SUPPLEMENTAL WATERSHED PLAN-ENVIRONMENTAL ASSESSMENT
For the
MARROWBONE CREEK WATERSHED

A supplement to the original watershed plan for rehabilitation of Marrowbone Creek Dam No. 1
Henry County, Virginia

December 2003

Supplemental Watershed Plan-Environmental Assessment for the Marrowbone Creek Watershed

A supplement to the original watershed plan for the rehabilitation of Marrowbone Dam No. 1

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Authority

The original work plan was prepared, and the works of improvement have been installed, under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566), as amended. The rehabilitation of Marrowbone Dam No. 1 is authorized by the Watershed Protection and Flood Prevention Act (Public Law 83-566) as amended by the Small Watershed Rehabilitation Amendments of 2000 (Section 313 of Public Law 106-472).

Sponsors

Blue Ridge Soil and Water Conservation District
Henry County Board of Supervisors

Prepared By:

USDA – Natural Resources Conservation Service

For further information, please contact:

M. DENISE DOETZER
State Conservationist
USDA - Natural Resources Conservation Service
Culpeper Building, Suite 209
1606 Santa Rosa Road
Richmond, Virginia 23229-5014
Telephone: (804) 287-1691

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SUMMARY OF SUPPLEMENTAL WATERSHED PLAN

Project Name: Marrowbone Creek Watershed Dam No. 1 Rehabilitation Plan

County: Henry **State:** Virginia

Sponsors: Henry County Board of Supervisors
Blue Ridge Soil and Water Conservation District

Description of recommended plan: The recommended plan is to rehabilitate one aging dam to meet current design and safety criteria. The plan provides for the construction of a roller-compacted concrete spillway through the existing earth embankment at the current auxiliary spillway elevation. The top of dam will be raised about 8.5 feet by placing a concrete wall on top of the existing embankment. The existing auxiliary spillway will be backfilled with earth and brought up to the same elevation as the new top of dam. 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 (drainage area): 19,300 acres
Drainage Area of Dam: 7,114 acres
Land Use:
- Pasture/Hayland: 2,400 acres
- Cropland: 31 acres
- Forest: 14,100 acres
- Urban and Miscellaneous: 2,643 acres
- Floodpool: 126 acres

Land Ownership: 100% private, 0% public

Project beneficiary profile: 2000 County population of 57,930. Population diversity is 74% white, 23% black, 0.4% Asian, 3% Hispanic, and 0.1% other. Census year 2000 per capita personal income in Ridgeway of $16,054 was 67% of the State average $23,975, and 76% of the national average of $21,194. A total of 42 properties are within the Marrowbone Creek breach inundation zone including: 20 single family homes, 19 mobile homes in two trailer parks, two businesses, and 1 public water treatment plant building. Approximately 160 people reside and/or work in the 42 properties within the breach inundation zone.

Threatened and Endangered Species: There are no threatened or endangered species within the Marrowbone Creek Watershed. One species, the Roanoke Log Perch, is found in the Smith River at the confluence with Marrowbone Creek. No adverse impacts are anticipated.

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

Problem Identification: Marrowbone Creek Dam No. 1 does not meet current dam design and safety criteria. The dam was originally designed and constructed as a class (a) (Low hazard) structure for the purpose of protecting downstream agricultural lands from flooding. The downstream area has changed and now homes and businesses are located within the breach inundation zone. The dam is now

classified as a class (c) (High hazard) structure. The local sponsors have requested assistance from NRCS to rehabilitate this aging watershed dam.

Alternative plans considered: Several alternatives were considered during the planning process with the following three being studied in detail:

1. No Action (Sponsor's Breach) – Removal of the hazard by breaching the earthen embankment pursuant to a mandate from the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management.
2. Decommission the Dam – Removal of the hazard by breaching the earthen embankment to NRCS Standards. This alternative will also include restoration of the original stream channel, stabilization of the stored sediment, removal of the riser and principal spillway pipe, construction of 10 acres of wetland mitigation, and the relocation or floodproofing of 42 structures in the floodplain that would receive induced flood damages from the removal of the structure.
3. Rehabilitate the Dam - Roller Compacted Concrete Spillway – Installation of a roller-compacted concrete auxiliary spillway over the top of the earthen embankment.

Project Purpose: This project brings the Marrowbone Creek Dam No. 1 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 57 years after completion. The rehabilitation project will address all needs identified during the planning process.

Principal project measures: Upgrade this dam to meet current design and safety criteria by installing a roller compacted concrete auxiliary spillway and replacing some deteriorating principal spillway components.

Project costs (dollars):	PL-106-472 Funds 65%	Other Funds 35%	Total 100%
Structural Measures	$ 1,883,000	$843,000	$2,726,000

Project benefits: Remove potential for loss of life. Net average annual benefits -$93,500.

Non-monetary Benefits:

- Meet 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 an unsafe dam
- Maintain the existing level of flood protection for downstream homes and businesses
- Maintain property values around the lake and downstream from the dam
- Protect four bridges with daily traffic counts of more than 14,400 vehicles
- Preserve recreational opportunities
- Protect existing fish and wildlife habitat around the dam and in Marrowbone Creek
- Safeguard 5 acres of jurisdictional wetlands
- Protect water quality by trapping 1.8 acre-feet of sediment and attached nutrients annually

Environmental values changed or lost:

Resource	Impact
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 upper reaches of the lake.
Wetlands	Positive impact – The 5 acres of jurisdictional wetlands in the upper end of the lake will be protected and maintained without disturbance by the project.
Cultural Resources	No Impact
Prime Farmland	N/A
Compensatory Mitigation	None

MARROWBONE CREEK WATERSHED AGREEMENT

Supplemental Watershed Work Plan Agreement
(Supplement No. 2)

between the

Henry County Board of Supervisors
Blue Ridge Soil and Water Conservation District

Commonwealth of Virginia

(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 Marrowbone Watershed, State of Virginia, executed by the Sponsors named therein and the Soil Conservation Service (currently NRCS), became effective the 20th day of January 1960; 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 31st day of March 1967: 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 Marrowbone Creek Dam No. 1 located in Henry 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 Dam No. 1 beyond its evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the rehabilitation of Marrowbone Creek Dam No. 1 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 Dam No. 1 of the Marrowbone Creek Watershed located in Henry 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 Henry County Board of Supervisors agree to participate in and comply with applicable Federal and State floodplain management and flood insurance programs before construction starts. (Note: Henry County has participated in the National Flood Insurance Program since 1980).

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 the same rate as the PL 83-566 share of the total project cost which is as follows:

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© 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:

Works of Improvement	Sponsors	NRCS	Estimated Eligible Project Cost-Share
Rehabilitation of Dam No. 1	$858,000 [1]/	$1,593,000 [2]/	$2,451,000 [3]/
Percentages	35%	65%	

9. The Sponsors will obtain agreements with landowners or operators of not less than 50 percent of the drainage area above Marrowbone Creek Dam No. 1. 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 structure.

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 59-year evaluated life of the project.

11. The Sponsors will be responsible to develop and annually maintain an emergency action plan.

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 59-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

[1] Includes $15,000 in local planning costs that are not included with other funds cost distribution in Table 2.
[2] Maximum allowable by law is 65% of the total project cost, not to exceed 100% of the construction cost.
[3] Excludes NRCS engineering costs of $244,000 and NRCS project administration costs of $46,000. See Table 2 for details.

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 statues;

    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.

19. 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 award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

(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.

20. 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.

Henry County Board of Supervisors

By: David S. Davis
DAVID S. DAVIS

Henry County Administration Building,
P.O. Box 7, Collinsville, Virginia 24078
Address Zip Code

Title: Chairperson

Date: 2/19/2004

The signing of this supplemental watershed agreement was authorized by a resolution of the governing body of the Henry County Board of Supervisors adopted at a meeting held on January 27, 2004.

Teresa A. Jamison
~~Secretary~~/Notary

Date: 2-13-04

Henry County Administration Building,
P.O. Box 7, Collinsville, Virginia 24078
Address Zip Code

Blue Ridge Soil and Water Conservation District

By: Daphne W. Jamison
DAPHNE W. JAMISON

1297 State Street, Rocky Mount, Virginia 24151
Address Zip Code

Title: Chairperson

Date: 2-19-04

The signing of this supplemental watershed agreement was authorized by a resolution of the governing body of the Blue Ridge Soil and Water Conservation District adopted at a meeting held on February 11, 2004.

Patricia R. Hodges
Secretary/~~Notary~~

1297 State Street, Rocky Mount, VA 24151
Address Zip Code

Date: 02/11/2004

Natural Resources Conservation Service
United States Department of Agriculture

Approved by:

M. Denise Doetzer
M. DENISE DOETZER
State Conservationist

Date: 2-19-04

INTRODUCTION

NEED AND PURPOSE

The hazard class of Marrowbone Creek Dam No. 1 has changed from class (a) (low) to class (c) (high) based on changes in downstream landuse since the dam was constructed in 1961. This supplement to the watershed plan is needed because the Marrowbone Creek Dam No. 1 does not currently meet dam design, safety, and performance standards and, as such, does not meet the objectives of the Henry County Board of Supervisors and the Blue Ridge 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 Marrowbone Creek Watershed.

PROJECT SETTING

ORIGINAL PROJECT

A plan for flood prevention and watershed protection was completed in 1959 under the authority of Public Law 83-566, the Watershed Protection and Flood Prevention Act of 1954. The plan included the construction of one single-purpose, low hazard class dam that was designed for a 50 year life, an accelerated land treatment program for watershed protection, 17.77 miles of roadside erosion control, land treatment for flood prevention, and 4.65 miles of channel improvement. An additional 4.66 miles of stream channel improvements were added in 1967 by Supplement No. 1. In 1961, when the Marrowbone Creek Dam was built, it was rated as a low hazard structure because it primarily protected agricultural land and there was little potential for loss of life in the event of dam failure.

PHYSICAL FEATURES

Project Location: The Marrowbone Creek Watershed is located in Henry County, Virginia, just south of the Town of Martinsville. The Town of Ridgeway is the only town within the watershed boundary. The Marrowbone Creek Watershed is in the Roanoke River Basin and is delineated by the hydrologic unit number 03010103 (L55). It is located in the Major Land Resource Area 136, Southern Piedmont, which extends from Virginia to Alabama. The Marrowbone Creek watershed is 19,300 acres (30.16 square miles). Marrowbone Creek Dam No. 1 has a drainage area of 7,114 acres (11.12 square miles), controlling the upper 37% of the watershed. Appendix C shows the location map for this watershed.

Topography: The landscape is characterized by rolling hills with occasional steep breaks close to the floodplain. The dominant topographic features are Chestnut Knob and Holt Mountain. Maximum relief in the watershed is 910 feet, from an elevation of 1,530 on Chestnut Knob to an elevation of 620 at the Smith River. Marrowbone Creek is a principal tributary to the Smith River. Although the overall watershed is about 7.5 miles long by 7 miles wide at its widest point, the creek flows from north to south for about 6.5 miles before turning to the northeast at the dam. It flows another 8.5 miles from the dam to the outlet. The point of confluence with the Smith River is about four miles east of the Town of Ridgeway.

Soils: During the planning process, the soils were inventoried for their runoff potential according to the NRCS hydrologic soil classification system. Approximately 14,030 acres (73%) of the watershed soils are classified as Hydrologic Group B, silts and loams with moderate infiltration rates and fine to coarse textures. Another 5,050 acres (26%) are classified as Hydrologic Group C soils which are soils with slow infiltration rates. Approximately 126 acres have very slow infiltration rates and are classified as Hydrologic Group D. Hydrologic features, such as lakes, streams, or ponds, cover the remaining 94 acres.

Geology: The area drained by Marrowbone Creek is underlain by metamorphic and igneous rock of Precambrian age. The Fork Mountain Formation is located to the southwest. This formation is characterized by a coarse- to medium-grained, migmatic, medium gray garnetiferous biotite gneiss with zones of intruded quartzite and alumino silicate. The Leatherwood Granite Formation, located to the north and west, is characterized as an igneous intrusive that is light gray, medium- to coarse-grained porphyritic biotite granite. The Rich Acres Formation is found on the eastern side of the reservoir. This is also characterized as an igneous intrusive with dikes, sills, and irregularly shaped plutons of dark greenish gray, medium grained locally porphyritic, biotite-horneblende gabbro. This unit also locally contains some quartz diorite, diorite, and norite. All of these rock units contain micas and related phyllosilicates to varying degrees, which make for deeply weathered, micaceous and erosive soils.

Climate: Temperatures in the Marrowbone Watershed are fairly typical of this portion of the Piedmont Section. Temperatures average about 40°F in the winter and about 70°F in the summer. There are occasional hot days when summertime temperatures range from 90° to 95°F. In the winter, cold spells with freezing temperatures may last up to a week but temperatures seldom get below zero. Average annual rainfall is about 46". This rainfall is distributed evenly throughout the year with greater runoff in the summer months. The average frost-free growing season is about 195 days beginning in mid-April and extending to the end of October.

Land Use: In 1959, when the original plan was written, there were 4,151 acres of cropland, 2,122 acres of grassland, 11,580 acres of woodland, and 1,447 acres of urban and miscellaneous, all privately owned. At the present time, there are 31 acres of cropland, 2,400 acres of grassland, 14,100 acres of woodland, 2,643 acres of urban and miscellaneous (Figure 1). There are also 126 acres of floodpool.

Threatened and Endangered Species: There are no threatened or endangered species in the Marrowbone Watershed. However, there is one species, the Roanoke Log Perch, that lives in the Smith River near the outlet of Marrowbone Creek. The Roanoke Log Perch is very sensitive to the presence of sediment and could be adversely affected if there was a release of sediment from the Marrowbone Creek Dam. Fisher's Dam, located just above the confluence of the Smith River, is likely to trap much of the sediment resulting from a release.

Cultural Resources, Natural and Scenic Areas, and Visual Resources: The Cultural Resources Specialist with NRCS in Virginia visited Marrowbone Creek Dam in August of 2003. 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 culturally significant sites noted.

Virginia has one World Heritage site and ten sites listed in the National Registry of Natural Landmarks. None occur in Henry County. There are 197 sites in Virginia listed on the National Register of Historic Landmarks. None are in Henry County. 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 ten sites in Henry County. Two sites listed are in Ridgeway and are in close proximity to the watershed. The other eight sites are scattered across the county. These ten sites as well as any additional locally significant sites will not be affected by the proposed project. The State Archaeological site file lists seven archaeological sites within one mile of the watershed. Two of these sites are in close proximity to the dam but will not be affected by the project. These sites are 44HR160 and 44HR167, and both were recorded as not eligible for the National Register of Historic Places. The Virginia State Architectural file lists twenty seven architectural sites within the watershed. However, none of these will be affected by the project.

Virginia has no Tribal Historic Preservation Officers or Federally recognized tribes, and as such, none were contacted.

One area immediately north of the current dam may be used as a borrow area for soil, depending on the alternative selected. This area was tested with eleven shovel test probes at 20 meter intervals, with a total of two transects. All shovel test probes were negative for artifacts. The area was in a sloping pasture field adjacent to a two track dirt road. The road and existing cuts in the hillside were inspected for artifacts or other cultural materials. None were noted. All other disturbance associated with the rehabilitation of the dam will occur in areas previously disturbed during construction of the dam.

Water Quality: An examination of monitored environmental data for the Marrowbone Creek Watershed revealed no impairments to the water quality. Load allocations that result in achievement of water quality standards developed by EPA and Virginia Department of Environmental Quality[1] were used to evaluate concerns. These water quality standards take into consideration special concerns for various streams in the watershed.

Data summaries of monitored data are from the EPA Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) data collection. Monitored data were collected for use with the STORET[2] data base from a station located at the mouth of the watershed. The collected parameter data for water quality, pathogens/bacteria, and sediment quality are summarized statistics for two 5-year intervals from 1985-1995 and a 3-year interval from 1995-1997.

Collected parameters analyzed were temperature, dissolved oxygen, biological oxygen demand, pH, alkalinity, residue (total suspended solids), nitrogen, ammonia, nitrate nitrogen, Kjeldahl nitrogen, hardness, and fecal coliform. None of these parameters equaled or exceeded standards.

In the 41 years since the dam was built, 99% of the agricultural land in the watershed reverted to forest or grassland; also there are no pastures or livestock. Therefore water quality is not adversely affected by chemical and biological inputs that are associated with animal or cropland farming.

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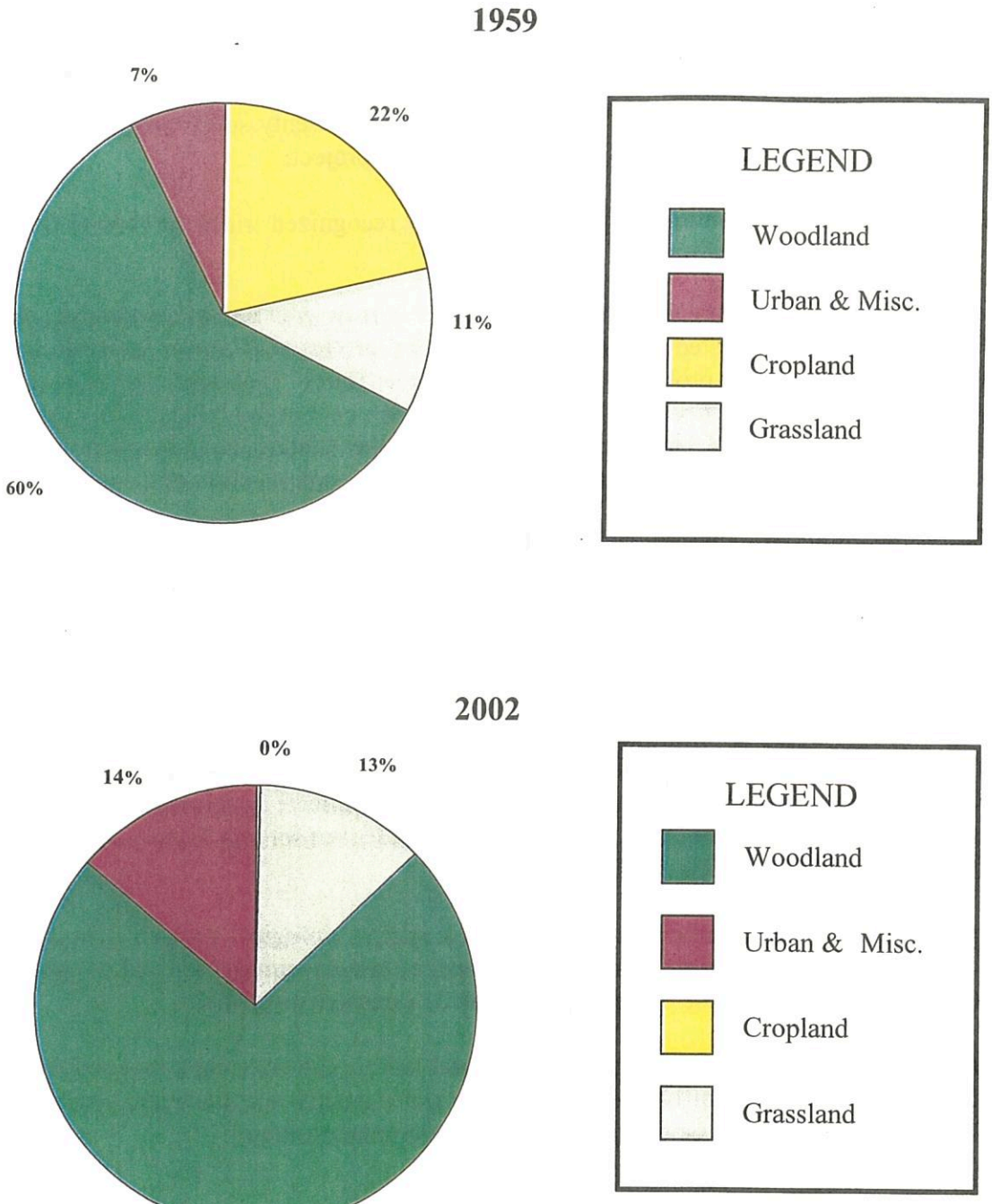
[1] State Water Control Board 9VAC 25-260-5 et seq. Water Quality Standards.

[2] STORET: Storage and Retrieval of US Waters Parametric Data (Database serves as a repository of waterway parametric data, including information on ambient, intensive survey, effluent, and biological water quality).

Figure 1 - Land Use Changes From 1959 to 2002



SOCIAL AND ECONOMIC CONDITIONS

Population and Race: According to the 2000 Census, Henry County has a total population of 57,930. Of the total population, about 74% (43,118) are white and 23% (13,127) are black or African American. Together these two groups make up 97% of the county's entire population. Hispanics are the second largest minority group, but have a relatively small presence with Hispanics of any race constituting about 3% (2,002) of the total population. Asians and Native Americans have an even smaller presence. These two groups made up less than 1% with 236 and 93 individuals, respectively[3]. Asian Indians and Vietnamese are the largest groups of Asians in the county.

The town of Ridgeway, which is contained within the Marrowbone Creek watershed along State Highway 220, has a total population of 775. About 80% (619) are white and 16% (124) are black or African American. Together these two groups make up 96% of Ridgeway's entire population. Asians and Hispanics are the next largest minority groups with 2.5% (19) and 2.3% (18), respectively. Ridgeway does not have any Native Americans, according to the 2000 Census.

Twenty-four homes and two businesses are located within Marrowbone Creek's 100-year floodplain under present conditions. The homes consist of 10 trailers in one trailer park and 14 single family residences. An estimated 100 people reside within the current 100-year floodplain. There are an additional five homes and a trailer located around the reservoir.

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 Henry County is 39.3. The median age for the town of Ridgeway is 38.9 years. About 15% of Henry County is 65 years old or older, while 12.4% of Ridgeway are in the same category. The median age for the state of Virginia is somewhat lower at 35.7 years.

Education: Approximately 33% of the residents in the county either have only a high school diploma or have passed an equivalency test. About 35% never completed high school, while almost 18% have completed some college level work. Around 5% have an associate degree in the county; 6.3% have earned a Bachelor's Degree, and 3.1% have earned a graduate school degree. Thus, 65% of the county has a high school degree or higher.

Employment/Unemployment, Class of Worker and Commuter Status: About 61.2% (28,404) of the population of Henry County are 16 years of age or older and are considered in the labor force pool. Of these, 94.5% were employed and 5.4% (1,526) were unemployed in 2000, according to the 2000 Census. This figure is higher than the unemployment rate in 2000 for the state of Virginia as a whole which was 4.2%. However, the unemployment rate for Ridgeway was 4.3%, comparable to the state rate. About 18,016 (38.8%) of the Henry County population were under the age of 16 and not considered to be in the labor force pool. The labor force data for Ridgeway are very similar to the Henry County data on a percentage basis.

The manufacturing and transportation related occupations were the single largest employer categories in 2000, providing 34.5% of the jobs in Henry County with manufacturing providing the majority of these jobs. Sales and office occupations were the second largest employment group with 23.7% of the jobs in the county. Management, professional, and related occupations constituted the third largest employment category at 18.9% of all jobs. These three categories together made up 77.1% of the jobs in Henry

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

County. The employment data for Ridgeway are very similar to the Henry County data on a percentage basis.

Farming, fishing and forestry jobs made up only 0.5% of all jobs in Henry County in 2000. Only 165 individuals were employed by agriculture, forestry, fishing and hunting, and mining in Henry County during 2000, according to the U.S. Census. No individuals who reside in Ridgeway are employed in these sectors.

Private employment constitutes 88.9% of all employment in Henry County (23,858) and 93.2% (313) of all workers residing in Ridgeway. Government workers, at all levels, local, state and federal, make up 10.9% (2,914) of those working in Henry County, and 6.8% (23) of all workers residing in Ridgeway. Unpaid family workers make up the remaining 0.2% of workers in Henry County and there are no unpaid family workers reported in Ridgeway.

Of all Henry County residents employed in 2000, 64.8% worked within Henry County and 35.2% commuted to another locale. At 64.8%, those residing and working within Henry county represents a much higher number than for the same category of worker reported for the state of Virginia as a whole. About 48.2% of all workers in Virginia reside and work within the same county (51.8% commute to another county). The number of residents of Ridgeway commuting to work in another county was 43% in 2000. The remaining 57% of all workers residing in Ridgeway commuted to jobs located within Henry County.

Income: The 2000 Census indicates that there were 23,946 households in Henry County in 1999. Median annual household income for the county in the same year was $31,816. 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 Henry County was 68% of the state median and 76% of the national median household income. Ridgeway had 301 households in 1999 and a median household income of $34,196 per year. In median household income, Ridgeway is slightly better off compared to the County as a whole.

Median family income in Henry County for 1999 was $38,649 per year. For Ridgeway, median family income in 1999 was $39,500 per year. These figures are substantially less, approximately 30% lower, than the $54,169 in median family income for Virginia as a whole and almost 22% lower than the $50,046 reported for the entire United States.

With respect to per capita incomes, Henry County residents reported per capita income of $17,038 in 1999. Ridgeway had per capita income of $16,054 in 1999. Virginia reported per capita income of $23,975 in 1999, while the same figure for the entire United States was $21,194.

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 $26,660 in Henry County, while the same category of females in the county earned $20,766/year. Full-time, year-round male workers within the town of Ridgeway had median income in 1999 of $27,109, while the same category of females in town earned $21,146/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, the Town of Ridgeway had 25 families and 93 individuals, or about 12% of the total population, that live below the poverty level. Henry County had 1,502 families (8.8% of the total) with incomes below the poverty level. State-wide, 7% of Virginia's families had incomes below the poverty level in 2000. Therefore, the Town of Ridgeway, the main beneficiary of the Marrowbone Creek Dam, has a poverty level that is approximately 40% higher than the county-wide rate and 73% higher than the state-wide rate.

Recreation: Marrowbone Reservoir, known locally as Clanton Lake, provides recreation to homeowners and landowners around the lake. Lake-based recreation includes fishing, swimming, and boating. Outdoor barbeques held adjacent to the lake are also enjoyed by local residents and their visitors. There are approximately 740 water-based user days annually.

Real Estate: There are approximately 15 lots with lake frontage around the reservoir. Currently there are five cottages and one trailer adjacent to the reservoir. An additional 42 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 dam range between $12,700 and $233,000 with an average of $81,500. The average value is lower than the average value for Ridgeway ($91,300), but higher than the average value for Henry County ($75,500).

DESCRIPTION OF EXISTING DAM

HAZARD CLASSIFICATION

In 1961, when the Marrowbone Creek Dam was built, it was rated as a low hazard structure because it primarily protected agricultural lands and there was little threat to life or property. Since that time, the population of Henry County has increased from 40,335 in 1960 to 57,930 in 2000. This represents a 44% increase in population in 40 years, or roughly 1% per year. Based upon a watershed scale analysis, there are now 39 homes, two businesses, a water treatment plant building and four bridges and roads in the dam breach zone. Over 14,400 vehicles cross Marrowbone Creek in an average day. Approximately 160 residents live within the breach zone below the dam. For this reason, NRCS and the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management consider Marrowbone Creek Dam to now be classified as high hazard. This classification is based upon the risk to life and property downstream in the event of a dam failure.

STATUS AND ACTION COVERED

Since the hazard class of Marrowbone Creek Dam has changed from a low hazard class to a high hazard class, the safety criteria have also changed. A high hazard dam must be able to safely pass the volume of water associated with the Probable Maximum Precipitation (PMP). The current NRCS and Virginia Dam Safety criteria specify a 6-hour duration PMP of 29.1 inches for Henry County. At the present time, the principal spillway pipe and the earthen auxiliary spillway of the Marrowbone Creek Dam together can only safely pass less than half of the runoff associated with the PMP.

The age of the dam is the second concern. Construction on the dam was completed in October of 1961. When the request for rehabilitation was received in March 2002, the dam was 41 years old and had reached 82% of its designed life of 50 years. It remains in good physical condition. The earth embankment and the auxiliary spillway are vegetated and stable. In August 2000, a remote controlled

mobile video camera was used to inspect the inside of the principal spillway and drain pipes. The outlet section of the drain pipe is corroded, but the remainder of the drain pipe and the principal spillway pipe are in good condition. In order to comply with current Virginia dam safety requirements, the existing solid top concrete riser would be replaced with an open (grated) top riser and the reservoir drain gate would be replaced during rehabilitation.

Operation and maintenance of the structure is the responsibility of the Blue Ridge Soil and Water Conservation District. Recent records indicate that the operation and maintenance of the structure has been kept current on this site. This has been verified through site assessments. However, due to the age of the structure, operation and maintenance will become increasingly more complex and expensive.

STRUCTURAL DATA

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

Table A. Existing Structural Data for Marrowbone Creek Dam No. 1

Dam Name	Marrowbone
Stream	Marrowbone Creek
Year Completed	1961
Cost	$56,500
Purpose	Flood Prevention
Drainage Area	11.12 sq. mi.
Dam Height	47 feet
Dam Type	Earthen
Dam Volume	53,000 yds.
Dam Crest Length	575 feet
Storage Capacity	
Sediment	108 acre-feet
Flood	2,160 acre-feet
Surcharge	580 acre-feet
Total	2,923 acre-feet
Principal Spillway	
Type	Concrete
Riser Height	15 feet
Conduit Size	42 inches
Stages	1
Capacity	126 cfs
Energy Dissipater	Plunge Pool
Auxiliary Spillway	
Type	Earthen
Width	300 feet
Capacity	8,300 cfs
Normal Pool Elevation	749.7 ft-mean sea level
Flood pool Elevation	777.5 ft-mean sea level
Top of Dam Elevation	782.0 ft-mean sea level

BREACH ANALYSIS

In order to confirm the change in Hazard Classification, NRCS performed a breach analysis for a sunny day breach with the water level at the top of the dam and the existing earthen auxiliary spillway blocked. The analysis was conducted using the NRCS Technical Release No. 66 Simplified Dam Breach Routing Procedure computer program utilizing cross section output from the HEC-RAS computer model for Marrowbone Creek. The cross sections were surveyed using survey-grade GPS equipment. The maximum discharge for the breach was computed using the criteria in Technical Release No. 60, Earth Dams and Reservoirs. The results of the breach analysis are shown in Table B and on the Breach Inundation Map in Appendix B. The breach inundation area includes 39 residences, two businesses, a water treatment facility building, and four bridges and roads, including a major four lane divided highway. There is the potential for loss of life.

Table B - Results of a Dam Breach Routing for Marrowbone Creek Dam No. 1.

Cross Section Number	Cross Section Location (feet)	Maximum Water Surface Elevation (ft MSL)	Maximum Flow (cfs)
Dam	1,124	782.0	69,000
4	6,514	742.7	46,200
10	16,562	727.5	21,900
13	21,258	705.6	18,900
16	25,565	699.8	16,500
17	26,357	699.4	15,900
18a	26,960	699.0	15,400
18b	27,073	694.5	15,300
20	29,260	692.6	14,400
21a	32,000	689.9	13,100
21b	32,055	688.8	13,100
22	34,018	684.7	12,500
25	43,520	663.2	10,500

If the dam is rehabilitated, a second breach analysis will be run for use by the Sponsors in the development of an updated Emergency Action Plan. A current Emergency Action Plan will be required prior to initiating construction.

EVALUATION OF POTENTIAL FAILURE MODES

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.

Marrowbone Creek Dam was designed with a 50-year sediment storage life and a sediment storage capacity of 183 acre-feet. As part of the planning process, a reservoir sediment survey was conducted in August of 2002. The survey showed that 75 acre-feet of sediment has been deposited in the reservoir and its tributaries since 1961. This equates to a sediment deposition rate of 1.8 acre-feet per year.

The future sediment accumulation rate is expected to be the same or less than the past rate. The land use above the dam has changed from agriculture to woodlands and homes. There is some evidence of headcutting and sedimentation associated with road building. Most of these roads appear to be private driveways to homes and hunting/fishing lodges. The low density of the area means that the erosion and sedimentation will have a localized and temporary impact on water quality and sediment quantity. Based upon a sediment accumulation rate of 1.8 acre-feet per year, the remaining sediment storage life of Marrowbone Creek Dam No. 1 is about 59 years. The required minimum project evaluation period is 50 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 is 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.

Marrowbone Creek Dam was designed to pass the runoff from 11.4 inches of rain falling in six hours without overtopping the embankment. It detains the 100-year, 6-hour rainfall in the flood storage below the crest of the auxiliary spillway for release through the principal spillway. The principal spillway has a standard one-stage riser with a height of 15 feet. The principal spillway is a concrete pipe that is 42 inches in diameter and 256 feet long. There is a 26 inch diameter orifice plate installed in the riser at the entrance to the pipe. The auxiliary spillway is 300 feet wide and has a maximum freeboard of 4.5 feet. It is located in natural ground at the left end of the embankment (looking downstream). The vegetative cover is good but the soils in the auxiliary spillway and dam embankment have a low resistance to erosion. At the time of the original design and construction, there was little information available about the erosivity of soils. Since that time, there is more information about the soils and new ways of modeling the hydrologic and hydraulic behavior of water and earthen dams. The overall potential for hydrologic failure of Marrowbone Creek Dam is considered to be high because of the erosivity of the soils.

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 increases in pool elevation is an indication of a potential problem, as is stained or muddy water or "sand boils." 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. Marrowbone Creek Dam does not exhibit obvious signs of excessive seepage. Seepage provides a low potential for failure.

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 Marrowbone Creek Watershed is not located within an area of significant seismic risk; therefore, there is low potential for seismic activity to cause failure of the dam.

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. Marrowbone Creek Dam has a concrete principal spillway inlet and conduit, which are showing signs of normal weathering and deterioration. The outlet end of the foundation drain pipe is slightly corroded, but the remainder is in good condition. Material deterioration is not a concern at this time.

CONSEQUENCES OF DAM FAILURE

At this point in time, Marrowbone Creek Dam is considered an unsafe structure, not because of imminent danger or potential for failure, but because it is now classified as a high hazard dam and there is a potential for loss of life. There is also the concern about the erosivity of the soils in the embankment and auxiliary spillway. The dam is designed to detain the rainfall from the 100-year, 6-hour 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, with no advanced 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 2,923 acre-feet of water and sediment, beginning with a wall of water that is about 47 feet high. Resource inventories during the planning process indicate that a failure of Marrowbone Creek Dam would jeopardize 39 homes and place about 160 residents at a fatal risk. Additionally, some 72 commuters on 4 roads and an undetermined number of others in businesses would also be at fatal risk. In addition to the damage caused by the water, a significant volume of sediment will initially be flushed downstream in the event of a catastrophic breach. Highly erodible sediment remaining in the sediment pool will continue to cause persistent sediment deposition problems for the downstream channel and floodplain.

The environmental damages of a dam failure would be significant. The five acres of wetlands at the upper end of the lake would be flushed downstream with the sediment. Approximately 8 miles of stream channel downstream of the dam would be damaged by scouring or deposition. Fishers Dam, located on Marrowbone Creek above the confluence with the Smith River, would trap some of the sediment, causing a decrease in storage capacity. Sediment would be deposited in 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 may cause water quality problems in the future.

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

would develop headcuts that would migrate upstream through the watershed, eroding the banks and channel bottoms and adding more sediment into the stream system.

The aquatic species composition of Marrowbone Creek would change as lake fish were added to the stream environment.

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. The homes and business properties at risk have structure and content values estimated at over $5,000,000. In addition, some damage would accrue to the land where the 39 homes, the two businesses and the water treatment plant building are located. Total land value for these properties is over $485,000. Other economic damages from a catastrophic breach would be: a) lost recreation opportunities with the lake 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. An estimated $2,000,000 in damages would occur if the dam were to fail.

The probability that a breach would occur is less than one percent in any given year. 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.

WATERSHED PROBLEMS AND OPPORTUNITIES

WATERSHED PROBLEMS

Change in Hazard Classification

Due to a change in hazard classification, Marrowbone Creek Dam No. 1 no longer meets the dam safety and performance standards of NRCS and the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management. The dam was constructed in 1961 as a class (a) (low hazard) structure for the purpose of protecting downstream agricultural lands from flooding. The dam is now identified as a class (c) (high hazard) structure due to the presence of houses and businesses built in the breach zone after construction of the dam.

The specific reason that Marrowbone Creek Dam does 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 Precipitation (PMP) without overtopping. At the present time, the structure can only safely pass less than half of the runoff associated with the PMP. A storm with greater runoff could result in a breach of the structure. Therefore, the State issued a conditional certificate for the dam to the Blue Ridge Soil and Water Conservation District in 1988. This conditional certificate was last issued on March 20, 2003. 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 should the dam breach and downstream damages result. In order to address these concerns, the Sponsors have requested the assistance of NRCS to do the watershed planning and to make the improvements necessary to obtain full dam safety certification.

Soil Erodibility

In addition to the above-mentioned issues, based on studies using the NRCS SITES Water Resources Site Analysis Computer Program, the soils in the dam and auxiliary spillway are now known to be erosive and, as such, vulnerable to failure in major storm events.

Floodplain Management

The Sponsors have identified flooding in the floodplain downstream as a primary concern. Henry County has participated in the National Flood Insurance Program since 1980 and realizes the value that the Marrowbone Creek Dam provides 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 dam 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. Marrowbone Creek Dam controls about half of the watershed above the affected properties and has little effect on flooding in Ridgeway due to the distance from the dam to the town. The portion of the watershed immediately above Ridgeway is uncontrolled. With the dam in place, 24 homes and 2 businesses could be affected by the 100-year, 24-hour storm event. Without the dam, three 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 Dam No. 1 has also 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 habitats and recreational opportunities. At the same time, sediment accumulation in the lake and/or release of stored sediment downstream, under any alternative being considered, are also issues of concern for local residents.

Designed Service Life

When the Marrowbone Creek Dam was built, it had a designed service life of 50 years. It is now approaching the end of that service life, but remains in good physical condition. The earth embankment and the auxiliary spillway are vegetated and stable. In August 2000, a remote controlled mobile video camera was used to inspect the inside of the principal spillway and drain pipes; both are in good shape. The concrete riser is also in good operating condition. The reservoir drain gate has not been operated recently. The dam rehabilitation process would provide an opportunity to more closely assess the condition of the individual components. If needed improvements are made, the service life of the dam would be extended by an additional 57 years (after a two year installation period).

Erosion and Sedimentation

As of August 2002, Marrowbone Creek Dam had reached about 82% of its planned service life. According to the sediment survey conducted by NRCS at that time, the volume of sediment in the reservoir and the tributaries was about 41% of the original amount planned in the design. Samples of the sediment were taken and tested. The chemical analysis has shown that the sediments do not contain heavy metals, oils, or grease in quantities considered hazardous.

Water Quality

Marrowbone Creek empties into the Smith River which, in turn, empties into the Dan River. At the present time, there are no impairments to the water quality.

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 Virginia Division of Dam Safety and Floodplain Management
- Reduce the potential for loss of life associated with noncompliance with current regulations
- 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 lake and downstream from the dam
- Protect existing fish and wildlife habitats around the dam and in Marrowbone Creek
- Preserve existing recreation opportunities
- Protect water quality (due to annual storage of 1.8 acre-feet of sediment and attached nutrients)
- Safeguard 5 acres of jurisdictional wetlands

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

A scoping process was used to identify issues of economic, environmental, cultural, and social concerns 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 April 17, 2003, a Scoping Meeting was held with the Virginia Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management and Division of Soil and Water Conservation, the Blue Ridge Soil and Water Conservation District, the Virginia Department of Environmental Quality, the Virginia Department of Transportation, the Henry County Board of Supervisors, and the West Piedmont Planning District Commission. Table C shows the degree of concern and degree of importance in decision making.

Table C – Scoping Results For Marrowbone Creek Dam Rehabilitation

Resource Concern	Degree of Concern	Significance to Decision making [1]	Remarks
Public Safety	High	High	DCR and Henry County rated this as the priority concern. General consensus of attendees was in agreement.
Property values downstream	High	Medium	County concern for basements.
Existing lots around lake	High	Medium	County concern for property values.
Transportation	High	High	VDOT linked this issue with public safety. EMS access, stream crossings at Rt. 688. Floods blocks entrance to subdivision at Rt. 220.
Air quality	Low	Low	
Threatened and endangered species	High	Low	None known to be present except the Roanoke Log Perch in the Smith River downstream.
Fish and wildlife habitat	High	High	Concern was for fishing in the lake. High only for decommissioning.
Floodplains	High	Medium	May need to re-draw FEMA maps.
Historic resources	High	Low	None known to be present.
Prime & unique farmlands	Medium	Low	
Water Quality	High	High-Low	Dependent on alternative; sediment moving downstream.
Wetlands	High	High	Wetlands at upper end of pond are considered jurisdictional.
Drinking water supply	Low	Low	
Flooding	High	High	Safety issues. Additional channel work requested downstream of Rt. 220.
Agricultural management ✓ Cropland ✓ Pastureland ✓ Forestry	Low	Low	
Fisheries	Low	Low	Downstream fisheries only.
Public recreation potential	Low	Low	
Erosion and sedimentation ✓ Dredge material if Removed	Low High	High High	High concern if decommissioning is selected. Movement of captured sediment in the sediment pool.
Groundwater quality and quantity	Medium	Medium	
Channel snagging	Medium	Low	SWCD concern east of Rt. 220.
Gas pipeline	Low	Low	New gas pipeline planned for installation downstream of dam.

[1] High- must be considered in the analysis of alternatives; Medium - may be affected by some alternatives solutions; Low- consider, but not very significant.

PLANNING ACTIVITIES

As part of the planning activities, several engineering surveys were conducted. The valley cross-sections from the dam to the Smith River were surveyed using survey-grade GPS equipment. This information was used in the hydrologic analysis to determine the breach inundation zone and the water surface elevations at each cross-section. 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.

FORMULATION AND COMPARISON OF ALTERNATIVES

The stated objectives of the Marrowbone Creek Watershed project for the Sponsors are: 1) to bring Marrowbone Creek Dam into compliance with current safety criteria; 2) to maintain the current level of flood protection provided by Marrowbone Creek Dam; and 3) to address the local resident's 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 plans for Marrowbone Creek Dam 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 Resource Problems, and other NRCS watershed planning policy. Each alternative evaluated in detail used a 59-year period of analysis, which includes a two year installation period and 57 years of expected useful life. This period of analysis was chosen based on the most limiting structural component which is sediment storage. The estimated remaining useful life of the existing sediment pool is currently 59 years.

The formulation process began with formal discussions between the Sponsors, the Virginia Department of Conservation and Recreation, Division of Dam Safety and Floodplain Management and Division of Soil & Water Conservation officials, and NRCS. The Division of Dam Safety and Floodplain Management 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, six alternative plans of action were developed based on NRCS planning requirements or their ability to address the initial objective of bringing Marrowbone Creek Dam into compliance with current dam safety criteria:

Table D - Alternative Plans of Action

1. No Action
2. Decommission Dam
3. Enlarge Auxiliary Spillway and Raise Top of Dam
4. Other Structural Measures
5. Roller Compacted Concrete Spillway
6. Non-structural – Relocate or floodproof structures in the breach zone

Alternative plans of action were presented to the public at a public meeting on August 28, 2003. Public meeting participants identified no additional viable alternative plans of actions to be considered during the planning process.

ALTERNATIVES CONSIDERED BUT NOT DEVELOPED IN DETAIL

Enlarge Auxiliary Spillway and Raise Top of Dam

Raising the top of the dam by five feet and widening the auxiliary spillway by 75 feet would meet the hydrologic conditions for improving dam safety. However, geologic investigations show that the auxiliary spillway contains 0.3 to 4.0 foot thick lenses of silty clay underlain by 3.5 to 30.0 feet of silty sand and then 1.5 to 15.0 feet of silty sand and gravel. Underneath this is highly to moderately weathered granite. Studies using the NRCS SITES Water Resources Site Analysis Computer Program show that this soil will erode during high flow, leading to head cutting that progresses upstream to breach the spillway. The bedrock is too deep to prevent the breach. Therefore, this alternative was excluded from further consideration.

Other Structural Measures

Several other structural alternatives were investigated but were not developed in detail. The use of roller compacted concrete (RCC) to armor the full embankment and auxiliary spillway was too expensive. An RCC gravity section through the auxiliary spillway to bedrock with a parapet wall across the embankment would be very difficult to install because of the depth to bedrock in the auxiliary spillway. A third alternative, a labyrinth spillway located either in the auxiliary spillway or over the embankment, would be very costly and would not address the soil erodibility.

Relocation or Floodproof Structures in Breach Zone

There are 39 homes, two businesses, and one public utility building located within the breach inundation zone. Nineteen homes are mobile homes and could be relocated out of the floodplain. The remaining 23 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) to class (b), Significant Hazard, due to the remaining presence of 4 bridges and roads in the breach zone. A class (b) dam must pass half of the probable maximum precipitation. According to the hydrologic analysis, the present auxiliary spillway is insufficient to pass this volume. Therefore, rehabilitation of the existing dam would 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, this alternative was unresponsive to the sponsor's objectives to maintain existing flood protection and property values. This alternative was also deemed least acceptable from a social feasibility perspective.

The Sponsors plan to re-evaluate the current zoning of the land within the breach area as a separate issue. There are presently ten mobile homes located adjacent to Marrowbone Creek in the 100-year, 24-hour frequency flood zone delineated by the Flood Insurance Rate Map. Some of these homes will have flood damages during the 10- and 25-year, 24-hour storm events. All but one of them will be damaged during the 50-year, 24-hour storm event.

DESCRIPTION OF ALTERNATIVE PLANS

No Action (Sponsor's Breach)

Under this alternative, no federal funds would be expended. The Sponsors would be totally responsible for the fate of the dam after the original life of the dam has been reached. If the Sponsors continue to operate and maintain the dam, there may be some level of flood control for some period of time beyond the designed life of the structure. However, the potential for an uncontrolled breach will be present and the Sponsors liable for the resulting damages until such time as the existing dam safety issues are addressed and resolved.

Without NRCS assistance, the Sponsors have the following options:

- Hire a consultant, prepare plans, and rehabilitate the dam. The State of Virginia has already allocated and spent money to hire a consultant and prepare a design for rehabilitation of the dam. However, the funds are not sufficient to implement the proposed design. Unless another source of funding is located, the Sponsors cannot utilize this option.

- Do nothing. In this case, the Division of Dam Safety and Floodplain Management may choose to breach the dam and send the Sponsors the bill. This option is likely to be more expensive than if the Sponsors performed the breach. The end results would be the same as those for the next option.

- The Sponsors could remove the flood storage capacity of the dam by breaching the dam using a least cost method (Sponsor's Breach). This breach would be a minimum size hole in the dam from the top of the dam to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam. The sediment would not be stabilized and will 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.

The Sponsors considered the option of trying to maintain a lower hazard classification by relocating the downstream homes and businesses. However, this option would not remove the risk to the roads that are below the dam and it would not change the potential for an uncontrolled breach due to the erosivity of the soils in the auxiliary spillway and embankment. In addition, the dam would still require rehabilitation to meet the (b) hazard class. Therefore, this option was not considered viable.

For the purposes of this evaluation, the Sponsor's Breach will be used as the No Action alternative. This is the least cost option. However, there will be unmitigated induced damages to 27 homes and two businesses that are located in the downstream 100-year floodplain. The 100-year floodplain that occurs without the dam in place will be more extensive than the present 100-year floodplain (with the dam in place). Some of these structures already experience flood damages in a 100-year event, but flood depths in these structures could be up to 1 foot deeper than presently occurs with the dam in place. Remnants of the embankment would be shaped to a 2:1 slope on both sides of the new channel for stability. Approximately 21,200 cubic yards of fill would be removed to a disposal site and 6.0 acres of critical area treatment would be installed. The principal spillway riser and pipe would be left on site. It is anticipated that the accumulated sediment in the pool area would be transported into Marrowbone Creek and then into Smith River. There would still be the potential for damage to the roads and bridges in the watershed. In addition, five acres of wetlands would be destroyed. The Sponsors would have to create 10 acres of wetlands to meet the mitigation requirements of the State. If the dam is breached

before the end of the design life, the Sponsors would forego the benefit of flood protection for the remaining years.

Decommission Dam

This alternative describes a plan to remove the flood detention capability of the dam by removing the entire embankment down to the valley floor. This is necessary to restore the original floodplain of the stream. Approximately 50,000 cubic yards of fill would be removed from the earthen embankment and placed in the auxiliary spillway and an off-site disposal area. In the pool area, approximately 15,500 feet of channel, and its floodplain system, would be reconnected in a stable manner using structural and geomorphic procedures. There is an estimated 121,000 cubic yards of accumulated sediment in the pool area. Some of this material would be removed to create the new floodplain. The remainder would be stabilized by vegetation. About 71 acres of forested riparian buffer would be planted on each side of the restored stream channels. There would be about 40 acres of critical area treatment needed. Removal of the riser and principal spillway pipe would require about 312 tons of off-site disposal. Ten acres of wetland creation would be required to mitigate for the five acre wetland that would be destroyed. The Sponsors would then have operation and maintenance responsibilities for these restoration components.

Like the Sponsor's Breach alternative, this alternative would induce flooding downstream once the structure is 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 29 structures in the revised 100-year floodplain. These mitigation measures would reduce downstream flood damages and the potential for loss of life. However, there would still be the potential for damage to the roads, bridges, and utilities in the watershed.

Rehabilitate Dam – Roller-Compacted Concrete Spillway

This alternative consists of constructing a 300-feet-wide roller-compacted concrete (RCC) spillway through the existing earth embankment at the current auxiliary spillway elevation. The water would drop over a series of steps from the spillway crest to the 60 foot long stilling basin floor. It is a 42 foot drop from the crest to the stilling basin. The top of the dam would be raised about 8.5 feet by placing a concrete wall on top of the existing embankment for a length of 100 feet on each side of the RCC spillway. Material excavated from the embankment would be used to construct an earth dike that begins at the end of the concrete wall and extends across the existing auxiliary spillway. The dike would be built to the same elevation as the top of the wall. The rehabilitated structure would have the same flood storage capacity as the existing structure. However, the dam would not overtop unless the storm exceeds the Probable Maximum Precipitation of 38.4 inches of rainfall in 24 hours. Although a 24-hour design is not currently required, NRCS and the Division of Dam Safety and Floodplain Management thought it was wise to use it since the adoption of 24-hour criteria appears to be imminent. There would be no change in the levels of flooding downstream. There would also be no loss of wetlands. This alternative would extend the life of the structure for 57 years after the two year construction period is complete.

EFFECTS OF ALTERNATIVE PLANS

Alternative plans of action can result in a multitude of effects on resources upstream and downstream of Marrowbone Creek Dam. 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.

Public Safety

Existing Conditions: Marrowbone Creek Dam was built in 1961 as a low hazard class (a) dam. It was not designed to provide the level of safety necessary to protect downstream homes, businesses, and utility and transportation systems. Current studies have recently identified soil conditions in the auxiliary spillway that are vulnerable to a potential breach under design flows. There are presently 39 homes, 2 businesses, 1 public utility, and 4 roads located in the breach inundation zone. See Table B2 in Appendix B for the depth of flow over the road bridges. There is the potential for loss of life in the event of a dam breach.

No Action (Sponsor's Breach): With a Sponsor's Breach, there would be an increased threat to public safety through increased flood frequencies and higher water surface elevations in homes and businesses. Roads, bridges, and utility infrastructure would also be exposed to increased risk. Removal of the dam without stabilizing the sediment in the flood pool would result in changes in the capacity and stability of Marrowbone Creek 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 Smith River. This alternative would eliminate the threat to loss of life associated with a dam breach.

Decommission Dam: Under the decommissioning alternative, there would be an increased threat to public safety through increased flood frequencies and higher water surface elevations on roads and bridges. The homes and businesses would be protected from flooding through nonstructural measures. Since the sediment left in the reservoir would be stabilized, it would not obstruct the stream or cause maintenance problems at the county bridges. This alternative would eliminate the potential for loss of life from a dam breach.

Rehabilitate Dam: Under this alternative, the dam would be structurally rehabilitated using current design and safety criteria in order to provide continued flood protection for 57 years after the two year rehabilitation project is completed. The downstream flooding levels would be the same as they are presently. The threat to loss of life from failure of the dam would be greatly reduced. The top of dam would be raised about 8.5 feet, which creates the potential to temporarily impound water behind the dam to this level. Current NRCS and Virginia criteria do not require land rights to be obtained for this, but the Sponsors are aware that this area must remain free of structures. This could be accomplished through zoning or obtaining easements.

Floodwater Damage

Existing Conditions: The Marrowbone Creek Watershed has not experienced any major flooding for the 41 years that the project has been in place. Currently, the dam provides $30,000 in average annual flood damage reduction benefits to 17 properties that are projected to receive first floor damages in the 100-year, 24-hour flood event. However, $29,000 in average annual flood damages are still projected to occur, mainly because of the uncontrolled drainage area between the dam and the town of Ridgeway. At the present time, a total of 24 homes and two businesses are located in the 100-year, 24-hour floodplain.

No Action (Sponsor's Breach): With the Sponsor's Breach, the sediment would not be stabilized. As the sediment 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 Sponsor's Breach. In addition, more homes would be damaged than under the decommissioning alternative. If the dam were removed by the Sponsors, $59,000 of average annual flood damage would be expected to occur to 18 properties that would suffer first-floor flooding. A total of 27 homes and two businesses could receive some flood damage in a 100-year storm.

Decommission Dam: The removal of the flood detention capability, or controlled breach, of the dam would result in a return to pre-project flooding conditions. Given that federal policy prohibits inducing flood damages without mitigating the negative effects, relocation or floodproofing would be offered to 29 property owners either projected to receive deeper flood depths, or for properties that previously did not get flooded. When compared to the No Action alternative, the average annual flood damages would decrease from $59,000 to $39,000 under this scenario.

Rehabilitate Dam: The flood reduction benefits currently provided by Marrowbone Creek Dam would be extended for a projected 57 years after construction. The dam would be designed to provide flood detention storage to the crest of the auxiliary spillway for the 100-year, 6-hour frequency storm. The maximum release rate through the principal spillway would be 126 cubic feet per second. Since the dam does not control the entire watershed above Ridgeway, the rehabilitation of Marrowbone Creek Dam would result in the continuation of present flood-damage reduction, but at a higher level of safety. The potential for failure of the dam would be reduced significantly. Average annual flood damages to properties under this scenario are estimated to be around $29,000. Twenty-four homes and two businesses would continue to be damaged in the 100-year, 24-hour storm event.

Erosion and Sedimentation

Existing Conditions: The Marrowbone Creek Dam trapped about 75 acre-feet (104,925 tons) of sediment in its flood pool and tributaries in its first 41 years. The sediment accumulation rate is 1.8 acre-feet per year. This is about half of the rate projected during the original design process. At this rate of sediment accumulation, there is enough storage available for an additional 59 years (from August 2002). Land use changes from cropland to forestland account for most of the reduction in erosion in the watershed.

No Action (Sponsor's Breach): In a Sponsor's Breach, about 104,925 tons of 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 Sponsor's Breach, there would be approximately 29,000 cubic yards (25,200 tons) of earthfill remaining in the embankment that could eventually erode and contribute sediment to the stream system. Additional sediment would be eroded from the upstream tributaries. Fisher's Dam, located on Marrowbone Creek above the confluence with Smith River, would initially trap some of the sediment but the majority of the material would flow downstream. About 1.8 acre-feet (2,546 tons) of sediment per year that is currently trapped by the dam would pass on through the stream system, eventually making its way to the Smith River.

Decommission Dam: Decommissioning the dam would return the floodplain to pre-project levels of flooding with its associated sediment and scour damages. The embankment would be removed entirely. Some of the stored sediment would be removed to create floodplain areas within the old pool. The

remainder would be stabilized with vegetation and grade control structures. The grade control structures would be used to stabilize the stream bed and protect the grade of the upstream tributaries. About 1.8 acre-feet (2,546 tons) of sediment per year that is currently trapped by the dam would pass on through the stream system, eventually making its way to the Smith River.

Rehabilitate Dam: The dam would provide flood control for 57 years after rehabilitation. The dam would trap about 103 acre-feet of sediment over its new designed life, which is sediment that would not be deposited in the Smith River. At the completion of its design life, the sediment would fill the pool area to the top of the principal spillway riser and no standing water will remain. At that time, only flood storage would be available.

Economic and Social Effects

Existing Conditions: Marrowbone Creek Dam has provided flood protection since 1961. Most of the residents of Ridgeway are not aware of the presence of the dam. Under the existing conditions, there is the potential for loss of life. An uncontrolled breach of the dam would release 2,923 acre-feet of water and sediment in a wall up to 47 feet high. There are 39 homes, two businesses, and one public utility building that could be affected. Four roads would also be at risk. The dam is estimated to provide $30,000 in average annual flood protection benefits. However, an estimated $29,000 in average annual flood damages may occur, even with the dam in place, due to the uncontrolled drainage area between the dam and the town of Ridgeway.

No Action (Sponsor's Breach): The two most obvious effects of a Sponsor's Breach would be the loss of recreation at the lake and a decline in the value of the properties around the lake. Downstream property values would also decrease because of increased flooding. These more frequent and deeper floods could limit access to emergency services and cause damage to roads and utilities. If the dam was breached before the end of the original project life, the Sponsors would forego the remaining years of the intended project benefits. There is the potential for sponsor liability due to induced damages to downstream properties. Removing the dam could also impact Henry 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 dam (about one year). Adverse economic effects associated with this alternative are estimated to be $92,000/year. The estimated cost for a Sponsor's Breach is $250,000.

Decommission Dam: Decommissioning the dam would have many of the same social and economic effects as the Sponsor's Breach. Relocation and/or flood-proofing properties with induced damages would add to the cost of this alternative, but minimize the sponsor's exposure to liability claims. Removing the dam could also impact Henry 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 dam and the subsequent stabilization and riparian restoration activities (about two years). Relocation and floodproofing would be done concurrently with the dam removal. Although the Operation and Maintenance (O&M) responsibilities of the Sponsors would be eliminated for the dam, new O&M agreements would be required for the grade stabilization structures needed to stabilize the stream channels, and maintenance of the riparian buffer areas and the created wetlands. Adverse economic effects associated with this alternative would be $39,000/year. The estimated cost for this alternative is $3,963,000.

Rehabilitate Dam: Structural rehabilitation of the Marrowbone Creek Dam would provide continued flood protection to the residents of the watershed for an estimated 57 additional years. Property values

Rehabilitate Dam: Structural rehabilitation of the Marrowbone Creek Dam would provide continued flood protection to the residents of the watershed for an estimated 57 additional years. Property values around the lake and downstream of the dam would be maintained. The existing opportunities for recreation would remain until the sediment pool is filled. 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). Adverse economic effects associated with this alternative would be $29,000/year. The estimated cost for rehabilitating the existing dam is $2,726,000.

Archeological and Historical Resources

Existing Conditions: There are no known archeological, cultural, or historic resources within the area of potential effect of this project. Given the review of known sources, the results of the field testing, and the extent of planned disturbance, it is our opinion that 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.

No Action (Sponsor's Breach): In a Sponsor's Breach, the water would be drained from the lake before the notch in the embankment was cut. As the existing sediment in the pool erodes, any sites in the pool area would be exposed and would no longer be protected. The removal of the dam could increase scouring and erosion to any downstream sites.

Decommissioning: This alternative includes construction of grade stabilization structures, creation of ten acres of wetland, planting a riparian buffer on 71 acres and relocation or flood proofing 29 structures in the 100-year floodplain. Only one of the structures that were identified as being affected by flooding is 50 years old. This is a single story structure built in 1953. The other structures were constructed between the 1960's and 2002, and 19 of these include house trailers. None of the structures identified are eligible for the National Register of Historic Places. The construction of wetland mitigation measures would occur within the existing pool area, an area disturbed during the construction of the dam. Therefore, no additional impacts to cultural resources would be expected.

Rehabilitation: The structure was built in 1961 and does not qualify as an historical site. Construction of a roller-compacted concrete spillway through the existing earth embankment would not disturb any new ground that was not disturbed by the initial construction. The fill for the earth dike across the existing auxiliary spillway would be taken from the existing embankment or adjacent areas that were evaluated during the cultural resources survey of the area of potential effect.

Threatened and Endangered Species

Existing Conditions: There are no known threatened or endangered species in the Marrowbone Creek Watershed according to the Henry County Natural Heritage Resources Map and the Threatened and Endangered Species Map issued by the Virginia Division of Natural Heritage. However, according to the Virginia Department of Game and Inland Fisheries, the Roanoke Log Perch, a federally listed endangered species, may be found at the confluence of Marrowbone Creek and the Smith River. This species requires a large habitat area, swiftly flowing water, and little sedimentation. It is possible that this fish may enter Marrowbone Creek near the mouth, but it is unlikely to become established further

upstream. Marrowbone Creek is too small to meet the habitat requirements of this fish and migration or passage to upstream Marrowbone Creek is blocked by Fisher's Dam near the confluence with the Smith River.

No Action (Sponsor's Breach): The removal of the Marrowbone Creek Dam without stabilizing the sediment would create a migration of sediment into the Smith River. This sediment load could temporarily impact the population of the Roanoke Log Perch found at the confluence of Marrowbone Creek and the Smith River. However, most of the population of this fish is found further upstream on the Smith River and the impact would be very small and localized at the confluence. The fish would probably move to safety upstream of the confluence.

Decommission Dam: Decommissioning Marrowbone Creek Dam would not impact the Roanoke Log Perch.

Rehabilitate Dam: Rehabilitation of the dam would have no impact on the Roanoke Log Perch. All existing conditions would remain the same.

Streams, Lakes, and Wetlands

Existing Conditions: The streams feeding the reservoir have stable outlets into the lake and are transporting relatively small amounts of sediment into the lake. There are about 28 acres of surface water and five acres of wetlands for a total of 33 acres of sediment pool. The wetlands located along the waters edge of the Marrowbone Creek pool area are classified as PEM1Bh, Palustrine Emergent Persistent Saturated Dike/Impoundment. They are considered jurisdictional wetlands according to the Virginia Department of Environmental Quality. These wetlands were formed after the dam was completed and the classification and extent is dependent on the condition of the dam.

No Action (Sponsor's Breach): Marrowbone Creek and its tributaries upstream of the dam would be adversely affected by the removal of the dam under a Sponsor's Breach. If the water were released from the lake, the streams feeding the reservoir would no longer have a stable outlet. Erosion of the channel banks and bottom would occur as the stream adjusts 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 dam breach, Marrowbone Creek and its floodplain would experience significant increases in both sedimentation and scour. Over time, the creek would establish a new channel with new dimensions, meander pattern, and bottom grade. The new location of the creek may not be where it is at present, causing changes in property boundaries defined by the stream.

If the dam is 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. Approximately 29,000 cubic yards of earthfill would be left in the embankment when the notch is made.

A Sponsor's Breach of Marrowbone Creek Dam would destroy the five acres of wetlands at the upper end of the lake. The wetlands would dry out, allowing the forest to reclaim the land. The Sponsors would have to create 10 acres of new wetlands to mitigate for the wetlands lost under this alternative.

Decommission Dam: If the dam is decommissioned, some of the sediment in the pool area would be removed from the pool area and placed in an off-site disposal area. The remainder would be stabilized with vegetation. Removal of the water would change the outlet conditions of the tributary streams. However, under this alternative, the streams would be stabilized by installing grade control structures, as needed. In addition, approximately 15,500 feet of stream channel would be re-established in the old pool area. The dimensions of the stream, meander patterns, and grade would be designed and installed in accordance with available fluvial geomorphology techniques. The floodplain would be re-established as part of the design. One hundred feet of forested riparian buffer would be planted on each side of the new channels to provide additional stability.

If the dam were breached, all water storage behind the embankment would be lost. The pre-dam hydrologic capacity of the floodplain will be restored by removing the earth fill used to create the dam.

Removal of Marrowbone Creek Dam will have the same effect on the wetlands as the No Action Alternative. Destruction of jurisdictional wetlands requires mitigation at the rate of two-to-one. Ten acres of wetlands would be created within the pool area of the lake. The Sponsors would be responsible for operation and maintenance of the grade stabilization structures, wetlands, and streambank restoration sites.

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

Fish and Wildlife Resources

Existing Conditions: The lake and streams currently provide typical habitat for warmwater and cool water fish species, respectively. There are also terrestrial and wetland wildlife species located both upstream and downstream of the dam.

No Action (Sponsor's Breach): The Sponsor's Breach would result in the loss of 28 acres of warm deep water aquatic habitat and five acres of wetland habitat. Fish and wildlife habitat associated with the pool area of the pond would be lost. 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. The fish population of Marrowbone Creek would change in abundance and species composition as fish from the lake migrate downstream and the sediment is released from the pond area.

Decommission Dam: This alternative would result in the loss of 28 acres of warm deepwater aquatic habitat and 5 acres of wetland habitat. Fish and wildlife habitat associated with the pool area of the pond would be lost. Wetland losses would be mitigated within the former pool area in conjunction with the stream restoration and sediment stabilization. Stream fisheries habitat and terrestrial habitat would increase within the former pool area. Stream restoration and establishment of a forested riparian buffer would enhance wildlife habitat after the mature growth is achieved. Adverse impacts to existing fish and wildlife downstream would be less with this alternative when compared to the Sponsor's Breach.

Rehabilitate Dam: 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 pond fisheries could be necessary at the end of the construction period.

Water Quality

Existing Conditions: There are no known water quality impairments to the lake, in its present condition.

No Action (Sponsor's Breach): If Marrowbone Creek Dam is removed by a Sponsor's Breach, the downstream water quality would be 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 kill-offs of other aquatic species.

Decommission Dam: Decommissioning of the dam may have some impact on water quality since sediments and attached nutrients once retained in the flood pool would be transported downstream. However, since the amount of material that would be transported is relatively small, minimal impacts are anticipated.

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

Transportation

Existing Conditions: There are three county roads (Rt. 688, Rt. 687, and Rt. 782) and one four-lane State Highway (Rt. 220) that are located below Marrowbone Creek Dam. Traffic numbers on these roads were estimated by the Virginia Department of Transportation at 470 on Rt. 688, 1,022 on Rt. 687, 971 on Rt. 782, and 11,962 on Rt. 220 for a total daily count of 14, 425 vehicles. A Norfolk and Western Railroad trestle is located downstream of the dam, but it is located beyond the impact area. Appendix B lists the water depths at each bridge for different storm events and different alternatives.

No Action (Sponsor's Breach): A Sponsor's Breach would result in flooding and associated damages to roads and bridges at levels greater than existed prior to project implementation due to the excessive amounts of sediment transport and deposition anticipated. Access to towns, schools, medical services, work locations, and emergency services could be restricted or limited for potentially long periods of time.

Decommission Dam: Removal of the dam would result in flooding at pre-dam levels. Transportation routes could be restricted during flood events and repair of subsequent damage similar to levels expected under the No Action alternative.

Rehabilitate Dam: The continuation of flood control for another 57 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 dam is primarily forested with isolated homes scattered 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. Acreage used for agricultural purposes has declined since the dam was constructed in 1961.

No Action (Sponsor's Breach): A Sponsor's 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 lake would be severely affected. Upstream development further above the lake would not likely be impacted.

Decommission Dam: Removing the Marrowbone Creek Dam would reduce the number of properties suitable for development in the downstream 100-year floodplain. Interest in development of the land around the lake would decline if the lake is removed. Development in the 100-year floodplain would have to be restricted in order for the county to continue in the National Flood Insurance Program.

Rehabilitate Dam: Rehabilitation of the Marrowbone Creek Dam to a class (c) (high hazard) dam 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 past changes in landuse have extended the potential life of the dam by reducing the amount of sediment deposited in the pool area. Additional protection of the riparian zone could further reduce the volume of sediment entering the lake. Since the volume available in the pool area for sediment storage is presently the restricting factor in determining the expected life of the dam, additional years of service could be gained by reducing the erosion in the watershed.

Prime and Unique Farmlands

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

COMPARISON OF ALTERNATIVE PLANS

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

Table E - Summary and Comparison of Candidate Plans

Effects	No Action (NED Plan)	Decommission Dam	Structural – RCC (Recommended Plan)
Sponsor Goals	Does not meet goals, increases liability for induced damages	Does not meet goals	Continue to provide flood protection, reduces liability
Structural	Sponsor Breach	Controlled breach of dam; remove/stabilize sediment, restore streams	Upgrade dam to meet dam safety criteria
Project Investment	$250,000	$3,963,000	$2,726,000
National Economic Development (NED) Account			
Beneficial Annualized (AAEs)	$1,200	$48,000	$60,000
Adverse Annualized (AAEs)	$14,000	$223,000	$153,000
Net Beneficial	-$12,800	-$175,000	-$94,000
Benefit/Cost Ratio	0.08 to 1.0	0.22 to 1.0	0.39 to 1.0
Estimated OM&R	$0	$1,250	$1,000
Environmental Quality Account			
Erosion & Sedimentation	Release of 75 ac-ft of trapped sediment, annual transport of 1.8 ac-ft plus material from dam embankment and degraded streams	Transport 1.8 ac-ft of sediment per year	Trap 1.8 ac-ft of sediment annually
Threatened and Endangered Species	No effect on Roanoke Log Perch	No effect on Roanoke Log Perch	No effect
Stream, Lakes and Wetlands	Approx. 15 miles of stream channel would be damaged from sediment or loss of grade control; 5 acres of wetland destroyed; 10 ac. wetland mitigation	Approx. 3 miles of stream channel would be restored to pre-dam condition; 5 acres of wetland destroyed; 10 ac of wetland mitigation	No effect
Fish & Wildlife Resources	Existing habitat destroyed; lake fish would populate stream	Existing habitat destroyed; lake fish would populate stream	No effect
Water Quality	Water quality would decline due to release of sediment and attached nutrients	Water quality would decline due to annual transport of sediment and attached nutrients	No effect

Effects	No Action (NED Plan)	Decommission Dam	Structural – RCC (Recommended Plan)
Other Social Effects Account			
Public Safety	Increase potential for loss of life from lack of flood control	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 dam is lost; induced damages occur where frequency, volume, and cost of flooding increases	Protection provided by dam is lost; induced damages would be mitigated for through the installation of nonstructural measures	Maintains present level of flood protection; no induced damages
Property Values	Decreased by 50% around the lake; decrease by 10% below the dam	Decreased by 50% around the lake; decrease by 10% below the dam	Values protected
Recreation	Opportunities reduced	Opportunities reduced	Opportunities maintained
Transportation	Access to emergency services may be limited; increased maintenance of 4 roads and bridges	Access to emergency services may be limited; increased maintenance of 4 roads and 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	27 homes & 2 businesses would require flood-proofing or relocation; zoning would be Needed	No effect
Enhanced protection from future flood events:	No protection	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	None, but concern for downstream loss of grade control would be Significant	Very low
Civil Rights Impacts:	Negative across all groups	Negative across all Groups	Positive across all groups
Environmental Justice Impacts:	No disparate treatment	No disparate treatment	No disparate treatment
Anxiety, frustration and mental duress:	Increases across all groups as risk of flooding increases	Increases across all groups, especially all affected by relocation and floodproofing, as these are at a minimum a major disruption.	Positive across all groups

Effects	No Action (NED Plan)	Decommission Dam	Structural – RCC (Recommended Plan)
Regional Economic Development Account			
Positive Economic Effects			
Annualized Benefits (AAEs*) Region: Rest of Nation:	 $1,200 -----	 $48,000 -----	 $60,000 -----
Negative Economic Effects			
Annualized Costs (AAEs*) Region: Rest of Nation:	 $14,000 -----	 $ 78,000 $145,000	 $54,000 $99,000

*AAEs – Average Annual Equivalents based on 5.875% discount rate and a 59 year period of analysis.

RISK AND UNCERTAINTY

Assessments, considerations, and calculations in this plan are based on a 59 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 probable maximum precipitation events, it could increase the occurrence of low frequency events and associated flood damages[4].

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 Marrowbone Creek Dam.

The adverse impacts on property values from the two alternatives that would remove the dam 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 lake were estimated based on existing property ownership around the lake. 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 the next 59 years.

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[4] "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 Marrowbone Creek Dam with a roller-compacted concrete (RCC) spillway. The structural RCC alternative was developed to comply with current dam design and safety criteria and to accommodate the maximum number of resource concerns identified during the initial scoping process of the first public meeting held July 25, 2002. This alternative eliminates the threat to life and property associated with noncompliance with current Virginia Dam Safety Regulations. It will maintain the existing levels of flood control for an additional 57 years following installation. Rehabilitation of the dam will eliminate the liability associated with operating an unsafe dam.

There are 39 homes, two businesses, and one public utility building that would be protected from the potential breach that could occur if the existing dam overtopped and failed. The four roads downstream of the bridge have an average daily traffic count of 14,425 vehicles. These roads would be protected at the existing levels.

There are significant environmental benefits associated with the implementation of this alternative. The dam would continue to trap 1.8 acre-feet of sediment and attached nutrients annually, maintaining the downstream water quality benefits. Downstream fisheries would also be protected. Above the dam, the existing fish and wildlife habitat would be retained around the lake and in the five acres of jurisdictional wetlands.

When compared against the No Action (Sponsor's Breach) and Decommissioning Alternatives, the Recommended Alternative was identified to be the more acceptable alternative to the public and a technical advisory group, and was subsequently recommended to the Sponsors. The structural RCC alternative meets the Sponsor's objectives of bringing Marrowbone Creek Dam 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 Blue Ridge Soil and Water Conservation District (SWCD), which serves Henry, Franklin and Roanoke Counties, and the Henry County Board of Supervisors. The Blue Ridge SWCD has been involved in the operation and maintenance of the Marrowbone Creek Dam No. 1 since it was built in 1961. Interest and support for rehabilitating the dam began in the late 1980's and early 1990's following the issuance of a Conditional Certificate by the Virginia Department of Conservation and Recreation (DCR), Division of Dam Safety and Floodplain Management in 1988. Local efforts were intensified after the Virginia General Assembly began appropriating funds for the rehabilitation of the Marrowbone Creek Dam in 1997. Some preliminary planning and design work was conducted by a private engineering firm based on a contract administered by the DCR, Division of Soil and Water Conservation.

Following the passage of Public Law 106-472, in November of 2000, federal funds became available to eligible applicants. The Blue Ridge SWCD applied to the NRCS for dam rehabilitation assistance on March 25, 2002.

Local, State and Federal support for the rehabilitation of the Marrowbone Creek Dam has been strong. Input and involvement of the public has been solicited throughout the planning of the project. At the initiation of the planning process, many meetings were held with representatives of the Blue Ridge

SWCD and Henry County to ascertain their interest and concerns regarding the Marrowbone Creek Dam No. 1. The Blue Ridge SWCD hired a local resident to serve as their Watershed Coordinator. He worked closely with the local landowners and residents to provide information on the planning process, obtain their permission to conduct surveys and investigations, and solicit their input on the pertinent issues being considered during planning.

The first public meeting was held at the Henry County Administration Building on July 25, 2002. Local, state and federal perspectives on the rehabilitation needs of the Marrowbone Creek Dam were provided to the approximately 30 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 Marrowbone Creek Dam.

A scoping meeting was held on April 17, 2003 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 Marrowbone Creek Dam No. 1 would not have significant negative impacts on the environment.

The NRCS National Water Management Staff from Little Rock Arkansas toured the watershed on August 6, 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 Marrowbone Creek Dam No. 1.

A second public meeting was held on August 28, 2003 at the Henry County Administration Building. 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 about 35 people and included elected officials from county, state and federal government, representatives from local, state and federal agencies, and watershed landowners and residents.

A draft version of this Watershed Supplement – Environmental Assessment was reviewed by the NRCS National Water Management Center, Sponsors, and NRCS Planning Staff prior to going to interagency and public review.

A Draft Supplemental Plan - Environmental Assessment (EA) for the Marrowbone Creek Watershed was distributed for interagency and public review on October 24, 2003. 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, as deemed appropriate, into the Final Watershed Supplemental Plan and EA. Letters of comment received on the draft plan and NRCS responses to the comments are included in Appendix A.

RECOMMENDED PLAN

SUMMARY

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 Marrowbone Creek Dam No. 1.

The recommended plan consists of constructing a roller-compacted concrete (RCC) spillway over the existing dam similar to the one shown in Figure 2. The purpose of the RCC spillway is to convey the design flood runoff safely through the reservoir without overtopping the earthen embankment. As planned in this watershed supplement, Marrowbone Creek Dam No. 1 will meet all current NRCS and State of Virginia dam safety and performance standards.

The existing embankment will be excavated to the design grade needed for construction of a 300-foot-wide RCC auxiliary spillway. The RCC spillway will be constructed as a broad-crested weir at an elevation of 777.5 feet MSL. The top of the dam will be raised 8.5 feet by installation of a concrete wall across the embankment. Material excavated from the embankment will be used to construct an earthen dike in the existing auxiliary spillway to the elevation of the new top of the embankment. The side slopes of the dike will be 2.5:1, which matches the slopes of the embankment. An access road will be installed across the upstream face of the dam to accommodate maintenance and to allow the property owners around the lake to cross the embankment. When the auxiliary spillway is flowing, the residents will use an alternate route.

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 site of the dam, it is projected that an additional acre of landrights will be needed in order to accommodate the larger dam footprint that will result from constructing the RCC overlay. NRCS currently does not require additional flood easements because the flood storage of the structure will not change. However, the Division of Dam Safety and Floodplain Management 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

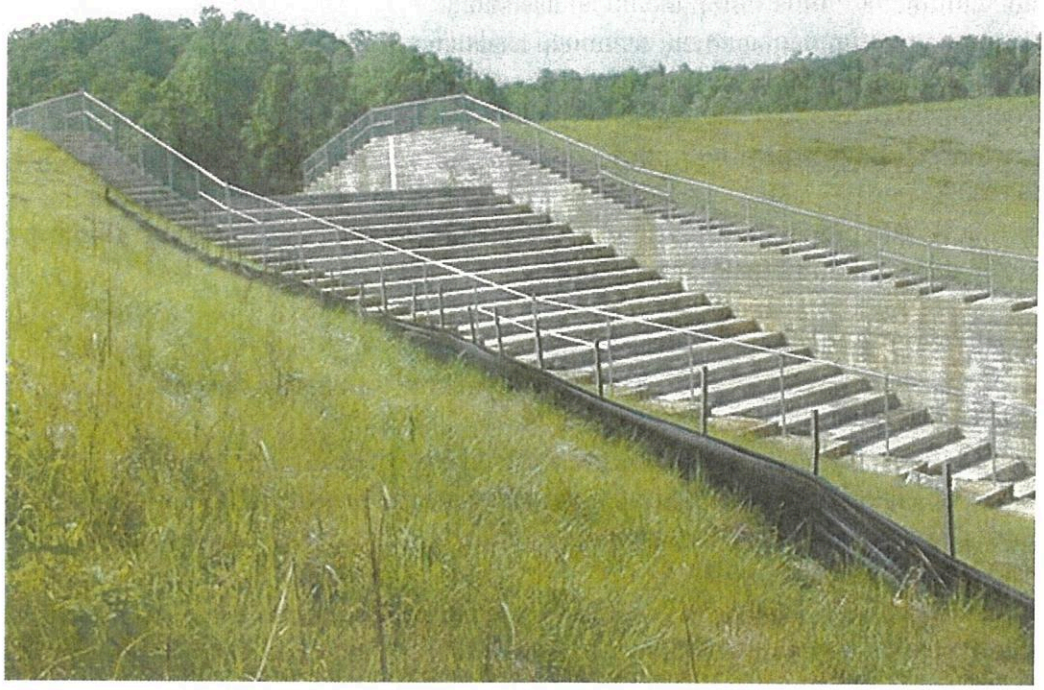
There are no planned mitigation requirements for this project.

PERMITS AND COMPLIANCE

Installation of the recommended plan will bring Marrowbone Creek Dam No. 1 into compliance with current dam safety criteria. The Sponsors will be responsible for obtaining the certification of compliance from the Division of Dam Safety and Floodplain Management upon completion of the RCC spillway. The Sponsors are also responsible for obtaining any needed permits from Federal, State, or

local regulatory agencies. During construction, Virginia Erosion and Sediment Control regulations will be applied.

Figure 2. Typical Roller-Compacted Concrete Spillway.



COSTS

As indicated in Table 1, the total project cost of the recommended plan is $2,726,000. Of this amount, PL-106-472 funds will bear $1,883,000 and nonfederal funds will bear $843,000. 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 December 2003 price base was used and amortized at a 5.875 percent interest for the 59 year period of analysis (including an installation period of 2 years and an expected useful life of 57 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. All the necessary preparation for the project, including installation of access roads, making ready the construction site, etc., will be

completed during one construction season. The RCC spillway will be installed the next construction season. During construction, equipment will not be allowed to operate when conditions are such that soil erosion, and water, air, and noise pollution cannot be satisfactorily controlled.

The NRCS will provide 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.
- Provide financial assistance equal to 65% of project costs, not to exceed 100% of actual construction costs.
- 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.
- 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 rehabilitated structure.
- Prepare an updated Emergency Action Plan for Marrowbone Creek Dam No. 1.
- Execute an updated Operation and Maintenance agreement with NRCS for the dam.
- 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 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 Marrowbone No. 1 utilizing the NRCS National Operation and Maintenance Manual, and will be executed prior to signing project agreements. 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 59 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.

EFFECTS OF RECOMMENDED PLAN ON RESOURCES

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

CIVIL RIGHTS AND ENVIRONMENTAL JUSTICE IMPACT ANALYSIS

Property values in the floodplain range from very low for some trailers (around $13,000) to well over $200,000. Most non-trailer single family homes in the floodplain range from $50,000 to $100,000 in structure value with $81,500 being the average value. According to the 2000 Census, the median home value within Ridgeway is $91,300. Median value of homes for Henry County was $75,500 in 2000, while the state and national levels were $125,400 and $119,600 respectively, in 2000. The trailers range in value from approximately $13,000 to $36,000.

Given the low values of the trailers in the floodplain, it appears reasonable to assume that the incomes of those residing in them are also likely low as compared to the rest of Ridgeway, the county, state and nation. Although incomes for the residents within the floodplain are unknown, we do know from the 2000 Census that per capita income within Ridgeway was $16,054. Per capita income in 2000 for Henry County, Virginia, and the nation as a whole were: $17,110, $23,975, and $21,587 respectively. The low income data for Ridgeway is consistent with the poverty statistics, also from the 2000 Census. Ridgeway has an estimated 12% living below the poverty level. This is 36% higher than the poverty rate for Henry County (8.8%) and 71% higher than the state as a whole.

Rehabilitation of the dam will have positive economic and social effects across all residents within the floodplain and above the dam. 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 Henry County and the state 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 dam 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 Marrowbone Creek Dam No. 1 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.

Table F - 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 threatened and endangered species are present in the project area.
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 F - 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.)	5 acres of wetlands in the upper end of sediment 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 59 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 limited to about 100 feet downstream of existing dam.

Table 1 - Estimated Installation Cost
Marrowbone Creek Watershed, Henry County, Virginia
(Dollars)[1/]

Installation Cost Item	Units	Number			Public Law 106-472 Funds	Other Funds			Grand Total
					Nonfederal Land				
		Federal Land	Non-federal Land	Total	NRCS Total	Federal Land	Non-federal Land	Total	
Rehabi-litation of Marrow-bone Dam # 1	Each	n/a	1	1	$1,883,000	n/a	$843,000	$843,000	$2,726,000

1/ Price base: December, 2003;

Table 2 - Estimated Cost Distribution - Structural Measures
Marrowbone Creek Watershed, Henry County, Virginia
(Dollars)[1/]

Item	PL-106-472 Cost[2/]				Other Funds[3/]					Total Project Cost[4/]
	Construction	Engi-neering	Project Admin-istration	Total PL-106-472 Cost[2/]	Con-struction	Engi-neering	Addi-tional Land Rights	Project Admin-istration	Total Other Funds	
Structural Measures Rehabilitation of Marrowbone Dam # 1	$1,593,000	$244,000	$46,000	$1,883,000	$697,000	$140,000	$1,000	$5,000	$843,000	$2,726,000

1/ Price base: December, 2003;
2/ 65% of Total Project Cost, excluding permits and not to exceed 100% of the estimated construction cost;
3/ 35% of Total Project Cost;
4/ Note: As per the NRCS National Watershed Manual, 508.44, the actual federal cost/share amount will be calculated based on a total project cost that excludes federal technical assistance costs, water, mineral and other resource rights, and all federal, state and local permits, i.e., only the design and construction costs are included. However, for the purposes of planning all of these costs are included in the benefit/cost analysis and are displayed as part of the public record of this analysis.

TABLE 3 - Structural Data
Dam with Planned Storage Capacity

ITEM	UNIT	AMOUNT
Hazard Class of Structure	-	C
Siesmic Zone	-	2
Total Drainage Area Controlled	Sq. Mi.	11.12
Antecedent Moisture Condition II Runoff Curve Number	-	70
Elevation, Top of Dam	Feet, MSL	790.5
Elevation, Auxiliary Spillway Crest	Feet, MSL	777.5
Elevation, Principal Spillway Crest	Feet, MSL	749.7
Auxiliary Spillway Type	-	RCC
Auxiliary Spillway Bottom Width	Feet	300
Auxiliary Spillway Exit Slope	%	40
Maximum Height of Dam	Feet	55.5
Volume of Fill (Rehabilitation)	Cu. Yd.	14,500
Total Capacity	Ac.-Ft.	4,285
Sediment (Including Aerated)	Ac.-Ft.	108
Floodwater Retarding	Ac.-Ft.	2,160
Surface Area		
Sediment Pool	Acres	32.8 [1/]
Floodwater Retarding Pool	Acres	126
Principal Spillway Design		
Rainfall Volume (1 day)	Inches	6.9
Rainfall Volume (10 day)	Inches	12.8
Runoff Volume (10 day)	Inches	5.94
Capacity at Crest of Emergency Spillway	CFS	126
Conduit Size (There is a 26" Dia. Orifice Plate in Riser)	Inches	42
Conduit Type	-	Concrete
Frequency of Operation, Auxiliary Spillway	% chance	1.1
Auxiliary Spillway Hydrograph		
Rainfall Volume	Inches	11.6
Runoff Volume	Inches	7.68
Storm Duration	Hours	6
Maximum Surface Elevation	Feet, MSL	782.8
Freeboard Hydrograph		
Rainfall Volume	Inches	38.4
Runoff Volume	Inches	33.7
Storm Duration	Hours	24
Maximum Surface Elevation	Feet, MSL	790.4
Capacity Equivalents		
Sediment	Inches	0.18
Floodwater Retarding	Inches	3.65

[1/] The existing surface area is approximately 28 acres of open water and 5 acres of wetlands.

Table 4 - Average Annual Adverse Effects
Marrowbone Creek Watershed, Henry County, Virginia
(Dollars)

Evaluation Unit	Amortized Installation Cost	Operation and Maintenance	Total Costs
Rehabilitation of Marrowbone Dam #1	$152,000	$1,000	$153,000

Price base: December, 2003;

Note: The average annual equivalents are based on a 5.875% discount rate and a 59 year period of analysis.

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits
Marrowbone Creek Watershed, Henry County, Virginia
(Dollars)

Flood Damage Category	Estimated Average Annual Damages		Damage Reduction Benefits	
	Without Project	With Project	Average Annual	Average Annual Equivalents
Damage to Structures	$44,000	$21,000	$23,000	$22,000
Damage to Contents	$13,000	$7,600	$5,400	$5,200
Private Clean-up Costs	$200	$100	$100	$90
Private Business Losses	$800	$400	$400	$375
Public Clean-up Costs	$100	$30	$70	$65
Public Administration Costs	$20	$0	$20	$15
Agricultural Losses	$30	$0	$30	$25
Traffic Disruption Costs	$1,000	$200	$800	$750
Lost Incidental Recreation Value	$3,400	$0	$3,400	$3,200
Lost Property Value	$30,000	$0	$30,000	$28,280
Grand Totals:	$92,550	$29,330	$63,220	$60,000

Price base: December, 2003;

Note: The average annual equivalents are based on a 5.875% discount rate and a 59 year period of analysis.

Table 6 - Comparison of Benefits and Costs

Marrowbone Creek Watershed, Henry County, Virginia

Item	Damage Reduction Benefits						Other Benefits		Total Annual Benefits	Total Annual Costs	Benefit Cost Ratio
	Building Structures and Contents (including infra-structure such as roads and bridges)	Private and Public Clean-up costs	Private Business Losses	Public Admin. Costs	Agricultural Losses	Traffic Disruption Costs	Incidental Recreation	Main-tenance of Property Values			
Reha-bilitation of Marrow-bone Dam No. 1	$27,200	$155	$375	$15	$25	$750	$3,200	$28,280	$60,000	$153,000	0.39

Price base: December, 2003;

Note: The average annual equivalents are based on a 5.875% discount rate and a 59 year period of analysis.

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Water Resources Site Analysis Program (SITES)

REPORT PREPARERS

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

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

VIRGINIA NATURAL RESOURCES PLANNING TEAM

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
Belinda Barnard	Cartographer – 5	AA Business Mgmt. Computer Service	Computer Specialist – 10 yrs. Support Services Specialist – 5 yrs.	
R. Wade Biddix	Watershed Program Coord.- 1	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.	
David L. Faulkner	Natural Resource Economist - 14	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 - 12	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.	
Alica J. Ketchem	Plng./Environmental Engineer – 10	M.S. Ag. Engineering B.S. Civil Engineering	Civil Engineer – 9 yrs.	PE

VIRGINIA NATURAL RESOURCES PLANNING TEAM

Name	Present Title and Years in Current Position	Education	Previous Experience	Other
Virginia A. Kopp	Soil Conservationist - 1	M.S. Forestry B.S. Forest Science	Resource Conservationist – 6 yrs. District Conservationist – 4 yrs. Soil Conservationist – 5 yrs.	SAF – Certified Forester
Bryan Lee	Cultural Resource Specialist – 2	MA Anthropology BA Anthropology	Archaeologist (Private) 10 years	
Mathew J. Lyons	State Conservation Engineer- 2	B.S. Civil Engineering	Professional Engineer – 5 yrs. Civil Engineer – 8 yrs.	PE
John D. Myers	Environmental Specialist – 12	B.S. Wildlife Mgmt.	District Cons. - 10 yrs. Soil Cons. - 2 yrs. U.S. Fish & Wildlife Serv. – 2 yrs.	
Julius Toenniessen	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 Marrowbone Creek Watershed surveying, collecting data, meeting with landowners, and attending public meetings.

- Virginia Department of Conservation and Recreation:
  - Division of Dam Safety and Floodplain Management Staff: William G. Browning, Director, and Thomas I. Roberts, PE, Engineer
  - Division of Soil and Water Conservation Staff: Kenneth E. Turner, Jr., PE, District Dam Safety Consultant
- Blue Ridge Soil and Water Conservation District Staff: Bill Murphy
- NRCS Project Engineering Staff: Jerry D. Hughston, Project Engineer; Charles E. (Billy) Bear, Jr., 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 from the Draft Supplemental Plan – EA from the following agencies and organizations.

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

Virginia State Agencies	Draft Supplemental Plan/EA
Virginia Marine Resources Commission	Responded
Virginia Department of Historic Resources	Responded
Virginia Department of Transportation	Responded

Other	
Virginia Association of Soil and Water Conservation Districts	Responded
Blue Ridge Soil and Water Conservation District	No Response
Henry County Board of Supervisors	Responded
West Piedmont Planning District Commission	Responded
Duke Energy East Tennessee Natural Gas Company	No Response

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

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.state.va.us

Robert G. Burnley
Director

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

December 3, 2003

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

RE: Draft Supplemental Watershed Plan and Environmental Assessment for Rehabilitation of Marrowbone Creek Watershed Dam Site No. 1, Henry County
DEQ-03-209F

Dear Ms. Doetzer:

The Commonwealth of Virginia has completed its review of the above-named document. 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 agencies, planning district commission, and locality joined in our review of these documents:

Department of Environmental Quality (hereinafter "DEQ")
Marine Resources Commission
Department of Transportation
West Piedmont Planning District Commission
Henry County.

In addition, the following agencies were invited to comment:

Department of Agriculture and Consumer Services
Department of Conservation and Recreation
Department of Historic Resources
Department of Forestry
Department of Emergency Services.

Project Description

According to the Draft Supplemental Watershed Plan and Environmental Assessment ("Plan/EA"), the NRCS proposes to rehabilitate an aging dam along Marrowbone Creek in Henry County, south of Martinsville (Plan/EA, page 1, "Project Setting" heading). The dam was originally designed as a low-hazard structure, protecting downstream agricultural lands from flooding. Much of the downstream area has changed to houses and businesses, and requires a high-hazard structure. Marrowbone Creek is a tributary of the Smith River. The Creek watershed is 19,300 acres; the drainage area for the dam is 7,114 acres in the upper 37% of the watershed. The EA and Plan considers alternatives of de-commissioning and no action as well as rehabilitation (Plan/EA, pages v-vi, "Summary" heading).

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Department of Conservation and Recreation expects to comment directly on this matter.

2. Water Quality and Wetlands. According to DEQ's Water Division, the project will not have adverse impacts on surface water quality provided that NRCS and the local sponsors follow Erosion and Sediment Control and Stormwater Management requirements of the Department of Conservation and Recreation. In addition, if land disturbance equals or exceeds one acre, a VPDES Stormwater General Permit may be required from DEQ (see "Regulatory and Coordination Needs," item 2, below).

The method of construction, backfilling the emergency spillway and raising the top of the dam by 8.5 feet (Plan/EA, page v, "Description of Recommended Plan" heading") will not affect water quality because it does not involve a change in the pool elevation. In consequence, it does not involve expansion of the pool into fringe wetland areas.

3. Forest and Tree Protection. In order to protect trees in the project area from construction activities, the Natural Resources Conservation Service (hereinafter "NRCS") should mark and fence them at least to the dripline or the end of the root system, whichever extends farther from the tree stem. Marking should be done with highly visible ribbon so that equipment operators see the protected areas easily.

Parking and stacking of heavy equipment and construction materials near trees can damage root systems by compacting the soil. Soil compaction, from weight or vibration, affects root growth, water and nutrient uptake, and gas exchange. The protection measures suggested above should be used for parking and stacking as well as for moving of equipment and materials. If parking and stacking are unavoidable, NRCS

should use temporary crossing bridges or mats to minimize soil compaction and mechanical injury to plants.

Any stockpiling of soil should take place away from trees. Piling soil at a tree stem can kill the root system of the tree. Soil stockpiles should be covered, as well, to prevent soil erosion and fugitive dust.

Questions on tree protection may be directed to the Department of Forestry (Mike Foreman, telephone (434) 977-6555).

4. Wildlife Resources. Under *Virginia Code* Title 29.1, the Department of Game and Inland Fisheries (DGIF) is the primary wildlife and freshwater fish management agency in the Commonwealth. DGIF has full law enforcement and regulatory jurisdiction over all wildlife resources, inclusive of state and federally endangered or threatened species, but excluding listed insects. The agency maintains a comprehensive system of databases of wildlife resources that is available through its web site at www.dgif.state.va.us, in the "Wildlife" section from the link to "Wildlife Information Online." DGIF determines likely impacts on fish and wildlife resources and habitats, and recommends appropriate measures to avoid, reduce, or compensate for those impacts. For more information on the Wildlife Information Online Service, NRCS may contact DGIF (Kathy Quindlen Graham, telephone (804) 367-9717).

5. Transportation. According to the Department of Transportation, the proposed project is likely to have minimal impacts on traffic during its construction phase.

6. Recreation Resources. The Department of Conservation and Recreation expects to comment directly on this matter.

7. Local and Regional Concerns. Henry County supports the project, stating that the project is essential to the safety of residents of the area downstream of the dam. Similarly, the West Piedmont Planning District Commission endorsed the project at its meeting on November 20, 2003.

Regulatory and Coordination Needs

1. Subaqueous Bed Encroachments. Any new activities within the original, natural streambed of Marrowbone Creek may require a permit from the Marine Resources Commission (Kevin Curling, telephone (757) 247-2200).

2. Water Quality Regulation. Questions pertaining to the applicability of the Virginia Pollutant Discharge Elimination System (VPDES) Stormwater General Permit

may be addressed to DEQ's West Central Regional Office (Jonathan Stauffer, telephone (540) 562-6873).

3. Transportation. Any work with the potential to affect roads or other transportation facilities should be coordinated with the Department of Transportation's Rocky Mount Residency (telephone (540) 420-3600).

Thank you for the opportunity to review the Plan/EA.

Sincerely,

Ellie L. Irons
Program Manager
Office of Environmental Impact Review

Enclosures
cc: Brian D. Moyer, DGIF
Keith R. Tignor, VDACS
Derral Jones, DCR
Ellen Gilinsky, DEQ-WD
Jonathan W. Stauffer, DEQ-WCRO
David V. Grimes, VDOT
Kevin Curling, MRC
Ethel R. Eaton, DHR
J. Michael Foreman, DOF
Robert W. Dowd, West Piedmont PDC
Benny Summerlin, Henry County

informal memo

December 2, 2003

TO: File

FROM: C. Ellis

SUBJECT: Marrowbone Creek Watershed Project, USDA-NRCS (DEQ-03-209F)

I talked with Dave Davis, DEQ Water Division, to get his comments today.

According to DEQ Water Division, the project will not have adverse impacts on surface water quality provided that NRCS and the local sponsors follow Erosion and Sediment Control and Stormwater Management requirements of the Department of Conservation and Recreation. In addition, if land disturbance equals or exceeds one acre, a VPDES Stormwater General Permit may be required.

The method of construction, backfilling the emergency spillway and raising the top of the dam by 8.5 feet (Plan/EA, page v, "Description of Recommended Plan" heading") will not affect water quality because it does not involve a change in the pool elevation. In consequence, it does not involve expansion of the pool into fringe wetland areas.

Ellis,Charles

From: Stauffer,Jonathan
Sent: Monday, December 01, 2003 7:07 PM
To: Ellis,Charles
Subject: EIR Comments: Project # 03-209F: Marrowbone Creek Watershed Dam Rehabilitation Plan

Mr. Ellis:
The West Central Regional Office (WCRO) of Virginia DEQ has completed its review of the Marrowbone Creek Watershed Dam Rehabilitation Plan. WCRO has no comments on the project at this time.
Please feel free to contact me if you have any questions.
Thank you for the opportunity to comment.

Jonathan W. Stauffer
Virginia Department of Environmental Quality
Virginia Water Protection Permit Program
West Central and Southwest Regional Offices
phone: 540.562.6873
email: jwstauffer@deq.state.va.us
mailing address: 3019 Peters Creek Road . Roanoke VA . 24019

RECEIVED

NOV 24 2003

DEQ-Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

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

PHILIP A. SHUCET
COMMISSIONER

EARL T. ROBB
STATE ENVIRONMENTAL ADMINISTRATOR

November 20, 2003

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

Dear Mr. Ellis:

The Virginia Department of Transportation has reviewed the information provided for the Marrowbone Creek Watershed Dam Rehabilitation Plan. Our review covers impacts to existing and proposed transportation facilities.

The proposed project should have minimal impacts to traffic during construction, with no long-term, negative impacts. All work with the potential to effect roadways or other transportation facilities should be coordinated with VDOT's Rocky Mount Residency (540-420-3600).

Thank you for the opportunity to comment on this project.

Sincerely,

David Grimes
Environmental Specialist II
VDOT
1401 East Broad St.
Richmond, VA 23219
804-786-6678 - O
804-786-7401 - FAX

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. **IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.**

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

Charles H. Ellis III

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

ANY NEW ACTIVITIES WITHIN THE ORIGINAL, NATURAL STREAMBED OF MARROWBONE CREEK MAY REQUIRE A PERMIT FROM THIS AGENCY.

(signed) Ken Cumbia (date) 12/1/03

(title) Environmental Engineer

(agency) VMRC

PROJECT # 03-209F **8/98**

PDC 12

West Piedmont
Planning District Commission

One Starling Avenue
P.O. Box 5268
Martinsville, VA 24115-5268
Phone: (276) 638-3987
Fax: (276) 638-8137
e-mail: staff@wppdc.org

Serving Franklin, Henry, Patrick, and Pittsylvania Counties – Cities of Danville and Martinsville – Town of Rocky Mount – Since 1970

December 2, 2003

Charles H. Ellis, III
Environmental Impact Review Coordinator
Department of Environmental Quality
Office of Environmental Impact Review
P.O. Box 10009
Richmond, VA 23240

RE: DEQ Project #: 03-209F
Marrowbone Creek Water Dam Rehabilitation Plan

Dear Charles:

We received the Department of Environmental Quality's Office of Environmental Review request to review and comment on a plan for rehabilitation of a dam facility in our region. At it's meeting on November 20, 2003, the West Piedmont Planning District Board of Commissioners voted to endorse the Marrowbone Creek Watershed Dam Rehabilitation Plan that was sponsored by the USDA/Natural Resources Conservation Service.

We do appreciate the opportunity to comment on projects addressed by the Office of Environmental Impact Review.

Sincerely,

Bob

Robert W. Dowd
Executive Director

County of Henry

P.O. BOX 7
KING'S MOUNTAIN ROAD
COLLINSVILLE, VIRGINIA 24078-0007
www.co.henry.va.us

November 3, 2003

Mr. Charles R. Ellis, III
Department of Environmental Quality
Office of the Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, Virginia 23219

Dear Mr. Ellis:

Thank you for the opportunity to comment on the Environmental Review related to the Marrowbone Creek Watershed Dam Rehabilitation Project identified as Project #03-209F. I am pleased to offer a favorable comment on this project as it is essential to the safety of the downstream residents of Marrowbone Dam.

Should you have any questions or require additional information, please feel free to contact me.

Sincerely,

Benny Summerlin
County Administrator

/sb

COMMONWEALTH of VIRGINIA

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.state.va.us

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Robert G. Burnley
Director

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

December 8, 2003

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

RE: Draft Supplemental Watershed Plan and Environmental Assessment for Rehabilitation of Marrowbone Creek Watershed Dam Site No. 1, Henry County
DEQ-03-209F

Dear Ms. Doetzer:

This letter reflects additional comments received from reviewing agencies since we mailed our comments, dated December 3, 2003. As indicated in the earlier comments, 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 agencies, planning district commission, and locality joined in our review of these documents:

Department of Environmental Quality (hereinafter "DEQ")
Marine Resources Commission
Department of Conservation and Recreation
Department of Historic Resources
Department of Transportation
West Piedmont Planning District Commission
Henry County.

Project Description

According to the Draft Supplemental Watershed Plan and Environmental Assessment ("Plan/EA"), the NRCS proposes to rehabilitate an aging dam along Marrowbone Creek in Henry County, south of Martinsville (Plan/EA, page 1, "Project Setting" heading). The dam was originally designed as a low-hazard structure, protecting downstream agricultural lands from flooding. Much of the downstream area has changed to houses and businesses, and requires a high-hazard structure. Marrowbone Creek is a

tributary of the Smith River. The Creek watershed is 19,300 acres; the drainage area for the dam is 7,114 acres in the upper 37% of the watershed. The EA and Plan considers alternatives of de-commissioning and no action as well as rehabilitation (Plan/EA, pages v-vi, "Summary" heading).

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Department of Conservation and Recreation 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, significant geologic formations, and similar features of scientific interest. The Department of Conservation and Recreation indicates that natural heritage resources have not been documented in the project area. The absence of data, however, may indicate that the project area has not been surveyed, rather than confirming that the area lacks such resources.

2. Erosion and Sediment Control; Stormwater Management. Federal agencies and their authorized agents conducting regulated land-disturbing activities on public and private lands in the Commonwealth of Virginia must comply with the Virginia Erosion and Sediment Control Law (*Virginia Code* section 10.1-567), the Virginia Stormwater Management Law (*Virginia Code* section 10.1-603.15), and other applicable federal non-point source pollution control mandates such as section 313 of the Clean Water Act and the federal consistency requirements of the Coastal Zone Management Act. The following activities are regulated by the Erosion and Sediment Control Law if they involve disturbance of 10,000 square feet or more of land area:

Clearing and grading
installation of staging areas
parking lots, roads, buildings, utilities, or other structures
soil/dredge spoil areas
related land conversion activities.

Similar activities that disturb one acre or more would be regulated by the Stormwater Management Law and its implementing regulations. Accordingly, NRCS should prepare and implement Erosion and Sediment Control Plans and Stormwater Management Plans that comply with state law. NRCS is ultimately responsible for achieving project compliance through oversight of on-site contractors, regular field inspection, prompt action against non-compliance, and/or other mechanisms consistent with NRCS policy. See "Regulatory and Coordination Needs," item 1, below.

3. Historic Structures and Archaeological Resources. The Plan/EA indicates that a survey of the project area yielded no cultural resources (see page v), according to the Department of Historic Resources in its December 3 letter to you. However, while the survey material used at the Department of Historic Resources is extensive, it is not comprehensive. Surveys have not identified all historic properties eligible for the National Register of Historic Places. Therefore, the failure to locate significant resources during an archive search at the Department's office does not preclude the possibility of such resources being present in the Area of Potential Effect of the project. At a minimum, the project proponent should conduct a "windshield survey" of the Area of Potential Effect in order to identify previously unrecorded historic properties that may be located there. The Department of Historic Resources asks that NRCS undertake such a survey and provide the results of it to the Department for review and comment.

In addition, the Plan/EA indicates that NRCS archaeologist Brian Lee performed an archival search and field survey of the property (page 2). The Department requests a letter reporting the results of these investigations be sent to the Department of Historic Resources for review and comment.

Regulatory and Coordination Needs

1. Erosion and Sediment Control; Stormwater Management. We encourage NRCS to contact DCR's James Watershed Office (Mike Bowman, telephone (804) 527-4484) to obtain plan development or implementation assistance so as to ensure project compliance during and after construction.

2. Historic Resources Investigations. The survey results requested above should be sent to the Department of Historic Resources, 2801 Kensington Avenue, Richmond, Virginia 23221. Questions may be directed to the Department (Marc Holma, telephone (804) 367-2323, extension 114).

Thank you for accepting these additional comments.

Sincerely,

Ellie L. Irons
Program Manager
Office of Environmental Impact Review

Enclosures
cc: (next page)

cc: Brian D. Moyer, DGIF
Keith R. Tignor, VDACS
Derral Jones, DCR
Ellen Gilinsky, DEQ-WD
Jonathan W. Stauffer, DEQ-WCRO
David V. Grimes, VDOT
Kevin Curling, MRC
Ethel R. Eaton, DHR
J. Michael Foreman, DOF
Robert W. Dowd, West Piedmont PDC
Benny Summerlin, Henry County

W. Tayloe 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
TDD (804) 786-2121

MEMORANDUM

Date: 3 December 2003

To: Charles H. Ellis, III, Virginia Department of Environmental Quality

Derral Jones

From: Derral Jones, Planning Bureau Manager

Subject: DEQ#03-209F: Marrowbone Creek Watershed-Dam Rehabilitation

The Department of Conservation and Recreation (DCR) functions to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreation and natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, state unique or exemplary natural communities, significant geologic formations and similar features of scientific interest.

DCR has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted maps. According to the information currently in our files, natural heritage resources have not been documented in the project area. This absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

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

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

For appropriate soil and water conservation on this project, please note that Federal agencies and their authorized agents conducting regulated land disturbing activities on private and public lands in the state must comply with the Virginia Erosion and Sediment Control Law and Regulations (VESCL&R), Virginia Stormwater Management Law and Regulations (VSWML&R), and other applicable federal nonpoint source pollution mandates (e..g, Clean Water Act-Section 313, Federal Consistency under the Coastal Zone Management Act). Clearing and grading activities, installation of staging areas, parking lots, roads, buildings, utilities, or other structures, soil/dredge spoil areas, or related land conv ersion activities that disturb 10,000 square feet or more would be regulated by VESCL&R and those that disturb one acre or greater would be covered by VSWML&R. Accordingly, federal agencies should prepare and implement erosion and sediment control (ESC) and stormwater management (SWM) plans to ensure compliance with state law. The sponsoring federal agency is ultimately responsible for achieving project compliance through oversight of on site contractors, regular field inspection, prompt action against non-compliant sites, and/or other mechanisms consistent with agency policy. The USDA-Natural Resources Conservation Service is highly encouraged to contact DCR's Roanoke Watershed Office (804-372-2191) to obtain plan development or implementation assistance to ensure project conformance during and after active construction. *[Reference: VESCL §10.1-567; VSWML §10.1-603.15]*

Thank you for the opportunity to offer comments on this plan.

RECEIVED

DEC 05 2003

DEQ-Office of Environmental Impact Review

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
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.state.va.us

December 3, 2003

Ms M. Denise Doetzer
National Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229-5014

Re: Marrowbone Creek Watershed Dam Rehabilitation Plan
Henry County, Virginia
DHR File # 2003-1356

Dear Ms Doetzer:

We have received your request for our review and comment regarding the above referenced project. It is our understanding that United States Department of Agriculture, Natural Resources Conservation Service, proposes to rehabilitate the existing Marrowbone Creek Watershed Dam located in Henry County, Virginia. The plan involves the construction of a roller-compacted concrete spillway through the existing earth embankment at the current emergency spillway elevation, raising the top of the dam 8.5 feet by placing a concrete wall on top of the embankment, and backfilling the existing emergency spillway with earth to bring it to the same elevation as the new top of the dam.

The "Draft Supplemental Watershed Plan-Environmental Assessment for the Marrowbone Creek Watershed" report states that the "project area was surveyed and no [cultural resources] were identified" (page v). Unfortunately, although the survey material at the Department of Historic Resources (DHR) is extensive it is not comprehensive. Surveys have not identified all historic properties eligible for the National Register of Historic Places. Therefore, the failure to locate historically or archaeologically significant resources during an archive search at DHR does not preclude the possibility of such properties being present within the project Area of Potential Effect (APE). It is thus necessary for the sponsoring agency to conduct, at a minimum, a windshield survey of the APE in order to identify previously unrecorded historic properties that may be located in the APE. Please conduct such a survey and provide DHR with its results for our review and comment. Additionally, the Draft Supplemental Watershed Plan indicates that NRCS

archaeologist Brian Lee performed an archival search and field survey of the watershed property. We ask that a letter report detailing the results of these investigations be forwarded to this office at your earliest convenience. We will complete our review upon receipt of the requested materials.

If you have any questions regarding our comments, please contact me at (804) 367-2323, Ext. 114.

Sincerely,

Marc Holma, Architectural Historian
Office of Review and Compliance

Cc: [redacted]

Memorandum

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
Larry G. Lawson, P.E., Director

To: **Charlie Ellis**
Environmental Program Planner

From: Ellen Gilinsky, Ph. D, PWS
VWP Permit Program Manager

Date: December 2, 2003

Subject: **Marrowbone Creek Watershed Dam Rehabilitation Plan**
USDA Natural Resources Conservation Service
Project Number **03-209F**

On behalf of the DEQ-Water Division, we have reviewed the Draft Supplemental Watershed Plan-Environmental Assessment regarding the proposed rehabilitation of floodwater retarding structure #1 located in Henry County, Virginia. The project site currently consists of paved and landscaped areas.

The report states that approximately 5 acres of wetlands, classified as Palustrine Emergent Persistent Saturated Dike/Impoundment (PEM1Bh), were identified along the water's edge of the existing pool elevation, in addition to the existing impounded surface water. Adverse impacts to surface water resources are not anticipated as part of facility renovation provided adequate erosion and stormwater management practices are properly implemented and maintained over the course of construction activities. We further encourage the project proponent to monitor construction activities to make certain that erosion and stormwater management practices are adequately preventing sediment and pollutant migration into nearby surface waters. Please note that a VPDES stormwater general permit for construction activities will be required should the proposed project disturb more than one acre of land.

Federal Emergency Management Agency

Region III
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

FIM

NOV 5 2003

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

Dear Ms. Doetzer:

The Federal Emergency Management Agency (FEMA), which is now incorporated within the Department of Homeland Security, received your letter, dated October 24, 2003, regarding a Draft Supplemental Watershed Plan for the rehabilitation of the Marrowbone Creek Watershed Dam Site Number 1 in Henry County, Virginia. It appears that the proposed project will impact Marrowbone Creek, which has been mapped by FEMA as a Special Flood Hazard Area (SFHA)—an area subject to flooding during the 1% annual chance flood—with base (1% annual chance) flood elevations and floodway determined.

FEMA administers the National Flood Insurance Program (NFIP), which is designed to reduce flood losses through local floodplain management and the provision of flood insurance to property owners. The NFIP requires participating communities to adopt and enforce floodplain management ordinances with stipulations regarding modifications made to areas within the SFHA. As such, each community is asked to enforce an ordinance that requires permits for all proposed construction within the SFHA and also requires that the flood-carrying capacity of an altered stream be maintained.

To prove that the flood-carrying capacity of an impacted stream will be maintained may require an engineering study and completion of a conditional Letter of Map Revision application. This application and related information can be found on our website at: www.fema.gov/mit/tsd/dl_mt-2.htm. Please coordinate with the Floodplain Management Officer of Henry County to ensure that the project meets the requirements of their floodplain management ordinances.

As this proposal involves Federal expenditure, it is subject to Executive Order 11988, which directs Federal agencies to "avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." Each Federal agency has issued regulations to comply with the Executive Order. These are administered by the involved Federal agency.

If you have any questions regarding this letter, or the NFIP in general, please call me at (215) 931-5669.

Sincerely,

Eugene K. Gruber, P.E.
Director, Federal Insurance and Mitigation Division

cc: Commonwealth NFIP Coordinator

RECEIVED
NOV - 7 2003
By

Action: WadeB
copy: Denise –
Ray –
Dwight –

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
Fax: (804) 367-2391
TDD: (804) 367-2386
www.dhr.state.va.us

January 15, 2004

Ms M. Denise Doetzer
National Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, Virginia 23229-5014

Re: Marrowbone Creek Watershed Dam Rehabilitation Plan
Henry County, Virginia
DHR File # 2003-1356

Dear Ms Doetzer:

We have received the additional information that we requested in a letter dated December 3, 2003, regarding the above referenced project. After reviewing the supplemental material, it is our determination that the undertaking will have No Effect on any known architectural or archaeological resources listed in or eligible for the National Register of Historic Places or the Virginia Landmarks Register.

If you have any questions regarding our comments, please contact me at (804) 367-2323, Ext. 114.

Sincerely,

Marc Holma, Architectural Historian
Office of Review and Compliance

RECEIVED
JAN 20 2004
By

Cc: Mr. Charles H. Ellis, III, Department of Environmental Quality

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

Portsmouth Region Office
612 Court Street, 3rd Floor
Portsmouth, VA 23704
Tel: (757) 396-6707
Fax: (757) 396-6712

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 2
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7535

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1691
Fax: 804/287-1737

December 17, 2003

Ms. Ellie Irons
Program Manager
DEQ Office of Environmental Impact Review
629 East Main Street
Richmond, Virginia 23219

Re: Marrowbone Creek Watershed Dam Rehabilitation Plan
Henry County, Virginia
DEQ-03-209F

Dear Ms. Irons:

Thank you for your letters dated December 3, 2003 and December 8, 2003 regarding the Draft Supplemental Watershed Plan for the rehabilitation of the Marrowbone Creek Watershed Dam. No. 1 located in Henry County, Virginia. We appreciate your assistance in coordinating this interagency review of appropriate agencies and organizations at the state, regional and local levels.

In response to the section of the letters entitled "Regulatory and Coordination Needs", the following additional information is provided:

1) *Subaqueous Bed Encroachments* – The project sponsors are the Blue Ridge Soil and Water Conservation District and the Henry County Board of Supervisors. They are responsible for all environmental permits. All necessary permits will be obtained prior to a construction start on this project.

2) *Water Quality Regulation* - See Item 1 above. The project sponsors will inquire and coordinate with the West Central Region DEQ office regarding the need for a Virginia Pollution Discharge Elimination System (VPDES) Stormwater General Permit.

3) *Transportation* – The Rocky Mount Office of the Virginia Department of Transportation will be consulted should the project affect roads or other transportation facilities.

4) *Erosion and Sediment Control; Stormwater Management* – As needed, the Virginia Department of Conservation and Recreation's James Watershed Office will be consulted to obtain plan development or implementation assistance to ensure project compliance during and after construction.

5) *Historic Resources Investigations* – The survey results were mailed to Marc Holma, Architectural Historian, with the Virginia Department of Historic Resources in a letter dated December 10, 2003. A carbon copy of the letter was provided to you under separate cover. The letter should resolve this issue.

Your comments on this supplemental watershed plan are appreciated. If you have any questions, please direct them to Wade Biddix, Watershed Program Coordinator, at (804) 287-1675.

Sincerely,

Acting for

M. DENISE DOETZER
State Conservationist

Cc: R. Wade Biddix, WPC, Richmond, VA

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1691
Fax: 804/287-1737

December 10, 2003

Marc Holma, Architectural Historian
Virginia Department of Historic Resources
Office of Review and Compliance
2801 Kensington Avenue
Richmond, Virginia 23221

Re: Marrowbone Creek Watershed Dam Rehabilitation Plan
Henry County, Virginia
DHR File #2003-1356

Dear Mr. Holma:

In response to your letter dated December 3, 2003, the following information is provided in order to more fully explain the cultural resources investigations conducted by NRCS for the proposed rehabilitation of the Marrowbone Creek Watershed Dam located in Henry County, Virginia.

NRCS Cultural Resource Specialist Bryan Lee conducted a field visit to the Area of Potential Effect (APE) in August of 2003. A methodology for considering culturally significant resources was developed and followed in this planning process. Several resource reviews were conducted before the APE was visited.

The National Register of Historic Places lists ten sites in Henry County. Two sites listed are in Ridgeway and are in close proximity to the watershed. The other eight sites are scattered across the county. None of these sites will be affected. These ten sites as well as any additional locally significant sites will not be affected by the proposed project. The State Archaeological site file lists seven archaeological sites within one mile of the watershed. Two of these sites are in close proximity to the dam but will not be affected by the project. These sites are 44HR160 and 44HR167, and both were recorded as not eligible for the National Register of Historic Places. The Virginia State Architectural file lists twenty-seven architectural sites within the watershed. However, none of these will be affected by the project.

One area immediately north of the current dam may be used as a borrow area for soil. Two transects were placed in this area and eleven shovel test probes (STP's) at 20m intervals were excavated. All STP's were negative for artifacts. The area was in a

sloping pasture field adjacent to a two track dirt road. The road and existing cuts in the hillside were inspected for artifacts or other cultural materials. None were noted. All other disturbance associated with the rehabilitation of the dam will occur in areas previously disturbed during construction of the dam.

An inventory of the watershed and associated downstream impacted area was completed with no culturally significant sites noted. Given the review of known sources and the results of field testing within the area of potential effect, it is our opinion that the project will not impact any cultural resources.

Please complete your review of this proposed project and provide your comments to me. Thank you in advance for your immediate attention to this issue.

Sincerely,

For M. DENISE DOETZER
State Conservationist

Cc: Ms. Ellie Irons, Program Manager, DEQ, Office of Environmental Impact Review, Richmond, VA
Mr. Wade Biddix, Watershed Program Coordinator, NRCS, Richmond, VA

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
1606 Santa Rosa Road, Suite 209
Richmond, VA 23229-5014
Telephone: 804/287-1691
Fax: 804/287-1737

December 17, 2003

Mr. Eugene Gruber, P.E.
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region III
One Independence Mall, Sixth Floor
615 Chestnut Street
Philadelphia, PA 19106-4404

Dear Mr. Gruber:

Thank you for your letter dated November 5, 2003 regarding the Draft Supplemental Watershed Plan for the rehabilitation of the Marrowbone Creek Watershed Dam. No. 1 located in Henry County, Virginia.

Henry County has participated in the National Flood Insurance Program since 1980. The rehabilitation of this dam is being sponsored by Henry County and we are coordinating the project with them. Based on the proposed plan, there will be no change in the current levels of flooding downstream of the dam as a result of project activity. Therefore, in keeping with the Executive Order 11988, it is our determination that the project will not have any long or short term adverse impacts to the floodplains.

Your review and comments of this plan are appreciated.

Sincerely,

Acting for.

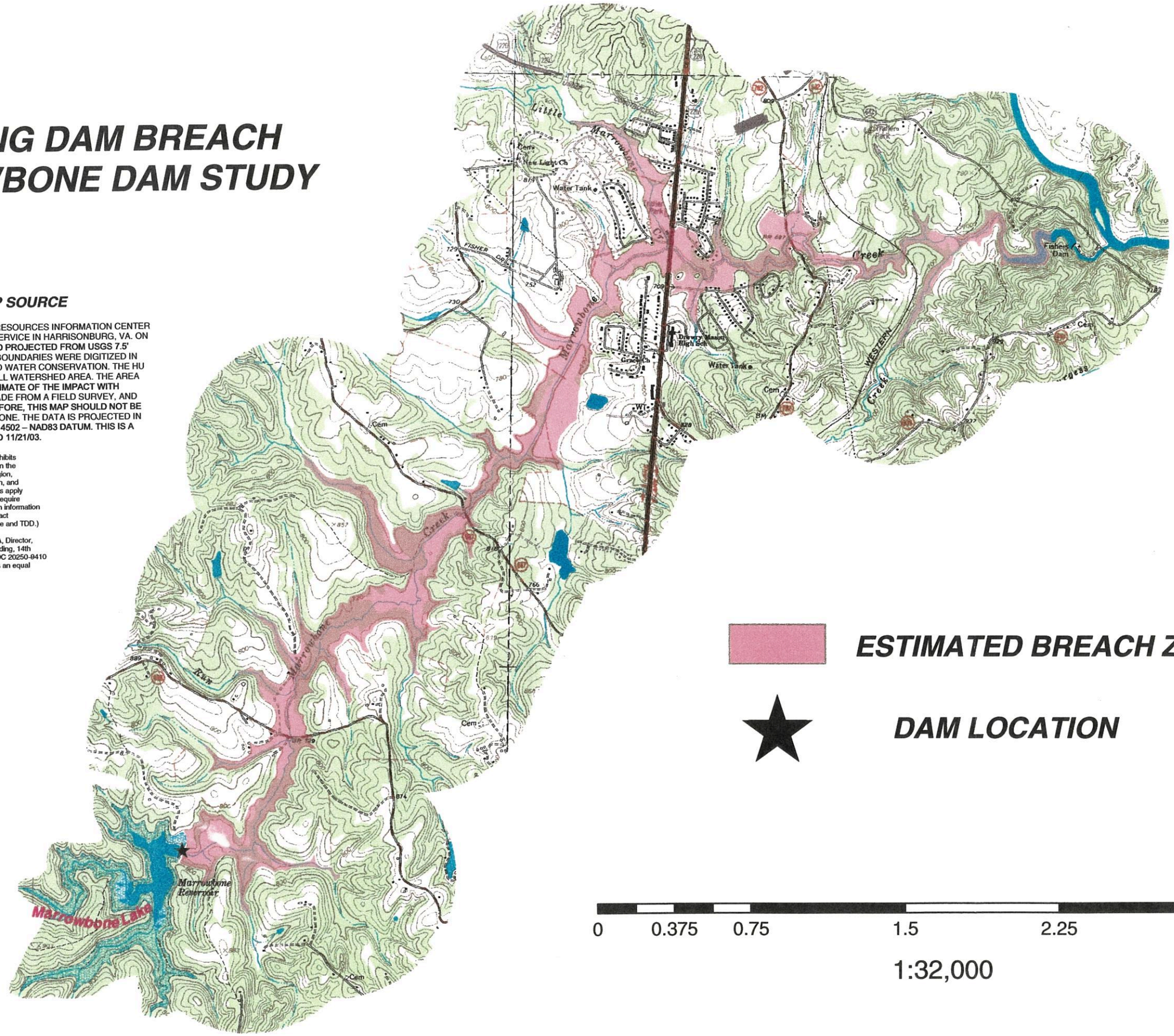
M. DENISE DOETZER
State Conservationist

APPENDIX B

EXISTING DAM BREACH
MARROWBONE DAM STUDY

DIGITAL DATA AND MAP SOURCE

THIS MAP WAS CREATED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER –THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VA. ON 08/12/03. THE DIGITAL IMAGERY WAS MOSAICKED, AND PROJECTED FROM USGS 7.5' DIGITAL RASTER GRAPHICS. THE HYDROLOGIC UNIT BOUNDARIES WERE DIGITIZED IN RICHMOND VA., BY THE VA DCR-DIVISION OF SOIL AND WATER CONSERVATION. THE HU WAS FURTHER EDITED AT VNRIC TO INCLUDE THE FULL WATERSHED AREA. THE AREA INDICATED ON THIS MAP AS THE "BREACH", IS AN ESTIMATE OF THE IMPACT WITH A BREACH CONDITION. THIS APPROXIMATION WAS MADE FROM A FIELD SURVEY, AND DIGITIZING ON A 7.5' DRG TOPOGRAPHIC MAP. THEREFORE, THIS MAP SHOULD NOT BE CONSIDERED AN EXACT REPRESENTATION OF THIS ZONE. THE DATA IS PROJECTED IN VIRGINIA STATEPLANE COORDINATES – SOUTH ZONE 4502 – NAD83 DATUM. THIS IS A "DRAFT" COPY, AND IS SUBJECT TO CHANGE! REVISED 11/21/03.



ESTIMATED BREACH ZONE

DAM LOCATION

Miles

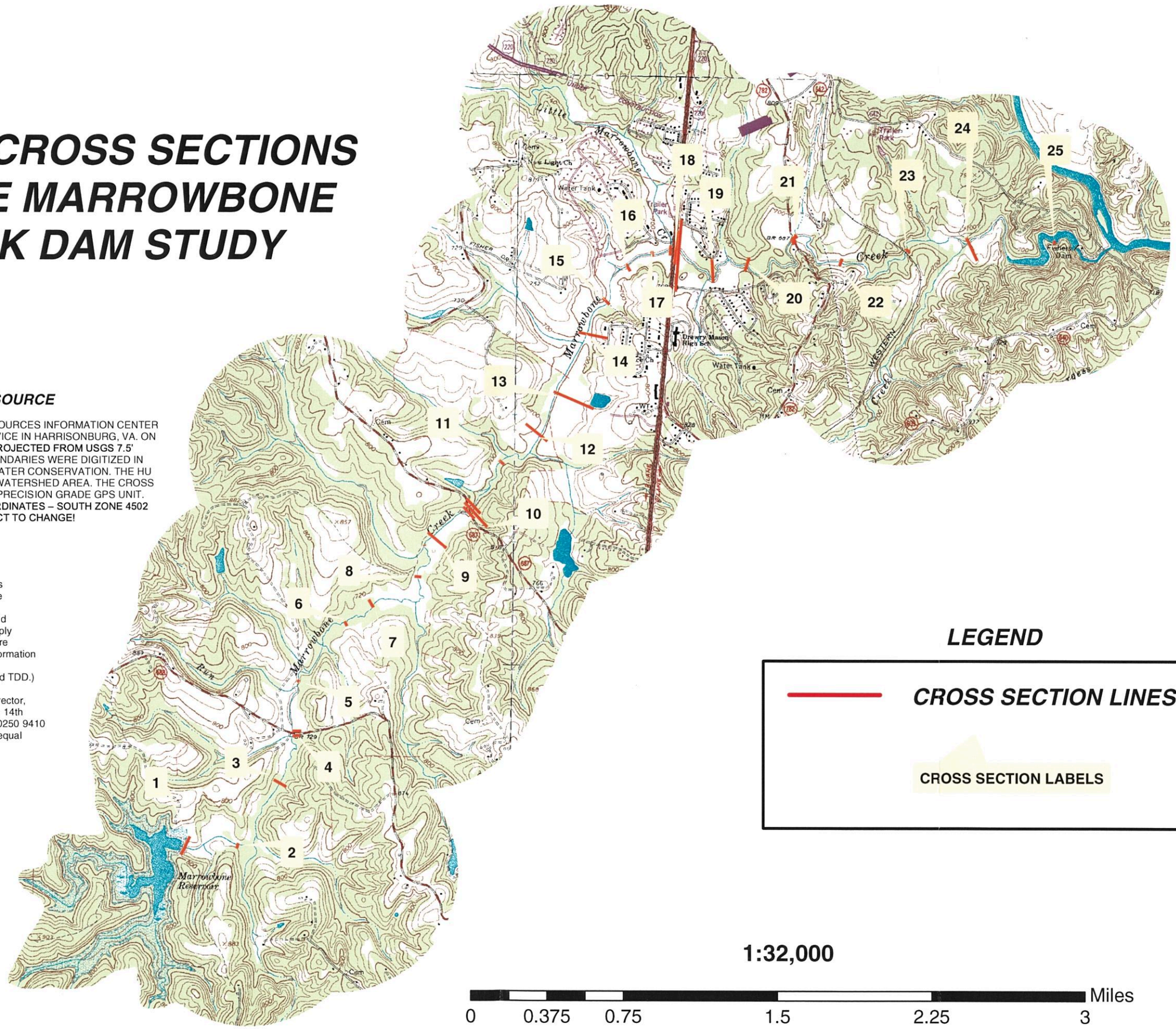
0 0.375 0.75 1.5 2.25 3

1:32,000

VNRIC
The Virginia Natural Resources Information Center

USDA
NRCS
Natural Resources Conservation Service

SURVEY CROSS SECTIONS FOR THE MARROWBONE CREEK DAM STUDY



DIGITAL DATA AND MAP SOURCE

THIS MAP WAS CREATED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VA. ON 08/26/03. THE DIGITAL IMAGERY WAS MOSAICKED, AND PROJECTED FROM USGS 7.5' DIGITAL RASTER GRAPHICS. THE HYDROLOGIC UNIT BOUNDARIES WERE DIGITIZED IN RICHMOND VA., BY THE VA DCR DIVISION OF SOIL AND WATER CONSERVATION. THE HU WAS FURTHER EDITED AT VNRIC TO INCLUDE THE FULL WATERSHED AREA. THE CROSS SECTIONS ARE FROM SURVEY DATA RECORDED WITH A PRECISION GRADE GPS UNIT. THE DATA IS PROJECTED IN VIRGINIA STATEPLANE COORDINATES – SOUTH ZONE 4502 – NAD83 DATUM. THIS IS A "DRAFT" COPY, AND IS SUBJECT TO CHANGE!

LEGEND

CROSS SECTION LINES

CROSS SECTION LABELS

1:32,000

0 0.375 0.75 1.5 2.25 3 Miles

Table B1. Water Surface Elevations For The 100-Year Frequency Storm Event

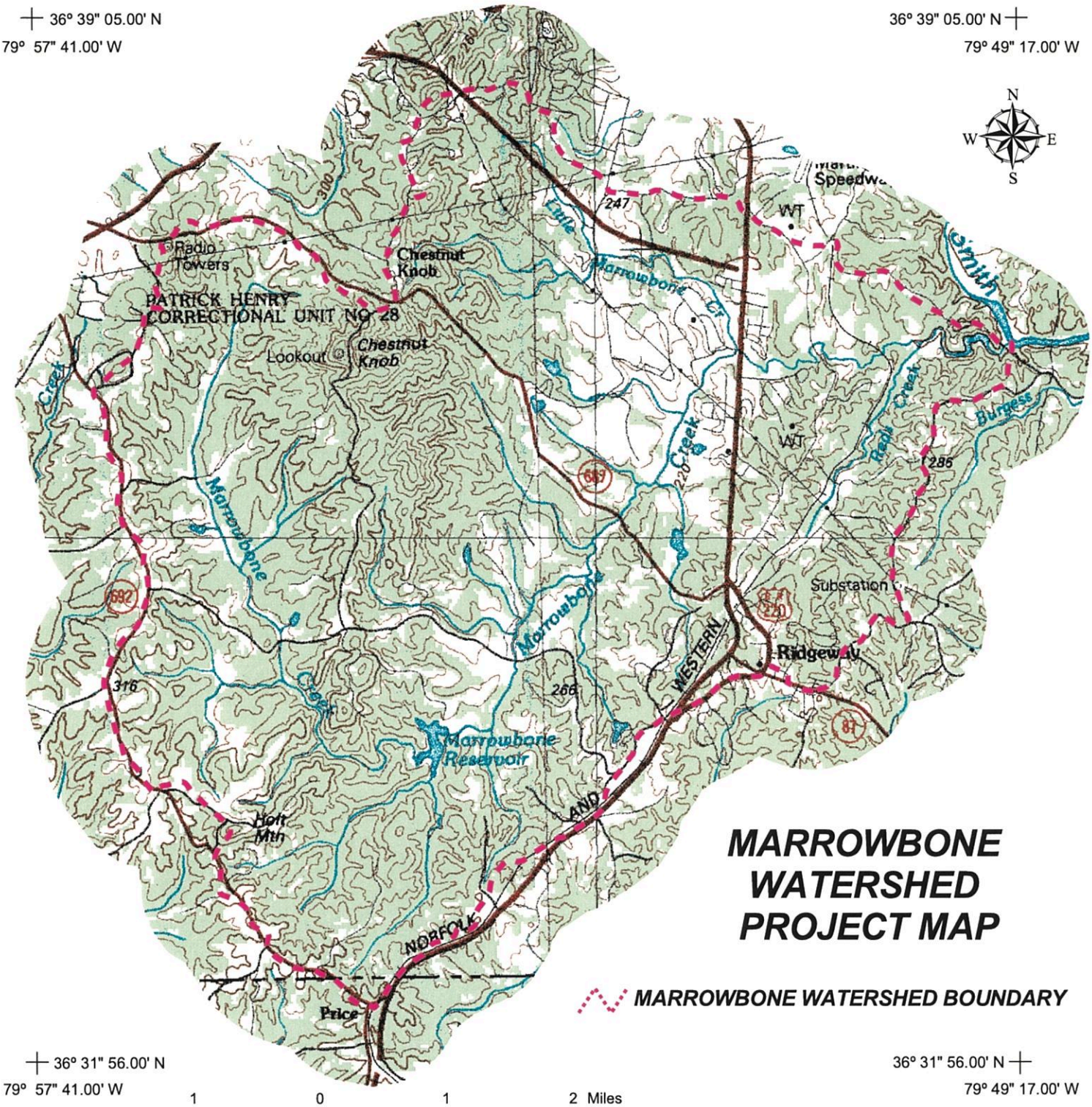
Cross Section Number	Cross Section Station (ft)	No Action/ Decommissioning (ft MSL)	Rehabilitation (ft MSL)
2	2,823	739.4	731.3
4a	6,514	733.0	730.1
10b	16,650	712.5	712.5
13	21,259	701.3	700.7
16	25,565	696.6	696.7
17	26,357	696.5	696.6
18a	26,920	696.4	695.5
18b	27,063	693.1	692.8
20	29,260	691.7	691.3
21a	32,000	689.6	689.3
21b	32,055	688.4	687.9
22	34,018	684.5	684.0
25	43,520	665.4	664.9

Table B2. Depth of Water Flow over the Bridges during Flooding Events

	Depth of Flow (feet)							
	Existing & Rehabilitation			Decommissioning				
Bridge	50-year	100-year	Breach	5-year	10-year	25-year	50-year	100-year
Rt. 688	0.1	2.3	14.9	2.5	3.6	4.4	4.7	5.2
Rt. 687	-	-	2.4	-	-	-	-	-
Rt. 220	-	0.2	3.7	-	-	-	-	1.1
Rt. 782	0.5	2.3	2.9	-	-	-	0.7	2.6

APPENDIX C

Marrowbone Creek Watershed Project Map



MARROWBONE WATERSHED PROJECT MAP

MARROWBONE WATERSHED BOUNDARY

VNRIC

USDA NRCS

THIS MAP WAS CREATED AT THE VIRGINIA NATURAL RESOURCES INFORMATION CENTER - THE USDA NATURAL RESOURCES CONSERVATION SERVICE IN HARRISONBURG, VA. 9/9/03. THE IMAGERY WAS IMPORTED FROM USGS DRGS(TIF FORMAT). THE HU LINES WERE DIGITIZED BY THE DCR-DSWC IN RICHMOND, VA. THE COUNTY BOUNDARIES WERE IMPORTED FROM USGS DLGS. THIS INFORMATION IS PROJECTED IN UTMS - ZONE 17 - NAD83 DATUM WITH THE GRS80 SPHEROID.

MARROWBONE WATERSHED GENERAL VICINITY MAP