FINAL

Supplemental Watershed Plan No. 2 and Environmental Assessment

for the

Rehabilitation of Floodwater Retarding Structure No. 1 (Cherrystone 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. 2 & Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 1 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. 1 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. 1, Cherrystone Lake, does not presently meet Natural Resources Conservation Service (NRCS) standards for integrity or capacity of a vegetated earth auxiliary spillway. In addition, the footer of the principal spillway riser does not meet NRCS seismic stability criteria. The selected plan is to rehabilitate Cherrystone Creek Dam No. 1 to meet current NRCS criteria and maintain the water supply and existing level of downstream flood protection. The plan is to install a 165-foot-wide roller-compacted concrete (RCC) chute spillway over the dam and block the existing auxiliary spillway with an earthen berm. Additional fill material will be placed on the embankment to address stability issues and widen the top of dam. Replacement of the riser and outlet structure is required. New toe drains will be installed in the embankment and the Hodnetts Mill Road culvert downstream of the dam will be replaced. 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 $12,968,300 of which $8,859,000 will be paid from the Small Watershed Rehabilitation funds and $4,109,300 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. 2)

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, 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. 1 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, through the cooperative efforts of the Sponsors and NRCS, a Supplemental Watershed Plan and Environmental Assessment has been developed to rehabilitate the Cherrystone Creek Dam No. 1, Commonwealth of Virginia, hereinafter referred to as the Plan, which Plan is annexed to and made a part of this agreement; and

Whereas, in order to provide for rehabilitation of the Cherrystone Creek Dam No. 1, it has become necessary to modify the Supplemental Watershed Plan 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. **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. NRCS policy regarding minimum landrights for areas upstream of the dam requires the local sponsors to acquire an easement for all areas below the top of dam, unless the plan explicitly allows for a lower elevation. The existing easements are for the construction, operation, and maintenance of the dam, and water storage. An economic and risk analysis was conducted to inform the Sponsors of their associated potential for risk of flood damages. The Sponsors acknowledge and accept the potential risk of flood damages for the real property between the auxiliary spillway crest elevation and the top of dam elevation. The three residences located below the crest of the auxiliary spillway will be removed or floodproofed by the Sponsors. Future development, structures, and/or buildings below the crest of the auxiliary spillway (elevation 682.0) will be restricted.
4. **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.

5. **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-Shareable Items	**Percent**	**Cost**	**Percent**	**Cost**	**Cost**
Rehabilitation of the dam (construction costs):	67%	$7,626,000	33%	$3,516,200	$11,142,200
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%	$511,600	$511,600
Subtotals: Cost-Shareable Costs: Cost-Share Percentages:[a/]	(65%)	**$7,626,000**	(35%)	**$4,106,300**	**$11,732,300** (100%)
Non Cost-Shareable Items (per PL-83-566 and NRCS policy)[b/]	---	---	---	---	---
NRCS Engineering and Project Administration Costs:	100%	$1,233,000	n/a	n/a	$1,233,000
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-Shareable Costs:	**100%**	**$1,233,000**	**100%**	**$3,000**	**$1,236,000**
Total Cost-Shareable Cost:	**n/a**	**$7,626,000**	**n/a**	**$4,106,300**	**$11,732,300**
Total Installation Cost:	**n/a**	**$8,859,000**	**n/a**	**$4,109,300**	**$12,968,300**

a/ The maximum NRCS cost-share is 65% of the cost-shareable 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-shareable item expenditures vary from these estimates, the responsible party will bear the change in costs.

6. **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 51% of the drainage area above Cherrystone Creek Dam No. 1 is wooded with another 32% in pasture and hayland. Thus, there is no requirement for the Sponsors to obtain agreements for protection of the upstream watershed.

7. **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.

8. **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.

9. **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.

10. **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.

11. **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.

12. **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.

13. **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.

14. **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.

15. **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.

16. **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.

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    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.

17. **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.

18. 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.

19. 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.

20. 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 subagreement.

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 subagreement.

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 subagreement. 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.

21. **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.

22. **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.

23. **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.

24. **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.

25. **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_____ Date: September 25, 2019_____
State Conservationist

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SUMMARY OF SUPPLEMENTAL WATERSHED PLAN NO. 2 AND ENVIRONMENTAL ASSESSMENT
for the
Rehabilitation of Cherrystone Creek Watershed Dam No. 1
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. 1 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. 1, Cherrystone Lake, to meet current Virginia Division of Dam Safety and NRCS safety and performance standards for a high hazard potential dam.

Purpose and Need for Action: Cherrystone Creek Dam No. 1 does not presently meet NRCS standards for the capacity or integrity of a vegetated earth auxiliary spillway. It also does not meet Virginia Division of Dam Safety criteria for capacity. The selected plan is to rehabilitate Cherrystone Creek Dam No. 1 dam to meet current NRCS criteria. 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 current level of water supply. The original design planned for floodwater detention storage at elevation 680.2 for the storm with a 100-year recurrence interval. The as-built auxiliary spillway has a crest elevation of 682.0, which equates to a storm with a frequency of between 150 and 200 years.

Description of Preferred Alternative: The selected plan is to rehabilitate Cherrystone Creek Dam No. 1 to meet current safety and performance standards for a high hazard potential dam, provide sediment storage for at least 50 years after construction, and maintain the existing 850 acre-feet of water supply storage and current level of flood protection downstream. The plan provides for installation of a 165-foot-wide, roller-compacted concrete (RCC) chute spillway over the dam and blockage of the existing auxiliary spillway with an earthen berm. The chute will discharge into an RCC stilling basin. The upstream embankment slope will be flattened to 3:1 and stability berms will be placed on both the upstream and downstream toes. Replacement of the riser and outlet structure and extension of the principal spillway pipe in both the upstream and downstream directions are subsequently required. New toe drains will be installed in the embankment. The Hodnetts Mill Road culvert downstream of the dam will be replaced. 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 significant change in the water resource operations or recreational uses of the lake once construction is complete.

Resource Information:

Location: Latitude: 36.85128054 Longitude: -79.43104504

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 Cherrystone Lake = 9,402 acres

Land Use: Woodland: 4,809 acres, 51.1%
Cropland: 528 acres, 5.6%
Developed: 580 acres, 6.2%%
Hay/Pasture: 3,040 acres, 32.3%
Water: 130 acres, 1.4%
Shrub land: 315 acres: 3.4%

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 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 16 structures within the breach inundation zone: eight homes, seven business structures 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 residential property (structures and contents only, excluding land values) at risk below the dam is an estimated $948,000.

Cherrystone Creek Dam No. 1 provides incidental recreation mainly for the residents who live around the reservoir.

Resource Concerns Identified Through Scoping:

Item/Concern	Rationale
SOILS	
Land Use	Upstream land use is restricted due to operation of the dam.
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.
Regional Water Management Plans	West Piedmont Planning District included Cherrystone Lake in their Regional Water Supply Plan.
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.
HUMANS	
Local and Regional Economy	Temporary benefit during construction.
Potable Water Supply	Only water supply in large part of town/county; have enough water supply for current demand but new industries may require more 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.

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 165-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. Replace the existing impact basin with the RCC stilling basin.

3) *Structural Rehabilitation with Federal Assistance – Reinforced Concrete Labyrinth Weir over the dam.* Install a 64-foot-wide, 320-foot long, one-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. Replace the existing impact basin with a new impact basin constructed downstream of the stability berm.

All the rehabilitation alternatives will require the following modifications:

- Flatten the upstream embankment to 3:1 and install a 24-foot-wide stability berm.
- Widen the top of the dam to 20 feet.
- Stabilize the downstream embankment with a 24-foot-wide stability berm.
- Replace the riser structure, catwalk, and water supply components.
- Extend the principal spillway upstream and downstream of the new embankment toes.
- Install new toe drains.
- Replace the culvert on Hodnetts Mill Road with a concrete arch culvert.

There will be no change in the current levels of flood protection downstream. There will be no significant change in the water supply operations 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	$7,626,000	68%	$3,516,200	32%	$11,142,200	100%
Engineering	$1,208,000	98.5%	$18,500	1.5%	$1,226,500	100%
Relocation	n/a	n/a	n/a	n/a	n/a	n/a
Sponsor Planning	n/a	n/a	$25,000	100%	$25,000	100%
Real Property Rights	n/a	n/a	$511,600	100%	$511,600	100%
Project Administration	$25,000	42%	$35,000	58%	$60,000	100%
Other (permits)	$0	0%	$3,000	100%	$3,000	100%
TOTAL COSTS	**$8,859,000**	**68%**	**$4,109,300**	**32%**	**$12,968,300**	**100%**
Annual O&M (non-Federal)	n/a	n/a	$5,300	100%	$5,300	100%

Project Benefits: Rehabilitation will allow the sponsors to meet the requirements for a high hazard potential dam, reduce the potential for loss of life, continue protection of existing infrastructure downstream of the dam, maintain property values around the reservoir and associated recreational opportunities, and continue to provide 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 Cherrystone 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 loss of life to approximately 150 people that live and/or work in the breach zone.
- Protects 16 structures within the breach inundation zone.
- Provides protection for a significant number of vehicle occupants who utilize nine county roads in the breach inundation zone with a cumulative total average daily traffic count of 6,940.
- Provides recreational benefits (primarily boating and fishing) to property owners.
- Reduces the threat of loss of access and loss of emergency services for 16 structures (eight residences, a water treatment plant, six commercial properties and a barn).
- 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.
- Eliminates the liability associated with continuing to operate an unsafe dam.
- Maintains the existing water supply storage that services 952 taps, supplying about 1,300 town residents and outlying areas, plus 1,000 prisoners at Green Rock Prison.
- Maintains existing stream habitat downstream of the dam.
- Retains the existing aquatic and terrestrial habitat in and around the reservoir.
- Leverages federal resources to install the planned works of improvement.
- Will meet current Virginia Division of Dam Safety and NRCS safety and performance standards for a high hazard potential dam.

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

Net beneficial effects (National Economic Development (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 - $1,145,500 for engineering and project administration; **Year 2** - $87,500 for construction supervision and project administration and $7,626,000 for construction.

Non-Federal funds: Year 1 - $7,000 for engineering and administration, $3,000 for permitting costs, and $511,600 for Real Property Rights; **Year 2** - $46,500 for engineering and project administration and $3,516,200 for construction. (The sponsor planning costs ($25,000) are incurred prior to Year 1)

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. The fishery is expected to fully recover in 3-4 years.

Resource	Impact
Forest Resources	None.
Wetlands	Temporary effects during construction on 121.98 acres of open water wetlands and emergent wetlands. Approximately 0.2 acres of scrub/shrub wetlands below the embankment will be permanently lost and 0.33 acres will be temporarily impacted due to the construction of the stability berm and the toe drains.
Wildlife Habitat	None.
Prime Farmland	No effect.
Cultural Resources	Cherrystone Creek Dam No. 1 and Hodnetts Mill Ruins are present in the project area. Both are potentially eligible for National Register consideration due to their age (50+ years old). NRCS has recommended to the Virginia Department of Historic Resources that the Cherrystone Creek Dam No. 1 be classified as "not eligible" and the Hodnetts Mill Ruins be given a "no adverse effect" determination.
Threatened and Endangered Species	No effect.
Mitigation	Mitigation will be required for the 0.2 acres of wetlands permanently lost below the embankment.

Major Conclusions: In order to bring this dam into compliance with NRCS and State safety and performance standards for a high hazard potential dam, it is necessary to rehabilitate the dam by installing an RCC armored chute spillway over the dam; increasing the stability of the embankment; replacing the riser and appurtenances; installing toe drains; and replacing a road culvert.

There will be no change in the current levels of flood protection downstream. There will be no significant change in the 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. 1, known locally as Cherrystone Lake. This dam was built in 1968 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. This dam also does not meet current USDA Natural Resources Conservation Service (NRCS) safety and performance standards for the integrity and capacity 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 for a high hazard potential dam, continue to provide water supply and the existing level of flood protection for downstream properties, and reduce the risk of loss of human life.

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 Cherrystone 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. 1 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. 1 was constructed as a significant hazard potential dam and is currently classified as a high hazard potential dam. The dam provides flood protection and water supply for the Town of Chatham and parts of Pittsylvania County. However, the vegetated earth auxiliary spillway and the dam embankment do not presently meet NRCS or Virginia Division of Dam Safety standards for a high hazard potential 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 upstream and downstream of the dam; and maintain the current level of water supply.

There is a need to comply with current state and federal safety and performance standards and to continue to provide the current levels of water supply and flood protection. There are eight homes, seven business structures, nine roadways, and other property downstream of this structure within the breach inundation zone. 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. There are three homes upstream of the dam in Zone AE (100-year) and two homes in the Special Flood Hazard Area (500-year).

The reservoir is the primary water source for the community with 850 acre-feet per year of water storage. 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.

The crest of the existing auxiliary spillway (682.0) is at an elevation that completely contains the 100-year storm event (680.2) and almost contains the 200-year storm event (682.95).

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 and one multi-purpose structure (flood protection and water supply) 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 Cherrystone Lake. The Sponsors applied for NRCS assistance with dam rehabilitation on October 1, 2013. The rehabilitation of Cherrystone Creek Dam No. 1 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 potential and issued a Conditional Operation and Maintenance (O&M) Certificate to the Town of Chatham. The conditional certificate for Cherrystone Lake 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 presence of an unresolved conditional certificate leaves the Sponsors vulnerable to liability should the dam breach and downstream damages result. 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.

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. 1. The vegetated earth auxiliary did not meet the NRCS or Virginia Division of Dam Safety criteria for capacity with the Probable Maximum Precipitation

(PMP) in effect at that time. In 2013, Hurt and Proffitt evaluated options for increasing the auxiliary spillway capacity. Further analysis indicated that the soil materials in the auxiliary spillway would be vulnerable to erosion in the PMF event. Therefore, the vegetated earth auxiliary spillway also does not meet NRCS criteria for integrity.

Landrights and Easements: Over the last several years, there have been fourteen homes built around the reservoir. Current surveys show that three homes have their first floors or points of entry below the crest of the auxiliary spillway elevation. There are seven other homes located between the crest of the auxiliary spillway and the top of dam elevation. The other four homes are above the top of dam 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 Cherrystone Lake provides in flood protection benefits, particularly for the roads. Cherrystone Lake controls 14.69 square miles (9,402 acres) of the watershed above the affected properties and benefitted area for frequent flood events.

Erosion and Sedimentation: As of 2015, when the sediment survey was completed, Cherrystone Lake had reached 46 years (46%) of its planned 100-year service life. The designed submerged sediment capacity was 242 acre-feet, but the as-built volume was 289 acre-feet due to the removal of extra borrow from the pool area. As of 2015, it is estimated that there were 95 acre-feet of sediment in the pool area which is about 32% of the as-built sediment storage volume. 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 Cherrystone Lake was mentioned at the first public meeting in June 2016 since decommissioning must be considered under the NRCS rehabilitation policy. During the initial watershed meetings, the Sponsors and residents indicated that they were adamantly opposed to decommissioning because of their concern that flooding would increase in the absence of the dam and they would lose their water supply. The dam has performed as designed and constructed for about 50 years.

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 existing 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.
- Prevent future construction of inhabitable dwellings upstream of the dam below the crest of the auxiliary spillway crest elevation of 682.0.
- Maintain aquatic and terrestrial habitats around the lake.
- Preserve existing recreation opportunities.

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 similar to those at the Scoping Meeting.

Table A - Summary of Scoping for Rehabilitation of Cherrystone 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 0.1 acres of farmland of statewide importance within the maximum extent of possible ground disturbance.
Land Use	X		Upstream land use is restricted due to operation of the dam.
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 (including coastal zone plans)	X		West Piedmont Planning District included Cherrystone Lake in their Regional Water Supply Plan.
Sole Source Aquifers		X	None present.
Streams, Lakes, and Wetlands	X		Minimize impacts during construction.
Water Quality	X		Minimize sediment transport. Maintain oxygen levels.
Water Resources		X	Addressed under Potable Water.
Wild & Scenic Rivers		X	None present.
AIR			
Air Quality	X		Air quality may be impacted during construction.
Clean Air Act		X	None.
ANIMALS			
Coral Reefs		X	None present.
Endangered and Threatened Species		X	Northern long-eared bat. Check downstream for presence of: Roanoke bass, Roanoke logperch and Orangefin Madtom. None found.
Essential Fish Habitat		X	None present.
Fish and Wildlife	X		Maintain normal flow regime during construction period.
Invasive Species		X	No invasive species identified in watershed.
Migratory Birds/Bald Eagles/Golden Eagles		X	Similar bodies of water are available nearby.
PLANTS			
Endangered and Threatened Species		X	None present.
Forest Resources		X	No impact anticipated.

Item/Concern	Relevant to the Proposed Action		Rationale
Invasive Species	X		Invasive species present around dam. Incorporate best management practices to both prevent the spread of existing invasive species and the introduction of new ones.
Natural Areas		X	None present.
Riparian Areas	X		Temporary impact anticipated during construction.
HUMANS			
Environmental Justice and Civil Rights		X	No disparate treatment is anticipated.
Historic Properties		X	No cultural resources present.
Local and Regional Economy	X		Temporary benefit during construction.
Park Lands		X	None present.
Potable Water Supply	X		Only water supply in large part of town/county; have enough water supply for current demand but new industries may require more water supply.
Public Health and Safety	X		Dam rehabilitation is needed. The dam does not meet current safety standards.
Recreation	X		Draining lake would have temporary impact on property owners and guests during construction.
Scenic Beauty		X	None present.
Scientific Resources		X	None identified.
Social Issues		X	No concerns expressed.

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 camera and riser surveys and geologic drilling. This work included the sediment survey, the hydrologic and hydraulic analysis, and the 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 of Cherrystone Lake is located entirely within Pittsylvania County, Virginia. The total Cherrystone Lake watershed is 9,402 acres (14.69 square miles). Appendix B shows the location map for this watershed. Cherrystone Lake is located on 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 Lake), 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: Cherrystone 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 652 feet at the dam to about 980 feet on an unnamed knob on the watershed divide near the small community of Climax.

Soils: The three major soil map units in the watershed above Cherrystone Lake comprise a total of 69.6%, or 6,539 acres, of the watershed. They consist of Cecil sandy clay loam, 7 to 15 percent slopes, severely eroded; Cecil sandy clay loam, 2 to 7 percent slopes, severely eroded; and Madison fine sandy loam, 15 to 25 percent slopes, according to Web Soil Survey. The area is 9,402 acres and includes floodplain, terrace and side slope landscape positions.

The watershed includes Cecil sandy clay loam, 5,015 acres (53.4%); Madison fine sandy loam, 1,753 acres (18.6%); Clifford sandy loam, 666 acres (7.1%); Cecil sandy loam, 475 acres (5.1%); Enott fine sandy loam, 354 acres (3.8%); Cullen clay loam, 318 acres (3.4%); Chenneby-Toccoa complex, 236 acres (2.5%); Orange loam, 141 acres (1.5%); Water, 138 acres (1.5%); Appling sandy loam, 111 acres (1.2%); State sandy loam, 59 acres (0.6%); Cullen loam, 50 acres (0.5%); and Ashlar fine sandy loam, 40 acres (0.4%). Other smaller soil map units make up the remainder of the acreage in the watershed. Approximately 61.3% of the soils are on slopes greater than 7%.

The NRCS generated a custom soil resource report using the Web Soil Survey Report Tool to identify the soil map unit data specific to the maximum extent of possible ground disturbance for the affected environment.

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. 1 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 on the right abutment of the structure. This formation trends north and south around 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 Cherrystone Lake is 9,402 acres. 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 B contains the land cover map of the watershed.

Table B - Land Use

Land Cover Type	Drainage Area of Cherrystone Lake (ac.)	Percent of Total	Sunny Day Breach Inundation Zone (ac.)	Percent of Total
Developed	580	6.2	92	8.0
Cropland	528	5.6	5	0.4
Woodland	4,809	51.1	777	67.7
Hay/Pasture	3,040	32.3	273	23.8
Water	130	1.4	~0	0
Shrub Land	315	3.4	0	0
Other	0	0	1	0.1
Total	**9,402**	**100.0**	**1,148**	**100.0**

POTABLE WATER SUPPLY

In addition to flood protection for downstream areas, Cherrystone Lake provides 850 acre-feet of water supply storage for the Town of Chatham. On January 29, 2016, the Virginia Department of Environmental Quality issued a Virginia Water Protection Permit to the Town 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 the 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 Cherrystone Lake, in addition to the daily water demands of the Town's service area. The permit was valid for 15 years from date of issuance.

SOCIAL AND ECONOMIC CONDITIONS

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

This table below describes the total population and change in total population for the Town of Chatham, Pittsylvania County, Virginia and the entire U.S. Except for some 2000 Decennial Census data, all other data used in this table are from the 2010-2014 American Community Survey (ACS) of the Census Bureau.

Table C - Population

Population, 2000-2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Population (2014*)	987	62,955	8,185,131	314,107,084
Population (2000)	1,338	61,745	7,078,515	281,421,906
Population Change (2000-2014*)	-351	1,210	1,106,616	32,685,178
Population Percent Change (2000-2014*)	-26.2%	2.0%	15.6%	11.6%
* The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.				

Graph A - Percent Change in Population, 2000-2014.

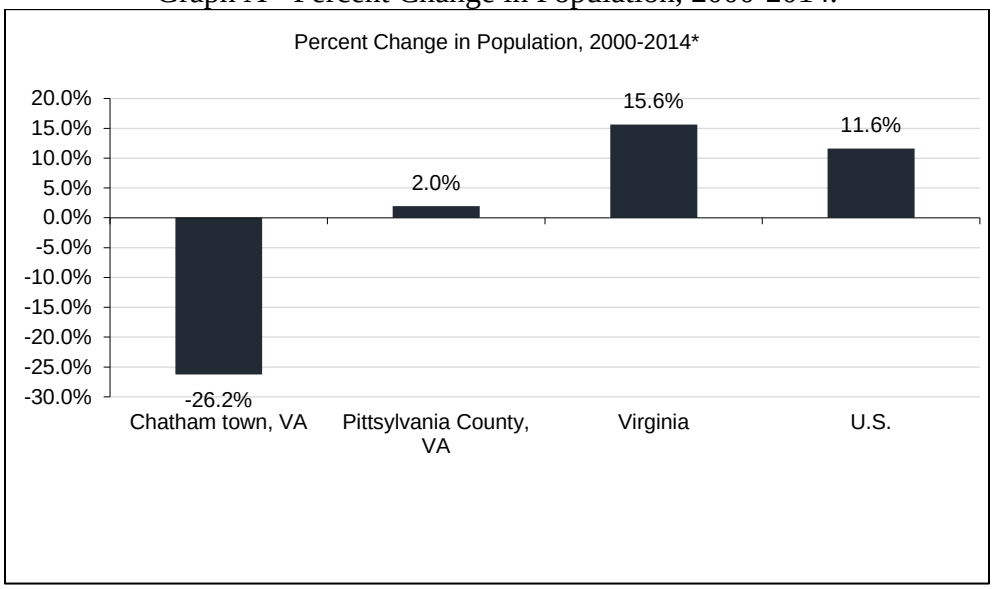
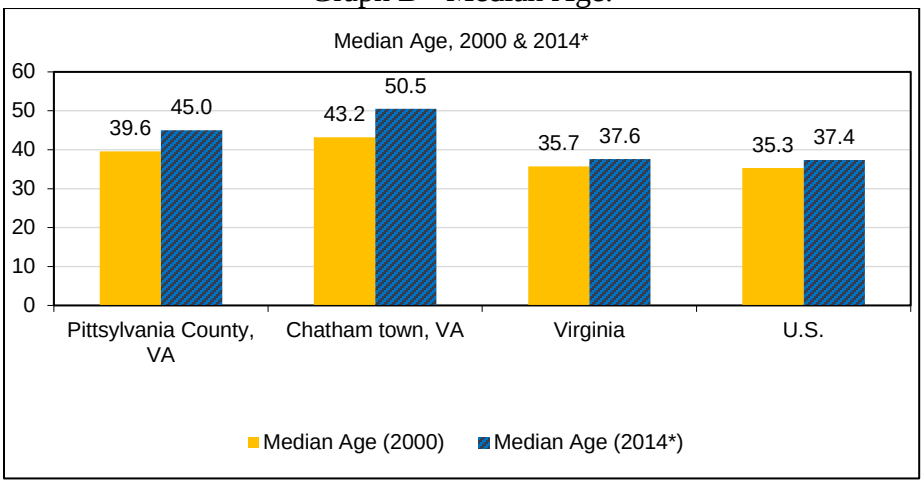


Table D - Population by Race.

Population by Race, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Total Population	987	62,955	8,185,131	314,107,084
White alone	757	47,318	5,668,363	231,849,713
Black or African American alone	186	13,472	1,577,943	39,564,785
American Indian alone	0	19	23,421	2,565,520
Asian alone	0	226	475,632	15,710,659
Native Hawaiian & Other Pacific Is. alone	0	11	5,485	535,761
Some other race alone	2	787	179,166	14,754,895
Two or more races	42	1,122	255,121	9,125,751
Percent of Total				
White alone	76.7%	75.2%	69.3%	73.8%
Black or African American alone	18.8%	21.4%	19.3%	12.6%
American Indian alone	0.0%	0.0%	0.3%	0.8%
Asian alone	0.0%	0.4%	5.8%	5.0%
Native Hawaiian & Other Pacific Is. alone	0.0%	0.0%	0.1%	0.2%
Some other race alone	0.2%	1.3%	2.2%	4.7%
Two or more races	4.3%	1.8%	3.1%	2.9%

* The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.

Graph B - Median Age.



*The age which divides the population into two numerically equal groups; i.e., half the people are younger than this age and half are older.

Table E - Change in Median Age, 2000-2014.

Change in Median Age, 2000-2014	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Median Age (2014)	50.5	45.0	37.6	37.4
Median Age (2000)	43.2	39.6	35.7	35.3
Median Age % Change	16.9%	13.6%	5.3%	5.9%
* The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.				

Table F - How People Self-Identify (Ethnicity).

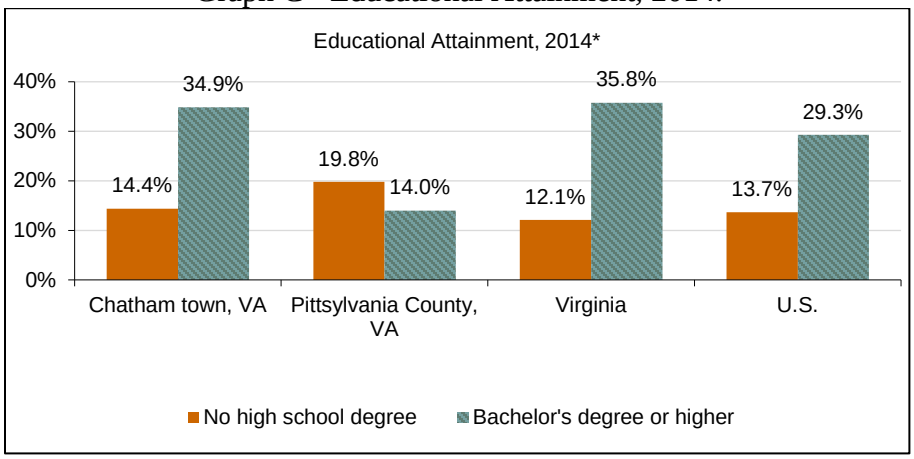
Hispanic Population, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Total Population	987	62,955	8,185,131	314,107,084
Hispanic or Latino (of any race)	27	1,457	687,265	53,070,096
Not Hispanic or Latino	960	61,498	7,497,866	261,036,988
White alone	753	46,757	5,227,415	197,159,492
Black or African American alone	186	13,468	1,549,909	38,460,598
American Indian alone	0	19	17,252	2,082,768
Asian alone	0	226	472,435	15,536,209
Native Hawaiian & Other Pacific Island alone	0	11	4,976	493,155
Some other race	0	9	16,733	611,881
Two or more races	21	1,008	209,146	6,692,885
Percent of Total				
Hispanic or Latino (of any race)	2.7%	2.3%	8.4%	16.9%
Not Hispanic or Latino	97.3%	97.7%	91.6%	83.1%
White alone	76.3%	74.3%	63.9%	62.8%
Black or African American alone	18.8%	21.4%	18.9%	12.2%
American Indian alone	0.0%	0.0%	0.2%	0.7%
Asian alone	0.0%	0.4%	5.8%	4.9%
Native Hawaiian & Other Pacific Island alone	0.0%	0.0%	0.1%	0.2%
Some other race	0.0%	0.0%	0.2%	0.2%
Two or more races	2.1%	1.6%	2.6%	2.1%
* The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.				

Table G - Education.

Educational Attainment, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Total Population 25 years or older	786	45,476	5,501,125	209,056,129
No high school degree	113	8,996	666,397	28,587,748
High school graduate	673	36,480	4,834,728	180,468,381
Associates degree	75	3,901	390,547	16,580,076
Bachelor's degree or higher	274	6,369	1,967,572	61,206,147
Bachelor's degree	119	4,305	1,140,878	38,184,668
Graduate or professional	155	2,064	826,694	23,021,479
Percent of Total				
No high school degree	14.4%	19.8%	12.1%	13.7%
High school graduate	85.6%	80.2%	87.9%	86.3%
Associates degree	9.5%	8.6%	7.1%	7.9%
Bachelor's degree or higher	34.9%	14.0%	35.8%	29.3%
Bachelor's degree	15.1%	9.5%	20.7%	18.3%
Graduate or professional	19.7%	4.5%	15.0%	11.0%

* The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.

Graph C - Educational Attainment, 2014.



Graph D - Employment/Unemployment.

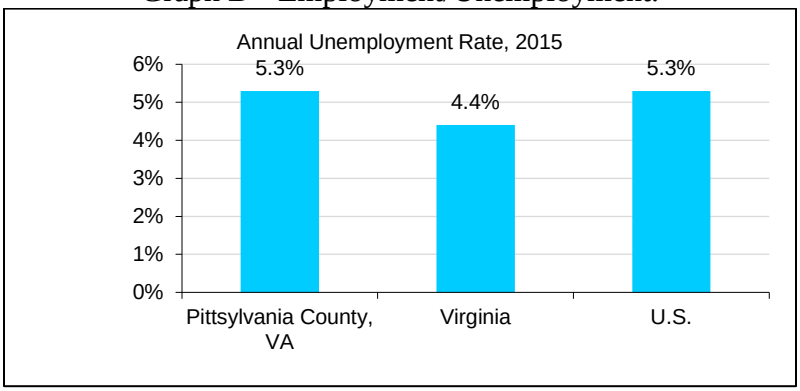
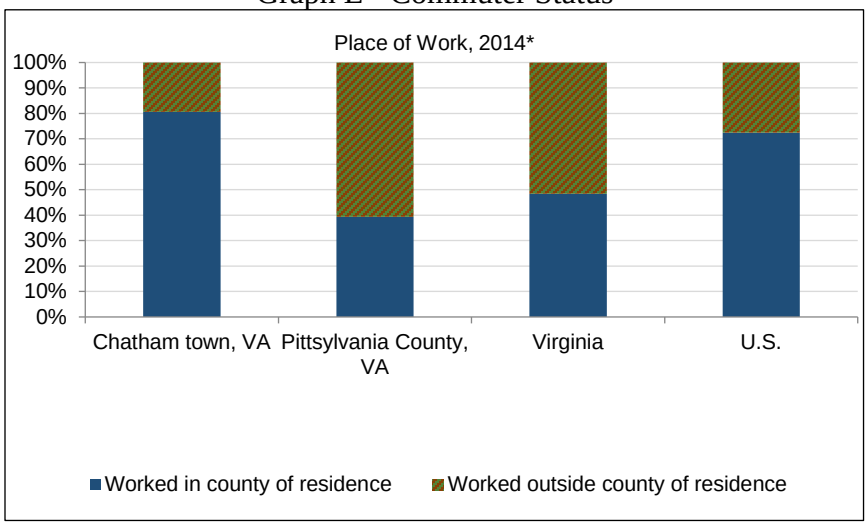


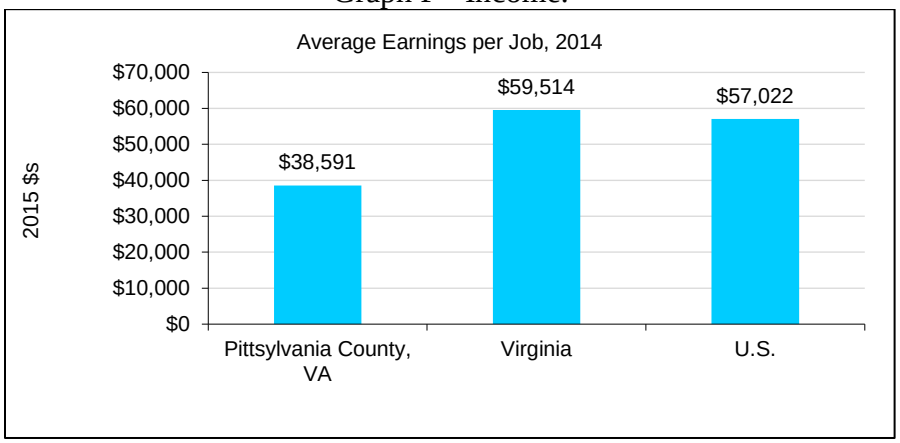
Table H - Class of Worker.

Employment by Industry, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Civilian employed population > 16 years	419	27,623	3,936,638	143,435,233
Ag, forestry, fishing & hunting, mining	0	539	41,440	2,807,292
Construction	30	2,164	253,932	8,843,718
Manufacturing	38	5,778	289,872	14,955,235
Wholesale trade	3	640	75,991	3,937,598
Retail trade	31	3,365	425,312	16,598,718
Transportation, warehousing, and utilities	18	1,275	162,080	7,066,666
Information	27	234	83,835	3,064,078
Finance and insurance, and real estate	17	1,047	249,014	9,467,555
Prof, scientific, mgmt., admin, & waste management	28	1,587	579,393	15,618,627
Education, health care, & social assistance	143	6,474	853,305	33,297,237
Arts, entertain., rec., accommodation, & food	16	1,902	346,714	13,610,162
Other services, except public admin.	33	1,391	206,810	7,112,579
Public administration	35	1,227	368,940	7,055,768
Percent of Total				
Ag, forestry, fishing & hunting, mining	0.0%	2.0%	1.1%	2.0%
Construction	7.2%	7.8%	6.5%	6.2%
Manufacturing	9.1%	20.9%	7.4%	10.4%
Wholesale trade	0.7%	2.3%	1.9%	2.7%
Retail trade	7.4%	12.2%	10.8%	11.6%
Transportation, warehousing, and utilities	4.3%	4.6%	4.1%	4.9%
Information	6.4%	0.8%	2.1%	2.1%
Finance and insurance, and real estate	4.1%	3.8%	6.3%	6.6%
Prof, scientific, mgmt., admin, & waste mgmt.	6.7%	5.7%	14.7%	10.9%
Education, health care, & social assistance	34.1%	23.4%	21.7%	23.2%
Arts, entertain., rec., accommodation, & food	3.8%	6.9%	8.8%	9.5%
Other services, except public admin.	7.9%	5.0%	5.3%	5.0%
Public administration	8.4%	4.4%	9.4%	4.9%
* The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.				

Graph E - Commuter Status



Graph F - Income.



Graph G - Per Capita Income, 2014.

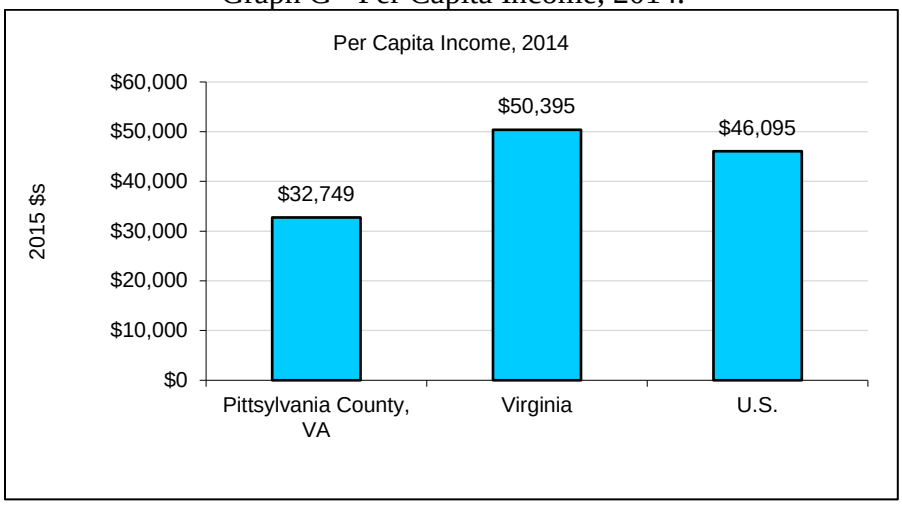


Table I - Income.

Income, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Median Family Income (pt. where ½ are above and ½ are below)	$80,625	$51,134	$77,939	$65,443
Median Family Income as a % of VA's Median Family Income	103.4%	65.6%	100%	84%
Mean Family Income (average)	$84,583	$59,725	$102,254	$86,963
Median Household Income	$45,000	$42,311	$64,792	$53,482
Median Household Income as a % of Virginia's Median Household Income	69.5%	65.3%	100%	82.5%
Mean Household Income	$66,324	$51,725	$88,413	$74,596
Per Capita Income (per person)	$27,849	$21,615	$33,958	$28,555
Per Capita Income as a % of Virginia's Per Capita Income	82%	63.7%	100%	84.1%
Mean Retirement Income	$30,280	$15,884	$29,144	$24,095
Mean Social Security Income	$17,299	$9,209	$17,750	$17,636
Mean Social Security Income as a % of Virginia's Mean Social Security Income	97.5%	51.9%	100%	99.4%
Number with Food Stamp/SNAP benefits in the last 12 months	59	3,984	290,122	15,089,358
% of Households with Food Stamp/SNAP benefits in the last 12 months	14.5%	15.3%	9.5%	13.0%
% Households with Food Stamp/SNAP benefits in the last 12 months as a % of Virginia's Households with Food Stamp/SNAP benefits in the last 12 months	152.6%	161.1%	100%	136.8%
* The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.				

Note: Median family income is consistently higher than median household income. This is because the household universe includes people who live alone. Their income would typically be lower than family income because by definition, a family must have two or more people.

Table J - Income Distribution.

Household Income Distribution, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Per Capita Income (2014 $s)	$27,849	$21,615	$33,958	$28,555
Median Household Income (2014 $s)	$45,000	$42,311	$64,792	$53,482
Total Households	406	26,029	3,041,710	116,211,092
Less than $10,000	11	2,053	174,239	8,395,338
$10,000 to $14,999	46	1,814	126,073	6,189,386
$15,000 to $24,999	43	3,524	255,915	12,402,928
$25,000 to $34,999	53	3,385	260,129	11,870,709
$35,000 to $49,999	71	4,481	371,336	15,681,133
$50,000 to $74,999	29	5,009	527,514	20,719,319
$75,000 to $99,999	65	2,977	388,971	14,125,429
$100,000 to $149,999	52	2,069	477,069	15,123,755
$150,000 to $199,999	15	516	218,333	5,857,717
$200,000 or more	21	201	242,131	5,845,378
Gini Coefficient^	0.44	0.41	0.46	0.48
Percent of Total				
Less than $10,000	2.7%	7.9%	5.7%	7.2%
$10,000 to $14,999	11.3%	7.0%	4.1%	5.3%
$15,000 to $24,999	10.6%	13.5%	8.4%	10.7%
$25,000 to $34,999	13.1%	13.0%	8.6%	10.2%
$35,000 to $49,999	17.5%	17.2%	12.2%	13.5%
$50,000 to $74,999	7.1%	19.2%	17.3%	17.8%
$75,000 to $99,999	16.0%	11.4%	12.8%	12.2%
$100,000 to $149,999	12.8%	7.9%	15.7%	13.0%
$150,000 to $199,999	3.7%	2.0%	7.2%	5.0%
$200,000 or more	5.2%	0.8%	8.0%	5.0%

^ Gini Coefficient: A summary value of the inequality of income distribution. A value of 0 represents perfect equality and a value of 1 represents perfect inequality. The lower the Gini coefficient, the more equal the income distribution.
* The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.

Graph H - Household Income Distribution, Chatham Town, VA, 2014.

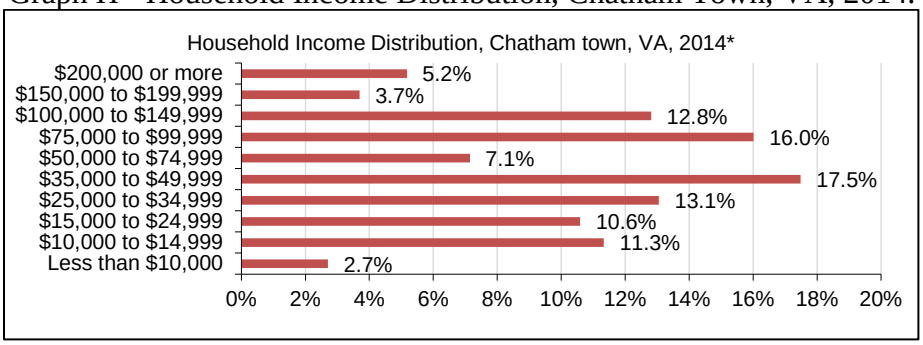


Table K - Poverty.

Poverty, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
People	844	61,936	7,939,332	306,226,394
Families	248	18,209	2,047,106	76,958,064
People Below Poverty	73	9,001	914,237	47,755,606
Families below poverty	23	2,016	168,707	8,824,660
Percent of Total				
People Below Poverty	8.6%	14.5%	11.5%	15.6%
Families below poverty	9.3%	11.1%	8.2%	11.5%

* Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or some unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being "below the poverty level." The data in this table are calculated by ACS using annual surveys conducted during 2010-2014 and are representative of average characteristics during this period.

Graph I - Individuals and Families Below Poverty Level, 2014.

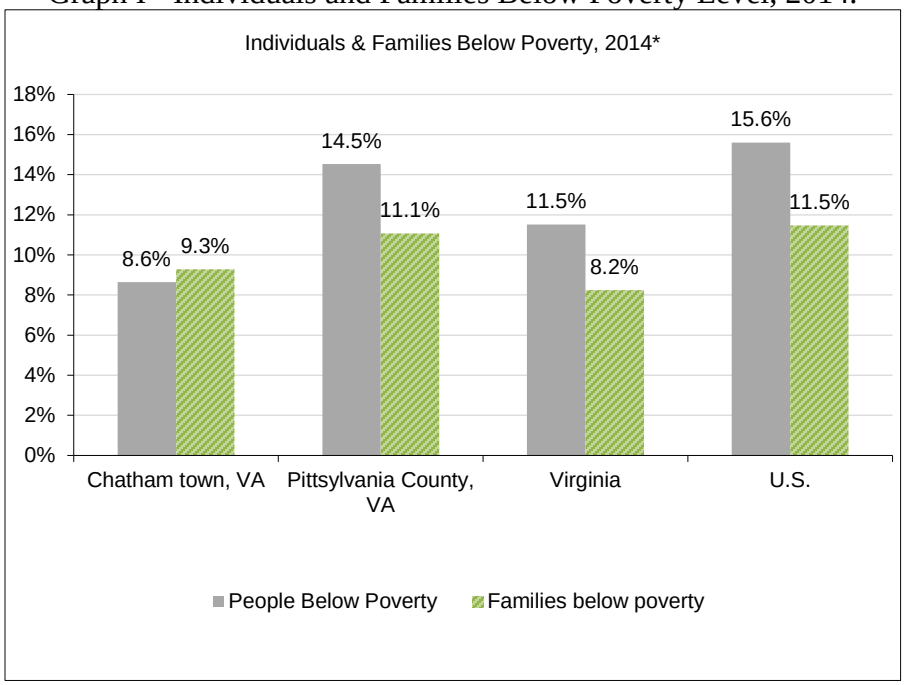


Table L - Poverty Levels by Race and Ethnicity.

Percent of People by Race and Ethnicity Who are Below the Poverty Level, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
White alone	4.7%	11.9%	9.2%	12.8%
Black or African American alone	27.1%	20.6%	20.1%	27.3%
American Indian alone	n/a	0.0%	13.9%	28.8%
Asian alone	n/a	0.0%	8.3%	12.7%
Native Hawaiian & Oceanic alone	n/a	0.0%	11.0%	20.7%
Some other race alone	n/a	52.7%	17.2%	27.1%
Two or more races alone	21.4%	31.6%	13.7%	20.3%
Hispanic or Latino alone	0.0%	34.3%	15.8%	24.8%
Non-Hispanic/Latino alone	4.7%	12.0%	8.6%	10.8%

* Poverty prevalence by race and ethnicity is calculated by dividing the number of people by race in poverty by the total population of that race. Race is a self-identification data item in which Census respondents choose the race or races with which they most closely identify. There are two minimum categories for ethnicity: Hispanic or Latino and Not Hispanic or Latino. The federal government considers race and Hispanic origin to be two separate and distinct concepts. Hispanics and Latinos may be of any race.

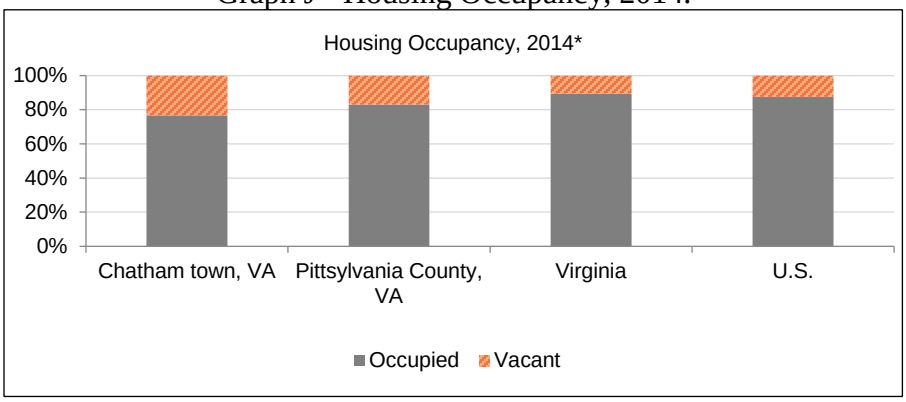
Data Sources: U.S. Department of Commerce. 2015. Census Bureau, American Community Survey Office, Washington, D.C.

Table M - Housing.

Housing Characteristics, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Total Housing Units	529	31,332	3,403,241	132,741,033
Occupied	406	26,029	3,041,710	116,211,092
Vacant	123	5,303	361,531	16,529,941
For rent	0	294	71,372	3,105,361
Rented, not occupied	20	277	25,571	609,396
For sale only	0	303	37,033	1,591,421
Sold, not occupied	4	46	15,302	616,027
Seasonal, recreational, occasional use	11	762	90,757	5,267,667
For migrant workers	0	63	598	34,475
Other vacant	88	3,558	120,898	5,305,594
Year Built				
Built 2005 or later	0	372	42,057	1,315,426
Built 2000 to 2004	3	3,983	544,008	19,803,260
Built 1990 to 1999	11	7,147	545,609	18,512,067
Built 1980 to 1989	19	4,678	577,792	18,346,272
Built 1970 to 1979	36	5,501	562,588	20,978,482
Built 1960 to 1969	79	2,879	383,142	14,626,326
Built 1959 or earlier	381	6,772	748,045	39,159,200
Median year structure built^	1951	1981	1980	1976
Percent of Total				
Occupancy				
Occupied	76.7%	83.1%	89.4%	87.5%
Vacant	23.3%	16.9%	10.6%	12.5%
For rent	0.0%	0.9%	2.1%	2.3%
Rented, not occupied	3.8%	0.9%	0.8%	0.5%
For sale only	0.0%	1.0%	1.1%	1.2%
Sold, not occupied	0.8%	0.1%	0.4%	0.5%
Seasonal, recreational, occasional use	2.1%	2.4%	2.7%	4.0%
For migrant workers	0.0%	0.2%	0.0%	0.0%
Other vacant	16.6%	11.4%	3.6%	4.0%
Year Built				
Built 2005 or later	0.0%	1.2%	1.2%	1.0%
Built 2000 to 2004	0.6%	12.7%	16.0%	14.9%
Built 1990 to 1999	2.1%	22.8%	16.0%	13.9%
Built 1980 to 1989	3.6%	14.9%	17.0%	13.8%
Built 1970 to 1979	6.8%	17.6%	16.5%	15.8%
Built 1960 to 1969	14.9%	9.2%	11.3%	11.0%
Built 1959 or earlier	72.0%	21.6%	22.0%	29.5%

^ Median year structure built is not available for metro/non-metro or regional aggregations.
* The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.

Graph J - Housing Occupancy, 2014.



For the 2010-2014 period, the Town of Chatham had the highest estimated percent for vacant housing, 23.3% (76.7% occupancy rate). Pittsylvania County had a vacancy rate of 16.9% (83.1% occupancy rate); Virginia had a vacancy rate of 10.6% (89.4% occupancy rate) and the nation, as a whole, had a vacancy rate of 12.5% (87.5% occupancy rate).

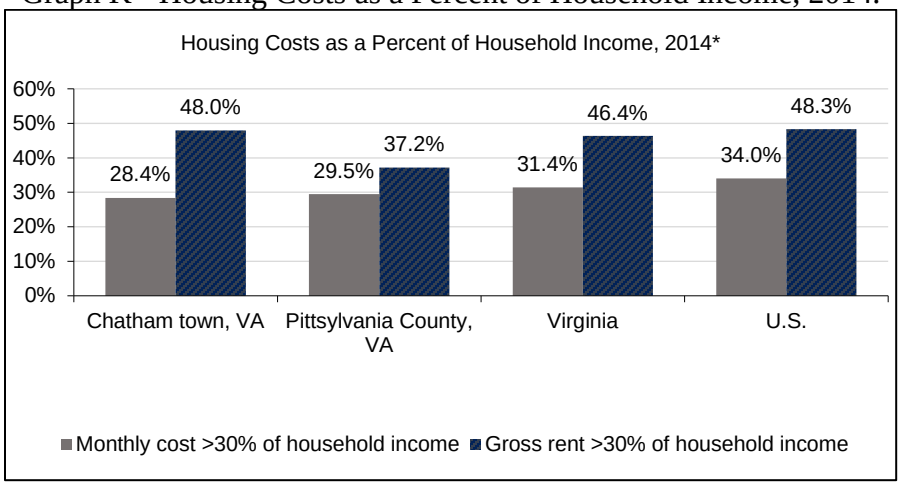
Table N - Housing Costs as a Percent of Household Income, 2014.

Housing Costs as a Percent of Household Income, 2014*	Chatham Town, VA	Pittsylvania County, VA	Virginia	U.S.
Owner-occupied housing w/ a mortgage	169	11,282	1,442,795	49,043,774
Monthly cost <15% of household income	68	2,728	288,862	9,630,439
Monthly cost >30% of household income	48	3,328	453,227	16,687,628
Specified renter-occupied units	123	5,609	1,013,466	41,423,632
Gross rent <15% of household income	9	812	106,841	4,472,954
Gross rent >30% of household income	59	2,084	469,812	20,011,827
Median monthly mortgage cost^	$1,091	$1,015	$1,742	$1,522
Median gross rent^	$601	$612	$1,108	$920
Percent of Total				
Monthly cost <15% of household income	40.2%	24.2%	20.0%	19.6%
Monthly cost >30% of household income	28.4%	29.5%	31.4%	34.0%
Gross rent <15% of household income	7.3%	14.5%	10.5%	10.8%
Gross rent >30% of household income	48.0%	37.2%	46.4%	48.3%

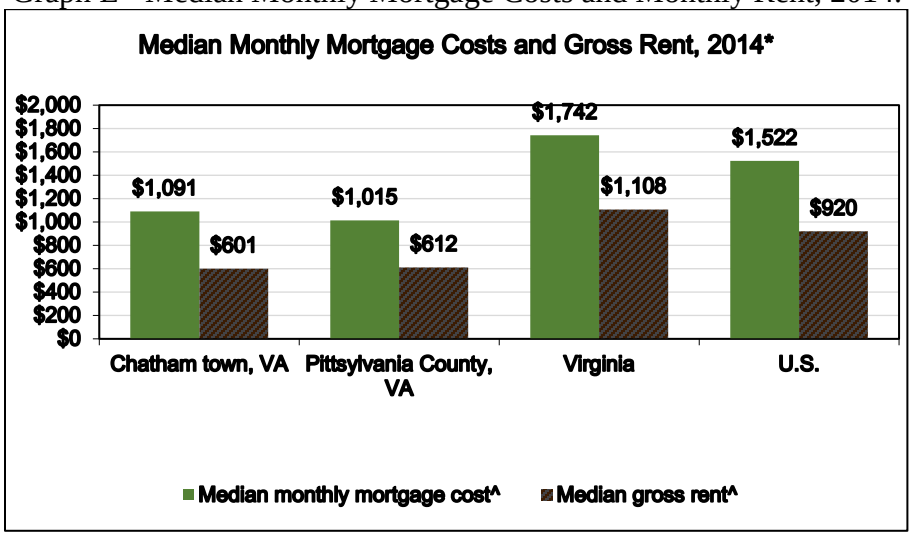
The data in this table are calculated by ACS using annual surveys conducted during 2009-2014 and are representative of average characteristics during this period.

Median monthly mortgage cost and median gross rent are not available for metro/non-metro or regional aggregations.

Graph K - Housing Costs as a Percent of Household Income, 2014.



Graph L - Median Monthly Mortgage Costs and Monthly Rent, 2014.



Eight homes (six single family homes, two mobile homes) are in the projected breach inundation zone below the dam. Most of the homes are in or near the Town of Chatham. Most of the residential property downstream of the dam ranges between $50,000 and $400,000 in total value with an average of about $150,000. The total value of residential property (structures and contents only, excluding land values) at risk below the dam is an estimated $1,650,000.

Recreation

Cherrystone Creek Site 1 provides incidental recreation to residents with homes around the lake and guests and is highly valued. Lake-based recreation and other activities associated with the site include fishing, boating, and bird watching.

SPECIAL ENVIRONMENTAL CONCERNS

SOILS

Prime and unique farmlands, and farmland of statewide importance:

There are no designated prime or unique farmlands within the area of the potential disturbance. There is 0.1 acre of farmland of statewide importance within the area of the potential disturbance.

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 on June 13, 2016, http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/WaterQualityAssessments/2014305(b)303(d)IntegratedReport.aspx#factsheets. It summarizes the water quality conditions in Virginia from January 1, 2007 through December 31, 2012. 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. The report also lists Cherrystone Reservoir as having a Category 5A impairment due to dissolved oxygen not supporting aquatic life and affecting 104.27 reservoir acres which requires a TMDL listing (303d list). The TMDL plan to address this impairment is scheduled for 2022.

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.

Cherrystone Creek is considered to be a water of the U.S. The Permits and Compliance section 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 act 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 121.98 acres of wetlands located within the affected environment of the proposed action.

The Cherrystone Lake shoreline, inflows, and outflow were visually surveyed in May 2017 for wetlands. Palustrine emergent (PEM) wetlands comprise a total of 18.7 acres which include the shorelines and the two inflows of the lake. The 102.7 surface acres of the lake are considered open water wetlands (OW). Approximately 0.58 acres of scrub/shrub wetlands (SS) were identified adjacent downstream of the embankment. 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. According to the Special Flood Hazard Area maps (Appendix C), the flood zone immediately upstream of the dam is within Zone AE and the 500-year floodplain. Zone AE designates a special flood hazard zone that has base flood elevation data (100-yr flood elevations). The Special Flood Hazard Area maps for Cherrystone Creek also includes the 0.2% annual chance of flooding area (500-year). The existing Flood Insurance Rate Maps and Floodplain Ordinances are based upon the dam in place. There are three homes in Zone AE and two homes in the Special Flood Hazard Area upstream of the dam. 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 will identify any state or local permitting that may be required based upon the alternative carried forward for impacts analysis.

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 (VDGF) 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 O.

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 O - 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.

In February 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 Lake Dam No. 1 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 P 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 P – 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 also 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 most significant infestation of invasive plant

species is located on the entire north side of the auxiliary spillway which is thick with Chinese privet with Tree of Heaven mixed in and Japanese stiltgrass in the understory in some areas. See Appendix B-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 Cherrystone Lake. Additional riparian areas are located along the banks of Cherrystone Creek downstream of the dam. Most of the riparian areas along the inflows and perimeter of Cherrystone 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.

HUMANS

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-6 depicts both the extent of ground disturbance during original dam construction in 1968 as well as the maximum possible extent of the APE.

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

On February 17, 2017 and again on December, 05, 2017, 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 site visit at Cherrystone Lake on December 04, 2017. Two potentially eligible historic resources were located, one within the direct APE (Cherrystone Dam No. 1, built in 1968), and one within the indirect APE (Hodnetts Mill). Neither potential historic resource was listed/identified in the Virginia Department of Historic Resources, Virginia Cultural Resource Information System database: However, both Hodnetts Mill ruins (construction date unknown) and Cherrystone Creek Dam No. 1 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.

In February 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 analysis was conducted for the breach inundation zone and associated nearby areas below the dam. 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.

Figure 1. Area evaluated for environmental justice effects.

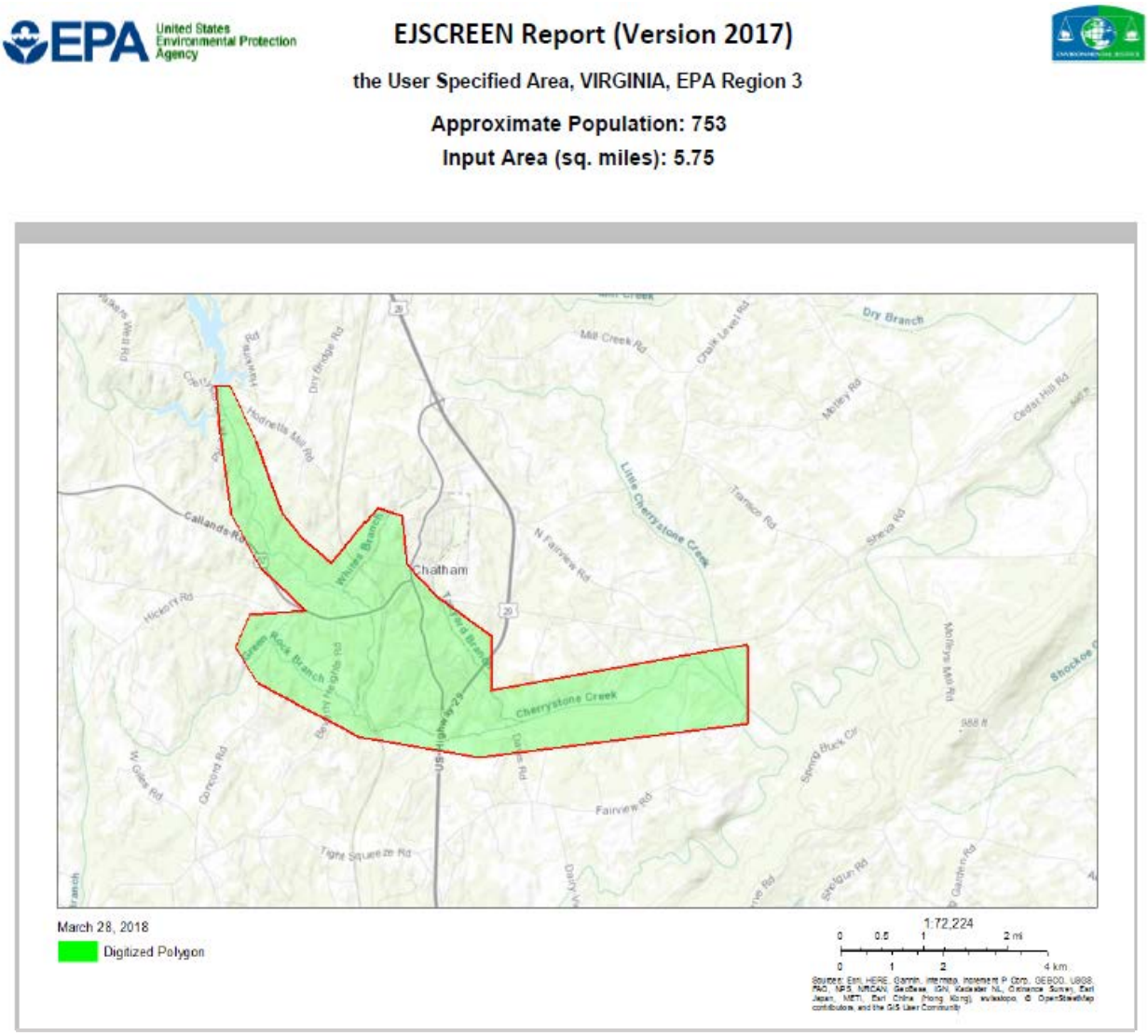


Table Q - Indicators and Groups from EPA's Environmental Justice Tool

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.

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 1968 and "As-Built" drawings are available. The earthen embankment is about 55 feet high, 780 feet long, and is built with about 184,000 cubic yards of excavated earth and rock. The upstream and downstream embankment slopes are 2.5:1. The upstream slope has two berms. The upper berm is eight feet wide and built with rock riprap. The lower berm is 10 feet wide. There are no berms on the downstream slope. The embankment was constructed with two core zones and an outer shell. The primary core zone extends through the foundation material to rock. The earthfill used to construct this zone was described as clayey silt and sandy silt and was obtained from the auxiliary spillway. The second core zone, Zone 3, was constructed of low-plasticity silty sands from Borrow Area A and silty sands and clayey sands from Borrow Area B. Zone 2, the outer shell, was constructed from silty sand from the auxiliary spillway and silty sands from Borrow Area A. A 20-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 17 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 693.9; the normal pool at elevation 661.7 and the auxiliary spillway crest at elevation 682.0.

Principal Spillway: The principal spillway is a 42-inch diameter reinforced concrete pipe, about 280 feet long. The pipe inlet is controlled by a two-stage reinforced concrete riser with interior dimensions of 3.5 feet and 10.5 feet. The riser is 33 feet high. The first-stage inlet is two rectangular orifices, 64 inches by 27 inches. The second-stage inlet is two 10.5 feet long weirs. The riser is equipped with a pond drain, 36 inches in diameter. The principal spillway pipe outlets into a reinforced concrete impact basin. The toe drains also outlet into the impact basin. The 2017 camera survey showed only minor issues with the concrete of the principal spillway riser.

Auxiliary Spillway: The dam's auxiliary spillway is a grassed open channel, 135 feet wide with 3:1 side slopes. The level control section is 30 feet long. The outlet channel slopes at 2.5%. The auxiliary spillway outlets about 360 feet downstream of the dam embankment. When designed as a "Significant" hazard potential class dam, the planned frequency of use was once in 100 years. The existing annual chance frequency is between the 150 and 200-year event.

Internal Drain System: An interior toe drain system was installed 90 feet downstream of the centerline of the embankment. Drain fill was also placed as a diaphragm surrounding the principal spillway conduit approximately 12 feet wide and extending 50 feet downstream from the centerline of the trench drain. The drain fill was graded as aggregate base material with no additional filter. Ten-inch diameter perforated corrugated metal collector pipes were installed. The toe drains exit through the sidewalls of the principal spillway outlet structure.

Appurtenances: The riser is also equipped with water supply equipment and appurtenances. Two water supply gates are installed at different pool elevations, each with a remotely-operated motorized actuator. A structural steel catwalk supported by two reinforced concrete piers and an abutment provides access to the top of the riser. The catwalk and the riser are equipped with safety handrails. A control panel for the water supply equipment and the remote telemetry system is installed on the top of dam opposite the riser. The outlet of the principal spillway pipe is equipped with a flow meter.

Sedimentation: Cherrystone Lake was designed to store 100 years of sediment in the pool area. The designed submerged sediment storage capacity was 242 acre-feet and the water supply storage capacity was 850 acre-feet. The volume of sediment estimated is 95 acre-feet. Approximately 47 acre-feet of additional sediment storage was created when borrow material was excavated for construction of the dam. The available sediment storage volume as of 2015 was 194 acre-feet.

The designed sediment accumulation rate was estimated at 2.42 acre-feet per year for the sediment pool of the reservoir. The calculated historic sedimentation rate from a 2015 survey was 2.06 acre-feet per year. Using the historic rate of sediment deposition, the sediment may impact the water supply storage in 94 years.

The designed aerated sediment storage for the structure is 158 acre-feet. The aerated sediment is material deposited between the normal pool and the crest of the auxiliary spillway during high flows. The designed deposition rate for the aerated sediment was 1.58 acre-feet per year. There was very little evidence of aerated sediment in the fall of 2014 and no visible gravel bars at the inlets to the lake. The aerated sediment deposition rate is estimated at 0.3 acre-feet per year. The aerated sediment for the 46 years prior to 2014 is estimated at 17.75 acre-feet. As of 2014, there is approximately 140 acre-feet of capacity for aerated sediment remaining. At a deposition rate of 0.3 acre-feet of aerated sediment per year, there is room for over 100 more years of aerated sediment deposition.

According to National Agricultural Statistics Service data from 2015, over half of the land cover within the watershed is forested. The forested acreage has changed slightly from 59 percent to 51 percent since the dam was constructed. Cropland has reduced from about 17 percent to 5.6 percent of the watershed and the erosion rate has reduced from as high as 45 tons per acre per year to an average rate of 9 tons per acre per year. Pasture or grassland has increased from 16 percent to 32 percent of the land in the watershed. The future sedimentation rate is projected to decrease further due to landowners converting highly erodible cropland to pasture or hayland.

Identified Deficiencies: NRCS identified five engineering deficiencies associated with the dam.

Slope Stability – The Slope/W component of the GeoStudio design software was used to analyze the stability of the existing upstream and downstream dam slopes. The upstream slope of the dam was evaluated for the potential to fail if the water is drawn down very quickly. The factor of safety for the upstream slope was determined to be 1.159 for the rapid-drawdown condition. This is less than the factor of safety of 1.2 that is required by Technical Release No. 60, Earth Dams and Reservoirs (TR-60). The downstream slope factor of safety for shear strength was determined to be 1.214. TR-60 requires a factor of safety of 1.5 for the downstream slope. The existing dam has a top width of 17 feet which does not meet the required width of 18.4 feet.

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

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

Tailwater – Hodnetts Mill Road (VDOT Route 802) crosses Cherrystone Creek about 1,200 feet downstream from the dam. The water flows through a 72-inch diameter culvert that was installed in 1973 and is currently in good condition. Due to the way that this culvert was installed, the water is sometimes ponded all the way back to the outlet structure of the dam. When this occurs, the outlet of each embankment drain is submerged and water from the drain cannot flow freely. The high tailwater also effects the capacity of the principal spillway pipe.

Hydraulics - The Virginia Division of Dam Safety issued a conditional use certificate in 2008 for Cherrystone 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. During the planning process, NRCS used the new Virginia PMP values to assess the capacity of the auxiliary spillway. These PMP values were lower than those used during the 2008 evaluation, but the auxiliary spillway capacity is not sufficient to meet the new criteria. NRCS also determined that the 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, it would develop gullies that erode upstream. A gully that erodes through the upstream side of the auxiliary spillway crest is considered to have caused a dam breach. The auxiliary spillway did meet the 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 floodpool 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 Cherrystone Lake is too low based on this criterion.

Easements: During the planning process, a sixth problem was identified. In May 2016, Armstrong & Associates conducted additional topographic survey of the auxiliary spillway and the area below the dam. They also conducted the survey of the elevations of the 14 houses located upstream of the dam. The surveys found that there were three houses located below the existing crest of the auxiliary spillway elevation; seven houses located above the auxiliary spillway crest and below the top of dam elevation; and four houses located above the top of the dam. The situation was enabled because the dam is physically located in Pittsylvania County even though it is maintained by the Town of Chatham. The County issued the building permits without knowledge of the existing auxiliary spillway crest and top of dam elevations. The Town of Chatham attorney determined that there has been no change in the easements around the dam and that the easements held by the Sponsors currently are those secured for the original construction. The easements that were obtained provided a right to construct, operate, and maintain the dam and to store water without referring to a specific elevation for the crest of the auxiliary spillway or the top of the dam.

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 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 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 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 R. 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 breach analysis terminated 6.8 miles downstream of the dam.

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.

Table R – As-Built and Existing Structural Data for Cherrystone Lake

	As-Built	Existing
Local Name	Cherrystone Lake	
Site Number	1	
Year Completed	1968	
Cost	$176,208	
Purpose	Flood control and water supply	
Drainage Area, mi^2	14.7	
Dam Height, feet	55.4	
Dam Type	Earthen	
Dam Volume, yds^3	183,733	
Dam Crest Length, feet	788	
Storage Capacity, acre-feet [1/]	4,739	4,494
Submerged Sediment, acre-feet	242	194
Aerated Sediment, acre-feet	158	140
Beneficial Use (M&I water)	850	850
Flood Storage, acre-feet	3,372	3,310
Surface Area, acre	105	102.7
Principal Spillway		
Type	Reinforced Concrete	
Riser Height, feet	33.0	
Conduit Size, inches (I.D.)	42	
Stages, number	2	
Orifice Elevation	661.7	
Riser Crest Elevation	670.2	
Capacity, cubic feet per second	264	
Energy Dissipater	Concrete Impact Basin	
Auxiliary Spillway		
Type	Vegetated Earth	
Width, feet	135	
Capacity, % of PMF		93
Sediment Pool Elevation	650.4	650.2
Water Supply Elevation	661.7	661.7
Floodpool Elevation	680.8	682.0
Top of Dam Elevation	692.1	693.9
Datum	NAVD88	NAVD88

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

Hazard Classification: Cherrystone Lake was originally constructed in 1968 to protect downstream lands from flooding and to provide water supply. It was designed as a significant hazard potential structure with a 100-year design life. Currently, the Virginia Division of Dam Safety has designated Cherrystone Lake as a high hazard potential structure. The breach analysis completed for this Watershed Plan concurs with the current hazard class of the structure.

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 Cherrystone Lake.

Sedimentation: The major land uses in the watershed above the dam are 51.1% Forest, 32.3% Hayland/Pasture, 6.2% Developed/Open Space, 5.6% Cropland, 3.4% Scrubland and 1.4% Water. These uses are not expected to change significantly in the future. The future sediment accumulation rate in Cherrystone Lake is expected to be the same or less than the historic rate due to the conversion of cropland fields with high erosion rates to hayland/pasture fields with much lower erosion rates. Based upon the historic sediment deposition rate of 2.06 acre-feet per year, the remaining sediment storage life of Cherrystone Lake in 2015 was 94 years. Once the sediment pool has lost storage capacity, then sediment will deposit in the water supply pool. The water supply and sediment pools will be filled in about 500 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 integrity and capacity to completely pass the full PMF event. The auxiliary spillway does not have sufficient capacity to prevent overtopping. It also does not have sufficient integrity to withstand the flows from the PMF event and could breach. For this reason, the overall potential for hydrologic failure of Cherrystone 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 Cherrystone 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 Cherrystone 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 50% of its planned 100-year service life. There is a reasonable expectation that it will continue to function as planned for the next 50 years. 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.

Slope Stability: The upstream face of the dam does not meet the required factor of safety for the rapid drawdown condition. In the event of a rapid drawdown, large scale slope failure could reduce the mass of the embankment, resulting in insufficient mass to hold the water back. Rapid drawdown is not likely to occur but if it does, then slope failure is likely. The potential for failure of the embankment due to a slope failure during the rapid drawdown condition is high.

On the downstream slope of the embankment, the 2.5:1 back slope is too steep for the strength of soil. In the event of a slope failure, the phreatic surface could be exposed. This would result in an increase in seepage through the embankment. The potential for a failure due to slope stability on the downstream slope is high.

Conclusion: At the present time, the mostly likely means of failure for the Cherrystone Lake dam are overtopping the dam or breaching the auxiliary spillway during the PMP event. This type of failure could occur at any time during the remaining life of the structure. There is adequate sediment capacity for the next 50 years and there is no evidence of seepage. The site has a high risk for a downstream slope stability failure due to material deterioration of the toe drain and inadequate soil strength of the downstream embankment. The potential for an upstream slope stability failure is high if the water is drawn down rapidly. 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.

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 68,659 acre-feet of water and sediment, beginning with a wall of water that is 18 feet high. A maximum breach discharge of 105,626 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 Cherrystone Lake Dam includes eight homes, four business structures, one industrial business, one commercial building, one barn, and the water treatment plant. Four main roads (Routes 57, 802, 694, and 703) and five secondary roads (Hodnetts Mill Road, Walkers

Well Road, White Street, Moses Mill Road and Beverly Heights Road) are impacted by a potential dam failure.

A breach event would cause significant economic damages to the homes, business structures, barn, roads and bridges below the dam. In addition, the loss of the reservoir would result in a loss of water supply. The residences and business properties at risk in the floodplain subject to a breach of Cherrystone Lake have structure and content values estimated at $1,650,000. A catastrophic breach would result in an estimated $948,000 in economic damages to existing buildings and their contents. The potentially impacted major bridge, culvert, and road embankment infrastructure is valued at $1,029,000. Approximately $788,000 in damages to road crossings could occur in this event. A catastrophic breach of the Cherrystone Lake dam would result in a total estimated $1,736,000 in damages to homes, businesses, 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 14 homes around the lake would lose recreational opportunities and property value.

FORMULATION AND COMPARISON OF ALTERNATIVES

The stated objectives of the Sponsors for the Cherrystone Lake 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 current level of water supply.

FORMULATION PROCESS

Formulation of the alternative rehabilitation plan for Cherrystone 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. 1 into compliance with current dam safety and design criteria. 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

Some 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 they 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 cutting a 220-feet-wide notch in the existing

embankment down to the valley floor. If the dam were removed, the eight homes and seven business structures in the breach zone will no longer be at risk from flooding caused by a breach of the Cherrystone Lake dam. Federal policy requires that the decommissioning alternative address the purpose and need for flood protection. Mitigation of induced damages to the buildings includes relocation or floodproofing the impacted structures. There are no inhabitable structures in the currently effective regulatory 100-year floodplain but one home is in the 500-year floodplain downstream of the dam. The downstream bridges and utilities would have to be protected. The Town would no longer have the public water supply from the reservoir. About 850 acre-feet of water supply would have to be developed or replaced by water wells.

Notching the dam embankment would require removal of about 112,000 cubic yards of material. About 60% of the embankment would be removed. The remaining fill material 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 113 acres of grass would be planted over the dam, pool, and spoil site. Table S lists some of the major components of decommissioning the dam.

The estimated cost of removing the storage capacity of the dam and all appurtenant structures ($6.35 million) and replacing the water supply ($6.15 million) is $12.50 million. This solution would meet the Sponsor requirements but at a higher cost and would require a much longer time to implement all required measures.

Table S – Major Components of Decommissioning the Dam

Items of Work	**Quantities**	**Unit cost**	**Cost**
Fill removal and disposal	112,000 CY	$9.00/CY	$1,008,000
Spoil spreading	112,000 CY	$8.00/CY	$896,000
Topsoil spreading	Lump Sum	$15,000	$15,000
Pollution control	Lump Sum	$215,311	$215,311
Seeding and mulching	112.3 Acres	$3,584/acre	$402,483
Removal of principal spillway pipe, riser, impact basin, and water supply structures	Lump Sum	$227,715	$227,715
Water diversion	Lump Sum	$921,600	$921,600
Reservoir reclamation	Lump Sum	$486,675	$486,675
Surveys, Quality Assurance, and other miscellaneous items, including 30% contingency.	Various		$2,178,746
Total cost of structure removal			**$6,351,530**
Replacement of water supply			$6,151,695
Mitigation for induced damages			$1,060,000
Total cost of decommissioning			**$13,563,225**

Note: Mitigation of induced damages and foregone incidental recreation costs were not examined in detail since the decommissioning cost without them exceeded the cost of rehabilitation. Mitigation of induced damages to the roads would be very difficult logistically.

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, floodproofing, or relocating the 16 structures in the breach zone of the dam would cost more than $1,060,000 and will not change the need for rehabilitation of the dam identified by the State Division of Dam Safety and NRCS. Therefore, 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 Cherrystone 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 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 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 $11,142,200. The total project cost would be $12,943,300.

Alternatives With Federal Assistance

There are six identified deficiencies or problems with the Cherrystone Lake Dam. The solution to issues 1-5, detailed below, are identical for each of the possible alternatives identified as potential solutions for the needed modifications to the auxiliary spillway.

Issue 1 - Slope Stability. The upstream slope will be flattened from 2.5:1 to 3:1 and a 24 feet wide berm will be added to meet the necessary slope stability criteria. The top of dam will be widened from 17 to 20 feet. A 24-foot-wide stability berm will be added at the base of the downstream slope. See Figure C-1. The earth material for the slopes will be excavated from the embankment during installation of the structural auxiliary spillway.

A new riser will be constructed at the toe of the new berm and the principal spillway outlet structure will be moved downstream to the toe of the new berm. The principal spillway pipe would be extended both directions. The catwalk to the riser would be replaced.

The lake will have to be drained to allow the modifications to the embankment, riser, and impact basin.

Issue 2 - Embankment Drainage. A new toe drain and filter will be installed downstream of the existing drain and beneath the new downstream berm. 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. See Figure C-2 for details of the embankment, toe drains, and culvert upgrades.

Issue 3 - Seismic Stability of Riser. Although only the footer needs retrofitting, the addition of the new stability berm requires relocation and replacement of the riser. Also, the footer of each existing catwalk pier will require modification for seismic stability. Both existing catwalk piers will remain, and the catwalk extended to the new riser.

Issue 4 – Tailwater. Replace the Hodnetts Mill Road pipe culvert with a concrete, open-bottom culvert at the correct elevation. It will be 6 feet high, 20 feet wide, and 50 feet long. The estimated cost of replacement is $257,800.

Issue 5 – Landrights/Easements. The Sponsors still hold the same easements that were certified to NRCS in 1967 prior to the original construction. These easements are specific to activities related to the construction, operation, and maintenance of the dam and the storage of water. 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. Therefore, the Sponsors acknowledge and accept the potential risk of flood damages for the real property between the crest of the auxiliary spillway (elevation 682.0) and the top of dam

(elevation 693.9). The auxiliary spillway elevation is 0.9 feet lower than the 200-year flood elevation. The seven houses that are currently located between the crest of the auxiliary spillway and the top of dam elevations will be left as they are now without alteration. The three houses that are currently located below the auxiliary spillway crest elevation will be floodproofed or otherwise protected from damage to the auxiliary spillway crest elevation. The estimated cost to the Sponsors is $253,800. No habitable dwellings will be allowed below the crest of the auxiliary spillway (elevation 682.0) in the future.

Issue 6 – Inadequate capacity and integrity in the vegetated earth auxiliary spillway. There is no practical way 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. Widening the auxiliary spillway to 165 feet will change the water surface elevation at the first downstream crossing by 0.09 feet for the 500-year event. Therefore, there will be no change in the 100-year or 500-year floodplain.

The use of a structural auxiliary spillway will also address the concerns associated with the failure to meet the 10-day drawdown criteria. Frequent flow in a structural auxiliary spillway will not cause damage to the auxiliary spillway.

Alternative 1: *Roller-Compacted Concrete (RCC) Chute Spillway over the Dam.* A notch with a 165-foot bottom width will be cut into the embankment. The RCC armor will begin with an apron on the upstream side of the dam that will lead to the auxiliary spillway crest. The crest will be set at the elevation of the existing auxiliary spillway. The walls will have side slopes of 3:1 and the chute will extend to the valley floor at a 3:1 slope. To dissipate the flow energy, the slope will be constructed with steps that are about 2 feet high. An RCC stilling basin at the valley floor will be used to complete the energy dissipation and allow a safe release into the floodplain. See Figure 2. The principal spillway pipe will outlet into the stilling basin. This will eliminate the need to replace the impact basin that is currently in use. The existing auxiliary spillway will be closed with an earthen berm. The total estimated construction cost for this alternative is $11,142,200.

Alternative 2: *Reinforced Concrete Labyrinth Weir over the embankment.* A labyrinth weir located on the embankment of the dam will have the capacity to pass the required auxiliary spillway flow within a flow area that is only 64 feet wide. See Figure 3 for an example of this type of structure. The spillway will be 320 feet long. The weir will be 14-feet high and will be a single-cycle labyrinth that is 64 feet wide and 128 feet long. The crest will 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 will be closed with an earthen dike. Issues 1-4 have a combined cost of $5,531,000. When the $7,263,000 cost of Alternative 2 is added, the estimated total construction cost will be $12,794,000.

Preferred Rehabilitation Alternative: The preferred alternative for rehabilitating the auxiliary spillway is to install an RCC chute over the embankment. The embankment stability issues will be addressed by the addition of fill material on the embankment. Replacement of the riser and extension of the principal spillway pipe in both the upstream and downstream directions are subsequently required. New toe drains would be installed in the embankment. The tailwater issue will be addressed by the replacement of the Hodnetts Mill Road culvert downstream of the dam.

Figure 2. Example of a roller-compacted concrete auxiliary spillway.

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

Table T - Summary and Comparison of Alternative Plans

Effects	**Future Without Federal Project** **No Federal Action – Sponsor's Rehabilitation**	**Future With Federal Project** **Rehabilitation with Federal Assistance** – **Alternative 1 -** Roller-compacted concrete chute spillway over the embankment and closure of the existing auxiliary spillway. **Selected Plan (NED Plan)**	**Alternative 2 –** Reinforced concrete labyrinth weir in the embankment. Closure of the 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 Cherrystone Lake	$12,943,300	$12,943,300	$14,727,000
Total Beneficial Annualized (AAEs[1/])	---	$448,100	$549,200
Total Adverse Annualized (AAEs[1/])	---	$448,100	$549,100
Net Beneficial	---	$0	$0
Benefit/Cost Ratio	---	1.0 to 1.0	1.0 to 1.0
Estimated OM&R[2/]	---	$5,300	$5,300
Clean Water Act	Temporary effects during construction.	Temporary effects during construction.	Temporary effects during construction.
Wetlands	Temporary impact during construction to 121.4 acres of open water and fringe wetlands; permanent loss of 0.20 acres and temporary impacts to 0.33 acres of shrub/scrub wetlands below the dam.	Temporary impact during construction to 121.4 acres of open water and fringe wetlands; permanent loss of 0.20 acres and temporary impacts to 0.33 acres of shrub/scrub wetlands below the dam.	Temporary impact during construction to 121.4 acres of open water and fringe wetlands; permanent loss of 0.17 acres and temporary impacts to 0.13 acres of shrub/scrub wetlands below the dam.
Floodplain Management	No change from existing conditions.	No change from existing conditions.	No change from existing conditions.
Air Quality	Temporary effects during construction.	Temporary effects during construction.	Temporary effects 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 Rehabilitation with Federal Assistance – **Alternative 1 -** Roller-compacted concrete chute spillway over the embankment and closure of the existing auxiliary spillway. **Selected Plan (NED Plan)**	**Alternative 2 –** Reinforced concrete labyrinth weir in the embankment. Closure of the 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 from a dam breach. Safety and noise concerns will be addressed during construction.	Decrease potential for loss of life from a dam breach. Safety and noise concerns will be addressed during construction.	Decrease potential for loss of life from a dam breach. Safety and noise concerns will be addressed 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.
Recreation	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years.	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years.	Temporary impacts to boating and fishing due to draining the lake during construction. Temporary impacts during fishery recovery period of 3-4 years.
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	Mitigation for 0.20 acres of wetland lost.	Mitigation for 0.20 acres of wetland lost.	Mitigation for 0.13 acres of wetland lost.

[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 $448,000, 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 2.875% 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 Cherrystone 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 in the Embankment.

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.

SUMMARY OF SPECIAL ENVIRONMENTAL CONCERNS NOT WITHIN THE AFFECTED ENVIRONMENT AND EXCLUDED FROM CONSEQUENCES ANALYSIS:

- Prime and Unique Farmlands and Farmland of State Importance
- Chesapeake Bay Preservation Act
- Coastal Zone Management Areas
- Wild and Scenic Rivers
- Clean Air Act-General Conformity Rule
- Clean Air Act-Regional Haze Regulations
- Coral Reefs
- Virginia Natural Area Preserves System
- Virginia Rare Species and Natural Communities
- Essential Fish Habitat
- Scenic Beauty
- National Historic Landmarks Program

SPECIAL ENVIRONMENTAL CONCERNS

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 Cherrystone Lake Dam to the Chatham Sewage Treatment Plan outfall, does not support recreational use. The 104.27 surface acres of the Cherrystone Reservoir is also listed as impaired due to dissolved oxygen issues. The latter impairment requires a Total Maximum Daily Load (TMDL) Plan which is scheduled for development in 2022. Additionally, the Town of Chatham has identified issues with sediment that are negatively impacting the raw water intake for the Town's Water supply.

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. No long-term impacts on water quality from rehabilitation activities are anticipated.

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) and EO 11990:

Existing Conditions: There are 121.98 acres of wetlands located within the affected environment of the proposed action.

The Cherrystone Lake shoreline, inflows, and outflow were visually surveyed in May 2017 for wetlands. Palustrine emergent wetlands comprise a total of 18.7 acres which include the shorelines and the two inflows of the lake. The 102.7 surface acres of the lake are open water wetlands. Approximately 0.58 acres of scrub/shrub wetlands were identified adjacent downstream of the embankment. 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. There will be a permanent loss of 0.20 acres and temporary impacts to 0.33 acres of scrub/shrub wetlands downstream of the embankment due to the construction of the stability berm and toe drains for which compensatory mitigation will be required. Because there would be unavoidable wetland impacts, a Section 401 Virginia State Water Quality Certification would be required prior to application for a Section 404 Permit.

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 impacts on water quality from rehabilitation activities are anticipated.

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 Cherrystone Lake dam will be done in accordance with all necessary requirements and restrictions. The existing level of flood protection will be maintained. Existing downstream floodplain management zoning restrictions will not be changed. The Sponsors will restrict future development, structures, and/or buildings upstream of the dam below elevation 682.0, which is the crest of the auxiliary spillway.

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: Cherrystone 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 exists 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

Existing Conditions: See Appendix B-5 for a map of known invasive plant species in the 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 non-invasive 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. The existing principal spillway pipe will be extended downstream 21 feet to allow construction of the downstream stability berm and the toe drains. The existing stilling basin will be removed. The principal spillway pipe will outlet into the RCC stilling basin. The construction of the new culvert at Hodnetts Mill Road will be done from the existing road surface with no riparian impacts anticipated.

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

Fish and Wildlife

Existing Conditions: Cherrystone Lake has crappie, channel catfish, largemouth bass, and sunfish. This reservoir is not open for public use.

No Federal Action (Sponsors' Rehabilitation): The reservoir will be completely drained during rehabilitation and the fish population will be lost. The fishery is expected to fully recover in a few years due to natural reestablishment or restocking.

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

HUMANS

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 Cherrystone Creek reservoir is included in the West Piedmont Planning District's Regional Water Supply Plan. The primary purposes of the reservoir are for flood protection and water supply storage. The water supply intake is about 3 miles below the dam and raw water is drawn directly from Cherrystone Creek. If additional water is needed, the gates on the riser are opened to increase the flow in the creek. These water withdrawals are currently much less than the permitted volume.

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

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 capacity or 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. Overtopping the dam could cause the dam to erode and collapse. Approximately 150 people are at risk for loss of life. The water treatment plant and 15 additional structures are in the breach zone of this dam, but none are in the regulatory 500-year floodplain. Nine 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 downstream flooding level would be the same as it is presently. The threat to loss of life from failure of the dam would be greatly reduced. Access to the site will be restricted during construction. When the culvert at Hodnetts Mill Road is replaced, the road will be temporarily closed or restricted.

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

Recreation

Existing Conditions: Cherrystone Lake is not open for public use. Residents and their guests utilize the reservoir for swimming, boating and fishing. It is described by local landowners as an excellent fishery with crappie, channel catfish, largemouth bass, and sunfish.

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).

Cultural Resources

Existing Conditions: Cherrystone Creek Dam No. 1 is located within the direct Impact Area of Potential Effect (APE) of the undertaking while Hodnetts Mill Ruins is in the indirect APE (viewshed). Both Hodnetts Mill ruins (construction date unknown) and Cherrystone Creek Dam No. 1 (1968) 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 the 50-year-old Cherrystone Dam No. 1 "not eligible" for the NRHP due to a lack of historic or architectural significance and integrity, per the NRHP eligibility evaluation criteria. Since the proposed Hodnetts Mill culvert replacement is located within the indirect APE (viewshed) of the Hodnetts Mill Ruins and there are no potential direct impacts to it, the NRCS assumes the resource to be "eligible" and recommended a determination of "No Adverse Effect" from the Virginia Department of Historic Resources.

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 estimated 33 more people 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 thousands 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 135 feet wide and is in permanent grass vegetation that is currently being grazed by livestock. Homes around the lake were built without regard to the elevation of the auxiliary spillway crest.

No Federal Action (Sponsors' Rehabilitation): The new auxiliary spillway will be installed over the dam. The existing auxiliary spillway will be blocked by an earthen berm. The existing auxiliary spillway area may be utilized for grazing or haying in the future, as needed. Restrictions will be put into place to prevent future development below the crest of the auxiliary spillway. Approximately 0.2 acres of wetland downstream of the dam will be permanently impacted.

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

CUMULATIVE EFFECTS

NRCS constructed one flood control dam and one multi-purpose (flood control and water supply) dam in this watershed; Roaring Fork Lake is the single purpose dam and Cherrystone Lake is the multi-purpose dam. 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 Cherrystone 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 Cherrystone 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.

The Sponsors procured easements for the construction, operation, and maintenance of the dam and the storage of water prior to original construction. None of the easements referred to a specific elevation for the crest of the auxiliary spillway or the top of the dam. 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. The Sponsors will floodproof the three homes currently below the auxiliary spillway crest and restrict future development below the elevation of the crest of the auxiliary spillway. The Sponsors accept the risk of flood damages that would occur in events between the crest of the auxiliary spillway elevation and the elevation of the top of the dam.

The projected sediment life of the lake is 94 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.

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 about 0.5% 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 Cherrystone 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 was changed from significant potential to high potential. The certificate was issued because of the capacity of the auxiliary spillway is insufficient to contain the volume of water associated with the PMP event.

Local, state and federal support for the rehabilitation of the Cherrystone 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 NRCS.

The first public meeting for Cherrystone Lake 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 Cherrystone 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 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 Draft Plan was distributed for interagency and public review on May 29, 2018. The distribution list of agencies and organizations is included on pages 107 and 108 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.

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 revised Draft Plan was distributed for public review on January 7, 2018. Because the change to the recommended alternative had no increase in the impact area and no anticipated difference in the environmental consequences, the revised Draft Plan was not sent for additional interagency review. 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. No additional comments were received on the revised Draft Plan.

A third public meeting was held on January 10, 2019, at the Old Dominion Agriculture Complex in Chatham, Virginia. There were 39 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 Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management, and the NRCS.

PREFERRED ALTERNATIVE

RATIONALE FOR PLAN SELECTION

The selected plan is to rehabilitate the dam to meet current NRCS and Virginia safety and performance standards for a high hazard potential dam. The selected 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 16 structures or utilize the four major roads and five secondary roads within the breach inundation zone.
- Provides protection for 6,940 vehicles per day that utilize the nine roads below the dam.
- Maintains the existing water supply storage that services 952 taps, supplying about 1,300 town people and outlying areas, plus 1,000 prisoners at Green Rock Prison.
- 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.
- Eliminates 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.
- Leverages federal resources to install the planned works of improvement.

The preferred alternative meets the Sponsors' objectives of bringing this dam into compliance with current dam design and safety criteria, maintaining the existing water supply, maintaining the existing level of flood protection for downstream properties, and addressing resource concerns identified by the public. The selected 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 selected plan.

SUMMARY AND PURPOSE

The selected plan of action for the dam is to:

- Install a roller-compacted concrete chute with a bottom width of 165' over the top of the dam.
- Install an earthen berm across the existing auxiliary spillway.

- Increase the stability of the upstream embankment by flattening the slope to 3:1 and installing a 24-foot-wide berm.
- Increase the top width of the dam to 20 feet.
- Replace the concrete riser with a new riser at the toe of the new upstream stability berm. Increase the footer size to meet seismic criteria. The principal spillway pipe will be extended about 29 feet to the new riser.
- Increase the stability of the downstream embankment by installing a 24-foot-wide earthen berm along the toe of the dam.
- Extend the principal spillway pipe downstream by approximately 21 feet. Remove the existing concrete impact basin. Outlet the principal spillway pipe into the RCC stilling basin.
- Install new toe drains with plastic pipe.
- Remove the 72-inch diameter culvert on Cherrystone Creek at Hodnetts Mill Road and replace it with a bottomless box culvert. (Note – the culvert will be replaced by the Sponsors using a separate contract from the dam rehabilitation construction contract. The costs of the culvert replacement are shown as landrights costs and are eligible as part of the total project costs).
- Pittsylvania County will prohibit future construction of habitable dwellings upstream from the dam below the crest of the auxiliary spillway elevation of 682.0.

After the implementation of these planned works of improvement, Cherrystone 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

Landrights for the structure currently exist for the construction, operation, and maintenance of the dam and the storage of water based on the original easements procured for the project. The elevation of the crest of the auxiliary spillway and the top of dam will not change for implementation of the recommended alternative. Additional landrights will not be procured because the Sponsors accept the risk associated with any flood flows that may occur between the elevation of the auxiliary spillway crest and the elevation of the top of dam. The seven homes that have a point of water entry between the top of dam elevation and the crest of the auxiliary spillway are at risk for flood damages during auxiliary spillway flow events. Two of these homes will have flooding in the basement at events lower than the 500-year event and one home has a first-floor elevation 0.1 foot above the 500-year event. The other four houses with first floor elevations below the top of the dam have first floor elevations that are four or more feet higher than the 500-year flood level. Before financial assistance is made available to the Sponsors for construction of the dam rehabilitation project, the three houses that are located below the elevation of the crest of the auxiliary spillway will be demolished, relocated, raised, floodproofed, or protected by a floodwall. The Sponsors have estimated that cost at $253,800 for the three properties. The Sponsors will be responsible for the replacement of the Hodnetts Mill Road culvert in a separate contract from the dam rehabilitation contract. The estimated cost for the culvert replacement is $257,800 and is

considered a landrights cost. Pittsylvania County will prohibit future construction of habitable dwellings upstream from the dam below the crest of the auxiliary spillway as a condition of securing federal funds for construction.

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. Mitigation will be required for the 0.20 acres of scrub/shrub wetlands below the embankment that are lost due to construction of the stability berm, RCC chute, and toe drains. There is a wetland mitigation bank in Pittsylvania County with available credits.

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 $12,943,300. Of this amount, PL-83-566 funds will bear $8,859,000 and nonfederal funds will bear $4,084,300. 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 Cherrystone 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 another 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.

- Replace the existing culvert on Hodnetts Mill road in a separate contract from the dam rehabilitation construction contract.
- 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 crest of the auxiliary spillway elevation of 682.0.

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 Cherrystone 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.

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

Installation Cost Items	Estimated Costs		
	PL-83-566 Funds[1]	Other Funds	Total
Structural measures to rehabilitate Cherrystone Creek Dam No. 1:	$8,859,000	$4,084,300	$12,943,300
Total Project:	$8,859,000	$4,084,300	$12,943,300

Price base: November 2018 Prepared: November 2018

Table 2 - Estimated Cost Distribution – Structural Measures
Cherrystone Creek Dam No. 1, 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. 1:	$7,626,000	$1,208,000	$25,000	$8,859,000	$3,516,200	$18,500	$511,600	$3,000	$35,000	$4,084,300	$12,943,300
Totals:	$7,626,000	$1,208,000	$25,000	$8,859,000	$3,516,200	$18,500	$511,600	$3,000	$35,000	$4,084,300	$12,943,300

Price base: November 2018 Prepared: November 2018

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[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 for Rehabilitated Dam
Cherrystone Lake – Cherrystone Creek Dam No. 1
Pittsylvania County, Virginia

Item	Unit	Structure Data
Class of structure		High
Seismic zone		2
Total drainage area	mi^2	14.7
Runoff curve no. (1-day) (AMC II)		63
Time of concentration (Tc); uncontrolled drainage area only	hours	5.5
Elevation top dam [1/]	feet	693.9
Elevation crest auxiliary spillway	feet	682.0
Elevation crest high stage inlet	feet	670.8
Elevation crest low stage inlet	feet	661.7
Auxiliary spillway type		Structural
Auxiliary spillway bottom width	feet	165
Auxiliary spillway exit slope	percent	33
Maximum height of dam	feet	55
Volume of fill	yd^3	213,000
Total capacity [2/]	acre-feet	4,494
Sediment submerged	acre-feet	194
Sediment aerated	acre-feet	140
Beneficial use (M&I water)	acre-feet	850
Floodwater retarding	acre-feet	3,310
Between high and low stage	acre-feet	1,161
Surface area		
Sediment pool	acres	53
Beneficial use pool (M&I water)	acres	101.48
Floodwater retarding pool [2/]	acres	146.5
Principal spillway design		
Rainfall volume (1-day)	inches	8.38
Rainfall volume (10-day)	inches	12.3
Runoff volume (10-day)	inches	5.0
Capacity of low stage (max.)	ft^3/sec	82
Capacity of high stage (max.)	ft^3/sec	298
Dimensions of conduit	inches	42
Type of conduit		circular RCP
Frequency of operation-auxiliary spillway	percent chance	0.5-1.0

Item	Unit	Structure Data
Auxiliary spillway hydrograph		
Rainfall volume	inches	9.52
Runoff volume	inches	4.90
Storm duration	hours	6
Velocity of flow (V_e)	feet/sec.	11.7
Max. reservoir water surface elev.	feet	685.73
Freeboard hydrograph		
Rainfall volume	inches	21.6
Runoff volume	inches	15.86
Storm duration	hours	6
Max. reservoir water surface elev.	feet	693.5
Capacity equivalents		
Sediment volume	inches	0.25
Floodwater retarding volume	inches	4.22
Beneficial volume (M&I water)	inches	1.08

[1/] All elevations are recorded in North American Vertical Datum 1988 (NAVD88).

[2/] Crest of auxiliary spillway. Based on 2015 sediment survey.

Table 4 - Average Annual National Economic Development (NED) Costs
Cherrystone Creek Dam No. 1, Virginia
(Dollars[5])

	Average Annual Equivalent Cost	Average Annual Equivalent O&M Costs	Total Average Annual Equivalent Cost
Rehabilitation of Cherrystone Creek Dam No. 1	$442,800	$5,300	$448,100
Totals:	$442,800	$5,300	$448,100

Price base: November 2018 Prepared: November 2018

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[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. 1, 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	$219,500	$219,500	$0
Other Agricultural	$2,280	$2,280	$0
Roads and Bridges	$56,350	$56,350	$0
Developed (structures and content damages)	$86,800	$86,800	$0
Erosion – floodplain scour	$1,370	$1,370	$0
Sediment – overbank deposition	27,720	$27,720	$0
Other (miscellaneous indirect damages)	$54,080	$54,080	$0
Totals:	$448,100	$448,100	$0

Price base: November 2018 Prepared: November 2018

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

Cherrystone Creek Dam No. 1, 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. 1	$448,100	$448,100	$448,100	$0	1.0 to 1.0
Totals:	$448,100	$448,100	$448,100	$0	1.0 to 1.0

Price base: November 2018 Prepared: November 2018

[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.

REFERENCES

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Virginia Department of Environmental Quality. 2016 305(b) Virginia Water Quality Assessment Report. Richmond, Virginia.

Virginia Department of Environmental Quality. 2016 303(d) Report on Impaired Waters. Richmond, Virginia.

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 – 1	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)

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
Thomas Wachtel	Geotechnical Engineer - 1	Ph.D. Civil Engineering M.S. Civil Engineering B.S. Civil Engineering		
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	No
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 Rural Development	No 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	Yes
Virginia Department of Game and Inland Fisheries	Yes
Virginia Department of Historic Resources	Yes
Virginia Department of Forestry	No
Virginia Department of Transportation	Yes

	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

2380 Hawkins Road
Chatham, VA 24531
June 18, 2018

Mr. Wade Biddix
Natural Resource Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229

Reference: **Draft Rehabilitation Plan - Cherrystone Lake Dam, Pittsylvania County ,VA**

Dear Mr. Biddix,

Please accept these comments on subject plan. Comments:

1. The draft plan indicates that the existing easements are adequate. My property is positioned such that modifications to the auxiliary spillway will require access across my land and possibly some excavation (taking) of my property. I have read the easements in place as a result of the original construction. They are general in nature. Also, Pittsylvania County deed book 440(pages 471-472) indicates that if construction does not begin within 10 years of the date of the easement, any rights and privileges granted revert to the property owners. I know this was put in place for the original construction but I am not certain whether it applies to the new work, now 60 years later. It would seem that new easements, especially on land where construction easements are needed, should be developed and secured. Most of the property involved around the lake is now in hands other than the original owners or their heirs. In the case of the auxiliary spillway work, I would expect a new access and construction easements to be negotiated to assure proper compensation for any land taken for the spillway widening and to restore all areas that are disturbed by the work to at least equal to pre-construction conditions. Also, our access to our property must me maintained throughout the work.

2. The former DeHart property recently sold. Most of the auxiliary spillway is on this land. I have provided the new owner's name to Chatham Town Manager, Richard Cocke.

3. Many residents are concerned about the plan to drain the lake. They worry about the odor but also the destruction of what is now a very good fishery. It would be good if the design could provide for the diversion scheme to retain a portion of the lake to prevent wholesale loss of the fish population.

Thank you for the opportunity to comment.

Joe Rogers

Joe Rogers, PE

USDA

United States Department of Agriculture

July 17, 2018

Mr. Joe Rogers, PE
2380 Hawkins Road
Chatham, Virginia 24531

Re: Draft Supplemental Watershed Plan-Environmental Assessment (EA) for the Rehabilitation of Cherrystone Creek Watershed Dam No. 1 (Cherrystone Lake, Pittsylvania County, Virginia

Dear Mr. Rogers:

Thank you for providing comments on the subject plan. We appreciate your involvement and assistance with the planning of this dam rehabilitation project thus far.

Regarding your specific comments, I provide responses below:

1) Easements and Land Rights – This acknowledges that access to your property must be maintained throughout the work. The acquisition of real property needed for the project is the responsibility of the local sponsors who are the Town of Chatham, Pittsylvania County and the Pittsylvania Soil and Water Conservation District. During the design phase of the project, NRCS will assist the local sponsors to develop a Land Rights Work Map that shows the needed access roads and borrow areas, and the overall footprint of disturbed area. This map can be used to work with affected landowners and to secure the permanent and temporary easements for the planned works of improvement. Before obligation of federal funds for the construction of the project, the local sponsors will have to certify that all the required land rights have been acquired. This assurance is also supported by an attorney's opinion that certifies an examination of the real property instruments and files was made and they were found to provide adequate title, right, permission and authority for the purposes for which the property was acquired.
2) Former DeHart Property – Thank you for the information on the new landowner for the property that is adjacent to the auxiliary spillway. Wade Biddix, Watershed Program Specialist, recently had a lengthy phone conversation with Mr. Toby Nissley. Mr. Richard Cocke, Chatham Town Manager, also called him about the project. We provided a hard copy of the Draft Plan-EA to him so he could become familiar with the proposed activities. We have complete contact information for him now and will keep him informed as the project goes forward.
3) Draining the Lake / Good Fishery – Thank you for the heads-up about the concerns of the local residents. A few of them have called to discuss these issues with staff. More detailed engineering analysis will be performed during the design phase of the project that will better determine if draining the reservoir will be required. We will do our best to prevent that if it is technically and economically feasible.

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

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

COMMONWEALTH of VIRGINIA

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Matthew J. Strickler
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

June 27, 2018

Mr. John A. Bricker
Natural Resources Conservation Service
U.S. Department of Agriculture
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229

RE: Draft Supplemental Watershed Plan No. 2 and Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 1 (Cherrystone Lake) of the Cherrystone Creek Watershed, Pittsylvania County, (DEQ 18-084F).

Dear Mr. Bricker:

The Commonwealth of Virginia has completed its review of the May 2018 Draft Supplemental Watershed Plan (SWP) No. 2 and Environmental Assessment (EA) (received May 30, 2018) for the above referenced project. The Department of Environmental Quality is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. DEQ is also responsible for coordinating Virginia's review of federal consistency documents submitted pursuant to the Coastal Zone Management Act (CZMA) and providing the state's response. The following agencies participated in the review of this proposal:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Conservation and Recreation
Marine Resources Commission
Department of Health
Department of Historic Resources
Department of Transportation

In addition, Pittsylvania County and the West Piedmont Planning District Commission were invited to comment on the proposal.

PROJECT DESCRIPTION

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Town of Chatham, Pittsylvania County, and the Pittsylvania Soil and Water Conservation District (project sponsors) propose to make improvements to the floodwater retarding structure (dam) No. 1 at Cherrystone Lake in the Cherrystone Creek watershed in Pittsylvania County. Cherrystone Creek Dam No. 1 does not presently meet NRCS standards for integrity of a vegetated earth auxiliary spillway. In addition, the principal spillway riser does not meet NRCS seismic stability criteria. The selected plan is to rehabilitate Cherrystone Creek Dam No. 1 to meet current NRCS criteria, maintain the water supply, and the existing level of downstream flood protection. The plan is to widen the existing auxiliary spillway from 135 feet to 165 feet and install a roller-compacted concrete (RCC) cutoff wall in the spillway. Additional fill material will be placed on the embankment to address stability issues. Replacement of the riser and outlet structure is required. New toe drains will be installed in the embankment and the Hodnetts Mill Road culvert downstream of the dam will be replaced.

CONCLUSION

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

ENVIRONMENTAL IMPACTS AND MITIGATION

1. Water Quality and Wetlands. According to the SWP/EA (page 63), 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.

The SWP/EA (pages 62-63) states that the reservoir will be temporarily drained for approximately one year to allow for construction. The open water wetlands and the fringe wetlands associated with the lake will be temporarily impacted during this time. There will be a permanent loss of 0.17 acres and temporary impacts to 0.13 acres of scrub/shrub wetlands downstream of the embankment due to the construction of the stability berm and toe drains for which compensatory mitigation will be required. Section 401 Virginia State Water Quality Certification would be required.

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*, 9 VAC 25-210-10.

1(b) Agency Findings. DEQ-BRRO finds that since impacts to wetlands are anticipated, a VWP Permit may be required.

1(c) Recommendations. In general, DEQ recommends that stream and wetland impacts be avoided to the maximum extent practicable. To minimize unavoidable impacts to wetlands and waterways, DEQ recommends the following practices:

- Operate machinery and construction vehicles outside of stream-beds and wetlands; use synthetic mats when in-stream work is unavoidable.
- Preserve the top 12 inches of trench material removed from wetlands for use as wetland seed and root-stock in the excavated area.
- Erosion and sedimentation controls should be designed in accordance with the most current edition of the Virginia Erosion and Sediment Control Handbook. These controls should be in place prior to clearing and grading, and maintained in good working order to minimize impacts to State waters. The controls should remain in place until the area is stabilized.
- Place heavy equipment, located in temporarily impacted wetland areas, on mats, geotextile fabric, or use other suitable measures to minimize soil disturbance, to the maximum extent practicable.
- Restore all temporarily disturbed wetland areas to pre-construction conditions and plant or seed with appropriate wetlands vegetation in accordance with the cover type (emergent, scrub-shrub, or forested). The applicant should take all appropriate measures to promote revegetation of these areas. Stabilization and restoration efforts should occur immediately after the temporary disturbance of each wetland area instead of waiting until the entire project has been completed
- Place all materials which are temporarily stockpiled in wetlands, designated for

use for the immediate stabilization of wetlands, on mats, geotextile fabric in order to prevent entry in State waters. These materials should be managed in a manner that prevents leachates from entering state waters and must be entirely removed within thirty days following completion of that construction activity. The disturbed areas should be returned to their original contours, stabilized within thirty days following removal of the stockpile, and restored to the original vegetated state.

- All non-impacted surface waters within the project or right-of-way limits that are within 50 feet of any clearing, grading, or filling activities should be clearly flagged or marked for the life of the construction activity within that area. The project proponent should notify all contractors that these marked areas are surface waters where no activities are to occur.
- Measures should be employed to prevent spills of fuels or lubricants into state waters.

(d) Requirements. The project sponsors must submit a Joint Permit Application (JPA) to the Virginia Marine Resources Commission (VMRC), which serves as the clearinghouse for permits issued by VMRC, DEQ, U.S. Army Corps of Engineers, and local wetlands boards. Upon receipt of a JPA for the proposed surface water impacts, DEQ VWP Permit staff will review the proposed project in accordance with program regulations and current guidance.

2. State Subaqueous Lands. The SWP/EA (page 74) states that, prior to construction, the project sponsors will be responsible for obtaining subaqueous lands permits from the Virginia Marine Resources Commission.

2(a) Agency Jurisdiction. The Virginia Marine Resources Commission (VMRC) regulates encroachments in, on or over state-owned subaqueous beds as well as tidal wetlands pursuant to Virginia Code §28.2-1200 through 1400. For nontidal waterways, VMRC states that it has been the policy of the Habitat Management Division to exert jurisdiction only over the beds of perennial streams where the upstream drainage area is 5 square miles or greater. The beds of such waterways are considered public below the ordinary high water line.

2(b) Agency Findings. VMRC finds that the extension of the principle spillway, new riser with catwalk, new impact basin, extended downstream principle spillway pipe, and replacement of the culvert, will require permits from VMRC for impacts to state subaqueous lands. However, maintenance work on the berm of the impoundment is not within VMRC's jurisdiction and a permit will not be required for this portion of the project.

2(c) Requirements. Prior to commencing any instream construction activities, the project sponsors must submit a JPA to VMRC. As noted above, VMRC acts as the clearinghouse for the JPA review project and will forward the application to the Corps

and DEQ for their concurrent reviews. Should project plans change to include any further disturbances to the stream bed, additional permitting may be required from VMRC.

3. Dam Safety and Floodplain Management. The SWP/EA (page 62) states that the rehabilitation of the Cherrystone Lake dam will be done in accordance with the local floodplain ordinance, which imposes zoning restrictions within the flood zones that is consistent with National Flood Insurance Program and state regulations. The existing level of flood protection will be maintained. Existing floodplain management zoning restrictions will not be changed.

3(a) Agency Jurisdiction. The DCR Division of Dam Safety and Floodplain Management (DSFM) 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.

3(b) Agency Findings. DCR-DSFM finds that the project will change the current levels of downstream flood protection.

3(c) Requirements.

(i) DCR Division of Dam Safety and Floodplain Management

As the dam is regulated by DCR-DSFM, an alteration permit from the agency will be required. Additional information on permit requirements may be found at http://www.dcr.virginia.gov/dam-safety-and-floodplains/dam-safety-index.

(ii) Pittsylvania County

Under 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 to evaluate its effect on the floodplain. If it is determined, from an appropriate study by a developer, that there will be a change in the extent of the floodplain (the edges) or an elevation of the 1% chance flood, then a letter of map revision (LOMR) must be submitted by the developer to FEMA, so the floodplain map may be up-dated.

Local governments participating in the NFIP have the authority and responsibility to properly manage the mapped floodplain within the community, including the submission to FEMA of new technical data on the floodplain within six months of receipt of a LOMR. Pittsylvania County participates in the NFIP. The project is considered

development within the County's Special Flood Hazard Area (SFHA) and must comply with the County's floodplain ordinance, to include a permit issued by the County. Because the project is in a delineated floodway, 44 CFR 60.3(d) and the County's floodplain ordinance require a Hydrologic and Hydraulic (H&H) analysis to determine if the project effects the base flood elevation (BFE). A Zero-Rise Certificate must be provided to the County.

3(d) Conclusion. DCR-DSFM does not object to the project as designed, provided it complies with Pittsylvania County's floodplain ordinance.

4. Erosion and Sediment Control and Stormwater Management. According to the SWP/EA (page 74), the successful contractor will be required to obtain a construction general permit and an erosion and sediment control permit. The construction general permit would require the operator to implement a site-specific stormwater pollution prevention plan (SWPP).

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

- Virginia Erosion and Sediment Control (ECS) Law (§ 62.1-44.15:51 *et seq.*) and *Regulations* (9 VAC 25-840);
  Virginia Stormwater Management Act (§ 62.1-44.15:24 *et seq.*);
  Virginia Stormwater Management Program (VSMP) Regulation (9 VAC 25-870); and
- 2014 General Virginia Pollutant Discharge Elimination System (VPDES) Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880).

In addition, DEQ is responsible for the Virginia Stormwater Management Program (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 (9 VAC 25-890-40).

4(b) Requirements. DEQ-OSWM did not respond to DEQ's request for comments. However, based on previous responses to similar projects, regulatory guidance for the control of non-point source pollution is presented below.

(i) Erosion and Sediment Control and Stormwater Management Plans

The applicant and its authorized agents that are conducting regulated land-disturbing activities on private and public lands in the state must comply with Virginia ESC Law and *Regulations*, Virginia Stormwater Management Act and *VSMP Regulations*, and other applicable federal nonpoint source pollution mandates (e.g., *Clean Water Act* Section 313 and federal consistency under the *Coastal Zone Management Act*).

Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, or other structures, soil or dredge spoil areas, or related land conversion activities that disturb equal to or greater than 10,000 square feet would be regulated by the state Acts and *Regulations*. Accordingly, the project sponsors must prepare and implement erosion and sediment control (ESC) and stormwater management (SWM) plans to ensure compliance with state law and regulations. The ESC plan is submitted to DEQ-BRRO, which 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: Virginia ESC Law § 62.1-44.15:51 *et seq.* and *Regulations* 9 VAC 25-840; Virginia Stormwater Management Act § 62.1-44.15:24 *et seq.* and *VSMP Regulations* 9 VAC 25-870].

(ii) Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (VAR10)

The operator or owner of a construction activity involving land disturbance of equal to or greater than 1 acre is required to register for coverage under the VAR10 permit 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 *Virginia Stormwater Management Program 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: Virginia Stormwater Management Act §62.1-44.15:24 *et seq.*; *VSMP Permit Regulations* 9 VAC-25-870-10 *et seq.*]

5. Air Pollution Control. According to the SWP/EA (page 64), particulate matter will increase during construction. A mobile concrete batch plant will be used that will generate dust. In addition, the open-burning of vegetative debris usually occurs. Required permits will be obtained by the contractor. Air pollution abatement actions will mitigate any potential temporary air quality concerns during construction and is not expected to violate any federal, state, or local air quality standards.

5(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, 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 major State projects are:

- Open burning: 9 VAC 5-130 *et seq.*
- Fugitive dust control: 9 VAC 5-50-60 *et seq.*
- Permits for fuel-burning equipment: 9 VAC 5-80-1100 *et seq.*

5(b) Agency Findings. According to the DEQ Air Division, the project site is located in an ozone attainment area.

5(c) Recommendation. The applicant should take all reasonable precautions to limit emissions of oxides of nitrogen (NO_x) and volatile organic compounds (VOCs), principally by controlling or limiting the burning of fossil fuels.

5(d) Requirements.

(i) Fugitive Dust

Fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 *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 chemicals for dust control;
- 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.

(ii) Open Burning

If project activities include the open burning or use of special incineration devices for the disposal of land clearing debris, this activity must meet the requirements of 9 VAC 5-130-10 through 9 VAC 5-130-60 and 9 VAC 5-130-100of 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. The project

sponsors should contact Pittsylvania County fire officials to determine what local requirements, if any, exist.

(iii) Fuel-Burning Equipment

The installation, operation or modification of stationary or portable fuel burning equipment (e.g., generators, wood chippers/grinders, boilers, etc.) or other sources of air pollutants may be subject to registration and/or air permitting requirements (http://www.deq.virginia.gov/Programs/Air/PermittingCompliance/Permitting/TypesofAirPermits.aspx).

6. Solid and Hazardous Wastes and Hazardous Management. The SWP/EA does not discuss solid and hazardous waste issues and their management.

6(a) Agency Jurisdiction. On behalf of the Virginia Waste Management Board, the DEQ Division of Land Protection and Revitalization (DEQ-DLPR) 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.

Virginia:

- Virginia Waste Management Act, Virginia Code § 10.1-1400 *et seq.*
- *Virginia Solid Waste Management Regulations*, 9 VAC 20-81 (9 VAC 20-81-620 applies to asbestos-containing materials).
- *Virginia Hazardous Waste Management Regulations*, 9 VAC 20-60 (9 VAC 20-60-261 applies to lead-based paints).
- *Virginia Regulations for the Transportation of Hazardous Materials*, 9 VAC 20-110

Federal:

- Resource Conservation and Recovery Act, 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.*

DEQ-DLPR also administers 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 (9 VAC 25-91 *et seq.*) and Underground Storage Tanks (9 VAC 25-580 *et seq.* and 9 VAC 25-580-370 *et seq.*), also known as 'Virginia Tank Regulations', and § 62.1-44.34:14 *et seq.* which covers oil spills.

6(b) Agency Findings. DEQ-DLPR staff conducted a search (1,000-foot radius) of solid and hazardous waste databases (including petroleum releases) in the project area and did not identify any waste sites in close proximity which might impact the project. However, the following CERCLA waste site of possible concern is located within the same zip code (24531) as the project site:

> VAD980554984, First Piedmont Corp. Rock Quarry, Route 360 State Road 719, Pittsylvania County, VA 24531. Final National Priorities List (NPL)

6(c) Requirement. Any soil that is suspected of contamination or wastes that are generated during construction must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. All construction waste must be characterized in accordance with the *Virginia Hazardous Waste Management Regulations* prior to management at an appropriate facility

6(d) Recommendations.

(i) CERCLA Site

The following websites may be accessed to identify additional information on the CERCLA site using the facility identification number:

- http://www.epa.gov/superfund/sites/cursites/index.htm
- https://www3.epa.gov/enviro/

(ii) Pollution Prevention

DEQ-DLPR recommends the implementation of pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

For questions or further information regarding waste comments, contact DEQ-DLPR, Katy Dacey at (804) 698-4274.

7. Pesticides and Herbicides. DEQ recommends that the use of herbicides or pesticides for construction or landscape maintenance should be in accordance with the principles of integrated pest management. The least toxic pesticides that are effective in controlling the target species should be used. Contact the Department of Agriculture and Consumer Services at (804) 786-3501 for more information.

8. Natural Heritage Resources. According to the SWP/EA (page 30), a February 6, 2018 search of the Virginia Natural Heritage Program's Rare Species and Natural Community database did not identify any natural heritage resources within the affected environment.

(i) The Virginia Department of Conservation and Recreation (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), authorizes DCR to maintain a statewide database for conservation planning and project review, protect land for the conservation of biodiversity, and the 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).

(ii) 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.

8(b) Agency Findings.

(i) Natural Heritage Resources

According to DCR-DNH, the agency's Biotics Data System (Biotics) 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 will adversely impact these natural heritage resources.

(ii) State-listed Plant and Insect Species

DCR-DNH finds that the activity will not affect any documented state-listed plants or insects at the site.

(iii) State Natural Area Preserves

DCR files do not indicate the presence of any State Natural Area Preserves under the agency's jurisdiction in the project vicinity.

8(c) Recommendation. Contact DCR-DNH to secure updated information on natural heritage resources if the scope of the project changes or six months pass before the

project is implemented, since new and updated information is continually added to the Biotics Data System.

9. Wildlife Resources and Protected Species. According to the SWP/EA (page 64), the federally-listed Endangered Roanoke logperch was identified in the Virginia Fish and Wildlife Information Service database and the federally-listed Threatened Northern long-eared bat was identified in the U.S. Fish and Wildlife Service (USFWS) IPaC database as potentially present. The reservoir will be completely drained during rehabilitation and the fish population will be lost. The fishery is expected to fully recover in a few years due to natural reestablishment or restocking.

9(a) Agency Jurisdiction. The Virginia Department of Game and Inland Fisheries (DGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state- or federally-listed endangered or threatened species, but excluding listed insects (Virginia Code, Title 29.1). DGIF is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S. Code §661 *et seq.*) and provides environmental analysis of projects or permit applications coordinated through DEQ and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce or compensate for those impacts. For more information, see the DGIF website at *www.dgif.virginia.gov*.

9(b) Agency Findings. DGIF does not currently document any listed wildlife or designated resources under its jurisdiction from the project area. Therefore, DGIF does not anticipate adverse impacts on wildlife resources and protected to result from the proposed work.

9(c) Recommendations.

(i) Northern Long-Eared Bat

DGIF recommends that the project sponsors coordinate with the U.S. Fish and Wildlife Service (USFWS) regarding potential impacts upon federally-listed Threatened Northern long-eared bat associated with tree removal.

(ii) Aquatic Resources

DGIF recommends the following for the projection of aquatic resource:

- Conduct instream activities during low- or no-flow conditions.
- Use non-erodible cofferdams or turbidity curtains to isolate the construction area.
- Block no more than 50% of the streamflow at any given time.
- Stockpile excavated material in a manner that prevents reentry into the stream.

Restore original streambed and streambank contours.
Revegetate barren areas with native vegetation.
Implement strict erosion and sediment control measures.
Install concrete "in the dry," whether using the Tremie method, grout bags, or wet concrete, to ensure the concrete has hardened and cured prior to contact with open water.

10. Water Supply. According to the SWP/EA (page 66), the water supply intake is about 2-3 miles below the dam and raw water is drawn directly from Cherrystone Creek. There will be a temporary loss of the water supply storage from Cherrystone Lake. The base flow will be conveyed around the dam and will continue to supply Cherrystone Creek. The Project Sponsors recently installed a water supply intake on the Roaring Fork reservoir in order to supplement the base flow of the creek as needed.

10(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.

10(b) Agency Findings. VDH-ODW finds five public groundwater wells and three surface water intakes in proximity (1,000-foot radius to 5-mile mile radius) to the project site. In addition, the project is within the watershed of five public surface water sources used by public water supply facilities. See VDH-ODW response attached for additional details on identified facilities.

10(c) Recommendations. VDH-ODW recommends the following:

- Employ Best Management Practices on the project site to protect water supply sources, including erosion and sediment controls and spill prevention controls and countermeasures.
- Transport materials into and out of the project site in a manner that prevents impacts to surface waters.
- Field mark wells located within a 1,000-foot radius of the project site to protect them from accidental damage during construction.

11 Historic Structures and Archaeological Resources. According to the SWP/EA (page 34), a review of the Department of Historic Resources (DHR), Virginia Cultural Resource Information System (V-CRIS), did not identify any recorded archaeological or architectural historic resources within the direct or indirect area of potential effect (APE).

11(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. Please 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.

11(b) Agency Findings. According to DHR, agency staff has been in direct consultation with NRCS regarding this project and requests that NRCS continue consultation with DHR, as necessary, pursuant to Section 106 of the National Historic Preservation Act.

12. Transportation Impacts. According to the SWP/EA (page 67), when the culvert at Hodnetts Mill Road is replaced, the road will be temporarily restricted.

12(a) Agency Jurisdiction. The Virginia Department of Transportation (VDOT) provides comments pertaining to potential impacts to existing and future transportation systems.

12(b) Agency Findings. VDOT Lynchburg District Office staff finds that its Route 793 (Cherrystone Lake Road) Rural Rustic Road Project (UPC T20010) is located within the geographic scope of the dam rehabilitation project. The project on Route 793 will impact approximately 2.4 miles from Route 57 to Route 605 and involves paving an unpaved road. Total programmed allocations are $370,157 for the project. A programmed start date indicates construction beginning October 4, 2023 and concluding February 12, 2024. However, this is a tentative schedule and is subject to change.

The dam rehabilitation project could pose significant traffic impacts along various roads throughout the service area during construction. Hodnetts Mill Road has an annual average daily traffic (AADT) in the affected area of 267 as of 2015 and Cherrystone Lake Road has an AADT of 130 as of 2012.

12(c) Requirements. An appropriate work zone plan will be required to ensure the safe and efficient travel of vehicles during the construction phase. A VDOT Land Use Permit will be required for any operations within VDOT rights-of-way

REGULATORY AND COORDINATION NEEDS

1. Water Quality and Wetlands. Surface water and wetland impacts associated with this proposal may require a VWP Permit issued by the DEQ-BRRO pursuant to Virginia Code §62.1-44.15:20. For additional information and coordination, contact DEQ-BRRO, Kip Foster at (540) 562-6782 or kip.foster@deq.virginia.gov.

2. State Subaqueous Lands. Pursuant to Virginia Code §28.2-1200 through 1400, the project sponsors must obtain a permit from VMRC for anticipated impacts to state subaqueous lands. This requires the submission of a JPA to VMRC. For additional information and coordination, contact VMRC, Lauren Pudvah at (757) 247-2200 or lauren.pudvah@mrc.virginia.gov.

3. Dam Safety and Floodplain Management. Coordinate with the Pittsylvania County Department of Planning at (434) 432-7974, on the required documentation demonstrating the effect the project will have on the BFE. In addition, coordinate with DCR-DSFM, Charles Wilson (Dam Safety) at (804) 371-6233 and Charley Banks (Floodplain Management) at (804) 371-6135, regarding the acquisition of a Dam Alteration Permit.

4. Erosion and Sediment Control and Stormwater Management.

4(a) Erosion and Sediment Control and Stormwater Management. The project sponsors must ensure the project is conducted in compliance with *Virginia's Erosion and Sediment Control Law* (*Virginia Code* §62.1-44.15:51 *et seq.*) and *Regulations* (9 VAC 25-840 *et seq.*) and *Stormwater Management Law* (*Virginia Code* §62.1-44.15:24 *et seq.*) and *Regulations* (9 VAC 25-870 *et seq.*). Additional information and coordination on erosion and sediment control and stormwater management plans may be addressed to DEQ-BRRO, Jay Roberts at (540) 562-6785.

4(b) General Permit for Stormwater Discharges from Construction Activities (VAR10). For land-disturbing activities of equal to or greater than one acre, the applicant is required to register for coverage under the Virginia Stormwater Management Program General Permit for Discharges of Stormwater from Construction Activities (9 VAC 25-880-1 *et seq.*). Specific questions regarding the Stormwater Management Program requirements should be directed to DEQ-OSWM, Holly Sepety at (804) 698-4039.

5. Air Quality Regulations. This project is subject to air regulations administered by the Department of Environmental Quality. The following sections of the Code of Virginia and Virginia Administrative Code are applicable:

- fugitive dust and emissions control (9 VAC 5-50-60 *et seq.*);
- open burning restrictions (9 VAC 5-130 *et seq.*); and

- fuel-burning equipment (9 VAC 5-80 *et seq.*).

For more information and coordination contact DEQ-BRRO, Paul Jenkins at (540) 562-6822. Also, contact Pittsylvania County fire officials for information on any local requirements pertaining to open burning

6. Solid and Hazardous Wastes.

6(a) Solid and Hazardous Waste Management Regulations. All solid waste, hazardous waste, and hazardous materials must be managed in accordance with all applicable federal, state, and local environmental regulations. Contact DEQ-BRRO, Beth Lohman at (540) 562-6872 for information on the location and availability of suitable waste management facilities in Virginia if free product, discolored soils, or other evidence of contaminated soils are encountered.

6(b) Fuel Storage Tanks. If petroleum-contaminated soils or water are encountered during work or if petroleum storage tanks are used, contact DEQ-BRRO, David Miles at (540) 562-6741.

7. Natural Heritage Resources. Contact DCR-DNH, Rene Hypes at (804) 371-2708 to secure updated information on natural heritage resources if the scope of the project changes and/or six months passes before the project is implemented, since new and updated information is continually added to the Biotics Data System.

8. Wildlife Resources and Protected Species.

8(a) Northern Long-Eared Bat. Due to the legal status of the Northern long-eared bat, coordinate with the USFWS Virginia Field Office at (804) 693-6694.

8(b) Protection of Wildlife Resources. Contact DGIF, Amy Ewing at (804) 367-2211, on the development of project specific measures for the projection of wildlife resources.

9. Water Supply. Contact VDH, Arlene Fields Warren at (804) 864-7781, regarding its comments on water supply resources.

10. Historic and Archaeological Resources. The NRCS must continue to consult with DHR, Roger Kirchen at (804) 482-6091, pursuant to Section 106 of the National Historic Preservation Act, to ensure the protection of historic and archaeological resources.

11. Transportation Impacts. The development of a work zone plan to address the safe and efficient travel of vehicles during the construction may be coordinated with VDOT. In addition, a VDOT Land Use Permit will be required for any operations within VDOT rights-of-way. For coordination, contact VDOT, David Cook at (434) 856-8252,

VDOT District Planning Manager, Rick Youngblood at (434) 856-8331, or the Area Land Use Engineer, Joseph Cradock at (434) 433-3142.

Thank you for the opportunity to review the Supplemental Watershed Plan No. 2 and Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 1 of the Cherrystone Creek Watershed, Pittsylvania County. Detailed comments of reviewing agencies are attached for your review. Please contact me at (804) 698-4204 or John Fisher at (804) 698-4339 for clarification of these comments.

Sincerely,

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

Enclosures

Ec: Amy Ewing, DGIF
Robbie Rhur, DCR
Tony Watkinson, VMRC
Arlene Fields Warren, VDH
Roger Kirchen, DHR
Lauren Pudvah, VMRC
James Cromwell, VDOT
David Smitherman, Pittsylvania County
David Hoback, West Piedmont PDC
John Bricker, NRCS
Wade Biddix, NRCS

USDA

United States Department of Agriculture

July 17, 2018

Bettina Rayfield, Program Manager
Environmental Impact Review and Long-Range Priorities
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. 1 (Cherrystone 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 water quality, important farmland, forest resources, historic resources, water quality and wetlands. We also agree with your conclusion that it is unlikely to adversely affect species of plans or insects listed by state agencies as rare, threatened, or endangered. It is hereby acknowledged that the Department of Environmental Quality has no objection to the proposed action provided that the activities are performed in accordance with your recommendations. 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

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APPENDIX B

PROJECT MAPS

Figure B-1. General Watershed Location Map.

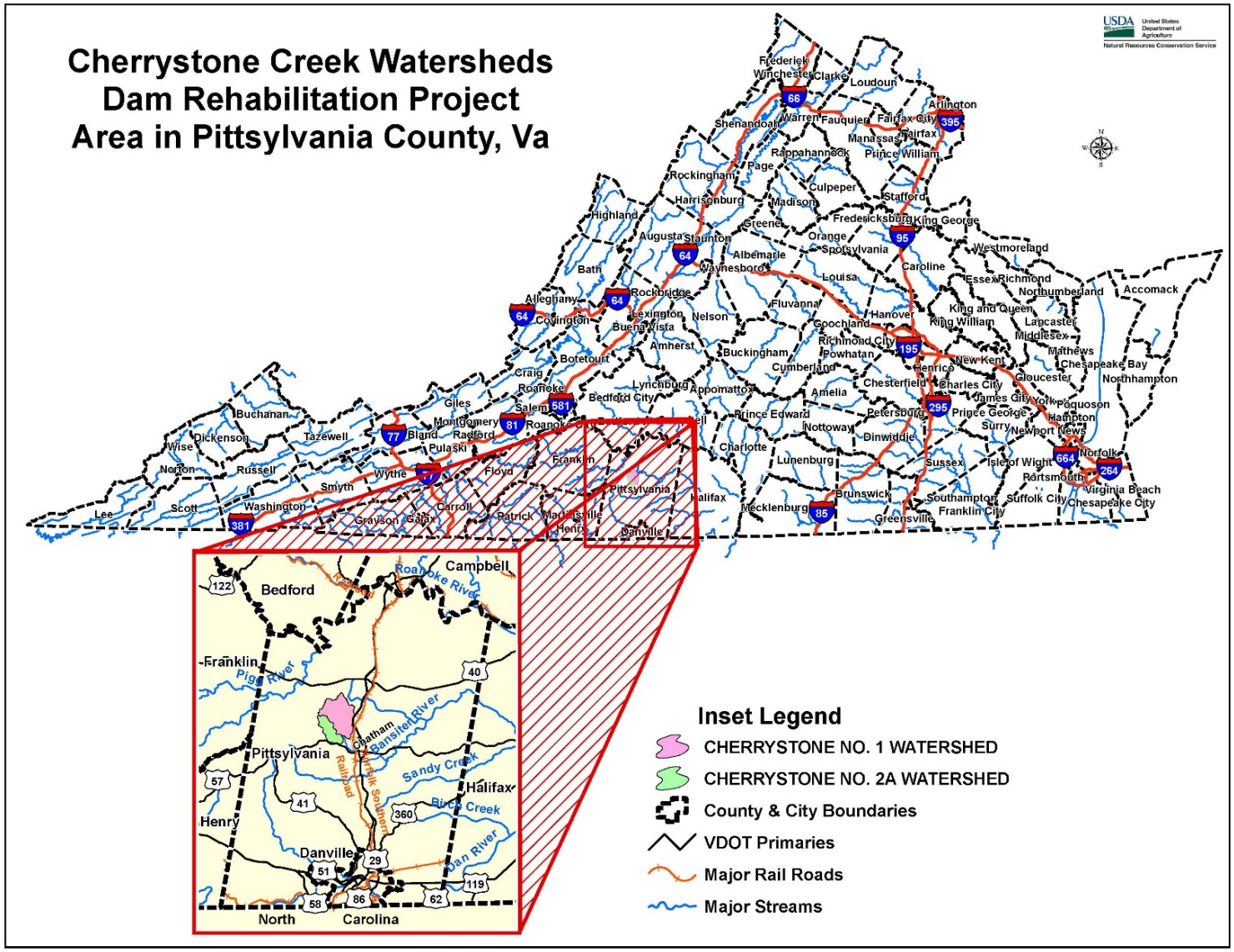


Figure B-2. Cherrystone Lake Watershed Land Use Map.

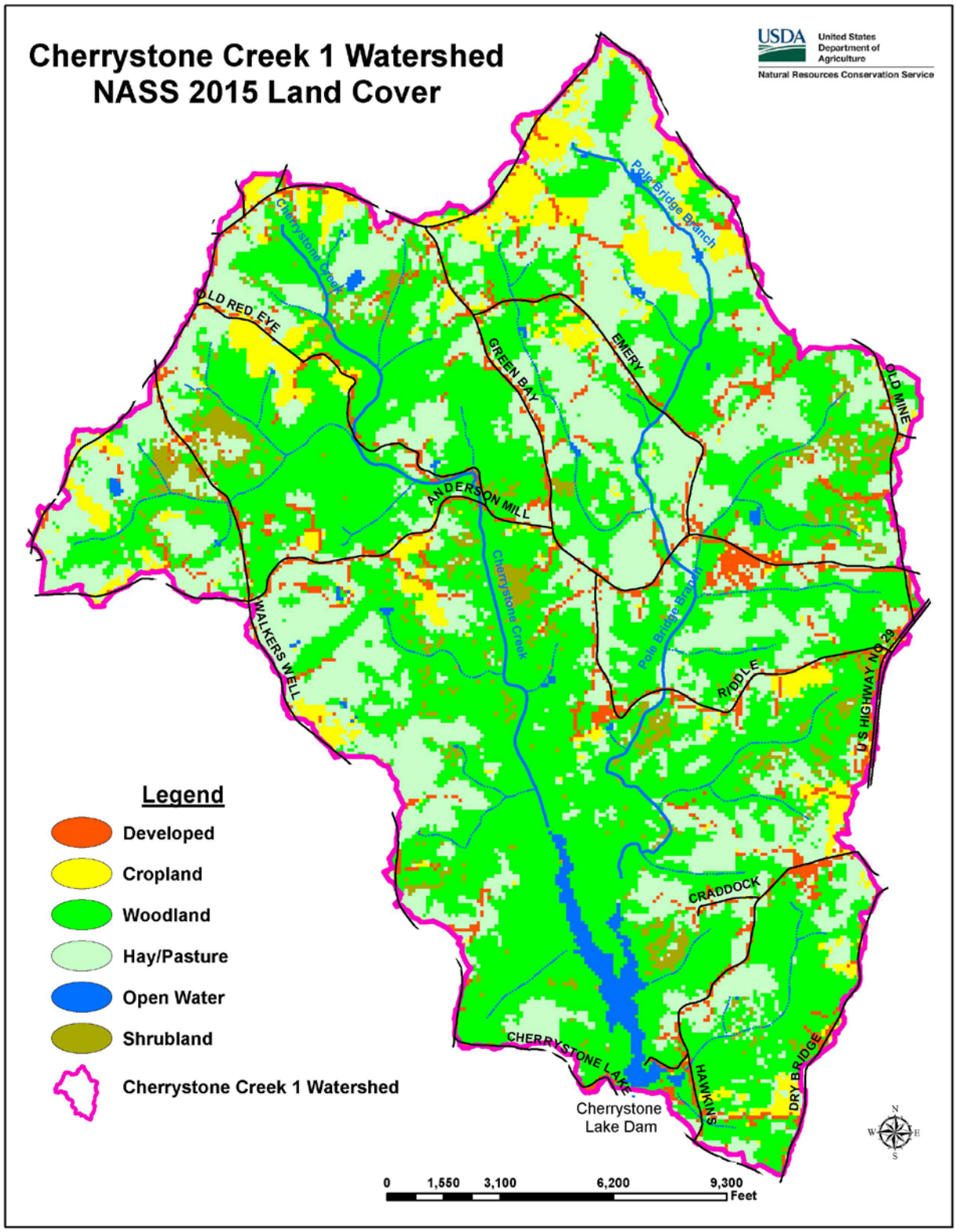


Figure B-3. Cherrystone Lake Dam No. 1 Watershed Soils Map.

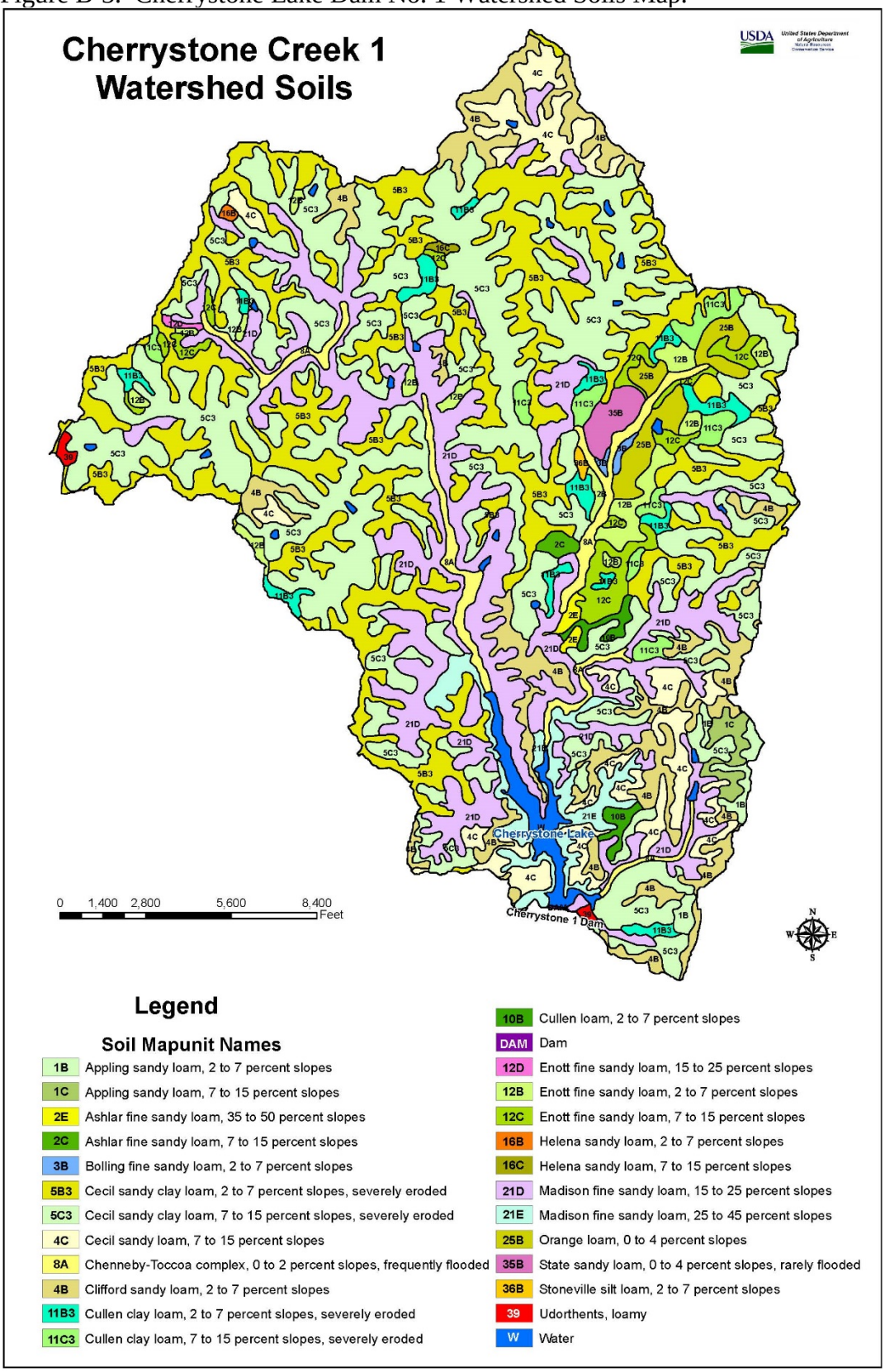
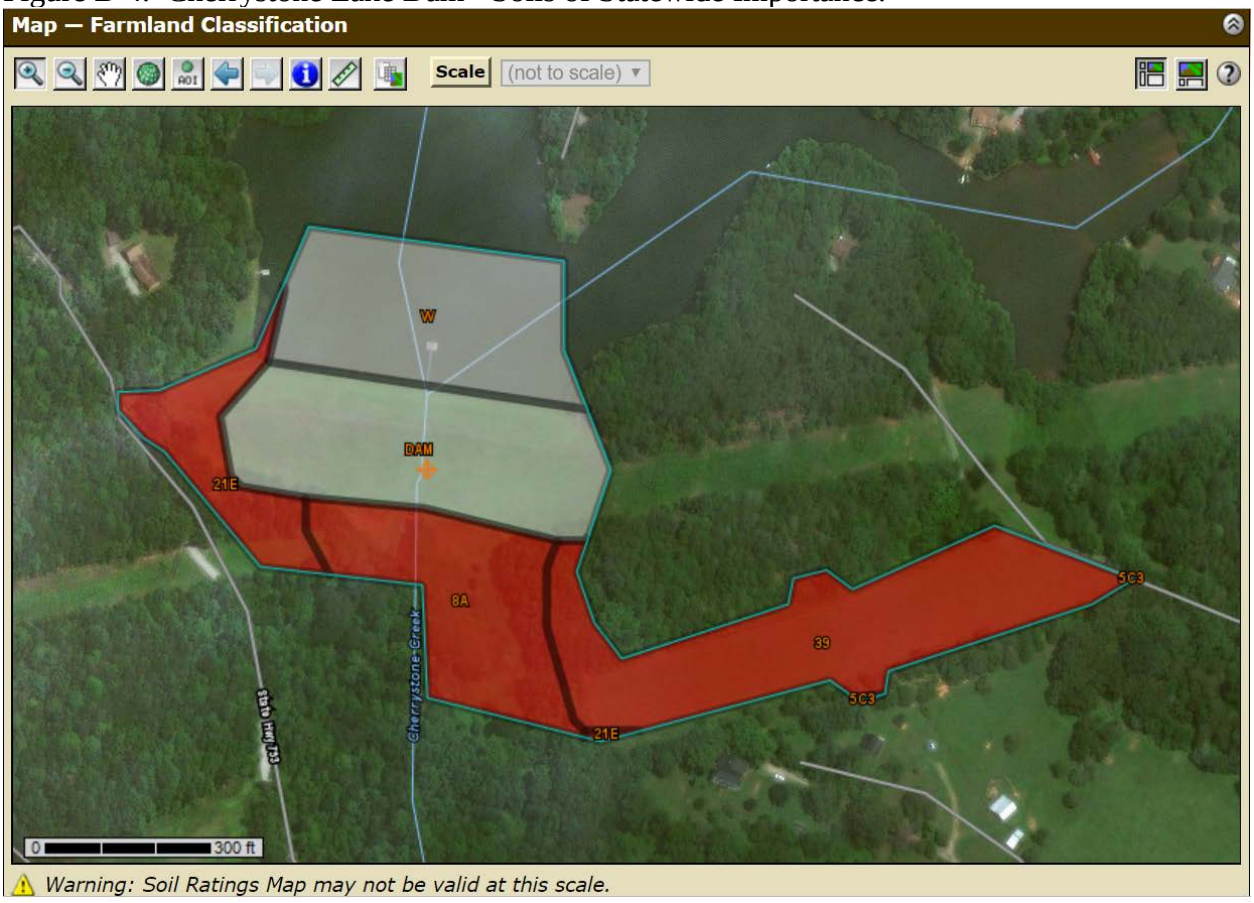


Figure B-4. Cherrystone Lake Dam - Soils of Statewide Importance.



Tables – Farmland Classification – Summary By Map Unit

Summary by Map Unit – Pittsylvania County and the City of Danville, Virginia (VA143)

Summary by Map Unit – Pittsylvania County and the City of Danville, Virginia (VA143)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5C3	Cecil sandy clay loam, 7 to 15 percent slopes, severely eroded	Farmland of statewide importance	0.0	0.1%
8A	Chenneby-Toccoa complex, 0 to 2 percent slopes, frequently flooded	Not prime farmland	2.5	17.5%
21E	Madison fine sandy loam, 25 to 45 percent slopes	Not prime farmland	1.3	9.0%
39	Udorthents, loamy	Not prime farmland	4.0	27.7%
DAM	Dam		3.6	24.5%
W	Water		3.1	21.2%
Totals for Area of Interest			**14.6**	**100.0%**

Description – Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 21, 1978.

Rating Options – Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Figure B-5. Cherrystone Lake Invasive Species Map.

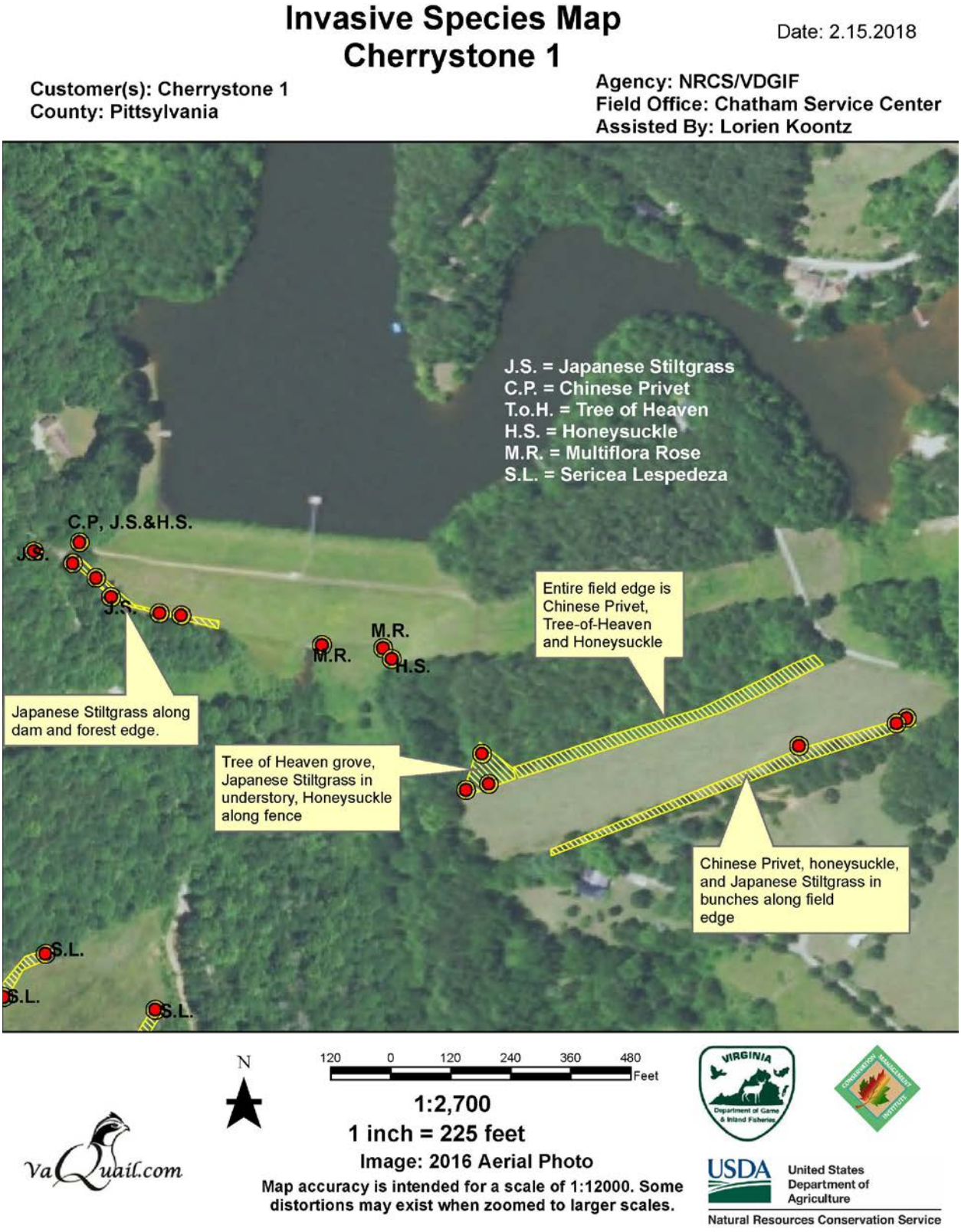
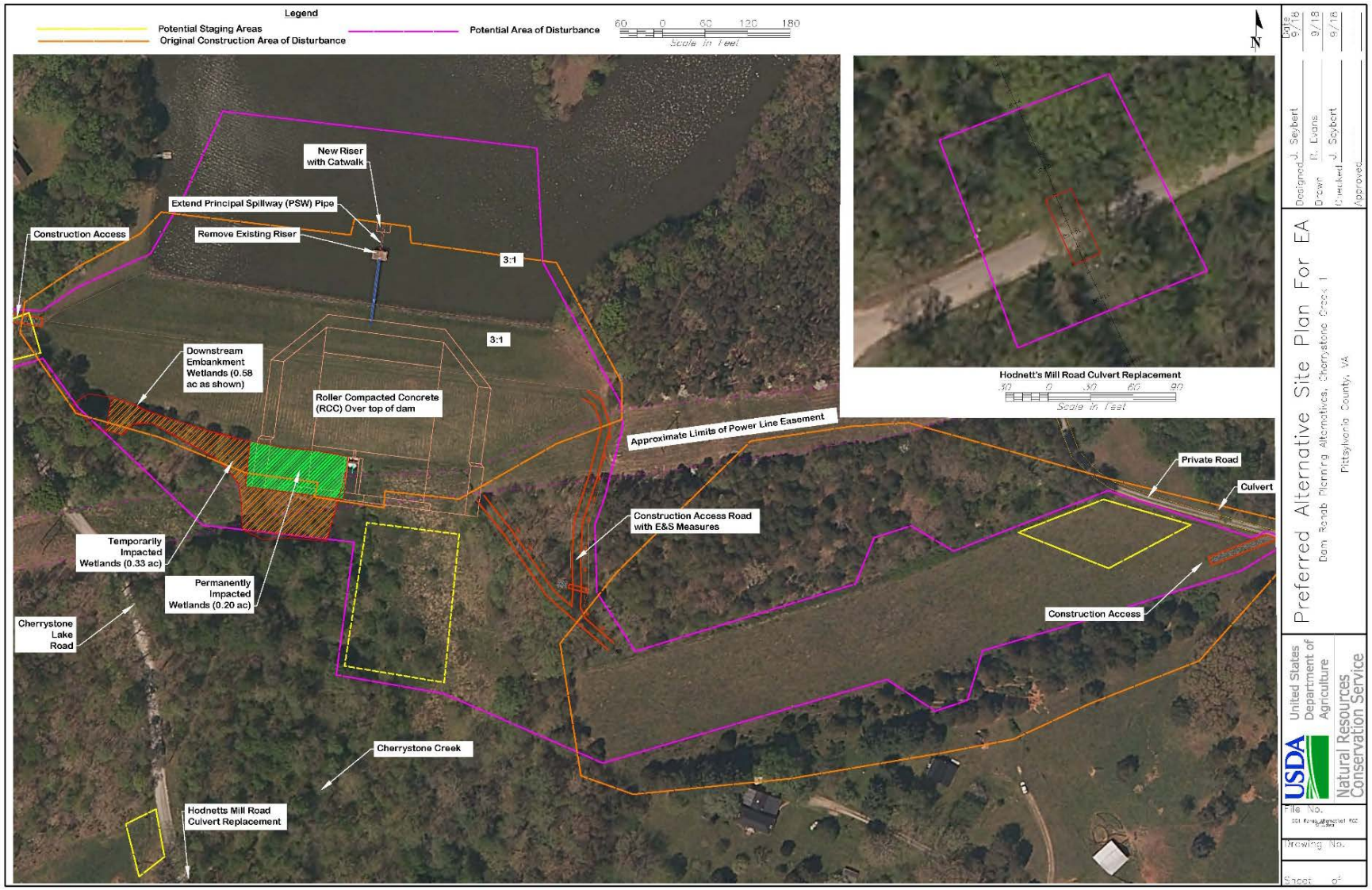


Figure B-6. Area of Potential Effect for Preferred Alternative (Aerial View).



APPENDIX C

SUPPORT MAPS

Figure C-1. Preferred Alternative - RCC Chute Auxiliary Spillway over Top of Dam.

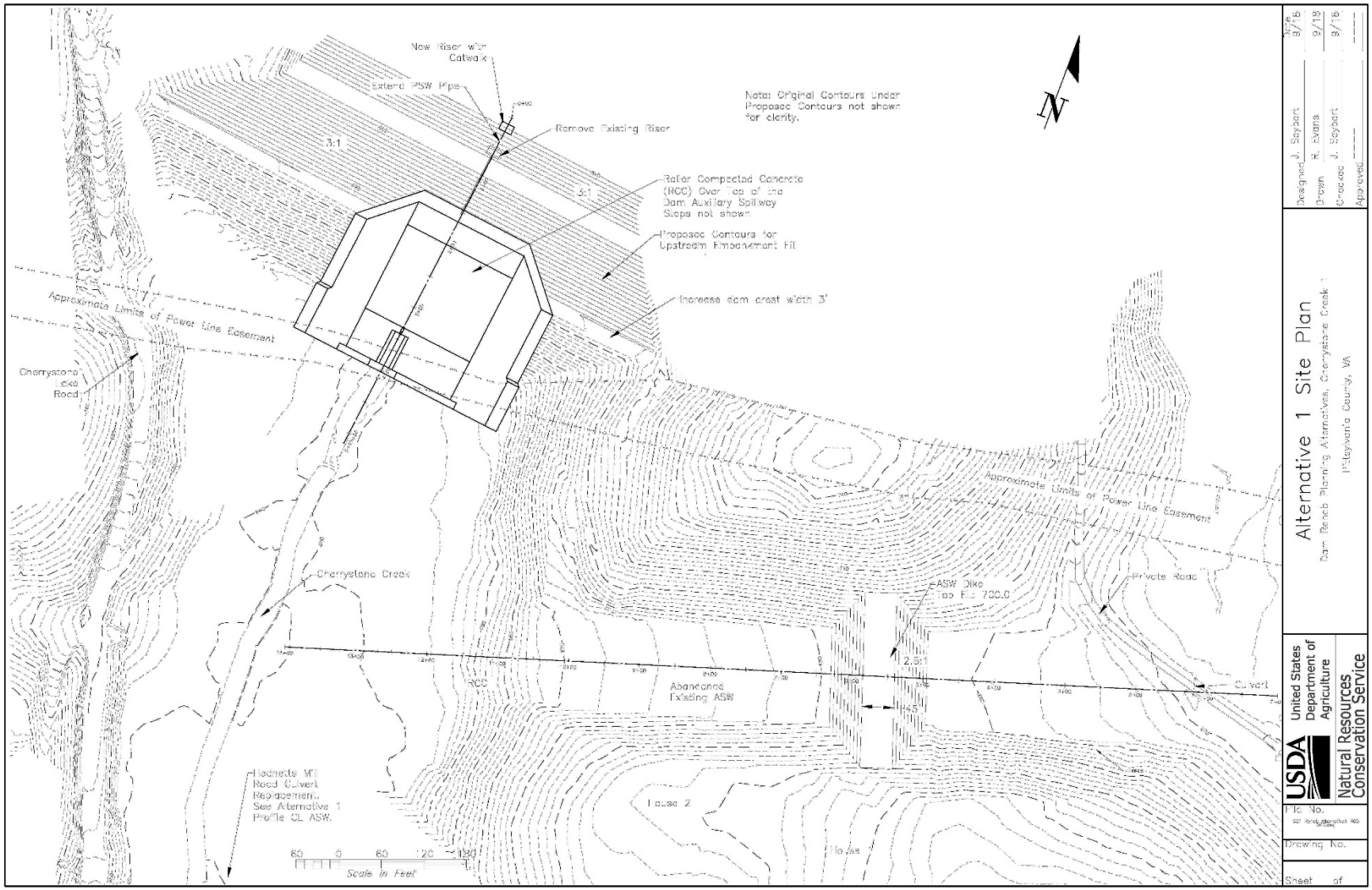


Figure C-2. Preferred Alterative - Details of Embankment, Toe Drain, and Culvert.

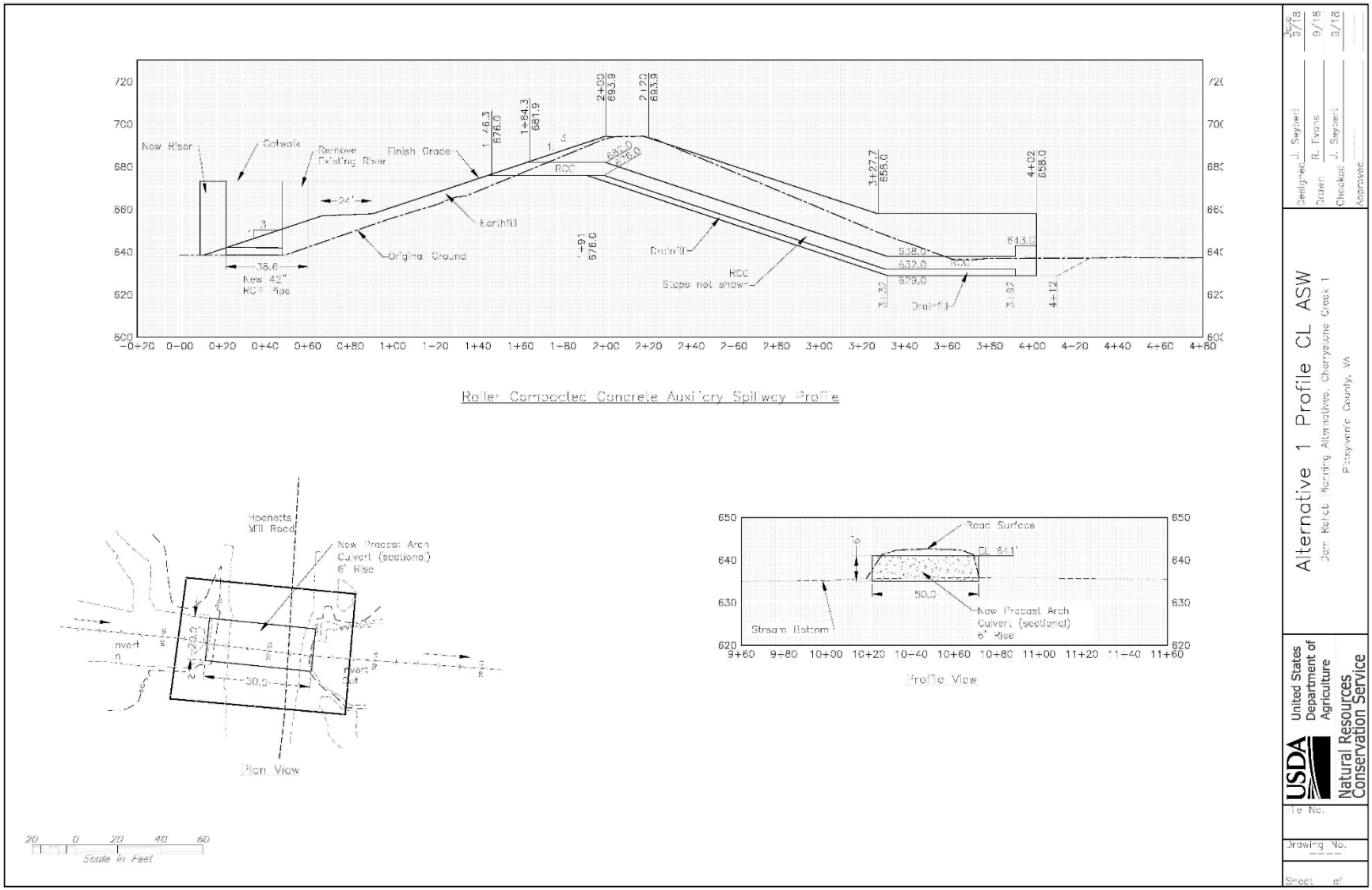


Figure C-3. Alternative 2 – Reinforced Concrete Labyrinth Weir Over the Dam.

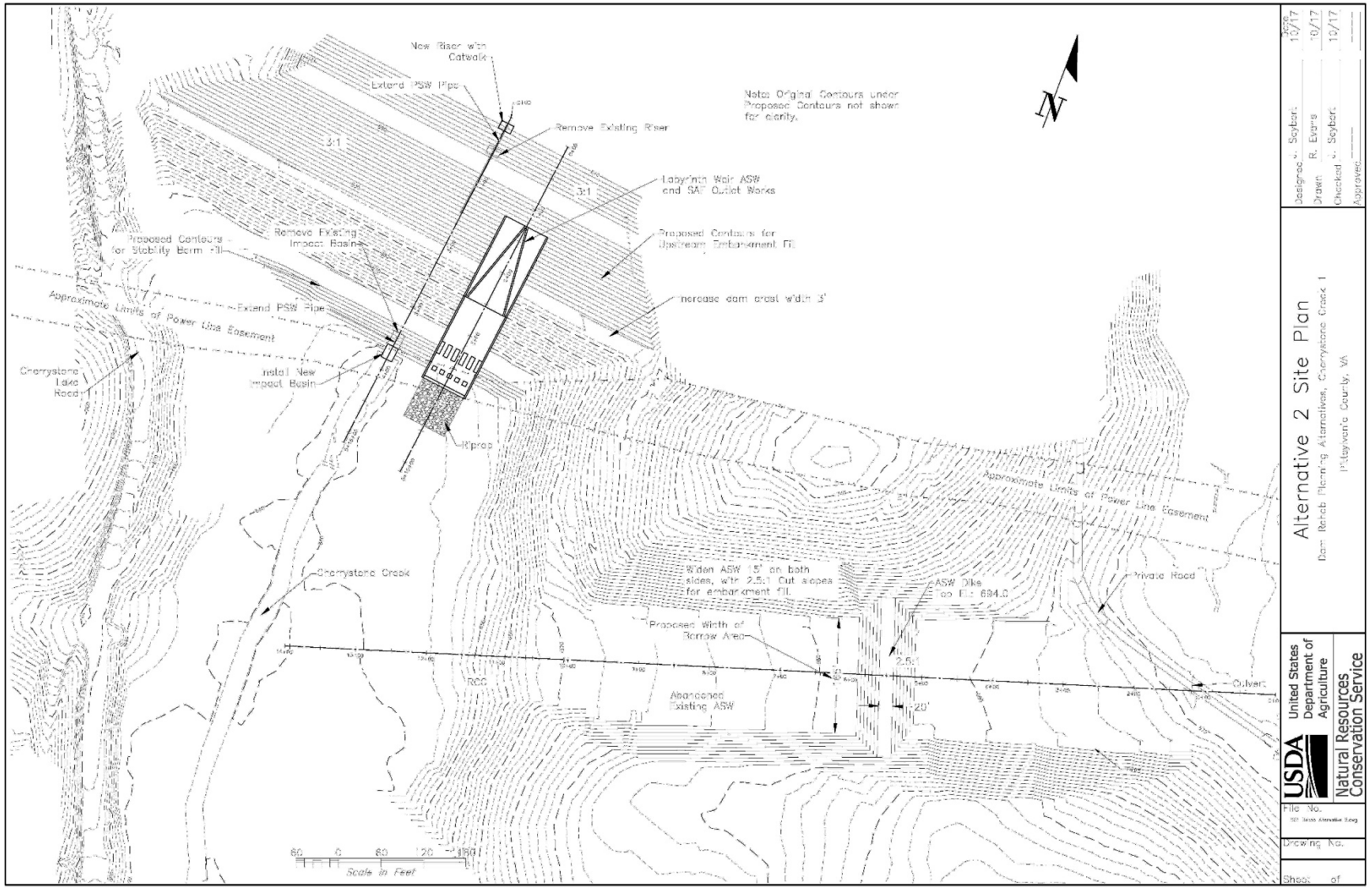
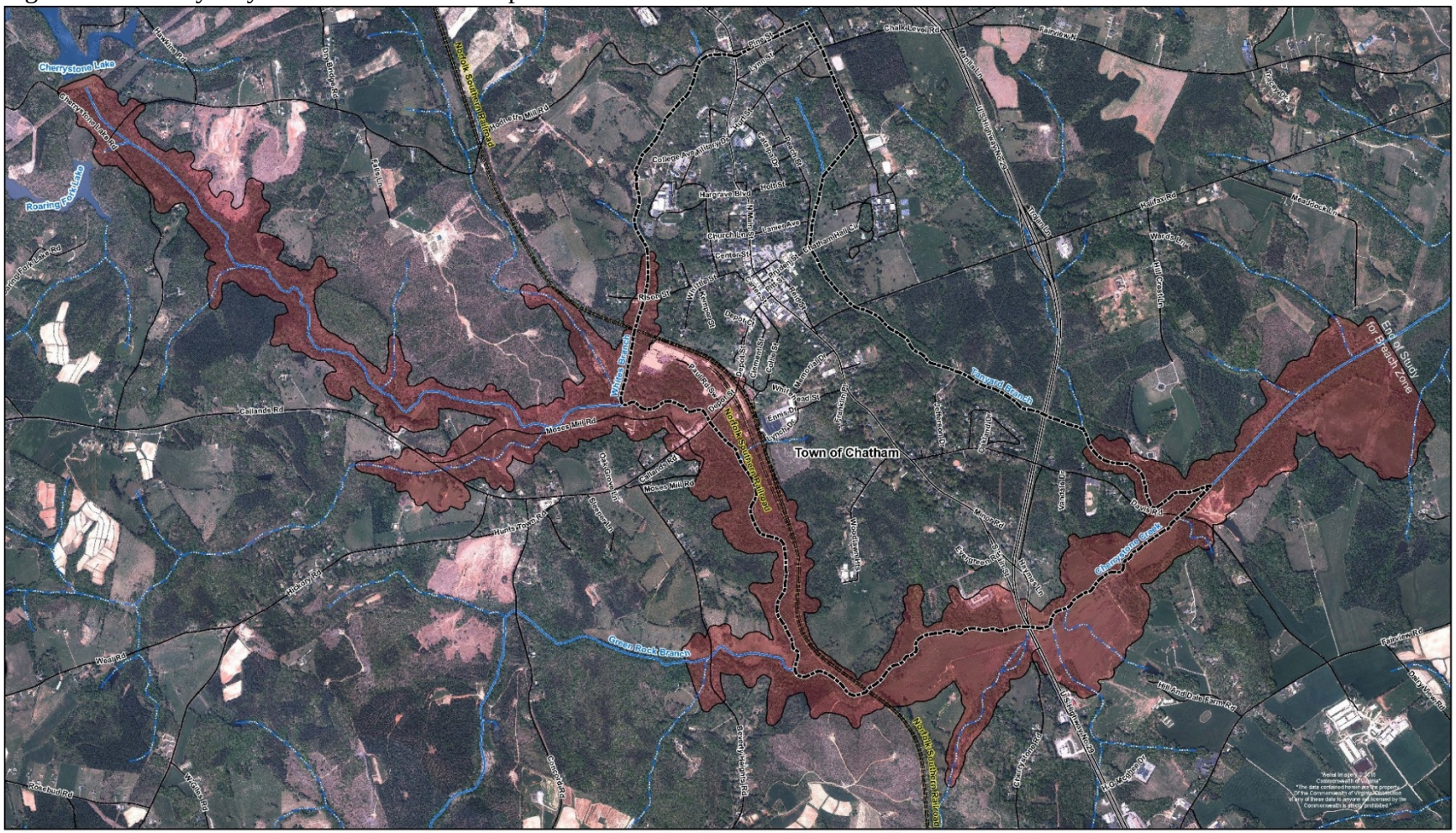


Figure C-4. Sunny Day Breach Inundation Map.



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THIS MAP WAS PRODUCED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER - THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VA. 03/15/18. THE AERIAL IMAGERY WAS EXTRACTED FROM THE VGIN 2015 VBMP DATA. THE SUNNY DAY BREACH INUNDATION ZONE IS FROM THE HURT & PROFFITT STUDY. THE ROADS ARE FROM THE VDOT TRANSPORTATION DATA, AND THE STREAMS WERE EXTRACTED FROM THE NATIONAL HYDROGRAPHY DATASET. THIS MAP IS PROJECTED IN STATEPLANE COORDINATES, VIRGINIA SOUTH ZONE 4502 - WITH THE NAD83 DATUM. THIS MAP IS A "DRAFT" COPY AND IS SUBJECT TO CHANGE.

Figure C-5. Cherrystone 1 FEMA Flood Panel Index

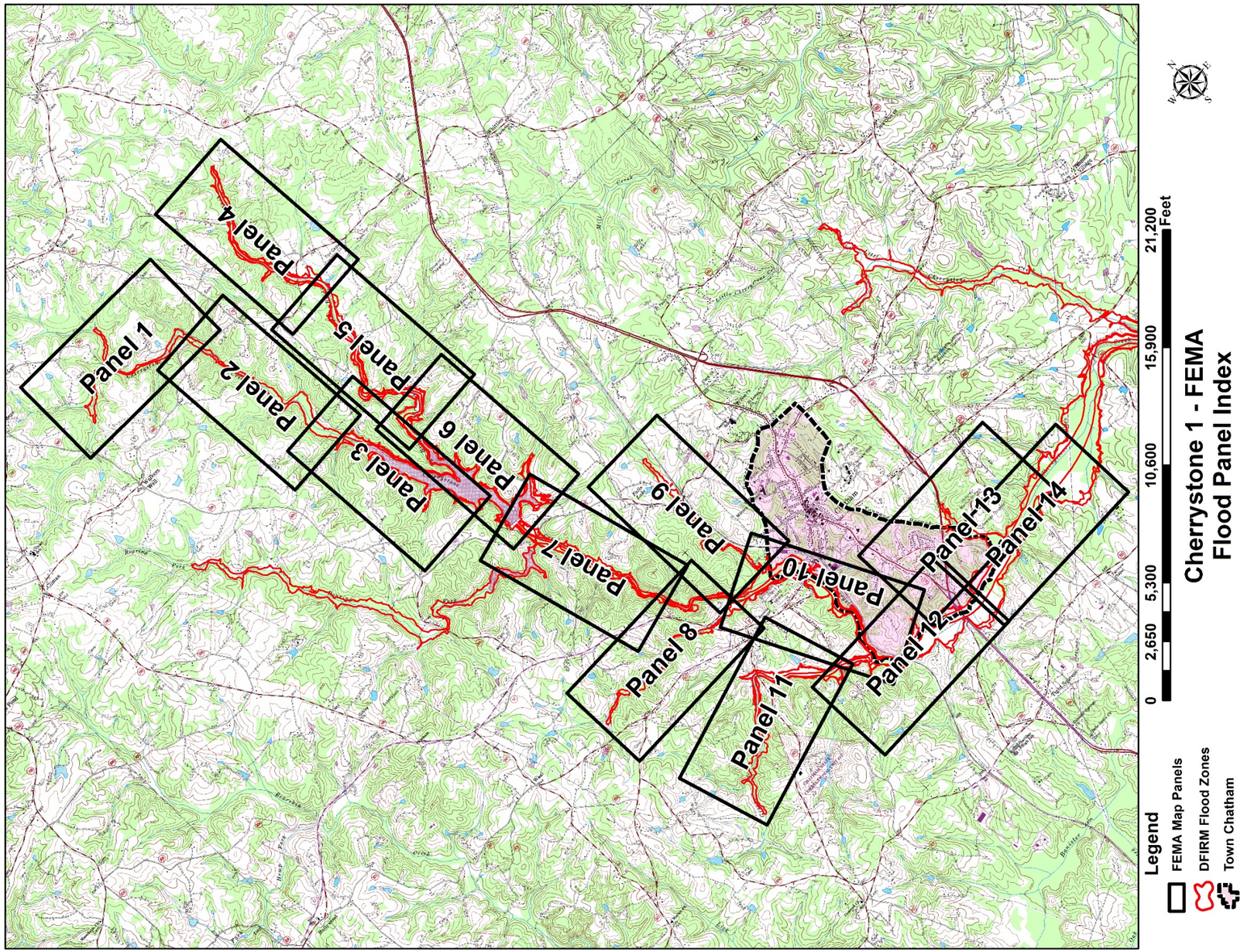
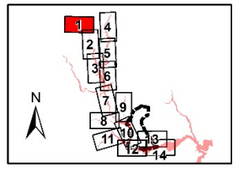


Figure C-6. Cherrystone 1 “Special Flood Hazard Areas” (Panel 1 of 14).



Cherrystone 1 “Special Flood Hazard Areas” (PANEL 1 of 14)

0 250 500 1,000 1,500 Feet

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

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Figure C-7. Cherrystone 1 “Special Flood Hazard Areas” (Panel 2 of 14).

Cherrystone 1 “Special Flood Hazard Areas” (PANEL 2 of 14)

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

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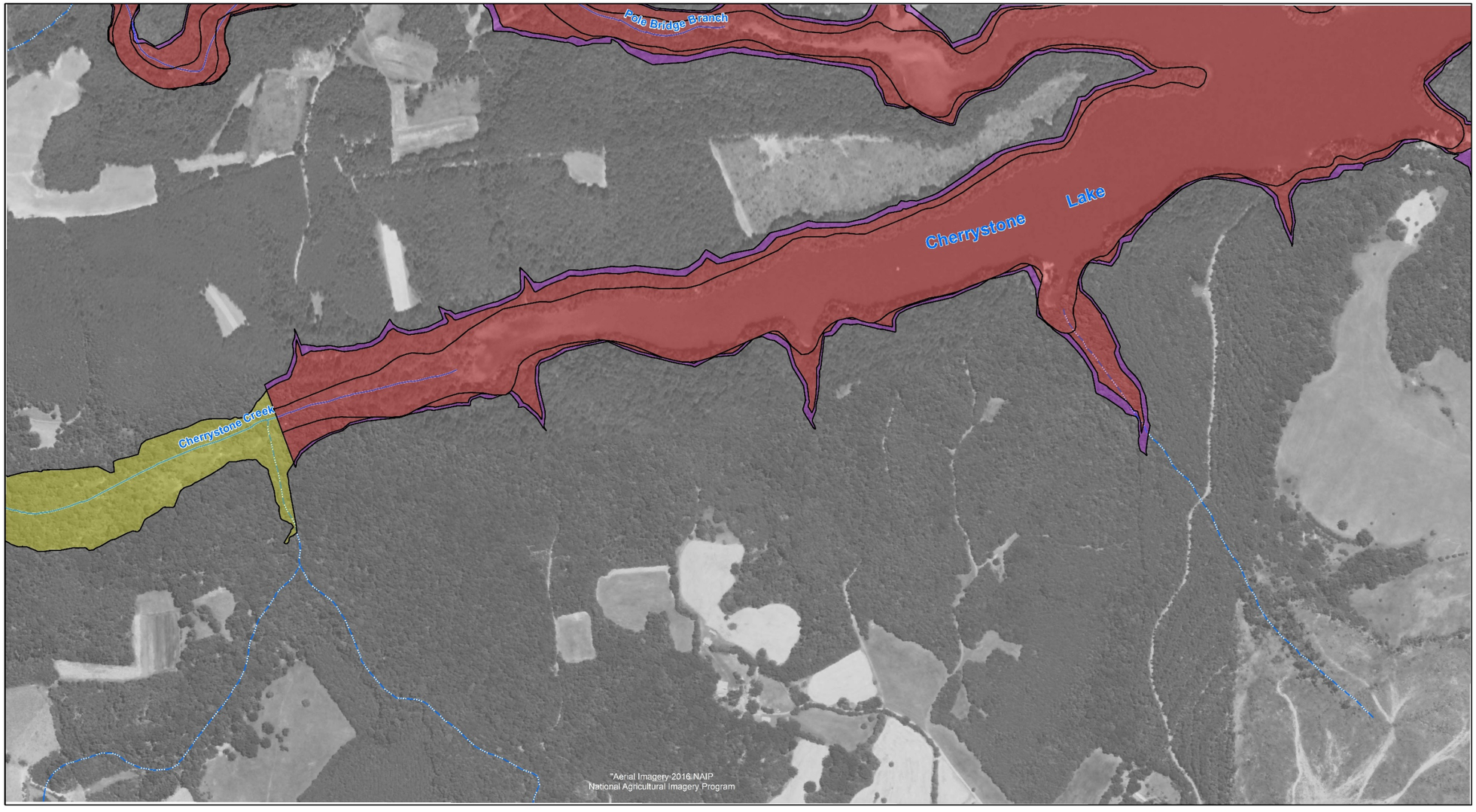
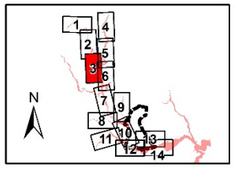
Figure C-8. Cherrystone 1 “Special Flood Hazard Areas” (Panel 3 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 3 of 14)

0 250 500 1,000 1,500 Feet

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

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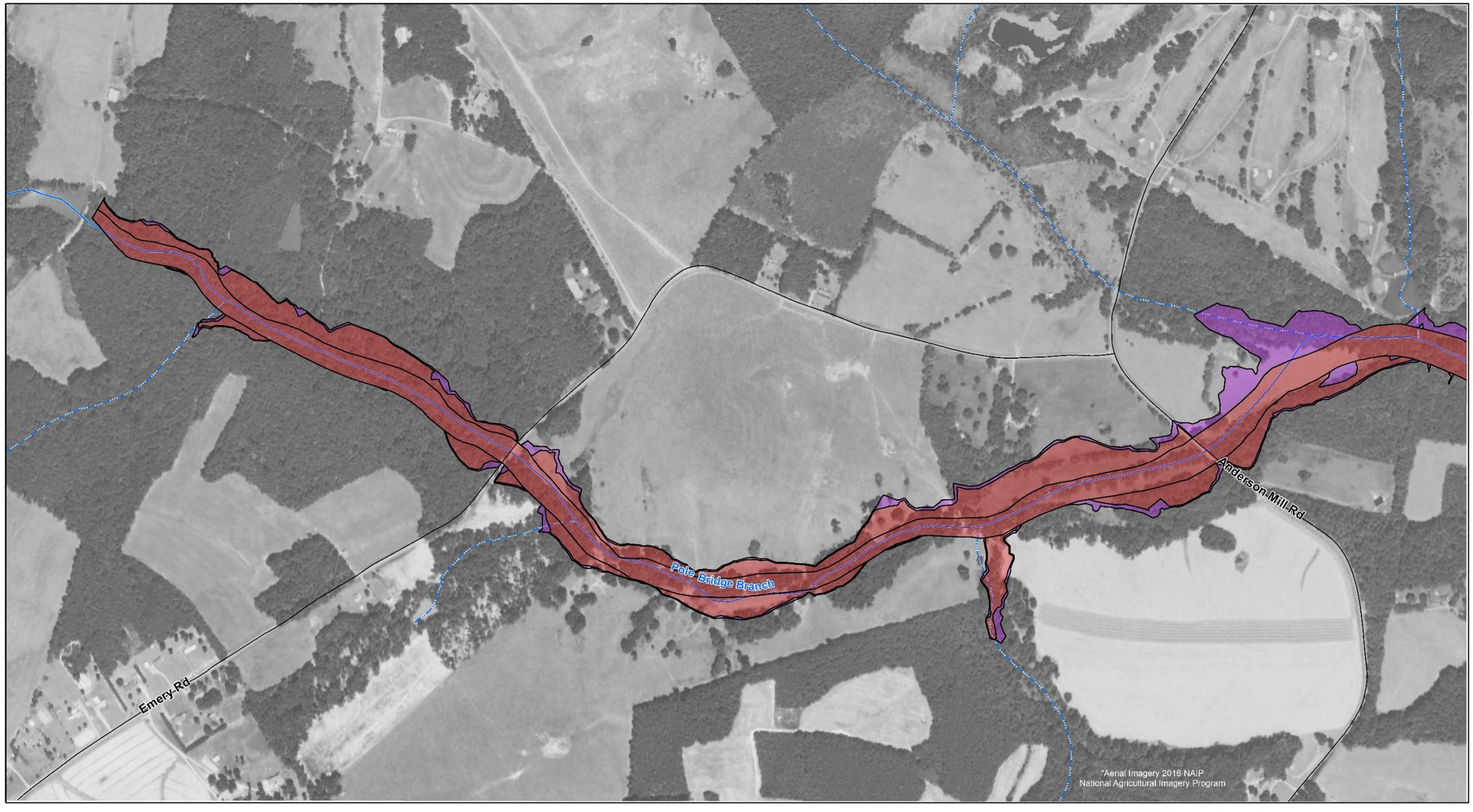
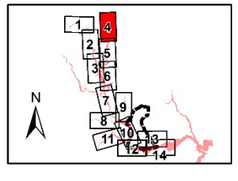
Figure C-9. Cherrystone 1 “Special Flood Hazard Areas” (Panel 4 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 4 of 14)

0 250 500 1,000 1,500 Feet

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

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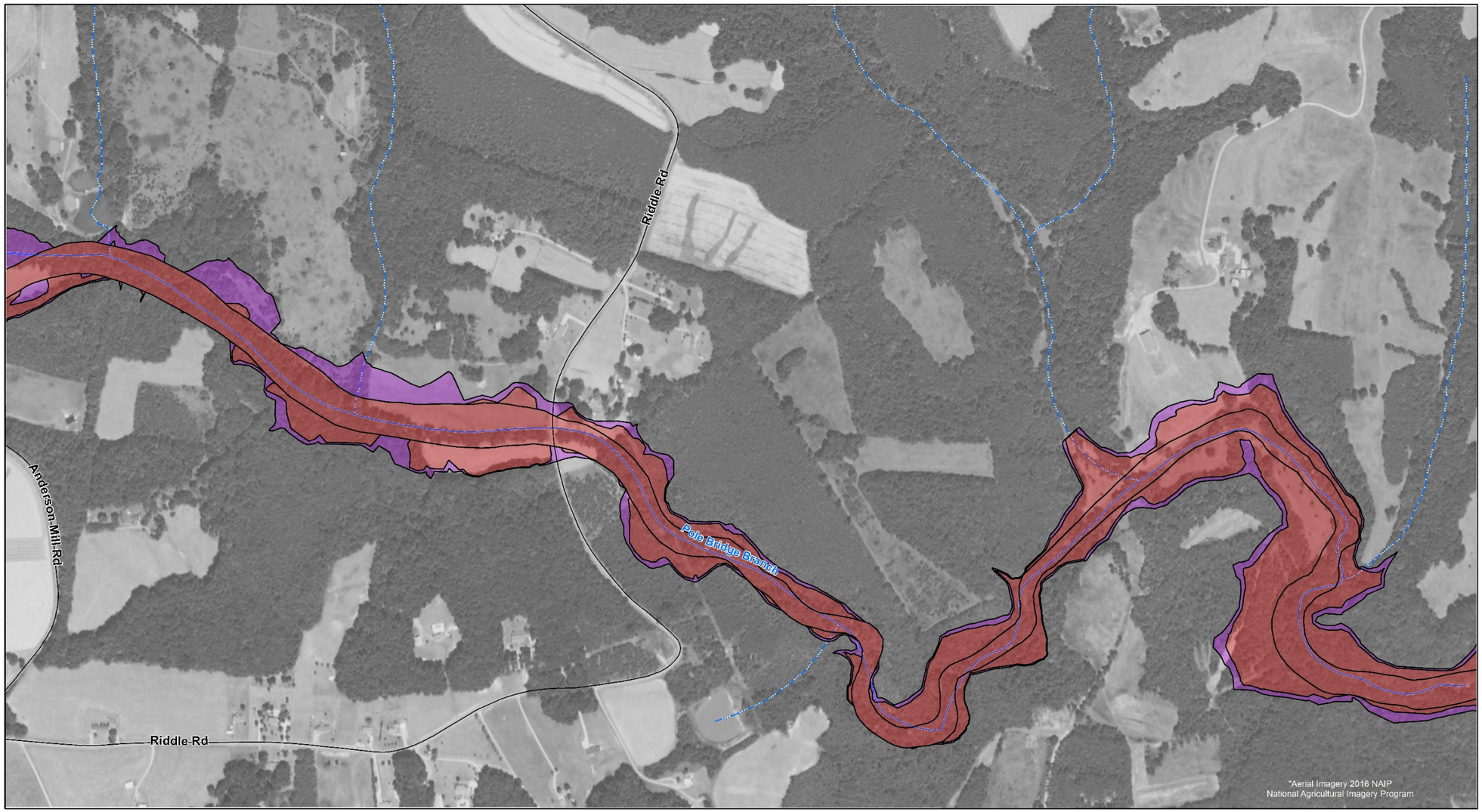
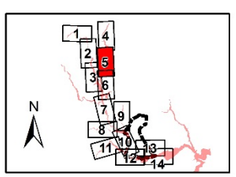
Figure C-10. Cherrystone 1 “Special Flood Hazard Areas” (Panel 5 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 5 of 14)

0 250 500 1,000 1,500 Feet

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

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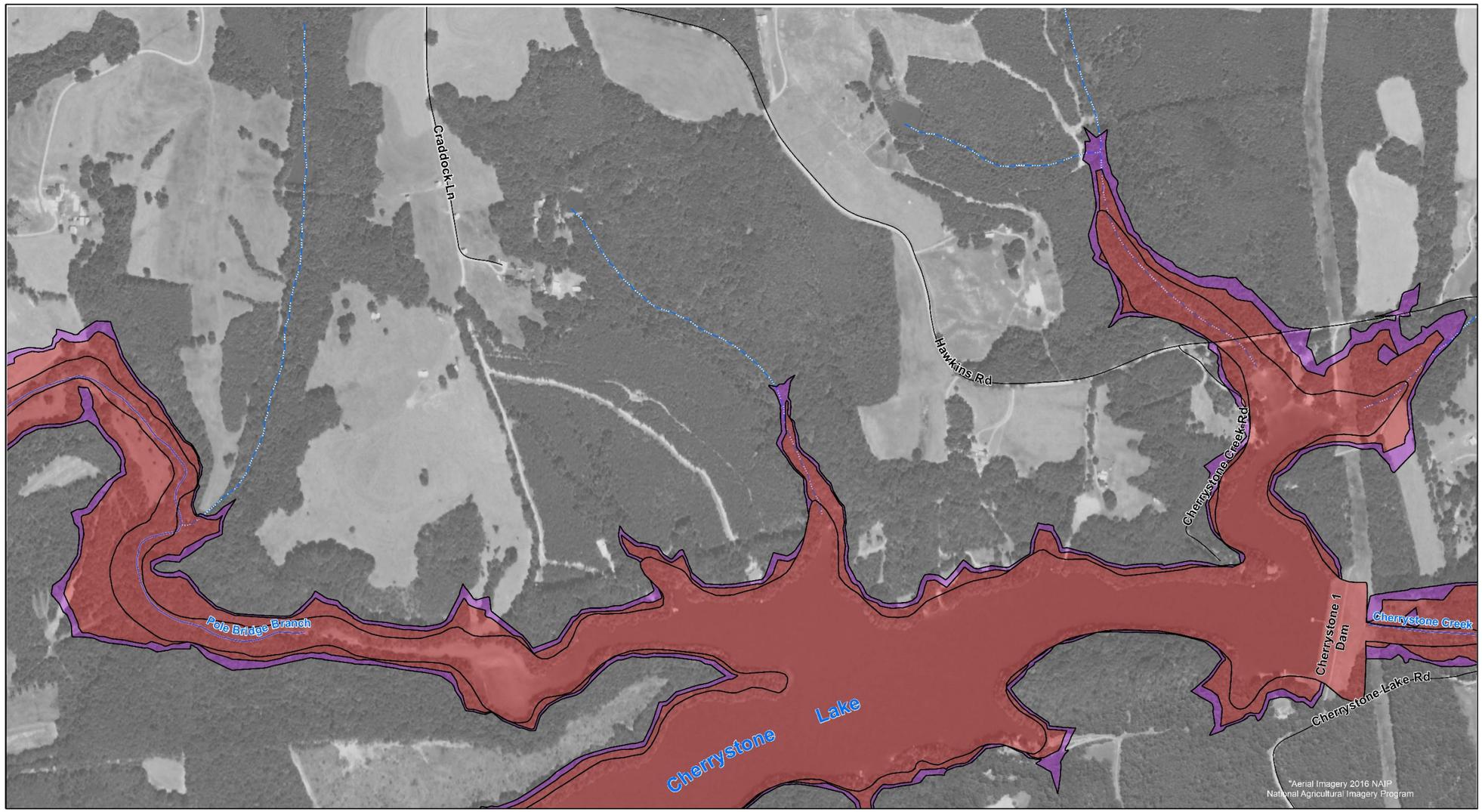
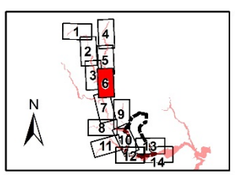
Figure C-11. Cherrystone 1 “Special Flood Hazard Areas” (Panel 6 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 6 of 14)

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

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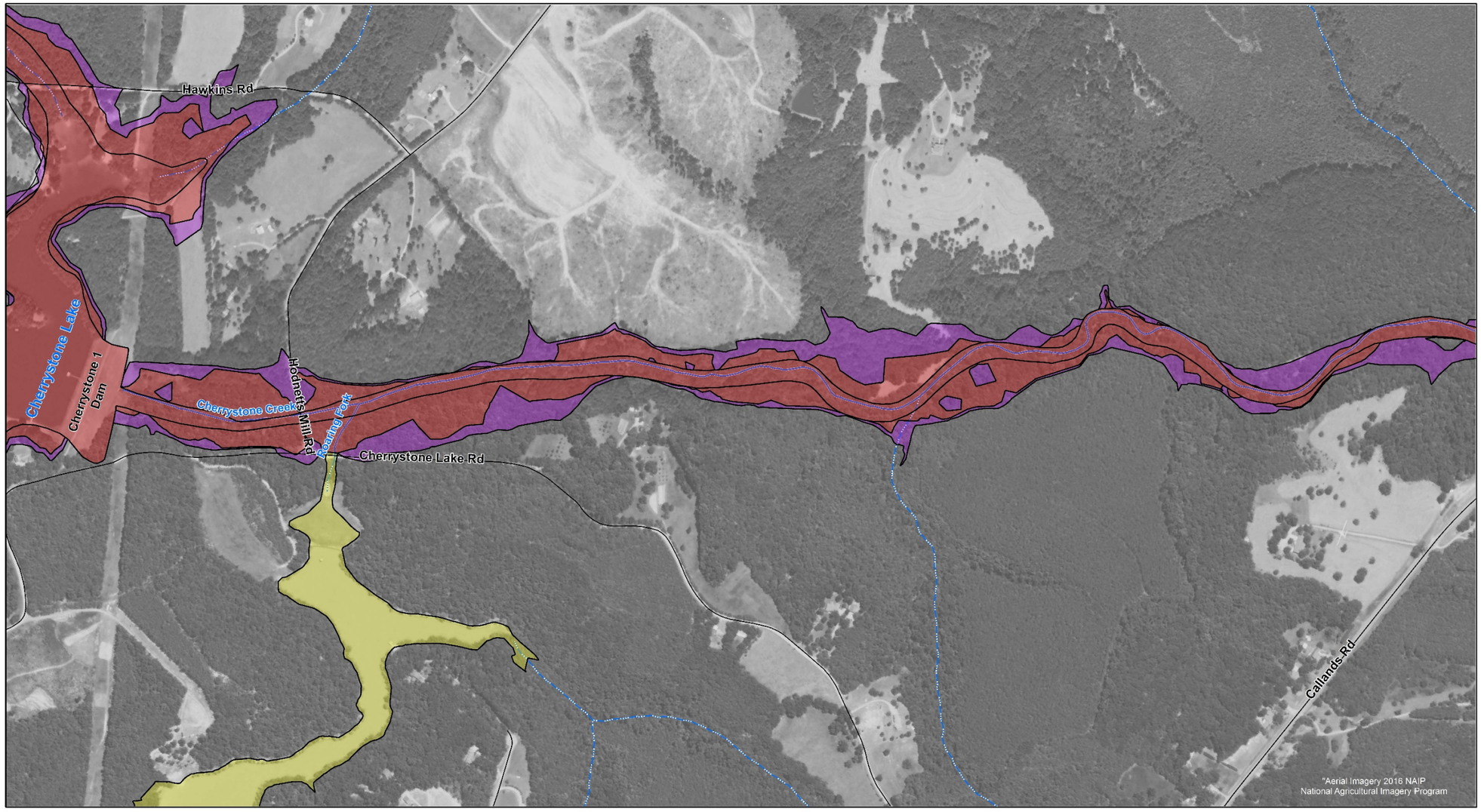
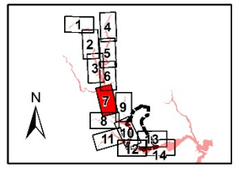
Figure C-12. Cherrystone 1 “Special Flood Hazard Areas” (Panel 7 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 7 of 14)

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

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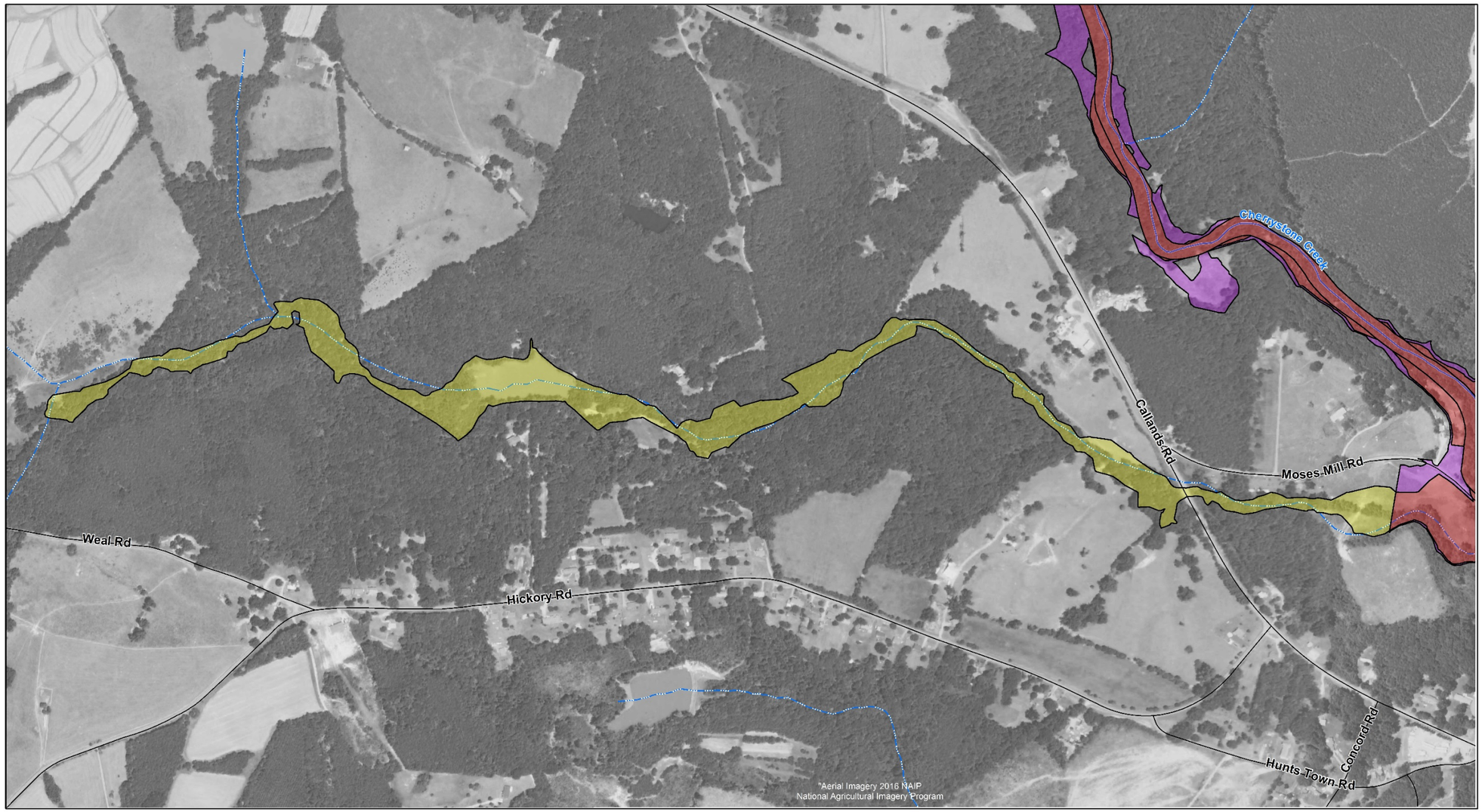
Figure C-13. Cherrystone 1 “Special Flood Hazard Areas” (Panel 8 of 14).



Cherrystone 1 “Special Flood Hazard Areas” (PANEL 8 of 14)

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

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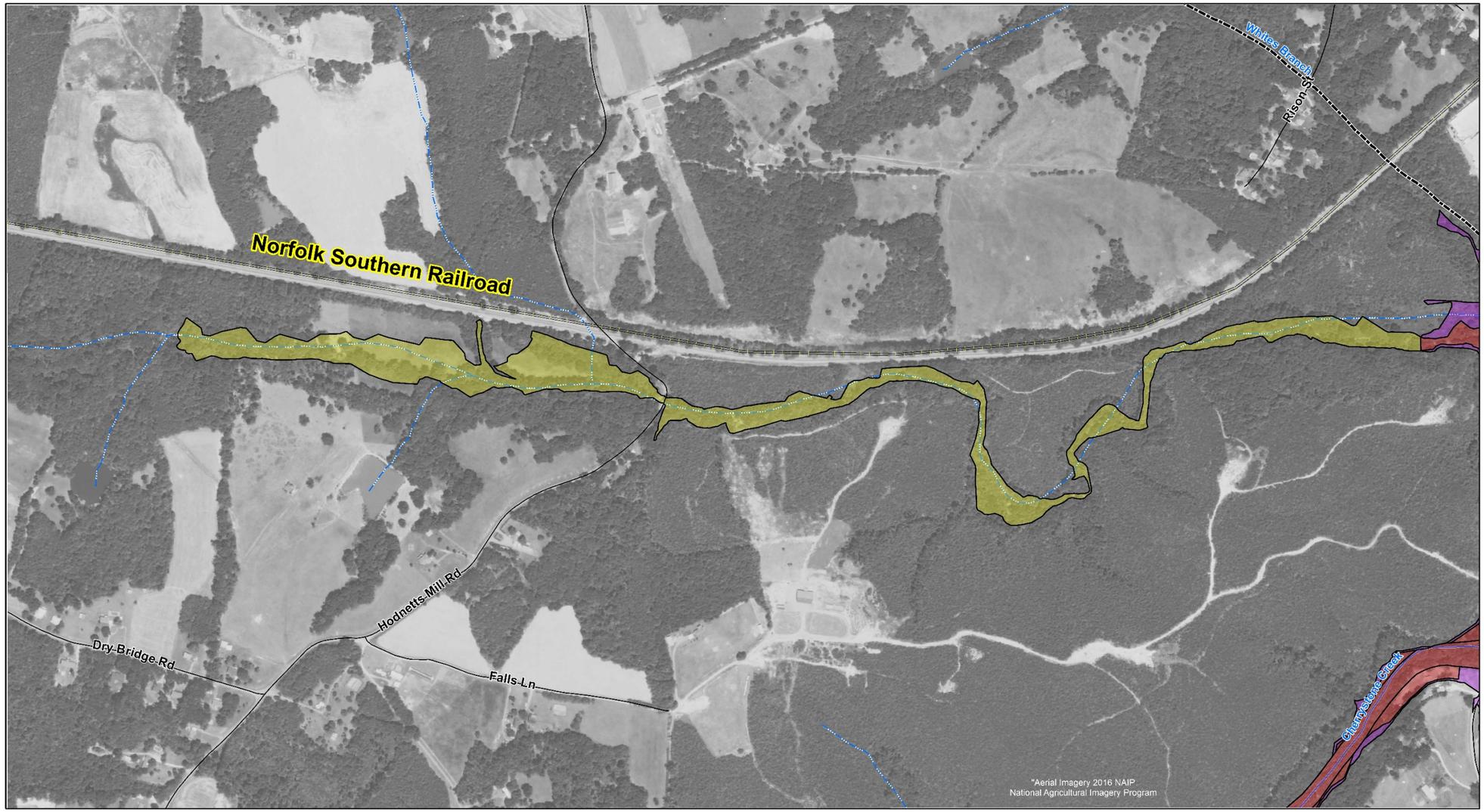
Figure C-14. Cherrystone 1 “Special Flood Hazard Areas” (Panel 9 of 14).



Cherrystone 1 “Special Flood Hazard Areas” (PANEL 9 of 14)

0 250 500 1,000 1,500 Feet

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

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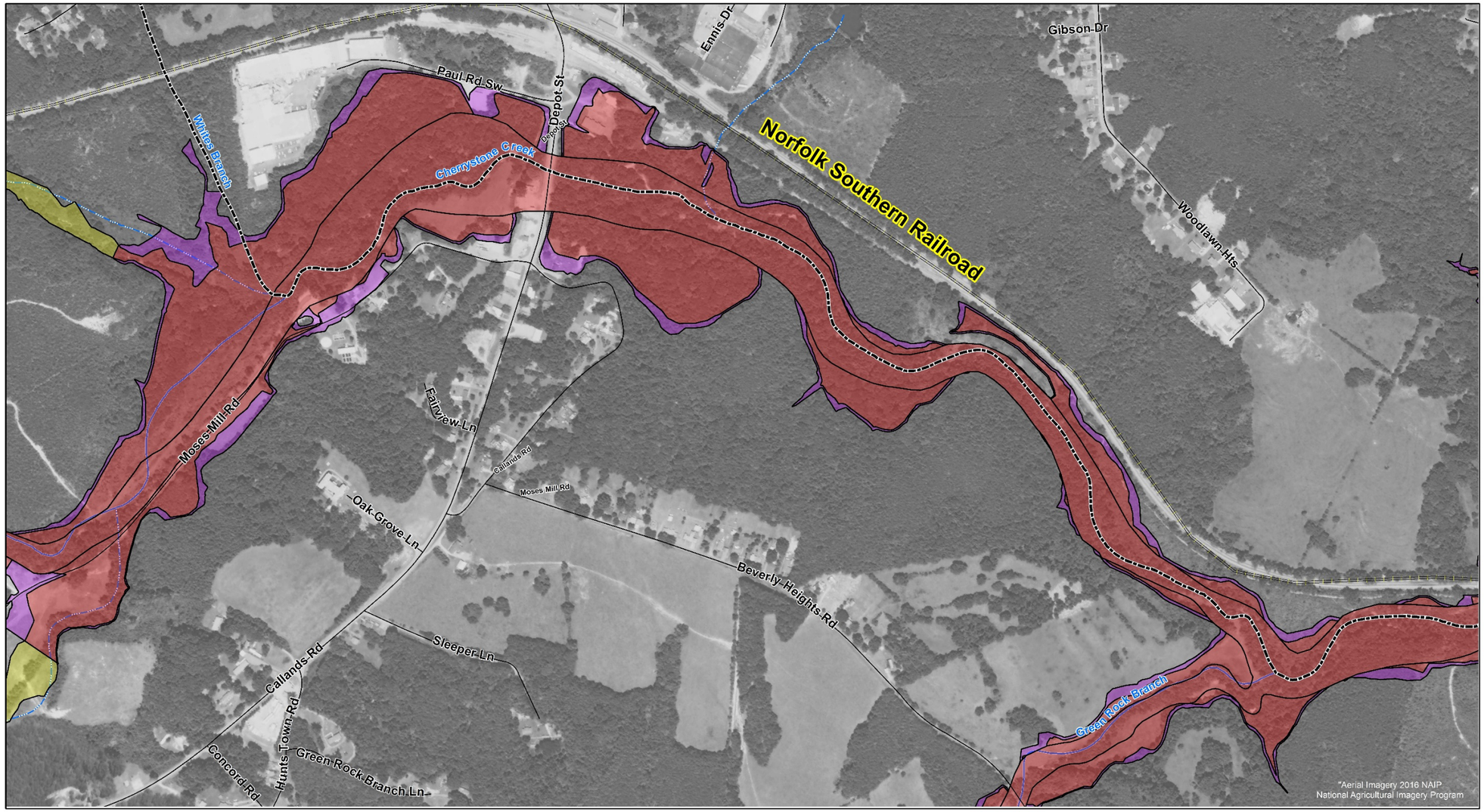
Figure C-15. Cherrystone 1 “Special Flood Hazard Areas” (Panel 10 of 14).



Cherrystone 1 “Special Flood Hazard Areas” (PANEL 10 of 14)

0 250 500 1,000 1,500 Feet

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

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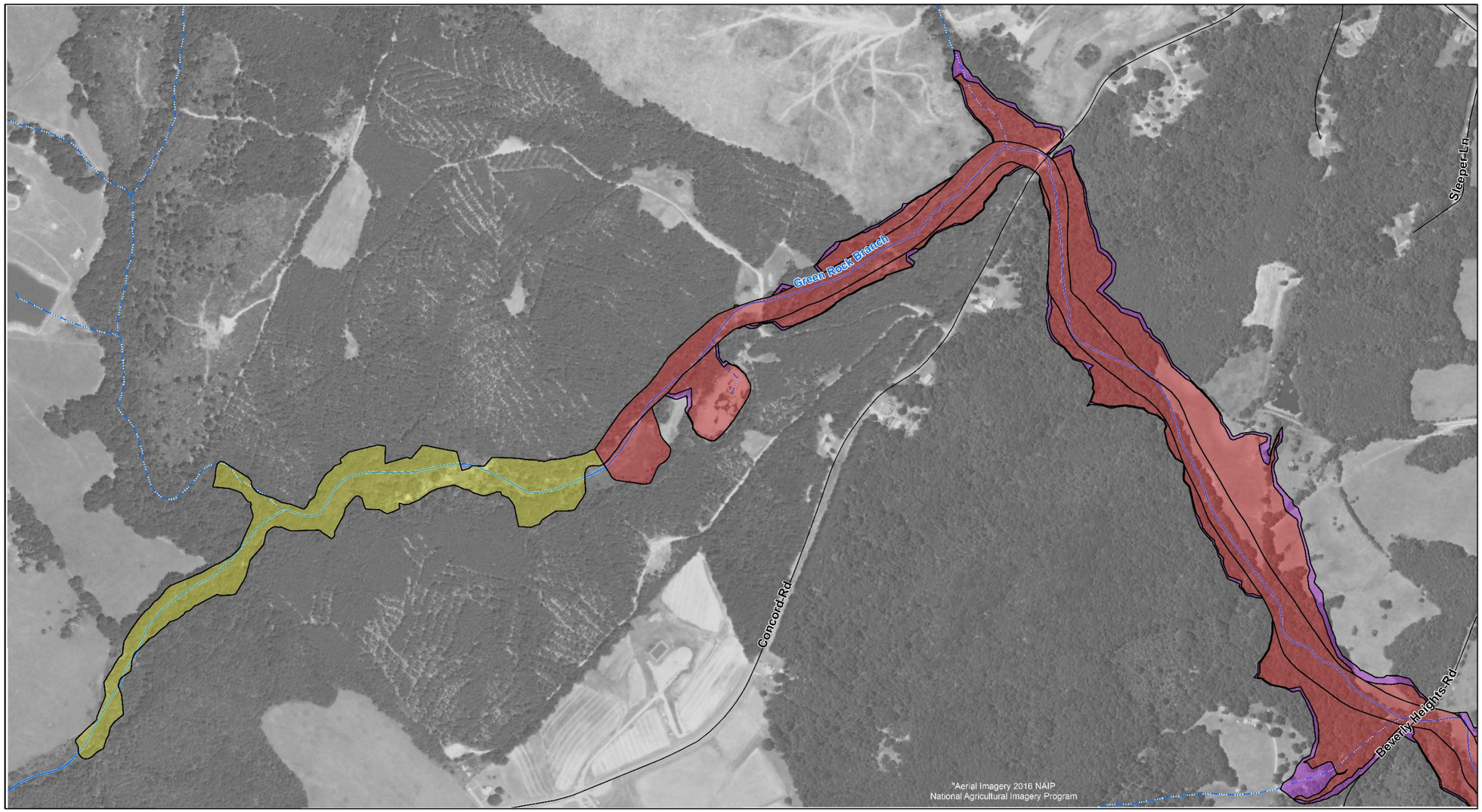
Figure C-16. Cherrystone 1 “Special Flood Hazard Areas” (Panel 11 of 14).



Cherrystone 1 “Special Flood Hazard Areas” (PANEL 11 of 14)

0 250 500 1,000 1,500 Feet

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- NHD Main Stems
- Rail Roads - VGIN

FEMA Floodway Zones

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- “Special Flood Hazard Areas” " A" 100yr Zones

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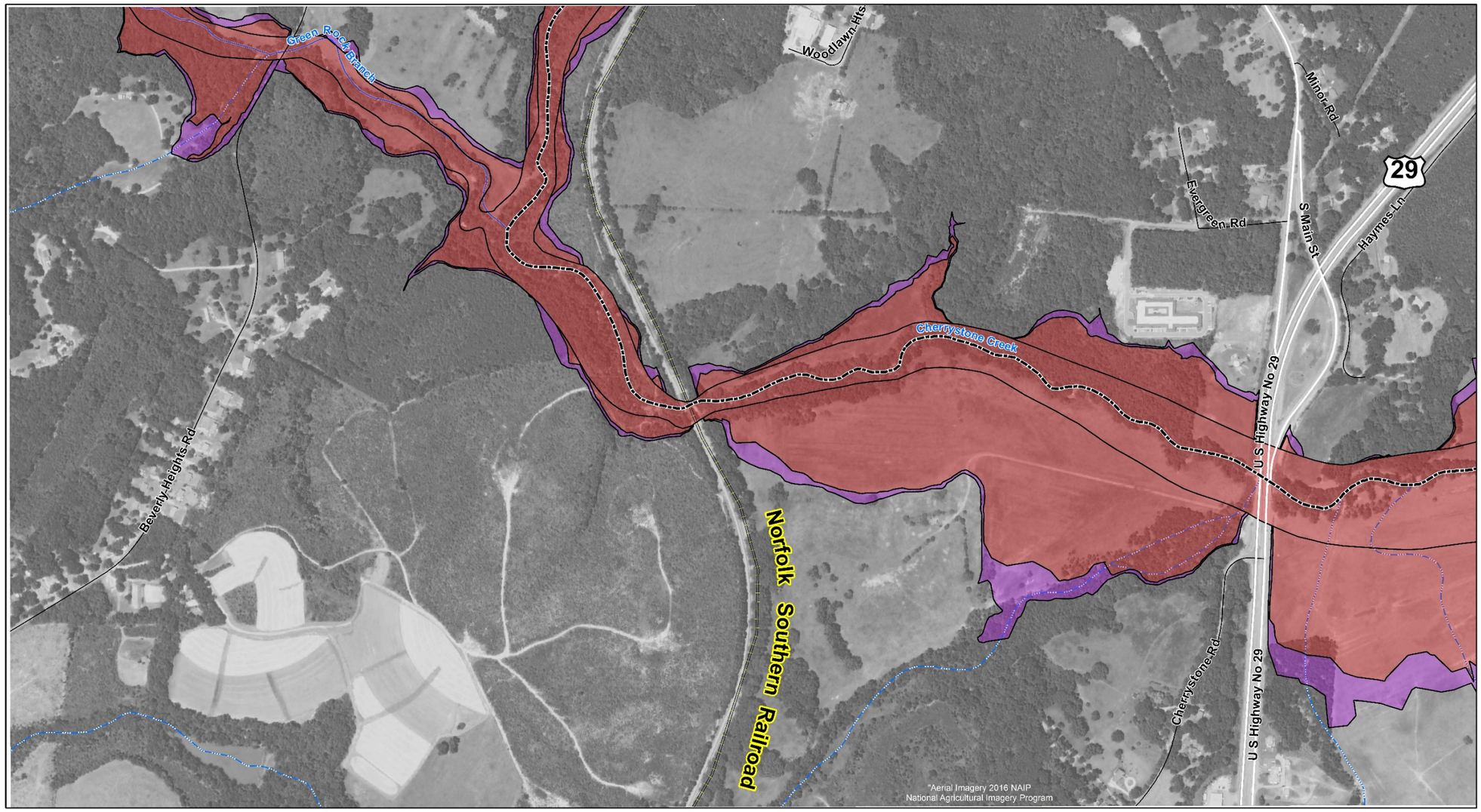
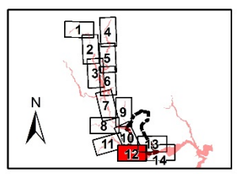
Figure C-17. Cherrystone 1 “Special Flood Hazard Areas” (Panel 12 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 12 of 14)

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

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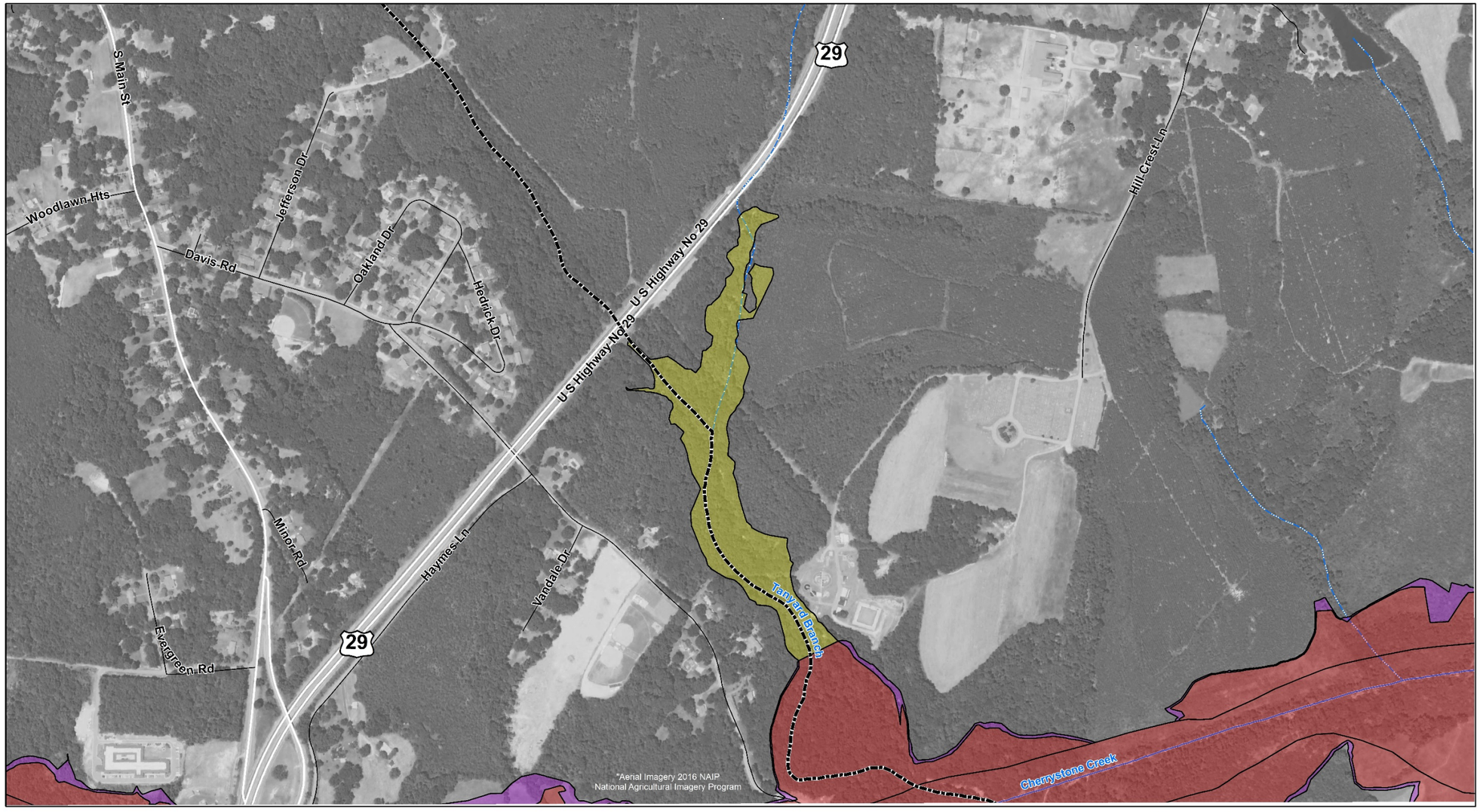
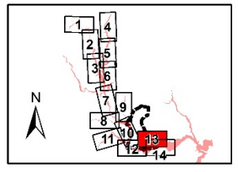
Figure C-18. Cherrystone 1 “Special Flood Hazard Areas” (Panel 13 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 13 of 14)

0 250 500 1,000 1,500 Feet

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

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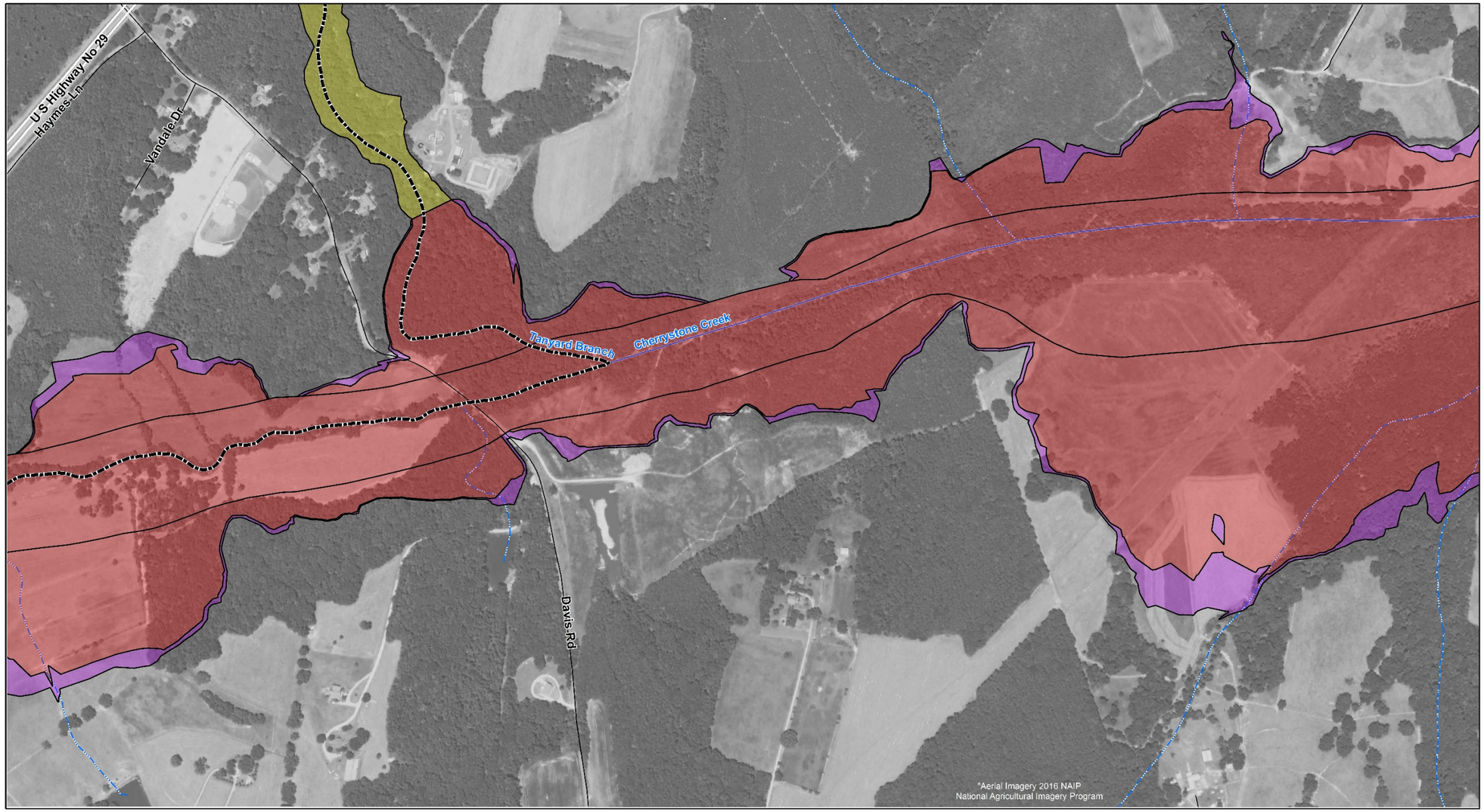
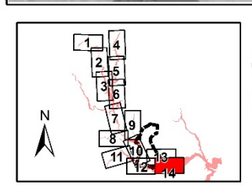
Figure C-19. Cherrystone 1 “Special Flood Hazard Areas” (Panel 14 of 14).





Cherrystone 1 “Special Flood Hazard Areas” (PANEL 14 of 14)

0 250 500 1,000 1,500 Feet

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Line Legend

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- 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

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Map Revision Date: 20180518

APPENDIX D

INVESTIGATIONS AND ANALYSES REPORT

Investigations and Analyses Used in the Planning for Rehabilitation of Cherrystone Creek Dam Site No. 1 (Cherrystone Lake)

Planning Engineering

Background

Cherrystone Creek stream originates in the western part of Pittsylvania County and flows generally east through the Town of Chatham (Town) and 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 and supplemented in 1976 to reduce flood flow in and around the Town and to provide water supply storage for the Town. Two watershed structures are in the Cherrystone Creek Watershed – Site 1 and 2A.

Cherrystone Creek Dam No. 2A is also currently in planning for rehabilitation to meet current state dam safety requirements, maintain existing flood control and water supply storage.

Purpose

This document summarizes the investigations and analysis completed for the dam rehabilitation planning engineering of Cherrystone Creek Dam No. 1. 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 1 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 and piers. The riser exterior had no significant issues to report. The riser interior showed a minor construction joint leak at the first joint below pool elevation, about 24 inches deep. No issues were reported for the principal spillway pipe. The impact basin was found to be in overall good condition. A few concrete issues were noted. The seal between the basin and the principal spillway pipe had come out of place and was found on the floor of the basin. The interior impact wall has water scour erosion of the concrete paste, leaving concrete aggregate highly exposed. The left toe drain could not be inspected due to gravel in the pipe. The right toe drain was inspected for 12 feet. No sediment or gravel was noted.

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 done 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 1.159. For downstream steady-state condition with pore pressure at the auxiliary spillway crest, the required FS is 1.5; the existing condition FS is 1.214. For the downstream steady-state with seismic forces, the required FS is 1.1; the existing condition FS is 1.257. In summary, the upstream and downstream slopes do not meet TR-60 safety factor criteria. Examining the top of dam with TR-60 criteria finds the top width of 17 feet to be insufficient. The minimum width is required to be 18.4 feet. For the purposes of constructability, the proposed top width is 20’. 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 (1966). 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. 1 does not meet the 10-day drawdown requirement during the PSH events but does meet the requirements to resist auxiliary spillway erosion during the FBH events (stability). The dam does not meet NRCS integrity criteria for high hazard potential dams. In 2008, the dam did not meet Virginia Division of Dam Safety criteria for the auxiliary spillway capacity for a high hazard potential dam. However, the State determination was made using the higher PMP value in effect at the time. With the lower PMP values adopted in Virginia, the existing auxiliary spillway still does not meet the needed capacity for a high hazard potential dam.

SITES runs for the recommended alternative show that the water surface elevation at the first crossing downstream of the dam will increase by 0.09 foot for the 500-year storm event. No change to the regulatory floodplain downstream is anticipated. There will also be no significant change in the floodpool upstream.

There are ten houses located below the top of the dam. The three located below the crest of the auxiliary spillway will be removed or floodproofed. Of the remaining seven homes, none have a first-floor elevation below the elevation of the 500-year auxiliary spillway flow although two have basements below the elevation of the 500-year event.

Life Span

As of 2018, Cherrystone Creek Dam No. 1 is 50 years old. The remaining sediment life of the structure is about 94 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.

Reservoir Storage

Cherrystone Creek Dam No. 1 was originally designed to detain future sediment, provide water supply, and provide flood storage. To determine the current reservoir storage, sediment surveys were completed by NRCS staff for Cherrystone Creek Dam No. 1 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 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 Cherrystone 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 1 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 1 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. 1,* 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 1 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 Cherrystone Lake are included in Appendix C. In Virginia, the localities are the zoning authorities. For the streams below Cherrystone Creek 1 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. In addition, “Principles, Requirements and Guidelines (PR&G) for Federal Investments in Water Resources”, March 2013, will soon be officially approved for use within the NRCS. These guidance documents were used to evaluate potential flood damages and estimate project benefits and associated costs. P&G and PR&G were 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. These guidance documents direct how to evaluate

alternative project actions and determine whether benefits from the proposed actions exceed project costs.

P&G, as well as PR&G, allow for abbreviated procedures commensurate with the planning and policy context to be used (P&G section 1.7.2 (a) (4) (ii) and PR&G section Chapter 2, 2.1B, pages 7-8), 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, PR&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 $448,100, 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 5.9 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 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 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 FY19 to discount and amortize the anticipated streams of costs and benefits.

Cherrystone Creek Site 1 Period of Analysis Determination

Discount rate:	0.02875	Design and replacement of principal spillway metalwork and gate assumed to be needed in years 25, 50 & 75:											$35,000
		Principal spillway is assumed to be slip-lined in year 50:											$171,000
		Dredging of sediment required sometime in the yr. 90-94 period to complete 100 year project life:											$250,000
Alt.	50-year Investment			75-year Investment			90-year Investment			100-year Investment			
NPV:	($17,231)			($67,163)			($71,616)			($166,529)			
AAV:	($654)			($2,193)			($2,233)			($5,087)			
Year	Benefits	Costs	Present Values	Benefits	Costs	Present Values	Benefits	Costs	Present Values	Benefits	Costs	Present Values	
-2	$1,133,000	$1,133,000	$0	$1,133,000	$1,133,000	$0	$1,133,000	$1,133,000	$0	$1,133,000	$1,133,000	$0	
-1	$11,143,476	$11,143,476	$0	$11,143,476	$11,143,476	$0	$11,143,476	$11,143,476	$0	$11,143,476	$11,143,476	$0	
1	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$7,312	($2,247)	
25	$5,000	$40,000	($17,231)	$5,000	$40,000	($17,231)	$5,000	$40,000	($17,231)	$5,000	$42,312	($18,370)	
26	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$7,312	($1,106)	
50	$5,000	$5,000	$0	$5,000	$211,000	($49,932)	$5,000	$211,000	($49,932)	$5,000	$213,312	($50,492)	
51	$0	$0	$0	$5,000	$5,000	$0	$5,000	$5,000	$0	$5,000	$7,312	($545)	
75	$0	$0	$0	$5,000	$5,000	$0	$5,000	$42,312	($4,453)	$5,000	$42,312	($4,453)	
76	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	$5,000	$7,312	($268)	
90	$0	$0	$0	$0	$0	$0	$5,000	$5,000	$0	$5,000	$257,312	($19,681.19)	
91	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($175)	
92	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($170)	
93	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($166)	
94	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($161)	
95	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($157)	
96	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($152)	
97	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($148)	
98	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($144)	
99	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($140)	
100	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000	$7,312	($136)	

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 90 have been hidden solely for truncating the table for presentation purposes; and all the hidden cells contain contents equal to the un-hidden row above them.

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.

Floodpool Risk Analysis

Planning principles were used to conduct an analysis of the risk associated with induced flooding due to floodpool water levels above the crest of the auxiliary spillway and the potential cost of meeting current top of dam easement policy. The difference between the crest of the auxiliary spillway elevation (682.0 feet) and the elevation of the floodpool associated with a PMP event (693.14 feet), as compared to the top of dam elevation of 693.9 feet, was used to estimate potential structure and content damages to the existing ten properties upstream of the dam potentially in harm's way (with points of water entry below the top of dam). A set of assumptions were used to estimate: 1) the cost of easements for the added 125 acres of land (easement encumbrance costs and legal fees for each parcel owner); 2) the value of residences and associated contents on the 70 identified parcels; 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 8.33 feet.

The associated average annual damages for all storm events were estimated to be $1,628. 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 $19,250 (excludes any estimates for litigation.). 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 0.085:1; an extremely low B/C ratio. Alternatively expressed, for every $1 in benefits (damages avoided), over $10 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 done 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.

This analysis along with alternatives for managing floodpool risk 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 70 existing parcels with land below the top of dam; and/or 5) pass a setback ordinance preventing future development below the top of dam.

The local sponsors unequivocally prefer to live with the existing easement and its associated risk for potential damages. They will enact an ordinance preventing future development below the crest of the auxiliary spillway. The local sponsors accepted and have lived for almost 50 years with the existing easement and its associated potential for risk of flood damages.

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 DEQ 2014 305(b)/303(d) Integrated Water Quality Assessment and Impaired Waters Report released in 2016.

Wetlands

A wetland investigation for Cherrystone 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).*