

FINAL
Supplemental Watershed Plan No. 4 and Environmental Evaluation
for the
Rehabilitation of Floodwater Retarding Structure No. 11
(Mountain Run Lake)
of the Mountain Run Watershed
Culpeper County, Virginia



Mountain Run 11 - Mountain Run Lake
in Culpeper, VA

0 300 600 1,200 1,800
Feet



Aerial Imagery 2013
VGIN - VBMP



PREPARED BY
USDA Natural Resources Conservation Service
IN COOPERATION WITH
Town of Culpeper
Culpeper Soil and Water Conservation District
April 2016

Non-Discrimination Statement

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FINAL

Supplemental Watershed Plan No. 4 & Environmental Evaluation
for the
Rehabilitation of Floodwater Retarding Structure No. 11
of the Mountain Run Watershed
Culpeper County, Virginia

Prepared By:
USDA – Natural Resources Conservation Service

In Cooperation With:
Town of Culpeper
Culpeper Soil and Water Conservation District

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 (Public Law 83-566) as amended. The rehabilitation of Mountain Run Dam No. 11 is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472.

Abstract

Mountain Run Dam No. 11, Mountain Run Lake, has been reclassified as a high hazard dam that fails to comply with current dam safety and performance criteria. It does not presently meet Natural Resources Conservation Service (NRCS) or Virginia Dam Safety standards for integrity, stability, and capacity of a vegetated auxiliary spillway. In addition, the principal spillway riser does not meet NRCS seismic stability criteria. The recommended plan is to rehabilitate Mountain Run Dam No. 11 to meet current Virginia Dam Safety and NRCS criteria. The plan provides for the installation of a 144-foot-wide, 6-cycle labyrinth weir over the embankment, installing a 200-foot-long earthen berm across the existing auxiliary spillway, and installing a stilling basin and rip-rap outlet protection. The principal spillway riser will also be upgraded to meet seismic criteria through the installation of about 5.5 feet of granular rock fill placed above and around the periphery of the existing riser footer. There will be no change in the current levels of flood protection downstream as a result of project activity. A total of 101.7 acre-feet of existing water supply storage in this structure will be reassigned to sediment storage. Project installation cost is estimated to be \$5,622,000 of which \$3,919,000 will be paid from the Small Watershed Rehabilitation funds and \$1,703,000 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.

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MOUNTAIN RUN WATERSHED AGREEMENT

Supplemental Watershed Plan Agreement
(Supplement No. 4)

between the

Town of Culpeper
Culpeper Soil and Water Conservation District
(herein referred to collectively as “Sponsors”)
Commonwealth of Virginia

and the

Natural Resources Conservation Service
United States Department of Agriculture
(herein referred to as “NRCS”)

Whereas, the Watershed Work Plan Agreement for the Mountain Run 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 (which is now NRCS, pursuant to section 246 of the Department of Agriculture Reorganization Act of 1994, 7 U.S.C. 6862), became effective the 24th day of April 1958; and

Whereas, Supplement No. 1, which modified the Watershed Plan Agreement, was developed through cooperative efforts of the Sponsors and the Soil Conservation Service and became effective on the 29th day of June 1967; and

Whereas, Supplement No. 2, which modified the Watershed Plan Agreement, was developed through cooperative efforts of the Sponsors and the Soil Conservation Service and became effective on the 20th day of March 1972; and

Whereas, Supplement No. 3, which modified the Watershed Plan Agreement, was developed through cooperative efforts of the Sponsors and the Soil Conservation Service and became effective on the 14th day of February 1979; 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 Mountain Run Dam No. 11 located in Culpeper 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 Evaluation has been developed to rehabilitate the Mountain Run Dam No. 11, Commonwealth of Virginia, hereinafter referred to as the Watershed Project Plan or Plan, which Plan is annexed to and made a part of this agreement; and

Whereas, in order to provide for rehabilitation of the Mountain Run Dam No. 11, 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 Town of Culpeper 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 Town of Culpeper and NRCS are as shown in the Cost-Share table in Section 5 hereof. The Town of Culpeper acknowledges the potential risk of flood damages for the real property between the flowage rights elevation and the top of dam elevation.
- 4. Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The Town of Culpeper 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 Town of Culpeper is 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
	Percent	Cost	Percent	Cost	Cost
Rehabilitation of the dam (construction costs):	65%	\$3,203,500	35%	\$1,646,500	\$4,850,000
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
Land Rights Acquisition Costs:	n/a	n/a	100%	\$0	\$0
Subtotals:					
Cost-Sharable Costs:	(65%)	\$3,203,500	(35%)	\$1,725,000	\$4,928,500
Cost-Share Percentages:^{a/}					(100%)
Non Cost-Sharable Items (per PL-83-566 and NRCS policy)^{b/}	---	---	---	---	---
NRCS Engineering and Project Administration Costs:	100%	\$715,500	n/a	n/a	\$715,500
Natural Resource Rights:	n/a	n/a	0%	\$0	\$0
Federal, State and Local Permits:	n/a	n/a	100%	\$3,000	\$3,000
Relocation, Beyond Required Decent, Safe, Sanitary	n/a	n/a	0%	\$0	\$0
Subtotals: Non-Cost-Sharable Costs:	100%	\$ 715,500	100%	\$3,000	\$718,500
Total Cost-Sharable Cost:	n/a	\$3,203,500	n/a	\$1,728,000	\$4,960,000
Total Installation Cost:	n/a	\$3,919,000	n/a	\$1,728,000	\$5,647,000

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

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

6. Land treatment agreements. Approximately 43% of the drainage area above Mountain Run Dam No. 11 is wooded with another 42% in pasture and hayland. Therefore, there is no need for additional erosion control measures in the watershed. 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, the Town of Culpeper must agree to participate in and comply with applicable Federal floodplain management and flood insurance programs.
8. **Water and mineral rights.** The Town of Culpeper 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 Town of Culpeper and these costs are not eligible as part of the Sponsors' cost-share.
9. **Permits.** The Town of Culpeper 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 Town of Culpeper 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 Culpeper 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 Culpeper'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 Culpeper

acknowledge 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 Culpeper 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 Culpeper 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.

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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 () 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.

Town of Culpeper
400 South Main Street
Culpeper, Virginia 22701

By: /S/ Christopher D. Hively
CHRISTOPHER D. HIVELY
Title: Town Manager

Date: April 13, 2016

The signing of this supplemental watershed agreement was authorized by the governing body of the Town of Culpeper at a meeting held on April 12, 2016.

/S/ Kimberly D. Allen
Clerk or Notary

Town of Culpeper
400 South Main Street
Culpeper, Virginia 22701

Date: April 13, 2016

**Culpeper Soil and Water
Conservation District**
351 Lakeside Drive
Culpeper, Virginia 22701

By: /S/ Lynn Graves
LYNN GRAVES
Title: Chairman
Date: April 5, 2016

The signing of this supplemental watershed agreement was authorized by the governing body of the Culpeper Soil and Water Conservation District at a meeting held on April 5, 2016.

/S/ JoAnne M. Neal
Administrative Secretary

Culpeper SWCD
351 Lakeside Drive
Culpeper, VA 22701

Date: April 5, 2016

**Natural Resources Conservation Service
United States Department of Agriculture**

Approved by:

/S/ John A. Bricker
JOHN A. BRICKER
State Conservationist

Date: April 14, 2016

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Tab 1

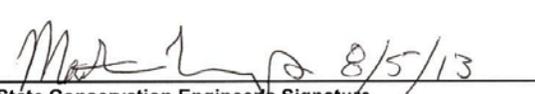
EVALUATION OF POTENTIAL REHABILITATION PROJECTS

EVALUATION OF POTENTIAL REHABILITATION PROJECTS							
STATE	VA	DAM	Mountain Run 11	BY	MJL	DATE	8/5/2013
YEAR BUILT		1959	DESIGN HAZARD CLASS	L	DRAINAGE AREA		6.4 mi ²
WORK PLAN DATE		1/1/1958	CURRENT HAZARD CLASS	H	DAM HEIGHT		39 ft
sht 1 of 5	CONSEQUENCES OF DAM FAILURE (ver. 2013-02)					NID ID	VA04702
POTENTIAL DAM FAILURE:							
Total Failure Index						157	A
POTENTIAL LOSS OF LIFE:							
Maximum Population-at-Risk [PAR]						(number)	3,458 B
Total Risk Index						21,560	C
POTENTIAL LOSS OF PROPERTY:							
Identify major community affected by breach and rate impact as High (H), Medium (M), Low (L) or None(blank)							
Community						Town of Culpeper	(H,M,L,-) H D
Number of homes, businesses, major buildings						(number)	947 E
POTENTIAL LIFELINE DISRUPTION:							
Water supply, identify community disrupted by dam failure, and estimate number/amount							
Municipal sole source						Water supply for Town of Culpeper	Users (number) 17,500 F
Supplemental source							Users (number) 0 G
Irrigation water							Storage (Ac-Ft) 0 H
POTENTIAL INFRASTRUCTURE DISRUPTION:							
Transportation system crossings, identify major crossing rendered unusable by dam failure, and estimate number							
Major/Interstate						229, 522, 667, 799, 15/29, 15/29 BUS, 29 BUS, 29, 7	Roads (number) 10 I
Secondary/County						94 secondary roads	Roads (number) 94 J
POTENTIAL ADVERSE IMPACTS ON THE ENVIRONMENT:							
Describe impacts and rate each as High (H), Medium (M), Low (L), or None (blank)							
Threatened & endangered species						There are T&E species within 2 miles of the project	(H,M,L,-) M K
Sensitive riparian areas						There are sensitive riparian areas along Mountain R	(H,M,L,-) M L
Contaminated reservoir sediment						There is data suggesting the reservoir sediment pote	(H,M,L,-) M M
Wetland and wildlife habitat						There are emergent wetlands along the shoreline ar	(H,M,L,-) H N
Other						No managed trout waters associated with Mountain	(H,M,L,-) L O
POTENTIAL ADVERSE SOCIAL IMPACTS:							
Describe impacts and rate each as High (H), Medium (M), Low (L) or None(blank)							
Known cultural resources						There are no known cultural resources within 1 mile	(H,M,L,-) L P
Historic preservation issues						There are no known historic preservation issues with	(H,M,L,-) L Q
Socially disadvantaged community						Town of Culpeper has a significant population of soc	(H,M,L,-) H R
POTENTIAL ADVERSE ECONOMIC IMPACTS:							
Average annual benefits attributed to this dam, updated workplan value						(\$)	25,500 S
Changes in benefits since workplan; Increase(I), No change(NC), Decrease(D)						(I,NC,D)	I T
Low income families impacted						(number)	1200 U
INPUT BY STATE DAM SAFETY AGENCY:							
State dam safety order issued for repair, modification, removal issued, Yes(Y), No(N)						(Y,N)	Y V
State Dam Safety Agency Priority, High(H), Medium(M), Low(L), None(blank)						(H,M,L,-)	H W
OTHER CONSIDERATIONS:							
Identify any other considerations and rate as High(H), Medium(M), Low(L) or None(blank)							
Wastewater treatment plant within breach zones						(H,M,L,-)	H X
						(H,M,L,-)	Y

EVALUATION OF POTENTIAL REHABILITATION PROJECTS							
STATE	VA	DAM	Mountain Run 11	BY	MJL	DATE	8/5/2013
sht 2 of 5	FAILURE & RISK INDEXES						ver 2013-02
Adopted from Bureau of Reclamation "Risk Based Profile System" see: http://www.usbr.gov/dsis/risk/rbpsdocumentation.pdf							
LIFE LOSS: Population-at-Risk [PAR], see NRCS dams inventory definition (number of people)							
Estimate PAR for static loading failure; typically assume water at or above invert of the lowest open channel auxiliary spillway						3,408	A
Estimate PAR for hydrologic loading failure; typically assume water at or above invert of the lowest open channel auxiliary spillway						3,458	B
Estimate PAR for seismic loading failure; typically assume water at or above invert of the lowest non-gated spillway (sunny day failure)						36	C
Fatality Rates [FR] from dam breach Adopted from BuRec "A Procedure for Estimating Loss of Life Caused by Dam Failure" DSO-99-06 see: http://www.usbr.gov/research/dam_safety/documents/dso-99-06.pdf Flood Severity/Lethality [DV] is the average depth [D] times velocity [V] across flood plain (ft2/sec) DV= (breach discharge - bank full discharge) / breach floodplain width Warning Time [T] between failure warning and flood wave at population (minutes) Flood Severity Understanding [U] of the warning issuer of the likely flooding magnitude							
Scenario	Breach Discharge	Bankfull Discharge	Breach Floodplain Width	DV	Warning Time, T	Understanding, U	
	(cfs)	(cfs)	(ft)	(ft2/sec)	(minutes)	(N/A or Vague)	
Static	45,500	255	540	84	60	Vague	
Hydrologic	66,500	255	540	123	60	Vague	
Seismic	33,000	255	508	64	60	Vague	
	For DV≥50	T≤60 T>60	U=vague	FR=0.04 FR=0.03			
	For DV<50	T≤60 T>60	U=vague	FR=0.007 FR=0.0003			
Estimate FR for static loading failure scenario						0.04	D
Estimate FR for hydrologic loading failure scenario						0.04	E
Estimate FR for seismic loading failure scenario						0.04	F
Scenario	Load Factor	Response Factor	Failure Index	Fatality Rate	PAR	Risk Index	
Static	1	78	78	0.04	3,408	10,633	
Hydrologic	*	*	79	0.04	3,458	10,927	
Seismic	0.00	#DIV/0!	0	0.04	36	0	
TOTAL=			157	TOTAL=		21,560	

EVALUATION OF POTENTIAL REHABILITATION PROJECTS							
STATE	VA	DAM	Mountain Run 11	BY	MJL	DATE	8/5/2013
sht 3 of 5	STATIC FAILURE INDEX						ver 2013-02
PRINCIPAL SPILLWAY SYSTEM (60 points max):				(total points)	20		A
Downstream filter or filter zone around conduit (yes=0 or no=10)					10		B
Conduit trench deep (>2d) and narrow (<3d) and steep sideslope (<2:1) (no=0 or yes=10)					0		C
Principal spillway system (inlet, pipe, or outlet) in deteriorated condition (no=0 or yes=10)					0		D
Conduit has seepage cutoff collars or other compaction adverse features (no=0 or yes=10)					10		E
Conduit contains open joints, open cracks, steady seepage (no=0 or yes=10)					0		F
Conduit founded on competent bedrock (yes=0 or no=10)					0		G
Reservoir control gate located at outlet of conduit (no=0 or yes=10)					0		H
RESERVOIR FILLING HISTORY (75 points max):				(total points)	50		I
Reservoir has filled to x% of effective height (earth spillway crest minus original streambed)					72		J
(<50%=75 or 51-75%=50 or 76-90%=25 or 91-95%=10 or 96-100%=5 or >100%=0)					50		K
SEEPAGE AND DEFORMATION (85 points max):				(total points)			L
Seepage carrying fines, or seepage increases with reservoir elevation increases, or sinkholes/jugholes exist in embankment (no=0 or yes=80)					0		M
Large amounts of seepage (no=0 or yes=6)					0		N
Visible and significant slope movement or sloughing (no=0 or yes=6)					0		O
Longitudinal or transverse embankment cracking greater than one foot in depth (no=0 or yes=6)					0		P
Sinkholes/depressions within two times effective height of the dam, either face (no=0 or yes=6)					0		Q
Poor top of dam condition, eroded, trees, rodent holes, settlement (no=0 or yes=6)					0		R
Abnormally wet areas at downstream toe/groin of embankment (no=0 or yes=6)					0		S
Inadequate slope protection against erosion by rainfall or waves (no=0 or yes=6)					0		T
FOUNDATION GEOLOGY (41 points max):				(total points)			U
Highly fractures rock under core (no=0 or treated=3 or untreated=30)					0		V
Karst terrain and soluble rock (gypsum or limestone) (no=0 or treated=3 or untreated=30)					0		W
Collapsible soils (no=0 or treated=3 or untreated=30)					0		X
Significant stress relief fractures in abutments (no=0 or treated=3 or untreated=30)					0		Y
History of underground mining under embankment area (no=0 or treated=3 or untreated=30)					0		Z
Coarse grained and highly permeable soils (no=0 or yes=3)					0		AA
Presence of weak layers/conditions diminishing embankment stability (no=0 or yes=3)					0		AB
Erodible soils (sandy/silty materials) or weakly cemented rock (no=0 or yes=3)					0		AC
Reservoir area prone to landslides that could cause overtopping (no=0 or yes=3)					0		AD
EMBANKMENT DESIGN AND CONSTRUCTION (24 points max):				(total points)	4		AE
Filters for core or foundation or incompatibility between zones (no=4 or yes=0)					4		AF
Embankment or foundation drainage system (yes=0 or no=4)					0		AG
Erodible core material (sands, silts, dispersive clays) (no=0 or yes=4)					0		AH
Incomplete or no foundation cutoff of shallow permeable layers (no=0 or yes=4)					0		AI
Poorly placed earthfill, inadequate density (no=0 or yes=4)					0		AJ
Gate features to drain reservoir (yes=0 or no=4)					0		AK
EMBANKMENT MONITORING (15 points max):				(total points)	4		AL
Instruments (except surficial survey points) installed at dam (yes=0 or no=4)					4		AM
Installed instruments routinely read and evaluated (yes=0 or no=4)					0		AN
Visual inspection of dam by engineer less often than yearly (no=0 or yes=4)					0		AO
Good physical/visual access to downstream groin/toe for inspection (yes=0 or no=4)					0		AP
STATIC FAILURE INDEX: A+I+L+U+AE+AL					78		AQ

EVALUATION OF POTENTIAL REHABILITATION PROJECTS						
STATE	VA	DAM	Mountain Run 11	BY	MJL	DATE
sht 4 of 5	HYDROLOGIC FAILURE INDEX					ver 2013-02
HYDROLOGIC LOADING:						
Total Spillway Capacity (PS&ES) for 6hr storm [Pfb], Work Plan Tbl 3 (rainfall inches) Obtained from Work Plan Tbl 3, or dams inventory data, or computer routings						11.6 A
100 year, 6hr rainfall [P100] (inches)						5.4 B
Probable Maximum Precipitation [PMP] (inches)						27.8 C
if Pfb <= P100 = 5.40 enter 40						
if Pfb = P100+0.2(PMP-P100) = 9.88 enter 25						
if Pfb = P100+0.4(PMP-P100) = 14.36 enter 15						
if Pfb = P100+0.6(PMP-P100) = 18.84 enter 7						
if Pfb = P100+0.8(PMP-P100) = 23.32 enter 3						
if Pfb => PMP = 27.80 enter 1						
Enter interpolated value						21.2 D
HYDROLOGIC UNCERTAINTY:						
Drainage Area [DA] (square miles)						6.4 E
DA<10 enter 1.5 ; 10<DA<20 enter 1.4 ; 20<DA<50 enter 1.3 ; DA=>50 enter 1.2						1.5 F
PIPE SPILLWAY PLUGGING:						
Pipe Diameter [D] (inches)						30 G
D<12 enter 1.1; 12<=D<24 enter 1.0; 24<=D enter 0.9						0.9 H
Riser & trash rack type:						
Non-standardized inlet enter 1.1, Open Top riser enter 1.0; Covered or Baffle Top enter 0.9						0.9 I
EARTH SPILLWAY FLOW:						
Earth spillway flow depth [Des] from top of dam to spillway crest (feet)(10' max)						5.5 J
DAM EROSION RESISTANCE:						
Non-plastic (PI<10) fill enter 2.0 ; Plastic core enter 1.7 ; Overtopping armoring enter 0.8						1.7 K
Vegetal Cover Factor [Cf], see SITES or AH667 http://www.pswcr.ars.usda.gov/ah667/ah667.htm						0.8 L
Cf <0.4 enter 1.1; Cf < 0.7 enter 1.0; Cf<1.0 enter 0.9; larger Cf enter 0.8						0.9 M
EARTH SPILLWAY EROSION RESISTANCE:						
Low, can be excavated with hand tools, enter 2.0						
PI>10 and SPT blows<8, PI<10 and SPT blows>8, Kh<0.10, seismic velocity<2000fps						
Moderate, can be excavated with construction equipment, easy ripping, enter 1.2						
PI>10 and SPT blows>8, PI<10 and SPT blows>30, Kh<10, seismic velocity<7000fps						
High, very hard ripping, requires drilling and blasting, enter 0.2						
moderately hard rock, Kh>10, seismic velocity>7000fps						1.2 N
Vegetal Cover Factor [Cf], see SITES or AH667						0.8 O
Cf <0.4 enter 1.1; Cf < 0.7 enter 1.0; Cf<1.0 enter 0.9; larger Cf enter 0.8						0.9 P
HYDROLOGIC FAILURE INDEX:						
dam overtopping breach: (2)(D)(F)(H)(I)(K)(M)						79 Q
earth spillway breach: (D+5J)(F)(H)(I)(N)(P)						64 R
larger of (2)(D)(F)(H)(I)(K)(M) or (D+5J)(F)(H)(I)(N)(P) but less than 300						79 S

EVALUATION OF POTENTIAL REHABILITATION PROJECTS							
STATE	VA	DAM	Mountain Run 11	BY	MJL	DATE	8/5/2013
sht 5 of 5	SEISMIC FAILURE INDEX						ver 2013-02
SEISMIC LOADING:							
Latitude (degrees.decimal)						38.480	A
Longitude (degrees.decimal)						-78.070	B
See "http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/" (MAP LINK)							
PGA [peak ground acceleration] for 2% chance in 50 years, see NSHM maps (%g)						7.80	C
if PGA is less than 10% g, enter 0							
if PGA is between 10% g and 19% g, enter 0.15							
if PGA is between 20% g and 39% g, enter 0.30							
if PGA is between 40% g and 59% g, enter 0.65							
if PGA is greater than 60% g, enter 1.0						0.00	D
FOUNDATION LIQUEFACTION:							
Select the following foundation conditions which best represents the site							
Loose alluvium, lacustrine, loess materials, enter 10							
Bedrock, glacial till, highly clayey materials, enter 5						5	E
EMBANKMENT FREEBOARD FOR FOUNDATION LIQUEFACTION:							
Dam height (ft)						39	F
Freeboard - Elevation difference from top of dam to assumed pool surface (ft)						16.5	G
Freeboard percent of dam height (%)						42	H
if Freeboard is less than 25% of dam height, enter 10							
if Freeboard is 25% to 50% of dam height, enter 5							
if Freeboard is more than 50% of dam height, enter 1						5	I
EMBANKMENT FREEBOARD FOR EMBANKMENT CRACKING:							
Freeboard is less than or equal to 15 feet (no=0 or yes=1)						0	J
EMBANKMENT CRACKING:							
Embankment contains self-healing filter zones (no=4 or yes=0)						4	K
SEISMIC FAILURE INDEX:							
IF E=10, L=(D)(E)(I) ; IF E=5, L=(D)(E)(J+1)(K+1) ; but less than 100						0	L
 State Conservation Engineer's Signature concurring with technical content of sheets 2 thru 5							

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Tab 2

ALTERNATIVES TABLE

Table A - Watershed Rehabilitation Alternatives with Rationale for Level of Analysis

Mountain Run Watershed - Mountain Run Lake, Dam No. 11

Alternative	Alternative Description	Cost	Carried Through Analysis	Rationale
No Action/Future Without Federal Project	Future Without Project - No Federal Action Alternative. Sponsors to rehabilitate the dam to meet current safety and performance standards, maintain water supply, maintain recreational use, maintain existing top of dam crest, and maintain existing flood control to downstream properties. They have decided to fully rehabilitate the dam the same way that the dam would be rehabilitated using federal assistance (see dam rehabilitation preferred alternative below for further details).	\$5,622,000	Yes	No Action
Dam Decommissioning	Decommission the dam - Federal assistance by performing a controlled breach of the structure to reduce dam breaching hazard potential downstream. Since the regulatory floodplain (100-yr) was established assuming the dam is in place, structures in the downstream flood zone would need to be relocated or flood-proofed. Since water supply for the Town would be eliminated, the action would require development of alternative drinking water sources.	\$8,265,000	No	Due to the exorbitant cost of developing alternative water supply and relocating or floodproofing structures, this alternative was eliminated from further study.
Dam Rehabilitation	Future With Project - Federal assistance to rehabilitate the dam to meet current safety and performance standards, continue water supply, maintain recreational use, maintain existing top of dam crest, and maintain existing flood control to downstream properties. Install a 144-foot-wide, 6-cycle structural concrete labyrinth spillway over the embankment, install a SAF stilling basin and rip-rap outlet protection, install a 200-foot-long earthen berm across the existing auxiliary spillway, and rehabilitate riser with rock berm. The storage below the principal spillway is less than the designed condition. To meet the sediment pool requirements, the Sponsors decided to reduce the water supply storage from 531 acre-feet to 429 acre-feet.	\$5,622,000	Yes	Preferred Alternative
Dam Rehabilitation	Future With Project - Federal assistance to rehabilitate the dam to meet current safety and performance standards, continue water supply, maintain recreational use, and maintain existing flood control to downstream properties. Raise the crest of the dam by 7.0' with a parapet wall, realign the auxiliary spillway, and armor the spillway and back of dam with articulated concrete blocks (ACBs).	\$8,700,000	No	Due to exorbitant costs to obtain additional floodpool easements and to construct parapet wall, this alternative was eliminated from further study.

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Tab 3

**WATERSHED REHABILITATION PLAN EVALUATION WORKSHEET
(NRCS-WS-1R)**

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department of Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet July 2015 Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District	Watershed:	Mountain Run		
	County(s):	Culpeper	State(s):	VA
	Hydrologic Unit Code(s)	020801030501		
	Watershed Project Number:	2002		
	Watershed Site Number:	11		
	NID Number:	VA04702		

A. Authority and Program Criteria

Original Program Authority	Public Law 83-566					
Current Program Authority	Section 14 of Public Law 83-566					
Current Hazard Classification	High					
Design Hazard Classification	Low					
Status of Operation and Maintenance	The Town of Culpeper is currently responsible for the O&M of this structure. Inspections of the dam indicate the dam is being properly operated and maintained. The dam is in good condition and has good vegetative cover. Investigations indicate that the dam, including the principal spillway, is structurally sound and is being properly maintained.					
Sedimentation rates (acre-feet/year) ^{1/}	Originally Planned	1.16	Actual	2.2	Future	2.2
Evaluation of Potential Rehabilitation Projects	Updated:				Yes	
Sponsor's Application Submission date	11/14/2012	NRCS acknowledges valid application			11/20/2012	
Will upstream land rights be obtained to top-of-dam elevation per NWPM 505.36G? ^{2/}						No
Are basic assumptions and decisions (Investigation and Analysis) included in the administrative record?						Yes
Is the Investigation and Analysis (I&A) attached to the Plan-EE?						Yes
Does planning and analyses comply with 1983 P&G?						Yes

^{1/} If future sediment storage is provided for less than 100 years, explain rationale in Section L Additional Notes and Comments.

^{2/} Provide rationale for selected land rights elevation if below top-of-dam in Section L Additional Notes and Comments.

B. Purpose and Need:

There is a continued need for flood protection, water supply and recreation in the Mountain Run Watershed and for the Mountain Run 11 dam to meet current dam safety and design standards. The original purposes of the dam were flood protection and M&I water supply. The purpose of this federal action is to meet current safety and performance standards and to continue to provide water supply for the Town of Culpeper and to maintain flood protection for downstream properties for a 100-year 24-hour flood event. Mountain Run 11 was originally designed as a low hazard dam. It does not meet the current safety and performance standards for a high hazard structure.

C. National Economic Development (NED) Account

NED Benefits and Costs	No Federal Action	Dam Decommissioning	Dam Rehabilitation
	Alt 1	Alt 2	Alt3
Project Investment	\$5,622,000	Alternative eliminated from further study. See Section L.	\$5,622,000
NRCS			\$3,919,000
Sponsors	\$5,622,000		\$1,703,000
NED Plan ^{3/}		○	●
Beneficial Annual	\$234,600		\$234,600
Adverse Annual	\$0		\$234,600
Net Beneficial	\$234,600		\$0
Benefit to Cost Ratio			1.0

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department of Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet		July 2015	Watershed:	Mountain Run	
Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District			County(s):	Culpeper	State(s): VA
			Hydrologic Unit Code(s)	020801030501	
			Watershed Project Number:	2002	
			Watershed Site Number:	11	
			NID Number:	VA04702	
Comparison of NED Benefits and Costs (Table 6) ^{4/}	No Federal Action	Dam Decommissioning	Dam Rehabilitation		
Agricultural Related	\$87,200		\$0		
Non-Agricultural Related	\$147,400		\$0		
Other - Cost Avoidance ^{5/}	NA		\$234,600		
Other Purpose					
Total Benefits	\$234,600		\$234,600		
Average Annual NED Costs (Table 4)	No Federal Action	Dam Decommissioning	Dam Rehabilitation		
Amortized Installation	\$230,100		\$230,100		
Other Direct Costs- _____					
Operation, Maintenance, and Replacement	\$4,500		\$4,500		
Total Adverse ^{6/}	\$234,600		\$234,600		
Average Annual Flood Damage Reduction (Table 5)	No Federal Action	Dam Decommissioning	Dam Rehabilitation		
<i>Agricultural</i>					
Floodwater - Crop and Pasture	\$30,800		\$30,800		
Floodwater - Other Ag	\$20,000		\$20,000		
Sediment and Erosion - Sediment Deposition	\$3,800		\$3,800		
Sediment and Erosion - Channel Filling					
Other	\$9,000		\$9,000		
Sub-total Ag Damages	\$63,600		\$63,600		
<i>Non-Agricultural</i>					
Floodwater - Urban	\$138,400		\$138,400		
Other					
Indirect - ____ Damage reduction benefit	\$32,600		\$32,600		
Sub-total Non-Ag Damages	\$171,000		\$171,000		
Total Damages	\$234,600		\$234,600		

^{3/} If NED plan is negative describe reasoning using NWPM 505.35B(1)(iv) in Section L Additional Notes and Comments.

^{4/} Price base: October 2015; Table 4 for preferred alternative average annual cost of \$234,600;

^{5/} -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, no net change in benefits occurs when comparing the two candidate plans to each other because the no federal action alt. would be the local sponsors implementing materially the same alt. as the federal-led dam rehabilitation, i.e., involving essentially the same scope, effects and costs (\$234,600AAC). Therefore, per use of abbreviated procedures allowed by 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 \$234,600, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1.

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet July 2015 Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District	Watershed:	Mountain Run	
	County(s):	Culpeper	State(s): VA
	Hydrologic Unit Code(s)	020801030501	
	Watershed Project Number:	2002	
	Watershed Site Number:	11	
NID Number:	VA04702		

⁶⁷ -Price base: October 2015; expected useful life: 50 years (sediment storage is assumed to be the limiting factor including lag times between completion of the most recent sediment survey and completion of the project plan plus time required for design); period of analysis: 52 years (useful life + 1 year for design and 1 year for installation + the evaluated period of 50 years useful life to determine average annual costs and benefits); discount rate used: 3.125% per Section 80 WRDA 1974 (PL 93-251) for FY 16 water resource project assessments/plans; Given NRCS policy, the no federal action alternative is viewed as local costs avoided and the resulting B/C ratio of the federal action is 1:1 due to the no federal action alternative being materially the same as the federal action alternative. Therefore, any added costs accrued to increase the project's expected useful life via dredging (increase sediment storage), would increase costs, but increased sediment storage would not change project benefits due to the policy invoked/asserted 1:1 B/C ratio. Thus the federal action with a 52 year period of analysis becomes the alternative with the lowest initial cost and lowest average annual cost when compared to evaluated periods of 75 and 100 year useful lives. Since by policy in this planning situation net benefits in any of the federal actions would be zero, the federal action that achieves maximum net benefits at lowest cost is identified as the NED alternative.

D. Regional Economic Development (RED) Account

The RED Account was not evaluated in the plan since it was not identified as an issue during plan development.

E. Other Social Effects (OSE) Account

Decreased access to the reservoir during construction. Diminished recreational value during construction. Reduced boating and fishing access fees collected by the Town. Nuisance traffic and noise during construction. Positive effect on local or regional construction companies. Change in aesthetics from vegetative auxiliary spillway to a concrete labyrinth weir auxiliary spillway.			
	No Federal Action	Dam Decommissioning	Dam Rehabilitation
Resource Concerns	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)
Public Health and Safety	May Effect		No Effect
	Rehabilitation of dam to current performance standards and criteria decreases the risk of a potential failure. Also maintains existing level of flood protection. Reduces surface water supply by 101.7 ac-ft for M&I use.		Rehabilitation of dam to current performance standards and criteria decreases the risk of a potential failure. Also maintains existing level of flood protection. Reduces surface water supply by 101.7 ac-ft for M&I use.
Floodplain Management	No Effect		No Effect
	Rehabilitation of dam will maintain existing flood control to downstream lands.		Rehabilitation of dam will maintain existing flood control to downstream lands.
Parklands	No Effect		No Effect

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet July 2015 Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District		Watershed: Mountain Run County(s): Culpeper Hydrologic Unit Code(s): 020801030501 Watershed Project Number: 2002 Watershed Site Number: 11 NID Number: VA04702	State(s): VA
Recreation	No Effect		No Effect
	Maintains existing level of recreation adjacent and downstream of dam.		Maintains existing level of recreation adjacent and downstream of dam.
Regional Water Resource Plans	No Effect		No Effect
	Rehabilitation of dam will continue to provide a necessary part of the M&I water supply for the Town.		Rehabilitation of dam will continue to provide a necessary part of the M&I water supply for the Town.
M&I Water Supply	May Effect		May Effect
	To meet the sediment pool requirements, the Sponsors decided to reduce the water supply storage from 531 acre-feet to 429 acre-feet. This loss will be offset by existing water supply storage and by augmenting surface water with groundwater sources.		To meet the sediment pool requirements, the Sponsors decided to reduce the water supply storage from 531 acre-feet to 429 acre-feet. This loss will be offset by existing water supply storage and by augmenting surface water with groundwater sources.

F. Environmental Quality (EQ) Account

Record additional environmental quality effects of the alternatives to the human environment not covered in the NRCS-CPA-52.			
	No Federal Action	Dam Decommissioning	Dam Rehabilitation
Resource Concerns	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)	Amount, Status, Description (Document both short and long term impacts)
Groundwater/Sole Source Aquifer	No Effect		No Effect
Other Scoped Concerns			

G. Potential Modes of Dam Failure	Potential Failure	Ranking
Stability	Yes	2
Hydrologic	Yes	1
Seismic	No	
Seepage	No	
Material Deterioration	No	
Other:		

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department of Agriculture Natural Resources Conservation Service Watershed Rehabilitation Worksheet July 2015 Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District	Watershed:	Mountain Run		
	County(s):	Culpeper	State(s):	VA
	Hydrologic Unit Code(s)	020801030501		
	Watershed Project Number:	2002		
	Watershed Site Number:	11		
	NID Number:	VA04702		
Reasoning for Potential Failure: The Dam Rehabilitation Risk Evaluation shows the potential failure index for hydrologic is 79 and for stability is 78. Supporting documentation is in the Investigations and Analyses Appendix of the Mountain Run Dam No. 11 Watershed Plan-EE.				

H. Consultation and Public Participation^{7/}

Agency/Public Participation	Meeting/Contact	Date Complete	Site Visit	Date Complete
USFWS Invited (Did not attend)	Public Meeting	6/10/2015		
USACE Invited (Did not attend)	Public Meeting	6/10/2015		
USDA - NRCS (Attended)	Public Meeting	6/10/2015		
VDGIF (Attended)	Public Meeting	6/10/2015		
VA DEQ (Attended)	Public Meeting	6/10/2015		
VA Dam Safety Agency (Attended)	Public Meeting	6/10/2015		
VDOT (Attended)	Public Meeting	6/10/2015		
VA Dept. of Emerg. Mgt. (Attended)	Public Meeting	6/10/2015		
Town of Culpeper (Attended)	Public Meeting	6/10/2015		
Culpeper SWCD (Attended)	Public Meeting	6/10/2015		
Media Network - TV (Attended)	Public Meeting	6/10/2015		
Other Attendees (List Below)	Public Meeting	6/10/2015		
Environmental Consultation and Public Comments - Other attendees at Scoping Meeting and/or Public Meeting held on June 10, 2015 included a member of the VA House of Delegates and an engineer from Hazen and Sawyer, Inc.. See other public participation events in Section L at the end of document.				

^{7/} Consultation correspondence and agency letters reside in the administrative record file.

Cultural Resources^{8/}

Literature Review	11/17/2015
Pedestrian Survey	2/12/2015
Consultation with State Archaeological Survey	11/20/2015
Consultation with State Historic Preservation Office	11/20/2015
Consultation with State Tribal Historic Preservation Office	N/A
Consultation with Tribes	No
Tribes Contacted - None	
Cultural Resources identified in area of potential effect - No site listed on National Register of Historic Places or sites from state data base were identified. Further, the pedestrian survey and sampling did not yield cultural resources of scientific significance.	
Cultural Resource Consultation and Public Comments - Cultural resources identification activities were not conducted in	

^{8/} Consultation correspondence and agency letters reside in the administrative record file.

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department of Agriculture Natural Resources Conservation Service July 2015 Watershed Rehabilitation Worksheet Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District	Watershed:	Mountain Run		
	County(s):	Culpeper	State(s):	VA
	Hydrologic Unit Code(s)	020801030501		
	Watershed Project Number:	2002		
	Watershed Site Number:	11		
	NID Number:	VA04702		

I. Land Use -Affected Area

Land Use -Affected Area (Acres)	Existing Conditions	No Federal Action	Dam Decommissioning	Dam Rehabilitation
Residential	449.2	449.2		449.2
Commercial	0.0	0.0		0.0
Cropland	0.0	0.0		0.0
Farmstead	0.0	0.0		0.0
Pasture and Rangeland	1,738.9	1,738.9		1738.9
Forest	1,763.2	1,763.2		1763.2
Water	129.9	129.9		129.9
Wetlands	43.8	43.8		43.8
Transportation	0.0	0.0		0.0
Other	3.1	3.1		3.1
Total	4,128.1	4,128.1		4128.1

J. Risk and Uncertainty

See attached Investigation and Analysis Section of Plan-EE

K. List of Preparers

Name	Current Position - Years	Education	Experience (Years)	Applicable Certifications
NRCS				
Rebecca M. Evans	Civil Engineering Technician - 6	B.S. Natural Resources Recreation	8	
David L. Faulkner	Natural Resource Economist - 25	M.S. Ag. Economics B. S. Ag. Education	35	
Fred M. Garst	GIS Specialist - 21	B.S. Geology	39	
Jeffray Jones	State Biologist - 3	B.S. Natural Resources Management	21	
Mathew J. Lyons	State Conservation Engineer - 13	B.S. Civil Engineering	25	P.E. in VA
Matthew Pyle	Project Engineer - 1	B.S. Civil Engineering	15	P.E. in WV
Jeffrey D. McClure	Geologist - 10	B.S. Geology B.A. Geology	31	CPG in VA, DE, PA
Kelly Ramsey	Hydraulic Engineer - 10	B.S. Biological Systems Engineering	17	P.E. in VA

Supplemental Watershed Rehabilitation Documentation Worksheet for a Plan-EE

U.S. Department of Agriculture Natural Resources Conservation Service July 2015 Watershed Rehabilitation Worksheet		Watershed: Mountain Run		
		County(s): Culpeper	State(s): VA	
		Hydrologic Unit Code(s) 020801030501		
Sponsoring Local Organization(s): Town of Culpeper and the Culpeper Soil and Water Conservation District		Watershed Project Number: 2002		
		Watershed Site Number: 11		
		NID Number: VA04702		
ACES Employee				
R. Wade Biddix	Watershed Program Specialist - 1	M.S. Public Administration B.S. Agriculture	34	
A&E Consultants				
Randy Bass, Schnabel Engineering	Principal Engineer - 11	B.S. Civil Engineering M.S. Civil Engineering	37	PE in VA, GA, MA
Paul Welle, Schnabel Engineering	Hydraulic Engineer - 16	B.S. Ag. Engineering,	46	PE in VA, WV, MD, NJ, PA
L. Additional Notes and Comments				
Sediment Storage Rationale - The planned sediment storage for the rehabilitated dam is 95 ac-ft (50 yr minimum storage + 2 yrs to construction). 101.7 acre-feet of water supply storage will be reassigned to sediment storage. This reduction will be replaced by other surface water and ground water resources. The concrete components of the principal spillway are expected to have a remaining life of 50-years. See documentation in the I&A appendix for explanation of sediment storage.				
Status of Easements - The Sponsors currently own easements to 449.3 (NAVD 88). The top of dam elevation is 450.0 (NAVD 88). To obtain the additional easements, 8.2 acres of land would need to be acquired. Currently, the probability of a flood reaching elevation 449.3 (NAVD 88) is 0.01%. Comparing the cost of acquiring the easements, and the very low risk of this type of event occurring, the Sponsors decided to forego obtaining easements to the top of dam. Refer to I&A section for details on the risk analysis related to easements and the top of dam elevation.				
Status of Existing Easements - During the planning phase, it was determined that one home is within the floodpool easement. The point of entry into an unfinished basement is 448.6 (NAVD 88). The existing easement is at 449.3 (NAVD 88), 0.7' above the point of entry. The Sponsor acknowledges an easement violation. The Town will be required to mitigate the easement violation at their own cost prior to implementation of this plan.				
Dam Decommissioning - Federal assistance to perform a controlled breach of the structure to reduce dam breaching hazard potential downstream. Since the regulatory floodplain (100-yr) was established assuming the dam is in place, structures in the downstream flood zone would need to be relocated or flood-proofed. Since water supply for the Town would be eliminated, the action would require development of alternative drinking water sources. Due to the exorbitant cost of developing alternative water supply and relocating or flood-proofing structures, this alternative was eliminated from further study				
Public Participation Events - Scoping meeting held in Culpeper on June 10, 2015 at 1 p.m. with 22 people attending. First public meeting held in Culpeper on June 10, 2015 at 7 p.m. with 9 people attending. Steering Committee meeting held in Culpeper on November 18, 2015 with 21 people attending. Public meeting held in Culpeper on December 8, 2015 during Town Council Meeting with about 60 people attending.				

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Tab 4

**ENVIRONMENTAL EVALUATION WORKSHEET
(NRCS-CPA-52)**

U.S. Department of Agriculture Natural Resources Conservation Service		NRCS-CPA-52 4/2015		A. Client Name: Town of Culpeper, VA (Lead Sponsor)	
ENVIRONMENTAL EVALUATION WORKSHEET				B. Conservation Plan ID # (as applicable): Supp. WS Plan Program Authority (optional): Watershed Rehabilitation	
D. Client's Objective(s) (purpose): The Town of Culpeper wants to maintain existing downstream flood protection, water supply for area residents, and recreational value of the reservoir. They also want to comply with current safety and performance standards for a high hazard dam. The dam needs to be rehabilitated to meet current safety and performance standards.			C. Identification # (farm, tract, field #, etc. as required): Mountain Run Dam #11, known locally as Mountain Run Lake, is located on Mountain Run Creek about 3.7 miles northwest of the Town of Culpeper. National Inventory of Dams Number VA04702.		
E. Need for Action: Mountain Run Dam #11 is a high hazard dam that was originally designed as a low hazard dam. The structure does not meet current minimum criteria for safety and performance standards. In the event of a failure, the Population at Risk is 3,458 and water supply to the Town of Culpeper would be disrupted.		H. Alternatives			
		No Action ✓ if RMS <input type="checkbox"/>		Alternative 1 ✓ if RMS <input type="checkbox"/>	
		Alternative 2 ✓ if RMS <input type="checkbox"/>			
		Future Without Project - No Federal Action Alternative. Sponsors to rehabilitate the dam to meet current safety and performance standards. They have decided to fully rehabilitate the dam the same way that the dam would be rehabilitated using federal assistance (See detailed write-up of structural components in Alternative 2).		Decommission the dam - Federal assistance by performing a controlled breach of the structure to reduce dam breaching hazard potential downstream. Since the regulatory floodplain (100-yr) was established assuming the dam is in place, structures in the downstream flood zone would need to be relocated or flood-proofed. Since water supply for the Town would be eliminated, the action would require development of alternative drinking water sources. Due to the exorbitant cost of developing alternative water supply and relocating or flood-proofing structures, this alternative was eliminated from further study.	
		Future With Project - Federal assistance to rehabilitate the dam to meet current safety and performance standards, continue water supply, maintain recreational use, maintain existing top of dam crest, and maintain existing flood control to downstream properties. Install a 144-foot-wide, 6-cycle structural concrete labyrinth spillway over the embankment, install a SAF stilling basin and rip-rap outlet protection, install a 200-foot-long earthen berm across the existing auxiliary spillway, and rehabilitate riser with rock berm. The storage below the principal spillway is less than the designed condition. To meet the sediment pool requirements, the Sponsors decided to reduce the water supply storage from 531 acre-feet to 429 acre-feet.			
Resource Concerns					
In Section "F" below, analyze, record, and address concerns identified through the Resources inventory process. (See FOTG Section III - Resource Planning Criteria for guidance).					
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)		I. Effects of Alternatives			
		No Action		Alternative 1 - Decommission	
		Alternative 2 - Rehabilitation			
		Amount, Status, Description <i>(Document both short and long term impacts)</i>		Amount, Status, Description <i>(Document both short and long term impacts)</i>	
		✓ if does NOT meet PC		✓ if does NOT meet PC	
		(Document both short and long term impacts)		(Document both short and long term impacts)	
SOIL: EROSION					
No resource concern identified.		Construction activities will temporarily increase soil erosion potential to downstream reach until establishment of permanent vegetation. Temporary erosion and sediment control measures will be installed during construction to minimize, if not eliminate, soil loss from the construction site. Installation of energy dissipation at outlet of structural spillway will minimize downstream erosion. No long-term impacts anticipated.		Probable increase in erosion due to the elevation difference between the reservoir pool and downstream reach.	
Structure provides a pool to detain upstream sediment. Existing embankment and auxiliary spillway are well maintained with a good stand of grass and no significant woody vegetation.		<input type="checkbox"/> NOT meet PC		<input type="checkbox"/> NOT meet PC	
SOIL: SOIL QUALITY DEGRADATION					
No resource concern identified.		Construction activities will temporarily reduce the quality of the onsite soil due to compaction. Topsoil to be preserved during construction and placed on finish grade after construction. Permanent vegetation to be established on disturbed soil. No long-term impact anticipated.		Probable decrease in soil quality until permanent vegetation is established. No long-term impact anticipated.	
Structure provides a pool to detain upstream sediment. Existing embankment and auxiliary spillway is well maintained with a good stand of grass and no significant woody vegetation.		<input type="checkbox"/> NOT meet PC		<input type="checkbox"/> NOT meet PC	

WATER: EXCESS / INSUFFICIENT WATER				
No resource concern identified	Upstream flood waters are attenuated in flood pool and structure maintains existing level of flood protection for downstream reach. 101.7 acre-feet of water supply storage will be reassigned as sediment storage. This reduction will be replaced by other surface water and groundwater sources. No change in water resource operation and no long-term impacts anticipated.	Upstream flood events are not attenuated that will result in an increase of frequent flood events to downstream reaches.	Upstream flood waters are attenuated in flood pool and structure maintains existing level of flood protection for downstream reach. 101.7 acre-feet of water supply storage will be reassigned as sediment storage. This reduction will be replaced by other surface water and groundwater sources. No change in water resource operation and no long-term impacts anticipated.	<input type="checkbox"/> NOT meet PC
Structure attenuates frequent flood events by providing a flood pool and controlled release of floods. Total sediment storage and water supply storage available is 524 acre-feet.				
WATER: WATER QUALITY DEGRADATION				
No resource concern identified	Construction activities may temporarily reduce the water quality due to the land-disturbing activities. Temporary erosion and sediment control measures will be installed during construction to minimize, if not eliminate, impacts. No long-term impacts anticipated. Rehabilitated structure will maintain current level of water quality.	Upstream flood events and associated turbidity and pollutant laden sediment will not be detained. Potential degradation of water quality to downstream reach.	Construction activities may temporarily reduce the water quality due to the land-disturbing activities. Temporary erosion and sediment control measures will be installed during construction to minimize, if not eliminate, impacts. No long-term impacts anticipated. Rehabilitated structure will maintain current level of water quality.	<input type="checkbox"/> NOT meet PC
Structure and reservoir provides detention of upstream sediment and associated pollutants during and after storm events. Structure and reservoir reduces water quality degradation, turbidity and pollutant laden sediment, to downstream reach.				
F. Resource Concerns and Existing/ Benchmark Conditions (Analyze and record the existing/benchmark conditions for each identified concern)	I. (continued)			
	No Action	Alternative 1 - Decommission	Alternative 2 - Rehabilitation	
	Amount, Status, Description <i>(Document both short and long term impacts)</i>	Amount, Status, Description <i>(Document both short and long term impacts)</i>	Amount, Status, Description <i>(Document both short and long term impacts)</i>	<input type="checkbox"/> if does NOT meet PC
AIR: AIR QUALITY IMPACTS				
No resource concern identified	Temporary minor dust during construction activities.	Temporary minor dust during construction activities.	Temporary minor dust during construction activities.	<input type="checkbox"/> NOT meet PC
No current problems with air quality. Culpeper County is in a nonattainment area. http://www.deq.virginia.gov/Programs/Air/AirQualityPlans/OzoneandPM25RegionalPlanningActivities.aspx				

PLANTS: DEGRADED PLANT CONDITION			
No resource concern identified	Invasive species will not be introduced during construction activities.	<input type="checkbox"/> meet PC	Permanent loss of some emergent wetland plant species at the inflow of the lake if decommissioned and permanently drained. Permanent increase in wetland scrub/shrub and forested communities with increase of new riparian areas that will no longer be underwater due to decommissioning. Invasive species will not be introduced during decommissioning construction activities.
			<input type="checkbox"/> meet PC
			<input checked="" type="checkbox"/> meet PC
ANIMALS: INADEQUATE HABITAT FOR FISH AND WILDLIFE			
No resource concern identified	Temporary impact to aquatic and riparian habitat while pool is drawn down about 3 feet during construction.	<input type="checkbox"/> NOT meet PC	Permanent reduction in aquatic lake habitat. Increased stream and riparian habitat when stream is restored.
Lake supports aquatic habitat and associated riparian habitat			<input type="checkbox"/> NOT meet PC
			Temporary impact to aquatic and riparian habitat while pool is drawn down about 3 feet during construction.
			<input type="checkbox"/> NOT meet PC
ANIMALS: LIVESTOCK PRODUCTION LIMITATION			
No resource concern identified	N/A	<input type="checkbox"/> meet PC	N/A
			<input type="checkbox"/> meet PC
			<input checked="" type="checkbox"/> meet PC
ENERGY: INEFFICIENT ENERGY USE			
No resource concern identified	N/A	<input type="checkbox"/> meet PC	N/A
			<input type="checkbox"/> meet PC
			<input checked="" type="checkbox"/> meet PC
HUMAN: ECONOMIC AND SOCIAL CONSIDERATIONS			
Public Health and Safety Risk	Maintains current level of protection while significantly reducing the risk of a breach.		Could only maintain current level of protection at great cost to prevent induced damages.
3,458 persons at risk of a catastrophic breach. 611 structures and 10 major roads at risk of a catastrophic breach.			Maintains current level of protection while significantly reducing the risk of a breach.
Recreation	Maintains current level of recreation permits and associated water-based activity.		Water based permit revenue and recreation lost permanently.
Potential loss of a significant amount of recreation and public revenue from boat and fishing permits			Maintains current level of recreation permits and associated water-based activity.
Water Supply	Reduced level of municipal and industrial water supply; development of alternative ground water sources and use of other surface water planned by sponsors.		Reduced level of municipal and industrial water supply; development of alternative ground water sources and use of other surface water planned by sponsors.
Loss of significant amount of municipal and industrial water supply.			Reduced level of municipal and industrial water supply; development of alternative ground water sources and use of other surface water planned by sponsors.

Special Environmental Concerns: Environmental Laws, Executive Orders, policies, etc.

In Section "G" complete and attach Environmental Procedures Guide Sheets for documentation as applicable. Items with a "•" may require a federal permit or consultation/coordination between the lead agency and another government agency. In these cases, effects may need to be determined in consultation with another agency. Planning and practice implementation may proceed for practices not involved in consultation.

G. Special Environmental Concerns (Document existing/benchmark conditions)	J. Impacts to Special Environmental Concerns					
	No Action		Alternative 1 - Decommission		Alternative 2 - Rehabilitation	
	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action	Document all impacts (Attach Guide Sheets as applicable)	√ if needs further action
•Clean Air Act <i>Guide Sheet FS1 FS-2</i> Culpeper County is in a nonattainment area.	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
•Clean Water Act / Waters of the U.S. <i>Guide Sheet Fact Sheet</i> Waters of the U.S. present. Emergent wetlands present at the inflow of the lake and shoreline. Permanent pool is 67 acres of open water wetland.	May Effect Minor impacts to waters of the U.S. Temporary effects to emergent wetlands at the inflow and shoreline during construction. Due to the lake being part of the Town's water supply, there will be a minor drawdown of about 3 feet, but the lake will not be drained. These activities likely authorized by NWP 3 for construction techniques and current codes and new safety standards that are necessary for the repair and rehabilitation of the existing structure.	<input type="checkbox"/>	May Effect Permanent loss of emergent wetlands at inflow, wetlands around perimeter and converts 67 acres of open water to approximately one mile of stream with associated forested wetland riparian area. These activities likely authorized by NWP 27 for stream restoration. Change in wetland types. Re-establish stream and riparian areas with associated forested wetlands.	<input type="checkbox"/>	May Effect Minor impacts to waters of the U.S. Temporary effects to emergent wetlands at the inflow and shoreline during construction. Due to the lake being part of the Town's water supply, there will be a minor drawdown of about 3 feet, but the lake will not be drained. These activities likely authorized by NWP 3 for construction techniques and current codes and new safety standards that are necessary for the repair and rehabilitation of the existing structure.	<input type="checkbox"/>
•Coastal Zone Management <i>Guide Sheet Fact Sheet</i> Culpeper County is not within the Virginia Coastal Zone Mangement Area.	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
Coral Reefs <i>Guide Sheet Fact Sheet</i> None present.	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
•Cultural Resources / Historic Properties <i>Guide Sheet Fact Sheet</i> No NRHP listings/known sites.	No Effect Consultation completed with VDHR. No NRHP eligible properties present; will monitor during construction.	<input type="checkbox"/>	May Effect Consultation with VDHR will be necessary for all affected downstream properties for potential NRHP listings.	<input type="checkbox"/>	No Effect Consultation completed with VDHR. No NRHP eligible properties present; will monitor during construction.	<input type="checkbox"/>
•Endangered and Threatened Species <i>Guide Sheet Fact Sheet</i>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
Environmental Justice <i>Guide Sheet Fact Sheet</i> All social groups currently benefit from the dam being in place providing flood protection.	No Effect Would equally benefit all social groups.	<input type="checkbox"/>	May Effect The complexity involved/ necessary to mitigate for induced damages could disproportionately burden low income and disabled beneficiaries.	<input type="checkbox"/>	No Effect Would equally benefit all social groups.	<input type="checkbox"/>
•Essential Fish Habitat <i>Guide Sheet Fact Sheet</i> None present	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>

Floodplain Management <i>Guide Sheet Fact Sheet</i> 100-yr floodplain downstream currently protected by MR11.	No Effect The established regulatory floodplain (100-yr) is based on the dam being in place. The rehabilitated dam will not result in a change to the regulatory floodplain or flood levels during frequent storm events (2-yr to 100 yr).	<input type="checkbox"/>	May Effect The established regulatory floodplain (100-yr) is based on the dam being in place. Floodplain protection for all storm events removed.	<input type="checkbox"/>	No Effect The established regulatory floodplain (100-yr) is based on the dam being in place. The rehabilitated dam will not result in a change to the regulatory floodplain or flood levels during frequent storm events (2-yr to 100 yr).	<input type="checkbox"/>
Invasive Species <i>Guide Sheet Fact Sheet</i> None present	No Effect Will not introduce any invasive species during construction. All disturbed areas will be reestablished to existing species. No change from existing conditions.	<input checked="" type="checkbox"/>	No Effect Will not introduce any invasive species during construction. All disturbed areas will be reestablished to existing species. No change from existing conditions.	<input checked="" type="checkbox"/>	No Effect Will not introduce any invasive species during construction. All disturbed areas will be reestablished to existing species. No change from existing conditions.	<input type="checkbox"/>
•Migratory Birds/Bald and Golden Eagle Protection Act <i>Guide Sheet Fact Sheet</i> No Bald Eagle nests present. Lake habitat potentially supports bald eagles and migratory birds.	May Effect Temporary effect to migratory birds and bald eagles during construction. Due to the lake being part of the towns' water supply, there will be a minor drawdown, but not drained.	<input type="checkbox"/>	May Effect Permanent loss of potential migratory bird and bald eagle habitat.	<input type="checkbox"/>	May Effect Temporary effect to migratory birds and bald eagles during construction. Due to the lake being part of the towns' water supply, there will be a minor drawdown, but not drained.	<input type="checkbox"/>
Natural Areas <i>Guide Sheet Fact Sheet</i> No national or state designated Natural Areas present	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
Prime and Unique Farmlands <i>Guide Sheet Fact Sheet</i> State and locally important farmland exists around the dam and ASW. These were impacted during original construction of the dam.	No Effect Area around dam and auxiliary spillway which will be part of rehabilitation project has already been disturbed.	<input type="checkbox"/>	May Effect Removing all flood protection would negatively affect downstream floodplain soils.	<input type="checkbox"/>	No Effect Area around dam and auxiliary spillway which will be part of rehabilitation project has already been disturbed.	<input type="checkbox"/>
Riparian Area <i>Guide Sheet Fact Sheet</i> Riparian areas present at the inflow of the lake and around shoreline	May Effect Temporary effects to riparian areas during construction. Due to the lake being part of the Towns' water supply, there will be minor a drawdown, but not drained.	<input type="checkbox"/>	May Effect Permanent open water pool converted to stream with increased riparian area.	<input type="checkbox"/>	May Effect Temporary effects to riparian areas during construction. Due to the lake being part of the Towns' water supply, there will be a minor drawdown, but not drained.	<input type="checkbox"/>
Scenic Beauty <i>Guide Sheet Fact Sheet</i> No national or state designated Scenic Beauty areas present	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>
•Wetlands <i>Guide Sheet Fact Sheet</i> Wetlands are present. Emergent wetlands present at the inflow of the lake and shoreline. Permanent pool is 67 acre open water wetland.	May Effect Temporary effects to emergent wetlands at the inflow and shoreline during construction. Due to the lake being part of the Town's water supply, there will be minor drawdown of about 3 feet, but not drained. These activities likely authorized by NWP 3 for construction techniques and current codes and new safety standards that are necessary for the repair and rehabilitation of the existing structure.	<input type="checkbox"/>	May Effect Permanent loss of emergent wetlands at inflow, wetlands around perimeter, and open water when lake is removed. Change in wetland types. Re-establish riparian areas with associated forested wetlands.	<input type="checkbox"/>	May Effect Temporary effects to emergent wetlands at the inflow and shoreline during construction. Due to the lake being part of the Town's water supply, there will be minor drawdown of about 3 feet, but not drained. These activities likely authorized by NWP 3 for construction techniques and current codes and new safety standards that are necessary for the repair and rehabilitation of the existing structure.	<input type="checkbox"/>
•Wild and Scenic Rivers <i>Guide Sheet Fact Sheet</i> No national or state designated wild or scenic rivers present	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>	No Effect None present	<input type="checkbox"/>

K. Other Agencies and Broad Public Concerns		<i>No Action</i>	<i>Alternative 1</i>	<i>Alternative 2</i>
Easements, Permissions, Public Review, or Permits Required and Agencies Consulted.		All easements, permission, public review, permits, and consultations would be the responsibility of the sponsors. Not a federal action.	All easements and permits are the responsibility of the Sponsors. A NWP27 permit would most likely be required.	All easements and permits are the responsibility of the Sponsors. Clean Water Act permit would most likely be NWP 3 for maintenance with PCN. Action is an EE; no interagency review of plan required under NEPA. No effect on T&E species; no consultation with USFWS required under ESA.
Cumulative Effects Narrative (Describe the cumulative impacts considered, including past, present and known future actions regardless of who performed the actions)		There are 5 dams in the Mountain Run Watershed - 2 of which are planned for dam rehabilitation. The two dams are being planned independently - MR11 as a Plan-EE and MR50 as a Plan-EA. The cumulative impact is fairly insignificant in that a total of about 1 acre of trees will be removed in MR50, 1 acre of wetlands will be impacted in MR50, and time of year restrictions for tree removal related to preservation of bat habitat during pup season in MR50.	Town and public both concerned with loss of drinking water supply and maintaining current water supply provided by reservoir with dam decommissioning. Permanent loss of emergent wetlands at inflow, wetlands around perimeter, and 67 acres of open water when lake is removed.	There are 5 dams in the Mountain Run Watershed - 2 of which are planned for dam rehabilitation. The two dams are being planned independently - MR11 as a Plan-EE and MR50 as a Plan-EA. The cumulative impact is fairly insignificant in that a total of about 1 acre of trees will be removed in MR50, 1 acre of wetlands will be impacted in MR50, and time of year restrictions for tree removal related to preservation of bat habitat during pup season in MR50.
L. Mitigation (Record actions to avoid, minimize, and compensate)		No compensatory mitigation required. Most likely authorized by NWP 3 for maintenance; no adverse impacts to the aquatic environment. Other mitigative conservation measures, like minimizing soil erosion, will be implemented during construction.	No compensatory mitigation required. Most likely authorized by NWP 27 for restoring stream channel and ecological corridor; adverse impacts to 67 acres of open water habitat, but gain in stream and riparian habitat. Other mitigative conservation measures, like minimizing soil erosion, will be implemented during construction.	No compensatory mitigation required. Most likely authorized by NWP 3 for maintenance; no adverse impacts to the aquatic environment. Other mitigative conservation measures, like minimizing soil erosion, will be implemented during construction.
M. Preferred Alternative	√ preferred alternative	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Supporting reason			This is the least environmentally damaging alternative that meets the purpose and need of the Sponsors.
N. Context (Record context of alternatives analysis)		local	local	local
The significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality.				

O. Determination of Significance or Extraordinary Circumstances

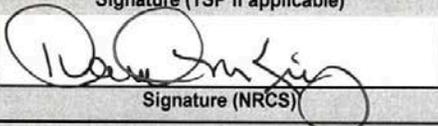
Intensity: Refers to the severity of impact. Impacts may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

If you answer ANY of the below questions "yes" then contact the State Environmental Liaison as there may be extraordinary circumstances and significance issues to consider and a site specific NEPA analysis may be required.

Yes	No	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Is the preferred alternative expected to cause significant effects on public health or safety?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Is the preferred alternative expected to significantly affect unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Are the effects of the preferred alternative on the quality of the human environment likely to be highly controversial?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Does the preferred alternative have highly uncertain effects or involve unique or unknown risks on the human environment?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Does the preferred alternative establish a precedent for future actions with significant impacts or represent a decision in principle about a future consideration?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Is the preferred alternative known or reasonably expected to have potentially significant environment impacts to the quality of the human environment either individually or cumulatively over time?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Will the preferred alternative likely have a significant adverse effect on ANY of the special environmental concerns? Use the Evaluation Procedure Guide Sheets to assist in this determination. This includes, but is not limited to, concerns such as cultural or historical resources, endangered and threatened species, environmental justice, wetlands, floodplains, coastal zones, coral reefs, essential fish habitat, wild and scenic rivers, clean air, riparian areas, natural areas, and invasive species.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Will the preferred alternative threaten a violation of Federal, State, or local law or requirements for the protection of the environment?

P. To the best of my knowledge, the data shown on this form is accurate and complete:

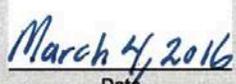
In the case where a non-NRCS person (e.g. a TSP) assists with planning they are to sign the first signature block and then NRCS is to sign the second block to verify the information's accuracy.

<input type="text"/>	<input type="text"/>	<input type="text"/>
Signature (TSP if applicable)	Title	Date
	Assistant State Conservationist (Water Resource Operations)	3/4/2016
Signature (NRCS)	Title	Date

If preferred alternative is not a federal action where NRCS has control or responsibility and this NRCS-CPA-52 is shared with someone other than the client then indicate to whom this is being provided.

The following sections are to be completed by the Responsible Federal Official (RFO)

NRCS is the RFO if the action is subject to NRCS control and responsibility (e.g., actions financed, funded, assisted, conducted, regulated, or approved by NRCS). These actions do not include situations in which NRCS is only providing technical assistance because NRCS cannot control what the client ultimately does with that assistance and situations where NRCS is making a technical determination (such as Farm Bill HEL or wetland determinations) not associated with the planning process.

Q. NEPA Compliance Finding (check one)		
The preferred alternative:		Action required
<input type="checkbox"/>	1) is not a federal action where the agency has control or responsibility.	Document in "R.1" below. No additional analysis is required
<input checked="" type="checkbox"/>	2) is a federal action ALL of which is categorically excluded from further environmental analysis AND there are no extraordinary circumstances as identified in Section "O" .	Document in "R.2" below. No additional analysis is required
<input type="checkbox"/>	3) is a federal action that has been sufficiently analyzed in an existing Agency state, regional, or national NEPA document and there are no predicted <u>significant</u> adverse environmental effects or extraordinary circumstances.	Document in "R.1" below. No additional analysis is required.
<input type="checkbox"/>	4) is a federal action that has been sufficiently analyzed in another Federal agency's NEPA document (EA or EIS) that addresses the proposed NRCS action and its' effects and has been formally adopted by NRCS . NRCS is required to prepare and publish its own Finding of No Significant Impact for an EA or Record of Decision for an EIS when adopting another agency's EA or EIS document. (Note: This box is not applicable to FSA)	Contact the State Environmental Liaison for list of NEPA documents formally adopted and available for tiering. Document in "R.1" below. No additional analysis is required
<input type="checkbox"/>	5) is a federal action that has NOT been sufficiently analyzed or may involve predicted significant adverse environmental effects or extraordinary circumstances and may require an EA or EIS.	Contact the State Environmental Liaison. Further NEPA analysis required.
R. Rationale Supporting the Finding		
R.1 Findings Documentation	The project has been properly evaluated and vetted through a Scoping Meeting, a Steering Committee Meeting, and two Public Meetings. There are no T&E Species impacts, no dredging required, and no significant controversies. The preferred alternative meets the purpose and need of the Sponsors and the proposed actions fall under number 14 and 15 of the Categorical Exclusions for dam rehabilitation.	
R.2 Applicable Categorical Exclusion(s) (more than one may apply)	(14) Repairing or maintaining principal spillways and appurtenances associated with existing serviceable dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the existing footprint of the dam, and no major change in reservoir or downstream operations will result;	
7 CFR Part 650 Compliance With NEPA, subpart 650.6 Categorical Exclusions states prior to determining that a proposed action is categorically excluded under paragraph (d) of this section,	(15) Repairing or improving (deepening/widening/armoring) existing auxiliary/emergency spillways associated with dams, originally constructed to NRCS standards, in order to meet current safety standards. Work will be confined to the dam or abutment areas, and no major change in reservoir or downstream operation will result;	
<i>I have considered the effects of the alternatives on the Resource Concerns, Economic and Social Considerations, Special Environmental Concerns, and Extraordinary Circumstances as defined by Agency regulation and policy and based on that made the finding indicated above.</i>		
S. Signature of Responsible Federal Official:		
	State Conservationist	
Signature	Title	Date
Additional notes		

Tab 5

**ECONOMIC TABLE 2 - Estimated Cost Distribution
(Cost Computation for Watershed Rehabilitation Projects)**

**Table 2 - Estimated Cost Distribution for Installation of Project Measures
Mountain Run Lake - Site 11 Dam Rehabilitation Project
(Dollars)**

Installation Cost Items	Installation Costs - Public Law 83-566 1/						Installation Costs Non-Federal 2/								Total Installation Costs 3/
	Construction	Engineering	Real Property	Relocation Payments	Project Admin.	Total PL-566 Cost	Construction	Engineering	Real Prop. Rights	Natural Resource Rights	Relocation Payments	Required Permits	Project Admin.	Total Non-Federal Cost	
Rehab. No. 11	\$3,203,500	\$690,500	\$0	\$0	\$25,000	\$3,919,000	\$1,646,500	\$18,500	\$0	\$0	\$0	\$3,000	\$35,000	\$1,703,000	\$5,622,000

Price base October, 2015

^{1/} Paid by the USDA/NRCS - the federal agency responsible for assisting in installation of improvements; 65% of Total Project Cost for measures related to flood control, excluding permits and not to exceed 100% of construction cost;

^{2/} 35% of Total Project Cost for measures related to flood control purpose;

^{3/} Note: As per the NRCS National Watershed Manual, 508.44, the actual federal cost/share amount will be calculated based on a total project cost that excludes federal technical assistance costs, water, mineral and other resource rights, and all federal, state and local permits, i.e., only the design and construction costs are included. 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.

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Tab 6

STRUCTURAL TABLE 3

Dams with Planned Storage Capacity

Table 3 – Structural Data—Dams with Planned Storage Capacity
 Mountain Run Lake - Dam No. 11
 Culpeper County, VA

Item	Unit	Structure
Class of structure		High
Seismic zone		2
Uncontrolled drainage area	mi ²	6.45
Controlled drainage area	mi ²	0.00
Total drainage area	mi ²	6.45
Runoff curve No. (1-day) (AMC II)		65
Time of concentration (Tc)	hrs	3.2
Elevation top dam ^{1/}	ft	450.0
Elevation crest auxiliary spillway	ft	444.1
Elevation crest high stage inlet	ft	433.2
Elevation crest low stage inlet	ft	NA
Auxiliary spillway type		Structural
Auxiliary spillway bottom width	ft	144
Auxiliary spillway exit slope	percent	3
Maximum height of dam	ft	39
Volume of fill	yd ³	5,700
Total capacity ^{2/}	acre ft	1,739
Sediment submerged	acre ft	95
Sediment aerated	acre ft	7
Beneficial use (M&I water)	acre ft	429
Floodwater retarding	acre ft	1,208
Between high and low stage	acre ft	NA
Surface area		
Sediment pool ^{3/}	acres	20
Beneficial use pool (M&I water)	acres	67
Floodwater retarding pool ^{2/}	acres	155
Principal spillway design		
Rainfall volume (1-day)	in	4.6
Rainfall volume (10-day)	in	5.4
Runoff volume (10-day)	in	6.2
Capacity of low stage (max.)	ft ³ /s	60
Capacity of high stage (max.)	ft ³ /s	125
Dimensions of conduit	in	30
Type of conduit		circular RCP
Frequency operation-auxiliary spillway	percent chance	1.0

Table 3 – Structural Data—Dams with Planned Storage Capacity
Mountain Run Lake - Dam No. 11
Culpeper County, VA

Item	Unit	Structure
Auxiliary spillway hydrograph		
Rainfall volume	in	Structural Spillway
Runoff volume	in	
Storm duration	hrs	
Velocity of flow (Ve)	ft/s	
Max. reservoir water surface elev.	ft	
Freeboard hydrograph		
Rainfall volume	in	28.0
Runoff volume	in	22.4
Storm duration	hrs	6
Max. reservoir water surface elev.	ft	450.1
Capacity equivalents		
Sediment volume	in	0.27
Floodwater retarding volume	in	3.50
Beneficial volume (M&I water)	in	1.25

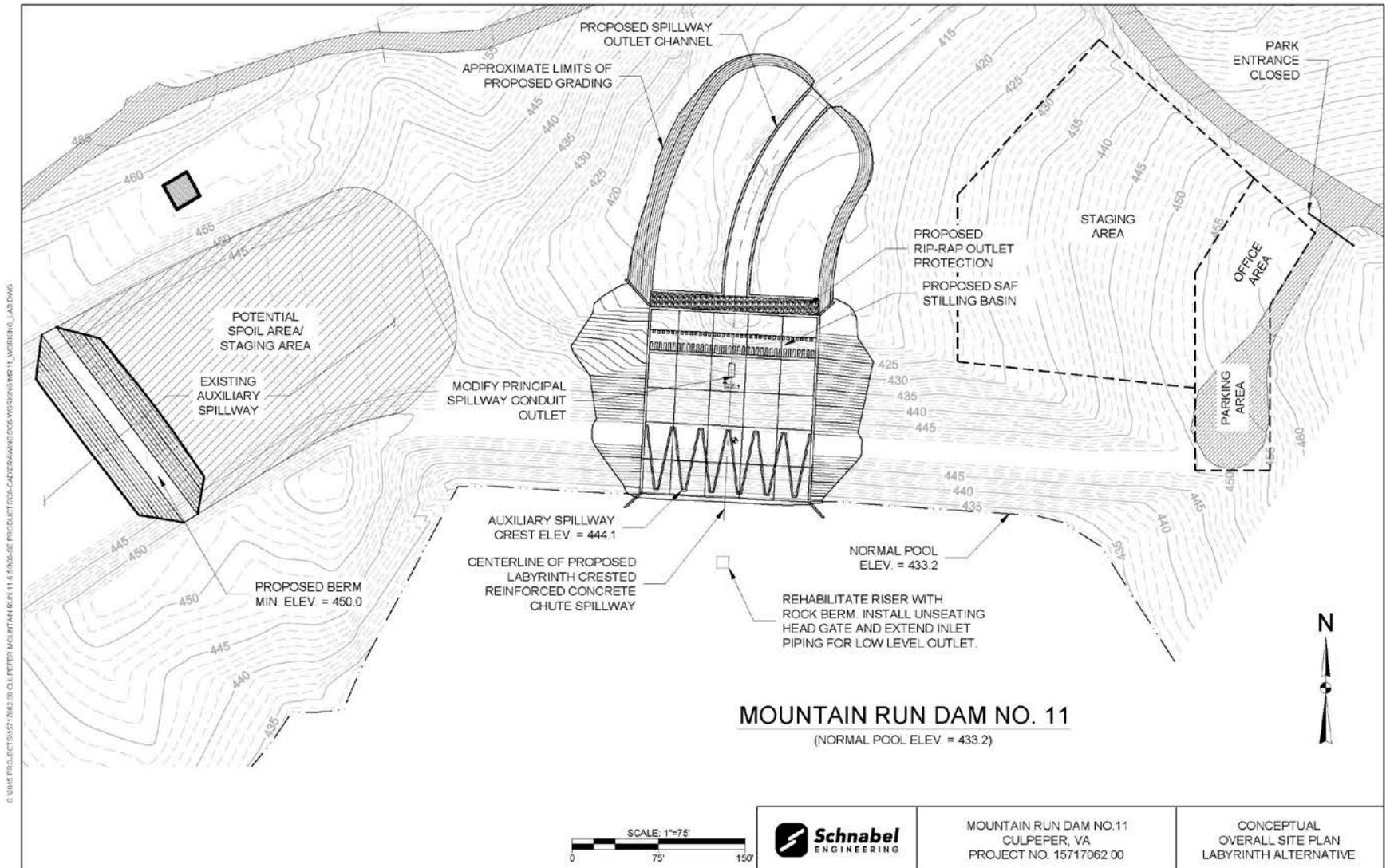
^{1/} All elevations are recorded in North American Vertical Datum 1988 (NAVD 88).

^{2/} Crest of auxiliary spillway.

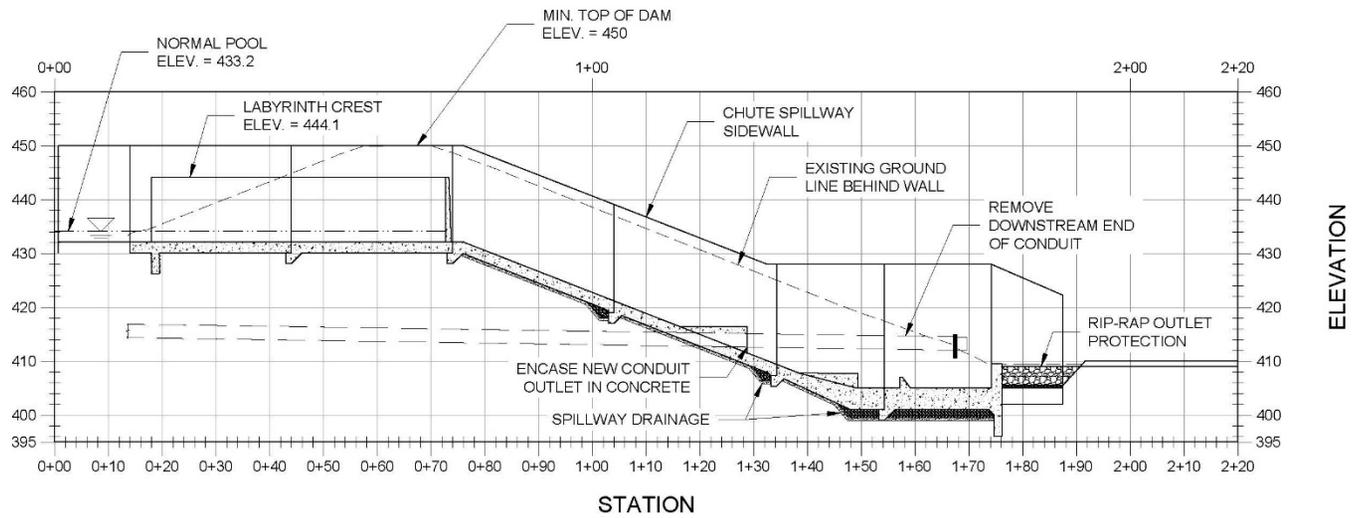
^{3/} If reservoir contains beneficial storage or if sediment capacity will not store water, show area in parenthesis and footnote accordingly.

APPENDIX A

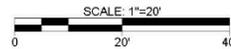
PROJECT MAPS



G:\2015 PROJECTS\15717062.00 CULPEPER MOUNTAIN RUN 11 & 5003-SE PRODUCTS\09-CAD\ARCHIVES\AS-RECEIVED\2015_11_02\MR11 SW PROFILE - STANDARD PROFILE_UPDATE.DWG

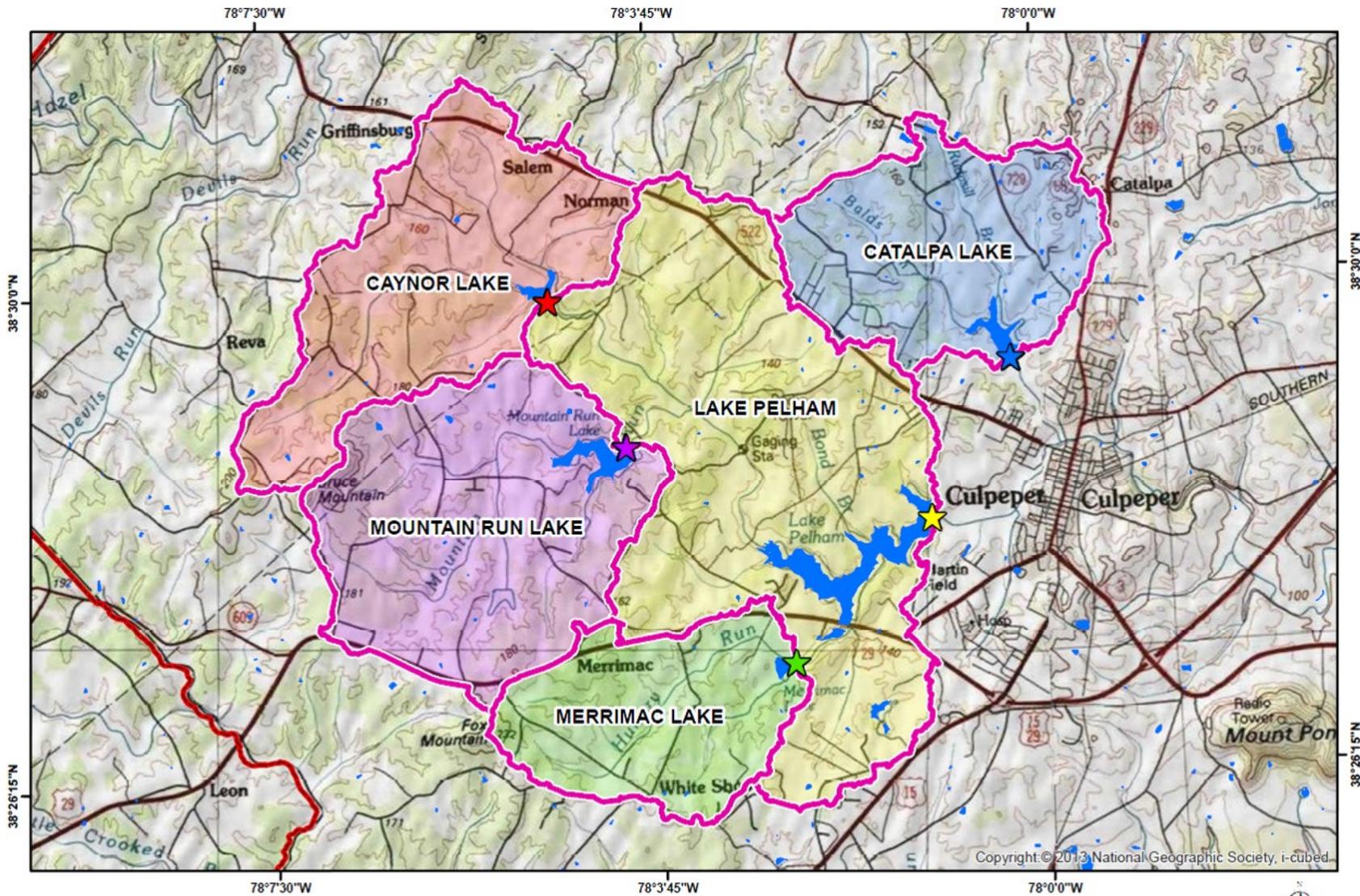


CENTERLINE OF LABYRINTH CRESTED CHUTE SPILLWAY PROFILE



	MOUNTAIN RUN DAM NO. 11 CULPEPER, VIRGINIA PROJECT NO. 15717062.00	CONCEPTUAL SPILLWAY PROFILE LABYRINTH ALTERNATIVE
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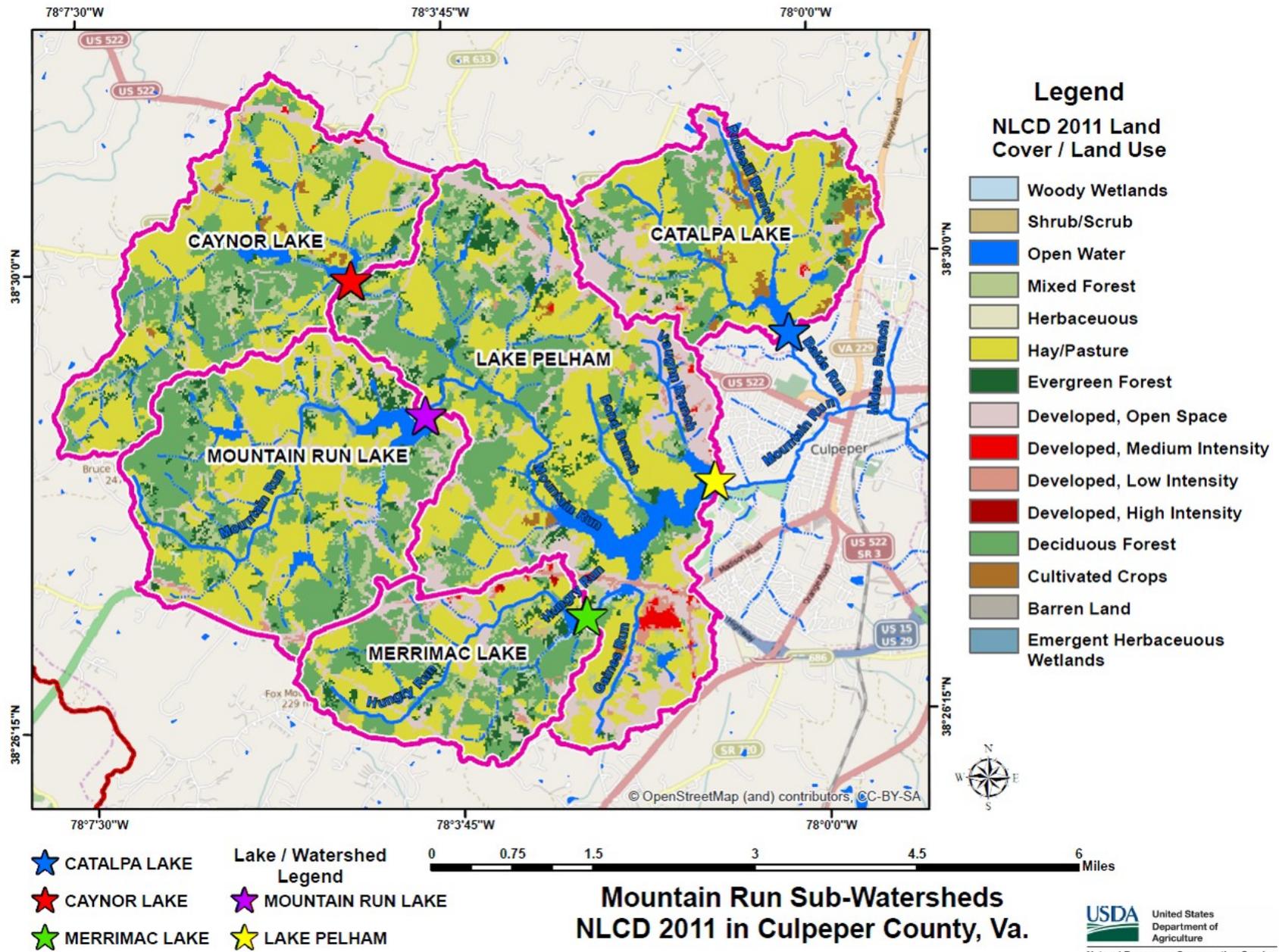


- | | | | |
|---|---------------|---|-------------------------|
|  | CATALPA LAKE |  | Lake / Watershed Legend |
|  | CAYNOR LAKE |  | MOUNTAIN RUN LAKE |
|  | MERRIMAC LAKE |  | LAKE PELHAM |



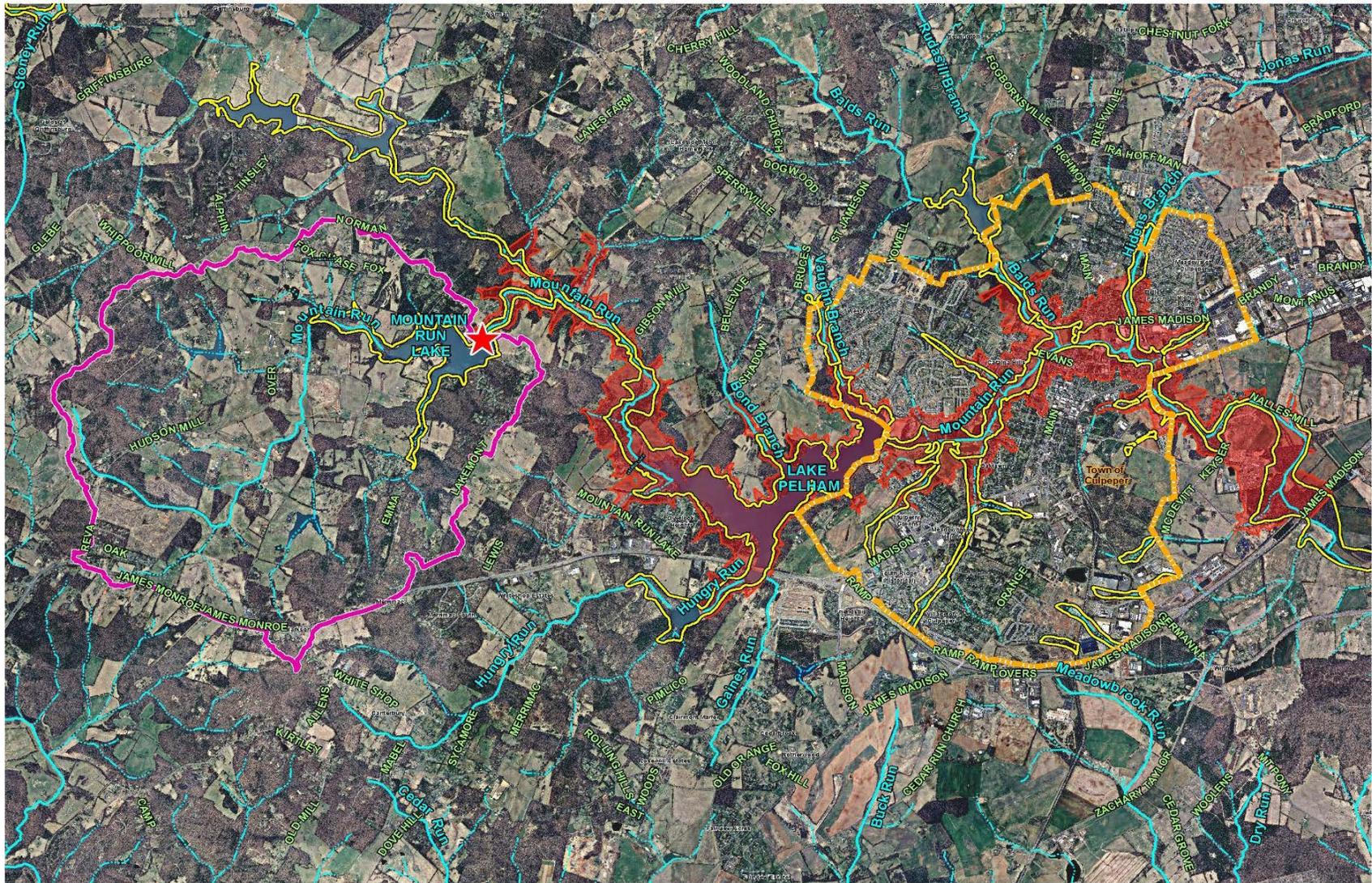
Mountain Run Sub-Watersheds Lakes in Culpeper County, Va.





APPENDIX B

BREACH INUNDATION MAP



Mountain Run 11 – Mountain Run Lake Watershed & VA Dam Safety Approved Breach Inundation Zone - in Culpeper, VA

- Legend**
- Mountain Run 11 Inundation Zone
 - Town of Culpeper Boundary
 - Mountain Run 11 Sub-Watershed
 - Baseflood, 100-year floodplain
 - Tributaries
 - Major Streams
 - Dam Location



USDA United States Department of Agriculture
 Natural Resources Conservation Service



"Aerial Imagery © 2013 Commonwealth of Virginia"
 "The data contained herein are the property of the Commonwealth of Virginia. Distribution of any of these data to anyone not licensed by the Commonwealth is strictly prohibited."

Map Date: 20151021

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APPENDIX C

INVESTIGATIONS AND ANALYSES REPORT

Investigations and Analyses Used in the Planning for Rehabilitation of Mountain Run Dam Site No. 11 (Mountain Run Lake)

PLANNING ENGINEERING INVESTIGATIONS AND ANALYSES

Background

Mountain Run stream originates in the western part of Culpeper County and flows generally east through the Town of Culpeper (Town) and empties into the Rappahannock River. The Mountain Run Watershed is located west of the Town of Culpeper. A Watershed Plan was developed by the NRCS in the 1950s and supplemented in the 1960s and 1970s to reduce flood flow in and around the Town and to provide water supply storage for the Town. Five watershed structures are located in the Mountain Run Watershed. The Culpeper SWCD owns and operates 3 structures and the Town of Culpeper owns and operates 2 structures (#11 and #50). The Town of Culpeper is the lead Sponsor for this project.

Mountain Run Dam No. 11 is currently in planning for rehabilitation to meet current NRCS and Virginia Dam Safety requirements, maintain existing flood control and maintain water supply storage. After consideration of the environmental impacts associated with the preferred alternative, it was determined that they would fit into the Categorical Exclusions for dam rehabilitation and that a Plan-Environmental Evaluation (Plan-EE) would be developed instead of a Plan-Environmental Assessment (Plan-EA). The Categorical Exclusions that apply to this dam rehabilitation project are CE14 and CE15.

Purpose

This document summarizes the investigations and analyses completed for the dam rehabilitation planning engineering of Mountain Run Dam No. 11. This includes a summary and reference for the existing conditions, breach, deficiencies, alternatives studied and the selected rehabilitation alternative for Mountain Run Dam No. 11.

The following Documents contain the assumptions, investigations, analysis performed and the conclusions developed:

- A. Schnabel Engineering, Preliminary Planning and Engineering for Mountain Run Dam No 11, December, 15, 2015.
- B. Schnabel Engineering, Mountain Run 11 Inlet/Outlet Inspection report, December 2, 2015.
- C. NRCS Hydrologic Analysis of Mountain Run 11 and Mountain Run 50 Watershed and Dams, May 2015
- D. Topo Survey, NRCS, 2014
- E. Risk Evaluation Worksheets, August 5, 2013
- F. Hazen & Sawyer, Preliminary Engineering Report, Lake Pelham and Mountain Run Lake Dam Improvements, April 25, 2013
- G. Breach Inundation Study, The Timmons Group, 2010
- H. Breach Maps, NRCS, 2013

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 402 - Dams

Existing Conditions and Deficiencies

NRCS and consulting engineers evaluated the existing condition of the dam and appurtenances since 2013. Initial investigations include a topographic survey (all elevations in NAVD 88), sediment survey and report, hydrologic analysis, spillway integrity analysis, and embankment and spillway capacity analysis. Detailed descriptions of the existing dam, reservoir and spillways are located in Documents A, B, C, E, and F. The existing topographic survey and key elevations are displayed in Documents D, Topo Survey.

The dam is well maintained and appears structurally sound. The principal spillway (riser, outlet pipe, and stilling basin) is in good condition and expected to remain structurally serviceable for 50 more years following construction.

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-builts, original design folder (1958), and the Hazen & Sawyer preliminary engineering report. Reservoir storage was developed using the current sediment survey (see discussion below). 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 standard distribution and 6-hr PMP from HMR 51, of 28”.

In 2012, the Town of Culpeper commissioned Hazen and Sawyer to study alternatives to bring Mountain Run Dam No. 11 up to current criteria. As part of that study, a geological investigation of the auxiliary spillway was completed. The investigation consisted of two phases. In the first phase, five boreholes were drilled in the auxiliary spillway from ten to sixteen feet of depth. All of the boreholes documented soil materials and none encountered rock. In the second phase, an electrical resistivity survey of the auxiliary spillway was completed. It consisted of three lines. The intent of the electrical resistivity survey was to document the top of competent rock. The survey seemed to show that competent rock at the auxiliary spillway control section was just over 30 feet deep on the inside edge which is the most critical area. The two phases of the investigation provided data used to develop the SITES model for the auxiliary spillway integrity and stability.

Results show that Mountain Run Dam No. 11 does not meet the 10-day drawdown requirement during the PSH events; does not have the capacity to route the FBH events without overtopping the dam; and does not have the integrity to resist auxiliary spillway erosion during the FBH events. The dam does not meet NRCS capacity or integrity criteria for high hazard dams. The dam does not meet VA Dam Safety criteria for a high hazard dam.

Reservoir Storage

Mountain Run Dam No. 11 was originally designed to detain future sediment, provide water supply, and provide flood storage. In order to determine the current reservoir storage, sediment surveys were completed by NRCS staff for Mountain Run 11, Mountain Run Lake (MR11) in September 2014. The sediment survey is 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 (Document C).

The results of the survey for Mountain Run Dam No. 11 show a total storage of 524 acre-feet below the crest of the principal spillway (PSW). Therefore, there is insufficient storage capacity below the crest of the PSW to store a minimum of 50 years of submerged sediment accumulation and the originally planned volume of water supply.

For the preferred rehabilitation alternative, the Sponsors decided to reduce the available water supply from 531 acre-feet to 429 acre-feet. This assumed water supply storage, along with existing already delivered sediment and estimated future sediment delivery, enables attainment of the Watershed Rehabilitation Program's required minimum 50-year useful life. The cost of dredging to increase the useful life and potential water supply was evaluated and found to be cost prohibitive for the Town. Just to increase the sediment storage capacity to achieve 75 and 100 year useful lives would require dredging of approximately 224,000 and 295,000 cubic yards, respectively, at estimated costs of \$16.8 and \$22.1 million (required environmental permit costs not included). The Sponsors have a Regional Water Supply Plan for the Town of Culpeper and Culpeper County (2011), in which additional future water supply sources are identified, including municipal wells. Based on this and the planned future water supply sources, the Sponsors decided to reduce the water supply storage in Mountain Run Lake and thereby provide the required 50-year minimum submerged sediment storage.

Mountain Run Lake Storage Capacity

Storage Capacity, acre-feet	Planned Storage (50-years after rehabilitation)	Planned Storage (100-years after rehabilitation)	Existing Storage (2014 Sediment Survey)	Designed Storage (1968 Design Folder)
Submerged Sediment Storage	95 ¹	183 ¹	NA	80
Water Supply Storage	429	341	NA	531
PSW Storage (Total Storage to PSW crest) ²	524	524	524	611
Aerated Sediment Storage (above the PSW crest)	7 ³	14	NA	Not determined
Flood Storage (Total Storage between PSW and ASW crest) ² ⁴	1208	1201	1215	1,240

1. The sedimentation rate of 1.76 acre-feet-year was determined using actual sedimentation accumulation over the life of the structure. Therefore, the submerged sediment accumulation over the next 54 years (50 yr. minimum storage + 4 years to construction from the time of the last sediment survey) is 95 acre-feet and over the next 104 years (100 yr. storage + 4 years to construction from the time of the last sediment survey) is 183 acre-feet.
2. PSW = principal spillway; ASW = auxiliary spillway
3. The future aerated sediment for Mountain Run No. 11 was not documented in the original design folders. Design documentation from an NRCS assisted dam in the same region, Mountain Run No. 50, was utilized to predict the aerated sedimentation rate. The aerated sediment is 7% of the sediment (by volume). This yields a 0.13 acre-feet-year aerated sedimentation rate, which equates to 7 acre-feet of aerated sediment over the next 54 years and 14 acre-feet over the next 104 years.
4. The storage volume was determined using current Digital Elevation Models, sediment survey, and the reservoir routing procedures in SITES. The difference between the designed storage and the existing storage is attributed to more precise measurements using current technology.

Alternatives

Rehabilitating Mountain Run Dam No. 11 to meet current NRCS auxiliary spillway criteria and 10-day drawdown criteria requires substantial modifications to the structure. Several alternatives were evaluated to rehabilitate the dam.

1. Vegetated Spillway without dam raise. NRCS analyzed a vegetated spillway to meet current safety and performance criteria (Document C). The Sponsors are unable to raise the top of dam due to difficulty and cost with moving homes and structures and gaining landrights to expand their flood pool easement. Since the auxiliary spillway materials are

erodible, a minimum width of 700' is needed or substantial amount of armoring and barriers would be needed. The conclusion of this study showed that a structural spillway can be operated more frequently than a vegetated auxiliary spillway and will maintain the existing normal pool, flood pool, and top of dam elevations.

2. Dam Decommissioning. NRCS analyzed the cost and impact of decommissioning the existing dam. This action requires a controlled breach of the structure to reduce dam breaching hazard potential downstream. Since the regulatory floodplain (100-yr) was established assuming the dam is in place, structures in the downstream flood zone would need to be relocated or flood-proofed. Since water supply for the Town would be eliminated, the action would require development of alternative drinking water sources. Due to the exorbitant cost of developing alternative water supply and relocating or floodproofing structures, this alternative was eliminated from further study.
3. Top of Dam Raise and Armor Auxiliary Spillway (Structural Alternative 4). Hazen & Sawyer performed a preliminary design to raise the top of dam and armor the spillway in 2013. (Document F). The Sponsors are unable to raise the top of dam due to difficulty and cost with moving homes and structures and gaining landrights to expand their flood pool easement. In addition, the projected construction cost is \$8.7 million, over \$3 million more than the preferred alternative. Due to exorbitant costs to obtain additional floodpool easements and to construct parapet wall, this alternative was eliminated from further study.
4. Roller Compacted Concrete (RCC) Chute (Structural Alternative 3). Schnabel performed a preliminary design to provide a new structural spillway using RCC. This would maintain the existing flood protection, continues water supply storage, and provide capacity and integrity to pass the FBH event. (Document A). It is estimated that an RCC overtopping spillway with an ogee control section would have a construction costs approximately \$95,000 more than the alternative of a labyrinth spillway over the embankment. This alternative would require significant excavation into both abutments and significant disturbance below the dam to train the spillway flows back towards the natural stream channel. Because this dam is located in a town park, the construction activities will have a detrimental effect on the use of the park during the construction phase. The staging area requirements for RCC construction will be significantly greater than the labyrinth alternative due to requirements for aggregate stockpiles, mixing plant setup, storage of cement and fly ash, and access and maneuvering of large delivery vehicles. Over 2,500 round trips for the delivery of aggregate, cement, and fly ash for the RCC mixture would be arriving at the site which would necessitate the closure of two entrances into the park and closure of a section of the park and parking spaces for staging areas. The labyrinth alternative would have far less impacts requiring only the closure of one park entrance and little additional closure of the park amenities or parking spaces. The potential for noise and dust from aggregate handling activities and the mixing of the RCC is significant. RCC production and placement is a high energy activity that will be a significant disturbance to the park activities during the construction of the RCC overtopping spillway.

RCC production and placement is considered more disruptive to the community than the installation of a labyrinth weir since the RCC staging area is twice as large as the labyrinth

weir staging area and the delivery of materials requires double impact on surrounding roads. Due to these reasons, this alternative was eliminated from further study.

5. Labyrinth weir and concrete chute (Structural Alternative 2 – Preferred Alternative). Schnabel performed a preliminary design to provide a new structural spillway using a labyrinth weir and concrete chute. This would maintain the existing flood protection, continue water supply storage, and provide capacity and integrity to pass the FBH event. (Document A).

Preferred Alternative

In order to meet current safety and performance standards, maintain water supply, maintain recreational use, maintain existing top of dam crest, and maintain flood control to downstream properties, a structural spillway was selected to rehabilitate the dam. Schnabel performed the preliminary engineering analysis to install a labyrinth weir and concrete chute to meet the objectives of the project (Document A). This alternative includes the following: install a 144-foot-wide, 6-cycle structural concrete labyrinth spillway over the embankment, install a SAF stilling basin and rip-rap outlet protection, install an earthen berm in the existing auxiliary spillway, and rehabilitate the riser with a rock berm.

The proposed alternative calls for eliminating the vegetative earth auxiliary spillway from the project. An earlier study found that the integrity of the spillway would be questionable were it to activate during the design storm event. To eliminate the function of the spillway, a berm will be constructed across the existing auxiliary spillway channel with an elevation the same as the crest of the dam. This berm would have a minimum 12 foot crest width with 3H:1V side slopes. The height of the berm would be approximately eight feet. This berm will be designed to meet the same NRCS standards for a typical dam. The footprint of this berm will remain within the original total project's footprint. Maps of the conceptual plan and profile are shown in Appendix A.

Based on the conceptual drawing developed as part of this planning effort, it is estimated that there will be 23,000 cubic yards of excavation required for the proposed labyrinth spillway and stilling basin. Of this quantity, it is expected that at least 15,000 cubic yards will be fill suitable for the construction of the saddle dam across the auxiliary spillway. It is estimated that approximately 9,000 cubic yards of fill will be required for the saddle dam. The remainder of the excavated soils will be wasted within the current limits of the auxiliary spillway.

Table B – Comparison Table of Structural Options - Mountain Run Watershed - Mountain Run Lake, Dam No. 11
Culpeper County, VA

Item	Unit	Existing Conditions	No Action	Alt 1	Structural Alt 2 - PREFERRED ALTERNATIVE	Structural Alt 3
Estimated construction cost	\$	NA	5.6 Million	8.3 Million	5.6 Million	5.7 Million
Description		NA	Same as Preferred Alternative, Structural Alt 2	Decommission	Install a 144-foot-wide concrete chute spillway with a 6-cycle labyrinth weir overtop the existing dam; existing auxiliary spillway to be filled with material removed from the dam for chute install; berm in auxiliary spillway to be at the existing top of dam elevation.	Install a 370-foot-wide roller compacted concrete (RCC) stepped spillway with ogee weir; existing auxiliary spillway to be filled with material removed from the dam for chute install; berm in auxiliary spillway to be at the existing top of dam elevation.
Considered a viable alternative to carry forward in Plan EE?		NA	Yes	No. Due to the exorbitant cost of developing alternative water supply and relocating or floodproofing structures, this alternative was eliminated from further study.	Yes	No. RCC production and placement is considered more disruptive to the community than the installation of a labyrinth weir. The RCC staging area is twice as large as the labyrinth weir staging area. Delivery of materials requires double impact on surrounding roads. The park would experience full closure while RCC is being placed.
Source		NRCS, "Hydrologic Analysis of Mountain Run 11 and Mountain Run 50 Watershed and Dams", May 2015	Schnabel Engineering, "Preliminary Engineering and Planning Study; Mountain Run Watershed Dam No. 11", December 15, 2015	NRCS, "Draft Mountain Run No. 11 Plan-EE; Investigation and Analysis Appendix", November 2015	Schnabel Engineering, "Preliminary Engineering and Planning Study; Mountain Run Watershed Dam No. 11", December 15, 2015	Schnabel Engineering, "Preliminary Engineering and Planning Study; Mountain Run Watershed Dam No. 11", December 15, 2015
Class of structure		High	High	NA	High	High
Seismic zone		2	2	2	2	2
Uncontrolled drainage area	mi ²	6.45	6.45	6.45	6.45	6.45
Controlled drainage area	mi ²	0.00	0.00		0.00	0.00
Total drainage area	mi ²	6.45	6.45	6.45	6.45	6.45
Runoff curve No. (1-day) (AMC II)	number	65	65	65	65	65
Time of concentration (Tc)	hrs	3.2	3.2	3.2	3.2	3.2

Table B – Comparison Table of Structural Options - Mountain Run Watershed - Mountain Run Lake, Dam No. 11
Culpeper County, VA

Item	Unit	Existing Conditions	No Action	Alt 1	Structural Alt 2 - PREFERRED ALTERNATIVE	Structural Alt 3
Elevation top dam ^{1/}	ft	450.0	450.0	NA	450.0	450.0
Elevation crest auxiliary spillway	ft	444.1	444.1	NA	444.1	444.1
Elevation crest high stage inlet	ft	433.2	433.2	NA	433.2	433.2
Elevation crest low stage inlet	ft	NA	NA	NA	NA	NA
Auxiliary spillway type	type	Earthen	Structural	NA	Structural	Earthen, with structural components
Auxiliary spillway bottom width	ft	150	144	NA	144	370
Auxiliary spillway exit slope	percent	3.85	3	NA	3	
Length of Dam	ft	700	900 (includes 200' of fill in auxiliary spillway)	NA	900 (includes 200' of fill in auxiliary spillway)	900 (includes 200' of fill in auxiliary spillway)
Maximum height of dam	ft	39	39	NA	39	39
Volume of fill	yd ³	5,700	7,400	NA	7,400	7,400
Total capacity ^{2/}				NA		
Sediment submerged	acre ft	95	95		95	95
Sediment aerated	acre ft	7	7		7	7
Beneficial use (M&I water)	acre ft	429	429		429	429
Floodwater retarding	acre ft	1,208	1,208		1,208	1,208
Between high and low stage	acre ft	NA	NA		NA	NA
Surface area				NA		
Sediment pool ^{3/}	acres	20	20		20	20
Beneficial use pool (M&I water)	acres	67	67		67	67
Floodwater retarding pool ^{2/}	acres	155	155		155	155
Principal spillway design				NA		NA
Rainfall volume (1-day)	in	4.6	4.6		4.6	NA
Rainfall volume (10-day)	in	5.4	5.4		5.4	NA
Runoff volume (10-day)	in	6.2	6.2		6.2	NA
Capacity of low stage (max.)	ft ³ /s	60	60		60	60
Capacity of high stage (max.)	ft ³ /s	125	125		125	125
Dimensions of conduit	ft/in	30	30		30	30
Type of conduit		circular RCP	circular RCP		circular RCP	circular RCP
Frequency operation-auxiliary spillway	percent chance	1.0	1.0		1.0	1.0
Auxiliary spillway hydrograph				NA		

Table B – Comparison Table of Structural Options - Mountain Run Watershed - Mountain Run Lake, Dam No. 11
Culpeper County, VA

Item	Unit	Existing Conditions	No Action	Alt 1	Structural Alt 2 - PREFERRED ALTERNATIVE	Structural Alt 3
Rainfall volume	in	11.6	Structural Spillway		Structural Spillway	Structural Spillway
Runoff volume	in	7.9				
Storm duration	hrs	6				
Velocity of flow (Ve)	ft/s	Unknown				
Max reservoir water surface elev. ^{1/}	ft					
Freeboard hydrograph				NA		
Rainfall volume	in	11.6	28.0		28.0	28.0
Runoff volume	in	7.9	22.4		22.4	22.4
Storm duration	hrs	6	6		6	6
Max reservoir water surface elev. ^{1/}	ft	454.7	450.0		450.0	450.0
Capacity equivalents				NA		
Sediment volume	in	0.27	0.27		0.27	0.27
Floodwater retarding volume	in	3.50	3.50		3.50	3.50
Beneficial volume (M&I water)	in	1.25	1.25		1.25	1.25

^{1/} All elevations are to be recorded in North American Vertical Datum 1988 (NAVD88).

^{2/} Crest of auxiliary spillway.

^{3/} If reservoir contains beneficial storage or if sediment capacity will not store water, show area in parenthesis and footnote accordingly.

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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 comply with the Virginia Impounding Structures Law and Regulations for high hazard dams. The Virginia Impounding Structures Regulations requires owners of high hazard 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 spillway design flood for High Hazard dams is the Probable Maximum Flood (PMF), consistent with NRCS Freeboard Hydrograph criteria. The Virginia inundation zones for a high hazard dam include:

- (1) a sunny day dam failure using the volume at the auxiliary spillway crest;
- (2) a spillway design flood (PMF) without a dam failure;
- (3) a dam failure during the spillway design flood (PMF).

The breach inundation report and maps are sealed by a Virginia professional engineer and are provided in Document G.

The breach inundation zone analysis and maps were approved by the Virginia Division of Dam Safety and Floodplain Management 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 of the structures in the potential breach impact zone of Mountain Run Lake were identified using GIS information provided by the Town of Culpeper and Culpeper 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 2013 using the current Sponsor breach inundation study and maps (Document G, The Timmons Group, 2010). The risk assessment shows that the dam has a potential to fail through hydrologic (overtopping) and static (piping) modes. There is a high risk of lifeline and municipal services (sanitary and drinking water) disruption, if not complete collapse.

The table below describes the population at risk per structure type, the number of structures in the sunny day breach inundation zone and the estimated damages expected to occur in such an event.

Structure	PAR (Population at Risk)	No. of Structures in the Sunny day breach inundation zone	Estimated Total Damages from a Sunny day breach (structures & content damages)
Single Family	2,798	496	\$35,620,000
Commercial/Industrial	576	80	\$16,360,000
Multi Family	48	24	\$4,970,000
Local Government	24	6	\$7,420,000
Religious	6	2	\$1,360,000
Charitable	6	3	\$360,000
Totals:	3,458	611	\$66,090,000

Within the NRCS sunny day breach inundation zone, the population at risk is 3,458.

The summary of the risk assessment is located in Document E.

SUMMARY OF DATA SOURCES FOR PLANNING ENGINEERING

Land Cover - NLCD 2011

The land cover was derived from the “National Land Cover Dataset” Circa 2011. This layer was extracted from the Virginia NLCD dataset using the Sub-Watershed Boundaries for Mountain Run 11 and Mountain Run 50. The National Land Cover Database (NLCD) serves as the definitive Landsat-based, 30-meter resolution, land cover database for the Nation. NLCD provides spatial reference and descriptive data for characteristics of the land surface such as thematic class (for example, urban, agriculture, and forest), percent impervious surface, and percent tree canopy cover. All NLCD data products are available for download at no charge to the public from the MRLC Web site: <http://www.mrlc.gov>.

Land Use Information

Future Land Cover was developed by overlaying Map 12.3 contained in the Future Land Use Plan from the Culpeper 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, Mountain Run Watershed Dam No. 11*, December 15, 2015 by Schnabel Engineering.

SSURGO Soils

This product was used to derive the Prime Farmland and Hydrologic Groups in the Mountain Run Dam Studies. 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 Culpeper County, Virginia. The NRCS Soil Data Viewer version 6.2 was used, with ArcGIS 10.2. The attributes selected for this layer is under 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 31, 1978.

Hydrologic Soil Groups

This layer was derived from the USDA NRCS - SSURGO data for Culpeper 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 Mountain Run 11 dam rehabilitation study to depict Streams and Water Bodies. The National Hydrography Dataset (NHD) and Watershed Boundary Dataset (WBD) 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

This layer was used to depict the baseflood, 100-yr floodplain zone in the Mountain Run Dam Studies. In Virginia, the localities are the zoning authorities. For the streams below Mountain Run Dam, both Culpeper County and the Town of Culpeper are the regulatory authorities for the baseflood. The baseflood depicted on all maps are FEMA Zone AE. For the preferred rehabilitation alternative, the baseflood will not change in the downstream channels.

The Digital Flood Insurance Rate Map (DFIRM) Database depicts flood risk information and supporting data used to develop the risk data. The primary risk classifications used are the 1-percent-annual-chance flood event, the 0.2-percent-annual-chance flood event, and areas of minimal flood risk. The DFIRM Database is derived from Flood Insurance Studies (FISs), previously published Flood Insurance Rate Maps (FIRMs), flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available. The FISs and FIRMs are published by the Federal Emergency Management Agency (FEMA).

Sub-Watershed Boundaries

These Boundaries were derived by using the LiDAR Bare Earth Digital Elevation Model, and Hydrologic Analysis in ArcGIS 10.2 Spatial Analyst Tool.

LiDAR – Digital Elevation

This data was used to create the sub-watershed boundaries for Mountain Run 11 in Culpeper, Virginia. The data consist of highly detailed elevation information collected circa 2013. This consisted of numerous tiles of information that were mosaicked into a seamless coverage for the study area. LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses—combined with other data recorded by the airborne system— generate precise, three-dimensional information about the shape of the Earth and its surface characteristics. The LiDAR data used for the Mountain Run 11 plan was Quality Level 2 data. The QL2 data has a resolution accuracy level that uses a nominal pulse spacing of 0.7 meters and a vertical accuracy of 9.25 centimeters. The project was overseen and contracted by the U.S. Geological Survey.

SOCIAL AND ECONOMIC CONDITIONS

Economic Analysis

The NRCS National Watershed Manual was used as a reference for the economic analysis along with two economic analysis guidance documents: “Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G), December, 1983, and the “Economics Handbook, Part II for Water Resources”, USDA/Natural Resources Conservation Service, July, 1998. These guidance documents were used to evaluate potential flood damages, and estimate project benefits and associated costs. P&G was developed to define a consistent set of project formulation and evaluation instructions for all federal agencies that carry out water and related land resource implementation studies. The basic objective of P&G is to determine whether or not benefits from project actions exceed project costs. P&G also allows for abbreviated procedures to be used (section 1.7.2 (a) (4) (ii)), when more detailed analysis will not alter identification of the recommended National Economic Development alternative. In this case, the future without federal project and the future with federal project involve the same least-cost alternative with comparable scope, effects, benefits and costs. No net change in benefits occurs when comparing the two candidate plans to each other.

Per use of abbreviated procedures allowed by P&G and NRCS policy, avoidance of the local cost is claimed as the benefits of the federally-led dam rehabilitation. The federally assisted alternative as displayed credits local costs avoided (Total Adverse Annualized for the Future Without Federal Project scenario) as adverse beneficial effects (Total Beneficial Annualized) consistent with P&G 1.7.2(b)(3). Thus, although the average annual benefits of rehabilitation are \$234,600, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1.

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 4 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.

The 50, 75 and 100 year useful lives were evaluated (52, 77 and 102 year periods of analysis including 1 year for design and 1 year for construction). Given policy mentioned above, the no federal action alternative is viewed as local costs avoided and the resulting B/C ratio of the federal action is 1:1 due to the no federal action alternative being materially the same as the federal action alternative. Therefore, any added costs accrued to increase the project's expected useful life beyond meeting the minimum 50-year life via for example dredging (increase sediment storage), would increase costs, but increased sediment storage would not change project benefits due to the policy invoked/asserted 1:1 B/C ratio. Thus, the federal action with a 52-year period of analysis becomes the alternative with the lowest initial cost and lowest average annual cost when compared to evaluated periods of 75 and 100 year useful lives. Since by policy in this planning situation net benefits in any of the federal action scenarios evaluated would be zero, the federal action that achieves maximum net benefits at lowest cost is identified as the NED alternative.

All costs of installation, operation and maintenance were based on 2015 prices. The costs associated with designing and implementing all structural measures were assumed to be implemented over a two-year installation period (1 year for design and 1 year for construction) and to have a 50-year useful life (the remaining sediment storage life of 54 years was determined 1.5 years ago; assuming approximately 0.5 years until final project approval and funding and 1 year for design and 1 year for construction). Thus, a 52-year period of analysis was used along with the mandated 3.125% discount rate for all federal water resource projects for FY16 to discount and amortize the anticipated streams of costs and benefits.

Mountain Run Site 11 was built in 1959. The designed peak flow precipitation event determined the elevation of the flood pool and allowed for establishment of an easement boundary by the sponsors based upon the extent of land necessary to prevent any development from being flooded. The easement was established to elevation 449.3 (NAVD 88). The PMP flood-pool elevation of 450 (NAVD 88) means that there is 0.7 feet of difference between the elevation of the existing

flood easement and where it should be by policy, i.e., NRCS policy requires sponsors to procure easements to the top of dam unless the plan allows a lower elevation (not lower than the elevation of the 100-year, 24-hour storm or the auxiliary spillway elevation, whichever is higher. This results in an 8.2 acre discrepancy between the existing top of dam/flood pool elevation and the easement area set at 449.3 should the designed flow associated with a PMP storm event occur.

An analysis was conducted to compare the cost of acquiring an easement associated with the land area needed to prevent development within the flood-pool. A set of assumptions were used to estimate: 1) the cost of an easement for the added 8.2 acres of land (easement encumbrance cost and legal fees); 2) the value of residences and associated contents for an assumed built-out scenario based upon 0.2 acre parcels and 41 parcels; and 3) estimated damages from a PMP event based upon 0.7ft. flood-depth assuming all 41 parcels were developed with points of water entry at the 449.3ft. elevation. The cost of acquisition of the easement was then compared to the cost associated with expected damages from such a low frequency event. All costs were converted to average annual costs so a benefit/cost comparison could be made (damages/cost of damage avoidance). The resulting B/C ratio came out to 0.012. The sponsors opted to not acquire the added easement given the risk/cost comparison, i.e., relatively high current cost in view of a very low risk/probability of occurrence and associated low average annual cost.

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.

The level of boating and fishing permits issued annually were assessed simply as part of evaluation of the decommissioning alternative. Boat permits were an estimated 475 for 2015 with revenue of almost \$7,000 for the year. Fishing permits were an estimated 875 issued for 2015 with revenue of \$13,300 for the year.

ENVIRONMENTAL CONDITIONS

Threatened and Endangered Species

NRCS staff first consulted informally with the U.S. Fish and Wildlife Service (USFWS) in January 2013 thru their online Information for Planning and Conservation (IPaC) system. At that time, the only T&E species reported was the Dwarf wedgemussel (*Alasmidonta heterodon*) and it was potentially in Mountain Run downstream of Mountain Run Dam No. 11. In the summer of 2015, NRCS contracted with an approved USFWS surveyor to survey 800 meters downstream of Mountain Run Dam No. 11 per USFWS protocol. In August 2015, the final report for the survey was submitted to NRCS. The report indicated that after a thorough survey for the Dwarf wedgemussel, none were found (report is available in the administrative record).

In November 2015, NRCS resumed informal consultation with the USFWS thru the IPaC system. At that time the only T&E species in the proposed project area was the Northern long-eared bat (*Myotis septentrionalis*). Furthermore, no longer was the Dwarf wedgemussel listed as potentially in the vicinity of the proposed project and no designated or proposed federally designated Critical Habitat for any species was identified.

According to USFWS species range maps, all of Virginia is within the range of the Northern long-eared bat. However, no known Northern long-eared bat hibernacula or maternity roost trees have been designated or recorded within ¼ mile of the project area. As stated in the USFWS Final 4(d) Rule, published February 16, 2016, of the Endangered Species Act of 1973, as amended, on the Northern long-eared bat, since no known maternity roost trees or hibernacula have been designated within a ¼ mile 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 Northern long-eared bats. In addition, no trees will be removed as a result of project implementation. Finally, NRCS concludes that the proposed project will have “no effect” on any federally listed or proposed species or their designated or proposed critical habitat. Likewise, primarily because there are no sensitive species or habitat present, and there will be no trees removed during implementation, the project will have no impact to any other identified sensitive species. Supporting consultation information and data can be found in the administrative record.

Cultural Resources, Natural and Scenic Areas, and Visual Resources

NRCS cultural resources staff completed database searches for any known cultural resources and ground surveyed the project area for evidence of archaeological and/or historical resources that had the potential to be impacted. A pedestrian survey was conducted throughout the entire project area in February 2015. No cultural resources were found in the areas of potential disturbance associated with rehabilitation measures at Mountain Run No. 11, and overall there appears to be low potential for intact subsurface cultural deposits in these areas. A search of the Virginia Department of Historic Resources’ Archeological and Architectural Sites database in November 2015, did not reveal any recorded archeological or historic sites in the vicinity of the proposed project. Consultation with the Virginia Department of Historic Resources (VDHR) was initiated in November 2015 by NRCS thru their online Electronic Project Information Exchange (ePIX) website pertaining to the proposed Mountain Run Lake Dam rehabilitation project. On December 18, 2015, the VDHR indicated their finding of “*no historic properties affected*” for the proposed rehabilitation project and indicated no additional studies or consultation would be necessary (documentation is available in the administrative record).

A search of the Native American Consultation Database (NACD) was conducted in November 2015 to determine if there were any Indian tribes that might list consultation contacts, attach religious or cultural significance to historic properties that could be located in the proposed project area. An additional search of the Tribal Directory Assessment Tool (TDAT) v2.0 was conducted in November 2015 to determine if there were any Indian tribes that might list consultation contacts, attach religious or cultural significance to historic properties that could be located in the proposed project area. This was done in accordance with 36 CFR 800.2 (c)(i) of the Advisory Council on Historic Preservation Regulations. Neither database identified any tribes to have a claimed interest

or consultation contact in Culpeper County, Virginia (National Park Service 2015) (Housing and Urban Development 2015).

The NRCS has determined pursuant to 36 CFR 800.4(d) that there are no properties included in or eligible for the National Register of Historic Places within the area of potential effect of the alternative resulting in rehabilitation of Mountain Run No. 11. This determination was reported to the SHPO in November 2015 for review and concurrence, and the SHPO concurred in the determinations on December 18, 2015 (both letters are available in the administrative record).

The absence of Natural Heritage Resources, including Natural and Scenic Areas and Visual Resources, was determined by review of the Virginia Department of Conservation & Recreation Natural Heritage Resource Map for Culpeper County.

Water Quality

Water quality data was taken from the Virginia DEQ 2014 305(b)/303(d) Integrated Water Quality Assessment and Impaired Waters Report.

Wetlands

A wetland investigation for Mountain Run Lake was completed during the growing season of 2015. Prior to conducting fieldwork, an off-site evaluation was completed. NRCS consulted the Culpeper West USGS 7.5 minute Topographical Quadrangle Map, the National Wetlands Inventory Interactive Mapper (NWI) website, administered by the U.S. Fish and Wildlife Service, and soil survey information provided by NRCS. The USGS quad map shows a moderately sloping site within the floodplain of Mountain Run. The NWI mapping depicts the 67-acre open water wetland and several acres of freshwater emergent wetlands at the inflow of the lake. No additional wetlands were identified during the on-site investigation. 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)*.

Forest and Wildlife Resources

Information on the forest and wildlife resources was obtained from field surveys and existing information from the Virginia Department of Game and Inland Fisheries and the Virginia Department of Forestry. Field surveys were conducted by NRCS staff during the growing season of 2015.