

# Nolichucky Reservoir Flood Remediation Project



## ***FINAL*** **Environmental Impact Statement**

October 2006

---

## Nolichucky Reservoir Flood Remediation Environmental Impact Statement

( ) Draft

(X) Final

**Lead Agency:** Tennessee Valley Authority (TVA)

**Abstract:** TVA has prepared this Environmental Impact Statement (EIS) to identify and evaluate a range of alternative ways to address flooding effects of Nolichucky Dam and the accumulated sediment in Nolichucky Reservoir on land and property not owned by the federal government. Nolichucky Dam was built in 1913 as a single-purpose power production facility and was acquired by TVA in 1945. Because of sediment-related problems, all four electric generators were removed from service between 1965 and 1972. Since 1972, the project has been used for wildlife management, environmental education, and public parks. The federal government (TVA) owns approximately 1,400 acres of land under and around the reservoir and holds easements over approximately 370 acres of land along this part of the river. These landrights include approximately 54 percent of the area within the present 500-year floodplain. Most of the remaining approximately 1,060 acres in the 500-year floodplain is in private ownership. Sediment accumulation in the reservoir has raised the 100-year flood level by as much as 10 feet above what it probably was in 1945 and, even then, the project landrights did not include all of the area that would have been affected during flood events. Four alternatives are discussed in detail in this EIS. Alternative A (No Action) would not change the potential for homes, historic structures, and other property in the area to be subject to flooding. Alternative B would involve the acquisition of fee title or flowage easements over approximately 1,060 acres of private land within the present 500-year floodplain upstream from Nolichucky Dam. Alternative C would involve lowering the height of the spillway in Nolichucky Dam and removing some sediment from the reservoir pool. Alternative D would involve removing all visible components of the dam and more sediment from the river valley. Each alternative received support from among those commenting on the Draft EIS. After considering those comments and the analyses done for this review, TVA has identified the No Action Alternative, Alternative A, as its preferred alternative. Under this alternative, TVA would provide information to agencies and individuals regarding flood risk and retain fee ownership of land (1,400 acres) and flowage easement (370 acres) around the reservoir. This would allow TVA to maintain the reservoir's recreational uses, including continuing existing agreements with the state and other agencies providing for public outdoor recreation.

**For further information, contact:**  
Susan Fuhr, Manager  
Holston-Cherokee-Douglas Watershed Team  
Tennessee Valley Authority  
3726 E. Morris Boulevard (MOC 1A-MOT)  
Morristown, Tennessee 37813-1270  
Phone: 423/585-2153

**or** Stanford E. Davis by **e-mail:** [sedavis2@tva.gov](mailto:sedavis2@tva.gov)  
**by commercial mail:**  
Stanford E. Davis, Senior Specialist  
Tennessee Valley Authority, NEPA Services  
400 W. Summit Hill Drive, WT 11D  
Knoxville, Tennessee 37902  
Phone: 865/632-2915

---

Page intentionally blank

---

## EXECUTIVE SUMMARY

The Tennessee Valley Authority (TVA) has prepared this Final Environmental Impact Statement (EIS) in accordance with Council on Environmental Quality regulations and TVA procedures for implementing the National Environmental Policy Act. The purpose of this EIS is to identify and evaluate a range of alternative ways to address flooding on land and property not owned by the federal government (TVA) around Nolichucky Reservoir that has been exacerbated by the accumulated sediment in the reservoir.

The Nolichucky River watershed includes parts of Avery, Mitchell, and Yancey counties in western North Carolina and parts of Coker, Greene, Hamblen, Jefferson, Unicoi, and Washington counties in eastern Tennessee. Nolichucky Dam is located at Nolichucky River Mile 46, about 7.5 miles south of Greeneville, in Greene County, Tennessee. Nolichucky Reservoir, also known as Davy Crockett Lake, extends upstream about 6 miles from the dam. Nolichucky Dam was built by the Tennessee Eastern Electric Company in 1913 as a single-purpose power production facility and was acquired by TVA in 1945. All four electric generators were removed from service between 1965 and 1972 because of sediment-related problems. Since 1972, the project has been used for wildlife management, environmental education, and recreation.

The federal government owns approximately 1,400 acres of land under and around Nolichucky Reservoir and holds easements over approximately 370 acres of land along this part of the river. These landrights include approximately 54 percent of the area within the present 500-year floodplain and approximately 63 percent of the area within the 100-year floodplain. Most of the remaining approximately 1,060 acres in the 500-year floodplain is in private ownership (41 percent of this area). Approximately 72 privately owned structures occur within this 500-year floodplain, 19 of which might be eligible for listing on the National Register of Historic Places.

In 1998, partly in response to letters and questions from local property owners, TVA began reviewing the areas around Nolichucky Reservoir that would be affected during flood events. The present 100-year floodplain

includes approximately 2,100 acres, and the larger area within the 500-year floodplain includes approximately 2,600 acres. Recent silt and sediment accumulations in the reservoir have raised the 100-year flood level by as much as 10 feet above what it probably was when TVA acquired the project in 1945. Even in 1945, the project landrights did not include all of the area that would have been affected by Nolichucky Dam during some flood events.

### **Alternatives**

Suggestions about possible ways to address the flooding effects on nonfederal land were made by the public, various agencies, and TVA staff during the scoping process for this project. The four alternatives developed during this process, discussed in detail, and evaluated in this EIS are Alternative A: No Action; Alternative B: Acquire the Affected Land or Landrights; Alternative C: Lower the Spillway in the Dam; and Alternative D: Remove Nolichucky Dam.

Under **Alternative A (No Action)**, TVA would not take any additional action to address the potential flood impacts on nonfederal lands that could occur because of the presence of Nolichucky Dam and the sediment accumulation in Nolichucky Reservoir. TVA would not acquire any additional landrights, take any action to remove sediment from the reservoir itself, or take other action to reduce the potential for flooding. Information about the boundaries of various projected flood levels would be provided to appropriate agencies in Greeneville, Greene County, and to landowners in the affected areas. TVA would assist agencies and individuals in understanding the potential flooding effects around the reservoir in an effort to influence what individual owners would do on their property. Greene County probably would require compliance with applicable local floodplain regulations during any future development of the land around the reservoir. Nolichucky Dam and Powerhouse would continue to be maintained as required by federal dam safety regulations and to preserve their historic value.

If Alternative A were adopted, present environmental conditions and ongoing trends would continue both in the water and on the land surrounding the reservoir. Present flood elevations upstream from Nolichucky Dam would not be affected by this alternative, and approximately 1,060 acres of land not in

federal ownership or covered by flowage easements would continue to be located within the 500-year floodplain affected by the dam. Approximately 72 privately owned structures occur within this 500-year floodplain, 19 of which might be eligible for listing on the National Register of Historic Places. Under this alternative, TVA would maintain the reservoir's recreational uses including continuing existing agreements with other agencies that provide for wildlife management, environmental education, and public parks. This alternative would not have any effect on the present population or economic conditions in the area adjacent to Nolichucky Reservoir.

Based upon analysis in this Final EIS, the cost of the action alternatives (below) would range up to \$150 million. There would be no costs associated with adoption of the No Action Alternative.

Under **Alternative B (Acquire Landrights)**, TVA would address the potential flooding effects on nonfederal land by acquiring either fee title or easements with the right to flood all of the nonfederal land within the present 500-year floodplain around Nolichucky Reservoir (about 1,060 acres). TVA would decide whether to acquire fee title or a flowage easement on any given tract based on a tract-specific evaluation of the potential flooding effects. If TVA acquired fee title, TVA would buy the affected land and all structures built on it and would hold all rights concerning the use of that land. If TVA acquired only a flowage easement, TVA would buy the right to overflow and flood specific parts of the property on an intermittent and temporary basis. The owner could continue to use the easement land in many ways, but would relinquish the right to build structures below a specific elevation on the affected property and would have to receive TVA approval prior to developing the affected land. Nolichucky Dam and Powerhouse would continue to be maintained as required by federal dam safety regulations and to preserve their historic value.

If Alternative B were adopted, present flood elevations upstream from Nolichucky Dam would not be affected, but the federal government would own either fee title or flowage easements over all of the land within the 500-year floodplain upstream from the dam. Most of the new land acquired in fee probably would be added to the existing wildlife management area on the

reservoir, presently managed by the Tennessee Wildlife Resources Agency. Uses of the land within this floodplain area would be controlled to minimize the potential for flooding effects, and all structures on this land, including potentially eligible historic structures, probably would be floodproofed, relocated to higher ground, or removed. Environmental conditions and ongoing trends in the water and on the land surrounding the reservoir would not be adversely affected. Public ownership or control over the entire floodplain area could lead to improved terrestrial habitat conditions, more resource protection, and increased public recreation potential. If increased recreation use did occur, this alternative could result in modest positive effects on economic conditions in the area surrounding Nolichucky Reservoir. Based on these effects, TVA has concluded that Alternative B is the environmentally preferred alternative.

Under **Alternative C (Lower Nolichucky Dam)**, TVA would address the potential flooding effects on nonfederal property by lowering the spillway part of Nolichucky Dam after removing or stabilizing sediment in the reservoir. The objective of this alternative would be to lower the spillway by approximately 40 feet (to elevation 1,200) so that the 500-year flood elevation associated with the modified dam would only affect land already in federal ownership or covered by existing flowage easements. A general evaluation of the environmental effects associated with this alternative is included in this EIS; however, the site-specific details of the project would be determined as part of the preconstruction design process. If this alternative were adopted, site-specific environmental effects evaluation would be prepared as a supplement to this Final EIS or in an Environmental Assessment (EA).

If Alternative C were adopted, lowering the spillway and removing sediment from the reservoir would reduce flood elevations to the point that the 500-year floodplain associated with Nolichucky Dam would not affect private land and property; however, some presently buried archaeological and historic sites might be exposed as sediment was relocated out of the reservoir pool. All federal land around the reservoir would remain in public ownership and would continue to be used for wildlife management, environmental education, and public parks, while private land no longer in flood-prone areas would be available for other uses.

Lowering the reservoir pool by 40 feet would lower the groundwater level adjacent to the reservoir, in some places enough that nearby well performance could be adversely affected. Lowering the pool level also would drain approximately 318 acres of high-quality wetlands around and in the reservoir, which would adversely modify the habitats of a variety of plants and animals that typically occur only in wetlands. Lowering the spillway and disturbing the sediment in Nolichucky Reservoir could result in some increased sedimentation in the river downstream from Nolichucky Dam during the construction period; however, the inclusion of sediment control measures and monitoring requirements would result in only insignificant effects on downstream aquatic life. Adoption of this alternative might still result in significant adverse construction effects on one or more silt-intolerant endangered or threatened aquatic species living only where the dam presently protects them from excessive sedimentation. Recreation and resource management opportunities in the area would be different from present uses around the reservoir and probably would shift to focus more on river-related activities. The local economy would receive a short-term benefit from the construction activities included in this alternative and a possible minor long-term benefit if recreation use did increase in the area.

Under **Alternative D (Remove Nolichucky Dam)**, TVA would address the flooding effects of Nolichucky Dam and Reservoir on the adjacent nonfederal lands using the same general approach as Alternative C—lowering the 500-year flood elevation by lowering the dam and removing or stabilizing the accumulated sediment. Under this alternative, however, TVA would completely remove all visible components of Nolichucky Dam and Powerhouse from the river valley. The general types and sequence of activities included in this alternative would be the same as those described under Alternative C; however, some specific differences would occur associated with removing the remainder of the dam, the powerhouse, and more of the accumulated sediment. If this alternative were adopted, site-specific details of the project would be determined as part of the preconstruction design process, and site-specific environmental effects evaluation would be prepared as a supplement to this Final EIS or in an EA.

Adoption of Alternative D would result in the removal of all visible components of Nolichucky Dam from the valley and the restoration of a free-flowing river through this area. The resulting 500-year flood elevation would be well within the existing federal landrights in the area. All federal land around the reservoir would remain in public ownership and would continue to be used for wildlife management, environmental education, and public parks. Some presently buried archaeological and historic sites might be exposed as sediment was relocated out of the full length of the reservoir pool.

Lowering the reservoir pool by 70 feet would lower the groundwater level adjacent to the reservoir, in places enough that nearby well performance could be adversely affected. Approximately 318 acres of wetlands upstream from the dam would be drained, which would adversely modify the habitats of a variety of plants and animals typically found only in wetlands. The land disturbance activities associated with this project would include sedimentation control measures and monitoring requirements, which would result in insignificant effects on surface water quality, sedimentation, and aquatic life in the Nolichucky River during the construction period. Following the complete removal of the dam, however, the riverbed downstream from the dam site would be blanketed with sand and other coarse sediment, which would have immediate and significant adverse effects on some aquatic species. Freshwater mussels and other uncommon bottom-dwelling species, including two federally listed endangered species, might be eliminated from the river. Critical habitat could also be adversely affected. Once the dam was removed, recreation activities in the former reservoir area could expand to include tubing, float fishing, and possibly as good or better canoeing potential as exists in the first 10 miles upstream or downstream from the reservoir. The net impact of this alternative on the local economy and employment probably would be positive, especially over the long term.

### **Comparison**

The adoption of Alternative A or B would result in very similar effects on the environment; however, Alternative B would legally address the potential flooding effects on nonfederal land and property while Alternative A would not. Alternative B would involve the acquisition of fee title or flowage easement rights over approximately 1,060 acres of private land within the

present 500-year flood elevation upstream from Nolichucky Dam. Alternative A would not affect the ownership of this land, but homes, historic structures, and other property located on that land, would continue to be subject to the risk of flooding.

The adoption of Alternative C or D also would result in some similar environmental effects; however, those effects would be very different from what would occur under Alternative A or B. Both C and D would involve modifications to the dam that would reduce the flood elevations around the reservoir and avoid the project-related flooding effects on private land and property, including homes and historic structures. Results of this general evaluation indicate that both of these projects also could drain about 318 acres of significant wetlands, lower groundwater levels in wells close to the reservoir, expose some buried archaeological or historic sites, and cause adverse effects on aquatic life in the river downstream from Nolichucky Dam. Largely because it would involve the complete removal of Nolichucky Dam, Alternative D would likely result in more extensive adverse effects on the downstream part of the river and aquatic life than Alternative C. Once the dam was removed, Alternative D would result in significant changes in the downstream river substrate, which could eliminate some types of bottom-dwelling animals, including two federally listed as endangered mussel species. Alternative D also would reconnect the upstream and downstream parts of the river and refocus local recreation activities on the free-flowing river. Both of these alternatives would include a variety of ways to avoid, minimize, or mitigate the potential adverse effects; however, some of those effects (such as the loss of the wetlands and elimination of aquatic species listed as endangered) would be extremely difficult to mitigate completely.

The estimated costs and completion times associated with these alternatives are as follows:

<u>Alternative</u>	<u>Cost</u>	<u>Duration</u>
A	none	little or no time
B	\$15-\$20 million	3 years
C	\$45-\$70 million	5-10 years
D	\$90-\$150 million	10-12 years

The construction activities associated with both Alternatives C and D would provide some short-term economic benefit to the local area. All of the action alternatives (Alternatives B, C, and D) might result in some long-term economic benefits; however, the extent of those potential benefits would depend on decisions that would be made by many individuals and governmental agencies.

### **Preferred Alternative**

Given that each alternative received some level of public support and the analyses done for this EIS, including the cost estimates for the action alternatives, TVA has identified the No Action Alternative as its preferred alternative. Under this alternative, TVA would provide information to agencies and individuals regarding flood risk and retain fee ownership of 1,400 acres of land and 370 acres of flowage easement around the reservoir. This would allow TVA to maintain the reservoir's recreational uses including continuing existing agreements with the Tennessee Wildlife Resources Agency and other agencies that provide for wildlife management, environmental education, and public parks. TVA would also continue to review requests for new or enlarged commercial sand removal operations on a case-by-case basis and approve these as appropriate. Albeit over the long-term, sand removal operations address in part the accumulation of sediment in the reservoir and the problems to which this contributes.

---

## TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Page</u></b>
Executive Summary	i
List of Tables	xii
List of Figures	xv
 <b>CHAPTER 1 - PURPOSE AND NEED FOR ACTION</b>	
1.1 Purpose	1
1.2 Background	1
1.3 Decision to be Made	8
1.4 Public Participation	9
1.5 Issues to be Addressed in Detail	10
1.6 Study Area	12
1.7 Related Documents	12
1.8 Review and Consultation Requirements	12
1.9 EIS Overview	16
 <b>CHAPTER 2 - ALTERNATIVES</b>	
2.1 Introduction	17
2.2 Selection of Alternatives	17
2.3 Floodplains and Landrights	19
2.4 Alternative A - No Action	23
2.5 Alternative B - Acquire Landrights	24
2.6 Alternative C - Lower Nolichucky Dam	25
2.7 Alternative D - Remove Nolichucky Dam	31
2.8 Alternatives Not Evaluated in Detail	34
2.9 Comparison of Alternatives	36
2.10 Preferred Alternative	44
 <b>CHAPTER 3 - AFFECTED ENVIRONMENT</b>	
3.1 Introduction	47
3.2 Climate, Geology, and Soils	47
3.3 Groundwater	54

<b><u>Section</u></b>	<b><u>Page</u></b>
3.4 Surface Water and Sedimentation	58
3.5 Aquatic Life	79
3.6 Wetlands	89
3.7 Floodplains and Flood Risk	98
3.8 Terrestrial Life	101
3.9 Endangered and Threatened Species	105
3.10 Land Use	115
3.11 Visual Character, Recreation, and Managed Areas	120
3.12 Cultural Resources	126
3.13 Socioeconomics	130
3.14 Environmental Justice	133

**CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES**

4.1 Introduction	137
4.2 Climate, Geology, and Soils	137
4.3 Groundwater	140
4.4 Surface Water and Sedimentation	143
4.5 Aquatic Life	153
4.6 Wetlands	162
4.7 Floodplains and Flood Risk	167
4.8 Terrestrial Life	171
4.9 Endangered and Threatened Species	174
4.10 Land Use	182
4.11 Visual Character, Recreation, and Managed Areas	186
4.12 Cultural Resources	191
4.13 Socioeconomics	196
4.14 Environmental Justice	199
4.15 Cumulative Impacts	200
4.16 Unavoidable Adverse Impacts	201
4.17 Short-Term Uses and Long-Term Productivity	201
4.18 Irreversible and Irrecoverable Resource Commitments	202

---

<b><u>Section</u></b>	<b><u>Page</u></b>
<b>CHAPTER 5 - LIST OF PREPARERS</b>	203
<b>CHAPTER 6 - SUPPORTING INFORMATION</b>	
6.1 List of Agencies, Organizations, and Persons to Whom Copies are Sent	209
6.2 Acronyms, Abbreviations, SymbolsG, and Glossary of Terms	220
6.3 References	225
6.4 Index	234
<b>APPENDICES</b>	
A. Land Ownership Around Nolichucky Reservoir	A-1
B. A Survey of Fish, Mussels, and Other Benthic Invertebrates in Parts of the Nolichucky River in East Tennessee	B-1
C. Lists of Wetland Plants and Terrestrial Animals Observed Around Nolichucky Reservoir During Field Studies Conducted in 2000	C-1
D. Names, Habitat Preferences, and Occurrence Information for the Protected Species That Could Occur in the Counties Around and Downstream From Nolichucky Reservoir	D-1
E. Estimated Flood Elevations Upstream From Nolichucky Dam Under Each of the Four Alternatives	E-1
F. Comments on the Draft EIS and TVA Responses	F-1
G. Tennessee State Historic Preservation Officer Section 106 Letter	G-1

---

## LIST OF TABLES

1.	Condensed List of Suggested Ways to Reduce Flooding Effects on Nonfederal Land and Property Around Nolichucky Reservoir.	18
2.	Federal Landrights Associated With Nolichucky Reservoir and All Landrights Within the 500-Year and 100-Year Floodplains Around the Reservoir	22
3.	Summary Comparison of the Four Alternatives Being Evaluated in Detail	37
4.	Summary of the Potential Environmental Effects of the Four Alternatives Being Evaluated in Detail	38-39
5.	Climate Statistics Representing the Nolichucky Reservoir Area	49
6.	Climate Statistics Representing the Upper Nolichucky River Watershed	50
7	Prime Farmland Soils within the 500-Year and 100-Year Floodplains Upstream from Nolichucky Dam	54
8.	Typical Characteristics of Groundwater in the Blue Ridge and Ridge and Valley Parts of the Nolichucky River System	57
9.	State Designated Uses for the Larger Streams in the Nolichucky River Watershed	63
9a.	Larger Streams in the Nolichucky River Watershed That do not Fully Support Their Designated Uses	64
10.	Results of Grain Size Analysis of Representative Core Samples From Sediments in Nolichucky Reservoir	76
11.	Chemical Analyses Results From Segments of Sediment Core Samples Collected at Various Sites in Nolichucky Reservoir During 2000	77
12.	Summary of the Numbers of Species (and Other Identified Taxa) Encountered During Benthic Invertebrate Sampling at Five Sites on the Nolichucky River During 2000	81

---

13.	Summary of the Numbers of Species (and Other Identified Taxa) Encountered During Benthic Invertebrate Sampling at Sites on the Nolichucky River in Earlier Years	82
14.	Summary of the Results From the Native Mussel Survey Conducted on the Nolichucky River During 2000	84
15.	Summary of the Results From the Native Mussel Survey Conducted on the Nolichucky River During 1980	85
16.	Summary of the Results of the Fish Survey Conducted at Five Sites on the Nolichucky River During 2000	87
17.	Summary of the Results From the Fish Survey at 31 Sites on the Nolichucky River Conducted by Tennessee Wildlife Resource Agency Staff During 1998	88
18.	Summary Results From Earlier Fish Evaluations on the Nolichucky River	88
19.	Wetlands Identified During Interpretation of Aerial Photography of the Floodplain Areas Around Nolichucky Reservoir	92
20.	Summary of the Numbers of Federal and Tennessee Endangered, Threatened, and Other Categories of Protected Species Known From the Three Counties Included in This Evaluation	105
21.	Endangered, Threatened, and Special Concern Plant Species Known From the Area Within the Nolichucky River Watershed That Could be Ffected by One or More of the Action Alternatives	106
22.	Endangered, Threatened, and Special Concern Animal Species Known From the Area Within the Nolichucky River Watershed Which Could be Affected by One or More of the Alternatives	108
23.	Land Use and Land Cover in the Nolichucky River Watershed	116
24.	Land Use/Land Cover Categories Identified During Interpretation of Aerial Photography of the Floodplain Areas Around Nolichucky Reservoir	118

25.	Types of Buildings Located in the Floodplain Areas Around Nolichucky Reservoir	120
26.	Population Statistics for Counties in the Labor Market Area Surrounding Greene County, Tennessee	130
27.	Average 2004 Labor Force and Unemployment Statistics in Counties in the Labor Market Area Surrounding Greene County, Tennessee	131
28.	Full- and Part-Time Employment by Industry in Counties in the Labor Market Area Surrounding Greene County, Tennessee	132
29.	Per Capita Personal Income in the Labor Market Area Surrounding Greene County, Tennessee	133
30.	Minority and Low-Income Population for Counties in the Labor Market Area Surrounding Greene County, Tennessee	134

---

## LIST OF FIGURES

1.	Nolichucky River watershed in Tennessee and North Carolina.	2
2.	The area around Nolichucky Reservoir.	3
3.	Comparison of the present 100-year flood profile and the estimated 1938 100-year flood profile along part of the length of the Nolichucky River.	9
4.	Possible floodplain boundaries around a lowered Nolichucky Reservoir with a spillway at elevation 1,200 feet.	29
5.	Suspended sediment concentrations as a function of stream discharge at two sites upstream from Nolichucky Reservoir.	68
6.	Comparison of suspended sediment concentrations upstream and downstream from Nolichucky Dam during three time intervals between the 1930s and the 1990s.	69
7.	Volume of accumulated sediment in Nolichucky Reservoir, calculated from TVA transect surveys.	73
8.	Broad categories of land uses within the 500-year floodplain around Nolichucky Reservoir.	93

[The map showing land ownership around Nolichucky Reservoir is presented in Appendix A, the first section following the EIS text.]