to add a water supply gate to allow for supplemental water in Cherrystone Creek. Water supply was added as a purpose of the dam in March 2019. The sponsors and residents want to maintain the existing level of flood control. The dam primarily protects Cherrystone Lake Road and Moses Mill Road. Access to the water treatment plant is currently protected by the dam.

No Federal Action (Sponsors' Rehabilitation): Rehabilitation of the dam will continue the existing level of flood protection, protect the access to the water treatment plant, and maintain the water supply. Water treatment costs are expected to decrease due to the anticipated improvement in water quality resulting from removal of the carp and suckers from the lake. Adding the water supply as a purpose for this dam will enable the Town to fully utilize this lake as a reliable source of raw water.

Rehabilitation with Federal Assistance (NED Alternative): Same as the No Federal Action (Sponsors' Rehabilitation).

CUMULATIVE EFFECTS

NRCS constructed one flood control dam, Site 2A, and one multi-purpose (flood control and water supply) dam, Site 1, in this watershed. Both dams are now multi-purpose structures. Roaring Fork Lake Dam and Cherrystone Lake Dam are currently operating under conditional certificates due to a need for rehabilitation. The No Federal Action alternative for Roaring Fork Lake calls for the Sponsors to rehabilitate the dam. The proposed rehabilitation alternative would have the same effect on the environment as the No Federal Action alternative. The cumulative effects of these projects on the principal resources of concern, along with the social and economic effects, are to

maintain the existing social, economic, and environmental conditions of the community. The cumulative effects of rehabilitating Roaring Fork Lake would have the same results. In both the selected plan and the rehabilitation by the local Sponsors, the two existing dams in the watershed stay in place, the same level of water supply storage and flood protection is provided, and the existing emergency action plan remains in force.

RISK AND UNCERTAINTY

Assessments, considerations, and calculations in this plan are based on a 52-year period of analysis. Associated monetary flooding impacts on downstream houses and businesses were based on the National Flood Insurance Program's Actuarial Rate Review. National averages were used to identify the value of potential damages. Actual damages occurring from each storm event could realistically be higher or lower, depending on soil moisture conditions at the time of a given event, associated debris flows, future development, and other factors such as changes in precipitation from various storm events. Although potential climatic changes are not expected to alter calculation of the PMP events, they could increase the occurrence of low frequency, high intensity storm events and associated flood damages.

Prior to the original construction, the Sponsors procured easements that would allow construction, operation, and maintenance of the dam and the storage of water. The Sponsors recognize that the dam is designed to detain floodwaters and that structures located below the top of dam are at risk for potential flood damage during major storm events. After an analysis was completed to compare the benefits and costs of procuring the easements to the top of dam, the Town decided to accept the risk associated with not owning the easements to the top of dam. The Town of Chatham will restrict development below the elevation of the 100-year flow event (700.6 feet NAVD88) prior to rehabilitation of the dam.

The projected submerged sediment life of the lake is 124 years. This information is based on multiple sediment surveys that were conducted throughout the life of the dam. Very large storm events, deforestation by fire, or increased construction of residential sites could cause an increased rate of erosion, sedimentation and deposition. There are no known plans for land use changes in this watershed that would affect the rate of sediment deposition in the reservoir. Based on the approval of water supply as a secondary purpose, the available sediment storage beyond 50 years will be utilized as water supply.

The limiting factor for the expected useful life of the Future with Federal Assistance Alternative (Preferred Alternative) is based on the remaining expected life of the principal spillway pipe and associated components. Thus a 52-year period of analysis was used for this structure.

The objective of this project is to meet applicable NRCS and Virginia safety and performance standards for a high hazard potential dam. From a financing and administrative standpoint, the Sponsors have committed to NRCS that they are able to fund the required 35% of the total project costs to complete installation of the preferred alternative and can perform the required maintenance on the upgraded structure for 50 years after construction.

There will be no damage to the RCC auxiliary spillway during flow events. The estimates do not include any costs for offsite damages which may occur during an auxiliary spillway flow event. Routine maintenance is not included in these amounts. This project plan assumes that a flow event has 1.67% chance of occurring in a given year.

CONSULTATION AND PUBLIC PARTICIPATION

The sponsoring organizations are the Town of Chatham, Pittsylvania SWCD and Pittsylvania County. The Town of Chatham has taken the lead as the owner and operator of Roaring Fork Lake. The Town received their first Conditional Operation and Maintenance Certificate to operate and maintain the dam from the Virginia Division of Dam Safety in 2008 when the hazard class changed from significant hazard potential to high hazard potential. The certificate was issued because the capacity of the auxiliary spillway was insufficient to contain the volume of water associated with the PMP event in effect at that time.

Local, state and federal support for the rehabilitation of the Roaring Fork Lake Dam has been strong. Input and involvement of the public has been solicited throughout the planning of the project. At the initiation of the planning process, many meetings were held with representatives of the Sponsors to ascertain their interest and concerns regarding the dam. A Public Participation Plan was developed and approved for the project and has been followed during the planning process.

The Sponsors have worked closely with the local landowners and residents to provide information on the planning activities and to solicit their input on the pertinent issues to be considered during planning. The Sponsors worked to provide all residents, including minorities, with information on the planning effort and intended works of improvement.

A scoping meeting was held on June 9, 2016, in the Old Dominion Agriculture Complex in Chatham, Virginia, to identify issues of economic, environmental, cultural, and social concerns in the watershed. Input was provided by local, regional, state and federal agencies at the meeting or through letters and emails to NRCS. There were 18 people in attendance. Agencies and organizations attending or providing input include the Town of Chatham, Pittsylvania County Board of Supervisors, Pittsylvania SWCD, Virginia Department of Transportation, Virginia Department of Environmental Quality, Virginia Department of Game and Inland Fisheries, U.S. Army Corps of Engineers, and the USDA NRCS.

The first public meeting was held in the Old Dominion Agriculture Complex in Chatham, Virginia, on June 9, 2016. Local, state and federal perspectives on the rehabilitation needs of the Roaring Fork Lake Dam were provided. Attendees were informed of the dam rehabilitation program and potential alternative solutions to bring the dam into compliance with current dam safety and design criteria. Meeting participants provided input on their issues and concerns to be considered during the planning process. A fact sheet was distributed which addressed frequently asked questions regarding rehabilitation of the dam. There were 33 people in attendance. Agencies and organizations attending or providing input include the Town of Chatham, Pittsylvania County Board of Supervisors, Pittsylvania SWCD, Dewberry Engineering Firm, and the USDA NRCS.

A workshop meeting was held on March 10, 2017 in Chatham with 11 people attending. The discussion centered on options to secure needed federal funding and nonfederal matching funds for the design and construction of the Cherrystone Creek dam rehabilitation projects. Attendees included Town of Chatham officials and employees, Pittsylvania County employees, landowners, a representative from State Delegate Les Adams, and NRCS employees.

A workshop meeting was held on January 29, 2018 in Chatham with 20 people attending. Information provided to meeting attendees included a summary of the current situation of the dam, planning efforts to date, the various alternatives considered during planning, and a detailed

explanation of the recommended alternative for dam rehabilitation. The audience included Town officials and employees, County employees, SWCD employees, Dewberry Engineering Firm, and NRCS employees.

A second public meeting was held on February 15, 2018 in the Old Dominion Agriculture Complex in Chatham, Virginia. A summary of the findings, landrights issues, alternatives considered, and the preferred alternative were presented. At that time, the preferred alternative was an RCC-cutoff wall in the existing auxiliary spillway. A project fact sheet and a multi-page frequently asked questions document were distributed at the meeting. There were 42 people in attendance. Agencies and organizations attending or providing input include the Town of Chatham, Pittsylvania County Board of Supervisors, Pittsylvania SWCD, Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management, Dewberry Engineering Firm, and the NRCS.

A workshop meeting was held on July 11, 2018 in Chatham with 13 people attending. Information provided to meeting attendees included a summary of the status of the planning for the dam, a review of existing easements and landrights documents, the need for a 4-month no-cost time extension on the performance period of the agreements, and a proposed schedule for completion of the Plan-EA. The audience included Town employees, County employees, SWCD employees, Town attorney, County attorney, and NRCS employees.

Another workgroup meeting was held by teleconference on October 18, 2018 with 13 people attending. The audience included Town employees, County employees, SWCD employees and Board members, and NRCS employees. The primary topic under discussion was the change in the recommended alternative from an RCC cutoff wall in the existing auxiliary spillway to an RCC chute spillway over the dam. Since this change will result in a noticeable change in the visual appearance of the dam and a major cost increase, a third public meeting was scheduled for January 2019. A 2-month no-cost time extension was requested to allow for the additional public participation.

A third public meeting was held on January 10, 2019, at the Old Dominion Agriculture Complex in Chatham, Virginia. There were 45 people in attendance. Participants were informed of the change in the recommended alternative and associated cost increases. Agencies and organizations attending or providing input include the Town of Chatham, Pittsylvania County Board of Supervisors, Pittsylvania SWCD, Virginia Division of Dam Safety, and the NRCS.

A Draft Plan was distributed for interagency and public review on March 15, 2019. The distribution list of agencies and organizations is included on pages 70 and 71 of this Plan-EA. Copies of the document were placed in local libraries and news articles were placed in local newspapers to solicit comments from the public during the comment period. After the interagency and public review period, comments received on the draft were incorporated into the Final Plan. Letters of comments received on the draft plan and NRCS responses to the comments are included in Appendix A.

PREFERRED ALTERNATIVE

RATIONALE FOR PLAN PREFERENCE

The preferred plan is to rehabilitate the dam to meet current NRCS and Virginia safety and performance standards for a high hazard potential dam, maintaining the existing level of flood protection provided by the dam, and retaining the reservoir as a source of supplemental water. The preferred plan meets the identified purposes and needs for the project and significantly reduces the potential risk to human life. The project Sponsors, residents, and state and local government agencies all prefer the selected plan because it:

- Reduces the threat to loss of life to approximately 150 people that live, work and play in the six structures and utilize the four secondary roads within the breach inundation zone.
- Provides protection for 630 vehicles per day that utilize the four roads below the dam and auxiliary spillway.
- Maintains the supplemental water supply storage.
- Continues onsite benefits to incidental recreational users who mainly live around the reservoir.
- Reduces the threat of loss of emergency service for a significant number of residences and several businesses.
- Provides downstream flood protection for the people living in the area, as well as those working, recreating, or traversing within the downstream floodplains, for an additional 50 years.
- Reduces the liability associated with continuing to operate a non-compliant dam.
- Maintains existing stream habitat downstream of the dam.
- Retains the existing aquatic and terrestrial habitat around the lake.

The preferred alternative meets the Sponsors' objectives of bringing this dam into compliance with current dam design and safety criteria, maintaining the supplemental water supply, maintaining the existing level of flood protection for downstream properties, and addressing resource concerns identified by the public. The preferred plan is the NED Alternative. The plan reasonably meets the following four criteria: completeness, effectiveness, efficiency, and acceptability. NRCS and the Sponsors agree on the preferred alternative.

SUMMARY AND PURPOSE

The preferred plan of action for the dam is to:

- Install a 200-foot-wide, roller-compacted concrete chute spillway over the embankment and close the existing auxiliary spillway.
- Increase the size of the riser footer to meet seismic criteria.
- Install new toe drains with plastic pipe.

- Pittsylvania County will restrict future construction of habitable dwellings upstream from the dam below the elevation of the 100-year flow event (700.6) in the auxiliary spillway elevation.

After the implementation of these planned works of improvement, Roaring Fork Lake will meet all current NRCS and Virginia Division of Dam Safety performance standards.

Detailed structural data for the proposed rehabilitated dam can be found in Table 3.

EASEMENTS AND LANDRIGHTS

The current landrights for the structure allow for construction, operation, and maintenance of the dam and storage of flood waters. The entire volume of the 100-year flood event is not detained by the structure. During this event, water will flow in the auxiliary spillway to a depth of about 0.8 feet. There currently are no structures upstream of the dam in the area between the 100-year flowage elevation and the top of the dam. The local Sponsors have determined that acquisition of additional easement area to meet current NRCS policy to the top of dam would require a significant added cost without an equally significant benefit. The Sponsors will restrict future construction below the elevation of the 100-year storm event (elevation 700.6 feet NAVD88) and acknowledge and accept the risks associated with allowing future construction to occur between the 100-year storm elevation and the top of the dam.

MITIGATION

During construction, site mitigation measures will include erosion and sediment control, seeding of denuded areas, dust control, and other practices identified during the design process. No compensatory mitigation is anticipated to be needed.

PERMITS AND COMPLIANCE

Prior to construction, the Sponsors will be responsible for obtaining an alteration permit from the Virginia Soil and Water Conservation Board, and, as needed, a 404 permit from the Army Corps of Engineers, a subaqueous lands permit from the Virginia Marine Resources Commission, and any other required permits. During construction, the successful contractor is required to develop a Stormwater Pollution Prevention Plan and acquire any applicable air quality and erosion and sediment control permits.

The construction general permit would require the operator to implement a site-specific stormwater pollution prevention plan (SWPP). The SWPP would outline the steps that an operator must take to comply with the permit, including water quality and quantity requirements to reduce pollutants in the stormwater runoff from the construction site. The SWPP also specifies all potential pollutant sources that could enter stormwater leaving the construction site and covers methods used to reduce pollutants in stormwater runoff during and after construction.

Prior to construction, the NRCS will verify that no Bald eagle nests or known NLEB hibernacula or maternity roost trees are located within the project area.

If cultural resources are discovered during installation, work will cease, and the State Historic Preservation Officer will be notified. Appropriate investigations procedures will be initiated.

The Sponsors will be responsible for obtaining a regular O&M Certificate from the Virginia Division of Dam Safety upon completion of the project.

COSTS

As indicated in Table 2, the total installation cost of the selected plan is $8,183,700. Of this amount, PL-83-566 funds will bear $5,536,900 and nonfederal funds will bear $2,646,800. Table 2 shows details of the costs and cost-share amounts by category. Total annualized costs are shown in Table 4 along with the estimated costs for operation and maintenance. Table 5 displays the average annual flood damage reduction benefits by flood damage categories, and Table 6 displays a comparison of annual costs and benefits. A 2018 price base was used and amortized at 2.875 percent interest for the 52-year period of analysis (including a design and installation period of two years and an expected useful life of 50 years).

The cost projections for the proposed rehabilitation measures are estimated costs only for planning. The fact that these costs are included in this plan does not infer that they are final costs. Detailed structural designs and construction cost estimates will be prepared prior to contracting for the work to be performed. Final construction costs will be those costs incurred by the contractor performing the work, including the cost of any necessary contract modifications.

INSTALLATION AND FINANCING

The project is planned for installation in about 12 months. During construction, equipment will not be allowed to operate when conditions are such that soil erosion and water, air, and noise pollution cannot be satisfactorily controlled.

NRCS will assist the Sponsors with the Roaring Fork Lake rehabilitation project. NRCS will be responsible for the following:

- Execute a project agreement with the Sponsors before either party initiates work involving funds of the other party. Such agreements set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
- Execute a Memorandum of Understanding with the Sponsors to provide a framework within which cost-share funds are accredited.
- Execute an updated Operation and Maintenance Agreement with the Sponsors that extends the O&M responsibilities for an additional 50 years following construction. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Provide financial assistance equal to 65% of total eligible project costs, not to exceed 100% of actual construction costs.
- Verify that a current Emergency Action Plan is developed before construction is initiated.

- Provide consultative engineering support, technical assistance, and approval during the design and construction of the project.
- Certify completion of all installed measures.

The Sponsors will be responsible for the following:

- Secure all needed environmental permits, easements, and rights for the installation, operation and maintenance of the rehabilitated structure.
- Prepare an updated Emergency Action Plan for the dam prior to the initiation of construction.
- Execute an updated Operation and Maintenance Agreement with NRCS for the dam. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Provide engineering services for the design, construction, and certification of the project.
- Provide local administrative and contract services necessary for the installation of the project.
- Provide nonfederal funds for cost-sharing of the project at a rate equal to, or greater than, 35% of the total eligible project costs.
- Acquire a regular Operation and Maintenance certificate from the Virginia Division of Dam Safety upon completion of the planned measures.
- Participate in and comply with applicable Federal floodplain management and flood insurance programs.
- Enforce all associated easements and rights-of-way for the safe operation of the dam.
- Prohibit future construction of habitable dwellings upstream from the dam below the elevation of the 100-year storm elevation through the auxiliary spillway (700.6).

OPERATION, MAINTENANCE, AND REPLACEMENT

Measures installed as part of this plan, and previously installed measures, will be operated and maintained by the Town of Chatham with technical assistance from federal, state, and local agencies in accordance with their delegated authority. A new Operation and Maintenance (O&M) agreement will be developed for Roaring Fork Lake and will be executed prior to construction of the project. The term of the new O&M agreement will be for 50 years following the completion of rehabilitation. The agreement will specify responsibilities of the Sponsors and include detailed provisions for retention, use, and disposal of property acquired or improved with PL 83-566 cost sharing. Provisions will be made for free access of district, state, and federal representatives to inspect all structural measures and their appurtenances at any time.

Table 1 - Estimated Installation Cost
Cherrystone Creek Dam No. 2A, Virginia
(Dollars)

Installation Cost Items	Estimated Costs		
	PL-83-566 Funds[1]	Other Funds	Total
Structural measures to rehabilitate Cherrystone Creek Dam No. 2A:	$5,536,900	$2,646,800	$8,183,700
Total Project:	$5,536,900	$2,646,800	$8,183,700

Price base: February 2019 Prepared: February 2019

Table 2 - Estimated Cost Distribution – Structural Measures
Cherrystone Creek Dam No. 2A, Virginia
(Dollars)

	Installation Cost: PL-83-566 Funds[2]				Installation Cost: Other Funds[3]						
Installation Cost Items	Construction Costs	Engineering Technical Assistance Costs	Project Admin. Costs	Total PL-83-566 Costs	Construction Costs	Engineering Costs	Real Property Landrights	Permits	Project Admin. Costs	Total Other Funds	Total Project Cost[4]
Rehab. Dam No. 2A:	$4,956,400	$555,500	$25,000	$5,536,900	$2,590,300	$18,500	$0	$3,000	$35,000	$2,646,800	$8,183,700
Totals:	$4,956,400	$555,500	$25,000	$5,536,900	$2,590,300	$18,500	$0	$3,000	$35,000	$2,646,800	$8,183,700

Price base: February 2019 Prepared: February 2019

[1] Paid by the USDA/NRCS – the Federal agency responsible for assisting in installation of improvements.
[2] 65% of total eligible project cost (The actual federal cost/share excludes technical assistance and permit costs and cannot exceed 100% of the construction cost).
[3] 35% of total eligible project cost. Per NRCS policy, $25,000 in local sponsor planning costs were excluded from Tables 1 and 2. These sponsor costs are included in the calculation of cost/share as shown in the watershed agreement.
[4] As per the NRCS National Watershed Manual, Part 508.44, the actual federal cost/share amount will be calculated based on a total eligible project cost that excludes federal technical assistance costs, water, mineral and other resource rights, and all federal, state and local permits. However, for the purposes of planning, all of these costs are included in the benefit/cost analysis and are displayed as part of the public record of this analysis.

Table 3 – Structural Data—Dams with Planned Storage Capacity
Roaring Fork Lake – Cherrystone Creek Dam No. 2A
Pittsylvania County, Virginia

Attribute	Unit	Structure Data
Class of structure		High
Seismic zone		2
Total drainage area	mi^2	5.75
Runoff curve no. (1-day) (AMC II)		63
Time of concentration (Tc); uncontrolled drainage area only	hours	3.5
Elevation top dam [1/]	feet	707.4
Elevation crest auxiliary spillway	feet	699.8
Elevation crest high stage inlet	feet	686.6
Elevation crest low stage inlet	feet	674.1
Auxiliary spillway type		Structural
Auxiliary spillway bottom width	feet	200
Auxiliary spillway exit slope	percent	33
Maximum height of dam	feet	65.1
Volume of fill	yd^3	83,735
Total capacity [2/]	acre-feet	1,181
Sediment submerged	acre-feet	52 [3/]
Sediment aerated	acre-feet	6
Beneficial use (M&I water)	acre-feet	63 [3/]
Floodwater retarding	acre-feet	1045
Between high and low stage	acre-feet	308
Surface area		
Sediment pool	acres	13.1 [4/]
Beneficial use pool (M&I water)	acres	0 [4/]
Floodwater retarding pool [2/]	acres	71.8
Principal spillway design		
Rainfall volume (1-day)	inches	8.38
Rainfall volume (10-day)	inches	12.3
Runoff volume (10-day)	inches	4.23
Capacity of low stage (max.)	ft^3/sec	40
Capacity of high stage (max.)	ft^3/sec	203
Dimensions of conduit	inches	36
Type of conduit		circular RCP

Table 3 – Structural Data—Dams with Planned Storage Capacity (cont.)		
Attribute	**Unit**	**Structure Data**
Frequency of operation-auxiliary spillway	percent chance	1.6
Auxiliary spillway hydrograph		
Rainfall volume	inches	9.89
Runoff volume	inches	5.21
Storm duration	hours	6
Velocity of flow (V_e)	feet/sec.	10.1
Max. reservoir water surface elev.	feet	702.47
Freeboard hydrograph		
Rainfall volume	inches	23.0
Runoff volume	inches	17.20
Storm duration	hours	6
Max. reservoir water surface elev.	feet	707.44
Capacity equivalents		
Sediment volume	inches	0.17
Floodwater retarding volume	inches	3.41
Beneficial volume (M&I water)	inches	0.20[3/]

[1/] All elevations are recorded in North American Vertical Datum 1988 (NAVD88).
[2/] Crest of auxiliary spillway. Based on 2015 sediment survey.
[3/] Available sediment storage is 115 ac-ft as of 2015. Required sediment storage for 56 years is 52 ac-ft. Available water supply will be 63 ac-ft at that time.
[4/] Water supply is taken from total available sediment storage.

Table 4 - Average Annual National Economic Development (NED) Costs
Cherrystone Creek Dam No. 2A, Virginia
(Dollars[5])

	Average Annual Equivalent Cost	Average Annual Equivalent O&M Costs	Total Average Annual Equivalent Cost
Rehabilitation of Cherrystone Creek Dam No. 2A	$283,370	$5,330	$288,700
Totals:	$283,370	$5,330	$288,700

Price base: February 2019 Prepared: February 2019

[5] The average annual equivalents are based on a 2.875% discount rate and a 52-year period of analysis (2 years for project design/installation and 50 years of expected useful life).

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits

Cherrystone Creek Dam No. 2A, Virginia
(Dollars)

Flood Damage Category	Estimated Average Annual Equivalent Damages		Damage Reduction Benefits
	Without Federal Project	With Federal Project	Average Annual Equivalents
Crops and Pasture	$141,770	$141,770	$0
Other Agricultural	$1,460	$1,460	$0
Roads and Bridges	$36,220	$36,220	$0
Developed (structures and content damages)	$55,790	$55,790	$0
Erosion – floodplain scour	$880	$880	$0
Sediment – overbank deposition	$17,820	$17,820	$0
Other (miscellaneous indirect damages)	$34,760	$34,760	$0
Totals:	$288,700	$288,700	$0

Note: Updated original Table 5 project benefits;
Price base: February 2019 Prepared: February 2019

Table 6 - Comparison of National Economic Development (NED) Benefits and Costs

Cherrystone Creek Dam No. 2A, Virginia
(Dollars)

Evaluation Unit	Average Annual Equivalent Benefits[6]		Costs	Net Change	Benefit/ Cost Ratios
	Damage Reduction Benefits	Total Average Annual Equivalent Benefits[7]	Average Annual Equivalent Costs	Net Average Annual Equivalent Benefits	
Cherrystone Creek Dam No. 2A	$288,700	$288,700	$288,700	$0	1.0 to 1.0
Totals:	$288,700	$288,700	$288,700	$0	1.0 to 1.0

Price base: February 2019 Prepared: February 2019

[6] The average annual equivalents are based on a 2.875% discount rate and a 52-year period of analysis (2 years for project design/installation and 50 years of expected useful life).

[7] The costs and benefits of the Future With Project Plan are the same as those for the Future Without Project Plan. To maintain consistency with the display in Table 4, the costs associated with the No Action Alternative are tracked as a benefit of the Preferred Alternative.

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REPORT PREPARERS

The Cherrystone Creek Watershed Supplemental Plan and Environmental Assessment was prepared primarily by NRCS staff located in Richmond, Virginia; Verona, Virginia; and Morgantown, West Virginia; and staff from Schnabel Engineering. The document was reviewed and concurred in by state staff specialists having responsibility for engineering, resource conservation, soils, agronomy, biology, economics, geology, and contract administration. The in-house review was followed by a review by the NRCS National Water Management Center, and then an interagency and public review.

The table identifies and lists the experience and qualifications of those individuals who were directly responsible for providing significant input to the preparation of the Supplemental Plan-EA. Appreciation is extended to many other individuals, agencies and organizations for their input, assistance and consultation, without which this document would not have been possible.

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
R. Wade Biddix	Watershed Program Specialist (ACES) - 4	M.S. Public Administration B.S. Agriculture	Assistant State Conservationist for Water Resources - 13 yrs. Supervisory District Cons. – 1.5 yrs. Planning Coordinator – 10.5 yrs. Area Resource Conservationist – 2 yrs. District Conservationist – 4 yrs. Soil Conservationist – 4 yrs.	
Rebecca M. Evans	Civil Engineering Technician - 8	B.S. Natural Resources Recreation	Civil Engineering Technician – 2.5 yrs. Conservation Specialist – 2 yrs.	
David L. Faulkner	Natural Resource Economist – 29	M.S. Ag. Economics B.S. Ag. Education	Ag. Economist (SCS) - 2.5 yrs. Ag. Economist (U.S.A.I.D.) - 4.5 yrs. Ag. Teacher (Peace Corps) – 2 yrs.	
Fred M. Garst	GIS Specialist - 25	B.S. Geology	GIS/Soil Scientist - 25 yrs. Soil Conservation Technician - 7 yrs. Geologist (Private) – 4 yrs.	
Jeffray Jones	State Biologist - 5	B.S. Natural Resources Management	Ecologist - 24 yrs.	
Alica J. Ketchem	Environmental Engineer - 25	B.S. Civil Engineering M.S. Agricultural Eng.	Civil Engineer – 10 yrs.	P.E. (VA)
Kim Kroeger	Geologist – 29	B.S. Soil Science B.S. Resource Management	Geologist Trainee (SCS) – 1.6 years Soil Scientist (SCS) – 0.3 years County Soil Scientist – 2 years	
Mathew J. Lyons	State Conservation Engineer- 16	B.S. Civil Engineering	Civil Engineer – 12 yrs.	P.E. (VA)
Jeffrey D. McClure	Geologist – 12.5	B.A. Geology B.A. Biology B.S. Geology	NRCS Geologist – 14 yrs. Geologist (WV Dept. of Environmental Protection) - 10 yrs. Geologist (Private) – 8.5 yrs.	CPG in VA and PA
Dana Perkins	Environmental Specialist – 3	B.S. Biology	Environ. Program Specialist (FAA) – 9 yrs. Ecologist (U.S. Army) – 2 yrs. Environ. Scientist (Consultant) – 10 yrs.	
Tim Ridley	Dam Safety Engineer – 2	B.S. Civil Engineering	NRCS Hydraulic Engineer – 29 yrs. Consulting Engineer – 8 yrs.	P.E. (PA and WV) PS (WV)
Joseph M. Seybert	Civil Engineer – 13	B.S. Civil Engineering	Civil Engineer – 17 yrs.	P.E. (WV)
Thomas Wachtel	Geotehnical Engineer - 1	B.S. Civil Engineering M.S. Civil Engineering Ph.D. Civil Engineering		

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
A&E Consultants				
Jonathan Pittman, Schnabel Engineering	Civil Engineer / Associate – 8	B.S. Civil Engineering	Civil / Geotechnical Engineer – 16 yrs.	P.E. in VA, NC and KY
Charles Johnson, Schnabel Engineering	Senior Structural Engineer – 2	B.S. Civil Engineering M.S. Civil Engineering	Civil / Structural Engineer – 9 yrs.	P.E. in CA, FL, NC and SC S.E. in CA, HI and IL
John Gagnon, Schnabel Engineering	Senior Staff Geologist – 3	B.S. Geology M.S. Geology	Engineering Geologist – 5 yrs.	P.G. in VA and NC

DISTRIBUTION LIST

Comments were requested on the Draft Supplemental Plan – EA from the following agencies and organizations.

	Response Received on Draft Supplemental Plan-EA
Federal Agencies	
Environmental Protection Agency Region III, Philadelphia	Yes
U.S. Army Corps of Engineers Lynchburg Field Office	No
U.S. Department of the Interior Fish and Wildlife Service Gloucester, Virginia Office	No
Federal Emergency Management Agency Philadelphia	No
U.S. Department of Agriculture	
Farm Service Agency	No
Rural Development	No
Virginia State Agencies	
Virginia Department of Environmental Quality Office of Environmental Impact Review (State Clearinghouse)	Yes
Virginia Department of Conservation and Recreation	Yes
Virginia Marine Resources Commission	No
Virginia Department of Game and Inland Fisheries	No
Virginia Department of Historic Resources	No
Virginia Department of Forestry	No
Virginia Department of Transportation	No

	Response Received on Draft Supplemental Plan-EA
Other	
Virginia Association of Soil and Water Conservation Districts	No
Pittsylvania Soil and Water Conservation District	No
Town of Chatham	No
West Piedmont Planning District Commission	No
Pittsylvania County Board of Supervisors	No
Pittsylvania County Planning Department	No
Pittsylvania County Parks and Recreation Department	No
Pittsylvania County Service Authority	No

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APPENDIX A

LETTERS OF COMMENT AND NRCS RESPONSES TO COMMENTS RECEIVED ON DRAFT SUPPLEMENTAL PLAN – EA

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 1111 East Main Street, Suite 1400, Richmond, VA 23219
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Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
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April 12, 2019

Mr. Wade Biddix
Watershed Program Specialist
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229

RE: U.S. Department of Agriculture Natural Resources Conservation Service Environmental Assessment: Rehabilitation of Floodwater Retarding Structure No. 2A (Roaring Fork Lake) of the Cherrystone Creek Watershed in Pittsylvania County (DEQ 19-027F).

Dear Mr. Biddix:

The Commonwealth of Virginia has completed its review of the draft environmental assessment (EA) for the above-referenced project. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents prepared pursuant to the National Environmental Policy Act (NEPA) and responding to appropriate federal officials on behalf of the Commonwealth. The following agencies joined in this review:

Department of Environmental Quality
Department of Conservation and Recreation
Department of Health

The Department of Game and Inland Fisheries, Department of Historic Resources, Virginia Marine Resources Commission, West Piedmont Planning District Commission, Pittsylvania County and Town of Chatham also were invited to comment.

PROJECT DESCRIPTION

The Natural Resources Conservation Service (NRCS) is proposing to improve Cherrystone Creek Dam No. 2A at Roaring Fork Lake in Pittsylvania County. The dam does not currently meet state and federal design and safety standards. The proposed project would correct identified deficiencies so the standards would be met. The

preferred plan is to rehabilitate the dam and maintain the existing level of downstream flood protection and use for water supply. The proposed project includes the replacement of the existing auxiliary spillway with a 200-foot wide roller-compacted concrete (RCC) chute over the top of the dam. Replacement of the riser and outlet structure would be required. New toe drains would be installed in the embankment. There will be no change in the current levels of flood protection downstream as a result of project activity. Although the lake will be drained during construction, there will be no permanent change in the water resource operations or recreational uses of the lake once construction is complete.

NEPA CONCLUSION

Provided activities are performed in accordance with the recommendations which follow in the Environmental Impacts and Mitigation section of this report, the proposal described in the EA is unlikely to have significant effects on ambient air quality, water quality, wetlands, wildlife resources, forest resources, historic resources, and solid and hazardous wastes. It is unlikely to adversely affect species of animals, plants or insects listed by state agencies as rare, threatened, or endangered.

ENVIRONMENTAL IMPACTS AND MITIGATION

1. Wetlands and Water Quality. The EA (page 47) states that the reservoir would be temporarily drained to allow construction, which would last approximately one year. The open water wetlands and the fringe wetlands associated with the lake will be temporarily impacted during this time. There will be a temporary impact on downstream water quality due to a sediment release when the water is drawn down prior to construction (EA, page 46). In addition, the EA (page 50) states that there would be a temporary loss of the potential water supply storage from Roaring Fork Lake. The base flow would be conveyed around the dam to supply Cherrystone Creek.

1(a) Agency Jurisdiction. The State Water Control Board promulgates Virginia's water regulations covering a variety of permits to include the Virginia Pollutant Discharge Elimination System Permit regulating point source discharges to surface waters, Virginia Pollution Abatement Permit regulating sewage sludge, storage and land application of biosolids, industrial wastes (sludge and wastewater), municipal wastewater, and animal wastes, the Surface and Groundwater Withdrawal Permit, and the Virginia Water Protection (VWP) Permit regulating impacts to streams, wetlands, and other surface waters. The VWP Permit is a state permit which governs wetlands, surface water, and surface water withdrawals and impoundments. It also serves as §401 certification of the federal Clean Water Act §404 permits for dredge and fill activities in waters of the U.S. The VWP Permit Program is under the Office of Wetlands and Stream Protection, within the DEQ Division of Water Permitting. In addition to central office staff that review and issue VWP permits for transportation and

water withdrawal projects, the six DEQ regional offices perform permit application reviews and issue permits for the covered activities:

- Clean Water Act, §401;
- Section 404(b)(i) Guidelines Mitigation Memorandum of Agreement (2/90);
- State Water Control Law, Virginia Code section 62.1-44.15:20 *et seq.*; and
- State Water Control Regulations, 9VAC25-210-10.

1(b) Agency Findings – Wetlands and Water Supply. The DEQ Office of Water Supply states that VWP Individual Permit15-0262 was issued to the Town of Chatham effective January 29, 2016. It authorizes installation of a new surface water intake and water withdrawal from Cherrystone Creek downstream of Dam 2A. It also authorizes temporary impacts to 16.5 acres of open water at Roaring Fork Lake to draw down the lake for rehabilitation of the discharge structure. Table 18 (page 43) in the EA lists temporary impacts to 18.1 acres of open water and fringe wetlands are planned as part of the rehab. The existing wetlands description on page 47 states that there are 15.6 acres of open water and 2.5 acres of fringe/shoreline wetlands. The VWP file for 15-0262 does not appear to address any fringe wetlands or contain a Jurisdictional Determination regarding wetland acreage. It is possible that additional DEQ permitting may be necessary for the proposed fringe wetland impacts. The scope of the EA is in agreement with information in the 15-0262 file regarding project purpose.
Individual Permit 15-0262 contains special conditions regarding tiered release requirements from the Roaring Fork Lake, depending upon water level elevations in the lake. The vertical datum listed in the VWP permit file for these elevations is NGVD1929; however, the vertical datum listed in the EA for the Dam is NAVD88. During rehab and operation, the sponsors will need to reconcile these datum differences so that the operation of the revised dam structure can be in compliance with the VWP permit.

1(c) Agency Recommendations.

- Coordinate with the DEQ Office of Water Supply regarding discrepancies in proposed fringe wetland impacts and the vertical datum for the dam regarding VWP Individual Permit15-0262.
- The DEQ Office of Wetlands and Stream Protection offers the following general recommendations concerning potential surface water impacts:
  1. Prior to commencing project work, all wetlands and streams within the project corridor should be field delineated and verified by the U.S. Army Corps of Engineers (the Corps), using accepted methods and procedures.
  2. Wetland and stream impacts should be avoided and minimized to the maximum extent practicable. Where access is required across a wetland, removable mats should be used to reduce compaction and rutting. When excavation for a structure is necessary in a wetland, excess spoil should not

be disposed of in adjacent wetland areas unless authorized by a state or federal wetland permit.

3. At a minimum, compensation for impacts to State Waters, if necessary, should be in accordance with all applicable state wetland regulations and wetland permit requirements, including the compensation for permanent conversion of forested wetlands to emergent wetlands.
4. No activity may substantially disrupt the movement of aquatic life indigenous to the water body, including those species, which normally migrate through the area, unless the primary purpose of the activity is to impound water. Culverts (if needed) placed in streams must be installed to maintain low flow conditions. No activity may cause more than minimal adverse effect on navigation. Furthermore the activity must not impede the passage of normal or expected high flows and the structure or discharge must withstand expected high flows.
5. Erosion and sedimentation controls should be designed in accordance with the *Virginia Erosion and Sediment Control Handbook*, Third Edition, 1992. These controls should be placed prior to clearing and grading and maintained in good working order to minimize impacts to state waters. These controls should remain in place until the area is stabilized and should then be removed. Any exposed slopes and streambanks should be stabilized immediately upon completion of work in each permitted area. All denuded areas should be properly stabilized in accordance with the Virginia Erosion and Sediment Control Handbook, Third Edition, 1992.
6. No machinery may enter surface waters, unless authorized by a VWP permit.
7. Heavy equipment in temporarily impacted surface waters should be placed on mats, geotextile fabric, or other suitable material, to minimize soil disturbance to the maximum extent practicable. Equipment and materials should be removed immediately upon completion of work.
8. Activities should be conducted in accordance with any time-of-eear restriction(s) as recommended by the Department of Game and Inland Fisheries, the Department of Conservation and Recreation, or the Virginia Marine Resources Commission. The permittee should retain a copy of the agency correspondence concerning the time-of-year restriction(s), or the lack thereof, for the duration of the construction phase of the project.
9. All construction, construction access, and demolition activities associated with this project should be accomplished in a manner that minimizes construction materials or waste materials from entering surface waters, unless authorized by a permit. Wet, excess, or waste concrete should be prohibited from entering surface waters.
10. Herbicides used in or around any surface water should be approved for aquatic use by the United States Environmental Protection Agency (EPA) or the U.S. Fish and Wildlife Service. These herbicides should be applied

according to label directions by a licensed herbicide applicator. A non-petroleum based surfactant should be used in or around any surface waters.

11. Consider mitigating impacts to forested or converted wetlands by establishing new forested wetlands within the impacted watershed.

1(d) Requirement. If the project qualifies for a U.S. Army Corps of Engineers (Corps) Nationwide Permit that DEQ has provided 401 certification, then a VWP permit is not necessary. If the applicant does not obtain a NWP 12, then a VWP permit may be necessary. The DEQ Blue Ridge Regional Office (BRRO) will make the final permitting decisions for state waters.

2. Erosion and Sediment Control and Stormwater Management. According to the EA (page 47), there should be minimal impacts on water quality during construction with required erosion and sediment controls and stormwater management measures in place.

2(a) Agency Jurisdiction. The DEQ Office of Stormwater Management (OSM) administers the following laws and regulations governing construction activities:

- Virginia Erosion and Sediment Control Law (VESCL) (§ 62.1-44.15:51 *et seq.*) and Regulations (VESCL&R) (9VAC25-840);
- Virginia Stormwater Management Act (VSMA) (§ 62.1-44.15:24 *et seq.*);
- Virginia Stormwater Management Program (VSMP) regulation (9VAC25-870); and
- 2014 General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities (9VAC25-880).

In addition, DEQ is responsible for the VSMP General Permit for Stormwater Discharges from Construction Activities related to Municipal Separate Storm Sewer Systems (MS4s) and construction activities for the control of stormwater discharges from MS4s and land disturbing activities under the Virginia Stormwater Management Program (9VAC25-890-40).

2(b) Requirements.

2(b)(i) Erosion and Sediment Control and Stormwater Management Plans. The applicant and its authorized agents conducting regulated land-disturbing activities on private and public lands in the state must comply with VESCL&R and VSMA and VSMP, including coverage under the general permit for stormwater discharge from construction activities, and other applicable federal nonpoint source pollution mandates (e.g. Clean Water Act-Section 313). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, borrow areas, soil stockpiles, and related land-disturbing activities that result in the total land disturbance of equal to or greater than

10,000 square feet would be regulated by *VESCL&R*. Accordingly, the applicant must prepare and implement an erosion and sediment control (ESC) plan to ensure compliance with state law and regulations. The ESC plan is submitted to the DEQ regional office that serves the area where the project is located for review for compliance. The applicant is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliant sites, and other mechanisms consistent with agency policy (Reference: VESCL 62.1-44.15 *et seq.*).

2(b)(ii) General Permit for Stormwater Discharges from Construction Activities (VAR10). The operator or owner of a construction project involving land-disturbing activities equal to or greater than one acre is required to register for coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project-specific stormwater pollution prevention plan (SWPPP). The SWPPP must be prepared prior to submission of the registration statement for coverage under the general permit and the SWPPP must address water quality and quantity in accordance with the *VSMP Permit Regulations*. General information and registration forms for the General Permit are available on DEQ's website at http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/VSMPPermits/ConstructionGeneralPermit.aspx (Reference: VSMA 62.1-44.15 *et seq.*; VSMP Permit Regulations 9VAC 25-880 *et seq.*).

3. Air Quality. The EA (page 47) states that during the rehabilitation of the dam, particulate matter will increase during construction activities. A mobile concrete batch plant may generate dust. Also, open burning of vegetative debris may occur during construction.

3(a) Agency Jurisdiction. The DEQ Air Division, on behalf of the State Air Pollution Control Board, is responsible for developing regulations that implement Virginia's Air Pollution Control Law (Virginia Code §10.1-1300 *et seq.*). DEQ is charged with carrying out mandates of the state law and related regulations as well as Virginia's federal obligations under the Clean Air Act as amended in 1990. The objective is to protect and enhance public health and quality of life through control and mitigation of air pollution. The division ensures the safety and quality of air in Virginia by monitoring and analyzing air quality data, regulating sources of air pollution, and working with local, state and federal agencies to plan and implement strategies to protect Virginia's air quality. The appropriate DEQ regional office is directly responsible for the issuance of necessary permits to construct and operate all stationary sources in the region as well as monitoring emissions from these sources for compliance. As a part of this mandate, environmental impact reviews (EIRs) of projects to be undertaken in the state are also reviewed. In the case of certain projects, additional evaluation and demonstration must be made under the general conformity provisions of state and federal law.

The Air Division regulates emissions of air pollutants from industries and facilities and implements programs designed to ensure that Virginia meets national air quality standards. The most common regulations associated with construction projects are:

- Open burning: 9VAC5-130 *et seq.*
- Fugitive dust control: 9VAC5-50-60 *et seq.*
- Permits for fuel-burning equipment: 9VAC5-80-1100 *et seq.*

3(b) Ozone Attainment Area. According to the DEQ Air Division, Pittsylvania County is in an ozone attainment area.

3(c) Requirements.

3(c)(i) Fugitive Dust. During land-disturbing activities, fugitive dust must be kept to a minimum by using control methods outlined in 9VAC5-50-60 *et seq.* of the regulations for the Control and Abatement of Air Pollution. These precautions include, but are not limited to, the following:

- Use, where possible, of water or suitable chemicals for dust control during the proposed demolition and construction operations and from material stockpiles;
- Installation and use of hoods, fans and fabric filters to enclose and vent the handling of dusty materials;
- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

3(c)(ii) Open Burning. If project activities include the burning of vegetative debris or construction material, this activity must meet the requirements under 9VAC5-130 *et seq.* of the regulations for open burning, and it may require a permit. The regulations provide for, but do not require, the local adoption of a model ordinance concerning open burning. Contact officials with the locality to determine what local requirements, if any, exist. Any open burning of vegetative debris must be performed in accordance with the open-burning regulation (http://www.deq.virginia.gov/Programs/Air/AirQualityPlans/OpenBurning.aspx) and coordinated with the local fire official to ensure that all local ordinances are met.

3(c)(iii) Fuel Burning Equipment. The installation of fuel burning equipment (e.g. boilers and generators), may require permitting from DEQ prior to beginning construction of the facility (9VAC5-80, Article 6, Permits for New and Modified Sources). The applicant should contact DEQ for guidance on whether this provision applies.

4. Solid and Hazardous Wastes. The EA does not address solid or hazardous waste management.

4(a) Agency Jurisdiction. On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization is responsible for carrying out the mandates of the Virginia Waste Management Act (Virginia Code §10.1-1400 *et seq.*), as well as meeting Virginia's federal obligations under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response Compensation Liability Act (CERCLA), commonly known as Superfund. The DEQ Division of Land Protection and Revitalization also administers those laws and regulations on behalf of the State Water Control Board governing Petroleum Storage Tanks (Virginia Code §62.1-44.34:8 *et seq.*), including Aboveground Storage Tanks (9VAC25-91 *et seq.*) and Underground Storage Tanks (9VAC25-580 *et seq.* and 9VAC25-580-370 *et seq.*), also known as Virginia Tank Regulations, and § 62.1-44.34:14 *et seq.* which covers oil spills. Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 *et seq.*
- Virginia Solid Waste Management Regulations, 9VAC20-81
  - (9VAC20-81-620 applies to asbestos-containing materials)
- Virginia Hazardous Waste Management Regulations, 9VAC20-60
  - (9VAC20-60-261 applies to lead-based paints)
- Virginia Regulations for the Transportation of Hazardous Materials, 9VAC20-110.

Federal:

- Resource Conservation and Recovery Act (RCRA), 42 U.S. Code sections 6901 *et seq.*
- U.S. Department of Transportation Rules for Transportation of Hazardous Materials, 49 Code of Federal Regulations, Part 107
- Applicable rules contained in Title 40, Code of Federal Regulations.

4(b) Agency Findings. DEQ Division of Land Protection and Revitalization (DLPR) staff conducted a search (1,000-foot radius) of the project area of solid and hazardous waste databases (including petroleum releases) to identify waste sites in close proximity to the project area. DLPR search did not identify any waste sites within the project area which might impact the project. Additionally, no waste sites of possible concern were located within the zip code of the project area.

4(c) Agency Recommendations. In general, DEQ encourages all projects and facilities to implement pollution prevention principles, including:

- the reduction, reuse and recycling of all solid wastes generated; and
- the minimization and proper handling of generated hazardous wastes.

4(d) Requirements.

- Any soil/sediment that is suspected of contamination or wastes that are generated during future activities must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations.
- All structures being demolished or removed should be checked for asbestos-containing materials (ACM) and lead-based paint (LBP) prior to demolition. If ACM and LBP are found, in addition to the federal waste-related regulations mentioned above, state regulations 9VAC20-81-640 for ACM and 9VAC20-60-261 for LBP must be followed.

5. Natural Heritage Resources. The EA (page 43) indicates that there would be a temporary impact to fish and wildlife habitat from draining the lake during construction.

5(a) Agency Jurisdiction.

5(a)(i) The Virginia Department of Conservation and Recreation's (DCR) Division of Natural Heritage (DNH): DNH's mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act (Virginia Code §10.1-209 through 217), authorized DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and to protect and ecologically manage the natural heritage resources of Virginia (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

5(a)(ii) The Virginia Department of Agriculture and Consumer Services (VDACS): The Endangered Plant and Insect Species Act of 1979 (Virginia Code Chapter 39 §3.1-1020 through 1030) authorizes VDACS to conserve, protect and manage endangered and threatened species of plants and insects. Under a Memorandum of Agreement established between VDACS and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species.

5(b) Agency Findings – Natural Heritage Resources. The Biotics Data System historically documents the presence of natural heritage resources within two miles of the project area. However, due to the scope of the activity and the distance to the resources, DCR DNH does not anticipate that this project would adversely impact these natural heritage resources.

5(c) Agency Findings – State Natural Area Preserves. DCR state that there are no State Natural Area Preserves under its jurisdiction in the project vicinity.

5(d) Agency Findings – Endangered Plant and Insect Species. DCR states that the current activity will not affect any documented state-listed plants or insects.

5(e) Agency Recommendations. Contact the DCR DNH and resubmit project information if the scope of the project changes and/or six months has passed before it is utilized.

6. Floodplain Management. The EA (pages 13 and 14) indicates that the floodplain area below the dam has been analyzed.

6(a) Agency Jurisdiction. DCR is the lead coordinating agency for the Commonwealth's floodplain management program and the National Flood Insurance Program (Executive Memorandum 2-97). Pursuant to §10.1-603 of the Virginia Code and in accordance with 44 CFR section 60.12 of the National Flood Insurance Program Regulations for Floodplain Management and Flood Hazard Identification, all construction or land-disturbing activities initiated by an agency of the Commonwealth, or by its contractor, in floodplains shall be submitted to the locality and comply with the locally adopted floodplain management ordinance.

6(b) Agency Findings. DCR states that this project could require a permit from the DCR Division of Flood Plain Management. The project is within a Special Flood Hazard Area on the community's flood insurance rate maps. The project area is located in an A Zone without a defined base flood elevation. Because this is a federal project, it must comply with Executive Order 11988, by reducing the risk of flood loss, minimizing the impact of floods on human safety, health, and welfare, and restoring and preserving the natural and beneficial values served by floodplains.

6(c) Requirements.

- The proposed project must comply with the town's floodplain ordinance, including being permitted by the town as necessary.
- According to 44 CFR 60.3, a participating community in the National Flood Insurance Program (NFIP) must receive information on any project in the community's mapped floodplain, bridge, dam removal, or stream restoration to evaluate the project for its effect on the floodplain.
- If it is determined by an appropriate study that there is a change in the extent of the floodplain (the edges) or the elevation of the 1% chance flood, then a letter of map revision (LOMR) should be submitted to FEMA by the 'developer' so the floodplain map can be updated.
- Local governments have the authority and responsibility to properly manage the mapped floodplain within the community, including the submittal to FEMA new technical data on the floodplain within six months of receipt so the maps may be updated for accuracy.

- NRCS and its cooperating sponsors are encouraged to lessen impacts on floodplains and must meet EO 11988 requirements by complying with the local floodplain ordinance for each community effected by the project.

7. Historic and Archaeological Resources. The EA (page 22) states that database search results did not identify any recorded archaeological or architectural historic resources within the project area.

7(a) Agency Jurisdiction. The Virginia Department of Historic Resources (DHR) conducts reviews of both federal and state projects to determine their effect on historic properties. Under the federal process, DHR is the State Historic Preservation Office, and ensures that federal undertakings – including licenses, permits, or funding – comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation at 36 CFR Part 800. Section 106 requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. For state projects or activities on state lands, DHR is afforded an opportunity to review and comment on (1) the demolition of state property; (2) major state projects requiring an EIR; (3) archaeological investigations on state-controlled land; (4) projects that involve a landmark listed in the Virginia Landmarks Register; (5) the sale or lease of surplus state property; (6) exploration and recovery of underwater historic properties; and (7) excavation or removal of archaeological or historic features from caves. See DHR's website for more information about applicable state and federal laws and how to submit an application for review: http://www.dhr.virginia.gov/StateStewardship/Index.htm.

7(b) Requirement. NRCS should consult directly with DHR, as necessary, pursuant to Section 106 of the National Historic Preservation Act (as amended) and its implementing regulations codified at 36 CFR Part 800, which require federal agencies to consider the effects of their undertakings on historic properties.

8. Public Water Sources. The EA (page 1) states that the lake provides a supplemental water supply for the Town of Chatham and parts of the county.

8(a) Agency Jurisdiction. The Virginia Department of Health (VDH) Office of Drinking Water (ODW) reviews projects for the potential to impact public drinking water sources (groundwater wells, springs and surface water intakes). VDH administers both federal and state laws governing waterworks operation.

8(b) Agency Findings. The VDH ODW states that the following public groundwater wells are located within a 1-mile radius of the facility (wells within a 1,000 foot radius are formatted in **bold):**

PWS ID Number	City/County	System Name	Facility Name
5143090	**PITTSYLVANIA**	**CEDARS COUNTRY CLUB**	**DRILLED WELL**
5143975	PITTSYLVANIA	VILLAGE RESTAURANT	DRILLED WELL
5143690	PITTSYLVANIA	ROBIN COURT SUBDIVISION PCSA	WELL NO.1

The following surface water intakes are located within a 5-mile radius of the project site:

PWS ID Number	System Name	Facility Name
5143114	CHATHAM_ TOWN OF	CHERRYSTONE CREEK INTAKE
5143210	GRETNA, TOWN OF	WHITETHORN CREEK (VADENS MILL)
5143210	GRETNA, TOWN OF	GEORGES CREEK

The project is within the watershed of the following public surface water sources and falls within 5 miles of the following intakes:

PWS ID Number	System Name	Facility Name
5143114	CHATHAM_ TOWN OF	CHERRYSTONE CREEK INTAKE
5143210	GRETNA, TOWN OF	WHITETHORN CREEK (VADENS MILL)

8(c) Agency Recommendations.

- Implement best management practices, including erosion and sedimentation controls as well as spill prevention controls and countermeasures, during future and-disturbing activities.
- Properly manage materials on site and during transport to prevent impacts to nearby surface waters.
- Field mark wells within a 1,000-foot radius from the project site to protect them from accidental damage during construction.

9. Pollution Prevention. DEQ advocates that principles of pollution prevention and sustainability be used in all construction projects as well as in facility operations. Effective siting, planning, and on-site Best Management Practices (BMPs) will help to ensure that environmental impacts are minimized. However, pollution prevention and sustainability techniques also include decisions related to construction materials, design, and operational procedures that will facilitate the reduction of wastes at the source.

9(a) Recommendations. We have several pollution prevention recommendations that may be helpful for future projects:

- Consider development of an effective Environmental Management System (EMS). An effective EMS will ensure that the the facility is committed to complying with environmental regulations, reducing risk, minimizing environmental impacts, setting environmental goals, and achieving improvements in its environmental performance. DEQ offers EMS development assistance and recognizes facilities with effective Environmental Management Systems through its Virginia Environmental Excellence Program (VEEP). VEEP provides recognition, annual permit fee discounts, and the possibility for alternative compliance methods.
- Consider environmental attributes when purchasing materials. For example, the extent of recycled material content, toxicity level, and amount of packaging should be considered and can be specified in purchasing contracts.
- Consider contractors' commitment to the environment when choosing contractors. Specifications regarding raw materials and construction practices can be included in contract documents and requests for proposals.
- Choose sustainable materials and practices for building construction and design.
- Integrate pollution prevention techniques into the facility maintenance and operation, to include inventory control for centralized storage of hazardous materials. Maintenance facilities should have sufficient and suitable space to allow for effective inventory control and preventive maintenance.

DEQ's Office of Pollution Prevention provides information and technical assistance relating to pollution prevention techniques and EMS. If interested, please contact DEQ (Meghann Quinn at 804-698-4021).

10. Pesticides and Herbicides. In general, when pesticides or herbicides must be used, their use should be strictly in accordance with manufacturers' recommendations. In addition, DEQ recommends that the responsible agent use the least toxic pesticides or herbicides effective in controlling the target species. For more information on pesticide or herbicide use, please contact VDACS (804-371-6560).

REGULATORY AND COORDINATION NEEDS

1. Water Quality and Wetlands. DEQ regulates surface waters, including wetlands, through implementation of the VWP Program (Virginia Code § 62.1-44.15 *et seq.*; 9VAC25-210 *et seq.*). Contact the DEQ BRRO (Jay Roberts at Jesse.Roberts@deq.virginia.gov) to determine the need for any permits prior to

commencing work that could impact wetlands. A Joint Permit Application (JPA) may be submitted to VMRC (Tony Watkinson at Tony.Watkinson@mrc.virginia.gov). Coordinate with the DEQ Office of Water Supply (Scott Kudlas at Scott.Kudlas@deq.virginia.gov) regarding discrepancies in proposed fringe wetland impacts and the vertical datum for the dam regarding VWP Individual Permit15-0262.

2. Erosion and Sediment Control and Stormwater Management. The project should be conducted in compliance with Virginia Erosion and Sediment Control Law (Virginia Code §62.1-44.15 *et seq.*) and Regulations (9VAC25-840-30 *et seq.*) and Stormwater Management Law (Virginia Code 62.1-44.15 *et seq.*) and Regulations (Regulations 9VAC 25-880 *et seq.*). Coordinate with DEQ (Hannah Zegler at Hannah.Zegler@deq .virginia.gov) to ensure compliance.

3. General Permit for Stormwater Discharges from Construction Activities (VAR10). The operator or owner of a construction activity involving land disturbance of equal to or greater than 1 acre should plan to register for coverage under the General Permit for Discharges of Stormwater from Construction Activities and develop a project specific stormwater pollution prevention plan (SWPPP). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ (Holly Sepety at 804-698-4039) (Reference: VSWML §62.1-44.15 *et seq.*).

4. Air Quality. The project may be subject to air regulations administered by DEQ. The following sections of Virginia Administrative Code are applicable:

- 9 VAC 5-50-60 *et seq.* governing fugitive dust emissions,
- 9 VAC 5-130 *et seq.* for open burning and
- 9VAC5-80-110 *et seq.* for fuel-burning equipment permit.

Coordinate with DEQ BRRO (Paul Jenkins at Paul.Jenkins@deq.virginia.gov) if the use of fuel-burning equipment is proposed.

5. Solid and Hazardous Wastes. Contact DEQ BRRO (Elizabeth Lohman at Eizabeth.Lohman@deq.virginia.gov) for additional information on waste management.

5(a) Asbestos-Containing Material. It is the responsibility of the owner or operator of a renovation or demolition activity, prior to the commencement of the renovation or demolition, to thoroughly inspect the affected part of the facility where the operation will occur for the presence of asbestos, including Category I and Category II nonfriable asbestos-containing material (as applicable). Upon classification as friable or non-friable, all asbestos-containing material shall be disposed of in accordance with the Virginia Solid Waste Management Regulations (9VAC20-81-640) and transported in accordance with the Virginia regulations governing Transportation of Hazardous Materials (9VAC20-110-10 *et seq.*). Contact the DEQ Division of Land Protection and

Revitalization (Carlos Martinez at 804-698-4575) and the Department of Labor and Industry (804-371- 2327) for additional information.

5(b) Lead-Based Paint. If applicable, this project must comply with the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) regulations and with the Virginia Lead-Based Paint Activities Rules and Regulations. For additional information regarding these requirements, contact the Department of Professional and Occupational Regulation (804-367-8500).

6. Natural Heritage Resources. Contact the DCR DNH (804-371-2708) and re-submit project information and a map for an update on this natural heritage information if the scope of the project changes and/or six months has passed before it is utilized.

7. Historic Resources. NRCS or its agents should consult directly as necessary with DHR (Roger Kirchen at Roger.Kirchen@dhr.virginia.gov, as necessary, pursuant to Section 106 of the National Historic Preservation Act (as amended) and its implementing regulations codified at 36 CFR Part 800, which require federal agencies to consider the effects of their undertakings on historic properties.

8. Public Water Supply. Contact VDH ODW (Arlene Warren at Arlene.Warren@ vdh.virginia.gov) for additional information about its comments and recommendations if necessary.

9. Local Coordination and Floodplain Requirements. The project must be permitted in compliance with Pittsylvania County's local floodplain ordinance. Coordinate with Pittsylvania County (Greg Sides at greg.sides@pittgov.org or 434-432-7974) regarding the local floodplain ordinance review. If necessary, contact DCR (Kristin Owen at Kristin.Owen@dcr.virginia.gov or 804-786-2886) for questions about its comments.

Thank you for the opportunity to comment on this draft EA. If you have questions, please do not hesitate to call me at (804) 698-4204 or Julia Wellman at (804) 698-4326.

Sincerely,

Bettina Rayfield, Manager
Environmental Impact Review and Long Range Priorities Program

Enclosures

ec: Amy Ewing, DGIF
Robbie Rhur, DCR
Roger Kirchen, DHR
Arlene Warren, VDH
Anthony Watkinson, VMRC
David Smitherman, Pittsylvania County
William Pace, Town of Chatham
David Hoback, West Piedmont PDC

USDA

United States Department of Agriculture

May 20, 2019

Ms. Bettina Rayfield, Program Manager
Environmental Impact Review and Long-Range Priorities Program
Commonwealth of Virginia
Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Re: Draft Supplemental Watershed Plan-Environmental Assessment (EA) for the Rehabilitation of Cherrystone Creek Watershed Dam No. 2A (Roaring Fork Lake), Pittsylvania County, Virginia

Dear Ms. Rayfield:

Thank you for providing the Commonwealth's consolidated comments on the referenced project. We agree with your conclusion that the proposal is unlikely to have significant effects on ambient air quality, water quality, wetlands, wildlife resources, forest resources, historic resources, and solid and hazardous wastes. We also agree with your conclusion that it is unlikely to adversely affect species of animals, plants or insects listed by state agencies as rare, threatened, or endangered. We will work with the local project sponsors regarding the regulatory and coordination issues of this project.

Since most of the comments address issues that are required during the implementation process, they will be addressed during the design, permitting, and/or construction phases of this project. It is very helpful to have this comprehensive listing of the State's requirements in your letter and we appreciate your support of this project.

If questions or concerns arise as the project proceeds, please contact David Kriz, Assistant State Conservationist for Water Resource Operations, at david.kriz@va.usda.gov, or by phone at 804-287-1646.

Sincerely,

JOHN A. BRICKER
State Conservationist

NATURAL RESOURCES CONSERVATION SERVICE
1606 Santa Rosa Road, Suite 209 ♦ Richmond, Virginia 23229
Phone: (804) 287-1691 ♦ Fax: (855) 627-9827

From: Jason Ball <jason.ball_va@yahoo.com>
Sent: Thursday, April 4, 2019 5:56 PM
To: Biddix, Wade - NRCS, Richmond, VA <Wade.Biddix@va.usda.gov>; Kriz, David - NRCS, Richmond, VA <David.Kriz@va.usda.gov>; John.Bricker@va.usda.gov
Subject: Roaring Fork Comment

RE: Cherrystone, Roaring Fork rehab plan input

Mr. Bricker, Mr. Biddix and Other Involved Parties,

Thank you for your letter to landowners allowing public input on the draft plan for Roaring Fork Dam, and in connection Cherrystone Lake. I fully support the improvements and thank you for your help with the project. My primary comment is that Delegate Adams and Senator Ruff graciously allotted State funds in our budget to study potential cost savings, and all plans should be paused until that study is complete.

I understand that Chatham hired Dewberry last year to connect Roaring Fork as an auxiliary water supply, which is likely the only reason this lake is not being decommissioned. Even as an auxiliary supply, I must question a $163,000 annual investment over 50 years for Roaring Fork Lake. The figures in the decommissioning option are definitely inflated and should be reconsidered, as replacing the alternate water source is not necessary with Cherrystone's (1A) much larger reserve. With only 3677 acres of drainage, a 1000-year flood event with a 4.9% chance of occurrence during the 50-year lifespan would only have the potential of damaging $1.07M of property and infrastructure which is in the current breach zone. That is far less than the proposed $10.2M construction cost, so the 1:1 cost/benefit math in the proposal doesn't make sense to me. At best the relationship is between 10:1 and 5:1 depending on how frugal the Project Engineer is. There is a 95.1% chance that there is no benefit to the project. Of course, decommissioning would require an alternate plan to Cherrystone's construction plan which does not involve draining. I personally see no need to drain Cherrystone 1A, based on Mr. Biddix's comments about the existing dam face being very close to the required factor of safety. The riser can be modified without draining, and the bald eagles nesting on the western banks of 1A would not be forced to relocate.

Finally, as an engineer at a company which provides precast concrete drainage structures, I have to question if a new RCC auxiliary spillway is necessary for either dam. Foremost, I do not believe that the soil composition/structure has changed enough in 50 years to not withstand the runoff of a flow event (issue 3) and the testing should be redone and retested with another lab and contractor. Even if the spillway soil were prone to erosion and the original construction was faulty, several companies produce "Cable Concrete Erosion" controls that could be placed in the existing spillway to prevent spillway erosion for many millions less than a new spillway. This control would only need placed at the top of the spillway and below the originally proposed cut-off wall. Alternatively, the Cable Concrete control could be used below the cutoff wall in conjunction with a catch basin and inlet/outlet design at the spillway crest to protect the ridge which eliminates the risk of a breach. As a related measure, if you plan to

drain Roaring Fork Lake and upgrade the riser footing why would you install a secondary plastic toe drain instead of replacing the original metal toe drain with a precast reinforced-concrete pipe and precast toe-drain in a new endwall structure? This method would reduce construction time considerably and therefore cost, having longer lifespan than plastic which is damaged by UV where not under soil.

Thank you,
Jason Ball

USDA

United States Department of Agriculture

May 20, 2019

Mr. Jason Ball
1900 Hawkins Road
Chatham, Virginia 24531

RE: Draft Supplemental Watershed Plan- Environmental Assessment for the Rehabilitation of Cherrystone Creek Dam No. 2A (Roaring Fork Lake), Pittsylvania County, Virginia

Dear Mr. Ball:

Thank you for providing comments on the referenced project. We appreciate your interest and involvement with the planning of this dam rehabilitation project.

Regarding your specific comments, I provide responses below:

1) *"I fully support the improvements and thank you for your help with the project."* NRCS is happy to be of assistance. We responded to the Sponsor's request for federal assistance with the development of the dam rehabilitation plans for Cherrystone Creek 1 and 2A.

2) *"...Delegate Adams and Senator Ruff graciously allotted State funds in our budget to study potential cost savings, and all plans should be paused until that study is complete."* NRCS has worked closely with the Sponsors, other agencies and the public during the development of the dam rehabilitation plans for Cherrystone Creek 1 and 2A. The plans are basically finished. The planning process has identified a proposed course of action rather than a final solution. More detailed studies and analyses can be undertaken for both dams during the design phase of the two projects.

3) *The figures in the decommissioning option are definitely inflated and should be reconsidered, as replacing the alternate water source is not necessary with Cherrystone's (1A) much larger reserve... There is a 95.1% chance that there is no benefit to the project."* The project Sponsors want to have additional water to supplement the water supply in Cherrystone Lake. The Town of Chatham requested that Dam No. 2A be approved for supplemental water supply and it was approved. In furtherance of this project purpose the Town installed a water supply gate on the riser tower in 2016 which makes this water storage available when needed. This added feature of 2A also could greatly facilitate rehabilitation of Dam No. 1 without disruption to the water supply should the need arise to drain Dam No. 1 during construction. NRCS considered the replacement costs for the water supply storage in the evaluation of the decommissioning alternative given that water supply had been added as a project purpose. The recommended structural rehabilitation alternative is the alternative that achieves the project purposes at least cost. By rehabilitating the dam, we can remove the threat to loss of life and property to downstream residents from a breach of the dam.

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When the Future Without Federal Project scenario is the same as the Future With Federal Project scenario, net project benefits are zero by agency policy. The No Federal Action - Sponsor's Rehabilitation alternative is based upon written communication from the local sponsors, that they would implement rehabilitation of the dam using the NRCS design criteria, and thus would essentially be the same in scope, benefits, costs, and effects as the Future with Federal Project alternative regardless of whether or not the local sponsors have the funds in hand to support such an assertion, i.e., they have committed to get the needed funds and that is all that matters for the project to move forward.

By agency policy with such a planning context, net benefits are $0. A no net change in benefits occurs when comparing the two candidate plans to each other. In the context of dam rehabilitation planning, there is an overarching goal to avoid potential loss of life (the social benefits account which can't be monetized) and if in the absence of federal funds and a federal project the local sponsors would implement a similar project per NRCS technical requirements, then the local costs avoided are defined by policy to be credited as benefits and therefore by policy a 1:1 benefit/cost ratio is achieved, i.e., although the average annual benefits of rehabilitation are $288,700, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting benefit/cost ratio is 1:1.

Pure economic considerations are trumped by agency policy when the future with federal project and future without federal assistance are the same. Similarly, to avoid potential loss of life the social effects account can be used when a project plan has a B/C ratio of less than 1:1. The threat to human life can also be used in NRCS project planning to supersede purely economic considerations when deemed appropriate. Therefore, the benefit/cost ratio of this project plan is not an economic analysis derived estimate. It is an asserted policy for the CC2A planning situation.

1) *I personally see no need to drain Cherrystone 1A, based on Mr. Biddix's comments about the existing dam face being very close to the required factor of safety. The riser can be modified without draining, and the bald eagles nesting on the western banks of 1A would be forced to relocate."* NRCS evaluated the stability of the upstream slope with the criteria in place at the time of planning. During the design phase, the upstream slope will be checked again to see if it needs to be modified or not. The replacement of the riser footer is still required because of seismic issues. The optimum way to perform this work will be determined in the design phase and may necessitate a partial or complete drain of the lake. The bald eagle nest will certainly be considered in the development of the solution.

2) *"...I have to question if a new RCC auxiliary spillway is necessary for either dam. Foremost, I do not believe that the soil composition/structure as changed enough in 50 years to not withstand the runoff of a flow event (issue 3) and the testing should be redone and retested with another lab and contractor."* NRCS agrees that the soils and rock in the existing vegetated earth auxiliary spillway have not changed in the 50 years since the dam

was constructed. However, the technology used to evaluate the strength of the soil materials has improved. The data from the SITES model is showing that the soil materials do not have sufficient strength to resist erosion during a Probable Maximum Flood event. The velocities in that situation could exceed 30 feet per second. Vegetation is stripped away in flows with velocities greater than 6 feet per second. NRCS has used articulated concrete blocks (ACBs) with great success in the past but their use is limited to situations with velocities less than 25 feet per second. Additional investigation would be needed to determine if this product would be suitable at either dam. A more economical solution would be welcome. NRCS prefers to give a conservative estimate of the projected cost in the planning stage rather than surprise the Sponsors with a very large cost during the design phase.

6) *"As a related measure, if you plan to drain Roaring Fork Lake and upgrade the riser footing why would you install a secondary plastic toe drain instead of replacing the original metal toe drain with a precast reinforced-concrete pipe and precast toe-drain in a new endwall structure? This method would reduce construction time considerably and therefore cost, having longer lifespan than plastic which is damaged by UV where not under soil."* The toe drain must be constructed of materials having a specific number of perforations per inch. If there is a concrete product that would meet this criteria, it should certainly be considered during the design process.

Thank you for your thoughtful comments and concerns. If there is an opportunity in the future during the design process, NRCS will take this information into consideration. If questions or concerns arise as the project proceeds, please contact David Kriz, Assistant State Conservationist for Water Resource Operations, at david.kriz@usda.gov, or by phone at (804) 287-1646.

Sincerely,

JOHN A. BRICKER
State Conservationist

NATURAL RESOURCES CONSERVATION SERVICE
1606 Santa Rosa Road, Suite 209 ♦ Richmond, Virginia 23229
Phone: (804) 287-1691 ♦ Fax: (855) 627-9827

From: Okorn (Root), Barbara <Okorn.Barbara@epa.gov>
Sent: Monday, April 15, 2019 10:36 AM
To: Biddix, Wade - NRCS, Richmond, VA <Wade.Biddix@va.usda.gov>
Subject: Cherrystone Creek Watershed Dam No. 2 Environmental Assessment

Dear Mr. Biddix,

EPA has reviewed your letter dated March 15, 2019 regarding the Environmental Assessment (EA) for the rehabilitation of the Cherrystone Creek Watershed Dam No.2, known locally as Roaring Fork Lake in Pittsylvania County, Virginia. We understand that the study is being done in compliance with the National Environmental Policy Act (NEPA) and CEQ regulations implementing NEPA.

The Dam is currently classified as a high hazard potential dam by the Virginia Division of Dam Safety. The project proposes to structurally rehabilitate the Dam to meet NRCS criteria for the integrity of a vegetated earth auxiliary spillway and maintain the existing level of downstream flood protection and use for water supply. Alternatives include the No Federal Action Alternative, and two Federally Assisted Action Alternatives: the roller-compacted concrete alternative and the reinforced concrete labyrinth weir over the dam alternative. EPA understands and appreciates the purpose and need of this project. Please find minor suggestions for your consideration below.

- EPA suggests including additional information related to the aquatic impacts of temporarily draining the lake, including how abandoned fish will be managed. Furthermore, the EA explains that removal of carp and white sucker populations will reduce turbidity and improve lake water quality. EPA recommends including additional details related to controlling the population of this species once construction is complete. Specifically, how reintroduction of carp will be controlled to prevent high turbidity in the lake as is currently occurring.
- The EA states that wetland resources were visually surveyed in May 2017. Please address the reasoning for using a visual evaluation of resources as the predominant methodology to determine wetland area adjacent to the lake. We suggest field identification be conducted and the EA discuss any Section 404 of the Clean Water Act permitting that may be necessary as the project moves forward.
- The temporary impacts to the Palustrine Emergent Wetlands in the project area and intended efforts to avoid and minimize these impacts could be included in more detail in the EA. It is recommended the document address any revegetation efforts that may be made post-construction to promote bank stabilization and account for temporary impacts to the riparian area.
- Please address if specific efforts will be made to control existing invasive species and prevent future colonization of invasive species, both in the lake and on the lake shore.
- Noise impacts could be included in more detail in the EA including specific time of day restrictions that may be employed to reduce disruption of nearby communities to the Lake.
- EPA recommends that the EA include a discussion of reasonably foreseeable effects that extreme weather events may have on the proposed project and the project area, including its long term viability.

Thank you for coordinating with EPA. We appreciate the opportunity to review this project. If you have questions regarding these comments, or would like to discuss any of the comments, please feel free to contact me.

Sincerely,

Barbara Okorn
Office of Communities, Tribes, & Environmental Assessment
US EPA, Region III
1650 Arch Street (3RA10)
Philadelphia, PA 19103
215-814-3330

USDA

United States Department of Agriculture

May 20, 2019

Ms. Barbara Okorn
Office of Communities, Tribes, & Environmental Assessment
US EPA, Region III
1650 Arch Street (3RA10)
Philadelphia, Pennsylvania 19103

Re: Draft Supplemental Watershed Plan-Environmental Assessment (EA) for the Rehabilitation of Cherrystone Creek Watershed Dam No. 2A (Roaring Fork Lake), Pittsylvania County, Virginia

Dear Ms. Okorn:

Thank you for providing comments on the referenced project. We appreciate your interest and involvement with the planning of this dam rehabilitation project.

Regarding your specific comments, I provide responses below:

- *"EPA suggests including additional information related to the aquatic impacts of temporarily draining the lake, including how abandoned fish will be managed. EPA recommends including additional details related to controlling the population of this species once construction is complete. Specifically, how reintroduction of carp will be controlled to prevent high turbidity in the lake as is currently occurring."*

  NRCS consulted with the Virginia Department of Game and Inland Fisheries (VDGIF) during the site assessment. VDGIF identified the carp and sucker population as the source of the turbidity. NRCS will follow VDGIF recommendations for elimination of the undesirable fish population. The Sponsors will be responsible for encouraging the residents to restock only game species.

- *"Please address the reasoning for using a visual evaluation of resources as the predominant methodology to determine wetland area adjacent to the lake. We suggest field identification be conducted and the EA discuss any Section 404 of the Clean Water Act permitting that may be necessary as the project moves forward."*

  During planning, a desktop review of NWI mapping, a soils review, and a visual field survey were conducted to meet NRCS planning requirements. NRCS will conduct a full wetland delineation, with confirmation from the USACOE, during the permit and detailed design phase.

- *"The temporary impacts to the Palustrine Emergent Wetlands in the project area and intended efforts to avoid and minimize these impacts could be included in more detail in the EA. It is recommended the document address any revegetation efforts that may be made post-construction to promote bank stabilization and account for temporary impacts to the riparian area.*

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The wetlands associated with the lake are expected to recover naturally once the lake is refilled. The Plan-EA was revised to reflect this expectation

- *"Please address if specific efforts will be made to control existing invasive species and prevent future colonization of invasive species, both in the lake and on the lake shore."*

  No attempt will be made to control the existing invasive vegetative species outside of the limits of disturbance due to the extent and prevalence in the watershed. Construction plans and specifications will include requirements to prevent introduction of new invasive species to the site. All disturbed areas will be reseeded to grasses.

  Reintroduction of carp and suckers will be discouraged by the Sponsors.

- *"Noise impacts could be included in more detail in the EA including specific time of day restrictions that may be employed to reduce disruption of nearby communities to the Lake."*

  The Roaring Fork Lake is located in a rural area. There are only four homes located around the lake. Therefore, the project will not require any time of day restrictions for noise disruptions to nearby communities.

- *"EPA recommends that the EA include a discussion of reasonably foreseeable effects that extreme weather events may have on the proposed project and the project area, including its long-term viability."*

  The purpose of the dam rehabilitation is to prevent overtopping the dam during the Probable Maximum Flood, which is the most extreme event possible.

Thank you for your thoughtful comments and concerns. If there is an opportunity in the future during the design process, NRCS will take this information into consideration. If questions or concerns arise as the project proceeds, please contact David Kriz, Assistant State Conservationist for Water Resource Operations, at david.kriz@usda.gov, or by phone at (804) 287-1646.

Sincerely,

JOHN A. BRICKER
State Conservationist

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Matthew J. Strickler
Secretary of Natural Resources

Clyde E. Cristman
Director

Rochelle Altholz
Deputy Director of Administration and Finance

Russell W. Baxter
Deputy Director of Dam Safety & Floodplain Management and Soil & Water Conservation

Thomas L. Smith
Deputy Director of Operations

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Comments of the Department of Conservation and Recreation, May 15, 2019

RE: Draft Supplemental Watershed Plan No. 3 and Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 2A (Roaring Fork Lake) of the Cherrystone Creek Watershed, Pittsylvania County, Virginia.

Observations:

1. Since the dam is under a current Watershed Agreement, it is subject to both the requirements of Virginia Dam Safety Regulations (4VAC50-20) and Natural Resources Conservation Services (NRCS) design procedures and requirements.

2. In accordance with 4VAC50-20-320, design procedures, manuals, and criteria used by the United States Department of Agriculture, Natural Resources Conservation Service are acceptable design procedures and references.

Comment:

1. An analysis should be done to determine if the current inundation zone will be changed due to the proposed change in the outlet structure configuration. If the new spillway results in a larger, or wider, inundation zone, new maps should be developed.

Notes on concerns raised by others:

1. While seismic stability is not required per DCR dam safety, if a dam is under a current O&M agreement with NRCS, this must be considered as a part of the rehabilitation. Any of the dams that will be rehabilitated under the DCR program, that have a current O&M agreement, will have to meet this criteria as well.

2. ACB Armoring of the Spillway-The DCR district dam rehabilitation program follows the same planning process that is utilized by NRCS. We always consider non-structural solutions first, but, since the spillway does not have integrity, that is not an option and a structural solution is required. When looking at structural solutions, there are many options considered. For the dams that DCR has done the planning on, ACBs have been eliminated as an option due to the high cost and site conditions that do not facilitate installation. This was the case when used in conjunction with a cut off wall as well.

One thing that must be considered when using ACBs is the velocity in the spillway. This will dictate how thick the ACBs need to be. In addition, there is a maximum allowable velocity for even the most

robust ACB design. Many of the dams we looked at exceeded this allowable velocity, and it appears the spillway of Cherrystone 2A is significantly steeper, which will result in a higher velocity, than some of the dams we looked at.

Site access and staging must also been considered when using ACBs. They required a large tractor trailer to deliver then, and a crane to set them. While we are not familiar with this site and any constraints, this could be an issue based on the steep topography that is present.

Based on a very cursory review, and considering the site constraints, cost and velocity requirements, it does not appear that ACBs are a viable option for this dam. This was likely considered and ruled out by NRCS during the planning process, as were multiple other options that are not listed. While it is not typical to list every option that is not viable, if the Department wishes to ensure this option was considered, it is our recommendation the following comment be provided:

ACB armoring of the auxiliary spillway has been used as a successful rehabilitation option in the past on several dams in the state. Please indicate if this option was considered and why it may have been eliminated from consideration.

If further information is required please contact:
Wendy Howard-Cooper
Acting Director Division for Dam Safety and Floodplain Management
wendy.howard-cooper@dcr.virginia.gov
804-786-5099

or

Russ Baxter
Deputy Director for Soil and Water Conservation, Dam Safety and Floodplain Management
russ.baxter@dcr.virginia.gov
804-786-2291

USDA

United States Department of Agriculture

May 21, 2019

Mr. Clyde Cristman, Director
Virginia Department of Conservation and Recreation
600 East Main Street
Richmond, Virginia 23219

Re: Draft Supplemental Watershed Plan-Environmental Assessment (EA) for the Rehabilitation of Cherrystone Creek Watershed Dam No. 2A (Roaring Fork Lake), Pittsylvania County, Virginia

Dear Clyde:

Thank you for providing DCR's observations and comments on the reference Plan-EA. I appreciate your cooperation and support to work collaboratively on this worthwhile project.

The final design will meet the design procedures and requirements of the Virginia Dam Safety Regulations and the Natural Resources Conservation Service. This will include the hydraulic and seismic analyses. The effects on the downstream floodplain will be determined as a part of the final design process.

NRCS investigated the potential use of Articulated Concrete Blocks (ACBs) to address the integrity of the vegetated earth auxiliary spillway. This alternative was not developed further because the anticipated velocities in the auxiliary spillway exceeded the limits of ACB usage.

If questions or concerns arise as the project proceeds, please contact David Kriz, Assistant State Conservationist for Water Resource Operations, at david.kriz@usda.gov, or by phone at (804) 287-1646.

Sincerely,

JOHN A. BRICKER
State Conservationist

cc: Russ Baxter, DCR Assistant Director, Richmond, Virginia
Wendy Powell, Director, DCR, Division of Dam Safety and Floodplain Management, Richmond, Virginia

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1606 Santa Rosa Road, Suite 209 ♦ Richmond, Virginia 23229
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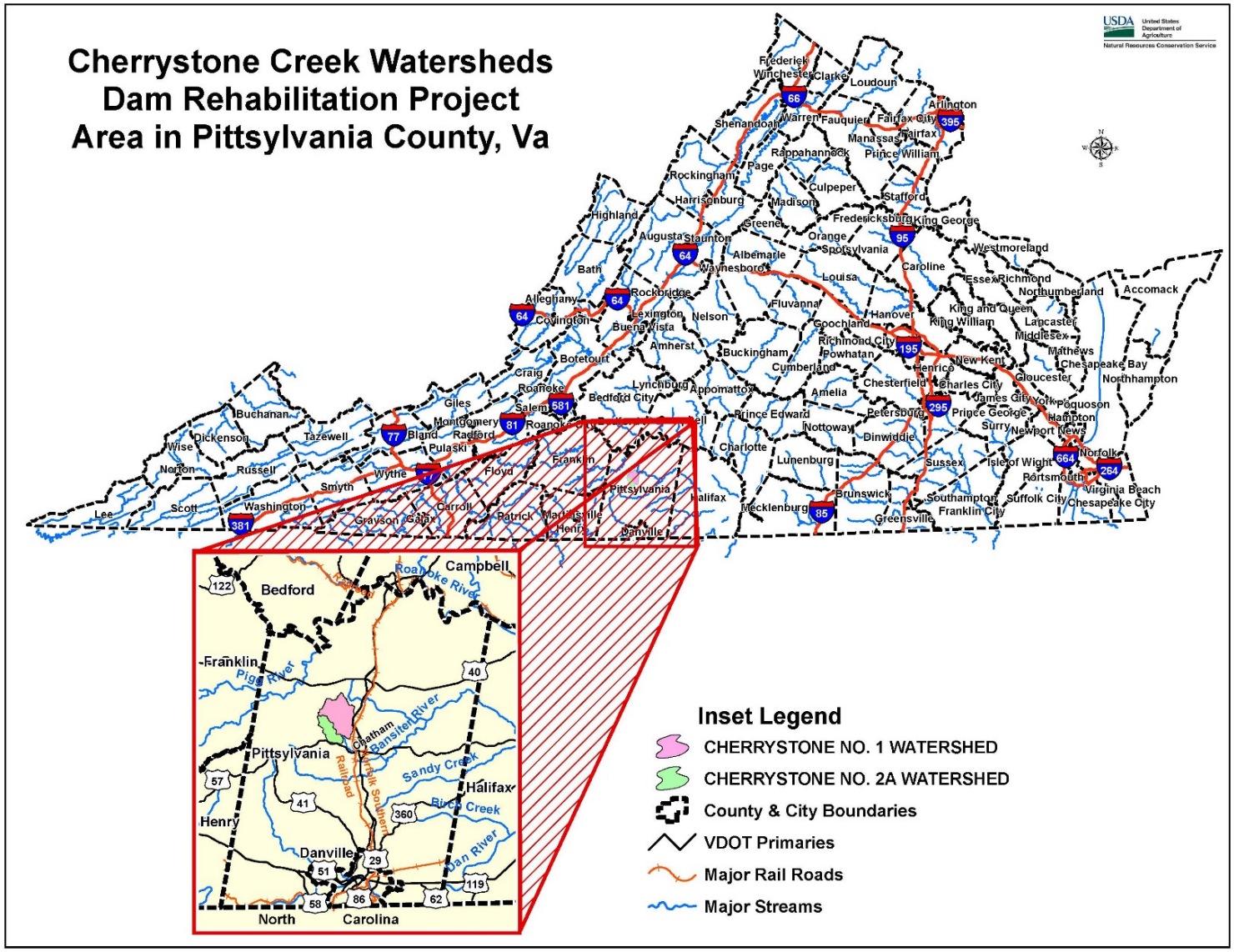
APPENDIX B

PROJECT MAP

Figure B-1. General Watershed Location Map.



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APPENDIX C

SUPPORT MAPS

Figure C-1. Roaring Fork Lake Watershed Land Use Map.

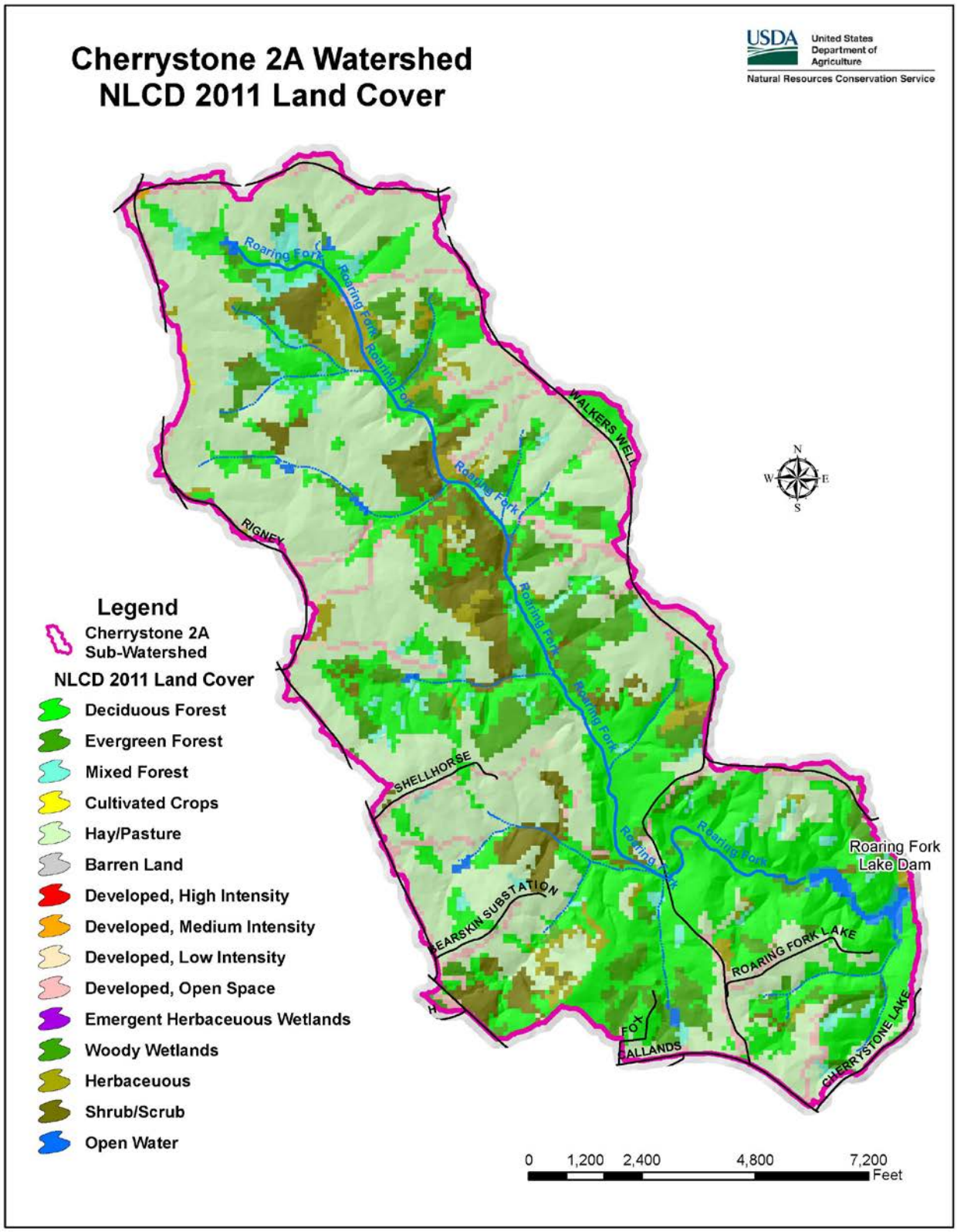


Figure C-2. Roaring Fork Lake Watershed Soils Map.

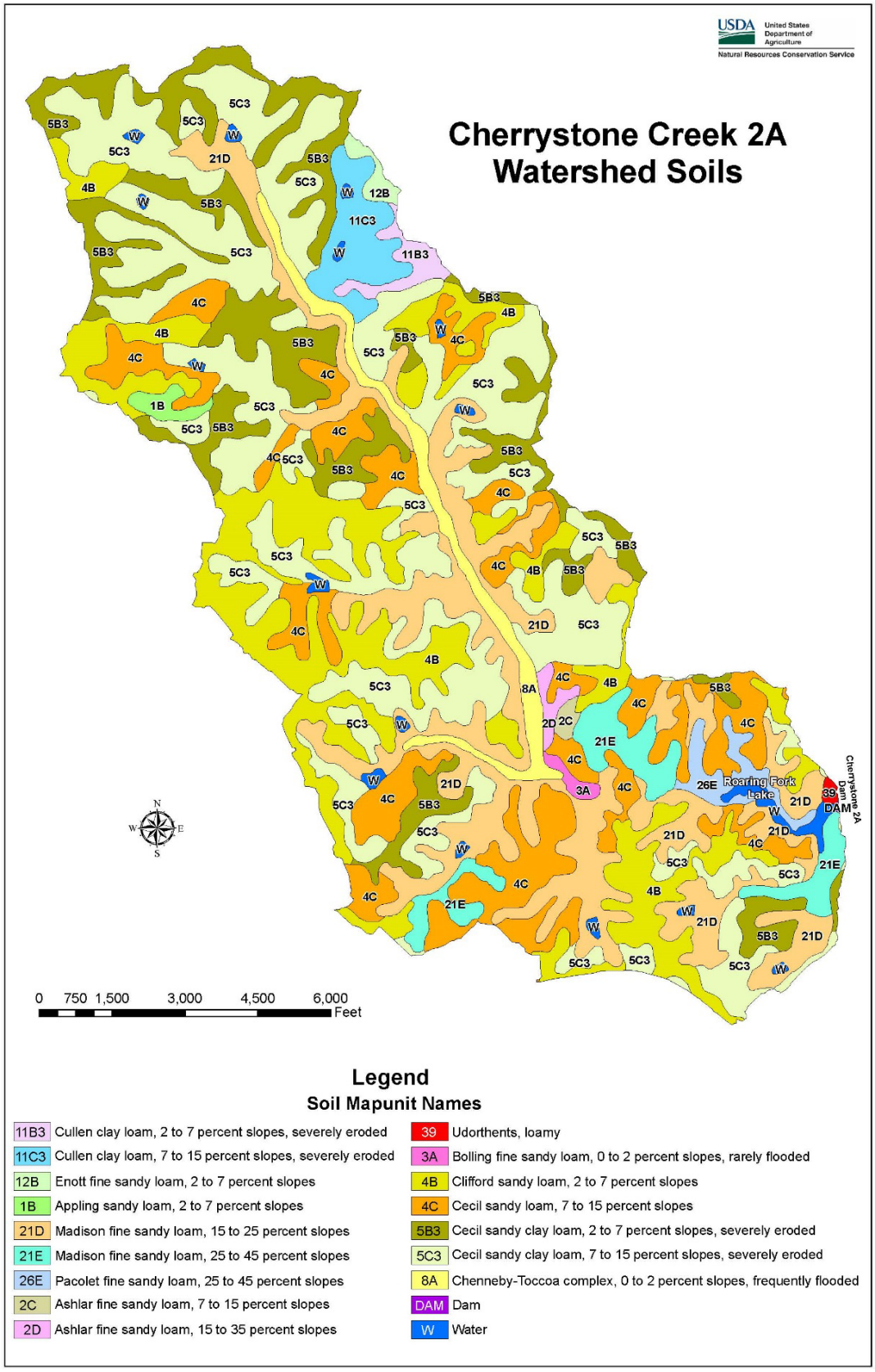


Figure C-3. Roaring Fork Lake Watershed Prime Farmland Map.

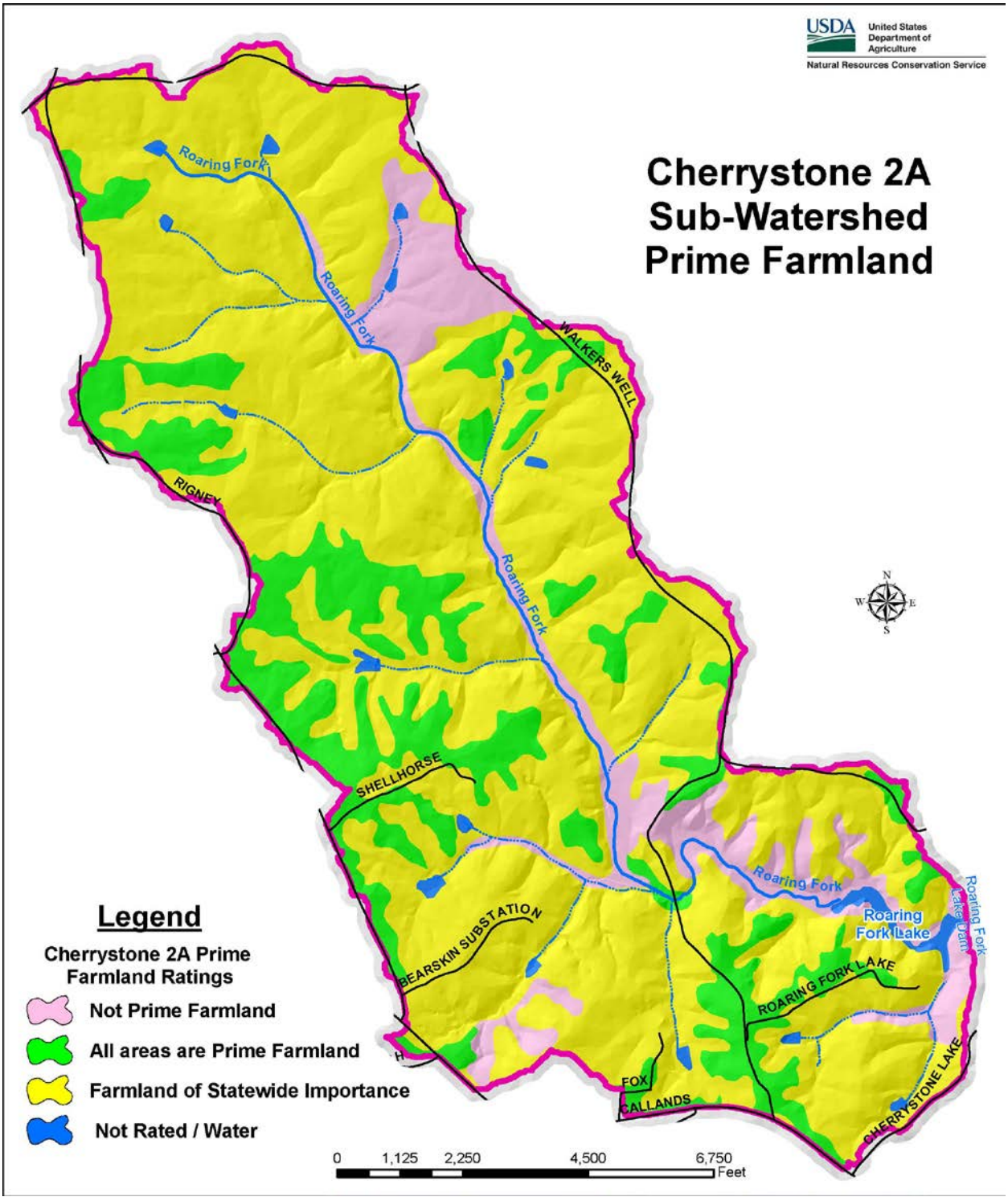


Figure C-4. Roaring Fork Lake - Prime Farmland in the Construction Area.

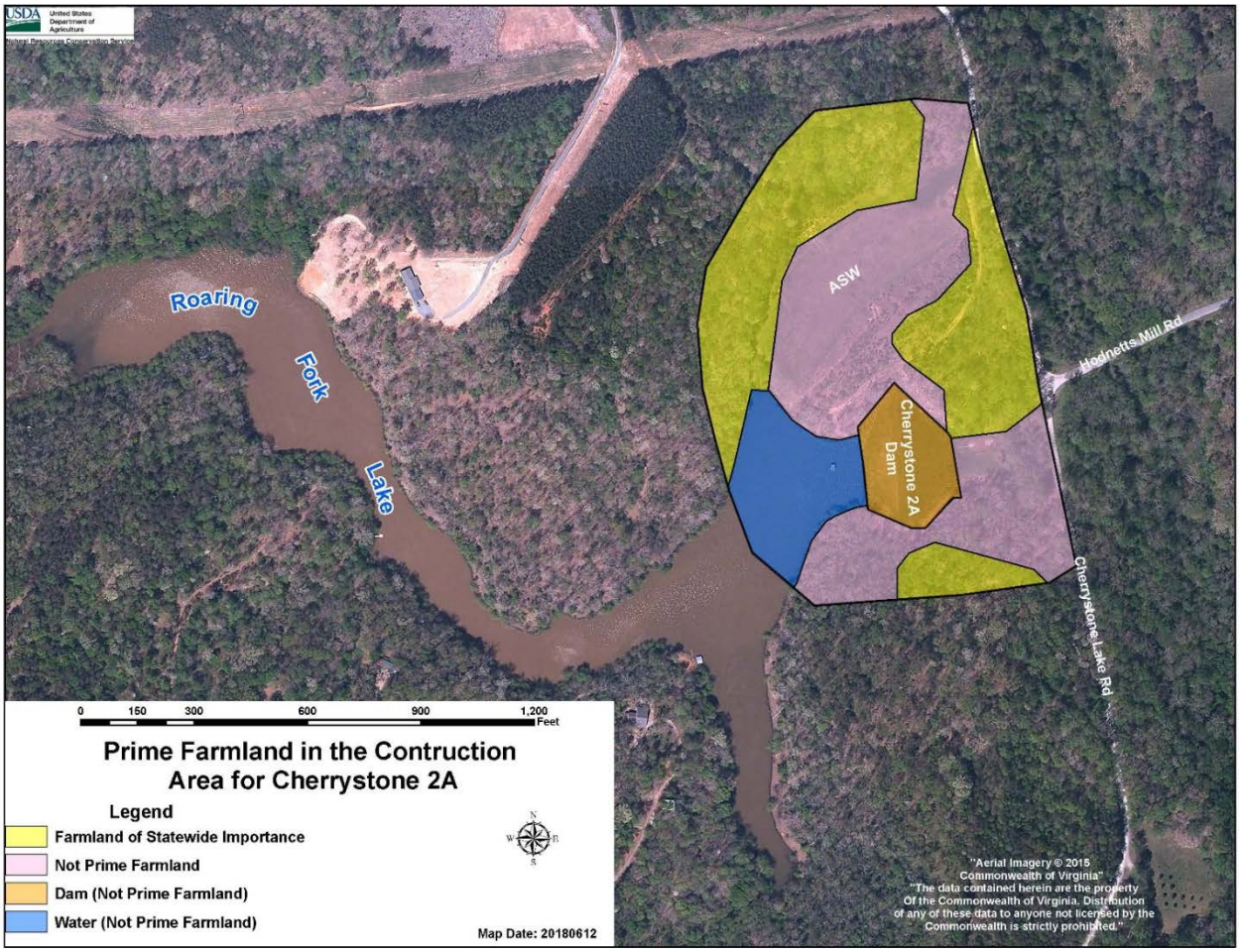


Figure C-5. Roaring Fork Lake Invasive Species Map.

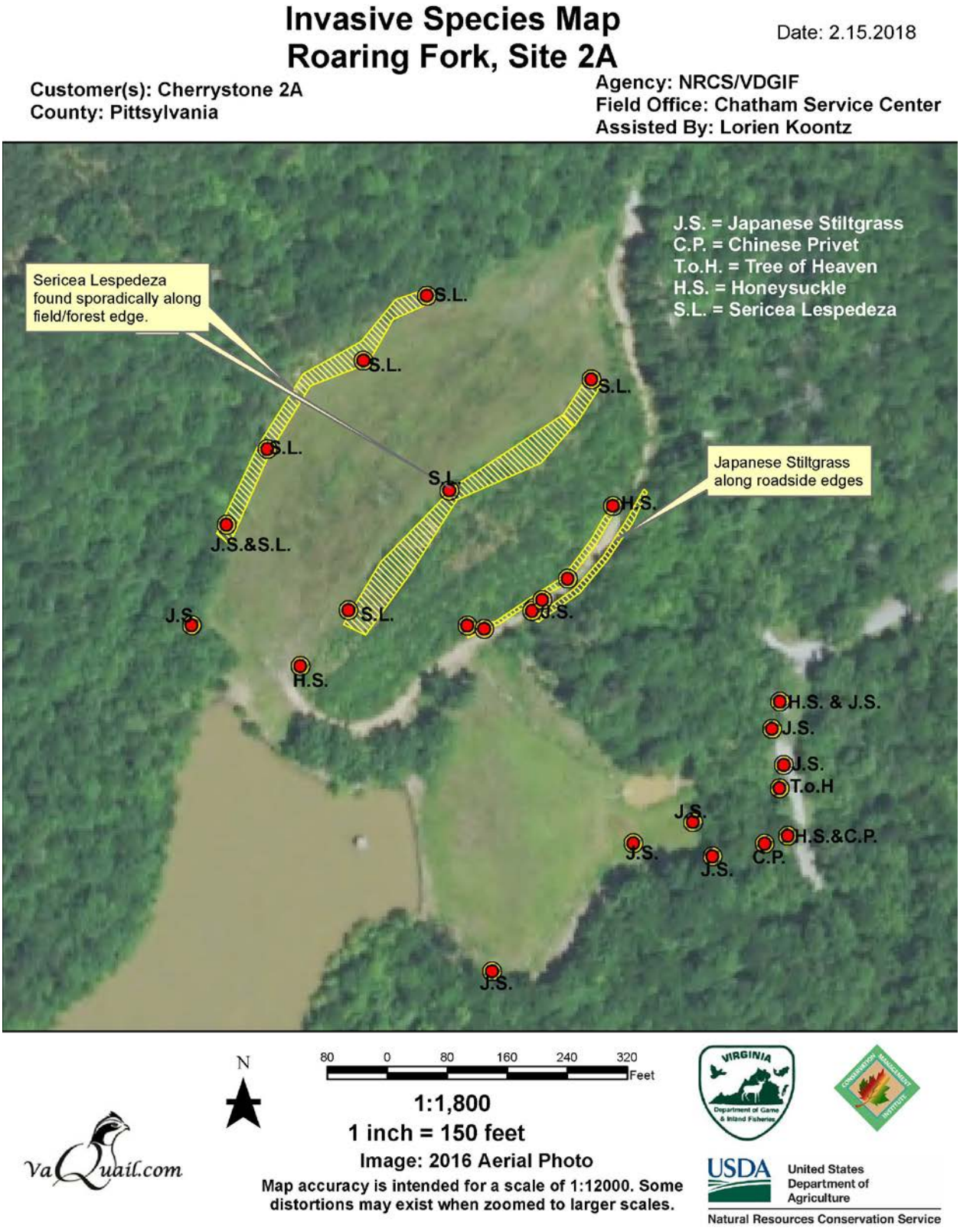


Figure C-6. Area of Potential Effect for Preferred Alternative (Aerial View).

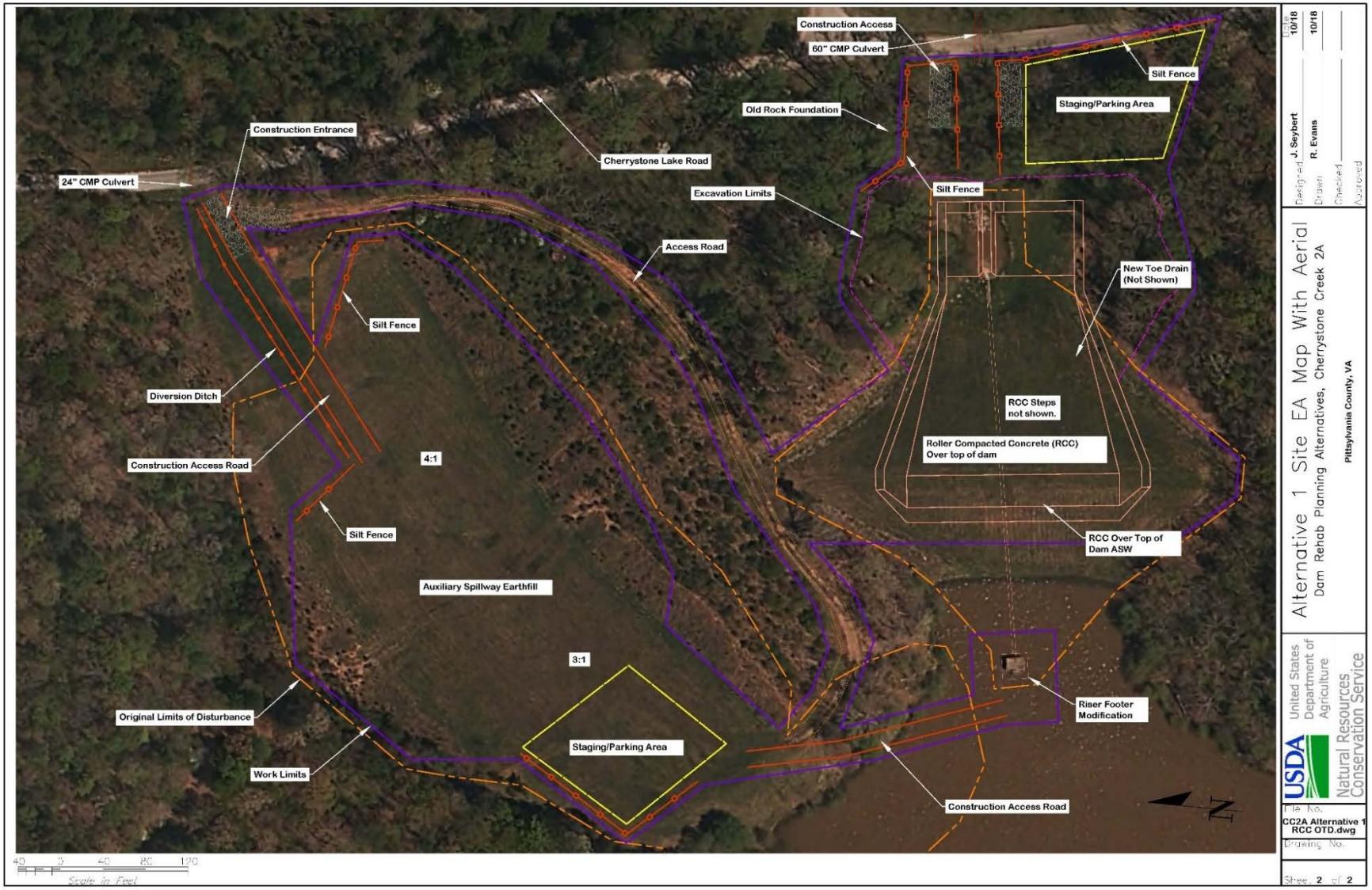


Figure C-7. Preferred Alternative - RCC Chute Spillway over top of dam.

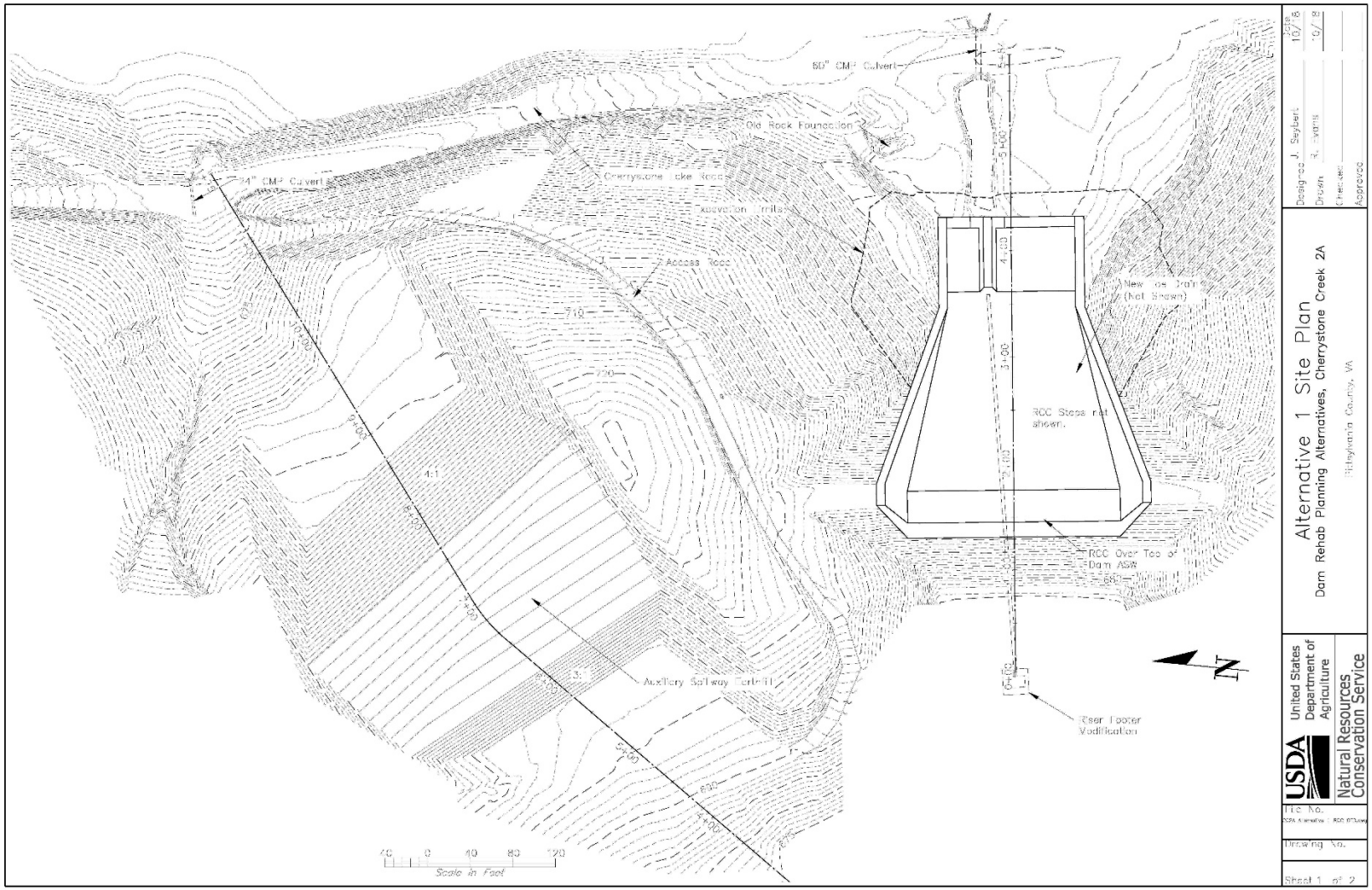


Figure C-8. Preferred Alternative - Auxiliary Spillway Profile.

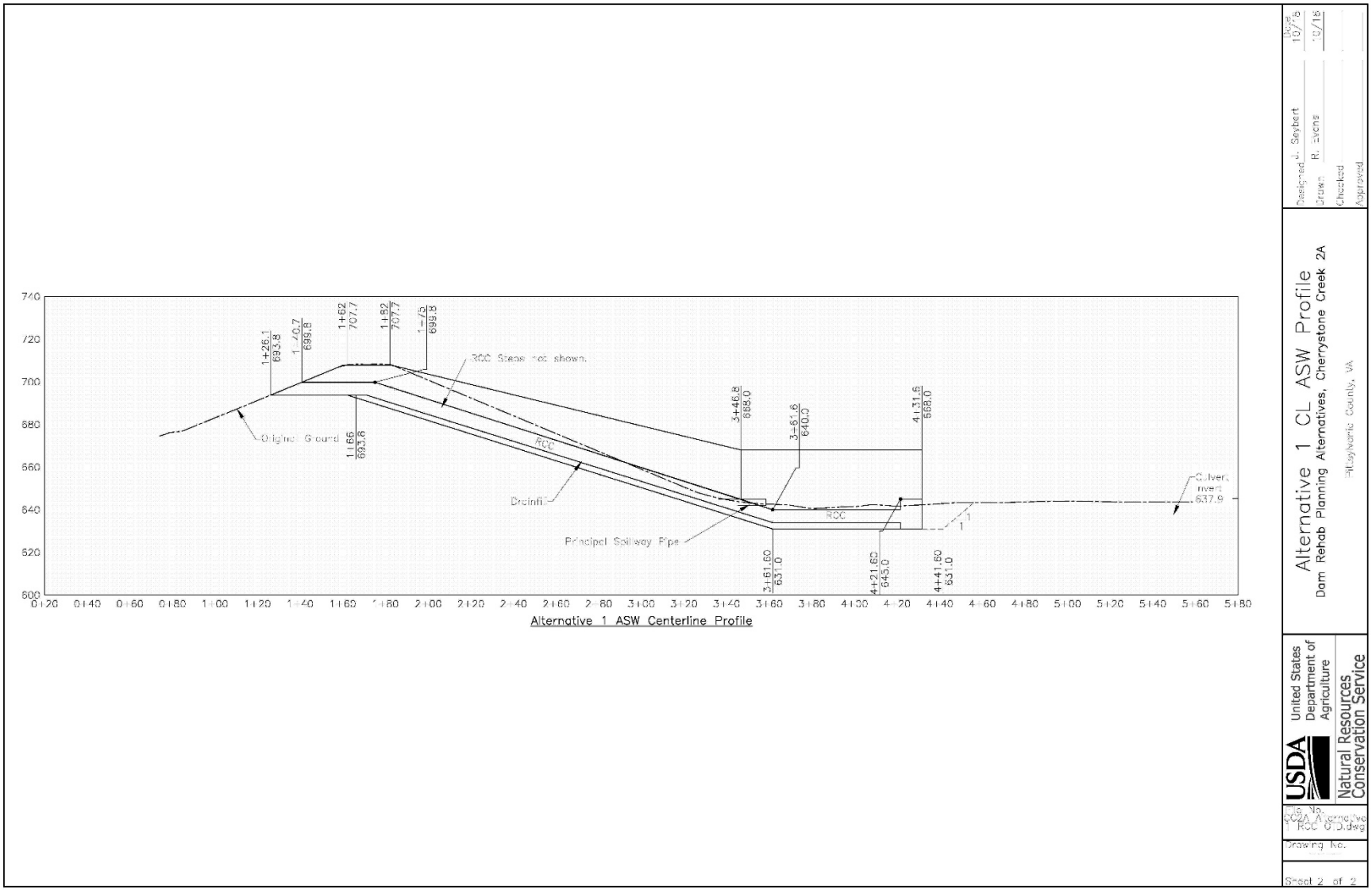


Figure C-9. Alternative 2 – Reinforced Concrete Labyrinth Weir Over the Dam.

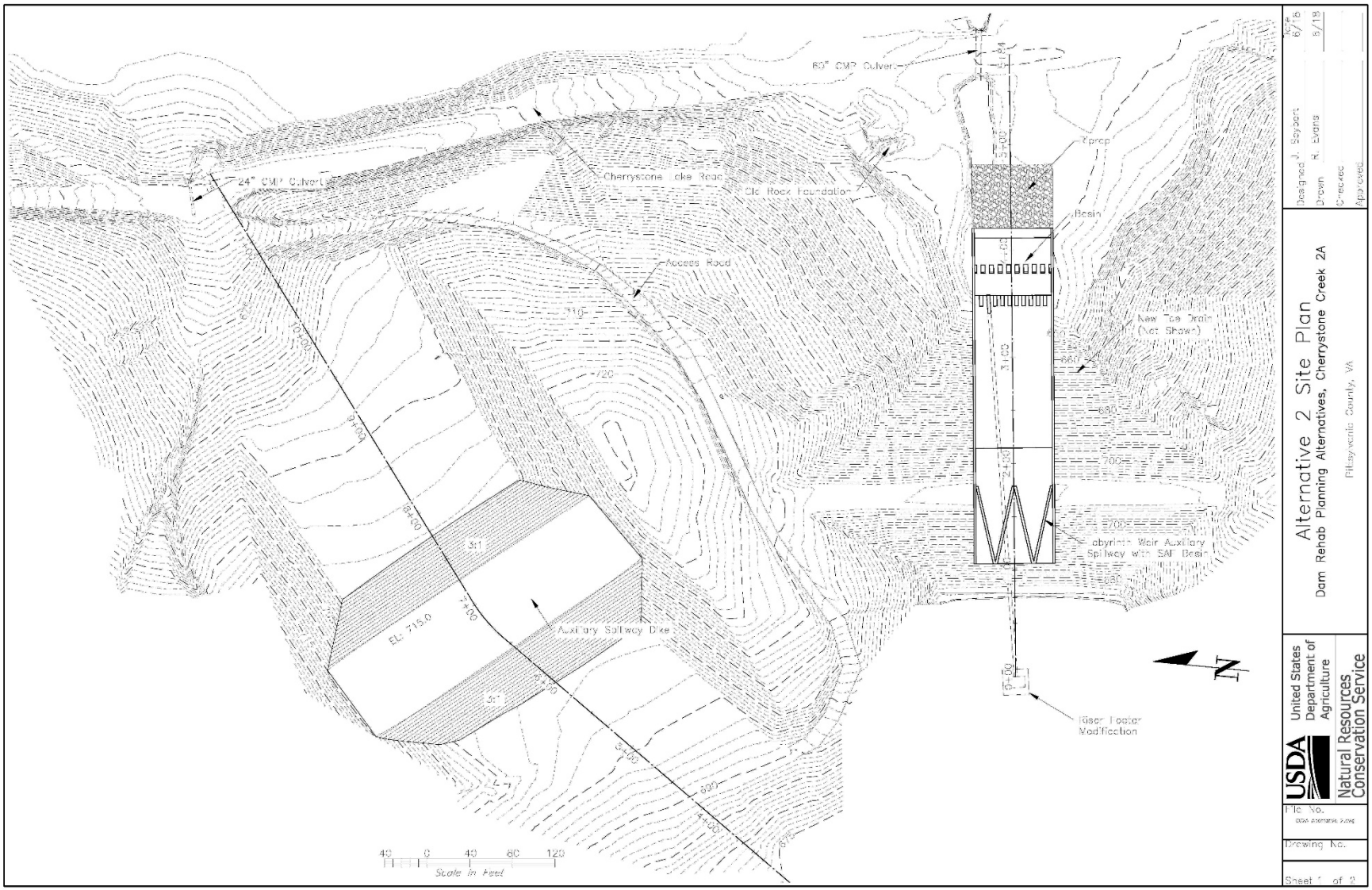


Figure C-10. Sunny Day Breach Inundation Map.

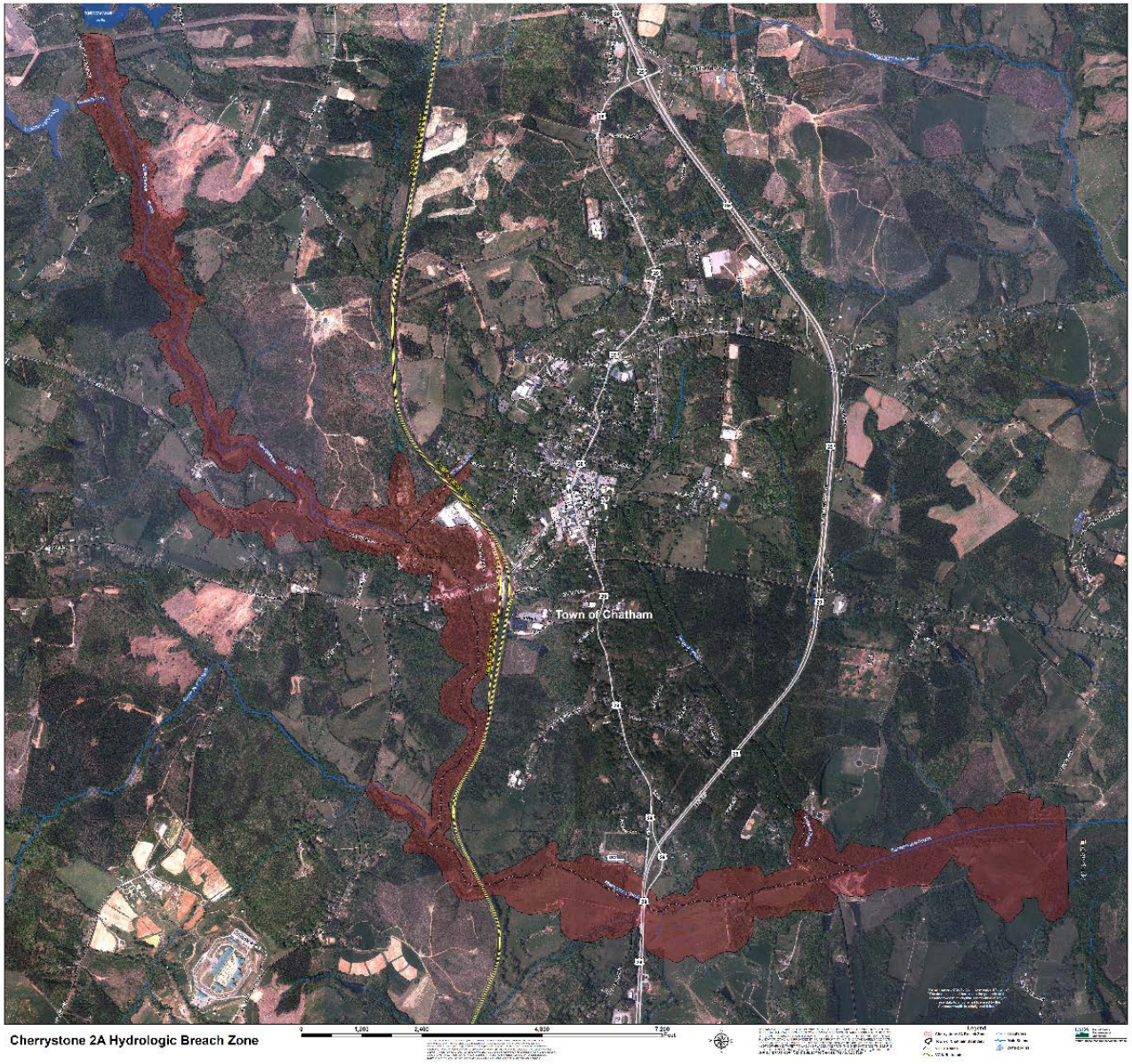


Figure C-11. Cherrystone Creek Special Flood Hazard Areas Map (Panel Index).

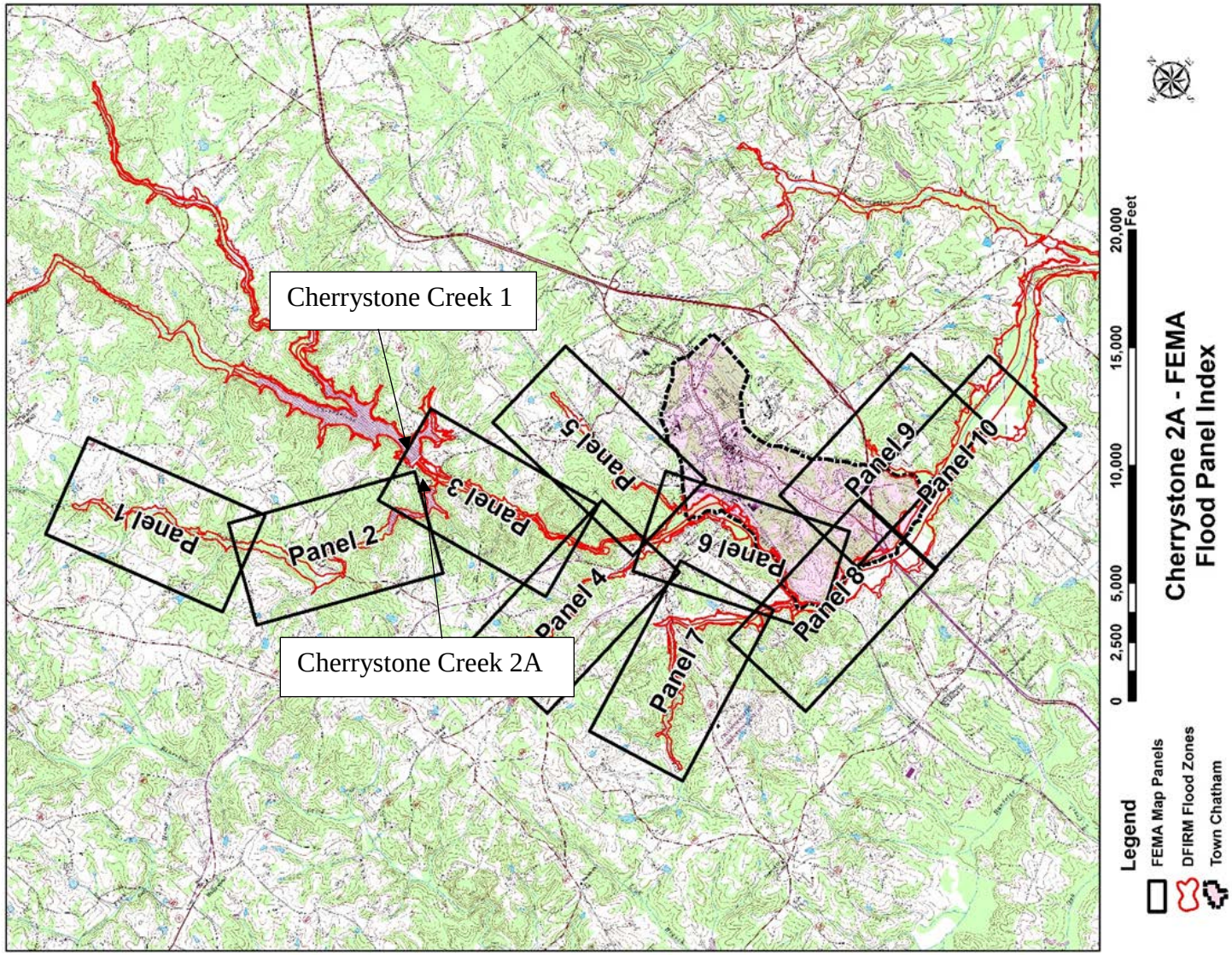


Figure C-12. Cherrystone 2A Special Flood Hazard Areas (Panel 1 of 10).

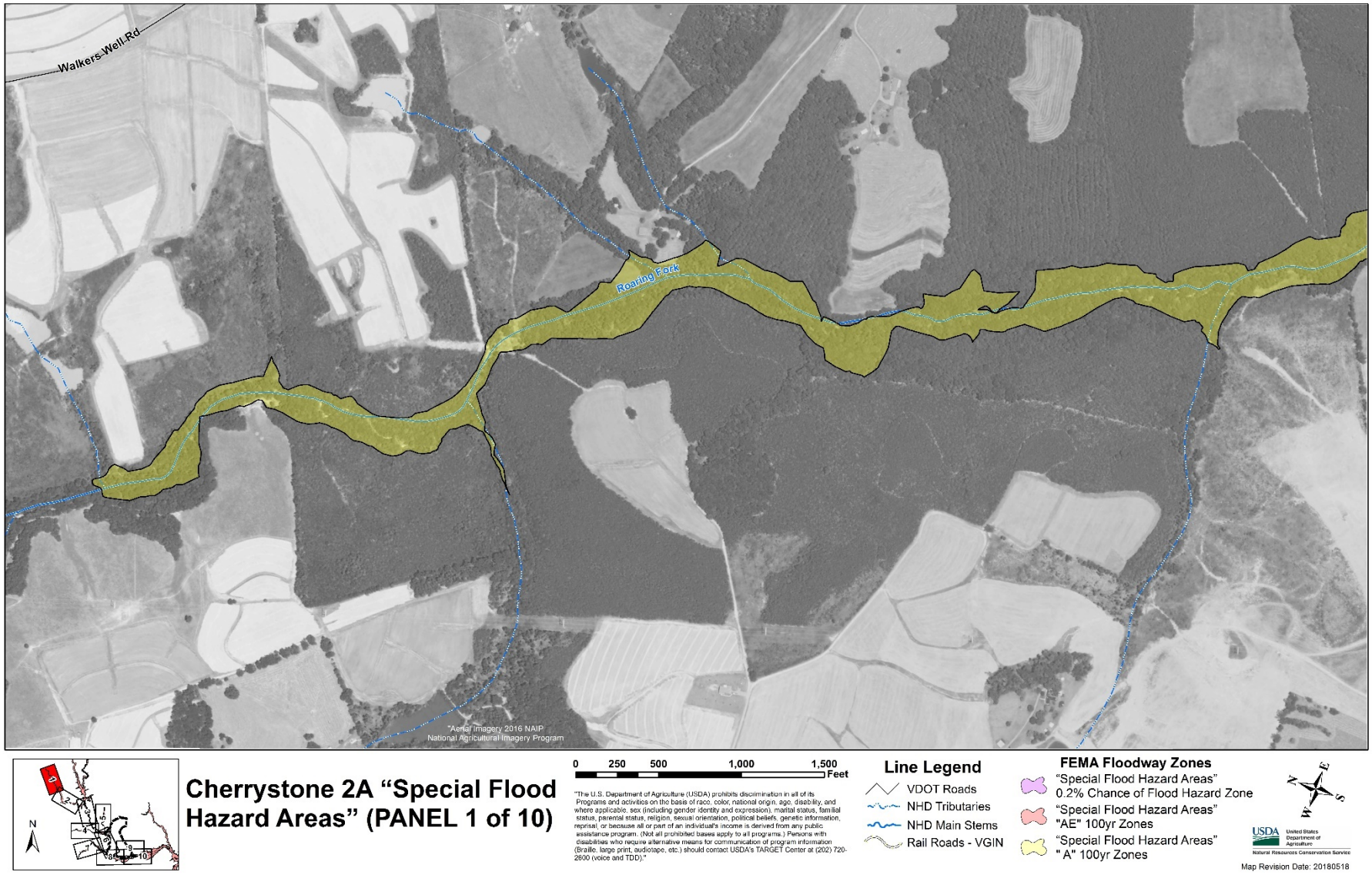
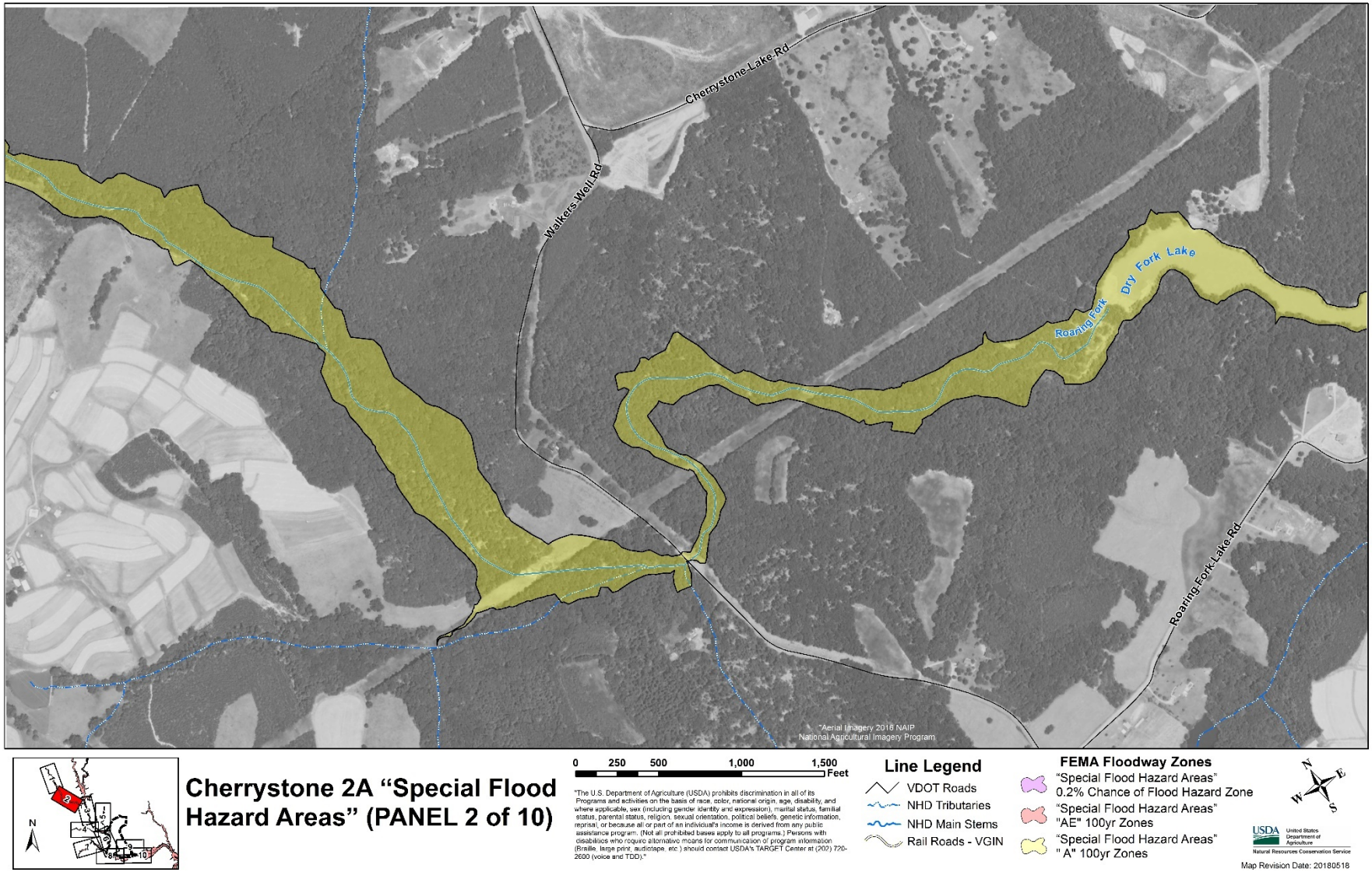
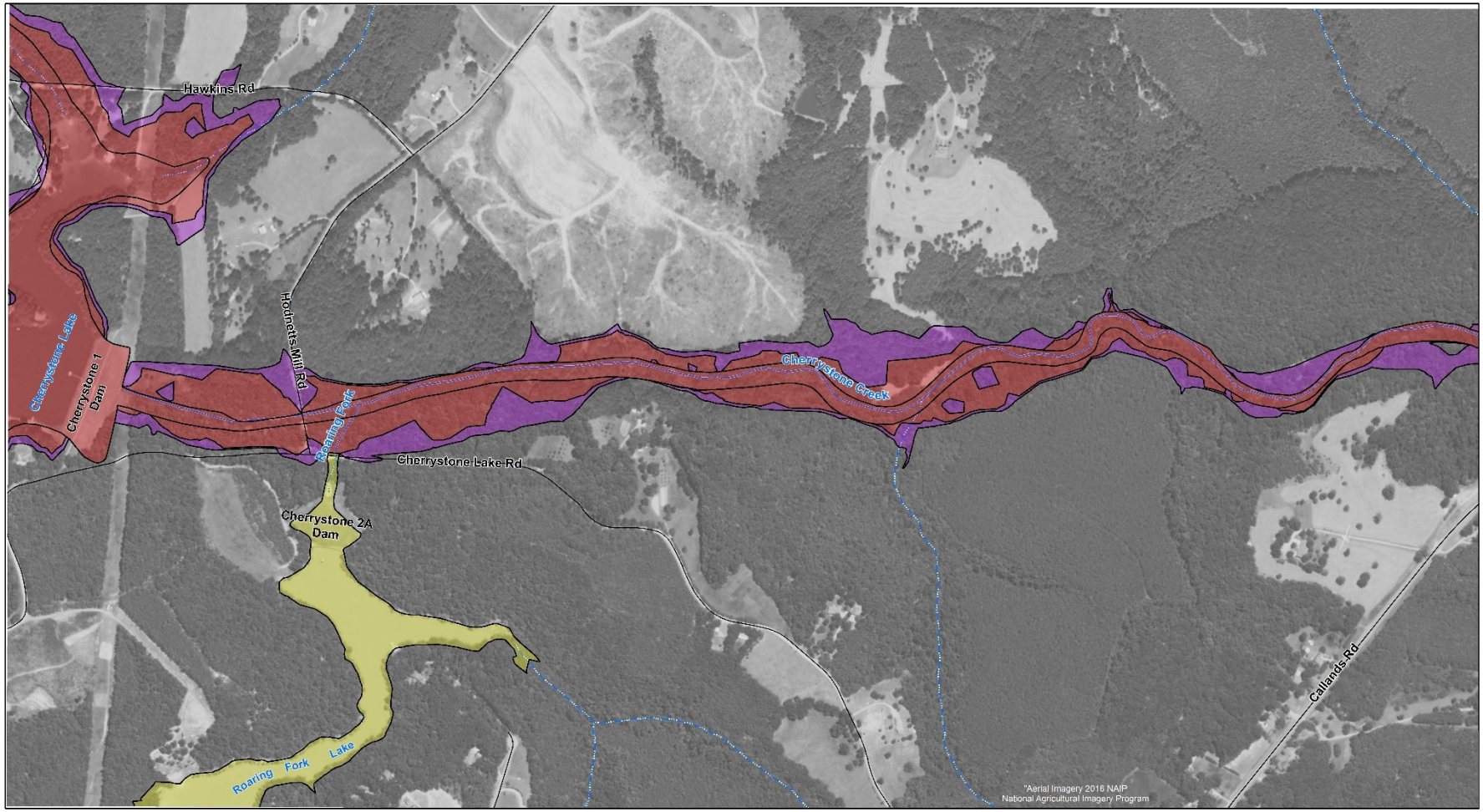
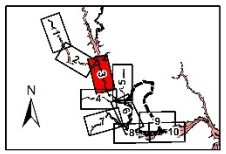


Figure C-13. Cherrystone 2A Special Flood Hazard Areas (Panel 2 of 10).



igure C-14. Cherrystone 2A Special Flood Hazard Areas (Panel 3 of 10).





Cherrystone 2A "Special Flood Hazard Areas" (PANEL 3 of 10)

0 250 500 1,000 1,500 Feet

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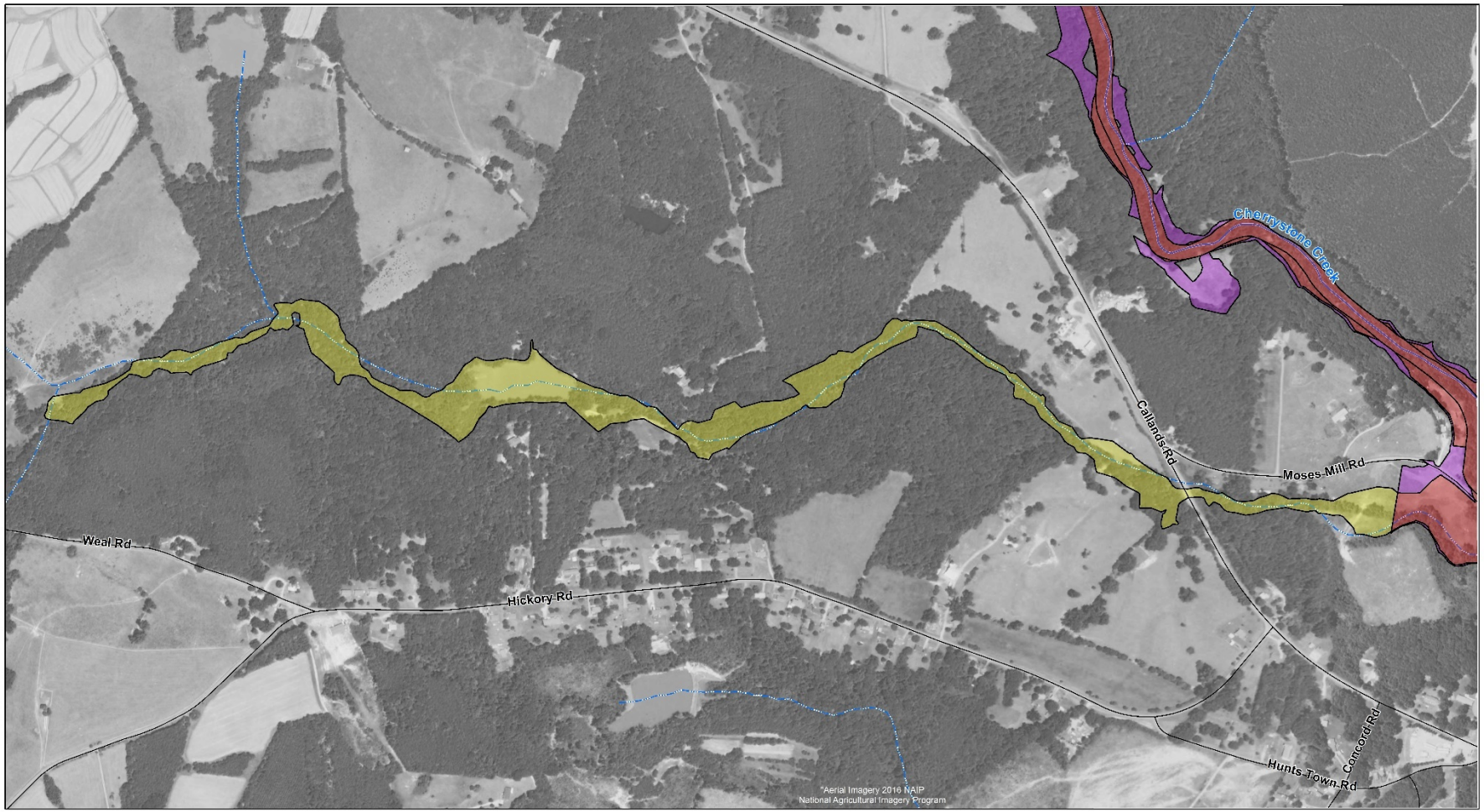
Line Legend
- VDOT Roads
- NHD Tributaries
- NHD Main Stems
- Rail Roads - VGIN

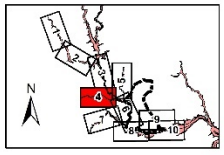
FEMA Floodway Zones
- "Special Flood Hazard Areas" 0.2% Chance of Flood Hazard Zone
- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

USDA United States Department of Agriculture Natural Resources Conservation Service

Map Revision Date: 20180518

Figure C-15. Cherrystone 2A Special Flood Hazard Areas (Panel 4 of 10).





Cherrystone 2A "Special Flood Hazard Areas" (PANEL 4 of 10)

0 250 500 1,000 1,500 Feet

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- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

N W E S

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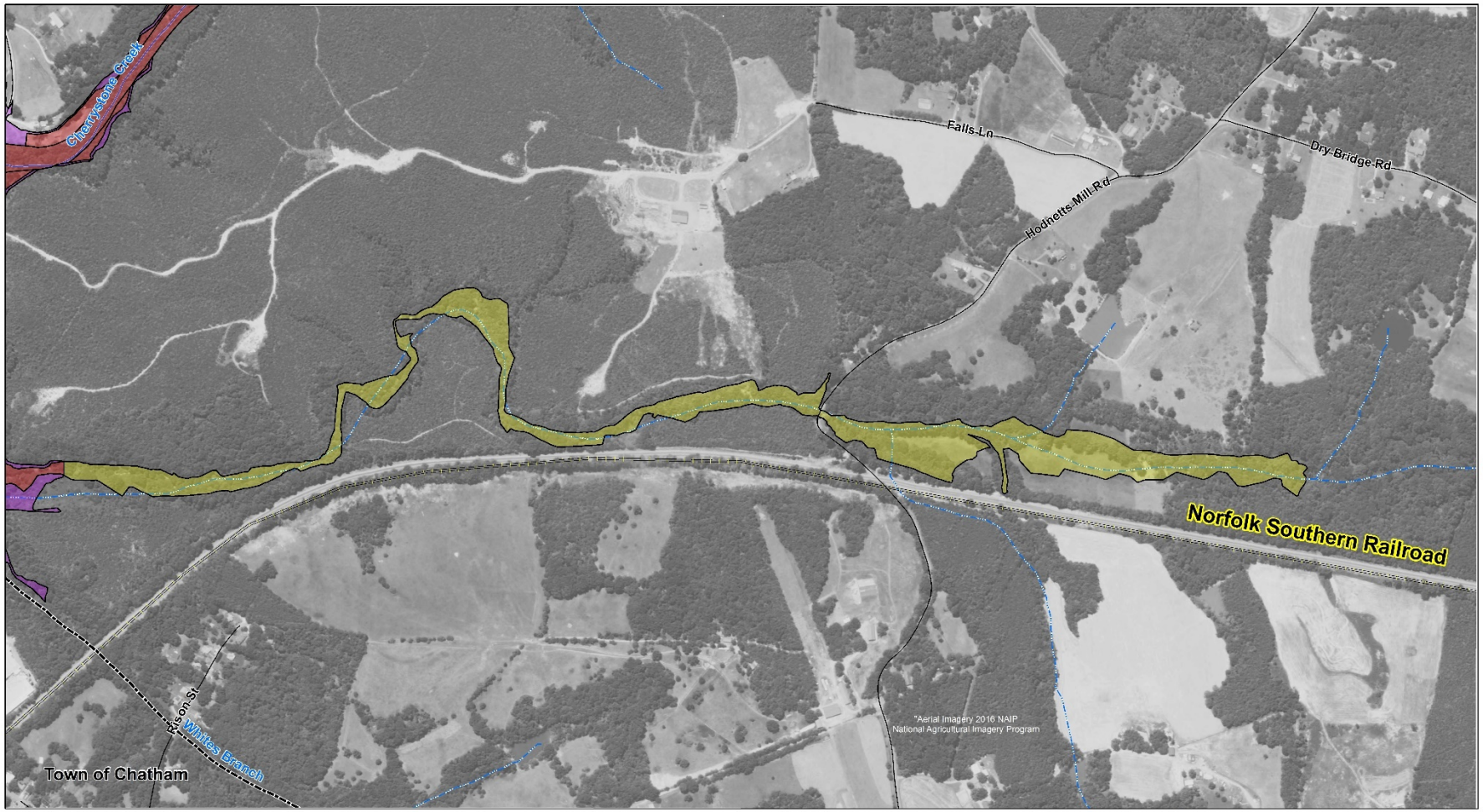
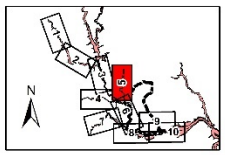
Map Revision Date: 20180518

Figure C-16. Cherrystone 2A Special Flood Hazard Areas (Panel 5 of 10).





Cherrystone 2A "Special Flood Hazard Areas" (PANEL 5 of 10)

0 250 500 1,000 1,500 Feet

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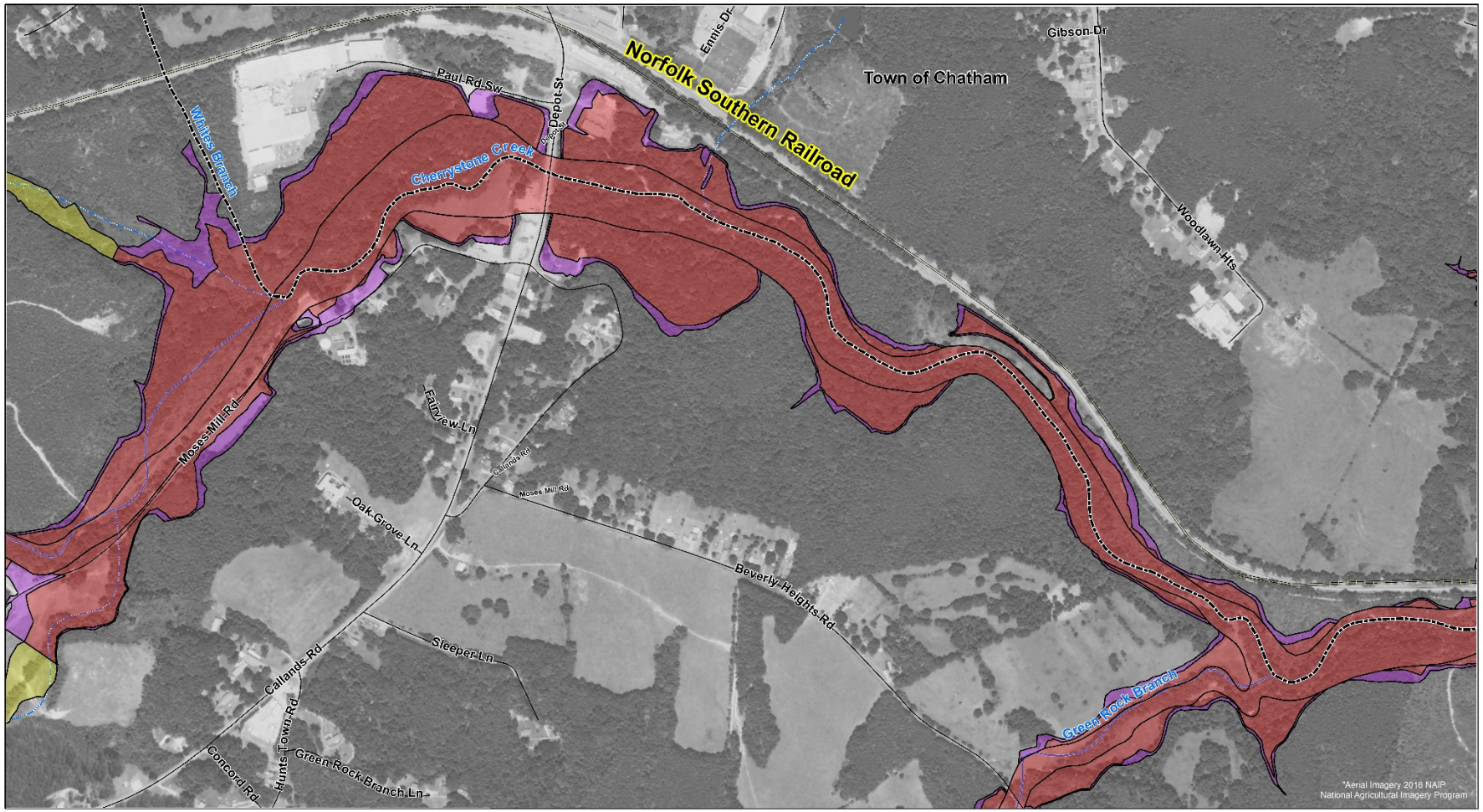
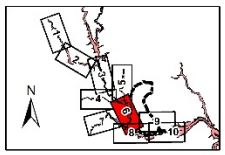
- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

USDA United States Department of Agriculture Natural Resources Conservation Service

Map Revision Date: 20180618

Figure C-17. Cherrystone 2A Special Flood Hazard Areas (Panel 6 of 10).





Cherrystone 2A "Special Flood Hazard Areas" (PANEL 6 of 10)

0 250 500 1,000 1,500 Feet

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its Programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex (including gender identity and expression), marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD)."

Line Legend

- VDOT Roads
- NHD Tributaries
- NHD Main Stems
- Rail Roads - VGIN

FEMA Floodway Zones

- "Special Flood Hazard Areas" 0.2% Chance of Flood Hazard Zone
- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

USDA United States Department of Agriculture Natural Resources Conservation Service

Map Revision Date: 20180618

Figure C-18. Cherrystone 2A Special Flood Hazard Areas (Panel 7 of 10).

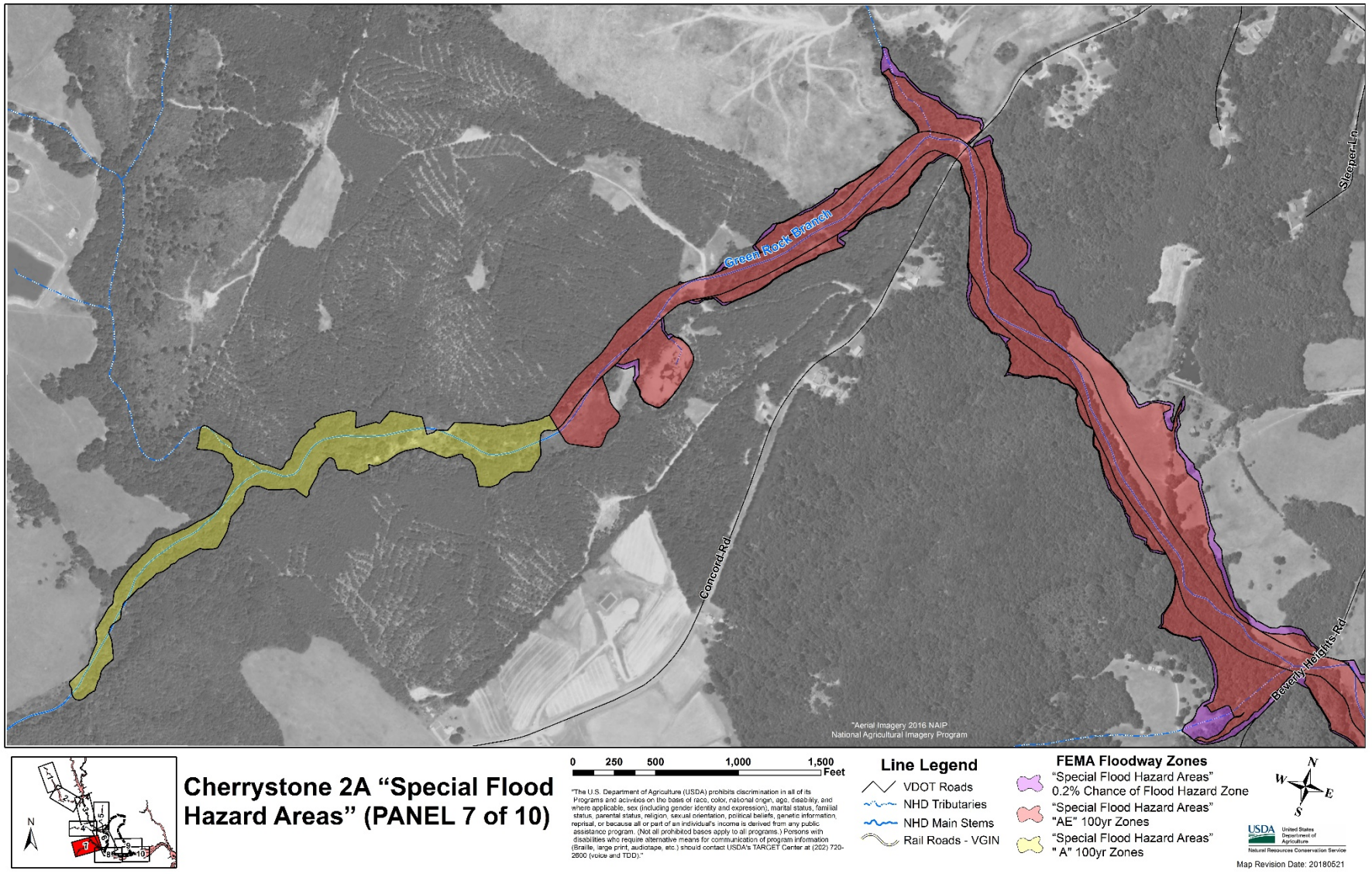


Figure C-19. Cherrystone 2A Special Flood Hazard Areas (Panel 8 of 10).

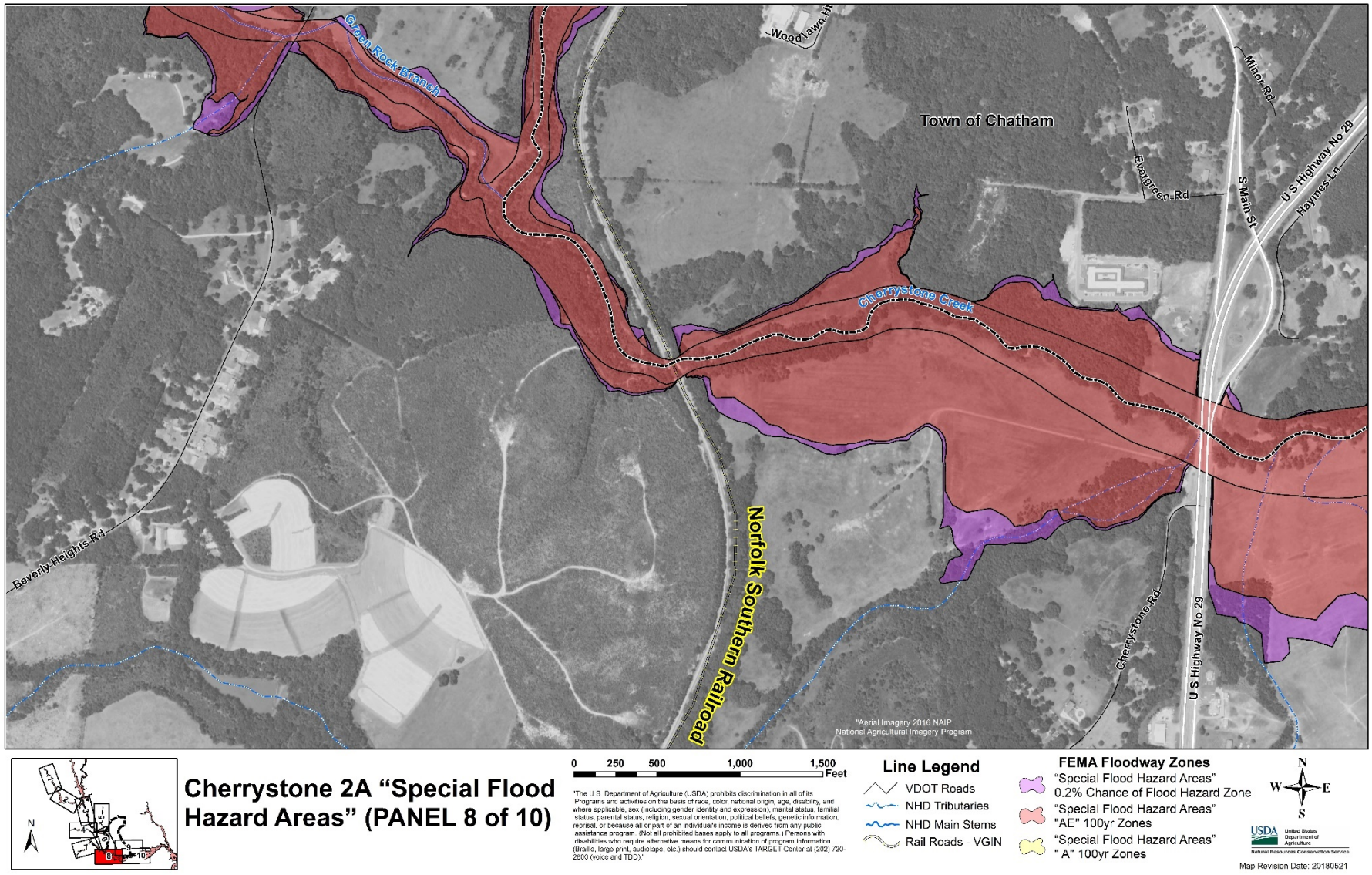
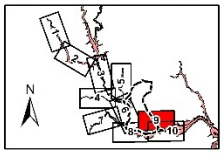


Figure C-20. Cherrystone 2A Special Flood Hazard Areas (Panel 9 of 10).



Cherrystone 2A "Special Flood Hazard Areas" (PANEL 9 of 10)

0 250 500 1,000 1,500 Feet

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Line Legend

- VDOT Roads
- NHD Tributaries
- NHD Main Stems
- Rail Roads - VGIN

FEMA Floodway Zones

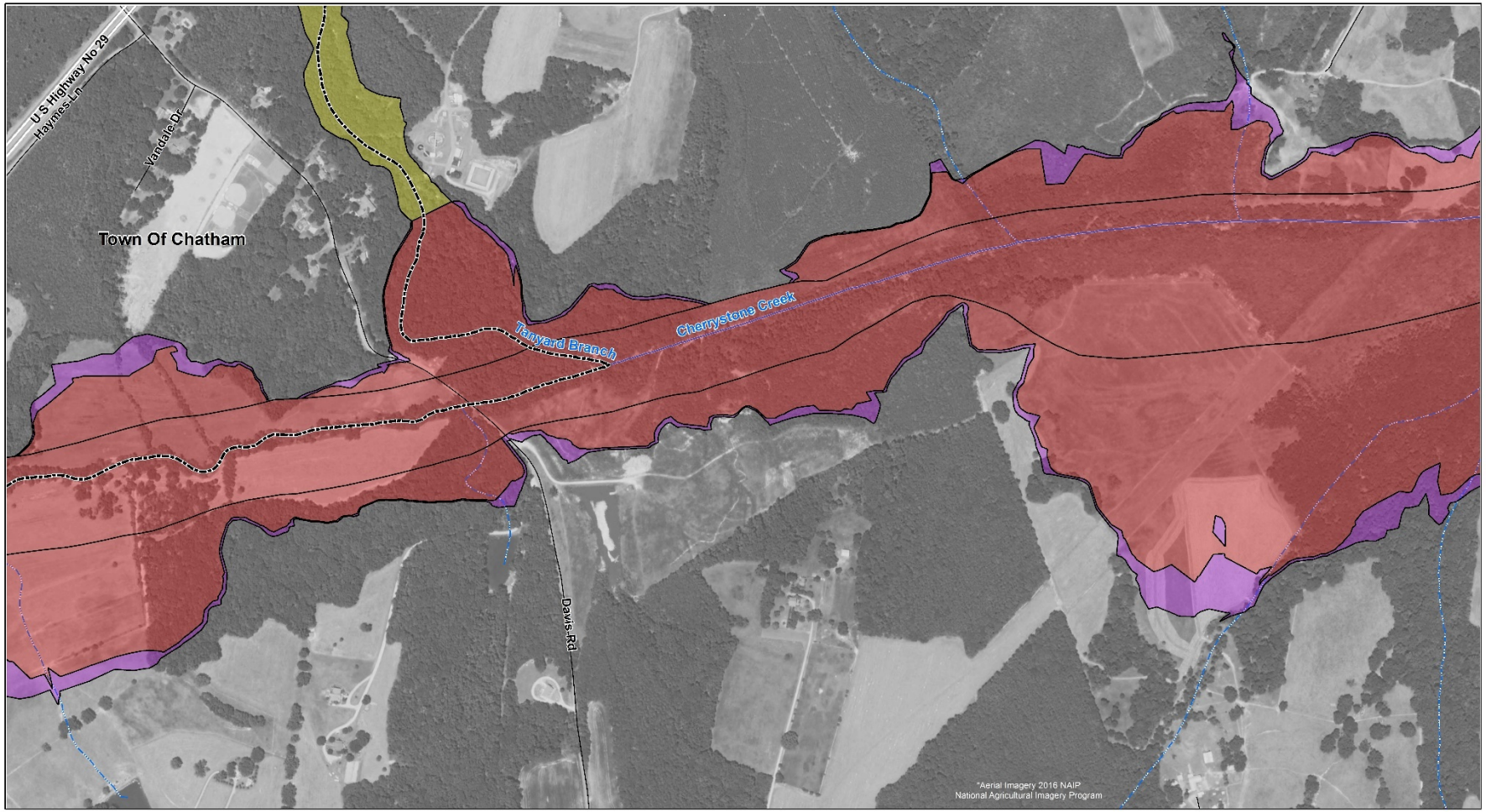
- "Special Flood Hazard Areas" 0.2% Chance of Flood Hazard Zone
- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

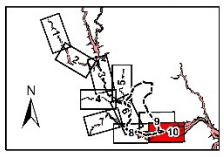
N W E S

USDA United States Department of Agriculture Natural Resources Conservation Service

Map Revision Date: 20180521

Figure C-21. Cherrystone 2A Special Flood Hazard Areas (Panel 10 of 10).





Cherrystone 2A "Special Flood Hazard Areas" (PANEL 10 of 10)

0 250 500 1,000 1,500 Feet

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Line Legend
- VDOT Roads
- NHD Tributaries
- NHD Main Stems
- Rail Roads - VGIN

FEMA Floodway Zones
- "Special Flood Hazard Areas" 0.2% Chance of Flood Hazard Zone
- "Special Flood Hazard Areas" "AE" 100yr Zones
- "Special Flood Hazard Areas" " A" 100yr Zones

N W E S

USDA United States Department of Agriculture Natural Resources Conservation Service

Map Revision Date: 20180521

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APPENDIX D

INVESTIGATIONS AND ANALYSES REPORT

Investigations and Analyses Used in the Planning for Rehabilitation of Cherrystone Creek Dam Site No. 2A (Roaring Fork Lake)

Planning Engineering

Background

Roaring Fork is a tributary to Cherrystone Creek, which originates in the western part of Pittsylvania County and flows generally east through the Town of Chatham (Town) emptying into the Bannister River. The Cherrystone Creek Watershed is located west of the Town. A Watershed Plan was developed by the NRCS in 1965 to reduce flood flow in and around the Town and to provide water supply storage for the Town. A supplement was prepared in 1976. Two watershed structures are in the Cherrystone Creek Watershed – Site 1 and 2A.

Cherrystone Creek Dam No. 1 is also currently in planning for rehabilitation to meet current state dam safety requirements, maintain existing flood control and maintain water supply storage.

Purpose

This document summarizes the investigations and analysis completed for the dam rehabilitation planning engineering of Cherrystone Creek Dam No. 2A. This includes a summary and reference for the existing conditions, breach, deficiencies, alternatives studied and the selected rehabilitation alternative for this dam. The following documents state the assumptions, investigations, and analysis performed, and the conclusions developed:

- Schnabel Engineering, Cherrystone Creek 2A Inlet/Outlet Inspection report, September 2017.
- Topo Survey, NRCS 2014
- Risk Evaluation Sheet, April 4, 2014
- Breach Inundation Study, Hurt and Proffitt, Inc., November 2010
- Breach Maps, NRCS 2017

The basis for the planning engineering investigations and analysis are current NRCS criteria and standards, including the following:

- National Engineering Handbook, Part 630, Hydrology
- National Engineering Handbook, Part 628, Dams
- Technical Release 60, Earth Dams and Reservoirs, July 2005
- NRCS Conservation Practice Standard Dam (Code 402)

Baseline Survey: A ground run topographical survey performed by NRCS in 2014 was the basis for critical elevations and the design of rehabilitative measures. The NRCS Hydrology and Hydraulics Report includes the differences between the NGVD29 elevations contained in the as-built drawings and NAVD88 elevations.

Existing Conditions and Deficiencies

NRCS evaluated the existing condition of the dam and appurtenances with a field inspection on June 27, 2017. The dam and its appurtenances appear to be generally well kept, having minor items of maintenance that are outstanding. Prior investigations include a topographic survey and a sediment survey by NRCS.

A video inspection of the riser interior and exterior, the interior of the principal spillway pipe, and the interior of the toe drains was conducted on August 23, 2017, by Bander and Smith under contract with Schnabel Engineering. Divers videoed the underwater portions of the riser exterior and found no significant issues. The galvanized steel trash rack for the intake orifice is in poor condition. The water supply gate installed in the left face of the riser was not seated properly and water was leaking into the riser. These issues should be addressed as part of the regular maintenance of the dam.

No issues were reported for the interior of the principal spillway pipe. At the downstream outlet, the first joint of the pipe is spalling on the exterior. The left toe drain was dry and could be inspected for about 75 feet. There is a partial collapse about 10 feet beyond the elbow in the pipe. The right toe drain was partially blocked with vegetation and sediment. The equipment was able to advance for about 32 feet before sediment in the drain pipe became too thick to proceed.

A geologic investigation was conducted by GSFW Engineering Joint Venture. The field drilling was completed between October 11 and October 27, 2016 by Red Dog Drilling. The drilling consisted of four holes in the embankment and five holes in the auxiliary spillway. Field tests and laboratory testing that are typical practice for dam analysis were conducted. Testing was supplemented by work performed at the National Design, Construction, and Soil Mechanics Center. Headcut erodibility indices were provided for SITES auxiliary spillway stability and integrity analysis.

Embankment seepage and slope stability analysis was conducted using the GeoStudio software suite. A typical section for analysis was prepared using as-built data and the results of the soil testing program. Slope stability analysis was performed in accordance with TR-60 for rapid drawdown, steady state seepage, and seismic factor of safety criteria. For rapid drawdown, the required factor of safety (FS) is 1.2; results of the slope analysis determined the existing FS to be 1.204. For downstream steady-state condition with pore pressure at the auxiliary spillway crest, the required FS is 1.5; the existing condition FS is 1.80. For the downstream steady-state with seismic forces, the required FS is 1.1; the existing condition FS is 1.51. In summary, the upstream and downstream slopes meet TR-60 safety factor criteria. Examining the top of dam with TR-60 criteria finds the existing top width of 20 feet to be sufficient. Soils analysis for filter and drainage found no issues of concern for the embankment. Each embankment zone is compatible with adjacent zones.

Initial investigations include hydrologic analysis, spillway integrity analysis, and embankment and spillway capacity analysis.

The SITES model was used to evaluate the capacity and integrity of the existing structure and the auxiliary spillway alternatives. Geotechnical information was taken from the as-built drawings and the original design folder (1967). Reservoir storage was developed using the current sediment survey. Crest elevations were taken from the current NRCS topo survey (NAVD 88) and the as-built drawings (NVD29 converted to NAVD 88). The 6-hour storm was found to be the critical

duration for the Freeboard Hydrograph (FBH). The 6-hr storm was developed using the NRCS 6-hour distribution and 6-hr Probable Maximum Precipitation (PMP) from Hydrometeorology Report No. 51, of 21.6 inches.

Results show that Cherrystone Creek Dam No. 2A does not meet the 10-day drawdown requirement during the PSH events and does not have the integrity to resist auxiliary spillway erosion during the FBH events. The dam does meet Virginia Division of Dam Safety criteria for a high hazard potential dam.

Based upon the SITES runs, the auxiliary spillway crest elevation is 8.4 feet too low and the top of dam elevation is 7.4 feet too low for a high hazard potential dam. These deficiencies are governed by the 1-day 10-day criteria for a vegetated earth auxiliary spillway. In addition, the auxiliary spillway is predicted to breach during passage of the freeboard hydrograph.

Life Span

As of 2018, Cherrystone Creek Dam No. 2A is 50 years old. The remaining submerged sediment life of the structure is about 121 years. The primary material components are the principal spillway riser, pipe, and toe drains. The CMP toe drains are close to failing and will be replaced as part of the rehabilitation. The riser and pipe are currently in good condition and are expected to last for another 50 years. The logic for determining the period of analysis is included in the Economics I&A section below.

Fifty, 75 and 100 year expected useful lives were evaluated (52, 77 and 102-year periods of analysis including 1 year for design and 1 year for construction). A net present value analysis was conducted comparing the three alternative periods of analysis. The added cost to replace the principal spillway riser and components (the trash-rack and gate valves) were used to assess net benefits for the 75 and 100-year project investments. All costs of installation, operation and maintenance were based on 2018 prices. The costs associated with designing and implementing all structural measures were assumed to be implemented over the aforementioned two-year period. The federal action with a 52-year period of analysis yielded the highest net benefits using the mandated 2.875% discount rate for all federal water resource projects for FY18 to discount and amortize the anticipated streams of costs and benefits.

Reservoir Storage

Cherrystone Creek Dam No. 2A was originally designed to detain future sediment and provide flood storage. To determine the current reservoir storage, sediment surveys were completed by NRCS staff for Cherrystone Creek Dam No. 2A in September 2015. The field survey was conducted in March 2015 using an aluminum fishing boat, electric trolling motor, and a Garmin GPSMAP541s Chartplotter. The unit recorded 2,586 GPS locations and water depths at the top of the sediment. This data was compared to the as-built information for the original bottom of the reservoir area to estimate the volume of submerged sediment present. Aerated sediment volume was determined using GPS waypoints and soil profile investigations. The sediment survey was also used to determine the yearly sedimentation rate which is used to determine the required sediment storage for fifty to one-hundred years after the rehabilitation is complete. A detailed trip report is available in the file as part of the supporting documentation.

Modes of Failure and Breach Study

The potential impacts to downstream structures and people due to an instantaneous breach of the dam were evaluated to assist the economist with benefit estimates and to verify the hazard class of high. The Sponsors have current breach inundation zone maps for the dam that complies with the Virginia Impounding Structures Law and Regulations for high hazard potential dams. The Virginia Impounding Structures Regulations requires owners of high hazard potential dams to provide a dam breach inundation zone map with multiple zones represented to determine hazard classification and develop the Emergency Action Plan (EAP). The auxiliary spillway design flood for High Hazard Potential dams is the PMF, consistent with NRCS Freeboard Hydrograph criteria. The zones for a high hazard potential dam include:

- a Sunny Day dam failure using the volume at the auxiliary spillway crest;
- a spillway design flood (PMF) without a dam failure; and
- a dam failure during the spillway design flood (PMF).

The breach inundation report and maps are sealed by a Virginia professional engineer.

The breach inundation zone analysis and maps were approved by the Virginia Division of Dam Safety in 2010. The Sponsors provided the hydrologic and hydraulic models to NRCS. The models and hydraulic data are consistent with NRCS policies and procedures for water surface modeling.

The current Sponsor breach inundation zones and maps were used to identify the population at risk and the impacted structures. All the structures in the potential breach impact zone of Roaring Fork Lake were identified using GIS information provided by the Town and Pittsylvania County. This was determined by overlaying the Sunny Day breach inundation zone and the Sponsor real estate data. This data includes current land ownership and description of associated improvements. This data includes single family dwellings, multiple family dwellings, businesses, commercial developments, recreational areas, and government infrastructure (roads, water supply, and water treatment).

A risk evaluation of the existing structure was completed by NRCS in 2014 using the current Sponsor breach inundation study and maps, (Hurt & Proffitt, Incorporated, 2010). Within the Sunny Day breach inundation zone, the population at risk is 150.

Falvey Master Template Labyrinth Weir Excel Spreadsheet

This Excel spreadsheet sizes labyrinth weirs, estimates weir quantities, and provides a cost estimate for the weir given unit cost inputs. The spreadsheet also provides a rating curve for the proposed weir and a graphic layout of the labyrinth weir system.

The spreadsheet is based on the work by Henry T. Falvey, a leading authority on the performance of labyrinth weirs. He has authored *Hydraulic Design of Labyrinth Weirs*, published by the American Society of Civil Engineers.

Hydraulic Design of Stilling Basins and Energy Dissipators

This manual is published by the DOI Bureau of Reclamation as Engineering Nomograph No. 25, authored by A. J. Peterka. It contains procedures for 10 types of stilling basins, including the SAF basins used in this analysis of alternatives.

GeoStudio Software Suite for Geotechnical Analysis

The Slope/W and Seep/W routines were used to model a typical section of the dam embankment to determine existing conditions of slope stability. The model was then used to determine remedial measures needed for compliance to TR-60 slope stability criteria.

SUMMARY OF DATA SOURCES FOR PLANNING ENGINEERING

Land Cover – NASS 2015

The National Agricultural Statistics Service (NASS) data was used for Land Cover / Land Use in the Cherrystone Creek 2A Watershed. This data was also used for the Land Cover / Land Use in the CST 1 Sunny Day Breach Inundation Zone. The USDA, NASS Cropland Data Layer (CDL) is a raster, geo-referenced, crop-specific land cover data layer. The 2015 CDL has a ground resolution of 30 meters. The CDL is produced using satellite imagery from the Landsat 8 OLI/TIRS sensor and the Disaster Monitoring Constellation (DMC) DEIMOS-1 and UK2 sensors collected during the current growing season. Some CDL states used additional satellite imagery and ancillary inputs to supplement and improve the classification. These additional sources can include the United States Geological Survey (USGS) National Elevation Dataset (NED) and the imperviousness and canopy data layers from the USGS National Land Cover Database 2011 (NLCD 2011). Agricultural training and validation data are derived from the Farm Service Agency (FSA) Common Land Unit Program. The most current version of the NLCD is used as non-agricultural training and validation data.

Land Cover (supplemental) - NASS 2015

The NASS data was used to supplement/update the cropland information in the Cherrystone Creek 2A Watershed. The USDA, NASS Cropland Data Layer (CDL) is a raster, geo-referenced, crop-specific land cover data layer. The 2015 CDL has a ground resolution of 30 meters. The CDL is produced using satellite imagery from the Landsat 8 OLI/TIRS sensor and the Disaster Monitoring Constellation (DMC) DEIMOS-1 and UK2 sensors collected during the current growing season. Some CDL states used additional satellite imagery and ancillary inputs to supplement and improve the classification. These additional sources can include the United States Geological Survey (USGS) National Elevation Dataset (NED) and the imperviousness and canopy data layers from the USGS National Land Cover Database 2011 (NLCD 2011). Agricultural training and validation data are derived from the Farm Service Agency (FSA) Common Land Unit Program. The most current version of the NLCD is used as non-agricultural training and validation data.

Land Use Information

Future Land Cover was developed by overlaying Map 12.3 contained in the Future Land Use Plan from the Pittsylvania County Comprehensive Plan, adopted September 1, 2015. The existing land cover was used for any land shown on the Future Land Use Plan to be in conservation/parks/open space, agricultural or rural land use. The existing land use was also used for any land already in an urban land use such as residential or commercial. The land use shown as developed on the Future Land Use Map was used for any land currently in open space, pasture, or woods. More

detailed information is contained in the Report entitled *Preliminary Engineering and Planning Study, Cherrystone Creek Watershed Dam No. 2A*, December 28, 2015 by Schnabel Engineering.

SSURGO Soils

This product was used to derive the Prime Farmland and Hydrologic Groups in the Cherrystone Creek Watershed. SSURGO datasets consist of map data, tabular data, and information about how the maps and tables were created. The extent of a SSURGO dataset is a soil survey area, which may consist of a single county, multiple counties, or parts of multiple counties. SSURGO map data can be viewed in the Web Soil Survey or downloaded in ESRI® Shapefile format. The coordinate systems are geographic. Attribute data can be downloaded in text format that can be imported into a Microsoft® Access® database. A more detailed description can be found at this URL- http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053627.

Prime Farmland

The Prime Farmland layers was derived from the USDA NRCS - SSURGO data for Pittsylvania County, Virginia. The NRCS Soil Data Viewer version 6.2 was used, with ArcGIS 10.2. The attributes selected for this layer are under Farmland Classification.

Hydrologic Soil Groups

This layer was derived from the USDA NRCS - SSURGO data for Pittsylvania County, Virginia. The NRCS Soil Data Viewer version 6.2 was used, with ArcGIS 10.2. The attributes selected for this layer is under "Soil Qualities and Features" – Hydrologic Soil Groups. Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration; when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

National Hydrography Dataset (USGS)

This layer was used in the Cherrystone Creek 2A dam rehabilitation study to depict Streams and Water Bodies. The National Hydrography Dataset (NHD) and Watershed Boundary Dataset are used to portray surface water on The National Map. The NHD represents the drainage network with features such as rivers, streams, canals, lakes, ponds, coastline, dams, and stream gages.

FEMA – DFIRM

The digital Flood Insurance Rate Map is used to depict the base flood, 100-year floodplain zone in the Cherrystone Creek Watershed. The FIRMETTES for Roaring Fork Lake are included in Appendix C. In Virginia, the localities are the zoning authorities. For the streams below Cherrystone Creek 2A dam, both Pittsylvania County and the Town of Chatham are the regulatory authorities for the base flood. The base flood depicted on all maps are FEMA Zone AE and Zone A. For the preferred rehabilitation alternative, the base flood will not change in the downstream channels.

Sub-Watershed Boundaries

These boundaries were derived by using the VGIN Digital Terrain Dataset. This data was converted to a Bare Earth Digital Elevation Model. Hydrologic analysis was used in ArcGIS 10.2 Spatial Analyst Tool to delineate the subwatershed.

VGIN DTM (Digital Terrain Model) – Digital Elevation

This data was used because there was no LiDAR coverage for Pittsylvania County during this study. The Digital Terrain model is a depiction of the topography for covered Virginia localities using photogrammetrically-derived mass points and breaklines collected or updated in 2011. This terrain dataset was built from masspoints and breaklines developed for the 2011 VBMP orthophotography project. The purpose of the digital terrain mode was orthorectification of the imagery. It is not hydro-enforced. The vertical accuracy of masspoints and breaklines is about 2.5 feet. This DTM was used to create a 3-meter Bare Earth Digital Elevation Model for analysis. This data is subject to the limitations of Virginia Code and the following disclaimer must be included with any map or documentation using these data: "Any determination of topography or contours, or any depiction of physical improvements, property lines or boundaries is for general information only and shall not be used for the design, modification, or construction of improvements to real property or for flood plain determination."

SOCIAL AND ECONOMIC CONDITIONS

Economic Analysis

The NRCS National Watershed Manual was used as a reference for the economic analysis along with two economic analysis guidance documents: “Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G), December 1983, and the “Economics Handbook, Part II for Water Resources”, USDA/Natural Resources Conservation Service, July 1998. These guidance documents were used to evaluate potential flood damages and estimate project benefits and associated costs. P&G was developed to define a consistent set of project formulation and evaluation instructions for all federal agencies that carry out water and related land resource implementation studies. This guidance document directs how to evaluate alternative project actions and determine whether benefits from the proposed actions exceed project costs.

P&G allows for abbreviated procedures commensurate with the planning and policy context to be used (P&G section 1.7.2 (a) (4) (ii)) when more detailed analysis will not alter identification of the recommended National Economic Development alternative. In this case, the future without federal project and the future with federal project involve the same least-cost alternative with comparable scope, effects, benefits and costs. No net change in benefits occurs when comparing the two candidate plans to each other.

Per use of abbreviated procedures allowed by P&G and NRCS policy, avoidance of the local cost is claimed as the benefits of the federally-led dam rehabilitation. The federally assisted alternative as displayed credits local costs avoided (Total Adverse Annualized for the Future Without Federal Project scenario) as adverse beneficial effects (Total Beneficial Annualized) consistent with P&G 1.7.2(b)(3). Thus, although the average annual benefits of rehabilitation are $288,700, net benefits

are zero because the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1.

In addition, one other overarching concern associated with dam rehabilitation analyses is the intent of the program to minimize threat to human life. Threat to human life is central to the dam rehabilitation program. Agency policy allows for use of the other social effects goal (account in P&G terms) to make the case for rehabilitating any given floodwater detention structure, even if the associated B/C ratio were less than 1:1. This is due to a priority placed on protecting lives. Also, trying to monetize the value of life, or in the case of dams, avoidance of loss of life, is fraught with subjective value judgements. Threat to human life can therefore be used to supersede purely economic considerations when deemed appropriate.

Flood damages. Assessed values for all homes and other properties within the breach inundation zone were obtained from local government sources within the watershed and used to estimate damages from a possible catastrophic breach. Estimated flood damages were based on the results of the hydrology and hydraulics (H&H) simulation modeling indicating that a maximum peak discharge average depth of 5.1 feet would be experienced outside of the stream channel should a breach event occur. This assumed depth of flood water data was then used with water depth to damage functions developed by the Federal Emergency Management Agency (FEMA) to estimate structural damages. Content values were then estimated as a function of assessed property values. All estimated values and damages were assessed within a customized Excel template prepared for this purpose.

Period of Analysis Determination: Fifty, 75 and 100 year expected useful lives were evaluated (52, 77 and 102-year periods of analysis including 1 year for design and 1 year for construction). A net present value analysis was conducted comparing the three alternative periods of analysis. Average annual values were also estimated. The added cost to replace the principal spillway riser tower and components (the trash-rack and gate valves), added maintenance of the plunge pool, and slip-lining of the principal spillway in year 50 were used to assess net benefits for the 75 and 100-year project investments. All costs of installation, operation and maintenance were based on 2018 prices. The costs associated with designing and implementing all structural measures were assumed to be implemented over the two-year period. The federal action with a 52-year period of analysis yielded the highest net benefits using the mandated 2.875% discount rate for all federal water resource projects for FY18 to discount and amortize the anticipated streams of costs and benefits.

Cherrystone Creek Site 2A Period of Analysis Determination

Discount rate:	2.875%	Design and replace principal spillway metalwork and gate assumed to be needed in years 25, 50 and 75:								$35,000
		Plunge pool maintenance (grading & riprap replacement) in years 25, 50 and 75:								$25,000
		Replace riser tower and &plunge pool replaced; principal spillway will be sliplined; all in yr.50:								$699,000
Alt.		50-year Investment			75-year Investment			100-year Investment		
NPV:		($29,540)			($213,511)			($220,671)		
AAV:		($1,121)			($6,970)			($6,740)		
Year	Benefits	Costs	Present Values	Benefits	Costs	Present Values	Benefits	Costs	Present Values	
-2	$480,480	$480,480	$0	$480,480	$480,480	$0	$480,480	$480,480	$0	
-1	$7,547,997	$ 7,547,997	$0	$7,547,997	$7,547,997	$0	$7,547,997	$7,547,997	$0	
1	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	
25	$5,000	$65,000	($29,540)	$5,000	$65,000	($29,540)	$5,000	$65,000	($29,540)	
26	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	
50	$5,000	$5,000	$0	$5,000	$764,000	($183,971)	$5,000	$764,000	($183,971)	
51	$0	$0	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	
75	$0	$0	$0	$5,000	$5,000	$0	$5,000	$65,000	($7,160)	
76	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
77	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
96	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
97	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
98	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
99	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	
100	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	

Note: this is a compressed jpeg image of the actual Excel spreadsheet; intervening years between years 1 and 25, 26 and 50, 51 and 75 and 76 and 96 have been hidden solely for the purpose of truncating the table for presentation purposes; all of the hidden cells contain contents equal to the unhidden row above them.

Landrights. NRCS policy regarding minimum landrights for potentially floodpool impacted areas upstream of the dam require the local sponsors to acquire an easement for all area below the top of dam, unless the plan allows for a lower elevation. When a lower elevation for floodpool easement acquisition is supported, this elevation can never be set below the 100-year storm event flood level nor below the crest of the auxiliary spillway elevation whichever is higher. Prior to construction of Cherrystone Creek Site 2A in 1969, the local sponsors acquired easements for the construction, operation, and maintenance of the dam. SCS policy in that time required the acquisition of easements for the floodpool upstream of the dam to the crest of the auxiliary spillway as a minimum.

Planning principles were used to conduct an analysis of the risk associated with the potential for induced flooding due to floodpool water levels during storm events and the potential cost of meeting current top of dam easement policy. The difference between the existing floodpool easement elevation (699.8 ft.) and the elevation of the floodpool associated with a PMP event (707.72 ft. as compared to the top of dam elevation of 707.40 ft.) was used to estimate potential structure and content damages if built upstream of the dam and potentially in harm's way (with points of water entry below the top of dam). At the current time (after 50 years of existence) there aren't any properties located within the floodpool. Ten homes were assumed to exist in the floodpool with an average water depth from a PMP event of 3.84 ft. as an initial assumption to attempt to estimate potential risk if homes were built between the 100-year storm elevation and the top of dam elevation.

Initial Assumed Waterfront Homes at Risk of Floodpool Flooding

Flood-pool House #	Pt. of water entry elev.	Flood-pool House #	Pt. of water entry elev.
1	703.6	6	703.6
2	703.6	7	703.6
3	703.6	8	703.6
4	703.6	9	703.6
5	703.6	10	703.6
Average point of water entry elevation			703.6

A set of assumptions were used to estimate: 1) the cost of easements for the added 17 acres of land (easement encumbrance costs assumed at $5,000/acre and legal fees assumed at $5,000/parcel for each parcel owner); 2) the value of potential built-out residences and associated contents on the 22 identified parcels ($158,800 average value); and 3) estimated damages from all storm events (as represented by the following specific modeled storms: 100, 200, 500, 1,000 year and PMP event for the with rehabilitation conditions) based upon an average flood depth of 3.84ft. The associated average annual damages for all storm events were estimated to be $705. The estimated average annual cost for acquiring additional easements to the top of dam, including administrative costs (legal and deed restriction recording fees) were estimated to be $6,050. The resulting benefit/cost ratio comparing average annual costs for all storm events induced from floodpool damages (average annual value of floodpool damages avoided) vs. average annual cost for establishment of the added easements (cost to avoid possible damages); mathematically: average annual cost of the potential floodpool damages without easements divided by the average annual cost of establishing the easements) came out to 0.12:1; an extremely low B/C ratio. Alternatively expressed, for every $1 in benefits (damages avoided), over $8 would have to be expended to acquire full extension of easements to the top of the dam.

In addition, a worst-case scenario analysis could be developed which would take into account potential build-out of many additional parcels resulting from future development but was deemed unnecessary given that the cost side of the analysis would increase, but the benefits (damages avoided) would likely increase more slowly, if at all.

Cherrystone Lake has 14 homes built on 14 lots out of 70 total parcels on 125 total acres which happened over 50 years. This is not a site with high risk of build-out over the evaluation period and Cherrystone 2A is even less of a threat for build-out over the next 50 years. Currently at Dam No. 2A, there are 22 parcels on 17 total acres potentially impacted by the floodpool risk for a PMP event and there aren't any homes built in the risk area.

Cherrystone Site 2A - Floodpool water surface elevations and flood depths by storm event

Storm Event	After rehab. Floodpool elevations	Ave. pt. of H20 entry	Ave. Flood Depth	Structure damages (%)	Content damages (%)
100-year	700.58	703.6	-3.02	0.0%	0.0%
200-year	701.34	703.6	-2.26	0.0%	0.0%
500-year	702.35	703.6	-1.25	0.0%	0.0%
1,000-year	703.15	703.6	-0.45	5.6%	3.9%
10,000-year	707.44	703.6	3.84	34.1%	44.2%

This analysis along with alternatives for managing floodpool risk and a table intended to communicate/educate regarding probabilities of occurrence (see table below) were presented to the local sponsors. The alternatives presented in no particular order were: 1) do nothing, i.e., accept the potential risk and possible associated implications whatever they might be including the risk of litigation; 2) acquire easements to the top of the dam; 3) Procure an insurance policy explicitly for the floodpool risk; 4) attempt to acquire a waiver of the risk from all landowners for the existing parcels; and/or 5) pass a setback ordinance preventing future development below the top of dam.

Storm Event Recurrence Intervals and Probabilities of Occurrences									
Recurrence interval, in years (n)	Probability of occurrence in any given year (in English)	Percent chance of occurrence in any given year (p = 1/n)	Annual exceedance probability (AEP) (p = between 0 - 1)	Probability of occurrence in any given year (between 0 & 1)	Probability of occurrence at least once over 30 years $(1 - (1 - p)^n)$	Probability of occurrence at least once over 50 years $(1 - (1 - p)^n)$	Probability of occurrence at least once over 70 years $(1 - (1 - p)^n)$	Probability of occurrence at least once over 100 years $(1 - (1 - p)^n)$	Likeli-hood (in English)
10,000	1 in 10,000	0.01%	0.0001	0.0001	0.3%	0.5%	0.7%	1.0%	Unlikely
5,000	1 in 5,000	0.02%	0.0002	0.0002	0.6%	1.0%	1.4%	2.0%	
2,500	1 in 2,500	0.04%	0.0004	0.0004	1.2%	2.0%	2.8%	3.9%	
1,000	1 in 1,000	0.10%	0.001	0.001	3.0%	4.9%	6.8%	9.5%	
500	1 in 500	0.20%	0.002	0.002	5.8%	9.5%	13.1%	18.1%	
200	1 in 200	0.50%	0.005	0.005	14.0%	22.2%	29.6%	39.4%	
100	1 in 100	1.00%	0.010	0.010	26.0%	39.5%	50.5%	63.4%	Occasional
75	1 in 75	1.33%	0.013	0.013	33.1%	48.9%	60.9%	73.9%	
50	1 in 50	2.00%	0.020	0.02	45.5%	63.6%	75.7%	86.7%	
25	1 in 25	4.00%	0.040	0.04	70.6%	87.0%	94.3%	98.3%	
20	1 in 20	5.00%	0.050	0.05	78.5%	92.3%	97.2%	99.4%	
10	1 in 10	10.00%	0.10	0.10	95.8%	99.5%	99.9%	100.0%	Highly Likely
5	1 in 5	20.00%	0.20	0.20	99.9%	100.0%	100.0%	100.0%	
2	1 in 2	50.00%	0.50	0.50	100.0%	100.0%	100.0%	100.0%	
1	1 in 1	100.00%	1.00	1.00	100.0%	100.0%	100.0%	100.0%	

Note: all definitions of individual storm events are interpretations from past historical storms. What constitutes a given storm event is a function of the volume of rainfall, over a defined period of time, and the volume of associated run-off. These defining characteristics can change over time as data from new storms is collected and analyzed. The results can lead to revisions to what constitutes a given storm event; To put the information about high-intensity/low-probability storm events, e.g., 1,000year events and larger, into perspective, note that over the course of a typical 30 year mortgage, a 1,000year event has a 3% chance of occurrence which is 30 times greater than the probability of such an event happening in any single year and a 4.9% chance of occurrence over the expected useful life of Cherrystone Site 2A – Roaring Fork Lake.

The local sponsors have existing easements to the elevation of the 100-year storm event flow through the auxiliary spillway. The local sponsors have determined that acquisition of additional easement area to meet current NRCS policy to the top of dam (elevation 707.4 feet NAVD88) would require a significant added cost. The sponsors opted to not acquire the added easements

given the risk/cost comparison, i.e., relatively high current cost of potential damage avoidance for an area that is undeveloped.

Recreational activities around and on the reservoir will be impacted during construction but are expected to return to before construction levels once the rehabilitation is completed. No new investments in recreational facilities are planned and recreation benefits are not claimed as a part of project benefits. Therefore, incidental recreation occurring as part of the site is expected to continue but was not evaluated and no recreation benefits are included in the economics tables. Since recreation is not a planned purpose for this project, all costs for incidental recreation will be paid with non-federal funds.

Water Supply Purpose: In March 2019, at the request of the Sponsors, NRCS added Municipal and Industrial (M&I) water supply as a purpose of the Cherrystone Creek Dam 2A.

ENVIRONMENTAL CONDITIONS

Threatened and Endangered Species

For Federally listed species, NRCS obtained the Official Species List from the U.S. Fish and Wildlife Service (USFWS) on March 26, 2018 via the online Information, Planning and Conservation (IPaC) system, https://ecos.fws.gov/ipac/. Using the search tool http://dgif-virginia.maps.arcgis.com/apps/webappviewer/index.html?id=32ea4ee4935942c092e41ddcd19e5ec5, NRCS found no recorded NLEB hibernacula or maternity roost trees for NLEB within Pittsylvania County. Therefore, as stated in the Final 4(d) rule on the NLEB, any incidental take that may result from the project is exempted by the 4(d) rule.

In December, 2017 the NRCS performed a search of the Virginia Department of Game and Inland Fisheries (VDGIF) Virginia Fish and Wildlife Information Service (VAFWIS) database, http://vafwis.org/fwis/, to identify potential species that may be present in the affected environment for the proposed action.

Water Quality

Water quality data was taken from the Virginia Final 2016 305(b)/303(d) Integrated Water Quality Assessment and Impaired Waters Report released on April 02, 2018.

Wetlands

A wetland investigation for Roaring Fork Lake was completed during the growing season of 2017. Prior to conducting fieldwork, an off-site evaluation was completed. NRCS consulted the USGS 7.5-minute Topographical Quadrangle Map, the National Wetlands Inventory Interactive Mapper (NWI) website administered by the USFWS, and soil survey information provided by NRCS. Fieldwork was conducted using methods as outlined in the *1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0).*

Fish and Wildlife

A fish survey was completed on May 18, 2017 by fisheries biologists from the Virginia Department of Game and Inland Fisheries (VDGIF) the request of the NRCS to investigate high turbidity levels in the reservoir. The goal of the investigation was to determine fish species present in the lake and determine if there was a correlation between the fish and persistent turbidity in the water column. Fish collections were made using a boat electrofishing unit around the perimeter of the lake. All fish species were collected in the first of three electrofishing runs while only carp and white suckers were collected in the remaining two runs. Much of the lake shoreline was shallow (< 3 feet) with abundant sediment, surface water temperature was measured at 22° C, and the water was muddy/murky in color.

Eight fish species were collected including largemouth bass, bluegill, redear sunfish, black crappie, brown bullhead catfish, golden shiner, white sucker, and common carp.

The investigation identified one species that is likely causing most of the persistent high turbidity, common carp. Another species found, white sucker, may also be contributing to some of the high turbidity but is not likely the primary contributor of the problem. Both species are in direct contact with the lake bottom and continually disturb the soft shallow sediments while feeding. Common carp are much larger, disturb much more sediments, and are known to cause persistent suspension of solids in the water column.