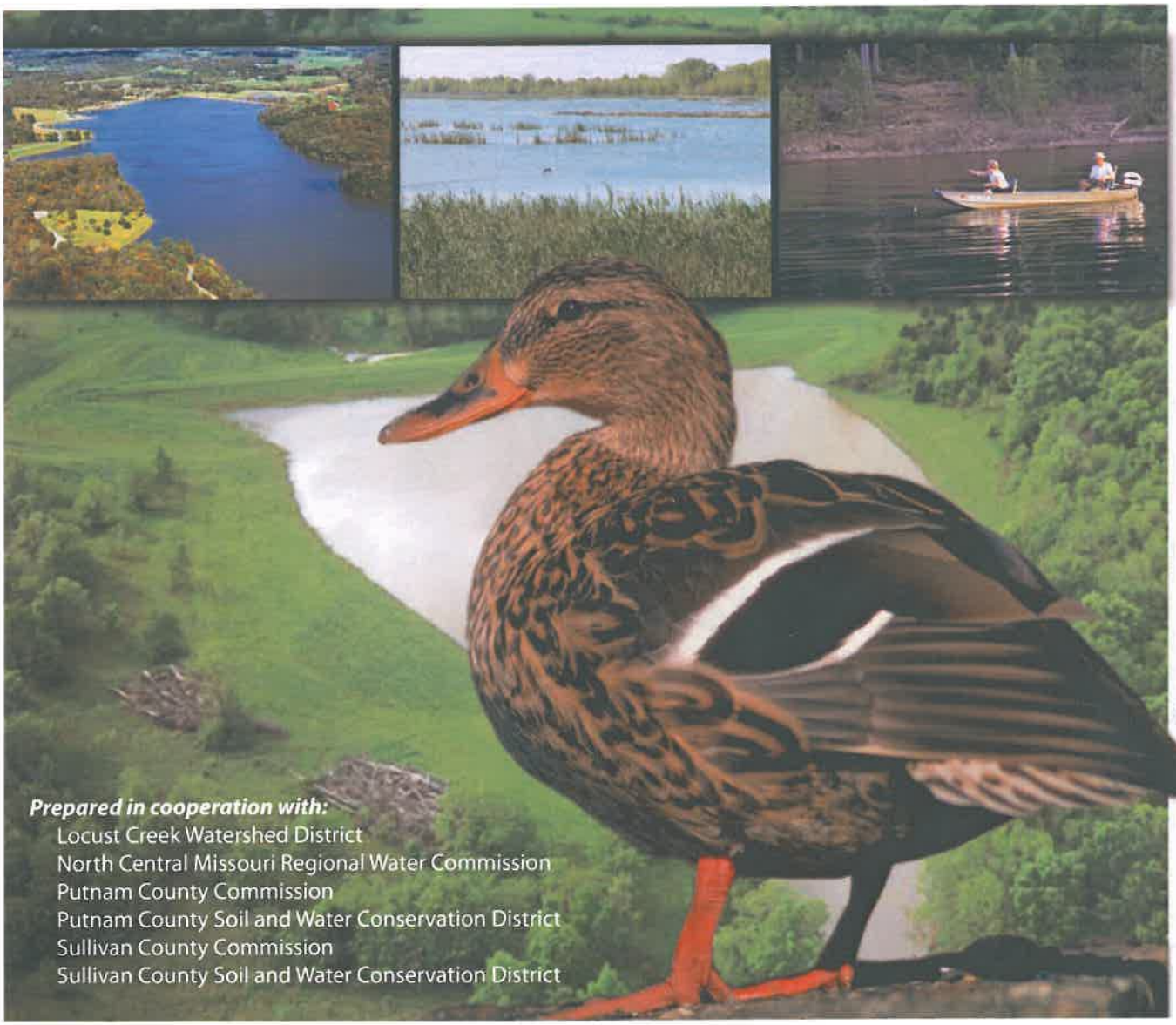
East Locust Creek

Watershed Revised Plan & Environmental Impact Statement



Prepared in cooperation with:

Locust Creek Watershed District
North Central Missouri Regional Water Commission
Putnam County Commission
Putnam County Soil and Water Conservation District
Sullivan County Commission
Sullivan County Soil and Water Conservation District

United States Department of Agriculture

NRCS Natural Resources Conservation Service

EAST LOCUST CREEK WATERSHED REVISED PLAN – ENVIRONMENTAL IMPACT STATEMENT

SULLIVAN COUNTY AND PUTNAM COUNTY, MISSOURI

ABSTRACT:

This document will set forth a revised plan to provide agricultural water management (rural water supply), water-based recreational opportunities, and reduced flood damages in the East Locust Creek Watershed. This revised plan will replace the original East Locust Creek Watershed Plan-Environmental Assessment signed in 1987. The recommended plan consists of one multiple-purpose reservoir (79.0 feet high, 2,235-acre permanent pool) capable of providing 7.0 million gallons per day of raw water; 22 small floodwater retarding (FWR) structures; modification of 7 existing, small FWR structures; 5 sediment/debris basins; development of recreational facilities, including access points, bank fishing areas, primitive camping sites, shelterhouses, picnic areas, restrooms, and playgrounds; and tree, shrub, and other vegetative plantings. Total project costs are $52,470,500; of which $28,550,100 will be paid from federal Public Law 83-566 funds and $23,920,400 from non-federal funds.

Special cost share rates have been authorized by Public Law 109-108, H.R.2744, Section 726, which states: "Notwithstanding any other provision of law, the Natural Resources Conservation Service shall provide financial and technical assistance through the Watershed and Flood Prevention Operations program to carry out the East Locust Creek Watershed Plan Revision in Missouri, including up to 100 percent of the engineering assistance and 75 percent cost share for construction cost of site RW1". All references to "the multiple-purpose reservoir" in this document pertain to Site RW-1 above.

This document has been prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008), and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4321 et seq.).

PREPARED BY THE:

Locust Creek Watershed District
North Central Missouri Regional Water Commission
Sullivan County Soil and Water Conservation District
Putnam County Soil and Water Conservation District
Sullivan County Commission
Putnam County Commission
U.S. Department of Agriculture, Natural Resources Conservation Service

FOR ADDITIONAL INFORMATION CONTACT:

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USDA - Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203 **Phone: (573) 876-0901**

REVISED WATERSHED AGREEMENT NO. 1

BETWEEN THE

Locust Creek Watershed District
(Referred to herein as LCWD)

North Central Missouri Regional Water Commission
(Referred to herein as NCMRWC)

Sullivan County Soil and Water Conservation District

Putnam County Soil and Water Conservation District

Sullivan County Commission

Putnam County Commission

(The aggregate referred to herein as Sponsors)

AND THE

United States Department of Agriculture,

Natural Resources Conservation Service

(Referred to herein as NRCS)

Whereas, the watershed plan for the East Locust Creek Watershed, State of Missouri, executed by the Sponsors named herein and the Natural Resources Conservation Service, became effective on the first day of July, 1987; and

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

Whereas, in order to carry out the watershed plan for said watershed, it has become necessary to revise and supersede said watershed agreement; and

Whereas, a revised plan-EIS which modifies the watershed plan dated July, 1987 for said watershed has been developed through the cooperative efforts of the Sponsors and NRCS;

Now, therefore, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on the revised watershed plan-EIS and that the works of improvement for this revised project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this revised watershed plan/environmental impact statement and including the following:

REAL PROPERTY:

1. The Sponsors will acquire such real property as will be needed in connection with the works of improvement. The percentages of the real property acquisition costs to be borne by the Sponsors and NRCS are as follows:

Works of Improvement (Structural Measures)	NRCS (percent)	LCWD (percent)	NCMRWC (percent)	Estimated Real Property Costs (dollars)
Multiple-Purpose Reservoir	12.4	0.0	87.6	13,811,700
5 Small Sediment & Debris Basins	0.0	0.0	100.0	13,400
22 Small FWR Structures	0.0	100.0	0.0	130,100

The Sponsors agree that all land acquired or improved with Public Law 83-566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project, except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement.

RELOCATION PAYMENTS AND ASSURANCES:

2. The Sponsors hereby agree that they will comply with all policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as implemented by 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the Sponsors are legally unable to comply with the real property acquisition requirements of the Act, they agree that, before any federal financial assistance is furnished, they will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance. In any event, the Sponsors agree that they will reimburse owners for necessary expenses as specified in 7 C.F.R. 21.1006(c) and 21.1007.

   The cost of relocation payments in connection with the displacements under the Uniform Act will be shared by the Sponsors and NRCS as follows:

Works of Improvement (Structural Measures)	NRCS (percent)	LCWD (percent)	NCMRWC (percent)	Estimated Relocation Costs (dollars)
Multiple-Purpose Reservoir	54.4	0.00	45.6	2,695,300

WATER, MINERAL, AND OTHER RESOURCE RIGHTS:

3. The Sponsors will acquire or provide assurance that landowners or water users have acquired such water, mineral, and other resource rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

PERMITS:

4. The Sponsors will obtain all necessary federal, state, and local permits required by law, ordinance, or regulation for installation of the works of improvement.

CONSTRUCTION COSTS:

5. The percentages of construction costs for structural measures to be paid by the Sponsors and NRCS are as follows:

Works of Improvement (Structural Measures)	NRCS (percent)	LCWD (percent)	NCMRWC (percent)	Estimated Construction Costs (dollars)[a]
Multiple-Purpose Reservoir [a]	75.0	0.0	25.0	17,483,700
7 Modified Small Structures	75.0	0.0	25.0	201,500
5 Small Sediment/Debris Basins	75.0	0.0	25.0	195,100
Recreational Facilities	75.0	0.0	25.0	2,609,400
Water Intake Tower	75.0	0.0	25.0	1,140,000
Raw Water Line	5.3	0.0	94.7	3,511,200
22 Small FWR Structures	100.0	0.0	0.0	1,434,200

a. Includes historic preservation costs.

ENGINEERING SERVICES COSTS:

6. The percentages of the engineering services costs to be borne by the Sponsors and NRCS are as follows:

Works of Improvement (Structural Measures)	NRCS (percent)	LCWD (percent)	NCMRWC (percent)	Estimated Engineering Services Costs (dollars)
Multiple-Purpose Reservoir [a]	100.0	0.0	0.0	4,439,400
7 Modified Small Structures	100.0	0.0	0.0	27,300
5 Small Sediment/Debris Basins	100.0	0.0	0.0	27,200
Recreational Facilities	75.0	0.0	25.0	309,600
Water Intake Tower	75.0	0.0	25.0	250,800
Raw Water Line	0.7	0.0	99.3	772,500
22 Small FWR Structures	100.0	0.0	0.0	602,100

a. Includes construction inspection costs that the NRCS will incur.

OPERATION, MAINTENANCE, AND REPLACEMENT:

7. 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 agreements to be entered into prior to issuing invitations to bid for construction work. The term of this agreement is for the service life expectancy of the project beginning at construction completion. The service life for all measures except the large multiple-purpose reservoir is 75 years. The large multiple-purpose reservoir is for 100 years. Sponsors are responsible under the agreement with NRCS to perform the obligations of the OM&R agreement for the service life of each of the works of improvement, and may be responsible for OM&R after the agreement has expired if required by state and/or local laws and regulations.

   The installed measures from the original plan include 72 small FWR structures completed prior to the authorization of this revised plan. These installed structures will either continue to function as intended, be totally inundated by the large multiple-purpose reservoir, or be modified in order to function immediately adjacent to the multiple-purpose reservoir. The Sponsors will also be responsible for the operation, maintenance, and replacement of these prior works of improvement by actually performing the work or arranging for such work, in accordance with agreements to be entered into prior to issuing invitations to bid for construction work. These agreements will clearly identify the specific Sponsor responsible for each specific installed measure. The term of this agreement is for the service life expectancy of the project beginning at construction completion. The service life for all existing measures is 75 years. Sponsors are responsible under the agreement with NRCS to perform the obligations of the OM&R agreement for the service life of each of the works of improvement, and may be responsible for OM&R after the agreement has expired if required by state and/or local laws and regulations.

   There will be an additional operation, maintenance, and replacement agreement entered into prior to issuing invitations to bid for construction work as mentioned above. However, at this time it is agreed upon by all the Sponsors that the operation, maintenance, and replacement responsibilities will be allocated to the specific Sponsor(s) listed in the following table:

Works of Improvement (Structural Measures)	Sponsor Responsible for Operation, Maintenance, & Replacement	
	LCWD	NCMRWC
Multiple-Purpose Reservoir		X
7 Modified Small Structures		X
5 Small Sediment/Debris Basins		X
Recreational Facilities		X
Water Intake Tower		X
Raw Water Line		X
22 Small FWR Structures	X	
58 Existing Small FWR Structures[a]	X	

a. The 58 small FWR structures identified include all of the 72 existing small FWR structures, minus the 7 modified small structures, and minus the 7 small structures that will be inundated by the multiple-purpose reservoir.

OM&R for mitigation features of the new structural measures installed will be the responsibility of the Sponsor in charge of the OM&R for the specific type of structural measure(s) which the mitigation is implemented for unless otherwise agreed upon by NRCS and the Sponsor.

PROJECT ADMINISTRATION:

8. The NRCS, LCWD, and NCMRWC will bear the project administration costs that each incurs, estimated to be $2,006,200, $20,900 and $788,900, respectively.

OTHER ITEMS:

9. The existing small floodwater retarding structures: E-26, E-27, E-28, E-38b, E-39, E-40, and E-41, installed in accordance with the original East Locust Creek Watershed Plan-EA signed in 1987, will be totally inundated by the installation of the multiple-purpose reservoir. An amount of $341,000 of cost-share was provided by NRCS (formerly the Soil Conservation Service) to the Sponsors in accordance to prior agreements for the construction of said structures. The NCMRWC agrees to reimburse $341,000 to NRCS for the elimination of said structures. This reimbursement will be made prior to completion of construction of the multiple-purpose reservoir identified in this revised plan.

10. Federal cost share rates will be implemented according to the Watershed Protection and Flood Prevention Act, Public Law 83-566, unless otherwise provided for in the appropriations for a given fiscal year.

11. The Sponsors will obtain agreements from owners of not less than 50 percent of the land above the multiple-purpose reservoir. These agreements state that the owners will carry out conservation farm or ranch plans on their land. The Sponsors will ensure that 75 percent of the land upstream of the multiple-purpose reservoir and each small floodwater retarding structure are adequately protected prior to construction of that particular measure.

12. The Sponsors will encourage landowners and operators to operate and maintain land treatment measures for the protection and improvement of the watershed.

13. The Sponsors agree to participate in and comply with applicable federal floodplain management and flood insurance program policies.

14. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto, will be the actual costs incurred in the installation of the works of improvement.

15. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

16. A separate agreement will be entered into between NRCS and the Sponsors before either party initiates work involving funds of the other party. Such agreement will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

17. This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may de-authorize or terminate funding at any time it determines the Sponsors have failed to comply with the conditions of this agreement. In this case, NRCS shall notify the Sponsors in writing of the determination and the reasons for the de-authorization of project funding, together with the effective date. Payments made to the Sponsors or recoveries by NRCS shall be in accordance with the legal rights and liabilities of the parties when project funding has been de-authorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the Sponsors having specific responsibilities for the measure involved.

18. The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the 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 American's With Disabilities Act of 1990. They will also be 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 grounds of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

19. The Sponsors will provide leadership in developing an Emergency Action Plan (EAP) and will update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The purpose of the EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of a floodwater retarding structure. The NRCS State Conservationist is to determine that an EAP is prepared for each high hazard dam prior to the initiation of construction.

20. **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 Sponsor knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, 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 pleas of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the federal or state criminal drug statutes;

Criminal drug statute means a federal or non-federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: 1) all direct charge employees, 2) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant, and 3) 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 subrecipients or subcontractors in covered workplaces).

Certification:

A. The Sponsors certify that they 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 grantees 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 violations 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 NRCS in writing, within ten calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant.

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4)(b), with respect to any employee 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 a drug abuse assistance or rehabilitation program approved for such purposes by a federal, state, or local health, law enforcement, or other appropriate agency.

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

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

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

21. Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds $100,000).

(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 subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients 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.

22. Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary 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 of 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.

Locust Creek Watershed District

Richard Morgan
By

23487 Eclipse Drive
Address

Sec
Title

Milan Mo. 63556
City State Zip Code

1-25-2007
Date

The signing of this plan was authorized by a resolution of the governing body of the Locust Creek Watershed District adopted at a meeting held on 1-18-2007.

North Central Missouri Regional Water Commission (NCMRWC)

Ronald N. Wilson
By

1098 Highway E
Address

Chairman
Title

Milan MO. 63556
City State Zip Code

1-25-07
Date

The signing of this plan was authorized by a resolution of the governing body of the NCMRWC adopted at a meeting held on Sept. 11-06.

Sullivan County Soil and Water Conservation District (SWCD)

Larry Stephens
By

23487 Eclipse Drive
Address

Chairman
Title

Milan Mo 63556
City State Zip Code

1-25-07
Date

The signing of this plan was authorized by a resolution of the governing body of the Sullivan County SWCD adopted at a meeting held on Aug 7 - 2006.

Putnam County Soil and Water Conservation District (SWCD)

Joseph W Koerner
By

28988 US Hwy 136
Address

SWCD Secretary
Title

Unionville MO 63565
City State Zip Code

01/25/07
Date

The signing of this plan was authorized by a resolution of the governing body of the Putnam County SWCD adopted at a meeting held on August 30, 2006.

Sullivan County Commission

Chris May
By

109 N. Main St.
Address

Presiding Commissioner
Title

Milan Mo. 63556
City State Zip Code

01-25-07
Date

The signing of this plan was authorized by a resolution of the governing body of Sullivan County, Missouri adopted at a meeting held on August 21, 2006.

Putnam County Commission

Claudia Fowler
By

Room 204 Courthouse
Address

presiding Commissioner
Title

Unionville MO 63565
City State Zip Code

1-25-07
Date

The signing of this plan was authorized by a resolution of the governing body of Putnam County, Missouri adopted at a meeting held on Aug 28 2006.

Natural Resources Conservation Service
United States Department of Agriculture

Approved by:

Roger A. Hansen

Roger A. Hansen, State Conservationist

1/25/07

Date

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APPENDICES

TABLES

SUMMARY OF WATERSHED REVISED PLAN - ENVIRONMENTAL IMPACT STATEMENT

PROJECT NAME

East Locust Creek Watershed Revised Plan-Environmental Impact Statement. This revised plan will replace the original East Locust Creek Watershed Plan-Environmental Assessment signed in 1987.

LOCATION

Sullivan and Putnam Counties, Missouri. (Refer to East Locust Creek Watershed Map, Appendix F)

SPONSORS

Locust Creek Watershed District
North Central Missouri Regional Water Commission
Sullivan County Soil and Water Conservation District
Putnam County Soil and Water Conservation District
Sullivan County Commission
Putnam County Commission

DESCRIPTION OF RECOMMENDED PLAN

The recommended plan consists of the installation of one multiple-purpose reservoir on the mainstem of East Locust Creek (79.0 feet high, 2,235-acre permanent pool). The multiple-purpose reservoir will provide 7.0 million gallons of locally-controlled, agricultural water management (rural water supply); water-based recreational facilities; and flood prevention. The plan also includes installation of 22 small FWR structures on Little East Locust Creek. These small structures will include livestock watering pipes. Seven existing small FWR structures impacted by the reservoir will be modified for integrity and protection. Five sediment/debris basins will be installed immediately upstream of the multiple-purpose reservoir.

RESOURCE INFORMATION

Watershed Size	79,490 acres
Putnam County Population	5,148
Sullivan County Population	7,080
Watershed Population	2,948
Number of Minority Farmers	
Putnam County	6
Sullivan County	22
Number of Limited Resource Farmers	
Putnam County	53
Sullivan County	4

Watershed Land Ownership	
Private	>99 percent
Federal, State, Local Government	<1 percent
Number of Farms (Wholly or partially in watershed)	540
Average Watershed Farm Size	145 acres
Prime Farmland in Watershed	9,240 acres
Soils of Statewide Importance in Watershed	39,740 acres
Highly Erodible Land in Watershed	9,950 acres
Floodplain -100-year (East Locust Creek)	6,747 acres
Floodplain -100-year (Lower Locust Creek)	29,470 acres
National Wetland Inventory Wetlands in Watershed	2,012 acres
Endangered Species	Suitable habitat in watershed for *Myotis sodalis* (Indiana bat); known locations in region from Natural Heritage database; Indiana bat has a global rank of G2 and a state rank of S1.

LAND USE/LAND COVER[a]

Land Use/Land Cover	Upland	Floodplain	Total
	acres		
Watershed			
Cropland	4,574	1,585	6,159
Grassland (pasture, hay, CRP[b], other)	46,373	1,966	48,339
Forestland	13,105	817	13,922
Brush, Woodland	4,651	371	5,022
Wetland (woody and herbaceous)	964	1,789	2,753
Open water	1,170	73	1,243
Urban (includes towns, farmsteads, roads and barren areas)	1,953	80	2,033
TOTAL	72,790	6,681[c]	79,471[c]

a. Mapped using 2001 Landsat satellite imagery and unsupervised classification techniques
b. Conservation Reserve Program.
c. Minor acreage discrepancies among total watershed and 100-year floodplain data with Resource Information above are due to GIS data format conversions from vector to raster.

LAND USE/LAND COVER CHANGES

Installation of the proposed East Locust Creek multiple-purpose reservoir will inundate these acreages: 294 of cropland, 791 of grassland, 531 of forestland, 124 of brush/woodland, 443 of wetlands, 35 of open water, and 19 of urban, farmsteads, and roads for a total of 2,234 acres (the minor variation in permanent pool acreage with Table 3 is due to GIS data format conversions from vector to raster). Within the proposed permanent pool area are 132 acres currently in Wetland Reserve Program (WRP) easement and 218 acres in active Conservation Reserve Program (CRP) contracts. The WRP easement will be mitigated as per WRP program policy and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for the impacts.

There are an additional 269 acres between the permanent pool and auxiliary spillway elevations, which are comprised of two acres of cropland, 91 acres of grassland, 117 acres of forestland, 21 acres of brush/woodland, 26 acres of wetlands, 11 acres of open water, and one acre of urban, farmsteads, and roads. These areas will become seasonally wet when the multiple-purpose reservoir is installed. NRCS will require the Sponsors to acquire additional landrights to cover an area to the top of dam elevation. These additional real property rights would provide additional acres of vegetative buffer and mitigation areas.

Sullivan County and the East Locust Creek Watershed experienced moderate population growth during the decade of the 1990s (13% and 16% respectively, compared to 9% statewide). A majority of the population growth occurred in small towns, not resulting in any major shift in land use/land cover. The construction of the multiple-purpose reservoir will likely result in moderate conversion of land to urban land uses, such as residential, commercial, and industrial, made possible by a larger and more reliable water supply.

PROJECT BENEFICIARY PROFILE

	Per Capita Income	Unemployment	Age - Over 65 Years
Putnam County	$ 19,005[a]	6.6 %[c]	20.7 %[f]
Sullivan County	$ 20,579[a]	11.2 %[c/d]	17.6 %[f]
Missouri	$ 28,512[a]	5.6 %[c]	13.3 %[f]
USA	$ 30,804[b]	6.0 %[e]	12.4 %[g]

a. 2002 MERIC (Missouri Economic Research and Information Center)/ Missouri Department of Economic Development. http://www.ded.mo.gov/

b. 2002 U.S. Bureau of Economic Analysis. http://www.bea.gov/

c. 2003 Missouri Department of Economic Development

d. In 2003 a major employer, Con Agra, closed its facility (2002 unemployment rate was 4.2 %). The October 2004 unemployment rate was 5.1%.

e. 2003 U.S. Bureau of Economic Analysis

f. 2003 estimate. Missouri Census Data Center (MCDC). http://mcdc2.missouri.edu/

g. 2003 estimate. U.S. Census Bureau American Fact Finder. http://factfinder.census.gov

There are 10 towns in Sullivan County. They are Milan with a population of 1,902, Browning – population 310, Humphreys – population 161, Green Castle – population 305, Green City – population 668, Pollock – population 128, Newtown – population 204, Harris – population 102, Osgood – population 50, and Boynton (Unincorporated) – no census data available. The total population of the 10 towns with census data is 3,830.

According to the U.S. Census Bureau's 2003 population estimates, there are 7,080 people in Sullivan County and 5,148 people in Putnam County.

	Putnam County	Sullivan County	East Locust Creek Watershed	Missouri	U.S.
Population	5,148	7,080	2,948	5,719,204	290,788,976
Population over 65	20.7%	17.6%	---	13.3%	12.4%
White	99.0%	90.0%	91.0%	83.3%	67.9%
Hispanic or Latino	0.6%	8.9%	---	2.3%	13.7%
African American	0.02%	0.6%	---	11.5%	12.2%
American Indian	0.02%	0.2%	---	0.4%	0.8%
Asian	0.2%	0.1%	---	1.3%	4.0%
Other[a]	0.2%	0.2%	9.0%	1.3%	1.4%

a. Includes two or more races reported and Native Hawaiian/Other Pacific Islander race categories for all categories except East Locust Creek Watershed; where other refers to all non-white races.

Milan is the main supplier of water in Sullivan County. Sullivan County PWSD #1 purchases water from Milan, Green City, and Trenton (in Grundy County). Currently Browning, Humphreys, and Newtown purchase water from Sullivan County PWSD #1. Green Castle purchases water from Green City. Green City has its own treatment plant and is in the process of constructing a water main and pumping station to purchase water from Sullivan County PWSD #1 (MDNR, May 20, 2004).

Sullivan County and surrounding areas have been experiencing recurring droughts in recent years. Many of the current water suppliers have a need for additional or supplemental water sources to reliably serve their customers (Burns and McDonnell, August 2003). Lack of adequate supplies is also hindering commercial/industrial growth in the county. The Premium Standard Farms processing plant in Milan would like to increase production by adding a second shift, but is restricted by lack of water (MDNR, May 20, 2004).

PROBLEM IDENTIFICATION

- Inadequate rural water supply for the residents of Sullivan County and other portions of the Green Hills Region, a 10-county area in northcentral Missouri.
- Flooding along East Locust Creek, its tributaries, and the common floodplain area of Locust Creek results in $1,228,500 average annual flood damages to crops, pastures, fences, roads, and bridges.

- Decreased farm income and increased maintenance due to flooding on 3,760 acres in East Locust Creek and 23,339 acres in the common floodplain area of Locust Creek.
- Unmet demand for water-based recreational facilities within 25 miles of the proposed multiple-purpose reservoir site.
- Erosion and sedimentation.

PROJECT PURPOSES

- To provide a reservoir capable of producing 7.0 million gallons of raw water per day for the residents and communities of northcentral Missouri.
- To provide water-based recreational opportunities.
- To reduce flood damages on the floodplains of East Locust Creek, Little East Locust Creek, and the common floodplain area of Locust Creek.

ALTERNATIVE PLANS CONSIDERED

Alternative 1

- 1 multiple-purpose reservoir (100-year recurrence interval flood storage).
- 22 small floodwater retarding (FWR) structures in the Little East Locust Creek subwatershed.
- Development of water-based recreational facilities.
- Modification of 7 existing, small FWR structures that will be impacted by the multiple-purpose reservoir.
- 5 sediment/debris basins immediately upstream of the multiple-purpose reservoir.

Alternative 2

- 1 multiple-purpose reservoir (25-year recurrence interval flood storage).
- 22 small FWR structures in the Little East Locust Creek subwatershed.
- 17 small FWR structures in the East Locust Creek mainstem watershed.
- Development of water-based recreational facilities.
- Modification of 7 existing, small FWR structures that will be impacted by the multiple-purpose reservoir.
- 5 sediment/debris basins immediately upstream of the multiple-purpose reservoir.

Alternative 3 (NED-Recommended Plan)

- 1 multiple-purpose reservoir (25-year recurrence interval flood storage).
- 22 small FWR structures in Little East Locust Creek subwatershed.
- Development of water-based recreational facilities.
- Modification of 7 existing, small FWR structures that will be impacted by the multiple-purpose reservoir.
- 5 sediment/debris basins immediately upstream of the multiple-purpose reservoir.

Alternative 4 (Future Without Revised Plan)

- Installation of 49 additional small FWR structures. This would be a continuation and completion of the original East Locust Creek Watershed Plan-EA that was signed in 1987. No multiple-purpose reservoir for rural water supply or recreational purposes would be installed.

PRINCIPAL PROJECT MEASURES FOR NED-RECOMMENDED PLAN

Structural

The primary structural measure is one multiple-purpose reservoir with a drainage area of 20,992 acres. The reservoir will be designed to provide 7.0 million gallons of raw water per day, as well as storage for flood control and water-based recreational facilities. The permanent pool will be approximately 2,235 acres and the floodwater retarding pool at the auxiliary spillway elevation will be approximately 2,512 acres. The vegetated buffer acquired around the reservoir will be developed into recreational and natural areas. Twenty-two small FWR structures will be constructed in the Little East Locust Creek subwatershed. Livestock watering pipes will be included into the small structure designs. Seven existing, small structures will be modified, and 5 sediment/debris basins will be constructed.

INSTALLATION COSTS

TABLE A
PROJECT COSTS [a]

	P.L. 83-566		Sponsors		Total
	(dollars)	(%)	(dollars)	(%)	(dollars)
STRUCTURAL MEASURES					
Multiple-Purpose Reservoir	22,426,500	55	18,170,400	45	40,596,900
7 Modified, Small Structures	187,900	78	53,500	22	241,400
5 Small, Sediment/Debris Basins	179,900	72	68,300	28	248,200
Recreational Facilities	2,313,500	75	771,100	25	3,084,600
Water Intake Tower	1,134,300	77	347,700	23	1,482,000
Raw Water Line	206,200	5	4,358,400	95	4,564,600
22 Small, FWR Structures	2,101,800	93	151,000	7	2,252,800
TOTAL	**28,550,100**	**54**	**23,920,400**	**46**	**52,470,500**

a. Price Base 2006

PROJECT BENEFITS

TABLE B
AVERAGE ANNUAL BENEFITS [a]

Benefits	Dollars[a]	Reduction
Flood Damage Reduction	265,500	22%
Rural Water Supply[b]	2,392,600	------
Recreational Facilities	2,092,000	------
Total Project Benefits	**4,750,100**	

a. Price Base 2006
b. Includes livestock water benefits from livestock water pipes installed through the small structures.

OTHER PROJECT BENEFITS

1. Improved quality of life and potential for increased economic development as a result of the installation of an adequate and dependable rural water supply system and water-based recreational facilities.

2. The 2,235-acre multiple-purpose reservoir will provide approximately 72,000 annual user days for fishing, boating, hunting, camping, water skiing, hiking, biking, picnicking, bird watching, nature study, swimming, and canoeing.

3. Much of the acquired land, adjacent to the reservoir, will revert to natural vegetative growth creating a natural filter for sediment, nutrients, animal waste, and pesticides. Water quality will be protected in the reservoir and improved in the downstream areas of East Locust Creek. Wildlife habitat, while not a funded project purpose, will be enhanced as the buffer areas and other mitigation areas are established.

4. The multiple-purpose reservoir, with its high trap efficiency, will reduce the amount of sediment and other pollutants delivered to downstream areas.

5. The multiple-purpose reservoir will contribute to regional economic development in the short run due to construction activities and in the long run due to recreational opportunities, operation and maintenance activities, and growth of commercial and industrial enterprises. A full regional economic development analysis is available by request through the NRCS State Office in Columbia, Missouri.

ENVIRONMENTAL VALUES CHANGED

Community Effects

Construction of the multiple-purpose reservoir will have significant and long term effects on the residents and communities throughout the Green Hills Region of northcentral Missouri. The town of Boynton will be inundated by the permanent pool of the proposed multiple-purpose reservoir. Acquisition and relocation services will be provided to any residents whose properties will need to be purchased in conjunction with construction of the reservoir and related works of improvement. Current and future water shortage problems will be eliminated. A new rural water supply source will allow area water systems to meet increased water demands associated with anticipated future economic growth (Missouri Department of Natural Resources, October 2000). The long term future and success of communities, such as the City of Milan, hinges on the construction of an adequate water supply impoundment (City of Milan, August 2000).

The reservoir will also provide water-based recreational opportunities and a basis for economic growth. Income generated by the reservoir, in the form of residential, commercial, and tourism growth, could help reduce historically high unemployment rates within the region (Burns and McDonnell, August 2003).

As a result of the installation of the proposed works of improvement within the East Locust Creek Watershed, floodwater damages related to cropland and pastures, fences, commercial and urban properties, roads, bridges, re-routing of traffic, maintenance, and clean-up will all be reduced. Costs to the community for such damages will be reduced. Disruption to daily traffic, mail delivery, emergency services, and other vehicle movement will be reduced as flooding is reduced. While some flooding will still occur, floodplain residents will realize a reduction of the fears associated with flood events and the emotional and economic stresses involved with flood recovery and clean up.

Recreation

The multiple-purpose reservoir and recreational facilities will provide public opportunities for fishing, boating, swimming, camping, walking/jogging, bicycling, picnicking, family and social events, bird watching, and observing wildlife. The proposed recreational facilities, constructed to comply with the Americans with Disabilities Act (ADA), will include access points, fishing piers/platforms, bank fishing areas, picnic areas, parking lots, primitive camping sites, boat ramps, swimming beaches, playgrounds, shelterhouses, and restrooms.

Water Quality

High trap efficiencies, exhibited by the multiple-purpose reservoir and small FWR structures, will reduce sediment, nutrients, pathogens, and toxic materials delivered to the East Locust Creek stream system. Erosion and sedimentation rates will be reduced in the watershed as a result of changes to less intensive land uses, development of a vegetated buffer around the reservoir, and stabilization of eroding gully systems.

Wildlife Habitat
A total of 1,684 acres of low value habitat will be permanently flooded. Wildlife habitat within the project area will be improved through installation of wetland, recreational development, and mitigation areas in the floodpool and adjacent to the multiple-purpose reservoir and through mitigation features associated with the 22 small FWR structures. NRCS will develop a mitigation plan in coordination with Missouri Department of Conservation (MDC), U.S. Fish and Wildlife Service (USFWS), Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), other appropriate state and federal personnel, and the project Sponsors. These mitigation areas will adequately compensate for the various habitats impacted and emphasize the native species that require these habitat types.

Stream Resources
Approximately 29 miles of stream channel will be inundated by construction of the multiple-purpose reservoir. Sediment trapping capability of the reservoir and improved land treatment measures in the watershed will improve water quality in the downstream channel reaches. A low flow port is planned in the principal spillway inlet tower or raw water intake tower of the multiple-purpose reservoir to augment downstream flows in East Locust Creek. Releases from the reservoir will reasonably replicate natural baseflow conditions. Flow recommendations will be developed during mitigation planning through consultation between the appropriate state and federal personnel and the project Sponsors. Stream impacts are further disclosed in the "Formulation and Comparison of Alternatives" section.

Consultations with USFWS and MDC concerning proposed modifications along East Locust Creek were conducted during the planning process and plan preparation. The consultation process is outlined in Appendix E, Investigations and Analyses. NRCS will continue consultations with MDC, USFWS, EPA, USACE, other appropriate state and federal personnel, and project Sponsors concerning mitigation for the loss of or impact to stream habitat caused by this project. Mitigation measures will be agreed to prior to issuance of the necessary project permits and prior to the start of construction activities.

Wetlands
A total of 290.9 acres of wetlands were identified with NWI within the top of dam elevation and structure, auxiliary spillway, and water transmission line footprints. However, a preliminary investigation of these wetlands was conducted by an NRCS soil scientist and Missouri Department of Conservation (MDC) biologist (both have had REC IV training). Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and transmission line footprints to assess the quality of wetlands intersected by the transect and to determine if these wetlands were identified correctly by NWI. Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised.

The areas located between the high bank of East Locust Creek and the old railroad bed do not meet wetland criteria due to the influence of the incised creek channel (average 50'-100' from bank) and the elevation of the old railroad bed. Soils were mapped mainly as Landes, which is non-hydric. Of these areas, delineated as wetlands, the vast majority meet the hydrology criteria due to saturated soil conditions. There was little evidence of ponding or long-term flooding on these sites. The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process.

There will be no net loss of wetlands as a result of project activities. Refer to Appendix E, Investigations and Analyses, Wetlands section for methodology. Potential mitigation includes:

- Wetlands will be created in the shallow water areas in the upper ends, as well as other areas of the multiple-purpose reservoir to mitigate for impacted wetlands and through mitigation features associated with the 22 small FWR structures. An estimated 178.5 acres of wetlands will be created in the reservoir's permanent pool and a minimum of an additional 63 acres in the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands;

- If the acres of wetlands created, by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above), are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek watershed to the south end of Fountain Grove Conservation Area; and,

- Fringe wetlands of another reference reservoir (e.g. Mozingo Structure MP-1) will be used to compare/assess wetland functions.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

Endangered Species

The Indiana bat (Myotis sodalis), a federal and state listed endangered species, may occur in the watershed. In order to avoid adverse impacts to the Indiana bat, the guidelines developed by the USFWS for the conservation of the bat will be followed as per Missouri Field Office Technical Guide Transmittal No. 386 (USDA-NRCS, April 1, 2003).

Cultural Resources

A 1985 cultural resources review and survey of the watershed, conducted in conjunction with the original 1987 East Locust Creek Watershed Plan-Environmental Assessment, found no significant cultural resources to be present in areas associated with the proposed small floodwater retarding structure sites. Of the 14 previously recorded cultural resources in the watershed, 7 are within or adjacent to the planned multiple-purpose reservoir. The village of Boynton (unincorporated) is within the impact area of the project. Historical documentation of Boynton and associated elements will be part of a cultural resources survey planned for fall/winter 2006. A geomorphic model of the reservoir site is being developed to aid in determining areas needing additional cultural resources survey. A Phase I survey of likely areas will be conducted during fall/winter 2006. Part of this survey will be a review and update of the 1985 report including consideration of the 7 previously recorded sites.

Social Acceptability

Virtually all residents contacted during the preparation of this revised plan and those attending the numerous public meetings support the purposes set forth in this planning document. There is broad support for the rural water supply reservoir and the associated recreational opportunities throughout the 10-county area that will be served by the North Central Missouri Regional Water Commission. Numerous letters from water supply districts, northcentral Missouri communities, and state agencies, have been received in support of adding a rural water supply reservoir to the original 1987 Watershed Plan-EA (Burns and McDonnell, August 2003). The Soil and Water Conservation Districts, the Locust Creek Watershed Board of Trustees, and a majority of landowners in the East Locust Creek Watershed want to see completion of flood control efforts that were started in 1987. All watershed plan components are acceptable to the project Sponsors and to a majority of the northcentral Missouri landowners and residents who provided feedback.

MITIGATION FEATURES

Multiple-Purpose Reservoir

Approximately 626 units of wildlife habitat (for the selected indicator species bobwhite quail and wood thrush) will be lost on 1,684 acres of cropland, grassland, and upland and bottomland hardwood acreage that will be converted to the multiple-purpose reservoir's permanent pool. Refer to Appendix E, Investigations and Analyses, Biology section for methodology/species used to determine wildlife habitat units. The 626 habitat units lost will be mitigated with 626 habitat units on a 1,605-acre mitigation area adjacent to the permanent pool.

Stipulations for the mitigation acres include:

- When obtaining mitigation acres around the multiple-purpose reservoir, credit will be given for the acres in the required buffer zone and the floodpool area;

- Areas obtained for the 1,605 acres of mitigation will be maintained in a natural state if the existing vegetation consists of wildlife friendly species and can be managed to meet the goal of a 0.80 HSI for a species associated with a targeted habitat type, such as bobwhite quail. In areas without wildlife friendly species, grasses, trees, and/or shrubs will be planted based upon recommendations of an NRCS or MDC biologist and/or forester;

- Forest management will be allowed based upon consultation with a NRCS or MDC forester;

- Trees should not be removed from the permanent and floodpool areas except as needed for excavation of borrow materials required for construction of the reservoir components, except as necessary due to detrimental impacts to the structure that may exist, or for boating safety;

- Grazing will not be allowed in mitigation areas;

- Mitigation areas will be fenced, where necessary, to exclude livestock;

- Prescribed burning that is consistent with wildlife habitat enhancement may be performed. An NRCS approved prescribed burn plan shall be followed;

- Haying is acceptable after July 15 if approved, annually, by a biologist and reviewed by an NRCS or MDC biologist and is contingent on wildlife impacts;

- Mowing will be allowed where necessary to enhance recreational opportunities or as a method to enhance wildlife habitat when approved by the appropriate NRCS or MDC biologist;

- Any cropland would be approved by a biologist and reviewed by an NRCS or MDC biologist;

- The team agreed that full credit for the compensation acres could begin at the time the land is acquired;

- A management plan for the mitigation area will be developed by the Sponsors in consultation with the NRCS, USFWS, MDC, USEPA and USACE.

Mitigation for the 153,500 feet (29 miles) of stream lost to reservoir inundation will be addressed through the USACE 404 and Missouri Department of Natural Resources (MDNR) 401 permit process. Mitigation measures could include, but are not limited to, long term easements on riparian areas in the watershed and/or cash payments to the Stream Stewardship Fund. Mitigation measures will be agreed to prior to issuance of the necessary project permits and prior to the start of construction activities.

A low flow port will be installed in the principal spillway inlet tower or raw water intake tower of the multiple-purpose reservoir to augment downstream flows. Releases from the reservoir will reasonably replicate natural baseflow conditions. Flow recommendations will be developed through consultation between appropriate federal and state personnel and the Sponsors.

Small Floodwater Retarding Structures

Mitigation features associated with the impact to wetland and wildlife habitat by the 22 small FWR structures will remain the same as set forth in the original East Locust Creek Watershed Plan-EA (see Investigations and Analyses, Biology Section). The Mitigation Features Section of the original East Locust Creek Watershed Plan states:

"Installation of the project will result in the loss of 1,050 acres of wildlife habitat, including 800 acres covered by sediment pools and 250 acres in the dam and spillway areas. The accelerated forestry plan and land treatment practices included in the recommended plan provide benefits to wildlife that will mitigate 600 acres. The remaining 450 acres will be mitigated through the fencing of the sediment pools and about five acres, including the dam and emergency spillway area, of perimeter lands on 90 of the 120 small floodwater dams. The triagency team members have concurred in this approach."

CONCLUSION

The East Locust Creek Watershed Revised Plan-EIS, when fully implemented, will have a major beneficial effect on the problems of an inadequate, undependable, rural water supply source; a lack of recreational opportunities; and floodwater damages along East Locust Creek, its tributaries, and the common floodplain area of Locust Creek. A reliable, dependable, locally-controlled, rural water supply source will be constructed. Water-based recreational facilities designed to meet ADA standards will be developed. Flood damages to the City of Milan, rural areas, roads, bridges, fences, grassland, and cropland will be reduced.

AREAS OF CONTROVERSY

The planning process included public meetings, scoping meetings, formation of a steering committee comprised of a diverse group of local residents, print media coverage of project activities, and coordination with relevant federal, state, and local agencies and groups. No significant unresolved issues or controversies remain.

INTRODUCTION

The Watershed Revised Plan and Environmental Impact Statement for the East Locust Creek Watershed project are combined into this single document. This revised plan will replace the original East Locust Creek Watershed Plan-Environmental Assessment signed in 1987. The purpose of the project is to provide rural water supply (agricultural water management), water-based recreational opportunities, and flood prevention. The project area is located within Sullivan and Putnam Counties, in northcentral Missouri. Plan elements include installation of a multiple-purpose reservoir, water intake tower and raw water line, water-based recreational facilities, and 22 small floodwater retarding (FWR) structures. Additionally, the plan includes the modification of 7 existing small FWR structures impacted by the reservoir and the construction of 5 sediment/debris basins. This plan makes public the expected impacts of the project and provides the basis for authorizing federal assistance for local implementation.

Project Sponsors:
Locust Creek Watershed District
North Central Missouri Regional Water Commission
Sullivan County Soil and Water Conservation District
Putnam County Soil and Water Conservation District
Sullivan County Commission
Putnam County Commission

The Sponsors were assisted in the development of this plan by the United States Department of Agriculture (USDA) - Natural Resources Conservation Service (NRCS).

This plan was prepared under authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 U.S.C. 1001-1008), and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 U.S.C. 4321 et seq.) and the National Historic Preservation Act of 1966, as amended. Responsibility for compliance with the National Environmental Policy Act rests with the Natural Resources Conservation Service (NRCS).

Special cost share rates have been authorized by Public Law 109-108, H.R.2744, Section 726 which states: "Notwithstanding any other provision of law, the Natural Resources Conservation Service shall provide financial and technical assistance through the Watershed and Flood Prevention Operations program to carry out the East Locust Creek Watershed Plan Revision in Missouri, including up to 100 percent of the engineering assistance and 75 percent cost share for construction cost of site RW1". All references to "the multiple-purpose reservoir" in this document pertain to Site RW1 above.

All information and data, except as otherwise noted, were collected during watershed planning investigations conducted by the Natural Resources Conservation Service (NRCS).

PROJECT SETTING

WATERSHED SIZE

79,490 acres

LOCATION

The East Locust Creek Watershed is located in Sullivan, Putnam and Linn Counties (very small portion in Linn County) in northcentral Missouri. East Locust Creek originates near the town of Lemons, Missouri, and flows south-southwest past the City of Milan to its outlet at Locust Creek about 1 mile northwest of Browning, Missouri.

SOCIAL AND ECONOMIC CONDITIONS

Putnam County is bordered on the north by Iowa and on the south by Sullivan County. Sullivan and Putnam Counties are both primarily agricultural, rural areas. According to the 2000 Census, the population density of Sullivan County is 11.1 persons per square mile; Putnam County is 10.1; and East Locust Creek Watershed has 23.7 persons per square mile. According to the USDA-Farm Service Agency's Common Land Unit data, there are 1,900 farms, or farm operations, in Sullivan County, 1,728 in Putnam County, and 540 in the East Locust Creek Watershed. Sullivan County land area is 416,640 acres, and Putnam County land area is 331,520 acres. The land in Sullivan and Putnam Counties is 98 percent privately owned with 2 percent in federal, state, or local government ownership. Within the watershed, only 86 acres (less than 1 percent) is in public ownership.

There are several small communities within the watershed boundary. The largest community is Milan (population 1,902). Milan is located approximately half way up the watershed from its outlet. The eastern edge of the incorporated area of Milan is in the floodplain of East Locust Creek, while the western part of town extends beyond the western boundary of the watershed.

According to the U.S. Bureau of Census 2003 estimates, the population of Sullivan County is 7,080 and the population of Putnam County is 5,148. The watershed population is 2,948. In Sullivan County and Putnam County, 17.6 percent and 20.7 percent of the population is over 65 years of age respectively compared to 13.3 percent for the state of Missouri and 12.4 percent for the nation. Sullivan County's population is 90.0 percent white, 8.9 percent Hispanic/Latino, 0.2 percent American Indian, 0.6 percent African American, 0.1 percent Asian, and 0.2 percent other. Putnam County's population is 99.0 percent white, 0.6 percent Hispanic/Latino, 0.02 percent American Indian, 0.02 percent African American, 0.2 percent Asian, and 0.2 percent other. The watershed population is 91.0 percent white and 9.0 percent all other groups.

As reported by the Missouri Department of Economic Development (DED), in the beginning of 2004, Sullivan County had a labor force of 1,888. Putnam County had a labor force of 1,007. Unemployment in Sullivan County and Putnam County was 11.2 percent and 6.6 percent respectively according to 2003 information. Sullivan County unemployment was inflated in 2003 due to a major local employer (ConAgra) closing its facility. Sullivan County's 2002 unemployment rate was 4.2 percent, and the October 2004 rate was 5.1 percent. Unemployment for the State of Missouri and the U.S. was 5.6 percent and 6.0 percent respectively in 2003. Per capita income for Sullivan County is $20,579 and per capita income for Putnam County is $19,005. Comparatively, per capita income for Missouri is $28,512, while the national figure is $30,804.

The Missouri Department of Economic Development also reports county employment by NAICS sector. The top 5 employment sectors in Sullivan County and their share of the workforce are manufacturing (38 percent), educational services (13 percent), health care and social assistance (13 percent), retail trade (9 percent), and public administration (5 percent). In Putnam County the top 5 employment sectors are health care and social assistance (23 percent), management of companies and enterprises (15 percent), retail trade (13 percent), public administration (8 percent), and manufacturing (7 percent).

There are no anticipated major socio-political factors that will influence major changes in land use or management of the soil, water, air, plant, or animal resources within the watershed.

TOPOGRAPHY AND SOILS

The watershed lies within Major Land Resource Area 109 – Iowa and Missouri Heavy Till Plain. Upland topography consists of nearly level to sloping, rounded ridgetops and gently sloping to moderately steep sideslopes. Nearly level to flat floodplain areas are located along the mainstream channel of East Locust Creek and its tributaries. Local relief is approximately 335 feet (102 meters) with elevations ranging from 1,075 feet (328 meters) National Geodetic Vertical Datum (NGVD) at the northern limit of the watershed to 740 feet (226 meters) at the watershed outlet.

The published soil survey of Sullivan County (USDA-NRCS, April 1995) lists the following soil associations within the watershed boundaries:

1. Gara-Armstrong: Gara soils are on back slopes of upland ridges. They formed in glacial till and have slopes that range from 9 to 20 percent. They consist of very deep, moderately well drained, moderately slowly permeable soils. Armstrong soils occupy ridgetops and back slopes. They formed in pedisediments and in the underlying paleosol weathered from glacial till and have slopes that range from 2 to 14 percent. They consist of very deep, somewhat poorly drained, slowly permeable soils. Minor soils in this association include: Pershing, Landes, Lenzburg, Rinda, Tice, and Zook.

2. Winnegan-Keswick: Winnegan soils are on some narrow ridgetops and backslopes. They formed in glacial till and have slopes that range from 9 to 40 percent. They consist of very deep, moderately well drained, slowly permeable soils. Keswick soils occupy narrow ridgetops and a few of the upper back slopes. They formed in pedisediments and in the underlying paleosol weathered from glacial till and have slopes that range from 5 to 14 percent. They consist of deep, moderately well drained, slowly permeable soils. Of minor extent in this association are Gorin, Landes, Reger, and Zook soils.

3. Armstrong-Pershing-Gara: Pershing soils are on narrow ridgetops and back slopes. They formed in loess and have slopes that range from 2 to 5 percent. They consist of very deep, somewhat poorly drained, slowly permeable soils. See Association 1 above for descriptions of Armstrong and Gara soils. Minor soils in this association include: Arbela, Belinda, Landes, Rinda, Tice, and Zook.

4. Landes-Chequest: Landes soils are adjacent to the stream channels on the floodplains or adjacent to former stream channels in areas where the channels have been straightened. They formed in loamy alluvium and have slopes that range from 0 to 2 percent. They consist of very deep, well drained, moderately rapidly permeable soils. Chequest soils are commonly between areas of the Landes soils along the present or former stream channels. They formed in silty, alluvial sediments and have slopes that range from 0 to 2 percent. They consist of very deep, poorly drained, moderately slowly permeable soils.

GEOLOGY

The northern and southern portions of the East Locust Creek Watershed are underlain by a Pennsylvanian age succession of shale, limestone, clay, and coal beds belonging to the Marmaton group. These bedrock units are blanketed with soils formed from glacial till, loess, and alluvium. The central portion of the watershed is underlain by Pennsylvanian age limestone and shale members belonging to the Kansas City group, and sandstones, shales, and channel fill deposits of the Pleasanton group. Some bedrock outcroppings are present in creek bottoms, streambanks, tributaries, gullies, valley sideslopes, and road cuts. Stratigraphic units identified in outcrop include Pleasanton group sandstones, siltstones, shales, and a thin limestone (Exline Member).

FOREST RESOURCES

A wide variety of trees and shrubs are currently found in the upland draws, side slopes, and bottomlands within the watershed. Approximately 18 percent of the watershed is forested. Tree species noted include: cottonwood, silver maple, black walnut, northern red oak, black oak, pin oak, white oak, swamp white oak, bur oak, red cedar, black cherry, choke cherry, elm, ash, mulberry, willow, honey locust, shingle oak, basswood, shagbark hickory, and bitternut hickory. Shrub species include: smooth sumac, grapevine, gray dogwood, rough-leaf dogwood, and hazelnut (Sell, 2005).

LAND USE/LAND COVER

TABLE C
LAND USE/LAND COVER[a,d]

Land Use/Land Cover	Upland	Floodplain	Total
	.....acres.....		
Watershed			
Cropland	4,574	1,585	6,159
Grassland (pasture, hay, CRP[b], other)	46,373	1,966	48,339
Forestland	13,105	817	13,922
Brush, Woodland	4,651	371	5,022
Wetland (woody and herbaceous)	964	1,789	2,753
Open Water	964	73	1,243
Urban (includes towns, farmsteads, roads, and barren areas)	1,953	80	2,033
TOTAL	**72,790**	**6,681[c]**	**79,471[c]**

a. Mapped using 2001Landsat satellite imagery and unsupervised classification techniques.
b. Conservation Reserve Program.
c. Acreage discrepancies among total watershed and 100-year floodplain data are due to GIS data format conversions from vector to raster.

The percentage of land treatment in the watershed can be improved, particularly with conservation practices on cropland. Soil erosion effects production, economics, water quality, and the environment in general. The watershed has nearly 5,617 acres currently in the USDA-Conservation Reserve Program (CRP). CRP expiration dates range from 2007 to 2018.

STREAM RESOURCES

Fish Community

Missouri Department of Conservation personnel sampled the fish community in East Locust Creek on June 30, 1988. The sample site is located 7.4 miles upstream from the confluence with Locust Creek near Cora, Missouri (Sullivan County, Sec.10, Township 61N, Range 20W). The sample site is located in an unchannelized reach of the stream and had a wooded corridor less than 100 feet on both sides of the stream. The habitat sampled consisted of a pool, run, and backwater. Twelve different fish species were collected and are listed below. All of the species collected were common and habitat generalists; no threatened or endangered species were collected. The bigmouth shiner, a species that has been favored by channelization and increased sedimentation in Prairie streams, dominated the sample.

Common Name	Species Scientific Name	Number	Percent of Total
Bigmouth Shiner	*Notropis dorsalis*	620	45.9
Bluntnose minnow	*Pimephales notatus*	1	0.1
Central Stoneroller	*Campostoma pullum*	9	0.7
Creek Chub	*Semotilus atromaculatus*	243	18.0
Golden Shiner	*Notemigonus crysoleucas*	1	0.1
Green Sunfish	*Lepomis cyanellus*	1	0.1
Red Shiner	*Cyprinella lutrensis*	299	22.1
River Carpsucker	*Carpiodes carpio*	14	1.0
Sand Shiner	*Notropis ludibundus*	145	10.7
Suckermouth Minnow	*Phenacobius mirabilis*	15	1.1
White Sucker	*Catostomus commersoni*	1	0.1
Yellow Bullhead	*Ameiurus natalis*	1	0.1
Totals		1350	100.0

Stream Habitat

East Locust Creek is considered a perennial stream from the mouth to Highway 6 (Milan). From Highway 6 to near Pollock it is intermittent and upstream of Pollock it is ephemeral. Channel width is variable, but averages approximately 50 feet through the project area. Channel depth averages approximately 12 feet. The majority of the channel through the project area is laden with sandy sediment, but at least one downstream reach is relatively clean. The channel is incised from past degradation, but now appears relatively stable and has natural and artificial grade control at several locations. Channel substrate is primarily coarse to fine sand with occasional riffles over resistant clay or weathered shale with rare exposures of bedrock and a few private cobble low water crossings. Woody debris is plentiful and logjams are common in reaches where sediment is stored. Woody riparian corridor is fair to excellent at the multiple-purpose structure centerline and downstream, but is very poor in upstream reaches.

Stream habitat conditions were sampled at eight different one-half mile reaches throughout the length of East Locust Creek using Stream Habitat Evaluation Procedures (SHEP). This procedure ranks 6 parameters reflecting human impacts on a stream and adjusts them by 4 alteration functions (channel modifications, impoundments, water quality, and streambed conditions) to determine an index value of stream quality. Values can range from zero (worst) to 10 (best). The average index value for East Locust Creek was 2.71 (range 0.6 to 5.0). Barriers to fish movement and flow alterations were not problems, but riparian vegetation was poor. Only 3 of 8 reaches had good riparian areas. Bank erosion was severe in half of the reaches and moderate in most of the remaining reaches. Stream migration potential was moderate, but improved in the upper half of the reaches. Channelization was a problem in about one third of the reaches, but only one reach was completely channelized. Impoundment was not a problem. Water quality was fair, and several reaches showed symptoms of excessive nutrients. Streambed condition was poor with excessive bedloads of sand and silt common in most reaches. Visual assessments conducted during the spring and summer of 2005 in the study area of the proposed multiple-purpose reservoir indicated that both the fish community and stream habitat are similar to the earlier 1988 MDC sampling.

The Stream Visual Assessment Protocol is a simple, coarse assessment procedure to evaluate the condition of aquatic ecosystems associated with streams. The results reflect the habitat quality of the stream. East Locust Creek was sampled at 3 locations on May 24, 2004. Sample sites were located: 1) approximately 3,700 feet south of the centerline of the proposed multiple-purpose structure, 2) just upstream of the bridge located west of the town of Boynton, and 3) upstream of a low-water crossing in the SW ¼, SE ¼, Section 35, T64N, R20W. The results indicate fair conditions at all 3 sample locations. Limited width of the riparian zone vegetation was common to all 3 sample sites.

East Locust Creek stream channel conditions downstream of the proposed multiple-purpose reservoir site were evaluated on May 18, 2005 and June 22, 2005. Investigators waded approximately 5.3 miles of the stream channel between the proposed reservoir site and the confluence with Elmwood Creek. Channel stability, channelization, sedimentation, and riparian vegetation were noted.

Past channelization is evident, but the stream channel is relatively stable overall with active channel migration observed at only two meanders. Sedimentation varies with location. Logjams and sediment storage are apparent over approximately 6,350 feet of channel between the proposed reservoir location and the first low-water crossing downstream. For approximately 8,500 feet below this low-water crossing, the channel exhibits some scour and little evidence of sedimentation. For the next 8,700 feet ending, at a second low-water crossing, the channel is characterized by numerous logjams, islands, channel braiding and sediment storage features. The remaining 4,600 feet of stream channel between the second low-water crossing and the confluence with Elmwood Creek exhibits scouring with resistant clay riffle features providing grade control at several locations.

Riparian corridor width varies considerably with location along the evaluated reaches. The 6,350 foot reach has excellent vegetation on the west channel bank, but limited vegetation on the east channel bank. The 8,500 foot reach has excellent riparian vegetation with nearly the entire reach exceeding 100-foot of vegetation on both channel banks. The remaining reach to the confluence with Elmwood Creek exhibits poor riparian vegetation.

Riparian buffer width along mainstem East Locust Creek and its tributaries upstream of the proposed reservoir site were evaluated using digital orthophotography flown in 2004, and digital infrared orthophotography flown in 2003. The riparian corridor was found to be very poorly vegetated.

WATER QUALITY

Missouri state water quality regulations (10 CSR 20-7) classify waters by type, establish beneficial uses and define general (10 CSR 20-7.031(3)) and specific (10 CSR 20-7.031(4)) water quality criteria that must be maintained to protect the assigned beneficial uses. If existing water quality is better than applicable water quality criteria, the state's anti-degradation policy (10 CSR 20-7.031(2)) requires existing levels of water quality to be maintained and protected.

Classified portions of the stream are required to meet specific and general water quality criteria and conform to the anti-degradation policy. Unclassified portions of the stream are required to meet general water quality criteria and conform to the anti-degradation policy. Water bodies that fail to meet either general or specific criteria are required to be listed as impaired water bodies under Section 303(d) of the federal Clean Water Act. East Locust Creek does not appear on Missouri's most recent (1998 and 2002) Section 303(d) lists.

East Locust Creek from the mouth to Highway 6 is classified as "P" (streams that maintain permanent flow even in drought). From Highway 6 to Section 12, Township 64N, Range 20W near Pollock, the stream is classified "C" (streams that may cease flow in dry periods but maintain permanent pools which support aquatic life). The remainder of the stream is unclassified. The State designated beneficial uses for East Locust Creek are livestock and wildlife watering and protection of warm water aquatic life and human health – fish consumption.

Watershed land cover is predominantly grassland and forestland with very little row-crop agriculture. Though agricultural non-point source pollution has not been associated with any impairment to water quality in East Locust Creek, any grassland, forestland, or row crop mismanagement in close proximity to the reservoir poses a risk to water quality. Approximately 7.1 percent of the watershed is enrolled in the Conservation Reserve Program (CRP). There is a possible, although unlikely, risk that significant portions of CRP land might some day be returned to crop production with a negative impact on water quality. Homes and businesses with on-site septic systems that are in close proximity to the proposed multiple-purpose reservoir also pose a risk to water quality. Individual septic systems in the watershed have not been investigated, but are likely to have significant problems if they are typical of those found in the region. The communities of Pollock and Lemons upstream of the proposed reservoir are not served by central sewer systems and pose a risk for discharge of untreated effluent. Missouri Department of Natural Resources officials are not aware of any leaking underground storage tanks, hazardous waste disposal sites, permitted landfills, treatment, storage and disposal (TSD) facilities, Superfund sites, or permitted wastewater treatment facilities upstream of the proposed multiple-purpose reservoir in the East Locust Creek Watershed.

The town of Boynton will be inundated by the permanent pool of the proposed reservoir. Remains of this town pose a risk to water quality if they are not properly demolished and removed. An automobile salvage yard at Pollock will not be inundated, but is located less than 300 feet from the stream channel and approximately 2,000 feet upstream from the 922.3-foot permanent pool elevation. Runoff from this site poses a risk to water quality. Illegal dumping poses a risk to water quality. Several illegal dump sites have been observed in the watershed upstream of the proposed reservoir. A ¼-mile length of State Highway 5 is located less than 600 feet from the 922.3-foot permanent pool elevation. The close proximity of the highway poses some risk of water pollution by deicers, herbicides, automotive and combustion by-products and some risk of a release due to a transportation-related hazardous materials incident. Low or no flow conditions in East Locust Creek during the driest part of the summer coupled with permitted wastewater discharges by Premium Standard Farms and the City of Milan can result in effluent-dominated flow downstream of these point discharges.

CULTURAL RESOURCES

Archaeological evidence is that humans have occupied the Sullivan County area for at least the last 10,000 years. A cultural resources survey was made during November and December 1985 of a sampling of 35 percent of the small floodwater retarding (FWR) structure sites planned in the watershed. Previous surveys in the proposed project area recorded 14 cultural resources consisting mostly of historic settlements and prehistoric sites along ridge tops and high terraces associated with major drainages. No additional cultural resources were found during the 1985 survey. The report suggested that sites were unlikely to be found in the steep terrain associated with the small flood prevention sites. Sites are more likely to be found adjacent to the larger stream valleys (the mainstem of East Locust Creek).

Previously recorded sites in the watershed vary in age from Archaic through Euro-American. One highly eroded lithic scatter site suggests a Mississippian/Oneota component. Two lithic scatters suggest woodland materials. The rest were lithic scatters listed as unknown prehistoric.

The first Euro-American settlement in the project area began in the 1830's. The county of Sullivan was organized in 1845, with a county seat at Milan. Other nineteenth century settlements in the watershed include: Pollock, Boynton, and Cora. The National Register of Historic Places lists 7 sites in Sullivan County. Five of the sites are buildings within either Green City or Milan. The other two listings are cemeteries located outside of the East Locust Creek project area.

WETLANDS

Wetland habitat quality has been reduced as wetlands within the watershed have been impacted by stream channelization and agricultural activity. The National Wetland Inventory (NWI) identified 290.9 acres of wetlands within the top of dam elevation, dam and auxiliary spillway elevation, and water transmission line footprint (refer to Appendix D). These wetlands consist of approximately 122 acres of palustrine emergent, 167 acres of palustrine forested, and 2 acres of palustrine scrub-shrub. However, a preliminary investigation of these wetlands was conducted by an NRCS soil scientist and Missouri Department of Conservation (MDC) biologist, both of whom have completed the Corps of Engineers, 1987 Wetland Delineation Manual, (REG IV) training. Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and transmission line footprints to assess the quality of wetlands intersected by the transect and to determine if these wetlands were identified correctly by NWI. Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised.

The areas located between the high bank of East Locust Creek and the old railroad bed do not meet wetland criteria due to the influence of the incised creek channel (average 50'-100' from bank) and the elevation of the old railroad bed. Soils were mapped mainly as Landes, which is non-hydric. Of these areas, delineated as wetlands, the vast majority meet the hydrology criteria due to saturated soil conditions. There was little evidence of ponding or long-term flooding on these sites.

The forested plant communities are dominated by light-seeded trees with very little hard mast present. Most are young stands typically dominated by silver maple with little canopy stratification and an herbaceous understory dominated by stinging nettle and Virginia wild rye. Many of the areas have been grazed, which likely influenced the vegetative community.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area.

CLIMATE

The East Locust Creek Watershed has a humid, sub-continental climate. The area is subject to large-scale changes in temperature and amounts of precipitation from season to season and year to year. On average, January is the coldest month and July is the hottest. The annual mean temperature is 54° Fahrenheit. Average annual total rainfall is 37.3 inches and the average total snowfall is 25.4 inches (worldclimate.com).

WATERSHED PROBLEMS AND OPPORTUNITIES

Significant land and water resource problems are present in the East Locust Creek project area. These problems are interrelated and adversely effect other resources or uses of resources, such as recreation, fisheries, wildlife habitat, recreation, and cropland production. Problems include an inadequate, rural, water supply system for the residents of Sullivan and Putnam Counties, as well as other areas of northcentral Missouri; flooding along East Locust Creek and its tributaries; erosion and sedimentation; and a lack of public, water-based recreational facilities. This section will demonstrate the need for project components and identify those problems that are a concern to public. It will also describe the opportunities made available through this plan to address these problems

AGRICULTURAL WATER MANAGEMENT (RURAL WATER SUPPLY)

The North Central Missouri Regional Water Commission has identified a need for an adequate, dependable, high quality, locally-controlled water supply system for the rural areas and municipalities of northcentral Missouri. The area to be served by the Commission is known as the "Green Hills Region of North Missouri". This region consists of the area south of the Missouri and Iowa state line that is bordered on the west by the Thompson River, on the east by the Chariton River, and on the south by the Missouri River. It covers an area of about 4,900 square miles and has a population of approximately 98,000 (Burns and McDonnell, August 2003).

A reliable, high quality source of drinking water is long overdue for northcentral Missouri. A large number of the water supply impoundments in northcentral Missouri are outdated and many of the older, raw water supply reservoirs are too small to meet the present day public, residential, commercial, and industrial demands (Rhodes Engineering Company, 1995). Several of the existing public water systems within the area are prone to water shortages during the recurring droughts of the area. Small surface water systems of the area face significant technical, managerial, and financial challenges in meeting more stringent drinking water standards now being proposed (Missouri Department of Natural Resources, October 2000). Northern Missouri is more susceptible to drought than the rest of the state. According to the Drought Assessment Committee, the public water system in Sullivan County has been problematic since July 1999; which is the beginning of the current drought (Missouri Climate Center, October 2000). The Green Hills Region has been plagued by droughts in recent years. In August 2003, the region was under a "category 3" drought as established by the Missouri Department of Natural Resources. This level of drought requires water conservation practices and is one step below the emergency drought category (Burns and McDonnell, August 2003).

Since costs for maintaining a quality water supply for the public have risen, larger regional water supplies are becoming more predominant and tend to be more efficient (Rhodes Engineering Company, 1995). The Green Hills Region is currently serviced by 10 public water supply districts and 35 municipal water utilities. Many of these suppliers are in need of additional water

sources in order to meet the needs of their customers. Green City, for example, has been mandated by the Missouri Department of Natural Resources to abandon their existing water plant. As a consequence, they have signed on as a charter member of the North Central Missouri Regional Water Commission (Burns and McDonnell, August 2003). The City of Milan has been under voluntary or mandatory water conservation for several years. Problems experienced by other water suppliers in the region include: increased demand due to population growth, increased use per customer, difficulty finding groundwater wells that will maintain yields, inadequate lake capacity due to siltation and increased water demand, lake capacities that must be supplemented by pumping water from nearby creeks, leaks in old water mains, increased water demands for rural businesses, refusal of suppliers to increase the contract amount of water they sell to consumers, dangerously low water levels in reservoirs during periods of drought, and stress on groundwater systems due to increasing demand and over pumping (Missouri Department of Natural Resources, May 20, 2004). Highway 36 is currently being renovated from 2 lanes to 4 lanes within the study area. Water suppliers will struggle to serve the growing demands that will result from increased usage along the Highway 36 corridor (Burns and McDonnell, August 2003).

While the most significant water need is for domestic uses, there is a growing need for water by rural businesses. Recent business expansions in the Green Hills Region have created the need for larger water supplies. Groundwater supplies are not available in much of the region and, as a consequence, have created a limiting factor for the location and establishment of some types of rural business facilities (Burns and McDonnell, August 2003). A growing number of food processing facilities are moving to, and investing in, rural areas of the country. Such facilities need to be located near the source of raw materials (Burns and McDonnell, August 2003).

The Premium Standard Farms (PSF) facility in Milan has wanted to add a second shift for some years, but has been restricted by lack of water. Their officials have approached the North Central Missouri Regional Water Commission to purchase raw water from a new water supply reservoir, if and when one is constructed (Missouri Department of Natural Resources, May 20, 2004). PSF is currently facing a raw water shortage, and addition of a second shift would likely double its current water usage. PSF has drilled test wells in the Milan area, but available yields are inadequate to supplement their water supply (Burns and McDonnell, August 2003).

In 2002, Con Agra closed a food processing facility in Milan. By 2010, or sooner, it is anticipated that the Con Agra Complex will be purchased and returned to operation. When previously in operation, Con Agra had a comparable daily average water demand to that of Premium Standard Farms (Burns and McDonnell, August 2003). Development and expansion of facilities, such as PSF and Con Agra, will increase both the work force and the demand for an increased water supply (Missouri Department of Natural Resources, May 20, 2004).

There is a need for an additional drinking water source in northcentral Missouri to meet the needs brought about by increasing population and additional demands from businesses. Based on population trends and knowledge of water systems in the Green Hills Region, it is clear that existing water systems and suppliers will not be able to meet demand (Missouri Department of

Natural Resources, May 24, 2004). Thirty-four water supply systems have the potential or desire to purchase water from a new water supply source proposed by the North Central Missouri Regional Water Commission. Sixteen immediate probable customers have been identified that will, or are likely to, become purchasers of the Commission's water (Missouri Department of Natural Resources, May 20, 2004).

Opportunities exist to provide an abundant source of low-cost, pure, quality water for the residents and communities of northcentral Missouri. It is anticipated that the North Central Missouri Regional Water Commission, if it has an adequate water source, will serve nearly 54,000 residents of the Green Hills Region by the year 2025 (Missouri Department of Natural Resources, May 20, 2004). "The Water Use Study, North Central Missouri Regional Water Commission, Sullivan County, Missouri" (Missouri Department of Natural Resources, May 20, 2004) was used as a guideline by the Commission to determine a raw water yield needed by 2025 to provide the water needs of its customers in the Green Hill Region. Yields needed by 2025 for probable customers and potential customers were examined and ranged from 4.5 MGD to 8.5 MGD. The Commission decided to use a 7.0 MGD yield for project planning purposes.

A proposed water supply reservoir located north of the City of Milan would produce 7.0 million gallons of raw water per day and would eliminate current and future water shortage problems. A new, regional, water supply source would allow the area water systems to meet increased water demands associated with anticipated and needed future economic growth in the area (Missouri Department of Natural Resources, October 2000). The long term future and success of communities, such as the City of Milan, hinges on the construction of an adequate water supply impoundment (City of Milan, August 2000). The proposed reservoir would also provide water-based recreational opportunities and a basis for economic growth. Income generated by the proposed reservoir, in the form of residential, commercial, and tourism growth, could help reduce historically high unemployment rates within the region. The reservoir would likely become a vital contributor to the Green Hills Region in many ways (Burns and McDonnell, August 2003).

FLOODWATER DAMAGES

The area subject to flooding damages addressed by this revised plan includes the floodplain within the East Locust Creek Watershed and the common floodplain area of Locust Creek Watershed. The common floodplain of the Locust Creek Watershed refers to the area south of the confluence of East Locust Creek and Locust Creek. The floodwater damages to the common floodplain of Locust Creek are referred to as off-site damages, and the damages to the East Locust Creek Watershed are referred to as on-site damages.

The original East Locust Creek Watershed Plan-Environmental Assessment, signed in 1987, proposed the installation of 121 small floodwater retarding (FWR) structures and land treatment measures to address flooding problems in the East Locust Creek Watershed. Estimated average annual crop and pasture damages to the on-site and off-site floodplains were $2,199,600 in 2005 dollars.

Land use has changed since signing of the original watershed plan in 1987 and 72 small FWR structures included in that plan are in place on the landscape. The new estimated crop and pasture average annual damages to the on-site and off-site floodplain are $822,300 ($79,100 on-site and $743,200 off-site).

Although the installed 72 structures have reduced flooding damages from their original levels, flooding still occurs at least every other year within the East Locust Creek floodplain. This 2-year return period flood (50% annual probability) currently inundates approximately 2,700 floodplain acres. Additionally, there are 11,600 acres of land inundated by the 2-year, 24-hour flood in the off-site floodplain. These flooded acres result in significant damages to crops, pastures, roads, bridges, and other floodplain features. Producers growing crops in the highly productive floodplain may understand the risks associated with frequent flooding, but continue to plant crops annually knowing some may not be harvested. Spring floods can delay planting while late summer and fall flooding can reduce yields and delay harvesting. Floodwaters often coat growing plants with silt which reduces grain values and yields. Crop yields can be greatly reduced by flood currents that flatten the growing plants.

Floods occur primarily during the period from March through June. The most damaging flood along East Locust Creek occurred in 1947 when 8,800 acres was flooded. This flood, with a recurrence interval of 100 years (1-percent chance, 7.1 inches of rainfall in 24 hours) caused an estimated $799,470 of crop and pasture damage based on 2004 current normalized prices.

Average annual damages to crop and pasture are estimated to be $79,100 on-site and $743,200 off-site. Other agricultural damages, such as fences and debris, are estimated to be $45,500 on-site and $193,200 off-site. Average annual damages to the urban area in Milan are $900 and average annual damages to roads and bridges, both on and off-site, are $32,800.

EROSION AND SEDIMENTATION

Approximately 321,300 tons of soil erode annually within the East Locust Creek Watershed from all sources including sheet-and-rill, ephemeral gullies, classical gullies, streambanks, road ditches, and floodplain scour. An estimated 110,000 tons moves through the stream system, leaves the watershed, and enters Locust Creek. The remaining sediment is deposited on cropfields in upland areas, in farm ponds and lakes, in wetlands, in stream and gully channels, and on floodplains. Sheet-and-rill erosion accounts for 53 percent of the total soil loss from all sources. Approximately 65 percent of the sheet-and-rill erosion occurs on grassland and pasture acres which comprise about 60 percent of the upland acreage. Cropland, which accounts for only four percent of the upland acreage, contributes about nine percent of the sheet-and-rill erosion.

Classical gullies produce an estimated 109,500 tons of sediment each year. Past straightening and channelization of portions of the East Locust Creek stream system and the Locust Creek system, as well as increased runoff from poor conservation practices have degraded (deepened) some stream channel reaches. This has lowered base levels, created advancing overfalls, and

triggered the movement of active gullies into the upper reaches of many drainage areas. This is particularly more evident in the Little East Locust Creek drainage. Areas voided by classical gully erosion suffer a significant economic loss while adjacent areas undergo depreciation of the land resource. About 34 percent of total sediment produced in the watershed is derived from classical gullies.

Streambank erosion produces nearly 18,000 tons of sediment annually. Streambank erosion is variable throughout the watershed. Some stream reaches exhibit stable to slightly eroding banks while others are undergoing moderate to severe erosion. Some of the more severe streambank erosion has occurred in the Little East Locust Creek watershed in response to extensive channel straightening that took place over the past decades along Locust Creek near and south of Browning, Missouri. Piecemeal channel straightening in the East Locust Creek system has also been a contributing factor. Other factors that have aggravated streambank erosion problems include excessive runoff, absence of woody or vegetated stream corridors, uncontrolled livestock grazing along streambanks, and plowing adjacent fields too close to the stream channel. About 6 percent of the total sediment produced in the watershed is attributable to streambank erosion.

Opportunities exist to reduce both erosion and sedimentation rates and their associated problems. Erosion and sedimentation resulting from sheet-and-rill soil losses, ephemeral gullies, and classical gullies will be reduced through ongoing and future conservation programs and by the requirement that soil losses be reduced to tolerable limits on 75 percent of the drainage areas above the proposed multiple-purpose reservoir and small FWR structures. Vegetated buffer strips will be established around the multiple-purpose reservoir that will serve to reduce erosion and act as a filter for sediment-laden runoff. The reservoir and small flood control structures will have high trap efficiencies for sediment, reduce gully erosion by providing grade stabilization benefits, reduce streambank erosion by inundating moderate to severely eroding stream reaches, and reduce sediment deposition in downstream reaches and on floodplains.

TRANSPORTATION

Flood damages to roads include replacement and repair of road surfaces and removal of sediment deposits and debris. The Missouri Department of Transportation (MODOT) and county townships place signs on roads to warn of flood hazards and to route traffic around flooded roads and bridges. Vehicles subjected to flooding receive damages from mud and water. Movement of all forms of traffic within flooded areas, including emergency vehicles and mail delivery, is greatly impaired or prohibited.

Opportunities exist to significantly reduce transportation hazards and damages to the road system by utilizing flood control measures to reduce the frequency and depths of floodwaters. Local townships and MODOT would realize cost savings from reduced maintenance and roads would be safer for motorists.

LAND USE AND TREATMENT

The watershed has nearly 5,617 acres currently in the USDA-Conservation Reserve Program (CRP). CRP expiration dates range from 2007 to 2018. Bringing these lands back into crop production after expiration from CRP could significantly increase the need for land treatment to protect water quality of the planned water supply. Soil erosion, off-site sediment damages, and agricultural non-point pollution can be reduced through education of producers and landowners, implementation of conservation practices, and stormwater and soil erosion regulations in the watershed.

Maintaining water quality to meet state standards for potential uses is an important concern for the proposed East Locust Creek Watershed multiple-purpose reservoir. Land treatment for water quality protection can be improved on agricultural land through existing Natural Resources Conservation Service (NRCS), Soil and Water Conservation District (SWCD), Missouri Department of Natural Resources (MDNR), Missouri Department of Conservation (MDC), and Environmental Protection Agency (EPA) technical, financial, and educational assistance programs. Rural water supply watersheds, such as the East Locust Creek Watershed, are eligible for the Missouri Conservation Reserve Enhancement Program (MoCREP). MoCREP can be used to protect water quality through incentive payments to convert cropland to permanent vegetative cover.

Development of the multiple-purpose reservoir will convert 285 acres of cropland and 830 acres of grassland to water. This conversion will reduce the potential water quality degradation from agricultural non-point pollution, such as pesticides, commercial fertilizer, livestock waste, and sediment.

Sullivan County and the East Locust Creek Watershed experienced moderate population growth during the 1990s. Construction of a multiple-purpose reservoir is likely to result in a moderate conversion of land to urban uses, such as residential, commercial, and industrial, made possible by the presence of an expanded, reliable water supply source and water-based recreational opportunities.

WATER QUALITY

East Locust Creek is absent from Missouri's 1998 and 2002 lists of impaired waters under section 303(d) of the Clean Water Act. The greatest threats to water quality in the East Locust Creek Watershed are from sediment, nutrients, pathogens, and toxic materials.

Streambank erosion produces nearly 18,000 tons of sediment annually. Streambank erosion is variable throughout the watershed. Some stream reaches exhibit stable to slightly eroding banks while others are undergoing moderate to severe erosion. Sediment smothers bottom dwelling organisms and blocks sunlight needed by aquatic plants. Sediment sources include unstable channel banks, classical and ephemeral gullies, roads, road ditches, and poorly managed cropland, pasture, and forestland. Though agricultural non-point source pollution has not been associated with any impairment to water quality in East Locust Creek, cropland or pasture

mismanagement in close proximity to the proposed multiple-purpose reservoir poses a risk to water quality. The watershed land cover is predominantly pasture, grassland, and forestland with very little row-crop agriculture. Approximately 7.1 percent of the watershed is enrolled in the Conservation Reserve Program (CRP). There is a possible, although unlikely, risk that significant portions of CRP land might some day be returned to crop production with a negative impact on water quality.

Excess plant nutrients spur algal blooms that can deplete oxygen and result in fish kills. The most problematic nutrients are nitrogen and phosphorus. Nitrogen is found in storm runoff that contains organic matter, animal waste, or fertilizers. Phosphorus also enters streams through storm runoff and is primarily found attached to sediment and organic matter.

Pathogens can arise from human, livestock, and wildlife sources. Poorly functioning on-site septic systems can be a source of both nutrients and pathogens. Individual septic systems in the watershed have not been investigated, but are likely to have significant problems if they are typical of those found elsewhere in the region. Homes and businesses with on-site septic systems that are in close proximity to the proposed reservoir pose a risk to water quality. The communities of Pollock and Lemons upstream of the proposed reservoir are not served by central sewer systems and pose a risk for discharge of untreated effluent.

The town of Boynton will be inundated by the permanent pool of the proposed reservoir. Remains of this town pose a risk to water quality if not properly decommissioned. An automobile salvage yard at Pollock will not be inundated, but is located less than 300 feet from the stream channel and approximately 2,000 feet upstream from the permanent pool elevation. Runoff from this site poses a risk to water quality. Several illegal dump sites have been observed in the watershed above the proposed reservoir. Toxic materials released by illegal dumping pose a threat to water quality. State Highway 5 is in close proximity to the permanent pool of the proposed reservoir at several locations. This transportation corridor poses a risk of water pollution by deicers, herbicides, automotive and combustion byproducts, and the risk of a release due to a transportation-related hazardous materials incident.

Missouri water quality regulations prohibit wastewater treatment facilities within 100 feet of any well or water supply structure (10 CSR 20-8.020). Landrights acquisition, septic system decommissioning, and monitoring will prevent on-site septic systems from discharging to the proposed water supply reservoir. Grant and loan programs could be used to construct central sewer systems in the communities of Pollock and Lemons assuring that untreated effluent does not enter the proposed water supply reservoir.

All remains of the town of Boynton, including septic tanks and drain fields, will need to be removed or properly decommissioned so that they pose no water quality risks upon inundation. Consideration and documentation of possible historic concerns will precede any demolition activities. Safeguards can be placed below the automobile salvage yard at Pollock to prevent discharge of toxic materials. Illegal dump sites that would be inundated should be located and removed prior to construction of the proposed reservoir. Special efforts should be made to locate

and remove illegal dump sites in the watershed and to prevent their reoccurrence. State and county highway department road crews can be trained to apply deicers and herbicides sparingly when in close proximity to the proposed reservoir. The water quality risks associated with a hazardous materials incident on Highway 5 could be reduced by training first responders and equipping them with the means to contain and remediate spills.

Installation of the multiple-purpose reservoir is expected to improve the water quality in the downstream reaches of East Locust Creek. Suspended solids, total nitrogen and total phosphorus are expected to be reduced due to reservoir trapping and land treatment practices.

Low or no flow in East Locust Creek during the driest part of the summer coupled with permitted waste discharges by Premium Standard Farms and the City of Milan can result in effluent-dominated flow downstream of these point discharges. Increased base flow and flow augmentation as a result of reservoir construction will dilute and lessen the aquatic impacts of effluent-dominated flow.

This plan provides opportunities to reduce or minimize the threats to water quality posed by sediment, nutrients, pathogens, and toxic materials. Described in detail under Land Use and Treatment, intensely focused conservation efforts in the watershed will result in significant reductions in soil erosion and sediment delivery to the reservoir. Commensurate with reductions in sediment delivery, loading of nutrients, pathogens, and toxic materials that attach to soil particles will also be reduced.

The Missouri Department of Natural Resources has multiple sources of funding and technical assistance to address water quality issues in the watershed. The department has committed to working with NRCS and the Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. The source water designation will create the opportunity for the local Sponsors to apply for grants and technical assistance to address these and other water quality concerns in the watershed area to be inundated or upstream of the inundated areas.

STREAM RESOURCES

Fish Community

Missouri Department of Conservation personnel sampled the fish community in East Locust Creek on June 30, 1988. The sample site is located 7.4 miles upstream from the confluence with Locust Creek near Cora, Missouri (Sullivan County, Sec.10, Township 61N, Range 20W). The sample site is located in an unchannelized reach of the stream and had a wooded corridor less than 100 feet on both sides of the stream. The habitat sampled consisted of a pool, run, and backwater. Twelve different fish species were collected. All of the species collected were common and habitat generalists. No threatened or endangered species were collected. The bigmouth shiner, a species that has been favored by channelization and increased sedimentation in prairie streams, dominated the sample. The fish community would benefit by reducing channelization and sedimentation.

Stream Habitat

Stream habitat conditions were sampled at 8 different one-half mile reaches throughout the length of East Locust Creek using Stream Habitat Evaluation Procedures (SHEP). This procedure ranks 6 parameters reflecting human impacts on a stream and adjusts them by 4 alteration functions (channel modifications, impoundments, water quality, and streambed conditions) to determine an index value of stream quality. Values can range from zero (worst) to 10 (best). The average index value for East Locust Creek was 2.71 (range 0.6 to 5.0). Barriers to fish movement and flow alterations were not problems, but riparian vegetation was poor. Only 3 of 8 reaches had good riparian areas. Bank erosion was severe in half of the reaches and moderate in most of the remaining reaches. Stream migration potential was moderate, but improved in the upper half of the reaches. Channelization was a problem in about one third of the reaches, but only one reach was completely channelized. Impoundment was not a problem. Water quality was only fair, and several reaches showed symptoms of excessive nutrients. Streambed condition was poor with excessive bedloads of sand and silt common in most reaches.

Subsequent visual assessments conducted in the study area of the proposed multiple-purpose reservoir during the spring and summer of 2005 indicated that both the fish community and stream habitat are similar to the earlier 1988 MDC sampling.

The Stream Visual Assessment Protocol is a simple, coarse assessment procedure to evaluate the condition of aquatic ecosystems associated with streams. The results reflect the habitat quality of the stream. East Locust Creek was sampled at 3 locations on May 24, 2004. Sample sites were located: 1) approximately 3,700 feet south of the centerline of the proposed multiple-reservoir structure, 2) just upstream of the bridge west of the town of Boynton, and 3) upstream of a low-water crossing in the SW ¼, SE ¼, Section 35, T64N, R20W. The results indicate fair conditions at all 3 sample locations. Limited width of riparian zone vegetation was a common problem at all 3 sample sites.

East Locust Creek stream channel conditions downstream of the proposed multiple-purpose reservoir site were evaluated on May 18, 2005 and June 22, 2005. Investigators waded approximately 5.3 miles of the stream channel between the proposed reservoir site and the confluence with Elmwood Creek. Channel stability, channelization, sedimentation, and riparian vegetation were noted.

Past channelization is evident but the stream channel is relatively stable overall with active channel migration observed at only 2 meanders. Sedimentation varies with location. Sedimentation and logjams are apparent over approximately 6,350 feet of channel between the proposed reservoir location and the first low-water crossing downstream. For approximately 8,500 feet below this low-water crossing, the channel exhibits some scour and little evidence of sedimentation. For the next 8,700 feet, ending at a second low-water crossing, the channel is characterized by numerous logjams, islands, channel braiding, and sediment storage features. The remaining 4,600 feet of stream channel between the second low-water crossing and the confluence with Elmwood Creek exhibits scouring with resistant clay riffle features providing grade control at several locations.

Riparian corridor width varies considerably with location along the evaluated reaches. The 6,350 foot reach has excellent vegetation on the west channel bank, but limited vegetation on the east channel bank. The 8,500 foot reach has excellent riparian vegetation with nearly the entire reach exceeding 100-foot of vegetation on both channel banks. The remaining reach to the confluence with Elmwood Creek exhibits poor riparian vegetation.

Riparian buffer width along mainstem East Locust Creek and its tributaries upstream of the proposed reservoir site were evaluated using digital orthophotography flown in 2004 and digital infrared orthophotography flown in 2003. The riparian corridor was found to be very poorly vegetated.

The area east of the proposed raw water transmission line, including riparian corridor on both sides of East Locust Creek from the reservoir site to the confluence with Elmwood Creek, provides excellent opportunities to protect and restore aquatic and riparian habitat. Immediately upstream of the reservoir, approximately 450 acres of potential riparian buffer adjoining approximately 18.6 miles of stream channels have been identified that offer the highest priority opportunities to restore riparian habitat and protect the quality of the public water supply and recreational reservoir. Further upstream, approximately 727 acres of potential riparian buffer adjacent to approximately 30 miles of stream channels offers additional opportunities to restore riparian habitat.

RECREATION

Analysis of the current supply and demand for recreational activities within 25 miles of the proposed reservoir site indicates there is an unmet demand for annual recreational user days. This unmet demand includes recreational opportunities, such as fishing, hunting, boating, swimming, camping, hiking and biking, picnicking, and bird watching/nature study.

Opportunities exist, with installation of the multiple-purpose reservoir, to provide an additional 72,000 annual user days for recreation purposes. Refer to Table 2B in the "Recommended Plan" section for the proposed recreational facilities and wildlife habitat development.

WETLANDS

Missouri wetlands occupy 643,000 acres, about 1.4 percent of the state's area (Dahl, 1990). Before the arrival of European settlers, wetlands occupied about 4.84 million acres, about 10.8 percent of what is now Missouri, and were a significant component of the landscape (Epperson, 1992). Wetlands in Missouri are primarily associated with the major rivers and streams. Palustrine forested wetlands, palustrine emergent wetlands, and palustrine scrub-shrub wetlands constitute most of the wetland acreage in Missouri (Epperson, 1992). Wetlands maintain water quality, mitigate flood effects, provide critical habitat for many threatened and endangered species, as well as provide opportunities for hunting, fishing, and bird watching.

Within the top of dam elevation of the multiple-purpose structure and the footprints of the structure, auxiliary spillway, and raw water transmission line, the National Wetland Inventory (NWI) identified 290.9 acres of wetlands (refer to Appendix D). However, a preliminary investigation of these wetlands was conducted by an NRCS soil scientist and Missouri Department of Conservation (MDC) biologist, both of whom have completed the Corps of Engineers, 1987 Wetland Delineation Manual, (REG IV) training. Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and transmission line footprints to assess the quality of wetlands intersected by the transect and to determine if these wetlands were identified correctly by NWI. Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised. Prior conversion of wetland areas for agricultural uses and stream channelization have reduced wetlands and wetland functions. The potential exists to create or restore wetlands in the pool areas of the multiple-purpose reservoir. Creative borrow, in and adjacent to the temporary and permanent pools, can also be considered for creating wetlands. In addition, detention basins located above the reservoir can be investigated as potential for creating wetlands.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The opportunity exists to mitigate the WRP easement as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section), and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

WILDLIFE HABITAT

Within the East Locust Creek project area, wildlife habitat quality is 41 percent of optimum for the selected indicator species – bobwhite quail and wood thrush. Refer to Appendix E, Investigations and Analyses, Biology section for methodology/species used to determine wildlife habitat units. Lower habitat values result from:

1. Lack of multiple-species pastures and hayland;
2. Overgrazing pastures;
3. Forest grazing;
4. Forest fragmentation; and
5. Lack of undisturbed grassy and woody cover suitable for ground nesting birds.

Development of a 1,605-acre mitigation area with native trees, shrubs, and grasses will improve wildlife habitat. A detailed description of the wildlife resources and habitat values is presented in the Effects of Alternative Plans and Recommended Plan, Mitigation Features sections.

FOREST RESOURCES

A wide variety of trees and shrubs are currently found in the upland draws, side slopes, and bottomlands within the watershed. Approximately 18 percent of the watershed is forested. Tree species noted include: cottonwood, silver maple, black walnut, northern red oak, black oak, pin oak, white oak, swamp white oak, bur oak, red cedar, black cherry, choke cherry, elm, ash, mulberry, willow, honey locust, shingle oak, basswood, shagbark hickory, and bitternut hickory. Shrub species include: smooth sumac, grapevine, gray dogwood, rough-leaf dogwood, and hazelnut (Sell, 2005).

Forestry problems identified in the East Locust Creek Watershed include: poor management of tree stands, conversion of forestland to cropland, overgrazing and erosion, and a deficiency in the amount and quality of vegetated riparian areas along the watershed's stream system.

Poor management of forested areas reduces their effectiveness as nutrient filters and does not promote regeneration of younger trees. Conversion of forestland to other land uses, especially cropland, can lead to increased rates of erosion and a diminished forest resource. Some riparian areas along East Locust Creek and its tributaries are in poor to fair condition. This has resulted due to clearing of riparian vegetation, which can accelerate streambank erosion and overgrazing, which reduces tree and shrub growth and decreases wildlife habitat values. Grazing in riparian areas can be detrimental to water quality due to the introduction of sediment and animal waste into the stream system.

The diversity of trees and shrubs currently in the watershed has a high value for protecting the watershed (Sell, 2005). Consequently, opportunities exist to increase and enhance the forest resource, particularly in those areas that will lie adjacent to and surround the proposed multiple-purpose reservoir. Forestland lost due to construction of the reservoir will be mitigated through measures, such as a vegetated buffer around the reservoir and easements along stream channels. Such measures will help maintain landscape diversity and improve wildlife habitat values. If landowners are willing to change and improve management of forest stands, some of the tree species, such as oaks, walnuts, and maples, have the potential to produce quality lumber (Sell, 2005).

SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The East Locust Creek Watershed Revised Plan-Environmental Impact Statement (EIS) set forth in this document will replace the East Locust Creek Watershed Plan-Environmental Assessment (EA) that was signed in 1987 and is currently in the operational phase. Formal scoping for the watershed plan-EA began at public meetings held in Sullivan and Putnam Counties, Missouri, on June 14 and 15, 1983. Some issues identified as high to medium concerns during scoping meetings for the EA, such as flood damages, sediment and scour damages, loss of wildlife habitat, and fisheries, remained as concerns during meetings held for the EIS. During the years since the watershed plan-EA was signed and partially implemented, some issues, such as upland sheet-and-rill erosion and classical gully erosion, have decreased in concern due to significant land use changes, a reduction in upland cropland acres, and stabilization of gully systems due to the installation of 72 small floodwater retarding (FWR) structures in the upland areas of the watershed. Other issues of little concern in 1983, such as the need for an adequate, dependable, rural water supply system and a desire for water-based recreational opportunities, have now become issues of high concern.

Meetings held to assess resource concerns are listed in the Consultation and Public Participation section of this document. Concerns listed in Table D were identified by the residents of northcentral Missouri, as well as federal, state, and local agency representatives.

TABLE D
EVALUATION OF CONCERNS[a]

Concerns	Degree of Concern	Significance to Decision Making	Remarks
Inadequate Rural Water Supply Source	High	High	Present systems inadequate, growing demands, susceptibility to drought, more stringent drinking water standards
Flood Damages	High	High	Planting delays, $1,228,500 average annual damages to crops, roads, bridges
Small Floodwater Retarding Structures	High	High	Need for flood damage reduction & grade control in Little East Locust Creek subwatershed
Lack of Water-based Recreational Facilities	High	High	Need for additional annual user days for fishing & other recreational activities
Lack of Wildlife Habitat	Medium	Medium	Habitat has been lost or degraded, concern of USFWS and MDC
Fisheries	Medium	Medium	Poor to fair fisheries in stream channels, desire for enhanced flatwater fisheries
Wetlands	Low	High	Need to mitigate for lost wetland areas
Archaeological & Historical Resources	Low	Medium	Primary concern of State Historic Preservation Officer
Threatened & Endangered Species	Low	Medium	Primary concern of USFWS & MDC

a. The concerns and degrees of concern are public perceptions obtained during public meetings and may not be supported by field data gathered and analyzed as part of this project or by the views of the project Sponsors.

FORMULATION AND COMPARISON OF ALTERNATIVES

GENERAL

A revised watershed plan, the East Locust Creek Watershed Revised Plan and Environmental Impact Statement, has been prepared and when authorized will replace the original East Locust Creek Watershed Plan and Environmental Assessment which was signed in 1987, and is currently being implemented. The primary purpose of the revised plan is the addition of a rural water supply reservoir capable of producing 7.0 million gallons of raw water per day to supplement the current and future needs of the Green Hills Region of northcentral Missouri. Additional purposes include: 1) reduction of flooding and subsequent damages to crops, pastures, roads, bridges, fences, and other agricultural and urban properties, and 2) development of water-based recreational facilities.

Watershed residents and federal, state, and local agencies cooperatively participated in the formulation process. Public meetings established the problems addressed and selected the most favorable and beneficial alternative. The public meetings also addressed project costs, local financial commitment, and each participant's level of commitment to implement the revised watershed plan. Northcentral Missouri's commitment is evidenced by strong support among the residents of the Green Hills Region and formation of the North Central Missouri Regional Water Commission (NCMRWC) in 2002. Numerous letters from water supply districts, northcentral Missouri communities, and state agencies have been received in support of adding a rural water supply reservoir to the original 1987 watershed plan (Burns and McDonnell, August 2003).

Four alternatives were developed and formulated for comparison in this revised plan. Three alternatives include construction of a multiple-purpose, rural water supply reservoir (79.0 feet high, 2,235-acre permanent pool) and various combinations of un-built small floodwater retarding (FWR) structures from the original 1987 plan. The alternatives also contain design variations in the multiple-purpose reservoir. Alternative 3, which most efficiently addresses the identified resource problems, is both the National Economic Development (NED) plan and the recommended plan. This alternative reasonably maximizes net economic benefits and satisfies the project purposes put forth by the project Sponsors. The fourth alternative is the future without revised plan option in which the rural water supply reservoir and associated recreational facilities will not be constructed as part of the East Locust Creek Watershed Revised Plan-EIS. The original 1987 East Locust Creek Watershed Plan-EA will continue to be implemented to meet flood damage reduction needs with NRCS assistance. These alternatives are described and compared under the section entitled "Description of Alternative Plans".

FORMULATION PROCESS

Problems and opportunities were identified through resource inventories, public meetings, input from the project Sponsors, and interviews. Three significant concerns were identified during the project evaluation process:

1. An inadequate rural water supply system for the "Green Hills Region", a 10 county area located in northcentral Missouri;
2. $1,228,500 average annual damages to crops, pastures, roads, bridges, fences, and other agricultural and urban properties in the floodplain of East Locust Creek and its tributaries, and the common floodplain area of Locust Creek Watershed; and
3. Limited water-based recreational facilities within 25 miles of the project area.

On August 8, 2003, Burns and McDonnell engineering firm released the "Water System Feasibility Study," prepared for the North Central Missouri Regional Water Commission (NCMRWC). This study evaluated 22 structural and nonstructural alternatives as possible sources of supplemental rural water supply for the Green Hills Region. Early in the formulation process for the East Locust Creek Watershed Revised Plan-EIS, the NRCS Watershed Planning Staff conducted a thorough review and analysis of the feasibility study. The study was found to contain extensive and detailed information related to potential water supply sources. NRCS is in agreement with the conclusions of the study and has utilized the Burns and McDonnell data to assist in the selection and development of the East Locust Creek Watershed Revised Plan-EIS alternatives that are discussed in detail in the "Description of Alternative Plans" section.

Burns and McDonnell evaluated 22 alternatives based on the following criteria and framework:

Water Yields – Yield of the alternatives was evaluated. If 5.75 million gallons per day (MGD) on an average day and 7.5 MGD on a maximum day could not be achieved, the alternative was not given further consideration.

Social Considerations – Alternatives with adequate water yield were evaluated for social and other considerations. Although some water sources evaluated had sufficient water yield, they were deemed socially unacceptable because the source would infringe upon existing water suppliers and communities, as well as any future plans for expansion or increased supply needs.

Cost-Effectiveness – Alternatives that met targeted water yields and social considerations were then evaluated for cost-effectiveness. Capital costs and operation and maintenance expenses were used to develop a present worth analysis.

Environmental Impacts – Alternatives that met the cost effectiveness criteria were analyzed for environmental impacts utilizing a desktop survey and field reconnaissance.

NRCS has reviewed the "Water System Feasibility Study" and provides the following summary of the rural water supply alternatives that were evaluated. The Burns and McDonnell study is paraphrased and referenced extensively in this section.

No Action – Under this alternative, a rural water supply reservoir would not be constructed. Existing water suppliers would be unable to meet the projected future water needs, and users would be forced to develop additional water sources on an individual basis. Consequently, many water utilities would do nothing in light of the fact that implementation of non-regional solutions would be cost prohibitive. Water shortages during drought conditions would continue.

Groundwater – Glacial Aquifers – Sometimes, significant amounts of groundwater are available from subsurface glacial deposits in northcentral Missouri. Yields as high as 500 gallons per minute (GPM) are possible, but average well yields are about 5 GPM. According to the Missouri Geological Survey, less than eight percent of northwestern Missouri has glacial outwash thick enough to provide yields over 100 GPM and only 25 percent have sufficient yield to produce 25 GPM. At an average yield of 25 GPM per well, approximately 200 wells and pumps would be needed to provide the proposed 7.0 MGD of water. At 5 GPM, 1000 wells and pumps would be needed. The actual number of wells needed is uncertain. Factoring in the effects of drought and overpumping on aquifer storage and the poor water quality due to total dissolved solids, this alternative was not given further consideration.

Groundwater – Bedrock Aquifers – Carbonate aquifers are present in northcentral Missouri, but are located at great depths and are highly mineralized with total dissolved solids values of 2,000 to 30,000 mg/L. Because yields are low, generally in the range of domestic wells, and water quality is marginal, these deep aquifer wells are not a viable source to supply the quantities needed for the Green Hills Region (Burns and McDonnell, August 2003). Unlike large portions of Missouri, construction of deep wells in the Green Hill Region will not produce palatable groundwater, and the "brackish" water is not economically feasible to treat for drinking water (Rhodes Engineering Company, 1995).

Missouri River Alluvium – The Missouri River is located approximately 60 miles south of the existing water treatment plant at Milan. With potential yields of 1,000 to 3,000 GPM, several wells developed in the Missouri River alluvium could provide the 7.0 MGD proposed in this plan. According to Burns and McDonnell, a 30-inch transmission pipeline approximately 80 miles long would be required to move the water from the well fields to the Milan water treatment plant. This alternative provides a potential source of the needed water and is a candidate for further analysis.

Aquifer Storage and Recovery (ASR) – ASR is a process, whereby, surface waters are introduced into the subsurface to recharge and increase aquifer yields. Costs are very high and this procedure is not practiced in Missouri. Burns and McDonnell have concluded that ASR is not a viable alternative and would not increase aquifer yields to the levels needed.

Streams and Rivers – Locust Creek, Yellow Creek, and Medicine Creek were evaluated by Burns and McDonnell as a source of raw water for direct use. Flow must always exceed design capacity in order to remove water directly from the stream. Low flow conditions on all of these streams are well below the nearly 11.0 cubic feet per second that would be required to produce the necessary 7.0 million gallons of water per day. Therefore, these creeks do not have adequate yields and are not viable sources of water for this project.

The Thompson River has adequate flow to provide water for the project. However, the City of Trenton draws raw water from the Thompson River and an intake upstream of the city would put Trenton's water supply in jeopardy during low flows. An intake downstream would not have adequate yields for the 7.0 MGD after withdrawal of water for use by Trenton. Consequently, the Thompson River is not a viable alternative.

The Chariton River is also capable of providing the required water yields for this project. However, the Chariton River is a potential source of water should the City of Kirksville, the largest city in the Green Hills Region, find it necessary to expand their water supply system. From both a political and social standpoint, it is reasonable to reserve the Chariton River water source for the City of Kirkville. Therefore, this alternative will not be given further consideration.

The Missouri River was also evaluated and is a viable source of raw water for direct use. This alternative provides a potential source of the needed water and is a candidate for further analysis.

Existing Suppliers – The Rathbun Regional Water Association (RRWA) is capable of processing 8.8 million gallons of water per day. They currently have 2.0 MGD of excess water, but plan to sell this water to customers within the State of Iowa. There are currently 5 pipelines which cross from Iowa into northern Missouri, but none of these are large enough to transmit the 7.0 MGD needed by the North Central Missouri Regional Water Commission (NCMRWC). A new reservoir, pipeline, and treatment plant would have to be constructed in order for Rathbun to provide the needed water. Obtaining water from the RRWA provides a potential source of the needed water and is a candidate for further analysis.

Raw water is drawn from Forest Lake and Hazel Lake to supply the needs of the City of Kirksville. These facilities, however, do not have adequate excess water to provide for the needs of the NCMRWC and were not given further consideration.

The City of Trenton's water treatment plant can produce 4.5 MGD and can store 1.7 million gallons of finished water in the distribution system. It does not have adequate water production and source water to provide for the needs of the NCMRWC and was not evaluated further.

The City of Chillicothe derives its water from alluvial wells and is capable of processing 6.0 MGD. This water serves the city and the Livingston PWSD No. 2. The city is currently searching for additional groundwater sources to meet existing and future needs. Chillicothe does not have adequate excess water for this project and was not given further consideration.

Reuse – The Green Hills Region has a total water usage, as of 2002, of 12.4 MGD. Approximately 8.4 MGD is consumed by cities and towns with wastewater treatment facilities. It has been estimated by Burns and McDonnell that 4.2 MGD should be available for reuse within the service area. This is not an adequate yield for this project; costs to collect the water and treat it are prohibitive, and public meetings have determined that reuse is not socially acceptable. This alternative was not given further consideration.

Conservation - Until recently the Green Hills Region, which has been plagued by droughts in recent years, was classified by the Missouri Department of Natural Resources as a Category 3 drought status. Such a classification requires water conservation. Conservation may help during these times, but it is not a long term solution to the raw water needs in the project area.

Reservoirs - Five reservoir locations were evaluated by Burns and McDonnell as possible sources of raw water. These locations are on East Locust Creek, Locust Creek, Little East Locust Creek, West Fork Locust Creek, and Yellow Creek. Each site was assessed based on design criteria and hydrologic analyses. All 5 locations have drainage areas of adequate size to provide the needed water yield, and all 5 were deemed to be socially acceptable. These alternatives provide a potential source of the needed water and are candidates for further analysis.

ALTERNATIVES GIVEN FURTHER CONSIDERATION BY THE BURNS AND McDONNELL ENGINEERING FIRM

Burns and McDonnell concluded that 8 out of the 22 alternatives evaluated met the criteria for being able to provide the necessary water yield and social acceptability. These 8, which include 2 non-reservoir alternatives and 6 reservoir alternatives, were further evaluated for cost effectiveness by calculating a total first cost and performing a present worth analysis. Results of the present worth evaluation are shown in Table E.

TABLE E
PRESENT WORTH EVALUATION FOR WATER SUPPLY ALTERNATIVES[a]
(Includes alternatives that can provide the necessary water yield and are socially acceptable)

Alternatives	Present Worth Value (dollars)		
	Capital Costs	O & M Costs	Total
Missouri River Groundwater	49,800,000	3,900,000	53,700,000
Missouri River Surface Water	51,600,000	3,900,000	55,500,000
Rathbun Rural Water Association	25,800,000	38,400,000	64,200,000
East Locust Creek	24,400,000	100,000	24,500,000
Big Locust Creek	46,800,000	400,000	47,200,000
Little East Locust Creek	40,100,000	2,200,000	42,300,000
West Fork Locust Creek	40,100,000	1,000,000	41,100,000
Yellow Creek	39,700,000	500,000	40,200,000

a. Adapted from Burns and McDonnell, August 2003, Table V-2.

As noted in Table E, the Missouri River Groundwater, Missouri River Surface Water, and Rathbun Rural Water Association Reservoir alternatives have significantly higher costs than the Missouri-located reservoir alternatives. Also noted is that the Big Locust Creek, Little East Locust Creek, West Fork Locust Creek, and Yellow Creek reservoir alternatives have significantly higher costs than the East Locust Creek alternative.

In the studies conducted by Burns and McDonnell, only the project purpose of developing an adequate rural water supply was considered. Other purposes identified by the project Sponsors, including flood damage reduction and development of water-based recreation and wildlife habitat, were not addressed. Consequently, the non-reservoir alternatives and the Rathbun Reservoir alternative, while socially acceptable with respect to providing an adequate water supply, are not socially acceptable with respect to other project purposes. These 3 alternatives, due to the fact that they are not cost effective and are not socially acceptable, were not given further consideration in preparation of the East Locust Creek Watershed Revised Plan-EIS.

Burns and McDonnell also conducted a preliminary environmental analysis for the 5 Missouri located reservoir sites. The analysis included such environmental criteria as wetlands, threatened and endangered species habitat, cultural resources, and natural areas. There were no fatal flaws identified for any of the 5 reservoir sites.

Based on the present worth cost evaluation, Burns and McDonnell have concluded that the 5 Missouri-located reservoirs are the most cost effective. Of those 5, a reservoir located on East Locust Creek is the most cost effective. Other advantages mentioned in the Burns and McDonnell feasibility study for the East Locust Creek site include: 1) this site was considered a favorite by the public at open meetings held during development of the feasibility study, 2) this site is located only 4.5 miles from the Milan Water Treatment Plant, and 3) raw water from this site can be gravity fed to the water treatment plant thereby eliminating the need for an expensive pumping system.

Based on the analyses and information provided by Burns and McDonnell, NRCS is in agreement that a reservoir site located on East Locust Creek is the most cost effective and will provide the desired water yield. In addition, this site fulfills the project Sponsors' purposes of water-based recreation and flood damage reduction benefits within the East Locust Creek Watershed. Four alternatives for the East Locust Creek Watershed Revised Plan-EIS have been developed by NRCS and the project Sponsors.

DESCRIPTION OF ALTERNATIVE PLANS

Four alternatives have been analyzed. Alternative 4 involves completing the original watershed plan signed in 1987 by constructing the remaining 51 small floodwater retarding (FWR) structures. Alternative 1 replaces 29 of the original East Locust Creek small structures with one large multiple-purpose structure built to hold the 100-year recurrence interval flood (1% annual probability event) and proposes construction of 22 small structures in the Little East Locust Creek subwatershed. Alternative 2 is a modification of Alternative 1, with the large structure designed to hold the 25-year recurrence interval flood (4% annual probability event). This alternative also proposes construction of 17 small FWR structures in addition to the 22 contained in Alternative 1. Alternative 3, the NED/Recommended Plan, is a modification of Alternative 1, with the large structure designed to hold the 25-year recurrence interval flood.

ALTERNATIVE 1

Alternative 1 includes the installation of one multiple-purpose reservoir on the mainstem of East Locust Creek to provide agricultural water management (rural water supply), recreational opportunities, and flood prevention. The flood prevention component of the multiple-purpose reservoir provides floodwater storage for up to the 100-year, 24-hour recurrence interval flood event (1% annual probability event). This reservoir would have a 938.5 top of dam elevation (3,460 acres), a 927.8 auxiliary spillway elevation (2,632 acres), and a 922.3 principal spillway elevation (2,235 acres). Additionally, 22 small FWR structures on Little East Locust Creek are planned and will include livestock watering systems. These 22 small FWR structures are exactly the same as the small structures identified in the recommended, NED plan. Please see Table 3 in the "Recommended Plan" section for engineering data. Seven existing, small FWR structures that are impacted by the pool area of the multiple-purpose reservoir will be modified, and 5 sediment/debris basins are planned. Again these measures are similar to the recommended, NED plan. Please refer to the "Recommended Plan" section for discussion of the parameters for these sites.

Components

Structural:

- Construction of 1 multiple-purpose reservoir with 100-year, 24-hour recurrence interval flood storage, water intake tower, and raw water line;
- Development of water-based recreational facilities;
- Construction of 22 small FWR structures with livestock water pipes;
- Modification of 7 small FWR structures that will be impacted by the pool area of the multiple-purpose reservoir;
- Construction of 5 sediment/debris basins.

TABLE F-1
COSTS – ALTERNATIVE 1
(dollars)[a]

Estimated Installation Costs	Public Law 83-566	Other Funds	Total
Structural Measures			
Multiple-Purpose Reservoir	22,787,500	18,289,500	41,077,000
Recreational Facilities	2,313,500	771,100	3,084,600
Water Intake Tower	1,134,300	347,700	1,482,000
Raw Water Line	206,200	4,358,400	4,564,600
22 Small FWR Structures	2,085,400	135,600	2,222,000
22 Livestock Watering Pipes	15,400	15,400	30,800
7 Modified Small Structures	187,900	53,500	241,400
5 Sediment/Debris Basins	183,000	65,200	248,200
TOTAL	**28,913,200**	**24,036,400**	**52,950,600**

Average Annual Costs	Amortization of Installation Costs[b]	OM&R Funds	Total
Structural Measures			
Flood Prevention	141,600	15,600	157,200
Agricultural Water Mgmt.	1,917,500	78,200	1,995,700
Recreational Facilities	720,000	58,900	778,900
TOTAL	**2,898,948**	**152,700**	**2,931,800**

Average Annual Benefits:	**$4,669,400**
Net Benefits:	**$1,767,600**
Benefit/Cost Ratio:	**1.60**

a. Price Base 2006
b. 5.125% for 75 years

ALTERNATIVE 2

Alternative 2 includes the installation of one multiple-purpose reservoir on the mainstem of East Locust Creek to provide agricultural water management (rural water supply), recreational opportunities, and flood prevention. The flood prevention component of the multiple-purpose reservoir provides floodwater storage for up to the 25-year, 24-hour recurrence interval flood event (4% annual probability event). The reservoir consists of exactly the same parameters as the reservoir evaluated in the Recommended NED plan section. Please see Table 3 in the "Recommended Plan" section for engineering data. Additionally, 22 small FWR structures on Little East Locust Creek and 17 small FWR structures on the mainstem of East Locust Creek (above and below the multiple-purpose reservoir) are planned. All of these small structures will include livestock watering systems. The 22 small FWR structures are exactly the same as the small FWR structures identified in the Recommended NED plan section. Please see Table 3, for engineering data. The other 17 small FWR structures consist of 11-Sample Type 1 sites, 1-Sample Type 2 site, and 5-Sample Type 3 sites. These 17 structures would control 1,510 acres, 196 acres, and 1,288 acres respectively. Seven existing, small FWR structures that are impacted by the pool area of the reservoir will be modified, and 5 sediment/debris basins are planned. Again, these measures are similar to the recommended, NED plan. Please refer to the "Recommended Plan" section for discussion of the parameters of these sites.

Components

Structural:

- Construction of 1 multiple-purpose reservoir with 25-year, 24-hour recurrence interval flood storage, water intake tower, and raw water line;
- Development of water-based recreational facilities;
- Construction of 39 small FWR structures with livestock water pipes;

- Modification of 7 small FWR structures that will be impacted by the pool area of the multiple-purpose reservoir;
- Construction of 5 sediment/debris basins.

TABLE F-2
COSTS – ALTERNATIVE 2
(dollars)[a]

Estimated Installation Costs	Public Law 83-566	Other Funds	Total
Structural Measures			
Multiple-Purpose Reservoir	22,426,500	18,170,400	40,596,900
Recreational Facilities	2,313,500	771,100	3,084,600
Water Intake Tower	1,134,300	347,700	1,482,000
Raw Water Line	206,200	4,358,400	4,564,600
39 Small FWR Structures	3,753,100	240,700	3,993,800
39 Livestock Watering Pipes	27,300	27,300	54,600
7 Modified Small Structures	187,900	53,500	241,400
5 Sediment/Debris Basins	179,900	68,300	248,200
TOTAL	**30,228,700**	**24,037,400**	**54,266,100**

Average Annual Costs	Amortization of Installation Costs[b]	OM&R Funds	Total
Structural Measures			
Flood Prevention	233,800	27,100	260,900
Agricultural Water Mgmt.	1,917,900	78,400	1,996,300
Recreational Facilities	696,500	57,800	754,300
TOTAL	**2,848,200**	**163,300**	**3,011,500**

Average Annual Benefits:	**$4,794,500**
Net Benefits:	**$1,783,000**
Benefit/Cost Ratio:	**1.59**

a. Price Base 2006
b. 5.125% for 75 years

ALTERNATIVE 3 - (NED/Recommended Plan)

Alternative 3 is the recommended plan. This alternative includes the installation of one multiple-purpose reservoir on the mainstem of East Locust Creek to provide agricultural water management (rural water supply), recreational opportunities, and flood prevention. The flood prevention component of the multiple-purpose reservoir provides floodwater storage for up to the 25-year, 24-hour recurrence interval flood event (4% annual probability event). Please refer to Table 3 in the "Recommended Plan" section for engineering data. Additionally, 22 small FWR structures on Little East Locust Creek are planned and will include livestock watering systems. Please refer to Table 3 for engineering data. Seven existing, small FWR structures that will be impacted by the pool area of the reservoir will be modified, and 5 sediment/debris basins are planned. Please refer to the "Recommended Plan" section for discussion of the parameters for these sites. Refer to the East Locust Creek Watershed Project Map, Appendix F, for approximate reservoir location and location of the 22 small FWR structures.

Components

Structural:

- Construction of 1 multiple-purpose reservoir with 25-year, 24-hour recurrence interval flood storage, water intake tower, and raw water line;
- Development of water-based recreational facilities;
- Construction of 22 small FWR structures with livestock water pipes;
- Modification of 7 small FWR structures that will be impacted by the pool area of the multiple-purpose reservoir;
- Construction of 5 sediment/debris basins.

TABLE F-3
COSTS – ALTERNATIVE 3
(dollars)[a]

Estimated Installation Costs	Public Law 83-566	Other Funds	Total
Structural Measures			
Multiple-Purpose Reservoir	22,426,500	18,170,400	40,596,900
Recreational Facilities	2,313,500	771,100	3,084,600
Water Intake Tower	1,134,300	347,700	1,482,000
Raw Water Line	206,200	4,358,400	4,564,600
22 Small FWR Structures	2,086,400	135,600	2,222,000
22 Livestock Watering Pipes	15,400	15,400	30,800
7 Modified Small Structures	187,900	53,500	241,400
5 Sediment/Debris Basins	179,900	68,300	248,200
TOTAL	**28,550,100**	**23,920,400**	**52,470,500**

Average Annual Costs	Amortization of Installation Costs[b]	OM&R Funds	Total
Structural Measures			
Flood Prevention	140,800	15,600	156,400
Agricultural Water Mgmt.	1,916,600	78,300	1,994,900
Recreational Facilities	696,500	57,800	754,300
TOTAL	**2,753,900**	**151,700**	**2,905,600**
Average Annual Benefits:			**$4,750,100**
Net Benefits:			**$1,844,500**
Benefit/Cost Ratio:			**1.63**

a. Price Base 2006
b. 5.125 for 75 years

ALTERNATIVE 4 - (Future Without Revised Plan)

Alternative 4 is the Future Without Revised Plan. If the revised plan is not implemented, the original East Locust Creek Watershed Plan and Environmental Assessment, signed in 1987, will continue to be installed as originally planned to meet flood damage reduction needs. However, a couple of minor modifications would be made. The large Site E-10 would be replaced with 5 small FWR structures due to landrights conflicts with the larger site. Twenty-two of the 51 small FWR structures are exactly the same as the small FWR structures identified in the recommended, NED plan. Please see Table 3 in the "Recommended Plan" section for engineering data. The other 29 small FWR structures consist of 20-Sample Type 1sites, 3-Sample Type 2 sites, 5-Sample Type 3 sites, and 1-Sample Type 4 site. These structures would control 2,643 acres, 599 acres, 1,288 acres, and 316 acres, respectively. Please refer to Table 3 for detailed data pertaining to each sample type. Present conditions will be altered by implementing the remaining structures in the original plan. Refer to forecasted future without a revised plan conditions in the "Effects of Alternative Plans" section.

Components

Structural:

- 51 small single-purpose FWR structures. This is a continuation and completion of the original East Locust Creek Watershed Plan-EA that was signed in 1987.

TABLE F-4
COSTS – ALTERNATIVE 4
(dollars)[a]

Estimated Installation Costs	Public Law 83-566	Other Funds	Total
Structural Measures			
51 Small, Single-Purpose, FWR Structures	3,825,300	301,100	4,126,400
TOTAL	**3,825,300**	**301,100**	**4,126,400**

Average Annual Costs	Amortization of Installation Costs[b]	OM&R Funds	Total
Structural Measures			
Flood Prevention	226,100	33,000	259,100
TOTAL	**226,100**	**33,000**	**259,100**

Average Annual Benefits:	**$225,800**
Net Benefits:	**-33,300**
Benefit/Cost Ratio:	**0.87**

a. Price Base 2006
b. 5.125% for 75 years

EFFECTS OF ALTERNATIVE PLANS

AGRICULTURAL WATER MANAGEMENT (RURAL WATER SUPPLY)

Existing Conditions

Currently, there is an inadequate rural water supply system for the residents of Sullivan County, as well as other rural areas and municipalities within the Green Hills Region of northcentral Missouri. A reliable, high quality source of drinking water is long overdue.

The Green Hills Region has been plagued by drought conditions in recent years, and until recently, was under a "Category 3" drought as established by the Missouri Department of Natural Resources. Several of the existing public water systems within the area are prone to water shortages during these periods of drought. Additionally, some of the small surface water systems face significant technical, managerial, and financial challenges in meeting more stringent drinking water standards now being proposed (Missouri Department of Natural Resources, October 2000). The Green Hills Region is currently serviced by 10 public water supply districts and 35 municipal water utilities, many of which are in need of additional water sources in order to meet the needs of their customers (Burns and McDonnell, August 2003).

The City of Milan has been under voluntary or mandatory water conservation for several years (Missouri Department of Natural Resources, May 20, 2004), and Green City has been mandated by the Missouri Department of Natural Resources to abandon its existing water plant (Burns and McDonnell, August 2003). Other water suppliers have experienced problems including: increased demand due to population growth, difficulty finding groundwater wells that will maintain yields, inadequate lake capacity due to siltation, lake capacities that must be supplemented by pumping water from nearby creeks, increased water demands for rural businesses, and refusal of suppliers to increase the contract amount of water they sell to consumers (Missouri Department of Natural Resources, May 20, 2004).

An additional raw water source is needed in northcentral Missouri to meet the needs brought about by increasing population, additional demands from rural businesses, and shortcomings of the current infrastructure. Based on population trends and knowledge of water systems in the Green Hills Region, it is clear that existing, decentralized water systems and supplies will not be able to meet future demand (Missouri Department of Natural Resources, May 24, 2004).

One of the major land uses in the East Locust Creek Watershed is pastureland for livestock grazing. Access to dependable water sources for livestock has been a problem in the past, especially during drought conditions. In some instances, livestock have access to streams and ponds which degrades the habitat and decreases water quality. Livestock water pipes in the small FWR structures provide livestock farmers with a reliable and high quality source of livestock water.

Alternative 1

A multiple-purpose reservoir, capable of yielding 7.0 million gallons of raw water per day, will be constructed on the mainstem of East Locust Creek approximately 5 miles north of the City of Milan. An adequate, dependable, high quality, locally-controlled rural water supply system will be available for the residents and rural businesses of northcentral Missouri as soon as a delivery system is installed.

It is anticipated that the North Central Missouri Regional Water Commission will be able to serve nearly 54,000 residents of the Green Hills Region by the year 2025 (Missouri Department of Natural Resources, May 20, 2004). Current and future water shortage problems will be eliminated. The new, regional water supply source will allow the local water supply systems to meet the increased demands associated with the area's anticipated, future economic growth (Missouri Department of Natural Resources, October 2000). The multiple-purpose reservoir will likely become a vital contributor to the Green Hills Region in many ways (Burns and McDonnell, August 2003).

Construction of the multiple-purpose reservoir within the East Locust Creek Watershed will result in $2,305,600 in average annual rural water supply benefits. Construction of 5 sediment/debris basins also contributes to water supply benefits by capturing sediment that would need to be removed during the treatment process. Construction of livestock water pipes in the 22 small FWR structures results in $35,300 in average annual agricultural water management benefits.

Alternative 2

A multiple-purpose reservoir, capable of yielding 7.0 million gallons of raw water per day, will be constructed on the mainstem of East Locust Creek approximately 5 miles north of the City of Milan. An adequate, dependable, high quality, locally-controlled rural water supply system will be available for the residents and rural businesses of northcentral Missouri as soon as a delivery system is installed.

It is anticipated that the North Central Missouri Regional Water Commission will be able to serve nearly 54,000 residents of the Green Hills Region by the year 2025 (Missouri Department of Natural Resources, May 20, 2004). Current and future water shortage problems will be eliminated. The new regional water supply source will allow the local water supply systems to meet the increased demands associated with the area's anticipated future economic growth (Missouri Department of Natural Resources, October 2000). The multiple-purpose reservoir will likely become a vital contributor to the Green Hills Region in many ways (Burns and McDonnell, August 2003).

Construction of the multiple-purpose reservoir within the East Locust Creek Watershed will result in $2,357,300 in average annual rural water supply benefits. Construction of 5 sediment/debris basins also contributes to water supply benefits by capturing sediment that would need to be removed during the treatment process. Construction of livestock water pipes in the 39 small FWR structures results in $62,600 in average annual agricultural water management benefits.

Alternative 3 - (NED/Recommended Plan)
A multiple-purpose reservoir, capable of yielding 7.0 million gallons of raw water per day, will be constructed on the mainstem of East Locust Creek approximately 5 miles north of the City of Milan. An adequate, dependable, high quality, locally-controlled rural water supply system will be available for the residents and rural businesses of northcentral Missouri as soon as a delivery system is installed.

It is anticipated that the North Central Missouri Regional Water Commission will be able to serve nearly 54,000 residents of the Green Hills Region by the year 2025 (Missouri Department of Natural Resources, May 20, 2004). Current and future water shortage problems will be eliminated. The new regional water supply source will allow the local water supply systems to meet the increased demands associated with the area's anticipated future economic growth (Missouri Department of Natural Resources, October 2000). The multiple-purpose reservoir will likely become a vital contributor to the Green Hills Region in many ways (Burns and McDonnell, August 2003).

Construction of the multiple-purpose reservoir within the East Locust Creek Watershed will result in $2,357,300 in average annual rural water supply benefits. Construction of 5 sediment/debris basins also contributes to water supply benefits by capturing sediment that would need to be removed during the treatment process. Construction of livestock water pipes in the 22 small FWR structures results in $35,300 in average annual agricultural water management benefits.

Alternative 4 – (Future Without Revised Plan)
In the future without revised plan, the large multiple-purpose reservoir in the East Locust Creek Watershed would not be built. Water demand would continue to be met by existing water supply sources in the short term, and the local sponsors would have to find an alternative water supply source for the long term.

The small FWR structures in the original 1987 plan did not include livestock water pipes; therefore, no livestock water benefit would be realized in Alternative 4.

FLOODWATER DAMAGES

Existing Conditions

Floodwater from the 100-year (1% annual probability; 7.1 inches in 24 hours) storm damages 6,670 acres in the East Locust Creek floodplain (on-site) and another 29,500 acres in the common floodplain of Locust Creek (off-site). Damages are primarily to cropland and pasture. Floodwaters also damage roads, bridges, and fences, and deposit debris that requires cleanup. Floodwater damages are $1,228,500 on an average annual basis.

Alternative 1

Installation of a multiple-purpose reservoir capable of storing the 100-year, 24-hour recurrence interval (1% annual probability) flood event and 22 small FWR structures along Little East Locust Creek will result in an average annual reduction of 22 percent in flood damages; $1,228,500 to $962,000. The reduction in damages is primarily to cropland, pasture, roads, and bridges. Alternative 1 will eliminate average annual flooding on 870 acres in the East Locust Creek floodplain (on-site) and another 3,500 acres in the common floodplain of Locust Creek (off-site).

Alternative 2

Installation of a multiple-purpose reservoir capable of storing the 25-year, 24-hour recurrence interval (4% annual probability) flood event, 22 small FWR structures along Little East Locust Creek, and 17 small FWR structures along the main stem of East Locust Creek will result in an average annual reduction of 23 percent in flood damages; $1,228,500 to $945,800. The reduction in damages is primarily to cropland, pasture, roads, and bridges. Alternative 2 will eliminate average annual flooding on 890 acres in the East Locust Creek floodplain (on-site) and another 3,660 acres in the common floodplain of Locust Creek (off-site).

Alternative 3 - (NED/Recommended Plan)

Installation of a multiple-purpose reservoir capable of storing the 25-year, 24-hour recurrence interval (4% annual probability) flood event and 22 small FWR structures along Little East Locust Creek will result in an average annual reduction of 22 percent in flood damages; $1,228,500 to $963,000. The reduction in damages is primarily to cropland, pasture, roads, and bridges. The recommended plan will eliminate average annual flooding on 870 acres in the East Locust Creek floodplain (on-site) and another 3,460 acres in the common floodplain of Locust Creek (off-site).

Alternative 4 – (Future Without Revised Plan)
In the future without revised plan alternative, the original 1987 East Locust Creek Watershed Plan-Environmental Assessment will be implemented. Under this alternative, 51 small FWR structures will be constructed resulting in an average annual reduction of 18 percent in flood damages; $1,228,500 to $1,002,800. The reduction in damages is primarily to cropland, pasture, roads, and bridges. Alternative 4 will eliminate flooding on 945 acres in the East Locust Creek floodplain (on-site) and another 2,770 acres in the common floodplain of Locust Creek (off-site).

TABLE G
AVERAGE ANNUAL FLOODWATER DAMAGES
(dollars)[a]

	Present Condition	Alternative 1	Alternative 2	Alternative 3 (NED/ Recommended Plan)	Alternative 4 (Future w/o Revised Plan)
Floodwater Damages					
Crop and Pasture	822,300	661,700	651,200	662,400	678,800
Fence and Debris	238,700	192,900	191,000	193,200	195,200
Commercial/Urban	900	0	0	0	0
Re-Route Traffic	1,400	200	100	200	200
Road and Bridge	32,800	20,600	19,800	20,600	19,800
Overbank Deposition	90,800	56,700	54,500	56,700	74,600
Swamping	15,800	11,400	11,100	11,400	13,000
Scour	25,800	18,500	18,100	18,500	21,200
Total	**1,228,500**	**962,000**	**945,800**	**963,000**	**1,002,800**

a. Price Base 2006

EROSION AND SEDIMENTATION

Existing Conditions
An estimated 321,300 tons of sediment is produced by erosion annually within the East Locust Creek Watershed from all sources. Of this total (gross erosion), approximately 110,000 tons moves through the stream system, passes through the watershed outlet, and enters Locust Creek (sediment yield). The remaining 211,300 tons of sediment is deposited in cropfields, farm ponds, lakes, wetlands, stream and gully channels, and on floodplains. Sediment sources include sheet-and-rill erosion, ephemeral and classical gullies, streambanks, floodplain scour, and road ditches.

Sheet-and-rill erosion produces about 53 percent of the total soil loss from all sources (171,300 tons annually) while classical gullies account for approximately 109,500 tons. Nearly 18,000 tons of sediment each year are attributable to streambank erosion which can exhibit quite variable rates throughout the watershed. Ephemeral gully, road ditch, and floodplain scour erosion, which occur in lesser amounts, produce a combined estimated total of 22,500 tons of sediment annually.

All of the proposed alternatives, as a result of the installation of various project measures, will reduce overall erosion and sedimentation rates within the watershed.

Alternative 1
Installation of a multiple-purpose reservoir, 22 small FWR structures, 7 modified structures, and 5 sediment/debris basins will provide grade stabilization for eroding gully systems and stream channels. Due to the high trap efficiencies provided by water detention structures, sediment and other pollutants that lead to downstream sedimentation problems will be reduced. The multiple-purpose reservoir will trap an estimated 20,200 tons of sediment annually while the 34 small structures (floodwater retarding, modified, and sediment/debris basins) will trap approximately 32,000 tons. Prior to installation of the multiple-purpose reservoir and the small structures, their drainage areas will be adequately protected for sheet-and-rill erosion. Erosion issues throughout the watershed will continue to be addressed through ongoing and future conservation programs administered through the Sullivan and Putnam Counties' Soil and Water Conservation Districts (SWCD) and the NRCS field offices.

Monetary damages to floodplain cropland and pastures caused by overbank sediment deposition will be reduced by 38 percent and scour erosion damages by 28 percent. It is estimated that sheet-and-rill erosion will be reduced by 6 percent, classical gully erosion by 10 percent, streambank erosion by 25 percent, and floodplain scour by 25 percent. Erosion from all sources will be reduced by approximately 9 percent to 291,000 tons on an average annual basis.

Alternative 2
Installation of a multiple-purpose reservoir 39 small FWR structures, 7 modified structures, and 5 sediment/debris basins will provide grade stabilization for eroding gully systems and stream channels. Due to the high trap efficiencies provided by water detention structures, sediment and other pollutants that lead to downstream sedimentation problems will be reduced. The multiple-purpose reservoir will trap an estimated 20,000 tons of sediment annually while the 51 small structures (floodwater retarding, modified, and sediment/debris basins) will trap approximately 48,000 tons. Prior to installation of the multiple-purpose reservoir and the small structures, their drainage areas will be adequately protected for sheet-and-rill erosion. Erosion issues throughout the watershed will continue to be addressed through ongoing and future conservation programs administered through the Sullivan and Putnam Counties' Soil and Water Conservation Districts (SWCD) and the NRCS field offices.

Monetary damages to floodplain cropland and pastures caused by overbank sediment deposition will be reduced by 40 percent and scour erosion damages by 30 percent. It is estimated that sheet-and-rill erosion will be reduced by 7 percent, classical gully erosion by 13 percent, streambank erosion by 29 percent, and floodplain scour by 25 percent. Erosion from all sources will be reduced by approximately 11 percent to 284,000 tons on an average annual basis.

Alternative 3 - (NED/Recommended Plan)
Installation of a multiple-purpose reservoir, 22 small FWR structures, 7 modified structures, 5 sediment/debris basins, and associated project measures will reduce erosion and sedimentation within the watershed. Erosion and sedimentation resulting from sheet-and-rill soil losses, ephemeral gullies, and classical gullies will be reduced through ongoing and future conservation programs administered through the Sullivan and Putnam Counties' Soil and Water

Conservation Districts (SWCD) and NRCS field offices and by the requirement that soil losses be reduced to tolerable limits on 75 percent of the drainage areas above the proposed multiple-purpose reservoir and small FWR structures prior to construction.

Vegetated buffer strips will be established around the multiple-purpose reservoir that will serve to reduce erosion and act as filters for sediment-laden runoff. The reservoir and small flood control structures will have high trap efficiencies for sediment, reduce gully erosion by providing grade stabilization benefits, reduce streambank erosion by inundating moderate to severely eroding stream reaches, and reduce sediment deposition in downstream reaches and on floodplains. The multiple-purpose reservoir will trap an estimated 20,000 tons of sediment annually while the 34 small structures (floodwater retarding, modified, and sediment/debris basins) will trap approximately 32,000 tons

Monetary damages to floodplain cropland and pastures caused by overbank sediment deposition will be reduced by 38 percent and scour erosion damages by 28 percent. It is estimated that sheet-and-rill erosion will be reduced by 6 percent, classical gully erosion by 10 percent, streambank erosion by 25 percent, and floodplain scour by 20 percent. Erosion from all sources will be reduced by approximately 9 percent to 292,000 tons on an average annual basis.

Alternative 4 – (Future Without Revised Plan)
Installation of 51 small FWR structures will provide grade stabilization for eroding gully systems. Due to the high trap efficiencies provided by these water detention structures, sediment and other pollutants that lead to downstream sedimentation problems will be reduced. The 51 small FWR structures will trap approximately 48,000 tons of sediment annually. Prior to installation of the small structures, their drainage areas will be adequately protected for sheet-and-rill erosion. Erosion issues throughout the watershed will continue to be addressed through ongoing and future conservation programs administered through the Sullivan and Putnam Counties' Soil and Water Conservation Districts (SWCD) and the NRCS field offices.

Monetary damages to floodplain cropland and pastures caused by overbank sediment deposition will be reduced by 18 percent and scour erosion damages by 18 percent. It is estimated that sheet-and-rill erosion will be reduced by 4 percent, classical gully erosion by 11 percent, streambank erosion by 16 percent, and floodplain scour by 15 percent. Erosion from all sources will be reduced by approximately 7 percent to 297,000 tons on an average annual basis.

ROAD AND BRIDGE DAMAGE

Existing Conditions
There are numerous bridges over East Locust Creek and its tributaries. Damages to roads and bridges, as a result of flood events, are estimated at $32,800 on an average annual basis. Additionally, when roads flood and are damaged by flooding, traffic has to be re-routed. Estimated annual damages of traffic re-routing are $1,400.

Alternative 1
As a result of the reduction of peak discharges from the implementation of Alternative 1, flood damages to roads and bridges are reduced by $12,200 annually, and traffic re-routing is reduced by $1,200 annually.

Alternative 2
As a result of the reduction of peak discharges from the implementation of Alternative 2, flood damages to roads and bridges are reduced by $13,000 annually, and traffic re-routing is reduced by $1,300 annually.

Alternative 3 - (NED/Recommended Plan)
As a result of the reduction of peak discharges from the implementation of Alternative 3, flood damages to roads and bridges are reduced by $12,200 annually, and traffic re-routing is reduced by $1,200 annually.

Alternative 4 - (Future Without Revised Plan)
As a result of the reduction of peak discharges from the implementation of the remaining planned structures from the original 1987 plan, flood damages to roads and bridges are reduced by $13,000 annually, and traffic re-routing is reduced by $1,300 annually.

WATER QUALITY

Existing Conditions

Missouri state water quality regulations (10 CSR 20-7) classify waters by type, establish beneficial uses and define general (10 CSR 20-7.031(3)) and specific (10 CSR 20-7.031(4)) water quality criteria that must be maintained to protect the assigned beneficial uses. If existing water quality is better than applicable water quality criteria, the state's anti-degradation policy (10 CSR 20-7.031(2)) requires existing levels of water quality to be maintained and protected. Classified portions of the stream are required to meet specific and general water quality criteria and conform to the anti-degradation policy. Unclassified portions of the stream are required to meet general water quality criteria and conform to the anti-degradation policy. Water bodies that fail to meet either general or specific criteria are required to be listed as impaired water bodies under Section 303(d) of the federal Clean Water Act. East Locust Creek does not appear on Missouri's most recent (1998 and 2002) Section 303(d) lists. Water quality in the East Locust Creek Watershed is currently most affected by sediment and nutrients.

Streambank erosion is variable throughout the watershed, but produces an estimated 18,000 tons of sediment annually. Some stream reaches exhibit stable to slightly eroding banks while others are undergoing moderate to severe erosion.

For stream health, the Missouri Department of Conservation (MDC) recommends a riparian corridor width of at least 100 feet on each bank of East Locust Creek. Riparian corridor width varied considerably with location along a 5.3-mile study reach downstream of the proposed multiple-purpose reservoir site. Riparian vegetation in this study reach was approximately 48 percent poor, 22 percent fair, and 30 percent excellent. Upstream of the reservoir site, the riparian area along East Locust Creek and its tributaries is very poorly vegetated. The riparian buffer meets MDC's 100-foot recommendation at only a few widely scattered locations along nearly 80 miles of stream channel.

Low or no flow conditions in East Locust Creek during the driest part of the summer, coupled with permitted waste discharges by Premium Standard Farms and the City of Milan, can result in effluent-dominated flow downstream of these point discharges.

The communities of Pollock and Lemons upstream of the proposed reservoir are not served by central sewer systems, and illegal dump sites have been observed in the reservoir's watershed. These conditions would pose a threat to water quality in the reservoir.

Alternative 1

Installation of Alternative 1 is expected to improve the water quality downstream of the proposed reservoir in East Locust Creek by trapping and treating pollutants entering the reservoir from upstream. Retention basins typically have pollutant removal efficiencies of 50-80 percent for suspended solids, 30-65 percent for nitrogen, 30-65 percent for phosphorus, <30 percent for pathogens and 50-80 percent for metals (USEPA, 1999). Land treatment activities will reduce soil loss to the tolerable rate (T) or below in at least 75 percent of the watershed above the reservoir. These practices also reduce the non-point discharge of nutrients, nitrogen, and phosphorus.

Restoration and protection of degraded riparian areas upstream and downstream of the reservoir is expected to improve water quality by reducing sedimentation and improving trapping efficiency of riparian buffers. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan. National Pollutant Discharge Elimination System rules require a Storm Water Pollution Prevention Plan (SP3) on construction sites disturbing one or more acres. Although an SP3 will be prepared for the site, a short-term decline in water quality may occur as a result of sediment discharge associated with construction activities.

The Missouri Department of Natural Resources is committed to working with NRCS and the Water Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. This plan will create the opportunity for the project Sponsors to apply for grants and technical assistance to address water quality concerns, such as illegal dump sites and a lack of central sewer systems.

Alternative 2

Installation of Alternative 2 is expected to improve the water quality downstream of the proposed reservoir in East Locust Creek by trapping and treating pollutants entering the reservoir from upstream. Retention basins typically have pollutant removal efficiencies of 50-80 percent for suspended solids, 30-65 percent for nitrogen, 30-65 percent for phosphorus, <30 percent for pathogens and 50-80 percent for metals (USEPA, 1999). Land treatment activities will reduce soil loss to the tolerable rate (T) or below in at least 75 percent of the watershed above the reservoir. These practices also reduce the non-point discharge of nutrients, nitrogen, and phosphorus.

Restoration and protection of degraded riparian areas upstream and downstream of the reservoir is expected to improve water quality by reducing sedimentation and improving trapping efficiency of riparian buffers. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan. National Pollutant Discharge Elimination System rules require a Storm Water Pollution Prevention Plan (SP3) on construction sites disturbing one or more acres. Although an SP3 will be prepared for the site, a short-term decline in water quality may occur as a result of sediment discharge associated with construction activities.

The Missouri Department of Natural Resources is committed to working with NRCS and the water commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. This plan will create the opportunity for the project sponsors to apply for grants and technical assistance to address water quality concerns, such as illegal dump sites and a lack of central sewer systems.

Alternative 3 - (NED/Recommended Plan)

Installation of the recommended plan is expected to improve the water quality downstream of the proposed reservoir in East Locust Creek by trapping and treating pollutants entering the reservoir from upstream. Retention basins typically have pollutant removal efficiencies of 50-80 percent for suspended solids, 30-65 percent for nitrogen, 30-65 percent for phosphorus, <30 percent for pathogens and 50-80 percent for metals (USEPA, 1999). The watershed agreement ensures that land treatment measures will be implemented to reduce soil loss to the tolerable rate (T) or below on at least 75 percent of the watershed acreage above the multiple-purpose reservoir and the small, floodwater retarding structures. These practices also reduce the non-point discharge of nutrients, nitrogen, and phosphorus.

Restoration and protection of degraded riparian areas upstream and downstream of the reservoir is expected to improve water quality by reducing sedimentation and improving trapping efficiency of riparian buffers. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan. National Pollutant Discharge Elimination System rules require a Storm Water Pollution Prevention Plan (SP3) on construction sites disturbing one or more acres. Although an SP3 will be prepared for the site, a short-term decline in water quality may occur as a result of sediment discharge associated with construction activities.

The Missouri Department of Natural Resources is committed to working with NRCS and the Water Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. This plan will create the opportunity for the project Sponsors to apply for grants and technical assistance to address water quality concerns, such as illegal dump sites and a lack of central sewer systems.

Alternative 4 - (Future Without Revised Plan)
As a result of constructing the remaining planned structures from the original 1987 plan, downstream water quality is expected to improve slightly as a result of sediment trapping and improved land treatment. Short-term declines in water quality due to construction activities are expected to be of similar magnitude as the other alternatives. Riparian buffers would remain in generally poor condition throughout the watershed. Effluent-dominated flow downstream of Milan in the dry summer months would continue to be an issue unless resolved in some other way.

STREAM RESOURCES

Existing Conditions
Missouri Department of Conservation (MDC) personnel sampled the fish community in East Locust Creek on June 30, 1988. The sample site is located in an unchannelized reach 7.4 miles upstream from the confluence with Locust Creek near Cora, Missouri. The habitat sampled consisted of a pool, run, and backwater. Twelve different fish species were collected and all were common and habitat generalists. No threatened or endangered species were collected. The bigmouth shiner, a species that has been favored by channelization and increased sedimentation in prairie streams, dominated the sample.

Stream habitat conditions were sampled at eight different one-half mile reaches throughout the length of East Locust Creek using Stream Habitat Evaluation Procedures (SHEP). This procedure ranks six parameters reflecting human impacts on a stream and adjusts them by 4 alteration functions (channel modifications, impoundments, water quality, and streambed conditions) to determine an index value of stream quality. Values can range from zero (worst) to 10 (best). The average index value for East Locust Creek was 2.71 (range 0.6 to 5.0). Barriers to fish movement and flow alterations were not problems, but riparian vegetation was poor. Only 3 of 8 reaches had good riparian areas. Bank erosion was severe in half of the reaches and moderate in most of the remaining reaches. Stream migration potential was moderate, but improved in the upper half of the reaches. Channelization was a problem in about one third of the reaches, but only one reach was completely channelized. Impoundment was not a problem. Water quality was only fair, and several reaches showed symptoms of excessive nutrients. Streambed condition was poor with excessive bedloads of sand and silt common in most reaches.

Visual assessments conducted in the study area of the proposed multiple-purpose reservoir during the spring and summer of 2005 indicated that both the fish community and stream habitat are similar to the earlier 1988 sampling. The Stream Visual Assessment Protocol is a simple, coarse assessment procedure to evaluate the condition of aquatic ecosystems and habitat quality associated with streams. East Locust Creek was sampled at three locations on May 24, 2004.

Sample sites were located: 1.) approximately 3,700 feet south of the centerline of the proposed multiple-purpose structure, 2.) just upstream of the bridge west of the town of Boynton, and 3.) upstream of a crossing in the SW ¼, SE ¼, Section 35, T64N, R20W. The results indicate fair conditions at all 3 sample locations. Limited width of the riparian zone vegetation was common to all 3 sample sites.

East Locust Creek stream channel conditions downstream of the proposed multiple-purpose reservoir site were evaluated on May 18, 2005 and June 22, 2005. Investigators waded approximately 5.3 miles of the stream channel between the proposed reservoir site and the confluence with Elmwood Creek. Channel stability, channelization, sedimentation, and riparian vegetation were noted.

Past channelization is evident, but the stream channel is relatively stable overall with active channel migration observed at only two meanders. Sedimentation varies with location. Logjams and sediment storage are apparent over approximately 6,350 feet of channel between the proposed reservoir location and the first low-water crossing downstream. For approximately 8,500 feet below this low-water crossing, the channel exhibits some scour and little evidence of sedimentation. For the next 8,700 feet, ending at a second low-water crossing, the channel is characterized by numerous logjams, islands, channel braiding, and sediment storage features. The remaining 4,600 feet of stream channel between the second low-water crossing and the confluence with Elmwood Creek exhibits scouring with resistant clay riffle features providing grade control at several locations.

Riparian corridor width varies considerably with location along the evaluated reaches. The 6,350 foot reach has excellent vegetation on the west channel bank, but limited vegetation on the east channel bank. The 8,500 foot reach has excellent riparian vegetation with nearly the entire reach exceeding 100-foot of vegetation on both channel banks. The remaining reach to the confluence with Elmwood Creek exhibits poor riparian vegetation.

Riparian buffer width along mainstem East Locust Creek and its tributaries upstream of the proposed reservoir site were evaluated using digital orthophotography flown in 2004 and digital infrared orthophotography flown in 2003. The riparian corridor was found to be very poorly vegetated.

Alternative 1

Under Alternative 1, approximately 29 miles of stream channel will be inundated by the permanent pool of the multiple-purpose reservoir. Hydrology along East Locust Creek downstream of the reservoir will be changed. However, flow augmentation, to the extent feasible, will replicate natural base flow conditions and will be a component of measures needed to mitigate the impacts to East Locust Creek. Waters for flow augmentation will be drawn from the metalimnion to avoid both warm summer surface waters and anoxic hypolimnetic waters. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan.

Additional mitigation measures could include, but are not limited to, restoration and perpetual or long term conservation easements on riparian areas in the East Locust Creek Watershed and/or cash payment to the Stream Stewardship Fund. The area east of the proposed water transmission line, including riparian corridor on both sides of East locust Creek from the reservoir site to the confluence with Elmwood Creek, provides excellent opportunities to protect and restore aquatic and riparian habitat. Immediately upstream of the reservoir, approximately 450 acres of potential riparian buffer adjoining approximately 18.6 miles of stream channels have been identified that offer the highest priority opportunities to restore riparian habitat and protect the quality of the public water supply and recreational pools. Further upstream, approximately 727 acres of potential riparian buffer adjacent to approximately 30 miles of stream channels offers additional opportunities to restore riparian habitat.

Installation of Alternative 1 is expected to improve the water quality downstream of the reservoir in East Locust Creek. Suspended solids, total nitrogen, and total phosphorus are expected to be reduced due to reservoir trapping and improved land treatment practices.

Alternative 2

Under Alternative 2, approximately 29 miles of stream channel will be inundated by the permanent pool of the multiple-purpose reservoir. Hydrology along East Locust Creek downstream of the reservoir will be changed. However, flow augmentation, to the extent feasible, will replicate natural base flow conditions and will be a component of measures needed to mitigate the impacts to East Locust Creek. Waters for flow augmentation will be drawn from the metalimnion to avoid both warm summer surface waters and anoxic hypolimnetic waters. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan.

Additional mitigation measures could include, but are not limited to, restoration and perpetual or long term conservation easements on riparian areas in the East Locust Creek watershed and/or cash payment to the Stream Stewardship Fund. The area east of the proposed water transmission line, including riparian corridor on both sides of East locust Creek from the reservoir site to the confluence with Elmwood Creek, provides excellent opportunities to protect and restore aquatic and riparian habitat. Immediately upstream of the reservoir, approximately 450 acres of potential riparian buffer adjoining approximately 18.6 miles of stream channels have been identified that offer the highest priority opportunities to restore riparian habitat and protect the quality of the public water supply and recreational pools. Further upstream, approximately 727 acres of potential riparian buffer adjacent to approximately 30 miles of stream channels offers additional opportunities to restore riparian habitat.

Installation of Alternative 2 is expected to improve the water quality downstream of the reservoir in East Locust Creek. Suspended solids, total nitrogen, and total phosphorus are expected to be reduced due to reservoir trapping and improved land treatment practices.

Alternative 3 - (NED/Recommended Plan)
Under the recommended plan, approximately 29 miles of stream channel will be inundated by the permanent pool of the multiple-purpose reservoir. Hydrology along East Locust Creek downstream of the reservoir will be changed. However, flow augmentation, to the extent feasible, will replicate natural base flow conditions and will be a component of measures needed to mitigate the impacts to East Locust Creek. Waters for flow augmentation will be drawn from the metalimnion to avoid both warm summer surface waters and anoxic hypolimnetic waters. Increased base flow and flow augmentation, as a result of reservoir construction, will dilute and lessen the aquatic impacts of effluent-dominated flow in the dry summer months downstream of Milan.

Additional mitigation measures could include, but are not limited to, restoration and perpetual or long term conservation easements on riparian areas in the East Locust Creek watershed and/or cash payment to the Stream Stewardship Fund. The area east of the proposed water transmission line, including riparian corridor on both sides of East locust Creek from the reservoir site to the confluence with Elmwood Creek provides excellent opportunities to protect and restore aquatic and riparian habitat. Immediately upstream of the reservoir, approximately 450 acres of potential riparian buffer adjoining approximately 18.6 miles of stream channels have been identified that offer the highest priority opportunities to restore riparian habitat and protect the quality of the public water supply and recreational pools. Further upstream, approximately 727 acres of potential riparian buffer adjacent to approximately 30 miles of stream channels offers additional opportunities to restore riparian habitat.

Installation of the recommended plan is expected to improve the water quality downstream of the reservoir in East Locust Creek. Suspended solids, total nitrogen and total phosphorus are expected to be reduced due to reservoir trapping and improved land treatment practices.

Alternative 4 - (Future Without Revised Plan)
As a result of constructing the remaining planned structures (drainage areas less than 350 acres) from the original 1987 plan, downstream water quality is expected to improve slightly as a result of sediment trapping and improved land treatment. Some short-term declines in water quality due to construction activities can be expected. Riparian buffers would remain in generally poor condition throughout the watershed. Any negative impacts on these upland drainages (stream channels?) that result from installation of the small headwater sites will be mitigated through the 404 permitting process.

RECREATION

Existing Conditions
Analysis of the current supply and demand for recreational activities within 25 miles of the proposed multiple-purpose reservoir site indicates there is an unmet demand for annual recreational user days. This unmet demand includes recreational opportunities, such as fishing, hunting, boating, swimming, camping, hiking and biking, picnicking, and bird watching/nature study.

Alternative 1
Development of the multiple-purpose reservoir will provide much needed water-based, recreational opportunities. The reservoir will supply approximately 72,000 annual user days of recreation. Recreational facilities will include access areas, boat ramps, swimming beaches, playgrounds, parking facilities, restroom facilities, hiking/biking trails, shelter houses, fishing piers (platforms), and tree, shrub, and other vegetative plantings. The multiple-purpose reservoir will provide $2,092,000 in average annual recreation benefits.

Alternative 2
Development of the multiple-purpose reservoir will provide much needed water-based, recreational opportunities. The reservoir will supply approximately 72,000 annual user days of recreation. Recreational facilities will include access areas, boat ramps, swimming beaches, playgrounds, parking facilities, restroom facilities, hiking/biking trails, shelter houses, fishing piers (platforms), and tree, shrub, and other vegetative plantings. The multiple-purpose reservoir will provide $2,092,000 in average annual recreation benefits.

Alternative 3 - (NED/Recommended Plan)
Development of the multiple-purpose reservoir will provide much needed water-based, recreational opportunities. The reservoir will supply approximately 72,000 annual user days of recreation. Recreational facilities will include access areas, boat ramps, swimming beaches, playgrounds, parking facilities, restroom facilities, hiking/biking trails, shelter houses, fishing piers (platforms), and tree, shrub, and other vegetative plantings. The multiple-purpose reservoir will provide $2,092,000 in average annual recreation benefits.

Alternative 4 - (Future Without Revised Plan)
No significant change in the amount of public or private recreational area is expected without the revised plan since the original 1987 plan does not address recreation demand. There will be a continued deficit in recreational opportunities for the surrounding area.

WETLANDS

Existing Conditions
Wetland habitat quality has been reduced as wetlands within the East Locust Creek Watershed have been impacted by agricultural activity. Within the top of dam elevation of the multiple-purpose structure and the footprints of the structure, auxiliary spillway, and transmission line, the National Wetland Inventory identified 290.9 acres of wetlands (refer to Appendix D). Note that due to classification and temporal differences between the two data sets, NWI wetland acreages and land cover wetland acreages vary. However, a preliminary investigation of these wetlands was conducted by an NRCS soil scientist and Missouri Department of Conservation (MDC) biologist, both of whom have completed the Corps of Engineers, 1987 Wetland Delineation Manual, (REG IV) training. Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and transmission line footprints to assess the quality of wetlands intersected by the transect and to determine if these wetlands were identified correctly by NWI.

Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised.

The areas located between the high bank of East Locust Creek and the old railroad bed do not meet wetland criteria due to the influence of the incised creek channel (average 50'-100' from bank) and the elevation of the old railroad bed. Soils were mapped mainly as Landes, which is non-hydric. Of these areas, delineated as wetlands, the vast majority meet the hydrology criteria due to saturated soil conditions. There was little evidence of ponding or long-term flooding on these sites.

The forested plant communities are dominated by light-seeded trees with very little hard mast present. Most are young stands typically dominated by silver maple with little canopy stratification and herbaceous understory dominated by stinging nettle and Virginia wild rye. Many of the areas have been grazed, which likely influenced the vegetative community.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

The classifications of these wetlands are listed in Table H.

TABLE H
WETLANDS IDENTIFIED WITHIN THE TOP OF DAM ELEVATION AND STRUCTURE, AUXILIARY SPILLWAY, AND TRANSMISSION LINE FOOTPRINTS[1]

Offsite Method and Classification	Acres
National Wetland Inventory	
[2]PEMA	104.1
[2]PEMB	4.8
[2]PEMC	11.8
[2]PEMF	1.2
[2]PFO1A	161.9
[2]PFO1C	5.4
[2]PSS1A	1.7
Total	**290.9**

[1]Wetlands were identified with NWI, an offsite method (see Appendix D). The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process.
[2]The definition of these National Wetland Inventory modifiers can be found on the wetland inventory map in Appendix D.

Alternative 1
Installation of a multiple-purpose reservoir and 22 small FWR structures will result no net loss of wetlands. It is anticipated that 178.5 acres of wetlands will be created in the shallow portions of the reservoir's permanent pool. Additional temporarily or seasonally flooded wetland habitat and water sources for wildlife will be created on a minimum of 63 acres within the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands.

If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of East Locust Creek Watershed to the south end of Fountain Grove Conservation Area.

Alternative 2
Installation of a multiple-purpose reservoir and 39 small FWR structures will result in no net loss of wetlands. It is anticipated that 178.5 acres of wetlands will be created in the shallow portions of the reservoir's permanent pool. Additional temporarily or seasonally flooded wetland habitat and water sources for wildlife will be created on a minimum of 63 acres within the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands.

If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of East Locust Creek Watershed to the south end of Fountain Grove Conservation Area.

Alternative 3 - (NED/Recommended Plan)
Installation of a multiple-purpose reservoir and 22 small FWR structures will result in no net loss of wetlands. It is anticipated that 178.5 acres of wetlands will be created in the shallow portions of the reservoir's permanent pool. Additional temporarily or seasonally flooded wetland habitat and water sources for wildlife will be created on a minimum of 63 acres within the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands.

If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of East Locust Creek Watershed to the south end of Fountain Grove Conservation Area.

Alternative 4 - (Future Without Revised Plan)
In the future without revised plan alternative, the original East Locust Creek Watershed Plan-Environmental Assessment will be implemented. Only small FWR structures with drainage areas less than 350 acres would be installed. These small headwater sites generally do not impact wetlands. If wetland determinations do identify wetlands, mitigation will be handled through the 404 permitting process.

WILDLIFE HABITAT

Existing Conditions
Wildlife habitat quality is 41 percent of optimum for the selected indicator species - bobwhite quail and wood thrush, with approximately 626 habitat units on cropland, grassland, and upland and bottomland hardwoods acreage within the proposed permanent pool boundary. Contributing factors for the low habitat value include monotypic and overgrazed pastures, forest grazing and fragmentation, and lack of undisturbed grassy and woody cover suitable for ground nesting birds. Refer to Appendix E, Investigations and Analyses, Biology section for methodology/species used to determine wildlife habitat units.

Alternative 1
A total of 1,684 acres of low value habitat will be permanently flooded. Installation of a multiple-purpose reservoir and 22 small FWR structures will result in a net increase of wildlife habitat quality. Measures in the plan that will improve habitat include recreational development of the floodpool and required buffer areas at the multiple-purpose site. These will include a 1,605-acre mitigation area with restoration of woody and grassland habitat, and livestock exclusion.

Alternative 2
A total of 1,684 acres of low value habitat will be permanently flooded. Installation of a multiple-purpose reservoir and 39 small FWR structures will result in a net increase of wildlife habitat quality. Measures in the plan that will improve habitat include recreational development of the floodpool and required buffer areas at the multiple-purpose site. These will include a 1,605-acre mitigation area with restoration of woody and grassland habitat, and livestock exclusion.

Alternative 3 - (NED/Recommended Plan)
A total of 1,684 acres of low value habitat will be permanently flooded. Installation of a multiple-purpose reservoir and 22 small FWR structures will result in a net increase of wildlife habitat quality. Measures in the plan that will improve habitat include recreational development of the floodpool and required buffer areas. These will include a 1,605-acre mitigation area with restoration of woody and grassland habitat, and livestock exclusion.

Alternative 4 - (Future Without Revised Plan)
In the future without revised plan alternative, the original East Locust Creek Watershed Plan-Environmental Assessment will be implemented. Under this alternative, 51 small single-purpose FWR structures would be built. No significant change is anticipated in wildlife habitat quality from the original plan.

FOREST RESOURCES

Existing Conditions
A wide variety of trees and shrubs are currently found in the upland draws, side slopes, and bottomlands within the watershed. Tree species noted include: cottonwood, silver maple, black walnut, northern red oak, black oak, pin oak, white oak, swamp white oak, bur oak, red cedar, black cherry, choke cherry, elm, ash, mulberry, willow, honey locust, shingle oak, basswood, shagbark hickory, and bitternut hickory. Shrub species include: smooth sumac, grapevine, gray dogwood, rough-leaf dogwood, and hazelnut (Sell, 2005).

In many areas, tree stands are poorly managed, the quality and quantity of riparian vegetation is poor to fair, forestland has been converted to cropland, and overgrazing has damaged the forest resource. Portions of the existing forest resource are lacking in their ability to reduce erosion, filter nutrients and sediment, regenerate younger trees, and provide good quality wildlife habitat.

Alternative 1
Installation of a multiple-purpose reservoir, 22 small FWR structures, 7 modified structures, and 5 sediment/debris basins will result in the loss of both bottomland and upland hardwoods. Approximately 531 acres of hardwoods will be lost due to construction of the multiple-purpose reservoir and 130 acres with construction of the small structures. These losses will be mitigated for by enhancing the necessary acres within 1,605 acres that will be acquired for mitigation purposes. The mitigation acreage will lie within the vegetated buffer that will be developed around the multiple-purpose reservoir, along stream channels, or in other areas deemed suitable. The mitigation areas will be maintained in a natural state if the existing trees, shrubs, and grasses consist of wildlife friendly species. Other areas will be enhanced with appropriate vegetative plantings. Tree and shrub species to be planted and any necessary timber management will be determined by the appropriate state and federal personnel.

Project measures and the associated mitigation will result in an improved forest resource. The enhanced vegetation will serve as filters for pollutants, reduce erosion, improve landscape diversity, and increase the quantity and quality of the watershed's wildlife habitat.

Alternative 2
Installation of a multiple-purpose reservoir, 39 small FWR structures, 7 modified structures, and 5 sediment/debris basins will result in the loss of both bottomland and upland hardwoods. Approximately 531 acres of hardwoods will be lost due to construction of the multiple-purpose reservoir and 200 acres with construction of the small structures. These losses will be mitigated for by enhancing the necessary acres within 1,605 acres that will be acquired for mitigation

purposes. The mitigation acreage will lie within the vegetated buffer that will be developed around the multiple-purpose reservoir, along stream channels, or in other areas deemed suitable.

The mitigation areas will be maintained in a natural state if the existing trees, shrubs, and grasses consist of wildlife friendly species. Other areas will be enhanced with appropriate vegetative plantings. Tree and shrub species to be planted and any necessary timber management will be determined by the appropriate state and federal personnel.

Project measures and the associated mitigation will result in an improved forest resource. The enhanced vegetation will serve as filters for pollutants, reduce erosion, improve landscape diversity, and increase the quantity and quality of the watershed's wildlife habitat.

Alternative 3 - (NED/Recommended Plan)
Installation of a multiple-purpose reservoir, 22 small FWR structures, 7 modified structures, and 5 sediment/debris basins will result in the loss of both bottomland and upland hardwoods. Approximately 531 acres of hardwoods will be lost due to construction of the multiple-purpose reservoir and 130 acres with construction of the small structures. These losses will be mitigated for by enhancing the necessary acres within 1,605 acres that will be acquired for mitigation purposes. The mitigation acreage will lie within the vegetated buffer that will be developed around the multiple-purpose reservoir, along stream channels, or in other areas deemed suitable.

The mitigation areas will be maintained in a natural state if the existing trees, shrubs, and grasses consist of wildlife friendly species. Other areas will be enhanced with appropriate vegetative plantings. Tree and shrub species to be planted and any necessary timber management will be determined by the appropriate state and federal personnel.

Project measures and the associated mitigation will result in an improved forest resource. The enhanced vegetation will serve as filters for pollutants, reduce erosion, improve landscape diversity, and increase the quantity and quality of the watershed's wildlife habitat.

Alternative 4 - (Future Without Revised Plan)
Without installation of the works of improvement set forth in the East Locust Creek Watershed Revised Plan-EIS, the project measures agreed to in the original 1987 East Locust Creek Watershed Plan-EA will continue to be implemented. The original plan calls for 56 acres of critical area planting, 20 acres of tree planting, installation of land treatment measures, and reduction of gully erosion. These measures will adequately mitigate for any negative impacts to the forest resource due to installation of the proposed works of improvement.

LAND USE AND TREATMENT

Existing Conditions

Within the watershed there are 6,159 acres of cropland, 42,722 acres of pasture/hayland, 5,617 acres of CRP, 13,922 acres of forestland, 5,022 acres of brush, 2,753 acres of wetlands, 1,243 acres of open water, and 2,033 acres of towns, farmsteads, roads and barren areas.

Alternatives 1, 2, and 3 (NED/Recommended Plan)
Construction of the proposed multiple-purpose reservoir will permanently convert 294 acres of cropland, 791 acres of grassland, 531 acres of forestland, 124 acres of brush, 443 acres of wetlands, and 19 urban acres to open water. The balance of the permanent pool area, 33 acres, is already open water.

There are an additional 269 acres between the permanent pool and auxiliary spillway elevations, which are comprised of 2 acres of cropland, 91 acres of grassland, 117 acres of forestland, 21 acres of brush/woodland, 26 acres of wetlands, 11 acres of open water, and 1 acre of urban, farmsteads, and roads. These areas will become seasonally wet when the multiple-purpose reservoir is installed.

Development of the multiple-purpose reservoir, increased awareness of water quality hazards, and utilization of voluntary federal and state financial, technical, and educational assistance programs will increase land treatment practices and have a positive effect on water quality in the watershed. Installation of the reservoir could make the watershed eligible for additional land treatment and water quality improvement programs. Installation of the reservoir could also make the watershed and land users in the watershed more competitive to receive cost share and grants.

There is potential for land currently under 10-year Conservation Reserve Program (CRP) contracts to be converted to cropland as contracts expire. The conversion of CRP fields to crop fields that are not adequately treated is a concern. NRCS and the Sponsors will encourage continued and expanded use of the CRP and similar programs to protect the entire watershed.

As stipulated in the watershed agreement, the Sponsors will ensure that 75 percent of the land upstream of the multiple-purpose reservoir and each small, floodwater retarding structure is adequately protected from erosion prior to construction of that particular measure. Practices that will improve water quality in the watershed and are eligible for federal and state financial, technical, and educational assistance include, but are not limited to, filter strips, riparian forest buffers, livestock exclusion, pest management, nutrient management, prescribed grazing, grade stabilization structures, water and sediment control basins, terraces, grassed waterways, well decommissioning, tree planting, forest stand improvement, etc.

Some potential programs that can provide financial and educational assistance to improve watershed protection include Sullivan County SWCD educational events, the SWCD/DNR state cost-share program, the USDA Environmental Quality Incentives Program, Conservation Reserve Program and Conservation Reserve Enhancement Program, and the EPA 319 Water Quality Program.

Alternative 4 - (Future Without Revised Plan)
Construction of 51 small FWR structures from the original 1987 East Locust Creek Watershed Plan-EA will convert land associated with the small FWR structures to open water.

THREATENED AND ENDANGERED SPECIES

The Section 7 consultation process in the Endangered Species Act was followed. The U.S. Fish and Wildlife Service provided information stating that the Indiana bat, a federal and state endangered species, may occur in the watershed. The scope and nature of the project indicate that the project is not likely to adversely impact this species. This precludes the need for preparation of a biological assessment.

The Indiana bat (Myotis sodalis), a federal and state listed endangered species, may occur in the watershed. In order to avoid adverse impacts to the Indiana bat, the guidelines developed by the USFWS for the conservation of the bat will be followed as per Missouri Field Office Technical Guide Transmittal No. 386 (USDA-NRCS, April 1, 2003).

CULTURAL RESOURCES

NRCS is currently completing a preliminary geomorphic analysis and cultural resources survey of the East Locust Creek project area. The results of this survey will guide the development of a process driven Memorandum of Agreement among interested parties, including the State Historic Preservation Office and any interested Native American nations. NRCS expects to contract for a Phase I survey of the project areas in fall/winter 2006. The village of Boynton (unincorporated) is within the impact area of the project. Historical documentation of Boynton and any associated elements will be part of the planned Phase I study.

There are no tribal lands in Missouri, and Sullivan County was not listed as an area of interest in the Native American Consultation Database. NRCS will contact the appropriate tribal representatives to determine if there are any areas of ancestral interest and initiate any necessary consultation prior to design and construction.

RELATIONSHIP TO OTHER PLANS, POLICIES, AND CONTROLS

The East Locust Creek Watershed Revised Plan-Environmental Impact Statement (EIS) set forth in this document is a revised plan and will replace the East Locust Creek Watershed Plan-Environmental Assessment (EA) that was signed in 1987 and is currently in the operational phase. The primary reason for the revision is to add to the original plan a multiple-purpose reservoir designed to produce 7.0 million gallons per day of raw water to be treated and used as rural water supply. The revised plan will eliminate 29 small FWR structures that were included in the original plan.

The "Water System Feasibility Study" (Burns and McDonnell, August 2003), "Water System Master Plan" (Burns and McDonnell, November 2003), and the "Water Use Study" (Missouri Department of Natural Resources, May 20, 2004) were prepared for the North Central Missouri Regional Water Commission to document the need for a rural water supply reservoir in

northcentral Missouri. The "Preliminary Engineering Report for North Central Missouri Regional Water Supply" (Rhodes Engineering Company, Inc., 1995) was prepared to present a brief review of existing water supply systems in the project area, present studies for a regional water supply source, and present preliminary cost data. Portions of these documents are summarized and referenced in this planning document.

The conservation provisions of the 1985 Food Security Act, the 1990 Food, Agriculture, Conservation, and Trade Act, and the 1996 Federal Agriculture Improvement and Reform Act were considered during the development of this plan. Impacts from these farm bills that involve land use changes and land treatment measures were incorporated into this Watershed Revised Plan and Environmental Impact Statement.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS

Irreversible and irretrievable commitments of resources consist of labor, material, and energy needed for installing and maintaining project measures. Permanent alteration of land use and cover will occur on approximately 2,400 acres as a result of the implementation of project measures. These acres will be converted to the multiple-purpose reservoir's dam and permanent pool and the dams and permanent pools of the 22 small FWR structures.

CIVIL RIGHTS IMPACT ANALYSIS

The project Sponsors' knowledge and familiarity of the residents that will be impacted by the implementation of the proposed project measures imply that no population subcategories (i.e., minorities, low-income, special needs, etc.) will be disproportionately impacted by federal actions.

All programs and activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the 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 American's With Disabilities Act of 1990. They will also be 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 grounds of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

Implementation of project measures will provide a source for rural water supply, water-based recreational opportunities, and may provide opportunities for minority contractors and construction company employees. The multiple-purpose reservoir will provide a basis for economic growth and opportunities to reduce unemployment rates within the region. A full regional economic development analysis is available by request through the NRCS state office in Columbia, Missouri.

RISK AND UNCERTAINTY

Installation of the multiple-purpose reservoir and the small floodwater retarding (FWR) structures will be dependent upon the Sponsors acquiring appropriate landrights or easements and issuance of all necessary permits, including the Department of the Army 404, Missouri Department of Natural Resources 401, and Missouri Dam and Reservoir Safety permits. Numerous public meetings, steering committee involvement, and media coverage indicate significant public support for the project within the watershed and the area to be served by the rural water supply. The ability of officials from the North Central Missouri Regional Water Commission and the Locust Creek Watershed District to reach mutual agreement with affected landowners is crucial in determining whether or not this project is implemented.

Some risk and uncertainty is associated with project funding. Funding appropriations for the Watershed Protection and Flood Prevention Act, Public Law 83-566 have decreased over the past years and several completed plans wait for funding. It is believed that the East Locust Creek Watershed Revised Plan and Environmental Impact Statement is a sound, environmentally sensitive project with strong local support, and all efforts will be made to secure the necessary federal funds. Local matching funds will be sought through the sale of treated water, grant monies, bond issues, sales taxes, or other non-federal sources.

Risk and uncertainty is always present with respect to geologic and soils conditions at sites where the construction of project measures such as reservoirs and other water retention structures are planned. A detailed, planning stage, foundation investigation of the proposed multiple-purpose reservoir site has been completed. About 40 test holes were drilled and approximately 90 samples collected. Samples included standard penetration testing, Shelby tubes, and large bag samples. All samples have been sent to the USDA-NRCS Soil Mechanics Laboratory in Lincoln, Nebraska for testing. Additional foundation investigations will be conducted prior to final design. Prior to construction, investigation will be completed on sites where small FWR structures are planned. All necessary measures will be taken during design and construction of structural measures to insure their safety and ability to function as intended.

During the planning phase, there is a limited amount of field data obtained for the actual structural design and quantity estimation. Thus, certain assumptions must be made at the time of planning in order to adequately complete a design. These two factors definitely incorporate risk and uncertainty into the structural measures for the project.

When planning the multiple-purpose reservoir, several hydrology, hydraulic, and design assumptions where made in order to complete the cost estimate. The main hydrology assumption was to utilize the synthetic hydrograph created by the SITES program to begin routing the appropriate storms. This was compared to the TR-20 inflow hydrograph which actually routed each storm through the reaches and existing structures in the 32.8 square mile drainage. An obvious timing lag and peak difference was witnessed between the two models. However, the synthetic hydrograph was kept in the routings and utilized in the plan because this built in a more conservative design verses using the TR-20 hydrograph. It is recommended the final design should utilize the TR-20 inflow hydrograph, which should better reflect the actual conditions.

Secondly, a computer aided drawing (CAD) was utilized to create a surface model of the existing area. This model was created on 4-foot contour intervals with an accuracy of plus or minus 2 feet. This model was used for development of the stage-storage curve. Various inlet works for the principal spillway could also be used for this site. Two previously built NRCS structures with large principal spillways were utilized as inputs for hydraulic characteristics of the principal spillway.

The final design could certainly evaluate different designs and dimensions that may prove to evacuate the temporary storage more efficiently and release more desirable rates of flow as well. It was also assumed that all storm events would be routed at the appropriate elevations according to TR-60 for a structural spillway. In fact, with a large water supply demand combined with the characteristics of the drainage area, the water budget reflects the water surface elevation slightly below the principal spillway crest a majority of the time. The final primary hydrology assumption involves the RESOP data used for the water budget information. The RESOP input data reflects to the best of our knowledge the historical climatic data for the area. This is not a prediction of future weather patterns, but merely reflects the best data on hand at the current time.

Several design assumptions were required throughout the design for the multiple-purpose reservoir. The primary design issues deal with the uncertainty of the actual geologic conditions of the structure's foundation and borrow areas. The completion of the subsurface investigation should better identify depths of cut-off trenches, drain locations, spillway alignments, and borrow areas. Additionally, remote sensing was utilized to identify infrastructure and utilities impacted by the large reservoir. Final design will clearly identify these locations in the field. Quantities were also calculated utilizing the afore mentioned CAD drawing. Field surveys will be required at a later date.

There are also hydrology and design uncertainties incorporated into the small FWR structures. For planning purposes, instead of routing and designing each specific small FWR structure, groups of structures were modeled. Constructed sites within the immediate regional vicinity were statistically evaluated and broken out into drainage area ranges with average characteristics assigned. These ranges where then used to group the 22 small FWR sites, assigning the drainage area range characteristics to each specific site. Actual as-built conditions will vary slightly from this as field conditions will differ from the statistical characteristics utilized.

Cost estimates are always of primary interest to the local Sponsors. This, however, can prove to be different when actual construction begins. Thus, there is always risk and uncertainty involved with the estimates. There are several general uncertainties involved with the competitive bidding process, such as fluctuations in building material costs, fuel costs, interested contractors, labor costs, size of job and complexity, or simply mobilization costs. Conservative design features and cost estimates were based on the best information available. A 20 percent contingency was incorporated to cover the degree of uncertainty inherent in estimating costs for large, competitively bid construction projects.

There is a large amount of uncertainty in describing and formulating the future without revised plan for the water supply purpose of this plan. There is a real need for a dependable source of water supply in the northcentral region of Missouri for the future. If the multiple-purpose reservoir is not built, then the local Sponsors will have to decide on another alternative to meet their future water supply needs. There are potentially many options for this based upon the original Burns and McDonnell studies. Additionally, unforeseeable changes in population, weather, regulations, and other factors may arise in the next few years that change the list of possible options for meeting water supply needs. The East Locust Creek Watershed Revised Plan does not attempt to make a determination of the potential alternative the Sponsors would take to meet water supply needs due to this high level of uncertainty.

Some risk and uncertainty is associated with maintaining good water quality in water supply and recreational reservoirs. Illegal dump sites in the proposed reservoir's watershed and a lack of central sewer systems in the cities of Pollock and Lemons pose risks to water quality. However, the Missouri Department of Natural Resources is committed to working with NRCS and the North Central Missouri Regional Water Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. This plan will create the opportunity for the project Sponsors to apply for grants and technical assistance to address water quality concerns related to the proposed reservoir.

RATIONALE FOR PLAN SELECTION

Alternative 3 is both the National Economic Development (NED) and the recommended plan. This alternative provides the most economically, environmentally, and socially acceptable alternative to address resource issues within the East Locust Creek Watershed. Alternative 3 will fulfill the purposes that were identified by the project Sponsors: 1.) an adequate, dependable, rural water supply reservoir to provide 7.0 million gallons of raw water per day for treatment and distribution to the Green Hills Area of northcentral Missouri, 2.) reduction of floodwater damages along East Locust Creek and its tributaries, and 3.) development of water-based recreational facilities. The recommended plan was selected by the watershed Sponsors as the most efficient and effective alternative to meet their identified project purposes.

COMPARISON OF ALTERNATIVE PLANS

TABLE I

Effects	Alternative 1	Alternative 2
MEASURES		
Structural	Installation of one multiple-purpose reservoir designed to store the 1% recurrence interval flood, 22 small, single-purpose structures, 5 sediment basins, and 7 modified structures.	Installation of one multiple-purpose reservoir designed to store the 4% recurrence interval flood, 39 small, single-purpose structures, 5 sediment basins, and 7 modified structures.
PROJECT INVESTMENT		
Structural	$52,950,600	$54,266,100
National Economic Development (NED) Account		
Average Annual Costs	$2,931,800	$3,011,500
Average Annual Beneficial Effects	$4,699,400	$4,794,500
Net Beneficial Effects	$1,767,600	$1,783,000
Environmental Quality (EQ) Account		
Fisheries/Wildlife Habitat	Negative impacts will be mitigated on 1,605 acres of woody and grassland habitat.	Negative impacts will be mitigated on 1,605 acres of woody and grassland habitat.
Scenic/Aesthetic Improvements	2,235-acre reservoir with an enhanced, vegetated corridor around the lake.	2,235-acre reservoir with an enhanced, vegetated corridor around the lake.
Erosion/Sediment Reduction	Erosion reduced 9% from all sources; 38% reduction in monetary damages from floodplain sediment; stabilization of eroding gully systems.	Erosion reduced 11% from all sources; 40% reduction in monetary damages from floodplain sediment; stabilization of eroding gully systems.
Water Quality	Suspended solids, total nitrogen, and total phosphorus reduced due to reservoir trapping and land treatment.	Suspended solids, total nitrogen, and total phosphorus reduced due to reservoir trapping and land treatment.
Wetlands	178.5 acres of wetlands will be created in the reservoir's permanent pool; minimum of 63 acres of wetlands created within the temporary pool.	178.5 acres of wetlands will be created in the reservoir's permanent pool; minimum of 63 acres of wetlands created within the temporary pool.
Stream and Riparian Areas	Approximately 29 miles of stream channel inundated. Restoration of degraded riparian areas upstream and downstream of the reservoir.	Approximately 29 miles of stream channel inundated. Restoration of degraded riparian areas upstream and downstream of the reservoir.
Other Social Effects (OSE) Account		
Flood Damages	22% reduction in flood damages.	23% reduction in flood damages.
Recreational Opportunities	Water-based recreational facilities, 72,000 recreational visits annually.	Water-based recreational facilities, 72,000 recreational visits annually.
Real Estate Values	Expected increase in property values.	Expected increase in property values.
Flood-related Social, Economic, & Psychological Problems	Problems reduced.	Problems reduced.
Regional Economic Development (RED) Account		
Total Estimated Regional Benefits		
New Jobs	2,875 (863 short term)[a]	2,899 (882 short term)[a]
Value Added	$74,388,200 ($23,732,100 short term)[a]	$75,054,400 ($24,236,300 short term)[a]
Total of Industry Output	$171,525,300 ($62,907,200 short term)[a]	$173,565,000 ($64,338,800 short term)[a]
Total Estimated Regional Costs		
Reduced Flooding	$337,300	$597,900
Water Supply/Recreation	$17,909,900	$17,909,900
Total	$18,247,200	$18,507,800
Net Regional Benefits	$56,141,000	$56,546,600

TABLE I (continued)

Effects	Alternative 3 (NED/Recommended Plan)	Alternative 4 (Future Without Revised Plan)
MEASURES		
Structural	Installation of one multiple-purpose reservoir designed to store the 4% recurrence interval flood, 22 small, single-purpose structures, 5 sediment basins, and 7 modified structures.	Installation of 51 small, single-purpose structures.
PROJECT INVESTMENT		
Structural	$52,470,500	$4,126,400
National Economic Development (NED) Account		
Average Annual Costs	$2,905,600	$259,100
Average Annual Beneficial Effects	$4,750,100	$225,800
Net Beneficial Effects	$1,844,500	-$33,300
Environmental Quality (EQ) Account		
Fisheries/Wildlife Habitat	Negative impacts will be mitigated on 1,605 acres of woody and grassland habitat.	No significant change is anticipated in wildlife habitat quality from the original 1987 plan.
Scenic/Aesthetic Improvements	2,235-acre reservoir with an enhanced, vegetated corridor around lake.	Continued rural setting; several small lakes constructed.
Erosion/Sediment Reduction	Erosion reduced 9% from all sources; 40% reduction in monetary damages from floodplain sediment; stabilization of eroding gully systems.	Erosion reduced 7% from all sources; 18% reduction in monetary damages from floodplain sediment; stabilization of eroding gully systems.
Water Quality	Suspended solids, total nitrogen, and total phosphorus reduced due to reservoir trapping and land treatment.	Some reduction in suspended solids, total nitrogen, and total phosphorus due to land treatment alone.
Wetlands	178.5 acres of wetlands will be created in the reservoir's permanent pool; minimum of 63 acres of wetlands created within the temporary pool.	There will be no net loss of wetlands as a result of project activities as any wetlands impacted will be mitigated as per a 404 permit.
Stream and Riparian Areas	Approximately 29 miles of stream channel inundated. Restoration of degraded riparian areas upstream and downstream of the reservoir.	Installation of small, headwater structures only. Impacts to headwater drainages mitigated through the 404 permitting process.
Other Social Effects (OSE) Account		
Flood Damages	22% reduction in flood damages.	18% reduction in flood damages.
Recreational Opportunities	Water-based recreational facilities; 72,000 recreational visits annually.	Continued lack of recreational opportunities.
Real Estate Values	Expected increase in property values.	Expected stagnant or decreasing property values.
Flood-Related Social, Economic, & Psychological Problems	Problems reduced.	Problems reduced.
Regional Economic Development (RED) Account		
Total Estimated Regional Benefits		
New Jobs	2,875 (863 short term)[a]	95 (57 short term)[a]
Value Added	$74,388,200 ($23,732,100 short term)[a]	$2,833,800 ($1,512,800 short term)[a]
Total of Industry Output	$171,525,300 ($62,907,200 short term)[a]	$9,589,700 ($4,295,700 short term)[a]
Total Estimated Regional Costs		
Reduced Flooding	$337,300	$301,100
Water Supply/Recreation	$17,909,900	-
Total	$18,247,200	$301,100
Net Regional Benefits	$56,141,000	$2,532,700

a. Short term refers to benefits realized during construction period. 1st value is total (short term+long term benefits).

CONSULTATION AND PUBLIC PARTICIPATION

In June 1987, the East Locust Creek Watershed Plan and Environmental Assessment (EA) was signed by the project Sponsors and the USDA-Soil Conservation Service (SCS). Numerous meetings were held during the planning process that led to its signing. These meetings will not be listed in this revised plan. Consultation and public participation that has occurred in preparation of the East Locust Creek Watershed Revised Plan and Environmental Impact Statement (EIS) are documented. The primary purpose of the revision is to add to the original plan a multiple-purpose reservoir designed to provide 7.0 million gallons per day of raw water to be treated and sold as rural water supply. The revised plan will also eliminate some small floodwater retarding (FWR) structures that were included in the original plan and will include development of water-based recreational facilities.

September 2000	The North Central Missouri Rural Electric Cooperative, Northeast Missouri Rural Telephone, and Public Water Supply District #1 formed a coalition to pursue additional water supply for Sullivan County and northcentral Missouri. A preliminary engineering study was funded to determine potential water sources.
November 2000	The coalition contacted the Locust Creek Watershed District and NRCS about assistance to construct a water supply reservoir.
April 2001	A steering committee for the lake project was established consisting of farm, home, and business owners; representatives from Unionville; Sullivan and Putnam Counties SWCDs; Green City; Trenton; Milan C-2 School Board; Farm Bureau; Sullivan County PWSD #1; and University Extension. Several meetings were held including: April 24, 2001, May 21, 2001, July 25, 2001, December 11, 2001, and others.
August 2001	Green City, the City of Milan, and Sullivan County Public Water Supply District #1 formed a regional wholesale water cooperative (North Central Missouri Regional Water Commission) to secure adequate water resources to serve the region.
Early 2002	The North Central Missouri Regional Water Commission (NCMRWC) received a HUD Special Projects grant to facilitate planning of a regional reservoir. The Burns and McDonnell engineering firm was asked to prepare a feasibility study and master plan for a regional project. The Commission began meeting each month. Meetings were promoted by letters, notices, newspaper articles, and radio.

October 2, 2003	Meeting of NCMRWC, NRCS, and Burns and McDonnell personnel to review and discuss the feasibility study and master plan prepared by Burns and McDonnell.
November 4, 2003	A scoping meeting was held to discuss the purposes of the proposed project and possible alternatives. Participants also discussed the inclusion of recreational facilities in the plan and the project's impacts on wetlands, wildlife, cultural resources, etc.
June 14, 2004	A public meeting was held at the Milan Community Center. A presentation was given to explain the types of assistance available through the PL-566 program for assisting in the design and construction of a rural water supply reservoir. Presenters addressed questions from the audience.
June 15, 2004	NRCS received a request from the NCMRWC to assist in the planning and construction of a rural water supply reservoir to serve northcentral Missouri. NRCS agreed to begin the planning process.
June 15, 2004	A meeting was held with the Locust Creek Board of Trustees, SWCD, NCMRWC, and NRCS personnel to discuss impacts that a revised watershed plan would have on measures installed or planned under the original 1987 watershed plan.
July 8 and August 17, 2004	A meeting was held with personnel from NCMRWC, Locust Creek Watershed District, MDNR, MDC, USACE, USFWS, USEPA, and NRCS concerning content and preparation of the EIS portion of the watershed plan.
September 7, 2004	A Notice of Intent to prepare an environmental impact statement was issued for the East Locust Creek Watershed.
October 19, 2004	Personnel from NRCS National Headquarters conducted a meeting to discuss NRCS' involvement in the East Locust Creek Watershed project. Also, in attendance were representatives from NCMRWC, Locust Creek Watershed District, SWCD, City of Milan, and NRCS Missouri.
December 22, 2004	A meeting was held with the Missouri Department of Transportation to discuss impacts of the proposed water supply reservoir and other project measures on state highway routes. NCMRWC and NRCS personnel also attended.

January 19, 2005	A public meeting was held at the Milan Community Center. A progress report was presented on the watershed plan being prepared by NRCS.
February 15, 2005	A meeting was held to discuss potential recreational facilities that would be associated with the proposed rural water supply reservoir. In attendance were personnel representing NCMRWC, Locust Creek Watershed District, SWCD, MDNR, MDC, and NRCS.
March 17, 2005	A meeting was held to discuss progress on the Revised East Locust Creek Watershed Plan. In attendance were representatives from the Locust Creek Watershed District, SWCD, and NRCS.
March 30, 2005	A meeting was held to discuss progress on the Revised East Locust Creek Watershed Plan. In attendance were representatives from NCMRWC, Locust Creek Watershed District, City of Milan, Green City, Sullivan County PWSD #1, NRCS Fort Worth National Technical Support Center, NRCS National Water Management Center, and NRCS Missouri.
April 27, 2005	A meeting was held to discuss mitigation strategies related to impacts of project measures to wetlands, stream resources, fish and wildlife habitats, threatened and endangered species, etc. In attendance were representatives from NCMRWC, Premium Standard Farms, MDNR, MDC, USACE, USFWS, USEPA, and NRCS.
March 27, 2006	A public meeting was held in Milan, Sullivan County, Missouri. Representatives from USDA-NRCS presented the recommended plan, and questions concerning the project were addressed.
May 25, 2006	A meeting was held with personnel from NCMRWC, MDNR, MDC, USACE, USFWS, USEPA, and NRCS to discuss comments received during the interagency review period on the draft EIS. Decisions were made concerning the preparation of NRCS' response to submitted comments.
Significant Written Comments	A list of recipients receiving copies of the draft East Locust Creek Watershed Revised Plan – Environmental Impact Statement is included in Appendix A. Letters, comments, and responses concerning the draft Revised Plan–EIS are reprinted in Appendix A.

RECOMMENDED PLAN

PURPOSES

1. Agricultural water management (rural water supply);
2. Development of water-based recreational facilities;
3. Flood prevention and reduction of flood damages.

SUMMARY

The National Economic Development (NED) plan is the recommended plan. It was selected by the Sponsors for implementation. The plan includes one multiple-purpose reservoir for agricultural water management (rural water supply), water-based recreational opportunities, and flood prevention. The plan also includes 22 small floodwater retarding (FWR) structures; modification of 7 existing FWR structures; and 5 sediment/debris basins. The project installation period is estimated at 6 years. Proper operation, maintenance, and replacement (OM&R) are planned for all measures, excluding the multiple-purpose structure, for a 75-year life period. The OM&R agreement for the multiple-purpose structure will be 100 years.

The benefit/cost ratio is 1.63 (or $1.63 of benefits generated for each $1.00 spent).

MEASURES TO BE INSTALLED

Land Use and Treatment

The watershed contains nearly 5,617 acres currently in the USDA-Conservation Reserve Program (CRP). CRP expiration dates range from 2007 to 2018. Bringing these lands back into crop production after expiration from CRP could significantly increase the need for conservation measures to protect the watershed's water quality. NRCS and the Sponsors will encourage continued and expanded use of the CRP and similar programs to protect the entire watershed.

Maintaining water quality to meet state standards is an important concern for the proposed multiple-purpose reservoir and the East Locust Creek stream system. Soil erosion, sedimentation, and agricultural non-point pollution can be reduced through education of producers and landowners and implementation of conservation practices. Federal, state, and local on-site septic system, stormwater control, and soil erosion regulations also reduce negative environmental impacts in the watershed.

Land treatment for water quality protection will be improved on agricultural land through existing Natural Resources Conservation Service (NRCS), Soil and Water Conservation District (SWCD), Missouri Department of Natural Resources (MDNR), Missouri Department of Conservation (MDC), and Environmental Protection Agency (EPA) technical, financial, and educational assistance programs. Public water supply watersheds are eligible for the Missouri Conservation Reserve Enhancement Program (MoCREP). MoCREP can be used to protect water quality through incentive payments to convert cropland to permanent vegetative cover.

As stipulated in the watershed agreement, the Sponsors will ensure that 75 percent of the land upstream of the multiple-purpose reservoir and each small FWR structure is adequately protected from erosion prior to construction of that particular measure. As needed, specific measures to add, improve, or supplement existing conservation measures will be agreed to prior to project implementation by the project Sponsors, NRCS, and any other necessary entities. Measures could include, but are not limited to: filter strips, riparian buffers, livestock exclusion, prescribed grazing, nutrient management, grade stabilization structures, terraces, grassed waterways, tree plantings, etc.

Structural Measures

A multiple-purpose reservoir will be designed to serve the purposes of agricultural water management (rural water supply), water-based recreation, and flood prevention. The reservoir will provide 7.0 million gallons of raw water per day to be treated for public consumption. "The Water Use Study, North Central Missouri Regional Water Commission, Sullivan County, Missouri" (Missouri Department of Natural Resources, May 20, 2004) was used as a guideline by the Commission to determine a raw water yield needed by 2025 to provide the water needs of its customers in the Green Hill Region. Yields needed by 2025 for probable customers and potential customers were examined and ranged from 4.5 MGD to 8.5 MGD. The Commission decided to use a 7.0 MGD yield for project planning purposes. The reservoir will be located on the mainstem of East Locust Creek approximately 4 miles north of Milan, Missouri. (Refer to East Locust Creek Watershed Map, Appendix F).

The Sullivan County Commission, upon receiving recommendations from the Missouri Department of Natural Resources Northeastern Regional Office, determined water demands. Water use within the county was detailed by the Green Hills Regional Planning Commission. A reservoir operation study was made to assure that an adequate amount of runoff occurs to supply the demand. A Water System Feasibility Study (Burns and McDonnell, 2003) was also prepared to determine feasibility of the project. Existing needs, future needs, and current water usage is detailed in the Watershed Problems and Opportunities section of this plan.

Twenty-two small FWR structures are planned for construction in the Little East Locust Creek drainage area. Seven existing structures that will be impacted by the multiple-purpose reservoir will be modified. Five sediment/debris structures are planned immediately upstream of the multiple-purpose reservoir.

Recreational Facilities
A portion of the land acquired for the multiple-purpose reservoir will be used to develop water-based recreational facilities. (Refer to Multiple-Purpose Reservoir and Recreational Facilities Map, Appendix B). Basic facilities planned include:

- access points
- fishing piers/platforms
- boat ramps
- swimming beaches
- shelterhouses
- picnicking facilities
- playground equipment
- walking/jogging/bicycle trails
- restrooms
- primitive camping sites
- bank fishing areas
- parking facilities
- underwater fish structures
- tree and shrub plantings

These facilities will provide much needed recreational opportunities for the residents of Sullivan County and surrounding areas, and will be designed to meet relevant standards set forth in the Americans with Disabilities Act (ADA). Refer to Table 2B for specific components of the recreational development.

Pre-Design Conference
A pre-design conference will be held prior to the initiation of the field survey for the reservoir. The conference will be scheduled by the NRCS project engineer and attended by the NRCS district conservationist and other necessary NRCS personnel, MDC and USFWS representatives, other appropriate state and federal personnel, and other representatives of the local Sponsors. Design details of the embankment and reservoir will be discussed. These will include limits of areas to be cleared and grubbed; pool size, depth, and surface area; fencing details; mitigation criteria; and environmental opportunities. Environmental opportunities include wildlife and fisheries enhancements, wetland development, and streamflow augmentation. Easement and riparian areas adjacent to the reservoir will be utilized for wildlife enhancement. Mitigation criteria are described under the heading "Mitigation Features".

Environmental Criteria
Clearing of the reservoir area will be limited to that needed for the embankment, spillways, intake tower, other required appurtenances, and any portion at or below the principal spillway elevation deemed necessary for borrow areas, or within 400 feet upstream of the principal spillway. Clearing may also be planned for boating safety. Timber and woody growth will be left standing in the upper ends of the pool, coves, and side-gully tributaries. The purpose of this practice is to improve wildlife habitat diversity.

In borrow areas that will be covered with shallow water, either permanent or temporary, the soil surface should be left to create an undulating bottom. Leaving the bottom at various elevations, including pools, will create diverse wetland habitat suitable to a wider array of species. MDC and USFWS personnel will be consulted prior to or during the design and construction phases for recommendations on this feature.

The construction period for the multiple-purpose reservoir, the small FWR structures, and other works of improvement is estimated at 6 construction seasons. During construction, temporary seeding, mulching, or other best management practices will be applied to disturbed areas, as soon as possible, when winter shut-down seems eminent.

Prior to construction, the area to be inundated will be systematically surveyed to determine the presence of any solid or hazardous wastes. All waste that is found below the elevation of the top of the dam will be removed and properly disposed of. In addition, the Missouri Department of Natural Resources (MDNR) will be asked to check their records for the presence of any active or abandoned solid or hazardous waste or leaking underground storage tank sites within the East Locust Creek Watershed. Appropriate action will be taken to assure that the risk of any discharge to the reservoir is minimized.

Multiple-Purpose Reservoir

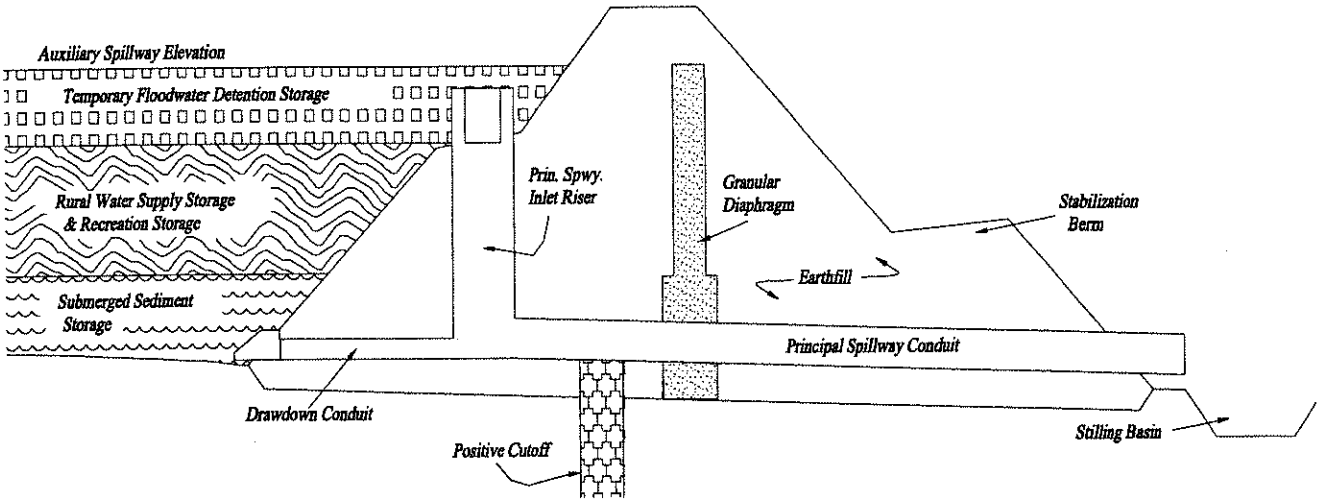
The multiple-purpose reservoir will be designed using NRCS Technical Release 60 criteria as a basis for design due to the high (class c) hazard classification. Specific data for the reservoir are provided in Table 3.

Storage for approximately 2 watershed inches of sediment is reserved in the reservoir with 85 percent being submerged and 15 percent being stored above the permanent pool.

The design of the reservoir embankment is based on high hazard hydrologic criteria except for the temporary storage criteria. The principal spillway will consist of a single stage, reinforced concrete, baffle-type riser and reinforced concrete pipe which outlets into a portion of the auxiliary spillway stilling basin. The auxiliary spillway will consist of a 240 foot wide, overtopping, roller compacted concrete structure. The exit portion of this spillway will consist of approximately 33-five foot horizontal by two foot vertical steps. A low flow port is traditionally installed in the principal spillway riser to augment streamflow below the reservoir. However, the low flow port for this structure may be installed in the raw water intake tower. This may allow easier manipulation to mimic mitigated low flows.

A structural auxiliary spillway was used in lieu of the detention storage and principal spillway requirements for earthen and vegetated earthen auxiliary spillways as contained in NRCS Technical Release 60. Attempts to fully meet TR-60 storage requirements for this scale of reservoir were not environmentally or economically feasible. The location of a vegetated spillway would introduce high energy flows into an adjacent small tributary, and if ever functional, would cause significant erosional damages. Also, a vegetated spillway would require temporary retention of the 100-year, 24-hour storm event. Significant and costly mitigation would be required to offset impacts to the downstream channel with this large retention volume. Instead, the reservoir has approximately 8,800 ac-ft of temporary floodwater retarding storage. The crest of the auxiliary spillway is at the elevation of full pipe flow for the principal spillway. The auxiliary spillway has approximately a four percent or less chance of flowing in any given year.

Figure 1
Typical Cross-Sectional View of Multiple-Purpose Reservoir



The reservoir embankment has been classified as high hazard. The NRCS State Conservation Engineer has recommended that the RW-1 structure be given a "class c" hazard classification. The Missouri Department of Natural Resources Dam and Reservoir Safety Council will consider this structure as an "environmental class I". This class identifies all structures that may inundate 10 or more permanent dwellings or any public building with permanent water.

Structure RW-1 is designed to safely convey the runoff from the probable maximum precipitation storm through the structure without extensive damage. High hazard dams are those located where failure may cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, main highways, and railroads. This classification is based on the potential hazard due to the presence of buildings and rural highways in the floodplain below the reservoir. The number of persons at risk during a catastrophic failure of the structure is difficult to estimate due to numerous variables (time of failure, traffic count, evacuation warning time, etc.). A conservative estimate is that as many as 250 people could be affected.

Limits of the flood wave from such a failure or breaching are delineated on the breach inundation maps in Appendix C. Delineation of the flood boundaries was terminated where the water surface elevation of the breach flow is less than the elevation of a 100-year, 24-hour flood with the dam built. To avoid the possibility of creating unsafe conditions, future development within the breach inundation zones will be in accordance with the regulations of the federal floodplain management and flood insurance programs.

Since the reservoir dam has a high hazard classification, the preparation of an emergency action plan by the project Sponsors is required prior to initiating construction. The purpose of the emergency action plan is to outline and define procedures to be followed in the event critical conditions develop relative to the dam. These conditions could result in the uncontrolled release of water or failure of the dam. The plan will also outline responsibilities of key personnel who will take necessary and immediate action in the event such conditions develop. Due to the close proximity of State Route 5, the emergency action plan should also include actions to protect the water supply in the event of a transportation accident that results in a hazardous materials incident. The state conservationist will determine that an emergency action plan is prepared prior to the initiation of construction.

The Sponsors will secure landrights needed for installation and maintenance of the reservoir. Landrights will be either fee-simple title or perpetual easements to the top of dam elevation of the multiple-purpose reservoir measure and will be obtained for the embankment areas, spillways, pools, spoil disposal areas, borrow areas, and areas needed for other activities. The Sponsors will, at a minimum, purchase that land which lies within the permanent pool and a 100-foot horizontal buffer from the principal spillway inlet elevation (permanent pool) outward. Also, if this buffer area does not extend up to the contour of the auxiliary spillway crest elevation, then additional acquisition will be required up to this contour. Landrights will be obtained for approximately 2,235 acres of permanent pool, 277 acres of temporary pool, 91 acres for the embankment and spillway, 805 acres of buffer area, and approximately 2,402 acres of miscellaneous area typically involved with the "squaring off" of land purchases. NRCS will require that the Sponsors acquire additional landrights to cover an area to the top of dam elevation. These additional real property rights would provide an additional 447 acres of vegetative buffer and mitigation areas while restricting development adjacent to the reservoir.

Construction of the reservoir will require the acquisition of approximately 20 residences and relocation of affected residents. Additionally, portions of State Route N and 6 different graveled township roads will be inundated, totaling 0.9 miles and 4.1 miles respectively. There are also water supply mains, telephone lines, and power lines that will be affected by the reservoir installation. The Burns and McDonnell master plan identified these 3 items (Burns and McDonnell, November 2003). The current design incorporates their inventory and replacement figures with adjustments for site location and pool enlargement. The water supply mains are planned to have approximately 2.7 miles impacted and 5.0 miles replaced. The telephone lines will have 4.6 miles abandoned and replaced by 2.2 miles of overhead and fiber optic lines. Finally, 2.4 miles of power lines will replace 6.6 miles of impacted lines. These figures were made from a cursory remote sensing review for planning purposes.

The proposed location for the multiple-purpose reservoir embankment is underlain primarily by soils formed in alluvium, loess, and glacial till. Portions of the left abutment area are underlain by soils formed in sandstone and siltstone (USDA-NRCS, April 1995). Subsurface geology at the embankment location consists of Pennsylvanian age sandstones and shales of the Pleasanton group and limestones and shales of the Marmaton group. Sandstones and silty shales were noted in bedrock outcrops in the left abutment area. Shale was encountered at a relatively shallow depth in a backhoe pit excavated near the toe of the right abutment.

Bedrock is relatively shallow in the left abutment area. Bedrock is deeper in the right abutment and is covered by thick layers of glacial till. At least 4 bedrock joint sets were identified in outcrops in the area. A preliminary foundation investigation was conducted using a backhoe in September 2004. A detailed, planning stage, foundation investigation of the proposed multiple-purpose reservoir site was completed in September 2005. About 40 test holes were drilled and approximately 90 samples collected. Samples included standard penetration testing, Shelby tubes, and large bag samples. All samples have been sent to the USDA-NRCS Soil Mechanics Laboratory in Lincoln, Nebraska for testing. Additional foundation investigations will be conducted prior to final design.

Borrow material for the embankment fill will be obtained primarily from two hilltop sources on the right abutment. A limited amount of material will be taken from the permanent pool area of the reservoir to avoid any unnecessary seepage losses. These materials were sampled during the above mentioned drilling and sampling contract. It is anticipated that these areas will primarily yield a clay, glacial till material adequate for use in construction.

Since the reservoir will provide a source for rural water supply and recreational opportunities, additional land treatment and technical assistance components have been targeted toward potential sources of water quality impairment located within the drainage area. Specifically, 5 sediment and debris basins will be constructed around the fringe of the permanent pool.

Water-based recreational facilities are planned for the reservoir site. The plan includes facilities for fishing, picnicking, trails, and restrooms. Table 2B displays the basic facilities plan and costs associated with the recreational development at the reservoir. The recreation plans include facilities designed according to ADA specifications for use by persons with disabilities, and appropriate state and federal guidelines for safety, health, and sanitation. A map of the planned recreational developments is included in Appendix B.

Mitigation for the loss of stream channel inundated by the pool of the multiple-purpose reservoir may include, but is not limited to, riparian restoration and perpetual conservation easements on riparian areas upstream and downstream of the reservoir on East Locust Creek and its tributaries; provision for in-stream flow; in-channel mitigation measures, land acquisition; and cash payment to the Missouri Stream Stewardship Trust Fund. Mitigation measures will be agreed to prior to issuance of the necessary project permits and prior to the start of construction activities.

There are 3 major alterations, changes, and/or modifications to existing improvements in the original East Locust Creek Watershed Plan – Environmental Assessment due to the installation of the multiple-purpose reservoir. As mentioned above, there are 5 sediment and debris basins planned. Secondly, there are 7 existing, small FWR structures that will be impacted by the permanent or temporary flood pool from the installation of the multiple-purpose reservoir. Finally, there are 7 existing, small FWR structures that will be totally inundated by the permanent pool of the water supply reservoir. These 7 totally inundated sites are E-26, E-27, E-28, E-38b, E-39, E-40, and E-41, installed in accordance with the original East Locust Creek Watershed Plan-EA, signed in 1987. There was $341,000 of cost-share provided by NRCS to the Sponsors in accordance to prior agreements for construction of those sites. The North Central Missouri Regional Water Commission will be required to reimburse NRCS for the cost-share previously provided since those sites will be eliminated.

The 5 sediment/debris basins were actually intended to be small FWR structures in the original 1987 plan. These structures will have a height times storage of less than 3,000, and will be designed according to NRCS Practice Standard Sediment Basin 350. These sites will not be over 35 feet in overall height. These 5 basins will provide for the storage of sediment and debris for a period of 75 years. Sediment and debris storage has been allotted from the principal spillway inlet to the bottom of the basin.

The 7 existing structures requiring modification will be redesigned to maintain their sediment storage capacity, but will not provide flood storage. Each structure will require a specific redesign plan to armor the downstream portions of the embankment. Redesign plans may include additional stability berms, riprap, geotechnical alternatives, or a combination of measures. For estimation purposes, it was assumed a notch at least the dimensions of the site's auxiliary spillway will be installed in the embankment. The crest portion of this notch would then be at the lower of the following: the principal spillway inlet elevation of the existing, small FWR structure, or approximately 1.0 foot below the principal spillway inlet elevation of the multiple-purpose reservoir. The back side of the structure and a portion of the new spillway would then be armored at least up to the water surface elevation of the multiple-purpose reservoir produced by the runoff from the 10-year, 24-hour storm event.

At this time, as long as no adverse safety conditions exist or can be predicted, there will be no alterations or decommissioning of the 7 existing structures that will be completely inundated by the multiple-purpose reservoir. These 7 will be left in their existing state until inundated. These sites will then assist during construction and initial fillings of the large reservoir to reduce sediment into the area and provide some floodwater retarding benefit to the site.

Small Floodwater Retarding (FWR) Structures

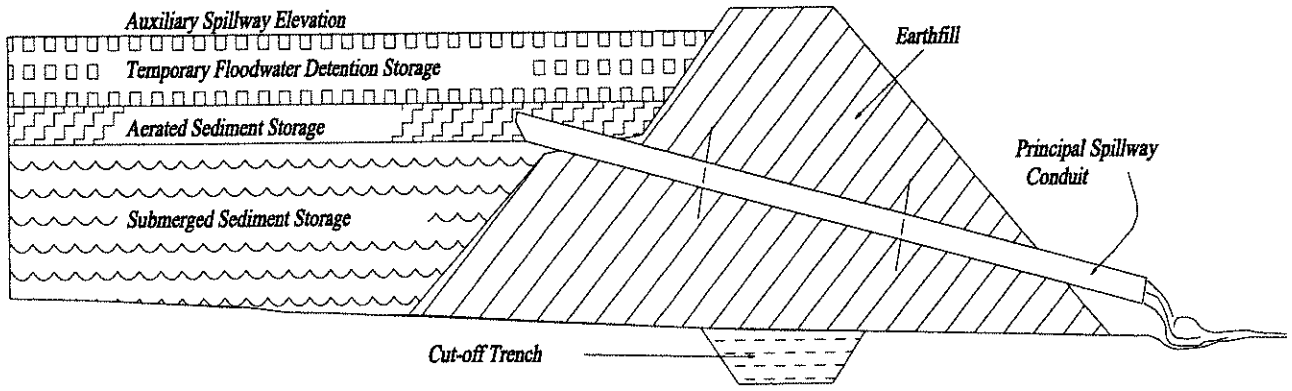
Twenty-two small FWR structures are included in the revised plan. All of these structures are located on the Little East Locust Creek Tributary. Seventeen of the 22 are planned structures from the original East Locust Creek Watershed Plan. The other 5 structures are located within the drainage area of the original plan's Site E-10. The landrights for Site E-10 were deemed unobtainable by the local Sponsors. However, 5 small structures proved to be both feasible and socially acceptable for the revised plan.

These small FWR structures will be designed using the NRCS Practice Standards Pond 378 and Dam 402. These structures will have a height times storage of less than 3000. Additionally, all structures should be less than 35 feet in overall height. Sample sites were not investigated in the traditional sense for the revised plan. The original 1987 plan has 72 small FWR structures completed to date. Quantities, elevations, and dimensions for 65 of those structures were used to plan the remaining 22 proposed small structures in the revised plan. A breakdown of estimated statistics for the proposed small structures is shown below in Table J.

TABLE J
Single-Purpose Floodwater Retarding Structures

Drainage Area Range	No. Dams	Principal Spillway		Avg. Sediment Pools		Avg. Flood Pools	
		Size	Release Range	Surface	Storage	Surface	Storage
ac				ac	ac-ft	ac	ac-ft
100-175	6	6"	7-13 csm	3.6	19.8	7.2	36.6
176-225	7	8"	8-14 csm	5.9	30.3	10.7	48.8
226-300	4	8"	8-14 csm	7.1	38.6	12.7	60.4
>300	5	10"	11-15 csm	8.7	48.7	15.2	66.1
Average For Small Dams:			Earthfill = 22,000 c.y. Embankment Height = 28.3 feet Drainage Area = 206 ac. Stage between Sediment Pool and Flood Pool = 6.5 feet				

Figure 2
Typical Cross-Sectional View of Small FWR Structure



The small FWR structures will be designed to store 90 percent of the estimated 2.0 watershed inches of sediment below the principal spillway inlet elevation. The remaining 10 percent will be stored above the inlet as aerated sediment. The principal spillways will consist of new smooth steel pipe, including steel anti-seep collars as specified.

The small structures will also be designed to store the runoff from the 10-year, 24-hour storm event (5.0 in. rainfall or 2.9 watershed inches runoff). The auxiliary spillway inlet will be located at the upper limits of this temporary storage. This will be a vegetated earthen spillway. It will be designed to pass the 50-year, 24-hour storm event (6.5 inches). In addition, a minimum of one foot of freeboard will be added to the maximum water surface elevation generated by the storm routings. Finally, the 25-year, 24-hour storm event will be routed starting at the auxiliary spillway inlet crest. This will be used to determine top of dam elevation, unless previous routings exceed this value.

Approximately 25 percent of the sites may exhibit rippable shales, sandstones, and limestones in the foundation or abutments. Most of these rock units appear to be sound, and a positive cutoff of seepage water can be accomplished by keying the cut-off trench into the rock 2 or 3 feet. Deeper, recent alluviums tend to be associated with those sites located immediately above the major floodplains while the shallower recent alluvium occurs on those sites on the smaller upland tributaries.

Sufficient borrow material can be found within the sediment pool area on approximately 85 percent of the small structure sites. Some borrow material may need to be obtained above the sediment pool elevation on 15 percent of the structures. Field examination of several structure sites, as well as general knowledge of soils and geology of the watershed, indicates borrow material will consist of glacial till and alluvium. Sediment pools and any additional borrow areas will be cleared as determined during field design.

The Locust Creek Watershed District will secure all the landrights required for installation of the small structures. Approximately 200 acres of fee simple title or term easements will be needed for the structures, spillways, and permanent pools. Some type of flowage easement will additionally be required for approximately 145 acres in the flood pools of the structures up to the top of dam elevation. There are no relocations associated with installation of the small FWR structures.

All of the small structures will be classified as low hazard (class a), according the National Engineering Manual, Part 520. This means that in case of embankment failure, damage would be limited to uninhabited farm buildings and agricultural land. Also, isolation of a community would not occur due to any damage caused to roads within the watershed. These low hazard structures are not designed to safely route the probable maximum precipitation event. This does allow a possibility of breach failure. All small FWR structures are located in the upper tributaries of the main channel. Additionally, none of the small FWR structures are in series. Any breach would cause immediate inundation in the tributary. This, however, would rapidly dissipate when the flood wave reached the main channel. Additional development downstream of these proposed structures could create a more hazardous condition than currently analyzed. A specific breach impact area was not defined for each site. Prior to any development within the limits of this potential hazard area, specific site evaluation studies would be made to reduce the

possibility of creating any unsafe conditions within the watershed. It is also, very unlikely, at this time that development will occur on the small tributary floodplains. However, NRCS would
recommend that the Sponsors work with local authorities as a precautionary measure to prevent future development in these potential hazard areas.

There are alterations, changes, and/or modifications to existing improvements in the original East Locust Creek Watershed Plan – Environmental Assessment. As mentioned earlier, there will be small FWR sites to replace the large FWR structure, E-10. More importantly, those small sites from the original plan that are not currently built or under construction and that are located along the mainstem of the East Locust Creek are eliminated in the revised plan. The minimal floodwater retarding storage that is coincidentally designed into the large multiple-purpose reservoir adequately substitutes the flood protection benefits that the original plan intended.

Livestock watering systems will be installed in the small FWR structures. These systems will be installed at a 50/50 cost share rate, as outlined by agricultural water management rates. The landowner will be responsible for 50 percent of costs, except in situations involving mitigation requirements.

MITIGATION FEATURES

Multiple-Purpose Reservoir

Wildlife Habitat

Approximately 626 units of wildlife habitat will be lost on cropland, grassland, and upland and bottomland hardwood acreage that will be converted to the multiple-purpose reservoir's permanent pool. Refer to Appendix E, Investigations and Analyses, Biology section for methodology/species used to determine wildlife habitat units. The 626 habitat units lost will be mitigated with 626 habitat units on a 1,605-acre mitigation area adjacent to the permanent pool.

Features of the plan that will reduce detrimental impacts on wildlife include limited clearing for construction of the reservoir, installation of a draw-down pipe to regulate permanent pool size, restricted work limits, and flow augmentation to replicate, as nearly as practical, natural baseflow conditions downstream of the reservoir. Other features planned to mitigate impacts on wildlife (measured in habitat units) include development of a 1,605-acre mitigation area adjacent to the reservoir.

Stipulations for the mitigation acres include:

- When obtaining mitigation acres around the multiple-purpose reservoir, credit will be given for the acres in the required buffer zone and the flood pool area;

- Areas obtained for the 1,605 acres of mitigation will be maintained in a natural state if the existing vegetation consists of wildlife friendly species and can be managed to meet the goal of a 0.80 HSI for a species associated with a targeted habitat type, such as bobwhite quail. In areas without wildlife friendly species; grasses, trees, and/or shrubs will be planted based upon recommendations of an NRCS or MDC biologist and/or forester;

- Forest management will be allowed based upon consultation with an NRCS or MDC forester;

- Trees should not be removed from the permanent and floodpool areas except as needed for excavation of borrow materials required for construction of the reservoir components, except as necessary due to detrimental impacts to the structure that may exist, or for boating safety;

- Any portion of the mitigation area that has wetland characteristics will be allowed to regenerate naturally;

- Grazing will not be allowed in mitigation areas;

- Mitigation areas will be fenced, where necessary, to exclude livestock;

- Prescribed burning that is consistent with wildlife habitat enhancement may be performed. An NRCS approved prescribed burn plan shall be followed;

- Haying is acceptable after July 15 if approved, annually, by a biologist and reviewed by an NRCS or MDC biologist and is contingent on wildlife impacts;

- Mowing will be allowed where necessary to enhance recreational opportunities or as a method to enhance wildlife habitat when approved by the appropriate NRCS or MDC biologist;

- Any cropland would be approved by a biologist and reviewed by an NRCS or MDC biologist;

- The team agreed that full credit for the compensation acres for upland impacts mitigation could begin at the time the land is acquired;

- A management plan for the mitigation area will be developed by the Sponsors in consultation with NRCS, USFWS, MDC, USEPA, and USACE;

- Planting costs have been included as part of the structural measures cost.

Approximately 153,500 feet (29 miles) of stream channel will be inundated by the permanent pool of the proposed multiple-purpose reservoir. Mitigation for the stream that will be lost due to inundation will culminate with the permitting process as required under Sections 404 and 401 of the Clean Water Act. Because it is impossible to replace 29 miles of lost stream channel, with stream channel somewhere else, stream channel mitigation efforts will focus on ways of improving and protecting Locust Creek elsewhere in the watershed.

Mitigation measures may include, but are not limited to, riparian restoration and perpetual conservation easements on riparian areas upstream and downstream of the reservoir on East Locust Creek and its tributaries, provisions for in-stream flow, in-channel mitigation measures, land acquisition, and cash payment to the Missouri Stream Stewardship Trust Fund. Mitigation measures will be agreed to prior to issuance of the necessary project permits and prior to the start of construction activities. In-stream flow, to the extent practical, will replicate the natural baseflow conditions and will be a component of measures needed to mitigate the impacts to East Locust Creek. Flow recommendations will be developed through consultation between appropriate federal and state personnel and the Sponsors.

Mitigation features may also include, but are not limited to, fencing materials and wildlife plantings as approved by appropriate state and federal personnel and the Sponsors. All mitigation measures will be installed using the average cost method. The mitigation area will be fenced, if necessary, to exclude livestock access. Fence will be installed according to NRCS Fencing Specification 382. Mitigation features will be installed at 100 percent of the approved average cost.

Sponsors are responsible for assuring that the mitigation acres are identified and landrights secured. Availability of construction dollars will be dependent upon a balanced acquisition of the mitigation area as the project proceeds.

Wetlands

Approximately 290.9 acres of wetlands, as identified by the National Wetlands Inventory, will be converted within the top of dam elevation and dam and auxiliary spillway and raw water transmission line footprints (refer to Appendix D). However, a preliminary investigation of these wetlands was conducted by an NRCS soil scientist and Missouri Department of Conservation (MDC) biologist (both have had REC IV training). Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and transmission line footprints to assess the quality of wetlands intersected by the transect, and to determine if these wetlands were identified correctly by NWI. Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised.

There will be no net loss of wetlands as a result of project activities. Refer to Appendix E, Investigations and Analyses, Wetlands section for methodology. Potential mitigation includes:

- Wetlands will be created in the shallow water areas in the upper ends, as well as other areas, of the multiple-purpose reservoir to mitigate for impacted wetlands and through mitigation features associated with the 22 small FWR structures. An estimated 178.5 acres of wetlands will be created in the reservoir's permanent pool and a minimum of an additional 63 acres in the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands;

- If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek watershed to the south end of Fountain Grove Conservation Area; and

- Fringe wetlands of another reference reservoir (e.g. Mozingo Structure MP-1) will be used to compare/assess wetland functions.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process.

Small Floodwater Retarding (FWR) Structures

Mitigation features associated with the impact to wildlife habitat by the 22 small FWR structures will remain the same as the original East Locust Creek Watershed Plan (see Investigation and Analysis, Biology Section). The Mitigation Features Section of the original East Locust Creek Watershed Plan state:

"Installation of the project will result in the loss of 1,050 acres of wildlife habitat, including 800 acres covered by sediment pools and 250 acres in the dam and spillway areas. The accelerated forestry plan and land treatment practices included in the recommended plan provide benefits to wildlife that will mitigate 600 acres. The remaining 450 acres will be mitigated through the fencing of the sediment pools and about five acres, including the dam and emergency spillway area, of perimeter lands on 90 of the 120 small floodwater dams. The tri-agency team members have concurred in this approach."

A certified wetland determination will be conducted prior to construction of the small FWR structures to assess potential impacts to wetlands. The appropriate federal and state agencies will be contacted to obtain the necessary permits.

Permits and Compliance

Section 404 of the federal Clean Water Act requires a permit for the deposition of dredged or fill material in the waters of the U.S. Under Section 401 of the Clean Water Act, Section 404 permits are not valid until the State of Missouri certifies that the proposed activity will not violate state water quality standards. Applicable Section 404 permits and Section 401 certifications will be obtained prior to construction. Any required compensatory mitigation will be completed according to conditions established by state and federal regulatory authorities. A Missouri Dam and Reservoir Safety Permit will also be required.

Under the Clean Water Act, National Pollutant Discharge Elimination System Phase 2 rules require a Storm Water Pollution Prevention Plan (SP3) on construction sites disturbing one or more acres. An SP3 will be prepared for the site under the Land Disturbance Permit requirements of the Missouri Department of Natural Resources Water Protection Program. This plan will seek to minimize the discharge of sediment and other pollutants during construction and set forth requirements for establishing permanent vegetation on the site when earthwork is completed.

Permanent vegetation will be established on the embankment, spillway, and surrounding areas of the multiple-purpose reservoir immediately following completion of the final grading and finish operations. Sod-forming grass will be seeded on the embankment and spillway. Seeding mixtures containing clump-type grasses and legumes are not acceptable because of inadequate soil cover and deep root structure. However, areas surrounding the embankment and spillway will be seeded or planted with a mixture of plant materials to provide habitat for wildlife. NRCS, MDC, and other appropriate state and federal personnel will develop planting recommendations.

The reservoir is expected to take approximately 6 construction seasons to build. Temporary seeding and mulching of the disturbed areas will be done as soon as possible when winter shut-down seems imminent.

This document was prepared to comply with the National Environmental Policy Act and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies.

All applicable federal, state, and local laws and regulations for minimizing water, air, and noise pollution will be followed during project activities. The Sponsors are responsible for securing all necessary permits, such as those for stormwater discharge, environmental pollution control, abatement, and access to public rights of way.

COSTS

Project costs, cost distribution, cost-share allocation, and average annual costs are listed in Tables 1, 2, 2a, 2b, 4, and 6. The watershed agreement presents the cost-sharing rates between the Watershed Protection and Flood Prevention Act, Public Law 83-566 funding, and other funds. All project costs are estimates and reflect a 2006 price base. Construction costs for all proposed structural measures are based on established current costs for similar work. A 20 percent contingency allowance is included for construction costs of the multiple-purpose reservoir. The 2002 Agricultural Census for Sullivan County was utilized to estimate costs of land rights for the small FWR structures. The landrights cost for the multiple-purpose reservoir was adjusted from this basis as well.

Engineering services for the structural measures include the cost of engineering analyses and designs, geologic investigations and analyses, archaeological evaluations, and other technical assistance needed to design and layout structural measures. Engineering costs also include investigations, preparation of plans and specifications, and inspection during construction. Project administration costs include contract administration, relocation assistance advisory services, and other related items. There are anticipated relocation costs associated with structural measures in the plan.

INSTALLATION AND FINANCING

Planned Sequence of Installation

The installation of structural measures is planned and coordinated to be accomplished over a 6 year period (Refer to Table K). Funds are scheduled for both construction and technical assistance during this time period

TABLE K
SCHEDULE OF OBLIGATIONS

Year		Item	P.L.- 566	Other	Total
1st	Multi-purpose Reservoir	**Financial Assistance**			
		Structural	0	0	0
		Real Property	700,000	100,000	800,000
		Relocation Assistance	300,000	100,000	400,000
		Technical Assistance			
		Structural	1,059,400	125,000	1,184,400
	Small FWR Structures	**Financial Assistance**			
		Structural	390,000	0	390,000
		Real Property	0	34,100	34,100
		Technical Assistance			
		Structural	172,700	5,700	178,400
		SUBTOTAL	**2,622,100**	**364,800**	**2,986,900**
2nd	Multi-purpose Reservoir	**Financial Assistance**			
		Structural	0	0	0
		Real Property	1,013,700	11,998,000	13,011,700
		Relocation Assistance	1,166,200	1,129,100	2,295,300
		Technical Assistance			
		Structural	1,800,000	325,000	2,125,000

	Small FWR Structures	Financial Assistance			
		Structural	326,300	0	326,300
		Real Property	0	31,000	31,000
		Technical Assistance			
		Structural	161,200	4,800	166,000
		SUBTOTAL	4,467,400	13,487,900	17,955,300
3rd	Multi-purpose Reservoir	Financial Assistance			
		Structural	6,811,900	2,090,100	8,902,000
		Real Property	0	13,400	13,400
		Relocation Assistance	0	0	0
		Technical Assistance			
		Structural	1,773,600	746,400	2,520,000
	Small FWR Structures	Financial Assistance			
		Structural	0	0	0
		Real Property	0	0	0
		Technical Assistance			
		Structural	0	0	0
		SUBTOTAL	8,585,500	2,849,900	11,435,400
4th	Multi-purpose Reservoir	Financial Assistance			
		Structural	4,533,500	1,703,800	6,237,300
		Real Property	0	0	0
		Relocation Assistance	0	0	0
		Technical Assistance			
		Structural	1,270,400	210,700	1,481,100
	Small FWR Structures	Financial Assistance			
		Structural	0	0	0
		Real Property	0	0	0
		Technical Assistance			
		Structural	0	0	0
		SUBTOTAL	5,803,900	1,914,500	7,718,400
5th	Multi-purpose Reservoir	Financial Assistance			
		Structural	5,063,100	3,276,000	8,339,100
		Real Property	0	0	0
		Relocation Assistance	0	0	0
		Technical Assistance			
		Structural	956,500	209,400	1,165,900
	Small FWR Structures	Financial Assistance			
		Structural	394,700	0	394,700
		Real Property	0	34,400	34,400
		Technical Assistance			
		Structural	172,600	5,700	178,300
		SUBTOTAL	6,586,900	3,525,100	10,112,000
6th	Multi-purpose Reservoir	Financial Assistance			
		Structural	0	1,662,500	1,662,500
		Real Property	0	0	0
		Relocation Assistance	0	0	0
		Technical Assistance			
		Structural	0	80,000	80,000
	Small FWR Structures	Financial Assistance			
		Structural	323,200	0	323,200
		Real Property	0	31,000	31,000
		Technical Assistance			
		Structural	161,100	4,700	165,800
		SUBTOTAL	484,300	1,778,200	2,262,500
TOTAL			28,550,100	23,920,400	52,470,500

Responsibilities
Local Sponsors are responsible for project administration duties related to obtaining permits needed to install the works of improvement, providing relocation assistance advisory services, administrative functions connected with relocation payments, and contract administration. NRCS is responsible for project administration of Public Law 83-566 duties and will assist the local Sponsors with their contract administration responsibilities.

Contracting
The Sponsors are responsible for coordinating with NRCS during the installation of structural measures. Project measures are installed by contracts awarded and administered by the Sponsor, unless they request NRCS to administer the contracts.

Real Property and Relocations
The North Central Missouri Regional Water Commission (NCMRWC) will obtain landrights for the multiple-purpose reservoir. Landrights will be obtained for approximately 2,235 acres of permanent pool, 269 acres of temporary pool, 91 acres for the embankment and spillway, an additional 805 acres of buffer, and approximately 2,402 acres of miscellaneous area typically involved with the "squaring off" of land purchases. Approximately 447 acres of temporary flooding easements will be obtained between the top of dam elevation and the land acquisition area. Construction of the reservoir will require the relocation of approximately 20 residences.

The Locust Creek Watershed District will obtain landrights for the small FWR structures. Landrights for approximately 200 acres will be obtained for the structures, associated spillways, and permanent pools. Flowage easements for approximately 145 acres will be obtained for the flood pools to an elevation equal to the top of each dam. There are no relocations associated with installation of the small structures.

Sponsors will acquire all landrights in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat 1894, 42 U.S.C. 4601 et seq.), and implementation regulations issued by the U.S. Department of Agriculture (7 CFR 21).

Financing
Federal assistance will be provided under authority of the Watershed Protection and Flood Prevention Act (Public Law 83-566, 83rd Congress, 68 Stat. 666), as amended. The balance of funds will be furnished by the Sponsors.

Special cost share rates have been authorized by Public Law 109-108, H.R.2744, Section 726 which states: "Notwithstanding any other provision of law, the Natural Resources Conservation Service shall provide financial and technical assistance through the Watershed and Flood Prevention Operations program to carry out the East Locust Creek Watershed Plan Revision in Missouri, including up to 100 percent of the engineering assistance and 75 percent cost share for construction cost of site RW1." All references to "the multiple-purpose reservoir" in this document pertain to Site RW-1 above.

All construction and engineering services costs allocated to flood prevention will be paid with Public Law 83-566 funds. Construction and engineering services costs allocated to fish, wildlife, and recreational development are shared jointly by Public Law 83-566 funds and other funds. NCMRWC is responsible for securing project costs other than Public Law 83-566 funding for all structural measures associated with the multiple-purpose reservoir. The Locust Creek Watershed District is responsible for securing project costs other than Public Law 83-566 funding for all structural measures associated with the small FWR structures. Funds provided by local Sponsors will be derived through general taxing authorities, general revenue bonds, general obligation bonds, and/or non-federal grants.

Project administration costs will be paid by NRCS and the Sponsors as they are incurred.

Construction and engineering service costs for the design and installation of recreational development facilities are specific costs allocated to these purposes and will be shared by NRCS and NCMRWC.

Landrights costs for the multiple-purpose reservoir will be paid by the NCMRWC and NRCS. Funds to finance the local share may be derived through general taxing authorities, general revenue bonds, general obligation bonds, and/or non-federal grants.

Cultural Resources

Funds are included in the recommended plan for surveys which identify the actual nature and distribution of historic properties. Funds will also be available for the recovery of information from archaeological and historic sites listed, or eligible for listing, on the National Register of Historic Places. Significant cultural resources identified during project implementation will be avoided or preserved in place to the fullest practical extent. If significant cultural resources cannot be avoided or preserved, pertinent information will be obtained prior to construction.

In the event of a significant cultural resource discovery during construction, appropriate notice will be made by NRCS to the State Historic Preservation Office and the Advisory Council on Historic Preservation. Consultation and coordination have been, and will continue to be, used to insure the provisions of the National Historic Preservation Act, as amended, and all other applicable cultural resources legislation have been met. NRCS will take action as prescribed in NRCS GM 420, part 401, to protect and/or recover any significant cultural resources discovered during construction.

Conditions for Providing Assistance

Federal assistance is subject to the appropriation of funds and the accrual of Sponsor secured landrights and permits necessary for the installation of project measures.

Before construction can begin on the multiple-purpose reservoir, 75 percent of the drainage area must be adequately protected from erosion. Any exception to this must be approved by the NRCS State Conservationist.

OPERATION, MAINTENANCE, AND REPLACEMENT

Operation

Operation is the administration, management, and performance of any services needed to insure proper functioning of a measure throughout its evaluated life. This includes such items as periodic inspections, reports, and necessary labor.

Maintenance

The maintenance of project measures is divided into annual and periodic. Annual maintenance is the regular service required on a measure to prevent deterioration and insure consistent functioning. It includes controlling the growth of undesirable vegetation; managing desirable vegetation through mowing, pruning, trimming, and fertilization; and inspecting the measure.

Periodic maintenance is required on a recurring basis. It includes re-vegetation; repairing fences; and repairing concrete, steel, or earthen parts of structural measures. It also includes repairing significant erosion and other storm damages. Damages to completed measures caused by normal deterioration, drought, flooding by storm events in excess of design criteria, or vandalism are considered maintenance regardless of when it occurs.

Replacement

Replacement is required when a component has a shorter performance life span than the life span of the project. Replacement includes situations where a component is damaged by storms or abuse. Continued effectiveness of measures must be assured throughout the life of the project. The multiple-purpose structure, water intake tower, raw water line, and recreational facilities each have a 100-year design life. The small FWR structures each have a 75-year design life.

Sponsors' Responsibilities and Costs

The local Sponsors accept responsibility for operation, maintenance, and replacement (OM&R) on structural measures in two stages. The first stage begins upon completion of construction and approval by the Sponsors and NRCS. The second stage begins following the establishment of vegetation, which usually occurs within two years after construction is completed. The Sponsors' responsibility extends throughout the life of the project, until the measure or practice is modified to remove potential risk of loss of life and property, or as may be required by federal, state, or local laws.

The annual OM&R costs for flood prevention, agricultural water management (rural water supply), and recreational development for the entire project are estimated to be $15,600, $78,300, and $57,800 respectively (Table F-3). NCMRWC is responsible for the operation and maintenance of the multiple-purpose reservoir embankment and appurtenances and all recreational facilities. NCMRWC is also responsible for replacement of any items relative to the embankment and recreational facilities. Recreational facilities and costs are itemized in Table 2B. The Locust Creek Watershed District is responsible for the operation and maintenance of the small FWR structures' embankments and appurtenances; this accounts for approximately

$14,600 of the above mentioned flood prevention OM&R. The Locust Creek Watershed District is also responsible for the replacement of any items relative to the embankments. More specifically, a replacement cost for one principal spillway conduit for each site is anticipated. This replacement is estimated at $1,320 annually of the OM&R.

Plantings will be maintained in a manner to preserve their wildlife values. Mowing, prescribed burning, and restricted grazing are a few of the management options the Sponsors can select. The embankment and spillway will be limed and seeded as needed for proper vegetative growth. Inspections should be made after major storm events. Periodic maintenance may be necessary to remove trash and repair damages.

Operation, Maintenance, and Replacement Agreement

A specific operation, maintenance, and replacement agreement will be made for each structural measure prior to signing landrights, relocation, or project agreements. Agreements will provide for inspections, reports, and procedures necessary for the performance of maintenance items. The agreements will include specific provisions for retention, use, and disposal of property acquired with Public Law 83-566 assistance. An OM&R plan will be prepared for each structural and nonstructural measure.

Operation, maintenance, and replacement requirements will be determined for each measure. These requirements will be covered in the operation, maintenance, and replacement plan attached to, and made part of, the operation, maintenance, and replacement agreement.

Operation, Maintenance, and Replacement Inspections

Inspections are necessary to ensure that installed measures are safe and functioning properly. Inspections should review and document the adequacy of operation, maintenance, and replacement activities; identify needed operation, maintenance, and replacement work; describe any unsafe conditions; specify means of relieving unsafe work; set action dates for performing corrective actions; and review hazard classification of the dam.

The local Sponsors are responsible for making inspections. Inspections will be made annually, as a minimum, for the life of a practice or as specified in the operation, maintenance, and replacement agreement. NRCS may, depending on the availability of resources, assist the Sponsors with their inspections. Inspections will be conducted in accordance with NRCS' National Operation and Maintenance Manual and Missouri Supplement.

The embankments, water intake tower, raw water line, and recreational facilities are to be inspected annually on a regularly scheduled basis; during or immediately following the initial filling of the reservoir; and during or immediately following major storms, earthquakes, or other occurrences which could adversely affect the structural measures.

TABLE 1
ESTIMATED INSTALLATION COSTS
(dollars)[a]

Installation Cost Item	Unit	Amount	P.L.-566 Funds Nonfederal Land	Other Funds Nonfederal Land	Total
			NRCS[b]		
Structural Measures					
Multiple-Purpose Reservoir	No.	1	22,426,500	18,170,400	40,596,900
Small Structures Requiring Modification	No.	7	187,900	53,500	241,400
Small Sediment & Debris Basins	No.	5	179,900	68,300	248,200
Recreational Facilities			2,313,500	771,100	3,084,600
Water Intake Tower			1,134,300	347,700	1,482,000
Raw Water Line			206,200	4,358,400	4,564,600
Small FWR Structures	No.	22	2,101,800	151,000	2,252,800
Subtotal (Proposed Measures)			**28,550,100**	**23,920,400**	**52,470,500**
Existing Small FWR Structures[c]	No.	72	6,499,400[d]	444,000	6,943,400
TOTAL			**35,049,500**	**24,364,400**	**59,413,900**

a. Price Base 2006.
b. Federal agency responsible for assisting in the installation of works of improvement.
c. Existing small FWR structures include all previously installed structures authorized under the original East Locust Creek Watershed Plan-EA authorized in 1987.
d. Includes $341,000 for construction of 7 structures which will be totally inundated by the multiple-purpose reservoir. This expense will be reimbursed to the NRCS by the Sponsors.

TABLE 2. - ESTIMATED COST DISTRIBUTION - STRUCTURAL MEASURES
(dollars)[f]

Works of Improvement	Installation Costs - P.L. 566 Funds						Installation Costs - Other Funds						Total Installation Costs
	Const.	Eng. Services	Real Property Rights	Reloc. Pymnts.	Project Admin.	Subtotal	Const.	Eng. Services	Real Property Rights	Reloc. Pymnts.	Project Admin.	Subtotal	
Multiple Purpose Reservoir													
Multiple-Purpose Reservoir	13,112,800[a]	4,439,400	1,713,700	1,466,200	1,694,400	22,426,500	4,370,900	0	12,098,000	1,229,100	472,400	18,170,400	40,596,900
7 Small Structures Requiring Modification	151,100[b]	27,300	0	0	9,500	187,900	50,400	0	0	0	3,100	53,500	241,400
5 Small Sediment & Debris Basins	146,300[c]	27,200	0	0	6,400	179,900	48,800	0	13,400	0	6,100	68,300	248,200
Recreational Facilities	1,957,100	232,200	0	0	124,200	2,313,500	652,300	77,400	0	0	41,400	771,100	3,084,600
Water Intake Tower	855,000	188,100	0	0	91,200	1,134,300	285,000	62,700	0	0	0	347,700	1,482,000
Raw Water Line	186,200	5,000	0	0	15,000	206,200	3,325,000	767,500	0	0	265,900	4,358,400	4,564,600
Small FWR Structures													
22 Small Flood Water Retarding Structures	1,434,200[e]	602,100	0	0	65,500	2,101,800	0	0	130,100	0	20,900	151,000	2,252,800
Existing Small FWR Structures													
72 Small Flood Water Retarding Structures	5,456,700[d,g]	772,600	0	0	270,100	6,499,400	0	0	357,500	0	86,500	444,000	6,943,400
TOTAL	**23,299,400**	**6,293,900**	**1,713,700**	**1,466,200**	**2,276,300**	**35,049,500**	**8,732,400**	**907,600**	**12,599,000**	**1,229,100**	**896,300**	**24,364,400**	**59,413,900**

a. Includes $675,900 for mitigation,$337,900 for cultural resources, and a 20% contingency.

b. Includes $7,000 for mitigation and $3,500 for cultural resources.

c. Includes $3,000 for mitigation and $2,100 for cultural resources.

d. Includes $309,000 for mitigation and $54,200 for cultural resources.

e. Includes $96,500 for mitigation, $13,300 for cultural resources, and $15,400 for livestock watering systems.

f. Price Base 2006. No replacement costs included in this table.

g. Includes $341,000 for construction of the 7 sites which will be totally inundated by installation of the multi-purpose reservoir.

TABLE 2A

COST ALLOCATION AND COST-SHARE SUMMARY[a,b]

	Cost-Allocation Purpose				Cost-Sharing							
					P.L.-566				Other			
	Flood Prevention	Recreation	Ag. Water Mgmt.	Total	Flood Prevention	Recreation	Ag. Water Mgmt.	Total	Flood Prevention	Recreation	Ag. Water Mgmt.	Total
WORKS OF IMPROVEMENT												
Multiple-Purpose Reservoir												
Construction	200,500	4,432,700	12,850,500	17,483,700	150,400	3,324,500	9,637,900	13,112,800	50,100	1,108,200	3,212,600	4,370,900
Engineering Services	50,400	1,114,100	3,274,900	4,439,400	50,400	1,114,100	3,274,900	4,439,400	0	0	0	0
Real Property Rights	155,000	3,427,400	10,229,300	13,811,700	0	1,713,700	0	1,713,700	155,000	1,713,700	10,229,300	12,098,000
Relocation Payments	30,200	668,200	1,996,900	2,695,300	16,400	363,500	1,086,300	1,466,200	13,800	304,700	910,600	1,229,100
Project Administration	24,600	543,400	1,598,800	2,166,800	19,200	424,900	1,250,300	1,694,400	5,400	118,500	348,500	472,400
Subtotal	460,700	10,185,800	29,950,400	40,596,900	236,400	6,940,700	15,249,400	22,426,500	224,300	3,245,100	14,701,000	18,170,400
7 Small FWR Structures Requiring Modification												
Construction[c]	0	0	201,500	201,500	0	0	151,100	151,100	0	0	50,400	50,400
Engineering Services	0	0	27,300	27,300	0	0	27,300	27,300	0	0	0	0
Real Property Rights	0	0	0	0	0	0	0	0	0	0	0	0
Project Administration	0	0	12,600	12,600	0	0	9,500	9,500	0	0	3,100	3,100
Subtotal	0	0	241,400	241,400	0	0	187,900	187,900	0	0	53,500	53,500
5 Small Sediment/Debris Basin Structures												
Construction[c]	0	0	195,100	195,100	0	0	146,300	146,300	0	0	48,800	48,800
Engineering Services	0	0	27,200	27,200	0	0	27,200	27,200	0	0	0	0
Real Property Rights	0	0	13,400	13,400	0	0	0	0	0	0	13,400	13,400
Project Administration	0	0	12,500	12,500	0	0	6,400	6,400	0	0	6,100	6,100
Subtotal	0	0	248,200	248,200	0	0	179,900	179,900	0	0	68,300	68,300
Recreational Facilities												
Construction	0	2,609,400	0	2,609,400	0	1,957,100	0	1,957,100	0	652,300	0	652,300
Engineering Services	0	309,600	0	309,600	0	232,200	0	232,200	0	77,400	0	77,400
Real Property Rights	0	0	0	0	0	0	0	0	0	0	0	0
Relocation Payments	0	0	0	0	0	0	0	0	0	0	0	0
Project Administration	0	165,600	0	165,600	0	124,200	0	124,200	0	41,400	0	41,400
Subtotal	0	3,084,600	0	3,084,600	0	2,313,500	0	2,313,500	0	771,100	0	771,100

TABLE 2A (Continued)

COST ALLOCATION AND COST-SHARE SUMMARY[a,b]

	Cost-Allocation Purpose				Cost-Sharing							
					P.L.-566				Other			
	Flood Prevention	Recreation	Ag. Water Mgmt.	Total	Flood Prevention	Recreation	Ag. Water Mgmt.	Total	Flood Prevention	Recreation	Ag. Water Mgmt.	Total
Water Intake Structure												
Construction	0	0	1,140,000	1,140,000	0	0	855,000	855,000	0	0	285,000	285,000
Engineering Services	0	0	250,800	250,800	0	0	188,100	188,100	0	0	62,700	62,700
Real Property Rights	0	0	0	0	0	0	0	0	0	0	0	0
Relocation Payments	0	0	0	0	0	0	0	0	0	0	0	0
Project Administration	0	0	91,200	91,200	0	0	91,200	91,200	0	0	0	0
Subtotal	0	0	1,482,000	1,482,000	0	0	1,134,300	1,134,300	0	0	347,700	347,700
Raw Water Line												
Construction	0	0	3,511,200	3,511,200	0	0	186,200	186,200	0	0	3,325,000	3,325,000
Engineering Services	0	0	772,500	772,500	0	0	5,000	5,000	0	0	767,500	767,500
Real Property Rights	0	0	0	0	0	0	0	0	0	0	0	0
Relocation Payments	0	0	0	0	0	0	0	0	0	0	0	0
Project Administration	0	0	280,900	280,900	0	0	15,000	15,000	0	0	265,900	265,900
Subtotal	0	0	4,564,600	4,564,600	0	0	206,200	206,200	0	0	4,358,400	4,358,400
Small FWR Structures												
22 small FWR structures												
Construction[d]	1,434,200	0	0	1,434,200	1,434,200	0	0	1,434,200	0	0	0	0
Engineering Services	602,100	0	0	602,100	602,100	0	0	602,100	0	0	0	0
Real Property Rights	114,700	0	15,400	130,100	0	0	0	0	114,700	0	15,400	130,100
Project Administration	86,400	0	0	86,400	65,500	0	0	65,500	20,900	0	0	20,900
Subtotal	2,237,400	0	15,400	2,252,800	2,101,800	0	0	2,101,800	135,600	0	15,400	151,000
Existing Small FWR Structures[e]												
72 small FWR structures												
Construction[c]	5,456,700	0	0	5,456,700	5,456,700	0	0	5,456,700	0	0	0	0
Engineering Services	722,600	0	0	772,600	772,600	0	0	772,600	0	0	0	0
Real Property Rights	357,500	0	0	357,500	0	0	0	0	357,500	0	0	357,500
Project Administration	356,600	0	0	356,600	270,100	0	0	270,100	86,500	0	0	86,500
Subtotal	6,943,400	0	0	6,943,400	6,499,400	0	0	6,499,400	444,000	0	0	444,000
TOTAL	9,641,500	13,270,400	36,502,000	59,413,900	8,837,600	9,254,200	16,957,700	35,049,500	803,900	4,016,200	19,544,300	24,364,400

a. Price Base 2006. No replacement costs are included in this table.

b. 75/25 cost-share rate applied to the Construction and Engineering Services in relation to the completion of the large water supply reservoir. This Authority provided by Congress. Otherwise, all rates follow the National Watershed Manual guidance.

c. Construction cost includes mitigation and cultural resources evaluation. Includes $341,000 for construction of the 7 sites which will be inundated by installation of the multiple-purpose reservoir.

d. Construction cost includes mitigation, cultural resources evaluation, and livestock watering systems.

e. Existing Small FWR Structures include all previously installed structures authorized under the original East Locust Creek Watershed Plan-EA authorized in 1987.

TABLE 2B
ESTIMATED CONSTRUCTION COSTS FOR RECREATIONAL FACILITIES
(dollars)[a]

Item	Unit	Number[b]	Unit Cost	Construction Cost
Walking/Jogging/Bicycle Trail, 8 feet wide	miles	6	85,000	510,000
Parking Lot (access points) 80 spaces	each	2	25,000	50,000
Parking Lot (bank fishing areas) 12 spaces	each	4	5,000	20,000
Access Road, 24 feet wide (access points & fishing areas)	each	6		
Gravel	feet	25,000	20	500,000
Grading	feet	25,000	10	250,000
Boat Ramp, 16 feet wide (access points)	each	2		
Concrete Ramp	feet	200	100	20,000
Gravel Approach & Turnaround	feet	600	15	9,000
Grading	feet	600	10	6,000
ADA Loading Platform	each	2	10,000	20,000
Restroom Facility-ADA (access points)	each	2	30,000	60,000
Restroom Facility-ADA (bank fishing areas)	each	4	20,000	80,000
Fishing Pier/Platform-ADA (access points)	each	2	25,000	50,000
Shelter House-ADA (access points)	each	4	20,000	80,000
Picnic Tables	each	40	500	20,000
Primitive Camping Sites (6 near each bank fishing area)	each	24		
Site Access Road, 12 feet wide	each	4		
Gravel	feet	6,000	10	60,000
Grading	feet	6,000	5	30,000
Site Parking Pad (gravel), 30 feet x 10 feet	each	24	500	12,000
Picnic Tables	each	24	500	12,000
Cooking Grills	each	24	500	12,000
Park Benches (at access points, bank fishing areas, trail)	each	40	300	12,000
Picnic Tables (bank fishing areas)	each	8	500	4,000
Cooking Grills	each	20	500	10,000
Trash Receptacles	each	40	300	12,000
Tree and Shrub Plantings	acres	300	400	120,000
Underwater Fish Structures (large brush pile)	each	10	1,000	10,000
Swimming Beaches, 300 feet x 75 feet (access points)	each	2	100,000	220,000
Playground Equipment (access points)	each	2	50,000	100,000
Subtotal				2,269,000
Contingency, 15%				340,400
Subtotal				2,609,400
Engineering Services				309,600
Project Administration				165,600
Subtotal, NRCS				2,313,500
Subtotal, Other				771,100
TOTAL COSTS				3,084,600

a. Price Base 2006.
b. Estimated quantity subject to variations at time of detailed design. Replacement costs not included in this table.

TABLE 3
STRUCTURAL DATA
WITH PLANNED STORAGE CAPACITY

Multiple-Purpose Reservoir	Unit		Total
Class of Structure		C	XXXX
Seismic Zone		1	XXXX
Controlled Drainage Area[f]	Acres	2,662	2,662
Total Drainage Area	Acres	20,992	20,992
Runoff Curve No. (1-day) (AMC II)		79	XXXX
Time of Concentration (Tc)	Hours	5.22	XXXX
Elevation			
Top of Dam[e]	Feet	938.0	XXXX
Crest Auxiliary Spillway	Feet	926.2	XXXX
Crest Low Stage Inlet	Feet	922.3	XXXX
Auxiliary Spillway Type		Roller Compacted Concrete[a]	XXXX
Auxiliary Spillway Bottom Width	Feet	240	XXXX
Auxiliary Spillway Exit Slope	Stepped, (D x H)	5 ft. X 2 ft.	XXXX
Maximum Height of Dam	Feet	79.0	XXXX
Volume of Fill	Cubic Yards	1,429,000	1,429,000
Total Capacity	Acre-Feet	58,808	58,808
Sediment Submerged	Acre-Feet	3,115	3,115
Sediment Aerated	Acre-Feet	385	385
Floodwater Retarding	Acre-Feet	8,863	8,863
Beneficial Use	Acre-Feet	46,445	46,445
Surface Area			
Sediment Pool	Acres	297	297
Beneficial Use	Acres	2,235	2,235
Floodwater Retarding	Acres	2,512	2,512
Principal Spillway Design[b]			
Rainfall Volume (1-day)	Inches	5.65	XXXX
Rainfall Volume (10-day)	Inches	12.44	XXXX
Runoff Volume (10-day)	Inches	7.56	XXXX
Capacity of Low Stage (max.)	Cubic Feet/Second	919.7	XXXX
Dimensions of Conduit	Inches	66	XXXX
Type of Conduit		RCP	XXXX
Frequency Operation – Auxiliary Spillway[b,c]	% Chance	4.0	XXXX
Auxiliary Spillway Hydrograph			
Rainfall Volume	Inches	10.0	XXXX
Runoff Volume	Inches	7.39	XXXX
Storm Duration	Hours	6.0	XXXX

Velocity of Flow (Ve)	Feet/Second	12.0	XXXX
Maximum Water Surface Elevation	Feet	928.4	XXXX
Freeboard Hydrograph[b]			
Rainfall Volume	Inches	24.3	XXXX
Runoff Volume	Inches	21.4	XXXX
Storm Duration	Hours	6.0	XXXX
Velocity of Flow (Ve)	Feet/Second	24.5	XXXX
Maximum Water Surface Elevation[d]	Feet	934.5	XXXX
Capacity Equivalents			
Sediment Volume	Inches	2.0	XXXX
Floodwater Retarding Volume	Inches	5.3	XXXX
Beneficial Volume	Inches	26.6	XXXX

a. Auxiliary spillway is designed as an overtopping, chute spillway. The exit portion will consist of 5 foot horizontal by 2 foot vertical steps from the control section to the stilling basin.
b. Precipitation represented indicates values with areal correction.
c. Auxiliary spillway frequency initially intended for the 25-year, 24 hour event. Auxiliary spillway crest raised from this initial routing up to full pipe flow for the principal spillway conduit.
d. Maximum water surface elevation reflects the 6-hour PMP routing. Both the 6-hour and 24-hour PMP freeboard hydrographs were analyzed. The final top of dam elevation was based on the more critical, 24-hour event, Type II distribution.
e. Top of dam elevation reflected in this table does not include settlement. According to the SITES routing, the settled top of dam elevation is 936.2.
f. The controlled drainage area upstream consists of 11 existing small FWR structures previously built under the authorization of the original East Locust Creek Plan and the 5 planned sediment/debris basins. These small structures were not considered in the planning design of the multiple-purpose reservoir.

TABLE 3 (Continued)
STRUCTURAL DATA
WITH PLANNED STORAGE CAPACITY

Small FWR Structures	Unit	SAMPLE STRUCTURE TYPE[g] 1	2	3	4	18 Additional Sites	Total
Class of Structure		A	---	---	---	---	
Seismic Zone		1	---	---	---	---	
Uncontrolled Drainage Area	Acres	145	202	244	317	4,317	5,225
Total Drainage Area	Acres	145	202	244	317	4,317	5,225
Runoff Curve Number (1-day) (AMC II)[h]		80.0	---	---	---	---	---
Elevation							
Top of Dam	Feet	103.2	928.5	937.7	943.9	---	---
Auxiliary Spillway Crest	Feet	100.0	924.5	934.0	940.0	---	---
Principal Spillway Crest	Feet	93.0	917.7	928.0	934.0	---	---
Auxiliary Spillway Type[i]		Veg.	---	---	---	---	---
Auxiliary Spillway Bottom Width	Feet	32.0	20.0	20.0	40.0	---	---
Auxiliary Spillway Exit Slope	% Slope	7.0	5.8	6.7	9.0	---	---
Maximum Height of Dam	Feet	25.9	32.1	24.4	30.7	---	---
Volume of Fill	Cu. Yds.	18,850	17,950	22,624	23,370	389,559	472,353

Small FWR Structures (cont)	Unit	SAMPLE STRUCTURE TYPE[g]				18 Additional Sites	Total
Total Capacity	Ac-Ft	59.3	82.5	99.7	116.2	1,579.3	1,937.0
Sediment Submerged	Ac-Ft	19.5	30.3	36.6	47.6	589.3	723.3
Sediment Aerated	Ac-Ft	2.2	3.4	4.1	5.3	65.4	80.4
Floodwater Retarding	Ac-Ft	37.6	48.8	59.0	63.3	924.6	1,133.3
Capacity Equivalents							
Sediment Volume	Inches	2.0	---	---	---	---	---
Floodwater Retarding Volume	Inches	2.9	---	---	---	---	---
Surface Area							
Sediment Pool	Acres	3.6	5.0	7.1	7.7	112.7	136.1
Floodwater Retarding Pool	Acres	7.1	9.4	13.2	13.3	67.0	110.0
Principal Spillway Design							
Rainfall Volume (10-yr/24-hr)	Inches	5.0	---	---	---	---	---
Runoff Volume	Inches	2.9	---	---	---	---	---
Capacity of Low Stage (max)	CFS	2.1	4.3	4.3	8.4	---	---
Dimensions of Conduit	Inches	6.0	8.0	8.0	10.0	---	---
Type of Conduit[j]		SSP	---	---	---	---	---
Auxiliary Spillway Design							
Frequency of Operation	% Chance	10	---	---	---	---	---
Auxiliary Spillway Hydrograph							
Rainfall Volume (50-yr/24-hr)	Inches	6.5	---	---	---	---	---
Runoff Volume	Inches	4.2	---	---	---	---	---
Velocity of Flow (V_e)	Ft./Sec.	2.8	3.9	3.7	5.0	---	---
Maximum Water Surface Elevation	Feet	100.5	921.1	934.6	941.0	---	---

TABLE 3 (Continued)
STRUCTURAL DATA
WITH PLANNED STORAGE CAPACITY

Existing Small FWR Structures[k]	Unit	SAMPLE STRUCTURE TYPE[g]				68 Additional Sites	Total
		1	2	3	4		
Class of Structure		A	---	---	---	---	
Seismic Zone		1	---	---	---	---	
Uncontrolled Drainage Area	Acres	145	202	244	317	14,101	15,009
Total Drainage Area	Acres	145	202	244	317	14,101	15,009
Runoff Curve Number (1-day) (AMC II)[h]		80.0	---	---	---	---	---
Elevation							
Top of Dam	Feet	103.2	928.5	937.7	943.9	---	---
Auxiliary Spillway Crest	Feet	100.0	924.5	934.0	940.0	---	---
Principal Spillway Crest	Feet	93.0	917.7	928.0	934.0	---	---

Existing Small FWR Structures (cont)	Unit	SAMPLE STRUCTURE TYPE[g]				68 Additional Sites	Total
Auxiliary Spillway Type[i]		Veg.	---	---	---	---.	---
Auxiliary Spillway Bottom Width	Feet	32.0	20.0	20.0	40.0	---	---
Auxiliary Spillway Exit Slope	% Slope	7.0	5.8	6.7	9.0	---	---
Maximum Height of Dam	Feet	25.9	32.1	24.4	30.7	---	---
Volume of Fill	Cu. Yds.	18,850	17,950	22,624	23,370	1,368,792	1,451,586
Total Capacity	Ac-Ft	59.3	82.5	99.7	116.2	5,655.6	6,013.3
Sediment Submerged	Ac-Ft	19.5	30.3	36.6	47.6	2,063.8	2,197.8
Sediment Aerated	Ac-Ft	2.2	3.4	4.1	5.3	231.4	246.4
Floodwater Retarding	Ac-Ft	37.6	48.8	59.0	63.3	3,360.4	3,569.1
Capacity Equivalents							
Sediment Volume	Inches	2.0	---	---	---	---	---
Floodwater Retarding Volume	Inches	2.9	---	---	---	---	---
Surface Area							
Sediment Pool	Acres	3.6	5.0	7.1	7.7	367.2	390.6
Floodwater Retarding Pool	Acres	7.1	9.4	13.2	13.3	685.9	728.9
Principal Spillway Design							
Rainfall Volume (10-yr/24-hr)	Inches	5.0	---	---	---	---	---
Runoff Volume	Inches	2.9	---	---	---	---	---
Capacity of Low Stage (max)	CFS	2.1	4.3	4.3	8.4	---	---
Dimensions of Conduit	Inches	6.0	8.0	8.0	10.0	---	---
Type of Conduit[j]		SSP	---	---	---	---	---
Auxiliary Spillway Design							
Frequency of Operation	% Chance	10	---	---	---	---	---
Auxiliary Spillway Hydrograph							
Rainfall Volume (50-yr/24-hr)	Inches	6.5	---	---	---	---	---
Runoff Volume	Inches	4.2	---	---	---	---	---
Velocity of Flow (V_e)	Ft./Sec.	2.8	3.9	3.7	5.0	---	---
Maximum Water Surface Elevation	Feet	100.5	921.1	934.6	941.0	---	---

g. Data for Table 3, Small FWR Structures, was developed using as-built results from 64 structures previously constructed in the original East Locust Creek Watershed Plan. Sample structure types 1, 2, 3, and 4 represent data from Sites E-63, E-36, E-20, and E-21 respectively. These sites reflect typical conditions for those planned sites with similar drainage areas. Quantities, elevations, and dimensions are subject to refinement at time of final design and prior to installation. The Sample Structure Types cover ranges of drainage areas for the planned structures. These are as follows: Type 1 – less than or equal to 175 acres, Type 2 – 176 to 225 acres, Type 3 – 226 to 299 acres, and Type 4 – greater or equal to 300 acres.

h. RCNs are representative areas of the watershed in which the sample structure types are located. Final design RCNs for specific sites may differ slightly from the listed value.

i. Veg. = vegetated, sod-forming grass only.

j. SSP = smooth steel pipe.

k. Existing Small FWR Structures includes all structures previously authorized under the original East Locust Creek Watershed Plan-EA, 1987.

TABLE 4
ESTIMATED AVERAGE ANNUAL COSTS
(dollars) [a]

Evaluation Unit	Amortization of Installation Cost	Operation Maintenance and Replacement Cost	Total
STRUCTURAL			
Multiple-Purpose Reservoir	2,448,000	105,400	2,553,400
7 Small Structures Requiring Modification	12,700	18,600	31,300
5 Small Sediment & Debris Basins	13,000	2,100[b,e]	15,100
Recreational Facilities	161,900	31,700[c,e]	193,600
22 Small FWR Structures	118,200	14,600[d,e]	132,800
TOTAL	**2,753,800**	**172,400**	**2,926,200**

a. Price Base 2006, discounted at 5.125 percent interest for 75 years.
b. Includes the present value replacement costs of $300.
c. Includes the present value replacement costs of $12,400.
d. Includes the present value replacement costs of $1,520.
e. Sponsors will be responsible for all costs of all replacements for all measures installed.

TABLE 5
ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION BENEFITS
(dollars) [a]

Item	Estimated Average Annual Damage		Damage Reduction Benefits	
	Without-Project	With-Project	Average Annual	Percent Reduction
Floodwater				
Crop and Pasture	822,300	662,400	159,900	19%
Fence and Debris	238,700	193,200	45,500	19%
Commercial/Urban	900	0	900	100%[b]
Re-Route Traffic	1,400	200	1,200	86%
Road and Bridge	32,800	20,600	12,200	37%
Subtotal	**1,096,100**	**876,400**	**219,700**	**20%**
Sediment				
Overbank Deposition	90,800	56,700	34,100	38%
Swamping	15,800	11,400	4,400	28%
Subtotal	**106,600**	**68,100**	**38,500**	**36%**
Erosion				
Floodplain Scour	25,800	18,500	7,300	28%
Subtotal	**25,800**	**18,500**	**7,300**	**28%**
TOTAL	**1,228,500**	**963,000**	**265,500**	**22%**

a. Price Base 2006.
b. This only includes the damages and benefits occurring from land voiding or deterioration that will be affected by the structural measures.

TABLE 6
COMPARISON OF BENEFITS AND COSTS
(dollars)[a]

Evaluation Unit	Agricultural-Related								Rural Water Supply	Recreation	Livestock Water	Average Annual Benefits Total	Average Annual Costs Total[b]	Net Benefits	Benefit Cost Ratio
	Crop and Pasture	Fence and Debris	Comm-ercial/ Urban	Re-Route Traffic	Road and Bridge	Overbank Deposition	Swamp-ing	Scour							
22 Small FWR Structures	124,700	31,500	-	900	9,200	25,800	3,300	5,500	-	-	35,300	236,200	132,800	103,400	1.78
Multiple-Purpose Reservoir	35,200	14,000	900	300	3,000	8,300	1,100	1,800	2,357,300	2,092,000	-	4,513,900	2,772,800	1,741,100	1.63
TOTAL	**159,900**	**45,500**	**900**	**1,200**	**12,200**	**34,100**	**4,400**	**7,300**	**2,357,300**	**2,092,000**	**35,300**	**4,750,100**	**2,905,600**	**1,844,500**	**1.63[c/d]**

a. Price Base 2006.

b. From Table 4.

c. Using the standard zero-based display contained in the National Watershed Manual would generate a benefit cost ratio of 1.71 based on this alternative's benefits, costs, and net benefits which are respectively $4,524,300, $2,646,500 and $1,877,800 greater than those of the future without revised plan alternative.

d. Total average annual equivalent benefits are $2,851,300; total average annual equivalent costs are $2,449,800 for an average annual equivalent benefit/cost ratio of 1.16 at 5.125 percent for 75 years.

GLOSSARY

Acquisition and Relocation (Buyout): Purchase and/or removal (relocation or demolition) of properties from floodprone areas. Process includes purchase of real property, appraisals, closing costs, moving expenses, demolition, and salvage removal.

Adequate Protection: Land having an erosion rate equal to or less than the tolerable soil loss rate (T).

Alluvium: A general term for all eroded material deposited or in transit by streams, including gravel, sand, silt, clay, and all variations and mixtures of these.

Average Annual Benefits: The difference between the without-project average annual damages and the with-project average annual damages plus other benefits, such as recreation.

Average Annual Cost: The capital of initial cost amortized to an annual cost plus the necessary operation, maintenance, and replacement cost.

Classical Gully Erosion: Erosion process whereby water concentrates in narrow channels and cuts into earth materials to depths of 1 to 2 feet or as much as 75 to 100 feet. Cannot be obliterated by ordinary tillage.

Conservation Practice or Measure: A technique or management based on published standards and used to control erosion, conserve water, protect plants, or generally improve soil, water, air, plant, and animal resources.

Cost-sharing: Financial assistance from a federal, state, or local agency to a land user or project sponsor for installation of soil and water conservation or watershed project measures.

Depreciated Areas: Areas that have suffered a loss of value and decreased monetary returns because of soil erosion, or because they have become inaccessible due to active gullies.

Ephemeral Gully: Concentrated flow erosion occurring on cropland. The soil erosion pattern can be eliminated by tillage operations but returns in approximately the same location following a runoff event.

Erosion (rill): An erosion process in which numerous small channels are formed by runoff water. Occurs primarily on recently cultivated soil and is intermediate between sheet and ephemeral gully erosion.

Erosion (sheet): The removal of a fairly uniform layer of soil from the land surface by runoff water. There are no conspicuous water channels.

Floodplain: Level land adjacent to a stream or river channel which is covered with water when the channel overflows its banks at flood stages (see "Frequency").

Floodwater Damage: The economic loss caused by floods, including damage by inundation, erosion, scour, or sediment deposition on floodplains. Floodwater damages result from physical damages or losses, reduced crop yields, emergency costs, and business or financial losses.

Floodplain Scour Damage: Erosion of the floodplain surface by flowing floodwaters. Results in the formation of channels or depressional areas which suffer reduced crop yields.

Floodplain Sediment Damage: Accelerated deposition of infertile, modern sediments on floodplain areas. These infertile sediments bury the developed, more fertile soil profiles resulting in reduced productivity, depreciation of land values, damage to farm equipment from sand and silt, and other damages.

Frequency: An expression or measure of how often a hydrologic event, such as precipitation or a flood, of a given size or magnitude should, on average, be equaled or exceeded. Example:
10-year – a hydrologic event having a 10 percent chance of occurring in any given year;
100-year – a hydrologic event having a 1 percent chance of occurring in any given year.

Grade Stabilization Structure: A structure which stabilizes the grade of a gully or other watercourse, thereby preventing further head-cutting or deepening of the channel.

Gross (total) Erosion: Erosion within a drainage area resulting from all sources (sheet-and-rill, ephemeral gully, classical gully, streambank, scour, etc.).

Habitat Suitability Index (HSI): A number representing the comparison between present or projected habitat quality and the optimum conditions possible in the area where a specific animal lives.

Habitat Unit (HU): A value derived from multiplying the Habitat Suitability Index (HSI) for an evaluation species by the size of the area for which the HSI was calculated. The HU provides a standardized basis for comparing habitat changes over time and space.

Hypolimnetic Water: The lowermost, non-circulating layer of cold water in a thermally stratified lake or reservoir that lies below the Thermocline and is usually deficient of oxygen.

Incremental Analysis: A systematic approach to formulating cost-effective resource protection. The technique involves layering and comparing protection levels of elements that address each of the watershed project purposes.

Landrights: Any interest acquired or permission obtained to use land, buildings, structures, or other improvements. Includes the acquisition of land by fee title or certain designated rights to the use of land by perpetual easement. Also includes the costs of modifying utilities, roads, and other improvements.

Metalimnion: The middle layer of a thermally stratified lake or reservoir. In this layer there is a rapid decrease in temperature with depth. Also referred to as Thermocline.

NED Plan (National Economic Development Plan): A plan that reasonably maximizes net national economic development benefits.

Ongoing Programs: Existing federal, state, and local programs, other than PL-566, which provide technical assistance, financial, and/or educational assistance for the installation of land treatment practices.

Prime Farmland: Land that is best suited to producing food, feed, forage, fiber, and oilseed crops, and is available. It includes cropland, pastureland, and forestland, but not urbanized land or water. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern agricultural methods.

Riparian Corridor: An ecosystem consisting of land adjacent to creeks, streams, and rivers which includes the channel itself, its floodplain, streambanks, and transitional upland fringes.

Sediment/Debris Basin: A basin constructed to collect and store sediment or debris. Can be helpful in preserving the capacity and water quality of reservoirs and lakes.

Sediment Yield: That portion of the gross (total) erosion that is delivered to a specified location (i.e., watershed outlet, stream channel, lake, etc.). Gross erosion less the sediment that is deposited prior to reaching the point of concern.

Source Water Protection Plan: A proactive strategy for effectively protecting and restoring aquatic ecosystems and protecting human health. The plan generally consists of contaminant source management and contingency planning aimed at preserving and protecting a public drinking water source.

Structural Measures: Project works of improvement such as dams, reservoirs, levees, diversions, channels, or other constructed devices, installed and maintained for flood prevention; drainage; irrigation; recreation; fish and wildlife; municipal, industrial, or rural water supply; water quality management; or other agricultural water management purposes. Structural measures are installed, operated, and maintained by a project sponsor.

Swamping Damages: Low, depressional areas formed on the floodplain which tend to pond water or remain wet for extended periods of time, caused by impairment of natural drainage by sediment deposits. Results in monetary agricultural losses by reducing crop yields or restricting access of farm equipment.

Technical Assistance: Help provided to individuals, groups, and units of government on opportunities, potentials, and problems having to do with soil and water resources. May include program formulation, planning, application, and maintenance.

Total of Industry Output: The value of production by industry for a given time period.

T Value/Tolerable Soil Loss: Expressed as the erosion factor "T" in the universal soil loss equation; an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without reducing crop productivity; rate expressed in tons per acre per year; individual value assigned to each soil mapping unit.

Value Added: Payments made by industry to workers, interest, profits, and indirect business taxes.

Voided Areas: Those portions of the land which have been eroded by gullies or gully systems. The productive capacity of these "voided areas" is essentially destroyed and restoration or productivity is, for the most part, not economically feasible.

Watershed: The area contained within a drainage divide above a specified point on a creek, stream, river, or other water body.

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REVIEW PROCESS

The draft Watershed Plan and Environmental Impact Statement received a technical review and was concurred in by USDA-Natural Resources Conservation Service (NRCS) specialists who have responsibility for agronomy, biology, cultural resources, economics, engineering, geographic information systems, forestry, geology, hydrology, soils, and water quality. This review was followed by an interagency review of the document by state and federal agencies and groups outside the NRCS.

APPENDIX A

Letters and Comments on Draft Watershed Revised Plan and Environmental Impact Statement

The draft East Locust Creek Watershed Revised Plan–Environmental Impact Statement was sent to the following agencies, organizations, and individuals in compliance with the P.L.-566 interagency review provisions:

Locust Creek Watershed District, Gary Brown, Chairman
Sullivan County Soil and Water Conservation District, Larry Stephenson, Chairman
Putnam County Soil and Water Conservation District, Dennis Fechtling, Chairman
Sullivan County Commission, Chris May, Presiding Commissioner
Putnam County Commission, Charlie Fowler, Presiding Commissioner
North Central Missouri Regional Water Commission, Bruce Hensley, Project Manager
Commission on Intergovernmental Cooperation, Director
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Missouri Department of Natural Resources, Doyle Childers, Director
Missouri Department of Transportation, Mark Kross, Design/Environmental Division
Missouri Soil and Water Districts Commission, Elizabeth Brown, Chairperson
Missouri State Capitol, Honorable Matt Blunt, Governor
Missouri State Representative, Bob Behnen
Missouri State Representative, Kathy Chinn
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Missouri State Senator, John Cauthorn
Missouri State Senator, David Klindt
Missouri State Senator, Bill Stouffer
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State Emergency Management Agency, Ronald M. Reynolds, Director
U.S. Army Corps of Engineers, District Engineer, Kansas City District
U.S. Department of Commerce, NOAA, Director, Ecology & Conservation Office
U.S. Department of Housing & Urban Development, Macie Houston, Regional Director
U.S. Department of Interior, Office of Environmental Policy & Compliance, Director
U.S. Department of Interior, Fish and Wildlife Service, Charlie Scott, Field Supervisor
U.S. Department of Transportation, U.S. Coast Guard G-MPSI, Coordinator, Water Resources
U.S. Environmental Protection Agency, Office of Federal Activities, Director
U.S. Environmental Protection Agency, Regional Administrator, Region VII

U.S. House of Representatives, Honorable Sam Graves
U.S. House of Representatives, Honorable Kenny Hulshof
U.S. Senate, Honorable Christopher Bond
U.S. Senate, Honorable Jim Talent
USDA, Office of Advocacy and Enterprise, Director
USDA- Farm Service Agency, Tim Kelley, State Executive Director
USDA-Forest Service, NA State and Private Forestry, Mike Majeski, Supervisory Hydrologist
USDA-NRCS, Merlin Bartz, Regional Assistant Chief-Central, NHQ
USDA-NRCS, Thomas Christensen, Deputy Chief-Programs, NHQ
USDA-NRCS, Keith Admire, Director, National Water Management Center
USDA-NRCS, Karen Brinkman, Area Conservationist, Palmyra Area Office
USDA-NRCS, Stuart Lawson, District Conservationist, Sullivan County Field Office
USDA-Rural Development, Greg Branum, State Director

APR 6 2006

MISSOURI DEPARTMENT OF CONSERVATION

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JOHN D. HOSKINS, Director

April 4, 2006

Mr. Roger Hansen
Natural Resources Conservation Service (NRCS)
Parkade Center, Suite 250
601 Business Loop West
Columbia, Missouri 65203

Dear Mr. Hansen:

Thank you for the opportunity to review and comment on the draft revised Watershed Plan-Environmental Impact Statement (Plan—EIS) that was prepared for East Locust Creek Watershed near Milan, Missouri in Sullivan County. The Missouri Department of Conservation (Department) is responsible for fish, forest, and wildlife resources in Missouri. As such, we actively participated throughout the scoping process of the Plan—EIS to address the anticipated impact of the natural resources. The Department's comments and recommendations throughout the process and in response to the Plan—EIS are intended to provide to NRCS and the sponsors with constructive suggestions to avoid or minimize impacts on aquatic and terrestrial natural communities.

The Department supports the selection of alternative # 3 (NED / Recommended Plan), as the plan that represents the best option to address the problems and opportunities within the watershed. All issue areas within the Plan—EIS are adequately addressed and the Department is supportive of the proposed mitigation options for wildlife and forestry. The potential mitigation options proposed for stream and wetlands impacts also fit the acceptable range of options considered for similar projects. Compensatory mitigation plans for wetlands and streams must first explore options both "in-kind and on-site" prior to considering alternatives outside of the watershed. However, with the large amount of stream loss expected, more innovative or "out-of-kind" options may need to be considered. These options might include upgrades to the wastewater plant to improve water quality or the removal of the Town of Milan's existing raw water intake pipe that creates a diversion from Locust Creek. The NED / Recommended Plan, when implemented should adequately replace the original need for this raw water intake. Downstream flow needs within the larger watershed (e.g. Pershing State Park and Fountain Grove Conservation Area) merit consideration when considering stream mitigation issues.

The Plan—EIS appears to contain three different variations regarding flow augmentations needs. Most of the flow-related statements in the document are similar to, "flow augmentation, to the extent practical, will replicate the natural base flow conditions"; however on page 94, the omission of "base" could create some misunderstandings. Also in the Investigations and Analyses appendix of the Plan—EIS, a discharge assumption of one-half of a cubic foot per second (0.5 cfs) was included in the planning phase of the water budget. Selection of a model that provides for the analysis of realistic and seasonal flow conditions may be needed.

The Department prefers a final set of variable flow recommendations that would replicate the natural flow conditions and is not supportive of a single low flow surrogate such as 0.5 cfs, as this approach is not protective enough for aquatic life. The in-stream flow augmentation issue is expected to be an area of discussion during the design phase of the project. The Department is committed to work with NRCS and the sponsors to collect relevant stream data to help address this important issue.

The Department commends NRCS and the sponsors for a well written and carefully thought out Plan—EIS. The Department respectfully requests that meritorious consideration be given to the comments provided here and is ready to assist NRCS in the next phase of the project.

Sincerely,

DOYLE F. BROWN
POLICY COORDINATOR

DFB:sg

United States Department of Agriculture

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July 6, 2006

Doyle F. Brown, Policy Coordinator
Missouri Department of Conservation
P.O. Box 180
Jefferson City, Missouri 65102-0180

Dear Mr. Brown:

This letter responds to your comments on the Draft East Locust Creek Watershed Revised Plan and Environmental Impact Statement.

The USDA-Natural Resources Conservation Service (NRCS) appreciates the Missouri Department of Conservation's support for the selection of Alternative 3, which are both the National Economic Development plan and the recommended plan. MDC's support for the proposed mitigation options to address project impacts on wildlife, forestry, streams, and wetlands is likewise appreciated.

1.) Removal of the City of Milan's raw water intake structure located on Locust Creek will not be considered as a mitigation option for stream losses associated with the East Locust Creek project. NRCS has contacted Rich Walker, City Manager for the City of Milan. Mr. Walker has stated that the city plans to keep the intake structure on Locust Creek, and that they are currently working with MDNR to pursue additional improvements to the structure. Upgrades to the Milan wastewater treatment plant are also not mitigation options as PL-566 funds cannot be spent for such purposes. According to Mr. Walker, the city is presently looking into a 2.5 million dollar upgrade and is in negotiations with the State of Missouri concerning problems at the plant.

2.) As per your comment, the text on page 94 of the draft document has been reworded to include the term "natural base flow conditions".

3.) Mitigation for the loss of stream channel will be officially and finally addressed through the Section 404 process. It is important to note that work on proposed mitigation is currently ongoing and steadily progressing. Because it is impossible to replace 29 miles of lost stream channel, with stream channel somewhere else, stream channel mitigation efforts will focus on ways of improving and protecting Locust Creek elsewhere in the watershed. NRCS is collaborating with the Missouri Department of Conservation to develop methodology to produce in-stream flows at the structure site that will mimic natural base flow conditions to the greatest extent possible and provide for the needs of downstream aquatic ecosystems. These objectives are complicated by the necessity to provide such flows while the structure is filling and under conditions of varying demand after the structure is completed. NRCS is modeling inflows to and outflows from the proposed structure with the Reservoir Operations (RESOP) computer program and 50+ years of historical weather data. NRCS is partnering with MDC to map and monitor downstream channel aquatic habitat. Profile and cross-section surveys will be used to define stream channel geometry and provide a reference should changes occur following construction of

RW-1. Discussions are also underway with the Missouri Department of Natural Resources regarding in-channel mitigation opportunities to address a very dangerous and potentially devastating stream piracy issue on Locust Creek above Pershing State Park.

Thank you for your review and comments of the draft Revised Plan-EIS. Your office will receive a copy of the final plan when it is completed. If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

Sincerely,

RD Wayne A Dras
ACTING

ROGER A. HANSEN
State Conservationist

cc: Harold Deckerd, Assistant State Conservationist, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

MAY 5 2006

RAH

Harold HLD

STATE OF MISSOURI
Matt Blunt, Governor • Doyle Childers, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

MAY 2 2006

Mr. Roger Hansen, State Conservationist
Natural Resource Conservation Service
Parkade Center Suite 250
601 Business Loop 70 West
Columbia, MO 65203

Dear Mr. Hansen:

RE: Locust Creek Watershed Revised Plan

The department supports the development of a regional solution to the water needs of North Central Missouri and supports the efforts of the Natural Resource Conservation Service (NRCS) and the North Central Missouri Regional Water Commission (Commission) to meet those needs. The proposed revised plan appears to meet the drinking water needs of the region effectively while seeking to minimize environmental impacts.

A wetland assessment must be done and will serve as one of the bases for the water quality certification. While we appreciate that the NRCS does not do wetland assessments without an invitation from the owner of each parcel of land, we encourage the NRCS to work closely with the Commission to conduct these certified wetland delineation as early as possible as the Commission purchases properties. Once the property requirements of the project are known, the Commission may work with landowners to make requests for assessments in order to prevent delays later in the construction process. Delays in conducting the wetland delineation could slow the development of a comprehensive mitigation plan and the issuance of the water quality certification.

There are discrepancies in the amount of wetlands expected to be impacted (e. g. 290.9 acres on page 9; 443 acres on page 3). These different assessments could confuse the reader though each was determined separately. Given the NRCS's commitment to conduct wetland delineation in the project area, these multiple estimates do not serve any purpose. The use of one number that represents the best current estimate with an explanation of how that number was determined would be helpful.

The department supports NRCS and the Commission consideration of wetland and streambank mitigation opportunities that exist immediately upstream of the newly formed lake. Streambank mitigation immediately upstream of the lake offers clear advantages, including protection of drinking water quality, land ownership by the Commission, and reduced sediment loading to the lake. The use of buffers and other efforts to reduce erosion and reverse the impacts of channelization can also aid in achieving the wildlife mitigation goals. In contrast, many of these areas may not meet the criteria for wetland mitigation success until after the reservoir has nearly filled; others may not succeed because of water level fluctuations of the lake or other factors. The department encourages the NRCS and Commission to include flexibility in their mitigation plan to provide greater assurance that the required mitigation goals will be met.

Given the large acreage of impacted wetlands and streams, the NRCS and sponsor may wish to consider the establishment of a mitigation bank within the watershed if on-site mitigation will not be sufficient. Such a bank could reduce time delays in mitigation and help keep mitigation ratios reasonable. The recent MoDOT Wetland Mitigation Agreement recognizes the advantages of banks, where appropriate, and provides guidance for the development of mitigation banks. Combined wetland and streambank mitigation sites do exist within the Ecological Drainage Unit and could provide effective and economical mitigation opportunities. The selection of a high quality site or sites could reduce the total mitigation acreage while providing greater biological and hydrological functions.

The department would like to work with the NRCS, the Sponsor and other agencies to agree upon a plan to support in-stream flows downstream of the dam. This plan should be based on historical flows and seasonal variation in flows. East Locust Creek is intermittent in that area above Milan and flows could be zero during the late summer while higher flows would be appropriate in the spring. We strongly encourage the development of a monitoring plan for the downstream reach that would serve as the basis for an adaptive management approach to meet in-stream flow needs. The department intends to incorporate the in-stream flow plan in its water quality certification for this project.

The plan states that it replaces a 1987 plan for the same watershed. The evaluation should include the 72 floodwater retarding structures already installed and how this plan either does or does not change the status of those structures. The management of some of the existing floodwater retarding structures is not clear. Under previous agreements, the sponsor is responsible for operation, maintenance and replacement. Under this plan the service life of these structures is extended to 75 years after construction completion. The plan should clearly outline the costs and responsibilities associated for the existing structures that still have a service life. An explanation tied to Table 4 on page 115 should explain the evaluated service life of each group of structures.

The Permits and Compliance section (page 95) should state that a Missouri dam and reservoir safety permit will be required.

It is unclear whether the Milan intake structure on Locust Creek will be removed once the multi-purpose reservoir is operational. If in-stream impacts in Locust Creek below its confluence with East Locust Creek were evaluated, the potential impact of this structure should be included in the analysis and clearly stated.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES

Doyle Childers
Director

DC:jm

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

July 5, 2006

Doyle Childers, Director
Missouri Department of Natural Resources
P. O. Box 176
Jefferson City, Missouri 65102

Dear Mr. Childers:

This letter responds to your comments on the Draft East Locust Creek Watershed Revised Plan and Environmental Impact Statement.

(1) A wetland assessment must be done . . . – As agreed to by the interagency team, at the May 25, 2006 meeting, to discuss agency comments regarding the DEIS for the East Locust Creek Watershed Revised Plan-Draft Environmental Impact Statement, the following has been added to the "Recommended Plan" section of the document:

"There will be no net loss of wetlands as a result of project activities. Refer to Appendix E, Investigations and Analyses, Wetlands section for methodology. Potential mitigation includes:

- Wetlands will be created in the shallow water areas in the upper ends, as well as other areas, of the multiple-purpose reservoir to mitigate for impacted wetlands and through mitigation features associated with the 22 small, floodwater retarding structures. An estimated 178.5 acres of wetlands will be created in the reservoir's permanent pool and a minimum of an additional 63 acres in the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands;

- If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek watershed to the south end of Fountain Grove Conservation Area; and

- Fringe wetlands of another reference reservoir (e.g. Mozingo Reservoir) will be used to compare/assess wetland functions.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514,

Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

(2) There are discrepancies in the amount of wetlands . . . – As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the DEIS for the East Locust Creek Watershed Revised Plan-Draft Environmental Impact Statement, it was clarified that the discrepancy between the 443 acres of wetlands and the 290.9 acres is the difference between two wetland inventory techniques. The 443 acres was the result of satellite imagery and the 290.9 acres was the result of the NWI. In addition, the following has been added to the "Recommended Plan" section:

"The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

(3) The department supports NRCS and the Commission . . . – Please see response to Comment 1.

(4) Given the large acreage of impacted wetlands and streams . . . – Please see response to Comment 1.

(5) The department would like to work with the NRCS, the Sponsors, and other agencies . . - NRCS is currently working with Charles DuCharme from MDNR and Del Lobb and Paul Blanchard from MDC on developing a plan to provide in-stream flows. The objectives are to mimic natural flows to the greatest extent possible and provide for the needs of downstream aquatic ecosystems. These objectives are complicated by the necessity to provide such flows while the structure is filling and under conditions of varying demand after the structure is completed. Historical stream gage data from the region is being considered. NRCS is modeling inflows to and outflows from the proposed structure with the Reservoir Operations (RESOP) computer program and 50+ years of historical weather data. NRCS is also partnering with MDC to map and monitor downstream channel aquatic habitat. Profile and cross-section surveys will be used to define stream channel geometry and provide a reference should changes occur following construction of the multiple-purpose reservoir. Should any channel instability result from the operation of reservoir, the Sponsors should be prepared to take appropriate action to address the instability. For this reason, NRCS recommends the Sponsors acquire fee simple or easement landrights to the stream channel and adjacent riparian corridor for at least five miles downstream of the proposed reservoir. For further clarification, narrative has been added under the heading "Mitigation Features" in the "Recommended Plan" section of the planning document.

(6) The plan states that it replaces a 1987 plan for the same watershed . . . – Tables 1, 2, 2A, and 3 have been revised to include economic and engineering data related to the existing 72 small, floodwater retarding (FWR) structures installed in accordance with the original 1987 plan. Fourteen of these existing structures will be impacted by construction of the multiple-purpose reservoir. These impacts are detailed under the heading "Multiple-Purpose Reservoir" in the

"Recommended Plan" section of the planning document. The remaining 58 structures will continue to function as originally designed.

Operation, maintenance, and replacement (OM&R) of the existing 72 small FWR structures are the responsibility of the Locust Creek Watershed District (LCWD) under agreements signed in conjunction with the original 1987 plan. The LCWD will retain OM&R responsibilities for 58 of the existing structures (not to include the 14 impacted structures), as well as for the 22 small FWR structures included as part of the revised plan. The seven inundated small structures will not require OM&R, and the Commission will take over OM&R on the seven modified small structures. Revised OM&R plans and agreements will be entered into prior to issuing invitations to bid for construction work. Refer to the heading "Operation, Maintenance, and Replacement" in the "Revised Watershed Agreement" section.

(7) The Permits and Compliance section (page 95) . . . – The requirement that a Missouri Dam and Reservoir Safety Permit be issued has been added to the narrative in this section, as well as under the heading "Risk and Uncertainty" in the "Formulation and Comparison of Alternatives" section.

(8) It is unclear whether the Milan intake structure on Locust Creek will be removed once the multi-purpose reservoir is operational . . . – NRCS has contacted Rich Walker, City Manager for the City of Milan. Mr. Walker has stated that the city plans to keep the intake structure on Locust Creek, and that they are currently working with MDNR to pursue additional improvements to the structure. NRCS is not aware of any in-stream impact studies on Locust Creek in relation to the intake structure. Any studies related to this intake structure's impacts on Locust Creek are outside the scope of the East Locust Creek project.

Thank you for your review and comments of the draft Revised Plan-EIS. Your office will receive a copy of the final plan when it is completed. If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

Sincerely,

Harold A Deckerd

ROGER A. HANSEN ACTING
State Conservationist

cc: Harold Deckerd, Assistant State Conservationist, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

MAY 2 2 2006

DEPARTMENT OF THE ARMY
KANSAS CITY DISTRICT, CORPS OF ENGINEERS
700 FEDERAL BUILDING
KANSAS CITY, MISSOURI 64106-2896

REPLY TO

May 19, 2006

Regulatory Branch
(200400255)

Roger A. Hansen, State Conservationist
USDA - Natural Resources Conservation Service
Parkade Center, Suite 250
601 Business Loop 70 W
Columbia, Missouri 65203-2546

Dear Mr. Hansen:

This letter is in response to your request for comments on the revised Watershed Plan – Draft Environmental Impact Statement for the East Locust Creek Watershed project in Sullivan and Putnam Counties. The project has been revised to include a large multi-purpose reservoir to provide a public water supply to this region of the state.

I apologize for the delay in providing comments. Mr. Robert Smith, Special Project Manager, was our previous contact concerning this proposed project. Mr. Smith is retired and Mr. Douglas Berka has assumed project management for review of the Draft EIS and the Section 404, Clean Water Act (33 USC 1344) permit process. Mr. Berka can be contacted by telephone at 816-389-3657 (FAX 816-389-2032) or email at douglas.r.berka@usace.army.mil.

The Corps of Engineers provides the following comments to the Revised Plan and Draft Environmental Impact Statement:

- Page 3, first paragraph, last sentence: clarification could be made as to if the 132 acres of WRP is included within the 443 acres of wetland impacts from inundation or are in addition to these impacts.
- Page 24 under Wetland heading, (both have had REC IV training) should be changed to "both have completed the Corps of Engineers, 1987 Wetland Delineation Manual, (REG IV) training." This same sentence appears on page 36 as well.
- Page 30, last paragraph, delete the extra space in 109,500 tons of sediment.
- Page 83, Recommended Plan, this section should include a discussion as to how and why the preferred alternative was selected and how the project site was determined. The discussion should justify the selected alternative as the least environmentally

damaging practicable alternative that meets the overall project purpose. The discussion should include the factors evaluated in order to site the structure. It appears practicable to site the multi-purpose structure downstream on the mainstem of East Locust Creek thus reducing the need for construction of the additional 22 FWR structures. The discussion should explain why this is not a preferred alternative. This discussion will certainly come up in the Section 404 public interest review.

If you have any questions concerning this matter, please feel free to write me or call Mr. Douglas Berka.

Sincerely,

for

Joseph S. Hughes
Chief, Regulatory Branch
Operations Division

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

July 5, 2006

Joseph S. Hughes
Chief, Regulatory Branch – Operations Division
Department of the Army
Kansas City District, Corps of Engineers
700 Federal Building
Kansas City, Missouri 64106-2896

Dear Mr. Hughes:

This letter responds to your comments on the Draft East Locust Creek Watershed Revised Plan and Environmental Impact Statement.

Page 3, first paragraph, last sentence – The Wetlands Reserve Program (WRP) easement of 132 acres does lie within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section), and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts. It has been clarified in the document that the discrepancy between the 443 acres of wetlands and the 290.9 acres is the difference between two wetland inventory techniques. The 443 acres was the result of satellite imagery and the 290.9 acres was the result of NWI.

Page 24 under Wetland heading – The text has been edited as requested.

Page 30, last paragraph – The correction has been made as requested.

Page 83, Recommended Plan – The recommended plan has been selected by the watershed sponsors as the most efficient and effective alternative to meet their identified project purposes. The "how" and "why" for selection of the preferred alternative and the factors evaluated in order to site the multiple-purpose reservoir are summarized in the "Formulation and Comparison of Alternatives" section of the planning document in accordance with "plan format and content" guidelines set forth in the USDA-NRCS National Watershed Manual.

The "Water System Feasibility Study" (Burns and McDonnell, August 8, 2003) was prepared for the North Central Missouri Regional Water Commission. This study summarizes 22 rural water supply alternatives based on water yields, social considerations, cost-effectiveness, and environmental impacts. Five potential reservoir sites on differing river systems, included in the 22 alternatives, were evaluated and are summarized in the planning document. The East Locust Creek site was deemed the most cost effective, was considered a favorite by the public at open meetings, is located only 4.5 miles from the Milan Water Treatment Plant, and will gravity feed raw water to the plant; thereby eliminating the need for an expensive pumping system.

A site located in the southern portion of the watershed at the confluence of East Locust and Little East Locust creeks would indeed eliminate the need for the additional 22 small FWR structures on Little East Locust. However, an estimated 29 small FWR structures would then need to be constructed north of Milan to provide flood control for that portion of the watershed. In addition, approximately 12 miles of pipeline, pumps, lift stations, etc., would need to be constructed to move the raw water to the existing treatment plant.

Thank you for your review and comments of the draft Revised Plan-EIS. Your office will receive a copy of the final plan when it is completed. If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

Sincerely,

R Dwaine Nelson

ROGER A. HANSEN ACTING
State Conservationist

cc: Harold Deckerd, Assistant State Conservationist, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

TAKE PRIDE IN AMERICA

May 2, 2006

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Mr. Roger A. Hansen, State Conservationist
USDA – Natural Resources Conservation Service
Parkade Center, Suite 250
601 Business Loop 70 West
Columbia, Missouri 65203

Dear Mr. Hansen:

The U.S. Department of Interior has reviewed the February 2006 Draft Revised Plan and Environmental Impact Statement (DEIS) for the East Locust Creek Watershed, Sullivan and Putnam Counties, Missouri, prepared by the Natural Resources Conservation Service (NRCS), and offers the following comments.

GENERAL COMMENTS

The DEIS describes a proposed plan to provide agricultural water management (rural water supply), water-based recreational opportunities, and reduced flood damages in the East Locust Creek Watershed. The recommended plan includes the construction of one multiple-purpose reservoir (2,235-acre permanent pool), 22 floodwater-retarding structures, 5 sediment/debris basins, and recreational facilities, as well as the modification of 7 existing floodwater-retarding structures.

Installation of the proposed reservoir will inundate approximately 2,234 acres of cropland, grassland, forestland, brush/woodland, wetlands, open water, and developed land (i.e., farmsteads and roads). Within the proposed permanent pool area are 132 acres currently in Wetland Reserve Program (WRP) easement and 218 acres in active Conservation Reserve Program (CPR) contracts.

Aquatic Resources

The DEIS fails to clearly describe the wetlands in the project area, as well as those that may be affected by the project. On page 3, the DEIS states that 443 acres of wetland will be inundated by the new reservoir. However, on page 9, the DEIS states that 290.9 acres of wetlands (using

the National Wetlands Inventory maps) were identified within the top elevation of the dam, structures, auxiliary spillway, and water transmission line footprints. The Final EIS should include a complete discussion of wetland habitats in the project area, project-related impacts to those wetlands for each alternative, and measures to avoid, reduce, or offset those impacts.

Unfortunately, the U.S. Fish and Wildlife Service (USFWS) was unable to participate in the preliminary discussions to develop measures to mitigate for wetlands impacts. The USFWS has the following concerns regarding potential effects to aquatic habitat. On page 77, the DEIS states that there will be no net loss of wetlands as a result of the project. That would be accomplished by creating 178.5 acres of wetlands in shallow areas of the reservoir's permanent pool and a minimum of 63 acres within the temporary pool. The majority of wetland acres to be created by the proposal will occur on the fringe of the reservoir where water will be less than 18 inches deep.

The USFWS is concerned that the reservoir will likely fluctuate several feet throughout the year with the proposed withdrawal of 7.0 million gallons of water per day, which may limit the quantity and quality of wetlands that would be created along the fringe of the reservoir. The Final EIS should provide a thorough discussion of whether a relatively constant water elevation can be maintained to create shallow water/wetland habitat, and how operational water fluctuations will likely affect the amount, distribution, and functions of those wetlands. The 132 acres of WRP wetlands that will be inundated are high quality. The mitigation plan should provide for in-kind compensation for these WRP wetlands and adjacent forested wetlands. Temporal loss for existing wetlands should also be accounted for. For unavoidable losses to wetland habitat, the USFWS recommends a minimum compensation ratio of 3:1 for forested wetlands and 2:1 for emergent wetlands. The mitigation plan for the watershed project should include adequate monitoring to ensure that the acreage and quality of wetlands created along the reservoir fringe and within the temporary pool meet the mitigation plan goals. The mitigation plan should also include remediation measures that could be taken if monitoring indicates that the mitigation goals are not being met.

Approximately 29 miles of stream channel will be inundated by the permanent pool. The DEIS states that the hydrology along East Locust Creek downstream of the reservoir will be changed and the flow augmentation, to the extent feasible, will replicate natural base flow conditions and will be a component of measures needed to mitigate the impacts to East Locus Creek. The DEIS does not provide sufficient water-budget information to evaluate potential project impacts to the aquatic environment, nor the feasibility of such mitigation measures. It will be difficult to create a lake of this size considering in-flow from the watershed, provide 7.0 million gallons of water a day for surrounding communities and still replicate natural base flows downstream of the dam. The Final EIS should provide hydrologic data that will show the length of time it will take to fill the reservoir while at the same time providing water supply and maintaining natural base flow conditions downstream of the project.

The DEIS further indicates that mitigation for the stream impacts (including flow augmentation) will be addressed through the Section 404/401 permitting process. Mitigation for aquatic and wetland impacts should be fully addressed in the Final EIS to allow for an adequate evaluation of project effects. Such data are critical to compare and contrast project alternatives and assess

which alternatives best meet the project needs and purpose while minimizing adverse effects to fish and wildlife resources.

The FEIS should fully explain how the project sponsor will implement long-term operation and maintenance of the proposed fish and wildlife habitat and recreational features. This should include the parties responsible for the restoration and maintenance of 1,177 acres of potential riparian buffer habitat in the watershed. That is a large task, and the USFWS is concerned that without adequate resources (i.e., staff, expertise, and funding), compensatory mitigation for fish and wildlife habitats will not be successful.

Endangered Species Comments

The USFWS agrees that the Indiana bat may occur in the watershed but cannot concur at this time that the project is not likely to adversely affect the Indiana bat. A summer roost was located about 15 miles west of the project site and dead trees left standing in the reservoir may provide suitable habitat for the Indiana bat. The NRCS should consult with the USFWS's Columbia, Missouri, Ecological Services Office to determine the type and number of trees that will be cleared for construction of the project. Based on that information, a determination will be made on the possible need for a site survey.

SPECIFIC COMMENTS

Page 8, Environmental Values Changed, first paragraph, second sentence

The town of Boynton, which will be inundated by the proposed reservoir, should be included in the list of towns in Sullivan County in the first paragraph on page 4.

Page 30, Floodwater Damages, second paragraph

Characterization of a flood of particular size as a "two-year flood" does not guarantee that a flood of this size will occur precisely every other year, as the text implies. Rather, a "two-year flood" is one which, over the long term, has a statistical probability of 50 percent of occurring in any given year. A flood of that size could occur twice in one year, two years in a row, or not for several years.

Page 34, Water Quality, first paragraph, second-to-last sentence

In addition to deicers and herbicides, other contaminants are associated with roadway use and maintenance, such as sediment, oil and grease, polycyclic aromatic hydrocarbons (PAHs), and trace elements. If ditches, infiltration swales, or other best management practices (BMPs) will be employed to prevent potentially contaminated roadway runoff from directly entering the reservoir, such measures should be described in the document.

Pages 57-58, Erosion and Sedimentation

In the Final EIS, please include estimates of the amount of sediment to be trapped for each of the alternatives to better evaluate and compare the effects of each alternative. An estimate is provided only for Alternative 3 (the Recommended Plan) in the DEIS.

Thank you for the opportunity to review and comment on this draft revised watershed plan and DEIS. If you have any questions concerning our general comments or endangered species comments, please contact Charles Scott, Field Supervisor, at (573) 234-2132, extension 104, or Rick Hansen at (573) 234-2132, extension 106, at the USFWS's Columbia, Missouri, Ecological Services Office. If you have any questions concerning our specific comments, please contact Lloyd Woosley, Chief of the US Geological Survey Environmental Affairs Program, at (703) 648-5028 or at lwoosley@usgs.gov.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

July 5, 2006

Robert F. Stewart
Regional Environmental Officer
U.S. Department of the Interior
Office of the Secretary
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

Dear Mr. Stewart:

This letter responds to your comments on the Draft East Locust Creek Watershed Revised Plan-EIS.

Aquatic Resources Comments

Paragraph 1 - As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the draft East Locust Creek Watershed Revised Plan-Environmental Impact Statement, it was clarified that the discrepancy between the 443 acres of wetlands and the 290.9 acres is the difference between two wetland inventory techniques. The 443 acres was the result of satellite imagery and the 290.9 acres was the result of the NWI. In addition, the following has been added to the "Recommended Plan" section of the document:

> "The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

Paragraph 2 - As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the draft East Locust Creek Watershed Revised Plan-Environmental Impact Statement, the following has been added to the "Recommended Plan" section:

> "There will be no net loss of wetlands as a result of project activities. Refer to Appendix E, Investigations and Analyses, Wetlands section for methodology. Potential mitigation includes:
>
> - Wetlands will be created in the shallow water areas in the upper ends, as well as other areas, of the multiple-purpose reservoir to mitigate for impacted wetlands and through mitigation features associated with the 22 small floodwater retarding structures. An estimated 178.5 acres of wetlands will be created in the reservoir's permanent pool and a minimum of an additional 63 acres in the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands.

- If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek watershed to the south end of Fountain Grove Conservation Area.

- Fringe wetlands of another reference reservoir (e.g. Elmwood) will be used to compare/assess wetland functions.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

Paragraph 3 - Please see response to Comment 2.

Paragraph 4 – Regardless of what measures NRCS proposes in the DEIS, mitigation for the loss of stream channel will be officially and finally addressed through the Section 404 process. It is important to note that work on proposed mitigation is currently ongoing and steadily progressing. Because it is impossible to replace 29 miles of lost stream channel, with stream channel somewhere else, stream channel mitigation efforts will focus on ways of improving and protecting Locust Creek elsewhere in the watershed. NRCS is collaborating with the Missouri Department of Conservation to develop methodology to produce in-stream flows at the structure site that will mimic natural flows to the greatest extent possible and provide for the needs of downstream aquatic ecosystems. These objectives are complicated by the necessity to provide such flows while the structure is filling and under conditions of varying demand after the structure is completed. NRCS is modeling inflows to and outflows from the proposed structure with the Reservoir Operations (RESOP) computer program and 50+ years of historical weather data. NRCS is partnering with MDC to map and monitor downstream channel aquatic habitat. Profile and cross-section surveys will be used to define stream channel geometry and provide a reference should changes occur following construction of RW-1. Discussions are also underway with the Missouri Department of Natural Resources regarding in-channel mitigation opportunities to address a very dangerous and potentially devastating stream piracy issue on Locust Creek above Pershing State Park.

Paragraph 5 – Please see response to Comment 4.

Paragraph 6 - The measures previously identified as fish and wildlife and recreational measures will be edited and referred to herein as recreational measures. On page 101 of the DEIS, the third paragraph states "The NCMRWC is responsible for the operation and maintenance of the multiple-purpose reservoir embankment and appurtenances and all recreational facilities. The NCMRWC is also responsible for the replacement of any items relative to the embankment and recreational facilities". The DEIS also identifies operation, maintenance, and replacement costs in Table 4, page 115.

Additionally, there are two signed agreements which will complete the PL-566 watershed plan. Both agreements will be signed by NRCS and all sponsors of the project. The watershed agreement will be signed at the completion of the final EIS. This agreement outlines and identifies cost share rates, cost allocation and responsibilities, and various other party responsibilities, including the sponsors responsible for the recreational measures' operation and maintenance. There will also be an operation, maintenance, and replacement agreement signed by all parties prior to the solicitation of construction contracts.

Finally, the 1,177 acres of riparian buffer habitat identified in the "Problems and Opportunities" and "Formulation and Comparison of Alternatives" sections of the DEIS are identified as potential mitigation areas, and do not represent the final agreed to acreages. A management plan for mitigation areas will be developed by the sponsors in consultation with NRCS, USFWS, MDC, USEPA, and USACE. Mitigation measures will be agreed to prior to issuance of the necessary project permits and prior to the start of construction activities. The close proximity of the potential 1,177 acres makes them the highest priority areas. However, other areas will be considered if necessary.

Endangered Species Comments

As per the statement on page 72 (see below), the Missouri Field Office Technical Guide Transmittal No. 386 (USDA-NRCS, April 1, 2003) provides the guidance by which NRCS will consult with the USFWS to determine the type and number of trees that will be cleared for construction of project measures. A determination, based on that information, will be made on the need for a site survey.

"The Indiana bat (Myotis sodalis), a federal and state listed endangered species, may occur in the watershed. In order to avoid adverse impacts to the Indiana bat, the guidelines developed by the USFWS for the conservation of the bat will be followed as per Missouri Field Office Technical Guide Transmittal No. 386 (USDA-NRCS, April 1, 2003)."

Specific Comments

Page 8 – The town of Boynton (Unincorporated) has been added to the list. There is no census data available for Boynton; therefore, a population is not noted.

Page 30 – Frequencies of hydrologic events are defined in the "Glossary" section under the term "Frequency". The annual probability for given flood events is included in the text in other sections of the plan. We have added the annual probability to this paragraph for clarity.

Page 34 – NRCS is aware that there are a multitude of pollutants that could affect the proposed water supply reservoir. A complete listing is not practical. The text states that "the plan provides opportunities to reduce or minimize the threats to water quality posed by sediment, nutrients, pathogens, and toxic materials". The exact nature of land treatment practices or structural measures that may be installed to improve water quality cannot be specified in a planning document. Potential practices that are eligible for federal or state financial, technical, and educational assistance are

discussed under the heading "Land Use and Treatment" in the "Formulation and Comparison of Alternatives" section.

The Missouri Department of Natural Resources has multiple sources of funding and technical assistance to address water quality issues in the watershed. The department has committed to working with NRCS and the Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. The source water designation will create the opportunity for the local Sponsors to apply for grants and technical assistance to address these and other water quality concerns in the watershed area to be inundated or upstream of the inundated areas.

Pages 57-58 – Estimates for the amount of sediment trapped by the proposed water supply and floodwater retarding structures have been added for each alternative. It should be noted that trap efficiencies are estimated on the basis of the ratio of the capacity of the reservoir/lake to the average annual inflow. The proposed water supply reservoir included in Alternative 1 has a total capacity of 62,932 acre-feet; therefore, it would have a slightly higher trap efficiency than the 58,808 acre-feet reservoir included in Alternatives 2 and 3.

Thank you for your review and comments of the draft Plan–EIS. Your office will receive a copy of the final plan when it is completed. If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

Sincerely,

R Duwaine Delmar

ACTING

ROGER A. HANSEN
State Conservationist

cc: Harold Deckerd, ASTC, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

MAY 8 2006

03 MAY 2006

Roger Hansen
State Conservationist
USDA-Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

Dear Mr. Hansen:

RE: Review of Draft Environmental Impact Statement for East Locust Creek Watershed Revised Plan-Draft Environmental Impact Statement

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the Environmental Protection Agency (EPA) has reviewed the above referenced Draft Environmental Impact Statement (DEIS). This DEIS was assigned a Council on Environmental Quality (CEQ) file number 20060085. Based upon our review, we have rated the DEIS as "EC-2" (Environmental Concerns-Insufficient Information). EPA's rating definitions are attached to provide additional information on the meaning of this rating. Specific issues that compel EPA's rating include wetlands, streams (impacts assessment and mitigation), and "social and cultural" impacts. Please refer to our detailed comments (attached) for discussion of our specific concerns and recommendations.

Thank you for the opportunity to review this document. If you have any questions about these comments, please contact Stephen K. Smith at (913) 551-7656, or Joseph Cothern at (913) 551-7148.

Sincerely,

U. Gale Hutton
Director
Environmental Services Division

East Locust Creek Draft Environmental Impact Statement
Detailed Comments, USEPA Region 7

Wetlands Impacts:

Page 67, Alternative 3 – Table H (page 66) indicates that the project is expected to adversely affect 3 major wetland classes (i.e., emergent, forested and scrub shrub) with as many as four different water regimes. The DEIS proposes that Alternative 3 will result in no net loss of wetlands by virtue of the creation of wetlands along the shoreline and in other shallow portions of the permanent pool as well as within the temporary pool. The DEIS provides no additional information (e.g., page 94, Wetlands) to suggest whether and how such mitigation or replacement wetlands will be created (excavation, planting, monitoring, success measures, etc.). Nor does the DEIS provide important details inherent to the mitigation process.

We believe that attention to such details about mitigation needs to include a number of key issues. First, experience with reservoir systems indicates that any wetland development often favors emergent and scrub-shrub wetlands. Based on current impacts information for the project, these wetland types at best would only offset approximately 43% of the total wetland anticipated impacts if one were to pursue replacement of wetland types in-kind. EPA strongly supports in-kind replacement where it is practicable. EPA believes that determining the practicability of such in-kind mitigation compels the project sponsors to adopt a watershed approach. We believe that an examination of the East Locust Creek watershed could reveal significant opportunities for restoring wetland types lost as a result of the proposed project. As an example, with approximately 58% of the mitigation demand focused on forested wetlands, and with the potential for riparian areas (i.e., profiled well on page 64, Alternative 3) to support wetlands, we believe that an opportunity exists in the EIS to address other wetland mitigation opportunities in the watershed. Such areas would go a long way toward helping to provide habitat and filtering water to ensure protection of water quality in the reservoir.

A second mitigation issue pertains to the feasibility of creating a sufficient amount of wetlands within the temporary pool. Water fluctuations in the reservoir and instability for wetland plant communities resulting from wave action would be expected to compromise the long-term success of such communities.

A third mitigation issue focuses on the long-term protection of wetlands developed in the shallow portion of the permanent pool. Conventional reservoirs that have reached the end of their design life often are plagued by sedimentation. Reservoir life often is extended by excavating to restore reservoir capacity. However, this practice adversely impacts those very wetlands that have developed in the permanent pool of the reservoir. The DEIS indicates that the proposed project will include five sediment/debris basins (page 1, Description of Recommended Plan). However, it is unclear from the DEIS what the relationship will be between the mitigation wetlands and the sediment basins and whether the mitigation wetlands would be affected by future sediment management.

We recommend that the final EIS address the above mitigation issues in full, including legal measures (e.g., conservation easement) for wetlands protection. A clearer picture of the expected mitigation from this project should be addressed, including in the "Wetlands" section of the Recommended Plan (page 94).

Page 70, Alternatives 1, 2, and 3 – This section indicates that 443 acres of wetlands will be converted, whereas Table H (page 66) indicates 290.9 acres. We do recall earlier discussions with the project sponsor and NRCS regarding the likely elimination under the project of a site currently managed under a USDA Wetlands Reserve Program (WRP) contract and easement. Although this WRP wetland acreage may explain the differences in reported wetland acreage, we are not sure, because impacts to the WRP wetland apparently were not addressed in the DEIS. Thus, we recommend that the discrepant impact numbers need to be rectified in the final EIS, and we believe that the EIS is the appropriate place to bring forth all available information related to the fate of the WRP wetland.

Page 77, Table 1 – The DEIS is silent on how mitigation acreage targets were determined. Throughout the document, we learn that wetland losses could be as high as 290.9 acres, but that existing wetlands adjoining East Locust Creek were determined to be of low quality as a result of livestock usage and a declining hydrology (i.e., from an incising stream channel). Proposed wetlands would be created within the permanent and temporary pools of the reservoir to produce a minimum of 178.5 + 63 or a total of 241.5 acres. This does not account for 49.4 acres of lost wetlands. Thus, the DEIS provides no explanation or justification for not achieving the no net loss goal which would assume a mitigation target of at least 290.9 acres wetlands using a 1 (acre restored):1 (acre impacted) mitigation ratio. We recommend that the final EIS support its proposed mitigation targets.

Cultural Resources and Social Impacts:

Page 10 and page 71, "Cultural Resources": In both sections, it appears that there will be some impact to cultural resources, but this potential impact is not clearly explained. The DEIS mentions that 7 cultural resources have previously been identified, and that it is likely that these will be impacted. Additionally, a cultural resources survey (planned for 2006) is being performed to identify additional resources. EPA suggests that the Final EIS list and briefly describe the 7 known to be impacted by the project, and what the impact is likely to be, and to provide discussion of how other resources will be managed, if discovered. The town of Boynton (which may or may not be one of the 7 previously identified) should be similarly described. Ideally, the cultural resources survey scheduled for 2006 will be completed in time to include its results in the Final EIS.

Population Relocations and social impacts: There is no data describing the relocations that will be necessary to construct the project (though your statement that any relocations will be properly compensated, on page iv is acknowledged). This will likely include persons living in the town of Boynton as well as rural farmsteads within the footprint of the reservoir. EPA suggests that an additional chapter or section be added to the Final EIS (titled "Social Impacts," "Relocations," or something similar) that identifies the required relocations. There may well be other impacts to

local residents that are not currently described (significant changes to emergency services, for instance) that can be included in such a section.

Page 72, "Civil Rights Impact Analysis": Presumably this section is included to address concerns as required under Executive Order 12989, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," or "Environmental Justice." Executive Order 12989 exists in order to insure that no population subcategory is being disproportionately impacted by federal actions. However, there are no data presented describing the project's impacts to populations (minority, low-income, special needs, or otherwise; note that population data on pages 1-2, as well as 17-18, describe populations throughout the two counties affected, but do not describe those directly impacted by the project), so it is impossible to gauge whether disproportionate impacts to any of these populations are anticipated.

EPA suggests that such analysis be performed and added to the "Civil Rights Analysis" Section. Note that the raw data for this analysis should be included in the "Relocations" section, as recommended, above. Additional information related to 'Environmental Justice" can be found at http://www.epa.gov/compliance/environmentaljustice/. You can also contact EPA Region 7's Environmental Justice Office for additional assistance at (913) 551-7649.

Additional Comments:

Page 23, Water Quality, paragraph 2 – The DEIS indicates that on-site septic systems in close proximity to the proposed reservoir "pose a risk for discharge of untreated effluent." Although such discharge could pose a risk to a reservoir that would be serving to provide drinking water and full body contact recreational opportunities, it is unclear whether this risk is specifically known to exist and how significant it is. Further, the Recommended Plan (page 83, Land Use and Treatment, paragraph 2) suggests no actions or efforts that will be expended to deal with this risk. We recommend that the final EIS elaborate on whether the project sponsors have any responsibility for and/or plans to deal with this potential issue as part of the project.

Page 51, Table F-3 – The DEIS contains apparently conflicting information regarding the benefit-cost (B-C) ratio associated with the preferred alternative (i.e., #3). Table F-3 indicates a B-C ratio of 1.81:1, whereas the "Recommended Plan," as described on page 83 in the Summary indicates a B-C ratio of 1.75:1. The correct ratio needs to be provided consistently throughout the final EIS.

Page 58, paragraph 1 – This paragraph discusses the reduction of overbank sediment deposition, scour erosion, etc. but doesn't attribute such reduction to anything. We are wondering if this could be resolved by reformatting the paragraph to include the last sentence of the previous paragraph.

Page 67, Wildlife Habitat, Existing Conditions – This section directs the reader to the Biology Section of Appendix E for supporting information related to the determination of wildlife habitat units. A search of Appendix E revealed no such information. We recommend that the referenced information be added to Appendix E.

Page 69, Alternative 3 – This alternative indicates here and throughout the document (e.g., page 68, Alternative 3) that 1,605 acres situated around the multi-purpose reservoir will serve as mitigation for natural resources, including bottomland hardwoods. Because bottomland hardwoods could constitute approximately 167 acres of forested wetlands (see Table H, page 66) we are concerned that the planning effort to date has not focused any wetland mitigation targeting in the broader watershed (page 94, Wetlands).

Page 83, Measures to Be Installed – The title of this section implies that definite steps are planned to be taken. However, the supporting text is not definitive. For example, under "Land Use and Treatment," paragraph 2, it is explained that soil erosion, sediment damages, etc. "can be reduced" through education and implementation of conservation practices. We recommend that the final EIS stipulate what specific measures could, or will, be pursued.

Page 93, bullet 10 – "Full credit for the compensation acres" should be clarified to show applicability to upland impacts mitigation and not mitigation for those stream and wetland impacts regulated under Section 404 of the Clean Water Act.

Page 93, final paragraph – This narrative indicates that stream mitigation will be addressed through the permitting process. EPA is very concerned that this proposed timeframe will be too late in the implementation of the entire project. Options for mitigation often are driven by available land and funding and historically were addressed as an afterthought to already approved and planned projects. Planning and targeting mitigation for 29 miles of stream channel lost to the proposed project should not be delayed until a separate 404 process is initiated by submittal of a 404 permit application. We believe that all mitigation options should be addressed early and, as fully as planning for such mitigation will allow, considered in the overall project costs.

Except for general discussion in the DEIS about the potential to "protect and restore aquatic and riparian areas (e.g., page 64, Alternative 3), no specific stream system restoration ideas have been advanced. The DEIS does provide valuable information to support the opportunity for such restoration (page 61, Stream Resources, Existing Conditions) by noting the condition of specific reaches of East Locust Creek (Creek) (e.g., scouring, channelization, low water crossings, sedimentation). We believe that in-channel mitigation measures, and not just riparian mitigation measures, should be considered both for the Creek and for other tributaries to the Creek. Such measures could include removal of logjams that threaten channel stability, bank grading and stabilization, grade control measures, meander restoration on otherwise straightened reaches, and removal of low water crossings, including undersized culverts, that serve as obstructions to the passage of aquatic organisms.

In summary of the stream impacts, we recommend that the final EIS (e.g., Recommended Plan, page 83) be specific in the measures that will be taken to mitigate the loss of the expected 29 miles of streams. Such mitigation options should include in-channel and riparian measures, and the geographic area of interest should be the East Locust Creek watershed. All anticipated mitigation costs should be incorporated early into project costs.

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

July 5, 2006

U. Gale Hutton
Director, Environmental Services Division
U.S. Environmental Protection Agency – Region VII
901 North 5th Street
Kansas City, Kansas 66101

Dear Mr. Hutton:

This letter responds to your comments on the Draft East Locust Creek Watershed Revised Plan and Environmental Impact Statement.

Wetlands Impacts Comments

(1) 1st Paragraph (Page 67, Alternative 3-Table H, page 66) – As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the DEIS for the East Locust Creek Watershed Revised Plan-Draft Environmental Impact Statement, the following was added on page 94:

> "There will be no net loss of wetlands as a result of project activities. Refer to Appendix E, Investigations and Analyses, Wetlands section for methodology. Potential mitigation includes:
>
> - Wetlands will be created in the shallow water areas in the upper ends, as well as other areas, of the multiple-purpose reservoir to mitigate for impacted wetlands and through mitigation features associated with the 22 small floodwater retarding structures. An estimated 178.5 acres of wetlands will be created in the reservoir's permanent pool and a minimum of an additional 63 acres in the temporary pool. Creative borrow, in and adjacent to the temporary and permanent pools, will also be considered for creating wetlands. In addition, detention basins located above the reservoir will be investigated as potential for creating wetlands.
>
> - If the acres of wetlands created by the shallow areas of the permanent and temporary pools and with creative borrow (as stated above) are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek Watershed to the south end of Fountain Grove Conservation Area.
>
> - Fringe wetlands of another reference reservoir (e.g. Mozingo Reservoir) will be used to compare/assess wetland functions.

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

(2) 2nd Paragraph – Please refer to Response 1 above.

(3) 3rd Paragraph – As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the East Locust Creek Watershed Revised Plan-DEIS, the following was added on page 94:

> "Fringe wetlands of another reference reservoir (e.g. Mozingo Reservoir) will be used to compare/assess wetland functions."

(4) 4th Paragraph – Erosion and sedimentation rates are relatively low in the East Locust Creek Watershed when compared to other areas of north Missouri. This is also true of the drainage area above the proposed multiple-purpose reservoir site. This drainage area of approximately 21,000 acres has a gross soil loss from all sources of only 3.7 tons/acre/year. It has been estimated that over the 100-year life of the reservoir, sediment will require only 2 to 6 percent of the total reservoir storage capacity. The plan proposes construction of seven modified small structures and five sediment/debris basins above the reservoir, as well as inundation of seven existing small structures. These measures will serve to keep significant amounts of sediment out of the reservoir's permanent pool and mitigation wetlands. Sponsors will be required to adequately protect drainage areas from erosion. Ongoing conservation programs will be administered through the SWCD and NRCS field offices. There is no anticipated need for future excavation measures to restore reservoir capacity.

(5) 5th Paragraph – Please refer to Response 1 above.

(6) 6th Paragraph (Page 70, Alternatives 1, 2, and 3) – As agreed to by the interagency team, at the May 25, 2006 meeting to discuss agency comments regarding the East Locust Creek Watershed Revised Plan-DEIS, it was clarified that the discrepancy between the 443 acres of wetlands and the 290.9 acres is the difference between two wetland inventory techniques. The 443 acres was the result of satellite imagery and the 290.9 acres was the result of NWI. In addition, the following was added on page 94:

> "The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process."

Regarding your comment about the WRP easement, the following was added on page 94:

> "A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see Appendix E, Investigations and Analyses, Wetlands section) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts."

(7) 7th Paragraph (Page 77, Table 1) – Please refer to Response 1 above.

Cultural Resources and Social Impacts Comments

(8) 1st Paragraph (Pages 10 and 71, Cultural Resources) – A contract for the Phase I survey of the reservoir area is now scheduled for the fall/winter of 2006. Consideration of the previously located seven sites, any new sites located during the contract investigation, and historic resources (including the unincorporated village of Boynton) will be a part of the upcoming contract. Any discussion of probable impacts of the proposed project is immature at this time.

(9) 2nd Paragraph (Population Relocations and Social Impacts) – Construction of the multiple-purpose reservoir will require the acquisition of approximately 20 residences and relocation of affected residents. These activities will be carried out in compliance with the Uniform Relocation Assistance and Real Property Acquisitions Act. We do not believe it necessary to detail all of the policies and procedures of this Act in this planning document.

The "Recommended Plan" section addresses impacts, replacements, and abandonment of roads, water supply mains, telephone lines, and power lines resulting from project activities. We see no need for an additional "chapter or section" as issues related to project impacts and relocations are addressed under the heading "Environmental Values Changed – Community Effects" in the "Summary of Watershed Plan" section, and in the "Revised Watershed Agreement". We believe the planning document adequately describes the more significant impacts to the local residents. We agree that there are, no doubt, some impacts that are not currently described, but a planning document cannot be expected to address the entire multitude of impacts that result from a project of this scope. For example, regional economic development impacts are not discussed in great detail. However, the "Summary of Watershed Plan" section states that "a full regional economic development analysis is available by request through the NRCS State Office in Columbia, Missouri".

(10) 3rd and 4th Paragraphs (Page 72, Civil Rights Impact Analysis) – The project sponsors' knowledge and familiarity of the residents that will be impacted by the implementation of the proposed project measures imply that no population subcategories (i.e., minorities, low-income, special needs, etc.) will be disproportionately impacted by federal actions.

All programs and activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the 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 American's With Disabilities Act of 1990. They will also be 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 grounds of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the U.S. Department of Agriculture or any agency thereof. Narrative has been added to the "Civil Rights Impact Analysis" section for further clarification.

Additional Comments

(11) 1st Paragraph (Page 23, Water Quality, paragraph 2) – The Missouri Department of Natural Resources has multiple sources of funding and technical assistance to address water quality issues in the watershed. The department has committed to working with NRCS and the North Central Missouri Regional Water Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. The source water designation will create the opportunity for the local sponsors to apply for grants and technical assistance to address water quality concerns (i.e., illegal dump sites, lack of central sewer systems, etc.) in the watershed area to be inundated or upstream of the inundated areas. Narrative has been added to the "Recommended Plan"

(12) 2nd Paragraph (Page 51, Table F-3) – The 1.75 benefit/cost ratio on Page 83 of the draft plan-EIS was in error. At the time the draft plan-EIS was prepared, the correct ratio was 1.81 as it appeared in Table F-3 and Table 6. However, due to rising land prices, fuel costs, and other factors, the cost estimates contained in the plan are being revised and a new benefit/cost ratio will appear in the final plan-EIS.

(13) 3rd Paragraph (Page 58, paragraph 1) – The reduction in erosion and sedimentation is attributable to the installation of project measures identified in the paragraph that precedes the paragraph referred to in the comment. Erosion and sedimentation resulting from sheet-and-rill soil losses, ephemeral gullies, and classical gullies will be reduced through ongoing and future conservation programs and by the requirement that soil losses be reduced to tolerable limits on 75 percent of the drainage areas above the proposed multiple-purpose reservoir and small floodwater retarding structures. Vegetated buffer strips will be established around the multiple-purpose reservoir that will serve to reduce erosion and act as a filter for sediment-laden runoff. The reservoir and small floodwater retarding structures will have high trap efficiencies for sediment, reduce gully erosion by providing grade stabilization benefits, reduce streambank erosion by inundating moderate to severely eroding stream reaches, and reduce sediment deposition in downstream reaches and on floodplains. Additional narrative will be added to this section to clarify the relationship between the reduction of erosion and sedimentation and the implementation of the recommended plan.

All programs and activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the 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 American's With Disabilities Act of 1990. They will also be 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 grounds of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving federal financial assistance from the U.S. Department of Agriculture or any agency thereof. Narrative has been added to the "Civil Rights Impact Analysis" section for further clarification.

Additional Comments

(11) 1st Paragraph (Page 23, Water Quality, paragraph 2) – The Missouri Department of Natural Resources has multiple sources of funding and technical assistance to address water quality issues in the watershed. The department has committed to working with NRCS and the North Central Missouri Regional Water Commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. The source water designation will create the opportunity for the local sponsors to apply for grants and technical assistance to address water quality concerns (i.e., illegal dump sites, lack of central sewer systems, etc.) in the watershed area to be inundated or upstream of the inundated areas. Narrative has been added to the "Recommended Plan"

(12) 2nd Paragraph (Page 51, Table F-3) – The 1.75 benefit/cost ratio on Page 83 of the draft plan-EIS was in error. At the time the draft plan-EIS was prepared, the correct ratio was 1.81 as it appeared in Table F-3 and Table 6. However, due to rising land prices, fuel costs, and other factors, the cost estimates contained in the plan are being revised and a new benefit/cost ratio will appear in the final plan-EIS.

(13) 3rd Paragraph (Page 58, paragraph 1) – The reduction in erosion and sedimentation is attributable to the installation of project measures identified in the paragraph that precedes the paragraph referred to in the comment. Erosion and sedimentation resulting from sheet-and-rill soil losses, ephemeral gullies, and classical gullies will be reduced through ongoing and future conservation programs and by the requirement that soil losses be reduced to tolerable limits on 75 percent of the drainage areas above the proposed multiple-purpose reservoir and small floodwater retarding structures. Vegetated buffer strips will be established around the multiple-purpose reservoir that will serve to reduce erosion and act as a filter for sediment-laden runoff. The reservoir and small floodwater retarding structures will have high trap efficiencies for sediment, reduce gully erosion by providing grade stabilization benefits, reduce streambank erosion by inundating moderate to severely eroding stream reaches, and reduce sediment deposition in downstream reaches and on floodplains. Additional narrative will be added to this section to clarify the relationship between the reduction of erosion and sedimentation and the implementation of the recommended plan.

(14) 4th Paragraph (Page 67, Wildlife Habitat, Existing Conditions) – The following text was added to the Biology Section of Appendix E:

> "A 0.80 Habitat Suitability Index (HSI) was agreed to by the interagency biology team for bobwhite quail and wood thrush, which represents a suite of species for the upland habitat impacted, as the attainable goal on compensation sites. The use of these HSIs provided the greatest number of mitigation acres (see below).

Upland mitigation analysis:

Upland Hardwoods, bottomland hardwoods, cropland, and grassland mitigation

Compensation of 1,604.6 acres will be required based upon these results:

	Acres	x	HSI*	=	HU
Upland Hardwoods	269	x	0.51	=	137.2
Bottomland Hardwoods	316	x	0.43	=	135.9
Cropland	284	x	0.40	=	113.6
Grassland (pasture/hayland) 815		x	0.31	=	252.7
Total	1,684	x	1.65	=	639.4 HU's

Mean HSI = 1.65/4 = 0.41

*HSI values for upland hardwoods, cropland, and grassland are for bobwhite quail and the HSI for bottomland hardwoods is for the Wood Thrush.

Pasture/hayland gain on dam/spillway

	Acres	x	HSI		
Pasture/Hayland Dam/Spillway	17	x	0.80	=	13.6 HU gain

Therefore, the Pasture/Hayland habitat type HU gains (13.6 HU's) will be deducted from the total HU loss (639.4).

639.4 HU's – 13.6 HU's = 625.8 HU's required for upland mitigation

Attainable goal HSI of 0.80 at compensation sites minus existing HSI (quail/wood thrush) of 0.41 equals 0.39 gain on mitigation areas.

$$\text{Required Compensation} = \frac{625.8 \text{ HU's}}{0.39 \text{ HSI}} = 1{,}604.6 \text{ Mitigation Acres"}$$

(15) 5th Paragraph (Page 69, Alternative 3) – Please refer to Response 1 above.

(16) 6th Paragraph (Page 83, Measures to be Installed) – The East Locust Creek project will involve "definite steps". These will include implementation of those measures necessary to reduce and minimize threats to water quality posed by sediment, nutrients, pathogens, toxic materials, etc. A "source water protection plan" will be created for the multiple-purpose reservoir (refer to Response 11 above). Focused conservation efforts within the watershed will result in reductions in soil erosion and sediment delivery where necessary. As stipulated in the watershed agreement, the sponsors will ensure that 75 percent of the land upstream of the multiple-purpose reservoir and each small floodwater retarding structure is adequately protected prior to construction of that particular measure.

Specific measures to improve or supplement existing conservation practices are not identified in the planning document as there is uncertainty with respect to what land use/land cover changes will occur in the watershed between the present conditions, and such time that project implementation begins. Specific measures, as needed, will be agreed to after issuance of the Record of Decision and prior to project implementation. Measures could include, but are not limited to: filter strips, riparian buffers, livestock exclusion, prescribed grazing, nutrient management, grade stabilization structures, terraces, grassed waterways, tree plantings, etc. The narrative of the referenced section will be supplemented to provide additional clarity.

(17) 7th Paragraph (Page 93, bullet 10) – The document text referred to in the comment has been re-worded for clarification.

(18) 8th Paragraph (Page 93, final paragraph) – Regardless of what measures NRCS proposes in the DEIS, mitigation for the loss of stream channel(s) will be officially and finally addressed through the Section 404 process. It is important to note that work on proposed mitigation is currently ongoing and steadily progressing. Because it is impossible to replace 29 miles of lost stream channel, with stream channel somewhere else, stream channel mitigation efforts will focus on ways of improving and protecting East Locust Creek elsewhere in the watershed.

NRCS is collaborating with the Missouri Department of Conservation to develop methodology to produce in-stream flows at the structure site that will mimic natural flows to the greatest extent possible and provide for the needs of downstream aquatic ecosystems. These objectives are complicated by the necessity to provide such flows while the structure is filling and under conditions of varying demand after the structure is completed. NRCS is modeling inflows to and outflows from the proposed multiple-purpose structure with the Reservoir Operations (RESOP) computer program and 50+ years of historical weather data. NRCS is partnering with MDC to map and monitor downstream channel aquatic habitat. Profile and cross-section surveys will be used to define stream channel geometry and provide a reference should changes occur following construction of RW-1. Discussions are also underway with the Missouri Department of Natural Resources regarding in-channel mitigation opportunities to address a very dangerous and potentially devastating stream piracy issue on Locust Creek above Pershing State Park. For further clarification, narrative has been added to the section referenced by the comment.

(19) 9th and 10th Paragraphs – Although not specifically mentioned, in-stream mitigation measures are indeed being considered. In the 5-mile reach below the proposed multiple-purpose reservoir, only one very minor occurrence of bank instability was observed. Two private low-water crossing are present in this reach but are very low and do not appear to hinder passage of aquatic organisms. The Missouri Department of Conservation agrees with NRCS that in-stream measures are not needed in this reach. As mentioned in regard to Comment No.18, discussions are underway with the Missouri Department of Natural Resources regarding in-channel mitigation opportunities to address the stream piracy issue on Locust Creek above Pershing State Park. The most critical stream issue in closest proximity to the proposed reservoir is the lack of woody riparian corridor along mainstem East Locust Creek and tributaries immediately upstream of the sediment pool. Instability in these upstream channels is a direct source of sediment and nutrients to the water supply. Hence, the DEIS emphasizes restoring woody riparian corridor but certainly does not exclude in-stream mitigation measures. Additional narrative has been added to the section referenced by the comment.

Thank you for your review and comments of the draft Revised Plan-EIS. Your office will receive a copy of the final plan when it is completed. If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

Sincerely,

R Dwaine Helmer

ACTING

ROGER A. HANSEN
State Conservationist

cc: Harold Deckerd, Assistant State Conservationist, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
P.O. Box 2890
Washington, D.C. 20013

MAR 2 3 2006

SUBJECT: PDM - Review of East Locust Creek Watershed Revised Plan

Date: MAR 1 7 2006

TO: Roger A. Hansen
State Conservationist, NRCS
Columbia, Missouri

File Code: 390

Thank you for providing the draft East Locust Creek Watershed Revised Plan- Environmental Impact Statement (EIS) for our review. Our comments are provided below.

The project cost totals over $43 million, which, if authorized for Watershed Program assistance under the authority of PL 83-566, includes $25 million of Federal assistance subject to appropriations. The multi-purpose reservoir has a total capacity of greater than 4,000 acre feet of water storage. As a result of these amounts, the plan will require approval by Congress after the public review and comment period has been completed and the final plan has been approved locally.

The watershed plan revision was prepared using the authorities provided by PL 83-566 and an appropriations earmark which stated, "Not withstanding any of provision of law, the Natural Resources Conservation Service (NRCS) shall provide financial and technical assistance through the Watershed and Flood Prevention Operations program to carry out the East Locust Creek Watershed Plan Revision in Missouri, including up to 100 percent of the engineering assistance and 75 percent cost share for construction of Site RW-1". The cost share rate of 75 percent is different than the amount provided for in PL 83-566, and special legislation such as the above would be required to maintain the cost share at 75 percent for any appropriations regarding Site RW-1. We recommend that the Watershed Agreement include an item that Federal cost share rates will be implemented according to PL 83-566 unless otherwise provided in appropriations for that year.

We recommend that the Operation, Maintenance, and Replacement (OM&R) section of the draft section of the Watershed Agreement be reworded. The last sentence in paragraphs one and two of item 7 regarding the OM&R responsibilities (after the designed service life of the structures) says, "This does not commit NRCS to assistance of any kind beyond that point unless agreed to by all parties". We suggest that the wording be changed to indicate that the sponsor is responsible under the agreement with NRCS to perform the obligations of the OM&R agreement for the service life of each structure, and may be responsible for OM&R after the agreement has expired according to State and Local laws and regulations.

Page 83 of the Watershed Plan/EIS indicates that the benefit/cost ratio is 1.75. However, Table 6 on page 119 shows the benefit/cost ratio to be 1.81. Please make the necessary corrections.

We recommend rewording of the last paragraph on page 87. The existing wording indicates that landrights will be acquired for the 100-year, 24 hour design life. It should be corrected to require landrights up to the elevation of the water surface attained during passage of a 100-year, 24 hour storm flow through the structure. Additionally, the landrights requirements on page 87 do not include areas needed for areas such as spoil disposal, borrow, entry and exit, and similar items. Please refer to the National Watershed Manual 502.82 for additional ideas for property rights requirements.

Page 89 of the plan and Table 4, Estimate Average Annual Costs, appears to dismiss the Federal investment of seven dams that were constructed with PL-566 funds and that will be inundated by Site RW-1. What provisions have been made for the reimbursement of the Federal investment? Additionally, it does not appear that the Federal and local costs for the existing seven dams were accounted for in the cost tables. Please provide further written explanation to me so that we can reach agreement that the existing Federal investment in the project is being protected. We would also be glad to arrange a teleconference to further discuss this issue.

The draft East Locust Creek Watershed Revised Plan/EIS was very well prepared and consistent with the thorough planning and documentation typically provided by the Missouri water resources staff, sponsoring local organizations, and the planning support from the National Water Management Center. Please call Stuart Simpson, National Watershed Program Leader, at (202) 720-3413, with questions regarding our evaluation.

Thomas W. Christensen

THOMAS W. CHRISTENSEN
Deputy Chief for Programs

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

Subject: PDM – East Locust Creek Watershed Plan – EIS Date: June 28, 2006

To: Thomas W. Christensen, Deputy Chief for Programs File Code: 390-11
NRCS, Washington, D. C.

This letter responds to your comments on the draft East Locust Creek Revised Watershed Plan-Environmental Impact Statement.

1) As recommended, text has been added to the "Revised Watershed Agreement" section under the heading "Other Items". It now states, "Federal cost share rates will be implemented according to the Watershed Protection and Flood Prevention Act, Public Law 83-566 unless otherwise provided for in the appropriations for a given fiscal year".

2) As recommended, the "Operation, Maintenance, and Replacement" portion of the "Revised Watershed Agreement" section has been reworded. It now states, "Sponsors are responsible under the agreement with NRCS to perform the obligations of the OM&R agreement for the service life of each of the works of improvement, and may be responsible for OM&R after the agreement has expired if required by state and/or local laws and regulations".

3) The 1.75 benefit/cost ratio on Page 83 of the draft plan-EIS was in error. At the time the draft plan-EIS was prepared, the correct ratio was 1.81 as it appeared in Table 6. However, due to rising land prices, fuel costs, and other factors, the cost estimates contained in the plan are being revised and a new benefit/cost ratio will appear in the final plan-EIS.

4) In the last paragraph on Page 87 of the draft plan-EIS, the term "24-hour" was placed in the sentence in error due to global changes that were made to other parts of the plan. Landrights will be secured by either fee-simple title or perpetual easements to the top of dam elevation of the multiple-purpose reservoir. These landrights will cover an estimated 6,257 acres which we believe will include all areas necessary for the embankment, spillways, pools, spoil disposal areas, borrow areas, ingress/egress, and areas needed for other activities. The text has been supplemented for clarification.

5) The amount of the federal investment in the seven structures that will be inundated by installation of the multiple-purpose reservoir has been included in footnotes to Table 1 (Estimated Installation Costs), Table 2 (Estimated Cost Distribution-Structural Measures), and Table 2A (Cost Allocation and Cost-Share Summary). The federal investment, calculated at $341,000, and the requirement that the responsible project Sponsor will reimburse NRCS for these lost investments has been written into the "Revised Watershed Agreement" and into the "Recommended Plan" section under the heading "Multiple-Purpose Reservoir".

If you have any further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912. Your office will receive copies of the final plan as soon as it is completed.

ROGER A. HANSEN
State Conservationist

cc: Harold Deckerd, Assistant State Conservationist, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

United States Department of Agriculture

FEB 3 2006

NRCS

Natural Resources Conservation Service
National Water Management Center
101 East Capitol Avenue, Suite B100
Little Rock, AR 72201-3811

SUBJECT: PDM – Final Comments on East Locust Watershed

DATE: January 31, 2006

TO: Roger A. Hansen, State Conservationist
Natural Resources Conservation Service
Parkade Center, Suite 250
601 Business Loop 70 West
Columbia, MO 65203

FILE CODE: 390-11-5

Attached are final comments for the above mentioned watershed. We appreciate the opportunity to assist you and your staff in developing quality watershed plans to better serve your client's and public's interest. Your staff has done a good job of planning and developing the appropriate solutions. If the Water Management Center can be of further service, please contact Jimmy Moore at 501-210-8922 or by email at james.moore@ar.usda.gov.

KEITH E. ADMIRE
Director

Attachment

Cc: w/attachment
Dan Lawson, Branch Chief, Conservation and Watershed Planning, NRCS, Washington, DC
Jackie Davis-Slay, Watershed Survey and Planning Program Manager, NRCS, Washington, DC
Harold L. Deckerd, ASTC (WR), NRCS, Columbia, MO 65203

National Water Management Center
Comments on
Revised Watershed Plan and Environmental Impact Statement
East Locust Creek Watershed
Missouri

General Comments:

The overall impression of the subject plan is very good. Most sections of the plan are well written in a clear and concise manner. Hopefully, the comments which follow will make it an even better plan.

Watershed Agreement - The revised plan replaces the original plan. The agreement should reflect the installed measures and the proposed measures and the responsibilities of the sponsors and NRCS.

Cost Share Rate - A cost share rate of 75 percent federal, 25 percent other is identified in the Watershed Agreement and at several locations within the document. The special congressional authority for this cost share rate is only identified in footnote b on Table 2A on page 100. As a matter of full disclosure, this special authority should be identified at the first convenient location in the document. Consider adding a section entitled "Authorities" on page 15. Both the PL-566 authority and the current congressional authority with special cost share provisions should be clearly identified.

Acceptability - The term "not acceptable" is used in numerous places in the document (e.g. page 38, last paragraph). Acceptable or not acceptable should not be used as an opinion. The basic reason(s) for lack of acceptability should be given. Most often, an option or alternative is not acceptable because it fails to meet the identified project objectives or it is not cost effective when compared with other potential alternatives. There may also be social or environmental consequences that make an alternative "unacceptable" and if appropriate, the underlying reasons should be clearly stated. Suggest providing the basic reasoning as to why a condition or alternative is "unacceptable". Also consider a global search of the document for the word "acceptable" and substitute the basic reason(s) or rationale as to why an alternative is or is not acceptable.

Design frequencies - Design frequencies or recurrence intervals are mentioned often in the document without providing the associated duration (e. g. page 43, 49, etc.). A frequency without the associated duration is meaningless. For example, there is a 100-year, 1-hour event; 100-year, 6-hour event; 100-year, 24-hour event; and a 100-year, 10-day event. On pages 81 and 82, the durations are correctly included. Suggest doing a global search for "-year" and providing the associated duration where appropriate.

Water Yield - The document should clearly indicate that the 7 mgd is intended to meet the current need, or 15- or 50- year projected need. A couple of passages state that the commission "will be able to serve 54,000 residents....by 2025". Since 54,000 residents at approximately 130 gallon/capita per day is approximately 7 mgd, the reader is left to assume that the full 7 mgd will be needed by 2025. The text should clearly state the initial demand and the point in time when the projected demand will reach the 7 mgd limit. The change in demand with time and the overall purpose and need for the project are not entirely clear. Since water demand is the key element in this plan, suggest an added section early in the document that clearly discusses the basis for water demand, the initial magnitude of demand from the proposed multiple-purpose reservoir and the estimated time in the future when the demand of 7 mgd is expected to be realized.

Project Purposes - The text and tables are inconsistent in their presentation of project purposes. Table 2A identifies three project purposes: flood prevention, fish & wildlife, and agricultural water management. The first paragraph on page 45 identifies flood prevention, recreation, and agricultural water management. The Project Purposes passage on page 5 identifies flood prevention, recreation, wildlife habitat, and water supply. Table 2A, which is meant to show the estimated construction costs of recreational facilities includes two entries (for Tree and Shrub Plantings and Underwater Fish Structures) which appear to pertain to fish and wildlife. The balance of the document appears to only refer to fish and wildlife in terms of project mitigation, or as a means of providing recreation.

Expenditure of funds for mitigation does not establish a fish and wildlife purpose. The expenditure of funds for Underwater Fish Structures designed to improve recreational fishing also does not establish fish and wildlife as a purpose. The placement of both of these cost items in Table 2A further indicates that they are both meant to provide recreation, rather than to simply promote fish and wildlife. The fact that Recreational Facility expenditures are being shown to achieve a Fish and Wildlife purpose in Table 2A further indicates there is no fish and wildlife purpose; and that rather these expenditures are associated with recreation.

A project with a fish and wildlife purpose spends funds to achieve fish and wildlife betterment. The document either needs to show that, or fish and wildlife needs to be dropped as a project purpose and recreation needs to be added.

Tables 1 and 2 - The tables should include the installed structures. The costs should be indexed to the present price base.

Cost Allocation Basis - NWSM 502.91 requires that the method or basis for cost allocation be described in the plan.

Replacement Costs - The text and tables must convey the consistent message that the local sponsors are responsible for all the costs of all the replacements for all the

project purposes and features. Specific instances in which this was not done have been identified, such as in Table 2A.

Specific Comments:

Page i, ABSRACT:

The description of the project should disclose that the "multiple-purpose reservoir" will have a surface area of 2235 acres at normal pool and include the approximate height of the dam. This should also be included in the "Description of Recommended Plan" on page 1 of the summary, and in the Description of Alternative Plans and throughout the document where the alternatives are described.

Watershed Agreement, Title:

The title of the agreement should be "Revised Watershed Agreement No. 1" as shown in Figure 506-2 of the NWSM. The revised agreement should include the opening paragraphs as shown in Figure 506-2 of the NWSM.

Page v, Watershed Agreement, Water Rights:

Suggest replacing this item with the more inclusive title "Water, mineral and other resource rights".

Watershed Agreement, Emergency Action Plan:

The requirement for an Emergency Action Plan (EAP) (NWSM 508.45) does not appear in the Watershed Agreement. Recommend including the EAP in the Watershed Agreement and identify the EAP as a requirement prior to initiation of construction. An example statement for use in the Watershed Agreement is as follows:

"The sponsors will provide leadership in developing an Emergency Action Plan (EAP) and will update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The purpose of the EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of a floodwater retarding structure. The NRCS State Conservationist is to determine that an EAP is prepared for each high hazard dam prior to the initiation of construction". (Reference NEM, section 520.27).

Watershed Agreement:

Future Development - For Hazard class "a" and "b" dams, include precautionary statements against future developments that could result in a changed classification. (NWSM 504.40(b)(3) and NEM 520.28). Recommend this requirement be included in the Watershed Agreement to heighten sponsor awareness of this commitment. This item could logically be included following the recommended requirement for an Emergency Action Plan for the high hazard dam.

Watershed Agreement, Term of Agreement:

Recommend including an item disclosing the term or life of the Watershed Agreement. An example could be as follows:

"The term of this agreement is 75 years, the service life expectancy of the project and does not commit the NRCS to assistance of any kind beyond that point unless agreed to by all parties."

Watershed Agreement, Term of Watershed O&M Agreement:

Recommend adding the term or life of the O&M agreement to Item 11. An example could be as follows:

"The terms of the agreements are 75 years, the service life expectancy of the project."

Page 3, Summary, Land Use/Land Cover, second paragraph:

The 466 acres between the permanent pool and auxiliary spillway elevation appear to describe the multipurpose reservoir. The difference for the multipurpose reservoir is 277 acres in Table 3. Please clarify and make any necessary changes.

Page 3, Land Use and Land Changes, second paragraph, third sentence:

The recommendation encouraging the sponsors to acquire land rights up to the top of dam elevation is endorsed by the NWMC on all new sites. The concept may not be feasible on some rehabilitation projects. The current draft of the new NWSM requires that easements be obtained to top of dam elevation. The requirement may or may not survive in the final version of the NWSM.

Page 3, second paragraph:

The text would appear to indicate that "1 acre of urban, farmsteads, and roads" would be subject to flooding with the installation of the recommended plan. Ensure this statement is consistent with the 100% damage reduction shown for Commercial / Urban in Table 5 on page 109. Presumably, the farmsteads and any urban dwellings will be acquired and removed from the detention pool. Consider rewriting the sentence for additional clarity regarding what is expected to happen with urban, farmsteads and roads within the detention pool.

Even though all occupied dwellings will presumably be removed from the detention pool, will there be remaining septic tanks and drain fields that are still located within the detention pool area?

The text needs to document the risk or uncertainty of flooding for any occupied dwellings located between the auxiliary spillway (or easement elevation) and the top of dam elevation.

The text indicates that a road will remain in the flood pool. The text needs to disclose the level of use on this road, and any threat which continued operation of this road poses to users such as school buses and commuter traffic.

Page 5, Alternatives 2 and 3:

As written here, Alternatives 2 and 3 are identical. The description of Alternative 2 on page 43 also identifies 17 small FWR structures on the mainstem of East Locust

Creek (above and below the multiple-purpose reservoir). Recommend clarifying the difference between Alternative 2 and 3 and verify that the description of Alternatives 2 and 3 on page 5 matches the description of Alternatives in the section on "Formulation and Comparison of Alternatives".

Page 6 and Tables F-1 through F-4, Installation Period, Amortization Period and Lag Period:

There is an apparent inconsistency in that page 6 of the document indicates installation will occur over six years but the Amortization of Installation Costs entries on Tables F-1 through F-4 do not indicate any such lag in installation.

Ensure project benefits are also appropriately lagged to reflect the installation period.

Page 8, Summary, Community Effects:

This section of the summary should mention that the town of Boynton will be inundated.

Page 9, Summary, Wildlife Habitat, Stream Resources, Wetlands:

These paragraphs should disclose impacts. (i.e. A total of x acres of low-medium value habitat will be permanently flooded. A total of x liner feet or acres of stream bed will be converted to lake habitat. A total of x acres of existing forested? wetlands will be permanently flooded and converted to deepwater habitat.) Currently only mitigation is disclosed.

Page 9, Summary, Wildlife Habitat, second sentence:

Ensure each alternative includes any estimated costs associated with mitigation.

Page 10, Summary, Cultural Resources:

1. The last cultural resources review and survey of the area potential effects was conducted in 1985. The effective life of this cultural resources survey and literature review has reached the end of acceptable reliability. It was indicated that another Phase I survey will be undertaken and that this survey will be aided in design by a geomorphic model. Because of the refinement of archaeological techniques, protocols, and the general passage of time, NWMC recommends the Phase I inventory design also consider another inventory of the previously inventoried area, an on-ground location and review of the fourteen extant sites previously recorded and a re-evaluation of the seven sites that could be impacted by the proposed project.

2. During the 1985 inventory, was consultation undertaken with the SHPO and/or ACHP on the eligibility (significance) of the fourteen archaeological sites identified? Were letters of eligibility and determination of effect issued?

Page 10, Summary, Mitigation Features:

The text states "626 units of wildlife habitat ... will be lost". The species and acres represented should be disclosed here.

Page 12, Conclusion, last sentence:

The last sentence needs to contain a qualifier since page 10, Cultural Resources indicates that a Phase 1 survey has yet to be conducted.

Page 18, Stream Resources:

Recommend adding a paragraph at the beginning of this section disclosing basic information regarding the stream that will give the reader, who not familiar with the area, a mental picture of the stream. This information should include average stream width, flow regime (perennial, intermittent, ephemeral?), substrate (mud, bedrock, cobble,) and other characteristics (riffle and pool? deeply incised channel? approximate bank height?) It is not until the water quality section that the reader finds basic information regarding flow regime.

Page 21, Project Setting, Water Quality, last paragraph:

This paragraph details proposed demolition, removal, and inundation of the nineteenth century settlement of Boynton. Have the appropriate cultural resources field and literature reviews been undertaken? Was this survey and consultation process covered in the 1985 report? Is there a cemetery or other buried human remains associated with Boynton? ***Without further clarification there exist significant concerns***. The proposed Phase I inventory should take the historic fabric of this settlement into account with a qualified specialist conducting the evaluation. If previous consultations with the SHPO and ACHP have not been undertaken for the consideration of Boynton, the internal changes within the structure and locations of the ACHP starting this last fiscal year might cause somewhat longer review times. If discovery, monitoring, and mitigation plans are called for, NWMC recommends a specific MOA be developed. Such a MOA is mention on page 64.

Page 22, Project Setting, Cultural Resources, first paragraph:

This paragraph indicates that only a 35% sample APE associated with proposed small floodwater retarding structures were inventoried in the 1985 report. Will the geomorphic model used to aid in the design of the new proposed Phase I inventory factor the 1985 sample areas into consideration? With all past considerations of the project area, how much of this area has been previously inventoried for cultural resources?

Alternative 3 (NED/Recommended plan) calls for the installation of one multiple purpose reservoir on the main stem of East Locust Creek and 22 small FWR structures. This paragraph indicates that "Sites are more likely to be found adjacent to the larger stream valleys (the main stem of East Locust Creek)." Again, it is essential that a comprehensive Phase I survey be conducted of this higher probability area.

With a cultural history extending back approximately 10,000 years, perhaps this section could detail (perhaps another paragraph) on what types of cultural resources sites are to be anticipated in the project area (*eg.* Prehistoric settlement sites, lithic sites, etc.).

Page 22, Wetlands:

Although the NWI maps are referenced, within this section the reader should be able to get a mental picture of what currently exists. Are the 291 acres of wetlands forested, marsh, or swamp? Inclusion of general species composition, and description of the condition of the communities (mature? logged? cutover?) is also recommended.

Page 23-34, Watershed Problems and Opportunities:

Recommend a well defined, concise "Purpose and Need" statement introducing this section.

Several passages of this section are repeated directly from the "Project Setting" section. This section should focus on clearly demonstrating the needs (problems and opportunities) to which the federal project is responding. When appropriate, the information already covered in "Project Setting" can be summarized here or the appropriate section referenced. It is important that this section clearly demonstrate the need for the 7 mgd, and clarify whether the purpose of the project is to meet the current, 15-, 25-, or 50- year projected need. A couple of passages state that the commission "will be able to serve 54,000 residents....by 2025" however the demand and intent of the project is not entirely clear. If this is not demonstrated and well defined within the purpose and need statement, a myriad of alternatives consisting of smaller dams/pools or other less environmentally damaging alternatives could be considered "reasonable".

Pages 29 and 30, Water Quality, fifth paragraph (fourth on page 29) and eighth paragraph (second on page 30):

Again, these paragraphs deal in a discussion of inundation of the town of Boynton. Of particular concern, page 30, "All remains of the town of Boynton will need to be removed or properly decommissioned..." Before the complete erasure of the historic fabric of Boynton, appropriate cultural resources assessments and consultations must be undertaken (see previous concerns).

Page 30, first paragraph, last sentence:

The text uses the phrase "could be used to construct". The text needs to make clear whether Pollock and Lemons are expected to construct central sewer systems. If construction of such sewer systems would only be expected to occur in some alternatives, those difference among the alternatives (including the costs and benefits) needs to be disclosed. If this sentence is simply speculation, the sentence should be deleted and respective alternative effects generated with an assumption that the central sewer systems would not be built. Any uncertainty associated with the assumption needs to be disclosed in the Risk and Uncertainty section of the document.

Page 30, second paragraph, third sentence:

As written, the text indicates that illegal dump sites should be located and removed. The text needs to reflect clearly the actions and effects associated with each

alternative. Do we expect this action to occur or not? If this is necessary work associated with the project, then its costs should be included even if the work is not cost sharable. If there is uncertainty as to how much work and how much costs will be associated with this effort, that needs to be disclosed in the Risk and Uncertainty section of the document.

Page 38, Social Considerations:

The passage is not clear. Does it mean to indicate these water supplies are unavailable because others have legal rights to them? Or does it mean others would prefer to keep those supplies to themselves? The paragraph needs to go into more detail explaining the base reasoning of why these potential sources were not socially acceptable.

If others have legal rights to that water, it would be easy for the reader to understand why that water is not available for this project. The text might simply indicate that negotiations with the water rights holders failed to identify any water supply available to meet this project's stated needs. If on the other hand, the water is legally available and this analysis is simply disregarding that water supply resource to avoid controversy—that would not make sense.

Alternatives may not simply be disregarded because local sponsors or the public do not like them. All alternatives vary in the degree to which they address P&G's acceptability, completeness, effectiveness, and efficiency criteria. Alternatives do not have to be 100% acceptable, 100% complete, 100% effective or 100% efficient. Normally no alternative is.

Page 39, first paragraph:

The last two sentences of this paragraph appear to contradict one another in that the first sentence talks about how many wells would be needed to meet the demand; and the second concludes that adequate yield is not attainable. If adequate yield is not attainable, then 200 wells would not attain it. The inconsistency needs to be resolved. If 200 wells could get the job done and is not otherwise unreasonable, that alternative would need to be developed in detail. Factors that should be considered include cost effectiveness, pumping depths, pumping costs, uncertainty of drilling producing wells, seasonal yields, etc.

Page 42, description of Alternative Plans:

Alternatives 1, 2 and 3 all include sediment/Debris Basins. There is no mention found in the document indicating how often these sediment/debris basins are expected to be cleaned out; who will be responsible for the cleanout; and a description of the conditions that would initiate or require cleanout. The provisions and responsibilities for cleanout should be included as an item in the Watershed Agreement. In addition, if the cleanout interval is less than the expected project life (75 years), the cleanout costs over the evaluated life of the project should be included in Alternatives 1, 2, and 3. If the intent is to cover cleanout as part of the OM&R agreement, the costs indicated in Table 4 may not be sufficient.

Page 42, Description of Alternative Plans:

The descriptions of the alternatives should include approximate pool areas and dam heights associated with the "multiple-purpose reservoir" described with the various alternatives. "Small structures" should be also be further defined in the alternatives section.

This section should describe appropriate mitigation measures associated with each alternative. (CEQ 1502.14)(f).

Page 44, Table F-2, Estimated Installation Costs, Other Funds:

The "Other Funds" total cost of $17,925,250 is not consistent with the sum of the individual entries immediately above it.

Page 47-71, Effects of Alternative Plans:

To reduce duplication, the "existing conditions" sections should summarize the information already provided and if appropriate reference the "project setting" section.

Page 48, Agricultural Water Management, Alternative 1, third paragraph:

The average annual water benefit for Alternative 1 is $1,940,800. The average annual water benefit for Alternatives 2 and 3 is $1,997,300. Please explain the lower average annual water benefit for Alternative 1.

Page 49, Alternative 4 – (Future Without Revised Plan):

This passage indicates the local sponsors would need to build the reservoir at their own expense in this alternative. This statement is problematic. If the most likely future condition for the Future Without Revised Plan is that the local sponsors would build the reservoir themselves, then that must be shown as the Future Without Revised Plan alternative. If the passage is miswritten, then it needs to be corrected.

Local sponsor construction of the reservoir would not necessarily have the same costs and benefits in the NED account. If for instance the local sponsors would construct the reservoir to state standards, rather than federal standards, the reservoir may have significantly different costs associated with it. Alternatively, the local sponsors might elect to develop a water supply reservoir without a flood damage reduction purpose.

The different options that are available to the local sponsors in the Future Without Revised Plan alternative need to be made known to them so they can make an informed decision. If they would build the reservoir themselves, that must be shown in the Future Without Revised Plan alternative.

It can be very difficult to identify the Future Without Revised Plan alternative. Any uncertainty associated with identifying the Future Without Revised Plan alternative needs to be addressed in the Risk and Uncertainty section of the document.

Page 51, Erosion and Sedimentation:

The narrative does an excellent job in describing the sources of the erosion and the reduction in erosion for the different alternatives. Recommend including the relationship to the sediment storage volume (watershed inches or acre-feet) required for the multiple-purpose reservoir and the small FWR structures.

Page 51, Erosion and Sedimentation, first and second paragraph:

The first paragraph indicates a total sediment production of 320,000 tons annually. The various sediment sources in the second paragraph add up to 321,300 tons annually. Suggest making the two totals match.

Page 51, Erosion and Sedimentation, overbank sediment deposition:

The overbank sediment deposition will be reduced 38% with Alternative 1 and 40% with Alternatives 2 and 3. Table G indicates the same remaining damages for Alternatives 1 and 3 and lower damages for Alternative 2. Please verify and make the appropriate corrections.

Page 60-61 Wetlands, Wildlife Habitat, and Forest Resources:

For each alternative, impacts to each of these resources should be quantified. Currently for wetlands, the impacts for each alternative have not been disclosed, (only mitigation is discussed). For wildlife habitat, acreages impacted and the species used to determine the habitat units impacted and mitigated should be discussed. Likewise for forest resources, the approximate acreages of "bottomland and upland hardwoods" impacted should be disclosed.

Page 62, Forest Resources:

The narratives for Alternatives 1, 2 and 3 indicates the loss of bottomland and upland hardwoods. Recommend including the estimated quantities of each with the alternative narratives.

Page 63, Land Use and Treatment, Alternatives 1, 2 and 3:

The total acreage converted to open water totals 2179 acres. Table 3 indicates that there will be 2235 acres of permanent water created with the multipurpose site.

Page 64, Effects of Alternative Plans:

Recommend including a section entitled "Cumulative Impacts" discussing the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Page 64, Formulation and Comparison of Alternatives

The consultation process and formulation of a MOA are proper procedure. NWMC concur the outlined consultative process with Native Americans and other concerned parties is adequate as stated. One consideration in the MOA process is the incorporation of discovery, monitoring, and mitigation plans if warranted by the results of the proposed comprehensive Phase I.

Page 65, Relationship to other Plans, Policies and Controls, first paragraph, last sentence:
Suggest deleting the word "some" and replacing with the number of small FWR structures to be eliminated.

Page 67, first paragraph, second and third sentences:
The two sentences as written give the impression that the point for beginning all routings is somehow related to the expectation that the water surface will normally be at or below the principal spillway crest based on the expected fluctuation of the municipal pool. The site must still meet the 10-day drawdown requirements contained on page 6-1 of the July 2005 TR-60. NRCS criteria require the standard design hydrographs and the freeboard hydrographs to begin routing at the 10-day drawdown if 85 percent of the detention storage volume is not evacuated. Normally, if the 10-day drawdown test is not met, the crest elevation of the auxiliary spillway crest is to be raised by a volume equal to the storage volume remaining to be drawn down after 10 days. The minimum principal spillway hydrologic criteria apply to the operation frequency of an earth or vegetated auxiliary spillway. The minimum principal spillway hydrologic criteria do not apply to a structural spillway. With a structural auxiliary spillway, it is not necessary to raise the auxiliary spillway crest if the 10-day drawdown test is not met but the routing of the auxiliary and freeboard hydrographs would still begin at the elevation of the 10-day drawdown if 85 percent of the detention storage volume is not removed in 10-days.

Given the discharge of the low stage (919.7 cfs = 1824 acre feet/day), there should not be any problem in removing 85 percent of the 8863 acre feet of detention storage within the allotted 10-days.

Page 67, fourth paragraph, fourth sentence:
The fourth sentence may be an oversimplification of variations in final construction costs. The competitive bidding process includes many factors other than fuel costs that may significantly influence the final contract cost. Factors such as number of interested contractors, competing earth moving or concrete jobs, fluctuations in building materials (especially concrete), size of job, mobilization costs and labor costs. Suggest rewriting the paragraph to reflect the general uncertainties in the competitive bidding process rather than emphasizing fuel costs.

Consider replacing the last sentence with the concept that "Design features and cost estimates were based on the best information available. A xx percent contingency was included to cover the degree of uncertainty inherent in estimating costs for large competitively bid construction projects".

Page 67, Rationale for Plan Selection, last sentence:
Consider rewriting the subject sentence to read similar to "The recommended plan was selected by the watershed sponsors as the most efficient and effective alternative to meet their identified project purposes".

Pages 68 and 69, Table 1:

Fisheries/Wildlife Habitat. Three alternatives indicate mitigation will improve habitat. Normally mitigation is meant to mitigate damages. Recommend rephrasing the passage accordingly—separating mitigation work from non-mitigation work, or providing summary information for Fisheries/Wildlife Habitat. As written, it appears mitigation funds are being expended to improve Fisheries/Wildlife Habitat. The Wildlife Habitat passage on the bottom of page 83 would appear to indicate this is mitigation rather than improvement.

There is a need for parallel statements. The table entries make comparison of the alternatives difficult. For instance, the Stream and Riparian Areas entries for Alternatives 1-3 show approximately 29 miles of stream channel inundated—but there is no parallel entry for how many miles of stream channel are inundated in Alternative 4. Likewise, for the Wetlands entries, the reader cannot readily compare Alternative 4's "no net loss of wetlands" with the acres of wetland created for the other alternatives.

Compare these to the entries for the NED account, Flood Damages, and Erosion/Sediment Reduction which all contain parallel statements which make comparison of the alternatives easy.

RED. The terms "Value Added" and "Total of Industry Output" need to be added to the glossary. If they, or any other figures presented in the RED account are representative only of the period of construction, rather than the project's design life, that distinction needs to be added.

Page 69, Table 1:

The math displayed for the NED account is incorrect for Alternative 4.

The Average Annual Beneficial Effects displayed are not consistent with those shown on page 46.

Page 71-73, Consultation and Public Participation:

This is one of the best Consultation and Public Participation sections that we have reviewed.

Page 78, third sentence:

Consider modifying the subject sentence to read similar to "The exit portion of this spillway will consist of approximately 33-five foot horizontal by two foot vertical steps".

Page 78, second paragraph, first sentence:

Suggest rewriting the subject sentence to read similar to "A structural auxiliary spillway was used in lieu of the detention storage and principal spillway requirements for earthen and vegetated earthen auxiliary spillways as contained in NRCS Technical Release – 60".

Page 78, second paragraph, second sentence:

Recommend stating the basic reasons of why detention storage requirements for an earthen of vegetated earthen auxiliary spillway were not socially or economically feasible. The difference in economic feasibility should not be difficult to demonstrate but what are the social issues? Are the social issues related to overall size of the reservoir, additional land rights issues, or are the social issues also economic feasibility issues? Please clarify what the social issues are.

Page 78, Multiple-Purpose Reservoir, hazard classification:

The high hazard designation for the multiple-purpose structure should be supported by describing the population at risk from the breach analysis. The number of people in the breach zone should be included. Recommend including the State Conservation Engineer's concurrence on the hazard classification. Recommend including the independent hazard classification from the Missouri state dam safety agency.

Page 79, first paragraph:

Reference the earlier general comment on Emergency Action Plans. Suggest incorporating the general language from that comment in this section. There should be a specific sentence that states "The state conservationist is to determine that an emergency action plan is prepared prior to the initiation of construction" (NEM 520.27).

Page 79, second paragraph, second sentence:

Suggest inserting the words "75-year evaluated" between the words "the" and "life".

Page 79, second paragraph, next to last sentence:

The subject sentence states "NRCS will require that the sponsors acquire additional land rights to cover an area to the top of dam elevation". A similar statement on page 3 "recommends that the sponsors give consideration to acquiring additional landrights to cover an area to the top of dam elevation". Recommend using the page 3 language since land rights to the top of dam elevation is not currently required. Again, the NWMC endorses the concept of requiring landrights to the top of dam elevation on all new sites.

Page 81, Table J:

The surface area for the "Avg. Flood Pools" is less than the surface area for the "Avg. Sediment Pools". The flood pools surface areas should be larger than the sediment pools surface area. Please verify the surface areas and make the appropriate corrections.

Page 85, Recommended Plan, Wetlands:

Recommend defining "wetland creation" (e.g. flooded uplands, excavate previously cleared uplands?).

Pages 99-100, Table 2A:

Some of the "Construction" entries have a double asterisk (**) but no corresponding footnote.

Page 101, Table 2B:

Recommend that "Wildlife Habitat Development" not be included in the title. As detailed below, the costs of wildlife habitat development are not to be included in this table.

If "Tree and Shrub Plantings" are for mitigation, it should be removed from this table. As stated in NWSM 503.46(e)(2): "Costs for mitigation measures will be allocated to the purposes of the work that produces the need for mitigation." NWSM 502.91(a) specifies that: "Mitigation costs will be separated into the cost of the feature and the cost of land components. The cost of the land will be a real property rights cost, while all other costs will be construction costs."

If "Underwater Fish Structures" is intended to be mitigation, it should not be included in this table. Including this work in this table acknowledges that the work is being done for recreational purposes, rather than for fish and wildlife purposes.

Replacement costs are not to be included as a construction cost.

Page 103, Table 3, Controlled Drainage Area:

Presumably, the 2662 acres is the area controlled by small structures upstream of the larger proposed multipurpose site. First, footnote the 2662 acres to identify how many small structures comprise the 2662 acres. Secondly, were the small structures ignored in the design of the lower structure? Since the small structures will not pass the class (c) freeboard requirements, they must either be considered breached or ignored altogether. If the small structures were ignored in the design of the lower structure, the "Controlled Drainage Area" item should be footnoted to that effect.

Page 103 and 104, Table 3:

Since both submerged and aerated sediment are identified under "Total Capacity" on page 103, recommend that submerged and aerated sediment be identified under "Capacity Equivalents" on page 104.

Page 104, Table 3, Freeboard Hydrograph:

The data entered for the Freeboard hydrograph appears to be 6-hour data. Footnote d) indicates that the top of dam was established utilizing a 24-hour PMP, Type II distribution (see attached comment regarding the appropriate distribution). The procedure for Auxiliary spillway and freeboard (routings) given on page 2-1 of Technical Release 60 (July 2005) should be followed. The short duration 6-hour event (bullet 2, page 2-1, TR-60) was correctly used for the auxiliary spillway routings (page 103, Table 3). The first bullet under "integrity" states that "Both a short duration (6 hour or longer) and a long duration (24 hour or longer) storm shall be analyzed and the most critical results used to check the discharge capacity and the

integrity of the auxiliary spillway". Footnote d) seems to indicate that the 24-hour storm was the most critical and should therefore be used. If the 6-hour PMP event produced the more critical results, it should be used to set the top of dam elevation (unless there is a state requirement that exceeds NRCS criteria).

The Freeboard Hydrograph item should be footnoted to read similar to " d) Both the 6-hour and 24-hour PMP freeboard storms were analyzed. The required top of dam elevation was based on the more critical xx-hour event".

Page 104, Table 3, footnote d:

The "Top of Dam Elevation" in Table 3 should be the settled height elevation. Please verify the top of dam elevation in the table does not include the additional height anticipated for settlement.

Page 104, Table 3, footnote d:

The Type II 24-hour distribution is overly conservative in the dam design for a PMP event. The top of dam is normally governed by the maximum 1-hour rainfall. The Type II distribution places 45.2% of the PMP rainfall (approximately 13.9 inches) at the 12^{th} hour. The dimensionless distribution from TR-20 for the design of emergency spillway and freeboard hydrographs has 19.2% of the PMP rainfall (approximately 5.9 inches) at the 9^{th} hour. The conservative design will inflate the cost of the dam. For more information on the effects of rainfall distributions on dam design, see "Comparison of Temporal Rainfall Distributions for Near Probable Maximum Precipitation Storm Events for Dam Design" by Moore and Riley in the 2003 ASDSO proceedings. Recommend determining the top of dam elevation with the dimensionless distribution (Figure 2-4, TR-60).

Page 107, Table 4:

A $3,131,300 recreational facility present value cost on Table 2B, 75 year project life, and a 5.375% discount rate, translate into the $171,700 amortization of installation cost for recreational facilities shown in Table 4. Because the Table 2B cost figure of $3,131,300 figure incorrectly includes recreational facility replacement costs, the $171,700 amortization of installation costs on Table 4 also includes them. Replacement costs are to be included in this table's Operation, Maintenance and Replacement Cost column—not as an amortized installation cost.

Ensure the Operation, Maintenance and Replacement costs presented in the table are our best estimates as to the average annual equivalent of these costs over the project life. The current discount rate is 5.125%.

Page 109, Table 5:

Because no remaining damages are shown for "Commercial/Urban" NWSM instructions for Table 5 indicate that: "...a footnote is needed to show that damages and benefits were not evaluated completely. Examples of appropriate footnotes might be "damages and benefits will accrue from floods of greater magnitude than the ____ frequency event, but these were not evaluated"...."

Page 111, Table 5:

Recommend adding a footnote explaining what the Benefit Cost Ratio would be if the traditional NWSM zero-based Future Without Project Plan display format were to be used.

The NWSM example for this table disaggregates agriculture-related and nonagricultural benefits. If the population of each affected community is less than 50,000 it would be appropriate to identify them all as agriculture-related.

Reviewers:

David Heffington, Ecologist
James Moore, Civil Engineer
Dale Pekar, Agricultural Economist
Ray Riley, Water Resource Planning Specialist
Alan Spencer, Archeologist

NRCS
Natural Resources Conservation Service
Parkade Center, Suite 250, 601 Business Loop 70 West
Columbia, Missouri 65203

Subject: PDM – East Locust Creek Watershed Plan – EIS Date: May 8, 2006

To: Keith Admire File Code: 390-11
Natural Resources Conservation Service
National Water Management Center
101 East Capitol Avenue, Suite B100
Little Rock, AR 72201-3811

This letter responds to your comments on the draft East Locust Creek Watershed Revised Plan and Environmental Impact Statement. The NWMC comments are included followed in bold type by the Missouri NRCS responses.

General Comments:

The overall impression of the subject plan is very good. Most sections of the plan are well written in a clear and concise manner. Hopefully, the comments which follow will make it an even better plan.

Watershed Agreement - The revised plan replaces the original plan. The agreement should reflect the installed measures and the proposed measures and the responsibilities of the sponsors and NRCS.

(1) The agreement has been changed to identify the previously installed measures as indicated in the comment. This should assist with clearly outlining the responsibilities of all parties involved.

Cost Share Rate - A cost share rate of 75 percent federal, 25 percent other is identified in the Watershed Agreement and at several locations within the document. The special congressional authority for this cost share rate is only identified in footnote b on Table 2A on page 100. As a matter of full disclosure, this special authority should be identified at the first convenient location in the document. Consider adding a section entitled "Authorities" on page 15. Both the PL-566 authority and the current congressional authority with special cost share provisions should be clearly identified.

(2) A paragraph has been added to the "Abstract", "Introduction", and "Recommended Plan (Installation and Financing)" sections of the planning document referencing Public Law 109-108, H.R. 2744, Section 726 which authorizes financial and technical assistance to carry out the East Locust Creek Watershed Plan Revision and specifies cost share rates for multiple-purpose Site RW-1.

Acceptability - The term "not acceptable" is used in numerous places in the document (e.g. page 38, last paragraph). Acceptable or not acceptable should not be used as an opinion. The basic reason(s) for lack of acceptability should be given. Most often, an option or alternative is not acceptable because it fails to meet the identified project objectives or it is not cost effective when compared with other potential alternatives. There may also be social or environmental consequences that make an alternative "unacceptable" and if appropriate, the underlying reasons should be clearly stated. Suggest providing the basic reasoning as to why a condition or alternative is "unacceptable". Also consider a global search of the document for the word "acceptable" and substitute the basic reason(s) or rationale as to why an alternative is or is not acceptable.

(3) Reasons why alternatives are unacceptable to project Sponsors, not viable, or were not given further consideration are included in the narratives. The narrative for the "no action" alternative has been modified to better explain why it is not an acceptable alternative to the project Sponsors.

Design frequencies - Design frequencies or recurrence intervals are mentioned often in The document without providing the associated duration (e. g. page 43, 49, etc.). A frequency without the associated duration is meaningless. For example, there is a 100-year, 1-hour event; 100-year, 6-hour event; 100-year, 24-hour event; and a 100-year, 10-day event. On pages 81 and 82, the durations are correctly included. Suggest doing a global search for "-year" and providing the associated duration where appropriate.

(4) The document has been reviewed and durations added where appropriate.

Water Yield - The document should clearly indicate that the 7 mgd is intended to meet the current need, or 15- or 50- year projected need. A couple of passages state that the commission "will be able to serve 54,000 residents....by 2025". Since 54,000 residents at approximately 130 gallon/capita per day is approximately 7 mgd, the reader is left to assume that the full 7 mgd will be needed by 2025. The text should clearly state the initial demand and the point in time when the projected demand will reach the 7 mgd limit. The change in demand with time and the overall purpose and need for the project are not entirely clear. Since water demand is the key element in this plan, suggest an added section early in the document that clearly discusses the basis for water demand, the initial magnitude of demand from the proposed multiple-purpose reservoir and the estimated time in the future when the demand of 7 mgd is expected to be realized.

(5) The overall purpose and need for the rural water supply portion of the plan is clearly stated in the "Watershed Problems and Opportunities" section under the heading "Agricultural Water Management (Rural Water Supply)". Narratives have been added to the "Watershed Problems and Opportunities (Agricultural Water Management-Rural Water Supply)" and "Recommended Plan (Structural Measures)" sections to clarify the yield used for project planning and the projected water usage.

Project Purposes - The text and tables are inconsistent in their presentation of project purposes. Table 2A identifies three project purposes: flood prevention, fish & wildlife, and agricultural water management. The first paragraph on page 45 identifies flood prevention, recreation, and agricultural water management. The Project Purposes passage on page 5 identifies flood prevention, recreation, wildlife habitat, and water supply. Table 2A, which is meant to show the estimated construction costs of recreational facilities includes two entries (for Tree and Shrub Plantings and Underwater Fish Structures) which appear to pertain to fish and wildlife. The balance of the document appears to only refer to fish and wildlife in terms of project mitigation, or as a means of providing recreation.

(6) Narratives and tables throughout the document have been edited to clarify that the project purposes consist of agricultural water management (rural water supply), water-based recreational opportunities, and flood prevention. Fish and wildlife habitat, while not a funded project purpose, will, however, be enhanced due to the implementation of project measures such as a vegetated buffer and mitigation areas.

Expenditure of funds for mitigation does not establish a fish and wildlife purpose. The expenditure of funds for Underwater Fish Structures designed to improve recreational fishing also does not establish fish and wildlife as a purpose. The placement of both of these cost items in Table 2A further indicates that they are both meant to provide recreation, rather than to simply promote fish and wildlife. The fact that Recreational Facility expenditures are being shown to achieve a Fish and Wildlife purpose in Table 2A further indicates there is no fish and wildlife purpose; and that rather these expenditures are associated with recreation.

A project with a fish and wildlife purpose spends funds to achieve fish and wildlife betterment. The document either needs to show that, or fish and wildlife needs to be dropped as a project purpose and recreation needs to be added.

(7) Refer to Response 6 above.

Tables 1 and 2 - The tables should include the installed structures. The costs should be indexed to the present price base.

(8) The existing, installed structures have been included in the tables and costs have been indexed to the present price base.

Cost Allocation Basis - NWSM 502.91 requires that the method or basis for cost allocation be described in the plan.

(9) A "COST ALLOCATION" section has been inserted into the Investigations and Analysis to support the methodology for cost allocation in the plan.

Replacement Costs - The text and tables must convey the consistent message that the local sponsors are responsible for all the costs of all the replacements for all the project purposes and features. Specific instances in which this was not done have been identified, such as in Table 2A.

(10) Replacement costs have been removed from the construction costs and added to the Operation and Maintenance costs for the Recreational Facilities.

<u>Specific Comments:</u>

Page i, ABSRACT: The description of the project should disclose that the "multiple-purpose reservoir" will have a surface area of 2235 acres at normal pool and include the approximate height of the dam. This should also be included in the "Description of Recommended Plan" on page 1 of the summary, and in the Description of Alternative Plans and throughout the document where the alternatives are described.

(11) The suggested changes have been incorporated into the document.

Watershed Agreement, Title: The title of the agreement should be "Revised Watershed Agreement No. 1" as shown in Figure 506-2 of the NWSM. The revised agreement should include the opening paragraphs as shown in Figure 506-2 of the NWSM.

(12) The title and opening statements have been changed to reflect guidance provided by Figure 506-2 in the NWSM.

Page v, Watershed Agreement, Water Rights: Suggest replacing this item with the more inclusive title "Water, mineral and other resource rights".

(13) The suggested changes have been incorporated into the document.

Watershed Agreement, Emergency Action Plan: The requirement for an Emergency Action Plan (EAP) (NWSM 508.45) does not appear in the Watershed Agreement. Recommend including the EAP in the Watershed Agreement and identify the EAP as a requirement prior to initiation of construction. An example statement for use in the Watershed Agreement is as follows:

> "The sponsors will provide leadership in developing an Emergency Action Plan (EAP) and will update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The purpose of the EAP is to outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of a floodwater retarding structure. The NRCS State Conservationist is to determine that an EAP is prepared for each high hazard dam prior to the initiation of construction". (Reference NEM, section 520.27).

(14) A statement (No. 17) has been added to include the suggested narrative. Statements following this insertion have been numerically adjusted.

Watershed Agreement: Future Development - For Hazard class "a" and "b" dams, include precautionary statements against future developments that could result in a changed classification. (NWSM 504.40(b)(3) and NEM 520.28). Recommend this requirement be included in the Watershed Agreement to heighten sponsor awareness of this commitment. This item could logically be included following the recommended requirement for an Emergency Action Plan for the high hazard dam.

(15) Sponsors have no requirement to prevent future development for class "a" or "b" dams much less any funding source or authority to do so. Nor does the watershed program or the PL-566 law provide any provision for the NRCS to require this from the Sponsors. It is our opinion that the watershed agreement should not be laden with precautionary statements. A brief statement is typically included in the OM&R agreement which is prepared at a later date. Also, a brief narrative statement will be included in the NED portion of the plan to identify this "precautionary" measure.

Watershed Agreement, Term of Agreement: Recommend including an item disclosing the term or life of the Watershed Agreement. An example could be as follows:

> "The term of this agreement is 75 years, the service life expectancy of the project and does not commit the NRCS to assistance of any kind beyond that point unless agreed to by all parties".

(16) A general statement disclosing the life of the watershed agreement has been added to statement No. 7 under the heading "Operation, Maintenance, and Replacement".

Watershed Agreement, Term of Watershed O&M Agreement: Recommend adding the term or life of the O&M agreement to Item 11. An example could be as follows:

"The terms of the agreements are 75 years, the service life expectancy of the project".

(17) Refer to Response 16 above.

Page 3, Summary, Land Use/Land Cover, second paragraph: The 466 acres between the permanent pool and auxiliary spillway elevation appear to describe the multipurpose reservoir. The difference for the multipurpose reservoir is 277 acres in Table 3. Please clarify and make any necessary changes.

(18) Edits have been made to the "Land Use/Land Cover" sections of the plan to better clarify the number of acres permanently or periodically inundated by the multiple-purpose reservoir. Minor variations in these acreages when compared Table 3 are due to GIS data format conversions from vector to raster.

Page 3, Land Use and Land Changes, second paragraph, third sentence: The recommendation encouraging the sponsors to acquire land rights up to the top of dam elevation is endorsed by the NWMC on all new sites. The concept may not be feasible on some rehabilitation projects. The current draft of the new NWSM requires that easements be obtained to top of dam elevation. The requirement may or may not survive in the final version of the NWSM.

(19) NRCS will require the Sponsors to acquire additional landrights to the top of dam elevation for the multiple-purpose reservoir. This may be done through purchase or easements. MDNR requires the Sponsors to acquire landrights for a 100-foot horizontal buffer beginning at the permanent pool elevation. Due to the topographic relief in this watershed, the buffer acquisition will lap into the area between the auxiliary spillway and top of dam elevations. Furthermore, Section 502.82(C)(2) of the NWSM states that "the state conservationist may not allow dwellings . . . to remain in the area requiring flowage rights . . ."

Page 3, second paragraph: The text would appear to indicate that "1 acre of urban, farmsteads, and roads" would be subject to flooding with the installation of the recommended plan. Ensure this statement is consistent with the 100% damage reduction shown for Commercial / Urban in Table 5 on page 109. Presumably, the farmsteads and any urban dwellings will be acquired and removed from the detention pool. Consider rewriting the sentence for additional clarity regarding what is expected to happen with urban, farmsteads and roads within the detention pool.

(20) Table 5 refers to commercial/urban floodplain properties within the City of Milan. The text in question is referring to urban, farmsteads, and roads within the flood pool of the multiple-purpose reservoir and these areas will be purchased by the Sponsors thus eliminating any future flood damages.

Even though all occupied dwellings will presumably be removed from the detention pool, will there be remaining septic tanks and drain fields that are still located within the detention pool area?

(21) These issues are addressed in the "Problems and Opportunities" section under the heading "Water Quality".

The text needs to document the risk or uncertainty of flooding for any occupied dwellings located between the auxiliary spillway (or easement elevation) and the top of dam elevation.

(22) Refer to Response 19 above.

The text indicates that a road will remain in the flood pool. The text needs to disclose the level of use on this road, and any threat which continued operation of this road poses to users such as school buses and commuter traffic.

(23) Refer to Response 19 above.

Page 5, Alternatives 2 and 3: As written here, Alternatives 2 and 3 are identical. The description of Alternative 2 on page 43 also identifies 17 small FWR structures on the mainstem of East Locust Creek (above and below the multiple-purpose reservoir). Recommend clarifying the difference between Alternative 2 and 3 and verify that the description of Alternatives 2 and 3 on page 5 matches the description of Alternatives in the section on "Formulation and Comparison of Alternatives".

(24) Alternatives 2 and 3 on Page 5 are not identical. Alternative 2 includes 17 small, floodwater retarding structures that are not included in Alternative 3. Descriptions on Page 5 and in the "Formulation and Comparison of Alternatives" section are in agreement.

Page 6 and Tables F-1 through F-4, Installation Period, Amortization Period and Lag Period: There is an apparent inconsistency in that page 6 of the document indicates installation will occur over six years but the Amortization of Installation Costs entries on Tables F-1 through F-4 do not indicate any such lag in installation.

Ensure project benefits are also appropriately lagged to reflect the installation period.

(25) Reference in Table A to a 6-year installation period has been removed to clarify any inconsistencies with Tables F-1 through F-4. According to the NREH Part 611.0103 referring to the P&G, annual equivalent analysis is required for NED costs. Annual equivalent analysis accounts for the fact that individual measures or parts of the project plan are completed before others, and benefits gradually increase as additional measures and systems are completed. In order to comply with the P&G requirement an average annual equivalent analysis has been completed for the NED plan and is presented as a footnote in Table 6.

Page 8, Summary, Community Effects: This section of the summary should mention that the town of Boynton will be inundated.

(26) Narrative has been added stating that the town of Boynton will be inundated by the multiple-purpose reservoir and that acquisition and relocation services will be provided to any residents whose properties will be purchased in conjunction with the construction of the reservoir and related works of improvement.

Page 9, Summary, Wildlife Habitat, Stream Resources, Wetlands: These paragraphs should disclose impacts. (i.e. A total of x acres of low-medium value habitat will be permanently flooded. A total of x liner feet or acres of stream bed will be converted to lake habitat. A total of x acres of existing forested? wetlands will be permanently flooded and converted to deepwater habitat.) Currently only mitigation is disclosed.

(27) Narrative has been added to the text address this comment.

Page 9, Summary, Wildlife Habitat, second sentence: Ensure each alternative includes any estimated costs associated with mitigation.

(28) Specific costs for mitigation in each alternative are not shown in the text. Mitigation costs are included in the construction costs for the multiple-purpose reservoir, small FWR structures, modified structures, and the sediment/debris basins. A breakout of mitigation costs for each is footnoted for the Recommended Plan in Table 2, "Estimated Cost Distribution-Structural Measures".

Page 10, Summary, Cultural Resources: 1. The last cultural resources review and survey of the area potential effects was conducted in 1985. The effective life of this cultural resources survey and literature review has reached the end of acceptable reliability. It was indicated that another Phase I survey will be undertaken and that this survey will be aided in design by a geomorphic model. Because of the refinement of archaeological techniques, protocols, and the general passage of time, NWMC recommends the Phase I inventory design also consider another inventory of the previously inventoried area, an on-ground location and review of the fourteen extant sites previously recorded and a re-evaluation of the seven sites that could be impacted by the proposed project.

(29) Agreed. A line was added to confirm that part of the new survey will be a review of the older report and that evaluation of Boynton will be a part of the new review.

2. During the 1985 inventory, was consultation undertaken with the SHPO and/or ACHP on the eligibility (significance) of the fourteen archaeological sites identified? Were letters of eligibility and determination of effect issued?

(30) No determinations of eligibility were made or suggested as the sites were outside any proposed project activities. Evaluation of the 7 sites inside the project area will be a part of the new survey.

Page 10, Summary, Mitigation Features: The text states "626 units of wildlife habitat ... will be lost". The species and acres represented should be disclosed here.

(31) Narrative has been added to the text address this comment.

Page 12, Conclusion, last sentence: The last sentence needs to contain a qualifier since page 10, Cultural Resources, indicates that a Phase 1 survey has yet to be conducted.

(32) This sentence has been deleted. Refer to the "cultural resources" narratives in the "Summary of Watershed Plan", "Project Setting", "Formulation and Comparison of Alternatives", and "Recommended Plan" sections for relevant information.

Page 18, Stream Resources: Recommend adding a paragraph at the beginning of this section disclosing basic information regarding the stream that will give the reader, who is not familiar with the area, a mental picture of the stream. This information should include average stream width, flow regime (perennial, intermittent, ephemeral?), substrate (mud, bedrock, cobble,) and other characteristics (riffle and pool? deeply incised channel? approximate bank height?) It is not until the water quality section that the reader finds basic information regarding flow regime.

(33) Narrative has been added to the text address this comment.

Page 21, Project Setting, Water Quality, last paragraph: This paragraph details proposed demolition, removal, and inundation of the nineteenth century settlement of Boynton. Have the appropriate cultural resources field and literature reviews been undertaken? Was this survey and consultation process covered in the 1985 report? Is there a cemetery or other buried human remains associated with Boynton? ***Without further clarification there exist significant concerns***. The proposed Phase I inventory should take the historic fabric of this settlement into account with a qualified specialist conducting the evaluation. If previous consultations with the SHPO and ACHP have not been undertaken for the consideration of Boynton, the internal changes within the structure and locations of the ACHP starting this last fiscal year might cause somewhat longer review times. If discovery, monitoring, and mitigation plans are called for, NWMC recommends a specific MOA be developed. Such a MOA is mention on page 64.

(34) This section concerns water quality issues with Boynton. Cultural resources concerns are addressed in the "Cultural Resources" sections of the plan.

Page 22, Project Setting, Cultural Resources, first paragraph: This paragraph indicates that only a 35% sample APE associated with proposed small floodwater retarding structures were inventoried in the 1985 report. Will the geomorphic model used to aid in the design of the new proposed Phase I inventory factor the 1985 sample areas into consideration? With all past considerations of the project area, how much of this area has been previously inventoried for cultural resources?

(35) Any new studies should take into account the older data. However, the magnitude of this project suggests that the old survey will only narrow the new survey area to certain geomorphic areas. Due to the fact that no sites are located in the smaller tributary valleys, we are suggesting that new surveys be confined mostly to the larger floodplains and associated areas.

Alternative 3 (NED/Recommended plan) calls for the installation of one multiple purpose reservoir on the main stem of East Locust Creek and 22 small FWR structures. This paragraph indicates that "Sites are more likely to be found adjacent to the larger stream valleys (the main stem of East Locust Creek)." Again, it is essential that a comprehensive Phase I survey be conducted of this higher probability area.

(36) Agreed. Refer to Response 35 above.

With a cultural history extending back approximately 10,000 years, perhaps this section could detail (perhaps another paragraph) on what types of cultural resources sites are to be anticipated in the project area (*eg*. Prehistoric settlement sites, lithic sites, etc.).

(37) A paragraph has been added to address this comment.

Page 22, Wetlands: Although the NWI maps are referenced, within this section the reader should be able to get a mental picture of what currently exists. Are the 291 acres of wetlands forested, marsh, or swamp? Inclusion of general species composition, and description of the condition of the communities (mature? logged? cutover?) is also recommended.

(38) Narrative has been added to the text address this comment.

Page 23-34, Watershed Problems and Opportunities: Recommend a well defined, concise "Purpose and Need" statement introducing this section.

Several passages of this section are repeated directly from the "Project Setting" section. This section should focus on clearly demonstrating the needs (problems and opportunities) to which the federal project is responding. When appropriate, the information already covered in "Project Setting" can be summarized here or the appropriate section referenced. It is important that this section clearly demonstrate the need for the 7 mgd, and clarify whether the purpose of the project is to meet the current, 15-, 25-, or 50- year projected need. A couple of passages state that the commission "will be able to serve 54,000 residents....by 2025" however the demand and intent of the project is not entirely clear. If this is not demonstrated and well defined within the purpose and need statement, a myriad of alternatives consisting of smaller dams/pools or other less environmentally damaging alternatives could be considered "reasonable".

(39) Narratives have been reviewed by each appropriate staff member and additions, deletions, and/or edits made, as deemed necessary, to address the comments provided above. Please refer to Response 5 above with respect to the yield of 7.0 MGD used in the planning document. We believe the intent of, and need for, the rural water supply is made clear in the document. The "Problems and Opportunities" section discusses the following issues related to the need for an additional water supply source: outdated impoundments, small reservoirs unable to meet present demands, difficulty finding groundwater wells that will maintain yields, challenges of meeting more stringent drinking water standards, category 3 drought conditions, suppliers unable to meet customer needs, increased demand due to population growth, increased demand by rural businesses, etc.

Pages 29 and 30, Water Quality, fifth paragraph (fourth on page 29) and eighth paragraph (second on page 30): Again, these paragraphs deal in a discussion of inundation of the town of Boynton. Of particular concern, page 30, "All remains of the town of Boynton will need to be removed or properly decommissioned..." Before the complete erasure of the historic fabric of Boynton, appropriate cultural resources assessments and consultations must be undertaken (see previous concerns).

(40) Clarification has been added to assure historic documentation if needed.

Page 30, first paragraph, last sentence: The text uses the phrase "could be used to construct". The text needs to make clear whether Pollock and Lemons are expected to construct central sewer systems. If construction of such sewer systems would only be expected to occur in some alternatives, those difference among the alternatives (including the costs and benefits) needs to be disclosed. If this sentence is simply speculation, the sentence should be deleted and respective alternative effects generated with an assumption that the central sewer systems would not be built. Any uncertainty associated with the assumption needs to be disclosed in the Risk and Uncertainty section of the document.

(41) Refer to Response 42 below.

Page 30, second paragraph, third sentence: As written, the text indicates that illegal dump sites should be located and removed. The text needs to reflect clearly the actions and effects associated with each alternative. Do we expect this action to occur or not? If this is necessary work associated with the project, then its costs should be included even if the work is not cost sharable. If there is uncertainty as to how much work and how much costs will be associated with this effort, that needs to be disclosed in the Risk and Uncertainty section of the document.

(42) With respect to illegal dump sites, the narrative has been reworded to state that "All illegal dump sites that will be inundated or that are located in the drainage area of the multiple-purpose reservoir and have the potential to negatively impact water quality in the reservoir will be located and removed prior to construction". Whether or not Pollock and Lemons will construct central sewer systems is an unknown at this time. These communities have expressed an interest in doing so if funding is available. The Missouri Department of Natural Resources has multiple sources of funding and technical assistance to address water quality issues in the watershed. The department has committed to working with the NRCS and the water commission to create a "source water protection plan" for the new reservoir once the Record of Decision is finalized. Additional narrative has been added to this section, as well as under the "Water Quality" and "Risk and Uncertainty" headings of the "Formulation and Comparison of Alternatives" section.

Page 38, Social Considerations: The passage is not clear. Does it mean to indicate these water supplies are unavailable because others have legal rights to them? Or does it mean others would prefer to keep those supplies to themselves? The paragraph needs to go into more detail explaining the base reasoning of why these potential sources were not socially acceptable.

If others have legal rights to that water, it would be easy for the reader to understand why that water is not available for this project. The text might simply indicate that negotiations with the water rights holders failed to identify any water supply available to meet this project's stated needs. If on the other hand, the water is legally available and this analysis is simply disregarding that water supply resource to avoid controversy—that would not make sense.

Alternatives may not simply be disregarded because local sponsors or the public do not like them. All alternatives vary in the degree to which they address P&G's acceptability, completeness, effectiveness, and efficiency criteria. Alternatives do not have to be 100% acceptable, 100% complete, 100% effective or 100% efficient. Normally no alternative is.

(43) Only 2 alternatives with potentially adequate water supply yields would infringe upon existing water supplies and communities. These are the Thompson River upstream of the City of Trenton and the Chariton River west of the City of Kirksville. Withdrawal of 7.0 MGD of water from upstream of Trenton would jeopardize that city's existing water supply and would be a legal issue. It would also not be socially or politically acceptable to the state, local entities, or portions of the public. Withdrawal of water from the Chariton River, while possibly legal, would certainly raise serious questions from the City of Kirksville and other potential water users in the area as it could jeopardize a source for future demand increases. The project Sponsors strongly believe it is reasonable to avoid such controversy considering that other adequate and more economical raw water sources are available. These 2 alternatives would also be socially unacceptable as they would not achieve the other specified project purposes of flood damage reduction and development of water-based recreation.

Page 39, first paragraph: The last two sentences of this paragraph appear to contradict one another in that the first sentence talks about how many wells would be needed to meet the demand; and the second concludes that adequate yield is not attainable. If adequate yield is not attainable, then 200 wells would not attain it. The inconsistency needs to be resolved. If 200 wells could get the job done and is not otherwise unreasonable, that alternative would need to be developed in detail. Factors that should be considered include cost effectiveness, pumping depths, pumping costs, uncertainty of drilling producing wells, seasonal yields, etc.

(44) The paragraph has been supplemented with additional information to support that 200 wells would in fact be "otherwise unreasonable" for detailed development as a viable alternative. The uncertainty and unreliability of yields from glacial aquifers is significant. There is no way to accurately determine how many wells would be needed to provide the 7.0 MGD – it could be 200 or it could be 1,000, or more.

Page 42, description of Alternative Plans: Alternatives 1, 2 and 3 all include sediment/Debris Basins. There is no mention found in the document indicating how often these sediment/debris basins are expected to be cleaned out; who will be responsible for the cleanout; and a description of the conditions that would initiate or require cleanout. The provisions and responsibilities for cleanout should be included as an item in the Watershed Agreement. In addition, if the cleanout interval is less than the expected project life (75 years), the cleanout costs over the evaluated life of the project should be included in Alternatives 1, 2, and 3. If the intent is to cover cleanout as part of the OM&R agreement, the costs indicated in Table 4 may not be sufficient.

(45) Narrative has been added to the "Recommended Plan" section to address this comment. No cleanout of the basins is expected as they are designed to store sediment and debris for their 75 year life.

Page 42, Description of Alternative Plans: The descriptions of the alternatives should include approximate pool areas and dam heights associated with the "multiple-purpose reservoir" described with the various alternatives. "Small structures" should be also be further defined in the alternatives section.

(46) Narratives for the alternatives have been supplemented to include more detailed information concerning height of dams, pool sizes, etc.

This section should describe appropriate mitigation measures associated with each alternative. (CEQ 1502.14)(f).

(47) Mitigation measures are briefly discussed in this section. Mitigation features for Alternatives 1, 2, and 3 are essentially the same – a 1,605-acre mitigation area adjacent to the pool of the multiple-purpose reservoir. A detailed description of mitigation features for the "proposed action" is found in the "Recommended Plan" section of the document.

Page 44, Table F-2, Estimated Installation Costs, Other Funds: The "Other Funds" total cost of $17,925,250 is not consistent with the sum of the individual entries immediately above it.

(48) Corrections have been made to the table.

Page 47-71, Effects of Alternative Plans: To reduce duplication, the "existing conditions" sections should summarize the information already provided and if appropriate reference the "project setting" section.

(49) Narratives have been reviewed by each appropriate staff member and additions, deletions, and/or edits made, as deemed necessary, to address the comments provided above.

Page 48, Agricultural Water Management, Alternative 1, third paragraph: The average annual water benefit for Alternative 1 is $1,940,800. The average annual water benefit for Alternatives 2 and 3 is $1,997,300. Please explain the lower average annual water benefit for Alternative 1.

(50) The discrepancy in water supply benefits between Alternative 1 and Alternatives 2 and 3 is due to the methodology for calculating water supply benefits using the separable cost remaining benefits (SCRB) method. The SCRB is used as the basis for obtaining the separable costs and a portion of the joint costs allocated to the water supply purpose of the multiple-purpose reservoir. Benefits are based upon this calculation as per guidance in P&G Section 2.2.12 (see the Investigations and Analysis section under Economics for a full description of the guidance for calculating water supply benefits). Alternatives 2 and 3 have a larger allocation of separable costs to the water supply purpose versus alternative 1 due to the difference design for the flood damage reduction purpose. As a result, the calculated water supply benefits for alternatives 2 and 3 are larger than in alternative 1. A paragraph has been added to the Investigations and Analysis section to clarify this.

Page 49, Alternative 4 – (Future Without Revised Plan): This passage indicates the local sponsors would need to build the reservoir at their own expense in this alternative. This statement is problematic. If the most likely future condition for the Future Without Revised Plan is that the local sponsors would build the reservoir themselves, then that must be shown as the Future Without Revised Plan alternative. If the passage is miswritten, then it needs to be corrected.

Local sponsor construction of the reservoir would not necessarily have the same costs and benefits in the NED account. If for instance the local sponsors would construct the reservoir to state standards, rather than federal standards, the reservoir may have significantly different costs associated with it. Alternatively, the local sponsors might elect to develop a water supply reservoir without a flood damage reduction purpose.

The different options that are available to the local sponsors in the Future Without Revised Plan alternative need to be made known to them so they can make an informed decision. If they would build the reservoir themselves, that must be shown in the Future Without Revised Plan alternative.

It can be very difficult to identify the Future Without Revised Plan alternative. Any uncertainty associated with identifying the Future Without Revised Plan alternative needs to be addressed in the Risk and Uncertainty section of the document.

(51) The passage for Alternative 4 (Future Without Revised Plan) on p. 49 has been re-written to reflect the uncertainty in the future condition with respect to water supply needs. Also, an additional passage has been added to the Risk and Uncertainty section of the document to discuss the difficulty and uncertainty in addressing the Future Without Revised Plan alternative with respect to water supply in this plan.

Page 51, Erosion and Sedimentation: The narrative does an excellent job in describing the sources of the erosion and the reduction in erosion for the different alternatives. Recommend including the relationship to the sediment storage volume (watershed inches or acre-feet) required for the multiple-purpose reservoir and the small FWR structures.

(52) Narrative has been added to the "Erosion and Sedimentation" section under the heading "Alternative 3-(NED/Recommended Plan) stating the tons of sediment trapped annually by the multiple-purpose reservoir and the small structures. The term "tons" is used as it has been our experience that the majority of readers of the plan are not familiar with the terms "watershed inches" or "acre-feet".

Page 51, Erosion and Sedimentation, first and second paragraph: The first paragraph indicates a total sediment production of 320,000 tons annually. The various sediment sources in the second paragraph add up to 321,300 tons annually. Suggest making the two totals match.

(53) Narrative has been changed and totals now match.

Page 51, Erosion and Sedimentation, overbank sediment deposition: The overbank sediment deposition will be reduced 38% with Alternative 1 and 40% with Alternatives 2 and 3. Table G indicates the same remaining damages for Alternatives 1 and 3 and lower damages for Alternative 2. Please verify and make the appropriate corrections.

(54) There was an error in the text. Alternative 3 reduces overbank deposition by 38 percent rather than 40 percent. The narrative now agrees with Table G.

Page 60-61 Wetlands, Wildlife Habitat, and Forest Resources: For each alternative, impacts to each of these resources should be quantified. Currently for wetlands, the impacts for each alternative have not been disclosed, (only mitigation is discussed). For wildlife habitat, acreages impacted and the species used to determine the habitat units impacted and mitigated should be discussed.

(55) Narrative has been added to the text address this comment.

Page 62, Forest Resources: The narratives for Alternatives 1, 2 and 3 indicates the loss of bottomland and upland hardwoods. Recommend including the estimated quantities of each with the alternative narratives.

(56) Narratives have been supplemented to include estimated loss of hardwoods.

Page 63, Land Use and Treatment, Alternatives 1, 2 and 3: The total acreage converted to open water totals 2179 acres. Table 3 indicates that there will be 2235 acres of permanent water created with the multipurpose site.

(57) Corrections have been made in the numbers. Total acreage converted to open water is now 2,202. The difference between this figure and the 2,235 acre permanent pool is due to the present condition existence of 33 acres of open water.

Page 64, Effects of Alternative Plans: Recommend including a section entitled "Cumulative Impacts" discussing the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

(58) The cumulative impacts of the recommended plan are discussed in the narratives of the "Summary of Watershed Revised Plan – Environmental Impact Statement" and the "Recommended Plan" sections of the planning document. We do not see the need for another section here.

Page 64, Formulation and Comparison of Alternatives: The consultation process and formulation of a MOA are proper procedure. NWMC concur the outlined consultative process with Native Americans and other concerned parties is adequate as stated. One consideration in the MOA process is the incorporation of discovery, monitoring, and mitigation plans if warranted by the results of the proposed comprehensive Phase I.

(59) Noted.

Page 65, Relationship to other Plans, Policies and Controls, first paragraph, last sentence: Suggest deleting the word "some" and replacing with the number of small FWR structures to be eliminated.

(60) Replacement has been made.

Page 67, first paragraph, second and third sentences: The two sentences as written give the impression that the point for beginning all routings is somehow related to the expectation that the water surface will normally be at or below the principal spillway crest based on the expected fluctuation of the municipal pool. The site must still meet the 10-day drawdown requirements contained on page 6-1 of the July 2005 TR-60. NRCS criteria require the standard design hydrographs and the freeboard hydrographs to begin routing at the 10-day drawdown if 85 percent of the detention storage volume is not evacuated. Normally, if the 10-day drawdown test is not met, the crest elevation of the auxiliary spillway crest is to be raised by a volume equal to the storage volume remaining to be drawn down after 10 days. The minimum principal spillway hydrologic criteria apply to the operation frequency of an earth or vegetated auxiliary spillway. The minimum principal spillway hydrologic criteria do not apply to a structural spillway. With a structural auxiliary spillway, it is not necessary to raise the auxiliary spillway crest if the 10-day drawdown test is not met but the routing of the auxiliary and freeboard hydrographs would still begin at the elevation of the 10-day drawdown if 85 percent of the detention storage volume is not removed in 10-days.

Given the discharge of the low stage (919.7 cfs = 1824 acre feet/day), there should not be any problem in removing 85 percent of the 8863 acre feet of detention storage within the allotted 10-days.

(61) The second sentence has been reworded to help clarify the concerns expressed in this comment.

Page 67, fourth paragraph, fourth sentence: The fourth sentence may be an oversimplification of variations in final construction costs. The competitive bidding process includes many factors other than fuel costs that may significantly influence the final contract cost. Factors such as number of interested contractors, competing earth moving or concrete jobs, fluctuations in building materials (especially concrete), size of job, mobilization costs and labor costs. Suggest rewriting the paragraph to reflect the general uncertainties in the competitive bidding process rather than emphasizing fuel costs.

Consider replacing the last sentence with the concept that "Design features and cost estimates were based on the best information available. A xx percent contingency was included to cover the degree of uncertainty inherent in estimating costs for large competitively bid construction projects".

(62) The paragraph has been supplemented to address the points raised in the comment.

Page 67, Rationale for Plan Selection, last sentence: Consider rewriting the subject sentence to read similar to "The recommended plan was selected by the watershed sponsors as the most efficient and effective alternative to meet their identified project purposes".

(63) The sentence has been rewritten as suggested.

Pages 68 and 69, Table 1: Fisheries/Wildlife Habitat. Three alternatives indicate mitigation will improve habitat. Normally mitigation is meant to mitigate damages. Recommend rephrasing the passage accordingly—separating mitigation work from non-mitigation work, or providing summary information for Fisheries/Wildlife Habitat. As written, it appears mitigation funds are being expended to improve Fisheries/Wildlife Habitat. The Wildlife Habitat passage on the bottom of page 83 would appear to indicate this is mitigation rather than improvement.

(64) Narratives in the table has been reworded to clarify that impacted habitat is being mitigated. However, it must be noted that in many cases the installation of mitigation areas do in fact result in a better quality habitat.

There is a need for parallel statements. The table entries make comparison of the alternatives difficult. For instance, the Stream and Riparian Areas entries for Alternatives 1-3 show approximately 29 miles of stream channel inundated—but there is no parallel entry for how many miles of stream channel are inundated in Alternative 4. Likewise, for the Wetlands entries, the reader cannot readily compare Alternative 4's "no net loss of wetlands" with the acres of wetland created for the other alternatives.

Compare these to the entries for the NED account, Flood Damages, and Erosion/Sediment Reduction which all contain parallel statements which make comparison of the alternatives easy.

(65) Alternative 4 would result in the implementation of the original 1987 East Locust Creek Watershed Plan-EA. Only small FWR structures (drainage areas less than 350 acres) would be installed. Comparison to Alternatives 1-3, with respect to impacts on stream channels and wetlands is difficult. These small, headwater sites generally do not impact wetlands. If wetland determinations do identify wetlands, the mitigation is handled through the 404 permitting process. Any impact to the drainages (streams channels?) is also handled through the 404 process.

RED: The terms "Value Added" and "Total of Industry Output" need to be added to the glossary. If they, or any other figures presented in the RED account are representative only of the period of construction, rather than the project's design life, that distinction needs to be added.

(66) The terms "Value Added" and "Total of Industry Output" have been added to the glossary. The RED account in Table I has been refined to include a breakdown of short term benefits realized during the construction phase and long term benefits realized over the project life.

Page 69, Table 1: The math displayed for the NED account is incorrect for Alternative 4.

The Average Annual Beneficial Effects displayed are not consistent with those shown on page 46.

(67) Table I has been reviewed and the inconsistency corrected.

Page 71-73, Consultation and Public Participation: This is one of the best Consultation and Public Participation sections that we have reviewed.

(68) The Missouri NRCS Water Resources Staff thanks you for this comment – it is greatly appreciated.

Page 78, third sentence: Consider modifying the subject sentence to read similar to "The exit portion of this spillway will consist of approximately 33-five foot horizontal by two foot vertical steps".

(69) The sentence has been rewritten as suggested.

Page 78, second paragraph, first sentence: Suggest rewriting the subject sentence to read similar to "A structural auxiliary spillway was used in lieu of the detention storage and principal spillway requirements for earthen and vegetated earthen auxiliary spillways as contained in NRCS Technical Release – 60".

(70) The sentence has been rewritten as suggested.

Page 78, second paragraph, second sentence: Recommend stating the basic reasons of why detention storage requirements for an earthen or vegetated earthen auxiliary spillway were not socially or economically feasible. The difference in economic feasibility should not be difficult to demonstrate but what are the social issues? Are the social issues related to overall size of the reservoir, additional land rights issues, or are the social issues also economic feasibility issues? Please clarify what the social issues are.

(71) Narrative has been reworded and supplemented to clarify the concerns expressed in this comment. The word "socially" was used inadvertently and should have been "environmentally". A vegetated spillway would introduce very high flows into an unstable, small tributary and would likely cause severe erosion and sedimentation problems. The vegetated spillway would also require costly mitigation due to temporary retention requirements. See new text for further details.

Page 78, Multiple-Purpose Reservoir, hazard classification: The high hazard designation for the multiple-purpose structure should be supported by describing the population at risk from the breach analysis. The number of people in the breach zone should be included. Recommend including the State Conservation Engineer's concurrence on the hazard classification. Recommend including the independent hazard classification from the Missouri state dam safety agency.

(72) Narrative has been added to this section to address the submitted comments.

Page 79, first paragraph: Reference the earlier general comment on Emergency Action Plans. Suggest incorporating the general language from that comment in this section. There should be a specific sentence that states "The state conservationist is to determine that an emergency action plan is prepared prior to the initiation of construction" (NEM 520.27).

(73) The suggested narrative has been added to the text.

Page 79, second paragraph, second sentence: Suggest inserting the words "75-year evaluated" between the words "the" and "life".

(74) The words "100-year life of the multiple-purpose reservoir measure" have been added to the text. The structure is designed and shall be maintained for a 100-year life once constructed.

Page 79, second paragraph, next to last sentence: The subject sentence states "NRCS will require that the sponsors acquire additional land rights to cover an area to the top of dam elevation". A similar statement on page 3 "recommends that the sponsors give consideration to acquiring additional landrights to cover an area to the top of dam elevation". Recommend using the page 3 language since land rights to the top of dam elevation is not currently required. Again, the NWMC endorses the concept of requiring landrights to the top of dam elevation on all new sites.

(75) NRCS will require the Sponsors to acquire additional landrights to the top of dam elevation for the multiple-purpose reservoir. This may be done through purchase or easements. Refer to Response 19 above. The statement on Page 3 has been reworded to reflect this position.

Page 81, Table J: The surface area for the "Avg. Flood Pools" is less than the surface area for the "Avg. Sediment Pools". The flood pools surface areas should be larger than the sediment pools surface area. Please verify the surface areas and make the appropriate corrections.

(76) Table J has been corrected to reflect the total floodpool areas.

Page 85, Recommended Plan, Wetlands: Recommend defining "wetland creation" (e.g. flooded uplands, excavate previously cleared uplands?).

(77) The reader is referred to Appendix E, Investigations and Analyses, Wetlands section. Created wetlands are no greater than 18 inches deep, inundated at least 15 consecutive days during the growing season, and can be created by measures such as creative excavation of borrow materials.

Pages 99-100, Table 2A: Some of the "Construction" entries have a double asterisk (**) but no corresponding footnote.

(78) Footnoting errors have been corrected.

Page 101, Table 2B: Recommend that "Wildlife Habitat Development" not be included in the title. As detailed below, the costs of wildlife habitat development are not to be included in this table.

If "Tree and Shrub Plantings" are for mitigation, it should be removed from this table. As stated in NWSM 503.46(e)(2): "Costs for mitigation measures will be allocated to the purposes of the work that produces the need for mitigation." NWSM 502.91(a) specifies that: "Mitigation costs will be separated into the cost of the feature and the cost of land components. The cost of the land will be a real property rights cost, while all other costs will be construction costs."

If "Underwater Fish Structures" is intended to be mitigation, it should not be included in this table. Including this work in this table acknowledges that the work is being done for recreational purposes, rather than for fish and wildlife purposes.

Replacement costs are not to be included as a construction cost.

(79) "Wildlife Habitat Development" has been removed from the title of Table 2B. Table 2B reflects the recreation construction costs only. Tree and shrub plantings and Underwater Fish Structures in Table 2B are included for the purpose of enhancing recreational value and opportunity. Mitigation costs are a separate cost item specified in the footnote of Table 2. The construction figures listed in Table 2A do not include any replacement costs.

Page 103, Table 3, Controlled Drainage Area: Presumably, the 2662 acres is the area controlled by small structures upstream of the larger proposed multipurpose site. First, footnote the 2662 acres to identify how many small structures comprise the 2662 acres. Secondly, were the small structures ignored in the design of the lower structure? Since the small structures will not pass the class (c) freeboard requirements, they must either be considered breached or ignored altogether. If the small structures were ignored in the design of the lower structure, the "Controlled Drainage Area" item should be footnoted to that effect.

(80) A footnote has been added to identify the number of small structures. The small FWR structures upstream of the proposed reservoir were not included in the planning design in regards to the multiple-purpose reservoir. A footnote has been added to this effect. The small structures were analyzed briefly to quantify their breach impacts on the reservoir. The small structures were assumed breached all at once.

Page 103 and 104, Table 3: Since both submerged and aerated sediment are identified under "Total Capacity" on page 103, recommend that submerged and aerated sediment be identified under "Capacity Equivalents" on page 104.

(81) The total capacity of sediment (both submerged and aerated) listed as 3,500 acre-feet is equivalent to the 2 watershed inches of sediment listed under capacity equivalents. We see no need to break out the watershed inches into submerged and aerated values.

Page 104, Table 3, Freeboard Hydrograph: The data entered for the Freeboard hydrograph appears to be 6-hour data. Footnote d) indicates that the top of dam was established utilizing a 24-hour PMP, Type II distribution (see attached comment regarding the appropriate distribution). The procedure for Auxiliary spillway and freeboard (routings) given on page 2-1 of Technical Release 60 (July 2005) should be followed. The short duration 6-hour event (bullet 2, page 2-1, TR-60) was correctly used for the auxiliary spillway routings (page 103, Table 3). The first bullet under "integrity" states that "Both a short duration (6 hour or longer) and a long duration (24 hour or longer) storm shall be analyzed and the most critical results used to check the discharge capacity and the integrity of the auxiliary spillway". Footnote d) seems to indicate that the 24-hour storm was the most critical and should therefore be used. If the 6-hour PMP event produced the more critical results, it should be used to set the top of dam elevation (unless there is a state requirement that exceeds NRCS criteria).

The Freeboard Hydrograph item should be footnoted to read similar to "d) Both the 6-hour and 24-hour PMP freeboard storms were analyzed. The required top of dam elevation was based on the more critical xx-hour event".

(82) Both the 6-hour and 24-hour storms were evaluated as assumed. TR-60 was utilized for a basis of design. The more conservative storm events were utilized since this multiple-purpose reservoir is at the upper limits of structures built under TR-60. The 24-hour event was more critical and was thus chosen for this design. The footnote has been added as recommended above.

Page 104, Table 3, footnote d: The "Top of Dam Elevation" in Table 3 should be the settled height elevation. Please verify the top of dam elevation in the table does not include the additional height anticipated for settlement.

(83) The 938.0 elevation in the table does not include settlement. The 936.2 settled elevation as predicted by the SITES program is listed in the footnote.

Page 104, Table 3, footnote d: The Type II 24-hour distribution is overly conservative in the dam design for a PMP event. The top of dam is normally governed by the maximum 1-hour rainfall. The Type II distribution places 45.2% of the PMP rainfall (approximately 13.9 inches) at the 12^{th} hour. The dimensionless distribution from TR-20 for the design of emergency spillway and freeboard hydrographs has 19.2% of the PMP rainfall (approximately 5.9 inches) at the 9^{th} hour. The conservative design will inflate the cost of the dam. For more information on the effects of rainfall distributions on dam design, see "Comparison of Temporal Rainfall Distributions for Near Probable Maximum Precipitation Storm Events for Dam Design" by Moore and Riley in the 2003 ASDSO proceedings. Recommend determining the top of dam elevation with the dimensionless distribution (Figure 2-4, TR-60).

(84) We are in agreement with the distribution explanation of this comment. However, please realize that these are planning estimates subject to change during final design when more detailed surveys and specific analyses are able to be performed. No change will be made at this time.

Page 107, Table 4: A $3,131,300 recreational facility present value cost on Table 2B, 75 year project life, and a 5.375% discount rate, translate into the $171,700 amortization of installation cost for recreational facilities shown in Table 4. Because the Table 2B cost figure of $3,131,300 figure incorrectly includes recreational facility replacement costs, the $171,700 amortization of installation costs on Table 4 also includes them. Replacement costs are to be included in this table's Operation, Maintenance and Replacement Cost column—not as an amortized installation cost.

Ensure the Operation, Maintenance and Replacement costs presented in the table are our best estimates as to the average annual equivalent of these costs over the project life. The current discount rate is 5.125%.

(85) Replacement costs have been removed from construction costs in Table 2B and added to the OM&R costs for recreational facilities in Table 4.

Page 109, Table 5: Because no remaining damages are shown for "Commercial/Urban" NWSM instructions for Table 5 indicate that: "...a footnote is needed to show that damages and benefits were not evaluated completely. Examples of appropriate footnotes might be "damages and benefits will accrue from floods of greater magnitude than the ____ frequency event, but these were not evaluated"...."

(86) A footnote has been added to Table 5.

Page 111, Table 5: Recommend adding a footnote explaining what the Benefit Cost Ratio would be if the traditional NWSM zero-based Future Without Project Plan display format were to be used.

The NWSM example for this table disaggregates agriculture-related and nonagricultural benefits. If the population of each affected community is less than 50,000 it would be appropriate to identify them all as agriculture-related.

(87) A footnote has been added to Table 6. Table 6 has also been updated to match the NWSM example to show the benefits as being agricultural-related.

We appreciate the thorough and professional efforts put forth by the NWMC staff in its review of the East Locust Creek document. It is obvious substantial staff time was spent in reading the document and preparing comments. The NWMC will receive a copy of the final plan as soon as it is completed.

If there are further questions or comments, please contact Harold Deckerd, Assistant State Conservationist at (573) 876-0912.

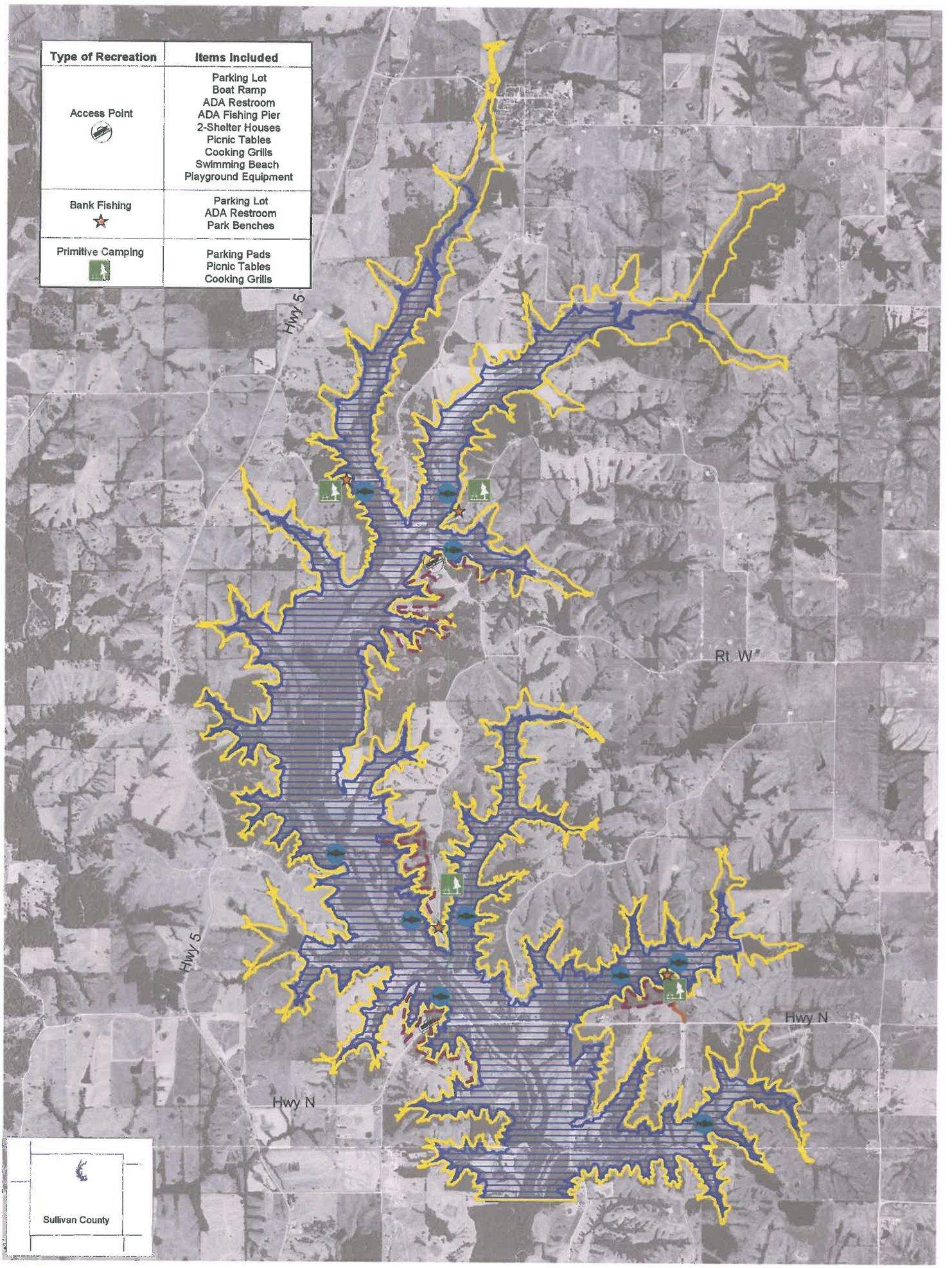
R Dwaine Helmas ACTING

ROGER A. HANSEN
State Conservationist

cc: Stu Simpson, Acting Branch Chief (WR), NRCS, Washington, D.C.
Harold Deckerd, ASTC, NRCS, Columbia, MO
Rob Cheshier, Geologist, NRCS, Columbia, MO

APPENDIX B

Multiple-Purpose Reservoir and Recreational Facilities Map



Note: The location of the recreational components shown on this map are for planning purposes only and are not meant to represent the actual locations where such components will be installed.

Underwater Fish Structures
Access Points
Bank Fishing
Primitive Camping
Trail
Access Road
Permanent Pool
Top of Dam
N

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004

Scale 1:35,000
July 2005

0.5 0 0.5 Miles

East Locust Creek Watershed

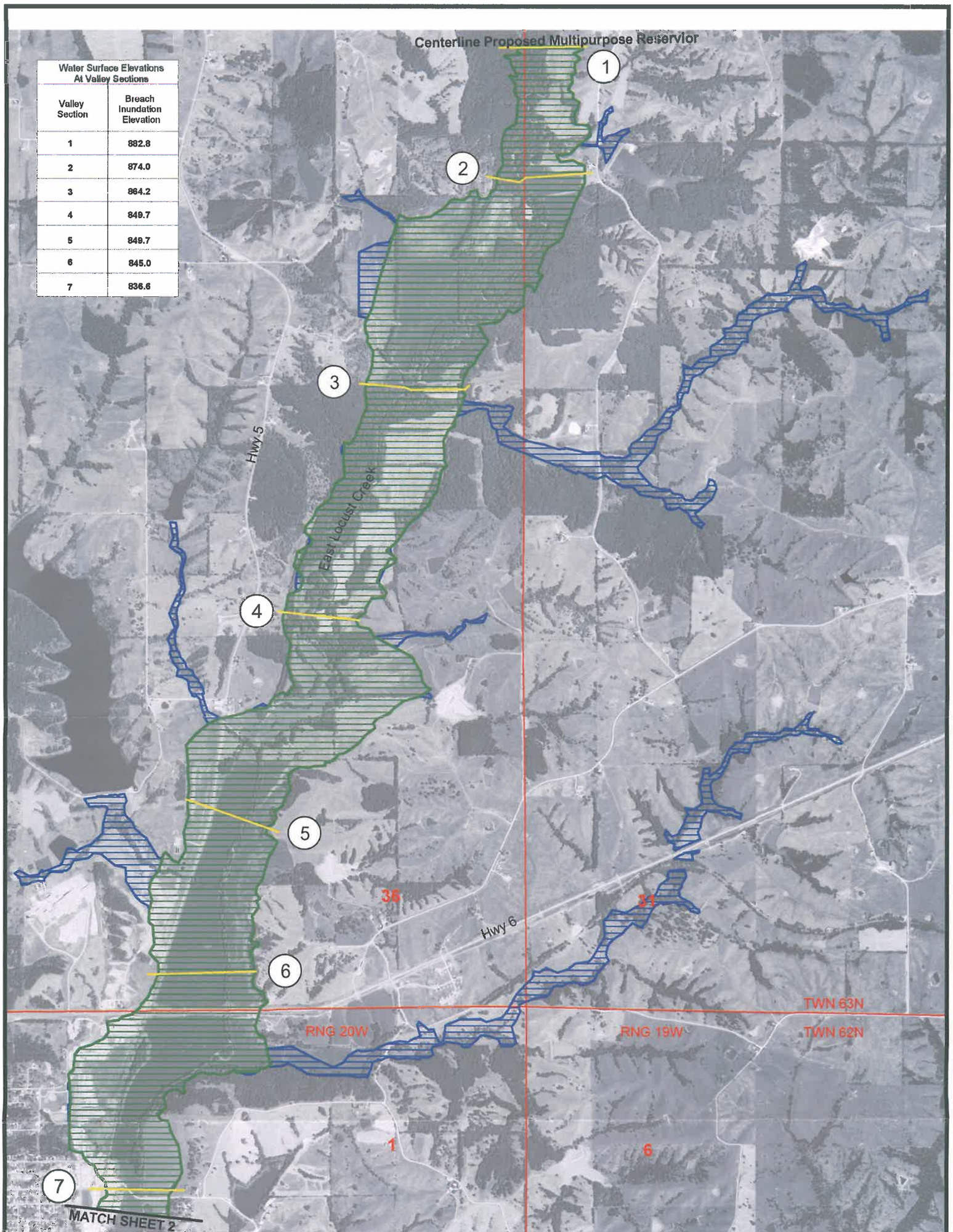
Multiple-Purpose Reservoir and Recreational Facilities Map

Sullivan County, Missouri

United States Department of Agriculture
Natural Resources Conservation Service

APPENDIX C

Breach Inundation Maps



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
1	882.8
2	874.0
3	864.2
4	849.7
5	849.7
6	845.0
7	836.6

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed
Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 1 of 12

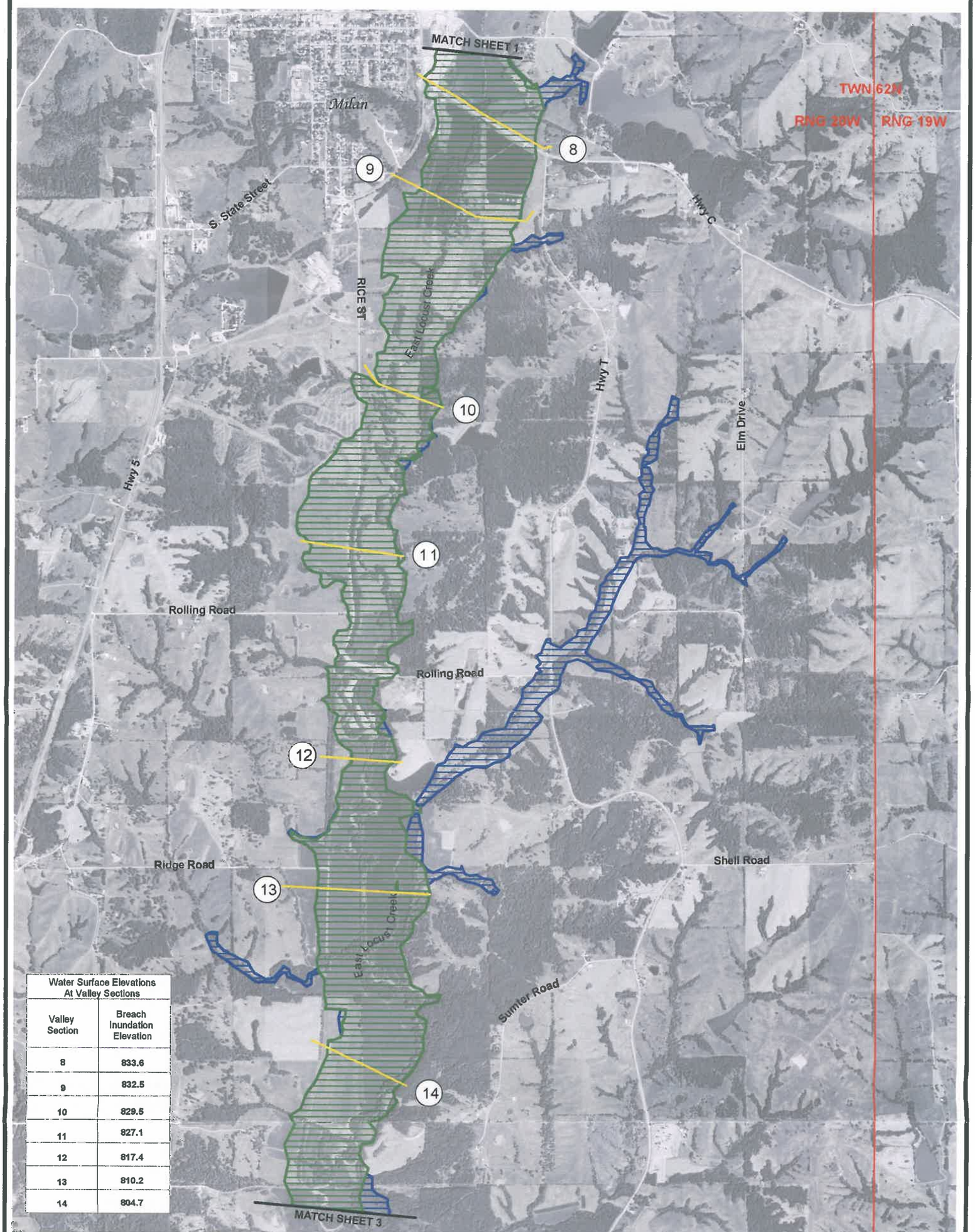
Scale 1:24,000
July 2005

N

The triangulated irregular network (TIN) elevation model used for the breach inundation analysis was derived from digital 1:24,000 scale topographic contours (USGS). Horizontal and vertical accuracy of these data meet national map accuracy standards at that scale.

United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
8	833.6
9	832.5
10	829.5
11	827.1
12	817.4
13	810.2
14	804.7

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 2 of 12

Scale 1:24,000
July 2005

N

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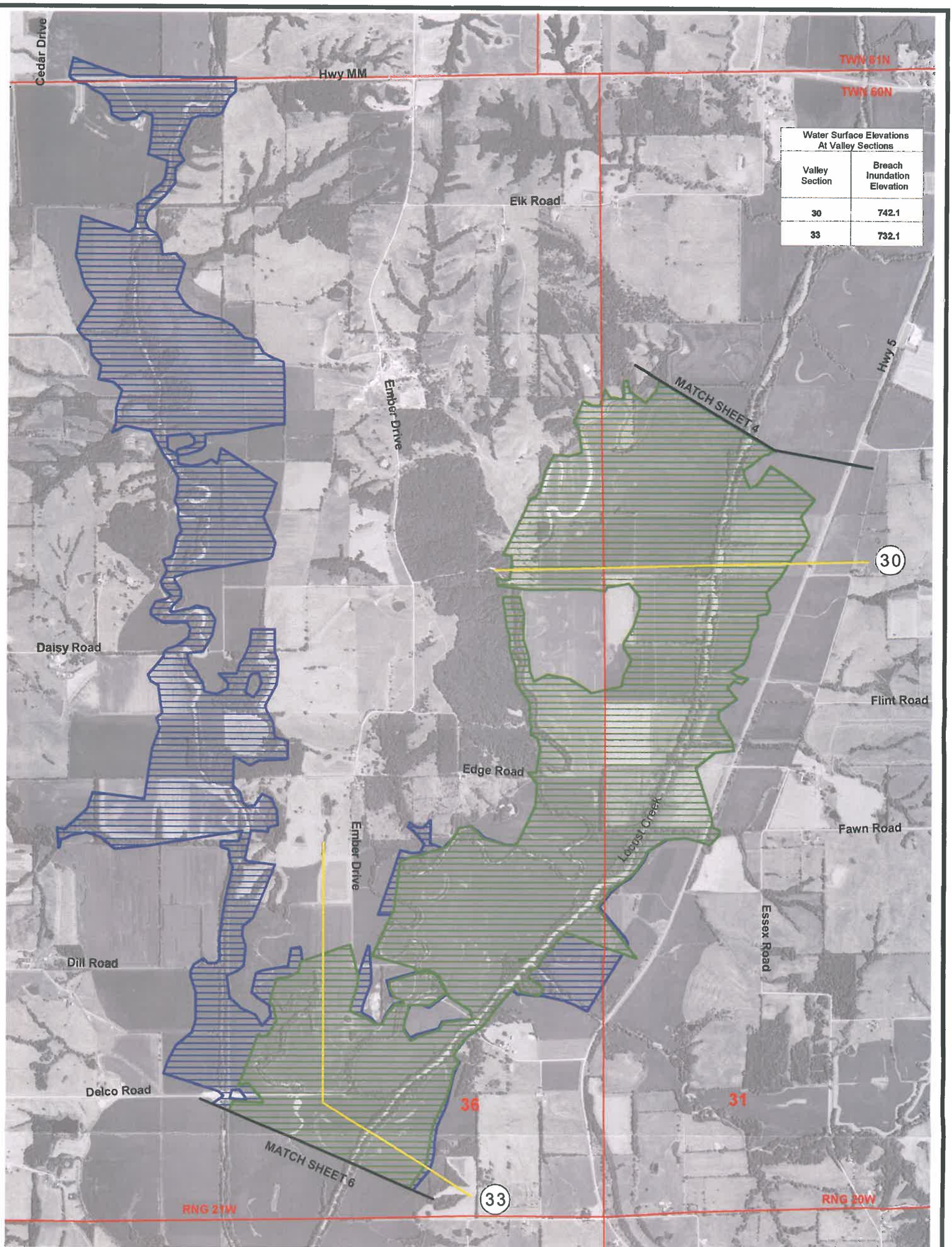
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 5 of 12

Scale 1:24,000
July 2005

N

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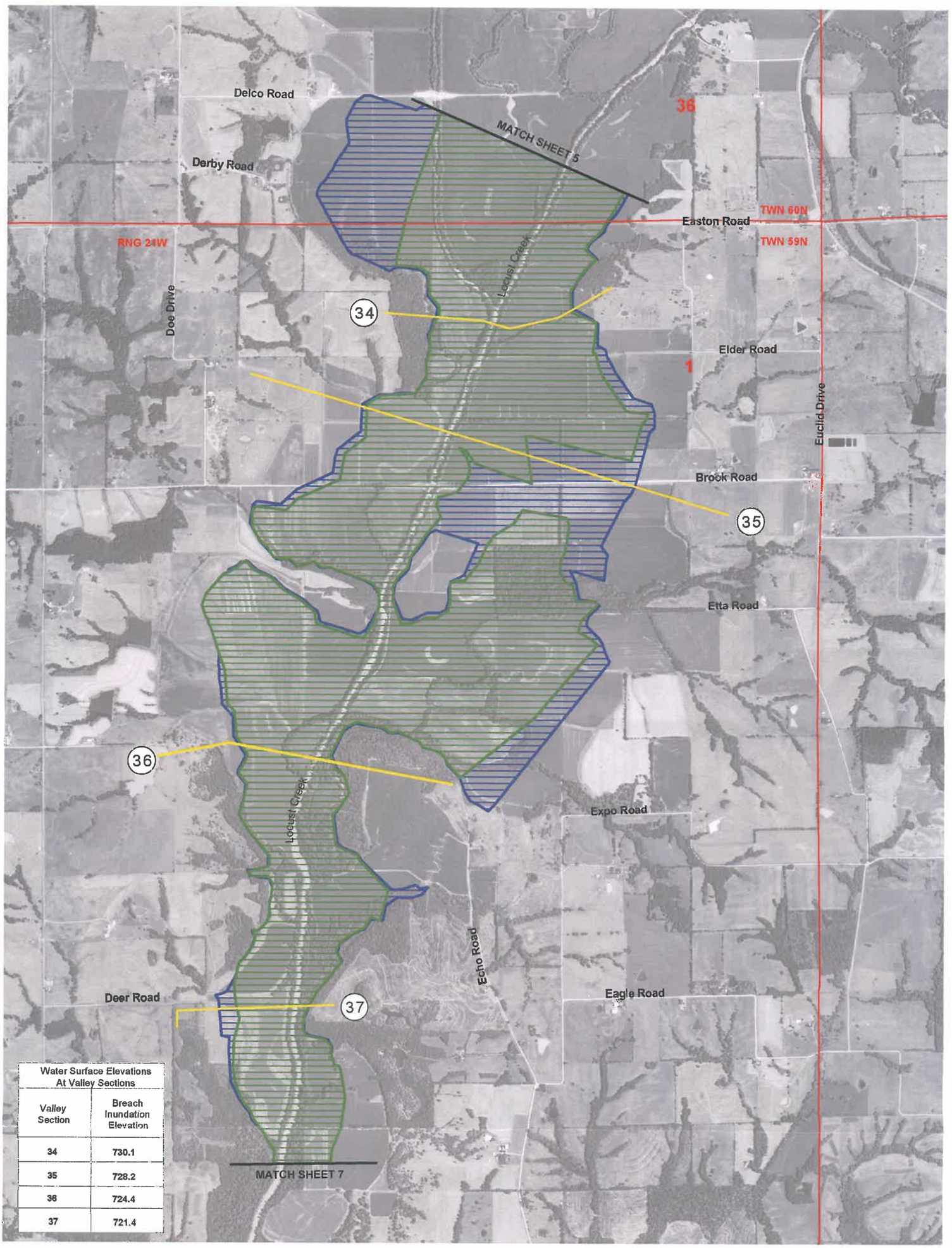
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
34	730.1
35	728.2
36	724.4
37	721.4

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 6 of 12

Scale 1:24,000
July 2005

N

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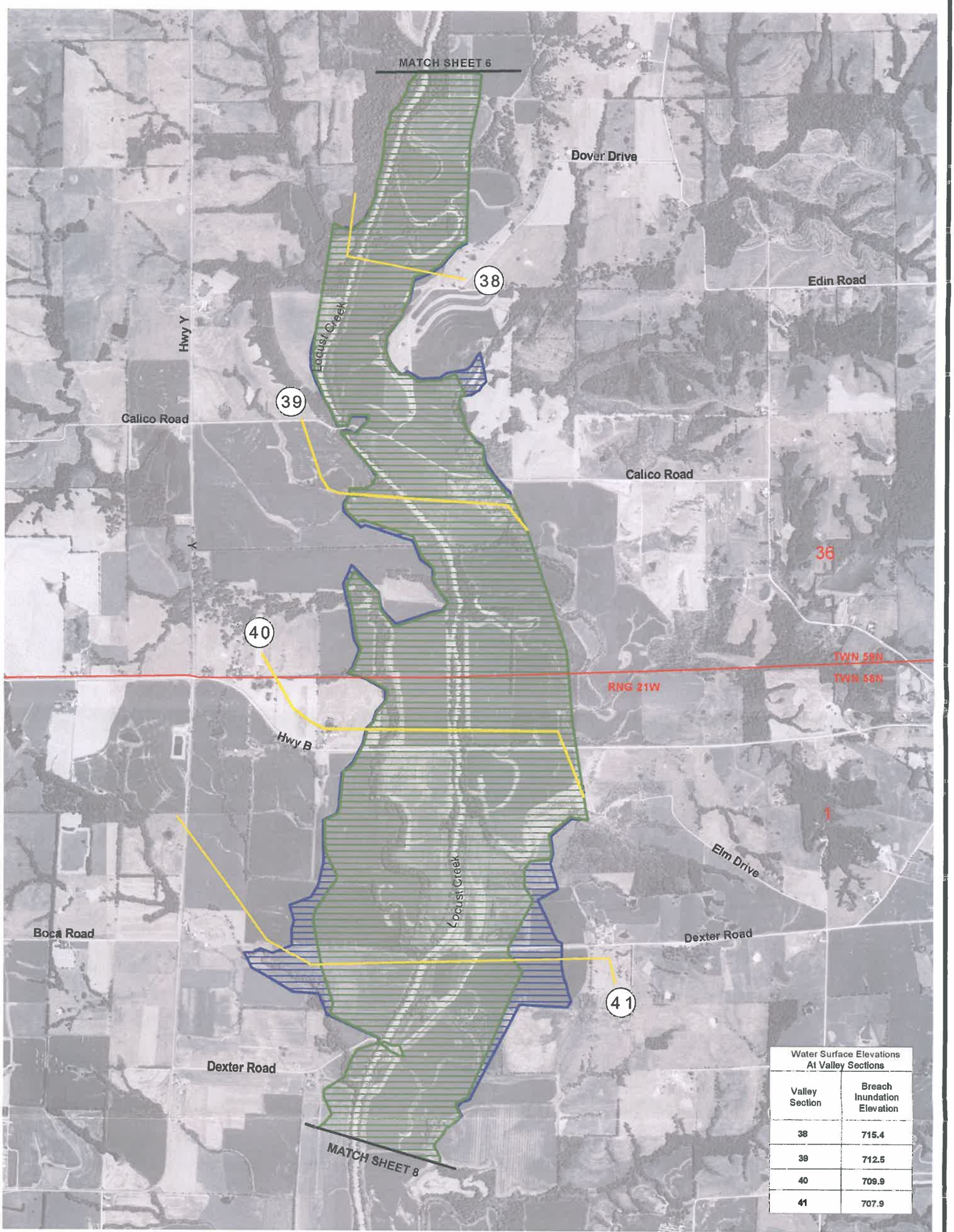
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
38	715.4
39	712.5
40	709.9
41	707.9

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 7 of 12

Scale 1:24,000
July 2005

N

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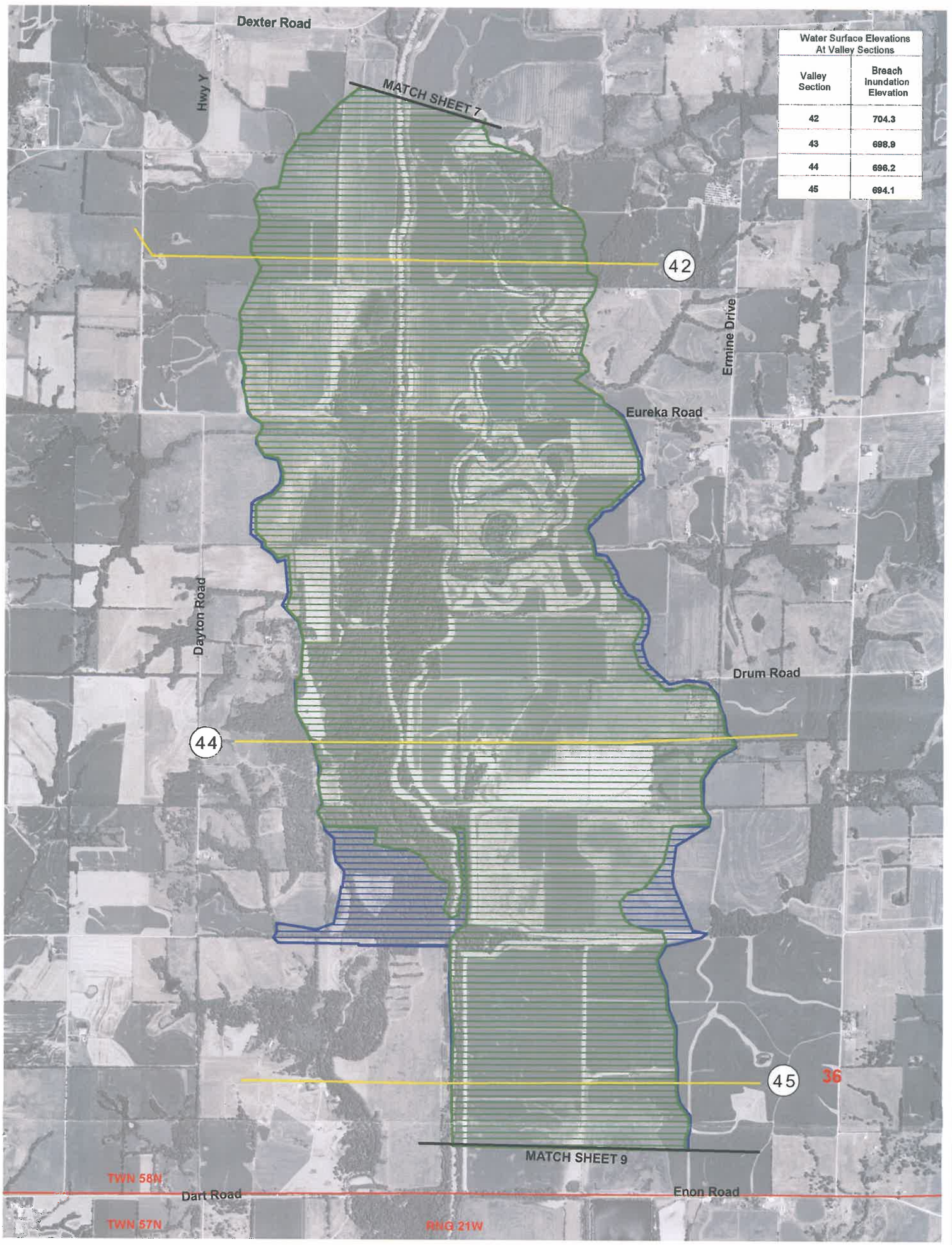
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
42	704.3
43	698.9
44	696.2
45	694.1

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 8 of 12

Scale 1:24,000
July 2005

N

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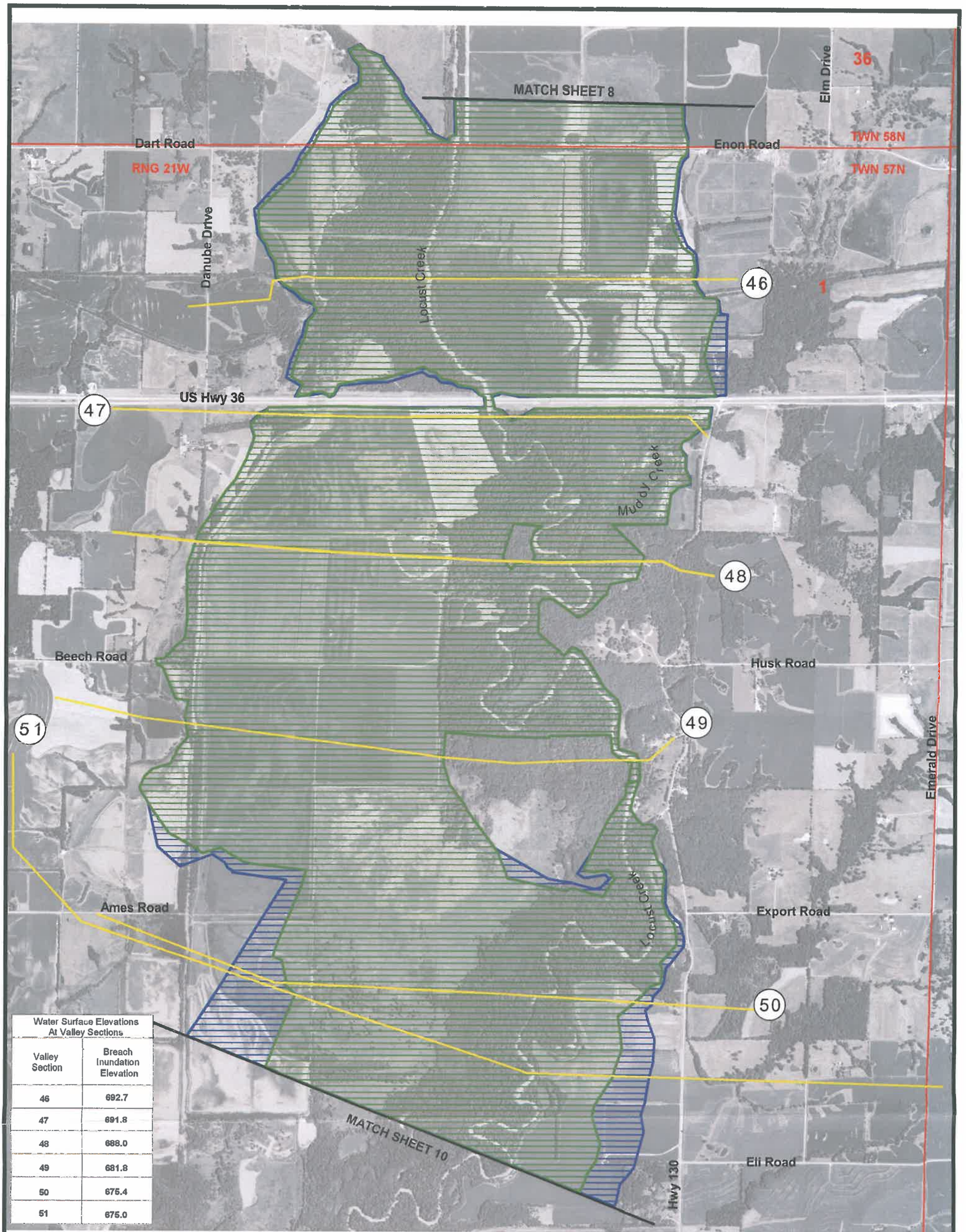
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
46	692.7
47	691.8
48	688.0
49	681.8
50	675.4
51	675.0

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 9 of 12

Scale 1:24,000
July 2005

N

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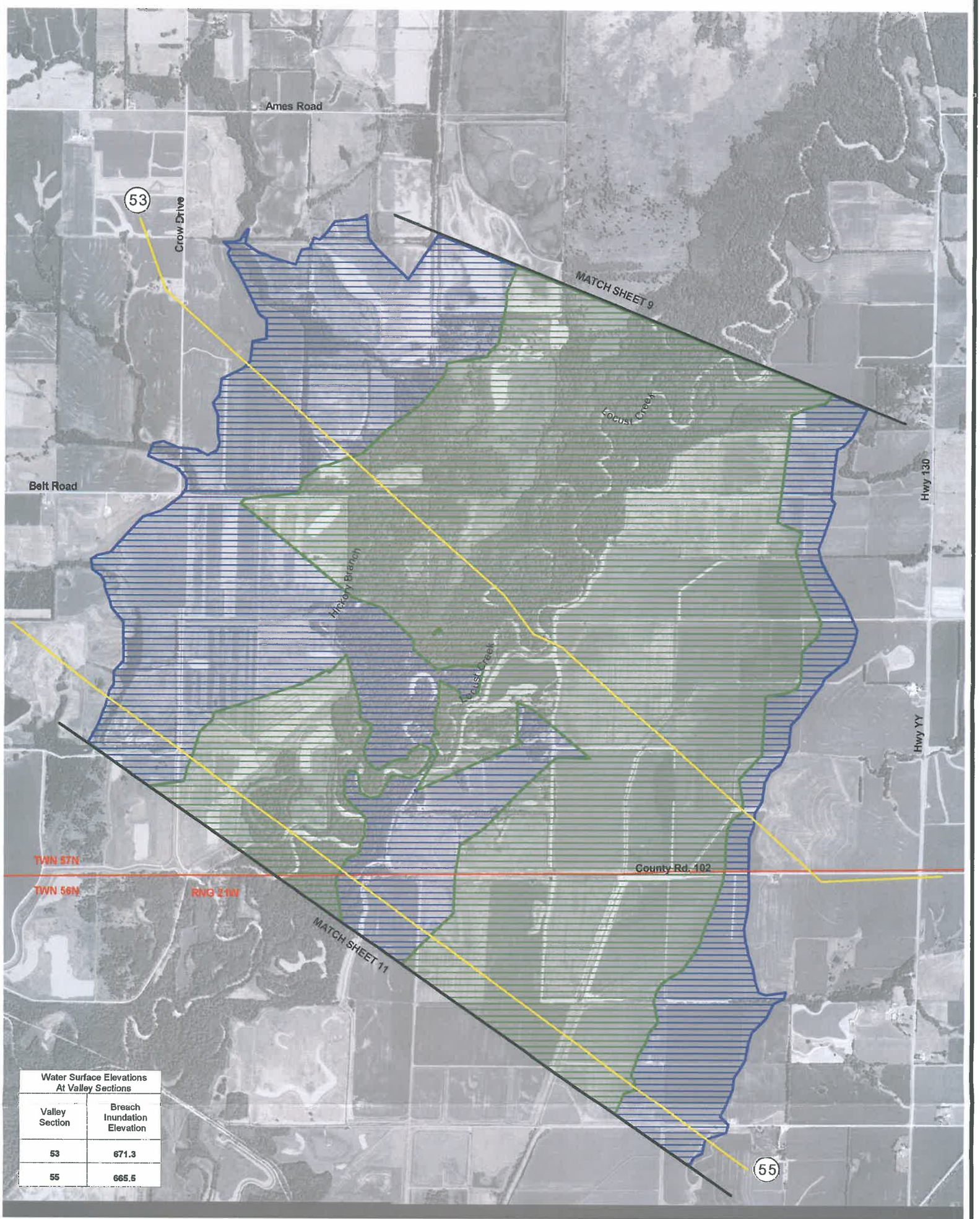
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



Water Surface Elevations At Valley Sections	
Valley Section	Breach Inundation Elevation
53	671.3
55	665.5

100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 10 of 12

Scale 1:24,000
July 2005

N

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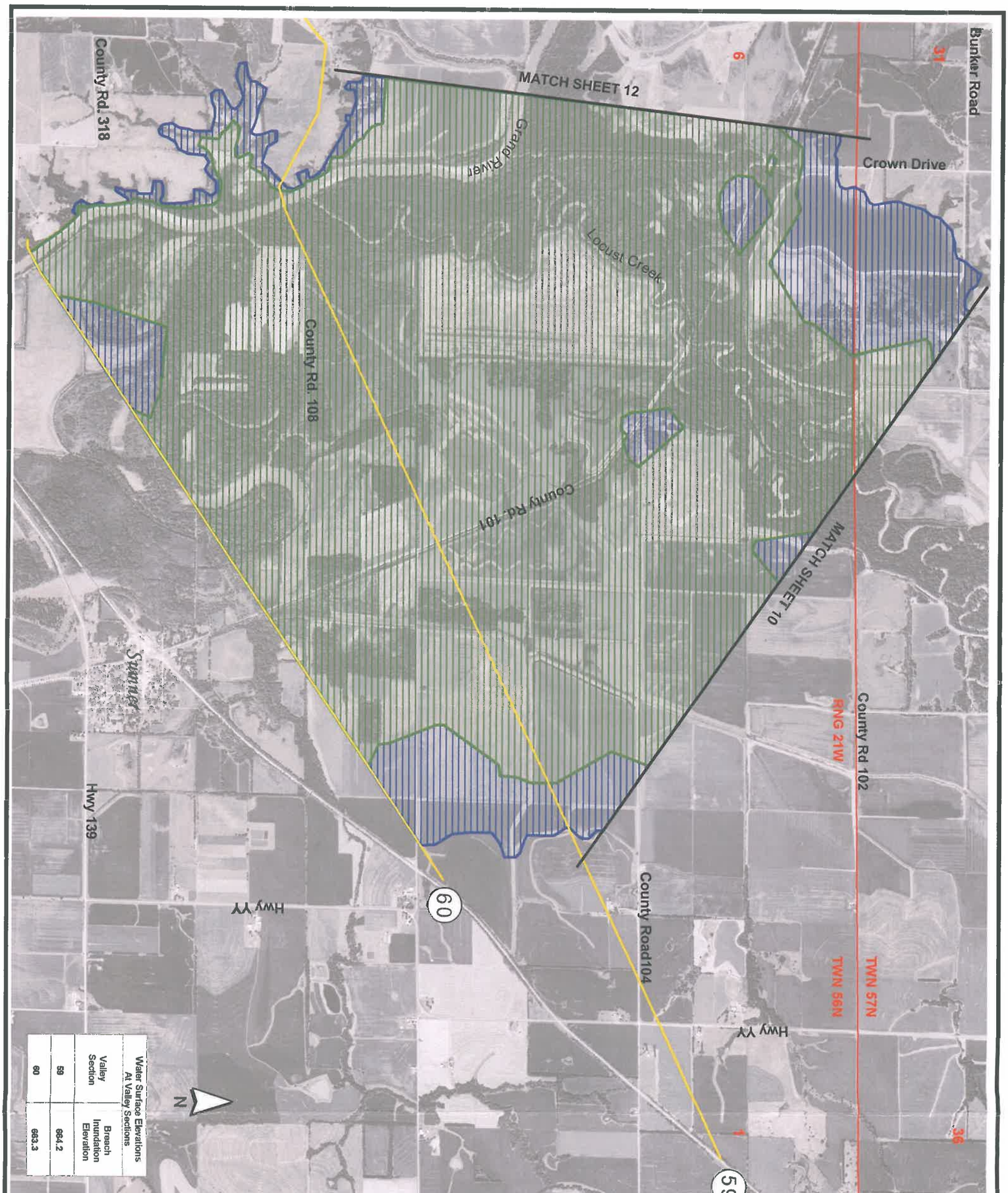
United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

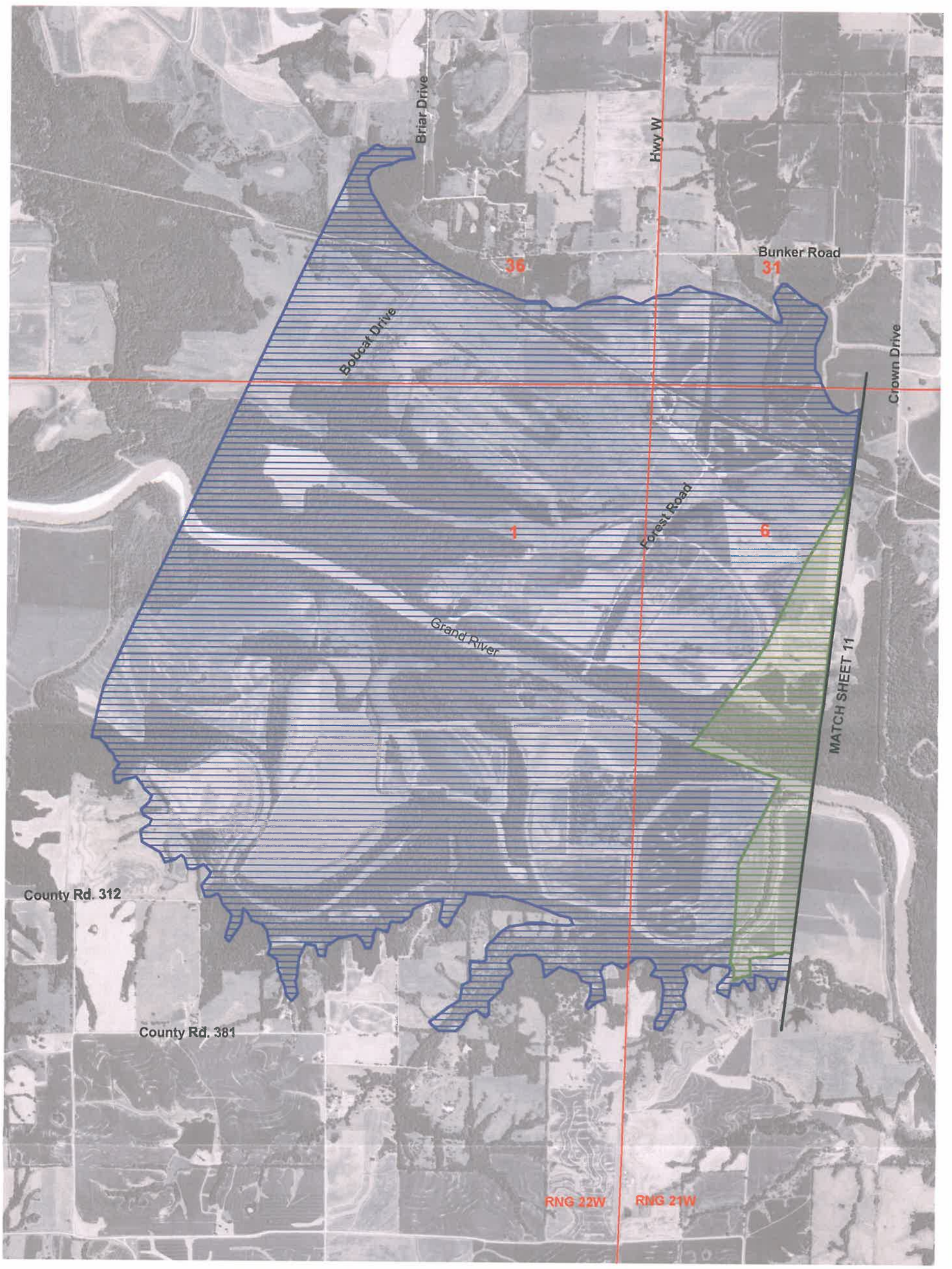
Sheet 11 of 12

Scale 1:28,000
July 2005

The triangulated irregular network (TIN) elevation model used for the breach inundation analysis was derived from digital 1:24,000 scale topographic contours (USGS). Horizontal and vertical accuracy of these data meet national map accuracy standards at that scale.

United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004



100-year flood area

Breach area

Valley sections

East Locust Creek Watershed

Breach Inundation Map

Linn, Putnam & Sullivan Counties, Missouri

Sheet 12 of 12

Scale 1:24,000
July 2005

N

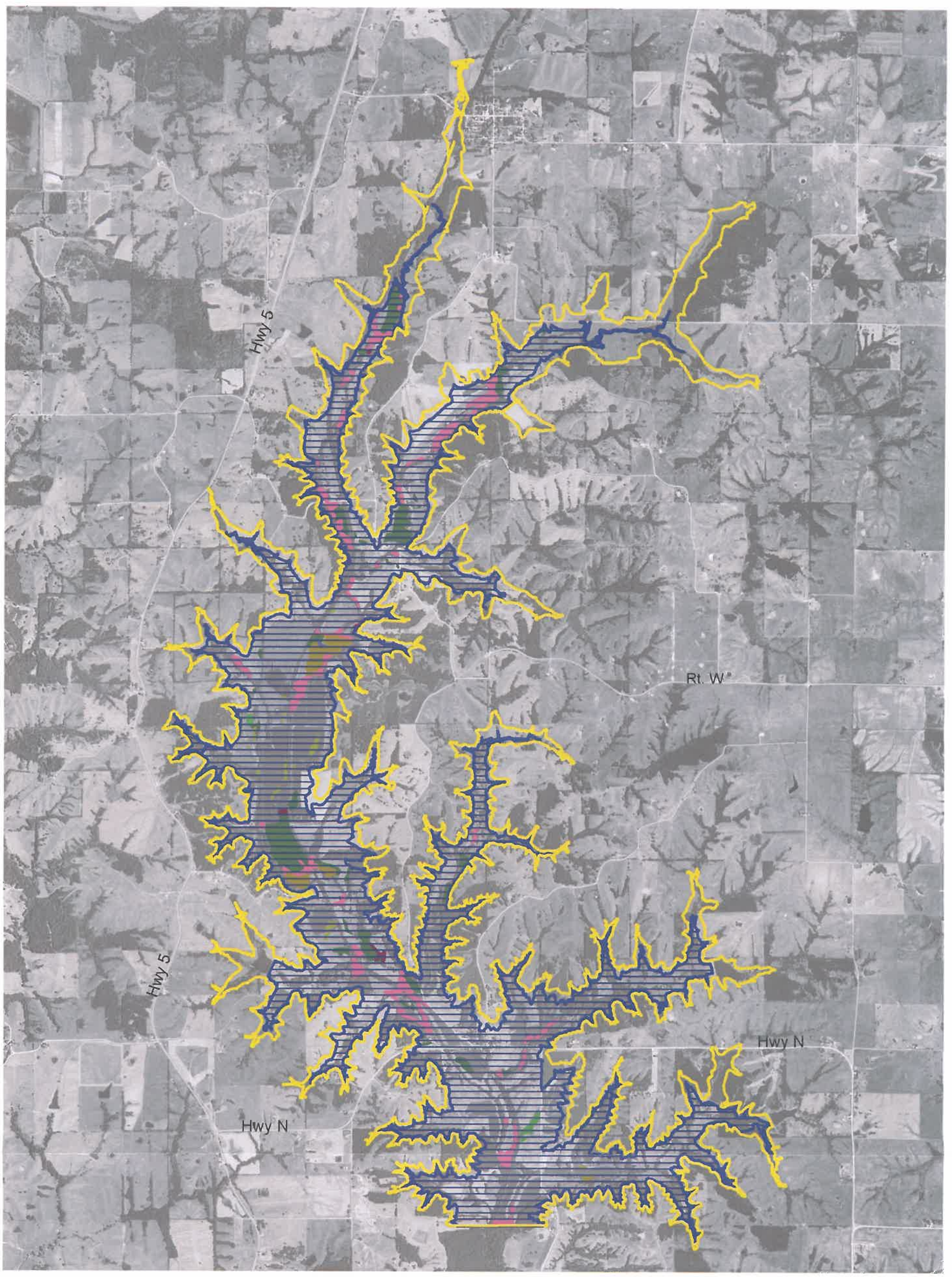
The triangulated irregular network (TIN) elevation model used for the breach inundation analysis was derived from digital 1:24,000 scale topographic contours (USGS). Horizontal and vertical accuracy of these data meet national map accuracy standards at that scale.

United States Department of Agriculture
Natural Resources Conservation Service

Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004

APPENDIX D

National Wetlands Inventory Map



Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004

NWI Classification:

- Palustrine Emergent Temporarily Flooded (PEMA)
- Palustrine Emergent Saturated (PEMB)
- Palustrine Emergent Seasonally Flooded (PEMC)
- Palustrine Emergent Semipermanently Exposed (PEMF)
- Palustrine Forested Broad-Leaved Deciduous Temporarily Flooded (PFO1A)
- Palustrine Forested Broad-Leaved Deciduous Seasonally Flooded (PFO1C)
- Palustrine Scrub Shrub Broad-Leaved Deciduous Temporarily Flooded (PSS1A)
- Permanent Pool
- Top of Dam

N

Scale 1:35,000
July 2005

0.5 0 0.5 Miles

East Locust Creek Multiple-Purpose Reservoir

National Wetlands Inventory Map

Sullivan County, Missouri

United States Department of Agriculture
Natural Resources Conservation Service

APPENDIX E

Investigations and Analyses

INVESTIGATIONS AND ANALYSES

The purpose of the investigations and analyses section is to present information that supports the formulation, evaluation, and conclusions of the East Locust Creek Watershed Revised Plan-EIS. Items of a routine nature are not included. However, citations are included throughout the East Locust Creek Watershed Revised Plan-EIS text for appropriate manuals, handbooks, research, and other references. Supporting data developed for this study are on file at the Natural Resources Conservation Service state office in Columbia, Missouri.

The Investigations and Analyses includes details on the formulations and assumptions for the following parts of the plan; hydraulics and hydrology, engineering design and cost estimates, geology, biology, wetlands, stream resources, cultural resources, social resources, economics, recreation, land cover and treatment, project formulation, and public participation. These sections are supplementary to the main text of the plan.

HYDRAULICS AND HYDROLOGY

The East Locust Creek Watershed was studied as a complex system consisting of four main areas. For the analysis, the multiple-purpose reservoir is referred to as RW-1.

The areas are identified in the following table:

Area Description	Drainage Area, Square Miles
East Locust Creek above RW-1	33.9
East Locust Creek/ Little East Locust Creek below RW-1	91.8
Upper Locust Creek Upstream of the East Locust Creek Junction	243.3
Lower Locust Creek below Upper Locust (Includes West Locust Creek)	273.5
Total drainage area analyzed	642.5

The rainfall-runoff relationship was determined using the average Runoff Curve Number (RCN) method for the present and future hydrologic conditions of the watershed through consideration of the soils, topography, vegetation, and conservation measures. The land cover/hydrologic soil group themes were prepared and tabulated by the GIS specialist. Runoff curve numbers were computed from the soil cover complex data and used with Figure 10.1 in the NRCS National Engineering Handbook, Part 630, in order to determine the depth of runoff from single storm events.

Time of Concentration (Tc) for intermediate drainage areas were computed by the velocity method using near bankfull velocities of cross sections within its reach and a constant 12 minutes to represent sheet and shallow concentrated flow. Tc computations were modified in the formulation alternatives that considered RW-1 to be in-place by using guidance from the National Engineering Handbook Part 630.

Point rainfall quantities were obtained from the United States Weather Bureau Technical Paper 40 (TP40) for use in structural design. For hydrologic evaluation and RW-1 design, TP40 aerial adjustments were used.

The SCS TR20 (Project Formulation) computer program was used to reservoir and stream reach route the 10 storms studied in detail. Four alternative formulations, in addition to present condition and future without-project, were modeled for economic evaluation.

The basic TR20 alternative formulations are as follows:

Alternative Description	Number of Small FWR Structures	
	Above RW-1	Below RW-1
Present Condition	26	46
Future Without RW-1	45	79
Hydrologic Alternative 1 (RW-1 with designed flood storage. All existing and planned structures below RW-1 were included)	30	79
Hydrologic Alternative 3 Increment 1 (No RW-1, Present Condition East Locust Creek, specific structures above RW-1 were analyzed to compare increments of alternatives 1 and 3, all Little East Locust Creek existing and planned structures)	30	68
Hydrologic Alternative 3 Increment 1A (No RW-1, specific structures above RW-1 were analyzed to compare increments of alternatives 1 and 3. All existing and planned structures below RW-1 were included)	30	79
Hydrologic Alternative 3 Increment 2 (RW-1 with reduced flood storage. All existing and planned structures below RW-1 were included)	30	79

The peak discharge, duration, and volume compared favorably with stream gauges in Locust Creek and surrounding watersheds. Basic rainfall amounts and corresponding runoff amounts used are as follows:

PRECIPITATION DATA

Frequency (year)	Duration (hours)	Rainfall (inches)	Runoff (inches)	
			Original Plan	Revised 3/ Plan
500 1/	24	7.84	---	4.68 – 5.48
100	24	6.62	4.47	3.70 – 4.34
50	24	6.02	3.91	3.12 – 3.80
25	24	5.43	3.38	2.62 – 3.28
10	24	4.64	2.68	2.00 – 2.58
5	24	4.03	2.15	1.55 – 2.06
2	24	3.24	1.50	1.00 – 1.43
1	24	2.63	1.04	0.64 – 0.98
0.50	24	2.10	0.67	0.37 – 0.62
0.33	24	1.69	0.42	0.20 – 0.39
0.28 2/	24	1.50	0.31	---- ----

1/ The 500-year precipitation was computed by procedures of (Bulletin #17B)
2/ The 0.28-year event was not used in the Watershed Plan Revision
3/ The Revised Plan uses RCN's of 73 through 80

The hydrology in the original East Locust Creek Watershed Plan-EA was modeled with TR20. The original plan used a method of grouping small dams (composite structures) in relation to physical features, such as topographic location, soils, foundation conditions, and economic and environmental effects. For the revised analysis, the models for East Locust, Upper Locust, and Lower Locust were recreated from microfiche archives. The TR20 representing the completed Upper Locust Creek Watershed project was modified to delete the 0.28-year, 24-hour storm event and add the 500-year, 24-hour event.

The original East Locust Creek Plan composite areas were assessed for use in representing the effects of structures built since the project began. The revised plan delineated new hydrologic areas and voided the original composite area hydrology. The Upper Locust TR20 model was unchanged. The Lower Locust TR20 changed, with respect, to inflow it receives from the East Locust Creek alternative formulations.

The East Locust Creek controlled areas and storage discharge tables of existing structures were used in place of the composite structure data. The planned and existing structures and uncontrolled areas were delineated from ArcView topographic images.

The revised plan TR20's created hydrographs for the 0.33-, 0.5-, 1.0-, 2.0-, 5.0-, 10-, 25-, 50-, 100-, and 500-year, 24-hour events. For example, the TR20 present condition alternative for upstream of RW-1 was modeled and the hydrographs computed at the proposed RW-1 location were used as input to the East Locust Creek below RW-1 TR20. The hydrographs computed at

the lower end of East Locust Creek, at the junction with Upper Locust Creek, was combined with the outlet hydrographs of Upper Locust Creek as modification to the TR20 of the lower reaches of Locust Creek.

The original plan cross-section locations were determined after making field examinations of hydraulic characteristics and considering the needs of the economist and geologist. The original 1987 East Locust Creek watershed plan contained engineering surveys of 15 road and bridge cross-sections and 44 valley and channel sections. The engineering surveys were made by contract in late 1979.

This revised plan required representation of the effects of existing structures, built during the project, and representation of inundated tributary areas. The U.S. Army Corps of Engineers Hydrologic Engineering Center's (COE HEC) HEC-GeoRAS was used to estimate geometry of needed cross-sections to compute water surface profiles and define existing dams, main channel junctions and tributary reaches. The stream layout for the watershed was traced from 2003 Mrsid ortho, 2004 Mrsid, and USGS digital Raster Graphic (drg) of scanned USGS topographic maps of various dates. HEC-GeoRAS is a set of procedures, tools, and utilities for processing geospatial data in ArcView GIS (or ArcInfo) using a graphical user interface (GUI). The interface allows the preparation of geometric data for import into the COE HEC's River Analysis System (HEC-RAS) water surface profile computer model and processes simulation results exported from HEC-RAS.

The 3-dimensional cross-sections developed from ArcView/HecGeoRas, the stream reaches, bank stations, and flow paths were exported to HecRas as a geometry file. As required by HEC-GeoRAS, all of the above were identified by stream, stream reach, and or stream station. These cross-sections were used for H&H computations and economic analysis.

The SCS computer program WSP2 (Water Surface Profile) for the unrevised East Locust Creek was converted to a non geo-referenced HEC-RAS. This program develops elevation-discharge and elevation-area flooded relationships used for hydrologic and economic analysis. This model conversion was used to adjust the Revised Plan's geo-referenced HecRas by using 'n' values and channel geometry to approximate the geometry of the original WSP2. A range of discharges (Q, cfs) was input and starting elevations were derived from the WSP2 ratings upstream of the Upper Locust Creek junction.

The HecRas rating output at this stage in development was input into the revised TR20. The TR20 flood discharges for the storm events were then transferred to the HecRas as a new flow file. The results of the HecRas were then exported to an ArcView project resulting in descriptive and quantitative themes for cross-section location, stream orientation, and flood boundaries for each storm event. This provided excellent tracking of how the effects of alternative formulations for various areas of the watershed and allowed quantification of inundated acres for each storm event.

The monthly flood distribution used for economic evaluation was developed from the USGS 06901500 Locust Creek near Linneus, Missouri stream gage.

Breach Analysis

Breach routing for the proposed multiple-purpose reservoir was performed using procedures outlined in Technical Release 60 (TR60), and TR66. The breach hydrograph was developed with TR66 criteria. An unsteady flow model representing the breach flood wave was computed with HecRas. The result of the analysis indicates a large area of impact, for several miles downstream from the dam, if an instantaneous catastrophic breach would occur.

Breach Data:

Top of dam elevation	938.0 feet	Storage at failure	62,698 acre-feet
Height of breach, H	56.0 feet	Breach peak discharge	111,500 cfs
Auxiliary spillway elevation	926.0 feet		

This is an approximate breach study. It is recommended that a more detailed analysis be completed for use in an Emergency Action Plan, such as field verification and/or modification of cross sections used, and the inclusion of all roadway influence into the hydraulic analysis. This analysis, also represents a typical sunny day breach were inflow into the reservoir before and during the breach is considered insignificant. The large magnitude of this reservoir requires inflow to be considered, and the breach parameters recalculated after final design.

ENGINEERING DESIGN AND COST ESTIMATES

The basis and criteria for planning and design of structural measures are contained in the following documents, manuals, and guides: National Watershed Manual; National Engineering Manual; NRCS Engineering Field Manual; Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies; Technical Releases 19, 20, 48, 52, 55, 60, 66; and National Engineering Handbooks.

The original East Locust Creek Watershed Plan-EA identified 120 small and one large FWR structure to address damages due to flooding. The major needs currently identified by the Sponsors of the East Locust Creek Watershed Revised Plan-EIS are rural water supply shortages, flood damages, minimal fish and wildlife habitat, and lack of water-based recreational opportunities. The revised plan adds a large multiple-purpose reservoir to the feasible small FWR structures to address all the current needs.

Early planning activities included field investigations and observation trips by an interdisciplinary team to identify and evaluate the natural resources of concern in their present conditions.

Evaluation of various alternatives yielded an NED plan consisting of one large multiple-purpose reservoir; 22 small FWR structures; seven modified small FWR structures; and five sediment/debris basins. The analysis for the project design is detailed below.

Multiple-Purpose Reservoir

The multiple-purpose reservoir is planned to supply an average of 7.0 million gallons of raw water per day. This figure has been requested by the North Central Missouri Regional Water Commission in response to the Department of Natural Resources' water use study of the North Central Missouri Regional Water Commission (Missouri Department of Natural Resources, May 20, 2004). Additionally, the reservoir will provide recreational and floodwater retarding benefits.

Planning design for the reservoir was prepared with data taken from 4-foot contour interval topographic maps prepared by Western Air Maps, Inc. with a scale of 1:2,400. The SITES computer program utilized this data to develop the stage-storage curves for the proposed reservoir, and then routed the design storms through the structure.

The reservoir was initially designed by routing the appropriate TR-60 hydrographs through the structure. The initial design attempted to utilize a 66" conduit with a baffle type riser (d x 3d) and a 400' wide vegetated auxiliary spillway. This resulted in temporary storage of the entire 100-year, 24-hour principal spillway hydrograph. The initial design also required addition of temporary storage due to the inability to meet the 10-day drawdown requirement. Further attempts at alternate auxiliary spillway alternatives where evaluated under this same scenario. In total, three spillway types where evaluated: 400' wide vegetated spillway, 200' wide concrete armored spillway with a SAF type outlet, and a 240' wide roller compacted concrete (RCC), chute spillway. These three types of spillways were estimated in some detail with costs as follows:

- 400' vegetated spillway $3,960,720
- 200' concrete armored spillway $5,484,780
- 240' RCC stepped chute spillway $2,348,240

Based upon the cost estimates, the RCC chute spillway was thus, chosen for the remainder of the analysis.

The volume of temporary storage was the last major aspect analyzed for the reservoir design. Preliminary evaluations were indicating the floodwater retarding capacity according to TR-60 requirements where going to yield unfeasible costs and unacceptable social consequences. At that time, it was determined to reduce the temporary floodwater retarding storage of the structure to a point that would more closely represent floodwater retarding capacities from implementation of the original plan. The principal spillway hydrograph was then designed to route the 25-year, 24-hour storm event rather than the 100-year, 24-hour. This yielded a condition where the crest of the auxiliary spillway was set, but the principal spillway was not flowing at optimum efficiency. Finally, the auxiliary spillway crest was raised approximately 0.3 of a foot to the principal spillway full pipe flow elevation. This condition, however, does not meet the 10 day drawdown requirement. There was approximately 70% of the temporary storage evacuated instead of 85%, a difference of 1.8 feet of stage above the inlet. This remaining storage was not added to the temporary volume to raise the auxiliary crest.

The final planning design thus, yielded the following: a total storage at top of dam elevation of 93,506 acre-feet and total storage at the auxiliary spillway elevation of 58,808 acre-feet. The auxiliary spillway elevation includes submerged sediment (3,115 acre-feet), aerated sediment (385 acre-feet), agricultural water management (45,045 acre-feet), recreation (1,400 acre-feet), and floodwater retention (8,863 acre-feet).

The planned principal spillway is a reinforced concrete pipe (rcp), which is 66" in diameter with a reinforced concrete baffle type riser. Two different previously constructed, NRCS assisted, site plans were utilized in modeling and designing. Missouri's Mozingo Creek Watershed Site MP-1 was built with a 60" rcp with a baffle type riser and Iowa's Three Mile Creek Watershed Site M-2 utilized a 66" rcp with a baffle type riser. Quantity and layout parameters where combined from both sites.

The planned auxiliary spillway is a 240' wide roller compacted concrete chute spillway. This structure has a stepped design on the inlet and exit portions of the spillway. The steps are 5' deep and 2' high. Salado Creek Watershed Site Number 10, constructed in Bexar County, Texas, has an RCC structure with the same dimensions. The RCC spillway design has been utilized for several other spillways around the country because it has been modeled by the USDA-Agriculture Research Service. Seven steps on the exit portion of the spillway were added to the Salado 10 site in order to fit into the layout for the reservoir's embankment and spillways. The East Locust Creek multiple-purpose structure consists of a flat stilling basin at the outlet that is approximately 50' long with an end sill at the outlet. The principal spillway outlets into the same stilling basin as the auxiliary spillway.

The reservoir, as planned, will require the closing of a portion of one state route highway and six gravel township roads. It is also estimated that relocation of 20 residences will be required. These figures were geospatially calculated using ArcView and AutoCAD software. Locations of water supply mains, telephone lines, and power lines identified in the revised plan were re-digitized from the Burns and McDonnell Master Plan. An adjustment was then made to these figures for site location and pool size discrepancies between the two plans.

Geologic data and foundation treatment recommendations for this embankment are not complete. A planning stage foundation investigation consisting of core drilling has been completed and samples have been submitted to the USDA-NRCS Soil Mechanics Lab in Lincoln, Nebraska. Design and cost estimates reflect installation of a 20' earthen clay cutoff trench along the length of the dam. There is also a slurry trench cut-off designed across the floodplain of valley. This will be verified upon completion of the investigation.

Allocation of installation costs for the multiple-purpose reservoir to the three purposes (rural water supply, recreation, and flood damage reduction) was accomplished by using the Separable Cost-Remaining Benefits (SCRB) procedure. A worksheet was developed for this allocation procedure using Excel software. The worksheet was expanded to incorporate development and preparation of Table 2A for the plan.

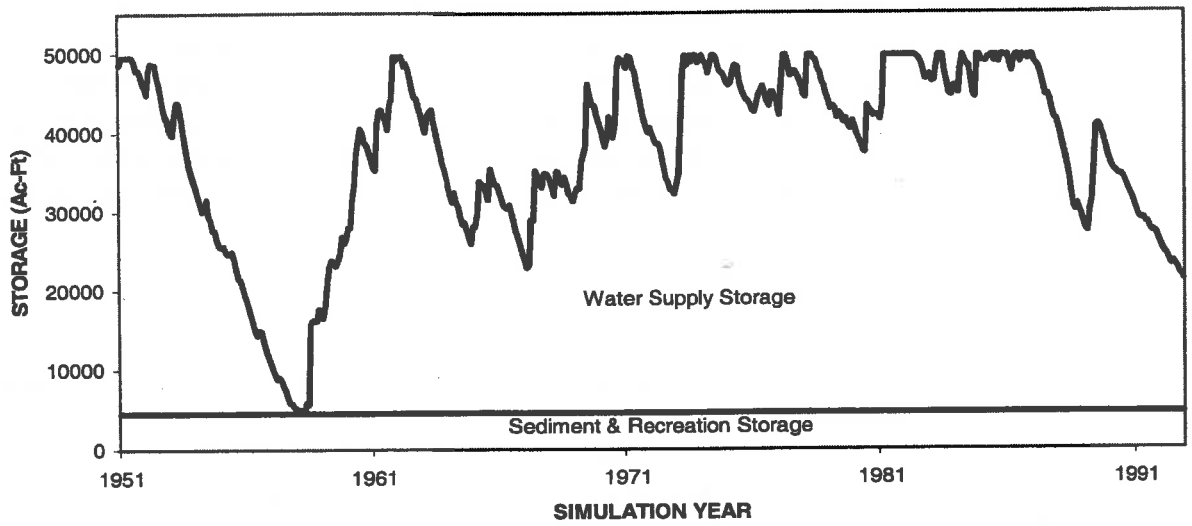
The reservoir includes 49,560 acre-feet of storage at the principal spillway crest, of which 45,045 acre-feet is for agricultural water management (rural water supply). This amount was determined by analysis of the present and projected demand by the Missouri Department of Natural Resources as mentioned above. The watershed yield and reservoir operation was analyzed using TR-19, Reservoir Operation Study Program. The Missouri Department of Natural Resources utilized the TR-19 program to model the Burns and McDonnell recommended site and also a larger site at the same location. The input data for those water budgets were utilized by the NRCS to model the water budget at the reservoir location NRCS selected. The reservoir performance was evaluated against the drought period of 1951-1992. The site selected by NRCS is approximately 2,000 feet upstream of the Burns and McDonnell location. The water budget models the drought through 1951-1959, and is considered to be the most severe drought period in recent times. The budget was optimized to withdraw a constant 7.0 MGD over the period of record including the 1950's.

The TR-19 input modeled the reservoir with the following input parameters:

- Water supply storage ranged from the principal spillway elevation (922.3 feet) to the upper limits of the recreation and sediment pool (888.5 feet).
- Seepage estimate was made at a progressive rate vs. elevation. Input data was entered as inches of seepage at a specific water surface elevation. It was as follows: 3" from 2,100 acres to 1,101acres, 2" from 1,100 acres to 881 acres, and 1.0" from 880 acres to 860 acres.
- Rainfall data came from the Milan, Missouri rain gage for the period 1951 through 1992.
- Monthly runoff volumes in watershed inches were determined at the Linneus gage on Locust Creek for the period of 1951 through 1972, at which time, the gage was removed. For the period 1973 through 1991, the Medicine Creek gage at Galt was used. From 1992 to June 2004, the runoff gage at Promise, Iowa was used. This gage is on East Fork Chariton River above Rathbun Reservoir. If runoff data did not appear reasonable when compared to rainfall, it was necessary to examine daily rainfall values for that month. Antecedent moisture was estimated for each rainfall event and adjustments to NRCS runoff curve numbers was made to arrive at runoff for each storm
- Pan evaporation at the Lakeside gaging station was used as a base because it has data for year round evaporation. This data was updated with gage data from stations at Spickard, New Franklin, and Columbia. Depending on the latest data for the station nearest to Milan.
- In order to supply flow augmentation needs to minimize impacts to stream habitat of East Locust Creek downstream of the reservoir, a discharge of one half of a cubic foot per second was included in the planning-phase of the water budget (TR-19). Storage for this flow is included in the agricultural water management (rural water supply) segment of the permanent pool.

Figure C-1

East Locust Watershed
Multipurpose Reservoir Operation



Small Floodwater Retarding (FWR) Structures

The 22 small FWR structures are planned to address the damages from flooding along the Little East Locust Creek Tributary. Seventeen of the 22 sites proposed where included in the original 1987 East Locust Creek Watershed Plan-EA. An additional five sites in the revised plan will replace the originally planned large FWR structure, E-10. Field investigations for design purposes for the small structures were not performed for the revised plan. Data from 65 of the 72 completed structures in the original plan were used to formulate quantity figures.

The small structures will be designed in accordance with Floodwater Retarding Dams Standard (402) and shall meet or exceed criteria as called for in the Pond Standard (378). Initial breach studies from the original plan indicate all sites should be low hazard (class a). A cursory remote review of these locations currently indicates no change in this initial analysis. No relocation measures are necessary for construction of these small structures.

A livestock watering system is included in the design of the small structures. This is planned in each structure to assist with improved agricultural water management for local producers.

The cost estimates are delineated according to specific watershed drainage area ranges and were developed utilizing cost data from 110 small structures constructed by NRCS, located within the local region of the East Locust Creek Watershed. Bid items included site preparation, excavation, principal spillway, earthfill, fencing, seeding and mulching, pollution and erosion

control, and livestock watering systems. As-built construction costs were indexed to present dollars utilizing the construction cost indices from Engineering News Records. Engineering, project administration and cultural resources costs are based on percentages of the construction cost. These percentages were verified by estimates from records of time and personnel used to perform the functions for similar work performed under PL-566 construction contracts. Operation and maintenance for the small structures was calculated as one percent of the construction costs. The only replacement value estimated for the small structures included replacement of the principal spillway conduit once during the design life. This replacement was recalculated by utilizing the original estimate, combined with a recent pipe replacement cost, performed on E-68 in the East Locust Creek Watershed due to other reasons besides design life.

GEOLOGY

Erosion and sedimentation data concerning sheet-and-rill, ephemeral gully, classical gully, and road ditch erosion for upland areas of the East Locust Creek Watershed were compiled based on field observations; information provided by NRCS and SWCD field personnel, and quantified, digital common land unit (CLU) data for Sullivan County derived by GIS analysis.

Channel conditions and streambank erosion were inventoried at the surveyed valley cross-sections and at randomly selected stream reaches. Bedload materials and sediment transport potential were evaluated along East Locust Creek and its major tributaries. Changes in channel plan form (geomorphic adjustment) were assessed by examination of historical aerial photography and through interviews with local residents.

The collection and analysis of erosion and sedimentation data were conducted using guidelines and recommendations set forth in the USDA-SCS National Engineering Handbook (NEH), Section 3 (Sedimentation), 1983; the USDA-SCS Guide to Sedimentation Investigations, Technical Guide 12, Engineering and Watershed Planning Unit, Fort Worth, Texas, June 1976; and other assorted reference materials. Comparisons and extrapolations were also made from erosion and sedimentation data collected for other watershed plans that have been completed in northern Missouri. These included the original East Locust Creek Plan, and the East Yellow Creek, Moniteau Creek, and East Fork of the Grand River plans.

Reconnaissance geologic investigations were conducted of possible reservoir impoundment sites. Water holding potential and availability of borrow materials were assessed. A preliminary, geologic, foundation investigation of the selected multiple-purpose site was conducted using backhoe pits in September 2004. A geologic foundation investigation was conducted in July and August, 2005. The investigation consisted of 40 test holes (including angle drilling), pressure testing, undisturbed sample collection, standard penetration testing and sampling, and other data collection as needed. All samples collected will be analyzed at the UDSA-NRCS Soil Mechanics Laboratory in Lincoln, Nebraska.

BIOLOGY

Multiple-Purpose Reservoir

Field investigations of upland wildlife habitat and aquatic habitat impacted by this project were conducted by an interagency team composed of biologists from the U.S. Fish and Wildlife Service (USFWS), Missouri Department of Conservation (MDC), Environmental Protection Agency (USEPA), Missouri Department of Natural Resources (MDNR), Army Corps of Engineers (USACE), and the Natural Resources Conservation Service (NRCS). Team members agreed to use representative species and four habitat types (grassland, cropland, upland hardwoods, and bottomland hardwoods) for the evaluation. Wildlife Habitat Appraisal Guide (WHAG) software was used to model the range of species niche requirements and habitat conditions impacted by the project. The WHAG software allowed us to assess the various habitat types to be impacted for 14 different species with niche requirements that represented all of these habitat types. Based on the field data collected, the interagency biology team agreed that the bobwhite quail and wood thrush habitat suitability indexes (HSI) would be used to assess the loss of the impacted upland habitats. A 0.80 Habitat Suitability Index (HSI) was agreed to by the interagency biology team for bobwhite quail and wood thrush, which represents a suite of species for the upland habitat impacted, as the attainable goal on compensation sites. The use of these HSIs provided the greatest number of mitigation acres (see below).

Upland mitigation analysis:

Upland Hardwoods, bottomland hardwoods, cropland, and grassland mitigation

Compensation of 1,604.6 acres will be required based upon these results:

	Acres	x	HSI*	=	HU
Upland Hardwoods	269	x	0.51	=	137.2
Bottomland Hardwoods	316	x	0.43	=	135.9
Cropland	284	x	0.40	=	113.6
Grassland (pasture/hayland)	815	x	0.31	=	252.7
Total	1,684 acres		1.65	=	639.4 HU's

Mean HSI = 1.65/4 = 0.41

*HSI values for upland hardwoods, cropland, and grassland are for bobwhite quail and the HSI for bottomland hardwoods is for the wood thrush.

Pasture/hayland gain on dam/spillway

	Acres	x	HIS		
Pasture/Hayland Dam/Spillway	17	x	0.80	=	13.6 HU gain

Therefore, the pasture/hayland habitat type HU gains (13.6 HU's) will be deducted from the total HU loss (639.4).

639.4 HU's – 13.6 HU's = 625.8 HU's required for upland mitigation

Attainable goal HSI of 0.80 at compensation sites minus existing HSI (quail/wood thrush) of 0.41 equals 0.39 gain on mitigation areas.

$$\text{Required Compensation} = \frac{625.8 \text{ HU's}}{0.39 \text{ HSI}} = 1{,}604.6 \text{ Mitigation Acres}$$

These mitigation acres will not be developed solely for bobwhite quail and wood thrush, but rather will adequately compensate for the various habitats impacted and emphasize the species that require these habitat types. Acres impacted of each habitat type affected were measured utilizing digital orthophotography. NRCS will develop a mitigation plan for these mitigation acres with the Sponsors, USEPA, MDC, and USFWS.

Threatened and endangered species, significant natural communities, and other environmental concerns will be addressed during the pre-design conference and other pre-contract meetings.

Small Floodwater Retarding (FWR) Structures

Mitigation features associated with the impact to wildlife habitat by the 22 small FWR structures will remain the same as the original East Locust Creek Watershed Plan (see Recommended Plan, Mitigation Features Section). Seventeen of these sites are actually remaining sites from the original East Locust Creek Watershed Plan. The other five sites are located within the drainage area of the original plan's Site E-10 and will replace E-10.

The five small structures that replace E-10 have a total permanent pool size of 22 acres. E-10 had a permanent pool size of 84 acres. Therefore, 62 fewer acres will be impacted and no additional mitigation will be included in the revised plan for these five small structures.

WETLANDS

Wetland acres were determined using digital Fish and Wildlife Service National Wetland Inventory maps and a field reconnaissance by an NRCS soil scientist and MDC biologist (both

have had REG IV training). Seven transects were completed within the top of dam elevation and structure, auxiliary spillway, and raw water transmission line footprints to assess the quality of wetlands intersected by the transect and to determine if these wetlands were identified correctly by NWI. Their findings indicated that the forested wetlands are of marginal quality and many of the wetlands were overestimated in size. The hydrology is only marginal on the wetland sites because the adjacent stream channel is deeply incised.

The areas located between the high bank of East Locust Creek and the old railroad bed do not meet wetland criteria due to the influence of the incised creek channel (average 50'-100' from bank) and the elevation of the old railroad bed. Soils were mapped mainly as Landes, which is non-hydric. Of these areas, delineated as wetlands, the vast majority meet the hydrology criteria due to saturated soil conditions. There was little evidence of ponding or long-term flooding on these sites.

The forested plant communities are dominated by light-seeded trees with very little hard mast present. Most are young stands typically dominated by silver maple with little canopy stratification and herbaceous understory dominated by stinging nettle and Virginia wild rye. Many of the areas have been grazed which likely influenced the vegetative community.

The best available and accepted tools will be used to accurately assess wetland functions and quantity at the time of the certified wetland determination and as part of the 404 process.

An assessment of wetlands that will be created in the permanent and temporary pools was made by an interagency team that included the following members: USACE, USEPA, USFWS, MDC, MDNR, NRCS, and the Sponsors. This team agreed to the following criteria to estimate wetlands created along the shoreline and upper ends of the permanent pool:

- Not greater than 18 inches in depth, and
- Inundated at least 15 consecutive days during the growing season.

The interagency team also agreed that wetlands could be created in the temporary pool by the use of creative borrow, using the same criteria as above. Using these criteria, monthly rainfall data during the growing season (April-October) for the period of 1960-1988 and surface topography were used to determine the water surface elevations of the permanent and temporary pools and the acres of wetlands created.

The interagency team agreed that if the acres of wetlands created by the shallow areas of the permanent and temporary pools, and with creative borrow (as stated above), are insufficient to mitigate wetland impacts, then opportunities within the following area will be investigated. The area that will be considered for mitigating wetland impacts will extend from the upper reaches of the East Locust Creek watershed to the south end of Fountain Grove Conservation Area, and the interagency team agreed that fringe wetlands of another reference reservoir (e.g. Mozingo Structure MP-1) will be used to compare/assess wetland functions.

WRP Easement

A Wetlands Reserve Program (WRP) easement of 132 acres lies within the proposed permanent pool area. The WRP easement will be mitigated as per WRP program policy (Part 514, Conservation Programs Manual Wetlands Reserve Program, see below) and the determination will be made through the 404 process as to whether the mitigation is adequate to compensate for impacts.

Conservation Programs Manual
Wetlands Reserve Program

514.37 Easement Modifications

a. General

NRCS has limited authority to modify WRP easements once acquired. NRCS can modify a WRP easement when there exists a compelling public need for the requested easement action, no reasonable alternatives exist, and the proposed project has included all practicable measures to minimize adverse affects. However, NRCS cannot modify an easement in situations where reasonable alternatives exist which meet the project purpose.

Easement modifications:

- should not be confused with a request for a compatible use. Compatible use requests are within the scope of the existing deed document,
- evolve from situations that could not be anticipated at the time the easement was established, such as new highway or levee construction project, and require recording of the change being adopted, and
- may be considered to facilitate the practical administration and management of the easement area providing the modification will not adversely affect the wetland and the associated buffer area functions and values for which the easement was established.

Because modifications to an easement could impact the total acres that are enrolled in the program, all modifications to an existing easement must result in no net loss of acreage enrolled in the program.

Example: A highway is going to cross the easement area and occupy several acres. NRCS will request that the entity replace the acreage being placed in the highway right-of-way. At a minimum, the replacement acre total must equal the lost acres but may be more where needed to fully offset any impact to wetland functions and values of the original easement area.

Easement modifications do not include changing a 30-year easement to a permanent easement. Requests to increase the easement duration should be considered a new offer for WRP. See paragraph 514.26(c).

b. Modification Requirements

The State Conservationist is required to consult with FWS and CD before making any decision. The State Conservationist shall:

- evaluate any modification request under NEPA, including the consequences of, and alternatives to, the requested easement action,
- comply with Executive Order 11990 when making any decisions related to the WRP easement,
- investigate whether reasonable alternatives to the proposed action exist, and
- determine whether the easement modification is appropriate considering the purposes of WRP and the facts surrounding the request for easement modification.

Note: An easement action request must not adversely affect the wetland functions and values for which the easement was acquired and must result in equal or greater environmental and economic values to the United States. Therefore, prior to approving a modification request, the issue of mitigation for the impact to the WRP program must be fully addressed.

Easement modifications after the easement has been recorded will only be made by mutual agreement with the Chief and the landowner. Modifications:

- **require** approval of the Director, WWD, and OGC-Natural Resources Division in consultation with the FWS and CD. The National Program Manager will coordinate the request with FWS at the national level and with the Director, WWD,
- **must** result in equal or greater ecological and economic values to the U.S. Government,
- **must** further the purposes of the program and address a compelling public need, and
- **must** comply with applicable Federal requirements, including NEPA, Endangered Species Act, Executive Order 11990, and related requirements.

The party requesting the modification is responsible for costs associated with actions involved in the modification. Easement amendments may involve much of the same title clearance processes that were necessary when the original easement was recorded, including an appraisal, legal boundary description, title search, subordination of any intervening liens, and recording of the amended deed. Corrections to easement documents do not require national approval, but do require coordination with OGC.

THREATENED AND ENDANGERED SPECIES

The Section 7 process in the Endangered Species Act was followed. A wildlife habitat investigation was made by the interagency biology team.

WATER QUALITY

Missouri state water quality regulations (10 CSR 20-7) classify waters by type, establish beneficial uses, and define general (10 CSR 20-7.031(3)) and specific (10 CSR 20-7.031(4)) water quality criteria that must be maintained to protect the assigned beneficial uses. If existing water quality is better than applicable water quality criteria, the state's anti-degradation policy (10 CSR 20-7.031(2)) requires existing levels of water quality to be maintained and protected. Classified portions of the stream are required to meet specific and general water quality criteria and conform to the anti-degradation policy. Unclassified portions of the stream are required to meet general water quality criteria and conform to the anti-degradation policy. Water bodies that fail to meet either general or specific criteria are required to be listed as impaired water bodies under Section 303(d) of the federal Clean Water Act. East Locust Creek does not appear on Missouri's most recent (1998 and 2002) Section 303(d) lists.

East Locust Creek from the mouth to Highway 6 is classified as "P" (streams that maintain permanent flow even in drought). From Highway 6 to Section 12, Township 64N, Range 20W near Pollock, the stream is classified "C" (streams that may cease flow in dry periods but maintain permanent pools which support aquatic life). The remainder of the stream is unclassified. The State designated beneficial uses for East Locust Creek are livestock and wildlife watering and protection of warm water aquatic life and human health – fish consumption.

Watershed land cover is predominantly pasture, hayland, and forestland with very little row-crop agriculture. Though agricultural non-point source pollution has not been associated with any impairment to water quality in East Locust Creek, any pasture, forest, or row crop mismanagement in close proximity to the reservoir poses a risk to water quality. Approximately 7.1 percent of the watershed is enrolled in the Conservation Reserve Program (CRP). There is a possible, although unlikely, risk that significant portions of CRP land might some day be returned to crop production with a negative impact on water quality.

Homes and businesses with on-site septic systems that are in close proximity to the reservoir also pose a risk to water quality. Individual septic systems in the watershed have not been investigated, but are likely to have significant problems if they are typical of those found in the region. The communities of Pollock and Lemons upstream of the proposed reservoir are not served by central sewer systems and pose a risk for discharge of untreated effluent.

Missouri Department of Natural Resources officials were contacted regarding the presence of any permitted facilities that could potentially affect water quality in the reservoir. They were not aware of any leaking underground storage tanks, hazardous waste disposal sites, permitted landfills, treatment, storage and disposal (TSD) facilities, Superfund sites, or permitted wastewater treatment facilities upstream of the proposed water supply reservoir in the East Locust Creek Watershed.

The town of Boynton will be inundated by the permanent pool of the proposed reservoir. Remains of this town pose a risk to water quality if they are not properly demolished and removed. An automobile salvage yard at Pollock will not be inundated, but is located less than 300 feet from the stream channel and approximately 2,000 feet upstream from the 922.3-foot permanent pool elevation. Runoff from this site poses a risk to water quality. Illegal dumping poses a risk to water quality. Several illegal dump sites have been observed in the watershed upstream of the proposed reservoir. A ¼-mile length of State Highway 5 is located less than 600 feet from the 922.3-foot permanent pool elevation. The close proximity of the highway poses some risk of water pollution by deicers, herbicides, automotive and combustion by-products and some risk of a release due to a transportation-related hazardous materials incident. Low or no flow conditions in East Locust Creek during the driest part of the summer, coupled with permitted wastewater discharges by Premium Standard Farms and the City of Milan, can result in effluent-dominated flow downstream of these point discharges.

STREAM RESOURCES

Fish Community

Missouri Department of Conservation personnel last officially sampled the fish community in East Locust Creek on June 30, 1988. The sample site is located 7.4 miles upstream from the confluence with Locust Creek near Cora, Missouri (Sullivan County T61N, R20W, S10). The sample site is located in an unchannelized reach of the stream and had a wooded corridor less than 100 feet on both sides of the stream. The habitat sampled consisted of a pool, run, and backwater. Twelve different fish species were collected (Table 1). All of the species collected were common and habitat generalists; no threatened or endangered species were collected. The bigmouth shiner, a species that has been favored by channelization and increased sedimentation in Prairie streams, dominated the sample.

Table 1. Fish community sample for East Locust Creek.

Species		Number	Percent of Total
Common Name	**Scientific Name**		
Bigmouth Shiner	*Notropis dorsalis*	620	45.9
Bluntnose minnow	*Pimephales notatus*	1	0.1
Central Stoneroller	*Campostoma pullum*	9	0.7
Creek Chub	*Semotilus atromaculatus*	243	18.0
Golden Shiner	*Notemigonus crysoleucas*	1	0.1
Green Sunfish	*Lepomis cyanellus*	1	0.1
Red Shiner	*Cyprinella lutrensis*	299	22.1
River Carpsucker	*Carpiodes carpio*	14	1.0
Sand Shiner	*Notropis ludibundus*	145	10.7
Suckermouth Minnow	*Phenacobius mirabilis*	15	1.1
White Sucker	*Catostomus commersoni*	1	0.1
Yellow Bullhead	*Ameiurus natalis*	1	0.1
Totals		1350	100.0

Stream Habitat

Stream habitat conditions were sampled at eight different one-half mile long reaches throughout the length of East Locust Creek using Stream Habitat Evaluation Procedures (SHEP). This procedure ranks six parameters reflecting human impacts on a stream and adjusts them by four alteration functions (channel modifications, impoundments, water quality, and stream bed conditions) to determine an index value of stream quality. Values can range from zero (worst) to 10 (best). The average index value for East Locust Creek was 2.71 (range 0.6 to 5.0). Barriers to fish movement and flow alterations were not problems, but riparian vegetation was poor. Only three of eight reaches had good riparian areas. Bank erosion was severe in half of the reaches and moderate in most of the remaining reaches. Stream migration potential was moderate, but improved in the upper half of the reaches. Channelization was a problem in about one third of the reaches, but only one reach was completely channelized. Impoundment was not a problem. Water quality was only fair, and several reaches showed symptoms of excessive nutrients. Streambed condition was poor with excessive bedloads of sand and silt common in most reaches. Visual assessments conducted in the study area of the proposed reservoir during the spring and summer of 2005, indicate that both the fish community and stream habitat are similar to the earlier MDC sampling.

The Stream Visual Assessment Protocol is a simple coarse assessment procedure to evaluate the condition of aquatic ecosystems associated with streams. The results reflect the habitat quality of the stream. East Locust Creek was sampled at three locations on 5/24/2004. Sample sites were located: 1) approximately 3,700 feet south of the proposed multiple-purpose reservoir site; 2) just upstream of the bridge west of Boynton; and 3) upstream of a crossing in the SW ¼, SE ¼, Section 35, T64N, R20W. The results indicate fair conditions at all three sample locations. Limited width of riparian zone vegetation was common to all three sample sites.

East Locust Creek stream channel conditions downstream of the proposed reservoir site were evaluated on May 18, 2005 and June 22, 2005. Investigators waded approximately 5.3 miles of the stream channel between the proposed reservoir site and the confluence with Elmwood Creek. Channel stability, channelization, sedimentation, and riparian vegetation were noted.

Past channelization was evident, but the stream channel was relatively stable overall with active channel migration observed at only two meanders. Sedimentation varied with location. Logjams and sediment storage were apparent over approximately 6,350 feet of channel between the reservoir site and the first low-water crossing downstream. For approximately 8,500 feet below this low-water crossing, the channel exhibited some scour and little evidence of sedimentation. For the next 8,700 feet ending at a second low-water crossing, the channel was characterized by numerous logjams, islands, channel braiding, and sediment storage features. The remaining 4,600 feet between the second low-water crossing and the confluence with Elmwood Creek was scoured with resistant clay riffle features providing grade control at several locations.

The width of riparian buffer along East Locust Creek and its tributaries upstream of the reservoir site was evaluated using digital orthophotography flown in 2004 and digital infrared orthophotography flown in 2003. The riparian corridor was found to be very poorly vegetated.

CULTURAL RESOURCES

A cultural resources review was made as part of the original 1987 East Locust Creek Watershed Plan-EA. The cultural resources specialist is completing a geomorphic analysis of the new project areas, and cultural resource surveys will be made of areas that potentially have significant cultural resources. If significant resources are discovered during these surveys, NRCS procedures for compliance with federal laws and executive orders will be implemented to protect important resource information. Cultural resources concerns will be coordinated with the State Historic Preservation Office, Tribal Historic Preservation Offices, other tribes, and interested parties. A contract for a Phase I survey of the reservoir area is now scheduled for the fall/winter of 2006. Consideration of the previously located seven sites, any new sites located during the contract investigation, and historic resources (including the unincorporated village of Boynton) will be a part of the upcoming contract.

SOCIAL RESOURCES

Sources for the social assessment and civil rights impact analysis include documented research data and interviews with local residents and local officials. Weighted averages were used for assessment purposes when specific watershed census data were not available.

ECONOMICS

The economic methodology used to evaluate the average annual damages, benefits, and costs are from the document, "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&G) published by the United States Water Resources Council. This document, signed by the President in 1983, provides consistent formulation and evaluation procedure guidelines for water and related land resource implementation studies planned by federal agencies.

The revision of the original East Locust Creek Watershed Plan-EA required a reanalysis of flood damages and potential flood damage reduction benefits for four alternatives, plus the addition of an analysis of rural water supply benefits, livestock watering benefits, and recreation benefits.

Flood Damage Reduction Benefits

Flood damage reduction benefits encompass several categories; crop and pasture, fence and debris, commercial/urban, re-routing traffic, road and bridge, overbank deposition, swamping and floodplain scour. Present condition flood damages were computed first to provide the baseline from which to calculate flood reduction benefits. Flood damages were then evaluated in an incremental approach that allowed for the isolation of different components that were combined to form the alternatives. The first increment analyzed flood damage reduction attributable to the 22 small FWR structures on the Little East Locust Creek tributary. The

second increment analyzed flood damage reduction attributable to the 17 planned small structures on the mainstem of East Locust Creek. The third increment analyzed flood damage reduction attributable to the large multiple-purpose structure with both a 100-year, 24-hour recurrence interval flood storage and 25-year, 24-hour recurrence interval flood storage.

Crop and Pasture

Average annual crop and pasture flood damages were computed using NRCS' ECON2 computer program. The flood damage reduction benefits were calculated by subtracting the computed future condition flood damages for each alternative from the computed present condition flood damages.

Ten storm frequencies were analyzed; 500, 100, 50, 25, 10, 5, 2, 1, 0.5, and 0.33 year, 24-hour events. The monthly flooding probability was determined from USGS monthly streamflow data (USGS 2005). The economic reaches for the analysis were based upon the delineation of economic reaches in the original plan. Floodplain land use by economic reach was determined by aerial photo imagery and land use data layers in arc view by the staff GIS specialist. The land use data included current CRP (Conservation Reserve Program) lands. With the assistance of the Sullivan County district conservationist, future land use of the CRP lands was predicted and included into the model. Crop yields and values were determined using current and historical data from the National Agricultural Statistics Service database, plus estimated crop yield estimates for the specific higher yielding soil types found in the floodplain area (NASS 2005). Depth damage factors for each land use type are based upon curves developed for Missouri that incorporate replanting costs and alternate cropping possibilities.

Fence and Debris

Floodwater damages to fencing and the clean up of debris after flood events constitute another category of flood damages that are calculated using ECON2. Interview data supports the costs involved to repair these damages. An estimate of the amount of fencing, subject to flood damages and the costs to repair the fences, is used to derive the damage per acre relationship for fence damages. The relationship between the acres of land subject to debris damage and the cost of labor and equipment is used to derive the damage per acre relationship for debris damage.

Commercial/Urban

The only urban area in the East Locust Creek floodplain that is impacted by this watershed revision is the town of Milan. Average annual flood damages to Milan were computed using NRCS URB1 computer program. The flood damage reduction benefits were calculated by subtracting the computed future condition flood damages for each alternative from the computed present condition flood damages.

The same 10 storm frequencies used for ECON2 analysis were used for the URB1 analysis. Site visits and Arc View maps provided an inventory of buildings in the floodplain. The local field office provided current first floor elevation surveys. Building values came from the county assessor records where available, and interview data otherwise. Content values were derived from established structure to content ratios and interview information. Depth damage relationships were based upon established relationships for building and content type.

Re-Routing Traffic/Road and Bridge

Very little data and information are available from the original plan to assess the current status of road and bridge flooding. Interviews with the Sullivan County Commissioner provided information that many of the bridges have been upgraded since the original plan was analyzed. It was determined that since this category of damages represented a small proportion of the overall costs and benefits of the revised plan, the cost to re-survey the bridges in the watershed would be much greater than the benefits of the data that would be achieved. As a result, the original estimates of damages with and without the plan were indexed to 2006 dollars and adjusted to reflect the current present condition situation in the watershed.

Overbank Deposition, Swamping and Floodplain Scour

Overbank deposition, swamping, and floodplain scour damage reduction benefits were provided by the staff geologist, and are covered in the Geology section of the Investigations and Analyses.

Water Supply Benefits

Water supply benefits were calculated for the multiple-purpose structure. The guidance for calculating water supply benefits are provided in P&G section 2.2.12; Evaluation procedure: Compute M&I water supply annualized benefits. This section states;

a) Annualized benefits of the Federal water supply plan are equal to the annualized cost of the most likely alternative. When applicable, the evaluation should reflect differences in treatment, distribution, and other costs compared to the most likely alternative.
b) The alternative cost of providing a water supply for smaller communities (population of 10,000 or less) may be extremely expensive on a per capita basis because these communities lack the efficiencies of large-scale development. If such communities are not able to afford an alternative water supply, comparable to the Federal water supply plan as identified in the procedure described above, that alternative should not be used as the basis for evaluating the benefits of the Federal water supply plan. In this case, the benefit may be considered equal to the cost of the separable M&I facilities, plus an appropriate share of the remaining joint cost of the project

As seen in part b above, P&G makes a distinction between water supply plans for larger municipalities and smaller rural communities in the evaluation procedure; however, it refers to both under the M&I water supply heading. NRCS National Watershed Manual makes a specific distinction between M&I Water Supply and Rural Water Supply for cost share requirements. However, the evaluation of the benefits follow those outlined in P&G even though they are under the heading M&I Water Supply.

For the East Locust Creek Watershed Revised Plan-EIS, rural water supply benefits were calculated using the separable costs of the structure, plus the appropriate share of the joint costs of the project. The separable and joint costs were determined using Separable Costs Remaining Benefits methodology. The joint costs were allocated proportional to the acre feet of storage designated to each project purpose (rural water supply, recreation, and food damage reduction). There is a small difference in water supply benefits between Alternative 1 and Alternatives 2 and 3 (see Formulation and Comparison and Alternative Plans section). Alternative 1 reports water supply benefits of $1,940,800. Alternatives 2 and 3 report water supply benefits of $1,997,300. The reason for the difference in water supply benefits is a direct result of the methodology. Alternatives 2 and 3 have a larger allocation of separable costs and proportion of joint costs to the water supply purpose because this structure provides minimal flood damage reduction compared to Alternative 1.

Livestock Watering Benefits

The small FWR structures are sometimes outfitted with livestock watering pipes. These pipes allow the landowner to have a consistent fresh water source for watering livestock as an added benefit of the structure being located on their property. Interviews with local landowners, who have established small structures on their property with livestock watering pipes, say that the consistent water source is a benefit especially during droughts.

Livestock watering benefits captures monetarily the benefits of having livestock watering pipes. Three categories of benefits are considered:

1. Labor savings in winter due to eliminated de-icing requirements
2. Cattle weight gain due to the consistent fresh water source
3. Cost savings of supplementing water during drought

Data for compiling these benefits are based upon interview data and literature research.

Cost Allocation

The NWSM 502.91 requires that the method or basis for cost allocation be described in the plan. Cost allocation is necessary "to make allocations of cost to the various purposes, to show the basis of such allocations, and to determine whether benefits exceed costs" (National Resource

Economics Handbook, Part 611, p. 6-2). The National Resources Economics Handbook, Part 611, also states that NRCS national policy directs that in allocating total project financial costs among the purposes served by the project or plan, separable costs will be assigned to their respective purposes, and all joint costs will be allocated to purposes for which the project was formulated.

Cost allocation only pertains to works of improvement serving more than one purpose. Since the large multiple-purpose reservoir is designed to provide flood damage reduction, agricultural water management and recreation benefits cost allocation is necessary.

The method used for cost allocation of the three purposes of the large multiple-purpose reservoir is the separable cost-remaining benefits method (SCRB). The SCRB method is explained in the National Resources Economics Handbook, Part 611. The SCRB method provides for assigning to each purpose, its separable cost, and a share of the joint cost in proportion to the remaining benefits. This method allows for an equitable sharing among the various purposes of the multiple purpose reservoir, including any savings that may result from multiple purpose development.

National Economic Development Plan (NED)

The major objectives outlined by the local watershed Sponsors is to provide rural water supply, reduce flood damages, and provide recreational opportunities. Principles and Guidelines requires analyzing a plan that maximizes net benefits. This plan is called the NED plan and is the recommended plan.

Installation Costs

Installation costs of the structural measures are amortized at 5.125 percent interest; the 2006 plan formulation rate for Federal Water Projects. The multiple-purpose reservoir has a design life of 100 years, the small FWR structures have a design life of 75 years, and the recreational facilities have an estimated design life of 25 years. In order to compare the costs and benefits of the entire plan, the project lives need to be analyzed on a consistent time frame. For this analysis, all costs and benefits are analyzed on a 75 year life. Therefore, technically the last 25 years of water supply benefits are not calculated, and replacement costs for the recreational facilities are added to bring the recreation life up to 75 years. Average annual costs include both installation costs and operation and maintenance costs.

RECREATION

The evaluation of recreation benefits for water resources planning is guided by the Principles and Guidelines (United States Water Resources Council, March 1983), which outlines three methodologies for calculating recreation benefits: travel cost method, contingent valuation method, and user day method. The user day value method is used in this study. Due to the rise

in recreation research that has been conducted since the P&G guidelines were published in 1983, the Forest Service has released a meta analysis that updates the user day values from P&G (Rosenberger and Loomis, 2001). In order to provide the most accurate estimate of recreation benefits, the meta analysis user day values are combined with the P&G user day value method for this analysis.

Meetings with the project Sponsors and personnel with the Missouri Department of Natural Resources and Missouri Department of Conservation provided information regarding the types of recreational facilities that are appropriate for a reservoir of the size of the proposed reservoir (USDA-NRCS, 2005). Recreational activities used for the recreation analysis are: fishing, boating, hunting, camping, water skiing, hiking, biking, picnicking, bird watching, nature study, swimming, and canoeing.

The analysis of recreational benefits identified the likely population that would utilize the recreational facilities at the proposed reservoir as the population within a 25 mile radius of the reservoir. In addition, existing recreation facilities within that 25 mile radius were identified and analyzed for the recreation activities that they supply. This analysis shows that even with the existing facilities, there is an unmet demand for the types of recreation proposed at the reservoir.

The full recreation analysis report is available upon request from the USDA-NRCS state office in Columbia, Missouri.

LAND COVER AND TREATMENT

Watershed land cover information was mapped using 2001 Landsat satellite imagery and unsupervised classification techniques. When higher resolution data were required, the county digital common land unit (CLU) theme was used. The CLU is a delineation of agricultural land into ownership and management boundaries. The CLU is attributed with farm, tract, and field numbers from historic involvement in USDA programs. Non-agricultural and non-program lands are also delineated and given a land cover code determined by aerial photography interpretation.

The Sullivan County NRCS staff also calculated a USLE value for most agricultural CLUs in the watershed. To determine acres in the watershed considered "treated", or with an acceptable soil loss rate, USLE values were compared to the soil loss tolerance factor (T) from the digital Sullivan County soil survey. For the comparison, each CLU was assigned the T value for the surface layer of the dominant soil map unit in the CLU. The CLU was considered "treated" if its calculated USLE was less than T, and "untreated" if USLE was greater than or equal to T.

Land cover statistics were categorized into upland and floodplain using the 100-year floodplain boundary mapped from hydrologic modeling.

PROJECT FORMULATION

Future without-project conditions were forecasted using present conditions as a base. An interdisciplinary team approach, interviews of local officials and residents, and input from the project Sponsors were used to reflect a cross-section of viewpoints. Structural and nonstructural measures were evaluated in order to address local project purposes.

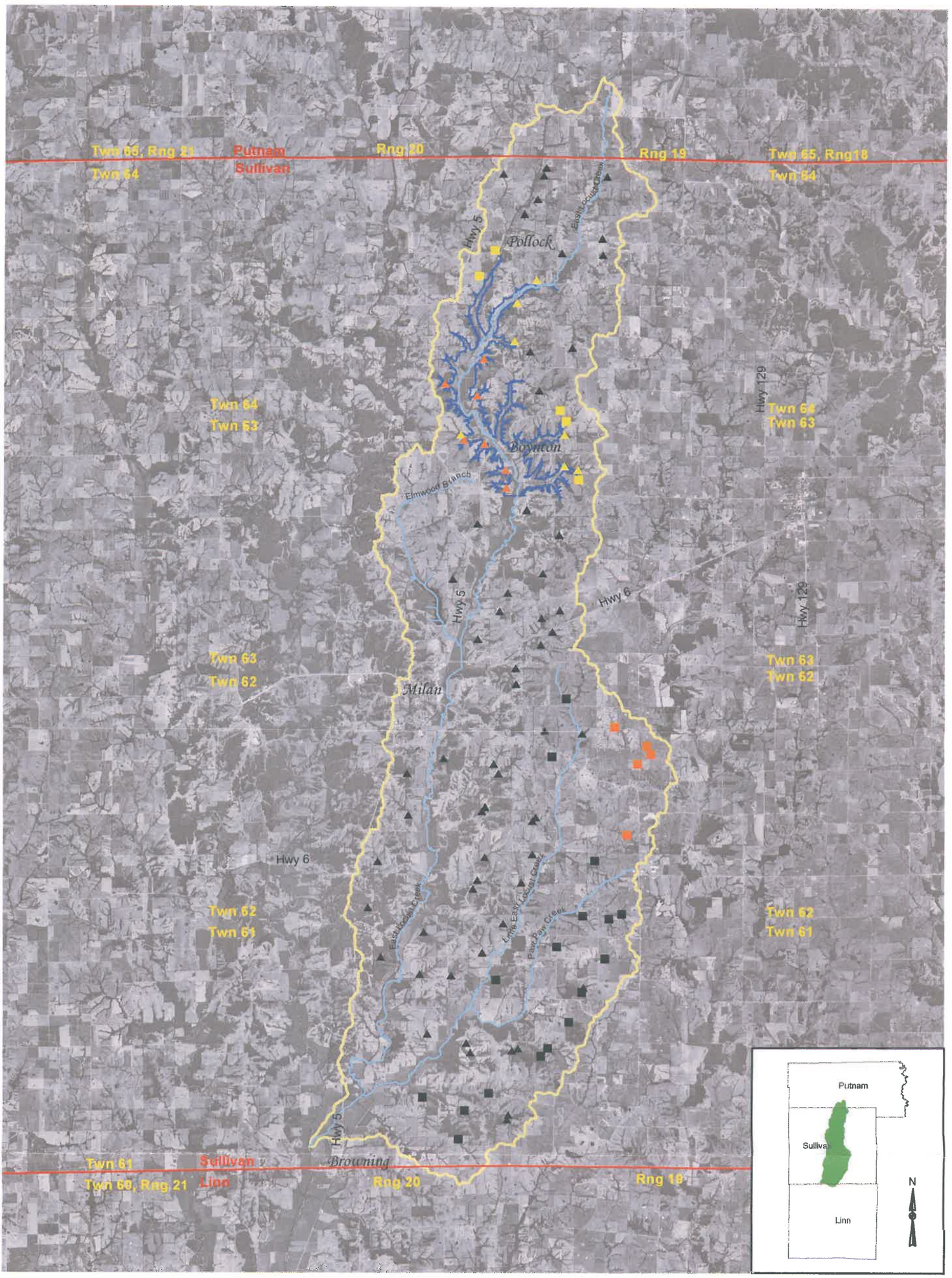
The major project objective, as determined by the Sponsors and through local input, is to find solutions to the following resource problems: an inadequate, undependable rural water supply for a 10-county area located in north central Missouri; lack of water-based recreational opportunities, limited and degraded wildlife habitat; and flooding along East Locust Creek and its tributaries. It was determined that one multiple-purpose reservoir situated on East Locust Creek and 22 small FWR structures within the Little East Locust Creek tributary would best meet local project needs.

EFFECTS OF THE RECOMMENDED PLAN ON RESOURCES OF NATIONAL RECOGNITION

Types of Resources	Authorities	Measurement of Effects
Air quality	Clean Air Act, as amended (42 U.S.C. 7401 et. seq.)	Short-term impacts from exhaust emissions, smoke, and dust during construction activities.
Area of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et.seq.)	Not present in planning area.
Endangered & threatened species, critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.)	No negative effects anticipated.
Wildlife habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et. seq.)	Overall increase in quality of wildlife habitat.
Floodplain	Executive Order 11988, Floodplain Mgmt.	Reduced damages.
Cultural resources	National Historic Preservation Act of 1966, (16 U.S.C. Sec. 470 et. seq.)	No Adverse Effects anticipated.
Prime & unique farmland	CEQ Memorandum of August 1, 1980: Analyses of impacts on prime or unique agricultural lands in implementing NEPA	No effect.
Water quality	Clean Water Act of 1977	Short-term decline in water quality during construction activities.
Wetlands	Executive Order 11990, Protection of Wetlands. Clean Water Act of 1977 (42 U.S.C. 1857th-7, et.seq.)	No net loss.
Wild and scenic rivers	Wild & Scenic Rivers Act, as amended (16 U.S.C. 1271 et. seq.)	Not present in area.

APPENDIX F

East Locust Creek Watershed Project Map



Imagery Data Source: National Aerial Imagery Program, Compliance Imagery, 2004

Completed Structures:
- Inundated
- Modified
- Flood Retarding

Planned Structures:
- E-10 Replacement
- Flood Retarding
- Redesigned as Sediment Basin

Permanent Pool of Reservoir

East Locust Creek Watershed

Scale 1:150,000
July 2005

1 0 1 2 3 Miles

East Locust Creek Watershed
Project Map

Linn, Putnam & Sullivan Counties, Missouri

United States Department of Agriculture
Natural Resources Conservation Service