

**Supplemental Watershed Plan-Environmental Assessment
for the
South River Watershed**

Supplement No. 4 to the original watershed plan for the rehabilitation
of South River Dam No. 10A (Mills Creek)

Augusta County, Virginia

September 2010



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Abstract

South River Dam No. 10A, Mills Creek, has changed from a significant hazard dam to a high hazard dam. It does not presently meet NRCS or Virginia safety standards for the capacity, stability, or integrity of the auxiliary spillway and the principal spillway riser system is in poor condition. The recommended plan is to rehabilitate the Mills Creek dam to meet current safety and design criteria. The principal spillway riser and intake system will be replaced and the permanent water level will be lowered by 24 feet. This will remove the water supply capacity of the dam. The control section of the auxiliary spillway will be lowered three feet and will be lengthened to 200 feet to achieve capacity and integrity. Armoring will be placed on the auxiliary spillway to achieve stability. An earthen inlet training dike and a concrete outlet training dike will be installed. Downstream flood protection will be increased as a result of project activity.

Authority

The original work plan was prepared, and the works of improvement have been installed, under the authority of the Flood Control Act of 1944 (Public Law 78-534). The rehabilitation of Mills Creek Dam No. 10A is authorized by the Watershed Protection and Flood Prevention Act (Public Law 83-566) as amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).

Sponsor

Augusta County Board of Supervisors

Prepared By:

USDA – Natural Resources Conservation Service
In cooperation with the U.S. Forest Service

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SUMMARY OF DRAFT SUPPLEMENTAL WATERSHED PLAN NO. 4 Environmental Assessment

Project Name: South River Dam No. 10A (Mills Creek)

County: Augusta **State:** Virginia

Congressional District: 6th

Authorization: Public Law 83-566, 1954, as amended by Section 313 of Public Law 106-472, 2000.

Sponsor: Augusta County Board of Supervisors

Description of Recommended Plan: The recommended plan is to rehabilitate the Mills Creek dam to meet current safety and design criteria. The principal spillway riser and intake system will be replaced and the permanent water level will be lowered by 24 feet. This will remove the water supply capacity of the dam. The control section of the auxiliary spillway will be lowered three feet and will be lengthened to 200 feet to achieve capacity and integrity. Armoring will be placed on the auxiliary spillway to achieve stability. An earthen inlet training dike will be constructed. The existing earthen training dike on the downstream side of the dam will be supplemented with a concrete training dike along the outlet section of the auxiliary spillway. Another section of earthen training dike will be installed at the base of the auxiliary spillway. Downstream flood protection will be increased as a result of project activity. The water supply capacity of the structure will be removed since it is no longer needed.

Resource Information:

Size of the entire South River Watershed = 156,700 acres (244.8 square miles)
Drainage Area of Mills Creek = 2,459 acres (3.84 square miles)
Latitude: 38.0525 Longitude: -78.8733333
8-Digit Hydrologic Unit Number: 02020005

Land Use Above the Dam:

Open Land, 4.2 acres, 0.1%
Woodland, 2,436.4 acres, 99.2%
Grassland, 1 acre, ~0%
Water, 17.4 acres, 0.7%
Floodpool of Mills Creek Dam = 27.7 acres

Land Ownership:

Upstream of dam: 100% public
Downstream of dam: 54% private, 46% public

Project Beneficiary Profile: The 2006-2008 population estimate for Augusta County was 70,714. The population diversity was 93.4% White, 4.4% Black or African American, 0.3% were Native Americans, 0.1% Asian, 0.2% Native Hawaiian or other Pacific Islanders, and 1.0% others. Hispanic or Latino constituted 1.9% and 0.6% were two or more races. The median age of the population of Augusta County was projected to be 40.4 in 2006-2008 as compared to 37.1

for the State and 36.7 for the entire nation. Residents 65 years of age or older totaled 13.6% of the total population. This compares to 11.8% for the State and 12.6% for the entire nation.

The 2006-2008 Census projections estimate indicate that there were 30,245 housing units within Augusta County with 92.2% occupied of which 80.4% were owner-occupied and 19.6% were renter-occupied. The state-wide occupancy rate for Virginia as a whole in 2006-2008 was 89.7% and the national figure was 88.0%. The local and state-wide rates for owner-occupancy are higher than the national figure of 67.1% in 2006-2008. Residential property values for the land and associated buildings downstream of the dam range between \$24,000 and \$188,000 with an average of \$101,700. The total value of residential property (structures and contents only, excluding land values) at risk below the dam is an estimated \$8,850,000.

In 2008 dollars, per capita personal income for Augusta County was \$24,382. That makes the County income for 2008 about 76% of the State level and 89% of the national figure.

Cultural Resources: In March 2010, a field reconnaissance of the dam footprint, staging areas, access roads, and turnarounds. There are numerous previously recorded archaeological sites downstream of the dam. A Phase I archaeological survey of the area to be disturbed was completed in March 2010. The one site found in the evaluated area will not be disturbed during construction.

Land in the Sunny Day Breach Inundation Zone by Type, Acres and Percentage

- Residential/Business, 149.3 acres, 10.2%
- Woodland, 1,070.7 acres, 73.2%
- Cropland, 45.4 acres, 3.1%
- Grassland, 183.8 acres, 12.6%
- Water, 12.5 acres, 0.9%
- Total = 1,461.7 acres

Highly Erodible Cropland: None exists in the watershed.

Threatened and Endangered Species: There are four State Threatened (ST) and four State Endangered (SE) animal species known or likely to occur within a two mile radius of the Mills Creek dam site. There are confirmed sightings of four of these species. Two of the species with confirmed sightings are also Federally Threatened (FT). Only one species, the Swamp Pink, has been located near the project site and is likely to be adversely affected by dam rehabilitation activities.

Wetlands: There are wetlands downstream of the dam. One spring, downstream of the dam, will be affected by installation of the earthen training dike at the end of the auxiliary spillway. The wetlands located along the access road will be protected from sedimentation by installation of Erosion & Sediment Control measures. There were no wetlands noted in the upstream areas of the lake.

Problem Identification: In 2005, the hazard class of the Mills Creek Dam changed from significant to high. As a result, the Mills Creek Dam does not meet current dam design and safety criteria. During the planning process, there were two primary problems identified by the NRCS Planning Team, the local Sponsor and the public. The primary issues addressed by the rehabilitation plan are:

- The vegetated earth auxiliary spillway does not have the capacity, stability or integrity to carry the design flow without breaching.
- The principal spillway riser system is in poor condition.

The breach inundation zone includes Mt. Torrey Road (3,400 Average Daily Traffic), Howardsville Turnpike (1,400 ADT), Back Creek Lane (200 ADT), Mills Creek Lane (150 ADT), China Clay Road (450 ADT), Coal Road (75 ADT) and several utilities. There are 57 single family homes, three business sites and five churches located in the breach inundation zone.

Alternative Plans Considered: Several alternatives were considered during the planning process with the following two being evaluated in detail:

1. No Federal Action – Sponsor will rehabilitate the dam to meet current dam safety and design criteria without Federal assistance.
2. Rehabilitate the Dam – Rehabilitate the dam to meet current dam safety and design criteria using Federal assistance.

Project Purpose: This project will bring the Mills Creek Dam into compliance with the current dam design and safety criteria for NRCS and the Commonwealth of Virginia. It also provides for the continuation of flood control for another 50 years after completion. The level of flood protection will be increased. The rehabilitation project will address all needs identified during the planning process.

Principal Project Measures: The rehabilitation of the dam involves the following actions:

- Replace the concrete riser and inlet components with a single-stage concrete riser located at the toe of the embankment. Install 130 feet of reinforced concrete pipe from the new riser to the existing principal spillway outlet pipe.
- Remove the concrete outlet structure at the end of the principal spillway pipe and replace it with a riprap stilling basin.
- Lower the elevation of the control section of the auxiliary spillway by three feet and increase the length of the control section to 200 feet.
- Armor the control section and constructed outlet section with Articulated Concrete Blocks.
- Augment the existing downstream training dike with a 350-foot long concrete wall that extends to the valley floor. Install a 70-foot long earthen dike along the valley floor to protect the toe of the dam from auxiliary spillway flows.
- Re-route a section of the access road around the end of the earthen berm.
- Install a 150-foot long earthen training dike in the inlet section of the auxiliary spillway.
- Capture the water from the spring at the toe of the dam and pipe the water under the new access road to outlet into its original channel.
- Install a toe drain collection system with monitoring wells at the downstream toe of the embankment.
- Vegetate the auxiliary spillway outlet section to reduce erosion.
- Improve access roads and drainage design to reduce short and long term sediment delivery to the Swamp Pink habitat.

Project Costs (Dollars):	<u>PL-106-472 Funds</u> 65%	<u>Other Funds</u> 35%	<u>Total</u> 100%
Structural Measures:	\$1,955,500	\$1,053,000	\$3,008,500

Project Benefits: Reduces potential for loss of life and maintains protection of existing infrastructure downstream of the dam and property values around the lake. Net average annual equivalent benefits between the Future with Federal Project (FWFP) and the Future without Federal Project (FWOFP) = \$0. Average annual flood damages will be reduced by 40%.

Non-monetary Benefits:

- Minimizes the threat to loss of life to approximately 355 people that live, work, and worship in the 57 single family homes, three business sites, and five churches within the breach inundation zone.
- Meets the dam design and safety criteria established by the Virginia Division of Dam Safety and Floodplain Management and NRCS.
- Eliminates the liability associated with continuing to operate an unsafe dam.
- Provides protection for Mt. Torrey Road, Howardsville Turnpike, China Clay Road, Back Creek Lane, Mills Creek Lane, and Coal Road, which have a combined average daily traffic count of 5,675 vehicles.
- Provides protection for utilities located in the breach zone.
- Increases flood protection for the people living in the area, as well as those working, recreating, or traversing within the downstream floodplains for an additional 50 years.
- Traps 0.54 acre feet of sediment annually, thereby improving downstream water quality.
- Maintains existing stream habitat downstream of the dam.
- Preserves recreational opportunities for area residents.
- Retains fish and wildlife habitat in and around the lake.
- Leverages federal resources to install the planned works of improvement.
- Minimize adverse effects on and possibly improve the potential for long term success of a federally threatened plant species.

Benefit to Cost Ratio: 1:1

Funding Schedule: It is anticipated that the design will be completed in 2011 and construction will be completed in 2012.

Period of Analysis: 52 years

Environmental Values Changed or Lost:

<u>Resource</u>	<u>Impact</u>
Air Quality	Short term impacts during construction.
Land Use Changes	Cut 0.4 acres of trees. Add 8.6 acres of riparian buffer around perimeter of lake.
Floodplains	Current floodplain would be maintained for additional 50 years.

Fisheries	Fish habitats would be maintained and/or protected. Lake size would decrease from 17.4 acres to 6.8 acres.
Wildlife Habitat	Habitat will be maintained and protected in the watershed. An additional 8.6 acres of riparian habitat will be added.
Wetlands	There are wetlands located downstream of the dam and access road that may be impacted by construction activities. Erosion & Sediment Control measures will be used to minimize these effects. One spring will be affected by installation of the training dike and rerouting the access road.
Prime Farmland	N/A
Cultural Resources	No effect.
Threatened and Endangered Species	Construction activities are likely to adversely affect Swamp Pink.
Mitigation	None.

Major Conclusions: In order to bring this dam into compliance with Virginia and NRCS dam safety criteria, it is necessary to rehabilitate the principal spillway, auxiliary spillway, and training dike. The majority of the environmental impacts are short-term and existing conditions will be restored upon completion of construction.

Areas of Controversy: None anticipated.

Issues to be Resolved: None.

Evidence of Unusual Congressional or Local Interest: None.

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

SOUTH RIVER WATERSHED AGREEMENT

Supplemental Watershed Agreement No. 4

between the

Augusta County Board of Supervisors
(Referred to herein as *Sponsor*)
State of Virginia

and the

Natural Resources Conservation Service
United States Department of Agriculture
(Referred to herein as *NRCS*)

Whereas, the Watershed Work Plan Agreement for the South River Watershed, Commonwealth of Virginia, executed by the Sponsor named therein and the Soil Conservation Service (currently NRCS), became effective the 27th day of January 1955; and

Whereas, Supplement No. 1, which modified the Watershed Work Plan Agreement for said watershed, was developed through cooperative efforts of the Sponsor and the Soil Conservation Service (currently NRCS) and became effective on the 22nd day of May 1961; and

Whereas, Supplement No. 2, which modified the Watershed Work Plan Agreement for said watershed, was developed through cooperative efforts of the Sponsor and the Soil Conservation Service (currently NRCS) and became effective on the 1st day of October 1976; and

Whereas, Supplement No. 3, which modified the Watershed Work Plan Agreement for said watershed, was developed through cooperative efforts of the Sponsor and NRCS and became effective on the 20th day of September 2005; and

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsor for assistance in preparing a plan for rehabilitation of South River Dam No. 10A located in Augusta County, Commonwealth of Virginia, under the authority of the Watershed Protection and Flood Prevention Act, as amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472); and

Whereas, in order to extend the watershed plan for said dam beyond its evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the Municipal and Industrial water supply purpose of this structure is no longer needed by Augusta County, this purpose is hereby removed and no federal dollars will be expended for this purpose; and

Whereas, the rehabilitation of South River Dam No. 10A has been authorized under the authority of Public Law 106-472, the Small Watershed Amendments of 2000, which amends Public Law

83-566, the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008, 1010, and 1012); and

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

Whereas, there has been developed through the cooperative efforts of the Sponsor and NRCS a Supplemental Plan to rehabilitate South River Dam No. 10A, located in Augusta County, Commonwealth of Virginia, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS and the Sponsor hereby agree on this Supplemental 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 the installation period and evaluated life of the project (50 years) and does not commit the NRCS to assistance of any kind beyond the end of the evaluated life.
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 and the cost-share percentages stated in this agreement.
3. **Real property.** The Sponsor 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 Sponsor and NRCS are as shown in the Cost-Share table in Section 5 hereof.
4. **Uniform Relocation Assistance and Real Property Acquisition Policies Act.** The Sponsor 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 Sponsor is legally unable to comply with the real property acquisition requirements, it agrees that, before any Federal financial assistance is furnished, it 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.

No relocations are planned with this rehabilitation project. However, should it be determined later that relocation is needed, relocation costs will be cost-shared at the following rate:

Sponsor	NRCS	Total Relocation Costs
35%	65%	100%

5. **Cost-share for Rehabilitation Project.** NRCS will assist the Sponsor with the installation of planned works of improvement. The percentages of total rehabilitation project costs to be paid by the Sponsor and by NRCS are as follows:

**Project Costs
(Dollars)**

Works of Improvement	NRCS PL-106-472 Funds	Other Funds - Augusta County's Responsibility	Total Estimated Cost
Cost Sharable Items (per PL-106-472 and NRCS policy)	---	---	---
Rehabilitation of the dam (construction costs):	\$1,955,500	\$1,040,000	\$2,995,500
Relocation, Replacement in-kind	\$0	\$0	\$0
Relocation, Required Decent, Safe, Sanitary	\$0	\$0	\$0
Sponsor's Planning Costs:	n/a	\$5,000	\$5,000
Sponsor's Engineering Costs:	n/a	\$2,000	\$2,000
Sponsor's Project Administration Costs:	n/a	\$6,000	\$6,000
Land Rights Acquisition Costs:	n/a	\$0	\$0
Subtotals: Cost-Sharable Costs: Cost-Share Percentages ^{a/}	\$1,955,500 (65%)	\$1,053,000 (35%)	\$3,008,500 (100%)
Non Cost-Sharable Items (per PL-106-472 and NRCS policy) ^{b/}	---	---	---
NRCS Engineering and Project Administration Costs:	\$360,200	n/a	\$360,200
Federal, State and Local Permits:	n/a	\$500	\$500
Subtotals: Non-Cost-Sharable Costs:	\$360,200	\$500	\$360,700

a/ The maximum NRCS cost-share is 65% of the cost-sharable items not to exceed 100% of the construction cost. Total eligible project costs include construction, land rights, relocation, project administration, and planning services provided by the Sponsor. Not included are NRCS engineering technical assistance costs of \$301,900; NRCS project administration costs of \$58,300; and the local cost of permitting and ordinances estimated at \$500.

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.** The entire drainage area above South River Dam No. 10A is federal land controlled by the U.S. Forest Service. The watershed is almost entirely forested and is expected to remain as such. Therefore, there is no need for additional erosion control measures in the watershed. Thus, there is no requirement for the Sponsor to obtain agreements for protection of the upstream watershed.
7. **Floodplain Management.** Before construction of any project for flood prevention, the Sponsor shall agree to participate in and comply with applicable Federal floodplain management and flood insurance programs.

8. **Water and mineral rights.** Since the entire footprint of the dam and the watershed is on USFS land, and the Sponsor has a special use permit from the USFS, no additional water or mineral rights will be needed in connection with the rehabilitation of this dam.
9. **Permits.** The Sponsor 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 Sponsor's 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 Sponsor 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 Sponsor has failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS shall promptly notify the Sponsor in writing of the determination and the reasons for de-authorization of project funding, together with the effective date. Payments made to the Sponsor or recoveries by NRCS shall be in accord 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 Sponsor having specific responsibilities for the measure involved.
13. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise there from; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.
14. **Operation and Maintenance (O&M).** The Sponsor 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). Although the Sponsor's responsibility to the Federal Government for O&M ends when the agreement expires upon completion of the evaluated life of measures covered by the agreement, the Sponsor acknowledges that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.
15. **Emergency Action Plan.** Prior to construction, the Sponsor shall prepare an Emergency Action Plan (EAP) for each dam or similar structure where failure may cause loss of life or as required by state and local regulations. The EAP shall meet the minimum content specified in Part 500.52 of the NRCS Title 180, National Operation and Maintenance Manual, Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. The NRCS will determine that an EAP is prepared prior to the execution of

fund obligating documents for rehabilitation of the structure. The EAP shall be reviewed and updated by the Sponsor annually.

16. Nondiscrimination provisions. The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW., Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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 Sponsor is providing the certification set out below. If it is later determined that the Sponsor 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. 812) and as further defined by regulation (21 CFR 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 Sponsor certifies 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 will--
 - (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 shall 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 Sponsor 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 shall keep the original of all disclosure reports in the official files of the agency.

18. Certification Regarding Lobbying (7 CFR 3018)

A. The Sponsor certifies 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 Sponsor, 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 shall complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The Sponsor shall 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 shall 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 3017).

A. The Sponsor certifies 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 shall 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-State Administrative Officer prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.
- (3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project Sponsoring organization(s) signatory to this agreement agrees 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, plan, 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, plan, installation, or structure, the entire location shall 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 Sponsor assures and certifies that it is 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: 2 CFR 225 (OMB Circular A-87, A-129, and A-133); and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: 2 CFR 215 (OMB Circular A-110), 2 CFR 230 (OMB Circular A-122, A-129, and A-133); and 7 CFR Parts 3015, 3017, 3018, 3019, 3021, and 3052.

22. Examination of Records. The Sponsor shall 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.

Augusta County Board of Supervisors
Augusta County Government Center
18 Government Center Lane
Verona, Virginia 24482

By: Gerald W Garber
GERALD W. GARBER

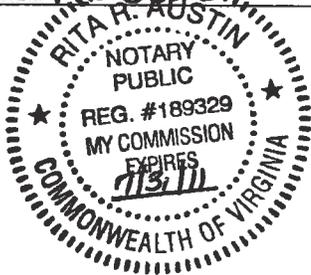
Title: Chairman

Date: 8/25/10

The signing of this supplemental watershed agreement was authorized by the governing body of the Augusta County Board of Supervisors at a meeting held on 8/25/10.

Rita R. Austin

Notary



18 Government Center Lane,
Verona, Virginia 24482

Date: 8/25/10

Natural Resources Conservation Service
United States Department of Agriculture

Approved by:

John A. Bricker

JOHN A. BRICKER
State Conservationist

Date: Sept. 24, 2010

INTRODUCTION

CHANGES REQUIRING PREPARATION OF A SUPPLEMENT

This supplement only addresses South River Dam 10A, known locally as Mills Creek Dam. A supplement to the watershed plan is needed because this dam does not meet current Natural Resources Conservation Service (NRCS) or Virginia Department of Conservation and Recreation, Virginia Division of Dam Safety and Floodplain Management (referred to herein as the Virginia Division of Dam Safety) dam design, safety, and performance standards for a high hazard dam. The purpose of the project is to continue to provide flood protection in the watershed by meeting current safety and performance standards.

The Mills Creek Dam was built in 1963. Based upon changes in downstream landuse that have occurred in the past 47 years, the NRCS hazard classification of this dam has changed from class (b), significant hazard, to class (c), high hazard. A conditional certificate for Operation and Maintenance of the structure has been issued by the Virginia Division of Dam Safety because the auxiliary spillway does not have sufficient capacity to pass the Probable Maximum Flood (PMF) without breaching the structure. For this reason, the dam does not meet the objectives of the Augusta County Board of Supervisors (herein referred to as the Sponsor), which are to continue to provide flood protection and to reduce the risk of loss of human life. This supplemental plan documents the planning process by which NRCS and the USDA Forest Service provided technical assistance to the local Sponsor and the public in addressing resource issues and concerns within the Mills Creek Watershed.

PROJECT SETTING

ORIGINAL PROJECT

A plan for flood prevention and watershed protection was completed in 1955 under the authority of Public Law 78-534, the Flood Control Act of 1944. The original work plan included the construction of sixteen single-purpose, low hazard class dams that were designed for a 50-year life, an accelerated land treatment program for watershed protection, land treatment for flood prevention, and nine miles of channel improvement. Of the structures proposed in the plan, eleven were built in the years from 1956 to 1980. One dam was built before the original plan was written. The Mills Creek multi-purpose dam was added into the plan in 1961 and built in 1963. Five of the 16 proposed dams were not built due to changes in site conditions and/or landrights problems. In 1963, when the Mills Creek Dam was built, it was rated as a significant hazard structure because of the potential for damage to isolated homes, main highways, or minor railroads, or interruption of service of relatively important public utilities.

PHYSICAL FEATURES

Project Location: The South River watershed is located in Augusta County, Virginia, just southwest of the City of Waynesboro. South River and its tributaries drain to the Shenandoah River which drains to the Potomac River and the Chesapeake Bay. The South River watershed is 156,700 acres (244.8 square miles). The Mills Creek watershed is 2,459 acres (3.84 square miles). All of the drainage area above the dam and the dam are located within the George

Washington and Jefferson National Forest. The dam is owned and operated by Augusta County under a Special Use Permit issued by the USDA Forest Service. Appendix F shows the location map for this watershed.

Topography: South River Site 10A, Mills Creek, is located in the Blue Ridge Physiographic Province. The topography of the Blue Ridge consists of steep ridges and narrow valleys filled with talus and colluvium. The elevation in the watershed ranges from about 1,800 feet at the toe of the dam to 3,580 feet at the watershed divide.

Soils: The soils present in the watershed of Mills Creek are primarily mapped in the Drall series and are associated with the Cataska and Hartleton soils. The Drall series consists of extremely stony sandy loam, 45 to 80 percent slopes (55% of watershed) and 15 to 45 percent slopes (5% of watershed). These soils are on upper side slopes of mountains and on mountain tops. The parent material consists of residuum derived from sandstone and quartzite. Depth to a root restrictive layer, (bedrock), is 40 to 80 inches. The natural drainage class is excessively drained.

The Cataska slaty silt loam (10.8% of the watershed), 45 to 70 percent slopes, and the Cataska slaty silt loam (5.4%), 15 to 45 percent slopes, are also found in this watershed. These soils are on highly dissected foot slopes. The parent material consists of residuum weathered from interbedded slate, shale, siltstone and phyllite. Depth to a root restrictive layer, (bedrock), is 20 to 30 inches. The natural drainage class is excessively drained. The Hartleton soils (12.8%), 25 to 75 percent slopes, are on ends and tops of ridges and on the upper side slopes in this watershed. The parent material consists of residuum weathered from weakly metamorphosed acid sandstone and shale. Depth to a root restrictive layer, (bedrock), is 40 to 60 inches. The natural drainage class is well drained.

The main drainageway consists primarily of Craigsville cobbly fine sandy loam (7.7% of the watershed). Slopes are 0 to 4 percent. This map unit is on low stream terraces adjacent to flood plains of major streams and rivers. The parent material consists of alluvium derived from shale, sandstone, phyllite and quartzite. Depth to a root restrictive layer is greater than 72 inches. The natural drainage class is well drained.

Geology: According to the digital representation of the 1993 geologic map of Virginia, the reservoir and its watershed are mainly covered by the Chilhowee Group of Cambrian age. There is a small area above the left abutment that is underlain by the Cambrian age Shady Dolomite. The actual formation at the dam site is the Antietam Formation of the Cambrian age Chilhowee Group. It is mainly quartzite, quartzose sandstone, and quartz-pebble conglomerate. The boring logs performed during the original design and those performed by Schnabel Engineering in 2006 indicate that this geology underlies mainly silty sands with some gravels.

Climate: The South River watershed mainly lies in the Blue Ridge Physiographic Province. This province is characterized by warm to hot summers and rather cold winters associated with its higher elevations. The average annual precipitation varies from about 37 inches in the northern part of the watershed to about 40 inches in the southern portion. This precipitation is well distributed throughout the year. Snowfall averages about 21 inches annually, but varies with the higher elevations receiving a greater percentage of snow.

In the part of the watershed which lies in the Valley and Ridge Physiographic Province, the average temperature is 36.6° F in the winter and 74° F in the summer. Average temperatures for

the Blue Ridge portion of the watershed are approximately 32° F in the winter and 69° F in the summer. The last frost of spring normally occurs in late April to early May and the first frost in the fall occurs in mid to late October. This provides a growing season of approximately 190 to 231 days, depending on elevation.

The prevailing winds in the watershed are southwesterly, blowing hardest from January to April, with usually a light to moderate breeze at all times of the year. Average wind speed is approximately nine miles per hour during this time.

LAND USE

The drainage area upstream of Mills Creek is 2,459 acres and is managed by the USDA Forest Service as part of Management Area 22 - *Habitat – Small Game/Watchable Wildlife* and Management Area 18 – *Riparian Areas*. This area was delineated with the water resources analysis tool ArcHydro (ESRI). The base elevations for this analysis were derived from the Augusta County VGIN 2007 TIN data. Table A lists the land use upstream of the dam. This table also lists the land use in the breach inundation zone below the dam.

Table A - Land Use In Acres

Land Cover Type	Drainage Area of Mills Creek Dam (ac.)	Percent of Total	Inundation Zone for Sunny Day Breach (ac.)	Percent of Total
Open Land	4.2	0.1	0	0
Residential/ Business	0	0	149.3	10.2
Woodland	2,437.4	99.2	1,070.7	73.2
Grassland	1	~0	183.8	12.6
Cropland	0	0	45.4	3.1
Water	17.4	0.7	12.5	0.9
Totals	2,459	100.0	1,461.7	100.0

THREATENED AND ENDANGERED SPECIES

According to the Virginia Fish and Wildlife Information Service, there are numerous federal and state listed threatened and endangered species and species of concern that are likely to occur within a two mile radius of the project dam site.

Table B summarizes the potential occurrence of Federal and State threatened and endangered species in the project area. It also includes Federal and State species of concern. Lack of confirmed occurrence of a species within a 2 mile radius of the project dam does not necessarily indicate the species absence since definitive surveys may not have been conducted. There is the assumption of potential occurrence due to existing habitat factors. Appendix D contains the Biological Evaluation/Biological Assessment prepared by the USDA Forest Service.

**Table B - Threatened and Endangered Species
Likely to Occur Within 2 Miles of the Project Dam**

Animal Species	Scientific Name	Status*	Confirmed	Tier**
Madison Cave Isopod	<i>Antrolana lira</i>	FTST	No	II
Swamp Pink	<i>Helonias bullata</i>	FTSE	Yes	
Virginia Sneezeweed	<i>Helenium virginicum</i>	FTSE	Yes	
Bewick's Wren	<i>Thryomanes bewickii</i>	SE	No	I
Eastern Tiger Salamander	<i>Ambystoma tigrinum tigrinum</i>	SE	Yes	II
Peregrine Falcon	<i>Falco peregrinus</i>	ST	No	I
Upland Sandpiper	<i>Bartramia longicauda</i>	ST	No	I
Loggerhead Shrike	<i>Lanius ludovicianus</i>	ST	Yes	I
Madison Cave Amphipod	<i>Stygobromus stegerorum</i>	FSST	No	I
Appalachian Grizzled Skipper	<i>Pyrgus wyandot</i>	FSST	No	I
Bald Eagle	<i>Haliaeetus leucocephalus</i>	FSST	No	II
Migrant Loggerhead Shrike	<i>Lanius ludovicianus migrans</i>	ST	No	
Regal Fritillary	<i>Speyeria idalia idalia</i>	FS	No	I
Roughhead Shiner	<i>Notropis semperasper</i>	FSSS	No	II
Diana Fritillary	<i>Speyeria diana</i>	FS	No	IV
Big Levels Salamander	<i>Plethodon sherando</i>	FS	No	
Red Crossbill	<i>Loxia curvirostra</i>	SS	Yes	I
Golden-Winged Warbler	<i>Vermivora chrysoptera</i>	SS	No	I
Cow Knob Salamander	<i>Plethodon punctatus</i>	SS	No	II
Northern Saw-Whet Owl	<i>Aegolius acadicus</i>	SS	No	II
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	SS	No	II
Winter Wren	<i>Troglodytes troglodytes</i>	SS	Yes	II
Spotted Turtle	<i>Clemmys guttata</i>	CC	Yes	III
Harrier, northern	<i>Circus cyaneus</i>	SS	Yes	III
Yellow-Crowned Night-heron	<i>Nyctanassa violacea violacea</i>	SS	No	III
Barn Owl	<i>Tyto alba pratincola</i>	SS	Yes	III
Timber Rattlesnake	<i>Crotalus horridus</i>	CC	Yes	IV
Brown Creeper	<i>Certhia americana</i>	SS	Yes	IV
Dickcissel	<i>Spiza americana</i>	SS	Yes	
Purple Finch	<i>Carpodacus purpureus</i>	SS	Yes	
Alder Flycatcher	<i>Empidonax alnorum</i>	SS	No	
Golden-Crowned Kinglet	<i>Regulus satrapa</i>	SS	Yes	
Common Moorhen	<i>Gallinula chloropus cachinnans</i>	SS	No	
Red-Breasted Nuthatch	<i>Sitta canadensis</i>	SS	Yes	
Long-Eared Owl	<i>Asio otus</i>	SS	No	
Caspian Tern	<i>Sterna caspia</i>	SS	No	
Hermit Thrush	<i>Catharus guttatus</i>	SS	Yes	
Magnolia Warbler	<i>Dendroica magnolia</i>	SS	No	
Mourning Warbler	<i>Oporornis philadelphia</i>	SS	No	
Northern River Otter,	<i>Lontra canadensis lataxina</i>	SS	No	

* Species Legal Status: FT = Federally Threatened; FE = Federally Endangered; FS = Federal Species of Concern; ST = State Threatened; SE = State Endangered; SS = State Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Based upon a review of the VDGIF and VDCR databases, there is one Federally Threatened, State Threatened (FTST) species, the Madison Cave Isopod, *Antrolana lira*, likely to occur

within a two mile radius of the project dam. The Swamp Pink, *Helonias bullata*, and the Virginia Sneezeweed, *Helenium virginicum*, are Federally Threatened, State Endangered (FTSE) species that are also likely to occur in the area.

Three State Threatened (ST) species are also Federal Species of Concern (FS): the Bald Eagle, *Haliaeetus leucocephalus*; the Appalachian Grizzled Skipper, *Pyrgus wyandot*, a butterfly; and the Madison Cave Amphipod, *Stygobromus stegerorum*. The Peregrine Falcon, *Falco peregrinus*; the migrant Loggerhead Shrike, *Lanius ludovicianus migrans*; the Loggerhead Shrike, *Lanius ludovicianus*; and the Upland Sandpiper, *Bartramia longicauda*, are other State Threatened (ST) species likely to occur within two miles of the dam. Two species are State Endangered (SE): the Bewick's Wren, *Thryomanes bewickii*, and the Eastern Tiger Salamander, *Ambystoma tigrinum tigrinum*.

There have been confirmed sightings of the Swamp Pink, the Virginia Sneezeweed, the Loggerhead Shrike, and the Eastern Tiger Salamander within a two mile radius of the project dam. None of these species have been sighted within the work limits of the proposed project. However, the wetlands downstream of the dam and adjacent to the access roads and work areas provide habitat for several colonies of Swamp Pink. These wetlands are fed by multiple springs/seeps, including one spring located immediately downstream of the dam.

The Swamp Pink is threatened by habitat loss, fragmentation, and degradation; collection and trampling; and other biological and physical factors. Cumulative habitat destruction resulting from development projects, draining and filling of wetlands, and timbering and clearing activities has significantly reduced the amount of available area for Swamp Pink. Given that this species may require buffers in excess of 500 feet where topography subjects a colony to habitat degradation from upstream activities (e.g. sedimentation and other changes in water quality), existing standards for buffers are clearly inadequate. In some cases, protection of the entire watershed may be needed.

Confirmed occurrence of a listed species in a project area requires consultation with the appropriate State or Federal agency. The U.S. Fish & Wildlife Service (USFWS), Virginia Department of Game and Inland Fisheries (VDGIF), and the Natural Heritage Division of the Virginia Department of Conservation and Recreation were invited to the preliminary scoping meeting on December 3, 2009. None of the three agencies attended, but two agencies submitted general comments by letter and email. The potential impact on the Swamp Pink was identified and discussed in the field on November 10, 2009, as a concern. It was again raised as a concern by the USDA Forest Service at the December 3, 2009, preliminary scoping meeting in Verona. Specific concerns regarding the impacts to Swamp Pink populations surfaced in the Spring of 2010 as proposed actions became more precise. The USFWS has provided a letter documenting a finding of *likely to adversely affect* that also lists specific actions that shall be taken to minimize these potential impacts (Appendix A).

CULTURAL RESOURCES, NATURAL AND SCENIC AREAS, AND VISUAL RESOURCES

The National Register of Historic Places lists fifty sites in Augusta County. Fifty-seven archaeological sites within one mile of the project area are listed in the State archaeological files. None will be affected by the proposed work. There are no architectural sites listed in the State

architectural files within one mile of the project area. However, the USDA Forest Service archeological staff identified a site of significant historical value in the project vicinity that should be avoided.

The National Historic Landmarks Program lists 119 sites, buildings or structures in Virginia, none of which are found in Augusta County. Therefore, none will be affected by the project activities.

There are three designated State Natural and Scenic Area Preserves in Augusta County. However, none are within the project vicinity. The project is within the George Washington and Jefferson National Forest. Effects to this area of the National Forest land are discussed throughout the document.

In March 2010, USDA Forest Service Cultural Resources staff surveyed the dam area, staging areas, access roads, and turnarounds for indicators of archaeological and/or historical resources. A field review was conducted for the areas immediately adjacent to the dam, and for a distance of approximately 200 meters downstream. The ground cover is wooded, with very little surface visibility. The topography is mostly level with a 0-3% slope. There are numerous previously recorded archaeological sites downstream of the dam. One site was identified as having archeological significance and should not be used for staging, turnouts, or any other activity.

Consultation with the Virginia Department of Historic Resources (VDHR) was also initiated in March 2010 by the USDA Forest Service. In April 2010, the VDHR indicated their concurrence with the USDA Forest Service finding of *no adverse effect* within the project limits.

WATER QUALITY

The Mills Creek Dam is located on Mills Creek which drains into Back Creek which then flows into the South River above Waynesboro. Mills Creek has a total stream length of 8.51 miles from its headwaters to Back Creek.

The Virginia 2008 305(b)/303(d) Integrated Water Quality Assessment and Impaired Waters Report lists Mills Creek as “severely impaired” for aquatic life use (VDEQ 2008). Total impairment length is 8.51 miles from the headwaters downstream to its confluence with Back Creek. This segment is considered impaired for aquatic life use based on a Severely Impaired Benthic assessment at USDA Forest Service station 5084 for the 2002 assessment cycle. This site is located on Mills Creek just upstream of the confluence with Back Creek. It was not visited during the 2008 cycle so it remains listed as impaired. The initial listing date was in 2002. The impairment is listed as high acidity. The primary cause of the high acidity is believed to be atmospheric deposition (VDEQ 2008). This impairment has not limited the use of Mills Creek as a put-and-take brook trout fishery in the reaches below the dam. The reservoir at the Mills Creek Dam is also stocked annually with fingerling brook trout to provide a put-and-grow fishery. Above the reservoir, Mills Creek is a wild brook trout stream.

WETLANDS

The Mills Creek lake shoreline, inflow and outflow areas were surveyed in March 2010 by NRCS and USDA Forest Service staff. A representative of the U.S. Army Corps of Engineers (USACOE) accompanied the NRCS and USDA Forest Service staff on a second survey in May 2010. No wetlands were noted in the inlet area. Below the dam, wetlands begin 25 feet downstream from the toe of the dam and continue intermittently to Coal Road (approximately one mile) along the valley floor adjacent to Mills Creek. These wetlands are classified as palustrine forested wetlands and are associated with surface water runoff and ground water discharge. At the present time, none of these wetlands have been officially delineated and confirmed by the USACOE. Numerous perennial springs were observed along the access road and in the area downstream of the dam.

There is one spring located immediately below the toe of the dam that contributes water to the wetlands that support the Swamp Pink habitat. There was some concern that activities at the dam could adversely affect this spring. Site visits were conducted by USDA Forest Service, NRCS, USACOE, and Virginia DCR-Division of Natural Heritage (Karst Program) staff to evaluate the relationship between the seeps along the toe of the dam and the spring located immediately downstream of the dam. It is the position of the USACOE and DCR that seepage from the dam and the spring are not hydrologically connected. Tests conducted on the lake water and the spring water to evaluate hydrologic connectivity have been inconclusive.

FOREST RESOURCES

The surrounding watershed is part of the Blue Ridge Physiographic Province. Vegetation in the project areas is comprised primarily of upland oaks and cove hardwoods. The most common species include red oak, chestnut oak, white oak, yellow poplar, hickory, black oak, white pine, yellow pine, pitch pine, shortleaf pine, Virginia pine, scarlet oak, sassafras, dogwood, and blackgum.

WILDLIFE RESOURCES

The Mills Creek Watershed is considered to be part of the Blue Ridge Mountains Ecoregion according to Virginia's Comprehensive Wildlife Conservation Strategy, 2005 (VDGIF). This Strategy lists 174 Species of Greatest Conservation Need in the Blue Ridge Mountains. Nineteen species are considered to be Tier I species, (species with a critical conservation need having an extremely high risk of extinction); 34 species are considered to be Tier II species, (species with a very high conservation need and a high risk of extinction); 40 species are considered to be Tier III species, (species with a high conservation need and face possible extinction); and 80 species are considered to be Tier IV species, (species with a moderate conservation need and have demonstrated a declining trend in population). The potential exists for several of the Tiered species to occur within the project watershed.

Wildlife species inhabiting these forests also include black bear, turkey, various thrushes and vireos, scarlet tanagers, woodpeckers, gray squirrels, rabbits, foxes, white-tailed deer, and raccoons. Ducks, geese, herons, kingfishers, mink, and otter may be found along the shoreline of the reservoir.

CHESAPEAKE BAY AND COASTAL ZONE MANAGEMENT AREAS

The South River Watershed drains into the Potomac River, a major tributary to the Chesapeake Bay. As such, the dam rehabilitation efforts must consider impacts as required by the Chesapeake Bay Preservation Act. The Bay Act is an element of Virginia's multifaceted response to the Chesapeake Bay Agreement. The Bay Act established a cooperative relationship between the Commonwealth and local governments which is aimed at reducing and preventing nonpoint source pollution. The Bay Act Program is designed to improve water quality in the Chesapeake Bay and its tributaries by requiring the use of effective conservation planning and pollution prevention practices when using and developing environmentally sensitive lands. Augusta County has adopted local land use plans and ordinances which incorporate water quality protection measures consistent with the Chesapeake Bay Act Regulations.

The South River Watershed is not located within the Virginia Coastal Zone Management Area.

SOCIAL AND ECONOMIC CONDITIONS

The Mills Creek Dam has a watershed of 2,459 acres, all of which is in Augusta County. The breach inundation zone for this dam is also entirely within Augusta County. Thus, the entire population affected by this dam resides within Augusta County.

Population and Race: According to 2006-2008 population estimates from the Census Bureau, Augusta County had a total population of 70,714 (up from 65,615 in 2000). The City of Waynesboro, which is contained within the South River watershed, lies mainly northeast and downstream of the majority of the watershed. Of the total population in Augusta County, about 93.4% (66,070) were white, 4.4% were Black or African American (3,135), 0.3% were Native Americans (221), 0.1% were Asian (60) as were Native Hawaiian and other Pacific Islanders (82), and 1.0% were some other race (695). Hispanic or Latino constituted 1.9% (1,323) and 0.6% were two or more races (451).

Waynesboro had an estimated total population of 21,649 (up from 19,520 in 2000). About 83% (17,960) are white (up from 16,877 whites in 2000) and 10.3% (2,226) are Black or African American (up from 1,945 in 2000). Together, these two groups make up 93.3% of Waynesboro's entire population. Hispanics and Asians are the next largest minority groups with 5.1% (1,104) and 0.6% (132), respectively. Waynesboro has 113 Native Americans, which constitute 0.5% of the local population, according to the 2008 Census Bureau estimates.

Age: The 2006-2008 Census projections from their American Community Survey indicate that the median age (middle point with ½ above and ½ below) of the population of Augusta County was 40.4 (up from 39 in 2000). The median age for the City of Waynesboro was 40.6 years. The median age for the state of Virginia was lower at 37.1 years while it was 36.7 for the entire nation. Residents in Augusta County that were 65 years old or older totaled 13.6% (9,610) as compared to 8,429 and 12.8% in 2000. These statistics compare to 11.8% for the State and 12.6% of the nation in the same age category. A little over 79% of the County population was over the age of 18. The same statistic for the state as a whole projected for 2008 was 76.4%. The national portion of the population over the age of 18 was estimated for 2008 at 75.5%.

Education: Also from the 2006-2008 Census projections, an estimated 84.3% of the residents in the County had a high school education or higher while the state-wide and national percentages for this same statistic were 85.7% and 84.5% respectively. Approximately 42.8% of the residents in the county, 25 years of age or older, indicated that they have a high school diploma or have passed an equivalency test with no further formal education. Some residents have less than a high school education (15.7%). Approximately 41.5% of the County residents have some education beyond high school, including 13.5% with a bachelor's degree and 6% with graduate or professional degrees (19.5% combined). An additional 17.0% in the County have completed at least some college level work with 5% having obtained an associate degree. The percent of the county with a bachelor's degree or higher is well below the state-wide (33.2%) and national averages (27.4%).

Employment/Unemployment, and Class of Worker: There are 57,808 Augusta County residents who are 16 years of age or older according to the 2006-2008 Census Bureau projections. Approximately sixty-three percent (36,424) of these people are considered in the labor force pool. According to the Bureau of Labor Statistics (BLS), 92.3% of the Augusta County labor force was employed and 7.7% unemployed as of January of 2010. This compares to 94.9% employed and 5.1% unemployed as of December of 2008 and represents a decline of 2.6% in employment over 13 months. The current unemployment rate in Augusta County is higher than the unemployment rate for the state of Virginia as a whole which was 6.9% as of January 2010. The national unemployment rate for January 2010 was estimated to be 9.7%. Unemployment in the City of Waynesboro as of December 2009 was 7.6% (comparable to the county-wide rate).

Augusta County has a diverse and productive economy. According to the 2006-2008 American Community Survey of the U.S. Census Bureau, private employment constitutes 76.8% of all employment in Augusta County. Government workers constitute 17.2% of the Augusta County workforce. According to the same 2006-2008 Census projections, four sub-sectors of the local economy employ about 63% of the workforce: construction (10.6%), retail trade (14.4%), manufacturing (17.6%) and educational services, and health care and social assistance (20.7%). All other sub-sectors of the local economy employ 5.9% or less of the work force. Occupations in agriculture, forestry, fishing and hunting and mining make up only 2.4% of area jobs (856). Employment data for Waynesboro is roughly comparable to the county-wide data.

Housing: The 2006-2008 Census data estimates indicate that there were 30,245 housing units within Augusta County with 92.2% occupied (80.4% owner-occupied and 19.6% renter-occupied). The state-wide occupancy rate for Virginia as a whole in 2006-2008 was 89.7% and the national figure was 88%. The local and state-wide rates for owner-occupancy are higher than the national figure of 67.1% in 2006-2008.

Median house value for the county during the 2006-2008 period was \$181,400. Below the dam in the projected breach inundation zone, and off of USDA Forest Service land, there are 57 homes, three business structures, five church structures, one large barn, 95 sheds and/or detached garages and one phone exchange remote site. Residential property values downstream of the dam range between \$24,000 and \$188,000 with an average of \$101,700. The total value of residential property (structures and contents only, excluding land values) at risk below the dam is an estimated \$8,850,000. An added \$140,000 of commercial property and \$561,000 worth of infrastructure (roads, bridges and culverts) are below the dam within the breach inundation zone.

Income: Mean (average) household income for the county was \$60,013 for the period 2006-2008. Median household income (householder and all others, related or not) estimated for the county for the same period was \$49,667. This compares to \$61,044 per year for the median household income calculated for the state of Virginia. The national figure for median household income per year estimated for 2006-2008 was \$52,175. The median estimated household income in 2006 for Augusta County was 81% of the state median and 95% of the national median household income.

Median family income (householder and all others that are related) in Augusta County for 2006-2008 was \$58,717 compared to \$48,579 per year for 2000¹. The current figure is significantly less, approximately 80% of the \$72,733 in median family income for Virginia as a whole and almost 93% of the \$63,211 reported for the entire United States for 2006-2008.

With respect to per capita incomes, Augusta County residents are estimated to have had a per capita income of \$24,382 in 2008 dollars as compared to \$19,744 reported in 2000. Virginians reported per capita income of \$32,224 in 2008 inflation adjusted dollars, and the estimated number for 2000 was \$23,975. The same figure for the entire United States was \$27,466 in 2008 and \$21,587 in 2000. That makes the county figure for 2008 about 76% of the State level and 89% of the national figure.

Poverty: According to the 2006-2008 Census projections, Augusta County had 1,280 families living below the poverty level (6.2%), up from 801 families (4.2%) living below the poverty level in 2000. State-wide, 7% of Virginia's families had incomes below the poverty level during 2006-2008, equal to the 7% level of 2000. At the national level, 9.6% of American families were estimated to live below the poverty level during the 2006-2008 period, up slightly from 9.2% in 2000.

Recreation: The Mills Creek Lake is on USDA Forest Service land and provides limited recreation to individuals who hike in. Fishing for stocked trout is the primary recreational activity along with hiking, hunting, mountain biking, and bird watching around the site.

¹ Median family income is consistently higher than median household income. This is because the household universe includes people who live alone. Their income would typically be lower than family income because by definition, a family must have two or more people.

PLANNING ACTIVITIES

As part of the planning process, several engineering studies were conducted. Valley cross-sections were developed using HEC-GeoRAS and supplemented with field survey data for the road crossings. The hydraulic modeling program HEC-RAS (Hydrologic Engineering Center – River Analysis System) was used to determine the breach inundation zone and the water surface elevations at each cross-section. Most of the information on the impacted structures in the dam breach zone was obtained from GIS layers generated from post-processing HEC-RAS results using HEC-GeoRAS. These layers included a polygon defining the inundation extent. The inundation extent polygon was used to extract building footprints data from Augusta County GIS datasets. All parcels in the inundation zone with buildings were identified. The first floor and point of water entry data for many of the inundated structures was obtained from the NRCS field surveys done in 2004. The GIS dataset was used to determine elevations for the structures that were not surveyed. This information was used to identify the economic damages associated with different flood frequencies and water surface elevations. The water depth grid was used to determine the mean inundation depth for each building footprint.

The SITES (Water Resources Site Analysis) computer program was used with information from the geologic investigations to model the capacity, stability, and integrity of the vegetated earthen auxiliary spillway. It was also used to evaluate the principal spillway alternatives. NRCS conducted the sediment survey and the hydrologic and hydraulic analysis for the existing condition and identified some of the possible auxiliary spillway rehabilitation alternatives. The other proposed auxiliary spillway rehabilitation alternatives were developed by Anderson & Associates.

Other planning activities included a land use inventory, natural resources inventories, wetland assessments, and the identification of threatened and endangered species and fish and wildlife resources. Cultural and historic resources were investigated. Social and economic effects of the potential alternatives were evaluated as was local acceptability. Both the benefits and the costs of the alternatives were computed and analyzed.

WATERSHED PROBLEMS AND OPPORTUNITIES

WATERSHED PROBLEMS

The Virginia Division of Dam Safety has issued a conditional certificate for the Mills Creek Dam because the vegetated earthen auxiliary spillway does not have the capacity to pass the Probable Maximum Flood (PMF) storm flows without overtopping the structure.

Sponsor Concerns: In 2005, the hazard class of the Mills Creek Dam was raised from significant hazard to high hazard. When this occurred, the dam was evaluated by more stringent criteria. The auxiliary spillway of a high hazard dam is required to pass the entire volume of water associated with the PMF without breaching. The Virginia Division of Dam Safety issued the most recent Conditional Operation and Maintenance Certificate to Augusta County for Mills Creek on September 25, 2008. It was issued because the existing vegetated auxiliary spillway can only contain about 70% of the PMF, as calculated by the Virginia Division of Dam Safety. Evaluation of the auxiliary spillway indicated that dam failure would occur due to erosion of the auxiliary spillway rather than by overtopping. The Conditional Certificate requires the Sponsor to address the potential for dam failure. The local Sponsor want to resolve the issues raised by the Virginia Division of Dam Safety and comply with the Dam Safety regulations.

A Conditional Certificate serves as notification to the Sponsor that the dam no longer meets State requirements and must be modified as soon as possible to meet State law. The presence of an unresolved Conditional Certificate leaves the Sponsor vulnerable to liability suits should the dam breach and downstream damages result. In order to address these concerns, the Sponsor requested the assistance of NRCS to do the watershed planning and to identify the improvements necessary to obtain full dam safety certification.

Soil Erodibility: In June 2006, Schnabel Engineering prepared a report entitled "SITES Analyses and Geotechnical Engineering Report, Mills Creek Dam Emergency Spillway Modifications, Augusta County, Virginia." According to this report, five borings were drilled in Mills Creek Dam auxiliary spillway between February 27 and March 2, 2006. The purpose of the borings was to evaluate the subsurface conditions within the auxiliary spillway.

A generalized subsurface stratigraphy was determined based on the boring data. Existing fill soils from the ground surface to depths of 2.4 feet to 6 feet were encountered for borings B-1, B-2, B-3, B-4 and B-5. From a depth of 8.3 feet to 27.9 feet, B-1 consisted of a medium to fine grained sand stone. Borings B-2, B-3, B-4 and B-5 consisted of a fine to medium grained quartzite. The depths of quartzite were 3.6 to 12.0 feet for B-2, 2.4 to 12.4 feet for B-3, 13.2 to 23.2 feet for B-4, and 7.8 to 20.4 feet for B-5. The rock below the above depths is competent (erosion-resistant).

The subsurface profiles and the engineering properties of the soil/rock were utilized as input parameters for the SITES model. The SITES model of the existing auxiliary spillway configuration indicated that the spillway is vulnerable to breach during flows from major storm events. The constructed outlet section of the auxiliary spillway currently daylight to the existing natural ground and exposed rock.

Floodplain Management: The Sponsor has identified flooding in the floodplain downstream as a primary concern. Augusta County and the City of Waynesboro have participated in the National Flood Insurance Program since 1990 and 1971, respectively, and both jurisdictions realize the value that the South River dams provide in flood protection benefits, particularly for the roads. As such, they have expressed concerns about returning to the pre-project flood exposure. Specifically, they are concerned that removal of the dam would have negative impacts associated with flood frequency and intensity downstream, including decreased property values, increased flood insurance premiums, and disruptions to the utilities and transportation network. The Mills Creek Dam controls 3.84 square miles (2,459 acres) of the watershed above the affected properties.

Erosion and Sedimentation: As of 2009, Mills Creek had reached about 92% of its planned service life. According to the 2009 sediment survey of the lake, the volume of sediment (both submerged and aerated) in the Mills Creek reservoir and its tributaries was about 22% of the original as-built sediment storage volume.

Local Concerns: The potential for removing this dam has sparked a number of concerns among local residents. Specifically, they have identified the potential for increased flooding and depreciating property values as a primary concern. A suggestion was made that the County could prevent the issuance of new building permits for sites in the floodplain. This would not change the hazard class back to significant. Local residents have also indicated that removing the dam would result in a loss of fish and wildlife habitat and recreational opportunities. They would like to have more recreational opportunities at the dam than those that are currently available. However, due to constraints in the USDA Forest Service budget, this is not likely to occur at this time.

Designed Service Life: When the Mills Creek Dam was built, it had a designed service life of 50 years. It is now approaching the end of that service life. In addition to the changes that need to be made to the auxiliary spillway as a result of the hazard class change, there are some upgrades that need to be made to the principal spillway riser and pipe. If the needed improvements are made, the service life of the dam would be extended by an additional 50 years (after a two year installation period).

WATERSHED OPPORTUNITIES

The following is a general list of opportunities that are associated with having the Mills Creek Dam in place. The dam:

- Provides flood protection for downstream houses, businesses, and infrastructure.
- Protects real estate values downstream from the dam.
- Creates fish and wildlife habitats in and around the lake.
- Provides recreation opportunities.
- Protects water quality. (As of 2009, the lake has trapped 16.6 acre-feet of sediment and attached nutrients.)

There are additional opportunities that can be realized if the dam is rehabilitated to meet current design and safety criteria. Some quantification of these opportunities will be provided in other sections of the report, as appropriate.

- Comply with dam design and safety criteria established by NRCS and the Virginia Division of Dam Safety.
- Minimizes the potential for loss of life associated with a failure of this dam.
- Reduces the Sponsor liability associated with operation of an unsafe dam.
- Improve current site conditions and protect a Federally Threatened plant.

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

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

Specific concerns and their significance to the decision making process were identified. On December 3, 2009, a Scoping Meeting was held in Verona, Virginia. Input was provided by Augusta County, the City of Waynesboro, the Headwaters Soil and Water Conservation District, Augusta County Emergency Management, the Virginia Department of Environmental Quality, the Virginia Department of Conservation and Recreation-Division of Dam Safety and Floodplain Management, and the USDA Forest Service. Additional comments were provided by Wild Virginia, the Central Shenandoah Planning District Commission, the Queen City Cycling Club, local citizens, and a representative from Congressman Bob Goodlatte's office. These concerns are listed in Table C.

**Table C - Scoping Meeting Results For Rehabilitation of Mills Creek Dam
December 3, 2009**

ITEM/CONCERN	Relevant to the proposed action?		RATIONALE
	YES	NO	
Air Quality	X		During construction only.
Coral Reefs		X	None present.
Ecologically Critical Areas	X		Sinkhole ponds, Big Levels area, etc., provide habitat for species of concern.
Environmental Justice and Civil Rights	X		No disparate treatment anticipated.
Essential Fisheries	X		Wild trout upstream, stocked trout below the dam and in the lake.
Fish & Wildlife Habitat (including migratory birds)	X		Minimal impacts anticipated.
Floodplain Management; Flood Damages	X		FEMA map based on dam in place. More people may need flood insurance if dam is removed. Effect on Waynesboro Nursery Dam.
Forest Resources	X		National Forest land.
Historic, Cultural and Scientific Resources	X		Sinkhole ponds contain historic information. No change anticipated.
Invasive Species	X		Prevent intrusion of invasive species during construction.
Land Use		X	No change anticipated.
Local Economy		X	Short term effect during construction.
National Economic Development	X		Required criteria.
Natural Areas		X	Kelley Mountain Roadless Area, USDA Forest Service land (special interest biologic).
Parklands		X	None present.
Prime & Unique Farmlands		X	None present.
Public Health & Safety	X		Education on flood zones needed. Limit site access to reduce illicit activities.
Public Recreation		X	Limited by access.
Regional Water Resources Plans/ Coastal Zone Management Areas		X	Water supply from lake no longer needed. Chesapeake Bay regulations apply.
Riparian Areas	X		No change anticipated.
Social Issues		X	Not identified as a concern.
Soil Resources		X	Not identified as a concern.
Threatened & Endangered Species	X		Plant and animal species in watershed.
Water Quality	X		Sediment during construction. Potential for scour when lake is drained. Maintain downstream flow requirement.
Water Resources (including aquifers)		X	No identified concerns.
Waters of the U.S.	X		No identified concerns.
Wetlands, Streams and Lakes	X		Potential effects on downstream wetlands
Wild & Scenic Rivers		X	None present.

DESCRIPTION OF EXISTING DAM

Purpose: The dam was planned and built with flood control as the primary purpose of the structure. The secondary purpose was to provide Municipal & Industrial (M&I) water storage for Augusta County. Due to water quality problems, the lake was only briefly used for water supply.

Current Condition of the Dam: A visual inspection of the dam was conducted on August 12, 2009. The dam and auxiliary spillway have been well maintained with a good stand of grass. There was some woody vegetation along the toe of the embankment and the abutments. The URS Group, Inc. conducted a video inspection of the riser and all associated pipes in 2009. These components were in generally poor condition. Two of the four gates were inoperable, leaks were observed in the riser tower, and there were multiple places with concrete deterioration. The principal spillway pipe through the dam was in good condition. The outlet structure is a concrete water distribution box with several structural deficiencies. Some wet areas along the downstream groins were noted.

Potential Dam Safety Deficiencies: The Virginia Division of Dam Safety issued a Conditional Operation and Maintenance Certificate for South River Watershed Dam No. 10A because the vegetated earthen auxiliary spillway would not pass the PMF without overtopping the structure.

As-Built Dam Specifications: The Mills Creek Dam was designed in 1961 and construction on the site was completed in July 1963. The earthfill used to construct the embankment was obtained from the pool area and from a borrow area upstream of the pool. The pool borrow area includes silty to well graded gravel. This material was used in the outer layer of the dam. The core materials were taken from the upper borrow area and consisted of silt, clay, silty sand and clayey sand. A grout curtain was installed on the upstream side of the embankment in 1965 to prevent leakage through the fractured bedrock. The top of the embankment is 24 feet wide. The upstream face of the dam has a slope of 3 horizontal to 1 vertical (3:1) from the toe to the permanent pool level at elevation 1862.0. From there, the slope is 2.5:1 to the top of the embankment. The downstream face has a slope of 2.5:1 with a 10 foot wide stability berm located midway down the slope. See Figure 1. The settled top of dam is at elevation 1897.5. This is 96.5 feet above the downstream toe of the embankment. The crest of the dam extends approximately 720 feet from the right abutment to the auxiliary spillway.

Principal Spillway: The principal spillway system has a concrete intake structure (riser) in the embankment with a 400-foot long concrete outlet pipe through the dam. This system controls the release of flood water. The riser is a multi-stage, covered structure (concrete slab on top of the riser), with inside dimensions of 2 feet wide by 6 feet long by 54 feet high. The crest of the riser controls the permanent pool elevation of 1862.0. There are four gates in the riser, numbered from the bottom to the top. The three uppermost gates were designed to allow increased flow during periods of high water demand. Gate 4 is located approximately 10 feet below the crest of the riser. Gates 3 and 2 are connected to the lake by 24-inch diameter cast iron pipes with lengths of 14 feet and 44 feet, respectively. The bottom gate (Gate 1) is used to drain the lake. A 114-foot long, 24-inch diameter reinforced concrete pipe conveys water from the inlet to the riser. See Figure 1. At the 2009 video inspection by URS, the riser, gates, and pipes were determined to be in poor condition due to material deterioration.

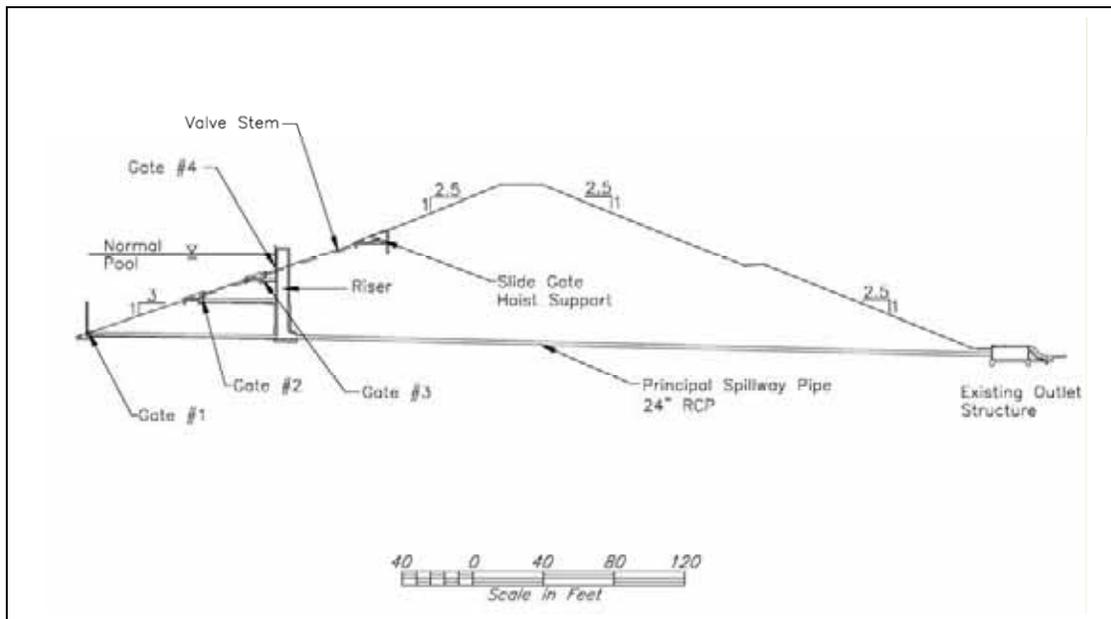


Figure 1. Layout of existing principal spillway system and embankment.

The outlet pipe is a 24-inch reinforced concrete pipe on a non-yielding foundation. It has 12 concrete anti-seep collars. This pipe discharges into a concrete outlet structure that was added after completion of the dam for use as a water distribution box. There are no issues of structural concern in the outlet pipe. However, at the outlet structure, there are three major concerns:

- 1) The connection between the principal spillway pipe and the outlet structure wall is not sound. This results in leakage around the joint (Figure 2);
- 2) Water hammer conditions are present in the principal spillway system due to the configuration of the outlet structure; and
- 3) The outlet structure concrete is in poor condition.



Figure 2. Outlet structure showing leak at the junction with the outlet pipe.

Auxiliary Spillway: A 100-foot-wide vegetated earth auxiliary spillway was constructed in the left abutment. The 2009 field surveys show a 145-foot-long inlet section with a 2% slope and a 20-foot-long level section approximately 9 feet below the top of dam. The 2009 survey of the site showed a control section elevation of 1887.4. This is 1.1 feet lower than the as-built elevation of 1888.5. The constructed exit section has a grade of 4% for 185 feet. At the end of the constructed outlet section, the auxiliary spillway outlet section drops about 70 feet to the valley floor on a 40% grade (Figure 3). The majority of the auxiliary spillway outlet consists of fractured bedrock with little or no fine material. There are some small pockets of unconsolidated soil material on the lower left side of the auxiliary spillway outlet. The general geology is sandstone, conglomerate, and quartzite. The erosion that has occurred in the outlet of the auxiliary spillway from the seven auxiliary spillway flow events has exposed rock that is considered to be more competent (less erosive). Most of the rock material that has eroded from the auxiliary spillway during the auxiliary spillway flow events has been deposited on the valley floor immediately below the outlet. Three small outlet channels have formed through the deposited material. These channels cross the lower access road and disperse in the woods. During rainfall events smaller than the 100-year, 24-hour storm, only the fine material that is still in the auxiliary spillway outlet is expected to erode. Removal of this material by erosion does not affect the integrity of the dam. Sediment from this area is deposited downstream of the dam or is transported into Mills Creek.



Figure 3. Auxiliary spillway outlet section, looking upstream from the valley floor.

The vegetated lining of the constructed portion of the auxiliary spillway is well maintained. The underlying strata in the auxiliary spillway consists of a top layer of general fill, residual, quartzite and sandstone with varying degrees of hardness. From 1969 (Hurricane Camille) to November 2005 (Hurricane Rita), the auxiliary spillway has flowed seven times. Six of these seven events were the result of hurricanes. The seventh event, in January 1996, was the result of rain on top of more than three feet of snow. Some damage occurred in these events. It was repaired each time. Appendix B contains a table describing these events.

The training dike that separates the auxiliary spillway flow from the dam embankment has one section that has settled to an elevation that is too low (Figure 4). Also, the training dike does not extend to the valley floor.



Figure 4. Low section of existing earth training dike.

Downstream Effects of Large Flow Events. Hydraulic modeling of the auxiliary spillway flows has shown that an unusual situation occurs in the watershed during very large storm events. Approximately a mile downstream of the dam, there is an area of land known locally as “The Levels” or “Big Levels.” The topography of this area is extremely flat across the entire width of the valley. Mills Creek traverses this area (Appendix E, Breach Map). The headwaters of other streams also traverse this area. An unnamed stream immediately west of Mills Creek drains to another NRCS dam in the South River watershed. The dam, South River No. 19, known as Waynesboro Nursery, was built by NRCS in 1957. Orebank Creek is in “The Levels” to the east of Mills Creek. For flow events equal to or smaller than the 100-year storm event, water from the Mills Creek drainage remains in the Mills Creek floodplain. During flow events in the Mills Creek watershed that are greater than the 100-year event, water spreads over “The Levels”. Approximately 80% of the water in excess of the amount normally carried by Mills Creek is transferred by the topography into the upper South River No. 19 watershed. While most of the remaining 20% remains in the Mills Creek drainage, a small portion diverts into the Orebank Creek watershed. This water drains into the North Fork of Back Creek upstream of the confluence of Mills Creek and Back Creek. This split flow pattern is a function of the topography and storm event size and would occur even if the dam were removed or had never been built.

Internal Drain System: The As-Built drawings indicated that there is a rock toe drain extending for 493 feet across the toe of the dam. Over the past 14 years, the annual dam inspection reports have repeatedly noted some clear water discharging from this area.

Precipitation Data: At the time this dam was designed in 1961, it was a significant hazard dam. Flow in the auxiliary spillway would occur when the runoff exceeded 3.31 inches for a 100-year, 6-hour duration storm. The rainfall for this event was 5.16 inches. The drawdown time was calculated to be 3.9 days. NRCS high hazard dams are designed to store the 100-year, 10-day storm before water can flow through the auxiliary spillway. According to the 2004 National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, design precipitation for the 100-year, 10-day event is 12.82 inches. The rainfall in the 100-year, 24-hour storm event increased from 6.93 inches (as estimated when the design for the dam was completed in 1961) to 8.59 inches. The 6-hour Probable Maximum Precipitation (PMP) rainfall is 28.0 inches. The rainfall for the 24-hour PMP is 36.8 inches.

Reservoir Sedimentation: In the original design for Mills Creek, 50 years of sediment storage was planned (75 acre-feet). Based upon the 2009 sediment survey, the volume of submerged sediment in the pool was 11.2 acre-feet. The sedimentation rate for the submerged sediment was 0.24 acre-feet/year. At the time of design, the projected sedimentation rate was 1.16 acre-feet/year. The future sedimentation rate is estimated to be 0.36 acre-feet/year. This number represents the past sedimentation rate multiplied by a factor of safety of 1.5. Although there will be no changes in this watershed from development, a natural event, such as a forest fire, could affect the sediment delivery to the reservoir.

Aerated sediment accounted for 5.37 acre-feet of accumulated sediment. The actual sedimentation rate for this time period was 0.12 acre-feet per year although the projected rate was 0.34 acre-feet/year. The future sedimentation rate is projected to be 0.18 acre-feet per year (0.12 acre-feet/year times a 1.5 factor of safety). This volume of sediment would be stored above the permanent pool elevation.

STATUS OF OPERATION AND MAINTENANCE

Operation and maintenance of the structure is the responsibility of Augusta County. Recent records indicate that the operation and maintenance of the structure has been kept current for the site. This has been verified through site assessments. The most recent inspection was conducted August 12, 2009.

STRUCTURAL DATA

The as-built structural data for the dam and watershed is described in Table D.

Table D - Existing Structural Data for Mills Creek Dam¹

Local Name	Mills Creek
Site Number	10A
Year Completed	1963
Cost	\$318,000
Purpose	Flood Control and Municipal & Industrial Water Supply
Drainage Area, mi ²	3.84
Dam Height, feet	91.5 ²
Dam Type	Earthen
Dam Volume, yds ³	378,124
Dam Crest Length, ft	720
Storage Capacity, ac-ft	962
Submerged Sediment, ac-ft	58
Aerated Sediment, ac-ft	17
Water supply, ac-ft	307
Flood Storage, ac-ft	580
Principal Spillway	
Type	Concrete
Riser Height, ft	54'-8"
Conduit Size, inches	24
Stages, no.	4
Capacity, cfs	84.5
Energy Dissipater	Concrete Outlet Structure
Auxiliary Spillway	
Type	Earthen
Width, ft	100
Capacity, % of PMF	89 ³
Normal Pool Elev.	1862.0
Flood Pool Elev.	1887.4 ⁴
Top of Dam Elev.	1897.5

¹ From As-built information on file.

² Measured from top of dam to low point on centerline of dam. Height to toe of embankment is 96.5 feet.

³ Calculated from SITES model.

⁴ 2009 surveyed data; As-built elevation 1888.5.

BREACH ANALYSIS AND HAZARD CLASSIFICATION

Breach Analysis: Due to the changes in land use within the watershed and issuance of a Conditional Certificate from the Virginia Division of Dam Safety, it was necessary for NRCS to evaluate the dam for its current hazard classification. To do this, NRCS performed a breach analysis for the sunny day breach and determined the downstream inundation zone. A sunny day breach is a theoretical event that assumes that the water level is at the existing crest of the auxiliary spillway and that a breach would occur with no warning.

The maximum breach discharge of 163,200 cfs was computed using the criteria in Technical Release No. 60, Earth Dams and Reservoirs (TR-60). The As-Built drawings, dated July 1963, and the field surveyed data obtained for Mills Creek were used to determine the maximum height used in the breach discharge. The depth of water at failure is 76.4 feet.

The computer models HEC-HMS and HEC-RAS (steady flow) were used to determine the inundation zone due to the breach of the dam. The river cross-sections were developed using HEC-GeoRAS and were supplemented with As-Built drawings and field survey data. The Manning's roughness coefficient "n" values used ranged from 0.16 in the overbank to 0.08 in the channel. These values were selected to account for mud/trees/brush that would be disturbed and washed downstream due to a breach of the dam. Contraction and expansion values of 0.1 and 0.3, respectively, were used in the modeling. The model limits were taken to a point where the depth of the inundation area was within 1 foot of the 100-year floodplain as determined from the 2005 NRCS Supplemental Watershed Plan for the rehabilitation of South River Watershed Dam Numbers 23, 25 and 26. Results of the breach analyses are shown in Tables E1 and E2 and on the Breach Inundation Map in Appendix E.

If the dam is rehabilitated, an additional breach analysis will be run for use by the Sponsor to update the Emergency Action Plan (EAP) that currently exists for the dam. The Virginia Dam Safety regulations stipulates that all owners of high hazard potential impounding structures shall provide dam break inundation map(s) representing the impacts that would occur with both a sunny day dam failure and a spillway design flood dam failure. The Sponsor must update the EAP annually with assistance from local emergency response officials. NRCS will provide technical assistance in the updating of the EAP. The purpose of an EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of one of the dams. The NRCS State Conservationist must confirm that the EAP is current prior to initiation of construction.

Hazard Classification: The Mills Creek Dam was originally constructed in 1963 for the purpose of protecting downstream agricultural lands from flooding and to provide Municipal and Industrial water supply. It was designed as a SCS class (b) (significant hazard) structure with a 50-year design life. Land use in the downstream watershed has changed since that time. The hazard class of the structure has changed to high because failure may cause loss of life and serious infrastructure damage.

The Virginia Division of Dam Safety regulations require a high hazard dam to safely pass the volume of water associated with the Probable Maximum Flood (PMF) without overtopping. The Virginia Division of Dam Safety definition of the PMF is "the flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region." NRCS is required to use the criteria established in NRCS TR-60 to prepare rehabilitation designs. Under these criteria, the Probable Maximum Precipitation (PMP) is used to define the design requirements rather than the Probable Maximum Flood used by the State of Virginia. Since the Probable Maximum Flood is the result of the Probable Maximum Precipitation, the NRCS criteria meet the State criteria.

Current NRCS policy in TR-60 requires an evaluation of both the short duration (6-hour) and the long duration (24-hour) PMP storms to assess the capacity and integrity of the earthen auxiliary spillway. Only the short duration storm is used to check the stability of the spillway. Based on

the results of these analyses, NRCS designs for the storm that has the potential to cause the most damage.

EVALUATION OF POTENTIAL FAILURE MODES

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

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

As the detention pool loses storage due to sediment deposition, the auxiliary spillway operates, or has flowage, more often. For a vegetated earth auxiliary spillway, repeated flows could erode the soil material and eventually cause the spillway to breach. The repair and revegetation of the spillway would be conducted under the Operation and Maintenance agreement.

The land use in the watershed above the Mills Creek Dam is essentially 100% Woodland. This use is not expected to change since the entire watershed is in the George Washington and Thomas Jefferson National Forest. As of 2009, the available sediment storage volume was 58.43 acre-feet. Based upon the future sediment deposition rate of 0.54 acre-feet (781 cubic yards) per year, the remaining sediment storage life of Mills Creek is 108 years. The potential for failure due to inadequate capacity is low.

Hydrologic Capacity: Hydrologic failure of a dam can occur by a breach of the auxiliary spillway or by an overtopping event that causes a breach of the dam. The integrity and stability of the auxiliary spillway and dam embankment are dependent on the depth, velocity, and duration of the flow, the vegetative cover, and the resistance of the soil in the auxiliary spillway and dam embankment to erosion. Under the present criteria for high hazard dams, the auxiliary spillway must have sufficient capacity to pass the full PMF event without breaching the spillway or overtopping the dam. According to the SITES analysis, the Mills Creek Dam can pass about 89% of the 6-hour PMF before the auxiliary spillway would breach. The overall potential for hydrologic failure of Mills Creek is considered to be high because it cannot pass the PMF without breaching the dam or auxiliary spillway.

Seepage: Embankment and foundation seepage can contribute to failure of an embankment by removing (piping) soil material through the embankment or foundation. As the soil material is

removed, the voids created allow even more water flow through the embankment or foundation, until the dam collapses due to the internal erosion. Seepage that increases with a rise in pool elevation is an indication of a potential problem, as is stained or muddy water or “sand boils” (the up-welling of sediment transported by water through voided areas). Foundation and embankment drainage systems can alleviate the seepage problem by removing the water without allowing soil particles to be transported away from the dam.

The principal spillway pipe for Mills Creek does not exhibit signs of seepage in the section from the riser to the outlet. Seepage along the principal spillway pipe provides a low potential for failure. However, it should be noted that seepage has been noted along the toe of the dam. Since this flow has been described as “clear” in every report, it is unlikely that it indicates a potential problem. A monitoring well will be installed to further evaluate the situation. The potential for a seepage failure of Mills Creek is considered to be low.

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

Material Deterioration: The materials used in the principal spillway system are subject to weathering and chemical reactions due to natural elements within the soil, water, and atmosphere. Concrete risers and conduits can deteriorate and crack, metal components can rust and corrode, and leaks can develop. Embankment failure can occur from internal erosion caused by these leaks.

For this structure, the camera survey of the principal spillway system showed significant material deterioration of the riser, water intake pipes, and gates. The slightly acidic pH conditions in the lake have contributed to the accelerated deterioration of the concrete. Additional problems were observed at the principal spillway outlet structure. The principal spillway pipe through the dam was in good condition and is expected to serve for an additional 50 years. The Mills Creek Dam has a high potential to fail due to the deterioration of the principal spillway components. This type of failure could result in a loss of the reservoir storage due to a release of water. Alternately, if the principal spillway is blocked due to component failure, the reservoir would fill to the crest of the auxiliary spillway. There would be no stormwater detention capacity and failure could occur as a result of repeated flowage in the auxiliary spillway.

Conclusion: At the present time, the Mills Creek Dam has the potential to fail due to a lack of hydrologic capacity since the auxiliary spillway does not have the structural integrity necessary to pass the required storm event. It also has the potential to fail due to material deterioration of the principal spillway system. These types of failure could occur at any time during the remaining life of the structure. There is adequate sediment storage capacity, there are no signs of a seepage failure due to material loss, and the site is not in a seismic activity area.

CONSEQUENCES OF DAM FAILURE FOR THE EXISTING AUXILIARY SPILLWAY CONDITION

NRCS and the State of Virginia consider this dam to be an “unsafe” structure because it does not meet the criteria established for a high hazard dam and is at risk for catastrophic failure under extreme rainfall event conditions. This dam is “unsafe,” not because of imminent danger, but because the soil materials in the auxiliary spillway do not have the structural integrity necessary to resist the flows of the PMF. Augusta County has installed instrumentation on this dam to provide near real-time data on precipitation and lake water levels in order to implement the Emergency Action Plan in a timely manner.

Storage in the reservoir will be about 1,170 acre-feet with a depth in the auxiliary spillway of approximately eight feet when the breach is modeled to occur. Several roads in the National Forest will be damaged, including the access road to the dam. This area also contains many Threatened, Endangered, Sensitive, and locally Rare species and their associated habitats. The houses, businesses, and churches downstream of the dam would be inundated. Howardsville Turnpike, Mt. Torrey Road, Back Creek Lane, Mill Creek Lane, and China Clay Road will be affected along with their associated utilities. The residents of 131 homes may have loss of access to emergency services due to flooding on the main roads.

CONSEQUENCES OF DAM FAILURE BY A SUNNY DAY BREACH

For the purposes of preparing the Emergency Action Plan, a worst-case scenario is assumed in the analysis of a possible dam failure. This scenario assumes a sunny day breach with water at the crest of the auxiliary spillway and with no advance warning. It is assumed that structural collapse would occur quickly and result in a release of 930 acre-feet of water and sediment, beginning with a wall of water that is 76.4 feet high.

The population at risk is approximately 355 people. The properties and infrastructure potentially affected by a breach of the Mills Creek Dam include 57 homes (and approximately 95 sheds and/or detached garages), three business structures, five churches, one large barn, a phone exchange, several water distribution lines, a pumping station, four road culverts, and two road bridges. Approximately 1.3 miles of State Rt. 664 (Mt. Torrey Rd.), 0.8 miles of USDA Forest Service Rd. 42 (Coal Rd.), 0.8 miles of State Rt. 610 (Howardsville Turnpike), 0.3 miles of State Rt. 634 (China Clay Rd.), and 0.5 miles of State Rt. 623 (Back Creek Lane) would be impacted by scour erosion damage. Impacts to USDA Forest Service property include several game plots, 0.4 miles of Turkey Pen Road (no vehicle access), and the 1.4 miles of access road to Mills Creek Dam. This area also contains many Threatened, Endangered, Sensitive, and locally Rare species and their associated habitats.

A sunny day breach of the Mills Creek Dam would transfer water into the watershed for Waynesboro Nursery Dam (South River No. 19). This potentially could cause a breach of this dam. The number of lives, homes, and businesses in jeopardy downstream of the Waynesboro Nursery Dam were not calculated for this event.

Mills Creek and Back Creek confluence around the intersection of Howardsville Turnpike and Mt. Torrey Road in the community of Sherando. Traffic counts from the Virginia Department of Transportation (VDOT) indicate that an additional exposure to loss of life could occur as a result

of the 1,400 vehicles that cross Back Creek at Howardsville Turnpike daily. There are about 3,400 vehicles per day on Mt. Torrey Road at this intersection. Other roads that could be affected include Back Creek Lane with 200 Average Daily Traffic (ADT), Mills Creek Lane with 150 ADT, and China Clay Road with 450 ADT. Coal Road has an ADT of about 75. The utilities associated with the transportation routes could also be destroyed.

A breach event would cause significant economic damages to the homes, businesses, roads, and utilities below the dam. In addition, loss of some business activity, and the loss of the lake and corresponding decreases in recreational opportunities (recreation benefits were not quantified) would also occur. The residences and business properties at risk in the area of the floodplain subject to a breach of Mills Creek have structure and content values estimated at \$9,990,000. In addition, potentially impacted infrastructure (bridges and culverts) is valued at \$561,000. A catastrophic breach would result in an estimated \$2,360,000 in economic damages to existing buildings and their contents.

Other economic damages from a catastrophic breach would be associated public and private clean-up costs, damages to vehicles, lost recreation opportunities with the lake gone, and increased flood damages in the future for remaining properties due to the absence of the dam and its flood protection effects. A catastrophic breach of the Mills Creek dam would result in a total estimated \$2,650,000 in damages.

The environmental damages from a dam failure would be significant. In addition to the damage caused by the water, the sediment stored in the pool area would be flushed downstream in the event of a catastrophic breach. At its full capacity, Mills Creek Dam has a sediment storage volume of 75 acre-feet. Highly erodible sediment remaining in the sediment pool would continue to cause persistent sediment deposition problems for the downstream channel and floodplain. Approximately twelve miles of stream channel downstream of the dam would be damaged by scouring or deposition. Sediment would be deposited in the floodplain. This would constrict the floodplain and cause additional flooding in subsequent storm events. Deposition of sediment in the floodplain would also restrict normal use of the land which may cause water quality problems in the future. It is unlikely that a catastrophic breach would remove all of the fill material used to build the dam. The embankment material remaining after a breach would also eventually erode into the stream, contributing to the downstream sediment deposition. The nutrients in the sediment could also cause water quality problems in the future. Over time, the sediment and attached nutrients would migrate downstream into the South River, and eventually to the Chesapeake Bay.

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

FORMULATION AND COMPARISON OF ALTERNATIVES

The stated objectives of the Sponsor for the Mills Creek Rehabilitation Plan are: 1) to bring the Mills Creek Dam into compliance with current dam safety and design criteria; 2) to maintain the current level of flood protection provided by the Mills Creek Dam; and 3) to address the local residents' concerns. The first two objectives and most of the third objective can be met by installing measures which will bring the dam into compliance with State and Federal regulations. Under the Watershed Rehabilitation Provisions of the Watershed Protection and Flood Prevention Act, NRCS is required to consider the technical, social, and economic feasibility of both the locally preferred solution and other alternatives identified through the planning process.

FORMULATION PROCESS

Formulation of alternative rehabilitation plans for the Mills Creek Dam followed procedures outlined in the NRCS *National Watershed Manual, Part 505.35B*. Other guidance incorporated into the formulation process included the NRCS *National Planning Procedures Handbook, Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, and other NRCS watershed planning policies. Each alternative evaluated in detail used a 52-year period of analysis, which includes a two year design and installation period and 50 years of expected useful life. This period of analysis was chosen by the Sponsor because it is the minimum allowable length of the Operation and Maintenance Agreement for a rehabilitated dam. It is anticipated that the dam will continue to be in service after that time with proper maintenance.

The formulation process began with formal discussions between the Sponsor, the Virginia Division of Dam Safety, and NRCS. The Virginia Division of Dam Safety conveyed state law and policy associated with a high hazard dam. NRCS explained agency policy associated with the Small Watershed Dam Rehabilitation Program and related alternative plans of action. The Sponsor provided additional suggestions for alternatives through the Mills Creek Dam Hydrology, Hydraulics, and Geotechnical Report prepared in 2005 by Anderson & Associates, Inc. These alternative plans of action were evaluated based on NRCS planning requirements and the ability of the alternatives to address the initial objective of bringing Mills Creek Dam into compliance with current dam safety and design criteria. See Table E.

Table E - Alternative Plans of Action

1. No Federal Action
2. Decommission the Dam
3. Non-Structural – Relocate or Floodproof Structures in the Breach Zone
4. Rehabilitate the Dam

There were several solutions considered for these alternatives. Each solution had to address the following issues:

- 1) Meet current State and NRCS design and performance criteria.
- 2) Repair/replacement of principal spillway system.

Issue 1. Meet current State and NRCS design and performance criteria.

For this site, the NRCS design and performance criteria gave more conservative results than the State criteria. Therefore, the NRCS criteria were used to evaluate the alternatives. The design criteria includes an evaluation of the capacity, integrity, and stability of the auxiliary spillway. The principal spillway system and other components of the dam also had to meet NRCS criteria.

Issue 2. Repair/Replace principal spillway.

The principal spillway system of this dam is in poor condition. Although the leaking gates and the damaged concrete could be repaired, the general condition of the riser and inlet system is so poor that multiple repairs would be required in the next fifty years. Under the rehabilitation program, NRCS must ensure that all the components of the dam have the same minimum life expectancy. Replacement of the principal spillway system is the only solution that will meet this criteria.

The proposed NRCS solution is to remove the existing riser and all of the gates and pipes upstream of the riser and replace them with a new riser and drain gate. The principal spillway pipe from the riser to the outlet is in good condition and is expected to be adequate for the next fifty years. The outlet structure will be removed. A riprap stilling basin will be installed for energy dissipation. Additional sections of pipe will be installed at the outlet, as needed. (Figure 5).

Since the water supply storage is no longer needed, NRCS was able to evaluate the system as if it were a new single-purpose structure. Initially, the future sedimentation rate of 0.54 acre-feet per year was used to set the crest of the principal spillway riser at an elevation of 1826.0 feet. This is 36 feet lower than the existing crest elevation. The water in the lake would be 14 feet deep and the surface area would be about 2.75 acres. This is about 15% of the previous surface area of the lake. The stormwater detention storage would be sufficient to hold the water from a 260-year, 24-hour storm event. The new riser would be placed at the toe of the embankment and 130' feet of reinforced concrete pipe would be installed from the riser to the existing pipe. This would require removal and reinstallation of 41,000 cubic yards of earthfill. The estimated cost for replacement of the principal spillway system is \$1,338,000.

The Virginia Department of Game and Inland Fisheries (VDGIF) did a preliminary evaluation of the proposed system for its effects on the fisheries. At the 14-foot depth, the water would be much warmer than it is at present. The fisheries upstream of the lake, in the lake, and downstream of the dam are all coldwater fisheries that are populated with trout. The temperature of the lake could affect both of these populations. According to VDGIF, the coldwater fishery in the lake could be maintained if the water depth was increased to 26 feet. This would put the elevation of the principal spillway crest at 1838.0 feet and would increase the surface area of the lake to 6.8 acres. The stormwater detention storage would be sufficient to contain the 200-year, 24-hour storm. The additional cost for the taller riser would be approximately \$80,000 for a total cost of \$1,418,000 for replacement of the principal spillway system.

For the purposes of planning, the higher water elevation will be used because it maintains the existing coldwater fisheries present at the site. The final design decision will be made in cooperation with the Sponsor.

Almost all of the sediment in the original pool area was deposited in the upper reaches of the pool. The proposed pool elevation of 1838.0 is lower in elevation than the downstream edge of

the depositional area. Therefore, all of the sediment storage volume in the proposed pool area is available for use.

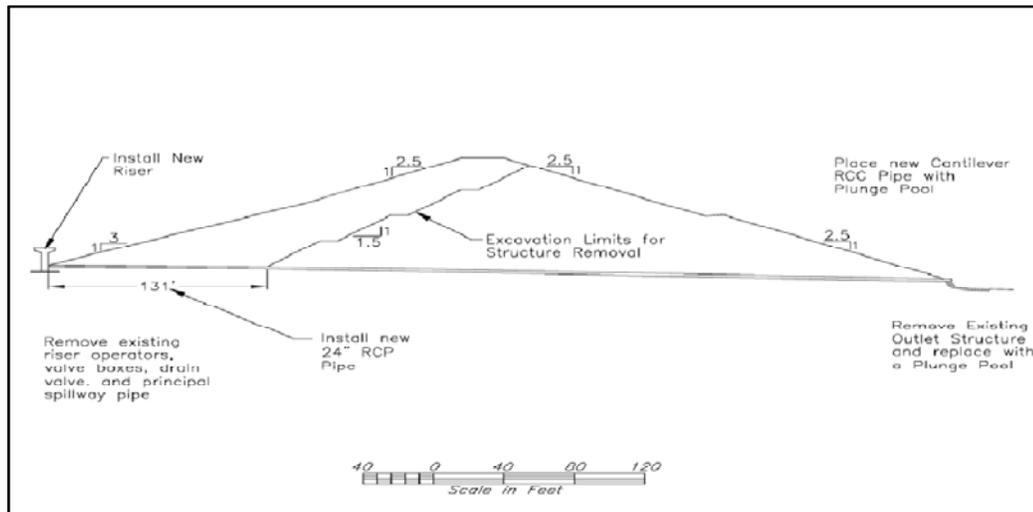


Figure 5. Proposed layout of principal spillway system and excavation limits.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The following alternatives considered in the planning process were eliminated from detailed consideration. These alternatives did not meet the proposed purpose or need for federal action, they were logistically impractical to implement, or they were otherwise considered to be unreasonable.

Decommission the Dam

Decommissioning could be used to remove the dam from service. This would include a plan to remove the flood detention capacity of the dam. Since this site is on USDA Forest Service property, it would be necessary to restore the site to the pre-dam condition by removing all of the existing embankment down to the valley floor and restoring the function and stability of the stream channel and the 100-year floodplain. Decommissioning would require removal of the accumulated sediment. The removal of the principal spillway riser and pipe would also be necessary. These unneeded materials would be hauled to an appropriate disposal site.

Decommissioning is a mandatory rehabilitation alternative under NRCS policy. For this site, it would be necessary to floodproof or relocate all of the structures in the downstream floodplain in order to meet the Sponsor's goal of maintaining the existing level of flood protection. Since the floodplain boundaries were delineated after construction of the South River dams, the present 100-year floodplain enforced by Augusta County is smaller than the 100-year floodplain without the Mills Creek Dam in place. There would also be the need to mitigate for damage to the roads, bridges, and utilities in the watershed. The number of homes with loss of access to emergency services during flood events would increase. Due to the exorbitant cost of floodproofing or relocating the homes and businesses in the floodplain, it was not considered as a viable option for detailed development. In addition, removing the dam would be very expensive. Table F lists some of the components and costs of decommissioning the dam itself. Overall costs

would include the necessary upgrades to downstream bridges affected by the increased volume of water.

Table F – Individual Components of Dam Decommissioning

Items of Work	Cost
Fill removed from site (378,124 CY)	\$ 5,981,000
Structure Removal	\$ 90,000
Topsoil Placement (121,000 CY)	\$ 137,000
Riprap Erosion Control	\$ 87,000
Pollution Control	\$ 318,000
Seeding and Mulching	\$ 90,000
Water Removal	\$ 60,000
Mobilization and Demobilization	\$ 345,000
Construction Survey and Quality Control	\$ 78,000
Clearing and Grubbing	\$ 68,000
Contingency (10%)	\$ 725,000
Cost of structure removal only*	\$ 7,979,000

* Other costs would include floodproofing or relocating homes and businesses, reduced property values, loss of recreation, and mitigation for induced damages to infrastructure, such as road and bridges.

Non-Structural - Relocate or Floodproof Structures in the Breach Zone

There are 65 homes, business structures, and churches and 95 other structures (detached garages and sheds) located in the breach zone of Mills Creek. Of these, 9 are mobile homes and could be relocated out of the floodplain. The remaining 56 structures could be floodproofed by elevation of the building, elevation of basement appliances, or relocation. These are considered to be nonstructural flood control measures. Implementation of this alternative could cause the hazard class of the dam to return to “significant.” The principal spillway would still have to be replaced and the auxiliary spillway training dike would still have to be installed. Also, it would be necessary to permanently zone the floodplain to prevent activities that would change the hazard class in the future. Implementation of this alternative was not considered in detail because of the cost and because it would be difficult to get social acceptance of restrictions to future development.

Non-Structural – Remove threatened properties and restrict downstream development.

Another non-structural solution would be to acquire the properties that are currently in the downstream inundation zone and eliminate the possibility of future development in the inundation zone. As proposed by Anderson & Associates, Inc., this solution would allow the existing dam to remain a significant hazard structure. This alternative would also include construction of a training berm in the Big Levels area to force the breach flow completely into Mills Creek. By doing this, there could be less land restricted from development. However, this would increase the flows in Mills Creek, Orebank Creek, and Back Creek and would increase the number of structures that could be impacted in those floodplains. Significant additional study of this option would be required. It would include an evaluation of the feasibility of this option from a legal and administrative perspective.

The dam would still need some structural improvements. The estimated cost of these improvements would be \$2,073,680. This cost includes modifications to the auxiliary spillway outlet and construction of an earthen training berm. It does not address the condition of the principal spillway system which would add an additional \$1,418,000 for an estimated total construction cost alone of \$3,492,000. The estimated cost of property acquisition, additional legal/administrative work, or loss of revenue from real estate taxes was not identified. This alternative was not developed in detail because the required removal of homes had limited potential for social acceptance.

Rehabilitate Dam – Entrench the auxiliary spillway. This solution would require excavation of a chute in the outlet section of the auxiliary spillway to direct the flow of water away from the toe of the dam. This alternative was not developed in detail because, based upon the known geology of the site, construction of the chute would remove the rock layer that is currently preventing a breach of the auxiliary spillway.

DESCRIPTION OF ALTERNATIVE PLANS CONSIDERED

No Federal Action

With this alternative, no federal funds would be expended. Since the Mills Creek Dam does not meet current safety and performance standards, it is considered to be “unsafe.” The Virginia Division of Dam Safety has issued a Conditional Certificate of operation for the dam. It is reasonable and prudent to expect that the Virginia Division of Dam Safety will soon issue an Administrative Order requiring the Sponsor to bring the dam up to State standards. This would be done by rehabilitation of the dam or by removal of the hazard (decommission the dam). The Sponsor would be totally responsible for the cost of either option. NRCS would still have the technical responsibility of approving the Sponsor’s solution.

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

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

- Remove the dam. Decommissioning the dam would remove the threat to loss of life that would occur in the event of a dam failure. However, it would also increase the potential for flooding in the downstream areas due to lack of flood control. Since the site is on federal land, decommissioning the dam would require restoration of the site to its pre-dam condition. This would include removal of all the embankment and principal spillway components, removal of all stored sediment, and stabilization of the stream channel. Removal of the structure would have the same cost as the NRCS Decommissioning alternative but there may not be the obligation to mitigate for induced damages. The cost of decommissioning the dam would be about \$8 million.
- Do nothing. This alternative would be selected in anticipation of the new legislation recently passed by the Legislature. Until the regulations are changed, this would not release the Sponsor from the responsibility associated with owning a dam with a Conditional Certificate of Operation. This solution could be used to address the auxiliary spillway issues but would not address the principal spillway issues.

- Rehabilitate dam to meet State criteria using the least cost method. Both the auxiliary spillway and principal spillway issues would be addressed.

The Sponsor has indicated that they will use the least cost alternative to rehabilitate the dam to meet the required dam safety and design criteria at their own expense in the absence of federal assistance. For the purposes of this evaluation, the Sponsor’s Rehabilitation will be used as the No Federal Action alternative.

Rehabilitation Alternatives Considered

Rehabilitate Dam – Widen auxiliary spillway and armor with riprap and RCC. According to Anderson & Associates, Inc., this alternative would require the excavation of additional material on the north (left) side of the present auxiliary spillway and exit channel. The spillway would be widened from 100 feet to 182 feet. The constructed outlet section of the spillway would be armored with riprap and the auxiliary spillway outlet would be armored with Roller Compacted Concrete (RCC) to protect the spillway from excessive velocities. The estimated cost of this alternative is \$2,879,000. This alternative would require expansion of the footprint of the dam and would require extensive rock excavation along the north side of the spillway. This conflicts with the USDA Forest Service preference to maintain the existing dam footprint. The rehabilitation of the principal spillway is not addressed in this solution. Rehabilitation of the principal spillway would add \$1,418,000 to the project cost. The estimated total construction cost of this alternative would be \$4,297,000.

Roller-compacted concrete is a non-reinforced concrete that is durable and easy to install. However, it would be difficult to use at Mills Creek because RCC has a very limited window of installation time. Each batch of concrete must be mixed and installed within a time window of one hour. The available working space onsite is too limited for installation of a temporary batch plant and there are no concrete plants within a reasonable driving distance.



Figure 6. Example of RCC used for auxiliary spillway rehabilitation.

Rehabilitate Dam – Raise the height of the dam, widen the auxiliary spillway, and armor with riprap and RCC. An example of this alternative, as proposed by Anderson & Associates, would be to increase the spillway width to 130 feet and add 2.5 feet of additional height to the dam. Riprap armoring of the constructed exit section and RCC armoring of the auxiliary spillway outlet section would still be required. The footprint of the dam would increase. The estimated cost for this option is \$2,360,000 and does not include the cost of rehabilitating the principal spillway (an additional \$1,418,000). The estimated total construction cost of this alternative would be \$3,778,000.

Rehabilitate Dam – Lower the elevation of the auxiliary spillway by three feet and armor with Articulated Concrete Blocks (ACBs). With this alternative, the elevation of the auxiliary spillway control section would be lowered by about three feet to elevation 1884.3 and the length of the control section would be increased to 200 feet. This configuration meets the capacity and integrity criteria. To meet the stability criteria, the auxiliary spillway would be armored with ACBs from the upstream edge of the level section to the end of the constructed outlet section. The end of the ACBs would be anchored by a concrete wall buried at the end of the constructed outlet section. The ACBs may be covered with a foot of topsoil and vegetation or they may be left uncovered with gravel backfill. Since this is an Operation and Maintenance (O&M) issue, the final condition will be decided by the Sponsor. This decision will affect the final elevation of the auxiliary spillway.

The auxiliary spillway outlet section would be left as it is currently. The SITES model indicates that the rock material in this area will experience some erosion but the erosion will not compromise the integrity of the auxiliary spillway. The pockets of unconsolidated soil material in the auxiliary spillway outlet would be vegetated. In addition, the access road below the auxiliary spillway would be graded so that sediment eroded from the auxiliary spillway outlet during normal rainfall events would be directed toward Mills Creek rather than toward the wetland areas that are currently supporting Swamp Pink populations. Auxiliary spillway flow events would not occur until the 200-year, 24-hour rainfall event has been exceeded.

A new earthen training dike would be installed in the inlet section of the auxiliary spillway. This training dike would be about 150 feet long and would be constructed of material removed from the auxiliary spillway. The existing downstream earthen training dike would be augmented by installation of a reinforced concrete wall that would start about 50 feet from the centerline of the dam and extend to the valley floor for a total distance of 350 feet. At the downstream end of the concrete wall, there would be another earthen training dike that would contain the pool created by the auxiliary spillway outflow. This dike would be about 70 feet long and 10-12 feet high. This dike would extend across the existing downstream access road into the woods. The road would have to be moved downstream to allow continued access to the toe of the dam. The spring located just downstream of the toe of the dam would be covered by fill material. The spring water would be captured by a vent that would convey the water to a point downstream of the road.

The principal spillway riser would be replaced with a single-stage baffled riser with a crest elevation of 1838.0. Since the water supply volume would be removed, the stormwater detention storage from the new principal spillway crest elevation to the new auxiliary spillway elevation would be sufficient to detain the volume of water from the 200-year, 24-hour storm. The new riser would be located at the toe of the embankment and would be connected to the existing principal spillway pipe by installation of 130 feet of 24" reinforced concrete pipe. All of the existing inlet structures would be removed. The new drain gate would be installed at the base of the riser. The concrete outlet structure at the downstream end of the principal spillway pipe would be removed. A riprap plunge pool would be installed for energy dissipation.

A toe drain collection system with monitoring wells would be installed at the downstream toe of the dam to address seepage issues and to allow measurement of seepage quality and quantity. Installation of the toe drain collection system could adversely affect the spring at the toe of the dam since the ground water level in the immediate vicinity of the dam would be lowered. If flow from the spring enters the toe drain system, it would outlet to Mills Creek through the toe drain

outlet. This addition of spring flow in the toe drain would make it very difficult to determine the volume of water entering the system from the seeps along the left toe of the dam. If the spring flow is not affected, it would be vented to the area below the road.

This auxiliary spillway system would be considered to be nonstructural because the capacity and integrity of the auxiliary spillway can be achieved by only reshaping the site. No additional materials are needed to meet these criteria. The ACBs are used to meet the stability criteria. The estimated total construction cost of this alternative is \$2,995,000.

Articulated Concrete Blocks (ACBs) are individually constructed concrete blocks that are cabled together to form a continuous erosion-resistant mattress. The proposed blocks are “open cell” which provides about 20% open space within and around the block. Geotextile fabric and six inches of gravel would be placed on the prepared subgrade to provide permeability and filtration while providing soil retention. The ACB mattress would then be set over the geotextile fabric. The ACBs can be manufactured offsite and trucked in for installation which reduces the amount of space needed for a staging area.



Figure 7. Example of ACB installation in an auxiliary spillway.

Rehabilitate Dam –Increase dam height with a concrete parapet wall. Raising the height of the dam by 4.8 feet with a concrete parapet wall would increase the capacity of the auxiliary spillway enough to accommodate the PMF. A parapet wall would be preferable to the use of earthfill. If earthfill were used to increase the dam height, it would be necessary to add additional fill material to the back side of the dam. This would increase the footprint of the structure which is not acceptable to the USDA Forest Service. The Anderson & Associates, Inc. report indicates that armoring the constructed exit section with riprap and armoring the auxiliary spillway outlet section with Roller-Compacted Concrete (RCC) would be required to meet stability and integrity. The estimated construction cost for this alternative is \$1,845,000. This does not include the cost of rehabilitating the principal spillway which would add \$1,418,000 for a total estimated construction cost of \$3,263,000.

Rehabilitate Dam - Incorporate an Ogee Spillway and Side Channel Chute to accommodate the PMF. This alternative would use an Ogee crest to convey more water without increasing the maximum stage. An Ogee crest is a wall that has one or more bends in it that make the overall length of the wall longer than the actual length of the opening. This allows the water to spread out over a larger weir length and increases capacity. The required Ogee section length would be approximately 138 feet and would be oriented nearly perpendicular to the dam so that it would not be necessary to widen the left abutment of the spillway. The exit chute would remain in its current 100-foot wide location and would require deepening to allow the Ogee section to

function without backwater effects during extreme flood events. The outlet section would be armored with reinforced concrete to withstand the severe scour. This alternative involves a complete spillway overhaul using concrete and installation of a stilling basin. The estimated cost of this option is \$4,203,000 and does not include the cost of replacing the principal spillway system. With replacement of the principal spillway (\$1,418,000), this alternative would have an estimated total construction cost of \$5,621,000.

Rehabilitate Dam - Armor with RCC to allow the PMF to overtop the dam. As proposed by Anderson & Associates, Inc., this alternative would require the placement of RCC along the top of the dam and downstream face of the dam to armor it from the erosion effects of an overtopping event. The spillway would be lined with RCC also. This option may require additional sub-grade preparation measures to prevent settling and cracking of the RCC lining. A stilling/collection basin along the foot of the dam would be required to prevent toe scour. The estimated cost of this alternative is \$10,314,000. This does not include the cost of the principal spillway replacement which would add \$1,418,000 for a total estimated construction cost of \$11,732,000.

Table G. Summary of Rehabilitation Alternatives.

Alternative	Cost*	Pro	Con
Widen auxiliary spillway and armor with riprap and RCC.	\$4,297,000		Expands footprint of dam, RCC difficult to use on site due to access.
Raise the height of the dam, widen the auxiliary spillway, and armor with riprap and RCC	\$3,778,000		Expands footprint of dam, RCC difficult to use on site due to access.
Lower the elevation of the auxiliary spillway by three feet, armor with Articulated Concrete Blocks (ACBs)	\$2,995,000	Nonstructural solution, does not change footprint of dam.	
Raise top of dam with concrete parapet wall, armor with riprap and RCC.	\$3,263,000	Does not change footprint of dam.	RCC difficult to use on site due to access.
Build Ogee Spillway and side channel chute, armor with reinforced concrete	\$5,621,000	Does not change footprint of dam.	Very complicated solution.
Armor entire dam with RCC	\$11,732,000	Does not change footprint of dam.	Very expensive, RCC difficult to use on site due to access.

*All costs include rehabilitation of the principal spillway system.

SELECTED REHABILITATION ALTERNATIVE

The selected rehabilitation alternative is to lower the auxiliary spillway and armor it with ACBs. The existing principal riser system will be replaced with a single-stage, baffled riser with a crest elevation of 1838.0 feet. About 130 feet of new pipe will be added to the existing reinforced

concrete pipe through the dam to convey water from the riser to the outlet. A riprap stilling basin will be installed to replace the existing principal spillway outlet structure. Toe drains with monitoring wells will be installed to monitor seepage. The elevation of the auxiliary spillway control section will be lowered by three feet and will be lengthened to 200 feet. The control section and the outlet section will be armored with ACBs. An earthen training dike will be added to the inlet section. In the outlet section, a concrete training dike will be added to the existing earthen training dike and will extend to the valley floor, ending with another earthen dike that will keep the auxiliary spillway flow away from the toe of the dam (Figure 8). The access road at the end of the auxiliary spillway will be graded to direct sediment from the auxiliary spillway outlet away from the wetland areas. The spring at the toe of the dam will be vented to discharge downstream of the road. All of the water supply capacity of the dam will be eliminated and the surface area of the permanent pool will be reduced from 17.4 acres to 6.8 acres. The floodwater detention storage will increase from 580 acre-feet to 733.8 acre-feet and will detain the runoff from a 200-year, 24-hour storm. This alternative was chosen because it achieves the required results with the least amount of complexity and it is the least cost alternative.

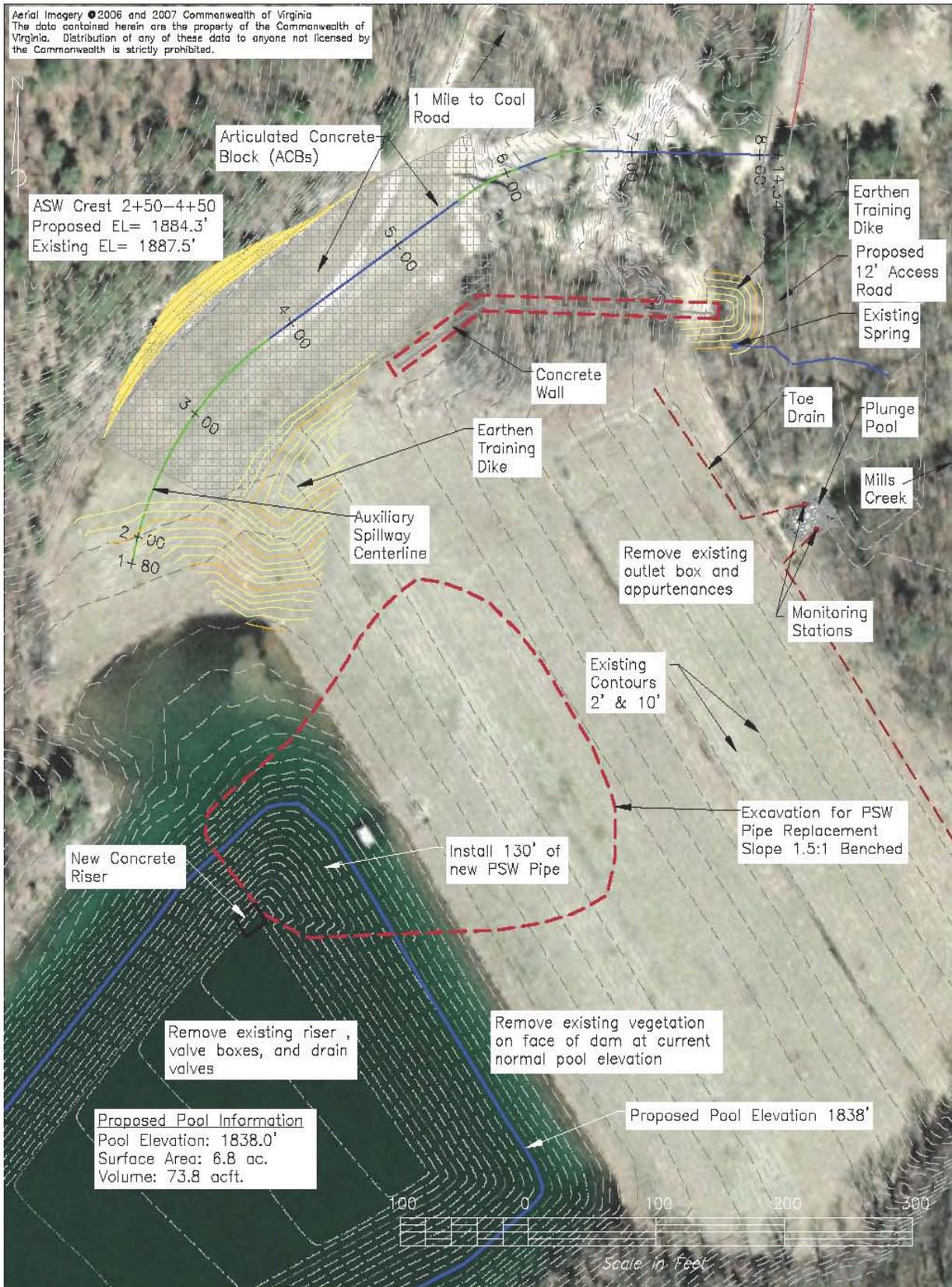


Figure 8. Plan view of auxiliary spillway configuration for the recommended alternative.

EFFECTS OF ALTERNATIVE PLANS

Alternative plans of action can result in a multitude of effects on resources upstream and downstream of Mills Creek. This section describes anticipated effects on resource concerns identified by the Sponsor, the public, and agency personnel. Effects of alternative plans of action on resource concerns of national importance are also included.

There are two plans that will be considered and evaluated in detail: 1) No Federal Action (Sponsor's Rehabilitation) and 2) Rehabilitate Dam with the selected alternative. The Sponsor has indicated that they will use the plan developed by NRCS to complete the rehabilitation of the dam in the event that federal funding is not available. Therefore, the Sponsor's Rehabilitation is the same as the Federal Rehabilitation and the effects of the rehabilitation will be the same.

Air Quality

Existing Condition: Air quality in the project area is satisfactory.

No Federal Action (Sponsor's Rehabilitation): During the rehabilitation of the dam, particulate matter (dust) from construction activities will increase. Air pollution abatement actions will minimize any potential temporary dust problems during construction, and the proposed work is not expected to violate any federal, state, or local air quality standards.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Coral Reefs

There are no coral reefs within the watershed.

Ecologically Critical Areas

Existing Conditions: There are several ecologically critical areas located in the watershed, including the Big Levels and Maple Flats Special Biological Areas. Numerous sinkholes are located upstream and downstream of the dam. The Big Levels area is located approximately a mile downstream of the dam and contains a diverse population of wetland species. The Big Levels Salamander is a Federal Species of Concern that was recently identified in the project vicinity although typically found at higher elevations.

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of the dam will not have an effect on any ecologically critical areas.

Rehabilitate Dam: Same as No Federal Action (Sponsor's Rehabilitation).

Environmental Justice and Civil Rights

Existing Conditions: The presence of the dam benefits all of the residents equally. An estimated 140 downstream residents, 15 workers and 200 church members are exposed to the risk of a catastrophic failure of the dam. The occupants of vehicles that traverse the roads and bridges below the dam are also at risk.

No Federal Action (Sponsor's Rehabilitation): There is no disparate treatment. An estimated 355 downstream residents, workers, and worshippers would benefit from significantly reduced risk of a catastrophic failure of the dam. Occupants of vehicles would also benefit from the reduced risk.

Rehabilitate Dam: Same as No Federal Action (Sponsor's Rehabilitation).

Essential Fisheries

Existing Conditions: Mills Creek above the dam has a wild brook trout population. Mills Creek below the dam is stocked with put-and-take brook trout. The reservoir is stocked with fingerling brook trout to provide a put-and-grow fishery.

No Federal Action (Sponsor's Rehabilitation): No impacts are expected to the upstream population of wild brook trout. The trout fishery in the lake will not be available during the construction period due to the planned dewatering. The Region 4 office of the VDGIF has agreed to manage and conduct fish salvaging operations prior to and during dewatering of the lake. Stocking of the lake and downstream fishery will be suspended prior to the start of construction and will not resume until the rehabilitation is complete. This includes the time needed for the water temperature in the lake to stabilize. This information will be posted to the DGIF website. Although construction restrictions would normally apply from October 1 thru March 31, correspondence from DGIF indicates that this condition would not apply on this site. Sediment delivery from the dewatered reservoir to Mills Creek will be limited by the planned E&S Control measures. After the rehabilitation is complete, the sediment delivery to the downstream reaches of Mills Creek will return to the preconstruction levels because sediment from the upper watershed will be retained in the lake. There will be a permanent reduction in the pool area that will reduce the capacity of the lake to support fish.

Rehabilitate Dam: Same as No Federal Action (Sponsor's Rehabilitation).

Fish and Wildlife Habitat (including migratory birds)

Existing Conditions: The fish population in Mills Creek Lake is managed by VDGIF as a recreational coldwater fishery. The lake is stocked annually with fingerling brook trout. This lake has limited use by migratory birds because the steep, rocky sides restrict access and the growth of plants needed for food. The USDA Forest Service has designated the area around the lake as Management Area 22: Habitat – Small game/watchable wildlife. In addition, Management Area 4 – Special Interest Areas/Research Natural Areas lies directly adjacent to the entire access road and project area indicating the need to protect unique resource values in the area.

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of the dam will result in a decrease of the permanent pool from 17.4 surface acres to 6.8 surface acres. This will result in a decrease of aquatic habitat. Water depth at the principal spillway crest will decrease from approximately 50 feet to 26 feet. The VDGIF agreed that a water depth of 26 feet would continue to support a coldwater fishery. Terrestrial habitats below the dam will be altered by the removal of 0.1 acres of trees to maintain current dam safety standards of a 25 foot distance between the toe of the dam and the wood line. Additionally, 0.3 acres of trees will be removed where the new training dike will be placed. There will be an increase of approximately five acres of terrestrial habitat when the permanent pool is lowered. The exposed lake bed will be replanted with native vegetation.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Floodplain Management; Flood Damages

Existing Conditions: The City of Waynesboro and Augusta County have participated in the National Flood Insurance Program since 1971 and 1990, respectively. The South River Watershed has experienced many floods during the 56 years since the first dam was installed. Currently, with the Mills Creek Dam in place, an estimated \$3,500 in average annual flood damages would occur from future storm events with 25 properties, 2 bridges and 4 culverts directly affected by a PMP flood event. Sixty-five properties would be affected by a Sunny Day Breach event. This includes 57 residences, five churches and three businesses. The risk of a catastrophic failure and potential loss of life would continue.

No Federal Action (Sponsor's Rehabilitation): The flood reduction benefits provided by Mills Creek would be extended for a projected 50 years after construction. The rehabilitation of the Mills Creek Dam would result in a higher level of safety/reduced risk for catastrophic breach. Since there is no longer a need for M&I water supply, this additional capacity will be used for stormwater detention. When the water level is lowered by 24 feet, there will be 733.8 acre-feet of stormwater detention capacity. This volume will contain the 200-year, 24-hour storm event. Rehabilitation of this dam would result in the continuation of present flood damage reductions, enhanced flood protection for storm events between the 100-year and 200-year, 24-hour rainfall, and provide a higher level of safety/reduced risk for catastrophic breach. The potential for failure of this dam would be reduced significantly. Average annual flood damages to properties below the dam from all future storm events are estimated to be \$2,100. This represents a 40 percent reduction (\$1,400) in average annual damages over the existing conditions. The number of properties impacted by PMP events would remain the same as estimated for the existing conditions scenario, but average water depths and damages would be significantly reduced overall as would the risk of a catastrophic failure. Reduction of the threat to property and the potential for loss of life would be substantially improved over the existing conditions scenario.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Forest Resources

Existing Conditions: At the present time, the watershed is predominately forested.

No Federal Action (Sponsor's Rehabilitation): During rehabilitation, approximately 0.4 acres of trees will be removed. A timber harvest fee will be paid to the USDA Forest Service. The anticipated cost is less than \$1,000.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Historic, Cultural, and Scientific Resources

Existing Conditions: A field reconnaissance of the project area was conducted in March 2010 by USDA Forest Service archaeologists. The proposed staging areas and turnouts were also evaluated. Consultation with the VDHR was initiated in March 2010 by the USDA Forest Service. The VDHR has indicated their concurrence with the USDA Forest Service finding of *no adverse effect* within the rehabilitation area. One site along the access road was later identified as having archaeological significance. Some of the sinkholes in the area contain historic sediment/pollen information.

No Federal Action (Sponsor's Rehabilitation): There are no anticipated changes from existing conditions. The designated area along the access road will be blocked with temporary fencing to ensure avoidance of the area.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Invasive Species

Existing Conditions: At the present time, invasive species exist in the project vicinity and activity area. Species include but are not limited to Autumn Olive, Ailanthus, Spotted Knapweed, Microstegium, and Lespedeza sp.

No Federal Action (Sponsor's Rehabilitation): Soil disturbance and lake water level changes are likely to promote the spread of these plants and others in the project vicinity. In an attempt to protect T&E species and associated habitat, the USDA Forest Service will spot treat individual invasive species in the future, if necessary. Care will be taken during construction to avoid the introduction of invasive species and comply with Executive Order 13112. When the permanent pool elevation is lowered, the exposed inflow area will be planted with native vegetation to prevent establishment of invasive species. The USDA Forest Service has provided a list of plants that will be used. In accordance with the restrictions from the USFWS, herbicides will not be used in the project area during rehabilitation.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Land Use

Existing Conditions: The watershed upstream of the dam is almost all wooded. The downstream watershed is also predominately forested (73.2%). Some land is used for Residential/Business (10.2%) and Grassland (12.6%).

No Federal Action (Sponsor's Rehabilitation): No changes in upstream or downstream watershed land use are anticipated.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Local Economy

Existing Conditions: Mills Creek Dam has provided flood protection since 1963. Under the existing conditions, there is the potential for loss of life because the dam does not meet current dam safety and design criteria. According to the HEC-RAS model, an uncontrolled breach of the Mills Creek auxiliary spillway would occur with approximately eight feet of water flowing through it. This could release 1,170 acre-feet of water and sediment in a wall up about 84 feet high. This would cause substantial damages to the downstream properties and infrastructure. Mt. Torrey Road, Howardsville Turnpike, nearby residential roads, and the associated utilities would all be at risk.

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of the Mills Creek Dam would provide flood protection to the residents of the watershed for 50 years after completion. Property values downstream of the dam would be maintained. The existing opportunities for recreation would remain for the evaluated life of the dam. Protection of the roads, bridges, and public utilities would be increased. Access to emergency services would be protected. In addition to

the long-term economic benefits provided by the dam, there would also be short-term economic benefits from the construction activities.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

National Economic Development

Existing Conditions: A catastrophic breach is more likely to occur under the existing conditions. Such an event would be a threat to loss of life and would result in significant damage to property and infrastructure.

No Federal Action (Sponsor's Rehabilitation): The alternative selected for rehabilitation of the Mills Creek Dam is the least cost alternative and will reduce the risks associated with a catastrophic breach.

Rehabilitate Dam: The alternative selected for rehabilitation of the Mills Creek Dam is the least cost alternative and will reduce the risks associated with a catastrophic breach. The benefit/cost ratio for rehabilitation of this dam is 1.0 to 1.0.

Natural Areas

Existing Conditions: The Kelley Mountain Roadless area was identified as being within 2 miles of the project area. This area has been proposed as a special biologic area, but has not been designated to date. A search of the Virginia Department of Conservation & Recreation's Natural Heritage Resource data base did not show any specially designated Natural Areas within 2 miles of the project area. However, Management Area (MA) 4 - *Special Interest Area/Research Natural Areas* lies adjacent to the project and emphasizes the protection of unique resource values.

No Federal Action (Sponsors' Rehabilitation): There are no potential impacts to the existing natural areas as a result of the planned rehabilitation activities.

Rehabilitate Dam: Same as the No Federal Action (Sponsors' Rehabilitation).

Parklands

There are no designated parklands within the watershed.

Prime and Unique Farmlands

There are no prime or unique farmlands within the watershed.

Public Health and Safety

Existing Conditions: The existing earth auxiliary spillway does not have the stability, integrity, or capacity necessary to withstand the PMF event. It is projected that the auxiliary spillway would breach at a 6-hour precipitation event of approximately 18.2 inches. In addition to the amount of water flowing through the auxiliary spillway, this event has the potential to release the entire amount of water and sediment stored upstream of the dam. This is a volume of approximately 1,170 acre-feet. Mt. Torrey Road, Howardsville Turnpike, China Clay Road, and multiple residential streets and all the associated utilities will be damaged. There is the potential for loss of life in the event of a dam breach.

No Federal Action (Sponsor's Rehabilitation): Under this alternative, the dam would be rehabilitated using current design and safety criteria in order to provide continued flood protection for 50 years after the rehabilitation period is complete. The additional stormwater detention storage behind the dam will reduce the frequency of flooding from storm events equal to or less than the 200-year, 24-hour event. The threat to loss of life from failure of the dam would be greatly reduced.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Public Recreation

Existing Condition: Public recreation around Mills Creek Lake is limited by access. However; the area is used for hiking, mountain biking, bird watching, and fishing.

No Federal Action (Sponsor's Rehabilitation): There are no anticipated changes to the existing recreational opportunities as a result of the planned rehabilitation activities.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Regional Water Resources Plans/Coastal Zone Management Areas

Existing Conditions: Mills Creek Lake is located in the Chesapeake Bay drainage area but outside of the Coastal Zone Management Area. The requirements of the Chesapeake Bay Preservation Act apply. The Municipal & Industrial Water Supply contained within the normal pool has never been utilized because of poor water quality.

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of Mills Creek Dam will be done in accordance with all of the requirements and restrictions that are necessary. Augusta County is responsible for assuring compliance and for obtaining any necessary permits and certificates. Lowering the water level of the lake will have no impact on the Chesapeake Bay. The flood storage of this structure will be increased due to the removal of the water supply component.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Riparian Areas

Existing Condition: Currently there is an extensive forested riparian area surrounding the lake and along Mills Creek upstream and downstream of the lake. Riparian areas can include wetlands, seeps, bogs, and springs as well as stream channels, lakes and ponds.

No Federal Action (Sponsor's Rehabilitation): Because the new permanent pool will be lower than the original water elevation, approximately 10.6 acres will be above the waterline. Of these, about two acres are steep and rocky and are not likely to have vegetation. The remaining 8.6 acres will be revegetated to perennial vegetation in accordance with USDA Forest Service recommendations.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Social Issues

Existing Conditions: There were no social issues identified in the watershed.

No Federal Action (Sponsor's Rehabilitation): No social changes in the watershed are anticipated to occur as a result of the rehabilitation process.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Soil Resources

Existing Conditions: About 19.3% (11.2 acre-feet) of the lake's available submerged sediment storage capacity has been filled. The historic sediment accumulation rate for submerged sediment is 0.24 acre-feet per year. There was an additional 5.37 acre-feet of aerated sediment in the flood pool (31.6% of available capacity). This sediment has a measured accumulation rate of 0.12 acre-feet per year.

In the left abutment of the outlet section of the auxiliary spillway, there is some soil material that erodes from the site during normal rainfall events. According to the NRCS geologist, this is one of several places in the area where there are pockets of soil material in the rock wall. Erosion of this material is not a threat to the integrity of the auxiliary spillway or the dam. At the present time, soil material eroded from the auxiliary spillway area is deposited in the wetlands downstream of the dam.

No Federal Action (Sponsor's Rehabilitation): Because of the nearly complete forestation of the watershed, the future submerged sediment accumulation rate is expected to be 0.36 acre-feet per year. The future sedimentation rate for aerated sediment is 0.18 acre-feet per year. These sedimentation rates include a 1.5 factor of safety to account for the potential effects of deforestation in a fire or insect infestation. The dam will provide sediment storage for 205 years after rehabilitation. The anticipated total accumulated sediment volume of 27 acre-feet is material that would not be deposited in Mills Creek, Back Creek, or the South River in the 50 years after rehabilitation. The sediment that is currently in the floodpool is upstream of the planned pool

The loose soil material on the left abutment of the auxiliary spillway outlet will be vegetated to reduce the amount of material available for transport during normal rainfall events. Erosion of this area during normal rainfall events is expected to continue to occur until the pockets of soil material have been removed, leaving exposed rock. To reduce the amount of sediment delivered to the downstream wetlands, the access road below the auxiliary spillway will be graded so that sediment eroded from the auxiliary spillway outlet during normal rainfall events will be directed toward Mills Creek rather than toward the wetland areas. Auxiliary spillway flow events will not occur until the 200-year, 24-hour rainfall event has been exceeded. In an event of this magnitude, soil material eroded from the auxiliary spillway will be carried downstream until the flow dissipates.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Threatened and Endangered Species

Existing Conditions: According to the DGIF database, there are three Federal Threatened (FT) and four State Endangered (SE) species likely to occur within a two mile radius of the Mills Creek Dam site. There have been confirmed sightings of Swamp Pink (FTSE) in the immediate vicinity of the dam.

No Federal Action (Sponsor's Rehabilitation): Swamp Pink is sensitive to sedimentation and habitat degradation. Rehabilitation of the dam is likely to adversely affect the hydrology downstream of the dam. Conservation measures, as recommended by the USFWS, will be implemented in order to minimize the adverse effect. These measures are described in the USFWS letter in Appendix A. There may be opportunities to improve long term conditions for the plant by modifying the access road downstream of the auxiliary spillway and by reestablishing access road drainage to reduce sediment delivery to nearby colonies.

Rehabilitate Dam: Same as No Federal Action (Sponsor's Rehabilitation).

Water Quality

Existing Conditions: Mills Creek is listed as severely impaired in the 2008 305(b)/303(d) Virginia Water Quality Assessment Report. The impairment is high acidity that apparently comes from atmospheric deposition. This is based upon the results from the USDA Forest Service water quality monitoring station (Station 5084) located at the lower end of Mills Creek. In the upper reaches, the water quality is sufficient to support a native brook trout population and a put-and-take trout fishery.

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of the dam will not significantly alter the present water quality in the watershed. With the required erosion and sediment control measures, there should be minimal impacts on water quality associated with construction. Prior to construction, silt fences will be placed upslope of all wetlands on the site. All disturbed areas will also be protected. This includes the turn-out and staging areas, the principal spillway outlet, and around the stockpiled material in the pool area. No long-term impacts on downstream water quality from rehabilitation activities are anticipated since both the temperature of the water and the amount of sediment trapped by the dam will return to their preconstruction condition after rehabilitation.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Water Resources (including aquifers)

Existing Conditions: Water-based recreation is limited due to restrictions on site access. The water in the lake is available for use in fire fighting. Problems with ground water resources have not been identified as a concern.

No Federal Action (Sponsor's Rehabilitation): The surface area of the lake will decrease in size from 17.4 acres to 6.8 acres. The water in the lake will still be available for use in fire fighting.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Waters of the U.S.

Existing Conditions: Mills Creek, the Mills Creek reservoir, and the associated wetlands are waters of the U.S.

No Federal Action (Sponsor's Rehabilitation): No changes are anticipated.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Wetlands, Streams and Lakes

Existing Conditions: Mills Creek is the sole source of water for the Mills Creek Lake. Below the dam, wetlands begin 25 feet downstream from the toe of the dam and continue intermittently to Coal Road (approximately one mile) along the valley floor adjacent to Mills Creek. These wetlands are classified as palustrine forested wetlands and are associated with surface water runoff and ground water discharge. Numerous perennial springs were observed along the access road and in the area downstream of the dam. At the present time, none of these wetlands have been officially delineated and confirmed by the USACOE..

No Federal Action (Sponsor's Rehabilitation): Rehabilitation of the dam will decrease the permanent surface area of the lake to 6.8 acres. Flow from the Mills Creek watershed above the lake will continue to supply the stream below the lake with no change to the base flow rate. The wetlands along the access road will be protected from dust and runoff by the installation of erosion control measures during construction (See Appendix C). The long-term conditions of the wetlands downstream of the dam will be improved because the increase in flood storage capacity will reduce the potential for auxiliary spillway flow and its associated erosion and sedimentation. There may be additional opportunities to improve long-term conditions for the Swamp Pink by modifying the access road downstream of the auxiliary spillway and by reestablishing access road drainage to reduce sediment delivery to nearby colonies. The spring located at the downstream toe of the dam will be captured in a vent and piped to a position downstream of the new access road where it will re-enter its original channel.

Rehabilitate Dam: Same as the No Federal Action (Sponsor's Rehabilitation).

Wild and Scenic Rivers

There are no wild and scenic rivers associated with Mills Creek Lake.

Cumulative Effects

Three dams in the South River Watershed have already been rehabilitated with NRCS assistance. The cumulative effect of these projects maintains the existing social, economic, and environmental conditions of the community. There are no other known projects in the watershed. Under both the No Federal Action alternative and the Recommended alternative for the Mills Creek Dam, the dam will be rehabilitated. The rehabilitation of the Mills Creek Dam would also have the effect of maintaining the existing social, economic and environmental conditions of the community. The rehabilitation of this dam would result in a significant reduction in the threat to loss of life for area residents. The emergency action plan will be modified due to the change in hazard class. In accordance with recommendations from the USFWS, measures will be taken to minimize the potential adverse affects on the Swamp Pink.

COMPARISON OF ALTERNATIVE PLANS

Table H summarizes the effects of each alternative considered. Refer to the Effects of Alternative Plans section for additional information.

Table H - Summary and Comparison of Candidate Plans

Effects	Future Without Federal Project No Federal Action - Sponsor's Rehabilitation	Future With Federal Project Structural Rehabilitation with Federal Assistance, the Recommended Plan (NED Plan)
Sponsor Goals	Continue to provide flood protection, reduce liability	Continue to provide flood protection, reduce liability
Structural	Upgrade dam to meet dam safety criteria	Upgrade dam to meet dam safety criteria
Total Project Investment - Mills Creek	\$3,364,200	\$3,364,200
National Economic Development Account		
Total Beneficial Annualized (AAEs*)	---	\$154,400
Total Adverse Annualized (AAEs*)	---	\$154,400
Net Beneficial	---	\$0
Benefit/Cost Ratios	---	1.0 to 1.0
Estimated OM&R (AAEs)**	---	\$2,400
Environmental Quality Account		
Air Quality	No long-term effects; short-term effects during construction will be minimized.	No long-term effects; short-term effects during construction will be minimized.
Coral Reefs	None present.	None present.
Ecologically Critical Areas	No effect anticipated.	No effect anticipated.
Essential Fisheries	Permanent pool size will be reduced.	Permanent pool size will be reduced.
Fish & Wildlife Habitat (including migratory birds)	Decrease permanent pool from 17.4 acres to 6.8 acres. Will continue to be coldwater fishery. 8.6 acres of terrestrial habitat added.	Decrease permanent pool from 17.4 acres to 6.8 acres. Will continue to be coldwater fishery. 8.6 acres of terrestrial habitat added.
Forest Resources	0.4 acres of trees will be removed.	0.4 acres of trees will be removed.
Invasive Species	Steps will be taken to avoid introduction or spreading during construction.	Steps will be taken to avoid introduction or spreading during construction.
Land Use	No effect.	No effect.
Natural Areas	No effect.	No effect.
Parkland	None present.	None present.
Prime & Unique Farmlands	None present.	None present.
Regional Water Resources Plans/Coastal Zone Management Areas	Work will be done in accordance with the Chesapeake Bay Act. Water supply capacity removed.	Work will be done in accordance with the Chesapeake Bay Act. Water supply capacity removed.
Riparian Areas	Increased by 8.6 acres around the perimeter of the lake	Increased by 8.6 acres around the perimeter of the lake.

Effects	Future Without Federal Project No Federal Action - Sponsor's Rehabilitation	Future With Federal Project Structural Rehabilitation with Federal Assistance, the Recommended Plan (NED Plan)
Soil Resources	Trap 0.54 ac-ft of sediment annually.	Trap 0.54 ac-ft of sediment annually.
Threatened and Endangered Species	Likely to adversely affect the Swamp Pink	Likely to adversely affect the Swamp Pink
Water Quality	No long-term effect. Erosion and sediment control measures will be used to protect water quality.	No long-term effect. Erosion and sediment control measures will be used to protect water quality.
Water Resources (including aquifers)	No anticipated effect on recreation or ground water	No anticipated effect on recreation or ground water
Waters of the U.S.	No effect.	No effect.
Wetlands, Streams and Lakes	Surface area of lake will decrease. Potential adverse effects on wetlands	Surface area of lake will decrease. Potential adverse effects on wetlands
Wild & Scenic Rivers	None present.	None present.
Other Social Effects Account		
Floodplain Management; Flood Damages	Increased flood protection; no induced damages downstream.	Increased flood protection; no induced damages downstream.
Historic, Cultural & Scientific Resources	No effect.	No effect.
Local Economy	Some short-term benefits during construction.	Some short-term benefits during construction.
Public Health & Safety	Decrease potential for loss of life from dam breach.	Decrease potential for loss of life from dam breach.
Public Recreation	Opportunities maintained.	Opportunities maintained.
Social Issues	No effect.	No effect.
Environmental Justice and Civil Rights Impacts	No disparate treatment.	No disparate treatment.

* Per 1.7.2 (a) (4) (ii) of the “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” (P&G), U.S. Water Resources Council, March, 1983, allowing for abbreviated procedures, damage reduction and recreation benefits have not been displayed because they are the same for both alternatives and no net change in benefits occurs when comparing the two candidate plans to each other. The federally assisted alternative is displayed within a zero-based accounting context that credits local costs avoided (Total Adverse Annualized for the Future Without Federal Project scenario) as adverse beneficial effects (Total Beneficial Annualized) consistent with P&G 1.7.2(b)(3). Although the average annual benefits of rehabilitation are \$154,400, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1. “AAEs” stands for Average Annual Equivalents which are based on a 4.375% discount rate and a 52 year period of analysis.

** OM&R – Operation, Maintenance and Replacement Costs include replacement of some topsoil and vegetation over the control section of the auxiliary spillway, once in the anticipated useful life of the structure.

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

IDENTIFICATION OF NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN

Detailed evaluation of the candidate plans to rehabilitate Mills Creek indicate that they have identical scope, substantially equivalent costs and equal effects. The rehabilitation with federal assistance is the most locally acceptable alternative and best serves the local Sponsor in achieving the needs and purpose of this rehabilitation. Therefore, the federal assistance alternative is selected as the recommended plan or NED plan. Per the Federal Principles and Guidelines document and NRCS National policy, when the Future Without Federal Project is the same as the Future With Federal Project, the local costs avoided are credited as benefits. This renders the federally assisted alternative as having zero net benefits. Net benefits are zero because, by policy, the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1. The results displayed in Table H are presented within a zero-based accounting context to highlight the costs and benefits associated with the recommended alternative alone. Within a zero-based accounting framework, the “Total Adverse Annualized” value associated with the Future Without Federal Project is displayed as the “Total Beneficial Annualized” in the Future With Federal Project column.

RISK AND UNCERTAINTY

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

A Special Use Permit was granted by the USDA Forest Service to construct, operate, and maintain this dam. However, a Special Use Permit amendment is required for this project and will be applied for by Augusta County with final plans and permits. The USDA Forest Service will analyze this application to ensure the compliance with the George Washington Revised Land and Resource Management Plan and the Endangered Species Act. USDA Forest Service ownership of the land at and around the dam ensures that there will be no development below the top of the dam. This meets NRCS policy.

No changes in water quality or upstream wetlands are anticipated due to this project. There may be some adverse affects on the downstream wetlands and on the Swamp Pink.

The sediment rate projected for the life of the project is based on the historic forested condition of the watershed. A factor of safety was added to account for deforestation from fire or disease.

The objective of this project is to meet applicable NRCS and Virginia public health and safety standards associated with this watershed dam. From a financing and administrative standpoint, the Sponsor has committed to NRCS that they are able to fund 35 percent of the total project costs to complete installation of the selected alternative and to perform the required maintenance on the upgraded structure for 50 years after construction. Statistically, there is about a 0.5%

chance in any given year that the auxiliary spillway would flow during the anticipated life of the rehabilitated structure. However, it is possible for several events to occur during this time period. The Sponsor may choose to cover the ACBs with a foot of topsoil and vegetation. If flow in the auxiliary spillway for a single event is assumed to remove all the topsoil and vegetation without damage to the blocks themselves or to any other component of the auxiliary spillway, the estimated repair cost would be about \$19,000. This is the topsoil and seeding cost alone and it has been included in the evaluated alternatives. If gravel backfill is used, the costs would be lower. The estimates do not include any costs for offsite damages incurred. Lesser events will have smaller costs. Routine maintenance is not included in these amounts, but is included in the estimated costs of the candidate plans.

RATIONALE FOR PLAN SELECTION

The recommended plan is to rehabilitate the dam to meet current NRCS and the Commonwealth of Virginia safety and performance standards. The recommended plan meets the identified purposes and needs for the project and significantly reduces the potential risk to human life. The project Sponsor, local residents, and state and local government agencies all prefer the Recommended Plan because it:

- Minimizes the threat to loss of life to approximately 140 people that live in the 57 single family homes and trailers within the breach inundation zone.
- Minimizes the threat to loss of life to the estimated 215 people who work or worship at three businesses and five churches.
- Provides protection for 5,675 vehicles on a daily basis that utilize Mt. Torrey Road (3,400 vehicles), Howardsville Turnpike (1,400 vehicles), China Clay Road (450 vehicles), Back Creek Road (200 vehicles), Mills Creek Road (150 vehicles), and Coal Road (75 vehicles).
- Provide protection for water and telephone service.
- Provides increased downstream flood protection for the people living in the area, as well as those working, recreating, or traversing within the downstream floodplains for an additional 50 years.
- Eliminates the liability associated with continuing to operate an unsafe dam.
- Traps 0.54 acre feet of sediment annually, thereby improving downstream water quality.
- Maintains existing stream habitat downstream of the dam.
- Retains fish and wildlife habitat in and around the lake.
- Leverages federal resources to install the planned works of improvement.
- Minimize adverse effects on and possibly improve the potential for long term success of a federally threatened plant species.

The selected alternative meets the Sponsor's objectives of bringing this dam into compliance with current dam design and safety criteria, maintaining the current 100-year floodplain, and addressing resource concerns identified by the public. The selected plan is the NED Alternative. The plan reasonably meets the following four criteria: completeness, effectiveness, efficiency, and acceptability. NRCS and the Sponsor are in agreement on the recommended plan.

CONSULTATION AND PUBLIC PARTICIPATION

Augusta County Service Authority was the original Sponsoring organization. They had been responsible for the operation and maintenance of the Mills Creek Dam, since it was built. In 2006, Augusta County replaced the Service Authority as the Sponsor. Augusta County contracts the Operation and Maintenance of this structure through the Headwaters Soil and Water Conservation District (SWCD). Interest and support for rehabilitating the dam began in 2003 when the Augusta County Service Authority began studies of the dam. Augusta County continued studies and plan development by hiring consultants to evaluate the hazard classification and subsequently develop a preliminary engineering report and preliminary engineering plans for spillway modifications to meet dam safety requirements. This was followed in October 2003 with the first issuance of a Conditional Certificate (Class II) by the Virginia Division of Dam Safety. Class I Conditional Certificates were issued in 2005, 2007 and 2008. Following the passage of Public Law 106-472 in November of 2000, federal funds became available to eligible applicants. NRCS received an application for dam rehabilitation assistance on June 28, 2004.

Local, State and Federal support for the rehabilitation of the Mills Creek Dam has been strong. Input and involvement of the public has been solicited throughout the planning of the project. At the initiation of the planning process, meetings were held with representatives of the Augusta County Board of Supervisors and the Headwaters SWCD to ascertain their interest and concerns regarding the dam. The Sponsor has worked with the local landowners and residents to provide information on the planning activities and solicit their input on the pertinent issues being considered during planning. The Sponsor worked to provide all residents, including minorities, with information on the planning effort and intended works of improvement.

The US. Forest Service agreed to be a cooperating agency with NRCS in this planning effort.

The first public meeting was held on December 3, 2009 at the Sherando-Lyndhurst Ruritan Hall in Lyndhurst, Virginia. Local, state and federal perspectives on the rehabilitation needs of the Mills Creek Dam were provided to the 42 meeting attendees. The public was informed of the dam rehabilitation program and potential alternative solutions to bring the dam into compliance with current dam safety and design criteria. Meeting participants provided input on their issues and concerns to be considered during the planning process.

A scoping meeting was held on December 3, 2009 at the Augusta County Government Center in Verona, Virginia to identify issues of economic, environmental, cultural and social concerns in the watershed. Input was provided by local, regional, state and federal agencies at the meeting or through letters and emails to NRCS. The State Historic Preservation Officer (SHPO) and the USFWS were informed of the scoping meeting, but did not attend or supply comments. Use of the VFWIS program and the VADCR Natural Heritage database did indicate the presence of federally listed threatened and endangered species within a 2-mile radius of the project. The U.S. Fish & Wildlife Service is currently reviewing the project. The USDA Forest Service has completed consultation with the VDHR and has received concurrence on their findings.

A second public meeting was held on April 12, 2010, at the Sherando-Lyndhurst Ruritan Hall. Information provided to meeting attendees included a summary of the current situation of the dam; planning efforts to date; the various alternatives considered during planning; and a detailed explanation of the recommended alternative for dam rehabilitation. Attendees understood the

need for the rehabilitation. A fact sheet was developed and distributed which addressed frequently asked questions regarding rehabilitation of the dam. Twenty-nine people attended this 2nd public meeting; watershed residents composed most of the turnout. A follow-up mailing was done to provide additional information to the attendees.

A Draft Plan was distributed for interagency and public review on July 13, 2010. Copies of the document were placed in local libraries and news articles placed in local newspapers which solicited comments from the public during the comment period. After a 45-day review period, comments received on the draft were incorporated into the Final Plan. Letters of comment received on the draft plan and NRCS responses to the comments are included in Appendix A.

RECOMMENDED PLAN

SUMMARY AND PURPOSE

This supplemental plan documents the planning process by which the NRCS provided technical assistance to the local Sponsor and the public in addressing resource issues and concerns relative to the rehabilitation of Mills Creek.

The recommended plan is to rehabilitate the dam. By doing this, the level of flood protection will be increased, property values are protected, and the threat to loss of life is reduced. The recommended plan of action for the dam is outlined below:

- Lower the elevation of the auxiliary spillway control section by three feet and increase the crest length to 200 feet.
- Armor the control section and the constructed outlet section with ACBs. Install a concrete wall at the outlet end of the ACBs as an anchor point.
- Install a 150-foot long earthen training dike in the inlet section of the auxiliary spillway.
- Augment the existing earthen training dike with a 350-foot long concrete wall that will start about 50 feet downstream of the centerline of the dam and extend to the valley floor. Install a 70-foot long earthen dike along the valley floor to protect the toe of the dam from auxiliary spillway flows.
- Re-route a section of the access road around the end of the earthen berm.
- Capture the water from the spring at the toe of the dam and pipe the water under the new access road to outlet into its original channel.
- Remove the principal spillway riser and all gates and supply/drain pipes.
- Install a new concrete riser at an elevation of 1838.0. This will lower the water level in the lake by 24 feet and remove all of the water supply storage.
- Install a new drain gate at the foot of the riser and connect the riser to the existing principal spillway pipe by installation of 130 feet of reinforced concrete pipe.
- Replace the concrete outlet structure with a riprap stilling basin.
- Install a toe drain collection system with monitoring wells at the downstream toe of the embankment.
- Vegetate the auxiliary spillway outlet section to reduce erosion.
- Improve access roads and drainage design to reduce short and long term sediment delivery to the Swamp Pink habitat.

After the implementation of these planned works of improvement, Mills Creek will meet all current NRCS and State of Virginia dam safety and performance standards.

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

EASEMENTS AND LANDRIGHTS

No additional easements or landrights are needed. However an amendment to the Special Use Permit from USDA Forest Service will be required.

MITIGATION

NRCS will plant vegetation in the riparian area exposed by the change in permanent pool elevation. In addition, NRCS will pay a small tree removal fee to the USDA Forest Service for the approximately 0.4 acres of trees that will be removed to meet State dam safety criteria and to allow installation of the training dike.

Although sections of Mills Creek below the dam are “dry” because water fluctuates from surface to sub-surface, it is still classified a perennial stream. To the extent possible, measures will be taken to ensure the constant flow of water through the dam.

The NRCS will follow the guidance provided by the USFWS regarding Swamp Pink during the construction phase in order to minimize the impacts on Swamp Pink colonies. The land manager, USDA Forest Service, will provide consultation, as needed.

PERMITS AND COMPLIANCE

Installation of the recommended plan will bring the dam into compliance with current NRCS and Virginia dam safety and design criteria. Prior to construction, the Sponsor will be responsible for obtaining an alteration permit from the Virginia Soil and Water Conservation Board, a 404 permit from the Army Corps of Engineers, a Virginia Water Quality Certification from the Virginia Department of Environmental Quality, any needed subaqueous lands permits from the Virginia Marine Resources Commission, a Special Use Permit amendment from the USDA Forest Service, and any other required permits. During construction, the successful contractor is required to develop a Stormwater Pollution Prevention Plan which includes applicable erosion and sediment control measures. All work will be done in compliance with the guidance provided by the USFWS. As required by the Virginia Division of Dam Safety, the Contractor will prepare an Emergency Action Plan for the construction site.

If cultural resources are discovered during installation, the work will be halted and the SHPO will be notified. Appropriate investigation procedures will be initiated.

The Sponsor will be responsible for obtaining the certification of compliance from the Virginia Division of Dam Safety upon completion of the project.

COSTS

As indicated in Table 1, the total project cost of the recommended plan is \$3,364,200. Of this amount, PL-106-472 funds will bear \$2,315,700 and nonfederal funds will bear \$1,048,500. Given that certain costs are excluded from calculation of the Sponsor’s contribution, the actual cash cost to the local Sponsor required for construction costs is an estimated \$1,040,000. Table 2 shows details of the costs and cost-share amounts by category. Total annualized costs are shown in Table 4 along with the estimated costs for operation and maintenance. Table 5 displays the average annual flood damage reduction benefits by flood damage categories, and Table 6 displays a comparison of annual costs and benefits. A 2010 price base was used and amortized at 4.375 percent interest for the 52 year period of analysis (including a design and installation period of one year each and an expected useful life of 50 years).

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

INSTALLATION AND FINANCING

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

The NRCS will provide assistance to the Sponsor with the Mills Creek Dam rehabilitation project. NRCS will be responsible for the following:

- Execute a project agreement with the Sponsor 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 through a federally awarded contract.
- Execute a Memorandum of Understanding with the Sponsor to provide a framework within which cost-share funds are accredited.
- Execute an updated Operation and Maintenance Agreement with Augusta County for the dam. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Provide financial assistance equal to 65% of total eligible project costs, not to exceed 100% of actual construction costs.
- Verify that a current Emergency Action Plan is developed before construction is initiated.
- Provide consultative engineering support, technical assistance, and approval during the design and construction of the project.
- Certify completion of all installed measures.

Augusta County will be responsible for the following:

- Secure all needed environmental permits, easements, and rights for installation, operation and maintenance of the rehabilitated structure.
- Prepare an updated Emergency Action Plan for the dam prior to the initiation of construction.
- Execute an updated Operation and Maintenance Agreement with NRCS for the dam. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Execute a Memorandum of Understanding with NRCS to provide a framework within which cost-share funds are accredited.
- Execute a project agreement with NRCS 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.
- Provide nonfederal funds for cost-sharing of the project at a rate equal to, or greater than, 35% of the total eligible project costs.
- Provide local administrative and contract services necessary for installation of the project.

- Acquire a Safe Dam Permit from the State of Virginia upon completion of the planned measures.
- Acquire an updated Special Use permit from the USDA Forest Service.
- Participate in and comply with applicable Federal floodplain management and flood insurance programs.
- Enforce all associated project easements and rights-of-way.

Table I. Schedule of Obligations

Year Number	Year	Activity	PL-566 Costs	Other's Costs	Total Costs
1	2011	Design	\$150,900	\$0	\$150,900
2	2012	Construction	\$2,164,800	\$1,048,500	\$3,213,300
Totals:			\$2,315,700	\$1,048,500	\$3,364,200

Price base: May, 2010

OPERATION, MAINTENANCE, AND REPLACEMENT

Measures installed as part of this plan, and previously installed measures, will be operated and maintained by Augusta County with technical assistance from federal, state, and local agencies in accordance with their delegated authority. A new Operation and Maintenance agreement will be developed for Mills Creek and will be executed prior to signing a project agreement for the construction of the project. The term of the new O&M agreement will be for the projected life of the rehabilitated structure, plus two years of project design and installation, for a total of 52 years. The agreement will specify responsibilities of the Sponsor and include detailed provisions for retention, use, and disposal of property acquired or improved with PL-106-472 cost sharing. Provisions will be made for free access of district, state, and federal representatives to inspect all structural measures and their appurtenances at any time.

CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE IMPACT ANALYSIS

Rehabilitation of the dam will have positive economic and social effects across all residents within the floodplain. Since vehicle operators also are significant beneficiaries of the proposed rehabilitation, it is reasonable to conclude that protection of the roads and bridges will benefit all racial, ethnic, and socio-economic groups within the watershed. Avoiding a dam breach will directly benefit all residents within the watershed and taxpayers in general within Augusta County and the Commonwealth of Virginia.

There are no known disparate impacts from the rehabilitation project. It was explained to local residents that rehabilitation of the dam would increase their downstream flood protection while reducing the risk to life and property that might occur from a dam breach.

EFFECTS OF RECOMMENDED PLAN ON RESOURCES

Table J lists the effects of the recommended plan on Resources of Principal National Recognition.

Table J - Effects of the Recommended Plan on Resources of Principal National Recognition

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Air Quality	Clean Air Act, as amended (42 U.S.C. 1857h-7 et. seq.)	No change except during the construction period.
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended, (16 U.S.C. 1451, et seq.)	N/A
Threatened and Endangered Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	Likely to adversely affect Swamp Pink
Fish and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	Temporary effects during construction. Permanent decrease in aquatic habitat and increase in riparian habitat due to change in lake size. Possible introduction and spreading of NNIS.
Floodplains	Executive Order 11988, Floodplain Management	Maintain flood protection for 50 more years.
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended, (16 U.S.C. Sec. 470, et seq.)	No known archaeological resources or historic properties affected.
Prime and Unique Farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act. Farmland Protection Policy Act of 1981, (7 U.S.C. 4201 et seq.)	None present in the project area.
Water Quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	Improve downstream water quality by continuing to trap 0.54 acre feet of sediment each year, vegetating the auxiliary spillway outlet, and installing E&S control measures.

Table J - Effects of the Recommended Plan on Resources of Principal National Recognition (Con't)

Types of Resources	Principal Sources of National Recognition	Measurement of Effects
Wetlands	Executive Order 11990, Protection of Wetlands; Clean Water Act of 1977 (42 U.S.C. 1857H-7, et seq.)	Likely to adversely affect wetlands.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended, (16 U.S.C. U.S.C. 1271 et seq.)	None present in the project area.
Economic	N/A	Increased level of flood protection for downstream residents for another 50 years. Maintain existing recreation values.
Fisheries	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	Permanent reduction in lake size.
Forestry	N/A	Approximately 0.4 acres of trees will be removed downstream and adjacent to the dam.
Recreation	N/A	The surface area of the reservoir will be reduced from 17.4 to 6.8 acres.
Riparian Zone	N/A	Riparian vegetation will have a net increase of approximately 8.6 acres.

Table 1 - Estimated Installation Cost
 South River Dam No. 10A, Virginia
 (Dollars)^{1/}

Installation Cost Items	Estimated Costs		
	PL-106-472 Funds ^{2/}	Other Funds ^{3/}	Total
Structural measures to rehabilitate floodwater retarding dam: South River Dam No. 10A:	\$2,315,700	\$1,048,500	\$3,364,200
Total Project:	\$2,315,700	\$1,048,500	\$3,364,200

^{1/} Price base: May 2010

^{2/} Paid by the USDA/NRCS – the Federal agency responsible for assisting in installation of improvements.

^{3/} Other funds: \$5,000 in local Sponsor planning costs have been excluded from Table 1 and Table 2 per NRCS policy to exclude non-federal technical assistance for planning from the estimated installation cost. These costs are included in the watershed agreement for calculating cost-share between the NRCS and the local Sponsor.

Prepared: May 2010

Table 2 - Estimated Cost Distribution – Structural Measures
 South River Dam No. 10A, Virginia
 (Dollars)^{1/}

Installation Cost Items	Installation Cost: PL-106-472 Funds ^{2/}			Installation Cost: Other Funds ^{3/}					Total Project Cost ^{4/}	
	Construction Costs	Engineering Technical Assistance Costs	Project Administration Costs	Total PL-106-472 Cost	Construction Costs	Engineering Costs	Required Permits	Project Administration Costs		Total Other Funds
South River Dam No. 10A	\$1,955,500	\$301,900	\$58,300	\$2,315,700	\$1,040,000	\$2,000	\$500	\$6,000	\$1,048,500	\$3,364,200
Totals:	\$1,955,500	\$301,900	\$58,300	\$2,315,700	\$1,040,000	\$2,000	\$500	\$6,000	\$1,048,500	\$3,364,200

^{1/} Price base: May 2010

^{2/} Federal funds: 65% of total project cost (the actual federal cost/share excludes technical assistance and permit costs and cannot exceed 100% of the actual construction cost).

^{3/} Other funds: 35% of total project cost.

^{4/} 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.

Prepared: May 2010

Table 3 – Structural Data for Rehabilitated Dam
Mills Creek Dam No. 10A, Virginia

ITEM	UNIT	AMOUNT
Hazard Class of Structure	-	High
Seismic Zone	-	2
Total Drainage Area	Sq. Mi.	3.84
Time of Concentration	Hours	2.2
Antecedent Moisture Condition II Runoff Curve Number	-	56
Elevation, Top of Dam	Feet, MSL	1897.5
Elevation, Auxiliary Spillway Crest	Feet, MSL	1884.3
Elevation, Principal Spillway Orifice Crest	Feet, MSL	1838
Auxiliary Spillway Type	-	Vegetated ¹
Auxiliary Spillway Bottom Width	Feet	100
Auxiliary Spillway Exit Slope	%	4
Maximum Height of Dam	Feet	91.5 ²
Volume of Fill (Rehabilitation)	Cu. Yd.	2,570 ³
Total Capacity	Ac.-Ft.	844.5
Sediment Submerged	Ac.-Ft	73.8 ⁴
Sediment Aerated	Ac.-Ft	36.9 ⁴
Water Supply	Ac-Ft	0
Floodwater Retarding Pool	Ac.-Ft	733.8
Surface Area		
Sediment Pool	Acres	6.8
Floodwater Retarding Pool	Acres	26.6
Principal Spillway Design		
Rainfall Volume (1 day)	Inches	8.59
Rainfall Volume (10 day)	Inches	12.82
Runoff Volume (10 day)	Inches	6.0
Capacity at Crest of Auxiliary Spillway	CFS	87.3
Conduit Size	Inches	24
Conduit Type	-	Concrete
Frequency of Operation, Auxiliary Spillway	Annual % chance	Less than 1
Auxiliary Spillway Hydrograph		
Rainfall Volume	Inches	11.2
Runoff Volume	Inches	5.3
Storm Duration	Hours	6
Velocity of flow (V_c)	Ft/s	10.7
Maximum Surface Elevation	Feet, MSL	1887.7
Freeboard Hydrograph (6-hr PMP)		
Rainfall Volume	Inches	28.0
Runoff Volume	Inches	20.38
Storm Duration	Hours	6
Maximum Surface Elevation	Feet, MSL	1897.0
Capacity Equivalents		
Sediment	Inches	0.5
Floodwater Retarding	Inches	3.6

¹ Vegetated auxiliary spillway with ACBs for stability.

² Height measured at centerline. Height to toe of embankment is 96.5 feet.

³ No fill associated with raising the dam, only with adding the inlet training dike

⁴ Sediment storage is for 205 years.

Table 4 - Average Annual National Economic Development (NED) Costs
 South River Dam No. 10A, Virginia
 (Dollars)^{1/}

	Amortized Installation Costs in Average Annual Equivalent terms ^{2/}	Annual Operation and Maintenance Costs in Average Annual Equivalent terms	Total Average Annual Equivalent Cost
Rehabilitation of South River Dam No. 10A	\$152,000	\$2,400	\$154,400
Totals:	\$152,000	\$2,400	\$154,400

^{1/} Price base: May 2010

Prepared: May 2010

^{2/} Average annual equivalents based on a 4.375% discount rate and a 52 year period of analysis (2 years for project design/installation and 50 years of expected useful life).

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits
 South River Dam No. 10A, Virginia
 (Dollars)^{1/}

Flood Damage Category	Estimated Average Annual Equivalent Damages		Damage Reduction Benefits ^{2/}
	Without Federal Project	With Federal Project	Average Annual Equivalents
Structure Damages:	\$760	\$760	\$0
Content Damages:	\$390	\$390	\$0
Infrastructure Damages:	\$680	\$680	\$0
Private Clean-up Costs:	\$30	\$30	\$0
Public Clean-up Costs:	\$20	\$20	\$0
Traffic and Added Emergency Service Disruption Costs:	\$20	\$20	\$0
Public Administration Costs:	\$15	\$15	\$0
Lost Business and Personal Income Costs:	\$90	\$90	\$0
Vehicle Damage Costs:	\$95	\$95	\$0
Lost Recreation Value:	\$0	\$0	\$0
Lost Property Value:	\$0	\$0	\$0
Totals (rounded):	\$2,100	\$2,100	\$0

^{1/} Price base: May 2010

Prepared: May 2010

^{2/} Damage reduction benefits resulting from recommended plan equal zero as compared to the no federal action alternative because they are the same in scope, cost and effects, and therefore yield equivalent benefits. Agricultural damages/benefits represent less than 1% of total damages.

Table 6 - Comparison of NED Benefits and Costs
 South River Dam No. 10A, Virginia
 (Dollars)^{1/}

Evaluation Unit	Benefits		Total Average Annual Equivalent Benefits	Costs	Net Change	Benefit/ Cost Ratios
	Average Annual Equivalent Benefits ^{2/}			Average Annual Equivalent Costs	Net Average Annual Equivalent Benefits	
	Damage Reduction Benefits	Other Benefits ^{3/}				
South River Dam No. 10A	\$0	\$154,400	\$154,400	\$154,400	\$0	1.0 to 1.0
Totals:	\$0	\$154,400	\$154,400	\$154,400	\$0	1.0 to 1.0

^{1/} Price base: May, 2010;

Prepared: May, 2010

^{2/} Average annual equivalents are based on a 4.375% discount rate and a 52 year period of analysis (2 year for project design/installation and 50 years of expected minimum useful life).

^{3/} The costs and benefits of the Future With Project Plan are the same as those for the Future Without Project Plan. To maintain consistency with the display in Table 4, the costs associated with the No Action Alternative are tracked as a benefit of the Preferred Alternative per 1.7.2 (a) (4) (ii) of the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&G), U.S. Water Resources Council, March, 1983, allowing for abbreviated procedures, damage reduction and recreation benefits have not been displayed because they are the same for both alternatives and no net change in benefits occurs when comparing the two candidate plans to each other. The federally assisted alternative is displayed within a zero-based accounting context that credits local costs avoided (Total Adverse Annualized for the Future Without Federal Project scenario) as adverse beneficial effects (Total Beneficial Annualized) consistent with P&G 1.7.2(b)(3). Although the average annual benefits of rehabilitation are \$154,400, net benefits are zero because the total project cost is equal to the claimed benefits and the resulting B/C ratio is 1:1.

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INDEX OF KEY WORDS AND PHRASES

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REPORT PREPARERS

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

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

NRCS NATURAL RESOURCES PLANNING TEAM

<u>Name</u>	<u>Present Title and Years in Current Position</u>	<u>Education</u>	<u>Previous Experience</u>	<u>Other</u>
Blaine Delaney	Watershed Program Coordinator - 1	B.S. Agricultural Engineering	RC&D Coordinator – 17 yrs. Conservationist – 9 yrs. Shoreline Engineer – 1 yr. Hydrologist – 1 yr.	
David L. Faulkner	Natural Resource Economist – 21	M.S. Ag. Economics B.S. Ag. Education	Agric. Economist (SCS) - 2.5 yrs. Agric. Economist (USAID) - 4.5 yrs. Agric. Teacher (Peace Corps) – 2 yrs.	
Fred M. Garst	GIS Specialist – 17	B.S. Geology	GIS/Soil Scientist - 7 yrs. Soil Cons. Tech. - 7 yrs. Geologist (Private) – 4 yrs.	
Jeffrey Jones	Natural Resources Specialist – 1	B.S. Natural Resource Management	Natural Resources Specialist – 15 yrs	
Alica J. Ketchem	Plng./Environmental Engineer – 16	M.S. Ag. Engineering B.S. Civil Engineering	Civil Engineer – 10 yrs.	PE
Brian Linvill	Design Engineer – 3	M.S. Ag. Engineering B.S. Ag. Engineering	Civil Engineer – 8 yrs	

<u>Name</u>	<u>Present Title and Years in Current Position</u>	<u>Education</u>	<u>Previous Experience</u>	<u>Other</u>
Mathew J. Lyons	State Conservation Engineer- 9	B.S. Civil Engineering	Civil Engineer – 12 yrs.	PE
Jeffrey D. McClure	Geologist – 6	B.A. Geology B.A. Biology B.S. Geology	NRCS Geologist – total 7 yrs. Geologist (WV Dept. of Env. Prot.) - 11 yrs. Geologist (Private) – 8.5 yrs.	CPG in KY, VA, DE and PA
Kelly Ramsey	Hydraulic Engineer – 5	B.S. Biological Systems Engineering		PE
Gerald Wright	Project Engineer - 4	B.S. Civil Engineering	Civil Engineer - 20	PE, PLS

USDA FOREST SERVICE STAFF

Annemarie Downing	District Ranger – 12	B.S. Forest Management	Forester – 12 Silviculturist – 12	
Dawn Kirk	Fisheries Biologist - 18	B.A. Biology M.S. Fish & Wildlife		
Wayne Larson	Civil Engineer – 1	B.S. Electrical Engineering B.S. Aerospace Engineering	Engineer - 27	PE
Richard Patton	Hydrologist - 30	M.S. Forest Management – Hydrology		
Daniel J. Wright	Wildlife Biologist - 10	B.S. Biology	DOI Park Service - 3	

Special acknowledgment goes to the following people who spent many hours in the Mills Creek Watershed surveying, collecting data, meeting with landowners, and attending public meetings, or providing technical support.

- Augusta County Staff: Doug Wolfe
- Headwaters Soil and Water Conservation District Staff: John Kaylor

APPENDIX A

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

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Comments were requested on the Draft Supplemental Plan – EA from the following agencies and organizations. (To be included in final environmental assessment.)

<u>Federal Agencies</u>	<u>Response Received on Draft Supplemental Plan/EA</u>
Environmental Protection Agency Region III, Philadelphia	No
U.S. Army Corps of Engineers Norfolk District Baltimore District	No No
U.S. Department of the Interior Fish and Wildlife Service Annapolis, Maryland Office Gloucester, Virginia Office	No Yes
Federal Emergency Management Agency Philadelphia	No
U.S. Department of Agriculture Forest Service Farm Service Agency Rural Development	Yes No No
 <u>Virginia State Agencies</u>	
Virginia Department of Environmental Quality Office of Environmental Impact Review (State Clearinghouse) Division of Waste Division of Air	Yes Yes Yes
Virginia Department of Emergency Management	No
Virginia Department of Conservation and Recreation Division of Soil and Water Conservation Division of Dam Safety and Floodplain Management Division of Natural Heritage Division of Planning and Recreation Resources	Yes Yes Yes No

<u>Virginia State Agencies (cont.)</u>	<u>Response Received on Draft Supplemental Plan/EA</u>
Virginia Soil and Water Conservation Board (Governor's Designated Agency)	No
Virginia Department of Agriculture and Consumer Services	No
Virginia Department of Game and Inland Fisheries	Yes
Virginia Marine Resources Commission	Yes
Virginia Department of Historic Resources	Yes
Virginia Department of Transportation	No
Virginia Department of Health	Yes
<u>Other</u>	
Virginia Association of Soil and Water Conservation Districts	No
Headwaters Soil and Water Conservation District	No
Augusta County Department of Community Development	Yes
Board of Supervisors	No
Central Shenandoah Planning District Commission	Yes
City of Waynesboro	No



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

AUG 27 2010

John A. Bricker
State Conservationist
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229-5014

Re: Draft Supplemental Watershed Plan
– Environmental Assessment Mills
Creek Dam, Project# 2010-I-0497,
Augusta County, Virginia

Dear Mr. Bricker:

We have reviewed the draft Supplemental Watershed Plan – Environmental Assessment (EA) for the South River Watershed, dated July 2010 and received by this office on July 15, 2010. This document is the fourth supplement to the original watershed plan for the rehabilitation of South River Dam No. 10A (Mills Creek Dam). The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA) and the Fish and Wildlife Coordination Act (16 U.S.C. 661-667, 48 Stat. 401), as amended.

The proposed action consists of rehabilitating the Mills Creek Dam to meet current safety regulations. The preferred alternative is to replace the principal spillway riser and intake system, which consists of removing the existing riser and all gates and pipes upstream of the riser and replacing them with a new riser and drain gate and removing the outlet structure and replacing it with a plunge pool for energy dissipation. The plan also includes lowering the elevation of the auxiliary spillway by 3 feet (ft), lengthening it by 200 ft, and armoring it with articulated concrete blocks (ACBs), which will be anchored by a concrete wall.

The federally listed threatened swamp pink (*Helonias bullata*) occurs within the project area. The proposed construction staging area is approximately 465 ft upslope of a known population of swamp pink, and the existing access road is 228 ft from the population. Both the access road and a portion of the staging area drain into swamp pink habitat. The existing access road receives minimal traffic; it is primarily used to access the lake for recreational activities. The increased level of ground disturbance from heavy equipment along the access road in conjunction with construction associated with the rehabilitation of the site is likely to result in discharge of sediment into wetlands where swamp pink occurs. Potential sources of sedimentation include the existing site access road, staging area, spillway, and new earthen training dike with associated access road.

Based on the information provided, we do not concur with your preliminary "no affect" determination. As proposed, the project is likely to adversely affect the swamp pink. However, the following avoidance and minimization measures can be incorporated into the project plan in addition to those proposed in the EA to minimize impacts to swamp pink:

- Include silt fence and straw bales or other sediment and erosion control measures around potential sources of sedimentation and around all swamp pink locations as a 50 ft buffer.
- Monitor and maintain all erosion and sediment control measures daily and after precipitation events, as identified in an approved sediment and erosion control plan. Clean, repair, and replace structures immediately. Do not remove sediment and erosion control measures until denuded areas have been completely revegetated and sediment loads to swamp pink habitat will not increase.
- Prior to a forecasted precipitation event avoid or minimize ground disturbance and activity in upslope areas that drain to the swamp pink habitat to reduce sedimentation.
- No use of herbicides at the project site.
- Relocate the construction staging area to a site that does not drain to swamp pink locations.
- Train operators, employees, and contractors on the identification and biology of the species, activities that may affect swamp pink habitat, and ways to avoid and minimize these effects.
- Flag a perimeter, including a 50 ft buffer, around swamp pink locations to aid in avoiding impacts.
- Plant the soil newly exposed from the drawn down lake with vegetation native to the area to reduce potential erosion and prevent invasive or non-native plant species from becoming established. Consult the Atlas of the Virginia Flora http://www.biol.vt.edu/digital_atlas/ to determine the species that are appropriate to plant.

If these measures are incorporated into the project plan and fully implemented no further consultation with this office is necessary under section 7 of the ESA. If you are unable to incorporate the avoidance and minimization measures, we recommend requesting formal consultation under section 7 of the ESA on the proposed project.

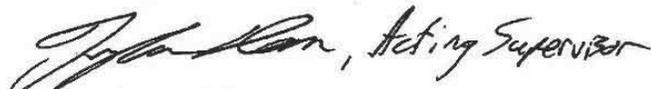
We also recommend refining your project plan to include an assessment of the impacts of a change in vegetative cover to the seeps and wet areas, a detailed spill prevention and response plan, and a land clearing plan.

Mr. Bricker

Page 3

Species information and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Sumalee Hoskin of this office at (804) 6694, extension 128.

Sincerely,

A handwritten signature in black ink, appearing to read "Cindy Schulz, Acting Supervisor".

 Cindy Schulz
Supervisor
Virginia Field Office

cc: USFS, VA (Daniel Wright)
VDCR, DNH, Richmond, VA (René Hypes)

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804-287-1653
Fax: 804-287-1736

September 7, 2010

Ms. Cindy Schulz
Supervisor
Virginia Field Office
USDI Fish and Wildlife Service
Ecological Services
6669 Short Lane
Gloucester, VA 23061

Re: Draft Supplemental Watershed Plan – Environmental Assessment (EA) for the South River Watershed for the Rehabilitation of South River Dam 10A (Mills Creek), Augusta County, Virginia

Dear Ms. Schulz:

Thank you for your timely review of the referenced Draft EA submitted to your office. We appreciate the time and consideration given by your agency to carefully examine our assessment and provide input.

We have amended the EA to reflect the finding that rehabilitation activities are “likely to adversely affect” the Swamp Pink. The avoidance and minimization measures listed in your letter will be implemented during the design and construction of this project.

If you have any further comments or questions, do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink that reads "W. Ray Douthett".

JOHN A. BRICKER
State Conservationist

Acting for

Helping People Help the Land

An Equal Opportunity Provider and Employer





United States
Department of
Agriculture

Forest
Service

George Washington & Jefferson
National Forests

5162 Valleypointe Parkway
Roanoke, VA 24019-3050
540/265-5100

File Code: 1950/2720-2

Date: August 24, 2010

John A. Bricker
State Conservationist
USDA - Natural Resources Conservation Service
1606 Santa Rosa Road
Suite 209
Richmond, VA 23229-5014

Dear Mr. Bricker:

As a cooperating agency we appreciate this opportunity to provide a response to scoping in the form of edits and comments to the EA and additional documentation to improve the overall quality of Mill Creek Dam project.

My staff has been working with you and your staff on your Mills Creek Dam rehabilitation project proposal. They have been to the field numerous times and have met with you and your staff in an effort to create a document that clearly outlines your proposal and discloses the effects.

This project has the unique status of dealing with a dam classified as high hazard and as a result needs modification as required by state law to improve its safety rating. This hazard is of great concern to the downstream public. We understand the timing of completion of your environmental analysis ties directly to future project funding that is required to improve this dam's safety.

The project is complicated by the fact that swamp pink, a federally threatened plant, occupies the habitat immediately downstream from this very large earth disturbing project. As the entire project area is on National Forest System lands we hold the responsibility of ensuring protection of this threatened plant.

Our edits, comments, and additions are our attempt to strengthen the document. We are trying to improve the disclosure of impacts, recommend alternatives and mitigation measures to reduce the impact of the work necessary to improve the safety rating of this dam.

Your efforts to improve the EA and project design to address the impacts of sedimentation on swamp pink and your consultation with the U.S. Fish and Wildlife Service are critical to reducing the impacts of this project on the swamp pink population and habitat. Our determination of likely to adversely affect the swamp pink and the mitigation you implement will be key to the issuance of a U.S. Army Corps of Engineers Permit and the special use permit modification that will be necessary for you to begin work on this project.

We will work with you to clarify our comments, as you incorporate our edits and comments of others in developing a final document.



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As this is a project on National Forest System lands and we are a cooperating agency I would like a copy of the final EA two weeks prior to its public release. This would give me the opportunity to prepare for public comment and provide you a letter on concurrence.

Sincerely,

/S/MAUREEN HYZER

MAUREEN T. HYZER
Forest Supervisor

cc: Annie Downing

Edited South River 10A Draft Couth River 10A EA
Edited South River 10 Cover Pages
Edited South River 10A Appendices B thru E
Add To EA- Biological Environment
Add To EA- Biological Evaluation
Add To EA- Project Wildlife Impacts
Add To EA- Sediment Modeling Spreadsheet

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804-287-1653
Fax: 804-287-1736

September 7, 2010

Ms. Maureen Hyzer
Forest Supervisor
USDA Forest Service
George Washington and Jefferson National Forest
5162 Valleypointe Parkway
Roanoke, VA 24019-3050

Re: Draft Supplemental Watershed Plan – Environmental Assessment (EA) for the South River Watershed for the Rehabilitation of South River Dam 10A (Mills Creek), Augusta County, Virginia

Dear Ms. Hyzer:

Many thanks to you and your staff for your contributions to the EA for the South River 10A dam rehabilitation. In particular, Annie Downing, Dawn Kirk, and Danny Wright provided numerous comments that strengthened the document, especially with regard to protection of the Swamp Pink. This project required multiple weeks of their time and it is much appreciated.

We have amended the EA to reflect the USDI Fish and Wildlife Service (FWS) and USDA Forest Service findings that rehabilitation activities are “likely to adversely affect” the Swamp Pink. The avoidance and minimization measures listed in the FWS letter will be implemented during the design and construction of this project. The specific details of these measures will be worked out with your staff at the appropriate time. Appendix C of the EA contains a preliminary description of the proposed actions for protection of the Swamp Pink.

As per your request, we will provide you an advance copy of the final EA two weeks prior to release. We look forward to working with you and your staff during the rehabilitation of this dam. If you have any further comments or questions, do not hesitate to contact me.

Sincerely,


JOHN A. BRICKER
State Conservationist

Acting For

Helping People Help the Land

An Equal Opportunity Provider and Employer





COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

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Douglas W. Domenech
Secretary of Natural Resources

David K. Paylor
Director

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

August 26, 2010

Mr. John A. Bricker
State Conservationist,
USDA - Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

RE: Draft Environmental Assessment: Supplemental Watershed Plan for the South
River Watershed (DEQ 10-114F)

Dear Mr. Bricker

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

- Department of Environmental Quality
- Department of Game and Inland Fisheries
- Department of Conservation and Recreation
- Department of Health
- Department of Historic Resources
- Marine Resources Commission
- Central Shenandoah Planning District Commission

The Department of Transportation, Augusta County and the City of Waynesboro also were invited to comment.

PROPOSED FEDERAL ACTION

The U.S. Department of Agriculture (USDA) submitted a draft environmental assessment (EA) on the supplemental watershed plan for the South River watershed. This EA describes environmental impacts that may result from the rehabilitation of the Mills Creek Dam in Augusta County along the South River. The dam's status has changed from a significant hazard to a high hazard. It does not meet safety standards set by the USDA Natural Resource Conservation Service or Virginia. The proposed action is to replace the principal spillway riser and intake system, which will lower the water level to 24 feet and remove the water supply capacity of the dam. The control section of the auxiliary spillway will be lowered three feet and will be lengthened to 200 feet, and inlets will be installed. This project will result in increased flood protection downstream.

COMMONWEALTH OF VIRGINIA COMMENTS

1. Water Quality, Water Supply and Wetlands. The EA (page iv) states that the principal spillway riser and intake system will be replaced and the permanent water level will be lowered by 24 feet. This will remove the water supply capacity of the dam. The EA (page vii) also states that wetlands are not expected to be affected.

1(a) Agency Jurisdiction. The State Water Control Board promulgates Virginia's water regulations, covering a variety of permits to include Virginia Pollutant Discharge Elimination System Permit, Virginia Pollution Abatement Permit, Surface and Groundwater Withdrawal Permit, and the Virginia Water Protection (VWP) Permit. The VWP Permit is a state permit which governs wetlands, surface water and surface water withdrawals/impoundments. It also serves as § 401 certification of the federal Clean Water Act § 404 permits for dredge and fill activities in waters of the United States. The VWP Permit Program is under the Office of Wetlands and Water Protection/Compliance within the DEQ Division of Water Quality Programs. In addition to central office staff who review and issue VWP permits for transportation and water withdrawal projects, the six DEQ regional offices perform permit application reviews and issue permits for the covered activities.

1(b) Agency Finding. The DEQ Virginia Water Protection (VWP) Program states that based on the information provided, it appears that there is potential for impacts to surface waters. A VWP permit may be required for impacts to any potential wetlands and other State Waters.

1(c) Agency Comments. The DEQ Office of Surface and Groundwater Supply Planning has no comment on the proposal. The project will not result in any new water withdrawals or the removal of water supply capacity that has recently been used.

1(d) Agency Recommendations. The DEQ VWP Program has the following recommendations:

- Submit a Joint Permit Application (JPA) for the proposed project to the Virginia Marine Resources Commission (VMRC) per the application instructions. The DEQ VRO will make the final permit decision regarding potential impacts to state waters.
- Delineate surface water features and their locations with approval by the U. S. Army Corps of Engineers (Corps).
- Avoid and minimize impacts to surface waters to the greatest extent practicable.
- Any instream work should be performed in the dry utilizing cofferdams, stream diversions and / or working during low flow conditions.
- Heavy equipment should work from uplands to the greatest extent possible and utilize mats and strict erosion and sediment controls for work that must be conducted from within surface waters.
- Caution should be taken to ensure prevention of the release of any oil or fuel from heavy equipment into surface waters.
- All disturbed stream beds should be restored to their original contours prior to redirecting the stream into the work area.
- Temporary impact areas should be restored to their original contours and revegetated with the same or similar species.
- Impacts within permanent maintenance easements requiring the conversion of forested wetlands to emergent or scrub shrub wetlands may require partial compensation based on the reduction or loss of the impacted wetland's functions and values.
- Standard erosion and sediment control measures as presented in the *Virginia Erosion and Sediment Control Handbook* should be implemented to further reduce potential impacts to State waters.
- Strictly adhere to erosion and stormwater management practices.
- Monitor construction activities to make certain that erosion and stormwater management practices are adequately preventing sediment and pollutant migration into surface waters, including wetlands.
- For any work that is performed instream, utilize cofferdams to perform all work in the dry.

Contact Brenda Winn with the DEQ VWP Program at Brenda.Winn@deq.virginia.gov or 804-698-4516 for additional information about these comments.

2. Subaqueous Lands. The EA (page vii) states that wetland impacts are not anticipated. According to the EA, the drainage area above the Mills Creek Dam falls below the threshold VMRC uses for exerting its jurisdiction.

2(a) Agency Jurisdiction. The VMRC regulates encroachments in, on or over state-owned subaqueous beds as well as tidal wetlands pursuant to § 28.2-1200 through 1400 of the Code of Virginia.

The VMRC serves as the clearinghouse for the Joint Permit Application (JPA) used by the:

- U.S. Army Corps of Engineers (Corps) for issuing permits pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act;
- DEQ for issuance of a VWP permit;
- VMRC for encroachments on or over state-owned subaqueous beds as well as tidal wetlands; and
- local wetlands board for impacts to wetlands.

The VMRC will distribute the completed JPA to the appropriate agencies. Each agency will conduct its review and respond.

2(b) Agency Comments. Please be advised that the Marine Resources Commission, pursuant to Section 28.2-1204 of the Code of Virginia, has jurisdiction over any encroachments in, on, or over any State-owned bays, rivers, streams, or creeks in the commonwealth.

2(c) Agency Finding. VMRC states that it does not appear that the proposed project will require a permit from VMRC.

3. Erosion and Sediment Control, and Stormwater Management. The EA (page 46) states that erosion and sediment control measures would be used to protect water quality.

3(a) Agency Jurisdiction. The Department of Conservation and Recreation (DCR) Division of Soil and Water Conservation (DSWC) administers the Virginia Erosion and Sediment Control Law and Regulations (VESCL&R) and Virginia Stormwater Management Law and Regulations (VSWML&R).

3(b) Agency Recommendation. Contact the DCR DSWC Staunton Office at (540) 332-9991 to determine the applicability of erosion and sediment control and stormwater management regulations.

4. Air Quality Impacts. The EA (pages 36 and 37) states that temporary impacts to air quality would occur during construction.

4(a) Agency Jurisdiction. The DEQ Air Division, on behalf of the State Air Pollution Control Board, is responsible for developing regulations that become Virginia's Air Pollution Control Law. DEQ is charged with carrying out mandates of the state law and related regulations as well as Virginia's federal obligations under the Clean Air Act as amended in 1990. The objective is to protect and enhance public health and quality of life through control and mitigation of air pollution. The division ensures the safety and quality of air in Virginia by monitoring and analyzing air quality data, regulating sources of air pollution, and working with local, state and federal agencies to plan and implement strategies to protect Virginia's air quality. The appropriate regional office is directly responsible for the issuance of necessary permits to construct and operate all stationary

sources in the region as well as monitoring emissions from these sources for compliance. In the case of certain projects, additional evaluation and demonstration must be made under the general conformity provisions of state and federal law.

4(b) Ozone Attainment Area. According to the DEQ Air Division, the project site is located in an ozone attainment area.

4(c) Open Burning. If the project includes open burning of vegetative debris, this activity must meet the requirements under 9VAC5-130 *et seq.* of the regulations for open burning, and it may require a permit. The regulations provide for, but do not require, the local adoption of a model ordinance concerning open burning. Contact the locality to determine what local requirements, if any, exist.

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

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

5. Solid and Hazardous Wastes and Hazardous Materials.

5(a) Agency Jurisdiction. Solid and hazardous wastes in Virginia are regulated by DEQ, the Virginia Waste Management Board and EPA. They administer programs created by the federal Resource Conservation and Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, commonly called Superfund, and the Virginia Waste Management Act. DEQ administers regulations established by the Virginia Waste Management Board and reviews permit applications for completeness and conformance with facility standards and financial assurance requirements. All Virginia localities are required, under the Solid Waste Management Planning Regulations, to identify the strategies they will follow on the management of their solid wastes to include items such as facility siting, long-term (20-year) use, and alternative programs such as materials recycling and composting.

5(b) Data File and Database Search. The DEQ Waste Division states that neither solid nor hazardous waste issues were addressed in the EA. The EA did not include a search of waste-related databases. The Waste Division conducted a cursory review of its data files including a Geographic Information System (GIS) database search but did not identify any waste sites that would impact or be impacted by the proposed construction.

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

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

5(d) Agency Requirements. Test and dispose of any soil that is suspected of contamination or solid wastes that are generated during demolition activities in accordance with applicable federal, state and local laws and regulations.

6. Natural Heritage Resources. The EA (page 15) states that minimal impacts to wildlife habitat would occur.

6(a) Agency Jurisdiction. The mission of DCR is to conserve Virginia's natural and recreational resources. The DCR Division of Natural Heritage's (DNH) mission is conserving Virginia's biodiversity through inventory, protection and stewardship. The Virginia Natural Area Preserves Act, 10.1-209 through 217 of the Code of Virginia, was passed in 1989 and codified DCR's powers and duties related to statewide biological inventory: maintaining a statewide database for conservation planning and project review, land protection for the conservation of biodiversity, and the protection and ecological management of natural heritage resources (the habitats of rare, threatened and endangered species, significant natural communities, geologic sites, and other natural features).

6(b) Agency Finding. The Biotics Data System documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, DCR does not anticipate that this project will adversely impact these natural heritage resources. Absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks additional natural heritage resources. See item 7 for additional information.

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

6(d) Threatened and Endangered Plant and Insect Species. Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and DCR, DCR has the authority to report for VDACS on state-listed plant and insect species. DCR found that the proposed activity may impact several state-protected plants and deferred to VDACS, which has regulatory authority to conserve rare and endangered plant and insect species through the Virginia Endangered Plant and Insect Species Act. The current activity will not affect any documented state-listed plants or insects.

6(e) Agency Recommendations. Since new and updated information is continually added to the Biotics Data System, contact DCR DNH at (804) 786-7951 if a significant amount of time passes before the project is implemented.

7. Wildlife Resources. The EA (page v) states that one protected species, the Swamp Pink, may be affected by dam rehabilitation activities.

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

7(b) Agency Findings. DGIF states that DCR data indicate that the federal-listed threatened, state-listed endangered swamp pink and federal-listed threatened, state-listed endangered Virginia sneezeweed have been documented from the project area. DCR states that it does not anticipate any impact to the natural heritage resources downstream of the dam including Swamp-pink (*Helonias bullata*, G3/S2S3/LT/LE) due to the scope of the project.

DGIF states that state-listed endangered eastern tiger salamanders have been documented from Maple Flats. Based on the scope and location of the proposed work, DGIF does not anticipate it to result in adverse impacts upon this species. Mills Creek above the existing dam is designated a wild trout water known to support brook trout. Below the dam, Mill Creek is designated a stockable trout water.

7(c) Agency Recommendations.

- Coordinate with the FWS VDACS, and DCR DNH regarding possible impacts upon the federal-listed threatened, state-listed endangered Virginia sneezeweed.
- To best protect trout resources associated with Mills Creek, adhere to a time-of-year restriction from October 1 through March 31 of any year for all instream work and coordinate with DGIF Region IV Fisheries Manager, Larry Mohn, at 540-248-9360 to ensure avoidance of stocking and angling activity conflicts.
- Conduct any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures;

Contact Amy Ewing with DGIF at (804) 367-2211 for additional information on these comments.

8. Historic Architectural Resources. The EA (page v) states that a Phase I archaeological survey of the area to be disturbed was completed in March 2010. According to the EA, the Virginia Department of Historic Resources (DHR) has concurred with the finding of no adverse impact.

8(a) Agency Jurisdiction. The Department of Historic Resources (DHR) conducts reviews of projects to determine their effect on historic structures or cultural resources under its jurisdiction. DHR, as the designated State's Historic Preservation Office, ensures that federal actions comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulation at 36 CFR Part 800. The preservation act requires federal agencies to consider the effects of federal projects on properties that are listed or eligible for listing on the National Register of Historic Places. Section 106 also applies if there are any federal involvements, such as licenses, permits, approvals or funding. DHR also provides comments to DEQ through the state environmental impact report review process.

8(b) Agency Comment. DHR states that the U.S. Forest Service has previously conducted an archaeological survey in support of this project (DHR File No. 2010-0459). That study identified two archaeological sites within the project boundary. Site 44AU0412 is located in a highly-disturbed wildlife clearing/vehicle turnaround. The intact portions of the site have been bermed and will not be impacted by this project. Site 44AU0277 is located within proposed Turnaround #3, closest to the dam. DHR states that this it understands from the Forest Service that this turnaround has been removed from the scope of the project.

8(c) Agency Finding. Provided that this turnaround is avoided, DHR finds that a determination of no adverse effect to historic properties is appropriate for this undertaking and no further consultation is warranted.

Contact Roger Kirchen with DHR at Roger.Kirchen@dhr.virginia.gov for additional information on these comments.

9. Dam Safety. The EA (page 1) states that the project will provide flood protection to downstream residents.

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

9(b) Agency Comments. The DCR Division of Dam Safety and Flood Plain Management (DSFM) has the following comments:

- This document is not required by the DCR Dam Safety Regulations (Virginia Soil and Water Conservation Board, Chapter 20, Impounding Structure Regulations), thus there are not any required changes.
- DCR concurs with proposal to store the 200-year flood water since this particular watershed has seen an abundance of 100-year floods in the past 30 years. Storing the 200-year flood water rather than the 100-year flood water should have a significant impact on adding to flood mitigation for downstream property owners.
- DCR concurs with the proposal to design to the Spillway Design Flood of the Probable Maximum Flood, which is the most common minimum standard, rather than designing to the lesser design of the flood resulting from the 0.9 Probable Maximum Precipitation, the current Virginia Regulatory Minimum resulting from recent changes to the Code of Virginia.
- DCR concurs with the conclusion of the study that the best way to achieve safe spillway capacity for this dam is to make the spillway larger and install an upstream and extend the downstream training dikes rather than provide overtopping armoring protection on the whole dam.
- The Virginia Soil and Water Conservation Board usually meets mid-month on the odd months of the year. The complete alteration permit application including the final plans and specifications are due to the DCR for review and recommendation to the Board 90 days before the end of the month of the board meeting for which approval is requested. For example, if approval for an Alteration Permit was desired for a November Board meeting, the complete submittal to DCR is due by September 2. Submittals should be sent to Thomas I. Roberts P.E., C.F.M., Regional Engineer, DCR Division of Dam Safety and Floodplain Management, 8 Radford Street, Suite 201, Christiansburg, Virginia 24073 - 3341.

9(c) Agency Recommendations. The DCR DSFM has the following recommendations:

- The sponsors, the Natural Resources Conservation Service (NRCS) and NRCS' consultants should meet with the regional engineer for a pre-design meeting, and a progress meeting during the design process to help facilitate adequate information on the dam alteration plans being prepared.
- Review the Dam Safety Regulations 4VAC50-20-80 I.14 for as-built requirements and 4VAC50-20-80 J. for certification requirements.

Contact Charley Banks, DCR Floodplain Program Engineer, at (804) 371-6135 or Charley.Banks@dcr.virginia.gov for additional information on these comments.

10. Water Sources and Sewerage Regulations.

10(a) Agency Jurisdiction. The Virginia Department of Health (VDH) ODW reviews projects for the potential to impact public drinking water sources (groundwater wells,

springs and surface water intakes). VDH also has authority for non-discharging systems such as septic tanks and drain fields.

10(b) Agency Findings. VDH ODW states that there are no apparent impacts to public drinking water sources due to this project. No groundwater wells are within a 1-mile radius of the project site. No surface water intakes are located within a 5-mile radius of the project site. The project does not fall within Zone 1 (up to 5 miles into the watershed) or Zone 2 (greater than 5 miles into the watershed) of any public surface water sources.

10(c) Requirement. Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility.

11. Local Comments. Augusta County and the City of Waynesboro did not respond to DEQ's request for comments.

12. Regional Comments. The Central Shenandoah Planning District Commission has no comments.

REGULATORY AND COORDINATION NEEDS

1. Surface Waters and Wetlands. A Virginia Water Protection (VWP) permit may be required from DEQ pursuant to Virginia Code §62.1-44.15:20 *et seq.* and Virginia regulations 9VAC25-210-10 *et seq.* Contact Ben McGinnis with the VMRC at (757) 247-8028 for information on submitting a JPA. Contact DEQ VRO (Brandon Kiracofe with the DEQ VWP Program at Brandon.Kiracofe@deq.virginia.gov) for additional information on VWP Program requirements. DEQ VRO will make the final permit decision regarding potential impacts to state waters.

3. Erosion and Sediment Control, and Stormwater Management. Contact the DCR DSWC Staunton Office at (540) 332-9991 to determine the applicability of erosion and sediment control and stormwater management regulations.

4. Air Quality Regulation. According to the DEQ Air Division, the following regulations may apply during project operation:

- 9VAC5-50-60 *et seq.* of the regulations governing fugitive dust.
- 9VAC5-130 *et seq.* of the regulations governing open burning.

For information on any local requirements pertaining to open burning, contact local officials.

5. Solid and Hazardous Wastes. All solid waste, hazardous waste and hazardous materials must be managed in accordance with all applicable federal, state and local environmental regulations. Some of the state laws and regulations that may apply are:

- Virginia Waste Management Act (Code of Virginia Section 10.1-1400 *et seq.*);
- Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC20-60);
- Virginia Solid Waste Management Regulations (VSWMR) (9VAC20-80);
- Virginia Vegetative Waste Management Regulations (9VAC20-101 *et seq.*); and
- Virginia Regulations for the Transportation of Hazardous Materials (9VAC20-110).

Some of the federal laws and regulations that may apply are:

- Resource Conservation and Recovery Act (RCRA) (42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations); and
- U.S. Department of Transportation Rules for Transportation of Hazardous materials (49 Code of Federal Regulations Part 107).

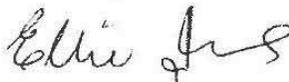
6. Natural Heritage Resources. Contact the DCR DNH at (804) 786-7951 for an update on natural heritage information if a significant amount of time passes before it is utilized.

7. Wildlife Resources. Coordinate with VDGIF Region IV Fisheries Manager, Larry Mohn, at 540-248-9360 to ensure avoidance of stocking and angling activity conflicts during the implementation of the project.

CONCLUSION

The Commonwealth has no objection to the proposed action provided that all applicable state and federal laws and regulations are followed. Thank you for the opportunity to review the EA. Detailed comments of reviewing agencies are attached for your review. Please contact me at (804) 698-4325 or Julia Wellman at (804) 698-4326 for clarification of these comments.

Sincerely,



Ellie L. Irons, Manager
Office of Environmental Impact Review

Enclosures

cc: Dave Barrett, Central Shenandoah District Commission
Mark K. Reeter, August County
James F. Rector, City of Waynesboro

ec: Wade Biddix, USDA ASTC
Amy Ewing, DGIF
Robbie Rhur, DCR
Barry Matthews, VDH
Paul Kohler, DEQ ORP
Kotur S. Narasimhan, DEQ OADA
Brenda Winn, DEQ VWP
Scott Kudlas, DEQ OSGWP
Greg Clark, DEQ VRO
Roger Kirchen, DHR
Melanie Allen, VDOT
Ben McGinnis, VMRC

Wellman, Julia (DEQ)

From: Hypes, Rene (DCR)
Sent: Thursday, August 26, 2010 12:20 PM
To: Wellman, Julia (DEQ); Ewing, Amy (DGIF)
Cc: Rhur, Robbie (DCR)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA
Julia and Amy,

John Townsend, DCR botanist reviewed this project and did not feel there would be any impact to the natural heritage resources downstream of the dam including Swamp-pink (*Helonias bullata*, G3/S2S3/LT/LE) due to the scope of the project. However he does feel that E & S measures should be implemented during dam rehabilitation activities to ensure natural heritage resources are protected.

Let me know if you have any questions.

René

S. Rene' Hypes
Project Review Coordinator
DCR-DNH
217 Governor Street
Richmond, Virginia 23219
804-371-2708 (phone)
804-371-2674 (fax)
Rene.Hypes@dcr.virginia.gov

From: Wellman, Julia (DEQ)
Sent: Thursday, August 26, 2010 11:27 AM
To: Ewing, Amy (DGIF); Hypes, Rene (DCR)
Cc: Rhur, Robbie (DCR)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

Thanks, Amy.

FYI -- Rene I'm sending this to you because I just realized that Robbie may not be in the office today since it is a Thursday.

Julia Wellman
Environmental Impact Review Coordinator
Virginia Department of Environmental Quality
PO Box 1105
Richmond, VA 23218
Phone: (804) 698-4326
Fax: (804) 698-4319
NEW E-mail: Julia.Wellman@deq.virginia.gov

From: Ewing, Amy (DGIF)
Sent: Thursday, August 26, 2010 11:24 AM
To: Wellman, Julia (DEQ); Rhur, Robbie (DCR)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

8/26/2010



COMMONWEALTH of VIRGINIA

Douglas W. Domenech
Secretary of Natural Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.virginia.gov

August 13, 2010

Mr. John A. Bricker, State Conservationist
USDA – Natural Resources Conservation Service
1606 Santa Rosa Rd., Suite 209
Richmond, Virginia 23229-5014

RE: Draft Supplemental Watershed Plan
Environmental Assessment for the South River Watershed
Supplement No. 4 – Rehabilitation of South River Dam No. 10A (Mills Creek)
Augusta County, VA
DHR File No. 2009-1825

Dear Mr. Bricker:

We have received for review the document referenced above. The NRCS plans to replace the spillway riser and intake system, lower and lengthen the control section of the auxiliary spillway, armor the dam, and install downstream flood protection. We have reviewed the document and provide the following comments to NRCS as assistance in your compliance with the National Environmental Policy Act and Section 106 of the National Historic Preservation Act.

The US Forest Service has previously conducted an archaeological survey in support of this project (see DHR File No. 2010-0459). That study identified two archaeological sites within the project boundary. Site 44AU0412 is located in a highly-disturbed wildlife clearing/vehicle turnaround. The intact portions of the site have been bermed and will not be impacted by this project. Site 44AU0277 is located within proposed Turnaround #3, closest to the dam. We understand from the USFS that this turnaround has been removed from the scope of the project. Provided that this turnaround is avoided, we find that a determination of *no adverse effect* to historic properties is appropriate for this undertaking and no further consultation is warranted.

Thank you for the opportunity to comment on this important project. If you have any questions, please do not hesitate to contact me at roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Archaeologist
Office of Review and Compliance

Administrative Services
10 Courthouse Ave.
Petersburg, VA 23803
Tel: (804) 862-6416
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Office
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

Tidewater Region Office
14415 Old Courthouse Way
2nd Floor
Newport News, VA 23608
Tel: (757) 886-2807
Fax: (757) 886-2808

Roanoke Region Office
1030 Penmar Avenue, SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Northern Region
Preservation Office
P.O. Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

From: Forsgren, Diedre (VDH)
Sent: Tuesday, July 27, 2010 2:28 PM
To: Wellman, Julia (DEQ)
Cc: Matthews, Barry (VDH)
Subject: (10-114F) EA: Draft Supplemental Watershed Plan for the South River Watershed

DEQ Project #: 10-114F
Name: Draft Supplemental Watershed Plan for the South River Watershed
Sponsor: U.S. Department of Agriculture
Location: Waynesboro, Augusta County

VDH – Office of Drinking Water has reviewed DEQ Project Number 10-114F. Below are our comments as they relate to proximity to **public drinking water** sources (groundwater wells, springs and surface water intakes). Potential impacts to public water distribution systems or sanitary sewage collection systems must be verified by the local utility.

No groundwater wells are within a 1 mile radius of the project site.

No surface water intakes are located within a 5 mile radius of the project site.

Project does not fall within Zone 1 (up to 5 miles into the watershed) or Zone 2 (greater than 5 miles into the watershed) of any public surface water sources.

There are no apparent impacts to public drinking water sources due to this project.

Diedre Forsgren

Office Services Specialist
VIRGINIA DEPARTMENT OF HEALTH
Office of Drinking Water, Room 622-A
109 Governor Street
Richmond, VA 23219
Phone: (804) 864-7241
email: diedre.forsgren@vdh.virginia.gov

Wellman, Julia (DEQ)

From: Rita Whitfield [rita@cspdc.org]
Sent: Tuesday, July 20, 2010 10:25 AM
To: Wellman, Julia (DEQ)
Subject: RE: Review Request: Supplemental Watershed Plan, South River, EA

The Central Shenandoah Planning District Commission has no comments on the above application. If you have any questions, please contact me at 540-885-5174 or email bonnie@cspdc.org.

Bonnie Riedesel
Executive Director
Central Shenandoah PDC
112 MacTanly Place
Staunton, VA 24401

From: Bonnie Riedesel
Sent: Monday, July 19, 2010 4:15 PM
To: Rita Whitfield
Subject: FW: Review Request: Supplemental Watershed Plan, South River, EA

Rita, see me about this EIR

From: Wellman, Julia (DEQ) [mailto:Julia.Wellman@deq.virginia.gov]
Sent: Monday, July 19, 2010 4:12 PM
To: Bonnie Riedesel; Andrea Terry; coadmin@co.augusta.va.us; enviromang@co.augusta.va.us; HampMG@ci.waynesboro.va.us; BarnesMD@ci.waynesboro.va.us; Allen, Melanie L. (VDOT); Ewing, Amy (DGIF); Kirchen, Roger (DHR); Kohler, Paul (DEQ); Matthews, Barry (VDH); Narasimhan, Kotur (DEQ); Rhur, Robbie (DCR); Watkinson, Tony (MRC); McGinnis, Ben (MRC); Kudlas, Scott (DEQ); Clark, Gregory (DEQ)
Subject: Review Request: Supplemental Watershed Plan, South River, EA

Request: The Department of Environmental Quality's Office of Environmental Impact Review is requesting your comments on an environmental assessment for the draft supplemental watershed plan for the South River Watershed. The review request form is attached.

Deadline: August 6, 2010

Document Attached: South River 10A DRAFT.pdf

Mail, Fax and/or E-mail Comments To:

Julia Wellman
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, VA 23219
Fax: 804-698-4319

7/30/2010

Wellman, Julia (DEQ)

From: Clark, Gregory (DEQ)
Sent: Wednesday, July 21, 2010 4:09 PM
To: Wellman, Julia (DEQ)
Subject: EIR Comments for the Draft Supplemental Watershed Plan for the South River Watershed (South River Dam Rehabilitation, Mills Creek) Project #10-114F

The DEQ-Valley Regional Office has reviewed the Draft Supplemental Watershed Plan for the South River Watershed (South River Dam Rehabilitation, Mills Creek) proposal and has no comments.

Gregory L. Clark, PE
Virginia Department of Environmental Quality
ph: (540)-574-7911
FAX: (540)-574-7878
Please note my NEW email address: gregory.clark@deq.virginia.gov

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR PROGRAM COORDINATION

ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY

TO: Julia H. Wellman

DEQ - OEIA PROJECT NUMBER: 10 - 114F

PROJECT TYPE: STATE EA / EIR FEDERAL EA / EIS SCC
 CONSISTENCY CERTIFICATION

PROJECT TITLE: DRAFT SUPPLEMENTAL WATERSHED PLAN FOR THE SOUTH RIVER WATERSHED

PROJECT SPONSOR: U. S. DEPARTMENT OF AGRICULTURE

PROJECT LOCATION: OZONE ATTAINMENT AREA

REGULATORY REQUIREMENTS MAY BE APPLICABLE TO: CONSTRUCTION
 OPERATION

STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY:

1. 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E - STAGE I
2. 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 F - STAGE II Vapor Recovery
3. 9 VAC 5-40-5490 et seq. - Asphalt Paving operations
4. 9 VAC 5-130 et seq. - **Open Burning**
5. 9 VAC 5-50-60 et seq. **Fugitive Dust Emissions**
6. 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to _____
7. 9 VAC 5-50-160 et seq. - Standards of Performance for Toxic Pollutants
8. 9 VAC 5-50-400 Subpart _____, Standards of Performance for New Stationary Sources, designates standards of performance for the _____
9. 9 VAC 5-80-10 et seq. of the regulations - Permits for Stationary Sources
10. 9 VAC 5-80-1700 et seq. Of the regulations - Major or Modified Sources located in PSD areas. This rule may be applicable to the _____
11. 9 VAC 5-80-2000 et seq. of the regulations - New and modified sources located in non-attainment areas
12. 9 VAC 5-80-800 et seq. Of the regulations - Operating Permits and exemptions. This rule may be applicable to _____

COMMENTS SPECIFIC TO THE PROJECT:



(Kotur S. Narasimhan)
Office of Air Data Analysis

DATE: July 23, 2010



MEMORANDUM

TO: Julia Wellman, Environmental Program Planner
FROM: ^{pk} Paul Kohler, Waste Division Environmental Review Coordinator
DATE: July 20, 2010
COPIES: Sanjay Thirunagari, Waste Division Environmental Review Manager; file
SUBJECT: Environmental Impact Report; Draft Supplemental Watershed Plan for the South River Watershed; 10-114F

The Waste Division has completed its review of the Environmental Impact report for the Draft Supplemental Watershed Plan for the South River Watershed Project in Augusta County, Virginia. We have the following comments concerning the waste issues associated with this project:

Neither solid nor hazardous waste issues were addressed in the report. The report did not include a search of waste-related data bases. The Waste Division staff conducted a cursory review of its data files including a GIS database search, but did not identify any waste sites that would impact or be impacted by the proposed construction.

Any soil that is suspected of contamination or wastes that are generated must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-80); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous materials, 49 CFR Part 107.

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Paul Kohler at (804) 698-4208.



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

Fax (804) 698-4500 TDD (804) 698-4021

www.deq.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David K. Paylor
Director

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

July 27, 2010

Ms. Julia Wellman
DEQ Office of Environmental Impact Review
P.O. 1105
Richmond, VA 23218

RE: Draft Supplemental Watershed Plan for the South River Watershed, 10-114F

Dear Ms. Wellman:

The Department of Environmental Quality (DEQ) has reviewed the information for the above-referenced project. The activities include rehabilitation of the Mills Creek dam to meet current safety and design criteria; replacing the principal spillway riser and intake system; lowering the permanent water level by 24 feet; lowering by three feet and lengthening by 200 feet the control section of the auxiliary spillway to achieve capacity and integrity; armoring the control section of the auxiliary spillway and the constructed outlet section; and installing an earthen inlet training dike and a concrete outlet training dike.

Based on the information provided, it appears that there is potential for impacts to surface waters. Surface waters features should be delineated and their locations approved by the U. S. Army Corps of Engineers. The applicant should avoid and minimize impacts to surface waters to the greatest extent practicable.

A Virginia Water Protection (VWP) permit may be required for impacts to any potential wetlands and other State Waters. A Joint Permit Application (JPA) should be submitted to the Virginia Marine Resources Commission (VMRC) per the application instructions. The DEQ Valley Regional Office will make the final permit decision regarding potential impacts to State Waters.

Any instream work should be performed in the dry utilizing cofferdams, stream diversions and / or working during low flow conditions. Heavy equipment should work from uplands to the greatest extent possible and utilize mats and strict erosion and sediment controls for work that must be conducted from within surface waters. Caution should be taken to ensure prevention of the release of any oil or fuel from heavy equipment into surface waters. All disturbed stream beds should be restored to their original contours prior to redirecting the stream into the work area.

Temporary impact areas should be restored to their original contours and revegetated with the same or similar species. Impacts within permanent maintenance easements requiring the conversion of forested wetlands to emergent or scrub shrub wetlands may require partial compensation based on the reduction or loss of the impacted wetland's functions and values.

Standard erosion and sediment control measures as presented in the *Virginia Erosion and Sediment Control Handbook* should be implemented to further reduce potential impacts to State waters. We recommend strict adherence to erosion and stormwater management practices, and further encourage the project proponent to monitor construction activities to make certain that erosion and stormwater management practices are adequately preventing sediment and pollutant migration into surface waters, including wetlands. For any work that is performed instream the applicant should utilize cofferdams to perform all work in the dry.

Should you have any questions, please feel free to contact me at brenda.winn@deq.virginia.gov or 804-698-4516.

Sincerely,



Brenda Winn
VWP Water Withdrawal Project Manager
Virginia Water Protection Permit Program
Dept. of Environmental Quality
POB 1105
Richmond, Virginia 23218
W: 804-698-4516
Fax: 804-698-4032

cc: Brandon Kiracofe, DEQ Valley Regional Office

Wellman, Julia (DEQ)

From: Ericson, Jason (DEQ)
Sent: Monday, August 09, 2010 4:01 PM
To: Wellman, Julia (DEQ)
Cc: Kudlas, Scott (DEQ); Winn, Brenda (DEQ)
Subject: Review Request: Supplemental Watershed Plan, South River, EA 10-114F
Attachments: deq_osgwsp.PDF

Julia,

Attached is the review request form for the South River Watershed Plan. I do not have any comments. The project will not result in any new water withdrawals or the removal of water supply capacity that has recently been used.

Thank you,

Jason P. Ericson, P.G.
Virginia DEQ
Office of Surface and Ground Water Supply Planning
(804) 698-4180
Jason.Ericson@deq.virginia.gov

8/13/2010

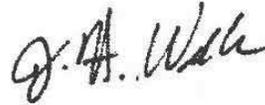
If you cannot meet the deadline, please notify JULIA H. WELLMAN at 804/698-4326 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

- A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.
- B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.
- C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

Please return your comments to:

MS. JULIA H. WELLMAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319
Julia.Wellman@deq.virginia.gov



JULIA H. WELLMAN
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

DEQ's Office of Surface and Ground Water Supply Planning has no comments on the proposal

(signed)  (date) 8/4/10

(title) Surface Water Hydrologist

(agency) DEQ Office of Surface and Ground Water Supply Planning

PROJECT # 10-114F

2/09



COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street, Suite 326
Richmond, Virginia 23219-2010
(804) 786-2556 FAX (804) 371-7899

MEMORANDUM

DATE: August 6, 2010
TO: Julia Wellman, DEQ
FROM: Roberta Rhur, DCR, Environmental Impact Review Coordinator
SUBJECT: DEQ 10-114F, South River Watershed...South River Dam No. 10A, Augusta CO

Division of Natural Heritage

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Biotics documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

Under a Memorandum of Agreement, DCR represents the Virginia Department of Agriculture and Consumer Services (VDACS) in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

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

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks additional natural heritage resources. New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain

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Chesapeake Bay Local Assistance • Dam Safety and Floodplain Management • Land Conservation*

information not documented in this letter. Their database may be accessed from www.dgif.virginia.gov/wildlifeinfo_map/index.html, or contact Shirl Dressler at (804) 367-6913.

Division of Dam Safety and Flood Plain Management

We reviewed the "Draft Supplemental (#4) Watershed Plan - Environmental Assessment for the South River Watershed...South River Dam No. 10A (Dam Inventory # 01504, A.K.A. Mills Creek), Augusta County, Virginia" and offer these comments:

1. This document is not required by the DCR Dam Safety Regulations (Virginia Soil and Water Conservation Board, Chapter 20, Impounding Structure Regulations) thus there are not any required changes.
2. I concur with proposal to store the 200 year flood since this particular watershed has seen an abundance of 100 year floods in the past 30 years. Storing the 200 year flood rather than the 100 year flood should have a significant impact on adding to flood mitigation for downstream property owners.
3. I concur with the proposal to design to the Spillway Design Flood of the Probable Maximum Flood which is the most common minimum standard rather than designing to the lesser design of the flood resulting from the 0.9 Probable Maximum Precipitation which is the current Virginia Regulatory Minimum resulting from recent changes to the Code of Virginia.
4. I concur with the conclusion of the study that the best way to achieve safe spillway capacity for this dam is to make the spillway larger and install an upstream and extend the downstream training dikes rather than provide overtopping armoring protection on the whole dam.
5. Noted on Page 53 under "Permits and Compliance" it states that "...Prior to construction, the Sponsors will be responsible for obtaining an alteration permit from the Virginia Soil and Water Conservation (SWC) Board ", Please note that the Virginia Soil and Water Conservation Board usually meets mid month on the odd months of the year. The complete alteration permit application including the final plans and specifications are due to the Department of Conservation and Recreation (DCR) for review and recommendation to the SWC Board 90 days before the end of the month of the board meeting for which approval is requested. For example, if approval for an Alteration Permit was desired for a November SWC Board, the complete submittal to DCR is due by September 2nd. Submittals for this dam should be sent to Thomas I. Roberts P.E., C.F.M. - Regional Engineer - Dam Safety, Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management, 8 Radford Street, Suite 201, Christiansburg, Virginia 24073 - 3341. It is recommended that the Sponsors, NRCS, and NRCS' consultants meet with the regional engineer for a predesign meeting, and a progress meeting during the design process to help facilitate adequate information on the dam alteration plans being prepared.
6. Noted on Page 53 under "Permits and Compliance" it states that: "...The Sponsors will be responsible for obtaining the certification of compliance from the Virginia [Department of Conservation and Recreation] Division of Dam Safety [and Flood Plain Management] upon completion of the project. Please see the Dam Safety Regulations 4VAC50-20-80 L.14 "A complete set of record drawings signed and sealed by a licensed professional engineer and signed by the owner" for As-Built requirements and 4VAC50-20-80 J. for certification requirements.

The remaining DCR divisions have no comments regarding the scope of this project. Thank you for the opportunity to comment.

Wellman, Julia (DEQ)

From: Ewing, Amy (DGIF)
Sent: Tuesday, August 17, 2010 4:06 PM
To: Wellman, Julia (DEQ)
Cc: Mohn, Larry (DGIF); nhreview (DCR)
Subject: ESSLog# 21018_ DEQ 10-114F: Supplemental Watershed Plan, South River, EA

Hi Julia,

Not sure how this one got missed. Thanks for the heads up. Our comments follow:

We have reviewed the Supplemental EA for the South River Watershed Project that proposes to rehabilitate South River dam no. 10A on Mills Creek in Augusta County, VA.

VDCR data indicate that federal Threatened state Endangered (FTSE) swamp pink and FTSE Virginia sneezeweed have been documented from the project area. We recommend coordination with the USFWS, VDACS, and VDCR-DNH regarding possible impacts upon these listed plants.

State Endangered eastern tiger salamanders have been documented from Maple Flats. Based on the scope and location of the proposed work, we do not anticipate it to result in adverse impacts upon this species.

Mills Creek above the existing dam is designated a wild trout water known to support brook trout. Below the dam, Mill Creek is designated a stockable trout water. To best protect trout resources associated with Mills Creek, we recommend that all instream work adhere to a time of year restriction from October 1 through March 31 of any year. In addition, we recommend coordination with VDGIF Region IV Fisheries Manager, Larry Mohn, at 540-248-9360 to ensure avoidance of stocking and angling activity conflicts.

We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
804-367-2211

From: Wellman, Julia (DEQ)
Sent: Tuesday, August 17, 2010 11:33 AM
To: 'coadmin@co.augusta.va.us'; 'enviromang@co.augusta.va.us'; 'HampMG@ci.waynesboro.va.us'; 'BarnesMD@ci.waynesboro.va.us'; Allen, Melanie L. (VDOT); Adkins, Chris (VDOT); McGinnis, Ben (MRC); Watkinson, Tony (MRC); Dressler, Shirl (DGIF); Ewing, Amy (DGIF)
Subject: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

If you would like to comment on the above-referenced project, please email me as soon as possible and no later than noon tomorrow, Wednesday, August 18.

8/26/2010

Wellman, Julia (DEQ)

From: Wellman, Julia (DEQ)
Sent: Thursday, August 26, 2010 11:27 AM
To: Ewing, Amy (DGIF); Hypes, Rene (DCR)
Cc: Rhur, Robbie (DCR)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA
Attachments: fromDCR.doc

Thanks, Amy.

FYI -- Rene I'm sending this to you because I just realized that Robbie may not be in the office today since it is a Thursday.

Julia Wellman
Environmental Impact Review Coordinator
Virginia Department of Environmental Quality
PO Box 1105
Richmond, VA 23218
Phone: (804) 698-4326
Fax: (804) 698-4319
NEW E-mail: Julia.Wellman@deq.virginia.gov

From: Ewing, Amy (DGIF)
Sent: Thursday, August 26, 2010 11:24 AM
To: Wellman, Julia (DEQ); Rhur, Robbie (DCR)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

Their letter, as I read it, does not say that nothing was documented, it just says no impacts. So, their records may have included the same records we have, they may just determined that the project would not impact swamp pink. You'd have to check with them to be sure.

If it is not a species under our jurisdiction, we don't make protective comments about the species. I would consider the response from DCR fulfillment of our request to coordinate with them.

Amy

Amy M. Ewing
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
804-367-2211

From: Wellman, Julia (DEQ)
Sent: Thursday, August 26, 2010 11:19 AM
To: Ewing, Amy (DGIF); Rhur, Robbie (DCR)
Subject: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

Hey Amy and Robbie,

8/26/2010

Just to make sure we're on the same page...

I noticed that DGIF referenced DCR's data; however, the comments I received from DCR did not report the same information (or rather did not specify) as DGIF did when referencing DCR's data. I attached comments from DCR.

Will you please clarify and please respond as soon as possible this morning?

Julia Wellman
Environmental Impact Review Coordinator
Virginia Department of Environmental Quality
PO Box 1105
Richmond, VA 23218
Phone: (804) 698-4326
Fax: (804) 698-4319
NEW E-mail: Julia.Wellman@deq.virginia.gov

From: Ewing, Amy (DGIF)
Sent: Tuesday, August 17, 2010 4:06 PM
To: Wellman, Julia (DEQ)
Cc: Mohn, Larry (DGIF); nhreview (DCR)
Subject: ESSLog# 21018_ DEQ 10-114F: Supplemental Watershed Plan, South River, EA

Hi Julia,
Not sure how this one got missed. Thanks for the heads up. Our comments follow:

We have reviewed the Supplemental EA for the South River Watershed Project that proposes to rehabilitate South River dam no. 10A on Mills Creek in Augusta County, VA.

VDCR data indicate that federal Threatened state Endangered (FTSE) swamp pink and FTSE Virginia sneezeweed have been documented from the project area. We recommend coordination with the USFWS, VDACS, and VDCR-DNH regarding possible impacts upon these listed plants.

State Endangered eastern tiger salamanders have been documented from Maple Flats. Based on the scope and location of the proposed work, we do not anticipate it to result in adverse impacts upon this species.

Mills Creek above the existing dam is designated a wild trout water known to support brook trout. Below the dam, Mill Creek is designated a stockable trout water. To best protect trout resources associated with Mills Creek, we recommend that all instream work adhere to a time of year restriction from October 1 through March 31 of any year. In addition, we recommend coordination with VDGIF Region IV Fisheries Manager, Larry Mohn, at 540-248-9360 to ensure avoidance of stocking and angling activity conflicts.

We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures.

Thanks, Amy

Amy M. Ewing
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries

8/26/2010

Wellman, Julia (DEQ)

From: McGinnis, Ben (MRC)
Sent: Tuesday, August 17, 2010 2:18 PM
To: Wellman, Julia (DEQ)
Subject: RE: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

This will acknowledge receipt of your transmittal letter with enclosures requesting Commission review of the above-referenced Environmental Assessment (EA).

Please be advised that the Marine Resources Commission, pursuant to Section 28.2-1204 of the Code of Virginia, has jurisdiction over any encroachments in, on, or over any State-owned bays, rivers, streams, or creeks in the commonwealth. However, according to the EA document the drainage area above the Mills Creek Dam falls below the threshold our agency uses for exerting our jurisdiction. Therefore, it does not appear that the proposed project will require a permit from our agency.

Thank you for the opportunity to comment.

Ben McGinnis
Environmental Engineer

Virginia Marine Resources Commission
Habitat Management Division
2600 Washington Avenue, Third Floor
Newport News, Virginia 23607
(757) 247-8028 (direct)
(757) 247-8062 (fax)

From: Wellman, Julia (DEQ)
Sent: Tuesday, August 17, 2010 11:33 AM
To: 'coadmin@co.augusta.va.us'; 'enviromang@co.augusta.va.us'; 'HampMG@ci.waynesboro.va.us'; 'BarnesMD@ci.waynesboro.va.us'; Allen, Melanie L. (VDOT); Adkins, Chris (VDOT); McGinnis, Ben (MRC); Watkinson, Tony (MRC); Dressler, Shirl (DGIF); Ewing, Amy (DGIF)
Subject: DEQ 10-114F: Supplemental Watershed Plan, South River, EA

If you would like to comment on the above-referenced project, please email me as soon as possible and no later than noon tomorrow, Wednesday, August 18.

Julia Wellman
Environmental Impact Review Coordinator
Virginia Department of Environmental Quality
PO Box 1105
Richmond, VA 23218
Phone: (804) 698-4326
Fax: (804) 698-4319
NEW E-mail: Julia.Wellman@deq.virginia.gov

From: Wellman, Julia (DEQ)
Sent: Monday, July 19, 2010 4:16 PM
To: Dressler, Shirl (DGIF)
Cc: Ewing, Amy (DGIF)
Subject: FW: Review Request: Supplemental Watershed Plan, South River, EA

8/26/2010

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804-287-1653
Fax: 804-287-1736

September 7, 2010

Ms. Ellie L. Irons
Manager
Department of Environmental Quality
Office of Environmental Impact Review
P.O. Box 1105
Richmond, VA 23218

Re: Draft Supplemental Watershed Plan – Environmental Assessment for the South River Watershed for the Rehabilitation of South River Dam 10A (Mills Creek), Augusta County, Virginia

Dear Ms. Irons:

Thank you for providing the Commonwealth's consolidated comments on the Draft Rehabilitation Plan for South River Dam Site No. 10A (Mills Creek). We appreciate your support of this project. Since all the comments address issues that are required during the implementation process, they will be addressed during the design, permitting, and/or construction phases of this project. It is very helpful to have this comprehensive listing of the State's requirements in your letter.

If you have any further comments or questions, do not hesitate to contact me.

Sincerely,

W. Ray Dault
Acting for JOHN A. BRICKER
State Conservationist

Helping People Help the Land

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Douglas W. Domenech
Secretary of Natural Resources



David A. Johnson
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

August 6, 2010

John Bricker
Natural Resources Conservation Services
1606 Santa Rosa, Suite 209
Richmond, VA 23229

Re: South River Watershed Dam Number 10A

Dear Mr. Bricker:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

Biotics documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

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

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

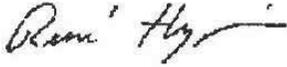
New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis/> or contact Shirl Dressler at (804) 367-6913.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

*State Parks • Soil and Water Conservation • Natural Heritage • Outdoor Recreation Planning
Chesapeake Bay Local Assistance • Dam Safety and Floodplain Management • Land Conservation*

Sincerely,

A handwritten signature in black ink, appearing to read "S. Rene' Hypes". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

S. Rene' Hypes
Project Review Coordinator

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Telephone: 804-287-1653
Fax: 804-287-1736

September 7, 2010

Ms. S. Rene' Hypes
Project Review Coordinator
Department of Conservation and Recreation
Division of Natural Heritage
217 Governor Street
Richmond, VA 23219-2010

Re: Draft Supplemental Watershed Plan – Environmental Assessment (EA) for the South River Watershed for the Rehabilitation of South River Dam 10A (Mills Creek), Augusta County, Virginia

Dear Ms. Hypes:

Thank you for your timely review of the referenced Draft EA submitted to your office. We appreciate the time and consideration given by your agency to carefully examine our assessment and provide input.

If you have any further comments or questions, do not hesitate to contact me.

Sincerely,

W. Ray Duvett
JOHN A. BRICKER
State Conservationist

Acting For

Helping People Help the Land

An Equal Opportunity Provider and Employer



Dr. Daniel M. Downey
465 Cardinal Drive
Harrisonburg, VA 22801
August 15, 2010

RE: Draft Supplemental Watershed Plan-Environmental Assessment

John A. Bricker
State Conservationist
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014

Dear Mr. Bricker:

Thank you for sending me a copy of the Draft Supplemental Watershed Plan-Environmental Assessment for the South River Watershed Supplement No. 4 to the original watershed plan for the rehabilitation of the South River Dam No. 10A (Mills Creek), hereinafter referred to as the "Draft Plan". I have reviewed this document and am sending you the comments that follow for your consideration. I have also requested and obtained a copy of the Special Use Permit for the operation of this dam on federally owned lands from the United States Forest Service (USFS). I have also reviewed this document as it pertains to the legal commitment that the Augusta County Service Authority (now Augusta County Government) made for continued operation and maintenance of the dam. I am writing to **strongly object** to the selected plan of rehabilitation that is described in the documentation for the Mills Creek Dam Project. There are multiple reasons for this objection as I will outline in the following statement.

First I will relate some background information. Mills Creek is one of several small streams that drain northward more or less from the historic Big Levels/Maple Flats/Green Pond Area of the former Pedlar Ranger District in the George Washington National Forests. Prior to acquisition by the National Forest in the early 1900s, the area was exploited for timber, minerals and other resources. Public acquisition of the area led to reestablishment of forest timber stands and wildlife. In fact, Big Levels was one of the first areas in Virginia where whitetail deer and other game animals were reintroduced following extirpation in the 1800s. The Virginia State Fish, native brook trout (*Salvelinus fontinalis*) populated the streams of Big Levels despite heavy logging and mining prior to the USFS acquisition and did not need to be reintroduced. Although as far as could be determined biomass data do not exist for the fish populations in Mills Creek, it is likely that the population increased when the ridges and riparian area re-vegetated based on similar situations elsewhere.

Dams built on cold water streams have adverse environmental effects that are well documented in the primary literature. For example, in 2006 my research group in cooperation with staff from the Virginia Department of Game and Inland Fisheries (VDGIF) studied three similar "trout" streams in western Rockingham County: two that were dammed and one that was slated for a dam that was never constructed. We found statistically significant differences in water chemistry, physical parameters and fish populations upstream and downstream of the dams. We concluded that the sediment removal by a dam for a nutrient starved headwater stream is actually detrimental for aquatic life endemic to the stream. Furthermore surface releases of warm water from the lentic reservoir pool during the summer months changes the downstream reach from cold water to warm water, which results in substantial changes in the aquatic life.

In the early 1960s, Mills Creek dam was built. The original purpose was two-fold: flood control and water supply. The construction of this dam eliminated habitat for native brook trout, both within the pool area and downstream of the dam. I estimate that one to two miles of native trout water were destroyed by the dam construction and subsequent operation. Wherever possible, VDGIF manages free flowing headwater streams for native brook trout. At Mills Creek, VDGIF responded to the loss of downstream native trout water in two ways: the downstream reach is

stocked in the cold months with "put and take" trout, while the reservoir pool was stocked with trout in the "put and grow" program. Coldwater fisheries as was in place in the former Mills Creek reservoir are possible in a southern state such as Virginia for two reasons. Elevation must be high enough to mimic northern climates where coldwater exists year round. Second, the reservoir pool must be deep enough that during the warm summer months thermal stratification can occur to establish a cold water zone within the pool where cold water species can over-summer. Neither of these management strategies completely replaces the aesthetic and natural appeal of a native trout stream but do provide opportunity for the angler that wouldn't otherwise exist *and* provides an alternate use of the reservoir that mitigates the destruction of a cold water resource from its construction.

In 1993-94, my research group conducted a study for US EPA Clean Lakes Program on Mills Creek and Coles Run, including the reservoirs. This study was done to evaluate water chemistry for potential acid mitigation projects. Unfortunately Congress did not renew funding for the Clean Lakes Program so we terminated that study. As a result of this project, we found acidic conditions due to atmospheric acid deposition. For the period of study, pH values in Mills Creek reservoir ranged from pH 4.81 - 6.34 depending on time of year and depth of sampling. Acid neutralizing capacity (ANC) ranged from 0 - 81 µeq/L (0 - 4 ppm). In brief, the water that enters Mills Creek reservoir is extremely soft as it drains from Antietam formation sandstone and contains little natural buffering capacity. Thus the absence of natural buffer results in poor mitigation of the atmospherically derived acid that accompanies rainfall, especially during the winter months. In the Draft Plan p. 6 the stream is described as "impaired" due to low acidity. This is absolutely incorrect; it's quite the opposite. More than likely, the impairment is the result of high acidity coupled with the physical effect of the dam as described above.

I feel that the Draft Plan has **not** given proper attention to the loss of the pre-dam cold water resources of Mills Creek. As you know, the purpose of an Environmental Assessment is to propose a course of action that will have the lowest environmental cost with the most benefit to the public. The Draft Plan (p.vii. and p. 45) indicates that fish habitat will be "maintained and protected." This is nonsense as I will explain below. The document also indicates "an increase of 5 acres of riparian area" with the proposed reduction of the lake pool. This too is nonsense. The riparian area can be defined as the narrow zone surrounding a body of water that due to the proximity to water supports plants and animals that differs from those of adjacent uplands. Without knowing the exact geometry of either the pre-existing pool or the proposed pool it is not possible to calculate the riparian perimeter length; but a quick calculation using a square geometry as a surrogate, gives 3482 and 2177 feet, respectively. This is a *reduction*, not an increase in riparian area. Of greater consequence is the fish habitat misinterpretation. "Fish habitat" generally refers to the physical and environment conditions which must be present for fish to survive and is dependent on the species of fish. In the case of Mills Creek, this means that the habitat would have to provide adequate cold water refugium during the warm months for survival. The key to this is adequate depth *and* area within the reservoir pool for over-summering of cold water fish species. The Draft Plan addressed the potential for cold water management by suggesting a 26 feet depth (p. 31). However the *actual surface area and volume* of cold water in such a small pool will be nil, and certainly not suited for substantial over-summering of cold water fish species. The reason for this is compression due to warm water at the surface coupled with low dissolved oxygen at the bottom of the lake. I contend this will be the situation based on the dissolved oxygen/temperature profiles we measured in our previous work. When the pool was at full level of 17.4 acres during the most extreme period of the summer, we found a limited cold water habitat zone of only about 3 feet about 15 feet below the surface with only about 30% of the lake pool area acceptable for cold water species. If the pool is reduced to 6.8 acres, there will be essentially no cold water refugium when the same conditions occur. **The only reasonable way to provide adequate cold water habitat is to maintain the pool area at 17.4 acres in the rehabilitated dam.**

It is possible that the cold water fisheries here could be replaced with warm water management; e.g., large mouth bass. This would not be acceptable for several reasons. First warm water

species are not native to this area and could be viewed as an exotic introduction. Second, the reservoir will only be warm during the summer months with limited growth and survival during the cold months. Finally, the water chemistry is poor for warm water species. Brook trout are not acid resistant, but they are more acid tolerant than many fish species and that is why the tributary stream upstream of the reservoir maintains a good trout population. Should acid deposition increase in this area, even brook trout may not be able to survive here.

Is it possible to rehabilitate this dam, keep the 17.4 acre pool and still achieve the desired flood control? I am having a bit of difficulty deciphering your numbers (p.61) and the text that describes the proposed activity in the Draft Plan, but in essence, the basic idea contained in the proposal is to eliminate the portion of the lake pool that was originally intended as a water supply. According to the National Inventory of Dams, the water supply storage was 370 acre-feet (differs from your document value of 307 acre-feet, p. 21). For a 100 year flood, you indicate 8.59 in. rainfall in 24 hours. For the watershed that equates to 1760 acre-feet. In such a rainfall scenario, the water supply storage would only accommodate 21% of this volume, a small increase and not enough to eliminate flow in the auxiliary spillway for some storms. The minimal increase gained from the water supply pool in my opinion does not offset the loss of cold water habitat. But what about safety? In a way the Draft Plan appeared to be orchestrated to inspire fear to some extent in the mind of the public. The idea of a "sunny day breach" (p. 25) with a 76.4 feet tall wall of water descending on the innocent citizens when the dam suddenly disappears is nothing more than "voodoo science" and is of no meaning to the sensible person. The document does not point out that the dam is down slope of a very small percentage of the drainage area affected by flooding described in this document. Of more importance is the statement "This dam is 'unsafe' not because of imminent danger, but because of the soil materials in the auxiliary spillway do not have the structural integrity necessary to reduce the flows of the PMP." This is an absolute conclusion and directs the proper ways to solve the problems here. First, reduction of PMP can be accomplished by widening the auxiliary spillway. This option is listed (p.35) but dismissed in part because it would expand the "footprint" of the dam. I feel certain that the conservation and environmental community could be convinced to support widening the auxiliary spillway (and dam footprint) if it meant preserving the 17.4 acre lake pool. Secondly the proposed action of armoring the spillway could be incorporated along with widening the spillway for creating the structural integrity necessary for safe operation. In this way I believe Mills Creek Dam can be properly rehabilitated and satisfy both the needs of safety in flood control and of the fisheries resource.

One issue that I have not yet discussed is the presence of Swamp Pink habitat downstream of the dam. All construction activities here will need to be done so that there is no or minimal effect on this rare and unique species of plant. My evaluation of the location of concern is east of the road that accesses the dam. Another advantage of widening the auxiliary spillway is that construction would be away from the Swamp Pink and by design could carry the discharge to the west. It will be more likely to have environmental groups and some government agencies support this rehabilitation effort if the plan adequately addresses this concern.

Reconstruction of the riser and the stilling basin, along with infrastructure of water delivery is a necessity regardless of whatever plan is chosen for rehabilitation. I feel that the proposal has not adequately addressed the corrosion potential for the concrete and iron materials that will be part of the rebuilt riser, etc. As noted above, the water in Mills Creek is more acidic than many surface waters in the Shenandoah Valley. The evidence of the corrosive nature of this water is manifest in the damage to the rebar and concrete that was revealed on the existing structures in the dam exposed by the emptying of the former pool. The concrete structure was terribly pitted and any exposed iron showed rust blisters in abundance. Any materials used for reconstruction will either need to be corrosion resistant (e.g., stainless steel) or treated with anti-corrosion compounds to avoid water penetration and for safety.

Finally I wish to comment on the commitment that the local government made in the 1960s that has been renewed to present time for this dam. As noted above, Mills Creek Dam is entirely

located on land publicly owned by the US government and within the National Forest. The USFS issued a permit for a special use for this dam that requires the permit holder to do certain things as outlined therein. Within that document, it clearly states that the normal pool level of the impounded water is 17.4 acres. The public has a legitimate grievance at this time, since the pool is dewatered, to complain the permit holder is in violation of said permit. Certainly this can be temporarily excused if the reason for dewatering is to rehabilitate the structure. However if the proposed action of reducing the lake pool to 6.8 acres is selected, the permit will need to be reissued and most certainly there will be action taken to ensure the public needs are fully met in that process.

In summary, I find that the Draft Plan does not properly address all environmental consequences of the proposed action. I suspect that if this dam were proposed in this day and age it would be seriously protested by private groups and government agencies alike due to its location in an area occupied by various Threatened & Endangered species and for interruption of a native trout stream. It was constructed during an era of less environmental concern and we must now adapt to its existence. Clearly those who were responsible are all either dead or very old and cannot be held accountable. From an environmental perspective a desired future condition is complete removal of the dam and restoration of the area. Whether this comes as a result of this project or we delay it for our grandchildren to deal with, it is an eventuality. Therefore whatever is done at this time, we must do it with that thought in mind. But meanwhile we must work to make the most of a bad situation. **Therefore adequate cold water refugium during the summer months with the lake pool must be included as an integral part of the final plan of action for this project to be amenable to environmental concerns.**

Thank you for an opportunity to respond to the Draft Plan. I regret not being able to provide input at any earlier date, but I had no knowledge of this project until July of this year. Please recognize that I am providing this letter as a private citizen, not in my capacity as either a professor at JMU or associate board member for the Shenandoah Valley Soil and Water Conservation District. Please feel free to contact me if I can provide further information or assistance.

Best regards,



Daniel M. Downey

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September 8, 2010

Dr. Daniel M. Downey
465 Cardinal Drive
Harrisonburg, VA 22801

Dear Dr. Downey:

Thank you for your comments and suggestions on the draft Supplemental Watershed Plan-Environmental Assessment for the South River Watershed, Mills Creek Dam site 10A. We share your concern for the historic loss of native brook trout habitat that occurred when site 10A was built in 1963. Concern for flood control and water supply were the factors that lead to the project being built and inevitably tradeoffs occur as a result of any project of this nature. Flood control remains the primary purpose served by the dam and rehabilitation will continue the protection afforded to downstream inhabitants, workers, commuters, public infrastructure and personal property. The local sponsors are determined that the dam will remain in place. They did this in recognition of the trade-offs that accompany a dam on a trout stream. The continued effect of diminished native trout habitat is regrettable, but unavoidable.

In your comments you noted "In the Draft Plan p.6 the stream is described as "impaired" due to low acidity. This is absolutely incorrect; it's quite the opposite." Thank you for pointing out this error. The document should have stated either "low pH" or "high acidity" due to atmospheric deposition. This mistake has been corrected.

You also note that the cold water fishery within the normal pool will be reduced to a state of "essentially no cold water refugium" when rehabilitation reduces the normal pool from 17.4 acres to 6.8 acres. Originally, we were proposing to reduce the normal pool to 14 feet of depth and 2.75 acres to maximize flood storage and protection. Discussions during planning with the Virginia Department of Game and Inland Fishery (DGIF) colleagues, and their assessment of the likely effects, concurred with your assessment and lead to their proposing that the normal pool water depth be set at 26 feet. A depth of 26 feet corresponds to the 6.8 acre normal pool with which we have agreed. This accommodation was made based upon DGIF judgment that such conditions were necessary to maintain a cold water fishery within the normal pool. It is debatable whether or not such a depth will only achieve the minimal conditions needed for maintaining the cold water fishery or some higher level state, but by establishing a 26 foot depth for the normal pool we are conforming to the expressed desire of the state agency responsible for the put and take trout fishery at the site.

If the USFS and DGIF preferred, and to enhance the cold water put and take fishery below the dam, during the design phase of this project we could include explicit inclusion of a cold water take-off from the base of the principal spillway. This minor change would not significantly alter the cost of the project, but could improve the downstream cold water fishery.

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You asked whether or not it would be possible to rehabilitate the dam keeping the 17.4 acre normal pool and still achieve the desired flood control. The short answer is yes, but not within the same footprint for the dam and auxiliary spillway, nor at the same level of cost. Such a solution would expand the footprint and significantly increase project cost. Excavation to widen the auxiliary spillway would require blasting, rock crushing, earth movement and disposal of excavated materials off-site. In addition, we still would have needed to harden the existing auxiliary spillway footprint. The challenge we faced was to both increase the capacity of the auxiliary spillway and harden it to be able to withstand flood flows from the probable maximum precipitation event and associated flood flow. To achieve these requirements within the same footprint, as required by the USFS who owns the land, and at least cost (as dictated by federal water resource project planning), forced us to lower the crest of the auxiliary spillway (to achieve the needed added capacity within the spillway) and to harden the spillway (to achieve stability).

You took strong exception to use of the “sunny day breach” concept. This concept has been a major part of the technical engineering planning process for a majority of the history of dam building with public funds in the United States. Likewise, public disclosure of the potential consequences of catastrophic failure associated with a sunny day breach has also been a part of public water resource planning for a majority of the history of these type projects. Inclusion of sunny day breach scenarios in our planning serves the purpose of evaluating and disclosing the expected consequences for the worst possible case, i.e., breach under conditions where the water level behind the dam is at or near the absolute maximum storage possible. Such a breach yields the largest volume of water possible which translates into the greatest flood possible. Building a dam without disclosing the worst case possible that could result from a catastrophic breach was, and continues to be, deemed unacceptable public policy. Therefore, all federal water resource projects involving potential construction of dams or their rehabilitation, call for evaluation and disclosure of the sunny day breach scenario. This is not to instill fear, but to fully disclose the worst potential harm that could occur should a dam fail. Such policy is required as essential for public disclosure.

Regarding the presence of Swamp Pink below the dam, we have worked with the USFS and the USFWS to plan numerous actions intended to minimize potential negative effects on this species. Increasing the flood water storage behind the dam will diminish the frequency that the auxiliary spillway experiences flows of water that could move sediment and damage the Swamp Pink. Use of super silt fencing, around the construction limits of the site, will protect the Swamp Pink and its habitat. In addition, we plan on grading the access road at the toe of the dam so that it acts as a sediment basin with an outlet in the plunge-pool and away from the Swamp Pink habitat.

Flood protection for the people who live, commute and work below the dam, and the public and private property at risk is the primary reason for the dam and rehabilitation of it. The local sponsors are legally liable for maintenance of the dam. Currently, the sponsors work within the context of a conditional certificate issued by the Virginia Division of Dam Safety. NRCS provides technical and financial assistance at the request of the local sponsors to achieve their purposes/needs for the dam. This project, with its capacity, integrity, stability, footprint limitations, species of concern issues and flood protection considerations, has challenged our

planning process to arrive at reasonable accommodations and still achieve the project's purpose. Trade-offs are inevitable in any planning effort as complicated as this one, i.e., a perfect solution that makes all interests completely happy does not exist. Complete removal of the dam and restoration of the native brook trout fishery is not acceptable to the sponsors. We feel certain that good faith by all parties and interests involved have resulted in a project plan that is technically feasible and socially acceptable to the principal stakeholders. We will continue to serve as a partner to the local sponsors for implementing this project unless and until the sponsors no longer require the dam for its flood protection benefits.

Thank you once again for your thoughtful comments and suggestions.

Sincerely,



JOHN A. BRICKER
State Conservationist

Acting For

APPENDIX B

RECORD OF INVESTIGATION AND ANALYSIS

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Appendix B. Investigation and Analysis Used in the Planning for the Rehabilitation of Mills Creek Dam Site No. 10A.

Threatened and Endangered Species: Identification of Federal and State listed threatened and endangered plant and animal species within a two mile radius of the project area was determined using the Virginia Fish & Wildlife Information Service computer program, a publication of the Virginia Department of Game and Inland Fisheries. In addition, the USFS performed a Biological Evaluation of the proposed rehabilitation activities and their potential effects. During the on-the-ground survey, one species, the Swamp Pink, was found in the project area. Subsequently, the USFWS was contacted for guidance. Their recommendation was to ask the USACOE and VDCR-Division of Natural Heritage (Karst Program) for a site assessment.

The USACOE and VDCR-Division of Natural Heritage (Karst Program) staff accompanied the USFS and NRCS staff on site visits made in May 2010. There is one spring located immediately below the toe of the dam that contributes water to the wetlands that support the Swamp Pink habitat. There was some concern that activities at the dam could adversely affect this spring. The U.S. Army Corps of Engineers (USACOE), and Virginia DCR-Division of Natural Heritage (Karst Program) staff were asked to evaluate the relationship between the seeps along the toe of the dam and the spring located immediately downstream of the dam. It is the position of the USACOE and DCR that seepage from the dam and the spring are not hydrologically connected. Tests conducted on the lake water and the spring water to evaluate hydrologic connectivity have been inconclusive. However, the earthen training berm that will be installed between auxiliary spillway and the toe of the dam will be placed over top of the spring. The spring water will be captured in a vent and piped back into its original channel.

There are multiple seeps located along the access road to the site that contribute to the wetlands in the area downstream of the dam. The USFWS has issued a finding that rehabilitation of the dam is “likely to adversely affect” the Swamp Pink and has provided guidance on ways to minimize the impacts. In addition to meeting these requirements, NRCS will grade the portion of the access road located immediately below the auxiliary spillway so that soil material that erodes from this area will be diverted away from Swamp Pink habitat.

The VDGIF, USFS, and NRCS met on site in March 2010 to discuss the effect of dam rehabilitation on the fish population. The originally proposed elevation of the permanent pool would result in warmer water temperatures in the lake. The maintenance of coldwater fisheries in the lake is of concern to VDGIF. To accommodate this, NRCS agreed to increase the elevation of the principal spillway by 12 feet. This will give a water depth of 26 feet and will allow maintenance of the coldwater fishery.

Cultural Resources, Natural and Scenic Areas, and Visual Resources: A field reconnaissance was conducted in March 2010 by USFS archaeologists of the area below the dam downstream for approximately 200 meters, the proposed staging areas, and turnouts. Consultation with the VDHR was initiated in March 2010 by the USFS. The VDHR has provided comments indicating their concurrence with the finding of *no adverse effects*. One site along the access road was later identified as have archaeological significance and will be fenced off during the construction period to avoid disturbance.

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

Water Quality: Impaired stream and lake listings and supporting information was taken from the Virginia DEQ 2008 305(b)/303(d) Integrated Water Quality Assessment and Impaired Waters Report.

Wetlands: There was a site visit with the US Army Corps of Engineers in May 2010. There are no delineated/confirmed jurisdictional wetlands on site.

Forest and Wildlife Resources: Information on the potential natural vegetation of the Blue Ridge Mountains and associated wildlife resources was obtained from The Natural Communities of Virginia Classification of Ecological Community Groups, VDCR, Natural Heritage Division, and the Virginia Comprehensive Wildlife Conservation Strategy, VDGIF, 2005.

Chesapeake Bay and /or Coastal Zone Management Areas: Information on the Chesapeake Bay Act and Coastal Zone Management Areas was taken from DEQ program literature.

Geology: Reference for this plan: The Geologic Map of Virginia, 1993, compiled by the Commonwealth of Virginia Department of Mines, Minerals, and Energy.

Sediment: NRCS performed the sediment survey in January and July 2009 as the water level was dropped in the reservoir. The survey showed that 22% of the sediment originally predicted to flow into Mills Creek had done so in the period from dam construction in 1963 to 2009 (46 years). The quantity of sediment was determined by generating two surfaces in AutoCAD Civil 3D. The upper surface was defined as the top of the sediment and the lower surface was defined as the bottom of the sediment layer corresponding to the original reservoir bottom.

HYDRAULICS AND HYDROLOGY

Background: In 2005, the hazard class of South River 10A changed from significant to high based upon changes in land use. NRCS conducted an analysis of the existing auxiliary spillway, evaluated rehabilitation alternatives, and quantified the effects of a breach on the downstream watershed. Hydrologic and hydraulic investigations included an analysis of rainfall/runoff relationships of the watershed.

Although the change of hazard class is the major reason for the proposed rehabilitation, the Sponsor has also indicated their concern about the multiple times that flow has occurred in the auxiliary spillway and the resulting need for repairs. In 2006, Gannett-Fleming prepared a report on South River Dam No. 19. In that report, there was information about the seven flow events that have occurred at South River Dam No. 10A (Table B-1).

Table B1. Storm Events that caused Auxiliary Spillway Flow.

Date of Event	Event	Maximum Depth of ASW Flow (feet)	Estimated Maximum Discharge (cfs)
August 20, 1969	Hurricane Camille	~2.7	1,100
June 22, 1972	Hurricane Agnes	~2.0	700
November 5, 1985	Hurricane Juan	~1.5	400
January 19, 1996	Rain on 3+ feet of snow	~0.8	250
September 7, 1996	Hurricane Fran	~0.6	100
September 18, 2003	Hurricane Isabel	~0.8	250
November 29, 2005	Hurricane Rita	~1.9	600

Hydrology

Watershed and Structure Parameters: South River 10A (SR10A) has a drainage area of approximately 3.84 square miles. The GIS, ArcHydro computer program was used to generate the drainage area using the VGIN 2007 TIN for Augusta County. The initial watershed parameters were computed using NRCS TR-55 procedures. A calibration of the watershed was completed (see “Runoff Prediction and Hydrologic Model Calibration” section below) and the runoff curve number (RCN), lag time, and initial abstraction used for the rehabilitation design were 56, 83 minutes, and 1.53 inches. The RCN of 56 is for both the existing and future conditions since the watershed is in the National Forest. Land cover was determined from digital land use maps (USDA’s National Land Cover Database 2001). Soil data was generated from digital soil data maps (USDA-NRCS’ Soil Survey Geographic (SSURGO) database for Augusta County, Virginia).

The stage-area curve for SR10A reservoir was prepared using sediment survey data (ground survey) and supplemented with the VGIN 2007 TIN for Augusta County. The stage-discharge curve for the SR10A was prepared using the existing principal and auxiliary spillway configurations and the results of the existing conditions SITES model.

Precipitation Data and Hydrologic Data: The precipitation data has changed since the original design was completed in 1963. Table B-2 compares the design precipitation values to the NOAA-14 data from 2004.

Table B2. Comparison of Precipitation Depths for Design Storms in 1961 and 2004.

Year	100-year, 6-hour event, inches	100-year, 24-hour event, inches	100-year, 10-day event, inches	6-hour PMP, inches	24-hour PMP, inches
1961	5.16	6.93	-	NA	NA
2004	6.88	8.59	12.82	28.0	36.8

In accordance with TR-60, the latest available precipitation data for the National Weather Service were used. Precipitation estimates for the various frequency storm events were taken

from NOAA Atlas 14 point rainfall data. NOAA Hydrometeorological Report No. 51, for 27 Contiguous States East of the 105th Meridian, for drainage areas less than 10 mi² was used for estimates of Probable Maximum Precipitation (PMP). These precipitation values are shown in Table 1.

Runoff Prediction and Hydrologic Model Calibration: The HEC-HMS rainfall-runoff simulation computer program was utilized to generate inflow hydrographs and to calibrate the watershed parameters. The storm events evaluated include the 2, 5, 10, 25, 50, 100, 200, and 500-year, Type II, 24-hour discharges.

The SR10A watershed parameters were calibrated using the National Weather Service IFLOWS data for Hurricane Isabel in September 2003 and the USGS regression equations for the Blue Ridge physiographic province (USGS Fact Sheet 023-01,2001). The calibrated results of the HEC-HMS reservoir routings for the SR10A watershed and dam are presented below. Comparing the HEC-HMS model to the Isabel storm event shows that the simulation model predicts the peak elevation to within 1 foot of the peak elevation during Isabel. The simulated peak inflow is approximately 10% less than the Isabel peak inflow. Comparing the HEC-HMS model to the Blue Ridge peak discharge regression equations shows that the simulation model may under-predict the higher frequency storm events (2, 5, 10 –year), and may over-predict the smaller frequency storm events (50, 100-year).

The watershed parameters that produce the larger peak discharges for the smaller frequency storm events and are close to the Isabel event were used for the rehabilitation design of the SR10A dam and flood routings downstream of the SR10A dam.

Table B3. Precipitation Data Used in Design Analysis

Description	Design Hydrograph	Duration (hrs)	Amount (in)	Source
100-year	PSH (rainfall)	1-day	8.59	Atlas 14
100-year	PSH (rainfall)	10-day	12.82	Atlas 14
100-year	PSH (runoff)	1-day	3	TR-60
100-year	PSH (runoff)	10-day	6	TR-60
ASW stability (P100 & PMP)	SDH	6	11.17	Atlas 14 & HMR-51
ASW capacity and Integrity (PMP)	FBH	6	28	HMR-51
ASW capacity and Integrity (PMP)	FBH	12	33.2	HMR-51
ASW capacity and Integrity (PMP)	FBH	24	36.8	HMR-51

Table B4. Existing Reservoir Routing Results

Flow Frequency	Precipitation (in)	Peak Inflow (cfs)	Peak Outflow (cfs)	Peak Elevation (ft)
2Year	3.58	207	76	1863.8
5 Year	4.55	486	78	1867.2
10 Year	5.36	790	80	1871
25 Year	6.52	1309	83	1877.1
50 Year	7.51	1809	86	1882.3
100 Year	8.59	2398	104	1887.8
200 Year	9.76	3076	444	1888.8
500 Year	11.49	4133	1335	1890.2

Hydraulics – Analysis of Dam and Potential Alternatives (SITES)

The SITES model was used to evaluate the capacity, stability and integrity of the existing structure and the auxiliary spillway alternatives. Geotechnical information was taken from the “SITES Analyses and Geotechnical Engineering Report, Mills Creek Dam Emergency Spillway Modifications” study by Schnabel Engineering, dated June 2006, that was a part of the Anderson & Associates report. In accordance with NRCS TR60 criteria, SITES routings of the principal spillway hydrograph (PSH) were prepared for both runoff and rainfall values. The rainfall routing resulted in the higher auxiliary spillway elevation. Therefore, rainfall values were used for all subsequent design runs.

NRCS TR60 critical freeboard hydrograph criteria for storm duration and rainfall distributions were used to develop PMF hydrographs. The NRCS dimensionless design storm distribution for the auxiliary spillway and freeboard hydrograph (Figure 2-4 of the TR60) was used to develop the 6-hr and 24-hr duration PMF hydrographs. Alternatively, the distribution for the 24-hr duration PMF can be developed using the procedures from the HMR52 (commonly called the 5 point distribution). SITES existing conditions model shows that the 6-hr FBH is the critical hydrograph.

The SITES model showed that the existing auxiliary spillway did not have the capacity, stability, or integrity to pass the flow from the PMP event. It also did not meet the 10-day drawdown criteria for the revised rainfall amounts.

Anderson & Associates suggested a variety of structural alternatives for rehabilitation of the auxiliary spillway. However, since rehabilitation of the principal spillway was not included in the scope of their work, these alternatives were constrained by the need to maintain the existing auxiliary spillway crest elevation. Under the rehabilitation program, NRCS was required to address the concerns associated with the principal spillway and was therefore able to consider changes to the overall configuration of the auxiliary spillway.

This dam was designed as a multi-purpose structure with both flood control and water supply. Since the water supply was never used, the Sponsor allowed this purpose to be removed during

the rehabilitation planning. When the dam was evaluated for flood control only, the historic sedimentation rate, the future sedimentation rate, the revised precipitation values, and the condition of the principal spillway were factors that were included in the evaluation. The principal spillway crest was set to an elevation of 1838.0 to maintain coldwater fisheries in the lake. SITES was used to determine the new auxiliary spillway crest elevation for the existing 100-foot auxiliary spillway width. The calculated auxiliary spillway crest elevation gave more than enough capacity to carry the PMF. To minimize the amount of cut needed in the auxiliary spillway, the crest elevation was raised to the elevation where the available capacity matched the needed capacity. This caused the stormwater detention capacity to increase from holding the 100-year, 24-hour storm event to holding the 200-year, 24 hour storm event.

Once the capacity had been achieved, NRCS used the SITES model to evaluate the integrity of the auxiliary spillway. The as-built length of the control section in the auxiliary spillway was 20 feet. This is shorter than the minimum allowed length in SITES of 30 feet. Therefore, the model was set to the minimum length to evaluate the existing condition. For this configuration, the auxiliary spillway did not meet the integrity criteria. On other sites, ACBs have been used to provide the needed integrity. For this site, the ACBs could not be used to provide integrity because the flow velocities are too high. Instead, the control section length was incrementally increased until the integrity criteria was met. This occurred at 200 feet. The control section and the constructed outlet section will be armored with ACBs to meet the stability criteria.

Although NRCS evaluated several other ways of reconfiguring the auxiliary spillway, this alternative was the simplest way to provide a complete solution.

Hydraulics - Water Surface Elevation Modeling

HEC-RAS (steady flow) was used to determine the water surface elevations within the downstream floodplain. The extent of model limits were taken to a point where the depth of the TR60 Breach inundation area was within one foot of the 100-year floodplain as determined from the 2004 study for the watershed plan for the rehabilitation of South River Watershed Dam Number 23, 25 and 26. That stream routing study was calibrated to known flood elevations during Hurricane Isabel and USGS gage located on the South River in Waynesboro (unpublished).

Manning's roughness coefficient "n" values ranging from 0.16 in the overbank to 0.08 in the channel were used. These values were selected to account for mud/trees/brush that would be disturbed and washed downstream due to a breach of the dam. Contraction and expansion values of 0.1 and 0.3 respectively were used in the modeling.

The valley cross sections were developed using the VGIN 2007 TIN model and supplemented with field survey data of the road crossings. HEC-GeoRAS was used to extract the cross-sectional data from the VGIN 2007 TIN digital elevation model for Augusta County. The VGIN 2007 TIN model does not meet National Map Accuracy Standards (NMAS) for contour development. The GIS metadata states that "any determination of topography or contours, or any depiction of physical improvements, property lines or boundaries is for general information only and shall not be used for the design, modification, or construction of improvements to real

property or for flood plain determination.” However, an analysis of the VGIN TIN model by NRCS GIS specialists shows that the accuracy of the TIN model is significantly better than the 10m USGS NED digital elevation model. Since the 10m DEM for a breach routing is routinely used in NRCS dam hazard classification, the use of the VGIN 2007 TIN model to develop the hydraulic data is considered to be commensurate with the risk and scope of the analysis

Peak Breach Discharge and Breach Hydrograph Prediction. In accordance with the National Engineering Manual and instructions from the State Conservation Engineer, the breach zone was determined by a breach that could occur if the water level was at the crest of the auxiliary spillway. The criteria defined in TR-60, Earth Dams and Reservoirs, was used to determine the peak discharge of 163,200 cfs for the breach hydrograph. The depth of the water at the dam at the time of failure was set to the existing crest of the auxiliary spillway. The depth of water at failure is 76.4 feet as determined from the As-Built drawings, dated November 1963, and 2009 field surveyed data. The minimum breach discharge of 163,200 cfs was computed using the criteria in TR60.

The breach hydrograph was developed using the procedures outlined in NRCS Technical Release No. 66, Simplified Dam-Breach Routing Procedure (TR66). The breach hydrograph is defined by the peak breach discharge, the total volume of water, and shape of hydrograph. The volume of water at failure is 928 ac-feet as determined from the recent sediment survey data and supplemented with the VGIN 2007 TIN.

The downstream inundation zone due to the sudden breach of the dam (hereafter, TR60 sunny day breach) was based upon a flood routing of the TR66 breach hydrograph. The breach inundation mapping was developed using the same procedures outlined above in Water Surface Elevations.

SOCIAL AND ECONOMIC CONDITIONS

Data/Information Sources: Sources for the data and information included in the social and economic conditions and analysis provided in this supplement include the U.S. Census Bureau, Department of Commerce, 2000 Census and 2006-2008 projections, interviews conducted with local contacts who are knowledgeable, and data from the hydraulics and hydrology (H&H) analyses. Basic data were obtained from field surveys, interviews with residents, businesses and local government officials within the watershed. Detailed data on the homes and other structures within the floodplain and breach inundation zone were obtained either from field surveys or from Augusta County government contacts.

Guidance Documents: The NRCS National Watershed Manual was used as a reference for the economic analysis along with two economic analysis guidance documents: “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” (P&G), U.S. Water Resources Council, March, 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 requires that the “National Economic Development” or NED alternative, which maximizes monetary net benefits, be selected for implementation unless there is an overriding reason for selecting another alternative based on federal, state, local or international concerns related to the social and environmental accounts. The allowance for exceptions to the NED plan recognizes the fact that not all project considerations or benefits can be quantified and monetized when it comes to some ecological system and social effects.

Procedures: Flood damages were based on the results of the hydrology and hydraulics (H&H) simulation modeling carried out by NRCS engineers. The H&H data routed water for the storm events modeled establishing the extent of the floodplain as well as flood depths. This data was then used with water depth to damage functions developed by the Federal Emergency Management Agency (FEMA) to estimate damages by storm event for both the future without federal project (FWOFP) and future with federal project (FWFP) candidate plans.

Techniques: The estimated damages formed the basis needed to construct damage frequency curves relating percent chance of storm occurrence with specific event damage estimates. The resulting functional relationships permit the prediction of damages for lesser and greater events than the storms of record and the simulated storm events. Annualized estimates of storm damages from all storm events for the FWOFP and FWFP scenarios are the end result of this analysis. Loss of recreation and property values, when applicable are added to the predicted annual damages to establish total average annual damages for both the FWOFP and FWFP alternatives.

Assumptions: All costs of installation, operation and maintenance were based on 2010 prices. The costs of 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. Thus, a 52 year period of analysis was used along with the mandated 4.375% discount rate for all federal water resource projects for FY10 to discount and amortize the anticipated streams of costs and benefits.

Scope and Intensity of the Investigations: There is no computation of damage reduction benefits associated with the two candidate plans because the two alternatives are the same. Therefore, there are no net benefits. However, damage reduction benefits do accrue to the proposed project as compared to the existing conditions. The basis for the assumptions and results concerning the existing conditions, FWOFP and FWFP conditions are covered in more detail in the plan under “Effects of Alternative Plans” and “Comparison of Candidate Plans.

APPENDIX C

**EROSION AND SEDIMENT CONTROL PLAN
FOR
ACCESS ROADS**

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Appendix C. Erosion and Sediment Control Plan for the Access Roads.

The Mills Creek Dam is located about a mile from Coal Road. Access to the site is by a poorly graded gravel road through the woods. Since the entrance to this road is restricted by a gate, this road normally has very limited use. During the rehabilitation of the dam, the road will be used daily for a period of 6-8 months. Approximately 700 feet from the dam, the road splits into two roads. Figure C1 shows the sections of the road that are in the vicinity of the dam. The upper road goes up to the auxiliary spillway (Point B to Point C), the top of the dam, and the lake. The lower road (B to H) is used to reach the principal spillway outlet.

The current condition of the access road from the “Y” intersection to the dam in both directions is poor. These roads are eroding and the current drainage design and culverts are delivering visible amounts of sediment directly to sensitive habitats and Swamp Pink populations. Several culverts located near the “Y” have also contributed to increased flows and stream channel downcutting. This downcutting channelizes the drainageways and increases water velocity, which has negative impacts to the amount of Swamp Pink habitat available.

This Appendix contains the conceptual plan for the erosion and sediment control measures needed for the access roads. There will be a need for some pruning of vegetation adjacent to the roads. The final details will be determined during the design process.

Upper road. The upper road has a drainage ditch on the north (uphill) side that extends from the auxiliary spillway (C) down the hill past the split in the road to a 36” culvert at Point A. The ditch is 2-3 feet deep and is experiencing considerable erosion. During storm events, sediment-laden water passes through the culvert into a wetland area that drains to the Waynesboro Nursery Dam (South River 19). Due to the gradient at the culvert outlet, most of the sediment is deposited in the wetland. This is of great concern to the USFS because the wetland is potential habitat for the Swamp Pink.

The proposed solution for reducing the volume of sediment is to armor the ditch with erosion control materials. The road will be re-graded to its original condition. NRCS may also modify the 36” culvert to reduce the “blasting” effect that occurs with large flows.

Lower road. There are four separate issues associated with the lower road.

1. The lower road serves as the boundary between the uplands and the floodplain wetlands. There are multiple seeps along the downstream edge that provide water for the wetlands. A small ditch runs along the uphill side of the road that collects surface water from the area between the upper and lower roads. At Point D, the ditch outlets into a 12”-15” culvert that passes under the road and releases water into the wetlands. The USFS has expressed concerns about the potential for deposition of sediment into the wetlands from both dust and erosion from the lower access road during the construction period.

The proposed solution for dust and sediment control from Point B to the edge of the clearing (E) is to place wattles on both sides of the road. These wattles will be made of rice straw to avoid introduction of invasive plant species. The wattles will be installed as shown in Figure

C2. Clean crushed stone will be placed between the wattles to minimize generation of dust. Safety fence will be installed on the downstream side to minimize pedestrian traffic in the area downstream of the road. There will be no land disturbance associated with installation of these measures.

2. The lower road passes by a cleared area (E-F) that was originally used by the Augusta County Public Service Authority for water supply activities. Approximately half of this area drains directly into an area with a documented Swamp Pink colony. The remainder of the area drains into other parts of the wetland.

The cleared area has a drainage divide across the center (N). The wattles installed along the downstream side of the road will be extended along the drainage divide from the road to the east side of the clearing in a continuous line. The south side of the clearing will be used for an equipment staging area (K). Silt fence and/or a safety fence barrier will be installed along the perimeter of this area. Other measures to contain sediment and chemical spills will be installed as needed.

3. This road also crosses the lower end of the outlet of the auxiliary spillway (F-I). Although the auxiliary spillway outlet is primarily composed of exposed bedrock, there are some pockets of unconsolidated soil material that erode during normal rainfall events. This eroded material crosses the access road and is deposited in the wetlands. A second staging area will be installed in the area to the left of the auxiliary spillway.

From Point F to Point G, the road will be graded toward the upslope side. Clean, crushed stone will be placed on the road through this reach. This rock will remain after construction. A small drainage ditch will be constructed on the upslope side. There are three separate flow channels in this area. The ditch will be graded so that flow from this area drains to the center channel. The ditch will outlet into a culvert under the road which will drain towards Mills Creek. Wattles will be placed on the east side of the road and will remain during the construction period (Figure C2 – One wattle). In order to minimize the amount of sediment available for transport through this system, the unconsolidated soil material in the auxiliary spillway will be vegetated. A temporary sediment trap (J) will be installed downhill from the staging area (L).

4. Between the south edge of the auxiliary spillway and the toe of the dam, an earthen berm/training dike (I) will be constructed as part of the rehabilitation. This will necessitate the relocation of the road from Point F to Point G.

The road will be 12 feet wide and will be surfaced with gravel. Grading and drainage will be provided.

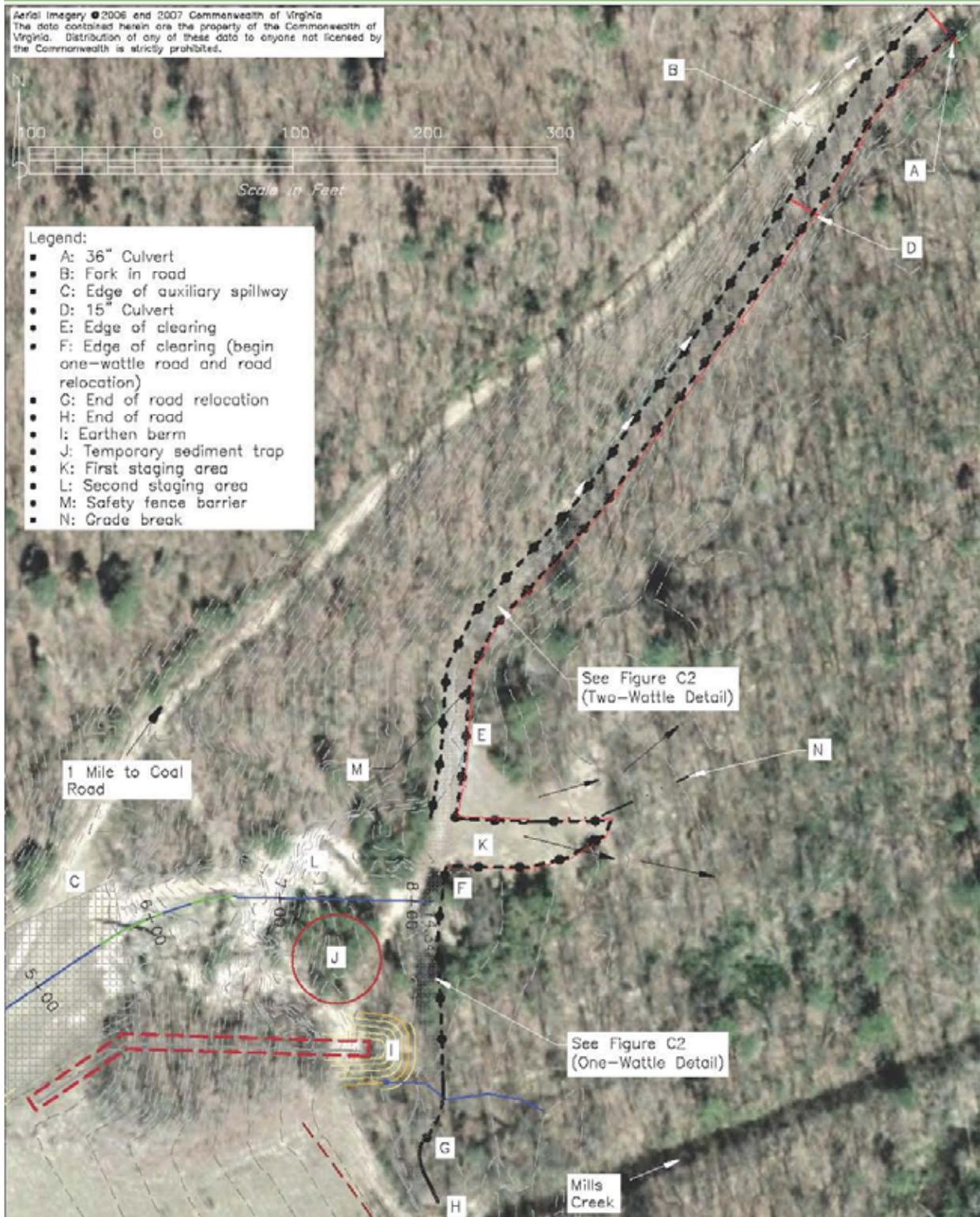


Figure C1. Plan View of E&S Control for Access Roads.

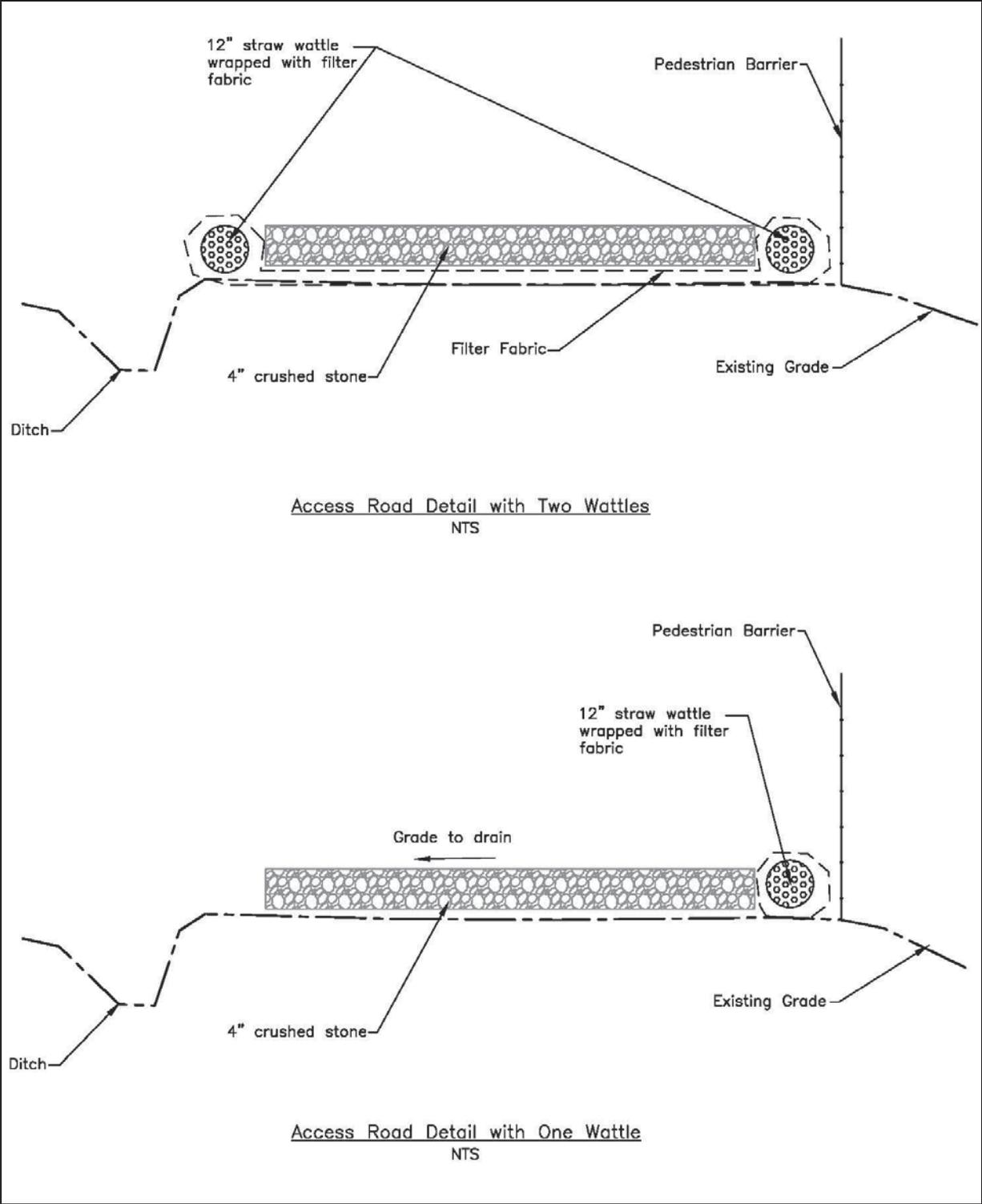


Figure C2. Access road wattle details.

APPENDIX D

BIOLOGICAL EVALUATION/BIOLOGICAL ASSESSMENT FOR THREATENED, ENDANGERED, AND SENSITIVE SPECIES

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**Biological Evaluation/Biological Assessment
For
Threatened, Endangered, Sensitive (TES) Species**

Mills Creek Dam Rehabilitation Project

Glenwood and Pedlar Ranger District

George Washington and Jefferson National Forests

Augusta County, Virginia.

Introduction

Forest Service Manual (FSM) Section 2612.41 requires a biological evaluation (BE) and/or biological assessment (BA) for all Forest Service planned, funded, executed, or permitted programs and activities. The objectives of this BE/BA are to: 1) ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native species or contribute to trends toward federal listing, 2) comply with the requirements of the Endangered Species Act (ESA) so that federal agencies do not jeopardize or adversely modify critical habitat (as defined in ESA) of federally listed species, and 3) provide a process and standard to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process.

The Glenwood Pedlar Ranger District supports known occurrences and suitable habitat for several TES species, all of which were considered in this analysis. This BE/BA documents the analysis of potential effects of the proposed project to TES species and associated habitat. It also serves as biological input into the environmental analysis for project-level decision making to ensure compliance with the ESA, National Environmental Policy Act (NEPA), and National Forest Management Act (NFMA).

This project involves rehabilitating and altering Mill Creek Reservoir to meet current dam safety standards and regulations. This flood control impoundment is located on the Pedlar Ranger District of the George Washington National Forest in Augusta County, Virginia.

Project Area and Cumulative Effects Analysis Area

The geographic scope of this biological analysis for terrestrial plants and animals is the project area. The geographic scope of the analysis for the Indiana bat is the entire George Washington and Jefferson National Forests (GWJNF). The geographic scope of the analysis area for aquatic species includes Mill Creek, a perennial stream which is classified a wild trout stream above the impoundment and a stocked trout stream below the Dam. All unnamed tributaries, wetlands, sinkhole ponds, bogs, seeps, and springs located within the treatment areas will also be analyzed. Since there will be soil disturbing activities associated with this project, these riparian areas will be buffered from activities using Forest Plan guidelines.

Vegetation in the project areas is dominated primarily of upland oaks and yellow pine communities. The most common species include red oak, chestnut oak, white oak, yellow poplar, hickory, black oak, white pine, scarlet oak, sassafras, dogwood, blackgum, pitch pine, shortleaf pine and Virginia pine.

Proposed Action

This supplemental plan documents the planning process by which the NRCS provided technical assistance to the local Sponsor and the public in addressing resource issues and concerns relative to the rehabilitation of Mills Creek.

The recommended plan is to rehabilitate the dam. By doing this, the level of flood protection will be increased, property values are protected, and the threat to loss of life is reduced. The recommended plan of action for the dam is outlined below:

- Lower the elevation of the auxiliary spillway control section by three feet and increase the crest length to 200 feet.
- Armor the control section and the constructed outlet section with ACBs. Install a concrete wall at the outlet end of the ACBs as an anchor point.
- Install a 150-foot long earthen training dike in the inlet section of the auxiliary spillway.
- Augment the existing earthen training dike with a 350-foot long concrete wall that will start about 50 feet downstream of the centerline of the dam and extend to the valley floor. Install a 70-foot long earthen dike along the valley floor to protect the toe of the dam from auxiliary spillway flows.
- Re-route a section of the access road around the end of the earthen berm.
- Capture the water from the spring at the toe of the dam and pipe the water under the new access road to outlet into its original channel.
- Remove the principal spillway riser and all gates and supply/drain pipes.
- Install a new concrete riser at an elevation of 1838.0. This will lower the water level in the lake by 24 feet and remove all of the water supply storage.
- Install a new drain gate at the foot of the riser and connect the riser to the existing principal spillway pipe by installation of 130 feet of reinforced concrete pipe.
- Replace the concrete outlet structure with a riprap stilling basin.
- Install a toe drain collection system with monitoring wells at the downstream toe of the embankment.
- Vegetate the auxiliary spillway outlet section to reduce erosion.
- Improve access roads and drainage design to reduce short and long term sediment delivery to the Swamp Pink habitat.

After the implementation of these planned works of improvement, Mills Creek will meet all current NRCS and State of Virginia dam safety and performance standards.

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

Need for the Proposed Action

This supplement only addresses South River Dam 10A, known locally as Mills Creek. This dam was built in 1963. Based upon changes in downstream land use that have occurred in the past 47 years, the NRCS hazard classification of this dam has changed from class (b), significant hazard, to class (c), high hazard. A supplement to the watershed plan is needed because this dam does not meet current Natural Resources Conservation Service (NRCS) or Virginia Department of Conservation and Recreation, Virginia Division of Dam Safety and Floodplain Management (referred to herein as the Virginia Division of Dam Safety) dam design, safety, and performance standards for a high hazard dam. A conditional certificate for Operation and Maintenance of the structure has been issued by the Virginia Division of Dam Safety because the auxiliary spillway does not have sufficient capacity to pass the Probable Maximum Flood (PMF) without breaching the structure. For this reason, the dam does not meet the objectives of the Augusta County Board of Supervisors and the Headwaters Soil and Water Conservation District (herein referred to as Sponsors), which are to continue to provide flood protection and to reduce the risk of loss of human life. This supplemental plan documents the planning process by which the USDA Natural Resources Conservation Service (NRCS) provided technical assistance to local Sponsors and the public in addressing resource issues and concerns within the Mills Creek Watershed.

The proposed action is needed to meet current dam safety regulations. The rehabilitation activities will occur on National Forest Lands and will follow the direction set in the Final Revised Land and Resource Management Plan for the George Washington National Forest (Forest Plan). The proposed action would occur in Management Area 22- Habitat-Small Game/Watchable Wildlife, Management Area 18-Riparian Areas, and is adjacent to Management Area 4- Special Interest Areas, Research Natural Areas.

Future Actions

There are no foreseeable future projects planned on National Forest System (NFS) land within the project area at this time that may have an effect on terrestrial plants and animals or water quality.

Species Reviewed

Federally listed threatened and endangered species, species proposed for federal listing, and Southern Region sensitive species (TES) that may potentially be affected by this project were examined using the following existing available information:

1. Reviewing the list of TES plant and animal species known or likely to occur on the George Washington and Jefferson National Forests, and their habitat preferences. This review included the U.S. Fish and Wildlife Service current list of endangered, threatened, and proposed species for the Forest, dated January 17, 2003, and the January 1, 2002 Southern Region Sensitive Species list, revised for known or possible Forest occurrences on January 8, 2008 (list attached as Appendix A)

2. Consulting element occurrence records (EOR's) for TES species as maintained by the Virginia Division of Natural Heritage (VDNH) and West Virginia Natural Heritage Program (WVNHP) and supplied to the Forest.
3. For Virginia, consulting species information, including county occurrence records, as maintained in the online database (<http://www.vafwis.org/wis/asp/default.asp>) titled Virginia Fish and Wildlife Information Service (VAFWIS) of the Virginia Department of Game and Inland Fisheries (VDGIF).
4. Consulting with individuals in the private and public sector who are knowledgeable about the area and its flora and/or fauna.
5. Reviewing sources listed in the reference portion of this report.

Most TES species known to occur on the Forest have unique habitat requirements, such as shale barrens, rock outcrops, bogs, caves, and natural ponds. Information gathered, analyzed, and presented in the Southern Appalachian Assessment dated July 1996 states that approximately 84% of threatened and endangered species and 74% of sensitive species are associated with rare or unique habitats, often referred to as rare communities.

Through cooperative agreements between the Forest and VDNH, Special Biological Areas have been identified and delineated on the Forest. These include rare and significant natural communities and vegetative types. These areas reflect current knowledge of the location, management, and protection needs of rare species and associated significant natural communities on the Forest. These areas are identified in the George Washington Forest Plan as Special Interest Areas/Research Natural Areas (Management Area 4) and in a supplemental report from VDNH, dated July 2000, which identifies additional areas for consideration as Special Biological Areas. Based on proposed project location, these Special Biological Area reports were reviewed as part of this analysis. As a result of this review, it was determined that the project is located adjacent to MA 4 and is within the Big Levels Extension Conservation Site. This site encompasses six known locations for the federally threatened swamp pink (*Helonias bullata*). These locations are characterized by sphagnum boggy areas close to flowing streams with mixed hardwood overstory and light shrubby understory. The project area and this conservation site also encompasses additional potential habitat that could support rare species.

Appendix A of this document lists all 190 TES species currently known or expected to occur on or near the George Washington and Jefferson National Forests. All species on the list were considered during the analysis for this project.

A "step down" process was followed to eliminate species from further analysis and focus on those species that may be affected by proposed project activities. Species not eliminated are then analyzed in greater detail. Results of this "step down" analysis process are displayed in the Occurrence Analysis Results (OAR) column of the table in Appendix A. First, the range of a species was considered. Species' ranges on the Forest are based on records contained in such documents as the Atlas of the Virginia Flora, but are refined further when additional information is available, such as more recent occurrences documented in scientific literature or in Natural Heritage databases. Many times range information clearly indicates a species will not occur in

the project area due to the restricted geographic distribution of most TES species. When the project area is outside a known species range, that species is eliminated from further consideration by being coded as OAR code “1” in the Appendix A table. For this project, 140 species were eliminated from further consideration because the project area is not within the species known range.

For the remaining species, after this first step, a field survey was conducted to determine if suitable habitat or the species were present in the project area.

Field Survey and Results

Field surveys were conducted on May 6, 2010 by Daniel Wright, Wildlife Biologist, Kenneth Hickman, Forestry Technician, and Dawn Kirk, Forest Fisheries Biologist. Additional surveys were conducted on May 25, 2010 by Daniel Wright, Dawn Kirk, Fred Huber, Forest Botanist and TES coordinator, and Will Orndorff, DCR. During the surveys perennial seep-like areas were located within the project area and activity area. Swamp Pink, *Helonias bullata*, is a federally **threatened** plant species was located around these wet areas located just outside of the activity area. These plant populations were shown to Jeff Jones and Jerry Wright, NRCS and an agreement to protect these T&E populations and habitat from vegetation manipulation, trampling and sedimentation delivery is understood. Other perennial seep habitats exist within the wooded area at the toe of the dam. These wet areas are within the area that is proposed to remove some overstory timber to meet dam maintenance requirements of 25 feet open space. These unique wet habitats and associated botanical and aquatic life may be negatively impacted by a change in microsite conditions if the shade producing overstory is removed. Due to the sensitivity of the surrounding area, these wet areas should be buffered by applying Forest Plan riparian guidelines and streamside management zones to ensure the protection of TES associated habitats.

The project area was also visited by Daniel Wright on November 10, 2009 and March 30, 2010.

Also, additional species were eliminated from further consideration because there is: a) Lack of suitable habitat in the project area (OAR code “2”) for 34 species; b) Habitat present and the species was searched for, but species was not found (OAR code “3”) for 13 species; and c) Aquatic species, known or suspected downstream of project/activity area, but outside of identified geographic bounds of water resource cumulative effects analysis area (OAR code “7”) for 1 species. The results of the field surveys are documented in the Appendix A table. Therefore, for this project, 48 additional species were eliminated from further consideration because of one of the above reasons.

Species Identified as Being In the Action Area or Potentially Affected by the Action

Those species which are analyzed and discussed further in this document are those that: a) Species occurs in project area, but outside activity area (OAR code “4”) for 1 species; b) Field survey located species in activity area (OAR code “5”); c) Species not seen during field survey, but possibly occurs in the activity area based on habitat observed or field survey not conducted when species is recognizable (OAR code “6”) for 1 species; d) Aquatic species, known or suspected downstream of project/activity area, and within identified geographic bounds of water resource cumulative effects analysis area (OAR code “8”); and e) Federally listed mussel and/or fish species known in 6th level watershed of project area. Conservation measures from USFWS/FS Conservation Plan applied (OAR code “9”).

As a result of this process, the following species are known to occur or are potentially affected by the Proposed Action:

<u>OAR Code</u>	<u>Scientific Name</u>	<u>Common Name</u>	<u>Taxa</u>	<u>TES</u>
6	<i>Myotis sodalis</i>	Indiana bat	Mammal	Endangered
4	<i>Helonias bullata</i>	Swamp Pink	Plant	Threatened

Other than potential for the above listed species and the previously mentioned seep habitats, no TES species or other associated habitats were identified as possibly having the potential to be affected. Virginia Sneezeweed, *Helenium virginicum* a federally threatened plant species and Variable Sedge, *Carex polymorpha* a forest service sensitive species is known to occur in the project vicinity however, they were searched for during surveys and not found in the project area. The Brook Floater, *Alasmidonata varicosa* exists in the South River approximately nine miles downstream from the project area. This species is located at a point below which sediment amounts are immeasurable and insignificant.

Cumulative Effects of Proposed Management Action on Each Identified Species

The analysis of possible effects to species identified as known or expected to occur in the vicinity of the proposed project, or likely to be affected by the action includes the following existing information:

1. Data on species/habitat relationships.
2. Species range distribution.
3. Occurrences developed from past field surveys or field observations.
4. The amount, condition, and distribution of suitable habitat.

Direct, Indirect and Cumulative Effects to Indiana Bat (Endangered)

Effects to the federally endangered Indiana bat (*Myotis sodalis*) were considered in this BE/BA because it is assumed the entire Forest is potential habitat for this species. See USFWS's Biological Opinion (BO) of September 16, 1997 and this agency's Environmental Assessment/Decision Notice of March 12, 1998 for the "Proposed Forest Plan Amendment for Management of the Federally Endangered Indiana Bat", herein referred to as the Bat Amendment EA (GW Amendment #6, Jefferson Amendment #7).

During past and recent general project surveys, no Indiana bats were seen even though potential habitat (mature trees with exfoliating bark) exists within the project area. Based upon professional judgment and known cave surveys, there are no caves with winter microclimate habitat conditions suitable for Indiana bats in the project area and the area is not within either the primary or secondary cave protection areas surrounding known hibernacula.

Since very few dominate trees are being cut as a result of this project, the potential to negatively impact the Indiana bat will be the slight chance that individuals or small groups of roosting bats (including summer maternity colonies) could be unintentionally killed by the intentional felling

of a non dominate tree harboring undetected roosts (e.g. dead limbs with loose bark, or small cavities in the boles).

The U.S. Fish and Wildlife Service supported the determination for the Indiana bat as follows:

In the September 16, 1997 U.S. Fish and Wildlife Service's Biological Opinion concerning the Indiana bat on the Forest the following conclusion was reached, "After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of forest management and other activities on the GWJNFs, the Indiana Bat Recovery Strategy presented in the GWJNFs's biological assessment, and the cumulative effects, it is the Service's biological opinion that forest management and other activities authorized, funded, or carried out on the GWJNFs, are not likely to jeopardize the continued existence of the Indiana bat. Critical habitat for this species has been designated in Kentucky, Tennessee, Illinois, Missouri, and West Virginia. However, this action does not affect those areas and no destruction or adverse modification of that critical habitat will occur as a result of GWJNFs management activities". There are no foreseeable activities in the area that would directly affect the Indiana bat. Therefore there will be no cumulative effects to the Indiana bat.

Determination of Effect for Indiana Bat

For the Indiana bat this project will be in compliance with the BO issued by the USFWS on September 16, 1997 and therefore constitutes compliance with ESA Section 7 requirements. Since implementation of this project will be in compliance with, and tiers to, the BO that was issued as a result of formal consultation and it provides both specific Plan and project level direction, plus no new information has been identified as of this date, a finding of the effect to the Indiana bat for this proposed project is: "no effect, beyond that which is already disclosed in the Biological Assessment on Indiana bats dated April 30, 1991 and by the USFWS in the BO of September 16, 1997." Therefore, given the project level effects analysis for the Indiana bat and the authorized level of incidental take, further Section 1 consultation is not necessary for the Indiana bat.

Direct, Indirect and Cumulative Effects to Swamp Pink (Threatened)

Helonias bullata was designated a Federally threatened species on September 9, 1988 due to decline and serious threats to its habitat (U.S. Fish and Wildlife Service 1988). Virginia has extensively searched the available suitable habitat for the species, and populations have been found in Augusta, Caroline, Henrico, and Nelson Counties. Eighteen of the state's 22 occurrences are located within a 10 mile radius of Sherando (Christopher Ludwig, Virginia Natural Heritage Program, in litt. 1990). These Blue Ridge populations are grouped along two stream corridors and a majority of the sites are in public ownership (Natural Heritage Program 1987).

Helonias is a smooth perennial herb, which form an evergreen basal rosette. These plants require wetlands that are saturated but not flooded, including spring seepage areas, boggy meadows and swampy forests bordering small streams. The most evident factor in determining the suitability of habitat for *Helonias* is a constant water supply. The groundwater-influenced wetlands

supporting the species are perennially saturated and rarely, if ever, inundated by floodwaters (Rawinski and Cassin 1986).

Helonias is threatened by habitat loss, fragmentation, and degradation; collection; trampling; and other biological and physical factors. Cumulative habitat destruction resulting from development projects, draining and filling of wetlands, and timbering and clearing activities has significantly reduced the amount of available area for Swamp Pink. Given that this species may require buffers in excess of 500 feet where site topography subjects a colony to habitat degradation (e.g. sedimentation and other changes in water quality) from upstream activities, existing standards for buffers are clearly inadequate. In some cases, protection of the entire watershed may be needed. There are current populations of Swamp Pink, within the Mills Creek drainage, upstream and downstream of the project area. Other sources of habitat degradation include siltation resulting from inadequate soil erosion control and modification of the hydrologic regime and/or frequency and duration of “normal” flood events in developed watersheds resulting from random storm water discharge. Evidence suggests that in developed watersheds, particularly where storm water is discharged through outfall structures such as spillways the frequency and duration of “normal” storm event flooding is altered, leading to adverse impacts to wetlands from increased floodwater elevations, increased flow rates, and increased deposition of sediments (Laurance Torok, New Jersey Department of Environmental Protection, in litt. 1990).

Threats to this species and its associated habitat from this project include; erosion and sediment delivery from the existing spillway and access road drainage during construction and the long term, sedimentation and chemical delivery from the proposed staging area and access roads which will have high use by heavy machinery, alteration of seeping water through the dam and the seep closest to the dam which may affect downstream habitats and *Helonias* populations, possible shade/canopy removal over or near seeps and wet areas which compromises available habitat, and the trampling of populations and available habitat by an increased human presence.

Site conservation may require, in some instances, significant time and funding, as it will involve protecting the habitat from loss of alteration caused by surrounding or land and water use practices.

Determination of Effect for Swamp Pink

Given the current proposed action and its proximity to Federally listed plant populations and the number of activities that may threaten these existing populations, a finding of the effect to Swamp Pink for this proposed project is: “likely to adversely affect”. **Because of this determination Section 7 consultation with the U.S. Fish and Wildlife Service is required for *Helonias bullata*.**

Persons Consulted:

Will Orndorff, Virginia Division of Natural Heritage

Fred Huber, Forest T&E Program Manager

Dawn Kirk, Forest Fisheries Biologist

Dick Patton, Forest Hydrologist

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Prepared by:

/s/ Daniel Wright

8/23/2010

Daniel Wright
Wildlife Biologist
Glenwood & Pedlar Ranger Districts

DATE

Final Review

Upon The review of the final Mills Creek Dam Rehabilitation EA and this BE/BA, I have determined that although proposed actions have slightly changed and provide reduced negative impacts to TES species by redirecting auxiliary spillway drainage, vegetating, piping perennial seep water back to its original channel, and improving the access road drainage system for the project and long term, these minor changes to the proposed action do not change the overall determination of effect for Swamp Pink and associated habitats cumulatively for the project.

Reviewed by:

/s/ Daniel Wright

9/17/2010

Daniel Wright
Wildlife Biologist
Glenwood & Pedlar Ranger Districts

Date

Attachments: References

Appendix A – forest TES List

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APPENDIX A

Documentation of Threatened, Endangered or Sensitive Species Occurrences for (Mills Creek Dam Rehab Project) Coding for Occurrence Analysis Results (OAR)

Forest update Spetember 8, 2009 (based on Region 8 sensitive species list effective Jan. 1, 2002)

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
VERTEBRATES										
Fish										

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1		X	<i>Ammocrypta clara</i>	Western sand darter	Clinch R, Powell R	Aquatic-rivers	S	G3	S1	-
1		X	<i>Cottus baileyi</i>	Black sculpin	Little R, Upper Clinch R, S Fork Holston R	Aquatic-streams	S	G4Q	S2	-
1		X	<i>Cyprinella monacha</i>	Spotfin chub	Lower N Fk Holston R	Aquatic-streams	T	G2	S1	-
1		X	<i>Erimystax cahni</i>	Slender chub	Two sites - Powell R, Lee Co	Aquatic-rivers	T	G1	S1	-
1		X	<i>Etheostoma acuticeps</i>	Sharphead darter	S and Middle Fk Holston R	Aquatic-rivers	S	G3	S1	-
1		X	<i>Etheostoma susanae</i>	Cumberland Johnny darter	Endemic to Upper Cumberland R watershed near VA	Aquatic-streams	S	G2	S1 (KY)	-
1		X	<i>Etheostoma osburni</i>	Candy darter	Big Stony Ck, Laurel Fork in New R watershed	Aquatic-streams	S	G3	S1	S2
1		X	<i>Etheostoma percunum</i>	Duskytail darter	Copper Ck, Clinch R	Aquatic-rivers	E	G1	S1	-
1		X	<i>Etheostoma tippecanoe</i>	Tippecanoe darter	Four sites Clinch R, lower Copper Ck	Aquatic-rivers	S	G2	S1	S2
1		X	<i>Icthyomyzon greeleyi</i>	Mountain brook lamprey	M, N Fk Holston R, Copper Ck, Indian Ck, Clinch R, Powell R	Aquatic-rivers	S	G3G4	S2	S1
1		X	<i>Notropis ariommus</i>	Popeye shiner	N Fk Holston R, Clinch R, Powell R	Aquatic-rivers	S	G3	S2S3	S2
1	X	X	<i>Notropis semperasper</i>	Roughhead shiner	Upper James R watershed above Buchanan	Aquatic-rivers	S	G2G3	S2S3	-
1		X	<i>Noturus flavipinnis</i>	Yellowfin madtom	Lower and Middle reaches of Copper Ck, Powell R	Aquatic-streams	T	G1	S1	-
1	X	X	<i>Noturus gilberti</i>	Orangefin madtom	S Fk Roanoke R watershed, Roanoke R above Salem, Craig Ck, Johns Ck, Cowpasture R	Aquatic-streams	S	G2	S2	-
1		X	<i>Percina burtoni</i>	Blotchside logperch	N Fk Holston R, Clinch R, Copper Ck, Little R	Aquatic-rivers	S	G2	S1	-
1		X	<i>Percina macrocephala</i>	Longhead darter	N Fk Holston R above Saltville, lower Copper Ck	Aquatic-rivers	S	G3	S1S2	S2
1		X	<i>Percina rex</i>	Roanoke logperch	Upper Roanoke R watershed	Aquatic-rivers	E	G1G2	S1S2	-
1		X	<i>Phenacobius crassilabrum</i>	Fatlips minnow	Unimpounded lower S Fk Holston R, Whitetop Laurel Ck	Aquatic-rivers	S	G3G4	S2	-
1		X	<i>Phenacobius teretulus</i>	Kanawha minnow	Upper New R watershed	Aquatic-streams	S	G3G4	S2S3	S1
1		X	<i>Phoxinus cumberlandensis</i>	Blackside dace	Upper Cumberland R, Upper Powell R, Poor Fk Cumberland R	Aquatic-streams	T	G2	S1	S3 (KY)
1		X	<i>Phoxinus tennesseensis</i>	Tennessee dace	Lick Ck, N Fk Holston R, Beaverdam Ck, M Fk Holston R	Aquatic-streams	S	G3	S1	-
Amphibian										
1		X	<i>Plethodon hubrichti</i>	Peaks of Otter salamander	Peaks of Otter, Apple Orchard Mtn	Mixed oak, late successional with loose rocks and logs, >1800'	S	G2	S2	-
1	X		<i>Plethodon punctatus</i>	Cow Knob salamander	Shenandoah Mtn, VA & WV	Mixed oak, late successional with loose rocks and logs, >2500'	S	G3	S2	S1
1	X		<i>Plethodon shenandoah</i>	Shenandoah salamander	Three isolated populations in SNP: Hawksbill Mtn, The Pinnacles, Stony Man Mtn. GW occurrence questionable.	Talus slopes	E	G1	S1	-
1		X	<i>Plethodon welleri</i>	Weller's salamander	Mt Rogers & Whitetop Mtn	Spruce-fir forests and adjacent northern hardwoods	S	G3	S2	-
Birds										
2	X	X	<i>Falco peregrinus</i>	Peregrine Falcon	Hack sites late 80s & early 90s - Mt Rogers, Grayson; Cole Mtn, Amherst; Big Schloss, Shenandoah; Elliot Knob, Augusta; High Knob, Rockingham Cos. No nests, current migrant.	Nests on ledges or cliffs, buildings, bridges, quarry walls. Non-breeding sites, farmland, open country, lakeshores, broad river valleys, airports. Prefers pigeons, ducks.	S	G4	S1B/S2N	S1B/S2N
2	X		<i>Haliaeetus leucocephalus</i>	Bald Eagle	Potomac R, James R watershed	Feeds and nests on or near large lakes and rivers	S	G5	S2S3B/S3N	S2B/S3N
2	X		<i>Lanius ludovicianus migrans</i>	Migrant Loggerhead Shrike	Ridge & Valley (Shenandoah Valley)	Open grasslands with trees and shrubs, fencerows	S	G4	S2B/S3N	S1B/S2N
1	X	X	<i>Thryomanes bewickii altus</i>	Appalachian Bewick's wren	Historical records in Botetourt, Giles, Highland Washington Cos	Thickets, old fields, fencerows, old home sites	S	G5T2Q	S1B/S2N	S1B/S1N
Mammals										
2	X	X	<i>Corynorhinus townsendii virginianus</i>	Virginia big-eared bat	Summer: VA - Tazewell Co. (3 caves), Highland Co. (1 cave), WV - Pendleton Co. (4 caves); Winter: Highland, Rockingham, Bland, & Tazewell Cos. (6 caves), Pendleton Co. (6 caves), largest VA population in Tazewell Co. & largest WV population in Pendleton Co. Small #'s of bats (usually <10) in a few other widely scattered caves during summer months. Bath & Pulaski County records are historic, no occupied caves currently known.	Resides in caves winter and summer. Short distance migrant (<40 miles) between winter and summer caves. Forages primarily on moths and foraging habitat is common (fields, forests, meadows, etc.). Forages within 6 miles of summer caves. USFWS Critical Habitat is 5 caves in WV (4 Pendleton Co. & 1 Tucker Co.). Closest Critical Habitat cave to GWJNF is ~3 miles in Pendleton Co., WV. OAR code of "2" used when project further than 6 miles from summer or winter occupied cave.	E	G4T2	S1	S2
1		X	<i>Glaucomys sabrinus coloratus</i>	Carolina northern flying squirrel	Mt Rogers & Whitetop area	Spruce-fir forests and adjacent northern hardwoods	E	G5T1	S1	-
1	X		<i>Glaucomys sabrinus fuscus</i>	Virginia northern flying squirrel	Laurel Fork area, Highland Co	Spruce-fir forests and adjacent northern hardwoods	S	G5T2	S1	S2
1	X		<i>Microtus chrotorrhinus carolinensis</i>	Southern rock vole	Alleghany Mtn, Bath Co	Cool, moist, mossy talus under oaks/northern hardwoods	S	G4T3	S1	S2
1		X	<i>Myotis grisescens</i>	Gray bat	Ridge & Valley, Clinch R watershed	Caves winter and summer, forages widely	E	G3	S1S2	-
2	X	X	<i>Myotis leibii</i>	Eastern small-footed bat	Ridge & Valley	Hibernates in caves during winter, roosts in crevices of large rock outcrops, cliffs, & under large rocks in talus & boulder-fields during summer, forages widely in all forested and open habitat types over both ridges and valleys.	S	G3	S1	S1

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
6	X	X	Myotis sodalis	Indiana bat	Blue Ridge, Ridge & Valley, Cumberland Mtns	Caves winter, upland hardwoods summer, forages widely along riparian areas and open woodlands	E	G2	S1	S1
2	X		Sorex palustris punctulatus	Southern water shrew	Alleghany Mtn, Bath Co; & Laurel Fork, Highland Co	Riparian areas w/in spruce-fir forests and northern hardwoods	S	G5T3	S1S2	S1
INVERTEBRATES										
Snail (Mollusk, Class Gastropoda)										
1	X	X	Glyphyalinia raderi	Maryland glyph	Alleghany, Montgomery Cos	Calciphile, edge of seeps within leaf litter	S	G2	S1S2	S2
1	X		Helicodiscus diadema	Shaggy coil	Alleghany Co	Calciphile, limestone rubble and talus	S	G1	S1	-
1	X		Helicodiscus lirellus	Rubble coil	Rockbridge Co	Calciphile, limestone rubble and talus	S	G1	S1	-
1	X	X	Helicodiscus triodus	Talus coil	Alleghany, Botetourt, Rockbridge Cos	Calciphile, limestone rubble on wooded hillsides and caves	S	G2	S1S2	SH
1		X	Io fluviialis	Spiny riversnail	Clinch R, N Fk Holston R	Aquatic-rivers	S	G2	S2	-
1		X	Paravitrea reesi	Round supercoil	Monroe, Summers Cos, WV	Calcareous woodlands and glades	S	G3	S2	S1
Clam and Mussel (Mollusk, Class Bivalvia)										
7	X		Alasmidonta varicosa	Brook floater	Potomac drainage	Aquatic-rivers	S	G3	S1	S1
1		X	Cumberlandia monodonta	Spectacle case	2 sites Clinch R	Aquatic-rivers	S	G2G3	S1	-
1		X	Cyprogenia stegaria	Fanshell	Lower Clinch R, Scott Co	Aquatic-rivers	E	G1	S1	S1
1		X	Dromus dromas	Dromedary pearl mussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
1	X	X	Elliptio lanceolata	Yellow lance	Roanoke R, James R	Aquatic-rivers	S	G2G3	S2S3	-
1		X	Epioblasma brevidens	Cumberlandian combshell	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
1		X	Epioblasma capsaeformis	Oyster mussel	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	E	G1	S1	-
1		X	Epioblasma florentina walkeri	Tan riffleshell	Clinch R, M Fk Holston R, N Fk Holston R	Aquatic-rivers	E	G1T1	S1	-
1		X	Epioblasma torulosa gubernaculum	Green-blossom pearl mussel	Clinch R, N Fk Holston R	Aquatic-rivers	E	G2TX	SX	-
1		X	Epioblasma triquetra	Snuffbox	Clinch R, Powell R, N Fk Holston R	Aquatic-rivers	S	G3	S1	S2
1		X	Fusconia barnesiana	Tennessee pigtoe	Clinch R, Powell R, N Middle, S Fk Holston R	Aquatic-rivers	S	G2G3	S2	-
1		X	Fusconia cor	Shiny pigtoe	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-rivers	E	G1	S1	-
1		X	Fusconia cuneolus	Fine-rayed pigtoe	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers	E	G1	S1	-
1		X	Fusconia masoni	Atlantic pigtoe	Roanoke R, Craig Ck drainage	Aquatic-rivers	S	G2	S2	-
1		X	Hemistena lata	Cracking pearl mussel	Clinch R, Powell R	Aquatic-rivers	E	G1	S1	-
1		X	Lampsilis abrupta	Pink mucket	Clinch R	Aquatic-rivers	E	G2	SX	S1
1		X	Lasmigona holstonia	Tennessee heelsplitter	Upper Clinch, N and M Fk Holston R drainages; Wolf Ck, Bland Co below Burkes Garden	Aquatic-streams	S	G3	S1	-
1	X		Lasmigona subviridis	Green floater	Widely distributed in N & S Fk Shenandoah R, Pedlar R, James R	Aquatic-rivers	S	G3	S2	S2
1		X	Lemiox rimosus	Birdwing pearl mussel	Clinch R, Powell R, Copper Ck, Little R	Aquatic-rivers	E	G1	S1	-
1		X	Lexingtonia dolabelloides	Slabside pearl mussel	Clinch R, M Fk Holston, N Fk Holston R	Aquatic-rivers	S	G2	S2	-
1		X	Pegias fabula	Little-winged pearl mussel	Clinch R, N Fk Holston R, Little R	Aquatic-streams	E	G1	S1	-
1		X	Plethobasus cyphus	Sheepnose	Clinch R, Powell R	Aquatic-rivers	S	G3	S1	S1
1	X	X	Pleurobema collina	James spiny mussel	Potts Ck, Craig Ck, Johns Ck, Patterson Run, Pedlar R, Cowpasture R, Mill Ck (Deerfield)	Aquatic-rivers	E	G1	S1	S1
1		X	Pleurobema cordatum	Ohio pigtoe	Clinch R	Aquatic-rivers	S	G3	S1	S2
1		X	Pleurobema oviforme	Tennessee clubshell	Clinch R, Powell R, N, Middle, S Fk Holston R	Aquatic-streams	S	G3	S2S3	-
1		X	Pleurobema plenum	Rough pigtoe	Clinch R	Aquatic-rivers	E	G1	SH	-
1		X	Pleurobema rubrum	Pyramid pigtoe	Upper Clinch R	Aquatic-rivers	S	G2	S1	-
1		X	Quadrula cylindrica strigillata	Rough rabbitsfoot	Clinch R, Powell R, N Fk Holston R, Copper Ck	Aquatic-streams	E	G3T2	S2	-
1		X	Quadrula intermedia	Cumberlandian monkeyface	Powell R	Aquatic-rivers	E	G1	S1	-
1		X	Quadrula sparsa	Appalachian monkeyface	Clinch R, Powell R	Aquatic-rivers	E	G1	S1	-
1		X	Toxolasma lividus	Purple lilliput	N Fk Holston R, Clinch R	Aquatic-rivers	S	G2	S1	-
1		X	Villosa perpurpurea	Purple bean	Clinch R, Copper Ck	Aquatic-rivers	E	G1	S1	-
1		X	Villosa trabalis	Cumberland bean	Clinch R	Aquatic-rivers	E	G1	SX	-
Spider (Arachnid)										
1		X	Microhexura montivaga	Spruce-fir moss spider	Mt Rogers	Damp, well-drained moss and liverwort mats on boulders in mature spruce-fir forests	E	G1	S1	-
Pseudoscorpion (Arachnid, Order Pseudoscorpiones)										
1		X	Kleptochthonius orpheus	Orpheus cave pseudoscorpion	Patton cave, Monroe Co, WV	Caves	S	G1	-	S1
Amphipod (Crustacean, Order Amphipoda)										
1		X	Stygobromus abditus	James cave amphipod	James & Sam Bells caves, Pulaski Co; Watsons cave, Wythe Co; & other New River caves	Caves	S	G2G3	S2	-
1		X	Stygobromus cumberlandus	Cumberland cave amphipod	Lee, Scott, Wise Cos	Caves	S	G3G4	S1S2	-
1		X	Stygobromus estesi	Craig County cave amphipod	Caves in Upper Sinking Ck Valley and Potts Ck, Poverty Hollow seeps, Captain seeps	Caves, seeps	S	G4	S3	-
1		X	Stygobromus fergusonii	Montgomery County cave amphipod	Botetourt, Montgomery Cos	Caves	S	G2G3	S1	-
2	X		Stygobromus gracilipes	Shenandoah Valley cave amphipod	Frederick, Rockingham, Shenandoah, Warren Cos	Caves	S	G3G4	S2S3	S1
1	X		Stygobromus hoffmani	Alleghany County cave amphipod	Lowmoore cave, Alleghany Co	Caves	S	G1	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
1	X		<i>Stygobromus mundus</i>	Bath County cave amphipod	Alleghany, Bath Cos	Caves	S	G2G3	S1S2	-
Isopod (Crustacean, Order Isopoda)										
1		X	<i>Caecidotea incurva</i>	Incurved cave isopod	Smyth, Wythe Cos	Caves	S	G2G4	S2	-
2	X	X	<i>Miktoniscus racovitzai</i>	Racovitz's terrestrial cave isopod	Alleghany, Botetourt, Page, Rockbridge, Shenandoah Cos	Caves	S	G3G4	S2	-
Millipede (Class Diplopoda)										
1		X	<i>Brachoria dentata</i>	a millipede	Known only from Pennington Gap and Cave Spring Recreation Area, Lee Co	Leaf litter, deciduous forests	S	G1	S1	-
1		X	<i>Brachoria eutypa ethotela</i>	Hungry Mother millipede	Pine Mtn above Troutdale	Leaf litter, deciduous forests	S	G2	S2	-
1		X	<i>Buotus carolinus</i>	a millipede	Brush Mtn, Whitetop Mtn, Apple Orchard Mtn, Tazewell Beartown	Beech leaf litter, deciduous forests	S	G1	S1	-
1		X	<i>Cleidogona hoffmani</i>	Hoffman's cleidogonid millipede	Mt Rogers, Whitetop Mtn, Elk Garden; Hamilton cave (private) Bland Co	Mountaintop species, leaf litter, deciduous forests	S	G2	S2	-
1		X	<i>Cleidogona lachesis</i>	a millipede	Whitetop Mtn & Mt Rogers	Beech leaf litter, deciduous forests	S	G2	S1	-
1		X	<i>Dixioria fowleri</i>	Fowler's millipede	Walker Mtn; Comers Rock on Iron Mtn; Laurel Ck, Damascas; 1/2 mile west of NRA office; Tazewell Beartown	Leaf litter, deciduous forests	S	G2	S2	-
1		X	<i>Dixioria pela coronata</i>	a millipede	Endemic to Mt Rogers	Leaf litter, northern hardwood and spruce-fir forests. Altitudinally restricted, >5000'	S	G2T2	S2	-
1	X		<i>Nannaria shenandoah</i>	Shenandoah Mountain Xystodesmid millipede	One site: along Long Run Road, Rockingham Co	Leaf litter, mixed oak forest	S	G1	S1	-
1	X		<i>Pseudotremia alecto</i>	a millipede	Griffith Knob, Alleghany Co; near Mountain Grove saltpetre cave, Bath Co	Leaf litter, deciduous forests	S	G1	S1	-
1	X	X	<i>Semionellus placidus</i>	a millipede	Hawksbill Mtn, Apple Orchard Mtn, Tomahawk Mtn	Leaf litter, deciduous forests	S	G3	S2	-
Centipede (Insect, Order Chilopoda)										
2	X	X	<i>Escaryus cryptorobius</i>	Montane centipede	The Priest, Nelson Co; Whitetop Mtn, Washington Co	Upper soil horizon, spruce - birch forests	S	G2	S2	-
1		X	<i>Escaryus orestes</i>	Whitetop Mountain centipede	Whitetop Mtn, Washington Co	Dark moist soil and litter, spruce - birch forests	S	G1G2	S1S2	-
1	X		<i>Nampibus turbator</i>	a cave centipede	One known site: Lowmoore cave, Alleghany Co	Caves	S	G1G2	S1	-
Springtail (Insect, Order Collembola)										
2	X	X	<i>Arrhopalites carolynae</i>	A cave springtail	Augusta, Highland, Bath, Lee, Wise Cos	Caves	S	G2G4	S1	-
1		X	<i>Arrhopalites commorus</i>	A cave springtail	Giles, Lee, Wise Cos	Caves	S	G2G4	S1	-
1	X		<i>Arrhopalites sacer</i>	A cave springtail	Bath Co	Caves	S	G1G2	S1	-
Mayfly (Insect, Order Ephemeroptera)										
1		X	<i>Leptophlebia johnsoni</i>	Johnson's prong-gill mayfly	One location: Lewis Fk north slope Mt Rogers	Aquatic-streams	S	G4	S1	-
Dragonfly and Damselfly (Insect, Order Odonata)										
1	X	X	<i>Gomphus viridifrons</i>	Green-faced clubtail	New R, Craig Ck, Pound R, Locust Spring	Aquatic-rivers	S	G3	S2	S2
1		X	<i>Ophiogomphus incurvatus alleghaniensis</i>	Allegheny snaketail	Rich Ck, Giles Co	Aquatic-streams	S	G3T3	S1	S1
Stonefly (Insect, Order Plecoptera)										
1		X	<i>Acroneria kosztarabi</i>	Virginia stonefly	Station Spring Ck, Tazewell Co	Aquatic-streams	S	G1	S1	-
1		X	<i>Isoperla major</i>	Big stripetail stonefly	Burkes Garden, Tazewell Co	Aquatic-streams	S	G1	S1	-
1		X	<i>Megaleuctra williamsae</i>	Smokies needlefly	Mt Rogers & Whitetop Mtn	Aquatic-streams	S	G2	S1	-
1		X	<i>Taeniopteryx nelsoni</i>	Cryptic willowfly	Lewis Fk & Grindstone Branch N of Mt Rogers	Aquatic-streams	S	G1	S1	-
Beetle (Insect, Order Coleoptera)										
1	X	X	<i>Cicindela ancocisconensis</i>	Appalachian tiger beetle	Alleghany, Bath, Highland, Lee, Rockbridge, Washington, Wise Cos	Riparian – sandy/silty edges of streams and rivers	S	G3	S2	S3
2	X	X	<i>Cicindela patruela</i>	Northern barrens tiger beetle	Blue Ridge, Ridge & Valley	Eroded slopes of exposed sandstone and conglomerate	S	G3	S2	S2S3
1		X	<i>Cyclotrachelus incisus</i>	a ground beetle	Breaks Interstate Park, Dickenson Co	Dry, well drained site, red maple, magnolia, mountain laurel	S	G4	S1	-
1	X	X	<i>Hydraena maurenae</i>	Maureen's shale stream beetle	Alleghany, Bath, Botetourt, Bland, Craig, Cos	Interstitial water in riparian-shale substrate along stream edge	S	G1G3	S1S3	-
Scorpionfly (Insect, Order Mecoptera)										
1		X	<i>Brachypanorpa jeffersoni</i>	Jefferson's short-nosed scorpionfly	Sugar Run Mountain, Giles Co; Whitetop Mtn, Smyth Co	Moist soil around seeps. Only known from high elevation. Larvae use short burrows in loose soil and moss.	S	G2	S1S2	-
Butterfly and Moth (Insect, Order Lepidoptera)										
2	X	X	<i>Callophrys irus</i>	Frosted elfin	Frederick, Montgomery, Page, Roanoke Cos	Dry, open woods, clearings, and road/powerline ROWs w/ abundant wild indigo (<i>Baptisia tinctoria</i>)	S	G3	S2?	S1
3	X	X	<i>Erynnis persius persius</i>	Persius duskywing	Blue Ridge, Ridge & Valley	Bogs, wet meadows, open seepages in boreal forests	S	G5T1T3	S1	-
2	X		<i>Pyrgus centaureae wyandot</i>	Appalachian grizzled skipper	Ridge & Valley	Shale barrens, open shaley oak woodlands	S	G5T1T2	S1S2	S1
2	X	X	<i>Speyeria diana</i>	Diana fritillary	Blue Ridge, Ridge & Valley	Grasslands-shrublands, near streams with thistles and milkweeds, larval host plant, violets	S	G3G4	S3	S2S3
2	X	X	<i>Speyeria idalia idalia</i>	Regal fritillary	Blue Ridge, Ridge & Valley	Riparian, grasslands-shrublands	S	G3T1Q	S1	S1
2	X	X	<i>Catocala herodias gerhardi</i>	Herodias underwing	Bald Knob, Bath; Poverty Hollow, Montgomery Co; Sand Mtn, Wythe Co (non FS property)	Pitch pine/bear oak scrub woodlands, >3000'	S	G3T3	S2S3	SU
1	X		<i>Erythrocia hebardii</i>	Hebard's noctuid moth	Bath Co	Rich, mesic hardwood forest. Larvae host plant is Canada horse-balm (<i>Collinsonia canadensis</i>).	S	GU	SH	-
1	X		<i>Euchlaena milnei</i>	Milne's euchlaena moth	Warm Springs Mtn, Catawba Creek Slopes, Sweet Spring Hollow, Salt Pond Mtn. (Doe Creek)	Moist, forested slopes of mixed pine hardwoods. Acidic oak woods.	S	G2G4	S2	S2

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
NON-VASCULAR PLANTS										
Lichen										
1		X	<i>Gymnoderma lineare</i>	Rock gnome lichen	Whitop Mtn.	Spruce-fir forests	S	G2	S1	-
3	X	X	<i>Peltigera hydrothyria</i>	Waterfan	Amherst, Alleghany, Bedford, Botetourt, Giles, Madison, Nelson, Rockbridge, Shenandoah Cos	Aquatic – in streams/springs/cascades	S	G3G5	S1	-
1		X	<i>Hypotrachyna virginica</i>	a foliose lichen	Mt Rogers & Whitetop Mtn	Spruce-fir forests	S	G1G2	S1	-
Liverwort										
1		X	<i>Bazzania nudicaulis</i>	a liverwort	Mt Rogers & Whitetop Mtn	Bark and rock outcrops in spruce-fir forests	S	G2G3	S?	-
1		X	<i>Frullania oakesiana</i>	a liverwort	Mt Rogers & Whitetop Mtn	Bark in spruce-fir forests	S	G3?	S?	-
1		X	<i>Mertzgeria fruticulosa</i>	a liverwort	Whitetop Mtn	Bark in spruce-fir forests, >5000'	S	G2Q	S?	-
3		X	<i>Nardia lescurii</i>	a liverwort	Blue Ridge, Ridge & Valley	Riparian – on peaty soil over rocks, usually in shade and associated w/ water, <3000'	S	G3?	SU	-
1		X	<i>Plagiochila austinii</i>	a liverwort	Little Stony Ck – Cascades; Red Ck on Beartown Mtn	Rich, moist, densely forested ravines; shaded outcrops	S	G3	S?	-
1		X	<i>Plagiochila sullivantii</i> var <i>sullivantii</i>	a liverwort	Whitetop Mtn, Salt Pond Mtn	Moist shaded rock outcrops, under cliff ledges, in crevices	S	G2T2	S?	-
1		X	<i>Sphenolobopsis pearsonii</i>	a liverwort	Mt Rogers & Whitetop Mtn	Bark of Fraser fir, mountain ash, occasionally red spruce, >5000'	S	G2	S?	-
Moss										
1		X	<i>Sphagnum flavicomans</i>	a peatmoss	Whitetop Mtn	Bogs, seeps	S	G3	SU	-
VASCULAR PLANTS										
2	X	X	<i>Aconitum reclinatum</i>	Trailing white monkshood	Blue Ridge, Ridge & Valley	Rich cove sites, streambanks, seepages all with high pH	S	G3	S3	S3
1	X	X	<i>Allium oxiphilum</i>	Nodding onion	Monroe, Summers, Mercer, Greenbrier Cos, WV	Shale barrens, sandstone glades	S	G2Q	-	S2
1	X	X	<i>Arabis patens</i>	Spreading rockcress	Frederick, Lee, Page, Shenandoah, Warren Cos	Shaded, calcareous cliffs, bluffs, and talus slopes	S	G3	S2	S2
2	X	X	<i>Arabis serotina</i>	Shale barren rockcress	Ridge & Valley N of New R watershed	Shale barrens and adjacent open oak woods	E	G2	S2	S2
2	X	X	<i>Berberis canadensis</i>	American barberry	Blue Ridge, Ridge & Valley	Calcareous open woods, bluffs, cliffs, and along fencerows	S	G3	S3S4	S1
1		X	<i>Betula uber</i>	Virginia round-leaf birch	One location: Cressy Ck, Smyth Co	Riparian, mixed open forest, usually disturbed sites	T	G1Q	S1	-
1		X	<i>Botrychium jennmanii</i>	Dixie grapefern	Scott, Wise Cos	Open woods, old fields, pastures	S	G3G4	S1	-
1	X	X	<i>Buckleya distichophylla</i>	Piratebush	Blue Ridge S of Roanoke R, Ridge & Valley S of James R	Open oak and hemlock woods	S	G2	S2	-
3	X	X	<i>Cardamine clematidis</i>	Mountain bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streambanks	S	G3	S1	-
3	X	X	<i>Cardamine flagellifera</i>	Bittercress	Blue Ridge, Ridge & Valley, S of New R watershed	Riparian, spring seeps, rocky streambanks	S	G3	SH	S2
3	X	X	<i>Carex polymorpha</i>	Variable sedge	Blue Ridge, Ridge & Valley, N of James R	Open acid soil, oak-heath woodlands, responds to fire	S	G3	S2	S1
3	X	X	<i>Carex schweinitzii</i>	Schweinitz's sedge	Bath, Montgomery, Pulaski, Washington Cos	Bogs, limestone fens, marl marshes	S	G3G4	S1	-
1		X	<i>Chelone cutbertii</i>	Cuthbert turtlehead	Blue Ridge Plateau, Grayson, Carroll Cos	Bogs, wet meadows, boggy woods and thickets	S	G3	S2	-
1		X	<i>Cimicifuga rubifolia</i>	Appalachian bugbane	Lower Clinch R watershed	Moist, rich wooded bluffs over limestone	S	G3	S2	-
1		X	<i>Cleistes bifaria</i>	Small spreading pogonia	Craig, Dickenson, Scott, Wise Cos	Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils	S	G4?	S2	S1
1		X	<i>Clematis addisonii</i>	Addison's leatherflower	Montgomery, Roanoke, Botetourt, Rockbridge Cos	Open glades & rich woods over limestone & dolostone	S	G2	S2	-
2	X	X	<i>Clematis coactilis</i>	Virginia white-haired leatherflower	Ridge & Valley, Rockbridge Co, S to Wythe Co	Shale barrens, rocky calcareous woodlands	S	G3	S3	-
1	X	X	<i>Corallorhiza bentleyi</i>	Bentley's coralroot	Alleghany, Bath, Giles Cos VA; Monroe, Pocahontas Cos WV	Dry, acid woods, along roadsides, well-shaded trails	S	G1G2	S1	S1
2	X	X	<i>Delphinium exaltatum</i>	Tall larkspur	Blue Ridge, Ridge & Valley	Dry calcareous soil in open grassy glades or thin woodlands	S	G3	S3	S2
3	X		<i>Echinodorus tenellus</i>	Dwarf burhead	Pines Chapel Pond, Augusta Co	Pond margins, wet depressions in sandy soil	S	G5?	S1	-
1	X	X	<i>Echinacea laevigata</i>	Smooth coneflower	Alleghany, Montgomery Cos	Open woodlands and glades over limestone or dolomite	E	G2G3	S2	-
3	X	X	<i>Euphorbia purpurea</i>	Glade spurge	Blue Ridge, Ridge & Valley	Rich, swampy woods, seeps and thickets	S	G3	S2	S2
1		X	<i>Gentiana austrorontana</i>	Appalachian gentian	Mt Rogers, Whitetop Mtn, High Knob	High elevation forests and grassy balds. Southern Appalachian endemic.	S	G3	S3	S1
1		X	<i>Hasteola suaveolens</i>	Sweet-scented Indian-plantain	Giles, Montgomery, Pulaski Cos	Riverbanks, wet meadows	S	G4	S2	S3
1	X		<i>Heuchera alba</i>	White alumroot	Shenandoah Mtn	High elevation rocky woods and bluffs	S	G2Q	S2?	S2
2	X	X	<i>Hypericum mitchellianum</i>	Blue Ridge St. John's-wort	Blue Ridge, Ridge & Valley	Grassy balds, forest seepages, moderate to high elevations	S	G3	S3	S1
3	X		<i>Helenium virginicum</i>	Virginia sneezeweed	Endemic to Augusta, Rockingham Cos	Seasonally dry meadows and sinkhole depressions	T	G3	S2	-
4	X		<i>Helonias bullata</i>	Swamp-pink	Augusta, Nelson Cos	Sphagnum bogs, seeps, and streambanks	T	G3	S2S3	-
2	X	X	<i>Ilex collina</i>	Long-stalked holly	Blue Ridge, Ridge & Valley	Bogs, seep, shrubby streamheads, >3100'	S	G3	S2	S2
1		X	<i>Iliamna corei</i>	Peter's Mountain-mallow	One location: Narrows, Peters Mountain, Giles Co	Rich, open woods along sandstone outcrops, soil pockets, fire maintained	E	G1Q	S1	-

OAR	GW	J	Species Name	Common Name	Range on or near GWJNFs	Habitat - Detail	TES	GRank	VA SRank	WV SRank
2	X	X	<i>Iliamna remota</i>	Kankakee globe-mallow	Alleghany, Botetourt, Rockbridge, Bedford Cos	Open, disturbed riverbanks and roadsides	S	G1Q	S1	-
2	X		<i>Isoetes virginica</i>	Virginia quillwort	Augusta Co	Seasonally dry sinkhole depressions	S	G1	S1?	-
1	X	X	<i>Isotria medeoloides</i>	Small whorled pogonia	In mountains of VA known only from Bedford, Craig, and Lee Cos; other VA occurrences in Piedmont & Coastal Plain	Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect	T	G2	S2	S1
2	X	X	<i>Juglans cinerea</i>	Butternut	Blue Ridge, Ridge & Valley	Well-drained bottomland and floodplain, rich mesophytic forests mostly along toeslopes	S	G4	S3?	S3
2	X	X	<i>Liatris helleri</i>	Turgid Gayfeather	Blue Ridge, Ridge & Valley	Shale barrens, mountain hillside openings	S	G3	S3	S2
1		X	<i>Lilium grayi</i>	Gray's lily	Blue Ridge, Mt Rogers & Whitetop Mtn (occurrences north of Floyd Co questionable)	Bogs, open seeps, wet meadows, grassy balds	S	G3	S2	-
1	X		<i>Lycopodiella margueritae</i>	Marguerite's clubmoss	Bath Co	Seasonally moist soils, wet acidic ditches, borrow pits	S	G2	NA	-
3	X	X	<i>Monotropsis odorata</i>	Sweet pinesap	Blue Ridge, Ridge & Valley	Dry oak-pine-heath woodlands, soil usually sandy	S	G3	S3	S1
1		X	<i>Packera millefolium</i>	Piedmont ragwort	Lee, Scott Cos	Open limestone outcrops and cedar barrens	S	G2	S2	-
2	X		<i>Paxistima canbyi</i>	Canby's mountain lover	Ridge & Valley	Calcareous cliffs and bluffs, usually undercut by stream	S	G2	S2	S2
2	X	X	<i>Phlox buckleyi</i>	Sword-leaf phlox	Blue Ridge, Ridge & Valley	Open, often dry oak woodlands and rocky slopes, usually over shale in humus rich soils, often along roadsides	S	G2	S2	S2
3	X	X	<i>Poa paludigena</i>	Bog bluegrass	Blue Ridge, Ridge & Valley	Shrub swamps and seeps, usually under shade	S	G3	S2	S1
1	X		<i>Potamogeton hillii</i>	Hill's pondweed	Bath Co	Clear, cold calcareous ponds	S	G3	S1	-
2	X		<i>Potamogeton tennesseensis</i>	Tennessee pondweed	Ridge & Valley	Ponds, back water of streams and rivers	S	G2	S1	S2
1		X	<i>Prenanthes roanensis</i>	Roan Mountain rattlesnake-root	Mt Rogers & Whitetop Mtn	Grassy balds, open high elevation forests and outcrops	S	G3	S3	-
2	X	X	<i>Pycnanthemum torrei</i>	Torrey's mountain-mint	Bland, Bath, Giles Rockbridge, Wythe Cos	Open, dry rocky woods, roadsides, and thickets near streams, heavy clay soil over calcareous rock	S	G2	S2?	S1
1		X	<i>Rudbeckia triloba</i> var. <i>pinnatifida</i>	Pinnate-lobed coneflower	Wise Co	Dry calcareous soil of open woods and roadsides	S	G5T3	S1	-
1		X	<i>Saxifraga caroliniana</i>	Carolina saxifrage	Blue Ridge, Ridge & Valley, S of New R	Moist, shaded rocks and cliffs	S	G3	S3	S1
3	X	X	<i>Scirpus ancistrochaetus</i>	Northeastern bulrush	Ridge & Valley	Mountain ponds, sinkhole ponds in Shenandoah Valley.	E	G3	S2	S1
2	X	X	<i>Scutellaria saxatilis</i>	Rock skullcap	Blue Ridge, Ridge & Valley	Rich, dry to mesic ridgetop woods, 32 counties in VA, likely G4/S4	S	G3	S3	S2
2	X	X	<i>Sida hermaphrodita</i>	Virginia mallow	Ridge & Valley, James R watersheds	Riverbank glades with loose rock or sandy soil	S	G3	S1	S3
1		X	<i>Silene ovata</i>	Mountain catchfly	Lee, Wise Cos	Rich woodlands and forests over limestone	S	G3	S1	-
1		X	<i>Spiraea virginiana</i>	Virginia spiraea	Blue Ridge, Ridge & Valley, S of New R	Scoured banks of streams, riverside or island shrub thickets	T	G2	S1	S1
1	X		<i>Trillium pusillum</i> var. <i>monticulium</i>	Mountain least trillium	Great North Mtn & Shenandoah Mtn, VA & WV	Open oak woodlands in well drained soil and margins of thickets	S	G3T2	S2	S1
1		X	<i>Tsuga caroliniana</i>	Carolina hemlock	Blue Ridge north to James R.	Rocky ridges and slopes, usually dry and well drained	S	G3	S3	-
2	X	X	<i>Vitis rupestris</i>	Sand grape	Ridge & Valley	Scoured banks of rivers and streams over calcareous bedrock	S	G3	S1?	S2

LEGEND FOR TES SPECIES LIST IN OCCURRENCE ANALYSIS RESULTS:

OAR CODES:

- 1 = Project located out of known species range.
- 2 = Lack of suitable habitat for species in project area.
- 3 = Habitat present, species was searched for during field survey, but not found.
- 4 = Species occurs in project area, but outside of activity area.
- 5 = Field survey located species in activity area.
- 6 = Species not seen during field survey, but possibly occurs in activity area based on habitat observed. or Field survey not conducted when species is recognizable (time of year or time of day). Therefore assume presence and no additional surveys needed.
- 7 = Aquatic species or habitat known or suspected downstream of project/activity area, but outside identified geographic bounds of water resource cumulative effects analysis area (defined as point below which sediment amounts are immeasurable and insignificant).
- 8 = Aquatic species or habitat known or suspected downstream of project/activity area, but inside identified geographic bounds of water resource cumulative effects analysis area.
- 9 = Project occurs in a 6th level watershed included in the USFWS/FS T&E Mussel and Fish Conservation Plan (August 8, 2007 U.S. Fish & Wildlife Service concurrence on updated watersheds). Conservation measures from the USFWS/FS T&E Mussel and Fish Conservation Plan applied.

SPECIES: The term "species" includes any subspecies of fish, wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife, which interbreeds when mature. (Endangered Species Act of 1973, as amended through the 100th Congress)

RANGE: The geographical distribution of a species. For use here “range” is expressed as where a species is known or expected to occur on or near the George Washington and Jefferson National Forests in terms of landform (feature name, physiographic province), political boundary (county name), or watershed (river, or stream name).

HABITAT: A place where the physical and biological elements of ecosystems provide a suitable environment and the food, cover and space resources needed for plant and animal livelihood. FSM 2605-91-8, pg 10 of 13

GLOBAL RANK: Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of taxon rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors including number of occurrences, numbers of individuals, and severity of threats.

G1 = Extremely rare and critical imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 = Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.

G4 = Common and apparently secure globally, though it may be rare in parts of its range, especially at the periphery.

G5 = Very common and demonstrably secure globally, though it may be rare in parts of its range, especially at the periphery.

GH = Formally part of the world’s biota with the exception that may be rediscovered.

GX = Believed extinct throughout its range with virtually no likelihood of rediscovery.

GU = Possibly rare, but status uncertain and more data needed.

G? = Unranked, or, if following a ranking, ranking uncertain (ex. G3?).

G_Q = The taxon has a questionable taxonomic assignment, such as G3Q.

G_T = Signifies the rank of a subspecies or variety. For example, a G5T1 would apply to a subspecies of a species that is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.

STATE RANK: The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources (NHRs) are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The criterion for ranking NHRs is the number of populations or occurrences, i.e. the number of known distinct localities; the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals; the quality of the occurrences, the number of protected occurrences; and threats.

- **S1** - Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.
- **S2** - Very rare; usually between 6 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.
- **S3** - Rare to uncommon; usually between 21 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
- **S4** - Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.
- **S5** - Very common; demonstrably secure under present conditions.
- **SA** - Accidental in the state.
- **S#B** - Breeding status of an organism within the state.
- **SH** - Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
- **S#N** - Non-breeding status within the state. Usually applied to winter resident species.
- **SR** – Reported for Virginia, but without persuasive documentation that would provide a basis for either accepting or rejecting the report.
- **SU** - Status uncertain, often because of low search effort or cryptic nature of the element.
- **SX** - Apparently extirpated from the state.

- **SZ** - Long distance migrant, whose occurrences during migration are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.
- **NA** – Not Applicable- A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

These ranks should not be interpreted as legal designations.

APPENDIX E

BREACH INUNDATION ZONE MAP

AND

WATER SURFACE ELEVATION DATA

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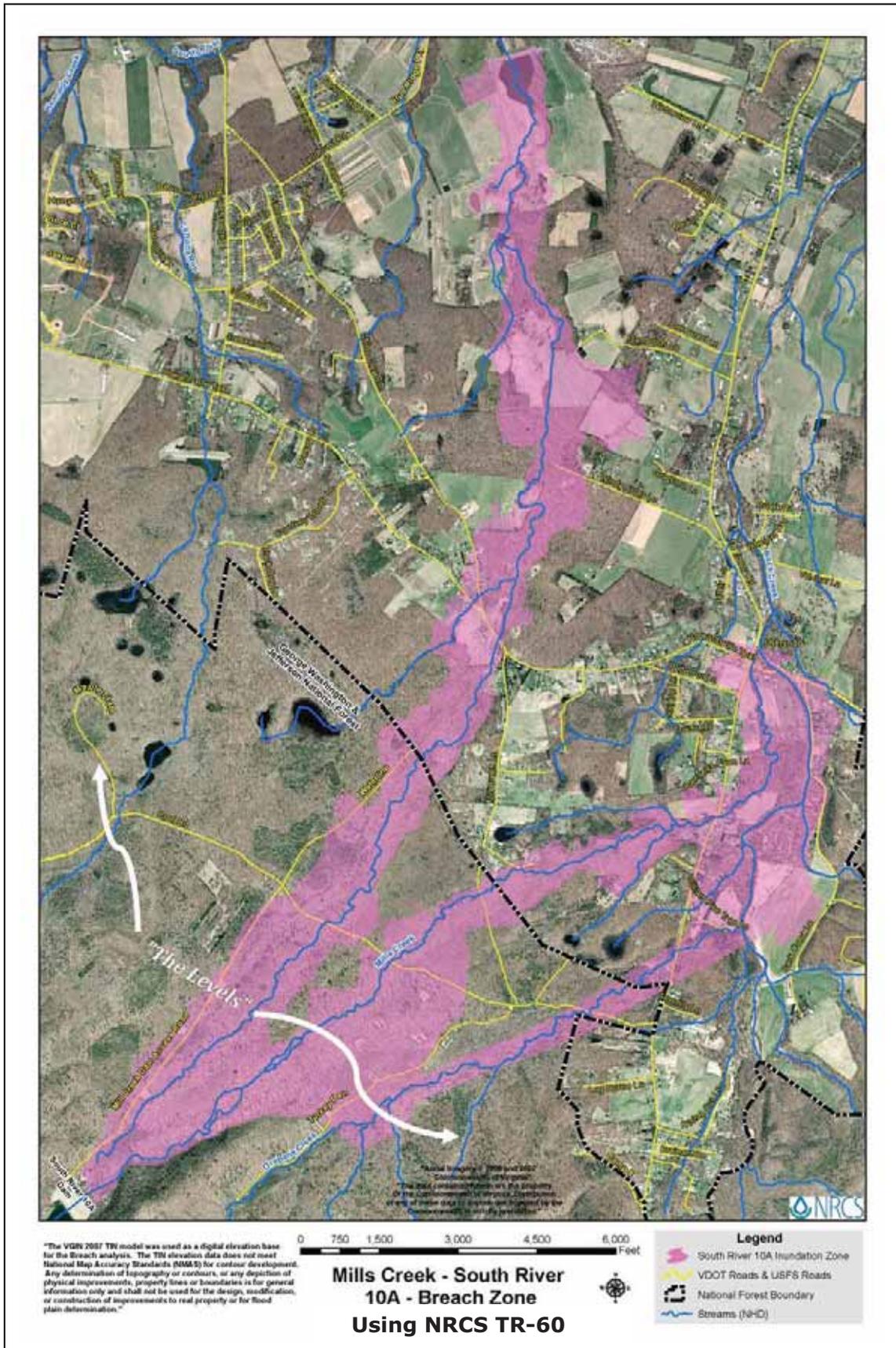
Table E1 - Depth of Water Flow over Bridges during Flooding Events (feet)

Stream Crossing	Reach	River Station	Sunny Day Breach
USFS 42 (Coal Road) culvert	Mills Creek	13518	4.83
SR 664 (Mt. Torrey Road) Bridge	Mills Creek	5084	4.08
SR 610 (Howardsville Tpke) Bridge	Mills Creek	1151	4.76
USFS 42 (Coal Road) culvert	UpperSR19	21067	6.32
SR 610 (Howardsville Tpke) culvert	UpperSR19	13329	14.94
South River 19 Dam (Waynesboro Nursery)	UpperSR19	106	7.55

Table E2 - Results of a Dam Breach Routing for Mills Creek

Reach	River Station (#)	Maximum Water Surface Elevation (feet)	Maximum Flow (cfs)	Location
Upper Mills Creek	21864	1816.91	163200	Just Below Dam
Mills Creek	16691	1690.49	25063	Below Drainage Divide
Mills Creek	13518	1627.31	21426	Upstream of USFS Rd 42 (Coal Road)
Mills Creek	5084	1501.37	12726	Upstream of St. Rt. 664 (Mt. Torrey Road)
Mills Creek	1151	1467.12	8818	Upstream of St. Rt. 610 (Howardsville Tpke)
Mills Creek	155	1455.82	8818	End of Breach Zone
Unnamed Trib to SR19 dam	23571	1690.67	100253	Below Drainage Divide
Unnamed Trib to SR19 dam	21067.1	1638.16	79187	Upstream of USFS Rd 42 (Coal Road)
Unnamed Trib to SR19 dam	13329.1	1506.24	60281	Upstream of St. Rt. 610 (Howardsville Tpke)
Unnamed Trib to SR19 dam	106	1421.05	30439	End of Breach Zone (SR19 Top of Dam)

Figure E1. Breach Zone for Sunny Day Breach.



APPENDIX F

WATERSHED PROJECT MAPS

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Mills Creek - SR10A Sub-Watershed in the South River Watershed

Site Number	Sub-Watershed Name
1	Rt 675 / 613
2	I - 81
3	Poor Creek
4	Lofton Lake
6	Stoney Creek
7	Lake Wilda
8A	Jones Hollow
10A	Mills Creek
11	Canada Run
18	Rt 657
19	Waynesboro Nursery
20	Rt 632
21	Broadhead Creek
23	Robinson Hollow
24	Happy Hollow
25	Toms Branch
26	Inch Branch
27	Upper Sherando

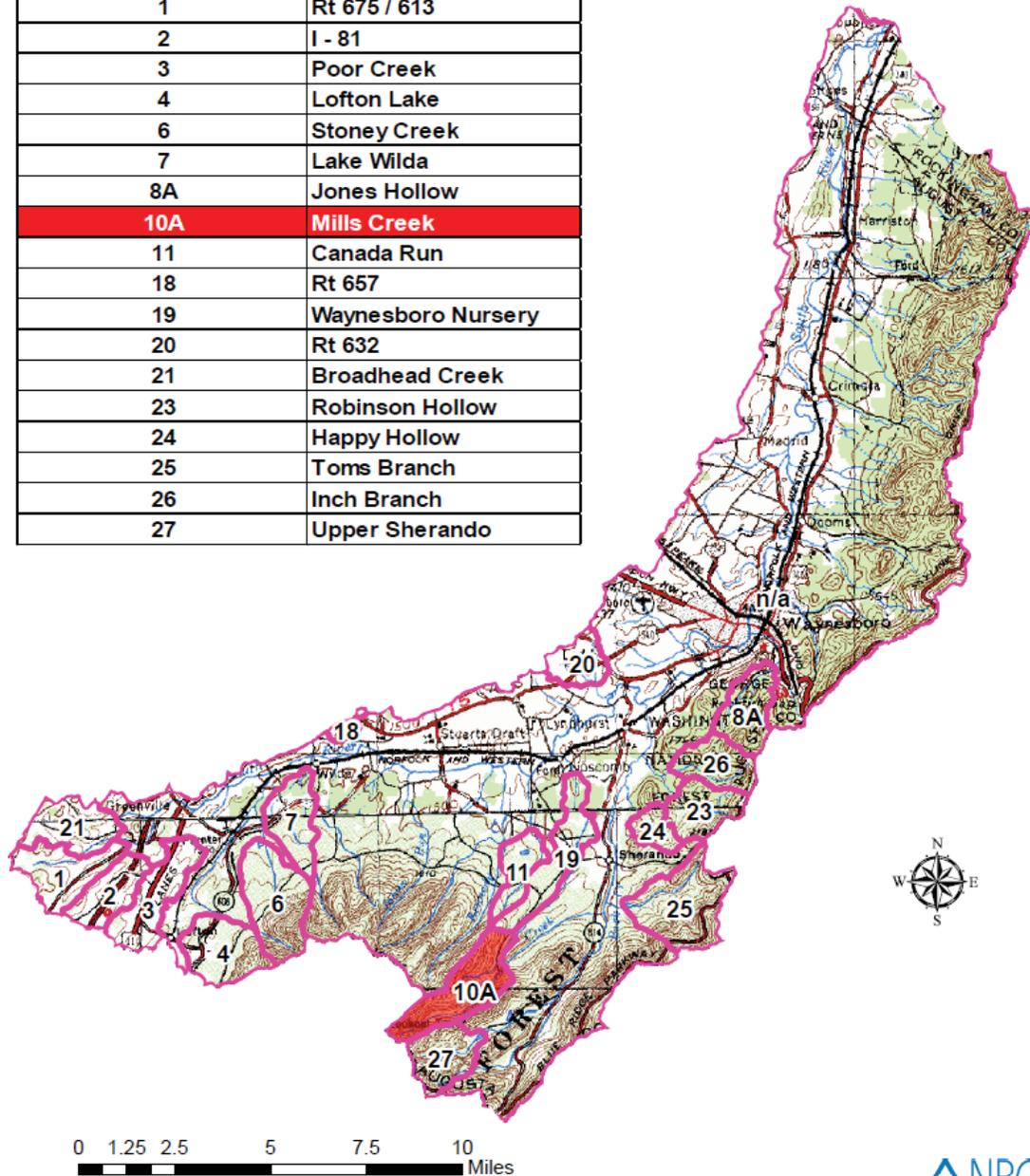


Figure F1. Mills Creek Sub-Watershed

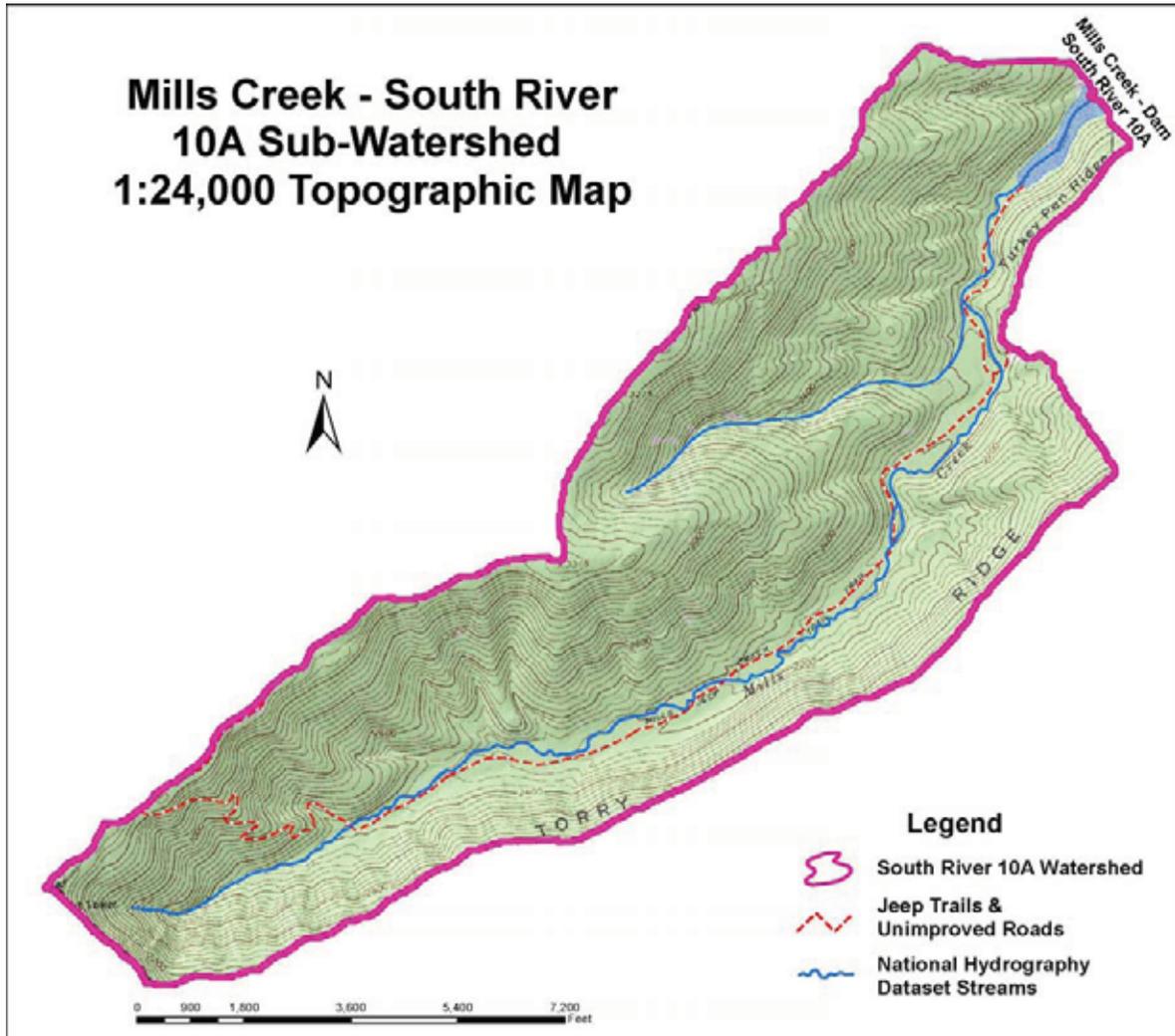


Figure F2. Topographic Map of the Mills Creek Sub-Watershed.