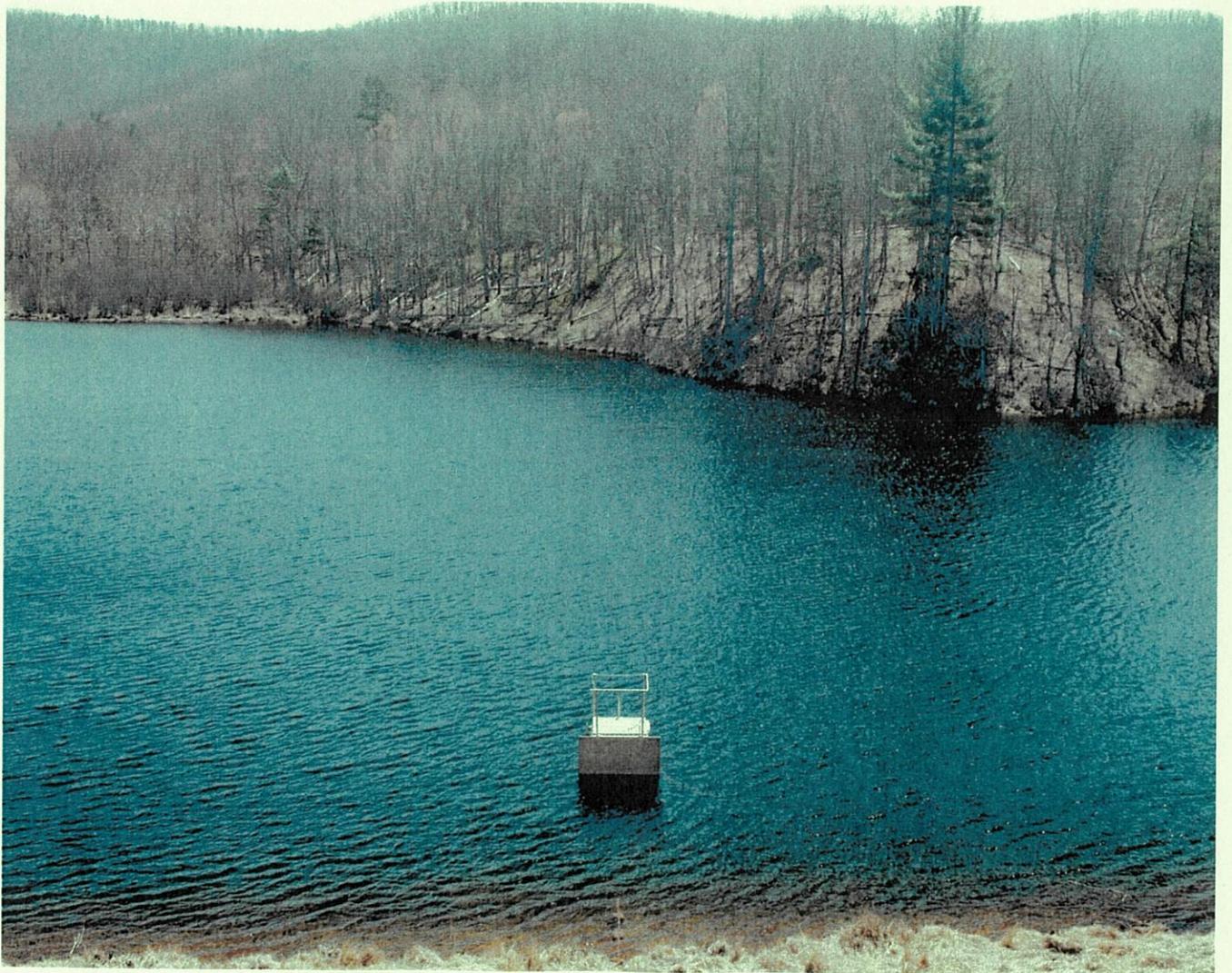


**Supplemental Watershed Plan-Environmental Assessment
for the
South River Watershed**

A supplement to the original watershed plan for the rehabilitation
of South River Watershed Dam Numbers 23, 25 and 26

Augusta County, Virginia

2005



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A supplement to the original watershed plan for the rehabilitation
of South River Dams Numbers 23, 25 and 26

Augusta County, Virginia

2005

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), as amended. The rehabilitation of South River Dams Numbers 23, 25, and 26 are 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).

Sponsors

Headwaters Soil and Water Conservation District
Augusta County Board of Supervisors
City of Waynesboro

Prepared By:

USDA – Natural Resources Conservation Service

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SUMMARY OF SUPPLEMENTAL WATERSHED PLAN

Project Name: South River Watershed Dams Numbers 23, 25, and 26

County: Augusta **State:** Virginia

Sponsors: Augusta County Board of Supervisors
Headwaters Soil and Water Conservation District
City of Waynesboro

Description of Recommended Plan: The recommended plan is to rehabilitate three aging dams to meet current safety and performance standards. The plan provides for the widening and/or armoring of the auxiliary spillways, and raising the height of the top of each dam through the construction of parapet walls. There will be no change in the permanent pool elevation and no change in the current levels of flooding downstream as a result of project activity.

Resource Information:

Watershed size of the study area of three dams = 22,831 acres

Drainage Area of Robinson Hollow Dam No. 23 = 1,651 acres

Drainage Area of Toms Branch Dam No. 25 = 2,921 acres

Drainage Area of Inch Branch Dam No. 26 = 1,728 acres

Land Use:

Pasture/Hayland = 1,995 acres

Cropland = 417 acres

Forest = 16,935 acres

Urban and Miscellaneous = 3,484 acres

Floodpool of Robinson Hollow Dam No. 23 = 32 acres

Floodpool of Toms Branch Dam No. 25 = 41 acres

Floodpool of Inch Branch Dam No. 26 = 33.4 acres

Land Ownership:

Upstream of dams: 59% private, 41% public

Downstream of dams: 100% private, 0% public

Project Beneficiary Profile: The population for Augusta County in 2000 was 65,615. The population diversity was 95% white, 3.6% black, 0.9% Hispanic, and 0.5% other. The City of Waynesboro population was 19,520 with 86.5% white, 10% black, 3.3% Hispanic and 0.9% other.

Census year 2000 per capita personal income for Augusta County was \$19,744 and for Waynesboro was \$17,932. That makes the County income 82% of the State level and 91.5% of the national figure, with Waynesboro coming in at 75% and 83% of the state and national figures for per capita income.

Cultural Resources: The area of potential effect was surveyed and no sites were identified.

Threatened and Endangered Species: There are confirmed occurrences of Swamp Pink, Helonius bullata, a federally threatened, state endangered plant species, in the Toms Branch area, and confirmed occurrences of Virginia Sneezeweed, Helenium virginicum, a state endangered species, at all three dam site areas. The Virginia Department of Conservation and Recreation, Division of Natural Heritage has been consulted regarding the confirmed occurrence of Swamp Pink and Virginia Sneezeweed in the project area. Natural Heritage has determined that the proposed action will not affect any state listed plants. The U.S. Fish and Wildlife Service has also determined that the proposed action will not affect the federally threatened plant species, Helonius bullata, the Swamp Pink, if existing wetlands remain intact. The proposed action will not affect existing wetlands.

Problem Identification: South River Dams Numbers 23, 25 and 26 do not meet current dam design and safety criteria. The dams were originally designed and constructed as class (a) (Low hazard) structures for the purpose of protecting downstream agricultural lands from flooding. The downstream area has changed and now homes and businesses are located below the dams. A total of 191 homes, 10 commercial buildings, 2 churches, 3 major roads, 13 residential roads, 10 bridges, and 6 agricultural buildings are located within the breach inundation zone. It is estimated that approximately 1,000 people live and/or work within the floodplain of these three dams. The dams are now classified as class (c) (High hazard) structures by NRCS. The local sponsors have requested assistance from NRCS to evaluate the rehabilitation of these three aging watershed dams.

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

1. No Action (Sponsor’s Breach) – Removal of the hazards by breaching the earthen embankments pursuant to a mandate from the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management.
2. Rehabilitate the Dams – Combinations of widening and/or armoring of the auxiliary spillways, and raising the height of the top of each dam through the construction of parapet walls.

Project Purpose: This project brings the South River Dams Numbers 23, 25 and 26 into compliance with the current dam design and safety criteria in the Commonwealth of Virginia. It also provides for the continuation of existing flood control for another 50 years after completion. The rehabilitation projects will address all needs identified during the planning process.

Principal Project Measures: Upgrade these dams to meet current design and safety criteria through the combination of widening and/or armoring of the auxiliary spillways, and raising the height of the top of each dam through the construction of parapet walls, and replacing some deteriorating principal spillway components.

Project Costs (Dollars):	<u>PL-106-472 Funds</u> 65%	<u>Other Funds</u> 35%	<u>Total</u> 100%
Structural Measures			
Dam No. 23	\$707,000	\$325,000	\$1,032,000
Dam No. 25	\$1,322,000	\$612,000	\$1,934,000
Dam No. 26	\$773,000	\$361,000	\$1,134,000
	-----	-----	-----
Total for 3 dams	\$2,802,000	\$1,298,000	\$4,100,000

Project Benefits: Remove potential for loss of life. Net average annual equivalent benefits = -\$41,600

Non-monetary Benefits:

- Minimize the threat to human life for approximately 1,000 people that live and work in the 191 homes, 10 commercial buildings and 2 churches within the floodplain.
- Satisfactorily meet the dam design and safety criteria established by the Virginia Division of Dam Safety and Floodplain Management.
- Reduce the potential for loss of life associated with noncompliance with current Virginia Dam Safety Regulations.
- Eliminate the sponsor liability associated with operation of three unsafe dams.
- Maintain the existing level of flood protection for downstream homes and businesses.
- Maintain property values around the lakes and downstream from the dams.
- Protect 3 public bridges, 1 railroad bridge, and 6 private bridges.
- Protect 3 major roads with traffic counts totaling 3,700 vehicles per day. Thirteen residential roads will also be protected.
- Preserve recreational opportunities.
- Maintain existing fish and wildlife habitat around the dams and in Back Creek and South River.
- Safeguard 3.75 acres of jurisdictional wetlands on Robinson Hollow.
- Protect water quality by trapping 0.8 acre-feet of sediment and attached nutrients annually.

Environmental Values Changed or Lost:

<u>Resource</u>	<u>Impact</u>
Land Use Changes	No Impact
Floodplains	Positive impact - Current floodplain will be maintained.
Fisheries	Positive impact - Fish habitats will be maintained and/or protected.
Wildlife Habitat	Positive impact – Habitat will be maintained and protected in the watersheds of the lakes.
Wetlands	Positive impact – The 3.75 acres of jurisdictional wetlands in the upper end of the Robinson Hollow Lake will be protected and maintained without disturbance.
Cultural Resources	No Impact
Threatened and Endangered Species	No impact – Habitat for Swamp Pink and Virginia Sneezeweed will be maintained.
Prime Farmland	N/A
Compensatory Mitigation	None

SOUTH RIVER WATERSHED AGREEMENT

Supplemental Watershed Work Plan Agreement
(Supplement No. 3)

between the

Augusta County Board of Supervisors
Headwaters Soil and Water Conservation District
City of Waynesboro
(hereinafter referred to as Sponsors)

and the

Natural Resources Conservation Service
United States Department of Agriculture
(hereinafter referred to as NRCS)

Whereas, the Watershed Work Plan Agreement for the South River Watershed, State of Virginia, executed by the Sponsors 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 for said watershed, was developed through cooperative efforts of the Sponsors and the Soil Conservation Service (currently NRCS) became effective on the 22nd day of May 1961; and

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

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for the South River Dams Numbers 23, 25, and 26 located in Augusta County, Commonwealth of Virginia, under the authority of 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); and

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

Whereas, the rehabilitation of South River Dams Numbers 23, 25, and 26 has been authorized under the authority of Public Law 106-472, the Small Watershed Rehabilitation Amendments of 2000, which amends Public Law 83-566, the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Flood Prevention Program authorized by the Watershed Protection and Flood Prevention Act of 1954, as amended, has been assigned by the Secretary of Agriculture to NRCS; and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a supplemental plan to rehabilitate Dams Numbers 23, 25 and 26 of the South River Watershed 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 Sponsors 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. The name of the Soil Conservation Service has changed to Natural Resources Conservation Service (NRCS). All references to the Soil Conservation Service, SCS, or Service, now refer to the NRCS.
2. The Augusta County Board of Supervisors and the City of Waynesboro agree to participate in and comply with applicable Federal and State floodplain management and flood insurance programs before construction starts. (Note: Augusta County has participated in the National Flood Insurance Program since 1990 and the City of Waynesboro since 1971).
3. The sponsors will acquire all land rights, easements, or right-of-ways in connection with the planned works of improvement.
4. 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 following rate:

Sponsors	NRCS	Total relocation costs
35%	65%	100%

5. The Sponsors hereby agree that they will comply with all the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as implemented by 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the sponsors are legally unable to comply with the real property acquisition requirements of the Act, they agree that, before any federal financial assistance is furnished, they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the Sponsors agree that they will reimburse owners for necessary expenses as specified in 7 C.F.R. 21.1006(C) and 21.1007.
6. The Sponsors will obtain all necessary federal, state, and local permits required by law, ordinance, or regulation for installation of the planned works of improvement. The costs of such permitting is not eligible as part of the Sponsors' cost-share requirement.
7. The Sponsors will be responsible for the costs of water, mineral and other resource rights and will acquire or provide assurance that landowners or resource users have acquired such rights pursuant to state law as may be needed in the installation and operation of the works of improvement. The costs associated with the subject rights are not eligible as a part of the sponsors' cost-share requirement.

8. NRCS will assist the Sponsors with the installation of planned works of improvement. The percentages of total rehabilitation project costs to be paid by the Sponsors and by NRCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u>	<u>NRCS 1/</u>	<u>Total Eligible Project Costs 2/</u>
Rehabilitation of Dam No. 23 (Percent)	\$335,000 35%	\$621,000 65%	\$956,000 100%
Rehabilitation of Dam No. 25 (Percent)	\$622,000 35%	\$1,156,000 65%	\$1,778,000 100%
Rehabilitation of Dam No. 26 (Percent)	\$366,000 35%	\$679,000 65%	\$1,045,000 100%
Totals (Percent)	\$1,323,000 35%	\$2,456,000 65%	\$3,779,000 100%

1/ Maximum allowable by law is 65% of the total eligible project costs, not to exceed 100% of the actual construction cost.

2/ Total eligible project costs include construction, land rights, relocation, project administration, and planning services provided by the sponsors. Not included are NRCS engineering technical assistance costs of \$295,000; NRCS project administration costs of \$51,000; nor the cost of permitting and ordinances.

9. The Sponsors will obtain agreements with landowners or operators of not less than 50 percent of the drainage area above South River Dams Numbers 23, 25 and 26. These agreements state that the owners will carry out conservation plans on their land and ensure that 50 percent of the land is adequately protected before rehabilitation of the floodwater retarding structures.

10. The Sponsors will be responsible for the operation, maintenance, and replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with a new operation and maintenance agreement that will be entered into before issuing invitations to bid for construction work. The term of the operation and maintenance agreement will be for the 52-year evaluated life of the project (50 years plus 2 years of installation).

11. Emergency Action Plans (EAPs) currently exist for the three Floodwater Retarding Structures included in this plan. The Sponsors will provide leadership in developing new EAPs that are appropriate for the rehabilitated condition of these structures and will update the EAPs annually with assistance from the local emergency response officials. NRCS will provide technical assistance in

preparation and updating of the EAPs. The purpose of the EAPs is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of a floodwater retarding structure. The NRCS State Conservationist is to determine that a current EAP is prepared prior to the initiation of construction.

12. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be based on the actual costs incurred in the installation of works of improvement and the cost-share percentages stated in this agreement.
13. 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.
14. This agreement does not commit the NRCS to assistance of any kind beyond the 52-year project life.
15. A separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
16. This rehabilitation plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may de-authorize or terminate funding at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, NRCS shall promptly notify the Sponsors in writing of the determination and the reasons for de-authorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS 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 Sponsors having specific responsibilities for the measure involved.
17. 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 therefrom; but this provision shall not be construed to extend to the agreement if made with a corporation for its general benefit.
18. Activities conducted under this agreement will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 CFR. 15, Subparts A&B) which provide that no person in the United States shall, on the basis of race, color, national origin, gender, age, religion, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.
19. Certification Regarding Drug-Free Workplace Requirements (7 CFR 3017, Subpart F).

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated

the requirements of the Drug Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

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

Conviction means a finding of (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).

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

- (1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (2) Establishing an ongoing drug-free awareness program to inform employees about—
 - (a) The danger of drug abuse in the workplace;
 - (b) The grantee's policy of maintaining a drug-free workplace;
 - (c) Any available drug counseling, rehabilitation, and employee assistance programs; and
 - (d) The penalties that may be imposed upon employees for drug abuse violation occurring in the workplace;
- (3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);
- (4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee 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 on of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employees who is so convicted--

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

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

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

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

20. Certification Regarding Lobbying (7 CFR 3018).

(1) The sponsors certify to the best of their knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) 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.

(c) The sponsors shall require that the language of this certification be included in the

and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

(2) 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, 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.

21. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primarily Covered Transactions (7 CFR 3017).

(1) The sponsors certify to the best of their knowledge and belief, that they and their principals:

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

(b) 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;

(c) 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 (1)(b) of this certification; and

(d) 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.

(2) Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

Augusta County Board of Supervisors

By: /s/ Wendell L. Coleman

P.O. Box 590, Verona, Virginia 24482
Address Zip Code

Title: Chairperson

Date: September 20, 2005

The signing of this supplemental watershed agreement was authorized by a resolution of the governing body of the Augusta County Board of Supervisors adopted at a meeting held on September 14, 2005.

/s/ Julia Bortle
Notary

P.O. Box 590, Verona, Virginia 24482
Address Zip Code

Date: September 20, 2005

City of Waynesboro

By: /s/ Thomas W. Reynolds

P.O. Box 1028, Waynesboro, Virginia 22980
Address Zip Code

Title: Mayor

Date: September 20, 2005

The signing of this supplemental watershed agreement was authorized by a resolution of the governing body of the City of Waynesboro adopted at a meeting held on September 12, 2005.

/s/ Julia Bortle
Notary

P.O. Box 1028, Waynesboro, Virginia 22980
Address Zip Code

Date: September 20, 2005

Headwaters Soil and Water Conservation District

By: /s/ Charles E. Horn

P.O. Box 70, Verona, Virginia 24482
Address Zip Code

Title: Chairperson

Date: September 20, 2005

The signing of this supplemental watershed agreement was authorized by a resolution of the governing body of the Headwaters Soil and Water Conservation District adopted at a meeting held on September 20, 2005.

/s/ Julia Bortle
Notary

P.O. Box 1028, Waynesboro, Virginia 22980
Address Zip Code

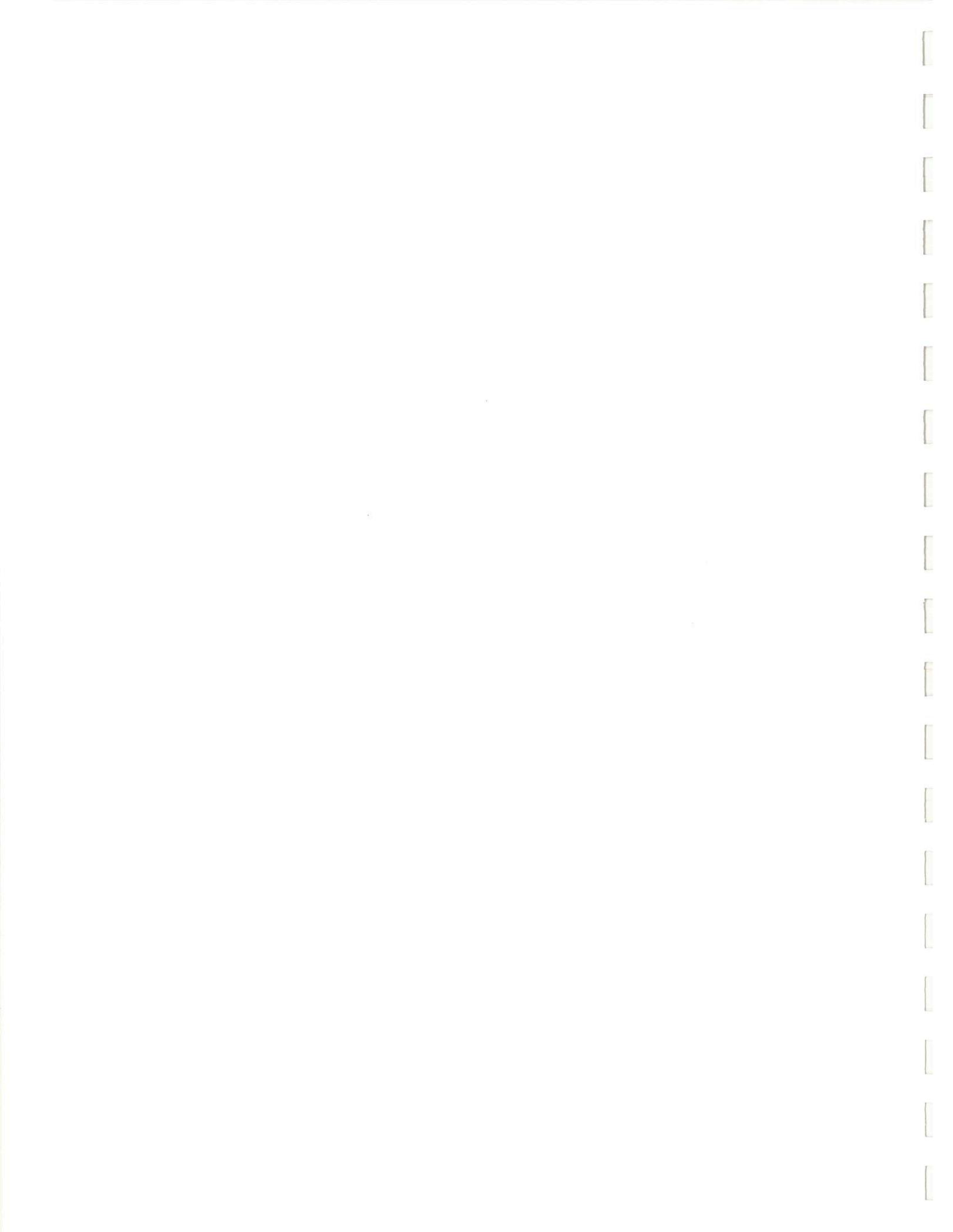
Date: September 20, 2005

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

Approved by:

/s/ M. Denise Doetzer
M. DENISE DOETZER
State Conservationist

Date: September 20, 2005



INTRODUCTION

NEED AND PURPOSE

There are thirteen dams in the South River watershed. Based upon changes in downstream landuse that have occurred in the past forty-nine years, the NRCS hazard classification of three of these dams has changed from class (a) (low hazard) to class (c) (high hazard). Robinson Hollow dam and Inch Branch dam were built in 1956. Toms Branch dam was built in 1957. This supplement to the watershed plan is needed because these dams do not meet current Virginia Department of Conservation, Division of Dam Safety and Floodplain Management (referred to herein as the Division of Dam Safety) dam design, safety, and performance standards and, as such, do not meet the objectives of the Augusta County Board of Supervisors, the City of Waynesboro, 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, technical advisors, and the public in addressing resource issues and concerns within the South River 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 9 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 and one multi-purpose dam was added into the plan and built in 1963. Five of the proposed dams were not built due to changes in site conditions and/or landrights problems. In 1956 and 1957, when the Robinson Hollow, Toms Branch and Inch Branch dams were built, they were rated as low hazard structures because they primarily protected agricultural land and there was no identified potential for loss of life in the event of dam failure.

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. The South River watershed is 156,700 acres (244.8 square miles). The study area for the three dams is a total of 22,831 acres (35.67 square miles); Robinson Hollow dam, Toms Branch dam, and Inch Branch dam have drainage areas of 2.58, 4.56, and 2.70 square miles, respectively. Forty-one percent of the drainage area above the three dams, 2,602 acres, is located within the George Washington & Thomas Jefferson National Forests. Appendix C shows the location map for this watershed.

Topography: The Robinson Hollow, Toms Branch, and Inch Branch dams are 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 elevations in the watersheds range from about 1,470 to 2,675 feet for Robinson Hollow, 1,575 to 3,610 feet for Toms Branch, and 1,430 to 2,675 feet for Inch Branch.

Soils: The soils present in the watershed are grouped in the Lew-Cataska-Hartleton Association. The soils are predominately deep to moderately deep, excessively drained to well drained and have channery or slaty subsoil with cobbles in the upper, more mountainous upland areas of the watershed. Soils at the dams at the lower end of the watershed are deep, moderately well drained to well-drained soils that have dense compact subsoil. The subsoil typically ranges from loam to clay on stream terraces.

Geology: The reservoirs are surrounded by two distinct rock types, with the Chilhowee Group of Cambrian age at each site and the Catoctin Formation of Cambrian/Precambrian age positioned upslope on the Blue Ridge to the East. At each site, the centerline and actual dam site are located in the Harpers Formation which is a member of the Chilhowee Group. The Harpers Formation consists of brown to gray metasandstone, dark gray metasilstone, and a gray to bronze colored phyllite. Talus deposits, cobbles and boulders are also common in the more rugged portions of each watershed.

Climate: The 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 elevation. 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 this form of precipitation.

In the part of the watershed which lies in the Valley and Ridge province, the average temperature is 36.6 degrees Fahrenheit in the winter and 74 degrees Fahrenheit in the summer. Average temperatures for the Blue Ridge portion of the watershed are approximately 31.8 degrees for the average daily winter temperature and 69.3 degrees for the average daily summer temperature. The last frost of spring normally occurs in late April to early May and the first frost in the fall occurs about mid to late October. This provides a growing season of approximately 190 to 231 days, depending upon 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 9 miles per hour during this time.

LAND USE

The land use of the study area for the three South River dams is listed in Table A. This table also lists the land use upstream of the individual dams and the land use in the potential breach inundation zone below the three dams. In 2005, forty-one percent of the watershed upstream of the dams was owned by the Forest Service and is wooded. Most of the remaining land in the upper watershed reaches is also forested with little likelihood of land use changes other than scattered residential use.

Table A - Land Use In Acres

Land Cover Type	South River Study Area	Drainage Area of Robinson Hollow	Drainage Area of Toms Branch	Drainage Area of Inch Branch	Breach Inundation Zone for all three dams
Pasture/Grassland	1,423	12	4	9	690
Hayland	572	-	-	-	247
Cropland	417	-	-	-	194
Harvested Woodland	589	-	-	-	-
Woodland	16,346	1615	2,880	1,606	710
Residential/Business	2,818	-	10	95	913
Transportation	318	17	16	10	55
Water	119	7	11	8	52
Nurseries	229	-	-	-	151
Total	22,831	1,651	2,921	1,728	3,012

THREATENED AND ENDANGERED SPECIES

There are two federally threatened (FT)/state threatened (ST) animal species listed in the project area. The Bald Eagle, Haliaeetus leucocephalus, and the Madison Cave Isopod, Antrolana lira, are known to occur within a two mile radius of each of the three project dams.

Listed state endangered (SE) animal species known to occur within a two mile radius of each of the three project dams include Bewick's Wren, Thyromanes bewickii, and the Eastern Tiger Salamander, Ambystoma tigrinum. Four state threatened (ST) animal species, the Peregrine Falcon, Falco peregrinus; the Upland Sandpiper, Bartramia longicaudus; the Loggerhead Shrike, Lanius ludovicianus; and the Madison Cave Amphipod, Stygobromus stegerorum, are known to occur within two miles of the dams.

There are confirmed occurrences of Swamp Pink, Helonius bullata, a federally threatened, state endangered (FT/SE) plant species, in the Tom's Branch area, and confirmed occurrences of Virginia Sneezeweed, Helenium virginicum, a state endangered (SE) plant species, at all three dam site areas. Confirmed occurrence of a listed species in a project area requires consultation with the appropriate State or Federal agency. The agencies contacted for project review of Threatened and Endangered species were the U.S. Fish & Wildlife Service, Virginia Department of Game and Inland Fisheries, and the Natural Heritage Division of the Virginia Department of Conservation and Recreation.

The DCR Natural Heritage Division responded in a June 14, 2004 letter that their "Biotics (database) documents the presence of natural heritage resources in the project area.The current activity will not affect any documented state-listed plants or insects." Due to the passage of more than one year since the initial review, a second review was requested on July 25, 2005. In a response by phone on August 9, 2005, Natural Heritage reaffirmed its' earlier conclusion that the South River dam rehabilitation projects will not affect any state-listed plants or insect species. It was further stated that

Natural Heritage does not disclose the location of listed species for inclusion in public documents to avoid potential adverse effects to the species or associated habitat.

The Virginia Department of Game and Inland Fisheries (VDGIF) responded by email on August 16, 2005 to an NRCS letter of July 26, 2005 requesting a project review of effects on Threatened and Endangered species. VDGIF stated “We do not anticipate a significant adverse impact upon threatened or endangered species under our jurisdiction to occur due to this project. The streams above all three reservoirs are classified as Class III and IV Cold Water Streams containing wild brook trout. We recommend preserving undisturbed wooded buffers of at least 100 – 200 feet in width around all streams in the watershed and around the reservoirs.”

The U.S. Fish & Wildlife Service (USFWS) provided comments on August 31, 2005. The USFWS stated that if the dam rehabilitation activity does not disturb existing wetlands, the U.S. Fish & Wildlife Service does not anticipate any adverse effects on the federally threatened, state endangered (FT/SE) plant species Helonius bullata, the Swamp Pink. Table B summarizes the occurrence of threatened and endangered species in the project area.

**Table B - Threatened & Endangered Animal and Plant Species
Known to Occur Within 2 Miles of the Project Dams**

Animal or Plant Species	Scientific Name	Status*	Inch Branch	Robinson Hollow	Toms Branch	Confirmed
Bald Eagle	<u>Haliaeetus Leucocephalus</u>	FT/ST	+ **	+	+	No
Madison Cave Isopod	<u>Antrolana lira</u>	FT/ST	+	+	+	No
Eastern Tiger Salamander	<u>Ambystoma tigrinum</u>	SE	+	+	+	No
Madison Cave Amphipod	<u>Stygobromus stegerorum</u>	ST	+	+	+	No
Bewick’s Wren	<u>Thyromanes bewickii</u>	SE	+	+	+	No
Peregrine Falcon	<u>Falco peregrinus</u>	ST	+	+	+	No
Upland Sandpiper	<u>Bartramia longicaudus</u>	ST	+	+	+	No
Loggerhead Shrike	<u>Lanius ludovicianus</u>	ST	+	+	+	No
Swamp Pink	<u>Helonius bullata</u>	FT/ST	-***	-	+	Yes
Virginia Sneezewood	<u>Helenium virginicum</u>	SE	+	+	+	Yes

*- Species Legal Status: FT = Federally Threatened; FE = Federally Endangered; ST = State Threatened; SE = State Endangered

** - a “+” indicates species presence in a 2 mile radius of the dam.

*** - a “-” indicates the absence of a species within a two mile radius of the dam area.

CULTURAL RESOURCES, NATURAL AND SCENIC AREAS, AND VISUAL RESOURCES

In March of 2004, an NRCS Cultural Resources Specialist visited the watershed and specifically, Robinson Hollow dam, Toms Branch dam, and Inch Branch dam. A methodology for considering culturally significant resources was developed and followed in this planning process. An inventory of the watershed and associated downstream impacted area was completed with no historic or cultural significant sites noted. A field investigation survey was conducted across the entire project area.

Virginia has two World Heritage sites. Both of these are in the nearby City of Charlottesville or Albemarle County and will not be affected by the planned work. There are ten sites in Virginia listed in the National Registry of Natural Landmarks. Of these ten sites, only one, Grand Caverns, occurs in Augusta County. It will not be affected by the proposed work. One hundred and seventeen sites in Virginia are listed on the National Registry of Historic Landmarks. None are in Augusta County and two are in adjacent counties. However, they will not be affected by proposed activities associated with this project.

The National Register of Historic Places lists fifty sites in Augusta County. None of the sites listed are in close proximity to any of the three dams and none will be affected by the proposed work. These fifty sites as well as any additional locally significant sites will not be affected by the proposed project. No archaeological sites are recorded on the State Archaeological files within or in immediate proximity to the area of planned disturbance. The Virginia State Architectural file lists fifteen architectural sites within the watershed. However, none of these will be affected by this project.

The Virginia Department of Historic Resources reviewed the Watershed Plan and Environmental Assessment on August 11, 2005 for cultural resource concerns, and offered "...a determination of no historic properties affected" by this action. This finding is in concurrence with NRCS conclusions.

There are no designated State Natural and Scenic Area Preserves nor visual resources in the project vicinity that will be affected by the proposed changes to the dams. The three dam sites are located within the Shenandoah Valley Battlefield National Historic District, but not within the boundaries of any designated battlefield.

WATER QUALITY

The South River Dams Rehabilitation Project includes Robinson Hollow dam, Toms Branch dam, and Inch Branch dam. The streams on which these dams are located all drain into Back Creek, which then enters the South River above Waynesboro. The project area is entirely within the boundaries of Hydrologic Unit B31, the Middle South River/Back Creek.

The 2002 303(d) Impaired Streams Report shows the following streams as "impaired" for one or more designated uses, and requires the development of a Total Maximum Daily Load (TMDL).

- The length of Back Creek, 13.59 miles, from the headwaters to the confluence with the South River is listed as Not Supporting for Aquatic Life Use. A biological assessment in 2002 produced a Moderately Impaired Benthic Rating. The cause of impairment is unknown. A TMDL is scheduled to be developed between 2002 and 2014.

- Mills Creek, which enters Back Creek a little over 8 miles from its source, is also listed as Not Supporting for Aquatic Life Use. The U.S. Forest Service monitoring station #5084 had a Severely Impaired Benthic Rating during the 2002 assessment period. The cause of the impairment is considered to be atmospheric deposition. Development of a TMDL is scheduled between 2002 and 2014.
- The stream segment that begins at the Toms Branch headwaters and ends 2.7 miles at its mouth is Not Supporting for Aquatic Life Use. The U.S. Forest Service monitoring station #5104 had a Moderately Impaired Benthic Rating during the 2004 assessment. The cause of impairment is believed to be atmospheric deposition.

WETLANDS

Of the ten soil types found in the vicinity of the Inch Branch, Robinson Hollow and Toms Branch dam sites, none are listed as hydric soils. However, three of the soil types, i.e. Craigsville cobbly sandy loam, Monongahela fine sandy loam, 7-15% slope, and Monongahela cobbly fine sandy loam, on 0-7 & 7-15% slopes, have hydric inclusions due to depression storage. Additionally, some frequently flooded soils adjacent to the stream channel downstream of the Inch Branch dam have hydric soil inclusions due to depression storage.

Field reconnaissance of the inlet areas of all three reservoirs on May 14, 2004 by NRCS and Army Corps of Engineers' (COE) personnel indicated the presence of jurisdictional wetlands contiguous with the reservoir at Robinson Hollow. There is an estimated total of 3.75 acres of wetlands upstream of the permanent pool at the Robinson Hollow site. The other two sites did not have any jurisdictional wetlands.

Inquiry into the history of maintenance of these reservoirs has revealed that Robinson Hollow is the only one of the three reservoirs that has not been dredged. Tom's Branch was dredged in 1972 and its inlet is currently free-flowing. Inch Branch was dredged in 2002, concurrent with repairs on the riser. There are wetlands above the inlet to the Inch Branch but they are disconnected from the reservoir and are probably supported by spring flow. The COE does not consider these wetlands to be jurisdictional. These wetlands will not be impacted by the project.

SOCIAL AND ECONOMIC CONDITIONS

Population and Race: According to the 2000 Census, Augusta County has a total population of 65,615. Of the total population, about 95% (62,347) are white and 3.6% (2,360) are Black or African American. Together these two groups make up 98.6% of the county's entire population. Hispanics are the second largest minority group, but have a very small presence with Hispanics of any race constituting 0.9% (620) of the total population. Asians and Native Americans have an even smaller presence. These two groups made up less than 1% with 185 and 101 individuals, respectively¹. Chinese (51) and Asian Indians (46) make up over 52% of the Asians present in the county.

¹ Census data totals may slightly exceed 100% due some respondents reporting more than one race.

The City of Waynesboro, which is partially contained within the South River watershed, lies mainly northeast and downstream of the majority of the watershed. Waynesboro has a total population of 19,520 according to the 2000 Census. About 86.5% (16,877) are white and 10% (1,945) are black or African American. Together these two groups make up 96.5% of Waynesboro's entire population. Hispanics and Asians are the next largest minority groups with 3.3% (643) and 0.6% (112), respectively. Waynesboro has 61 Native Americans, which constitute 0.3% of the local population according to the 2000 Census.

Age: The 2000 Census of the U.S. population indicates that the median age (middle point with ½ above and ½ below) of the population of Augusta County is 39. The median age for the City of Waynesboro is 38.9 years. The median age for the state of Virginia is somewhat lower at 35.7 years. Residents in Augusta County that are 65 years old or older total 12.8%, while 17.6% of Waynesboro is in the same category.

Education: Twenty-two percent of the residents in the county have less than a high school education. Approximately 40% of the residents in the county have only a high school diploma or have passed an equivalency test. Thirty-eight percent of the residents have some education beyond high school. Almost 18% have completed some college level work. Five percent of county residents have an associate degree; 10.9% have earned a Bachelor's Degree, and 4.1% have earned a graduate school or professional degree. Thus, 78% of the county has a high school degree or higher.

Employment/Unemployment, Class of Worker and Commuter Status: Sixty-five percent (33,835) of the population of Augusta County are 16 years of age or older and are considered in the labor force pool. Of these, 97.4% were employed and 2.5% (839) were unemployed in 2000, according to the 2000 Census. This figure is lower than the unemployment rate in 2000 for the state of Virginia as a whole which was 4.2%. However, the unemployment rate for Waynesboro was 6.5%, which is somewhat higher than the state rate and much higher than the county-wide rate of unemployment. About 18,000 (27.5%) of the Augusta County population were under the age of 16 and not considered to be in the labor force pool. About 5,980 residents of Waynesboro, 30.6% of the total population, are under 16 and are not considered in the labor force.

Augusta County has a very diverse and productive economy. According to the 2000 Census, three sub-sectors of the local economy each employ about 25% of the workforce: management and related professional occupations (25.6%); sales and office occupations (24.8%); and manufacturing and transportation (23.1%). Together these three sub-sectors employ 73.5% of all employed in the county. Occupations in the service sector make up 13% and construction and related jobs employ an additional 12.3% of all employed. Farming, fishing and forestry employ only 1.3% of the workforce in Augusta County. The employment data for Waynesboro are similar to the Augusta County data on a percentage basis.

Private employment constitutes 84.8% of all employment in Augusta County (27,948), including 2,368 self-employed workers who own their own businesses. Within Waynesboro, the percentage of privately employed workers is also 84.8% (7,327), and includes 456 self-employed individuals. Government workers, at all levels, local, state and federal, make up 14.8% (4,894) of total workers in Augusta County, and 14.9% (1,288) of all workers within Waynesboro. Unpaid family workers make up the remaining 0.4% of workers (120) in Augusta County and Waynesboro (32).

Of all Augusta County residents employed in 2000, 49.5% worked within Augusta County and 50.5% commuted to another locale. Waynesboro's work force has a slightly higher number who commute to jobs outside of the locale where they reside (54.9%). Thus, 45.1% reside and work within Waynesboro. About 48.2% of all workers in Virginia reside and work within the same county (51.8% commute to another county).

Income: The 2000 Census indicates that there were 24,857 households in Augusta County in 1999. Median annual household income for the county in the same year was \$43,045. This compares to \$46,677 per year for the median household income calculated for the state of Virginia and \$41,994 per year at the level of the entire nation. The median household income in 1999 for Augusta County was 92% of the state median and 102.5% of the national median household income. Waynesboro had 8,318 households in 1999 and a median household income of \$32,686 per year. With respect to median household incomes, Waynesboro is significantly worse off compared to the County as a whole with only 76% as much household income (70% of the state level and 78% of the national median household income figure).

Median family income in Augusta County for 1999 was \$48,579 per year. For Waynesboro, median family income in 1999 was \$40,772 per year. These figures are somewhat less, approximately 20% and 25% lower respectively, than the \$54,169 in median family income for Virginia as a whole and almost 3% and 19% lower respectively than the \$50,046 reported for the entire United States in 2000.

With respect to per capita incomes, Augusta County residents reported per capita income of \$19,744 in 1999. Waynesboro had per capita income of \$17,932 in 1999. Virginia reported per capita income of \$23,975 in 1999, while the same figure for the entire United States was \$21,587. That makes the county figure 82% of the State level and 91.5% of the national figure. Waynesboro's per capita income figure for 1999 was 75% of the Virginia figure and 83% of the national figure for per capita income.

From a gender-specific perspective, males earn far more than females in the workplace at all levels. Full-time, year-round male workers had a median income in 1999 of \$31,577 in Augusta County, while the same category of females in the county earned \$24,233/year. Full-time, year-round male workers within the town of Waynesboro had median income in 1999 of \$30,943, while the same category of females in town earned \$22,185/year. Full-time, year-round male workers had a median income in 1999 of \$37,764 in Virginia, while the same category of females in Virginia earned \$28,035/year. The Virginia figures are very close to the national statistics of \$37,057 and \$27,194 for male and female full-time, year-round workers respectively.

Poverty: According to the 2000 Census, Augusta County had 801 families (4.2%) living below the poverty level. The City of Waynesboro had 604 families, or 11% of the total population, that live below the poverty level. State-wide, 7% of Virginia's families had incomes below the poverty level in 2000. At the national level, 9.2% of our families live below the poverty level. Therefore, the City of Waynesboro, the main beneficiary of any potential dam rehabilitation activity on the South River, has a poverty level that is approximately 162% higher than the county-wide rate, 57% higher than the state-wide rate, and almost 20% higher than the nation-wide rate.

Recreation: The three South River dams under study, known locally as Inch Branch, Robinson Hollow and Toms Branch, provide recreation to homeowners and landowners around the respective lakes. Lake-based/associated recreation includes fishing, camping, swimming, boating, barbequing and some bird watching. In addition, numerous sportsmen enjoy hunting and skeet-shooting in the surrounding

woodlands and open areas associated with the lake sites. Currently, there are an estimated 820 water-based recreation user days enjoyed on and around the three lakes annually.

Real Estate: There are approximately 25 lots with lake-frontage around the three reservoirs. Currently there are two second homes adjacent to Inch Branch, two second homes and one hunting cabin around Robinson Hollow, and three second homes and one hunting cabin next to the Toms Branch reservoir. An additional 201 homes and businesses are located in the breach zone below the dam. The value of lake-front lots is 50 to 60% higher than comparable property that is not on the lake. Property values downstream of the dams range between \$18,000 and \$280,000 with an average of \$100,500. The average value is higher than the average value for Waynesboro (\$89,300), but lower than the average value for Augusta County (\$110,900).

PLANNING ACTIVITIES

As part of the planning process, several engineering surveys were conducted. Valley cross-sections were surveyed by aerial photographs. This information was used in the hydraulic analysis to determine the breach inundation zone and the water surface elevations at each cross-section. The computer modeling program HEC-RAS was used. A second survey was conducted to identify the first floor elevation and point-of-water-entry elevation for houses and businesses within the breach zone. This information was used to identify the economic damages associated with different flood frequencies and water surface elevations. The SITES computer program was used with information from the geologic investigations to model the stability of the auxiliary spillways and to identify rehabilitation alternatives that would meet the dam safety requirements. SITES is a computer program that was developed cooperatively by NRCS, ARS, and Kansas State University.

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 researched. Social and economic effects of the potential alternatives were evaluated for cost-effectiveness and for local acceptability. Both the benefits and the costs of the alternatives were computed and analyzed.



Figure 1 - Survey of first floor elevations and points of entry for all structures in the breach zone

WATERSHED PROBLEMS AND OPPORTUNITIES

WATERSHED PROBLEMS

Change in Hazard Classification: Due to a change in hazard classification, the Robinson Hollow, Toms Branch and Inch Branch dams no longer meet the dam safety and performance standards of NRCS and the Division of Dam Safety. The dams were constructed in 1956 and 1957 as NRCS class (a) (low hazard) structures for the purpose of protecting downstream agricultural lands from flooding. The dams are now identified as NRCS class (c) (high hazard) structures due to the presence of houses and businesses built in the breach zone after construction of the dams.

The specific reason that the South River dams do not meet the dam safety criteria is that, in Virginia, a high hazard dam must be able to safely pass the volume of water associated with the Probable Maximum Flood (PMF) without overtopping. The Virginia Dam Safety definition of the PMF is defined as *"the flood that might be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The PMF is derived from the current Probable Maximum Precipitation (PMP) available from the National Weather Service, NOAA. In some cases local topography or meteorological conditions will cause changes from the generalized PMP values; therefore, it is advisable to contact local, state or federal agencies to obtain the prevailing practice in specific cases."* Current NRCS practice is to evaluate both the 6-hour PMP and the 24-hour PMP in order to determine the most damaging storm event. NRCS designs for the most critical storm.

At the present time, Robinson Hollow, Toms Branch and Inch Branch can only safely pass 55%, 60%, and 50%, respectively, of the runoff associated with the PMF. Storms with flood volumes exceeding these percentages of the PMF could result in a breach of the structures. Therefore, the State issued a conditional certificate to the Headwaters SWCD for each of the three dams in July 1987. These conditional certificates were last issued in 2004. A conditional certificate serves as notification to the Sponsors 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 permit leaves the Sponsors vulnerable to liability suits should the dam breach and downstream damages result. In order to address these concerns, the Sponsors requested the assistance of NRCS to do the watershed planning and to make the improvements necessary to obtain full dam safety certification.

NRCS is required to use the criteria established in NRCS Technical Release 60 (TR-60) to prepare rehabilitation designs. Under these criteria, the Probable Maximum Precipitation is used to define the design requirements rather than the Probable Maximum Flood used by the State of Virginia.

Soil Erodibility: During May 2004, a subsurface investigation was performed at each of the three South River Dam sites (Robinson Hollow, Toms Branch and Inch Branch). The subsurface investigation included the advancement of eight (8) borings to a depth of 40 feet within each of the auxiliary spillways, except at Robinson Hollow, Site 23. At Robinson Hollow, four (4) borings were advanced in the northern auxiliary spillway and four (4) borings were advanced in the southern auxiliary spillway. The soils and rock were visually classified upon retrieval and documented in general accordance with ASTM D-2488. The investigations were performed in order to provide a generalized subsurface profile at each dam site and estimation of the engineering properties of the soil and/or rock encountered. The engineering properties were primarily determined by the former state geologist for NRCS, Virginia. These parameters were also evaluated using the publications *Soil Survey of Augusta County, Virginia* and NRCS's *Headcut Erodibility Index Photo Reference*.

The subsurface profiles as well as the engineering properties of the soil/rock were utilized as input parameters for the NRCS computer program SITES. The program is used to evaluate the potential for a spillway breach. SITES analysis of each of the auxiliary spillways at the South River dams indicated that the spillways are vulnerable to breach during flows from major storm events.

Floodplain Management: The Sponsors have 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 removing the dams would have negative impacts associated with flood frequency and intensity downstream, including decreased property values, increased flood insurance premiums, and disruptions to utilities and the transportation network. The three South River dams together control about 9.84 square miles of the watershed above the affected properties. With the dams in place, 48 homes and 5 business structures could be affected by the 100-year, 24-hour storm event. Without the dams, 28 additional homes could be damaged by the 100-year storm, and the depths of flooding in all these homes would be greater.

Local Concerns: The potential for removing these dams 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. They have also indicated that removing the dam will result in a loss of fish and wildlife habitat and recreational opportunities. At the same time, sediment accumulation in the lakes and/or release of stored sediment downstream, under any alternative being considered, are also issues of concern. Additional concerns include the loss of water for fighting forest fires, via dry hydrants, and the need for more flood control dams. The need for more flood control dams cannot be addressed under the watershed rehabilitation program. A separate planning effort and report would be required in order to provide additional flood control.

Designed Service Life: When the South River dams were built, they had a designed service life of 50 years. They are now approaching the end of that service life, but they remain in good physical condition. If needed improvements are made, the service life of the dams would be extended by an additional 50 years (after a two year installation period). Although the available sediment storage is 90 years or greater, a 52 year evaluation period was chosen due to the anticipated life of the materials in the principal spillways and embankment drains. With proper maintenance, these components should last for an additional 50 years, but the life expectancy after that time may be limited.

Erosion and Sedimentation: As of 2004, the South River dams had reached about 95% of their planned service life. According to the sediment survey conducted by NRCS at that time, the volume of sediment (both submerged and aerated) in the Robinson Hollow, Toms Branch, and Inch Branch reservoirs and their tributaries was about 16%, 17.5%, and 25%, respectively, of the original amount planned in the design. The estimated quantities of submerged and aerated sediment are presented in Table D. Samples of the sediment were taken and tested. The chemical analysis has shown that the sediments do not contain heavy metals, oils, grease, or other contaminants in quantities considered hazardous.

In the original watershed plan, approximately 2% of the watersheds were in crop production with very high erosion loss values. Most of the drainage area of each site is now in forest land. As expected, most of the sediment observed is present in the inlet channel area of each structure. This material is primarily

deposited sediments plus leaf and other organic debris. This combination of factors has produced the sediment volumes and distributions seen in the three dam sites.

Water Quality: Water quality impairments have been identified in the Toms Branch tributary and in Back Creek. However, these impairments will not be affected by any of the rehabilitation alternatives under consideration. If the dams are removed, the water quality in Robinson Hollow, Toms Branch, Inch Branch, and Back Creek will be negatively affected by an increase in sediment loading from both the erosion of the sediment that is currently deposited in the lakes and by the addition of the sediment that is annually trapped by the dams.

WATERSHED OPPORTUNITIES

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

- Compliance with dam design and safety criteria established by the Division of Dam Safety
- Minimize the potential for loss of life associated with these three dams
- Eliminate the sponsor liability associated with operation of an unsafe dam
- Maintain the existing level of flood protection for downstream houses and businesses
- Protect real estate values around the lakes and downstream from the dams
- Maintain existing fish and wildlife habitats around the dams and in South River
- Preserve existing recreation opportunities
- Protect water quality (due to a total annual storage of 0.84 acre-feet of sediment and attached nutrients)
- Safeguard 3.75 acres of jurisdictional wetlands on Robinson Hollow

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

A scoping process was used to identify issues of economic, environmental, cultural, and social importance in the watershed. Watershed concerns of Sponsors, technical agencies, and local citizens were expressed in the scoping meeting and 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, and geology.

Specific concerns and their degree of significance to the decision making process were identified. On February 13, 2004, a Scoping Meeting was held with the Division of Dam Safety, and the Division of Soil and Water Conservation, the Headwaters SWCD, the Virginia Department of Environmental Quality, the Virginia Department of Emergency Management, the Augusta County Board of Supervisors, the City of Waynesboro, the Virginia Department of Forestry, the U.S. Forest Service and the U.S. Army Corps of Engineers. Table C shows the degree of concern and degree of importance in decision making based on the scoping meeting.

**Table C – Scoping Results For Rehabilitation of South River Dams
Scoping Meeting – February, 13, 2004**

Resource Concern	Degree of Concern ¹	Significance to Decision making ²	Remarks
Public Safety	High	High	Includes water for firefighting
Property values downstream	Med-High	High	
Existing lots around lake	Medium	High	
Transportation	Low	Low	
Air quality	Low	Low	
Threatened and endangered Species	Medium	Medium	
Fish and wildlife habitat	Med-High	Medium	
Floodplains	High	High	Likely to contain Cultural Resource & Historic Resource sites
Historic resources	Medium	High	
Prime & unique farmlands	Medium	Low	
Water Quality	High	Medium	
Wetlands	High	High	
Drinking water supply	Medium	Medium	
Flooding	High	High	Primary reason structures built
Agricultural management ✓ Cropland ✓ Pastureland ✓ Forestry	Medium	Medium	
Fisheries	Low	Low	Concern for trout water
Public recreation potential	Medium	Medium	Should not drive the process
Erosion and sedimentation ✓ Dredge material if Removed	Med – High	Medium	
Groundwater quality and quantity	Low	Low	
Channel snagging	Medium	Medium	
Gas pipelines	Medium	Low	Can affect historic resources.
Additional Concerns:	Low	Low	Water for fighting forest fires

¹ Low, Medium or High

² High- must be considered in the analysis of alternatives; Medium - may be affected by some alternatives solutions; Low- consider, but not identified as important to decision making.

DESCRIPTION OF EXISTING DAMS

EXISTING CONDITIONS

For Robinson Hollow, the principal spillway has a standard 5 foot square one-stage riser with a height of 15 feet. The principal spillway is a concrete pipe that is 24 inches in diameter and 306 feet long. There are two auxiliary spillways. The one on the north is 20 feet wide and has a crest elevation of 1496.0 feet above mean sea level (MSL). The south spillway is 55 feet wide and has a crest elevation of 1496.5 feet MSL. Both are located on natural ground. The vegetative cover of grass for each spillway is very good. The top of the dam is at 1504.0 MSL.

At Toms Branch, the principal spillway has a standard square one-stage baffle riser with a height of 14 feet. It was completely replaced in 1981. The principal spillway is a concrete pipe that is 24 inches in diameter and 371 feet long. The auxiliary spillway is 200 feet wide with a crest elevation of 1583.5 feet MSL. It is located in natural ground at the left end of the embankment (looking downstream). The vegetative cover is good. The top of the dam is six feet above the crest of the auxiliary spillway (elevation 1589.5 MSL).

For Inch Branch, the principal spillway is a standard square one-stage riser with a height of 14 feet. The principal spillway pipe is made of concrete encased corrugated metal that is 24 inches in diameter and 305 feet long. The auxiliary spillway is located in original ground on the right abutment of the dam. It is 100 feet wide with a crest elevation of 1460.5 feet MSL. The vegetative cover here is also very good. The top of the dam is at elevation 1467.0 MSL.

In 1997, a remote controlled mobile video camera was used to inspect the insides of the principal spillways and drain pipes. At Robinson Hollow, the concrete principal spillway pipe appeared to be in satisfactory condition with only minor exposure of the aggregate. The embankment drains had some silt material present in the pipes but appeared to be functioning. At Toms Branch, the concrete principal spillway pipe had some exposure of the aggregate. In addition, there was a circumferential crack in the pipe about 81 feet from the outlet. The joints appeared to be tight. Investigations done for the Phase I Inspection Report could not locate any embankment drains. At Inch Branch, the concrete surfaces and joints in the concrete principal spillway pipe appeared to be in satisfactory condition. The embankment drain on this site had excessive amounts of silt present, which blocked a majority of the pipe.

The riser and gate were replaced on Toms Branch in 1981. No sediment was removed at that time. Some sediment removal was done by the landowner in 1972, after Hurricane Agnes.

In 2002, the risers on Inch Branch and Robinson Hollow were fitted with new gates and tops. The concrete on the risers was refurbished. At the time of the repairs, some of the sediment in the pool at Inch Branch was removed by the landowners.

STRUCTURAL DATA

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

Table D - Existing Structural Data for the South River Dams

Name	Robinson Hollow	Toms Branch	Inch Branch
Number	23	25	26
Year Completed	1956	1957	1956
Cost	\$82,700	\$78,300	Included in cost of #23
Purpose	Flood control	Flood control	Flood control
Drainage Area, mi ²	2.58	4.56	2.70
Dam Height, feet	45	60	48
Dam Type	Earthen	Earthen	Earthen
Dam Volume, yds ³	70,000	169,000	135,000
Dam Crest Length, ft	437	1,110	755
Storage Capacity			
Sediment, ac-ft	37	65	43
Submerged, ac-ft	3.8	7.9	3.1
Aerated, ac-ft	2.0	3.6	7.2
Flood, ac-ft	465	950	556
Surcharge, ac-ft	267	263	243
Total, ac-ft	769	1278	842
Principal Spillway			
Type	Concrete	Concrete	Concrete
Riser Height, ft	15	14	14
Conduit Size, inch	24	24	24
Stages, no.	1	1	1
Capacity, cfs	67	71.9	68.2
Energy Dissipater	Stilling Basin	Stilling Basin	Stilling Basin
Auxiliary Spillway			
Type	Earthen	Earthen	Soft rock
Width, ft	North 20 South 55	200	100
Capacity, % of PMF	55	60	50
Normal Pool Elev.	1470.0	1542.0	1432.0
Flood Pool Elev.	1496.5*	1583.5	1460.5
Top of Dam Elev.	1504.0	1589.5	1467.0

*North Auxiliary Spillway elevation is 1496.0; South Auxiliary Spillway elevation is 1496.5

Two of the three dams are equipped with an Integrated Flood Observing and Warning System (IFLOWS). Information from these gauges is used to remotely monitor the level of water in the reservoirs. The gauges have alarms that alert emergency service providers when the water in the reservoir reaches 25%, 50%, and 100% of the flood storage capacity. The Augusta County Department of Emergency Services uses this information to decide if and when to issue emergency evacuation

orders. During the rehabilitation planning process, NRCS used IFLOWS data from Hurricane Isabel to calibrate the water surface profile computer model.

STATUS OF OPERATION AND MAINTENANCE

Operation and maintenance of the structures is the responsibility of the Headwaters SWCD. Recent records indicate that the operation and maintenance of the structures has been kept current on all three sites. This has been verified through site assessments and the Headwaters SWCD is commended for their good stewardship. However, due to the age of the structures, operation and maintenance will become increasingly more complex and expensive.

SEDIMENTATION

All of the South River dams were designed with a 50-year sediment storage life. The sediment storage capacities of Robinson Hollow, Toms Branch and Inch Branch are 37 acre-feet, 65 acre-feet, and 43 acre-feet, respectively. As part of the planning process, a reservoir sediment survey was conducted in April of 2004. The survey showed that Robinson Hollow dam has had 5.84 acre-feet of sediment deposited in the reservoir and its tributaries since its construction in 1956. This equates to a sediment deposition rate of 0.12 acre-feet per year. Approximately 16% of the available sediment storage capacity has been filled. Toms Branch was drained in 1972 after Hurricane Agnes and the accumulated sediment and debris were removed at that time. The 2004 sediment survey showed that there was 11.46 acre-feet of sediment present. This represents about 17.5% of the available sediment storage capacity. There are no records of the amount of sediment removed in 1972. If it is assumed that all of the accumulated sediment was removed at that time, the sediment deposition rate is calculated to be a maximum of 0.36 acre-feet per year. Inch Branch was dredged in 2002 by the local residents. There is no record of the amount of sediment removed. The 2004 sediment survey showed that there was 10.3 ac-ft of sediment in the reservoir. This is about 25% of the available sediment storage capacity. Since Inch Branch was recently dredged, it is not possible to determine a sediment deposition rate.

BREACH ANALYSIS AND HAZARD CLASSIFICATION

Due to the changes in land use within the watershed and issuance of Conditional Certificates from the Division of Dam Safety, it was necessary for NRCS to evaluate each dam for its current Hazard Classification. To do this, NRCS performed breach analyses for sunny day breaches with the water level at the top of the dams and the existing earthen auxiliary spillways blocked. The dam heights used in the breach analyses were as follows:

- Robinson Hollow, Site 23 – 45 feet
- Toms Branch, Site 25 – 60 feet
- Inch Branch, Site 26 – 48 feet

The analyses were conducted using the HEC-RAS computer model. The cross sections were surveyed aerially. The maximum discharge for the breaches was computed using the criteria in Technical Release No. 60, Earth Dams and Reservoirs.

The results of the breach analyses are shown in Tables E1 – E3 and on the Breach Inundation Map in Appendix B. The population of Augusta County has increased from 37,363 in 1960 to 65,615 in 2000. This represents a 75.6% increase in population in 40 years, or roughly 1.9% per year. Based upon a watershed scale analysis, there are now 191 homes, 10 business structures, 10 bridges (5 public and 5 private), and 16 public and residential roads in the dam breach zone of the Toms Branch dam. The breach zones of Robinson Hollow and Inch Branch are also located within the breach zone of the Toms Branch dam. Approximately 955 residents live within the breach zone below the three dams. There is the potential for loss of life in the event of a dam failure for any of these three dams.

Mt. Torrey Road (Rt. 664) and Howardsville Road could be affected by a breach of the Toms Branch dam. The average daily traffic count on Mt. Torrey Road (Rt. 664) at the intersection of Lyndhurst Road was 2,800 vehicles in 2002. Howardsville Road had a count of 490 vehicles in 2001. The next road that could be impacted is Rt. 650, North/South Oak. This road crosses the South River at a point downstream of the three dams and it carried approximately 410 vehicles in an average day in 2002. The Norfolk Southern Railroad has a rail line in the breach zone of the three dams.

Table E1 - Results of a Dam Breach Routing for Toms Branch

Cross Section Number	Cross Section Location (feet)	Maximum Water Surface Elevation (ft MSL)	Maximum Flow (cfs)	Approximate Location of Cross-section
Dam	281+60T*	1589.5	89,200	
31	303+00	1515.8	82,903	
29	350+95	1483.4	65,236	
28	372+67	1468.4	58,926	Howardsville Rd
27	396+05	1453.7	54,810	
23	474+90	1406.4	43,093	
21	520+30	1379.2	38,572	Upstream of confluence of Inch Branch
13	546+75	1367.4	34,130	Downstream of confluence
11	583+25	1356.2	25,632	Mt. Torrey Rd
9	607+89	1347.1	24,460	R.R. bridge
7	639+50	1336.4	21,491	South River
5	678+09	1328.7	18,327	Oak St.
3	708+22	1326.4	17,175	I-64

*Toms Branch

Table E2 - Results of a Dam Breach Routing for Robinson Hollow

Cross Section Number	Cross Section Location (feet)	Maximum Water Surface Elevation (ft MSL)	Maximum Flow (cfs)	
Dam	454+80R*	1504.0	54,600	
16	497+80R*	1416.8	46,906	
14	527+80R	182.7	43,193	Inch Branch above confluence w/Back Creek
13	546+75	1366.6	29,537	Downstream of confluence
11	583+25	1355.0	16,910	Mt. Torrey Rd
9	607+89	1344.9	14,105	R.R. bridge
7	639+50	1334.3	13,301	South River
5	678+09	1326.7	12,465	Oak St.
3	708+22	1323.0	11,076	I-64

*Robinson Hollow

Table E3 - Results of a Dam Breach Routing for Inch Branch

Cross Section Number	Cross Section Location (feet)	Maximum Water Surface Elevation (ft MSL)	Maximum Flow (cfs)	
Dam	486+50I*	1467.0	51,100	
17	490+10I*	1423.8	50,634	
14	527+80I*	1382.7	43,733	Inch Branch
13	546+75	1366.7	30,498	Downstream of Confluence
11	583+25	1355.2	18,271	Mt. Torrey Rd
9	607+89	1345.1	14,438	R.R. bridge
7	639+50	1334.4	13,501	South River
5	678+09	1327.6	12,549	Oak St.
3	708+22	1323.3	11,666	I-64

*Inch Branch

If the dams are rehabilitated, a second breach analysis for each dam will be run for use by the Sponsors in the development of an update to the Emergency Action Plans (EAPs) that currently exist for the three dams in this plan. The Sponsors will update the EAPs annually with assistance from local emergency response officials. NRCS will provide technical assistance in the updating of the EAPs. 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 is to determine that a current EAP is prepared prior to initiation of construction.

In 1956 and 1957, when Robinson Hollow, Toms Branch and Inch Branch were built, they were rated as low hazard structures because they primarily protected agricultural lands and there was little threat to life or property.

Based on the hazard analysis conducted, the NRCS has raised the hazard classification for all three dams to class (c) (high hazard). Since the hazard class of these dams has changed from a low hazard class to a high hazard class, the safety criteria has also changed. Current Virginia Dam Safety regulations require a high hazard dam to safely pass the volume of water associated with the Probable Maximum Flood (PMF). Current NRCS TR-60 criteria require that a high hazard dam safely pass the volume of water associated with the Probable Maximum Precipitation (PMP). The PMF is the volume of runoff associated with the PMP. Therefore, the NRCS TR-60 criteria meets the Virginia Dam Safety regulations.

In 1987, the Virginia DCR Division of Dam Safety and Floodplain Management reclassified the Robinson Hollow, Toms Branch and Inch Branch structures to be high hazard. This classification is based upon the risk to life and property downstream in the event of a dam failure.

At the present time, the principal spillway pipes and the earthen auxiliary spillways of Robinson Hollow, Toms Branch and Inch Branch can only safely pass 55%, 60%, and 50% of the runoff associated with the PMF, respectively. Based upon the Virginia Dam Safety regulations and anticipated changes in the NRCS safety criteria, the more critical results for potential breach of the spillway and overtopping of the dam based upon the 6-hour duration PMP of 28 inches and the 24-hour duration PMP of 36 inches for Augusta County were used for planning any potential rehabilitation.

The age of the dams is the second concern. Construction on the dams was completed in 1956 and 1957. When the request for rehabilitation was received in 2002, Robinson Hollow and Inch Branch were 46 years old and had reached 92% of their evaluated life of 50 years. Toms Branch was 45 years old in 2002 and had reached 90% of its 50 year evaluated life. They all remain in good physical condition. The earth embankments and the auxiliary spillways are vegetated and stable.

The State of Virginia considers these dams to be unsafe because they do not meet the criteria established for high hazard dams and are at risk for catastrophic failure under extreme rainfall event conditions. There is little or no potential for a catastrophic dam failure under the original designed storm-event conditions.



Figure 2 - Robinson Hollow (#23) dam and riser.

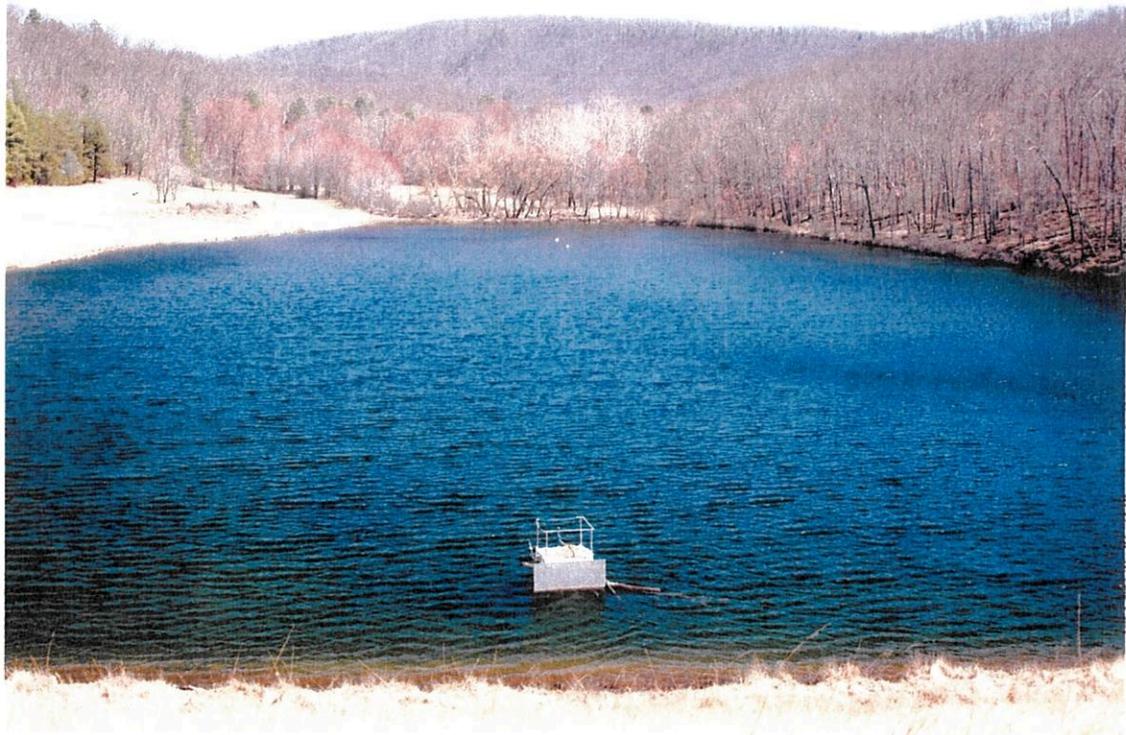


Figure 3 - Inch Branch (#26) riser and reservoir.

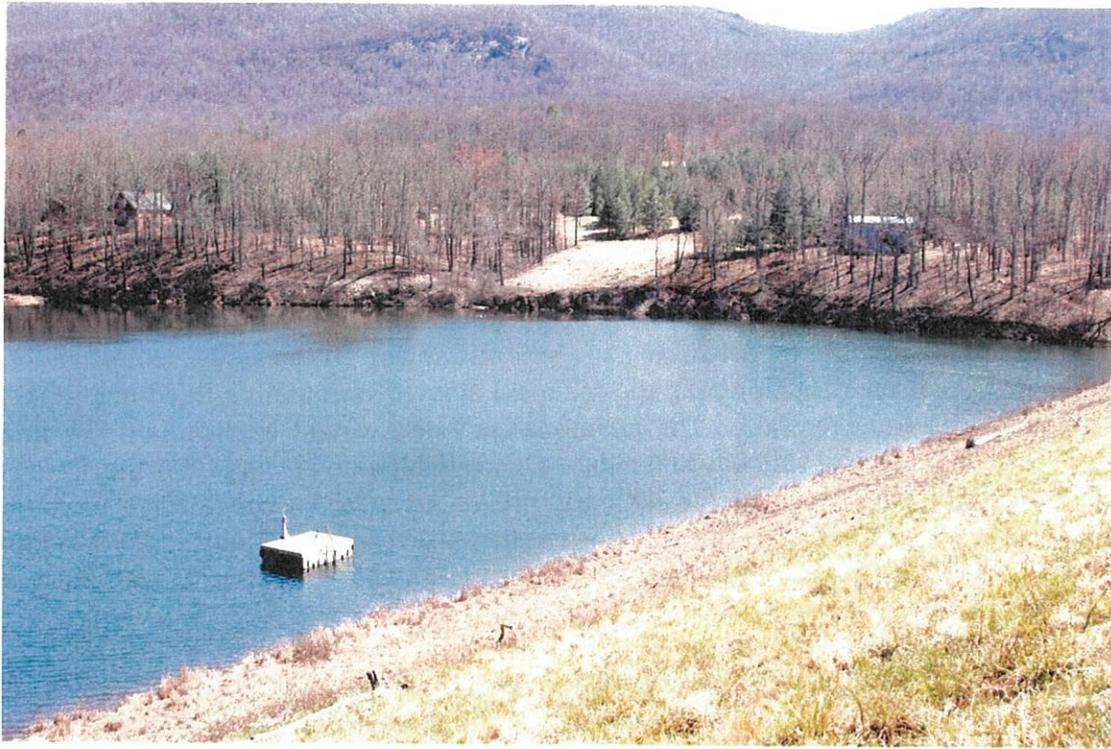


Figure 4 - Toms Branch (#25) dam, looking upstream at the riser and auxiliary spillway.



Figure 5 - Looking downstream of Toms Branch dam.

EVALUATION OF POTENTIAL FAILURE MODES

Since both NRCS and the State of Virginia recognize that South River Structures 23, 25, and 26 are now high hazard structures, several potential modes of failure were examined.

Sedimentation: All floodwater retarding structures are designed to store sediment in the area below the elevation of the principal spillway inlet and to detain floodwater in the area between the principal spillway inlet and the crest of the auxiliary spillway. In many cases, water accumulates behind the dam 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 inlet, 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. As the detention pool loses storage due to sediment deposition, the auxiliary spillway operates, or has flowage, more often and is therefore subject to erosion. A potential mode of failure exists as the auxiliary spillway continues to degrade and depth of flow increases. If this natural process continues without being addressed, the dam will ultimately breach.

The future sediment accumulation rates are expected to be the same or less than the past rates. Most of the land above the dam has been in National Forest for the life of these dams and this use is not expected to change. Based upon a sediment deposition rate of 0.12 acre-feet per year, the remaining sediment storage life of Robinson Hollow is 260 years. For Toms Branch, a sediment deposition rate of 0.36 acre-feet per year gives an anticipated storage life of about 149 years. Since there was no available data for Inch Branch, the potential sediment life of the dam was estimated twice using the sediment deposition rates for the other two dams. A sediment deposition rate of 0.36 ac-ft per year was selected because the results more closely corresponded with the anecdotal information about the site and the amount of sediment removed. The potential life of the dam is then about 90 years. The required minimum project evaluation period is 52 years; therefore, sedimentation presents no potential for dam failure during the evaluation period of the project.

Hydrologic Capacity: Hydrologic failure of a dam can occur by breaching the auxiliary spillway or by overtopping and breaching 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.

When these dams were built, in 1956 and 1957, low hazard dams were designed to detain the 100-year, 6-hour rainfall in the flood storage below the crest of the auxiliary spillway for release through the principal spillway. This is different that the current criteria listed in TR-60. To be sure that the existing flood storage meets the current criteria, the SITES model was run for each dam. According to the model, the flood storage at each dam is slightly greater than that required by TR-60. This means that no changes in flood storage would be required during any rehabilitation efforts

For low hazard dams, the auxiliary spillway requirements are much lower than for high hazard dams. Under the present Virginia criteria for high hazard dams, the auxiliary spillway must have sufficient capacity to pass the PMF event without breaching the spillway or overtopping the dam. At the present time, Robinson Hollow can pass 55% of the PMF, Toms Branch can pass 60% of the PMF, and Inch Branch can pass 50% of the PMF.

The overall potential for hydrologic failure of these South River dams is considered to be high because none of them can pass the PMF without overtopping.

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 South River dams do not exhibit obvious signs of excessive seepage. Seepage provides a low potential for failure. However, it should be noted that the location of the embankment drain at Toms Branch cannot be identified. In addition, the drains at Inch Branch and Robinson Hollow were observed to be partially blocked during the most recent dam safety inspection. These issues will be addressed in the rehabilitation plan.

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, the foundation and embankment drains, and the pool drainage system are subject to weathering and chemical reactions due to natural elements within the soil, water, and atmosphere. Concrete risers and conduits can deteriorate and crack, metal components will rust and corrode, and leaks can develop. Embankment failure can occur from internal erosion caused by these leaks. In 2002, new gate components and riser tops were installed on Robinson Hollow and Inch Branch. Some repairs were made to the concrete risers as part of the maintenance work. Failure of the dams is not likely to occur through material failure. Concerns identified in the Phase I Inspection Report will be addressed during rehabilitation.

The failure mechanism is most likely to be a lack of hydrologic capacity, since the sediment capacity is adequate, there are no signs of seepage, the site is not in a seismic activity area, and the material components are in satisfactory condition.

CONSEQUENCES OF DAM FAILURE

These three dams are currently considered to be “unsafe” structures, not because of imminent danger or recognized structural deficiencies, but because they are now classified as high hazard dams whose potential failure would present a significant risk for loss of life. The dams are required to detain the rainfall from the 100-year, 10-day storm without releasing water through the auxiliary spillway. During storm events larger than the design storm, flow through the spillway should be monitored closely.

A worst-case scenario is assumed in the analysis of a possible dam failure. This scenario assumes a sunny day breach of just one dam, with no advance warning. Dam failure is assumed to occur when water begins to overtop the structure due to the unresolved blockage of the principal and auxiliary

spillways. It is assumed that structural collapse would occur quickly and result in a release of water and sediment, beginning with a wall of water equal to the dam height. For Robinson Hollow, 769 acre-feet of water would be released at an initial water height of 45 feet. Toms Branch has a top-of-dam capacity of 1,278 acre-feet at a water height of 60 feet. Inch Branch has a top-of-dam capacity of 842 acre-feet at a water height of 48 feet.

Resource inventories performed during the planning process indicate that a failure of the dam on Toms Branch would jeopardize 191 homes and place about 955 residents at a fatal risk. Daily traffic counts from VDOT indicate that an additional exposure to loss of life could occur as a result of the 3,700 vehicles that cross the bridges on Mt. Torrey Road, Howardsville Road and Oak Street. Additionally, an undetermined number of other commuters crossing private bridges, Creekside Drive and individuals in local businesses would also be at fatal risk. The breach zone for Toms Branch extends from the dam to I-64. This is a distance of about eight miles.

Failure of either of the Inch Branch or Robinson Hollow dams would impact 72 homes and place about 360 residents at a fatal risk. In addition, commuters in 410 vehicles on the roads each day and an undetermined number of others in local businesses would also be at fatal risk. These two dams are located in adjacent watersheds on Inch Branch and are about the same size. For these reasons, the impact area of a breach is essentially the same for both dams.

In addition to the damage caused by the water, a significant volume of sediment would initially be flushed downstream in the event of a catastrophic breach. At their full capacities, Robinson Hollow, Toms Branch, and Inch Branch have sediment storage volumes of 37, 65, and 43 acre-feet, respectively. Highly erodible sediment remaining in the sediment pool would continue to cause persistent sediment deposition problems for the downstream channel and floodplain. 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. Sediment would be deposited in the stream channels and on the floodplain. This would constrict the floodplain and cause additional flooding in subsequent flood events. Deposition in the floodplain would also restrict the normal use of the land. The nutrients in the sediment could cause water quality problems in the future. At a minimum, sediment would initially be transported for the entire length of the breach inundation zone. For Toms Branch, this is a distance of about eight miles. For Robinson Hollow and Inch Branch, the immediate impact area is about three miles long. Over time, the sediment would migrate downstream into the Shenandoah River and eventually to the Potomac River.

For Robinson Hollow, the 3.75 acres of jurisdictional wetlands at the upper end of the lake would be drained as a consequence of dam failure.

There is also the potential for stream degradation upstream from the dam site. The abrupt removal of the water and sediment would cause instability in the streams feeding the reservoir. These streams could develop headcuts that would migrate upstream through the watershed, eroding the banks and channel bottoms and adding more sediment into the stream system.

The economic damages would include the damages to the homes, businesses, and roads, the loss of business activity, and the loss of the lake and corresponding decreases in property values. Excluding overlapping areas, the homes and business properties at risk in the area of the floodplain subject to a breach of Toms Branch have structure and content values estimated at over \$10,741,000. In addition, some damage would accrue from a breach of Tom's Branch within the area of the floodplain that Tom's

Branch overlaps with Robinson Hollow and Inch Branch. A total of 191 homes, the 10 businesses, and eight other structures are located within the combined breach inundation zone. Total structure value and content value for these properties is over \$22,823,000. In addition, the land they are on is valued at over \$6,757,000. The homes and business properties at risk in the Robinson Hollow and Inch Branch breach inundation zone have structure and content values estimated at over \$12,083,000. In addition, some damage would accrue to the land where the 72 homes and 3 business structures are located. Total land value for properties within the Inch Branch and Robinson Hollow inundation area is over \$2,887,000. Other economic damages from a catastrophic breach would be: a) lost recreation opportunities with the lakes gone; b) changes in real property values and the tax base associated with increased flooding in the future; and c) increased flood damages in the future for remaining properties due to the absence of the dam and its flood protection effects. A catastrophic failure of Robinson Hollow would result in an estimated \$2,464,000 in damages. An estimated \$5,707,000 in damages would occur if the dam on Toms Branch were to fail. A failure of the Inch Branch dam would result in an estimated \$2,654,000 in damages.

FORMULATION AND COMPARISON OF ALTERNATIVES

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

FORMULATION PROCESS

Formulation of alternative rehabilitation plans for the South River Dams followed procedures outlined in the NRCS National Watershed Manual, Part 508. 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 policy. Each alternative evaluated in detail used a 52-year period of analysis, which includes a two year installation period and 50 years of expected useful life. This period of analysis was chosen based on the most limiting structural component which is the anticipated life of the materials in the principal spillways and embankment drains. The estimated remaining useful life of the existing sediment pool is currently 260 years for Robinson Hollow, 149 years for Toms Branch and 90 years for Inch Branch.

The formulation process began with formal discussions between the Sponsors, the Division of Dam Safety, the Division of Soil & Water Conservation, and NRCS. The Division of Dam Safety conveyed state law and policy associated with high hazard dams. NRCS explained agency policy associated with the Small Watershed Dam Rehabilitation Program and related alternative plans of action. As a result, alternative plans of action were developed based on NRCS planning requirements and the ability of the alternatives to address the initial objective of bringing the South River Dams into compliance with current dam safety criteria:

Table F - Alternative Plans of Action

- | | |
|-------------------------------|--|
| 1. No Action/Sponsors' Breach | 3. Non-structural – Relocate or floodproof structures in the breach zone |
| 2. Decommission dams | 4. Rehabilitate dams |

Alternative plans of action were presented to the public at a public meeting on April 12, 2005. Public meeting participants identified no additional viable alternative plans of actions to be considered during the planning process.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Some of the alternatives considered in the planning process were eliminated from detailed consideration because they did not meet the needs of the Sponsors.

Decommission Dams: Decommissioning is an alternative which includes a plan to remove the flood detention capacity of all three of the dams by removing a portion (or all) of the existing embankments down to the valley floor and restoring the function and stability of the stream channels and the 100-year floodplains. Decommissioning may require grading of the sediment pool to remove accumulated sediment. The removal of the principal spillway riser and pipe is also necessary. These unneeded materials may be buried or hauled to an appropriate disposal site.

Even though decommission has been identified as a mandatory rehabilitation alternative under NRCS policy, this alternative was not considered as a viable option and developed in detail because it did not meet the identified purpose and need of the plan which was to provide continued flood protection. The sponsors would like more flood control within this watershed, not less. In addition, the costs for decommissioning would be more expensive than other alternatives studied in detail. Overall costs would include the necessary upgrades to the bridges affected by the increased volume of water.

Table G – Individual Components of Dam Decommissioning

	ROBINSON HOLLOW	TOMS BRANCH	INCH BRANCH
Fill Removed, CY	66,200	231,450	131,000
Channel Restoration, mi.	0.3	1.8	0.3
Accumulated Sediment to be removed, CY	9,800	19,300	17,300
Forested Riparian Buffer to be created, acres	6.7	43.6	7.2
Critical Area Treatment, acres	20	26.6	22.4
Off-Site Disposal, tons	72	80	70
Wetland Mitigation, acres	7.5	NA	NA
Cost of structure removal only*	\$838,000	\$1,347,600	\$2,479,300

* Other costs would include mitigation for induced damages, loss of recreation, and reduced property values.

This alternative would induce flooding downstream once the structures were removed. Federal policy requires that induced damages be mitigated. In order to address the Sponsors' original objective of providing downstream flood protection, this alternative would offer relocation or floodproofing to the owners of the 76 structures in the revised 100-year floodplain. These mitigation measures would reduce downstream flood damages and the potential for loss of life, but at great inconvenience and costs. In addition, there would still be the potential for damage to the roads, bridges, and utilities in the watershed.

Non-Structural - Relocation or Floodproof Structures in Breach Zone: There are 209 homes, business structures, and other structures located in the Toms Branch breach inundation zone. Of these, 72 homes and three businesses are also in the breach inundation zone of the Robinson Hollow and Inch Branch dams. Forty-three homes are mobile homes and could be relocated out of the floodplain. The remaining 166 structures could be floodproofed by elevation of the building, elevation of basement appliances, or relocation. These are considered to be nonstructural flood control measures. However, the implementation of this alternative was not considered in detail because it would only change the hazard class of the dam from class (c) (high hazard) to class (b) (significant hazard) due to the remaining presence of 5 public bridges and roads in the breach zone. A class (b) dam must pass half of the PMP. According to the hydrologic analysis, the present auxiliary spillways are sufficient to pass this volume. However, rehabilitation of one or more of the existing dams may still be needed in order to meet class (b) requirements and to address the soil stability issues of the embankment and auxiliary spillway. In addition, due to the large number of properties involved, this alternative would not be cost effective when compared to the structural alternatives.

DESCRIPTION OF ALTERNATIVE PLANS

No Action (Sponsors' Breach): Under this alternative, No NRCS federal funds would be expended. The Sponsors would be totally responsible for the fate of the dams after the original life of the dams has been reached. Both NRCS and the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management (Dam Safety Division) have identified South River Sites 23, 25, and 26 as high hazard dams. Since the subject sites do not meet current safety and performance standards, they are judged to be "unsafe". The Dam Safety Division has issued conditional certificates of operation for the three dams. It is reasonable and prudent to expect that the Dam Safety Division will soon issue an Administrative Order requiring the Sponsors to bring the dam up to state standards; remove the hazard by relocation and land-use restrictions; or remove the hazard by removing the storage function of the reservoir. If the Sponsors continue to operate and maintain the dams, there may be some level of flood control for some period of time beyond the designed life of the structures. However, the potential for an uncontrolled breach would be present and the Sponsors would be liable for the resulting damages until such time as the existing dam safety issues were addressed and resolved.

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

- Hire a consultant, prepare plans to meet the State of Virginia standards, and rehabilitate the dams using their own resources. Unless another source of funding is located, the Sponsors cannot utilize this option.
- Do nothing. In this case, the Division of Dam Safety may choose to breach the dams and send the Sponsors the bill. This option is likely to be more expensive than if the Sponsors performed the breach. The end results would be the same as those for the next option.

- The Sponsors could remove the flood storage capacity of the dams by breaching the dam using a least cost method (Sponsors' Breach). This breach would be a minimum size hole in the dams from the top of the dams to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dams. The sediment would not be stabilized and would migrate downstream. This course of action would minimize the Sponsors' dam safety liability but would not eliminate all liability as it would induce flooding downstream.

For the purposes of this evaluation, the Sponsors' Breach will be used as the No Action alternative. This is the least cost option. However, there will be unmitigated induced damages to 76 homes and 7 business structures that are located in the downstream 100-year floodplain. The 100-year floodplain that occurs without the dams in place will be more extensive than the present 100-year floodplain (with the dams in place). Some of these structures already experience flood damages in a 100-year event, but flood depths in these structures could be about 1 foot deeper than presently occurs with the dams in place.

In a Sponsors' Breach, the water would be drained from the lake and a notch cut in the embankment to the valley floor. The remnants of the embankment would be shaped to a 2.5 to 1.0 slope on both sides of the new channel for stability. The remaining fill and stored sediment would eventually erode into the stream system. The sediment quantity is based on the volume of sediment present at the time of the assessment in 2004, the current sediment accumulation rate, and the assumption that the Sponsors would act in 2006 to perform the breach. Critical area planting would be required to stabilize the remaining embankment and the disposal site of the removed material. On all of the sites, the principal spillway riser and pipe would be left in place. It is anticipated that the accumulated sediment in the pool areas would be transported into the South River and then into the Shenandoah River. There would still be the potential for damage to the roads and bridges in the watershed. There would also be the potential for headcuts to cause erosion in the tributaries upstream of the dam sites. The streams that existed before the dams were built would have to re-establish new channels through the accumulated sediment. It is likely that extensive downcutting would occur in the upstream portions of the streams when the lakes are removed. If the dams were breached before the end of the design life, the Sponsors would forego the benefit of flood protection for the remaining years. The following table displays the planned amounts of each component associated with the Sponsors' Breach.

Table H – Planned Amounts of Each Component For Sponsors' Breach

	ROBINSON HOLLOW	TOMS BRANCH	INCH BRANCH
Fill Removed, CY	40,850	70,000	40,400
Fill Remaining, CY	25,400	161,500	90,500
Accumulated Sediment To Remain, CY	9,800	19,300	17,300
Critical Area Treatment, acres	11	12	11
Wetland Mitigation, acres	7.5	NA	NA
Cost for structure removal*	\$376,000	\$456,000	\$272,000

* These estimates include mitigation for lost wetlands, project administration and technical assistance costs, but do not include other costs that would accrue including mitigation for induced damages, loss of recreation, and reduced property values.

Rehabilitate dams: There were several solutions considered under the Rehabilitation alternative.

Rehabilitation - Raise the Top of the Dam Only: Typically, a dam with insufficient hydrologic capacity will fail in one of two ways: erosion in the auxiliary spillway can occur to the point where the dam no longer holds water or the water is so deep that the water flows over the dam, causing the whole dam to wash away. One way to prevent overtopping is to raise the top of the dam. However, since raising the top of the dam does not prevent breach of the auxiliary spillway due to erosion during flow; only raising the top of the dam will not be sufficient to prevent dam failure. For this reason, this alternative was not considered as a stand-alone option.

Rehabilitation – Widen Auxiliary Spillway Only: All of the dams in this project were designed to store the volume of water generated by the 100-year, 6-hour storm event and allow it to be gradually released through the principal spillway pipe. (This storage volume is slightly greater than the 100-year, 10-day volume currently required by TR-60.) Excess water from rainfall events larger than the design storm is passed through the auxiliary spillway. All of the auxiliary spillways are vegetated and therefore subject to erosion when flow occurs in the spillway. Widening the existing spillway(s) would: 1) increase the capacity to allow the 24-hour and 6-hour PMP to pass through the spillway(s) without risk of overtopping the dam and 2) reduce the velocity of the flow to prevent damage and possible breach of the spillway(s).

For Robinson Hollow, widening the southern auxiliary spillway by 110 feet would allow the PMP flow to pass without breaching or overtopping the dam. The cost would be about \$1,440,000. For Toms Branch, the SITES analysis shows that it would be impractical to widen the spillway to prevent it from breaching. It would be necessary to widen the auxiliary spillway on Inch Branch by 140 feet to eliminate the risk of breaching or overtopping. The cost of widening the auxiliary spillways is heavily dependent on the material proposed for excavation. For example, for Inch Branch, if the material is rippable, the cost would be about \$1.5 million. However, the cost increases to \$2.8 million if blasting is required. The existing breach zones of the dams would remain the same if this alternative were chosen.

Rehabilitation – Raise the top of the dam and widen the auxiliary spillway: Another way to increase the hydrologic capacity of the dam would be to raise the top of the dam while also increasing the width of the auxiliary spillway. The basis of this solution is to find the most cost-effective or compromise solution between solely raising the dam height or exclusively widening the spillway. Land rights restrictions or unfavorable geology in the spillway are conditions that would preclude widening the spillway alone. For increases in dam height of two feet or less, the dam could be raised by the addition of earthfill material across the crest of the dam. Increases in dam height greater than two feet by earthfill would require placing fill not only along the crest of the dam but along the upstream and downstream sides of the dam. This would allow the fill to be blended into the original configuration of the dam and help prevent sloughing of a vertical face of the fill. Increasing the dam height could also be accomplished by installing a concrete parapet wall along the upstream side of the crest of the dam (see Figures 6 and 7). This alternative would be considered for increased dam height of 2 feet or more. If this alternative were chosen, the existing 100-year floodplain would not be changed but the breach inundation zone would be increased due to the increased height of the dam.

On Robinson Hollow, increasing the height of the dam and widening the spillway would cost between \$945,000 and \$1,580,000, depending on the combination of increased dam height and increased spillway width chosen. For Inch Branch, the cost would be about \$713,000. This option cannot be used

for Toms Branch because there are no combinations of increased dam height and increased spillway width that meet the breaching and overtopping requirements.

Rehabilitation – Raise the top of the dam and armor the auxiliary spillway: In order to maintain the existing spillway width, both the capacity and the erosion resistance of the auxiliary spillway must be increased. For low velocities, vegetation alone is often able to protect the soil from erosion. For the present spillway dimensions, the flow velocities due to the PMP will be too great for vegetative protection to be effective and it will be necessary to line the auxiliary spillway with harder material.

Products that can be used to armor the auxiliary spillway include an articulated concrete block (ACB) mat system or roller-compacted concrete. The ACB system involves a matrix of individual concrete blocks cabled together to form an erosion resistant mat (see Figure 8). A geotextile fabric is first placed on the prepared subgrade to provide permeability and filtration while providing soil retention. The concrete mat is then placed over the geotextile fabric. Topsoil can be placed over the blocks and the site can be seeded.

Roller-compacted concrete (RCC) is a special type of concrete mix that is drier than conventional concrete and stiff enough to be compacted by vibratory rollers. RCC would be placed in the spillway and compacted with vibratory rollers as it is placed. RCC would be placed from the crest of the spillway to the outlet.

With this alternative, the spillway dimensions would be unchanged. Since the capacity of the spillway is not changed, overtopping protection of the dam must be provided for the PMP. This can be accomplished by placing additional fill or the installation of a concrete parapet wall. If the dam height is increased, the 100-year floodplain will not change but the breach inundation zone would increase.

On Robinson Hollow, raising the dam by four feet with a parapet wall and armoring both spillways would cost about \$702,000. Raising the dam four feet, armoring only the Southern spillway, and widening the Northern spillway by 5 feet would cost \$651,000. This alternative is the only one that is practical for Toms Branch. Raising the dam by five feet with a parapet wall and armoring the auxiliary spillway with ACBs would cost about \$1,377,000. On Inch Branch, raising the dam by four feet with a concrete parapet wall and armoring the spillway would cost about \$752,000.

Rehabilitation – Raise the top of the dam and install a cutoff wall in the auxiliary spillway: A cutoff wall is an L-shaped wall that is installed below ground, slightly downstream of the auxiliary spillway crest, with its top at the existing spillway crest elevation. The base of the wall is seated into the underlying bedrock. The wall would extend across the width of the spillway and run perpendicular to the dam within the raised dike that is located between the spillway and the edge of the dam.

When flow occurs in the auxiliary spillway, the wall holds the spillway crest at the design elevation and prevents the spillway from being breached. The flood storage of the dam is thus maintained. However, the cutoff wall only protects the storage capacity of the reservoir. It cannot prevent erosion from occurring on the downstream sections of the auxiliary spillway. It also does not change the capacity of the spillway. The installation of a cutoff wall also does not prevent the dam from being overtopped. Consequently, in order to prevent overtopping, the top of the dam would need to be raised. This alternative is comparable in price to armoring the auxiliary spillway with concrete block mattresses or roller-compacted concrete. However, the price for installation of the wall does not include additional repair costs that may arise due to damage in the spillway from flow. As with the other methods of

spillway protection, the 100-year floodplain would remain the same but the breach inundation zone would increase. The increased risk of erosion and the maintenance required for a cutoff wall makes this alternative unacceptable to the Sponsors.

Selected Rehabilitation Alternative

For each dam, the potential solutions were evaluated for cost and engineering feasibility. This information was presented to the Sponsors at a meeting on March 9, 2005 and to the public at a meeting on April 12, 2005. The selected solution for Robinson Hollow is to widen the northern spillway by five feet, armor the southern spillway with ACBs, and raise the top of the dam with a four foot parapet wall. This solution will cost \$1,032,000. On Toms Branch, the only feasible solution is to armor the spillway with ACB and raise the top of the dam by five feet. The cost of this solution will be approximately \$1,934,000. A similar solution was selected for Inch Branch. The cost to armor the spillway and raise the top of the dam by four feet will be \$1,134,000. The costs for replacing the risers and the costs for other rehabilitation needs are included in these numbers.

The changes to the auxiliary spillways are necessary to meet the current safety criteria of both the State and NRCS. In addition, NRCS is also required to ensure that the principal spillways meet current Federal standards. The existing risers are square in shape with 24-inch principal spillway pipes. Each riser will be replaced with a rectangular riser having interior dimensions of 2'x 6'. This configuration is designed to reduce the potential for clogging and to extend riser life.

Raising the top of the dams will not change the existing 100-year floodplain because the crest (elevation) of each auxiliary spillway will remain the same. However, there will be more water impounded behind the dams in the PMP storm event. This will increase the breach inundation zone associated with each dam. The increased extent of the breach inundation zones must be determined in order to prepare the new Emergency Action Plans which are required before the start of construction.

The following figures show some of the selected measures that will be used for the rehabilitation.

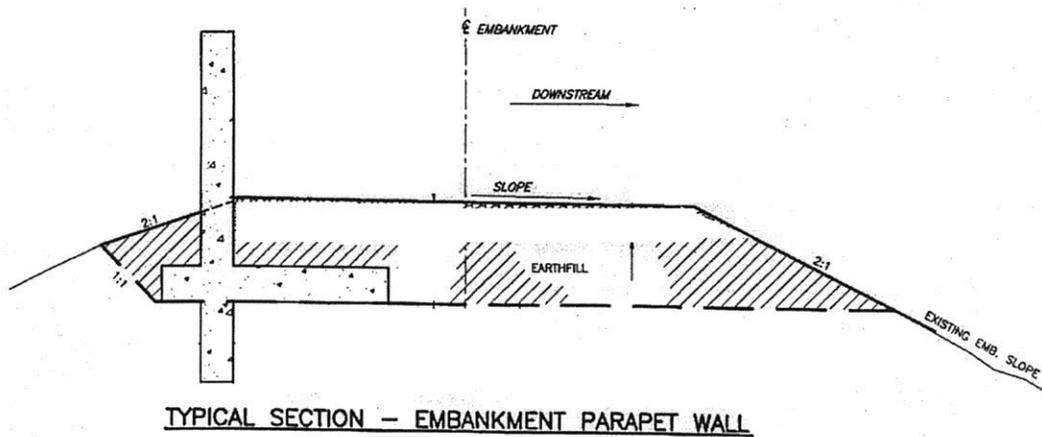


Figure 6 - Cross-sectional view of typical parapet wall design. The wall is installed on the upstream side of the dam. Roads located on the tops of the dam will remain in their present location.

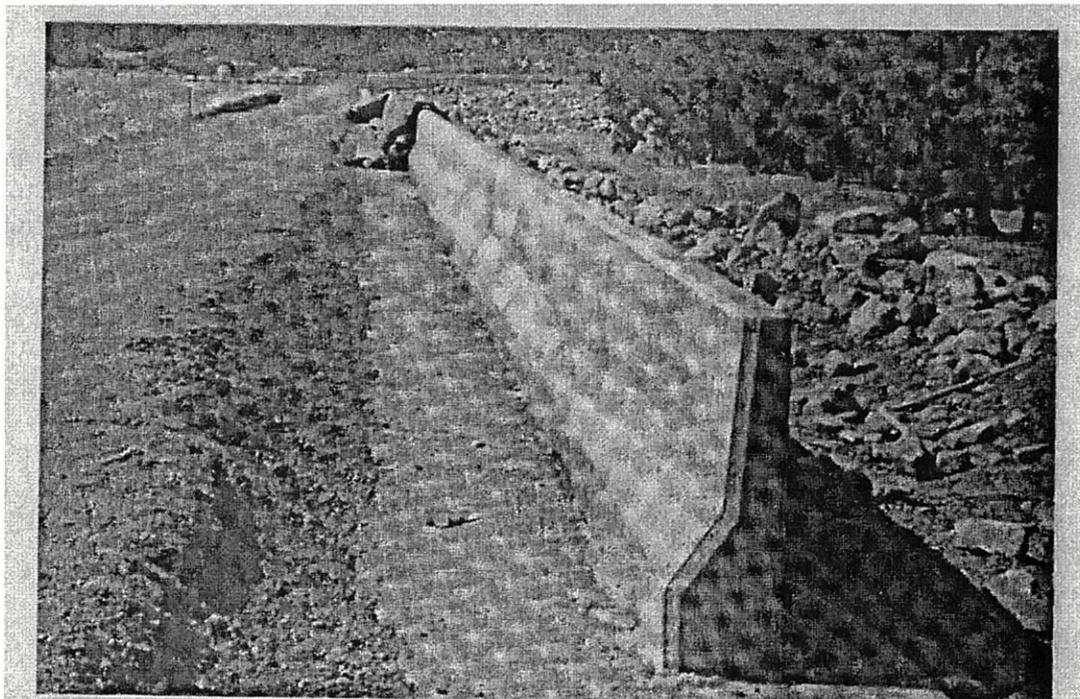


Figure 7 - Example of a concrete parapet wall under construction. This wall is approximately three feet high. The parapet walls installed on the rehabilitated dams will be four to five feet high.

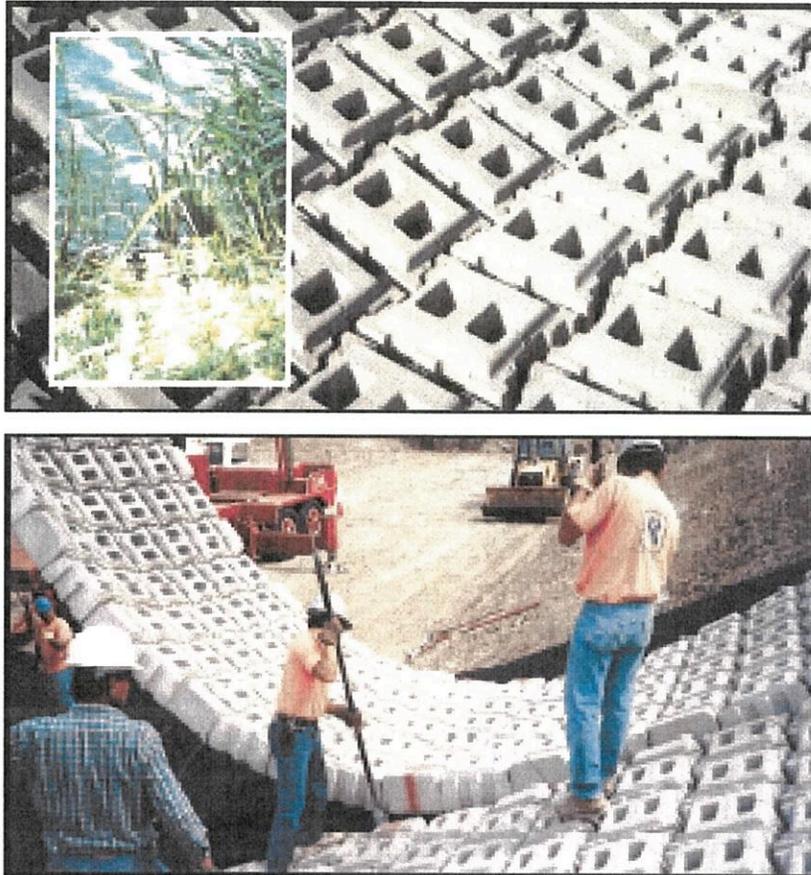


Figure 8 - Articulated Concrete Block mattress installation, close-up details, and finished appearance

EFFECTS OF ALTERNATIVE PLANS

Alternative plans of action can result in a multitude of effects on resources upstream and downstream of the South River Dams. This section describes anticipated effects on resource concerns identified by the Sponsors, 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) the No Action (Sponsors' Breach) and 2) Rehabilitation of the three dams by raising the tops of the dams and armoring the auxiliary spillways.

Public Safety

Existing Conditions: There are presently 191 homes, 10 business structures, 2 church buildings, 6 farm buildings, 10 bridges and 6 public roads located in the entire breach inundation zone of the Toms Branch dam. In the breach area for Robinson Hollow and Inch Branch there are 72 homes, three business structures, and three bridges that could be impacted in a sudden breach of these structures. There is the potential for loss of life in the event of a dam breach. At the present time, there is one house upstream of the dam on each site that has a first floor elevation that is between the elevation of the crest of the

auxiliary spillway and the top of the dam. The water stored behind the dams can be used for fighting forest fires, as needed.

No Action (Sponsors' Breach): With a Sponsors' Breach, there would be an increased threat to public safety through increased flood frequencies and higher water surface elevations in 76 homes and 7 businesses. Roads, bridges, and utility infrastructure would also be exposed to increased risk. Removal of the dams without stabilizing the sediment in the flood pool would result in changes in the capacity and stability of South River as the sediment is transported through the stream system. Flooding levels would be higher initially, then they would return to the pre-dam levels as the sediment is moved downstream into the South River and on into the Shenandoah River. This alternative would eliminate the threat to loss of life associated with a dam breach but would increase Sponsor liability for increased flooding. The bridges in the watershed would be subject to greater flows than the present condition.

Rehabilitate Dams: Under this alternative, the three dams would be structurally rehabilitated using current design and safety criteria in order to provide continued flood protection for 50 years after the two year rehabilitation period is complete. The downstream flooding levels would be the same as they are presently. The threat to loss of life from failure of the individual dams would be greatly reduced. The elevation of the top of dams for the Robinson Hollow, Toms Branch, and Inch Branch dams would be raised about four, five, and four feet, respectively, which creates the potential to temporarily impound water behind the dams to these levels. Current NRCS and Virginia criteria do not require land rights to be obtained to the top of dam elevation, but the Sponsors are aware that the associated floodpools should remain free of structures. This could be accomplished through zoning or obtaining easements. Each site presently has one residential building located between the elevation of the crest of the auxiliary spillway and the top of the dam. For Robinson Hollow and Inch Branch, the two houses upstream of the dams will experience greater depths of flooding in the PMP event, but no additional houses will be impacted. On Toms Branch, there will be two additional houses that will be impacted by raising the top of the dam and the water depth in the house that is presently located below the top of the dam will be deeper. The breach inundation zone will be larger due to increases in the heights of the rehabilitated dams.

Floodwater Damage

Existing Conditions: The South River Watershed has experienced many floods during the nearly fifty years that the dams have been in place. Currently, the three dams in this study provide \$82,000 in average annual flood damage reduction benefits to the 54 properties that are projected to receive first floor damages in the 100-year, 24-hour storm event. However, \$39,000 in average annual flood damages are currently projected to occur in a 100-year, 24-hour storm event.

No Action (Sponsors' Breach): With the Sponsors' Breach, the sediment and the remaining embankment would not be stabilized. As this material is eroded downstream, the stream channels would fill with sediment, and the probable annual flood damages would increase to more than the original pre-project damages. Flood frequency and flood depths would increase with a Sponsors' Breach. More homes would be damaged than under the existing conditions. If the dams were removed by the Sponsors, \$96,000 of average annual flood damages would be expected to occur to 88 properties that would suffer first-floor flooding.

Rehabilitate Dams: The flood reduction benefits currently provided by the Robinson Hollow, Toms Branch, and Inch Branch dams would be extended for a projected 50 years after construction. The dams

would still provide flood detention storage to the crest of the auxiliary spillways for the 100-year, 10-day frequency storm. The maximum release rate through the principal spillways would be 67 cubic feet per second (cfs) for Robinson Hollow, 71.9 cfs for Toms Branch, and 68.2 cfs for Inch Branch. Since the dams do not control the entire watershed, the rehabilitation of the South River Dams would result in the continuation of present flood-damage reductions, but at a higher level of safety/reduced risk for catastrophic breach. The potential for failure of the dams would be reduced significantly. Average annual flood damages to properties under this scenario are estimated to be around \$57,000. Forty-eight homes and five businesses would continue to be damaged in the 100-year, 24-hour storm event.

Erosion and Sedimentation

Existing Conditions: Robinson Hollow dam has trapped 5.84 acre-feet (7,908 tons) of sediment in its reservoir and tributaries since its construction in 1956. The sediment accumulation rate is 0.12 acre-feet per year. Toms Branch dam has about 11.46 acre-feet (17,292 tons) of sediment in its flood pool and tributaries. Assuming a complete clean-out when the site was dredged in 1972, the sediment accumulation rate is estimated to be 0.36 acre-feet per year. The Inch Branch site presently has 10.3 acre-feet (18,157 tons) of sediment stored in the reservoir and tributaries. Because this site was dredged in 2002, it is not possible to determine the actual annual sediment accumulation rate. Based on anecdotal information about the site, a rate of 0.36 acre-feet per year was assumed. These sediment accumulation rates are 16%, 28%, and 42% of the amounts projected in the original design process for Robinson Hollow, Toms Branch, and Inch Branch, respectively. At these rates of sediment accumulation, there is enough storage available for an additional 260 years for Robinson Hollow, 149 years for Toms Branch, and 90 years for Inch Branch (from 2004).

No Action (Sponsors' Breach): In a Sponsors' Breach, most of the trapped sediment would be released into the stream channels over time. Initially, the stream would fill in, resulting in a loss of channel capacity and increased flooding. There would also be an increase in sediment deposition upon previously protected floodplains. Since only a small portion of the embankment would be removed in a Sponsors' Breach of Robinson Hollow, Toms Branch, and Inch Branch, there would be approximately 25,400 cubic yards, 161,500 cubic yards, and 90,500 cubic yards of earthfill remaining in the embankments, respectively, that could eventually erode and contribute sediment to the stream system. In addition, the sediment present in the normal pool at the time of the Sponsors' Breach would also be eroded into the stream system. A third source of sediment will be the material eroded from the upstream watersheds. About 0.12, 0.36, and 0.36 acre-feet (157, 470, and 470 tons) of sediment per year that is currently trapped by the Robinson Hollow, Toms Branch, and Inch Branch dams, respectively, would pass on through the stream system, eventually making its way to the Shenandoah River and the Chesapeake Bay. Additional sediment may be eroded from the upstream tributaries as the streams establish new channels through the old pool area.

Rehabilitate Dams: The dams would provide flood control for 50 years after rehabilitation. The Robinson Hollow, Toms Branch, and Inch Branch dams would trap about 0.12, 0.36, and 0.36 acre-feet per year, respectively, of sediment over their new designed lives, which is sediment that would not be deposited in the South River or the Shenandoah River. At the end of the 50-year evaluated life of these dams, there would still be substantial sediment storage available.

Economic and Social Effects

Existing Conditions: The South River Dams have provided flood protection since 1956. Most of the residents in the area are not aware of the presence of the dams. Under the existing conditions, there is the potential for loss of life because the dams do not meet current dam safety and design criteria. An uncontrolled breach of the Robinson Hollow dam would release 769 acre-feet of water and sediment in a wall up to 54 feet high. There are 72 homes, 3 business structures, and one farm building that could be affected. Thirteen roads and three bridges would also be at risk. This dam is estimated to provide \$22,000 in average annual flood protection benefits. An uncontrolled breach of the Toms Branch dam would release 1,278 acre-feet of water and sediment in a wall up to 63 feet high. There are 191 homes, 10 business structures, 2 church buildings, and 6 farm buildings that could be affected. Sixteen roads and ten bridges would also be at risk. This dam is estimated to provide \$76,000 in average annual flood protection benefits. An uncontrolled breach of the Inch Branch dam would release 755 acre-feet of water and sediment in a wall up to 53 feet high. The properties damaged in this event would be essentially the same as those damaged in an uncontrolled breach of Robinson Hollow dam. The Inch Branch dam is estimated to provide \$26,000 in average annual flood protection benefits. As a set, the three dams provide an estimated \$124,000 in average annual damage reduction benefits. However, an estimated \$39,000 in average annual flood damages remains, even with the dams in place, due to the level of protection afforded plus uncontrolled drainage area between the dams and impacted properties in the floodplain.

No Action (Sponsors' Breach): The two most visible effects of a Sponsors' Breach of the three dams would be the loss of recreation at the lakes and a decline in the value of the properties around the lakes. Downstream property values would also decrease because of increased flooding. There is the potential for damage to 76 homes, 7 business structures, 2 church buildings, and 3 farm buildings. These more frequent and deeper floods could limit access to emergency services and cause damage to roads and utilities. There would be the potential for sponsor liability due to induced damages to downstream properties. Removing the dams could also impact Augusta County's participation in the National Flood Insurance Program by the enlargement of the downstream 100-year floodplain. There would be some short-term economic benefits to the community during the actual removal of the dams (about one year). Average annual economic damages associated with this alternative are estimated to be \$162,000/year. The estimated cost for a Sponsors' Breach of the three dams is \$1,104,000.

Rehabilitate Dams: Structural rehabilitation of the South River Dams would provide continued flood protection to the residents of the watershed for 50 additional years. Property values around the lakes and downstream of the dams would be maintained. The existing opportunities for recreation would remain for the evaluated lives of the dams. Protection of the roads, bridges, and public utilities would be maintained at the present levels, as would the access to emergency services. In addition to the long-term economic benefits provided by the dam, there would also be short-term economic benefits from the construction activities (about two years). Average annual economic damages associated with this alternative would be \$39,000/year. The estimated cost for rehabilitating the three dams is \$4,100,000.

Archaeological and Historical Resources

Existing Conditions: There are no known archaeological, cultural, or historic resources within the area of potential effect of this project.

No Action (Sponsors' Breach): In a Sponsors' Breach, the water would be drained from the lakes before the notch in the embankment was cut. As the existing sediment in the pools erode, any sites in the pool areas would be exposed and would no longer be protected. The removal of the dams could increase scouring and erosion to any downstream sites.

Rehabilitate Dams: Given the review of known sources, the results of the field testing, and the extent of planned disturbance, the project will not impact any cultural resources. All disturbance associated with the rehabilitation of the dams is anticipated to occur in areas previously disturbed during construction of the dams or on areas with slope greater than twenty percent. Given the review of known sources and the extent of planned disturbance, the project will not impact any cultural resources.

The sediment buildup in the pool area will continue to protect any sites that were not discovered before the structure was built. Undiscovered sites downstream from the structure will not be subject to the scouring produced by flood conditions.

Threatened and Endangered Species

Existing Conditions: There are two known threatened/endangered plant species in this portion of the South River Watershed according to the Augusta County Natural Heritage Resources Map and the Threatened and Endangered Species Map produced by use of the Virginia Fish and Wildlife Information Service. The Swamp Pink, Helonius bullata, a federally threatened, state endangered plant species has a confirmed presence in the area of the Toms Branch dam. Virginia Sneezeweed, Helenium virginicum, a state endangered plant species, has confirmed occurrences near all three dam sites.

No Action (Sponsors' Breach): The removal of South River dams may have localized catastrophic effects on small populations of Swamp Pink and Virginia Sneezeweed that have established themselves since the dams were constructed.

Rehabilitate Dams: The rehabilitation of the Robinson Hollow, Toms Branch, and Inch Branch dams will not have any effects on the populations of Swamp Pink and Virginia Sneezeweed according to a 2004 review by DCR's Natural Heritage Biologist. In a February 12, 2004 letter from the Virginia Department of Conservation and Recreation states that "...natural heritage resources have not been documented in the project area. ...The current activity will not affect any documented state-listed plants or insects." (VDACS has delegated commentary on state-listed threatened and endangered plant and animal species to the Virginia Department of Conservation and Recreation by a Memorandum of Agreement). Accordingly, the U.S. Fish & Wildlife Service agrees with this determination.

Streams, Lakes, and Wetlands

Existing Conditions: The streams feeding the reservoirs have stable outlets into the lakes and are transporting relatively small amounts of sediment into the lake. At the Robinson Hollow dam, there are 6.9 acres of surface water and 3.75 acres of wetlands for a total of 10.65 acres of sediment pool. The wetlands located along the waters edge of the Robinson Hollow pool area are considered jurisdictional wetlands according to the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality. These wetlands were formed after the dams were completed and the classification and extent were dependent on the condition of the dam. The surface area of the Toms Branch reservoir is 8.7 acres.

There are no wetlands associated with this site. The Inch Branch reservoir has a surface area of 7 acres. This site also has no associated wetlands.

No Action (Sponsors' Breach): South River and its tributaries upstream of the dams would be adversely affected by the removal of the dams under a Sponsors' Breach scenario. If the water were released from the lake, the streams feeding the reservoirs would no longer have a stable outlet. Erosion of the channel banks and bottom would occur as the streams adjust to the new outlet conditions. The instability at the lower end of each stream would trigger additional instability in the upstream reaches. Additional sediment would be transported downstream during this time.

Below the breached dams, Back Creek and the floodplain would experience significant increases in both sedimentation and scour. Over time, the creeks would establish new channels with new dimensions, meander pattern, and bottom grade. The new locations of the creeks may not be where they are at present, causing changes in property boundaries defined by the stream.

If the dams are breached, all permanent water storage behind the embankment would be lost. Since the breach would be accomplished by cutting a notch in part of the embankment and leaving the rest, the pre-dam floodplain would not be re-established at the time of removal. As the creek flows out-of-bank, the water on the floodplain would flow against the sides of the notch and cause erosion. Eventually, most of the embankment would be eroded away.

A Sponsors' Breach of South River Dams would destroy the 3.75 acres of wetlands at the upper end of Robinson Hollow. The wetlands would dry out, allowing the forest to reclaim the land. The Sponsors would have to create 7.5 acres of new wetlands to mitigate for the wetlands lost under this alternative.

Rehabilitate Dams: Rehabilitation of the dams would have no adverse effect on the wetlands, the lake, or the streams.

Fish and Wildlife Resources

Existing Conditions: The streams above all three reservoirs formed by Tom's Branch, Robinson Hollow and Inch Branch Dams are classified as Class III and IV Cold Water Streams for brook trout (Salvelinus fontinalis) habitat. The reservoirs provide habitat for a number of cool and warm water fish species such as large and smallmouth bass, bluegills, sunfish, bullheads and a number of species of forage fish including shiners, minnows, dace and killifish.

The surrounding watershed is a typical Appalachian oak-hickory forest with yellow-poplar and green ash as associated species. Sugar maple and hemlock-mixed hardwoods dominate on the wetter bottomlands. The potential natural or pre-settlement vegetation of these forests was oak-hickory with chestnut, yellow-poplar, ash, and walnut as associated species and sugar maple-hemlock-mixed hardwood bottomlands.

Wildlife species inhabiting these forests include ruffed grouse, woodcock, various thrushes, and vireos, scarlet tanager, several species of woodpeckers, gray and red squirrels, gray fox, white-tailed deer, and raccoon. Ducks, geese, herons, shore birds, mink, muskrat and beaver may be found in wetland areas and shoreline associated with the reservoirs.

No Action (Sponsors' Breach): At the Robinson Hollow dam site, a Sponsors' Breach would result in the loss of 6.9 acres of warm deep water aquatic habitat and 3.75 acres of wetland habitat. The Toms Branch and Inch Branch sites would lose 8.7 and 7 acres of warm deep water aquatic habitat, respectively. Shoreline and wetland wildlife habitat associated with the pool areas of the reservoirs would be lost, except that 7.5 acres of wetland mitigation would be required to replace the 3.75 acres of wetlands at Robinson Hollow. Over time, early successional habitat types would naturally regenerate in the areas previously occupied by water.

The aquatic stream habitat would be impaired by a large increase in sediment deposition that would increase turbidity and reduce dissolved oxygen levels. Initially, some fish kills could result from the operation, depending on pre-operation salvage efforts. The fish population of South River would change in abundance and species composition as fish from the reservoirs migrate downstream and the sediment is released from the pond area. The fish species most likely to survive and proliferate under the altered habitat of increased turbidity probably would include channel catfish, suckers, chubs and carp.

Rehabilitate Dams: Rehabilitation of the dam would result in no major changes in wildlife habitat. The pool area would not permanently change and no permanent adverse effects are expected to the wetland and terrestrial habitat adjacent to the pool area. Terrestrial and wetland habitats would be affected only by temporary disturbance of grasses on the embankment and auxiliary spillway areas of the dam and by the temporary drawdown of the water during the construction period. Aquatic habitat at the site would be affected short-term by changes in the water level during construction activities. Re-stocking of the desired reservoir fisheries could be necessary at the end of the construction period.

Water Quality

Existing Conditions: Toms Branch, Mills Creek, and Back Creek are listed in the 2002 303(d) Impaired Waters Report for Virginia as Not Supporting for Aquatic Life Use. Toms Branch and Back Creek have a moderately impaired benthic rating and Mills Creek has a severely impaired benthic rating..

No Action (Sponsors' Breach): If the South River Dams were removed by a Sponsors' Breach, the downstream water quality would be further impaired by the presence of large amounts of sediment and its attached nutrients. There would also be reductions in dissolved oxygen in the water that could result in fish kills and die-offs of other aquatic invertebrate species.

Rehabilitate Dams: Other than for some short-term negative effects during the construction period, rehabilitation of the dams would not significantly change the present water quality in the watershed.

Transportation

Existing Conditions: There are three main roads, Howardsville Turnpike, Mt. Torrey Road, and Oak Street, and one smaller road, Creekside Drive, which cross either Back Creek or South River. Back Creek Lane and Inch Run Lane are parallel to their respective streams. There are also ten streets in residential areas that can be affected by flood waters. There is also one railroad bridge and five private bridges in the watershed. Presently, access to the Robinson Hollow Dam is restricted when high flows occur on Inch Branch.

No Action (Sponsors' Breach): A Sponsors' Breach would result in flooding and associated damages to roads and bridges at levels greater than existed prior to project implementation. Flooding would be more frequent. Access to towns, schools, medical services, work locations, and emergency services could be restricted or limited for potentially long periods of time.

Rehabilitate Dams: The continuation of flood control for another 50 years after rehabilitation would provide continued access to transportation routes in the watershed that currently exist. Access to towns, shopping, schools, work places, medical services, and emergency services would be the same as under present conditions.

Land Use and Management

Existing Conditions: At the present time, the land use in the watershed above the dams is primarily forested with scattered cabins throughout. The land below the dam is more urban than it was when the dam was constructed. It is likely that more urban expansion will occur.

No Action (Sponsors' Breach): A Sponsors' Breach would result in a loss of flood protection for the downstream properties. The floodplains would be subject to flooding at higher levels than existed prior to project installation. The productivity of the land would increase as nutrient-laden sediment is deposited on the floodplain, but the same events causing deposition will impose undesired damages and clean-up costs. The value of property immediately adjacent to the lakes would be negatively affected.

Rehabilitate Dams: Rehabilitation of the South River Dams to class (c) (high hazard) dams would eliminate the need to impose the zoning restrictions in the downstream watershed that are required for lower hazard class structures. However, the Sponsors should be aware that activities in the 100-year, 24-hour floodplain could affect participation in the National Flood Insurance Program. In the watershed above the dam, the water level impounded behind each dam would increase during the PMP storm event. Landowners should be made aware of any restrictions that this would impose on their land use.

Prime and Unique Farmlands

Existing Conditions: There are no prime or unique farmlands within the watershed.

Cumulative Effects

The no-action alternative calls for a sponsors' breach of all three dams. The recommended alternative is to rehabilitate all three dams. The effects of these two alternatives on the principle resources of concern, along with the social and economic effects, have been addressed in the previous pages. The cumulative effects of the sponsors' breach will result in a diminished quality of life in the community caused by increased flooding, loss of recreation, and decreased property values, and an increased threat to loss of life. The cumulative effects of the recommended alternative are to maintain the existing social, economic, and environmental conditions of the community. The rehabilitation of these three dams will result in a significant reduction in the threat to loss of life for area residents.

COMPARISON OF ALTERNATIVE PLANS

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

Table I - Summary and Comparison of Candidate Plans

Effects	No Action Sponsors' Breach (NED Plan)	Structural Rehabilitation (Recommended Plan)
Sponsor Goals	Does not meet goals, increases liability for induced damages	Continue to provide flood protection, reduces liability
Structural	Breach dams	Upgrade dams to meet dam safety criteria
Project Investment -		
Site 23:	\$376,000	\$1,032,000
Site 25:	\$456,000	\$1,934,000
Site 26:	\$272,000	\$1,134,000
Total Project Investment	\$1,104,000	\$4,100,000
National Economic Development Account		
Beneficial Annualized (AAEs*)		
Site 23:	\$1,200	\$21,000
Site 25:	\$1,200	\$74,000
Site 26:	\$1,200	\$26,000
Total Beneficial Annualized (AAEs*)	\$3,600	\$121,000
Adverse Annualized (AAEs*)		
Site 23:	\$16,000	\$56,000
Site 25:	\$29,000	\$104,000
Site 26:	\$17,000	\$61,000
Total Adverse Annualized (AAEs*)	\$62,000	\$221,000
Net Beneficial		
Site 23:	-\$14,800	-\$35,000
Site 25:	-\$27,800	-\$30,000
Site 26:	-\$15,800	-\$35,000
Total Net Beneficial		
Non-Zero-based display:	-\$58,400	-\$100,000
Zero-based display:	\$0	-\$41,600
Benefit/Cost Ratios		
Site 23:	0.075 to 1.0	0.73 to 1.0
Site 25:	0.041 to 1.0	0.94 to 1.0
Site 26:	0.071 to 1.0	0.66 to 1.0
Overall Benefit/Cost Ratio	0.06 to 1.0	0.81 to 1.0
Estimated OM&R**		
Site 23:	\$0	\$1,200
Site 25:	\$0	\$1,200
Site 26:	\$0	\$1,200
Total Estimated OM&R**	\$0	\$3,600

Effects	No Action Sponsors' Breach (NED Plan)	Structural Rehabilitation (Recommended Plan)
Environmental Quality Account		
Erosion & Sedimentation	Release of 27.6 ac-ft of trapped sediment, annual transport of 0.84 ac-ft plus material from dam embankments and degraded streams	Trap 0.84 ac-ft of sediment annually
Threatened and Endangered Species	Likely destruction of habitat for endangered plant species	No effect
Stream, Lakes and Wetlands	Approx. 10 miles of stream channel would be damaged from sediment or loss of grade control; 3.75 acres of wetland destroyed; 7.5 ac. wetland mitigation required	No Effect
Fish & Wildlife Resources	Existing habitat destroyed; lake fish would populate stream	No Effect
Water Quality	Water quality would decline due to release of sediment and attached nutrients	No Effect
Other Social Effects Account		
Public Safety	Increase potential for loss of life from lack of flood control	Decrease potential for loss of life from dam breach
Floodwater Damage	Protection provided by dams is lost; induced damages occur where frequency, volume, and cost of flooding increases	Maintains present level of flood protection; no induced damages downstream, five upstream houses may be damaged if auxiliary spillway flows
Property Values	Decrease by 50% around the lake; decrease by 10% below the dam	Values protected
Recreation	Opportunities reduced	Opportunities maintained
Transportation	Access to emergency services may be limited; increased maintenance of 16 roads and 10 bridges	Access to emergency services maintained at present level; road maintenance continues at present level
Land Use and Management	Sponsors would need to rezone the floodplain to prevent future development & limit their liability	No effect
Enhanced protection from future flood events	No protection	No added protection beyond that provided under the existing conditions
Exposure/Risk of a catastrophic breach as proxy for associated mental duress	None, but concern for mass eroding of the remaining notched dam significant	Very low

Effects	No Action Sponsors' Breach (NED Plan)	Structural Rehabilitation (Recommended Plan)
Other Social Effects Account (cont.)		
Civil Rights Impacts:	Negative across all groups	Positive across all groups
Environmental Justice Impacts:	No disparate treatment	No disparate treatment
Anxiety, frustration and mental duress:	Increased across all groups as risk of flooding increases	Decreased across all groups with flood storage retained
Regional Economic Development Account (positive and negative effects annualized)		
Annualized Benefits (AAEs*)		
Region:	\$3,600	\$121,000
Rest of Nation:	-----	-----
Annualized Costs (AAEs*)		
Region:	\$53,000	\$77,000
Rest of Nation:	\$9,000	\$144,000
Net Beneficial (AAEs*)		
Region:	-\$49,400	\$43,000
Rest of Nation:	-\$9,000	-\$144,000
Net Benefits:	-\$58,400	-\$100,000
Net Difference:	-\$41,600	

* AAEs – Average Annual Equivalents based on 5.375% discount rate and a 52 year period of analysis.

** OM&R – Operation, Maintenance and Replacement Costs

IDENTIFICATION OF NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN

Detailed evaluation and incremental analysis of each of the three sites failed to identify any site with positive net benefits. The Future Without Project (FWOP), breaching all three dams, had the least negative net benefits and therefore is the NED alternative. However, this alternative is not a satisfactory plan because all three dams would be breached. While this would solve dam safety issues, it would leave the sponsors without their current level of flood protection. While the risk to loss of life would be reduced in the breach inundation zone, people would likely be added to the 100-year floodplain and their potential risk of loss of life would increase for everyone in the new 100-year floodplain.

NRCS policy requires selection of the NED Plan unless there are compelling social and/or environmental considerations for selection of a non-NED Plan. Due to the significant threat to loss of life and property, an exception to the NED Plan policy was requested from the Chief of NRCS on June 14, 2005. This request was granted on July 14, 2005.

RISK AND UNCERTAINTY

Assessments, considerations, and calculations in this plan are based on a 52 year period of analysis. Impacts of each evaluated alternative were identified based on the 5-, 10-, 25-, 50- and 100-year, 24-hour storm events. 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 global change impacts on storm events. Although global change is not expected to alter calculation of the PMP events, it could increase the occurrence of low frequency events and associated flood damages¹.

Because the location of future development is uncertain, the potential damages to roads, bridges, and utilities that were evaluated were based on current conditions within the watershed and downstream of the South River Dams.

The adverse impacts on property values from the alternatives that would remove the dams were based on interviews with local real estate agents and real property appraisers. Impacts were projected for both immediately around the lake and within the floodplain below the dam.

Impacts to incidental water-based recreation of the lakes were estimated based on existing property ownership around the lakes. Water-based recreational activities were identified and user days and values were estimated using methods detailed in the Principles and Guidelines of the Federal Water Resource Council.

The objective of this project is to meet applicable NRCS and State of Virginia public health and safety standards associated with watershed dams.

From a financing and administrative standpoint, the Sponsors have committed to NRCS that they will be able to fund 35 percent of the sponsor cost-share amount to complete installation of the selected alternative and also perform the required maintenance on the upgraded structure for 50 years after construction.

¹ "Long-term observations confirm that our climate is now changing at a rapid rate. Over the 20th century, the average annual U.S. temperature has risen by almost 1 degree F (0.6 degrees C) and precipitation has increased nationally by 5 to 10% mostly due to increases in heavy downpours. These trends are most apparent over the past few decades. The science indicates that the warming in the 21st century will be significantly larger than in the 20th century. Scenarios examined in this Assessment, which assume no major interventions to reduce continued growth of world greenhouse gas emissions, indicate that temperatures in the U.S. will rise by about 5-9°F (3-5°C) on average in the next 100 years, which is more than the projected global increase. This rise is very likely to be associated with more extreme precipitation and faster evaporation of water, leading to greater frequency of both very wet and very dry conditions." Source: *Climate Change Impacts on the United States The Potential Consequences of Climate Variability and Change Overview: Summary*. Climate Change and Our Nation By the National Assessment Synthesis Team, US Global Change Research Program, Published in 2000.

RATIONALE FOR PLAN SELECTION

The recommended plan is to rehabilitate all three dams to meet current 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 sponsors, local residents, and state and local government agencies all prefer the Recommended Plan because it:

- Minimizes the threat to loss of life to approximately 1,000 people that live and work in the 191 homes, 10 commercial buildings and 2 churches within the floodplain. This satisfactorily addresses the safety concerns associated with these three dams that are among the highest priority dams in Virginia for rehabilitation according to the Division of Dam Safety and the Virginia General Assembly.
- Provides protection for Mt. Torrey Road, (Rt. 664) which is a state highway downstream of the dam that has an average daily traffic count of 2,800 vehicles.
- Provides downstream flood protection for the scores of 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 three unsafe dams.
- Traps 0.84 acre feet of sediment annually, thereby improving downstream water quality.
- Provides continued protection for Swamp Pink (a species listed as federally threatened and state endangered) and Virginia Sneezeweed (a species listed as state endangered).
- Protects 3.75 acres of jurisdictional wetlands from being destroyed.
- Maintains existing stream habitat downstream of the dams.
- Retains the existing fish and wildlife habitat around the lakes and in the adjacent wetlands.

When compared to the No Action Alternative (Sponsors' Breach), the Recommended Alternative (Rehabilitation) meets the public and technical advisory groups' identified purposes and needs and was subsequently recommended to the Sponsors. The structural alternative meets the Sponsors' objectives of bringing these three South River dams into compliance with current dam design and safety criteria, maintaining the current 100-year floodplain, and addressing resource concerns identified by the public.

CONSULTATION AND PUBLIC PARTICIPATION

Original sponsoring organizations include the City of Waynesboro, the Headwaters SWCD, and the Augusta County Board of Supervisors. The Headwaters SWCD has been involved in the operation and maintenance of the South River Dams since they were built. Interest and support for rehabilitating the dams began in July 1987 following the first issuance of a Conditional Certificate by the Division of Dam Safety. Following the passage of Public Law 106-472, in November of 2000, federal funds became available to eligible applicants. The Headwaters SWCD applied to the NRCS for dam rehabilitation assistance on May 20, 2002.

Local, State and Federal support for the rehabilitation of the South River Dams has been strong. Input and involvement of the public has been solicited throughout the planning of the project. At the initiation of the planning process, many meetings were held with representatives of the Headwaters SWCD, City of Waynesboro, and Augusta County to ascertain their interest and concerns regarding the South River Dams. The Headwaters District has worked closely with the local landowners and residents to provide

information on the planning activities, obtain their permission to conduct surveys and investigations, and solicit their input on the pertinent issues being considered during planning.

The NRCS National Water Management Center Staff from Little Rock, Arkansas toured the watershed on August 7, 2003 and provided input and support to the ongoing planning efforts. Feedback was provided regarding the federal dam rehabilitation program and the completion of a supplemental plan and environmental assessment for the rehabilitation of the South River Dams.

The first public meeting was held at the Wilson Fire Hall in Lyndhurst on October 30, 2003. Local, state and federal perspectives on the rehabilitation needs of the South River Dams were provided to the approximately 40 meeting attendees. The public were informed of potential alternative solutions to bring the dam into compliance with current dam safety criteria. Meeting participants provided input on their issues and concerns to be considered during the planning process. A fact sheet was developed and distributed which addressed frequently asked questions regarding rehabilitation of the South River Dams.

A scoping meeting was held on February 13, 2004 at the Augusta County Government Center 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. Consultation has been made with the Virginia Department of Historic Resources on project measures contained in this rehabilitation plan. Consultation with the U.S. Fish and Wildlife Service, in accordance with Section 7 of the Endangered Species Act of 1973, was also conducted. All parties agreed that the rehabilitation of South River Dams would not have significant negative impacts on the environment.

A second public meeting was held at the Wilson Fire Hall on March 9, 2004 to discuss the need for landowner permission to access the property during the planning phase. About 40 people attended the meeting.

A third public meeting was held on April 12, 2005 at the Wilson Fire 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. There was favorable support and acceptance of the recommended alternative from those in attendance. The meeting attendance totaled 33 people and included elected officials, representatives from local, state and federal agencies, and watershed landowners and residents.

A Draft Plan was distributed for interagency and public review on July 15th, 2005. Copies of the document were placed in area 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 local Sponsors, technical advisors, and the public in addressing resource issues and concerns relative to the South River Dams.

The recommended plan is to rehabilitate all three of the dams. By doing this, the present level of flood protection is maintained, property values are protected, and the threat to loss of life is reduced. The recommended plan of action for each dam is outlined below:

Robinson Hollow - Site 23

- Raise top of dam 4 feet by installing a concrete parapet wall on the upstream side of the dam crest.
- Armor the southern auxiliary spillway surface with articulated concrete blocks and widen (excavate) the northern spillway by 5 feet.
- Replace the square riser with a D X 3D rectangular riser.
- Raise and lengthen the training dike.
- Clean the dam toe drains.
- Remove trees from downstream left abutment and the southern spillway exit section.
- Improve the access road to the dam.

Toms Branch - Site 25

- Raise top of dam 5 feet by installing a concrete parapet wall on the upstream side of the dam crest.
- Armor the auxiliary spillway surface with articulated concrete blocks.
- Replace the square riser with a D X 3D rectangular riser.
- Raise and lengthen the training dike.
- Grout the circumferential crack in the principal spillway pipe.
- Locate the dam toe drain outlets and clean them, as needed.
- Improve the access road to the dam.
- Repair riser.

Inch Branch - Site 26

- Raise top of dam 4 feet by installing a concrete parapet wall on the upstream side of the dam crest.

- Armor the auxiliary spillway surface with articulated concrete blocks.
- Replace the square riser with a D X 3D rectangular riser.
- Raise and lengthen the training dike.
- Remove trees from upstream and downstream left abutments.
- Seed the downstream side of the left abutment.
- Clean the dam toe drains.
- Repair slough on downstream side of dam.
- Improve the access road to the dam.

These are the major structural components. There are a number of smaller improvements that will also be incorporated into the designs of the rehabilitated dams. The cost of these additional elements is included in the cost estimate.

After the implementation of these planned works of improvement, these three South River dams 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

The Sponsors are responsible for obtaining any needed landrights and easements associated with the rehabilitation project. At the three dam sites, it is projected that an additional 2 acres of landrights will be needed in order to accommodate the larger dam footprints that will result from the rehabilitation project. NRCS currently does not require additional flood easements because the flood storage of the structure will not change. However, the Division of Dam Safety is strongly encouraging the acquisition of flood easements to the top of the dam or implementation of a special zoning district to prohibit development of habitable dwellings in the new floodpool. There are no relocations planned as a result of the installation of the project measures.

MITIGATION

There are no planned mitigation requirements for this project.

PERMITS AND COMPLIANCE

Installation of the recommended plan will bring the South River Dams into compliance with current dam safety criteria. The Sponsors will be responsible for obtaining the certification of compliance from the Division of Dam Safety upon completion of the project. The Sponsors are also responsible for obtaining any needed environmental permits from Federal, State, or local regulatory agencies. During construction, Virginia Erosion and Sediment Control regulations will be followed.

COSTS

As indicated in Table 1, the total project cost of the recommended plan is \$4,100,000. Of this amount, PL-106-472 funds will bear \$2,802,000 and nonfederal funds will bear \$1,298,000. Given that certain costs are excluded from calculation of the Sponsors' contribution, the actual cash cost to the local sponsors is an estimated \$1,270,000. Table 2 shows the costs 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 2005 price base was used and amortized at 5.375 percent interest for the 52 year period of analysis (including an installation period of 2 years and an expected useful life of 50 years).

The planning costs for the proposed rehabilitation measures are estimated costs only. 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 within two construction seasons. 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 technical and financial assistance to the Sponsors with the design and/or construction of the rehabilitation project. NRCS will be responsible for the following:

- Provide contract administration technical assistance.
- Provide construction management technical assistance.
- Execute a project agreement with the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
- Execute a Memorandum of Understanding with the sponsors to provide a framework within which cost-share funds are accredited.
- Provide financial assistance equal to 65% of total eligible project costs, not to exceed 100% of actual construction costs.
- Certify completion of all installed measures.

The Sponsors will be responsible for the following:

- Secure all needed environmental permits, easements, and rights for installation, operation and maintenance of the rehabilitated structures.
- Prepare updated Emergency Action Plans for the South River Dams prior to the initiation of construction.
- Execute an updated Operation and Maintenance agreement with NRCS for the dams.
- 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 services necessary for installation of the project.
- Acquire a Safe Dams Permit from the State of Virginia upon completion of the planned measures.
- Participate in and comply with applicable Federal floodplain management and flood insurance programs.
- Enforce all associated project easements and rights-of-way.

OPERATION, MAINTENANCE, AND REPLACEMENT

Measures installed as part of this plan, and previously installed measures, will be operated and maintained by the Sponsors 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 the South River Dams utilizing the NRCS National Operation and Maintenance Manual, and will be executed prior to signing project agreements 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 installation, for a total of 52 years. The agreement will specify responsibilities of the Sponsors 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 dams will have positive economic and social effects across all residents within the floodplain and above the dams. 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 that the rehabilitation project could possibly have. There are some minority and non-minority residents downstream of the dams who expressed in public meetings that they would like to have added protection from potential floods. However, it was explained to them that rehabilitation of the South River Dams will not enhance their flood protection, but simply maintain the existing level of 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.
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended, (16 U.S.C. 1451, et seq.)	The project area is not located in a coastal zone.
Endangered and Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	No effects on the populations of Swamp Pink and Virginia Sneezeweed are expected.
Upland and Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	No effect.
Floodplains	Executive Order 11988, Floodplain Management	Maintain current flood protection.
Historic and Cultural Properties	National Historic Preservation Act of 1966, as amended, (16 U.S.C. Sec. 470, et seq.)	No known historic resources will be 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.)	No change expected.

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.)	3.75 acres of wetlands in the upper end of Robinson Hollow pool will not be impacted. No effect.
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended, (16 U.S.C. U.S.C. 1271 et seq.)	There are no designated Wild and Scenic rivers in the project area. No effect.
Economic	NA	Maintain existing flood protection for downstream residents for another 50 years.
Fisheries	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	There may be slight adverse impacts during construction. However, long term beneficial effects are expected due to the extended life of the project.
Forestry	NA	No forest impacts are expected.
Recreation	NA	Existing incidental benefits will be maintained.
Riparian Zone	NA	Riparian vegetation impacts will be minimal around and downstream of existing dams.

**Table 1 - Estimated Installation Cost
South River Watershed, Augusta County, Virginia**
(Dollars)⁵

Installation Cost Items	Estimated Costs	
	PL-106-472 Funds ⁶	Other Funds
Structural measures to rehabilitate floodwater retarding dams: Robinson Hollow – Site 23:	\$707,000	\$325,000
Tom's Branch – Site 25:	\$1,322,000	\$612,000
Inch Branch – Site 26:	\$773,000	\$361,000
Total Project:	\$2,802,000	\$1,298,000
		\$4,100,000

**Table 2 - Estimated Cost Distribution – Structural Measures
South River Watershed, Augusta County, Virginia**
(Dollars)

Installation Cost Items	PL-106-472 Funds ⁷				Other Funds ⁸			
	Construc- tion Costs	Engi- neering Technical Assistance Costs	Project Admin. Costs	Total PL-106-472 Cost	Construc- tion Costs	Added Land Rights	Project Admin. Costs (admin. costs + eng. services)	Total Other Funds
Robinson Hollow – Site 23:	\$621,000	\$74,000	\$12,000	\$707,000	\$316,000	\$1,000	\$8,000	\$325,000
Tom's Branch – Site 25:	\$1,156,000	\$139,000	\$27,000	\$1,322,000	\$602,000	\$1,000	\$9,000	\$612,000
Inch Branch – Site 26:	\$679,000	\$82,000	\$12,000	\$773,000	\$352,000	\$1,000	\$8,000	\$361,000
Totals:	\$2,456,000	\$295,000	\$51,000	\$2,802,000	\$1,270,000	\$3,000	\$25,000	\$1,298,000
								\$4,100,000

⁵ All tables have a price base of 2005;

⁶ Paid by the USDA/NRCS – the Federal agency responsible for assisting in installation of improvements;

⁷ 65% of total project cost (the actual federal cost/share excludes technical assistance and permit costs and cannot exceed 100% of the estimated construction cost);

⁸ 35% of total project cost;

**TABLE 3a – Robinson Hollow, Site 23
Structural Data – Dam with Planned Storage Capacity**

ITEM	UNIT	AMOUNT
Hazard Class of Structure	-	C
Seismic Zone	-	2
Total Drainage Area	Sq. Mi.	2.58
Time of Concentration	Hours	1.62
Antecedent Moisture Condition II Runoff Curve Number	-	66
Elevation, Top of Dam	Feet, MSL	1507.7
Elevation, Auxiliary Spillway Crest	Feet, MSL	Southern Spillway – 1496.5 Northern Spillway – 1496.5
Elevation, Principal Spillway Crest	Feet, MSL	1470
Auxiliary Spillway Type	-	Southern Spillway – ACB Northern Spillway – Earthen
Auxiliary Spillway Bottom Width	Feet	Southern Spillway – 55 Northern Spillway – 25
Auxiliary Spillway Exit Slope	%	Southern Spillway – 3 Northern Spillway – 4
Maximum Height of Dam	Feet	58
Volume of Fill (Rehabilitation)	Cu. Yd.	N/A*
Total Capacity	Ac.-Ft.	502
Sediment Pool	Ac.-Ft.	37
Sediment Submerged	Ac.-Ft.	3.8
Sediment Aerated	Ac.-Ft.	2.0
Floodwater Retarding Pool	Ac.-Ft.	505
Surface Area		
Sediment Pool	Acres	6.9
Floodwater Retarding Pool	Acres	32
Principal Spillway Design		
Rainfall Volume (1 day)	Inches	7.75
Rainfall Volume (10 day)	Inches	11.48
Runoff Volume (10 day)	Inches	4.38
Capacity at Crest of Auxiliary Spillway	CFS	62
Conduit Size	Inches	24
Conduit Type	-	Concrete
Frequency of Operation, Auxiliary Spillway	% chance	1
Auxiliary Spillway Hydrograph		
Rainfall Volume	Inches	10.84
Runoff Volume	Inches	6.43
Storm Duration	Hours	6
Velocity of flow (V_c)	Ft/s	Southern Spillway – 10.5 Northern Spillway – 11.2
Maximum Surface Elevation	Feet, MSL	1499.49
Freeboard Hydrograph (6-hr PMP)		
Rainfall Volume	Inches	28
Runoff Volume	Inches	22.64
Storm Duration	Hours	6
Maximum Surface Elevation	Feet, MSL	1507.68
Capacity Equivalents		
Sediment	Inches	0.27
Floodwater Retarding	Inches	3.38
* No fill associated with raising the dam, only with lengthening and raising the training dike		
ACB = Articulated Concrete Block system		
** 6-hr and 24-hr PMP storms were evaluated. The 6-hr was the most critical condition in this case.		

TABLE 3b – Toms Branch, Site 25
Structural Data – Dam with Planned Storage Capacity

ITEM	UNIT	AMOUNT
Hazard Class of Structure	-	C
Seismic Zone	-	2
Total Drainage Area	Sq. Mi.	4.56
Time of Concentration	Hours	2.18
Antecedent Moisture Condition II Runoff Curve Number	-	61
Elevation, Top of Dam	Feet, MSL	1594.7
Elevation, Auxiliary Spillway Crest	Feet, MSL	1583.5*
Elevation, Principal Spillway Crest	Feet, MSL	1542
Auxiliary Spillway Type	-	ACB
Auxiliary Spillway Bottom Width	Feet	200
Auxiliary Spillway Exit Slope	%	2
Maximum Height of Dam	Feet	68.5
Volume of Fill (Rehabilitation)	Cu. Yd.	N/A**
Total Capacity	Ac.-Ft.	1015
Sediment Pool	Ac.-Ft.	65
Sediment Submerged	Ac.-Ft.	7.9
Sediment Aerated	Ac.-Ft.	3.6
Floodwater Retarding Pool	Ac.-Ft.	950
Surface Area		
Sediment Pool	Acres	8.7
Floodwater Retarding Pool	Acres	49.7
Principal Spillway Design		
Rainfall Volume (1 day)	Inches	8.06
Rainfall Volume (10 day)	Inches	11.99
Runoff Volume (10 day)	Inches	3.88
Capacity at Crest of Auxiliary Spillway	CFS	69.5
Conduit Size	Inches	24
Conduit Type	-	Concrete
Frequency of Operation, Auxiliary Spillway	% chance	1
Auxiliary Spillway Hydrograph		
Rainfall Volume	Inches	11.01
Runoff Volume	Inches	5.87
Storm Duration	Hours	6
Velocity of Flow (V_e)	Ft/s	9.3
Maximum Surface Elevation	Feet, MSL	1587.54
Freeboard Hydrograph (6-hr PMP)		
Rainfall Volume	Inches	28
Runoff Volume	Inches	21.56
Storm Duration	Hours	6
Maximum Surface Elevation	Feet, MSL	1594.62
Capacity Equivalents		
Sediment	Inches	0.27
Floodwater Retarding	Inches	3.91
* No fill associated with raising the dam, only with lengthening and raising the training dike		
ACB = Articulated Concrete Block		
** 6-hr and 24-hr PMP storms were evaluated. The 6-hr was the most critical condition in this case.		

TABLE 3c – Inch Branch, Site 26
Structural Data – Dam with Planned Storage Capacity

ITEM	UNIT	AMOUNT
Hazard Class of Structure	-	C
Seismic Zone	-	2
Total Drainage Area	Sq. Mi.	2.70
Time of Concentration	Hours	1.74
Antecedent Moisture Condition II Runoff Curve Number	-	67
Elevation, Top of Dam	Feet, MSL	1470.6
Elevation, Auxiliary Spillway Crest	Feet, MSL	1460.5
Elevation, Principal Spillway Crest	Feet, MSL	1432
Auxiliary Spillway Type	-	ACB
Auxiliary Spillway Bottom Width	Feet	100
Auxiliary Spillway Exit Slope	%	5
Maximum Height of Dam	Feet	57
Volume of Fill (Rehabilitation)	Cu. Yd.	N/A*
Total Capacity	Ac.-Ft.	599
Sediment Pool	Ac.-Ft.	43
Sediment Submerged	Ac.-Ft.	3.1
Sediment Aerated	Ac.-Ft.	7.2
Floodwater Retarding Pool	Ac.-Ft.	556
Surface Area		
Sediment Pool	Acres	7.0
Floodwater Retarding Pool	Acres	41.8
Principal Spillway Design		
Rainfall Volume (1 day)	Inches	7.64
Rainfall Volume (10 day)	Inches	11.31
Runoff Volume (10 day)	Inches	4.69
Capacity at Crest of Auxiliary Spillway	CFS	63.9
Conduit Size	Inches	24
Conduit Type	-	Concrete
Frequency of Operation, Auxiliary Spillway	% chance	1
Auxiliary Spillway Hydrograph		
Rainfall Volume	Inches	10.88
Runoff Volume	Inches	6.61
Storm Duration	Hours	6
Velocity of Flow (V _c)	Ft/s	10.2
Maximum Surface Elevation	Feet, MSL	1463.05
Freeboard Hydrograph		
Rainfall Volume	Inches	28
Runoff Volume	Inches	22.85
Storm Duration	Hours	6
Maximum Surface Elevation	Feet, MSL	1470.54
Capacity Equivalents		
Sediment	Inches	0.30
Floodwater Retarding	Inches	3.9
* No fill associated with raising the dam, only with lengthening and raising the training dike		
ACB = Articulated Concrete Block		
** 6-hr and 24-hr PMP storms were evaluated. The 6-hr was the most critical for overtopping and the 24-hr was the most critical for breach.		

**Table 4 - Average Annual National Economic Development (NED) Costs
South River Watershed, Augusta County, Virginia
(Dollars)**

	Average Annual Costs (the amortized project installation costs)	Annual Operation and Maintenance Costs	Total Average Annual Costs	Total Average Annual Equivalent Costs ⁹
Rehabilitation of South River dams:				
Robinson Hollow – Site 23	\$59,000	\$1,200	\$60,200	\$56,000
Tom’s Branch – Site 25:	\$111,000	\$1,200	\$112,200	\$104,000
Inch Branch – Site 26:	\$65,000	\$1,200	\$66,200	\$61,000
Totals:	\$235,000	\$3,600	\$238,600	\$221,000

**Table 5 - Estimated Average Annual Flood Damage Reduction Benefits
South River Watershed, Augusta County, Virginia
(Dollars)**

Flood Damage Category	Estimated Average Annual Damages		Damage Reduction Benefits	
	Without Project	With Project	Average Annual	Average Annual Equivalents
Structure Damages:	\$48,000	\$20,000	\$28,000	\$28,000
Content Damages:	\$29,000	\$12,000	\$17,000	\$16,000
Private Clean-up Costs:	\$900	\$100	\$800	\$700
Public Clean-up Costs:	\$100	\$20	\$80	\$80
Private Income Losses:	\$1,500	\$700	\$800	\$800
Traffic Disruption Costs:	\$200	\$60	\$140	\$100
Infrastructure Damages:	\$16,000	\$6,000	\$10,000	\$10,000
Agricultural Losses:	\$30	\$10	\$20	\$15
Public Admin. Costs:	\$40	\$20	\$20	\$15
Lost Recreation Value:	\$11,000	\$0	\$11,000	11,000
Lost Property Value:	\$55,000	\$0	\$55,000	\$54,000
Totals (rounded):	\$162,000	\$39,000	123,000	\$121,000

⁹ The average annual equivalents are based on a 5.375% discount rate and a 52 year period of analysis (2 years for project installation and 50 years of expected minimum useful life, assuming site 25 is installed in year 1 and sites 23 and 26 are built in year 2).

**Table 6 - Comparison of NED Benefits and Costs
South River Watershed, Augusta County, Virginia
(Dollars)**

Evaluation Unit	Benefits			Costs	Net Change	Benefit/ Cost Ratios
	Average Annual Equivalent Benefits		Total Average Annual Equivalent Benefits	Average Annual Equivalent Costs	Net Average Annual Equivalent Benefits	
	Damage Reduction Benefits ¹⁰	Other Benefits ¹¹				
Robinson Hollow – Site 23:	\$21,000	\$20,000	\$41,000	\$56,000	-\$15,000	0.73
Tom’s Branch – Site 25:	\$74,000	\$24,000	\$98,000	\$104,000	-\$6,000	0.94
Inch Branch – Site 26:	\$26,000	\$14,000	\$40,000	\$61,000	-\$21,000	0.66
Totals:	\$121,000	\$58,000	\$179,000	\$221,000	-\$42,000	0.81

Price base: May 2005

Note: The average annual equivalents are based on a 5.375% discount rate and a 52 year period of analysis (2 years for project installation and 50 years of expected minimum useful life, assuming site 25 is installed in year 1 and sites 23 and 26 are built in year 2).

¹⁰ Damage reduction benefits displayed here are average annual amounts adjusted based on incremental analysis estimates for each site installed alone vs. the benefits achievable for installing all three dams together.

¹¹ Other benefits are costs avoided by the local sponsors from not having to breach each site.

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NRCS Headcut Erodibility Index Photo Reference.

NRCS National Engineering Manual.

NRCS National Planning Procedures Handbook.

NRCS Soil Survey of Augusta County, Virginia.

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NRCS National Watershed Manual.

River Analysis System Computer Model (HEC-RAS).

Scenic river information from www.nps.gov/rivers/index.html.

Sources for T&E species information were the Virginia Department of Game and Inland Fisheries, the Virginia Fish and Wildlife Information Service and the Virginia Department of Conservation and Recreation, Division of Natural Heritage.

REFERENCES (Cont.)

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Virginia Department of Environmental Quality. 2002 303(d) Report on Impaired Waters. Richmond, Virginia.

Water Resources Site Analysis Computer Program (SITES).

REPORT PREPARERS

The South River 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

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
R. Wade Biddix	Assistant State Conservationist for Water Resources – 2.5 years	M.S. Public Administration B.S. Agriculture	Supervisory District Cons. – 2 yrs. Planning Coordinator – 11 yrs. Area Resource Cons. - 2 yrs. District Conservationist - 4 yrs. Soil Conservationist - 4 yrs.	
Edward J. Fanning	Resource Conservationist – 1.5	B.S. Wildlife & Fisheries Management B.S. Range Management Graduate Course Work in Range Management	District Conservationist – 1.25 yrs. Soil Conservationist - 5 yrs. Sr. Environmental Analyst – 13 yrs.	
David L. Faulkner	Natural Resource Economist – 15.5	M.S. Ag. Economics B.S. Ag. Education	Ag. Economist (SCS) - 2.5 yrs. Ag. Economist (U.S.A.I.D.) - 4.5 yrs.	
Brian W. Ganoe	Geologist - 13 (retired)	B.S. Geology	NRCS Geologist - 13 yrs. Geologist (Bureau Rec.) - 2 yrs.	CPG in VA and IN, AIPG
Fred M. Garst	GIS Specialist - 8	B.S. Geology	GIS/Soil Scientist - 7 yrs. Soil Cons. Tech. - 7 yrs. Geologist (Private) – 4 yrs.	

NRCS NATURAL RESOURCES PLANNING TEAM (cont.)

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
Alica J. Ketchem	P Ing./Environmental Engineer – 11	M.S. Ag. Engineering B.S. Civil Engineering	Civil Engineer – 10 yrs.	PE
Bryan Lee	Cultural Resource Specialist – 2	MA Anthropology BA Anthropology	Archaeologist (Private) 10 years	
Mathew J. Lyons	State Conservation Engineer- 3	B.S. Civil Engineering	Professional Engineer – 5 yrs. Civil Engineer – 8 yrs.	PE
Jeffrey D. McClure	Geologist – less than 1	B.A. Geology B.A. Biology B.S. Geology	NRCS Geologist – total 1.5 yrs. Geologist (WV Dept. of Env. Prot.) - 11 yrs. Geologist (Private) – 8.5 yrs. CPG in KY and PA	
Phillip Rippé	Design Engineer - 1	M.S. Environmental Eng. B.S. Civil Engineering	Professional Engineer – 5 yrs. Civil Engineer – 9 yrs.	PE
Julius Toenniessen (Retired)	Design/Hydraulic Engineer – 10	M.S. Civil Eng. B.S. Civil Eng.	Design Engineer – 13 yrs. Hydraulic Engineer – 11 yrs.	

Special acknowledgment goes to the following people who spent many hours in the South River Watershed surveying, collecting data, meeting with landowners, and attending public meetings.

- Headwaters Soil and Water Conservation District Staff: John Kaylor
- NRCS Project Engineering Staff: Jerry D. Hughston, Project Engineer; Charles E. (Billy) Bear, Jr. (retired), Civil Engineering Technician; Barry K. Mason, Construction Inspector.

APPENDIX A

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

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

<u>Federal Agencies</u>	<u>Was Response Received on Draft Supplemental Plan/EA</u>
Environmental Protection Agency Region III, Philadelphia	No
U.S. Army Corps of Engineers, Norfolk District Wilmington District	No No
U.S. Department of the Interior Fish and Wildlife Service Annapolis, Maryland Office Gloucester, Virginia Office	No No
Federal Emergency Management Agency, Philadelphia	No
U.S. Department of Agriculture Forest Service Farm Service Agency Rural Development	No No No
<u>Virginia State Agencies</u>	
Virginia Department of Environmental Quality Office of Environmental Impact Review (State Clearinghouse)	Yes
Virginia Soil and Water Conservation Board (Governor's Designated Agency)	No
Virginia Department of Emergency Management	No
Virginia Department of Agriculture and Consumer Services	Yes
Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation	Yes
Division of Dam Safety and Floodplain Management	Yes
Division of Natural Heritage	Yes
Virginia Department of Game and Inland Fisheries	Yes

Virginia State Agencies

Was Response Received on
Draft Supplemental Plan/EA

Virginia Marine Resources Commission	No
Virginia Department of Historic Resources	Yes
Virginia Department of Transportation	Yes

Other

Virginia Association of Soil and Water Conservation Districts	No
Headwaters Soil and Water Conservation District	No
Augusta County Board of Supervisors	No
Central Shenandoah Planning District Commission	Yes
City of Waynesboro	No



1270 Nova Drive
Waynesboro, Va. 22980

July 28, 2005

NRCS
1606 Santa Rosa Road
Richmond, Va. 23229-5014

M Denise Doetzer
State Conservationist

Dear Ms Doetzer,

My wife and I are owners of 50% of the land surrounding Dam 26 (Inch Branch). The owners of the other 50 % are our daughter and her husband. We have read a copy of the Draft Supplemental Watershed Plan - Environmental Assessment for the rehabilitation of three dams in the South River Watershed in Augusta County, Va. We thought the draft report was very well thought out and based on good data. We also thought it was well written. However we do have some comments we would like to share with you.

1. The project is scheduled to take two years. Will access be provided to our house beside Dam during the whole period of time. We spend much of our time there.
2. The outfall has been repaired at considerable expense within the past year. Is it necessary to replace the existing square outfall with a rectangular one? The existing outfall has been in place through all the floods for fifty years without a problem.
3. If the outfall is replaced, the lake will have to be drained. The last time this was done we lost all of our fish, and replaced them at our expense. Will the State replace them this time. Also if the lake is drained will existing sediment be excavated..We did half the lake at our expense last time. Since that time the lake has risen quite a few times and the sediment has filled much of the work we did. We think the numbers on the rate of sediment build up based on the rainfall numbers the last few years are quite a bit on the optimistic side.
4. Will the auxiliary spillway be the same height as it is currently. When the spillway overflows water comes up on the door of the basement of our daughters house. A further increase in height would cause a severe problem.
5. The new armored spillway should be dirt filled or be made so it can be walked on easily.

Very truly yours,

William Blafey

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 2, 2005

Mr. William Blakey
1270 Nova Drive
Waynesboro, VA 22980

Dear Mr. Blakey:

Thank you for your letter regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. My response to your concerns follow:

1. Access to the residential properties in the area will be provided throughout the construction period of the project.
2. The existing square principal spillway risers do not meet the current design criteria for a high hazard structure. The risers will be upgraded to meet the D by 3D standard (the diameter of the pipe on one side and 3 times the diameter of the pipe on the other side). In this case, the riser will be 2 feet X 6 feet for a 24" pipe.
3. When the risers are replaced, the lake will have to be drained. Restocking of the fish is a local issue and not part of our project. However, the Headwaters Soil and Water Conservation District in Verona may be able to assist you with restocking the lake. The removal of sediment is not part of the rehabilitation project. Based on the sediment survey we conducted, the lake has adequate sediment storage for the expected life of the structure.
4. The crest of the auxiliary spillway will remain the same elevation. This elevation was set in order to store the 100-year flood event. Any storm event greater than the 100-year event, is designed to flow through the auxiliary spillway without overtopping the dam.
5. The proposed plan is to armor the auxiliary spillway with articulated concrete blocks. These will be filled with soil and the spillway vegetated.

Thanks again for your comments. If you have any further questions please contact me.

Sincerely,

W. Ray Doetzer (ACTING)

M. DENISE DOETZER
State Conservationist

For

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona



W. Taylor Murphy, Jr.
Secretary of Natural
Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124

FROM: Thomas I. Roberts P.E. – Dam Safety Engineer
Virginia Department of Conservation and Recreation
Dam Safety and Floodplain Management
RU Business Technology Park
6245 University Park Drive, Suite A
Radford, Virginia 24141
540-831-4071 Office Phone
540-831-4072 Fax
888-408-5564 For Emergencies
thomas.roberts@dcr.virginia.gov
Web Site <http://www.dcr.virginia.gov>

Action: Wade
Copy: Denise -
Ray -

facsimile transmittal

To: M. Denise Doetzer, State Conservationist **Fax:** 804-287-1737

From: Thomas I Roberts, PE **Date:** September 1, 2005

Re: Comments on: Supplemental Watershe Pages: 2 including this page
Plan-Environmental Assessment for
the South River Watershed, Dams #23
(01508 Robinson Hollow), #25 (01502
Tom's Branch) and #26 01501 (Inch
Branch)

CC:

Urgent For Review For Approval Please Reply For Your Files

Ms. Doetzer-

Thank you for sending me a copy of the above referenced document for comment. I have the following comments to offer:

1. On page 9 it states that "Each of the three dams is equipped with IFLOWS". I believe that #25, Inch Branch, does not have IFLOWS.

2. On page 12 and page 17 the embankment drains are addressed. Since there was "excessive amounts of silt present, which blocked a majority of the pipe" for the embankment drainpipe at Inch Branch, I recommend that during the preparation of the rehabilitation plan, the stone gradation in the embankment filter drain be checked against a sieve analysis of a sample of the embankment material for each of the three dams.
3. At Tom's Branch there is believed to be a 2" galvanized steel pipe through the dam with a valve at the lower end near the outfall headwall, buried in an unmarked location. This pipe should be located and determine whether or not it is under pressure. Due to the age of the galvanized pipe, if it is under pressure, this could be a serious issue for dam embankment stability and embankment piping.

Again, thank you for the opportunity to make comment on this plan. In general, the plan is an very well prepared and conceived document and study.

Tom Roberts



United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 8, 2005

Mr. Thomas Roberts, PE
Virginia Department of Conservation and Recreation
Division of Dam Safety and Floodplain Management
RU Business Technology Park
6245 University Park Drive, Suite A
Radford, Virginia 24141

Dear Mr. Roberts:

Thank you for your letter regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. My responses to your comments follow:

1. The IFLOWS paragraph on page 9 has been revised to delete Site 26, Inch Branch. Your comment had Site 25, Inch Branch, but Site 26 is Inch Branch. That is the site that does not have an IFLOWS gauge.
2. During the final design process, the embankment drains will be checked and addressed.
3. NRCS cannot find anything in our files that indicate this 2" galvanized pipe was ever installed. We will check on this and locate it if we can during construction. This was part of the planned rehabilitation activities.

Thanks again for your comments. If you have any further questions please contact me.

Sincerely,

A handwritten signature in cursive script that reads "M. Denise Doetzer, Acting S.O.S.".

M. DENISE DOETZER
State Conservationist

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona

From: Steve Rosenberg
Sent: Thursday, August 25, 2005 10:50 AM
To: Pat Coffield
Cc: Nancy Wilson
Subject: South River Watershed Agreement

I have completed my review of the above-referenced document and offer the following comments:

1. In the sixth recital (i.e. "whereas" clause), "South River Dam Numbers 23, 25, and 25" should be changed to read "South River Dam Numbers 23, 25, and 26[.]"

2. The last recital references a supplemental plan as "annexed to and made a part of this agreement" but no such supplemental plan is attached. A draft plan was distributed to the board of supervisors at the staff briefing on July 25, 2005. Has the plan been reviewed by county staff, and is it acceptable to the county? Has it been finalized? (I note that the transmittal letter from the state conservationist invites comments until September 1, 2005, so the plan likely is not finalized.) In my view, the agreement should not be presented to the board of supervisors for approval until the plan is finalized and attached. I will send you plan

3. In paragraph 2, I question whether "The Augusta County Board of Supervisors" should be changed to "The Augusta County Board of Supervisors and City of Waynesboro[.]"

4. Paragraph 3 requires the sponsors to "acquire all land rights, easements or right-of-ways in connection with the planned works of improvement." Do you know whether any such acquisitions are required? Page 46 of the draft plan states "[a]t the three dam sites, it is projected that an additional 2 acres of landrights will be needed in order to accommodate the larger dam footprints that will result from the rehabilitation project." Perhaps all of the land needed is owned by the United States Forest Service, so that it will not be an issue. You might check with Bobby Whitescarver to determine whether that is the case, and if so, what sort of an agreement will be required (e.g. amendment to special use permit).

5. On the last line of paragraph 5, "7 C.F.R. 21.100©" should be changed to "7 C.F.R. 21.100(C)[.]"

6. Paragraph 9 requires that the sponsors enter into conservation agreements with the owners of not less than 50% of the land in the drainage area for the dams. Has the feasibility of this requirement been considered? Again, the land in the drainage area may be owned by USFS, so that there is no issue.

7. I call to your attention the requirements set forth in paragraph 19 concerning a drug-free workplace.

8. I also call to your attention the requirement of paragraph 19 entitled "Certification Regarding Lobbying[.]" (There are two paragraphs numbered 19.) Subparagraph (c) of that paragraph requires that the sponsors include the appropriate certification language in any ITB or RFP issued in connection with the works of improvement.

9. The agreement provides that its signing "was authorized by a resolution[.]" Do you want me to prepare such a resolution? Please

10. The signature block for the City of Waynesboro should be revised to reflect execution of the agreement by the "Mayor" instead of the "Chairperson[.]"

Let me know if you have any questions.

Steve Rosenberg
County Attorney
Augusta County, Virginia
18 Government Center Lane
P.O. Box 590
Verona, Virginia 24482-0590
(540) 245-5017 (VOICE)
(540) 245-5096 (FAX)
srosenberg@co.augusta.va.us

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 2, 2005

Mr. Steve Rosenberg
Augusta County Attorney
18 Government Center Lane
P.O. Box 590
Verona, Virginia 24482

Dear Mr. Rosenberg:

Thank you for your email regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. We appreciate the detailed review you did and the comments you provided on this project.

The following are the NRCS responses and actions taken regarding your comments.

Comment 1: A correction has been made to the agreement.

Comment 2: The final plan will be completed prior to the watershed sponsors being asked to sign the watershed agreement. The comment period closes on September 1, 2005.

Comment 3: The City of Waynesboro was added.

Comment 4: Any additional land rights, easements, or right-of-ways will be specifically identified as part of the development of the final designs for each dam. A real property work map will be developed for each dam which will identify these areas. The county will then be required to acquire the necessary landrights, easements or right-of-ways.

Comment 5. A correction has been made to the agreement

Comment 6: More than 50% of the drainage area above these dams is in permanent forest land owned by the U.S. Forest Service. Therefore, the watershed is protected and there is no issue to worry about for these dams.

Comment 7. Just a comment to the Board members. No action or response is required from NRCS.

Mr. Steve Rosenberg
Page 2

Comment 8: Just a comment to the Board members. The error in numbering was corrected in the agreement. No further action or response is required by NRCS.

Comment 9: Just a question to the County. Usually the sponsors pass a resolution before signing the agreement.

Comment 10: A correction has been made to the agreement.

Again, thanks for your comments. I think they have been adequately addressed.

Sincerely,

W. Ray Douthett (ACTING)

for M. DENISE DOETZER
State Conservationist

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona

W. Tayloe Murphy, Jr.
Secretary of Natural
Resources



Action: Wade B

Copy: Denise —
Ray —

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

217 Governor Street
Richmond, Virginia 23219-2010
Telephone (804) 786-7951 FAX (804) 371-2674 TDD (804) 786-2121

August 9, 2005

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

Re: Draft Supplemental Watershed Plan – Environmental Assessment South River Dams

Dear Ms. Doetzer:

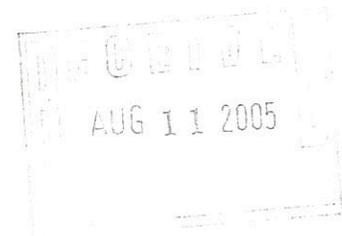
The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant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

In addition, 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.

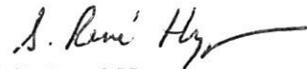
The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, which may contain information not documented in this letter. Their database may be accessed from http://www.dgif.virginia.gov/wildlife/info_map/index.html , or contact Shirl Dressler at (804) 367-6913.



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.

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.

Sincerely,



S. René Hypes
Project Review Coordinator

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 2, 2005

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

Dear Ms. Hypes:

Thank you for your letter regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. We appreciate the research you have conducted and the coordination you have done with the DCR, Division of Natural Heritage Biotics Data System, the Department of Agriculture and Consumer Services Database and the Virginia Department of Game and Inland Fisheries Database.

Through your review and submission of comments, we received the needed information on the potential impacts to natural heritage resources, state listed threatened and endangered plant and insect species, and fish and wildlife resources. We are pleased the project will not have any long-term effect on these resources. We will contact DCR for an update on this natural heritage information if a significant amount of time passes before the project is implemented.

Thanks again for your comments on this worthwhile project.

Sincerely,

W. Ray Dault (ACTING)

for
M. DENISE DOETZER
State Conservationist

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona



Action: Wade
Copy: Denise —
Rau —

COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P. O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
www.deq.virginia.gov

Robert G. Burnley
Director

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

August 30, 2005

Ms. M. Denise Doetzer
State Conservationist
Natural Resources Conservation Service, USDA
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229

RE: Draft Supplemental Watershed Plan and Environmental Assessment for
the South River Watershed (Rehabilitation of Dams 23, 25, and 26)
DEQ-05-189F

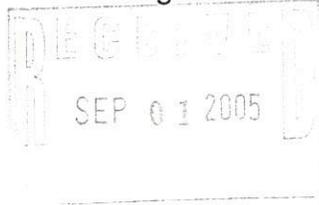
Dear Ms. Doetzer:

The Commonwealth of Virginia has completed its review of the above document (hereinafter "Supplemental EA"). The Department of Environmental Quality is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. The following state agencies and regional planning district commission joined in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Agriculture and Consumer Services
Department of Conservation and Recreation
Department of Transportation
Department of Historic Resources
Central Shenandoah Planning District Commission.

In addition, the following agencies and localities were invited to comment:

Marine Resources Commission
Department of Emergency Management
City of Waynesboro
Augusta County.



Project Description

The Natural Resources Conservation Service of the U.S. Department of Agriculture has published a supplement to the original watershed plan for rehabilitation of three dams along the South River Watershed in Augusta County. The County, along with the City of Waynesboro and the Headwaters Soil and Water Conservation District, are the local sponsors. The purpose of the project is to rehabilitate the dams to bring them into compliance with dam safety and design criteria and reduce the likelihood of downstream flooding. The proposed project would involve widening and/or armoring the auxiliary spillways and raising the top of each dam by constructing parapet walls. The alternative would involve breaching of the dams' earthen embankments by the local sponsors (Supplemental EA, page v). The dams are known as Robinson Hollow, Toms Branch, and Inch Branch (Supplemental EA, pages 1, 5, and 9).

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Department of Conservation and Recreation (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the project area. "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. According to DCR, natural heritage resources are present in the project vicinity. However, DCR does not anticipate that the project would adversely affect these resources because of the scope of the project and the distance to the resources.

Under a Memorandum of Agreement between DCR and the Department of Agriculture and Consumer Services (VDACS), DCR has the authority to report for VDACS on state-listed plant and insect species. The proposed project will not affect any documented state-listed plant and insect species. VDACS concurs with this conclusion (Fulgham/Ellis, 8/30/05). DEQ recommends that the Natural Resources Conservation Service contact DCR's Division of Natural Heritage (Rene` Hypes, telephone (804) 371-2708) to secure updated information on natural heritage resources if a significant amount of time passes before the project is implemented and the foregoing information used.

2. Wildlife Resources. The Department of Game and Inland Fisheries, 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. The Department (hereinafter "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 the Department of Environmental Quality 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.

(a) *Findings.* DGIF states that the project will not adversely affect any threatened or endangered species of wildlife under its jurisdiction.

According to DGIF, the Virginia sneezeweed and the swamp pink, two plants that are on the state endangered species list and the federal threatened species list, are present within 2 miles of the project area. DGIF understands that the Department of Conservation and Recreation's Division of Natural Heritage has determined that the proposed dam rehabilitation projects would not adversely affect any state-listed plants or insects. As indicated above (see item 2), VDACS confirms this conclusion.

(b) *Recommendations and Rationale.* DGIF recommends preserving undisturbed forested buffers of at least 100 to 200 feet in width along all streams in the watershed upstream of these dams, and around the reservoirs, as a means of protecting the streams and reservoirs. These streams are classified as Class III and Class IV Cold Water Streams containing wild brook trout.

At this time, 41% of the watershed upstream is owned by the U.S. Forest Service. Most of the remaining land is also forested. The Supplemental EA states that there is "little likelihood of land use changes other than scattered residential use" (page 2, "Land Use" heading). According to the Department of Game and Inland Fisheries, caution is warranted with regard to the potential adverse effects of future development upon the watershed and its wildlife and fishery resources due to habitat loss and increases in erosion, sedimentation, and runoff volume. The above recommendations are made for these reasons.

3. *Dam Safety.* DCR's Division of Dam Safety and Floodplain Management has determined that the project would not adversely affect floodplains along the South River or its tributaries.

4. *Solid and Hazardous Waste Management.* The Supplemental EA did not address either solid waste issues or hazardous waste issues; nor did it indicate that the Natural Resources Conservation Service had checked DEQ's waste data bases, according to DEQ's Waste Division. DEQ's Waste Division

did a cursory review of its data files and did not identify any waste sites likely to affect or be affected by this project.

DEQ encourages the Service to implement pollution prevention principles in this and other projects. These principles include the reduction of waste materials at the source, re-using materials, and recycling solid waste materials. The Service should also minimize hazardous wastes.

5. Air Quality.

(a) *Fugitive Dust Control.* During construction activities, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 et seq. of the Regulations for the Control and Abatement of Air Pollution. These precautions include, but are not limited to, the following:

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

(b) *Open Burning.* If project activities include the burning of construction or demolition material, this activity must meet the requirements of the Regulations for open burning (9 VAC 5-40-5600 et seq.), and it may require a permit (see "Regulatory and Coordination Needs," item 1, below). The Regulations provide for, but do not require, the local adoption of a model ordinance concerning open burning. The Service should contact Augusta County officials to determine what local requirements, if any, exist. The model ordinance includes, but is not limited to, the following provisions:

- All reasonable effort shall be made to minimize the amount of material burned, with the number and size of the debris piles;
- The material to be burned shall consist of brush, stumps and similar debris waste and clean burning demolition material;
- The burning shall be at least 500 feet from any occupied building unless the occupants have given prior permission, other than a building located on the property on which the burning is conducted;
- The burning shall be conducted at the greatest distance practicable from highways and air fields;
- The burning shall be attended at all times and conducted to ensure the best possible combustion with a minimum of smoke being produced;

- The burning shall not be allowed to smolder beyond the minimum period of time necessary for the destruction of the materials; and
- The burning shall be conducted only when the prevailing winds are away from any city, town or built-up area.

(c) *Fuel-burning Equipment.* Fuel-burning equipment used in dam rehabilitation or for other purposes may require permitting by DEQ. See "Regulatory and Coordination Needs," item 1, below.

6. *Water Quality and Wetlands.* DEQ's Valley Regional Office indicates that it is unclear whether the dams contribute to current water quality impairments in Back Creek, Mills Creek, and Toms Branch. A Total Maximum Daily Load (TMDL) study, to be completed in 2014, may address water quality impacts of these dams, if indeed they contribute to the impairments.

7. *Historic Structures and Archaeological Resources.* The Supplemental EA indicates (page 1) that the three dams were built in 1956 (Robinson Hollow and Inch Branch) and 1957 (Toms Branch). According to the Department of Historic Resources, these dams are not eligible for listing on the National Register of Historic Places because they are not yet 50 years old. Moreover, the limited ground disturbance will take place mainly on previously affected areas; accordingly, the likelihood that intact archaeological resources are present is minimal. No known archaeological resources or architectural resources listed in or eligible for the National Register of Historic Places or the Virginia Landmarks Register are present within the Area of Potential Effect. Accordingly, the Department of Historic Resources finds that the project will not affect historic properties.

In the event unanticipated archaeological resources are encountered during construction, the construction should stop and the Service should contact the Department of Historic Resources immediately (Roger Kirchen, telephone (804) 367-2323, extension 153).

8. *Natural Area Preserves.* According to the Department of Conservation and Recreation, there are no state Natural Area Preserves in the project vicinity.

9. *Floodplains.* According to the Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management, these projects would not adversely affect floodplains along the South River or its tributaries.

10. *Transportation.* According to the Department of Transportation, the construction phase of the project may cause temporary disruption of traffic flows

in the area. Greater impacts to area roads would result, however, if the dams are not repaired and one or more of them should be breached.

11. Local and Regional Comments. The Central Shenandoah Planning District Commission has no comments on this project. Augusta County and the City of Waynesboro did not respond to our invitation to comment.

Regulatory and Coordination Needs

1. Air Quality Regulation. In the event open burning is contemplated, the Service should contact DEQ's Valley Regional Office (Sharon Foley, Air Permits Manager, telephone (540) 574-7821) to determine whether an open burning permit is required. Similarly, the Service should inquire about air pollution control permits if it intends to use fuel-burning equipment in connection with the project.

2. Solid and Hazardous Waste Management. Any soil 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. These include, but are not limited to, the Virginia Waste Management Act (*Virginia Code* sections 10.1-1400 *et seq.*), the Virginia Hazardous Waste Management Regulations (9 VAC 20-60), and the Virginia Solid Waste Management Regulations (9 VAC 20-80); see the enclosed comments of DEQ's Waste Division (DEQ memo, Brockman to Ellis, dated August 3, 2005) for additional details.

3. Water Quality Regulation. The dam rehabilitation efforts contemplated in this project may require a Virginia Water Protection Permit from DEQ. Inquiries should be directed to DEQ's Valley Regional Office (Raymond Gay, telephone (540) 574-7898).

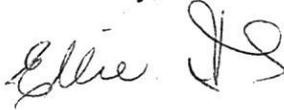
4. Transportation. All work with the potential to affect roadways or other transportation facilities should be coordinated with VDOT's Verona Residency (telephone (540) 248-9321).

5. Subaqueous Lands Encroachment. DEQ recommends that the Natural Resources Conservation Service contact the Marine Resources Commission (Tracy West, telephone (757) 247-2200) to determine whether a permit will be required for this project. The Commission administers a permit requirement for encroachment in, on, or over state-owned subaqueous lands.

Ms. M. Denise Doetzer
Page 7

Thank you for the opportunity to review this project. If you have questions, please feel free to contact me (telephone 698-4325) or Charles Ellis of this Office (telephone 698-4488).

Sincerely,



Ellie L. Irons
Program Manager
Office of Environmental Impact Review

Enclosures

cc: Andrew K. Zadnik, DGIF
Keith R. Tignor, VDACS
Scott Bedwell, DCR
Allen Brockman, DEQ-Waste
Ronald D. Phillips, DEQ-VRO
Nicholas M. Nies, VDOT
Tracy West-Pinkoski, MRC
Roger W. Kirchen, DHR
William H. Strider, Central Shenandoah PDC
Patrick J. Coffield, Augusta County
Douglas C. Walker, City of Waynesboro

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 2, 2005

Ms. Ellie L. Irons, Program Manager
Office of Environmental Review
Virginia Department of Environmental Quality
P.O. Box 10009
Richmond, VA 23240

Dear Ms. Irons:

Thank you for coordinating and submitting the State's response regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. We appreciate the input from the various agencies that responded. We will continue to work with these agencies during the implementation of the project.

My responses to the section entitled *Regulatory and Coordination Needs* follow:

1. In the event open burning is contemplated, we will contact DEQ's Valley Regional Office for their permit requirements.
2. Any soil suspected of contamination, or wastes that are generated, will be tested and disposed of in accordance with applicable federal, state, and local laws and regulations.
3. We will coordinate with DEQ regarding the need for a Virginia Water Protection Permit for the implementation of this project.
4. We will coordinate, as needed, with VDOT's Verona Residency regarding any impacts to roadways or other transportation facilities.
5. We will coordinate with the Virginia Marine Resources Commission regarding the need for a VMRC permit for the implementation of this project.

Thanks again for the State's review of this project.

Sincerely,

W. Ray Doetzer (ACTING)

M. DENISE DOETZER
State Conservationist

Fbr

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona

Ellis, Charles

From: Andrew Zadnik [Andrew.Zadnik@dgif.virginia.gov]
Sent: Tuesday, August 16, 2005 11:29 AM
To: Ellis, Charles
Cc: ProjectReview.Richmond_PO.DGIF@dgif.virginia.gov; Edward.Fanning@va.usda.gov
Subject: 05-189F_Supplemental South River Watershed Plan_dam safety

This project involves the rehabilitation of three dams in the South River watershed. The dams are on Inch Branch, Robinson Hollow, and Toms Branch, all in eastern Augusta County. The NRCS and localities feel this project is necessary because the dams have been classified as a high hazard due to changes in downstream land use. The purpose of this project is to continue to provide flood protection and reduce the risk of loss of human life. The work will involve raising the top of each dam with a 4-5 ft parapet wall, and armor the spillway with articulated concrete blocks. Also, the Robinson Hollow dam will have the northern spillway widened by 5 ft. We understand that this work will not change the permanent pool elevation nor change the current levels of flooding downstream.

Our records indicate the presence of the Federal Threatened/State Endangered Virginia sneezeweed and the Federal Threatened/State Endangered swamp pink within 2 miles of this project. The conservation of State-listed plant species falls under the jurisdiction of the VA Dept. of Agriculture and Consumer Services, which has established a MOA with the VA Dept. of Conservation and Recreation. We understand NRCS has already received a letter from the VDCR- Division of Natural Heritage, stating that this activity will not affect any documented State-listed plants or insects. We do not anticipate a significant adverse impact upon threatened or endangered species under our jurisdiction to occur due to this project.

In 2005, 41% of the watershed upstream of the dams was owned by the U. S. Forest Service. Most the remaining land also is forested. The Environmental Assessment states that there is "little likelihood of land use changes other than scattered residential use". We believe some caution is warranted regarding the potential adverse impacts that future development may have upon the watershed and its wildlife and fishery resources due to habitat loss, and increases in erosion, sedimentation, and runoff volume. The streams above all three reservoirs are classified as Class III and IV Cold Water Streams containing wild brook trout. We recommend preserving undisturbed wooded buffers of at least 100-200 feet in width around all streams in the watershed and around the reservoirs.

Thank you,

Andrew K. Zadnik
Environmental Services Section Biologist
Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230

(804) 367-2733
(804) 367-2427 (fax)

W. Tayloe Murphy, Jr.
Secretary of Natural
Resources



Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION

217 Governor Street
Richmond, Virginia 23219-2010
Telephone (804) 786-7951 FAX (804) 371-2674 TDD (804) 786-2121

MEMORANDUM

DATE: August 15, 2005

TO: Mr. Charles H. Ellis, III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Va. 23219
chellis@deq.state.va.us
(804) 698-4488

FROM: Robert Munson, Planning Bureau Manager
Virginia Department of Conservation and Recreation

SUBJECT: DEQ-05-189F: South River Watershed Plan

After review of the above referenced project, the Department of Conservation and Recreation's (DCR) Division of Planning and Recreation Resources has determined that the above-mentioned project is acceptable as proposed.

The Department of Conservation and Recreation (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.

In addition, 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.

Based on the information provided in the application, DCR's Division of Dam Safety and Flood Plain Management has determined that there would be no negative impacts to floodplains along the South River or its tributaries.

Thank you for the opportunity to comment on this project.

Sincerely,

A handwritten signature in cursive script that reads "Robert S. Munson". The signature is written in dark ink and is positioned above the typed name.

Robert S. Munson
Planning Bureau Manager



RECEIVED

AUG 04 2005

DEQ-Office of Environmental
Impact Review

Robert G. Burnley
Director

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

COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P. O. Box 10009, Richmond, Virginia 23240
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www.deq.virginia.gov

MEMORANDUM

TO: Charles H. Ellis, III, Environmental Program Planner

FROM: *ARB* Allen Brockman, Waste Division Environmental Review Coordinator

DATE: August 3, 2005

COPIES: Sanjay Thirunagari, Waste Division Environmental Review Manager; file

SUBJECT: NRCS—South River Watershed Plan; Augusta County, Virginia; DEQ Project Code 05-189F

The Waste Division has completed its review of the Environmental Impact Report for the rehabilitation of dams in the South River Watershed Plan, as proposed by the Natural Resources Conservation Service in Augusta County, Virginia. We have the following comments concerning the waste issues associated with this project:

The report did not address either solid waste or hazardous waste issues and sites. Nor did the report indicate that the Department's waste databases had been checked. However, the Waste Division's cursory review of its data files did not identify any waste sites likely to impact or be impacted by the project.

Any soil that is suspected of contamination, during rehabilitation of the dams, or any 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 hazardous wastes should be minimized.

If you have any questions or need further information, please contact Allen Brockman at (804) 698-4468.

Ellis, Charles

From: Phillips, Ronald
Sent: Wednesday, August 17, 2005, 12:56 PM
To: Ellis, Charles
Cc: Simmons, Larry
Subject: EIR Comments for 05-189F

The DEQ-Valley Regional Office has reviewed the South River Watershed Dam proposal. Prior to rehabilitation, the project sponsors should contact Raymond Gay (540-574-7898) at DEQ to inquire about Virginia Water Protection permitting requirements.

As a general comment, it is unclear at this time whether the dams contribute to the current water quality impairments that exist in Back Creek, Mills Creek, and Toms Branch. TMDLs to be completed in 2014 may address the impact, if any, that the dams have on water quality.

Ron Phillips
Senior Compliance Manager
DEQ Valley Regional Office
P.O. Box 3000
111 Early Rd.
Charlottesville, VA 22801
404-574-7846 (phone)
404-574-7907 (fax)
phillips@deq.virginia.gov
www.deq.virginia.gov



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219-2000

GREGORY A. WHIRLEY
ACTING COMMISSIONER

RECEIVED

AUG 09 2005

DEQ-Office of Environmental
Impact Review

August 5, 2005

Mr. Charles H. Ellis III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main St., Sixth Floor
Richmond VA 23219

Re: South River Watershed Plan

Dear Mr. Ellis:

The Virginia Department of Transportation has reviewed the information provided for the referenced project. Our review covers impacts to existing and proposed transportation facilities.

The Supplemental Watershed Plan for the South River Watershed should have a minimum impact on transportation facilities in the area. Impact to transportation facilities will be limited to the temporary disruption of traffic flow associated with the construction phase of this project. However, impacts to the transportation facilities for this area will be greater if the project is not constructed and a breach of the dam should occur.

All work with the potential to effect roadways or other transportation facilities should be coordinated with VDOT's Verona Residency (540) 248-9321

Thank you for the opportunity to comment on this project.

Sincerely,

Nicholas Nies
Environmental Specialist
Virginia Department of Transportation
(804) 786-1092



RECEIVED

AUG 16 2005

COMMONWEALTH of VIRGINIA

Department of Historic Resources

2801 Kensington Avenue, Richmond, Virginia 23221

DEQ-Office of Environmental
Impact Review

Kathleen S. Kilpatrick
Director

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

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

August 11, 2005

Mr. Charles H. Ellis, III
DEQ Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Virginia 23219

Re: South River Watershed Plan
DHR File No. 2005-1031; DEQ Project # **05-189F**

Dear Mr. Ellis:

Our office has received directly from USDA – Natural Resources Conservation Service the supplement to the Environmental Assessment for the project referenced above. The plan includes the rehabilitation of three dams: Robinson Hollow (Site 23), Toms Branch (Site 25), and Inch Branch (Site 26). Generally, these rehabilitations will include raising the height of the dams and general maintenance on the risers, dikes, toe drains, spillways, and access roads.

It is reported that these structures were constructed in 1956 and 1957, and, as such, do not surpass the 50-year threshold for National Register eligibility. In addition, the limited ground disturbance will take place mainly on previously impacted areas and the likelihood that intact archaeological resources are present is minimal. We understand that NRCS has consulted directly with the US Forest Service and they had little concern about these actions. No known archaeological or architectural resources listed in or eligible for the Virginia Landmarks Register and the National Register are within the Area of Potential Effect. Accordingly, a determination of *no historic properties affected* is appropriate for this undertaking. Consistent with current NRCS guidelines, in the event that unanticipated cultural resources are encountered during construction all such action shall cease and our office shall be contacted immediately.

We appreciate the opportunity to comment on this project. If you have any questions concerning these comments, please contact me at (804) 367-2323 x153 or email roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Archeologist
Office of Review and Compliance

Cc: Ms. M. Denise Doetzer, State Conservationist, NRCS

Administrative Services
10 Courthouse Avenue
Petersburg, VA 23803
Tel: (804) 863-1624
Fax: (804) 862-6196

Capital Region Office
2801 Kensington Ave.
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 Ave., SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Winchester Region Office
107 N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

Central Shenandoah

PLANNING DISTRICT COMMISSION

William H. Strider
Executive Director

August 29, 2005

Mr. Charles H Ellis, III
Department of Environmental Quality
Division of Environmental Enhancement
629 East Main Street, 6th Floor
Richmond, VA 23219

Re: Environmental Assessment
Project Sponsor: USDA/Natural Resources Conservation Service
Project Title: South River Watershed Plan

Dear Mr. Ellis:

The Central Shenandoah Planning District Commission has no comments on the above referenced project at this time. Thank you for your notification and permission to comment.

Sincerely,



William H. Strider
Executive Director

WHS:rw





Action: Wade B

Copy: Mat Z

Copy: Denise —
Ray —

COMMONWEALTH of VIRGINIA

Department of Historic Resources

2801 Kensington Avenue, Richmond, Virginia 23221

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Kathleen S. Kilpatrick
Director

Tel: (804) 367-2323
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www.dhr.virginia.gov

August 11, 2005

Mr. Charles H. Ellis, III
DEQ Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Virginia 23219

Re: South River Watershed Plan
DHR File No. 2005-1031; DEQ Project # 05-189F

Dear Mr. Ellis:

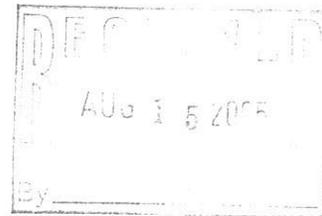
Our office has received directly from USDA – Natural Resources Conservation Service the supplement to the Environmental Assessment for the project referenced above. The plan includes the rehabilitation of three dams: Robinson Hollow (Site 23), Toms Branch (Site 25), and Inch Branch (Site 26). Generally, these rehabilitations will include raising the height of the dams and general maintenance on the risers, dikes, toe drains, spillways, and access roads.

It is reported that these structures were constructed in 1956 and 1957, and, as such, do not surpass the 50-year threshold for National Register eligibility. In addition, the limited ground disturbance will take place mainly on previously impacted areas and the likelihood that intact archaeological resources are present is minimal. We understand that NRCS has consulted directly with the US Forest Service and they had little concern about these actions. No known archaeological or architectural resources listed in or eligible for the Virginia Landmarks Register and the National Register are within the Area of Potential Effect. Accordingly, a determination of *no historic properties affected* is appropriate for this undertaking. Consistent with current NRCS guidelines, in the event that unanticipated cultural resources are encountered during construction all such action shall cease and our office shall be contacted immediately.

We appreciate the opportunity to comment on this project. If you have any questions concerning these comments, please contact me at (804) 367-2323 x153 or email roger.kirchen@dhr.virginia.gov.

Sincerely,

Roger W. Kirchen, Archeologist
Office of Review and Compliance



Cc: Ms. M. Denise Doetzer, State Conservationist, NRCS

Administrative Services
10 Courthouse Avenue
Petersburg, VA 23803
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Fax: (804) 862-6196

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Tel: (540) 857-7585
Fax: (540) 857-7588

Winchester Region Office
107 N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

United States Department of Agriculture



Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1663
Fax: 804/287-1736

September 2, 2005

Mr. Roger W. Kirchen
Office of Review and Compliance
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, Virginia 23221

Dear Mr. Kirchen:

Thank you for your letter regarding the rehabilitation of the three South River Watershed Dams in Augusta County, Virginia. We appreciate the research you have conducted for this project.

We agree with your determinations regarding the impacts to archaeological resources and historic properties for this undertaking. Consistent with NRCS guidelines, in the event that unanticipated cultural resources are encountered during construction, all such action will cease and we will contact your office immediately.

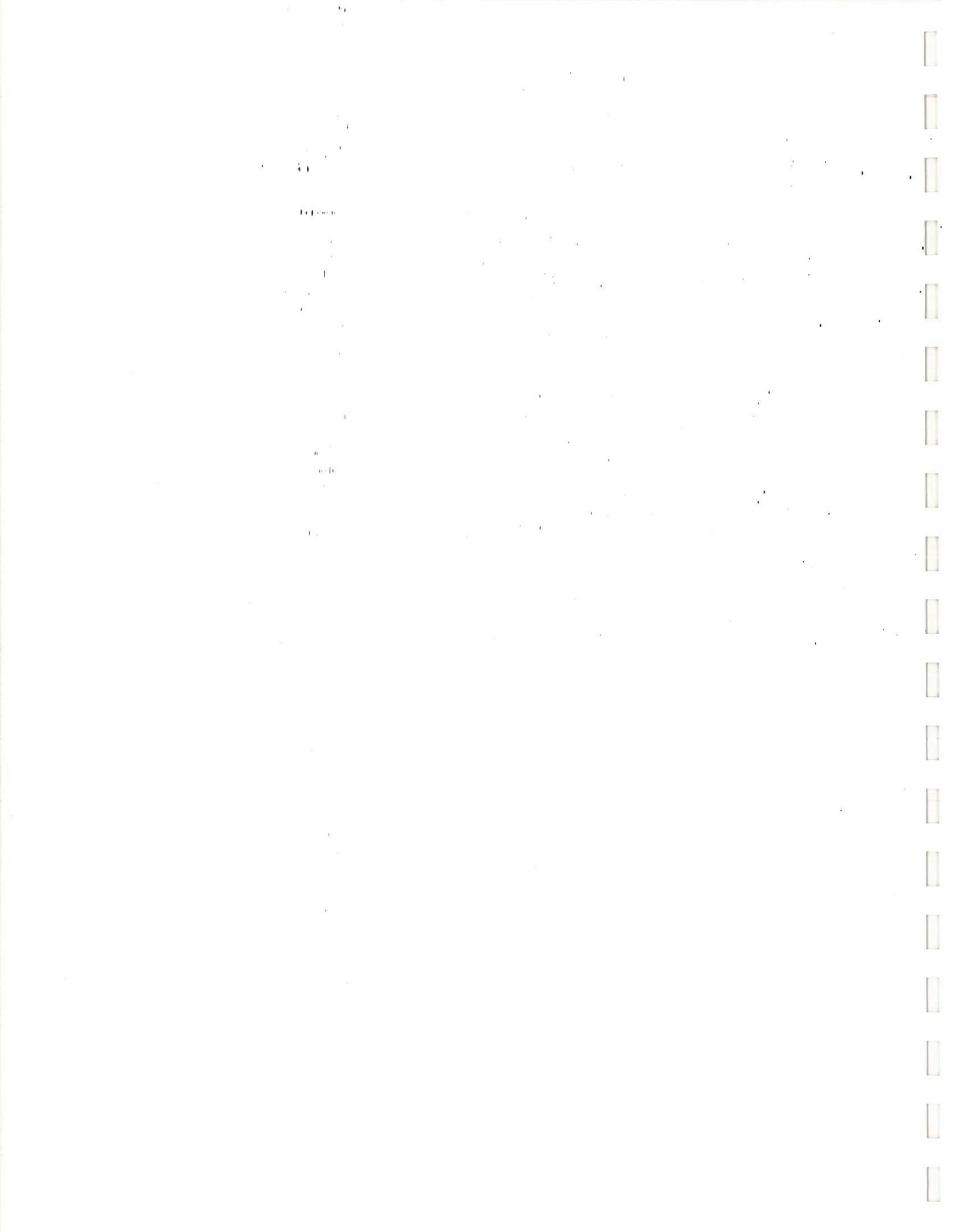
Thanks again for your comments on this worthwhile project.

Sincerely,

W. Ray Doetzer (ACTING)

For
M. DENISE DOETZER
State Conservationist

Cc: Charles Horn, Headwaters SWCD, Verona
Bobby Whitescarver, DC, Verona



APPENDIX B

Table B1. Toms Branch Water Surface Elevations for the 100-Year Frequency Storm Event

Table B2. Robinson Hollow Water Surface Elevations for the 100-Year Frequency Storm Event

Table B3. Inch Branch Water Surface Elevations for the 100-Year Frequency Storm Event

Table B4. Depth of Water Flow over the Bridges during Flooding Events

Figure B1. Breach Inundation Map of the South River Dams

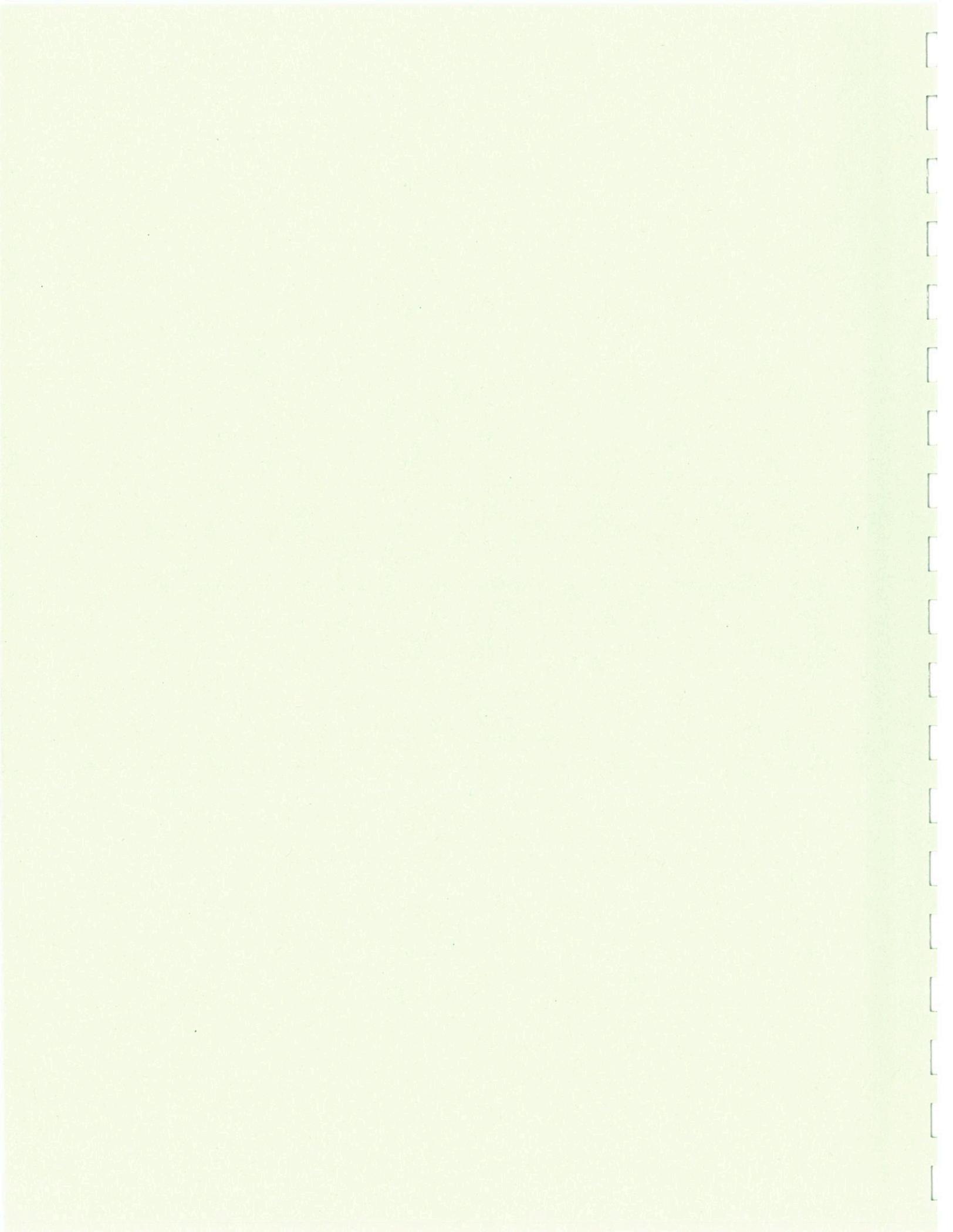


Table B1 - Toms Branch Water Surface Elevations for the 100-Year
10-Day Frequency Storm Event

Cross Section Number	Cross Section Station (ft)	No Action (Sponsors Breach) (ft MSL)	Rehabilitation (ft MSL)
Dam			
31	303+00	1509.7	1508.8
29	350+95	1479.1	1477.9
28	372+67	1465.0	1464.3
27	396+05	1450.3	1449.7
23	474+90	1404.6	1404.1
21	520+30	1376.7	1376.4
13	546+75	1364.9	1364.0
11	583+25	1352.9	1351.4
9	607+89	1345.7	1343.8
7	639+50	1333.5	1332.8
5	678+09	1327.6	1326.8
3	708+22	1324.6	1323.1

Table B2 - Robinson Hollow Water Surface Elevations for the
100-Year 10-Day Frequency Storm Event

Cross Section Number	Cross Section Station (ft)	No Action/Decommissioning (ft MSL)	Rehabilitation (Ft MSL)
Dam			
16	497+80R*	1404.1	1402.3
14	527+80R	1374.7	1373.1
13	546+75	1364.2	1364.0
11	583+25	1351.6	1351.4
9	607+89	1344.3	1343.8
7	639+50	1332.9	1332.8
5	678+09	1326.9	1326.8
3	708+22	1323.4	1323.1

*Robinson Hollow tributary

Table B3 - Inch Branch Water Surface Elevations for the 100-Year
10-Day Frequency Storm Event

Cross Section Number	Cross Section Station (ft)	No Action/Decommissioning (ft MSL)	Rehabilitation (Ft MSL)
Dam			
17	490+10I*	1413.1	1411.5
14	527+80I*	1374.7	1373.1
13	546+75	1364.2	1364.0
11	583+25	1351.6	1351.4
9	607+89	1344.3	1343.8
7	639+50	1332.9	1332.8
5	678+09	1326.9	1326.8
3	708+22	1323.4	1323.1

* Inch Branch tributary

Table B4 - Depth of Water Flow over the Bridges during Flooding Events

Bridge X-Section	Depth of Flow (feet)							
	Existing & Rehabilitation			Sponsors' Breach				
	50-year	100-year	Breach	5-year	10-year	25-year	50-year	100-year
33	0	0	16.5	0	0.3	0.8	1.3	1.8
28 u/s	0	0	18.1	0	0	0	0	0
27.3	1.1	1.8	5.9	0	0	1.1	1.7	2.5
26.8	0	0	0	0	0	0	0	0
25.8	1.6	2.4	6.2	0	0.5	1.5	2.3	3.0
24.3	0.2	1.2	5.0	0	0	0.1	1.0	2.0
22	0	0	1.2	0	0	0	0	0
11 u/s	0	0	0	0	0	0	0	0
9 u/s	0	0	0	0	0	0	0	0
5 u/s *	0.3	1.1	2.6	0	0	0.3	1.1	2.3
3 u/s	0	0	0	0	0	0	0	0

*For existing bridge. VDOT plans to replace this bridge with a larger structure in the near future.

APPENDIX C

South River Watershed Project Map
Breach Inundation Map

78°57'0"W

78°55'30"W

78°54'0"W

38°30'0"N

38°13'0"N

38°0'0"N

37°58'30"N

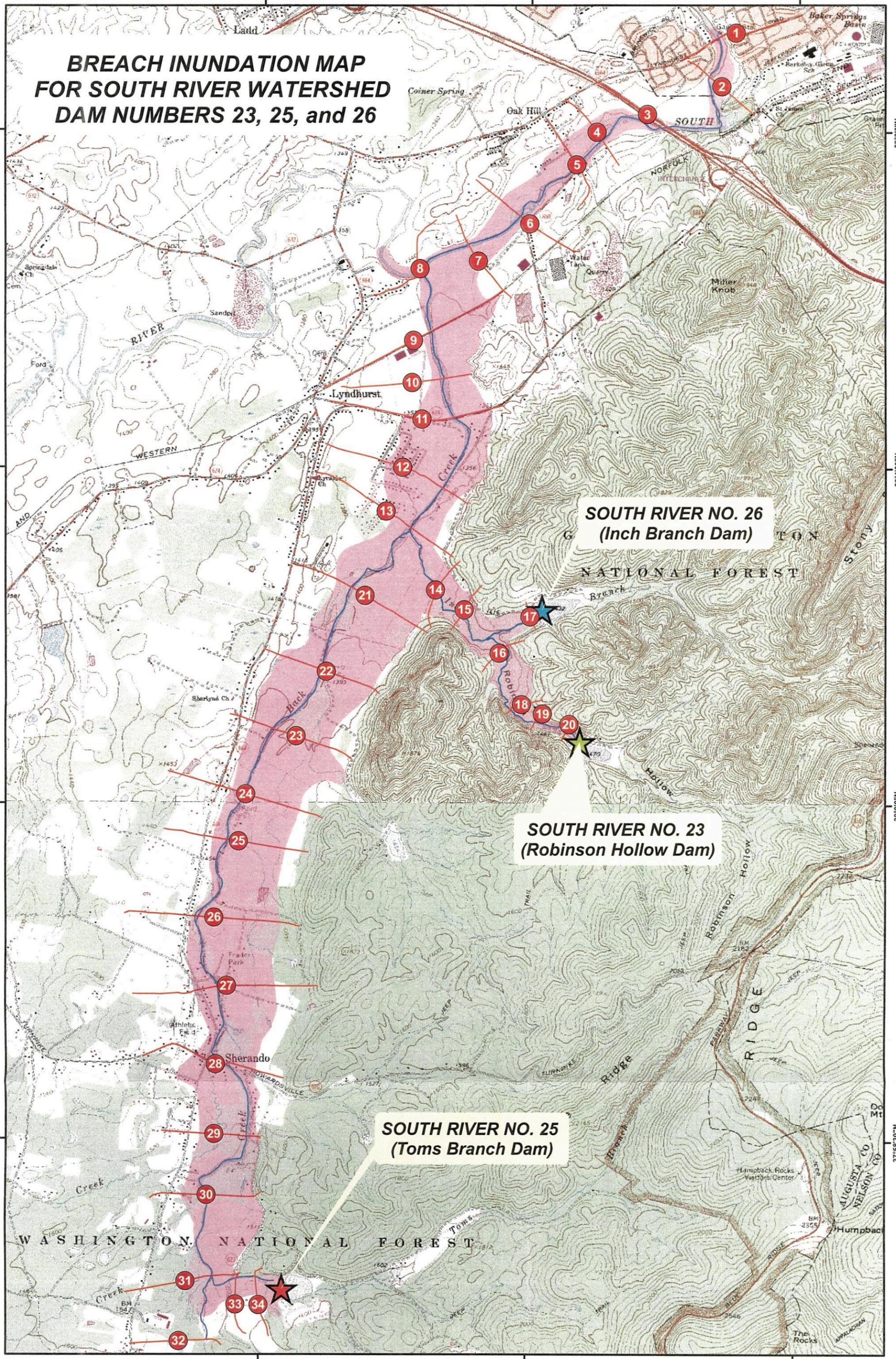
38°30'0"N

38°13'0"N

38°0'0"N

37°58'30"N

BREACH INUNDATION MAP FOR SOUTH RIVER WATERSHED DAM NUMBERS 23, 25, and 26

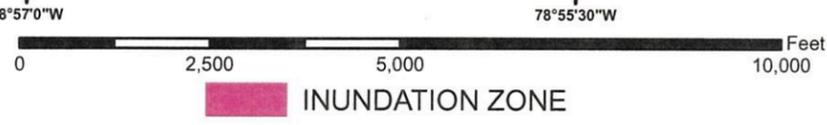


**SOUTH RIVER NO. 26
(Inch Branch Dam)**

**SOUTH RIVER NO. 23
(Robinson Hollow Dam)**

**SOUTH RIVER NO. 25
(Toms Branch Dam)**

- Legend**
- ★ SOUTH RIVER NO. 23 (Robinson Hollow Dam)
 - ★ SOUTH RIVER NO. 26 (Inch Branch Dam)
 - ★ SOUTH RIVER NO. 25 (Toms Branch Dam)
 - SURVEY CROSS SECTIONS
 - SURVEY CHANNEL CENTERLINE



INUNDATION ZONE



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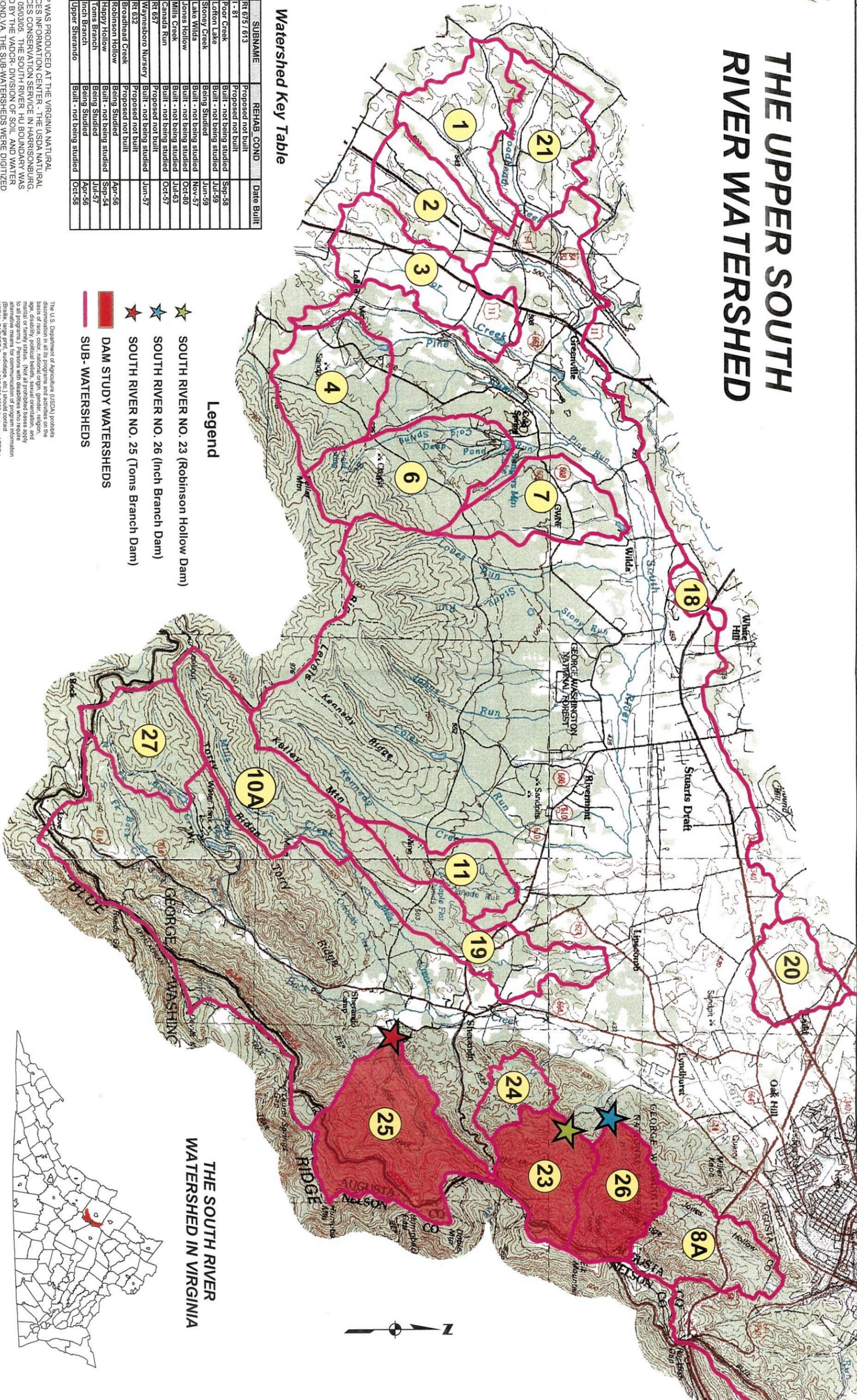
THIS MAP WAS CREATED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER - THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VA. ON 08/08/03. THE DIGITAL MAPS WERE DERIVED FROM 1:24,000 USGS DTMs. THE BREACH ZONE IS AN ESTIMATED AREA OF FLOODING BASED ON ENGINEERING DESIGN AND INTERPOLATION OF CONTOUR DATA. THE CROSS SECTIONS WERE ALSO USED AS A REFERENCE TO ESTIMATE THE EXTENT OF INUNDATION. THIS IS NOT AN EXACT AREA, AND SHOULD BE CONSIDERED AN APPROXIMATION OF FLOODING IF A BREACH OCCURS ON THE CURRENT DAMS. THIS DATA IS PROJECTED IN STATE PLANE COORDINATES (VIRGINIA NORTH ZONE 4501, AND NAD83 DATUM). THIS IS A "DRAFT" COPY, AND IS SUBJECT TO CHANGE!



THE UPPER SOUTH RIVER WATERSHED

SITE_NO	SUBNAME	REHAB_COND	Date Built
1	Rt 675 / 613	Proposed not built	
2	I - 81	Proposed not built	
3	Poor Creek	Built - not being studied	Sep-58
4	Lifton Lake	Built - not being studied	Jul-59
6	Stoney Creek	Being Studied	Jun-59
7	Lake Wilda	Built - not being studied	Nov-57
8A	Jones Hollow	Built - not being studied	Oct-80
10A	Mills Creek	Built - not being studied	Jul-63
11	Canada Run	Built - not being studied	Oct-57
18	Rt 657	Proposed not built	
19	Waynesboro Nursery	Built - not being studied	Jun-57
20	Rt 632	Proposed not built	
21	Broadhead Creek	Proposed not built	
23	Robinson Hollow	Being Studied	Apr-56
24	Happy Hollow	Built - not being studied	Sep-54
25	Toms Branch	Being Studied	Jul-57
26	Inch Branch	Being Studied	Apr-56
27	Upper Sterando	Built - not being studied	Oct-56

Watershed Key Table



Legend

- SOUTH RIVER NO. 23 (Robinson Hollow Dam)
- SOUTH RIVER NO. 26 (Inch Branch Dam)
- SOUTH RIVER NO. 25 (Toms Branch Dam)
- DAM STUDY WATERSHEDS
- SUB- WATERSHEDS

THIS MAP WAS PRODUCED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER - THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VIRGINIA 05030/05. THE SOUTH RIVER HU BOUNDARY WAS DIGITIZED BY THE VADCR - DIVISION OF SOIL AND WATER IN RICHMOND, VA. THE SUB-WATERSHEDS WERE DIGITIZED BY THE NRCS. WITH 1:24000 DRG BACKDROP. THE 100K TOPO BACKGROUND IMAGERY WAS DERIVED FROM USGS DRGS. THIS MAP IS PROJECTED IN UTM-ZONE 17, NAD83 DATUM WITH THE GRS80 SPHEROID. THIS IS A DRAFT COPY AND IS SUBJECT TO CHANGE.

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THE SOUTH RIVER WATERSHED IN VIRGINIA

79°15'0"W

79°7'30"W

79°0'0"W

78°52'30"W

38°0'0"N

37°52'30"N

38°0'0"N

37°52'30"N

79°15'0"W

79°7'30"W

79°0'0"W

78°52'30"W