Exhibit 10

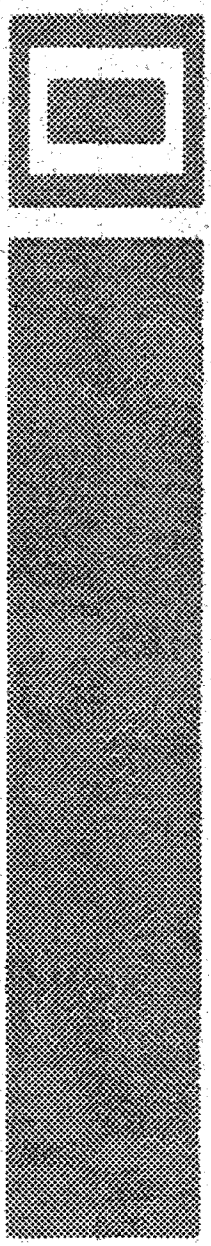
TESTIMONY OF LESTER RANDALL, CHAIRMAN, KICKAPOO TRIBE IN KANSAS, IN SUPPORT OF S. 2154, THE KICKAPOO TRIBE IN KANSAS WATER RIGHTS SETTLEMENT AGREEMENT ACT

COMMITTEE ON INDIAN AFFAIRS UNITED STATES SENATE
JULY 18, 2018

WATERSHED PLAN

and

ENVIRONMENTAL IMPACT STATEMENT



UPPER DELAWARE AND TRIBUTARIES WATERSHED

ATCHISON, BROWN, JACKSON, AND NEMAHA COUNTIES, KANSAS

JANUARY 1994

ADDENDUM

Upper Delaware and Tributaries Watershed
Atchison, Brown, Jackson, and Nemaha Counties, Kansas

This addendum shows annual project costs, benefits, and the benefit-cost ratio based on 8 percent interest, 1993 installation costs, current normalized prices for agricultural commodities, and 1993 current prices for other items.

1. Project costs are $1,268,400

2. Project benefits are $1,527,500

3. The project benefit-cost ratio is 1.20:1

June 1994

WATERSHED PLAN AND

ENVIRONMENTAL IMPACT STATEMENT

UPPER DELAWARE AND TRIBUTARIES WATERSHED

ATCHISON, BROWN, JACKSON AND NEMAHA COUNTIES, KANSAS

ABSTRACT:

This document describes a plan consisting of 20 floodwater retarding dams, 1 multipurpose structure with recreational facilities, 11,000 acres of land treatment, 1,000 acres of riparian and other woodland enhancement, 200 acres of riparian easements, and 16 livestock waste management systems. Alternatives considered during planning include: no-project action, a national economic development alternative, and two resource protection alternatives. Sponsors are responsible for 30.8 percent of the installation costs. Environmental impacts include: reduced sedimentation, reduced flood damages, reduced flood plain scour, decreased terrestrial wildlife habitat, increased aquatic reservoir habitat, decreased stream aquatic habitat, and improved water quality associated with sediment and phosphorus reductions. Sediment and other nonpoint source pollutants delivered to Perry Lake, located approximately 18 miles downstream, will be reduced. Forestland wildlife habitat units lost due to project action will be compensated fully. Approximately 75 percent of the herbaceous habitat units will be compensated.

This Plan/EIS has been prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 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 USC 4321 et seq.).

Prepared by: Nemaha-Brown Watershed Joint District No. 7, Kansas
Kickapoo Tribe of Kansas
Atchison County Conservation District, Kansas
Brown County Conservation District, Kansas
Jackson County Conservation District, Kansas
Nemaha County Conservation District, Kansas
Kansas Department of Wildlife and Parks
Kansas Department of Health and Environment
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Agriculture, Kansas State and Extension Forestry

For additional information contact: James N. Habiger, State Conservationist, Soil Conservation Service, 760 South Broadway, Salina, Kansas 67401. Phone: (913) 823-4565.

WATERSHED AGREEMENT

between the

Nemaha-Brown Watershed Joint District No. 7
Kickapoo Tribe of Kansas
Atchison County Conservation District
Brown County Conservation District
Jackson County Conservation District
Nemaha County Conservation District
Kansas Department of Wildlife and Parks

(referred to herein as sponsors)

State of Kansas
and the
Soil Conservation Service
United States Department of Agriculture

(referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by sponsors for assistance in preparing a plan for resource management systems for the Upper Delaware and Tributaries Watershed, State of Kansas, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); 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 SCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and SCS a plan for resource management systems for the Upper Delaware and Tributaries Watershed, State of Kansas, hereinafter referred to as the watershed plan/environmental impact statement, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The Watershed District and the Tribe will acquire such land rights as will be needed in connection with the works of improvement. The percentages of land rights costs to be paid by the sponsors and the SCS are as follows:

Works of Improvement	Watershed District (percent)	Tribe (percent)	SCS (percent)	Estimated Land Rights Costs (dollars)
17 Floodwater Retarding Dams	100.0	0	0	652,300
3 Floodwater Retarding Dams	0	100.0	0	257,700
Multipurpose Dam No. 21-14	0	98.3	1.7	749,200
Recreational Facilities Dam No. 21-14	0	50.0	50.0	172,200

The sponsors agree that all land acquired or improved with P.L. 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.

2. The Watershed District and the Tribe will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state or tribal law as may be needed in the installation and operation of the works of improvement.

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

4. The percentages of construction costs to be paid by the Watershed District and the Tribe and by SCS are as follows:

Works of Improvement	Watershed District (percent)	Tribe (percent)	SCS (percent)	Estimated Construction Costs (dollars)
17 Floodwater Retarding Dams	0	0	100.0	3,225,500
3 Floodwater Retarding Dams	0	0	100.0	732,000
Multipurpose Dam No. 21-14	0	58.8	41.2	1,022,600
Water Supply Intake System Dam No. 21-14	0	100.0	0	71,400
Recreational Facilities Dam No. 21-14	0	50.0	50.0	660,800

5. The percentages of the engineering services costs to be borne by the Watershed District and the Tribe and SCS are as follows:

Works of Improvement	Watershed District (percent)	Tribe (percent)	SCS (percent)	Estimated Engineering Service Costs a/ (dollars)
17 Floodwater Retarding Dams	0	0	100.0	1,094,500
3 Floodwater Retarding Dams	0	0	100.0	248,700
Multipurpose Dam No. 21-14	0	58.8	41.2	349,600
Water Supply Intake System Dam No. 21-14	0	100.0	0	25,000
Recreational Facilities Dam No. 21-14	0	50.0	50.0	99,000

a/ Construction inspection costs are included and are estimated at $567,500. The sponsors and the SCS will bear the cost of construction inspection that each incurs.

6. The Watershed District will be responsible for the operation, maintenance, and replacement of the floodwater retarding dams including mitigation areas not on the Kickapoo Reservation by actually performing the work or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work.

7. The Tribe will be responsible for the operation, maintenance, and replacement of the floodwater retarding dams on their reservation and the multipurpose dam, reservoir area, recreational facilities, water intake structure, and any mitigation areas by actually performing the work or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work.

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

	Sponsors (percent)	SCS (percent)	Estimated Relocation Payment Costs (dollars)
Relocation Payments	30.8	69.2	0 [a/]

a/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later date, the cost of relocation assistance and payments will be cost shared in accordance with the percentages shown.

9. The conservation districts will obtain agreements from owners of not less than 75 percent of the land above each floodwater retarding and multipurpose dam. These agreements state that the owners will carry out conservation farm or ranch plans on their land and ensure that 75 percent of the land is adequately protected before construction of any dam.

10. The conservation districts will obtain agreements with landowners or operators to operate and maintain land treatment measures for the protection and improvement of the watershed.

11. The conservation districts will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.

12. The Soil Conservation Service will assist the conservation districts in providing technical assistance to landowners or operators to plan and install land treatment practices shown in the plan. Percentages of technical assistance costs to be borne by landowners and SCS are as follows:

Works of Improvement	Others (percent)	SCS (percent)	Estimated Technical Services Costs (dollars)
Conservation Treatment Practices	0	100.0	428,800
Woodland Treatment Practices	20.0	80.0[a/]	140,000

a/ P.L. 566 woodland technical assistance is provided by the Forest Service through Kansas State and Extension Forestry.

13. Cost-sharing rates for the establishment of enduring land treatment practices are a percentage of the average cost of installing enduring practices in the project area.

The cost-share rate to be paid by landowners or operators and by the SCS are as follows:

Practice	Landowners and Operators (percent)	SCS (percent)	Estimated Installation Costs (dollars)
Conservation Treatment Practices	35.0	65.0	1,643,900
Riparian Woodland Practices	35.0	65.0	71,000
Other Woodland Practices	100.0	0	35,000

14. The percentages of implementation costs (including as appropriate, construction, engineering, real property acquisition, administration and overhead) of nonstructural costs to be paid by the sponsors and SCS are as follows:

Nonstructural Works of Improvement	KDWP (percent)	SCS (percent)	Estimated Costs (dollars)
Riparian Woodland Easements	50.0	50.0	40,000

15. The sponsors agree to participate in and comply with applicable federal flood plain management and flood insurance programs before construction starts.

16. The SCS and sponsors will each bear the costs of project administration that each incurs, estimated to be $687,600 and $177,800, respectively.

17. The costs shown in this plan are preliminary estimates. Final costs, to be borne by the parties hereto, will be the actual costs incurred in the installation of works of improvement. Land treatment costs will be based on average annual costs for each practice installed.

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

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

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

21. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

22. The program conducted will be in compliance with the nondiscrimination provisions as contained in Titles VI and VII of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7 CFR 15, Subparts A & B), which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap 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 Department of Agriculture or any agency thereof.

23. Certification regarding drug-free workplace requirements (7CFR 3017, Subpart F)

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the SCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

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

Conviction means a finding of (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the federal or state criminal drug statutes;

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

Employee means the employee of a grantee directly engaged in the performance of work under a grant, including: (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 provide or will continue to provide a drug-free workplace by:

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(2) Establishing an ongoing drug-free awareness program to inform employees about:

(a) The danger of drug abuse in the workplace;
(b) The grantee's policy for 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 the SCS 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.

24. Certification regarding lobbying (7 CFR 3018)

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

(a) No federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, a 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 an 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 pre-requisite 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.

25. 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 or default.

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

Signatures:

NEMAHA-BROWN WATERSHED JOINT DISTRICT NO. 7

By Gale E Miller

Gale E. Miller

905 North Street

Seneca, Kansas 66538

Title President

Address Zip Code

Date May 12, 1994

The signing of this plan was authorized by a resolution of the governing body of the NEMAHA-BROWN WATERSHED JOINT DISTRICT NO. 7.

(sponsor)

adopted at meeting held on May 12, 1994

V Dean Wenger

V. Dean Wenger, Secretary

Powhattan, Kansas 66527

Address Zip Code

Date May 12, 1994

==========

KICKAPOO TRIBE OF KANSAS

By Emery Negonsott

Emery Negonsott

P.O. Box 271

Horton, KS 66439

Title Chairman

Address Zip Code

Date May 12, 1994

The signing of this plan was authorized by a resolution of the governing body of the KICKAPOO TRIBE OF KANSAS

(sponsor)

adopted at meeting held on May 12, 1994

Carol Anske

Carol Anske, Secretary

P.O. Box 271 Horton, KS 66439

Address Zip Code

Date May 12, 1994

==========

ATCHISON COUNTY CONSERVATION DISTRICT

By Steven Banks

Steven Banks

603 Sixth Street

Title Chairman

Effingham, Ks. 66023-4041
Address Zip Code

Date May 2, 1994

The signing of this plan was authorized by a resolution of the governing body of the ATCHISON COUNTY CONSERVATION DISTRICT
(sponsor)

adopted at meeting held on April 4th, 1994, at the USDA

Building at 603 Sixth Street, Effingham, Ks. 66023-4041
Address Zip Code

Date May 2, 1994

Jim Oswald

Jim Oswald
Secretary-Treasurer

BROWN COUNTY CONSERVATION DISTRICT

By

Brad Sommers, Chairman

1310 Oregon
Hiawatha, KS 66434

Title CHRM

Address Zip Code

Date 5/16/94

The signing of this plan was authorized by a resolution of the governing body of the BROWN COUNTY CONSERVATION DISTRICT
(sponsor)

adopted at meeting held on May 16, 1994

Wayne Finger

Wayne Finger, Secretary-Treasurer

1310 Oregon
Hiawatha, KS 66434
Address Zip Code

Date May 16, 1994

JACKSON COUNTY CONSERVATION DISTRICT

By William H Coverdale
William Coverdale

307 Montana
Holton, KS 66436
Address Zip Code

Title Chairman

Date 5/12/94

The signing of this plan was authorized by a resolution of the governing body of the JACKSON COUNTY CONSERVATION DISTRICT (sponsor)

adopted at meeting held on April 14, 1994

Warren Smith
Warren Smith, Secretary/Treasurer

Holton, KS 66436
Address Zip Code

Date 5/12/94

NEMAHA COUNTY CONSERVATION DISTRICT

By Jane Niehues
Jane Niehues

411 North Street
Seneca, KS 66538
Address Zip Code

Title Chairperson

Date 5/18/94

The signing of this plan was authorized by a resolution of the governing body of the NEMAHA COUNTY CONSERVATION DISTRICT (sponsor)

adopted at meeting held on May 18, 1994

Thomas H. Gold
Thomas H. Gold, Secretary/Treasurer

411 North Street
Seneca, KS 66538
Address Zip Code

Date 5/18/94

STATE OF KANSAS
DEPARTMENT OF WILDLIFE AND PARKS

Approved by:

By _____
Theodore D. Ensley

Title Secretary

900 Jackson, Suite 502, Topeka, KS 66612
Address Zip Code

Date May 5, 1994

APPROVED
AS TO FORM

Soil Conservation Service
United States Department of Agriculture

Approved by:

_____
James N. Habiger
State Conservationist

Date 6/13/94

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Appendix C

SUMMARY OF WATERSHED PLAN/ENVIRONMENTAL IMPACT STATEMENT

PROJECT NAME: Upper Delaware and Tributaries Watershed

COUNTIES : Atchison, Brown, Jackson, and Nemaha

STATE : Kansas

SPONSORS : Nemaha-Brown Watershed Joint District No. 7
Kickapoo Tribe of Kansas
Atchison County Conservation District
Brown County Conservation District
Jackson County Conservation District
Nemaha County Conservation District
Kansas Department of Wildlife and Parks

DESCRIPTION OF RECOMMENDED PLAN:

The recommended plan includes 20 floodwater retarding dams, 1 multipurpose dam with recreational facilities, treatment of 11,000 acres of cropland, 1,000 acres of riparian and other woodland enhancement areas, 200 acres of riparian easements, and 16 livestock waste management systems. This plan was formulated for: the reduction of floodwater damages; to meet state water quality criteria, to provide an adequate water supply for the Kickapoo Tribe, and to provide public water-based recreation.

RESOURCE INFORMATION:

Size of Watershed - 177,180 acres

Land Cover

Present Land Use	Total Watershed		100-Year Flood Plain	
	Acres	Percent	Acres	Percent
Cropland	108,240	61	8,380	70
Grassland	43,360	25	350	3
Forestland	14,890	8	2,030	17
Other Land	10,690	6	1,230	10
Total	177,180	100	11,990	100

Land Ownership	Percent
Private	95
Kickapoo Tribe and private Native American	4
Other	1

Number of Farms - 700 Average Size - 240 acres

Number of Minority Farmers - Kickapoo Tribal Unit - 1
Native American - 50
Other Minority - 2

Important Farmland - 68,850 acres prime farmland

Highly Erodible Cropland - 83,000 acres

Wetlands - Wetlands may occur in four areas of the watershed: depressional areas along flood plains, oxbow channels, seeps or springs, and linear stream channels. The project will not affect wetlands in the watershed.

Threatened or Endangered Species - Federally-listed species which may occur in the project area include the bald eagle, Eskimo curlew, least tern, peregrine falcon, piping plover, and the western prairie fringed orchid. State-listed species that occur in the project area are the eastern spotted skunk, snowy plover, and the white-faced ibis.

Cultural Resources - No significant sites have been identified that would be affected by the project.

PROBLEM IDENTIFICATION:

The dominant problems identified in the project area are: rural flooding, water quality impairment, the lack of a dependable water supply, and the lack of adequate water-based recreation. The use of watershed streams for aquatic life and recreation is impaired due to nonpoint source pollution of water quality.

Annual flood damages to the 11,990-acre flood plain are: (1) crop and pasture, $321,200; (2) other agricultural, $51,200; (3) scour, $58,800; and (4) roads and bridges, $53,400.

Nonpoint source (NPS) pollutants impair watershed stream use for aquatic life and contact and non-contact recreation. The NPS pollutants are phosphorus, nitrates, suspended solids (primarily soil), organic matter, and fecal bacteria.

Lack of a dependable water supply causes economic losses on businesses and livestock producers during periods of drought. A lack of dependable water supply hampers the recruitment of businesses and industries with jobs to the reservation. A lack of jobs causes tribal members to leave the reservation and their cultural ties to seek employment.

Recreation studies of northeast Kansas show an unmet demand for water-based recreation. Additional water-based recreational opportunities are being lost due to the sedimentation of Corps of Engineers' Perry Lake.

CANDIDATE PLANS CONSIDERED:

Alternatives considered included: a no-project action plan, National Economic Development (NED) plan, and two resource protection alternatives. The NED alternative was formulated through an incremental analysis. The water quality resource protection alternatives were formulated to meet Kansas water quality standards.

PROJECT PURPOSES:

The project purposes include: flood prevention, improved water quality, water supply development, and water-based recreational development. Two over-riding purposes were the development of a water supply for the Kickapoo Tribe and the reduction of sediment delivered to the Corps of Engineers' Perry Lake, 18 miles downstream from the project area.

PRINCIPAL PROJECT MEASURES:

20	floodwater retarding dams*
1	multipurpose dam with recreational facilities
11,000	acres of conservation land treatment
1,000	acres of riparian and other woodland practices
200	acres of riparian easements
16	livestock waste management systems

* Definition - a detention-type structure that includes flood control, grade stabilization, and sediment storage.

PROJECT COSTS:

	P.L. 83-566 Cost		Other Funds		Total	
	$	%	$	%	$	%
Land Treatment Measures						
Conservation Treatment Systems	1,114,500	64	635,400	36	1,749,900	100
Technical Assistance	540,800	95	28,000	5	568,800	100
Riparian Easements	20,000	50	20,000	50	40,000	100
Structural Measures						
Flood and Erosion	4,360,400	78	1,205,200	22	5,565,600	100
Recreation	446,800	50	448,300	50	895,100	100
Water Supply	0	0	1,083,000	100	1,083,000	100
Technical Assistance	1,536,600	85	280,200	15	1,816,800	100
Project Administration	687,600	79	177,800	21	865,400	100
Total	8,706,700	69	3,877,900	31	12,584,600	100

PROJECT BENEFITS IN DOLLARS:[a/]

Item	Value	Percent
Flood and Erosion Reduction	666,500	44.6
Water Conservation	109,900	7.4
Water Quality	33,900	2.3
Recreation	179,800	12.0
Water Supply	197,600	13.2
Off-Project Flood	60,600	4.1
Off-Project Stream Fishery	44,400	3.0
Off-Project Sediment	200,800	13.4
Total	1,493,500 [b/]	100.0

a/ Price base 1991
b/ Off-project benefits amount to 20.5 percent or $305,800

IMPACTS:

Land Use Changes - Less than 1 percent of the watershed land use will change due to project action

Riparian woodland enhancement will convert 60 acres of flood plain cropland to forestland

Floodwater Retarding Dams -

Land Use	Acres	Changed to			
		Crop	Grass	Forest	Water
Cropland	403				403
Flood Plain Crop	60			60	
Grassland	439		219[a/]		220
Forestland	498				498
Water	--				
Total	1,400		219	60	1,121

a/ Dam and spillway areas seeded to a native grass mixture and managed for wildlife

ENVIRONMENTAL VALUES CHANGED OR LOST:

Wildlife Habitat - Affected by the multipurpose dam and floodwater retarding dams

	Loss Before Compensation	Compensation	Net Loss
Forestland (HU)*	3,100	3,100	0
Herbaceous (HU)	2,900	2,200	- 700

* Habitat units equal the rated quality value (variable 1 to 10) multiplied by acres

Aquatic Habitat - 18.6 miles of intermittent stream and 13.7 miles of perennial stream amounting to approximately 300 aquatic habitat units will be destroyed. Created will be 1,120 acres of reservoir or approximately 2,000 aquatic habitat units. Aquatic habitat in the remaining streams will be improved for largemouth bass, channel catfish, and green sunfish and reduced for bullhead, carp, and drum.

Wetlands - No change. The project will not affect wetlands in the watershed.

Cultural Resources - No change - The project will not affect the cultural resources in the watershed.

Perry Lake (COE) - Sediment delivery to Perry Lake will be reduced, extending the life of the structure ten years. The lake's use for water-based recreation, such as boating and fishing, will be extended. The project will also reduce the delivery of other nonpoint source pollutants to the lake which will improve current uses, such as recreation and water supply.

MAJOR CONCLUSIONS:

The proposed plan meets the sponsors' objectives for flood protection, water supply, recreation, and water quality. The project will cause minimal adverse environmental impact and result in many positive environmental impacts.

AREAS OF CONTROVERSY:

While final resolution has not been made regarding general wetland determination criteria, the wetland impacts of the project were made based on the best information available.

ISSUES TO BE RESOLVED:

None

INTRODUCTION

The watershed plan and environmental impact statement have been combined into a single document describing plan formulation and expected environmental impacts and is the basis for authorizing federal assistance for implementation.

The USDA Soil Conservation Service (SCS) and Forest Service (FS), Kansas State and Extension Forestry (KSEF), Kansas State Conservation Commission (SCC), Kansas Department of Wildlife and Parks (KDWP), Kansas Department of Health and Environment (KDHE), and the Bureau of Indian Affairs (BIA) assisted the local sponsors in developing the plan. Other federal, state, and local agencies also assisted by providing information, reviewing data, and helping with assessments.

The plan was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 566 (83d Cong., 68 Stat. 666), as amended (16 USC 1001-1008), and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, as amended (42 USC 4321 et seq.). The Soil Conservation Service is responsible for compliance with the National Environmental Policy Act.

The project sponsors have requested assistance through the P.L. 566 Program to enable a coordinated project approach to solve problems in the watershed and downstream. A joint organization between the watershed district and the Kickapoo Tribe was established to address the common objectives of the two groups through a watershed project.

PROJECT SETTING

LOCATION - SIZE

The Upper Delaware and Tributaries Watershed includes 177,180 acres in Nemaha, Brown, Jackson, and Atchison Counties in northeast Kansas. The upper reaches of the Delaware River originate near Sabetha, Kansas, and flow southeast toward Muscotah, Kansas.* Three main tributaries begin in southeastern Nemaha County and flow southeast merging into the Delaware River in Brown and Jackson Counties. From Muscotah, the river flows downstream approximately 18 miles to Perry Lake, a Corps of Engineers' reservoir used for flood prevention, recreation, water supply, and fish and wildlife. The Upper Delaware and Tributaries Watershed makes up twenty-five percent of Perry Lake's drainage area. See Appendix B, page B-3, for Delaware River Basin map. Perry Lake outlets four miles upstream of the confluence of the Delaware River and the Kansas River between Topeka and Lawrence.

PHYSICAL CHARACTERISTICS

Topography and Drainage

Upper Delaware and Tributaries streams are deeply incised due to erosion caused by channel straightening by private owners in the past. Twenty-one percent of the stream length has perennial flow, 16 percent intermittent, and 63 percent ephemeral. The watershed is a part of the Kansas-Lower Republican subbasin within the Kansas Basin. Its United States Geologic Survey Hydrologic Unit Code Number is 10270103. The elevation at the top is 1,370 feet and at the mouth 940 feet for a total relief of 430 feet in 43 miles including stream channel meander.

The flood plain of the watershed ranges from 1/8 to 3/4 mile wide. The upland is rolling and sharply dissected with deeply entrenched drainage systems.

Geology and Soils

The watershed is in the Nebraska and Kansas Loess-Drift Hills major land resource area and the Dissected Till Plains physiographic province. Bedrock is composed of limestone and shale of Pennsylvanian and Permian age. Little bedrock is exposed at the surface. Bedrock exposures occur along the steep slopes adjacent to stream channels. Most of the bedrock

* All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigations by the Soil Conservation Service and the Forest Service, U.S. Department of Agriculture.

is covered by glacial till and loess. The most recent material is composed of alluvium and terrace deposits of clay, silt, sand, and gravel along the river plain. No significant mineral deposits exist in the watershed.

Soils are derived predominantly from loess and glacial materials. Grundy, Wymore, and Pawnee; all having a silty clay surface texture; are the major upland soils. Minor soils include Sogn, Shelby, and Burchard. Flood plain soils consist of Judson, Wabash, and Kennebec and are derived from alluvial and terrace materials.

Land Use

The present land use of the watershed is shown in Table A. Land use is not anticipated to change significantly (± 1 percent) in the future without project conditions.

Table A - Present Land Use

Land Use	Upland		Flood Plain		Total	
	Acres	Percent	Acres	Percent	Acres	Percent
Cropland	99,500	60	8,380	70	108,240	61
Grassland	43,370	26	350	3	43,360	25
Forestland	12,860	8	2,030	17	14,890	8
Streams/Ponds	1,310	1	1,050	9	2,360	1
Miscellaneous	6,560	4	180	1	6,740	4
Gullies	1,590	1	--	--	1,590	1
Total	165,190	100	11,990	100	177,180	100

The 1985 and 1990 Federal Farm Bills will affect land use decisions. Approximately 14,400 acres of cropland have been established to "permanent" vegetation under the Conservation Reserve Program (CRP). About 40 percent of the CRP acres are estimated to be cultivated after ten years. Under "future without" project conditions, only 2,500 acres will be converted to permanent vegetation. Most of those acres will be on land with slopes of 11 percent or greater. The potential for existing grassland or forestland being converted to other land uses is reduced by sodbuster/swampbuster regulations.

Precipitation and Runoff

Average annual precipitation for Sabetha is 36 inches with extremes ranging from 15 to 50 inches. A large portion of the precipitation occurs as high intensity, short duration thunderstorms. Seventy-five percent of the precipitation normally falls between April and October during the 178-day average growing season. Average annual runoff is 8 inches.

Economy and Sociology

The economy of the watershed and surrounding area is based primarily on agricultural production. Agri-business and local markets support crop production. Sabetha, population 2,500; Fairview, population 320; and Powhattan, population 140, are located in the watershed. Muscotah, Whiting, Netawaka, Wetmore, and Goff are towns with populations of less than 300, each located just outside the watershed.

About 700 farms averaging 240 acres in size occupy the watershed. Of these, nearly 80 percent are cooperators with the local conservation districts. Land values are approximately $500 per acre for upland cropland and $375 per acre for upland pastureland. Flood plain land averages $1,140 for cropland and grassland.

Cash crop production; cattle, swine, and sheep feeding; and dairying are major enterprises in the watershed. Corn, milo, soybeans, and wheat are the principal cultivated crops. Gross value of annual crop production is estimated at $230 per acre. Much of the pastureland is smooth brome grass. Some truck farming is being attempted.

Transportation routes include U.S. Highways 36 and 75, Kansas Highway 20, plus many county and secondary roads.

The Kickapoo Nation

The Kickapoo Nation in Kansas, hereafter referred to as the Tribe, is centered on a reservation in the southeast part of the watershed. The Kickapoo constitutional boundaries are based upon the 1854 Treaty between the Tribe and the U.S. Government which include about 40 percent of the watershed. Land currently in Tribal and individual Indian ownership comprises about 37 percent of the allotted portion of the reservation, a 6 by 5 mile area of 19,200 acres, most of which is held in Trust by the U.S. Government.

An individual allotment may have as many as 200 owners. The numerous ownerships are the result of inheritance of the land for several generations. Owners are often absentee and sometimes cannot be located. This land is managed in trust by the Bureau of Indian Affairs (BIA). Most of the allotted land is leased to non-Indian farmers.

The land owned by the Tribe was farmed by the Tribe for several years. Currently they are crop-share renting their cultivated land. All pasture, hay, and CRP lands are operated by the Tribe. They have a cow/calf operation and a feeding operation. Since the early 1980's, the Tribe has been active in installing land treatment practices and in the use of the Conservation Reserve Program to protect their farmland. Land

treatment practices such as terraces and waterways have been built by the Tribal construction team.

Approximately 500 of the Tribe's 1,400 members reside on the reservation. This group is young, with a median age of 20.5, and characterized by low income, high unemployment, low educational attainment, and major health and social problems. The Reservation has been designated as an "economically disadvantaged area" by the United States Commerce Department. 3/**

In the late 1970's the Tribe initiated comprehensive planning. Studies and plans developed included: Land Use Plan, 1975; Water Use Study, 1976; Industrial Development Plan, August 1976; Water Resource Investigation, 1976; and Tribal Water System/Engineering Study, 1979. The studies indicated that the key to the Tribe's advancement is the development of industry to supply jobs; and the key to industrial development is a dependable water supply.

Since 1975 the Tribe has developed several residential communities, a water treatment and distribution system, and has attracted several minor businesses. They also have established their own school system, kindergarten through high school. The Tribe's main goal now is the development of a dependable water supply for increased and sustainable industrial, domestic, and recreational uses.

** Numbers appearing in the text correspond to the numbers listed in Selected References.

PROBLEMS AND OPPORTUNITIES

The dominant problems identified in the project area are: rural flooding, water quality impairment, the lack of a dependable water supply, and the lack of water-based recreation.

Flooding damages on cropland acres affect the average annual income of the community. Flooding caused by high intensity thunderstorms increases production costs and reduces income. The variability of income among the farm operators affects the economic stability of the rural community. A project goal is to reduce this economic variability by reducing flooding potential.

The use of streams and water bodies in the area is affected by poor water quality conditions caused by nonpoint source pollutants. NPS pollutants change the natural fauna, increase the hazard to public health, reduce aesthetic values, and reduce the quality of life.

The lack of an adequately dependable water supply has limited the economic and cultural growth of the area, particularly the Kickapoo Tribe. The opportunity exists to improve the quality and dependability of the rural water supply of the Kickapoo Tribe and surrounding communities.

Water-based recreation is lacking in the area. Recreational opportunities are being lost at Perry Lake due to sedimentation.

FLOODWATER DAMAGE

Approximately seven percent of the watershed (11,990 acres) is subject to flooding. The flood plain includes 8,380 acres of cropland. Flooding is normally frequent and of short duration. Out-of-bank flow occurs on the average two to three times per year for a duration of six to twelve hours at a time.

Floodwater damages crops by washing them out, covering them with sediment, and/or affecting their normal growth pattern. Early season floods often cause fields to be retilled and replanted. Yields of replanted crops are often reduced due to a shortened growing season.

Flooding causes damage to fences, farm roads, and machinery. Even minor floods damage or destroy many miles of fence. Feed bunks, hog pens, and stock tanks are frequently damaged by high water flow. Considerable expense is incurred by landowners in cleaning up debris and making repairs after floods. Other direct damages include a loss of income to

agricultural service businesses such as trucking, repair shops, and elevators.

An estimated 12 miles of roads and 42 bridges are subject to damage by floods. Floods wash away road surfacing, scour road shoulders, silt in roadside ditches, and damage bridges structurally.

Floods of longer duration cause the inconvenience of closing farm-to-market roads, school bus routes, rural mail routes, and emergency vehicle access to rural residences and Tribal living communities.

The project map (Appendix D) shows the sub-area locations.

Table B - Average Annual Flood Damages by Subarea

Subarea	100-year Flood Plain (acres)	Dollars a/				
		Crop and Pasture	Other Agri.	Road	Scour and Sediment	Total
I	3,320	48,100	12,700	1,400	17,400	79,600
II	1,480	46,800	9,300	4,800	5,200	66,100
III	2,360	62,800	10,000	5,300	9,900	88,000
IV	4,830	163,500	19,200	41,900	26,300	250,900
Off Project	6,700	207,300	16,400	16,100	56,600	296,400
Total	18,690	528,500	67,600	69,500	115,400	781,000

a/ Price base 1991 and 1991 current normalized prices for crop and pasture.

Table C - Flood Damages by Flood Frequency

Type	2-year	10-year	50-year	100-year
Agricultural				
Crop and Pasture				
Total Damages ($)	354,500	1,248,300	1,900,000	2,020,500 a/
Flooded (ac.)	(4,900)	(14,700)	(17,900)	(18,890) a/
Other (farms, fences, etc.)				
Total Damages ($)	51,400	162,300	249,500	285,900
Subtotal Damages ($)	405,900	1,410,600	2,149,500	2,306,400
Roads, Bridges, and Utilities				
Total damages ($)	46,200	162,000	271,600	326,500
Scour				
Total Damages ($)	70,900	268,500	362,800	399,200
TOTAL ALL DAMAGES ($)	523,000	1,841,100	2,783,900	3,032,100

a/ Total flood plain of 18,890 acres includes crop and pasture land, 13,750 acres; woodland, 3,200 acres; stream channel, 1,660 acres; and miscellaneous land, 280 acres.

Crop and pasture, other agricultural property, road and bridge, and flood plain scour damages are estimated to continue in the *"future without project action"* alternative. Installation of land treatment practices at the on-going rate will reduce flood peaks approximately 2 percent.

Flood plain crop yields reflect application of existing technology. Crop yield potential will likely increase due to changes in technology.

WATER QUALITY IMPAIRMENTS

Surface Water

Using data from long-term monitoring at Muscotah station near the watershed outlet, the Kansas Department of Health and Environment reported impairment of the Delaware River's use for aquatic life support and both contact and non-contact recreation. 7/ Water quality of the streams in the watershed is impaired by total suspended solids (sediment), phosphorus, nitrate-nitrogen, and fecal coliform bacteria.

Water quality data for streams throughout the watershed indicate that the pollutants identified at the Muscotah monitoring site originate throughout the watershed from nonpoint sources. One exception is Webster Creek. Substantial portions of nitrogen, phosphorus, and fecal bacteria in that creek can be attributed to the city of Sabetha's wastewater discharge. All watershed sites monitored show at least a moderate impairment to aquatic life support.

Aquatic life support criteria are exceeded by total suspended solids, total phosphorus, and fecal coliform count concentrations by almost three times. The fecal coliform bacteria standard for recreational use is exceeded more than 25 percent of the time. While pesticides are occasionally detected, concentrations normally do not exceed water quality criteria. No impairment of water use is caused by pesticides.

Total suspended solids (TSS) are generally sediment being transported by the stream. Sediment comes from the erosion of soil. Table D shows the relationship of erosion to sediment delivered. Sheet and rill erosion and ephemeral erosion of unterraced cropland is the source of 65 percent of the sediment. Gully erosion normally occurring on grasslands and woodlands is a source of 23 percent of the sediment. Stream bank and flood scour, while having a high delivery rate, is a small source of sediment due to its small proportion of total erosion.

Table D - Present Erosion - Sedimentation

Source	Erosion Tons/Year	Erosion Percent	Yield a/ Tons/Year	Yield a/ Percent
Sheet and Rill	809,900	68	142,100	32
Ephemeral	198,100	17	145,500	33
Gully	120,900	10	102,300	23
Stream Bank	33,500	3	31,800	7
Scour	22,900	2	20,500	5
Total	1,185,300	100	442,200	100

a/ Sediment yield on the Delaware River near Muscotah

Phosphorus and nitrogen are commonly associated with fertilizers used on cropland, livestock waste, and public or private sewage treatment discharge. Phosphorus commonly adsorbs to soil particles and is carried away by erosion. Nitrogen is highly soluble. During rainfall, available nitrogen dissolves into solution and is washed away in runoff.

Where a system of soil conservation practices has been applied, soil erosion and phosphorus losses are reduced proportionately. The reduction of soil loss has a lesser effect on the loss of nitrogen. Conservation practices do slow runoff, allowing the absorption of nitrogen into the soil profile and reducing its loss into surface waters.

Nitrogen and phosphorus concentrations associated with livestock waste generally occur where a large amount of livestock waste is in close proximity to a stream. Phosphorus is usually washed into the stream attached to soil or manure. Nitrogen is washed from soil and manure into the stream in solution.

Fecal bacteria concentrations are also associated with livestock waste. Approximately 136 potential livestock operations were documented in the watershed by KDHE. Cattle (cow-calf and stocker cattle), dairy, and swine were the common types of livestock. Some of the operations confined livestock to a two to three acre area year round. Other operations were free range pasture with access to stream or wintering areas where livestock were concentrated for two to three months in riparian woodlands along streams.

A majority of these operations were considered to have a low or moderate potential to pollute streams. The pollution potential of these areas can be reduced by management or the construction of diversions to divert runoff away from streams. Sixteen livestock operations were thought to have a high

potential to pollute streams. These areas would require relocation and/or construction of systems to contain all runoff.

Pesticides: While no stream use impairment has been caused by pesticides, pesticides have been detected. Higher concentrations of pesticides are more likely to occur during spring and summer runoff events.

Groundwater

In many instances the use of groundwater for public drinking water is impaired. Most of the exceedences cause only aesthetic problems which result from naturally high mineralization of groundwater in the glaciated region. Nitrate contamination is a problem in approximately one third of the wells in the watershed area. Most of the contaminated wells are shallow, older wells within farmstead areas rather than deep aquifers used by municipalities or farmstead wells drilled in recent years. Likely sources of nitrates are: livestock or human waste disposal, hay or silage storage, and fertilizer handling and storage. Poor quality or improper construction of farmstead wells increases the potential for pollution to occur.

The overall quality of groundwater in the area is not expected to change in the future. In many cases, conditions of farmstead wells could be improved by individual landowner actions.

Perry Lake

Downstream from the Muscotah monitoring station the use of Perry Lake is impaired by nutrient enrichment and pesticides. High concentrations of chlorophyll-a and total phosphorus increase the risk of an algae bloom. If a algae bloom were to occur, it would cause a temporary reduction in the lake's use for recreation and create a distaste in public drinking water.

The pesticide Atrazine has been detected in the reservoir. Natural settlement or conventional public treatment systems cannot remove significant amounts of the pesticide from drinking supplies. There is little doubt that both the lake's enrichment and pesticide contamination come from agricultural nonpoint pollution sources throughout the lake's watershed.

Sediment and fecal bacteria delivered to the lake from its watershed does not cause water quality problems. The natural cleansing action of the lower reaches of the river and the upper part of the reservoir reduces the concentrations

of these nonpoint pollutants in the lake. However, large deposits of sediment have caused the closing of recreational facilities due to the loss of access to the lake.

WATER SUPPLY

Lack of an adequate water supply for the Kickapoo Tribe:

The Kickapoo Tribe's water supply system serves tribal living communities and rural residences within the 30 square mile reservation.

The Kickapoo Tribe built a low-water dam on the Delaware River in 1976 to provide a source of water. The volume of storage above this dam has since been reduced by siltation. The quality of raw water deteriorates when stream flow over the low-water dam stops. At their present rate of usage, a nine-day supply of treated water exists in storage in an underground tank and two standpipes. To determine the adequacy of the tribe's supply of water, a low-flow analysis was done on the river using the Muscotah stream gage. Seven days of no flow, likely to occur every five years, would have them processing poor quality water to maintain fire protection. Fifteen days of little or no flow, likely to occur every five years, would have them using poor quality water without fire protection.

During the droughts of 1989 and 1991, the Tribe's water supply was reduced to emergency situations. The use of water by businesses and residences was limited. The watering of livestock was restricted. Water to the Kickapoo Nation School (K-12) was cut off. Contingency plans to obtain water from Horton (also in short supply) were prepared. Water was pumped from isolated pools in the stream bed to the pool at the Tribe's water intake inlet.

The development of a dependable water supply would eliminate economic losses due to water restrictions on businesses and livestock producers. The risk of fire damage due a marginal water supply would be eliminated. The closing of schools due to a lack of water would not occur. The overall stress on people would be reduced.

The potential of water use restrictions and limited fire protection does not allow the Tribe to attract industry that will employ their members. A dependable water supply would increase the likelihood of the recruitment of new industries and jobs. The lack of jobs has been the reason that many Tribal members have moved away from the reservation. Separation from Tribal community increases the chance of a Tribal member losing cultural identity.

Under present conditions the Tribe is dependant on surrounding communities for water during drought. With a

dependable water supply, the Tribe would be a source of water to other communities during drought.

RECREATION

High Demand for Water-Based Recreational Opportunities:

Community lakes have been the source of the area's water based recreation. Built in the 1930's, city lakes of Horton, Sabetha, and Hiawatha and state lakes in Brown and Nemaha counties have served much of their useful life span. Sediment has filled the lakes, reducing boating and fishing opportunities, as well as reducing aesthetic uses of picnicking, family outings, and sightseeing.

In 1985 the State Comprehensive Outdoor Recreation Plan reported a need for an additional 8,000 acres of surface water in a northeast Kansas eight county area. An SCS analysis of recreational facility needs for the area surrounding Brown county was done in 1987. This analysis showed a need for approximately 120,000 user days of water-based recreation. Needed activities included fishing, picnicking, boating, and camping.

New community lakes were planned or recently constructed near the towns of Holton, Sabetha, and Centralia to provide agricultural and municipal water and recreational opportunities. The likelihood of other multipurpose lakes being built is low.

If a lake was located in the project area, most of the users would be expected to come from the towns of Hiawatha, Horton, and the living communities of the Kickapoo Tribe. If the lake were accessible and visible from one of the federal highways crossing the project area, recreational users would be drawn from a greater distance.

A source of recreation at an extended distance is Perry Lake. The Lake was constructed by the Corps of Engineers (COE) in the late 1960's and includes flood control, water supply, recreation, and fish and wildlife purposes. Recreational users of the lake are drawn from a large population base which includes Kansas City, Topeka, and Lawrence. The COE and State of Kansas each developed basic water-based facilities around the lake.

Perry Lake is a major recipient of sediment from the Upper Delaware and Tributaries Watershed. Sediment accumulations in the upper end of the lake caused the closing of two camping areas and boat ramps. These areas are now open for primitive day use only. Rest rooms, trash pick up, and most services have been discontinued. Photos in Appendix B, page B-1, show advancement of a silt bar around recreational areas and into the reservoir. An analysis of the lake

concludes that the lake will continue to decline in the number of recreational visitors days as sediment replaces permanent water. By the year 2070, the planned 100-year life of the lake, recreational use will be limited. Water for water skiing and fishing will be replaced by sediment. The usefulness of this lake could be extended if the amount of sediment entering the lake could be reduced.

The Delaware River has 54.7 mainstream miles and 112.7 tributary miles of stream capable of providing a stream fishery.8/ Tributary fishermen gain access from roads and bridges or receive permission from private owners to fish streams and pools. Many stream fishermen fish the mainstream by boating upstream from Perry Lake.

The fishery potential of the river system has been severely affected by nonpoint source pollution. Fish species collected from watershed streams are relatively tolerant of low dissolved oxygen and high turbidity and are of low sport fishery value. The Kansas Department of Wildlife and Parks has forecast that common fish species would change and fisherman/angler days would significantly increase if the streams met state water quality standards.

INVENTORY OF RESOURCES

SCOPING OF CONCERNS

Scoping of concerns has been a continuing process during project planning. The original concerns were noted in the Nemaha-Brown Watershed District's application for PL-566 assistance and their general plan. Actions to obtain the concerns of the public are documented in the Public Participation Section. Concerns of governmental agencies were made known during on-going planning and through direct written requests.

The watershed district's general plan and solutions formulated by neighboring water resource projects with similar problems were used as an early indicator of potential alternatives. A system of floodwater retarding dams, land treatment systems, and a multipurpose water supply lake was considered a likely solution. The impacts of this alternative on environmental, economic, and social factors were considered early in planning to determine the significance to decision making and to design the environmental evaluation. These concerns are listed on Table E. As interdisciplinary, multi-agency planning evolved, additional alternatives were evaluated in relation to the list of concerns.

Assessment findings show that alternatives would have no significant impact on minimum stream flow, prime agricultural land, and mineral supplies. Therefore, these factors will not be discussed in the impacts section although some basic data concerning these factors have been collected in order to verify the magnitude of impacts.

Factors with a high or medium potential to be impacted, by project action were used to scope, formulate plan alternatives, and compare impacts of the plan alternatives.

Several factors, estimated to have low potential to be impacted by project action, were considered to be of significance to be considered during planning. These included: cultural resources, wetlands, and threatened and endangered species.

EROSION AND SEDIMENTATION

The watershed is in one of the most highly erodible areas of the state. Approximately 1,185,000 tons of soil are displaced annually through erosion. This results in an annual sediment yield of 442,000 tons to the Delaware River at the outlet of the watershed.

Table E - Resources and Problems Significant to Decision Making

Natural Resources, Problems, and Concerns	Significance to Decision Making a/	Estimated Project Impact a/	Remarks
Flooding	H	H	*Sponsor priority
Gully Erosion	H	H	
Sheet and Rill Erosion	H	H	
Sedimentation	H	H	
Water Supply	H	H	Kickapoo Tribe, small towns
Wetlands	H	L	
Surface Water Quality (other than sediment)	H	H	Project area is in a "State Pesticide Management Area"
Perry Lake	H	H	Protection from NPS pollution
Kickapoo Tribe	H	H	Tribal economic well being and cultural integrity
Minority Groups (other than Kickapoo Tribe)	L	L	
Threatened and Endangered Species	H	L	
Wildlife Habitat	M	M	
Fisheries Habitat	M	M	
Road and Bridge Maintenance	M	H	
Human Health and Safety	M	M	
Cultural Resources	M	L	No identified concerns
Water-Based Recreation	M	H	
Agricultural Income	M	M	Affected by flooding
Ground Water Quality	M	L	Nitrates are naturally occurring
Prime Farmland	L	L	
Relocation of Families	L	N	None
Visual Resources	L	L	
Minimum Stream Flow	L	L	

a/ H - High, M - Medium, L - Low, N - None

Sheet and rill erosion makes up 68 percent of total erosion. It reduces crop yields and increases production costs. This type of erosion carries away fertilizers, pesticides, and seed causing a reduction in annual yield and income potential. In an attempt to sustain production levels on eroding crop fields, farm operators tend to increase fertilization rates. Sheet and rill erosion and other erosion-related problems vary in severity according to soil types and slopes. Analysis shows that about 43,000 acres or 44 percent of the upland cropland are presently eroding at rates which reduce the productive capacity and quality of the soil. Average annual rates of sheet and rill erosion on untreated cropland range from 5.2 to 41.0 tons per acre.

In the future 21,600 acres of cropland will continue to decline, eroding at a rate exceeding tolerable soil loss amounts. Infiltration rates will decrease thereby reducing available water and potential crop yields.

Ephemeral gullies on cultivated land account for 17 percent of the watershed erosion. Ephemeral gully areas void 0.4 percent of untreated cropland acreage annually resulting in loss of production. Several times a year farmers fill these voids with soil from adjacent areas using normal tillage tools. Loss of top soil from these adjacent acres causes a reduction in crop yield due to a loss of productive potential. The voided and adjacent acres are 8 percent of the untreated cropland acres.

Classical gullies account for approximately 10 percent of the erosion in the watershed. Agricultural land lost to gully erosion is permanently removed from production. Gullies also destroy field crossings, hindering access to crop and pasture fields. Some of the conservation practices installed to reduce sheet and rill erosion have been rendered ineffective by the advancing gullies. Uncontrolled gullies also increase the delivery efficiency of nonpoint source pollutants to streams.

In addition to the agricultural land concerns, eroding gullies constantly threaten the public transportation system. Bridges are subject to gully erosion damage. The design and construction of all stream crossings reflect extra cost required to protect the system from gully erosion. Concrete aprons and/or rock riprap are generally needed at the downstream ends to retard undercutting of the culverts. Routinely, rock and earth fill must be hauled in to replace that which has been eroded away.

Streambank erosion is occurring at slight to moderate rates on approximately 30 percent of the nearly 600 miles of stream channel in the watershed. These channels erode at a current rate of over 33,000 tons per year, voiding three acres of new channel annually.

Streambank erosion will be reduced slightly in the future due to the construction of on-going land treatment systems and small floodwater/grade stabilization structures. A 2 percent reduction of this type of erosion is expected to occur.

Scouring by floodwater affects 25 percent of the cropland on the flood plain. Scouring erosion makes up 2 percent of the total erosion in the watershed. This sediment is deposited on other areas of the flood plain or is carried down stream. On-going land treatment and the construction of small farm ponds will have little effect in reducing flood plain scour damage in the future.

The Delaware River and Perry Lake are the major recipients of off-site damages caused by the deposit of sediment. Road ditches and farm ponds are also affected. The water supply of the Kickapoo Reservation is also affected by sediment.

WILDLIFE HABITAT

Terrestrial: Subareas I and II in the northern part of the watershed are 70 percent cropland. Small areas of forestland herbaceous vegetation provide the main source of permanent wildlife habitat in these subareas. Subareas III and IV in the south and southwest portions of the watershed offer more potential for habitat diversity with 55 percent cropland, 35 percent grassland, and 10 percent woodland. These subareas also contain a large amount of cropland converted to native vegetation under the ten-year Conservation Reserve Program (CRP). CRP areas provide improved upland habitat.

Cropland accounts for 70 percent of the flood plain land use and provides limited wildlife habitat value. Some of the riparian woodland areas have been destroyed by landowners clearing and straightening stream channels.

Wildlife species commonly found where suitable habitat is available are: opossum, eastern cottontail rabbit, fox squirrel, gray squirrel, beaver, muskrat, coyote, raccoon, skunk, white-tailed deer, bobwhite quail, meadowlark, cardinal, red-tailed hawk, yellow-shafted flicker, ornate box turtle, red-sided garter snake, and western chorus frog.

The quantity and quality of wildlife habitat will improve initially due to the Conservation Reserve Program. Over a 50-year period there will be no significant change in land use or terrestrial habitat.

Aquatic: Water quality criteria for aquatic life support are commonly exceeded. Problems with turbidity,

nitrates, coliforms, and pesticides are noted in the water quality section. Species most commonly expected to be found in the streams of this area would be the red shiner, sand shiner, creek chub, bluntnose minnow, fathead minnow, suckermouth minnow, stoneroller, white sucker, black bullhead, green sunfish, orangespotted sunfish, and orangethroat darter. Within the larger streams, common carp and channel catfish would be expected. 4/

With the high delivery rates of sediments, nutrients, and pesticides from upland fields to streams; aquatic habitat is expected to degrade slightly. Species diversity, being less than desirable already, will not change significantly.

THREATENED OR ENDANGERED SPECIES

Nationally threatened or endangered species that may occur in the watershed include the bald eagle, Eskimo curlew, least tern, peregrine falcon, piping plover, and the western prairie fringed orchid. In addition to these species, three state-listed may occur within the watershed. The state-listed species are the eastern spotted skunk, snowy plover, and white faced ibis. 1/ 2/

HISTORICAL-CULTURAL RESOURCES

The Kansas State Historical Society reported that there are no properties within the watershed which are listed in the National Register of Historic Places. Phase I and Phase II reviews were done by the State Historical Society noting the watershed project as shown in the watershed district's general plan would not affect any known historical, architectural, or archeological sites. 10/ Detailed archeological surveys of all floodwater retarding structure and the multi-purpose site will be performed during detailed geologic investigations.

WETLANDS

Wetlands could potentially occur in four areas: depressional areas along flood plains, oxbow channels, seeps or springs, and linear stream channels.

Depressional Areas Along Flood Plains: Individual depressional areas are irregular in shape and range from ten acres to several hundred acres in size. Calco, Wabash, and Zook soils typically occur at these locations. Permeability as well as surface runoff is very slow on these soils. Normal depression depths are under four inches. Unless depressional areas have been mechanically drained, these areas are readily filled by normal rainfall. It then takes several days of

evaporation to return the areas to prior conditions. A seasonal high water table is within a depth of one foot.

Using definitions in the 1987 Food Security Act Manual, wetlands in cropland fields were inventoried by the Soil Conservation Service. Approximately 3,400 acres of this type were found in the project area. Additional depressional areas are likely to occur within grassland or forestland uses.

Oxbow Channels: Random straightening of stream channels has created a number of oxbow channels. Where possible, landowners cleared oxbows of forestland vegetation and filled them in order to raise commodity crops. Existing oxbow channels normally receive surface runoff from ephemeral or intermittent streams. A few oxbows retain a permanent pool of water year round. These two conditions prevent cultivation. During periods of high rainfall and uniform storm distribution conditions, oxbows are filled before main stream out-of-bank flows occur.

Seeps or Springs: Small seeps or springs may occur on upland side slopes where the loess soils contact glacial till soils or where bedrock occurs close to the surface. Normally these wetland areas remain in native vegetation and retain hydrology.

Linear Stream Channels: Approximately 420 acres of stream channels may be linear wetlands. Typically, these areas occur in channels within the Kennebec soil map unit. "Wetness" is supplied by surface runoff and/or ground water base flow.

FORESTLAND

There are approximately 15,000 acres of forest/woodland in the watershed. This includes 9,500 acres of the commercial quality forest which contains marketable quantities of such timber species as ash, black walnut, cottonwood, silver maple, hackberry, bur oak, and red oak. An additional 5,500 acres of non-commercial forest, woodland strips, and hedgerows exist. Currently few of these woodlands are under any type of management.

Narrow bands of trees partially border stream channels. Sixty-seven percent of the corridor has woodland cover on both banks, 27 percent has woodland on one bank, and 7 percent has no woodland cover. Even where some cover is present, it is sometimes confined to a narrow band of one or two rows of trees. An estimated 600 acres of riparian zone are in need of tree planting to re-establish or reinforce forest buffers within 66 feet of the stream.

Over-grazing is a concern on about 11 percent of the riparian forest acres. Heavy grazing leads to lack of forest reproduction, inadequate ground cover, and soil compaction. These conditions diminish the forestland's ability to filter nonpoint source pollutants, provide long-term erosion control, provide significant wildlife habitat, and to maintain sustained production of timber resources.

Four hundred acres of riparian woodland are in need of improvement through interplanting new trees to increase and/or improve stocking or through timber stand improvement practices.

An inventory of other woodlands in the watershed found approximately 2,500 additional woodland acres outside of the riparian zone needing treatment. Over-grazing, poor woodland reproduction, inadequate ground cover, and soil compaction were common problems.

No significant change in forestland condition is forecast for the future without project action.

FORMULATION AND COMPARISON OF ALTERNATIVES

FORMULATION PROCESS

The Principles and Guidelines for Water and Related Land Resource Implementation Studies were used to formulate alternatives which would meet local sponsor objectives. The alternative that reasonably maximizes net national economic development benefits is referred to as "NED." An NED plan shall increase the value of the nation's output of economic goods and services or improve economic efficiency. This is to be done in such a way as to protect the nation's environment, either by conserving or preserving the non-monetary aspects of man's surroundings such as: cultural resources, ecological systems, or natural resource qualities. The selection of an alternative plan other than the NED plan would require an exception be granted by the Secretary of Agriculture.

The sponsors objectives are to solve four main resource problems: rural flood damage, impaired use of surface water quality, a lack of a dependable water supply, and a lack of water-based recreational facilities.

The watershed district, who initiated the request for assistance, has the main priority of reduction of floodwater damages. A co-sponsor, the Kickapoo Tribe, supports this need for flood damage reduction and requests that one of the sites be developed to provide an adequate water supply. The watershed district's original general plan specified control of storm runoff from approximately 54 percent of the watershed by PL-566 floodwater retarding dams for an estimated reduction of flood damages of 50-60 percent.

A supporting goal of local sponsors is the development of water-based recreational facilities to meet local need.

The watershed district and the tribe also have the goal of improving the water quality of the streams in the project area. The Kansas Department of Health and Environment set recommended nonpoint source pollutant reduction goals for the mouth of the watershed.

A strong local commitment was also voiced for the protection of Perry Lake from sedimentation.

Individual practices and systems of practices were evaluated as to how they would affect flood damages and water quality. Various water quality alternatives were considered. Examples were: (1) conversion of cultivated land to permanent vegetation, (2) treatment of sheet and rill and ephemeral erosion, (3) treatment of gullies with grade stabilization land treatment systems, (4) use of dams as

Table F - Measures[a/] to Satisfy Problem and Opportunities

Problems and Opportunities	Floodwater Retarding Dams	Conversion of Flood Plain Cropland to Riparian Vegetation	Treatment of Upland Cropland with Resource Management Systems	Multi-purpose Structure
TO INCREASE AGRICULTURAL INCOME:				
Reduce soil loss on cropland eroding at an amount greater than "T"	N	N	+	N
Stabilize gullies that restrict use and treatment	+	N	+	+
Maintenance of existing erosion control practices	+	N	+	+
Reduce flood damages to cropland	+	N	N	+
Reduce "other agricultural" flood damages (fences, machinery, etc.)	+	N	N	+
Reduce flood damages to roads and bridges	+	N	N	+
TO INCREASE WATER SUPPLY:				
Provide 1.6 mgd water supply (98 percent surety)	N	N	N	+
TO ENHANCE ENVIRONMENTAL VALUES:				
Improve stream aquatic habitat	+	+	+	+
Improve wildlife habitat	-	+	+	-
Increase habitat diversity	N	+	+	N
Protect woody riparian habitat	-	+	N	-
Reduce sediment yield	+	+	+	+
Reduce scour of flood plain	+	+	N	+
Reduce erosion in forestland	N	+	N	N
Reduce soil loss on upland cropland	N	N	+	N
Stabilize gullies	+	N	+	+
Maintain erosion control practices	+	N	+	+

a/ See narrative for definition of each measures

(+) favorable impact (N) no impact or negligible impact (-) adverse impact

sediment traps, (5) establishment of riparian woodland areas along streams, and (6) various combinations of the above.

Public participation and social acceptance levels prohibit any of those systems from being installed 100 percent voluntarily. Participation rate for land treatment of cropland is expected to be approximately 90 percent, treatment of gully erosion is expected to be accepted at a 60 percent rate. With a strong public educational effort, acceptance of the re-establishment of cultivated areas to permanent riparian woodland areas is expected to be around 10 percent. Other riparian woodland enhancement practices such as timber stand improvement and reinforcement plantings will have an acceptance rate of between 20 and 50 percent.

A non-structural alternative with the conversion of all cropland on the 100-year flood plain to permanent vegetation and the raising of roads and bridges above flood levels was considered. Average annual income from the converted area would be reduced approximately $230 per acre or $1.9 million for the project. The cost of elevating roads and bridges on the flood plain would be approximately $7.4 million or an average cost of $624,000 for 50 years. Such an alternative was found not to be socially or economically acceptable.

Water supply alternatives considered were: a reservoir on the Kickapoo Reservation, piping water from the Missouri River, piping water from Perry Lake, development of ground water sources and piping water to the Reservation, and buying water from adjoining water users. The construction of a water supply on the Reservation was found to be feasible and the most cost effective.

Treatment alternatives for flood damage reduction and water quality improvement in the project area were found to also address the sponsor emphasis on protecting Perry Lake outside of the project area.

COMPARISON OF ALTERNATIVES

Alternative 1 (No project action) - consists of continuing the present conservation program without project action for the next 50 years. The going conservation program and compliance to the 1985 and 1990 Farm Bill requirements will treat 21,350 acres of cropland in that period. Some HEL cropland acres will remain untreated. The watershed district will continue to construct state-funded dams controlling about twelve square miles of drainage area. Flood damage will be reduced on the upper branches of the tributaries to a minor extent. Damage reduction on the main tributaries and off project on the Delaware River will not be significant.

The Kickapoo Tribe will continue using the pool behind a low-head dam as their main source of water. Economic development of the Tribe will remain limited by lack of a dependable water supply.

Perry Lake will continue to lose storage capacity due to sedimentation. Recreational opportunities will be reduced.

Alternative 2 - Floodwater retarding dams (FRD) were found to be the most efficient practice to reduce flood damage. This alternative includes 14 FRDs and 1 multi-purpose dam including water supply and recreational facilities. Land treatment practices used to reduce sheet and rill and ephemeral erosion on 4,600 acres were added as protection of the FRDs. It was found to be more efficient to control erosion on the field than to build that increment of sediment storage at the FRD. A maximum of 90 percent landowner participation rate was used with a minimum of 75 percent required before a FRD can be built.

Costs: Total project costs - $9,498,400; PL-566 share - $6,182,900; other $3,315,500; average annual cost - $888,600; operation, maintenance, and replacement cost - $89,800.

Effects: Average annual flood damages in the watershed would be reduced by about 42 percent or $204,100 and average annual flood damages downstream from the project area would be reduced by 18 percent or $53,900. Nonpoint source pollutants would be reduced by: sediment, 67 percent; phosphorus, 60 percent; nitrates, 25 percent; and organic matter fecal bacteria, 40 percent. The probability of this alternative to meet water quality goals is low.

Improved water quality would account for a stream fishery average annual benefit of $39,800.

The average annual benefits of this alternative are estimated to be $1,120,800 and the estimated annual costs are $888,600. The net annual benefit therefore is estimated to be $232,200.

Alternative 3 - Alternative 2 does not meet the sponsors' goals for flood damage reduction or the state's NPS pollutant reduction goals. Alternative 3 was formulated to increase the levels of flood damage reduction and NPS pollution control.

Alternative 2 was used as a first increment of this alternative. Six additional floodwater retarding dams and 6,400 acres of land treatment systems were added to reduce flood damages and to reduce concentrations of sediment and nutrients in the streams. Land treatment levels on cropland would be 90 percent. Grade stabilization land treatment

systems would be installed to treat gully erosion to a 60 percent level. Sixteen confined livestock areas would be treated with waste management systems in order to reduce fecal bacteria and phosphorus concentrations. Riparian woodland enhancement measures, including protection and management of existing riparian forest areas and reinforcement or re-establishment in inadequate areas, were added to reduce sediment and nutrient concentrations and to control erosion along stream banks.

Costs: Total project costs - $12,584,600; PL-566 share - $8,706,700; other $3,877,900; average annual cost - $1,197,600, operation, maintenance, and replacement cost - $139,200.

Effects: Average annual flood damages in the watershed would be reduced by about 51 percent or $246,500 and average annual flood damages downstream from the project area would be reduced by 20 percent or $60,600. Nonpoint source pollutants would be reduced by sediment, 70 percent; phosphorus, 65 percent; nitrates, 30 percent; and fecal bacteria, 60 percent. The probability of this alternative to meet water quality goals is moderately high.

Improved water quality would provide for an average annual stream fishery value of $44,400.

The average annual benefits of this alternative are estimated to be $1,493,500 and the estimated annual costs are $1,197,600. The net annual benefit therefore is estimated to be $295,900. This alternative is the National Economic Development (NED) alternative.

Alternative 4 - Alternative 4 was formulated in an effort to increase the likelihood of meeting the state's NPS pollutant reduction goals. Alternative 3 was used as a first increment of this alternative. Ten small floodwater retarding dams were added to reduce concentrations of sediment and phosphorus in the streams.

Costs: Total project costs - $14,928,200; PL-566 share - $10,911,700; other $4,016,500; average annual cost - $1,400,500, operation, maintenance, and replacement cost - $145,000.

Effects: Average annual flood damages in the watershed would be reduced by about 59 percent or $285,600 and average annual flood damages downstream from the project area would be reduced by 23 percent or $67,400. Nonpoint source pollutants would be reduced by sediment, 75 percent; phosphorus, 70 percent; nitrates, 30 percent; and organic matter fecal bacteria, 60 percent. The probability of this alternative to meet water quality goals is high.

Improved water quality would provide for an average annual stream fishery value of $44,400.

The average annual benefits of this alternative are estimated to be $1,539,400 and the estimated annual costs are $1,400,500. The net annual benefit therefore is estimated to be $138,900.

PROJECT INTERACTION

The total project area is part of a State-Designated Pesticide Management area. A number of federal and state agencies are cooperating to reduce the impact of Atrazine and other pesticides in the area. All alternatives would have a positive impact except the no action alternative. Ranked in order of most positive effect to least: Alternative (4), Alternative (3), and Alternative (2).

The development of a state nonpoint source (NPS) pollution management control plan for the basin area is under consideration. Successful installation of the NED or WQ alternatives may influence similar actions in other parts of the basin.

RISK AND UNCERTAINTY

Water quality benefits to streams and sediment reduction benefits to Perry Lake are based on the installation of a complete plan. Installation of only a partial plan may significantly decrease total benefits.

Sponsors have actively communicated with landowners directly affected by construction of floodwater retarding dams and the multipurpose structure and feel assured of social acceptance. Along with public participation rates estimated on other planned measures, the risk and uncertainty of less than a complete plan is minimal.

Water quality inventory, analysis, and forecast methods are in the infancy stage. Planning of water quality was done by using the best information available as agreed upon by a consensus of multi-agency water resource planners. An interdisciplinary, multi-agency technical group was formed to guide the initial planning. The group consisted of the EPA, KDHE, KDWP, and the SCS. Additional agencies were asked to participate as advisors. Water quality planning progress was regularly reviewed at watershed district board meetings and special public meetings. Methodologies have been reviewed for technical reasonableness with the SCS Midwest National Technical Center. Methods used and data gathered have been agreed upon as being the best available at the time of

decision making. It is expected that others would learn from these processes and the installation of the project, allowing for a refinement of concepts and methodologies.

RATIONALE FOR PLAN SELECTION

Four alternatives were considered including "no project action." Summaries and comparisons of the effects of each alternative are shown in Table G. Alternative 1 was not selected because it did not address the problems. Alternatives 2, 3, and 4 all contain a multipurpose reservoir which meet sponsor water supply and water-based recreational facility needs. Alternative 2 was not selected because of the low level of flood damage reduction and the low probability of the State's water quality standards being met. Elements added to Alternatives 3 and 4 increased the probability of meeting the State's water quality standards as well as reducing annual flood damages. Both Alternatives 3 and 4 were complete, effective, and socially acceptable. Comparing the cost of installation versus the probability of meeting the State's water quality standards between Alternatives 3 and 4, Alternative 3 is more efficient. Sponsors selected Alternative 3 as their recommended plan.

Alternative 3 is the National Economic Development alternative. Alternative 3 meets all tests of the *Principles and Guidelines* while maximizing ecological, cultural, and social benefits in accordance with national policy. Alternative 3 also extends the life expectancy and public use of a federal reservoir. Alternative 3 has a benefit:cost ratio of 1.25:1.

Table G - Summary and Comparison of Candidate Plans

Effects	Alternative 1 Future Without Project	Alternative 2	Alternative 3	Alternative 4
MEASURES				
Multipurpose Sites (no.)	--	1	1	1
Floodwater Retarding Dams (no.)	--	14	20	30
Conservation Treatment Systems (acres)	--	4,600	11,000	11,000
Riparian and Other Woodland Enhancement (acres)	--	--	1,000	1,000
Riparian Easements	--	--	200	200
Livestock Waste Management Systems	--	--	16	16
PROJECT INVESTMENT				
Construction Cost	--	5,408,300	7,502,200	9,186,400
Engineering Cost	--	1,562,300	2,385,600	2,710,100
Project Administration Cost	--	779,700	865,400	1,081,700
Land Rights	--	1,748,100	1,831,400	1,950,000
Total Installation Cost	--	9,498,400	12,584,600	14,928,200
NATIONAL ECONOMIC DEVELOPMENT				
Adverse, Annual ($)	--	888,600	1,197,600	1,400,500
Beneficial, Annual ($)	--	1,120,800	1,493,500	1,539,400
Net Beneficial ($)	--	232,200	295,900	138,900
B:C Ratio	--	1.26:1	1.25:1	1.10:1
Recreational Visitor Days				
Stream (angler days)	28,000	35,400	36,200	37,200
Multipurpose Lake (days)	--	23,000	23,000	23,000
Incidental (angler days)	--	6,400	7,200	7,300
Perry Lake				
Life of Recreation Development Water Quality	Declining Impaired	Extended Improvement	Extended Improvement	Extended Improvement

Table G - Summary and Comparison of Candidate Plans, Continued

Effects	Alternative 1 Future Without Project	Alternative 2	Alternative 3	Alternative 4
NATIONAL ECONOMIC DEVELOPMENT, continued				
FLOODING - ZERO DAMAGE FREQUENCIES REACH LOCATION OUTLETS	Time(s)/Year(s)	Time(s)/year(s)	Time(s)/Year(s)	Time(s)/Year(s)
DELAWARE RIVER				
1 NE 1/4 SEC 5 - T6S - R17E	1/2	1/5	1/6	1/7
2 NW 1/4 SEC 23 - T5S - R16E	1/4	1/10	1/12	1/16
MUDDY CREEK				
3 NE 1/4 SEC 9 - T5S - R16E	1/10	1/31	1/44	1/50
4 SW 1/4 SEC 12 - T5S - R15E	2/3	2/5	1/3	2/7
WOLFLEY CREEK				
5 NE 1/4 SEC 8 - T5S - R15E	1/1	4/5	2/3	1/2
6 NW 1/4 SEC 35 - T4S - R14E	4/3	1/1	1/1	4/5
8 NW 1/4 SEC 21 - T4S - R14E	3/1	2/1	2/1	2/1
MUDDY CREEK				
11 NE 1/4 SEC 8 - T5S - R15E	1/1	1/1	4/5	4/5
12 SE 1/4 SEC 13 - T4S - R14E	1/2	1/4	1/4	1/7
13 NE 1/4 SEC 3 - T4S - R14E	1/1	2/3	2/3	3/5
DELAWARE RIVER				
18 SW 1/4 SEC 3 - T5S - R16E	1/7	1/33	1/50	1/70
GREGG CREEK				
16 NE 1/4 SEC 30 - T4S - R16E	1/2	1/4	1/4	1/5
17 SE 1/4 SEC 23 - T4S - R15E	2/1	1/1	1/1	1/1
22 NE 1/4 SEC 7 - T4S - R15E	3/1	3/2	3/2	3/2
28 NE 1/4 SEC 14 - T3S - R14E	4/3	2/3	2/5	2/5
DELAWARE RIVER				
23 NW 1/4 SEC 18 - T4S - R16E	2/1	3/2	3/2	4/3
26 SE 1/4 SEC 23 - T3S - R15E	4/5	2/3	1/2	2/5
27 SW 1/4 SEC 10 - T3S - R15E	1/3	1/5	1/5	1/6
FLOODING - PEAK REDUCTION REACH LOCATION	Percent	Percent	Percent	Percent
DELAWARE RIVER				
1 NE 1/4 SEC 5 - T6S - R17E	0	29	33	38
2 NW 1/4 SEC 23 - T5S - R16E	0	29	33	38
MUDDY CREEK				
3 NE 1/4 SEC 9 - T5S - R16E	0	21	26	33
4 SW 1/4 SEC 12 - T5S - R15E	0	22	29	35
WOLFLEY CREEK				
5 NE 1/4 SEC 8 - T5S - R15E	0	25	33	39
6 NW 1/4 SEC 35 - T4S - R14E	0	29	35	42
8 NW 1/4 SEC 21 - T4S - R14E	0	28	28	38
MUDDY CREEK				
11 NE 1/4 SEC 8 - T5S - R15E	0	26	31	38
12 SE 1/4 SEC 13 - T4S - R14E	0	31	31	40
13 NE 1/4 SEC 3 - T4S - R14E	0	27	27	40
DELAWARE RIVER				
18 SW 1/4 SEC 3 - T5S - R16E	0	35	40	44
GREGG CREEK				
16 NE 1/4 SEC 30 - T4S - R16E	0	42	45	45
17 SE 1/4 SEC 23 - T4S - R15E	0	28	28	32
22 NE 1/4 SEC 7 - T4S - R15E	0	23	35	35
28 NE 1/4 SEC 14 - T3S - R14E	0	49	56	59
DELAWARE RIVER				
23 NW 1/4 SEC 18 - T4S - R16E	0	14	27	35
26 SE 1/4 SEC 23 - T3S - R15E	0	11	26	32
27 SW 1/4 SEC 10 - T3S - R15E	0	28	28	35

a/ Average reduction for storms ranging from 1.5 inches to 7.4 inches of rainfall in 24 hours

Table G - Summary and Comparison of Candidate Plans, Continued

Effects	Alternative 1 Future Without Project	Alternative 2	Alternative 3	Alternative 4
NATIONAL ECONOMIC DEVELOPMENT, continued				
PERCENT REDUCTION IN AVERAGE ANNUAL FLOOD DAMAGES				
	Percent	Percent	Percent	Percent
Reach				
1	0	55	65	71
2	0	59	70	76
3	0	47	61	70
4	0	38	50	59
5	0	33	45	53
6	0	36	41	51
7	0	70	70	70
8	0	31	31	40
11	0	36	43	53
12	0	60	60	72
13	0	50	51	71
16	0	68	68	72
17	0	42	42	47
18	0	69	78	85
21	0	54	54	54
22	0	42	53	54
23	0	16	39	50
26	0	22	41	52
27	0	63	63	76
28	0	72	78	80
Watershed	0	42	51	59
ENVIRONMENTAL QUALITY				
WATER QUALITY				
Tons of Sediment Delivered to Delaware River at Muscotah	301,000	136,000	129,000	118,000
Livestock Problem Areas Treated	0	0	136	136
NPS POLLUTION				
PERCENT REDUCTION FROM PRESENT CONDITIONS AT WATERSHED OUTLET				
Pollutant:	Percent Goal	Percent	Percent	Percent	Percent
Sediment	70	30	67	70	75
Phosphorus	70	30	60	65	70
Nitrates	17	20	25	30	30
Fecal Bacteria	60	20	40	60	60
Probability of Meeting State Water Quality Standards		None	Low	Moderately High	High

Table G - Summary and Comparison of Candidate Plans, Continued

Effects	Alternative 1 Future Without Project	Alternative 2	Alternative 3	Alternative 4
ENVIRONMENTAL QUALITY, continued				
OTHER ENVIRONMENTAL CONDITIONS				
Total Stream Length (miles)	619.0	593.5	590.0	590.0
Stream Length Inundated (miles)	--	25.5	32.3	37.0
Surface Water Created (acres)	--	1,098	1,185	1,260
Prime Farm Land Inundated by FR Reservoirs				
Total Prime Land (acres)	68,850	68,080	68,020	67,990
Lost to FR Dams (acres)	--	440	500	550
Lost to MP Dam (acres)	--	330	330	330
Total Lost (acres)	0	770	830	880
(percent)	0	1.1	1.2	1.3
Riparian Buffer Created-Enhanced (miles)	--	--	7.5	7.5
Wildlife Habitat Units				
Herbaceous	151,600	150,900	150,900	150,900
Habitat Units Lost	--	- 2,600	- 2,900	- 3,000*
Habitat Units Mitigated	--	+ 1,900	+ 2,200	+ 2,300*
Net Herbaceous HU Change	0	- 700	- 700	- 700
Forestland	98,300	98,300	98,300	98,300
Habitat Units Lost	--	- 2,900	- 3,100	- 3,300*
Habitat Units Mitigated	--	+ 2,900	+ 3,100	+ 3,300*
Net Forestland HU Change	0	0	0	0
Wetland (acres)	No impact - Hydrology for wetness is due to surface runoff from adjacent areas, not to out-of-bank flooding.			
OTHER SOCIAL EFFECTS				
INFRASTRUCTURE EFFECTS				
Roads Flooded by "Out-of-Bank" Flows (miles)	7.0	5.0	4.5	4.0
Roads Flooded by FRD's (not including MP) (miles)				
Permanently	--	0.3	0.3	0.3
Temporarily	--	1.8	1.8	1.8
Roads Closed and/or Relocation due to MP Dam No. 21-14 Reservoir (miles)	--	2.2	2.2	2.2

* Habitat units lost and mitigated for this alternative are estimated

Table G - Summary and Comparison of Candidate Plans, Continued

Effects	Alternative 1 Future Without Project	Alternative 2	Alternative 3	Alternative 4
OTHER SOCIAL EFFECTS, continued				
COMMUNITY HEALTH	No change	Slight reduction in fecal bacteria	Fecal bacteria levels reduced in streams -- less potential for human or animal disease	Same as Alternative 3
KICKAPOO TRIBE				
Flooding	No effect	A reduction in flood damages to Tribal cropland and other agricultural flood damages. A reduction of flooding of Reservation roads. Reduced maintenance of roads and bridges. Increased safety.		
Water Quality	No effect	A reduction of sediment, nutrients, fecal coliform, and pesticide concentrations in the streams. Less chance of public health problems due to poor water quality. Less water treatment expense for Tribal water supply system.		
Water Supply	Inadequate Supply	Creation of a dependable water supply (98 percent surety). Increased standard of living potential. Increased ability for Tribal and individual economic development.		
Cultural Impacts	No Change	Increase in "on-reservation" Jobs and increase in cultural identity		
CULTURAL RESOURCES	No resources identified	None known Potential for unknown cultural resources to be identified during cooperative KSHS/SCS study during detailed site investigations or during construction.		
ALTERNATIVE FORMULATION TESTS				
Completeness	No	No	Yes	Yes
Efficiency	No	Yes	Yes	No
Effectiveness	No	No	Yes	Yes
Acceptability	No	Yes	Yes	Yes

CONSULTATION AND PUBLIC PARTICIPATION

Interested people attended a public meeting to consider watershed problems in December 1955. A steering committee to direct efforts for the formation of a watershed district was selected in January 1956. Petitions were found sufficient by the Secretary of State and Division of Water Resources, Board of Agriculture, to formally incorporate the Nemaha-Brown Watershed Joint District No. 7 on January 21, 1958.

A request for planning assistance under the Watershed Protection and Flood Prevention Act (PL 566) was made to the State in 1958. The Kansas Watershed Review Committee declined to act on the application because the district's boundary on the south was formed on political boundaries rather than natural hydrologic boundaries. An effort to correct the boundary was initiated in early 1960 and finalized in 1975. A second application for planning assistance under PL 566 was filed in October of 1975. A field review of the watershed district was held in November 1975 by the State Watershed Field Examination Team and a public hearing was held in Wetmore. A field examination report was prepared summarizing the team's findings and recommendations. The watershed feasibility rating was accepted by the State Conservation Commission (SCC). The State Watershed Review Committee accepted the application for PL-566 planning and assigned a feasibility rating to the watershed.

A general plan was developed by the watershed district under the authority of the Kansas Watershed District Act, Section 24-1201-33, in 1978.

In 1983 the Kickapoo Tribe of Kansas was recognized as a co-sponsor of the PL-566 application. The Nemaha-Brown--Kickapoo Tribe Joint Watershed Board was formed. The joint board received funding from the Bureau of Indian Affairs (BIA) for the initiation of water resource planning in 1984.

The joint board held a public meeting in conjunction with a public barbecue in an effort to determine the public's continued interest in watershed planning. Concerns and problems to be considered during planning were gathered from the public and local, state, and federal agencies.

The PL-566 application was given priority for planning by the State of Kansas in December 1984. Soil Conservation Service watershed planning assistance began in 1985 as part of the authorized Northeast Kansas River Basin Study.

Land users were interviewed individually and in small groups to determine flood and erosion damages.

In 1988 a water quality study was initiated by the KDHE and the SCS. SCS, KDHE, watershed board members, and Tribe

personnel participated in collecting water quality samples. The preliminary report on conditions of surface and ground waters in the watershed was released by KDHE to the watershed sponsors and cooperating agencies in January 1990. 7/

The Kansas Department of Wildlife and Parks released a report in March 1990 on the effects of nonpoint source pollutants on aquatic habitat of the upper tributaries of the Delaware River. 8/

Kansas State and Extension Forestry (KSEF) released a report in May 1989 on forestry and woodland resource concerns in the watershed area. 9/

Watershed hydrology and the initial feasibility of dams proposed in the watershed district's general plan were reviewed by the SCS at a meeting of the joint watershed district--Kickapoo Tribe in October 1989. A second proposal of dam sites was developed by the watershed district and presented at a public meeting in February 1990.

Finding of project feasibility in an SCS pre-authorization report was reviewed at two public meetings in February 1991. The public was invited to attend the meeting through newspaper and radio releases. The Kickapoo Tribe provided a free lunch to those attending. The areas to be affected by Multipurpose Dam No. 21-14 were noted in a video enhanced slide presentation.

In April 1991, SCS reviewed expected flood damage reductions of a potential alternative plan at a public meeting.

In 1985 the State Historical Society completed a literature search to determine the presence of archeological and historical sites in the watershed. A field inventory of the watershed was done in May 1991. 10/

USDA authorized PL-566 planning in May 1991. The people of northeast Kansas were notified by radio and newspaper releases. Comments on important problems and concerns to be considered were requested from the sponsors, public, and other agencies at that time.

During July 1991, with a joint contract, the Kickapoo Tribe and SCS cooperated in the preliminary geological investigation of Multipurpose Dam No. 21-14.

Upon request, the Fish and Wildlife Service (FWS) and the KDWP cited federal and state threatened and endangered species commonly found in the watershed in July 1991. 1/ 2/

In August 1991, a public water quality information meeting was held in Powhattan. KDHE, KDWP and SCS reviewed

water quality conditions, NPS pollutant reduction goals, benefits of improved water quality, and several alternative methods of treatment.

In October 1991, proposed structure sites were investigated by a tri-agency team comprised of biologists from FWS, KDWP, and SCS. Wildlife habitat units lost due to planned construction were determined and compensation recommendations were suggested. 4/

During the fall of 1991, the KDWP, KSEF, and the SCS worked to define the role of riparian woodlands in water quality protection. These agencies worked together to determine present conditions, treatment needs, and economic cost and benefits. The SCS worked with the Brown, Jackson, and Nemaha County Conservation Districts to determine local feasibility and public participation. In April 1992, the three agencies met with representatives from the Brown and Nemaha County Conservation Districts, Glacial Hills RC&D Council, Nemaha-Brown Watershed District, and the State Conservation Commission to determine a riparian woodland improvement element for this plan.

Since formal incorporation of the Nemaha-Brown Watershed District the board has carried out a continuing program to inform and involve the general public. Frequent person-to-person contacts have been ongoing to help explain the project and to ask for input into the planning needs and processes. Quarterly or on-call meetings open to the public have been held. Annual meetings are advertised in advance in the principal county newspapers.

List of agencies, conservation groups, and organizations to whom copies of the draft plan were sent for comment:

Federal:

- Department of Agriculture
  - Agricultural Stabilization and Conservation Service
  - Farmers Home Administration
  - Forest Service
  - Office of Equal Opportunity
- Department of Army
  - Chief of Engineers
  - District Engineer
- Department of Commerce
  - Ecology and Conservation Division
  - River Forecast Center
- Department of Health and Human Services
  - Indian Health Service
- Department of Housing and Urban Development

Federal, continued
- Department of the Interior
  - Bureau of Indian Affairs
  - Bureau of Mines
  - Bureau of Reclamation
  - Fish and Wildlife Service
  - Geological Survey
  - National Park Service
  - Office of Environmental Project Review
  - Secretary of the Interior
- Environmental Protection Agency

State:
- Biological Survey
- Department of Health and Environment
- Department of Transportation
- Department of Wildlife and Parks
- Division of Budget
- Governor of Kansas
- Kansas State University
  - Dean of Agriculture
- Kansas Water Office
- State Board of Agriculture
  - Division of Water Resources
  - Secretary
- State and Extension Forestry
- State Conservation Commission
- State Historical Society
- Geological Survey

Other:
- Kansas Chapter Wildlife Society
- Kansas Wildlife Federation, Inc.
- National Audubon Society
- National Wildlife Federation
- Natural Resources Defense Council
- Sierra Club (national level)

Local:
- Conservation Districts
- Watershed District
- Kickapoo Tribe
- Glacial Hills RC&D Council
- Kansas Rural Center
- Kansas Rural Development Council

SELECTED PLAN - ALTERNATIVE 3

WATER QUALITY RESOURCE PROTECTION

PURPOSE AND SUMMARY

The project is planned for the purposes of flood damage reduction, water quality improvement, water supply development, and development of water-based recreation. The selected plan includes 20 floodwater retarding dams, a multipurpose dam with water supply and recreational facilities, conservation land treatment systems, and riparian and other woodland treatment systems. Conservation land treatment includes: resource protection practices, grade stabilization practices, nutrient and pest management, and livestock waste systems.

PLAN ELEMENTS

Floodwater Retarding and Multipurpose Dams: Twenty floodwater retarding dams and a multipurpose dam will be installed as structural measures to reduce flooding, reduce gully erosion, improve water quality, provide an agricultural water supply, and provide a source of water-based recreation. Each dam will have the capacity to store a minimum 25-year runoff event. Larger storms may be safely passed through the emergency spillway.

Each floodwater retarding dam will have a drop-inlet type principal spillway constructed to maintain water at a specific elevation to control grade stabilization problems. Each dam will have a planned fifty-year sediment storage. The multipurpose dam has a planned sediment storage of 100 years. (A typical dam with a drop-inlet principal spillway is shown in Appendix B.)

Conservation Land Treatment Systems: Systems of conservation practices will be installed and applied to cropland fields to reduce the loss of top soil by sheet and rill and ephemeral gully erosion. Practices will include: grassed waterways, gradient terraces, tile outlet terraces, underground tile outlets, diversion terraces, sediment control basins, pasture and hayland planting, and range seeding. Noncost-shared management practices will include: conservation cropping systems, contour farming, pest management, nutrient management, conservation tillage, and crop residue use.

The SCS will provide three man years of agronomy technical assistance for the purpose of accelerating the recommended use of nutrients and pesticides. The agronomist will perform informational and educational activities, such

as field days, demonstrations, and local media releases, as well as working one-on-one with land users to develop individual nutrient and pesticide management plans. The agronomist will encourage the use of practices such as soil fertility testing, manure nutrient testing, calibration of sprayers and applicators, Farm*A*Syst, farmstead well testing, abandoned well plugging, and farmstead management. This person will assist with other plan elements, such as riparian woodland treatment and treatment of confined livestock areas.

Grade stabilization practices will be installed to reduce gully erosion. Practices will often be associated with and protect other conservation land treatment systems. Practices may include: grade stabilization structures, underground tile outlets, water and sediment control basins, and tile outlet diversions.

Systems of livestock waste management practices will be installed to control the washing and eroding away of soil, livestock waste, and fecal bacteria from confined livestock areas into streams. "Foreign" drainages will be diverted from flowing through lots and pens. Lots and pens with perennial or intermittent streams flowing through them will be abandoned or relocated. Practices included in a waste management system may include: diversions, lagoons, vegetated filter strips, waterways, and disposal systems. Noncost-shared items may include proper waste management and cover crops. The cost of construction of new fences and the development of water supply systems needed in the relocation will be cost shared.

Riparian and Other Woodland Treatment Systems:
Approximately 60 acres of cropland or grassland will be converted to riparian woodland. Four hundred thirty-five acres of existing riparian woodland will be reinforced with woodland management practices. Approximately five acres of converted wetlands associated with riparian woodland restoration will be restored. Enhanced or created riparian areas will improve water quality, reduce stream bank erosion, reduce flood scour damage, increase woodland production, and increase terrestrial wildlife habitat.

The Forest Service will provide three man years of forestry technical assistance through Kansas State and Extension Forestry. This will include informational and educational activities as well as providing technical forestry assistance for the riparian woodland enhancement. This person will also provide technical assistance on the other woodland enhancement practices and assist with the rural fire protection elements. Where needed, forestry assistance can be provided on mitigation efforts.

Riparian easements will be purchased on high value stands of existing forestland for the purposes of water

quality protection, flood damage reduction, erosion control, grade stabilization, and wildlife habitat. Easements will be for the forfeiture of the landowners' rights to convert the land use to anything besides forestland. Upon acceptance of terms of the easement by the landowners, SCS, and KDWP, it will be filed with the respective county register of deeds. Riparian easements will be for a minimum of 50 years.

In addition to the riparian woodland efforts, improved protection and management practices will be applied on 500 forest acres outside the riparian zone. Applied practices on these woodlands will help to assure their retention for water quality and erosion protection as well as for wildlife habitat, timber products, and other multiple benefits. Any cost share provided for these practices will come from programs other than PL-566 except for the technical forestry assistance provided by Kansas State and Extension Forestry.

DAM SAFETY

A breach analysis was made for each dam included in this plan to estimate the maximum area downstream that might be flooded if the dam should suddenly fail. Based on this, each dam has been assigned a hazard classification as shown in Table 3. The hazard classification of each dam will be reviewed and revised as necessary prior to its construction.

Multipurpose Dam No. 21-14 and FRD No. 29-23 are classified as (b) medium hazard dams. FRD No. 31-25 is classified as a (c) high hazard dam. Damages from the failure of a class (b) hazard dam would be limited to isolated homes, main highways, minor railroads, or interruption of service of relatively important public utilities. For class (c) hazard dams, loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, main highways, or railroads could occur.

All other floodwater retarding dams are class (a) hazard. Damage due to sudden failure of the dam would be limited to farm buildings, agricultural land, or township and county roads.

Existing buildings in the flood plain have been considered in breach inundation studies. Before anyone develops or builds anywhere on the flood plain shown in yellow on the Project Map (Appendix D), a more detailed determination of potential hazard should be completed.

EFFECTS ON EXISTING PHYSICAL FEATURES

Roads and Utilities: Periodically the flood pools of six floodwater retarding dams will back water over sections

of township roads for short periods of time. These roads are of low use or traffic flow. The watershed district will be required to obtain temporary flooding permits from the townships involved before the construction of the dams. The dams involved are Nos. 15-30, 28-4, 29-23, 20-17, 24-7, and 30-21.

Two dams will permanently flood roads in their sediment pools. These roads will either be closed or elevated and permits obtained to make them usable except in times of temporary flooding. The dams involved include Nos. 20-17 and 24-7.

Multipurpose Structure No. 21-14 will flood roads being operated and maintained by the Kickapoo Tribe. Part of the roads will be relocated in conjunction with recreational development around the reservoir.

Floodwater Retarding Dam No. 28-33 has approximately 3,800 feet of KP&L power line to be removed from the sediment and flood pool. The watershed district will work with the power company to relocate the line.

A buried telephone line is located in the sediment and flood pool of Multipurpose Structure No. 21-14. The Tribe will work with the telephone company to relocate the line before construction of the dam.

MITIGATION FEATURES

The habitat value of woodland areas destroyed by the construction of planned floodwater retarding dams or the multipurpose dam will be mitigated 100 percent. This mitigation will be done by enhancement of existing woodland areas or the establishment of new woodland areas.

The value of the herbaceous habitat lost will be partially mitigated. Herbaceous mitigation actions include: establishment of the dams and spillway areas to mixed native grasses and forbs, and fencing of all dams and spillways to allow for managed grazing.

Woodland mitigation will be done within approximately three miles of a FRD or MP dam proposed by this plan. The cost of financial and technical assistance for mitigation will be paid for at the same rate as the construction cost of the dam causing the loss. The Watershed District and Kickapoo Tribe are responsible for obtaining easements for the operation and maintenance of habitat mitigation areas. During the establishment period, operation and maintenance including weed control, watering, replanting, and fence repairs will be the responsibility of the SCS. Upon certification of establishment, the Watershed District and Kickapoo Tribe will accept responsibility for the operation,

maintenance, and replacement of these areas for the life of the easement.

PERMITS AND COMPLIANCE

It is the sponsors' responsibility to acquire or provide assurance that all permits have been obtained before construction starts. This includes those permits listed in the following paragraphs as well as any others that may be required at the time of construction.

Sponsors will obtain a 404 permit (Section 404 of P.L. 92-500) as required by federal regulations. A permit to construct is required by the State of Kansas for each of the dams in the project. In addition, a National Pollution Discharge Elimination Systems Permit will be required from KDHE.

SCS cultural resource procedures will be followed during installation for practices that may affect such resources. SCS will consult with the State Historic Preservation Officer to mitigate or eliminate adverse effects that may occur to significant cultural resources discovered during construction.

No critical habitats for federal or state listed threatened and endangered species have been identified in the project area. Potential effects on listed species will be reviewed before construction of individual floodwater retarding dams through the State Environmental Coordination process and the Federal 404 Permit process.

The sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to State and Tribal laws as may be needed in the installation and operation of the works of improvement.

COSTS

Total project cost is $12,584,600, of which $3,877,900 will borne by local funds and $8,706,700 by P.L. 566 funds. Cost allocation and sharing is shown in Table 2a. Multipurpose Dam No. 21-14 costs were allocated using the Separable Cost Remaining Benefit Method.

The Kickapoo Tribe will pay for portions of Multipurpose Dam No. 21-14 to store water for an agricultural water supply and recreational uses. The Tribe will pay all cost associated with the agricultural water supply. Cost of recreational facilities will be shared by the government and the Tribe. The Tribe will be responsible for the local cost of land rights for the multipurpose dam. The Tribe will also be responsible for all operation and maintenance associated with the multipurpose dam. The estimated cost

distribution for this structure is shown in the watershed agreement and Table 2a.

Definitions of cost categories:

Structural construction costs are direct costs for installation of structural measures. Construction includes such items as earth embankment, excavation, riprap, reinforced concrete, reinforced concrete pipe, wildlife habitat compensation measures, seeding, and fencing.

Engineering services costs for structural measures include all direct and related costs of surveys, geologic investigations, soil mechanics testing and analysis, designs, plans, specifications, and construction inspection.

Land rights costs are direct and related costs for the right to install, operate, and maintain works of improvement. These costs include land purchases, easements, agreements, permits, and modifications of properties and utilities.

Relocation costs include all payments and services provided according to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Project administrative costs include contract administration, review of engineering plans by others, and relocation assistance advisory services.

FINANCING

Nemaha-Brown Watershed Joint District No. 7 and the Kickapoo Tribe of Kansas have the necessary authority to finance and install their portions of the planned project. This includes the right to accept contributions, levy taxes, make assessments against benefited land, issue bonds, and exercise the right of eminent domain. They have agreed to use these powers as needed and will be financially responsible for excess investigation and design costs resulting from their delay or failure to do so.

Expenses of organizing the Watershed District have been paid and current general expenses are being met by an annual ad valorem tax. Future expenses of the sponsors will be paid from funds on hand, funds to be collected through taxes, or through the issuances of general obligation bonds.

Federal technical assistance, engineering services, project administration, and funds for construction are contingent upon appropriations for these purposes.

Works of improvement will be installed in a 16-year period following authorization of federal assistance under P.L. 566. Table H shows anticipated cost by fiscal year for land treatment and structural measures.

P.L. 566 funds for construction of structural measures will be provided to the Watershed District and the Kickapoo Tribe through project agreements with the SCS. Funds transferred to the sponsors by these agreements are subject to the Office of Management Budget Circular A-102. A project agreement will be prepared for each construction contract.

Prior to making agreements that obligate funds of the SCS, the Watershed District and/or Tribe must certify they have a financial management system for adequate control and accountability for property and other assets purchased with P.L. 566 funds. The Watershed District and Tribe will pay their own contract administration costs.

INSTALLATION

Floodwater Retarding Dams and Multipurpose Structure

The Watershed District will develop, and keep current throughout project installation, a schedule of dam installation. The schedule will identify when each dam is to be installed with particular detail on the current year and following two years. Other dams may be grouped for installation in following years. This schedule will be used to guide land treatment installation and land rights acquisition.

The Watershed District will employ a contracting officer and contract for construction of FRDs not on the Kickapoo Reservation. The Tribe will employ a contracting officer and contract for construction of the multipurpose dam and those FRDs on the reservation. Construction contracts will be awarded on the basis of competitive sealed bidding. Project agreements for construction will begin when land rights have been certified, applicable water rights obtained land treatment certifications are made, habitat mitigation requirements are met, P.L. 566 funds and technical assistance are available, approved drawings and specifications have been developed, and all necessary permits obtained.

The Watershed District will furnish legal services and obtain all land rights needed for installation of floodwater retarding dams not on the reservation. The Tribe will furnish legal services and obtain all land rights needed for installation of the floodwater retarding dams on their reservation and the multipurpose dam. The sponsors will maintain a land rights schedule showing status of land rights

Table H - Distribution of Project Costs by Fiscal Year
(dollars) a/

Year	Conservation Treatment Systems b/			Livestock Waste Management Systems			Riparian Woodland Practices			P.L. 566 Dams			Total		
	P.L. 566	Other	Total	P.L. 566	Other	Total	P.L. 566	Other	Total	P.L. 566	Other	Total	P.L. 566	Other	Total
1	110,600	42,100	152,700	34 000	14,000	48,000	30,000	17,200	47,200	256,100	288,800	544,900	430,700	362,100	792,800
2	110,600	42,100	152,700	34,000	14,000	48,000	30,000	17,200	47,200	256,100	288,800	544,900	430,700	362,100	792,800
3	110,600	42,100	152,700	34,000	14,000	48,000	30,000	17,200	47,200	256,100	288,800	544,900	430,700	362,100	792,800
4	110,600	42,100	152,700	34,000	14,000	48,000	30,000	17,200	47,200	354,600	569,000	923,600	529,200	642,300	1,171,500
5	110,600	42,100	152,700	34,000	14,000	48,000	30,000	17,200	47,200	687,300	859,500	1,546,800	861,900	932,800	1,794,700
6	110,600	42,100	152,700				14,000 c/	11,000 c/	25,000 c/	687,300	859,600	1,546,900	811,900	912,700	1,724,600
7	110,600	42,100	152,700				14,000 c/	11,000 c/	25,000 c/	438,100	4,000	442,100	562,700	57,100	619,800
8	110,600	42,100	152,700							422,400	4,000	426,400	533,000	46,100	579,100
9	110,600	42,100	152,700							432,400	4,000	436,400	543,000	46,100	589,100
10	110,600	42,100	152,700							569,400	4,000	573,400	680,000	46,100	726,100
11	110,600	42,100	152,700							566,900	2,000	568,900	677,500	44,100	721,600
12	110,700	42,300	153,000							384,100	4,000	388,100	494,800	46,300	541,100
13										490,700	4,000	494,700	490,700	4,000	494,700
14										526,800	6,000	532,800	526,800	6,000	532,800
15										382,100	4,000	386,100	382,100	4,000	386,100
16										321,000	4,000	325,000	321,000	4,000	325,000
Total	1,373,400	505,400	1,832,700	170,000	70,000	240,000	178,000	108,000	286,000	7,031,400	3,194,500	10,225,900	8,706,700	3,877,900	12,584,600

a/ Price base 1991
b/ Includes nutrient management
c/ Easements

for each planned dam in the watershed. The sponsors will also make arrangements to abandon, move or modify roads, utilities, and other improvements where necessary.

The need for water and air pollution abatement during construction will be determined on a site-by-site basis. Abatement measures normally include dry stream crossings, temporary vegetative establishment, watering for dust control, and temporary sediment control basins.

Conservation Land Treatment Systems

Participation in the land treatment element of this plan is voluntary. Landowners or operators will make final decisions on land use and practices to be installed.

The ongoing program will be continued in the watershed as it would have been without project action. The county Agricultural Stabilization and Conservation committees will cooperate with conservation districts to accelerate assistance for conservation practices. The Extension Service will assist with the educational phase of the land treatment program.

PL-566 land treatment measures will be applied according to a schedule developed jointly for each county by the conservation districts and the Watershed District. This schedule will meet the goals of the conservation districts and the Watershed District and correlate with the floodwater retarding dam installation schedule.

Problem areas selected for land treatment application acceleration will include logical physical units within the project area. Commitments to carry out planned land treatment measures will be obtained from the operators of not less than 75 percent of the land in the problem area before the first long-term contract is approved for installation.

Long-term contracts will be made between SCS and the landowners or operators during the first five years of project installation. Conservation plans will be a part of each agreement. Long-term contracts will be for at least 3 years and not more than 10 years. Implementation of non-cost-shared practices may be required as a condition for cost sharing when they are necessary to achieve project objectives. All structural cost-shared land treatment will be completed prior to the last two years of the contract.

Participation in the treatment of confined livestock areas is voluntary. The Soil Conservation Service will provide technical assistance to landowners or operators in the design of livestock waste management systems. State and local permits will be the responsibility of the landowners.

The local conservation district will review the plans and assign cost-share priorities.

Systems will be cost-shared through long-term contracts between the SCS and the landowners. Installation of waste management structural measures will be completed in the first three to five years of a contract with an additional five years of operation and maintenance required. A system may be contracted in conjunction with a PL-566 land treatment or riparian area enhancement long-term contract.

Riparian Woodland Treatment Systems

Technical and financial assistance will be made available to encourage landowners to establish new or enhance existing riparian woodland areas. These areas will normally be expected to occur more than three miles away from a planned FRD or MP structure. Technical assistance will be provided through the SCS and Kansas State and Extension Forestry. Installation and establishment costs will be shared through long-term contracts between the SCS and the landowner. Individual practices will be cost shared at a rate of 65 percent of the watershed average cost. Planned practices include: tree planting, critical area planting, fencing, pasture and hayland planting, range seeding, timber stand improvement, and controlled harvesting. Plans will be developed by the forester and landowner and approved by the SCS district conservationist and the conservation district board. Additional assistance may be obtained from other state and local groups.

Approximately five acres of wetland restoration will be done in conjunction with one or more riparian woodland restoration areas. Practices used in restoration of associated wetlands may include: wildlife wetland habitat management, water control structures, and dikes. Practices will be cost shared at the same rate as other riparian area enhancement practices. A wetland restoration plan will be part of a riparian woodland long-term contract. Plans will be developed by the biologist, forester, and landowner and approved by the SCS district conservationist and the conservation district board.

Actions initiating the purchase of riparian easements will begin in approximately the sixth year of project installation. The KDWP will be the lead sponsor on this measure in cooperation with the Watershed District, Tribe, conservation districts, KSEF, SCS, and other sponsors. Applications for the purchase of easements with the amount of cost per acre will be submitted to the county conservation districts. A committee made up of representatives from the watershed district, the conservation district, the district KSEF forester, and the area KDWP biologist will give the application

a priority of high, medium, or low. A committee made up of representatives from the KDWP, KSEF, and the SCS will then use these priorities in ranking applications for funding consideration.

Upon availability of funding, the SCS and KDWP will jointly approve applications up to $40,000. SCS and KDWP will each bear 50 percent of the cost.

OPERATION AND MAINTENANCE

Floodwater Retarding and Multipurpose Dams: Operation and maintenance agreements for the individual floodwater retarding dams and the multipurpose dam will be made with the sponsors before construction. The agreements will provide for the sponsors to operate and maintain project dams and vegetation according to operation and maintenance plans to be developed with SCS technical assistance. Operation and maintenance agreements will be signed before land rights, relocation, or project agreements are signed. They will be based on the SCS National Operations and Maintenance Manual. Emergency action plans will be included where appropriate.

Each dam will be jointly inspected by SCS and the sponsor immediately after initial filling. Thereafter, the sponsor will annually inspect the structure. The inspection team is to: review hazard classification, assess operation and maintenance adequacy, identify unsafe conditions, and specify work needed. A qualified engineer will assist during or immediately following the occurrence of major events, such as floods or earthquakes, and with annual inspections for the first three years. Formal inspections are to be conducted under the leadership of a qualified engineer at least once every five years for all class (b) and (c) dams (see Table 3) and any additional dams reclassified as (b) or (c) dams during the life of the structure.

Items of inspection will be listed in the Plan of Operation and Maintenance and will include, but not be limited to, the principal spillway and its appurtenances, emergency spillway, dam, vegetation on the dam and emergency spillway, and fences installed as part of the project. Record of inspection will be kept by the sponsors. The sponsors will be responsible for access to conduct the inspections.

Maintenance work for structures will be carried out by the sponsors when needed. Kinds of maintenance expected rather frequently are repairs to fences, clearing of debris and weed control, etc. Repairs to major construction items such as dams and spillways are expected very infrequently. The SCS will provide technical assistance.

The sponsors will be responsible for maintaining draw down control valves and passing natural stream flow through all floodwater retarding dams and the multipurpose dam to meet downstream water rights as provided by the Kansas Water Appropriation Act. The sponsors will operate control valves as necessary for pool drainage and dam maintenance.

The multipurpose structure and water supply facilities will be operated and maintained by the Tribe.

Recreational facilities will be operated, maintained, and replaced by the Tribe. Useful life will vary for recreational facilities, but an average period of 20 years has been used to compute replacement costs. Operational expenses include custodial, police, sanitary, safety, and emergency services.

Technical assistance for operation and maintenance of sanitary facilities will be provided by the Kansas Department of Health and Environment as requested. A regular water quality monitoring program will be executed cooperatively by the Tribe and the Kansas Department of Health and Environment.

Table 4 itemizes the estimated annual operation and maintenance cost for the floodwater retarding dams multipurpose dam, water intake structure, recreational facilities, and forestland treatment.

Mitigated Areas: Upon certification of establishment, the sponsors will be responsible for the operation, maintenance, and replacement of these areas for the life of the easement. An annual operation and maintenance inspection of the woodland mitigation areas will be made by the sponsors and a written report provided to the SCS. A joint SCS-sponsor inspection will be done the year establishment is certified, the following year, and every five years thereafter.

Conservation Treatment Systems: Landowners will accept responsibility for the operation, maintenance, and replacement of practices making up treatment systems. Operation and maintenance will be an agreed-to item in the long-term contract.

Riparian Woodland Treatment Areas: Upon certification of establishment, the landowners will accept responsibility for the operation, maintenance, and replacement of these areas. Operation and maintenance will be an agreed-to item in the long-term contracts.

KDWP, or a third party jointly agreed to by the SCS and the KDWP, will be trustee of the riparian easements. The trustee will inspect the easement area as needed to confirm that the terms of the easement are being met.

TABLE 1 - ESTIMATED INSTALLATION COST

Upper Delaware and Tributaries Watershed, Kansas

Installation Cost Item	Unit	No.	Estimated Cost (Dollars) a/		
			P.L. 566 Funds	Other Funds	Total
LAND TREATMENT					
SOIL CONSERVATION SERVICE					
Conservation Treatment Practices	Ac.	11,000 b/	1,068,500	575,400	1,643,900
Riparian Woodland Practices	Ac.	500	46,000	25,000	71,000
Technical Assistance			428,800	0	428,800
SCS SUBTOTAL			1,543,300	600,400	2,143,700
FOREST SERVICE					
Other Woodland Practices	Ac.	500	0	35,000	35,000 c/
Technical Assistance			108,800	27,200	136,000
FS SUBTOTAL			108,800	62,200	171,000
RIPARIAN WOODLAND EASEMENTS					
Riparian Woodland Easements	Ac.	200	20,000	20,000	40,000
Technical Assistance			3,200	800	4,000
RIPARIAN SUBTOTAL			23,200	20,800	44,000
TOTAL LAND TREATMENT			1,675,300	683,400	2,358,900
STRUCTURAL MEASURES					
Floodwater Retarding Dams	No.	20			
Dam Construction			3,957,500	0	3,957,500
Engineering			1,343,200	0	1,343,200
Land Rights			0	910,000	910,000
Project Administration			576,400	40,000	616,400
FRD Subtotal			5,877,100	950,000	6,827,100
Multipurpose Dam	No.	1			
Dam Construction			420,800	673,200	1,094,000
Engineering			143,900	230,700	374,600
Land Rights			12,400	736,800	749,200
Project Administration			61,600	88,200	149,800
MPD Subtotal			638,700	1,728,900	2,367,600
Recreational Facilities	No.	1			
Construction			330,400	330,400	660,800
Engineering			49,500	49,500	99,000
Land Rights			86,100	86,100	172,200
Project Administration			49,600	49,600	99,200
Rec. Fac. Subtotal			515,600	515,600	1,031,200
TOTAL STRUCTURAL MEASURES			7,031,400	3,194,500	10,225,900
TOTAL PROJECT			8,706,700	3,877,900	12,584,600

a/ Price Base 1991
b/ About 5,700 acres treated above dams and 5,300 acres treated on drainages not controlled by dams
c/ Includes technical assistance for riparian woodland enhancement, riparian easements, and other woodland enhancement

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TABLE 2 - STRUCTURAL COST DISTRIBUTION

Upper Delaware and Tributaries Watershed, Kansas

(Dollars) a/

Floodwater Dams	Installation Cost - P. L. 566 Funds					Installation Cost - Other Funds					Total Installation Cost
	Construction	Engineering	Land Rights	Project Adm.	Total P. L. 566	Construction	Engineering	Land Rights	Project Adm.	Total Other	
6-26	142,300	48,600	0	20,800	211,700	0	0	15,300	2,000	17,300	229,000
6-32	166,700	57,300	0	24,600	248,600	0	0	13,000	2,000	15,000	263,600
7-19	172,000	56,500	0	24,200	252,700	0	0	36,400	2,000	38,400	291,100
9-31	157,300	53,000	0	22,700	233,000	0	0	23,900	2,000	25,900	258,900
10-14	160,700	53,400	0	22,900	237,000	0	0	29,100	2,000	31,100	268,100
11-24	148,400	50,700	0	21,700	220,800	0	0	13,400	2,000	15,400	236,200
12-03	177,800	60,300	0	25,800	263,900	0	0	25,500	2,000	27,500	291,400
14-17	205,400	68,000	0	29,100	302,500	0	0	44,600	2,000	46,600	349,100
15-30	197,800	67,000	0	28,700	293,500	0	0	46,700	2,000	48,700	342,200
20-17	197,600	66,700	0	28,600	292,900	0	0	54,300	2,000	56,300	349,200
23-35	135,200	46,400	0	19,900	201,500	0	0	15,700	2,000	17,700	219,200
24-07	336,600	115,000	0	49,200	500,800	0	0	156,700	2,000	158,700	659,500
26-10	144,600	49,800	0	21,300	215,700	0	0	10,200	2,000	12,200	227,900
26-15	184,800	63,500	0	27,200	275,500	0	0	15,700	2,000	17,700	293,200
28-04	137,800	46,300	0	19,800	203,900	0	0	19,200	2,000	21,200	225,100
28-4A	159,200	53,700	0	23,000	235,900	0	0	190,000	2,000	192,000	427,900
28-10	150,700	50,700	0	21,700	223,100	0	0	18,200	2,000	20,200	243,300
29-23	272,200	89,900	0	38,500	400,600	0	0	53,800	2,000	55,800	456,400
30-21	219,200	72,200	0	31,000	322,400	0	0	52,600	2,000	54,600	377,000
31-25	491,200	174,200	0	75,700	741,100	0	0	75,700	2,000	77,700	818,800
SUBTOTAL	3,957,500	1,343,200	0	576,400	5,877,100	0	0	910,000	40,000	950,000	6,827,100
MULTIPURPOSE											
21-14	420,800	143,900	12,400	61,600	638,700	673,200	230,700	736,800	88,200	1,728,900	2,367,600
Recreation	330,400	49,500	86,100	49,600	515,600	330,400	49,500	86,100	49,600	515,600	1,031,200
SUBTOTAL	751,200	193,400	98,500	111,200	1,154,300	1,003,600	280,200	822,900	137,800	2,244,500	3,398,800
GRAND TOTAL	4,708,700	1,536,600	98,500	687,600	7,031,400	1,003,600	280,200	1,732,900	177,800	3,194,500	10,225,900

a/ Price Base 1991

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TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY
ESTIMATED COSTS FOR MULTIPURPOSE RESERVOIR SITE 21-14
KICKAPOO
Upper Delaware and Tributaries Watershed, Kansas

Item	Flood	Recreation	Water Supply	TOTAL	P.L. 566 COST SHARE				OTHER (LOCAL) COST SHARE				GRAND TOTAL
					Flood Prevention	Recreation	Water Supply	TOTAL	Flood Prevention	Recreation	Water Supply	TOTAL	
Construction	% 39.4	% 3.5	% 57.1	% 100.0									
Dam	402,900	35,800	583,900	1,022,600	402,900	17,900	0	420,800	0	17,900	583,900	601,800	1,022,600
Water Intake	0	0	71,400	71,400	0	0	0	0	0	0	71,400	71,400	71,400
Engineering													
Dam	137,800	12,200	199,600	349,600	137,800	6,100	0	143,900	0	6,100	199,600	205,700	349,600
Water Intake	0	0	25,000	25,000	0	0	0	0	0	0	25,000	25,000	25,000
Legal Fees	3,900	400	5,700	10,000	0	0	0	0	3,900	400	5,700	10,000	10,000
Easements	12,800	1,100	18,500	32,400	0	0	0	0	12,800	1,100	18,500	32,400	32,400
Land (dam and pool)	238,300	21,200	345,300	604,800	0	10,600	0	10,600	238,300	10,600	345,300	594,200	604,800
Utility Modification	40,200	3,600	58,200	102,000	0	1,800	0	1,800	40,200	1,800	58,200	100,200	102,000
SUBTOTAL	835,900	74,300	1,307,600	2,217,800	540,700	36,400	0	577,100	295,200	37,900	1,307,600	1,640,700	2,217,800
Recreational Facilities													
Construction	0	660,800	0	660,800	0	330,400	0	330,400	0	330,400	0	330,400	660,800
Engineering	0	99,000	0	99,000	0	49,500	0	49,500	0	49,500	0	49,500	99,000
Recreational Land	0	172,200	0	172,200	0	86,100	0	86,100	0	86,100	0	86,100	172,200
SUBTOTAL	0	932,000	0	932,000	0	466,000	0	466,000	0	466,000	0	466,000	932,000
TOTAL	835,900	1,006,300	1,307,600	3,149,800	540,700	502,400	0	1,043,100	295,200	503,900	1,307,600	2,106,700	3,149,800
Project Admin.													
Multipurpose Str.	60,400	1,200	88,200	149,800	60,400	1,200	0	61,600	0	0	88,200	88,200	149,800
Rec. Facilities	0	99,200	0	99,200	0	49,600	0	49,600	0	49,600	0	49,600	99,200
GRAND TOTAL	896,300	1,106,700	1,395,800	3,398,800	601,100	553,200	0	1,154,300	295,200	553,500	1,395,800	2,244,500	3,398,800

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TABLE 2B - RECREATIONAL FACILITIES
ESTIMATED CONSTRUCTION COSTS

Upper Delaware and Tributaries Watershed, Kansas

Dollars) a/

Item	Unit	Numberb/	Estimated Unit Cost	Total Construction Cost
Electricity	L.F.	10,560	1.63	17,200
Water Line	L.F.	6,000	2.50	15,000
Hydrant	No.	10	250.00	2,500
Water Meter	No.	1	1,800.00	1,800
Access Road	L.F.	22,480	12.00	269,800
Culvert	No.	10	650.00	6,500
Fencing	L.F.	17,864	1.40	25,000
Signs	L.S.	--	--	2,000
Swimming Beach	Sq.Ft.	11,250	.55	6,200
Volleyball Court	No.	1	800.00	800
Comfort Station	No.	6	13,830.00	83,000
Parking Lot	No.	1	15,000.00	15,000
Shelter House	No.	3	11,000.00	33,000
Picnic Table	No.	52	225.00	11,700
Grill	No.	28	250.00	7,000
Bath House	No.	1	28,000.00	28,000
Dumpster	No.	6	500.00	3,000
Fire Ring	No.	31	50.00	1,600
Camping Pad	No.	40	300.00	12,000
Parking	Sq.Ft.	5,625	2.00	11,200
Horseshoe Pit	No.	2	400.00	800
Playground Equipment	No.	8	1,400.00	11,200
Boat Ramp	No.	2	19,000.00	38,000
Boat Dock	No.	2	8,000.00	16,000
Cleaning Station	No.	2	500.00	1,000
Boat Parking	Sq.Ft.	10,000	2.00	20,000
Trash Containers	No.	10	50.00	500
Shelter House with Outdoor Exhibits	No.	1	14,000.00	14,000
Interpretative Signs and Trails	L.S.	-	3,000.00	3,000
Outdoor Classroom	No.	1	4,000.00	4,000
Total				660,800

a/ Price base 1991
b/ Subject to change in final design

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TABLE 3 - STRUCTURAL DATA
STRUCTURES

Upper Delaware and Tributaries Watershed, Kansas

ITEM	UNIT	STRUCTURE NUMBER						
		6-26	6-32	7-19	9-31	10-14	11-24	12-3
Hazard Class	-	A	A	A	A	A	A	A
Seismic Zone	-	2	2	2	2	2	2	2
Total Drainage Area	Sq. Mi.	2.03	1.78	4.68	2.76	3.42	1.98	3.74
Runoff Curve No. (1-day AMC II)	-	76	74	76	75	75	75	77
Time of Concentration (Tc)	Hrs.	3.36	2.64	2.10	2.32	2.70	2.28	2.95
Elevation Top of Dam	Ft.	1,140.0	1,186.8	1,181.8	1,226.3	1,244.0	1,135.6	1,192.1
Min. Easement Elev. 100 yr. 24 hr.	Ft.	1,137.0	1,183.8	1,179.1	1,223.5	1,241.1	1,132.4	1,189.2
Elevation Crest Emergency Spillway	Ft.	1,135.0	1,181.8	1,176.8	1,221.3	1,239.0	1,130.6	1,187.1
Elevation Inlet Principal Spillway	Ft.	1,124.6	1,171.5	1,166.4	1,211.2	1,228.4	1,119.5	1,174.5
Maximum Height of Dam	Ft.	36.1	37.7	36.6	35.5	36.1	42.6	42.3
Volume of Fill	Cu. Yds.	55,600	64,700	60,900	59,800	56,700	57,700	69,300
Total Capacity	Ac. Ft.	442	356	936	585	640	418	770
Sediment	Ac. Ft.	135	106	222	177	170	130	225
Floodwater	Ac. Ft.	307	250	714	408	470	288	545
Beneficial Use	Ac. Ft.	--	--	--	--	--	--	--
Surface Area								
Sediment Pool	Acres	18	15	41	26	26	16	26
Beneficial Use	Acres	--	--	--	--	--	--	--
Floodwater Retarding	Acres	45	38	104	60	72	43	73
Principal Spillway Design								
Rainfall Volume (1-day)	In.	5.8	5.9	5.8	5.9	5.8	5.9	5.9
Rainfall Volume (10-day)	In.	9.6	9.7	9.4	9.6	9.4	9.7	9.7
Runoff Volume (10-day)	In.	4.58	4.26	4.42	4.32	4.16	4.39	4.79
Capacity (Max)	c.f.s.	24	24	62	32	62	25	68
Diameter of Conduit	In.	16	16	24	18	24	16	24
Emergency Spillway Design								
Frequency of Operation	% Chance	4	4	4	4	4	4	4
Spillway Type	-	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	75	40	90	40	65	60	100
Exit Slope	%	7.5	10.0	4.0	4.5	7.0	5.0	6.0
Emergency Spillway Hydrograph								
Rainfall Volume	In.	5.5	5.6	5.5	5.5	5.8	5.5	5.5
Runoff Volume	In.	2.95	2.85	2.95	2.86	2.86	2.86	3.05
Storm Duration	Hrs.	6	6	6	6	6	6	6
Velocity of Flow (Ve)	Ft./Sec.	0	2	0	0	0	0	2
Max. Water Surface Elevation	Ft.	1,135.1	1,181.9	1,176.7	1,221.2	1,239.0	1,130.6	1,187.3
Freeboard Hydrograph								
Rainfall Volume	In.	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Runoff Volume	In.	5.25	5.02	5.25	5.13	5.13	5.13	5.37
Storm Duration	Hrs.	6	6	6	6	6	6	6
Max. Water Surface Elevation	Ft.	1,138.3	1,184.6	1,180.0	1,224.7	1,242.3	1,133.3	1,190.2
Outflow/Ft of Width (Qe/b)	A.F./Ft.	3.1	4.6	7.6	6.8	5.4	3.6	4.2
Bulk Length	Ft.	254	320	350	488	407	280	316
Capacity Equivalents								
Sediment Volume	In.	1.25	1.11	0.89	1.20	0.93	1.23	1.13
Floodwater Retarding Volume	In.	2.84	3.02	2.86	2.77	2.58	2.73	2.73
Beneficial Volume	In.	--	--	--	--	--	--	--

TABLE 3 - STRUCTURAL DATA
STRUCTURES

Upper Delaware and Tributaries Watershed, Kansas

ITEM	UNIT	STRUCTURE NUMBER						
		14-17	15-30	20-17	23-35	24-7	26-10	26-15
Hazard Class	-	A	A	A	A	A	A	A
Seismic Zone	-	2	1	1	2	1	1	1
Total Drainage Area	Sq. Mi.	6.11	5.83	6.60	1.90	9.18	1.43	2.01
Runoff Curve No. (1-day AMC II)	-	79	76	77	77	80	78	78
Time of Concentration (Tc)	Hrs.	3.26	5.83	3.63	1.39	4.07	2.00	2.30
Elevation Top of Dam	Ft.	1,252.6	1,041.4	1,063.0	1,094.6	1,065.2	1,143.6	1,126.9
Min. Easement Elev. 100 yr. 24 hr.	Ft.	1,249.3	1,038.1	1,059.7	1,091.1	1,061.7	1,140.4	1,124.1
Elevation Crest Emergency Spillway	Ft.	1,247.6	1,036.4	1,058.0	1,089.6	1,060.0	1,138.6	1,121.9
Elevation Inlet Principal Spillway	Ft.	1,234.0	1,025.0	1,044.9	1,077.0	1,047.7	1,125.6	1,109.3
Maximum Height of Dam	Ft.	38.1	36.4	37.9	34.6	38.8	39.9	37.6
Volume of Fill	Cu. Yds.	71,300	74,800	75,700	48,400	107,100	58,200	82,200
Total Capacity	Ac. Ft.	1,374	1,256	1,439	400	2,229	301	422
Sediment	Ac. Ft.	300	280	271	99	450	78	107
Floodwater	Ac. Ft.	1,074	976	1,168	301	1,779	223	315
Beneficial Use	Ac. Ft.	--	--	--	--	--	--	--
Surface Area								
Sediment Pool	Acres	45	50	50	13	78	10	14
Beneficial Use	Acres	--	--	--	--	--	--	--
Floodwater Retarding	Acres	123	129	139	39	219	30	41
Principal Spillway Design								
Rainfall Volume (1-day)	In.	6.2	6.3	6.3	5.9	6.3	5.9	5.9
Rainfall Volume (10-day)	In.	10.1	10.5	10.4	9.8	10.5	9.8	9.7
Runoff Volume (10-day)	In.	5.52	5.31	5.36	4.87	6.00	5.00	4.92
Capacity (Max)	c.f.s.	107	106	107	30	169	24	31
Diameter of Conduit	In.	30	30	30	18	36	16	18
Emergency Spillway Design								
Frequency of Operation	% Chance	4	4	4	4	>2	4	4
Spillway Type	-	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.
Bottom Width	Ft.	180	175	150	40	150	40	40
Exit Slope	%	3.3	6.9	7.0	6.0	4.0	7.0	4.0
Emergency Spillway Hydrograph								
Rainfall Volume	In.	6.8	6.8	6.9	5.5	6.9	5.5	5.5
Runoff Volume	In.	4.40	4.08	4.28	3.05	4.60	3.14	3.14
Storm Duration	Hrs.	6	6	6	6	6	6	6
Velocity of Flow (Ve)	Ft./Sec.	5	4	4	0	4	1	1
Max. Water Surface Elevation	Ft.	1,249.0	1,037.5	1,059.2	1,089.6	1,061.1	1,138.6	1,121.9
Freeboard Hydrograph								
Rainfall Volume	In.	11.1	11.1	11.2	8.1	11.2	8.1	8.1
Runoff Volume	In.	8.44	8.04	8.27	5.37	8.67	5.48	5.48
Storm Duration	Hrs.	6	6	6	6	6	6	6
Max. Water Surface Elevation	Ft.	1,252.2	1,040.7	1,063.0	1,092.9	1,065.2	1,141.5	1,125.3
Outflow/Ft of Width (Oe/b)	A.F./Ft.	8.3	7.6	10.1	4.8	13.8	4.0	5.4
Bulk Length	Ft.	523	508	622	367	600	300	525
Capacity Equivalents								
Sediment Volume	In.	0.92	0.90	0.77	0.98	0.88	1.02	1.00
Floodwater Retarding Volume	In.	3.30	3.14	3.32	2.97	3.60	2.93	2.94
Beneficial Volume	In.	--	--	--	--	--	--	--

TABLE 3 - STRUCTURAL DATA
STRUCTURES

Upper Delaware and Tributaries Watershed, Kansas

ITEM	UNIT	STRUCTURE NUMBER							TOTAL
		28-4	28-33	28-10	29-23	30-21	31-25	MP21-14	
Hazard Class	-	A	A	A	B	A	C	B	
Seismic Zone	-	2	2	2	2	2	2	1	
Total Drainage Area	Sq. Mi.	1.89	3.37	1.90	6.35	5.12	11.07	16.54	99.67
Runoff Curve No. (1-day AMC II)	-	81	83	81	82	83	82	78	
Time of Concentration (Tc)	Hrs.	1.80	2.70	2.00	5.39	3.71	5.15	4.32	
Elevation Top of Dam	Ft.	1,251.5	1,252.4	1,226.2	1,251.5	1,278.6	1,218.6	1,092.6	
Min. Easement Elev. 100 yr. 24 hr.	Ft.	1,248.5	1,249.5	1,223.1	1,247.5	1,275.0	1,204.1	1,088.1	
Elevation Crest Emergency Spillway	Ft.	1,246.5	1,247.4	1,221.2	1,246.5	1,273.6	1,210.0	1,087.0	
Elevation Inlet Principal Spillway	Ft.	1,235.5	1,235.8	1,209.6	1,231.4	1,260.8	1,185.3	1,080.5	
Maximum Height of Dam	Ft.	35.6	37.6	36.7	43.5	40.5	55.2	53.9	
Volume of Fill	Cu. Yds.	46,700	56,500	55,900	120,300	80,700	201,700	551,000	2,055,200
Total Capacity	Ac. Ft.	442	800	446	1,749	1,303	4,750	10,572	31,630
Sediment	Ac. Ft.	120	207	126	318	309	477	1,287	5,594
Floodwater	Ac. Ft.	322	593	320	1,431	994	4,273	3,572	20,323
Beneficial Use	Ac. Ft.	--	--	--	--	--	--	5,713	5,713
Surface Area									
Sediment Pool	Acres	17	28	18	43	47	70	180	831
Beneficial Use	Acres	--	--	--	--	--	--	475	475
Floodwater Retarding	Acres	47	81	43	167	132	297	615	2,537
Principal Spillway Design									
Rainfall Volume (1-day)	In.	5.8	5.8	5.8	6.5	6.2	7.2	6.4	
Rainfall Volume (10-day)	In.	9.5	9.5	9.5	10.6	10.1	12.0	10.9	
Runoff Volume (10-day)	In.	5.27	5.65	5.27	6.49	6.18	7.73	5.91	
Capacity (Max)	c.f.s.	31	63	31	116	112	365	382	
Diameter of Conduit	In.	18	24	18	30	30	48	48	
Emergency Spillway Design									
Frequency of Operation	% Chance	4	4	4	2	4	1	2	
Spillway Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	
Bottom Width	Ft.	40	70	50	250	250	500	300	
Exit Slope	%	5.5	4.5	6.0	6.1	6.4	6.0	3.0	
Emergency Spillway Hydrograph									
Rainfall Volume	In.	5.5	5.5	5.5	8.1	6.8	11.0	7.9	
Runoff Volume	In.	3.43	3.63	3.43	5.95	4.84	8.72	5.25	
Storm Duration	Hrs.	6	6	6	6	6	6	6	
Velocity of Flow (Ve)	Ft./Sec.	2	2	2	5	4	4	4	
Max.Water Surface Elevation	Ft.	1,246.6	1,247.5	1,221.4	1,248.0	1,274.7	1,211.4	1,088.6	
Freeboard Hydrograph									
Rainfall Volume	In.	8.1	8.1	8.1	13.8	11.1	26.7	13.4	
Runoff Volume	In.	5.84	6.07	5.84	11.48	8.97	24.25	10.51	
Storm Duration	Hrs.	6	6	6	6	6	6	6	
Max. Water Surface Elevation	Ft.	1,249.6	1,250.6	1,224.3	1,251.0	1,277.3	1,218.6	1,092.55	
Outflow/Ft of Width(Oe/b)	A.F./Ft.	5.1	5.4	4.4	8.9	5.1	18.7	16.2	
Bulk Length	Ft.	372	413	366	500	477	1,000	1,000	
Capacity Equivalents									
Sediment Volume	In.	1.19	1.15	1.24	0.92	1.13	0.76	1.46	
Floodwater Retarding Volume	In.	3.19	3.30	3.15	4.45	3.64	5.20	4.83	
Beneficial Volume	In.	--	--	--	--	--	--	6.47	

TABLE 4 - ANNUAL COSTS
Structural Measures

Upper Delaware and Tributaries Watershed, Kansas

(Dollars) a/

Evaluation Unit	Project Outlays		Total
	Amortization of Installation Cost	Operation, Replacement, and Maintenance Cost	
20 Floodwater Retarding Dams	574,200	15,600	589,800
1 Multipurpose Dam	199,100	7,900	207,000
Recreational Facilities	86,700	39,500	126,200
Land Treatment	198,400	76,200	274,600
TOTAL	1,058,400	139,200	1,197,600

a/ 50 years at 8.25 percent

January 1994

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Upper Delaware and Tributaries Watershed, Kansas

(Dollars) a/

ON PROJECT

Item	Estimated Average Annual Damage				Damage Reduction Benefits Within the Watershed c/	
	Without Project		With Project			
	Agric. Related b/	Non-Agric.	Agric. Related	Non-Agric.	Agric. Related	Non-Agric.
Floodwater						
Crop and Pasture	296,100	--	147,400	--	148,700	--
Other Agricultural	51,200	--	25,700	--	25,500	--
Road and Bridge	--	53,400	--	23,900	--	29,500
Flood Plain Scour	58,800	--	28,600	--	30,200	--
Other Direct	25,100	--	12,500	--	12,600	--
Subtotal	431,200	53,400	214,200	23,900	217,000	29,500
Erosion						
Sheet and Rill, Ephemeral, Current, and Resource Protection	645,600	--	225,600	--	420,000	--
TOTAL WATERSHED	1,076,800	53,400	439,800	23,900	637,000	29,500

OFF PROJECT

Item	Estimated Average Annual Damage				Damage Reduction Benefits to Delaware River Properties Outside of the Watershed	
	Without Project		With Project			
	Agric. Related b/	Non-Agric.	Agric. Related	Non-Agric.	Agric. Related	Non-Agric.
Floodwater						
Crop and Pasture	193,800	--	154,000	--	39,800	--
Other Agricultural	16,400	--	13,000	--	3,400	--
Road and Bridge	--	16,100	--	12,900	--	3,200
Flood Plain Scour	9,700	--	7,700	--	2,000	--
Other Direct	13,500	--	10,700	--	2,800	--
Subtotal	233,400	16,100	185,400	12,900	48,000	3,200
Erosion						
Sedimentation	--	46,900	--	37,500	--	9,400
TOTAL OUTSIDE OF WATERSHED	233,400	63,000	185,400	50,400	48,000	12,600

GRAND TOTAL	1,310,200	116,400	625,200	74,300	685,000	42,100

a/ Price base 1991 for all items except crop and pasture which are 1991 current normalized prices
b/ Agriculture-related damage includes damage to rural communities
c/ Includes effects of required land treatment measures

January 1994

TABLE 6 - COMPARISON OF RECOMMENDED PLAN BENEFITS AND COSTS

Upper Delaware and Tributaries Watershed, Kansas

(Dollars) a/

Evaluation Unit	Average Annual Benefits									Total Costs b/	Benefit: Cost Ratio
	On Project					Off Project			Total Benefits		
	Flood and Erosion Damage Reduction	Water Conservation	Water Quality	Recreation	Water Supply	Flood and Damage Reduction	Stream Fishery	Sediment Reduction to Perry Lake			
Multipurpose Dam	77,400	5,400	1,600	129,000	197,600	10,100	7,300	36,300	464,700	341,800	1.36:1
20 Dams and Land Treatment	572,600	104,500	30,800	40,600	--	50,500	36,900	164,500	1,000,400	828,800	1.21:1
Woodland Treatment Including Riparian	16,500	--	1,500	10,200	--	--	200	--	28,400	27,000	1.05:1
TOTAL	666,500	109,900	33,900	179,800	197,600	60,600	44,400	200,800	1,493,500 c/	1,197,600 c/	1.25:1 c/

a/ Price base 1991 including current normalized prices for crop and pasture for 1991
b/ From Table 4
c/ When discounted to the beginning of the 16-year installation period and annualized over the 66-year period of analysis, total average annual equivalent benefits are $831,600, total average annual equivalent costs are $706,900, and the average annual equivalent benefit-cost ratio is 1.18 to 1.

January 1994

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

Types of Resources	Principal Sources of National Recognition	Measurement of Effect
Air quality	Clean Air Act, as amended (42 U.S.C. 185th-7 et seq.).	No effect
Areas 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 and threatened species critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531) et.seq.)	No effect
Fish and wildlife habitat	Fish and Wildlife Coordination Act (16 U.S.C. (Sec. 661) et. seq.).	Minimal
Flood plains	Executive Order 11988, Flood Plain Management	Moderate
Historic and cultural properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec 470 et seq.).	No effect
Prime and unique farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act, Farmland Protection Policy Act of 1981	Minimal
Water quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.).	Significant
Wetlands	Executive Order 11990, Protection of Wetlands Clean Water Act of 1977 (42 U.S.C. 185th-7, et seq.).	No effect
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.).	Not present in planning area

INDEX

SELECTED REFERENCES*

1. Kansas Department of Wildlife and Parks. Letter to Ken Kuiper, State Biologist, Soil Conservation Service, from Robert Wood, Wildlife Ecologist, July 18, 1991.

2. U.S. Department of Interior, Fish and Wildlife Service. Letter to Ken Kuiper, State Biologist, Soil Conservation Service, from William H. Gill, State Supervisor, July 1, 1991.

3. Kickapoo Tribe Water Resources. Cultural and Social Significance, January 1991, Mid-Kansas of Topeka, Inc., Engineering Consultants.

4. Kansas Department of Wildlife and Parks, U.S. Fish and Wildlife Service, Soil Conservation Service. Tri-agency Report, October 1992.

5. State of Kansas. Kansas Parks and Resources Authority, Kansas Statistical Abstract, 1970.

6. Kansas State Parks and Resources Authority. Kansas State Comprehensive Outdoor Recreation Plan, (SCORP), August 1985.

7. Kansas Department of Health and Environment. Water Quality and Nonpoint Source Pollution Summary Report, Upper Delaware and Tributaries Watershed, January 1990.

8. Kansas Department of Wildlife and Parks. Abatement of Nonpoint Source Pollution Impacts and Abatement Levels on Sport Fishing in Upper Delaware River and Tributaries Watershed of Kansas, March 1990

9. Kansas State and Extension Forestry. Forest/Woodland Resources Plan for Upper Delaware and Tributaries Watershed Joint District No. 7, May 1989. Amended with additional riparian zone condition data, June 1992.

10. Kansas State Historical Society. Upper Delaware River Tributaries Watershed, Results of Geomorphological and Archeological Studies in Atchison, Brown, Jackson, and Nemaha Counties, Kansas, Contract Archeology Publication Number 9, September 1991

* Footnote numbers appearing in the text correspond to these references.

LIST OF APPENDICES

APPENDIX A

LETTERS OF COMMENT ON DRAFT PLAN/EIS AND RESPONSE TO COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

September 27, 1993

Mr. James N. Habiger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

RE: Watershed Plan and Environmental Impact Statement (EIS), Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act, we have reviewed the above referenced document. Based on our review, we rate the document a EC-1 (Environmental Concerns, Adequate Information).

Our primary concern with the design of the preferred alternative is the lack of consideration of non-structural design options to achieve the project purposes. There was also no development of an alternative that exclusively considered non-structural design options. Inclusion of this additional information would help to "sharply define the issues and provide a clear basis of choice among options by the decision-maker and the public," pursuant to 40 CFR Part 1502.14. The final EIS should fully explain what non-struotural alternatives, as mentioned on page 31 of the draft EIS, were considered but then excluded from consideration.

Thank you for the opportunity to comment. If you have any questions, please call Ms. Cathy Tortorici at 913/551-7435.

Sincerely,

Gene Gunn
Chief, Environmental Review
and Coordination Section

RECYCLE

RESPONSE TO EPA

See response to Kansas State Board of Agriculture's comment 4.

United States Department of Agriculture | Forest Service | Rocky Mountain Region | 11177 W. 8th Avenue Box 25127 Lakewood, CO 80225-0127

Reply to: 3500

Date: JUL 13 1993

James N. Habiger, State Conservationist
760 South Broadway
Salina, KS 67401

Dear Mr. Habiger:

Thank you for the opportunity to review the draft Watershed Plan and Environmental Impact Statement for Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas. We have discussed the forestry aspects of the project with Kansas State and Extension Forestry. They have made substantial input into the draft regarding the needed treatment of riparian and other woodland areas. We support their findings.

We are especially pleased to note that the draft calls for technical and financial assistance to be made available to encourage landowners to establish new or enhance existing riparian woodlands through forestry practices. Kansas State and Extension Forestry is highly qualified to provide the technical assistance, and cost-sharing assistance for landowners that should provide the incentive to get needed on-the-ground cultural practices installed.

We are also pleased to see that tha needs of the Kickapoo Nation have been addressed.

Again, we appreciate this chance to comment, and wholeheartedly support the close working rslationship that you have established with Kansas State and Extension Forestry.

Sincerely,

Jim Lawrence
JAMES A. LAWRENCE
Director for State and Private Forestry

cc: W.Ripley, SPF
Kansas State Forester
Gordon Stuart, CF-WO

No response necessary

U.S. Department of Housing and Urban Development

Kansas City Regional Office, Region VII
Gateway Tower II
400 State Avenue
Kansas City, Kansas 66101-2406

June 24, 1993

Mr. James N. Habiger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, KS 67401

Dear ~~Mr. Habiger~~ Jim:

SUBJECT: Draft Watershed Plan and Environmental Impact Statement: Upper Delaware Watershed; Atchison, Brown, Jackson and Nevada Counties, Kansas (May 1993)

This is to acknowledge that the subject draft watershed plan and environmental impact statement has been received by this office. It is being reviewed by Lance Long, Environmental Officer.

Mr. Long will review the draft plan and statement and provide comments, if any, directly to you by August 2, 1993. If you do not receive a reply within this time frame, you may assume we have no comments.

Sincerely,

Gary D. Ultican
Regional Environmental Officer

cc:
Lance Long

No response necessary

U.S. Department of Housing and Urban Development

Kansas City Regional Office, Region VII
Gateway Tower II
400 State Avenue
Kansas City, Kansas 66101-2406

July 16, 1993

Mr. James N. Habiger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, KS 67401

Dear Mr. Habiger:

SUBJECT: Draft Watershed Plan and Environmental Impact Statement: Upper Delaware Watershed; Atchinson, Brown, Jackson and Nevada Counties, Kansas (May 1993)

This office has reviewed the subject draft statement for flood control in the Upper Delaware Watershed. The document was found to be in accordance with the spirit and intent of the National Environmental Policy Act and no apparent adverse impacts were noted relating to Housing and Urban Development projects in this jurisdiction.

We appreciate the opportunity to comment.

Sincerely,

Lance L. Long
Environmental Officer
Office of Community Planning
and Development

No response necessary

United States Department of the Interior

BUREAU OF MINES
Intermountain Field Operations Center
P.O. Box 25086
Building 20, Denver Federal Center
Denver, Colorado 80225

May 25, 1993

James N. Habiger, State Conservationist
Soil Conservation Service
760 South Broadway
Salina, KS 67401

Dear James Habiger:

Subject: Review of Notice of Intent to Prepare an Environmental Impact Statement for Creek Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas (ER 93/379)

As requested by the Director, Office of Environmental Affairs, U.S. Department of the Interior, personnel of the U.S. Bureau of Mines reviewed the subject notice to determine whether mineral resources or mineral-production facilities would be adversely impacted by the proposed project. The notice pertains to a proposed plan for flood prevention and water quality improvement for the Upper Delaware River and its tributaries. Alternatives under consideration include land, livestock waste, riparian and other woodland treatment, systems for conservation, floodwater retarding dams, and a multipurpose dam with water supply and recreational facilities.

Available maps and literature indicate that sand and gravel, limestone, clay, shale, and coal occur in and have been mined from the subject river drainage system. Although most alternatives considered would have no impact on the development of mineral resources, the construction of a dam and recreation facilities could impact mineral development. We recommend that a
1 section be included in the upcoming environmental document in which the general quantity, quality, distribution, development potential, and value of mineral deposits are specifically addressed. Any impact to future development of mineral deposits that might result from the proposal also should be discussed. If it is determined that no impact to minerals would occur, a statement to that effect should be included in the environmental document.

Our comments are drawn from available information, are provided on a technical assistance basis only, and may not reflect the position of the Department of the Interior. If you have questions concerning this review, please contact Jeanne Zelten at (303) 236-0451.

Sincerely,

Mark H. Hibpshman
Supervisory Physical Scientist

jez/cv

RESPONSE TO DOI, BUREAU OF MINES

1 The project setting section has been modified to state that no significant mineral deposits exist in the watershed.

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

REPLY TO ATTENTION OF:

August 24, 1993

Environmental Resources Branch
Planning Division

Mr. James N. Habiger
State Conservationist
USDA - Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

The Kansas City District (KCD) has completed its review of the Interagency Review Draft of the "Watershed Plan and Environmental Impact Statement, Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas" (Plan/EIS). KCD offers the following comments for your consideration and resolution.

Based on our review of the information furnished, we have determined that the proposed project will involve the discharge of fill material into waters of the United States, including wetlands. Section 404 of the Clean Water Act (33 USC 1344), which is administered under Federal regulations 33 CFR 320-330, provides the Corps of Engineers with regulatory jurisdiction over all waters of the United States. These provisions require prior authorization from the Corps of Engineers for the discharge of dredged or fill material into waters of the United States, including wetlands.

1

KCD has recently completed a review of the procedures for applying for Department of the Army Section 404 authorization for watershed projects in Kansas. Criteria for applying for a Section 404 permit have been determined and applied to your proposed project with the finding that your watershed project would require an individual Section 404 permit. One application should be sent to KCD for all structures within the watershed project/plan. As your watershed plan is still in the planning stages and KCD has finalized the application procedures for Kansas watersheds, the structures in your project are ineligible for consideration under the Corps of Engineers nationwide permit process. Any questions regarding regulatory items should be addressed to Mr. Chad Remley in KCD's Regulatory Branch at telephone number (816) 426-5500.

2

The draft Watershed Plan/EIS contains conflicting information regarding the presence of wetlands. The discussion of wetlands in the Inventory of Resources section (pages 25-26) identifies four types of areas within the watershed where wetlands could potentially occur. The discussion indicates that approximately 3,400 and 420 acres of wetlands are located in two of these areas of potential wetlands, i.e., "depressional areas along flood plains" and "linear stream channels," respectively. Despite these specified wetland locations and quantities, the Plan/EIS Summary and Table G ("Summary and Comparison of Candidate Plans") both state that the selected plan and its 20 floodwater retarding and one multi-purpose dams have no impact on wetlands. The disparity in the quantity of wetlands identified in the Inventory of Resources and the wetland acreage affected by the selected Alternative ("none") needs to be examined/certified.

3

3

KCD's Planning Division archeologist reviewed the Plan/EIS and offers several comments. The Phase I literature search apparently included "historical sites" but there is no information as to what they were and if they need to be inventoried. Total emphasis of the Plan/EIS appears to be on prehistoric archeology. The need for additional detailed testing of the dam sites isn't clear, especially if the sites have already been inventoried and no sites were found. To avoid confusion, KCD suggests that the Plan/EIS clarify the areas and methods of the previous inventory, describe the results of both the Phase I and Phase II work, and include any recommendations of the State Historic Preservation Officer. Although the Kickapoo Reservation is a sponsor, as well as a major part of the Watershed Plan, there is no mention in the Plan/EIS of coordination regarding the American Indian Religious Freedom Act.

4

5

The Permits and Compliance Section on page 49 briefly mentions the requirement to obtain an "NPDES Permit," but does not identify or specify the exact NPDES permit involved. If the subject permit is the NPDES permit for storm water discharges from construction activities, the Watershed Plan/EIS should identify it in that manner and provide additional information regarding the State's requirements for storm water discharge permits. The State of Kansas office responsible for the storm water permit program is the Industrial Programs Section, Bureau of Water, Kansas Department of Health and Environment, Building 740, Forbes Field, Topeka, Kansas 66620.

6

KCD's Planning Division suggests that all woodland mitigation areas be fenced to keep grazing out of the mitigation areas. Continued maintenance of the mitigation areas is also a priority issue that should be written into all real estate agreements. The investment of time and money spent to mitigate the woodland losses should be protected and maintained.

7

The Watershed Plan/EIS contains no discussion or mention of a possible water supply alternative involving excavation or dredging to restore water storage capacity in the Kickapoo Reservation's existing low-water dam on the Delaware River. KCD suggests that the Watershed Plan/EIS evaluate and discuss this alternative or partial alternative.

8

The wording in the last paragraph of the Dam Safety writeup on page 47, i.e., "before anyone builds or develops in the flood plain shown in yellow on the Project Map, a more detailed determination of potential hazard should be completed" doesn't answer the extremely important question of who will be responsible for making "these more detailed determinations." The Plan/EIS should spell out who is responsible for doing these "detailed determinations," whether it is/will be the Soil Conservation Service, the project sponsors, builders/developers, or some other governmental agency.

9

Although the Plan/EIS states that one of the project's two "over-riding purposes" is the "reduction of sediment delivered to the Corps of Engineers Perry Lake, 18 miles downstream," there doesn't appear to have been any coordination between our agencies regarding the effects on Perry Lake. KCD requests your office contact Mr. Bob Pearce, River and Lakes Engineering Section, Engineering Division, telephone number (816) 426-3773, with regard to the Watershed Plan's effects on KCD's Perry Lake.

10

If you need additional information or have any questions regarding these comments, please contact Mr. Martin Schuettpelz of my staff at telephone number (816) 426-5063.

Sincerely,

James L. Goering
Chief, Planning Division

RESPONSE TO COE

1. & 2. Page 49 of the plan identifies the 404 permit as being required. Kansas watershed districts have been notified by the COE regarding the requirements of the permits.

3 A section on wetlands has been added to the Investigation and Analysis Report located in Appendix C of the Plan/EIS. This addition details the methods used to determine the project's effects on wetlands.

4 Cultural Resources investigations have been coordinated with the State Historic Preservation Officer. Additional investigations will be done jointly with the State Historical Society at the time detailed geological investigations are done at individual dam sites. All concerns of the State Historic Preservation Officer have been satisfied.

5 The reservation is not a sponsor. The Kickapoo Tribe (Tribal Council) is the sponsor. They have been actively involved in the planning process. The Bureau of Indian Affairs and the Indian Health Service have also been involved in developing the plan.

6 This section has been clarified to emphasize that any and all permits required for the project will be the responsibility of the sponsors.

7 Habitat mitigation areas are normally fenced.

Proposed riparian enhancement areas are to have livestock grazing excluded, but permanent fencing is not required. This condition was agreed to by local sponsors representing the local landowners, the state environmental agencies, and the SCS.

8 The alternate of dredging the existing low-water dam was not considered viable. Having only 13 acre feet of storage initially, the existing system of in-channel storage does not have enough storage to provide a dependable water supply. The proposed multipurpose structure has 7,000 acre feet of storage for sediment and beneficial use.

9 The sponsors of the floodwater retarding dams and individual landowners will be responsible for determining the potential hazard. Technical assistance would be available through the SCS.

10 Public water resource data released by the Corps of Engineers on sedimentation rates and storage were used during the evaluation. Data on recreational use were obtained from the COE and KDWP offices at the lake. The rate of sediment being transported to the lake was obtained from KDHE.

The general outline of the water resource plan and planning conventions were included in the project's 1991 Pre-Authorization Report. The Kansas City District COE Office reviewed this report and did not express any concerns on the project's effect on sediment transport or on Perry Lake.

Mr. Pearce's office has been contacted several times by phone. He has not returned the calls.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

AUG 3 1993

ER 93/500

Mr. James N. Habiger
State Conservationist
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

The Department of the Interior has reviewed the watershed plan and draft environmental statement for the Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas. We have the following comments and recommendations.

General Comments

Within the Upper Delaware Watershed, the Little Delaware River, Muddy Creek, and Wolfrey Creek are classified as Class III streams of moderate fishery value, and Gregg Creek is classified as a High-Priority Fishery Resource. The moderate classifications are due in part to the intense use of land within the subbasins for agricultural (cropland) use. Fully 70 percent of these basins are in cropland. The High-Priority rating for Gregg Creek is in part due to (a) a greater proportion of the subbasin being in forest land (35 percent) and grassland (10 percent) and (b) the contribution of small, high quality, spring fed tributaries.

1 With the preferred plan, approximately 73 miles of these streams and their tributaries will be inundated and replaced by approximately 1,120 acres of reservoir habitat. The plan, however, claims to have positive stream benefits. While lacustrine fish fauna may be benefited, stream-dependent species native to this basin may be adversely affected. In addition to stream habitat being inundated and movement upstream being hindered by dams, slow constant flows and lack of peak flows below the dams would create conditions that favor lacustrine fishes and place obligated stream dwellers at a disadvantage. Because the quantity of stream habitat available would be significantly reduced, the document needs to describe how the quality of remaining habitat will be raised enough to offset the stream loss, much less produce net stream benefits.

2 Many of the positive lacustrine fishery benefits may be derived from the 4/5-acre beneficial use pool of the multipurpose structure to be located on the Kickapoo Indian Reservation. However, the document needs to clarify if any of the 23,000 angler days claimed for the project came from this site and whether there will be provision within the plan for fish stocking, fishery management, or some form of fish habitat development. The Department's Fish and Wildlife Service (FWS) is concerned because stocking and development of a fisheries management plan may be a Federal responsibility/opportunity borne either by the Bureau of Indian Affairs or the FWS's Division of Fish and Wildlife Management Assistance.

3 The Kickapoo Nation needs to decide who will provide the needed fisheries technical assistance and have a management plan prepared for this multipurpose site. Once a plan is prepared, the fishery benefits claimed for this structure should become more defined. The FWS recommends that such a plan be developed before finalizing the Environmental Impact Statement, which in turn should discuss the essence of the plan.

4 The FWS is pleased to see proposed efforts to meet new and pressing conservation challenges within the watershed, such as reducing nonpoint source pollution, addressing depicted water supplies associated with recurring drought on the Kickapoo Reservation, riparian woodland protection and enhancement, and even some wetland development/enhancement in the preferred alternatives. Improved watershed planning, land treatment, and other nonstructural approaches, although not the featured solution to watershed problems, have at least been considered and incorporated to some extent.

5 Water quality is a serious concern for the Kickapoo Tribe and Allottee Trust owners. This is especially true of the Multipurpose Dam (21-14) and it's drainage area. Approximately 57.1% of the capacity of this structure is allocated to water supply for drinking water purposes. Of special concern is safe nonpoint source (NPS) pollutant levels, namely, safe fecal coliform bacteria levels, safe pesticide levels and safe phosphorous and nitrate nitrogen levels.

Although these concerns are addressed on pages 16, 17, 38 and 59 of the Summary of Watershed Plan/Environmental Impact Statement and on pages 5, 6, 7 and 8 of the Resource Investigations section, the importance and need for good quality water in structure 21-14 cannot be overemphasized. A sound monitoring system and effective analysis program is of prime importance in providing and maintaining the water quality necessary to meet state water quality standards for human consumption.

Specific Comments

6 Page 4, Project Benefits In Dollars--Approximately $44,000 is claimed for off-project stream fishery benefits. The document needs to explain how this figure was derived and where the benefits accrue.

7 Page 5, Environmental Values Changed or Lost, Wetlands--This section indicates no change to wetlands. However, under the definition of wetlands (page 2), linear stream channels are defined as wetlands, and the preceding section (page 5) on Aquatic Habitat notes 60 miles of intermittent stream and 4.6 miles of perennial stream will be destroyed. In addition to the linear stream channels that will be inundated, reduced peak flows may affect additional wetland types listed on page 2. A more thorough discussion of wetland functions, values, and anticipated losses is needed.

NBJWD04037

Page 11, The Kickapoo Nation--We recommend that the following paragraph replace the first paragraph of this section.

> The Kickapoo Nation in Kansas, hereafter referred to as the Tribe, is centered on a Reservation in the southeast part of the watershed. The Kickapoo constitutional boundaries are based upon the 1854 Treaty between the Tribe and the U.S. Government which includes about 40 percent of the watershed area. The land currently in Tribal and Individual Indian ownership, which is held in Trust by the U.S. Government, is about 4 percent of the watershed area or about 7104 acres.

8

Page 26, Oxbow Channels--Oxbow wetlands perform many valuable functions such as flood control, entrapment of contaminants and nutrients, fish and wildlife habitat, and ground water recharge. If oxbow wetlands occur in the Tower watershed, they may be dependent for at least part of their water replenishment upon out-of-bank flows due to rains in the upper watershed. Therefore, the document incorrectly implies on page 26 that oxbows are always filled by rainfall before out-of-bank flows occur, and it should be amended.

9

Page 33, paragraph 4--improvements to water quality are projected to provide for an average annual stream fishery value of $44,200. It is unclear as to how structural measures (the dams) are providing stream fishery benefits in the form of improved water quality. A complete discussion is needed on the economic assessment, the economic model, and the assumptions that produced the benefits.

10

Page 49, Costs--The Kickapoo Tribe is identified as being responsible for recreation development at multipurpose dam No. 21-14. If this recreational development is to include fishing, a fisheries management plan for the 475-acre lake should be developed and implemented (see General Comments). The tribe needs to decide who it wishes to provide the needed technical assistance for plan development. If fishery benefits are attributed to this multipurpose lake, a plan for fishery development and management are required before any major benefits can be ascribed to the project. Therefore, it is recommended that this plan be completed before release of a final environmental impact statement and be discussed in that document.

11

We hope these comments and recommendations will be of assistance.

Sincerely,

Jonathan P. Deason
Director
Office of Environmental Affairs

RESPONSE TO DOI

1 On page 5 of the Plan/EIS is a miss print, 69 and 4.6 should be 18.5 and 13.7. This caused us to review and revise stream lengths on page 39 and Appendix C, page C-4.6. The selected alternate has 32.2 miles or 13.7 perennial and 18.5 intermittent. Roughly 25 percent of all the inundated stream length is at the multipurpose site. Much of the perennial flow is shallow flow due to springs, which should keep the water bodies full and a continuous stream flowing through the outlets of the dams and on down the stream.

SCS agrees that the pools will benefit lacustrine fish. Other such projects have done such while attracting local fisherman. A major premise of the project is the cleaning (clearing-up) of the streams. The Investigation and Analysis (I&A) Report (pages C-4.5-7) details water quality rationale. Kansas Department of Health and Environment has recommended pollution reduction goals. The Kansas Department of Wildlife and Parks has forecasted that cleaning up the nonpoint source pollutants (NPS), especially the sediment, will cause a change in fisheries. The change from turbid waters to clear waters results in an increase in sport fishery.

The dollar value increase in stream fishery due to cleaner water is greater than the dollar value loss of the stream fishery caused by the inundation by the pools. This economic factor plus society's desire for cleaner streams, as shown by the Clean Water Act, overrides the environmental loss of this amount of stream.

2 On page 36, the multipurpose lake is credited with 23,000 visitor days. A summary of the recreational analysis can be found in Appendix C, Investigation and Analysis Report, page C-4.17. You will note that the Kansas State Comprehensive Outdoor Recreation Plan (SCORP) was used to determine the need for water-based recreation in the project area. Several other non-published recreational need studies were found that confirmed SCORP's numbers.

A multipurpose lake of the planned size has shown to have the ability to support up to 60,000 annual visitor days. Due to the closeness of other lakes this size, only 23,000 annual visitor days have been conservatively used in the analysis of this lake. Due to the proximity of Highway 75 and the Kickapoo Tribal members, this site has the potential to reach 60,000 annual visitor days.

3 Similar watershed projects with similar multipurpose structures have been satisfactorily built and maintained in Kansas. A detailed recreational plan including fisheries management was not developed for those projects until Congress had authorized funding eligibility. It is not the scope of this plan to develop a detailed recreation and management plan.

Informal discussions have been held with the BIA and KDWP on need for recreational planning including fisheries management. The Tribal Council will be encouraged to begin discussions with FWS and other agencies on detailed recreational planning.

4 The FWS's recognition of an effort to expand the water resource planning process is appreciated. Local sponsors and a number of agencies played an important part in the process. The plan would not have evolved without the help of KDHE and KDWP. The SCS also recognizes that the process is still evolving. We would also welcome FWS's and/or others active participation in project planning.

5 Water quality throughout the project area has been a serious concern during the planning process. The Tribal Council's engineering consultant determined that the water quantity and quality at the proposed multipurpose site are adequate. In addition, many of the land treatment systems to be implemented through the project will protect water quality from future pollution. Technical and/or financial assistance will be made available for confined livestock area treatment, nutrient management, pest management, and riparian woodland improvement.

The Tribe will continue to monitor and analyze the quality of their treated water just as they do now. It should be recognized that the quality of raw water in the proposed multipurpose dam will be much improved over that existing at the low-head dam on the Delaware River.

6 KDWP'S stream fishery evaluation, reference 8, was used as a basis for determining the effects of reducing NPS pollutants on the fishery of the Delaware River system. The report states that the river is physically capable of supporting thirteen times more fishing-days per years. Taking into consideration parameter variability and limited stream access, the use of a more conservative estimate of tripling existing annual fishing-days was recommended by the report. Existing fishing-day use is 21,250, so an increase of 42,750 would occur resulting in a total use of 64,000. Reduction of NPS pollutants will be a result of treatment of the basin as a whole. With this watershed making up approximately 25 percent of the Delaware River's drainage area, it was credited with that portion of the increase or approximately 10,700 fishing days.

7 A section on "Wetlands" has been added to the Investigation and Analysis Report, Appendix C, of the Plan/EIS. It provides the discussion on functions, values, and project effects.

8 Revisions made as suggested.

9 We believe the document adequately and correctly shows that oxbows are filled prior to any out-of-bank flows. See reply to comment 7 for additions to the Investigation and Analysis Report that documents these conclusions.

10 The I&A Report (page C-4.15, Delaware River) has been expanded to discuss economic assessment and modeling as requested. Dams have a 90 percent plus sediment trap efficiency. Thus sediment entering the stream system, from all land uses and all treatment levels, is trapped at a rate of over 90 percent. The removal of sediment from the stream translates into a cleaner less turbid stream. See reply to comment 6.

11 See reply to comment 3.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

ER 93/500

AUG 11 1993

Mr. James N. Habiger
State Conservationist
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

The Department of the Interior wishes to amend its comments of August 3, 1993, for the Upper Delaware and Tributaries Watershed in Kansas. We have these additional comments and recommendations.

1 The Kickapoo reservation has received Land and Water Conservation Fund (L&WCF) financial assistance, but the map provided in the subject document is too general to enable determination of the potential extent of impact by the proposed watershed development. Inasmuch as it is stipulated in the L&WCF Act that assisted sites shall not be converted to other than outdoor recreation uses, the SCS should consult with the official responsible for administering the L&WCF program within the State. This is Mr. Theodore Ensley, Secretary, Kansas Department of Wildlife and Parks, 900 Jackson Street, Room 502, Topeka, Kansas 66612.

The proposed dam system would not appear to have any direct impacts to rivers listed on the Nationwide Rivers Inventory (NRI). However, it could have indirect impacts on the Kansas River, which is downstream of the project area and which is listed on the NRI.

2 The portion of the Kansas River listed on the NRI is from the confluence of the Delaware River to Interstate Route 635. The NRI includes rivers selected on the basis of the degree to which they are free-flowing, the degree to which the rivers and their corridors are undeveloped, and the outstanding natural and cultural characteristics of the rivers and their immediate environments. The purposes of the inventory are several, including the identification of rivers which could qualify for inclusion in the National Wild and Scenic Rivers System (NWSRS). The Kansas River was included in the inventory because of its outstanding scenic, recreational, fish, wildlife, and cultural values.

In his second message on the environment, issued in August 1979, the President underscored the need to strengthen the NWSRS and to take particular care not to harm rivers which may qualify for inclusion therein. The President issued a directive in conjunction with this message which required Federal Agencies to take care to avoid or mitigate adverse effects on rivers identified in the NRI as part of their normal planning and environmental review process. Therefore, we recommend that the environmental impact statement be expanded to consider the impacts of the proposed dam system on the unique resources of the Kansas River. The impact analysis to be included in the final statement should include an evaluation of the effects of the proposed dam system on instream flows in the Kansas River and consider the cumulative effects of this and other similar projects in the Kansas River watershed.

Sincerely,

Jonathan P. Deason
Director
Office of Environmental Affairs

RESPONSE TO DOI

1 The Kansas Department of Wildlife and Parks has been contacted. No Land and Water Conservation Fund sites are expected to be affected.

2 The need to expand the environmental evaluation was not recognized during initial or on-going scoping of project concerns and impacts. The Upper Delaware is a tributary to Perry Lake. Management of and releases from Perry Lake nullifies any impacts from this watershed project. No effect on the Kansas River by this project is expected.

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Horton Agency
908 First Avenue East
Horton, Kansas 66439

IN REPLY REFER TO
913, 486-2161

July 6, 1993

James N. Habiger
State Conservationist
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habiger:

The following comments are in regard to the Interagency Review Draft of the Watershed Plan and Environmental Impact Statement for the Upper Delaware and Tributaries Watershed in Atchison, Brown, Jackson and Nemaha counties, Kansas:

Water Quality

Water quality is a serious concern for the Kickapoo Tribe and Allottee Trust owners. This is especially true of the Multipurpose Dam (21-14) and it's drainage area. Approximately 57.1% of the capacity of this structure is allocated to water supply for drinking water purposes.

Of special concern is safe nonpoint source (NPS) pollutant levels, namely, safe fecal coliform bacteria levels, safe pesticide levels and safe phosphorous and nitrate nitrogen levels. 1

Although these concerns are addressed on pages 16, 17, 38 and 59 of the Summary of Watershed Plan/Environmental Impact Statement and on pages 5, 6, 7 and 8 of the Resource Investigations section, the importance and need for good quality water in structure 21-14 cannot be overemphasized. A sound monitoring system and effective analysis program is of prime importance in providing and maintaining the water quality necessary to meet state water quality standards for human consumption.

Draft Revision

We would recommend that the below listed paragraph replace the 1st paragraph following the heading, **The Kickapoo Nation**, on page 11 of **SUMMARY OF WATERSHED PLAN/ENVIRONMENTAL IMPACT STATEMENT:** 2

The Kickapoo Nation in Kansas, hereafter referred to as the Tribe, is centered on a Reservation in the southeast part of the watershed. The Kickapoo constitutional boundaries are based upon the 1854 Treaty between the Tribe and the U.S. Government which includes about 40 percent of the watershed area. The land currently in Tribal and Individual Indian ownership, which is held in Trust by the U.S. Government, is about 4 percent of the watershed area or about 7104 acres. 2

If you have any questions, please contact my office.

Sincerely,

Superintendent

RESPONSE TO DOI, BIA

1 See the response to Department of Interior's comment 5.

2 See the response to Department of Interior's comment 8.

NBJWD04041

DEPARTMENT OF HEALTH & HUMAN SERVICES — Public Health Service

Oklahoma City Area Indian Health Service
Five Corporate Plaza
3625 N.W. 56th Street
Oklahoma City, OK 73112

OEH&ES District Office
U.S. Post Office Bldg.
201 West Oklahoma Avenue
Guthrie, Oklahoma

July 29, 1993

Mr. James Habiger, State Conservationist
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Re: Draft Watershed Plan and EIS for Upper Delaware and Tributaries Watershed

Dear Mr. Habiger:

The Indian Health Service has received and reviewed the above referenced document. We do not have any comments regarding the document. We appreciate the continuing contact and updates on project status provided by the SCS.

The Indian Health Service is particularly interested in the dam #21-14 as it will eventually provide a new community water supply for the Kickapoo Tribe of Kansas. We are currently working with the Kickapoo Tribe to construct improvements to their water supply, treatment, and distribution system. We will continue to maintain an interest in the progress of the project especially as it relates to the dam #21-14.

Contact with the Indian Health Service, can be coordinated with Delrey Pearson, Field Engineer, Holton, Kansas, telephone (913) 364-4843.

Sincerely,

Robert A. Young

Robert A. Young, P.E.
District Engineer

cc. Delrey Pearson, Field Engineer, Holton
Ward Conaway, Director, DSFC
File
Chrono

No response necessary

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
4821 Quail Crest Place
Lawrence, Kansas 66049-3839

July 30, 1993

James N. Habinger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Dear Mr. Habinger,

We have briefly reviewed the draft Watershed Plan and Environmental Impact Statement for Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson, and Nemaha Counties, Kansas. In summary, this project should decrease sediment loads to Perry Lake, improve water quality in the streams, and provide a dependable water supply for the Kickapoo Tribe. However, a comprehensive water-
1 quality monitoring program, including collection of water and biological samples, is essential prior to implementation of this project. These samples will establish a baseline prior to installation of the flood-control structures. This baseline will assist in the evaluation of positive impacts of these structures on water quality, sedimentation, and water supply. Improvements in water quality can be directly related to the implementation of the project by comparing subsequent monitoring data to the baseline data.

Please contact me, Mike Pope, or Andy Ziegler at (913) 842-9909, if you have any questions or are interested in our assistance in monitoring activities.

Sincerely,

Johnette C. Shockley

Johnette C. Shockley
Acting District Chief

cc: Area Hydrologist, Midwest Programs, Lawrence, Kansas

RESPONSE TO DOI, USGS

1 The Kansas Department of Health and Environment was the lead agency with responsibility for determining present water quality conditions, trends, and nonpoint source pollutant (NPS) reductions goals. Twenty years of water quality data has been used from the USGS/KDHE monitoring station on the Delaware River near the town of Muscotah. KDHE has led the water quality monitoring efforts of the watershed.

Kansas Department of Wildlife and Parks and Kansas Biological Survey have also been involved in monitoring stream parameters and biotic populations as they relate to water quality.

The USGS is currently participating with the State of Kansas and local groups in monitoring several subareas of the Delaware basin including this watershed. A continuation of that effort will provide comparable data to baseline conditions. The SCS encourages continuation of this monitoring.

STATE OF KANSAS

Joan Finney, Governor

KANSAS WATER OFFICE
Stephen A. Hurst
Director

Suite 300
109 SW Ninth
Topeka, Kansas 66612-1249
913-296-3185
FAX 913-296-0878

August 4, 1993

Mr. James M. Habiger
State Conservationist
Soil Conservation Service
760 S. Broadway
Salina, KS 67401

Jim

Dear ~~Mr.~~ Habiger:

Please refer to your transmittal dated June 10, 1993, requesting that I coordinate the state agency review for the Interagency Review Draft Watershed Plan and Environmental Impact Statement (EIS) for the Upper Delaware and Tributaries Watershed - Atchison, Brown, Jackson and Nemaha Counties in Kansas.

I would like to compliment you on the coordination that you have initiated and carried out with all agencies in developing this Interagency Review Draft Watershed Plan and Environmental Impact Statement. It is a very progressive plan due to the inclusion of nonstructural practices such as riparian easements and riparian improvement between dam sites. This concept is a significant accomplishment and one that we encourage.

The Interagency Review Draft Watershed Plan and Environmental Impact Statement includes a multipurpose site proposal to provide recreation and water supply for the Kickapoo tribe. It appears that this water supply is needed and we welcome the opportunity to further substantiate the projected water supply needs as included in the subject plan.

I have received comments from the Cooperative Extension Service, Kansas State University, and the Kansas Department of Transportation indicating favorable consideration of the subject plan and environmental impact statement. The Kansas Department of Transportation would appreciate receiving information about streamflow and water elevations for those structures affecting state highways. This information should be forwarded to Mr. Warren Sick, Chief, Bureau of Design, Kansas Department of Transportation, Docking State Office Building, 915 Harrison Street, Room 954-W, Topeka, Kansas 66612-1568.

I have also received comments from the Division of Water Resources, Kansas State Board of Agriculture; Kansas Department of Health and Environment; and the Kansas Biological Survey. These comments included specific written suggestions for improving the plan and remarks on any impacts not adequately recognized in the environmental impact statement. Please find enclosed copies of these specific comments.

I further understand that you have worked in close cooperation and with input from the Kansas Department of Wildlife and Parks and the State and Extension Forestry. We have received no comments directly from the Kansas Department of Wildlife and Parks and have assumed that their input is included in the review draft. We have received a phone call from the State and Extension Forestry stating that they will comment directly to you.

We appreciate the opportunity to review and to coordinate the state agency review of the Interagency Review Draft Watershed Plan and Environmental Impact Statement for the Upper Delaware and Tributaries Watershed. We look forward to participating in the public meeting process toward the end of the review period.

Sincerely,

Steve

Stephen A. Hurst
Director

SAH:GEK:Habiger.ltr/dk
Enclosures
cc wo/encl.: Mr. David L. Pope, Division of Water Resources
Dr. Raymond G. Aslin, State and Extension Forestry
Mr. Michael Johnston, Ks. Dept. of Transportation
Mr. Robert C. Harder, Kansas Department of Health and Environment
Mr. Charles F. Jones, Division of Environment, Kansas Department of Health and Environment
Mr. Theodore D. Ensley, Kansas Department of Wildlife and Parks
Mr. Doug Sonntag, Kansas Department of Wildlife and Parks
Regional Supervisor, Kansas Department of Wildlife and Parks
Dr. Craig C. Freeman, Kansas Biological Survey
Dr. John S. Hickman, Cooperative Extension Service
Mr. Ramon Powers, State Historical Society
Dr. Mark A. Johnson, Dean of Agriculture, Kansas State University
Mr. Kenneth Kern, State Conservation Commission
Dr. Lee C. Gerhard, Kansas Geological Survey
Thomas C. Stiles
Blake Henning

RESPONSE TO KWO

1 The Kickapoo Tribal Council and the Nemaha-Brown Watershed Joint District Board have been contacted about the interest of the Kansas Department of Transportation (KDOT) for information about stream flow and water elevations on those structures that might affect state highways.

Normally contacts are generally not made with KDOT until plan/EIS approval and the sponsors are closer to construction of a specific site. KDOT is accustomed to contacting SCS regarding downstream effects on specific future KDOT projects.

Kansas Department of Health and Environment
Division of Environment
Bureau of Water - Nonpoint Source Section

M E M O R A N D U M

DATE: July 22, 1993

TO: Karl Mueldener, Director Bureau of Water

FROM: Don Snethen, Chief Nonpoint Source Section

SUBJECT: Upper Delaware and Tributaries Watershed, Atchison, Brown, Jackson and Nemaha Counties - Watershed Plan and Environmental Impact Statement

The Kansas Water Office is coordinating the state agency review of the subject documents. Comments for improving the plan and identification of impacts not adequately covered by the EIS are requested. Staff offer the following comments and recommendations.

The desire for this type of plan began in the 1950's when flooding problems were identified by people in the watershed. A watershed district was formed pursuant to Kansas statutes. This district has been actively seeking state funding for the construction of small watershed detention dams. The district claims that considerable progress has been made through state funding and more progress could be made if federal funding could be obtained through the PL 566 watershed program administered by the Soil Conservation Service. The Plan and EIS reflect the response of the Soil Conservation Service to the watershed district's request for federal financial assistance. In recent years the PL 566 program has evolved to be a more comprehensive water resources management program rather than simply to address flooding. To its credit the plan does attempt to address water quality protection, enhancement of drinking water supplies, and enhancement of recreation activities. Unfortunately, the desire of the watershed district for structural solutions to flooding problems appears to dominate the analysis and decision making process and the plan for the most part addresses water quality protection and restoration and recreation enhancement as incidental benefits of achieving flood control through structural means.

1. Wetland impacts are noted several times and the conclusion is reached that the plan will have no wetland impacts. We question whether this is indeed realistic. The plan identifies 4 types of wetlands being present in the project area, depressional areas along flood plains, oxbow channels, seeps or springs, and linear stream channels. The plan identifies 3,400 acres of depressional areas and 420 acres of linear wetlands. The plan does not provide any commentary concerning the benefits of wetlands. The plan does not note the benefits wetlands provide including providing substantial habitat for wildlife and serve as a natural water pollution control system. Many of the wetlands are assumed to be present in project area flood plains and if flooding is reduced, stream hydrology is modified and riparian area wetlands could be reduced in number and area. A similar impact would be expected to occur on the linear wetlands. On the other hand, the 21 proposed dams should also result in the creation of additional wetland area in the upper shallow areas of the impoundments. In addition, it would appear to be a simple matter to enhance these new created wetland areas during dam construction. The plan makes no mention of these additional wetlands.

   The plan does not provide an inventory of the oxbow channel wetlands and the seep or spring wetlands. While it is probably not realistic to inventory all seeps or springs, the oxbow channel wetlands should be relatively easy to inventory. Oxbow channels are probably the more critical wetlands for water quality protection because of their size and ability to store and process larger volumes of water. Because the oxbow wetlands are not identified, no action is contemplated to protect these important resources.

   At the minimum, the plan should:

   (1) State that the plan will result in no net loss of wetlands and will result in some quantitative increase in wetland areas associated with construction of the 21 dams.

   (2) Contain an inventory oxbow wetlands and propose some means to assure the long term maintenance and preservation of these areas.

   (3) Describe a means to enhance the amount of wetlands that will result from the construction of the dams and include such enhancement measures in the construction specifications of each dam.

2. The plan states that feed bunks, hog pens and stock tanks are frequently flooded. While not stated, we assume frequently flooded means the 10 year flood frequency. If these facilities are located in the 10 year flood plain they are too close to the streams to protect water quality and should be relocated.

   The plan indicates there are 136 livestock production enterprises within the planning area. The plan states that 16 livestock production enterprises will receive pollution controls by either relocation or structural pollution control measures. The presumption appears to be that the remaining 120 enterprises currently receive adequate pollution control. This appears to conflict with Table G, page 38 with indicates that 136 livestock problem areas will receive treatment. All livestock enterprises will need some type of pollution controls if the community health effects resulting from reduced fecal bacterial levels in streams is to be achieved (Table G, page 40). Based on studies conducted by the KDHE-Nonpoint Source Section for the Soil Conservation Service to support the planning process, we found that 84 percent of the livestock production enterprises need improved water pollution controls. We recognize that not all of these will necessarily need to be relocated or will need structural pollution control measures and assume that 16 is a reasonable number needing relocation or structural measures. If the plan is to seriously address water quality, all livestock production enterprises in the watershed need a pollution controls. These controls can range from the identified structural solutions to improved facility management practices including diversion of foreign drainage away from the area where animals are concentrated; providing an adequate buffer area between animal confinement areas, feeding, watering sites and shelters and water courses; frequent cleaning of accumulated manure; maintaining good grass conditions on grazing land; and use of manure as a crop nutrient and applying in a manner that will not be carried into water courses.

At the minimum the plan should:

(1) Provide at least 3 FTE of technical resources to assure that all livestock production enterprises have a water pollution control plan.

3. The plan proposes a multipurpose lake as a public water supply for the Kickapoo Tribe of Kansas. This is a reasonable objective supported by KDHE. The plan does not note or state that a watershed pollution control plan is needed to protect the quality of this planned water supply lake. Given the atrazine pollution problems in downstream Perry Reservoir, it is very likely this impoundment will also suffer similar atrazine problems.

At the minimum the plan should:

(1) Provide technical assistance resources to assure that a watershed pollution control plan will be developed to protect the water quality conditions of the planned water supply lake.

4. Groundwater is noted rather casually. About 30 percent of individual household wells have nitrate concentrations greater than 10 mg/L. We consider this to be a significant water quality problem. We also question whether these nitrate problems can all be attributed to natural sources as claimed in Table E, page 22. Table E also conflicts with the discussion on page 17. The plan notes that many of these problems are probably related to activities near the well site however if the plan is to be a comprehensive water resources management plan, these areas should also be addressed.

At the minimum the plan should:

(1) Provide resources to improved farmstead and household pollution control management to protect the drinking water supply. A three year effort to apply the Farm*A*Syst program to the watershed would be appropriate.

(2) Consider the feasibility of establishing a public water supply system to residents of the watershed.

5. The permits and compliance section should note that designed livestock pollution control systems (such as detention systems and vegetated filter systems) must have permits from KDHE. The plan should also note that any action subject to Section 404 permitting must also receive a Section 401 water quality certification. KDHE is responsible for providing such a certification.

6 The plan indicates that implementation will result in a moderately high achievement of water quality goals. We have no reason to dispute this conclusion if the implemented plan will result in maintenance of existing wetlands and good condition riparian areas, enhancement of wetlands, implementation of riparian area improvements, implementation of nutrient and pesticide management plans on a substantial portion of the watershed, and livestock pollution controls for all livestock enterprises.

C Northeast District Office

RESPONSE TO KDHE

1 Methodology and conventions of identifying wetlands have not been agreed upon. At the time of planning, a moratorium on identification of additional wetlands existed while the National Academy of Science reviewed these issues. A section on wetlands has been added to Appendix C, Investigation and Analysis Report. This shows rationale for concluding that the project's impacts on wetlands will be minimal or none. While we believe the dams will create additional wetlands, no effort has been made to quantify them during the moratorium.

While we agree that the dams can be enhanced for the creation of wetlands, no sponsor or interest has been shown during planning. SCS would be willing to work with local sponsors and KDHE or any other interested group to propose wetlands creation or enhancement associated with watershed dams.

2 The statement on flood problems has been revised.

Page 38 notes that 136 livestock problem areas will be adequately treated. KDHE's reports to SCS indicate approximately 22 are currently adequately treated. Page 36 notes that Livestock Waste Management Systems will be used to treat 16 areas. The remaining 98 will be treated through management or structural land treatment practices. Financial and technical assistance dollars amounts are included in the land treatment systems.

3 We agree that a watershed pollution control plan (WPCP) should be developed for the water supply site. Many of the treatment practices that a WPCP would require, such as an emphasis on pesticide management, are already included in this Plan/EIS. Whereas the Tribe is an entity equal to and/or separate from the State of Kansas, it may not be bound by state mandate. We recommend that KDHE contact the Tribal Council suggesting the advantages of developing a WPCP and offering assistance.

4 Technical assistance to be provided for the protection or improvement of farmstead or household water supplies is noted in the first paragraph on page 46. The reference to "Farm*A*Syst" has been added as suggested.

Public meetings, news articles, and personal contacts requested any individuals or groups interested in the development of a water supply for a public system become involved in the planning process. No immediate interest has been shown in developing an additional rural distribution system.

5 This section has been revised to emphasize known permits needed and sponsors' responsibilities.

6 KDHE provided us the terminology "moderately high" in referring to the project's potential to meet State water quality standards. The plan elements were conservatively assembled and agreed upon by a multi-agency, interdisciplinary group that included local sponsors including the Kickapoo Tribe. The sponsors believe that the public participation process reasonably demonstrates the needed support to implement the plan.

KANSAS STATE BOARD OF AGRICULTURE
Sam Brownback, Secretary

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer-Director
901 S. Kansas Avenue, Second Floor
Topeka, Kansas 66612-1283
(913) 296-3717 Fax (913) 296-1176

July 23, 1993

MR STEPHEN HURST DIRECTOR
KANSAS WATER OFFICE
109 S KANSAS STE 300
TOPEKA KS 66612-1249

Re: EIS, Nemaha-Brown WJD No. 7

Dear Mr. Hurst:

Thank you for the opportunity to review the draft EIS for Upper Delaware tributaries watershed. The following comments regarding this draft document are made by Warren D. Lutz and George A. Austin of my staff. Please feel free to use these comments in response to the Soil Conservation Service-USDA, or transmit this information in its entirety.

1. The EIS indicates that a modified general plan for the Nemaha-Brown Watershed Joint District Number 7 will be required under the Kansas Watershed District Act. The modified general plan should be submitted to the Chief Engineer for his approval prior to the contemplation of constructing any of the structures identified in the EIS.

2. The Nemaha-Brown Watershed Joint District Number 7 should be advised that under the Kansas Watershed District Act, it may be advisable for the district to hold public hearings regarding the change in the method of financing of their structures. The method of financing requires public input and any changes in such method probably should occur with additional public hearings. The watershed district should proceed on this matter under the advice of their attorney.

3. We note that the construction of Multipurpose Dam Number 21-14 will be on indian reservation land. The majority of the drainage area and a portion of the impoundment will be located on non-Indian lands. While the tribe is not necessarily subject to the Kansas Water Appropriation Act, it may be to the tribe's interest to file for a water appropriation permit for the volume of water stored and used in connection with MPD Number 21-14. This will provide us with an avenue to administer water rights upstream from the reservoir in a manner consistent with the Kansas Water Appropriation Act. Any right to appropriate water acquired by the tribe under Kansas statutes would probably enable this agency to administer the tribe's right, were it ever impaired by an upstream party. Ultimately, the quantification of the tribes Federal Reserved Water Right may be necessary or desirable to address this and related water allocation issues.

4. There is a statement that a non-structural alternative was considered for the establishment of permanent vegetation within the 100-year floodplain and the raising of roads and bridges above flooding elevations. The statement indicates that such an alternative is not found socially or economically acceptable. While that may be the actual case, we do not find any information which details this unacceptability. In the comparison of alternatives, the four alternatives that were economically analyzed did not include this non-structural alternative so that no true economic comparison was presented in the EIS as to the economic feasibility of the non-structural alternative. In addition, no comment or indication was presented as to how it was determined that this alternative was unacceptable socially. It also was not indicated to whom the decision for social acceptability was presented. As a consequence, we suggest that the non-structural alternative would be addressed in more detail than is currently presented in the EIS.

5. Under the heading, "Permits and Compliance," there is an indication that a permit to construct is required by the State of Kansas. As a matter of fact, there may be more than one permit required by the State of Kansas, depending on the various statutes required. For instance, the Division of Water Resources actually issues two approvals or permits for each watershed district dam constructed. One is a specific project approval under the provisions of the Kansas Watershed District Act and the second is a permit to construct under the Obstructions in Streams Act. Other permits which may be required by the State of Kansas would include threatened and endangered species permits from the Kansas Department of Wildlife and Parks, Section 401 permits administered by the Kansas Department of Health and Environment, or permits with regards to alterations or modifications to national historic sites or archaeological sites administered by the Kansas State Historical Society. It appears that with the participation of the agencies involved with the production of the EIS, more specific reference to those approval processes should be made.

6. Hazard classifications of dams are conducted by this office in connection with its review of the structures for permit to construct and specific project approval. This agency does take into account reasonably foreseeable future potential for development in assessing these hazard classifications. Our assessment is not limited solely to existing structures so it is possible that there may be conflict between the preliminary hazard classification identified in the EIS and what may finally be required during the plan review phase.

The comments above are intended to inform the appropriate agencies regarding the Division of Water Resources programs and administration that may be affected by or have an affect on the proposed plan. The Division of Water Resources would recommend that the EIS recognize those concerns and address them appropriately. Again, thank you, Steve, for the opportunity to comment on this matter. If there are any questions please feel free to contact Warren D. Lutz or George A. Austin, or me regarding this matter.

Sincerely,

David L. Pope, P.E.
Chief Engineer
Division of Water Resources

DLP:GAA:mrj

pc: Mr. Warren D. Lutz
Mr. George A. Austin
Leita Hiebsch, A-95 # 93.66

RESPONSE TO DWR:

1 Modification of the Nemaha-Brown Watershed Joint District's general plan appears to be needed. Normally this action is taken after the proposed plan/EIS is approved and authorized to use federal funds.

2 A public meeting for the sole purpose of reviewing this water resource plan/EIS was held July 22, 1993. The methods of financing the project were covered. It has been suggested the watershed district board follow up on this concern with the Division of Water Resources.

3 The Tribe has been notified of your concern. The responsibility of the sponsors to ensure water rights is noted on page iv of the Watershed Agreement, Item 2, and on page 49 under "Permits and Compliance."

The relationship of tribal reservation boundaries and tribal land ownership is recognized by federal agencies similar to state boundaries and state ownership.

4 The write-up on page 31 dealing with a non-structural alternative has been expanded to provide more details.

This alternative was reviewed with the watershed district board and found to be socially and economically unacceptable.

Some of the rationale for dropping detailed consideration of a non-structural alternative are as follows:

Loss of income incurred converting from flooded cropland to flooded grassland amounts to approximately $210 per acre or $1.9 million to the project area. The annual cost of converting to grass and raising roads and bridges is approximately $1 million. The cost of $1 million combined with "benefits" of minus $1.9 million gives this alternative a net "benefit" of minus $2.9 million. Normally an alternative is not evaluated in detail unless it has an economic benefit-to-cost ratio of at least 0.8:1. This alternative is less than 0:1. It is not economically feasible.

The interest of individual landowners in reducing their income by $210 per flood plain cropland acre is low. The economics for owners and operators give this type of alternative a low social acceptability. One attempt to over come the low social acceptability is to purchase easements, which drives up the cost another $5 to $10 million. This reduces the economic feasibility of the project even more.

For the general public, the income of the community is reduced by approximately $1.9 million annually and over a million dollars in annual taxes are needed to pay for road and bridge changes. The social acceptability of the local public reducing their income and paying more taxes is low.

5 More than one state permit maybe required before actual construction. No effort has been made to list all the permits required. Permit requirements can change. Sponsor responsibility for them has been emphasized.

6 Present hazard classification has considered future development downstream from the dam in the breach area. The hazard classification of each structure is updated prior to final design.

STATE OF KANSAS

Joan Finney
Governor

DEPARTMENT OF WILDLIFE & PARKS

Theodore D. Ensley
Secretary

August 3, 1993

Mr. Larry Miles
Soil Conservation Service
760 South Broadway
Salina, KS 67401

Ref: D1.0402
Nemaha Brown WJD #7
Upper Delaware & Tribs.

Dear Mr. Miles:

The Kansas Department of Wildlife and Parks is pleased to provide these comments on the Draft Plan/Environmental Impact Statement for the Upper Delaware and Tributaries Watershed Project. These comments are considered to be supplementary to the comments submitted on the preliminary draft on January 4, 1993. Our earlier comments should be included with this response.

General Comments:

Our agency would like to again recognize the Soil Conservation Service for its inclusion of nonstructural floodplain protection measures within the NED and preferred alternatives. These measures, featuring riparian woodland protection, are an important first step in developing a more holistic approach to solving floodplain problems beyond attempts to control excessive flood waters.

Future watershed planning should build upon this effort to include a nonstructural alternative that will help identify those practices which are most cost-effective and that may be included in the NED alternative. Our agency also is interested in broadening the existing woodland/wetland mitigation policy used for P.L.566 planning to emphasize protection of existing habitats and to provide greater flexibility in meeting mitigation requirements so as to attract a greater degree of protection/restoration within the floodplain itself where such habitats are most valuable. Finally, we would like to continue to work with your agency on the assessment of economic benefits associated with recreational hunting and fishing and perhaps offer an alternative approach to that used for assessing stream fisheries benefits in this draft plan.

Another recommendation for improving future watershed plans is to address the issue of stream channel and wetland restoration. Many of the watersheds in Northeastern Kansas have undergone significant alterations in the past that have contributed to today's floodplain problems. This plan stops short in dealing with these resources. We recommend a more proactive approach that explores restoration of channelized streams and/or floodplain wetlands as a means to retard flood waters and to restore naturally functioning floodplains.

Specific Comments:

1 Page vii, item 14 - Language needs to be clear that landowners may donate all or part of the KDWP share similar to donated land rights for construction of dams. Also, inclusion of KDWP as a project sponsor should not bind our agency to provide resources that would be used to meet mitigation requirements. Mitigation is the responsibility of the project sponsor and KDWP does not consider itself a project sponsor in this regard. Investments made by KDWP are intended to result in net gains to the resource.

2 Page 19, last paragraph - After "caused closing of two camping areas and boat ramps," add "These areas are now open to day use only."

3 Page 24, "Terrestrial" paragraph, last sentence - Add "if managed properly in native vegetation."

4 Page 27 - Overgrazing is identified as a problem in both riparian and upland woodlands. Will cost-share be available for fencing and alternative livestock watering as an approved woodland enhancement practice?

5 Page 30, Table F - Conversion of floodplain cropland to riparian vegetation should be given a "+" for lines 2 and 4 and arguably for 5 and 6 as well. Conversely, it is unclear how flood water retarding dams and the multipurpose dam stabilize gullies and maintain existing erosion control practice. Why is more engineering needed to maintain existing engineered erosion control practices? "Improve stream aquatic habitat" should be N++- because it is uncertain whether any improvements in water quality offset complete loss of linear streams. Similarly, treatment of uplands should be rated as an N for improve of wildlife habitat and increase habitat diversity. Not all upland practices improve conditions for wildlife.

6 Page 31-33, Alternatives 1-4 - Please provide documentation of stream fishery values in a separate report to our agency. Stream fishery values represent 15 percent of total net annual benefit of this project. Do these economic values affect the feasibility of individual structures? Have any of these benefits been credited to riparian woodland restoration? In the future, our agency will be willing to provide recreational data for watershed projects only if we are able to maintain a greater oversight role in reviewing analyses.

7 Page 46, Paragraph 3 - SCS may consider adding constructed wetlands for wastewater treatment as a livestock waste management practice.

8 Page 46, Riparian and Wetland Treatment Systems - Future plans should include much larger acreage targets for these valuable habitats, perhaps in conjunction with a revising to the current mitigation policy. In particular, we encourage SCS to consider a major channel restoration or wetland restoration project in the future to assess the effectiveness of these alternative nonstructural practices.

9 Page 54, Paragraph 3 - Modify sentence 2 to read, "The KDWP will be the lead sponsor on this measure in cooperation with the Watershed District, County Conservation Districts, KSEF, SCS and other sponsors." Change the last sentence by striking "numerically" and insert "for funding consideration."

10 Appendix C, Page 13 - Increased stream flow at low flow periods are claimed as a recreational benefit of dam construction. Does SCS have any empirical evidence that substantiates the estimate that 30 additional miles of perennial streams would be established?

Sincerely,

Eric W. Schenck, Chief
Environmental Services Section

EWS:cs

xc: Steve Hurst, KWO
John Strickler, SEF
Paul Liechti, KBS
Chris Mammoliti, KDWP
Roger Wolfe, KDWP
Randy Whiteaker, KDWP
Chuck Bever, KDWP
Bob Bergquist, KDWP

NBJWD04049

RESPONSE TO KDWP

1 The comment states a similarity between land rights for construction of a dam and the land rights for a riparian woodland treatment. In both cases land rights can be donated or bought. In the case of the dam, the watershed district has full responsibility for land rights. They pay 100 percent of the cost or receive 100 percent of the donation. In the case of the riparian woodland treatment, the SCS has half of the responsibility and a non-federal sponsor has half of the responsibility with the KDWP being the non-federal sponsor in this case. If a donation is made, it is split 50/50. Where a land right is purchased, the cost is split 50/50.

The Plan/EIS has been modified to clarify the mitigation responsibility. On page 48, last paragraph, "sponsors" has been changed to "watershed district and/or Kickapoo Tribe." Watershed Agreement Items 6 and 7 on page v have been expanded to include mitigation.

2 Page 19, last paragraph, has been modified as suggested. The word "primitive" was added to the description. Also added was the sentence, "Restrooms, trash pick up, and most services have been discontinued."

3 Paragraph has been modified to state CRP will provide improved habitat. The prior sentence notes a large amount of the conversion is to native vegetation. Since the CRP is under contract, it is expected to be managed properly. CRP habitat in native vegetation is an improvement over its prior cropland use.

4 Pages 46-47 and pages 54-55 discuss the riparian woodland treatment systems and their installation. Page 47, second paragraph, notes that land treatment practices installed in areas outside of the riparian zones will be funded through other state or federal programs. Page 54, second full paragraph, notes that there will be 65 percent cost-share on practices in the riparian zone. It also includes fencing as one of those practices. In Appendix C, Page C-4.5, is a table noting cost-share rate for land treatment practices. Fencing is covered in all three categories. Using the footnote, a livestock pond could be authorized under the riparian woodland category. Cost-sharing authority can be added during the implementation phase for new and proven livestock watering systems.

5 This table/matrix was meant to be used to make judgments for selecting measures to be combined into alternatives during formulation. The first six ratings come under the heading "To Increase Agricultural Income." Under the second column, "Conversion of Flood Plain Cropland to Riparian Vegetation," stabilize gullies was given an "N." Land use conversion would not stop existing gullies. If still growing in 15-30 years, trees would slow the rate of future gully growth. Loss of agricultural income would occur until then for the gully voided areas and the area converted to permanent vegetation. "Reduce flood damages to cropland:" Conversion to a permanent vegetation would reduce flood damages but it would reduce average annual income more than the flooding.

Engineering needed to maintain engineering: Existing engineering practices include gradient terraces and grass waterways for the purpose of controlling sheet and rill erosion. New engineering practices are to control gully erosion which has advanced upstream. If uncontrolled, gullies will advance up through waterways and into terrace channels.

The stream report prepared by KDWP states that meeting water quality goals will improve aquatic habitat. During the Tri-agency habitat assessment the loss of linear stream habitat was evaluated with documentation of minimum loss to aquatic habitat. Rating has been left as a "+."

Not all upland practices improve conditions for wildlife: The heading refers to Resource Management Systems (RMS). KDWP has recently assisted in the development of the Kansas Habitat Assessment for RMS's. In this evaluation, individual practices with the system are rated for relative value towards terrestrial wildlife. Each RMS will have to meet a minimum level of treatment ensuring a neutral or positive effect on wildlife habitat.

6 Stream fishery is an "off project" value or a value occurring downstream from the project area. It accounts for 3 percent of the project's total benefits. Riparian woodland enhancement is expected to have most of its effect at the site of enhancement and less effect downstream from the project. A majority of the downstream benefits are credited to dams which stop a larger portion of the sediment. The feasibility of any of the individual floodwater retarding dams is not effected by the stream fishery value.

The riparian woodland enhancement benefits dealing with improving the fishery of the streams within the project area are shown in other accounts. The accounts that "on project" benefits of riparian woodland treatment are credited to include: reduction of erosion and sedimentation and reduction of nutrient delivery. Eighteen thousand dollars from these accounts along with approximately $10,000 for increased recreation opportunity related to the increase in wildlife habitat are credited directly to riparian woodland treatment. This riparian woodland enhancement has a benefit/cost ratio of 1.05:1.

7 The list on Page 46, paragraph 1, includes those practices commonly used in livestock waste management systems. The use of wetlands for waste water treatment is a relative new concept with limited documentation. New and proven treatment practices can be added during the implementation phase.

8 State and federal agencies working with the local landowners through the districts agreed on what the riparian element should be. The amount of riparian acres and wetland acres were part of that consensus. The group agreed that the need was large but the public participation rate would be limiting. If the information and education actions of the project achieve a greater interest, the SCS would be agreeable to revising this project's or future projects' target amounts.

9 Revision made as suggested.

10 The statement does not say that intermittent streams will be converted to perennial streams. The stream flow due to seeps from extended flows through or releases from the dams will protect fishery population during extended droughts. In situations like the dry summers of 1989 and 1991 where river channel dried to a series of pools, dams could be used as sources of enhanced stream flow.

The University of Kansas

Kansas Biological Survey

July 21, 1993

Mr. Stephen A. Hurst, Director
Kansas Water Office
109 SW Ninth, Suite 300
Topeka, KS 66612-1249

Dear Mr. Hurst,

Thank you for the opportunity to review and comment on the Interagency Review Draft Watershed Plan and Environmental Impact Statement for the Upper Delaware and Tributaries Watershed. The following comments are offered for your consideration.

Watershed resource management and planning seems to be an increasingly complex process in that natural resource values that have not typically been taken into consideration are now being included as plan components. One factor we would have expected to have been considered in more depth is the relationship between flood damage and past channel straightening and shortening. Past channel straightening was identified as having caused erosion and channel incision in the basin, but there was no discussion of how this may be contributing to flood damage or whether or not corrective measures, such as reconstructing altered channel segments, were considered.

In the discussion of the Formulation Process it is stated that various alternatives were considered. One non-structural alternative was mentioned as being considered: "...establishment of the 100-year flood plain to permanent vegetation and the raising of roads and bridges above flood levels." We feel considering alternatives of this extreme to be unreasonable and it is not surprising that this alternative was found to be socially and economically unacceptable. We would hope that more reasonable non-structural alternatives were also considered, such as establishment of the 10-year, 5-year or 2-year flood plain to permanent vegetation and selectively raise bridges and/or roads in the most flood prone areas.

Table G summarizes and compares the four candidate plans. The information in the table concerning Alternative 1 (Future Without Project) appears inaccurate. On page 36 under MEASURES, no information is provided concerning the number of flood retarding dams and no acreage is given for conservation treatment systems. However, in the discussion of Alternative 1 on page 31 it is stated that over the next 50 years the watershed district will continue to construct state-funded dams and the going conservation program will treat 21,350 acres of cropland. While this alternative will probably not adequately address the problems identified, we feel it should be accurately represented to allow for a fair comparison of four the alternatives.

2041 Constant Ave. • Lawrence, Kansas 66047-2906 • (913) 864-7725

Of the four main resource problems identified by the sponsors for solution and the six resources of concern discussed, erosion stands out as one of the more important economic loss factors, nearly equal to floodwater losses (Table 5, page 65). We are not sure how these dollar losses were calculated, but if the amount estimated is real, we hope that the projected 90% landowner participation will come to fruition.

We concur that of the four alternatives considered, Alternative 3 appears to best meet the designated objectives and we are pleased to see that wildlife habitat value that will be lost due to construction will be compensated.

Again, thank you for the opportunity to comment on the draft plan and EIS.

Sincerely,

Paul M. Liechti

Paul M. Liechti
Assistant Director
Environmental Review Contact

RESPONSE TO KBS

1 Scoping of project problems and alternatives has not previously identified reconstructing channel segments as an alternative; therefore, it was not considered. Earlier identification of such an alternative on this project would have allowed evaluation of the effects in greater detail. Judgmental analyses indicate that flooding downstream from the straightened area would be reduced due to reconstruction and flooding would increase in the vicinity of the reconstruction. The net effect in Upper Delaware and Tributaries Watershed would be small and could be either a slight increase or decrease in flood damage.

2 While a separate non-structural alternative was found to be not viable, the use of non-structural practices was considered in the formulation of other alternatives. The non-structural practices, riparian and other woodland treatment systems and riparian woodland easements, were included in alternatives 3 and 4.

3 Alternative 1 is forecast as "future-without-project" action. This is the baseline conditions. The state-funded dams and going land treatment noted on page 31 are also expected to occur in the other alternatives. The measures shown in alternatives 2 through 4 are those that a federally-supported project would install.

4 On page 31, the first full paragraph notes "approximately 90 percent" participation in land treatment. Present land treatment rate is approximately 70 percent. Small drainage areas in the project area are presently treated to a 90 percent level and small drainage areas in adjoining watershed areas have reached 95 percent. Local conservationists forecast the potential to reach a 90 percent participation in a land treatment program with additional financial and technical assistance.

KANSAS STATE HISTORICAL SOCIETY

CENTER FOR HISTORICAL RESEARCH
120 West Tenth • Topeka, Kansas 66612-1291 • 913/296-3251
FAX #913/296-1005

KANSAS MUSEUM OF HISTORY
6425 South West Sixth • Topeka, Kansas 66615-1099 • 913/272-8681

August 20, 1993

James M. Habiger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

Re: Draft Watershed Plan and EIS
Upper Delaware and Tributaries Watershed
Atchison, Brown, Jackson and Nemaha Counties

Dear Mr. Habiger:

Staff review of the draft "Watershed Plan and Environmental Impact Statement: Upper Delaware and Tributaries Watershed" has been completed. We apologize for submitting these comments after the review deadline, but we understand through conversation with your staff that they are still wanted and can be incorporated into the revised document.

We agree with the statements made in the plan that the proposed structures will not affect any property listed on the National Register of Historic Places; however, we note that prehistoric archeological sites and historic buildings have been recorded within five of the 20 watershed structures proposed for PL566 funding (see table below). These sites and buildings have not been evaluated for their eligibility to be listed on the National Register.

Watershed Structure	Remarks
31-25	Site 14NH321 - Nebraska Aspect
26-15	Site 14BN310 - Unknown, Historic Bldg. (1919)
15-30	Site 14BN1320 - Nebraska Aspect
20-17	Historic Bldg. (1919)
25-35	Historic Bldg. (1887)

Other watershed structures proposed for construction have not been examined for the presence of either archeological sites or historical buildings. However, we note on page 25 of the plan that archeological surveys will be completed for all structures and the multipurpose dam.

Construction proposed in the plan will not affect properties currently listed on the National Register, but there are properties not yet evaluated that will be affected. The plan provides for the proper evaluation of those properties, however, and this office approves of its implementation. We hope the information about the number and kinds of properties already inventoried will assist you in planning for the construction of these watershed structures.

If you have questions or need additional information about these comments, please contact Mr. Martin Stein at 913 296-5294.

Sincerely yours,

Ramon Powers
State Historic Preservation Officer

Richard Pankratz, Director
Historic Preservation Office

RP/ms

cc: Kansas Water Office

No response necessary

KSU KANSAS STATE UNIVERSITY

Cooperative Extension Service
State and Extension Forestry
2610 Claflin Road
Manhattan, Kansas 66502-2798
913-537-7050
FAX: 913-539-9584
Postage Paid

August 4, 1993

James N. Habiger
State Conservationist
Soil Conservation Service
760 South Broadway
Salina, KS 67401-4642

Dear Jim:

We have completed review of the draft Watershed Plan and Environmental Impact Statement for the Upper Delaware and Tributaries Watershed.

We have worked closely with your staff and the Kansas Department of Wildlife and Parks in development of this plan. Because of this early involvement in the process, we have very little to comment on at this time. On a very minor note, we would suggest our title be Kansas State and Extension Forestry and eliminate the word "the" for sake of consistency. I have attached the pages with the suggested deletions marked in red.

We want to commend the SCS and other project sponsors for their willingness to break new ground and include the element of riparian woodland treatment as non-structural measures for water quality in the PL 566 cost share. We have really appreciated the open and cooperative attitude of SCS staff as we worked through this process.

We look forward to working with the sponsors as this plan is implemented. We believe the inclusion of a riparian woodland element will provide positive water quality benefits to the overall project.

Thank you for the opportunity to review and comment on this plan.

Sincerely,

John K. Strickler

John K. Strickler
Extension Forester

JKS/gs

pc: Dave Bruton, District Forester
Steve Hurst, Kansas Water Office
Bill Ripley, R-2 Forest Service
Gordon Stuart, Forest Service, Washington

No response necessary

KSU KANSAS STATE UNIVERSITY

Cooperative Extension Service
Extension Agronomy
219 Throckmorton Hall
Manhattan, Kansas 66506-5504
913-532-5776
FAX: 913-532-6315

July 15, 1993

Stephen A. Hurst
Kansas Water Office
109 SW Ninth, Suite 300
Topeka, KS 66612-1249

Dear Steve:

I have completed my review of the Watershed Plan and Environmental Import Statement, Upper Delaware and Tributaries Watershed. I do not have many comments on the plan.

I think there is some recent USGS data on pesticides which would indicate some impairment in the Watershed. I am not sure how much of the data has been formally released, but I do not think this would change the out come of the report.

The plan indicates that nitrogen can dissolve in water and wash away in runoff (page 16). I imagine some of the nitrogen in the water is from nitrate that has leached into in the soil and moves into the stream as base flow. Again, this would not change the outcome of the plan.

I recommend the plan be favorably approved.

Sincerely,

John S Hickman

John S. Hickman
Extension Specialist & Coordinator
Water Quality

JH:cc

cc: Daryl Buchholz
Larry Miles

No response necessary

APPENDIX B

SUPPORT MAPS

Sediment Deposition Effects on Recreational Facilities at Perry Lake

Typical Earth Dam with Drop Inlet Spillway

Delaware Basin Map

Watershed Map Showing Subarea Boundaries

Breach Inundation Maps

Recreational Area Development Graphic

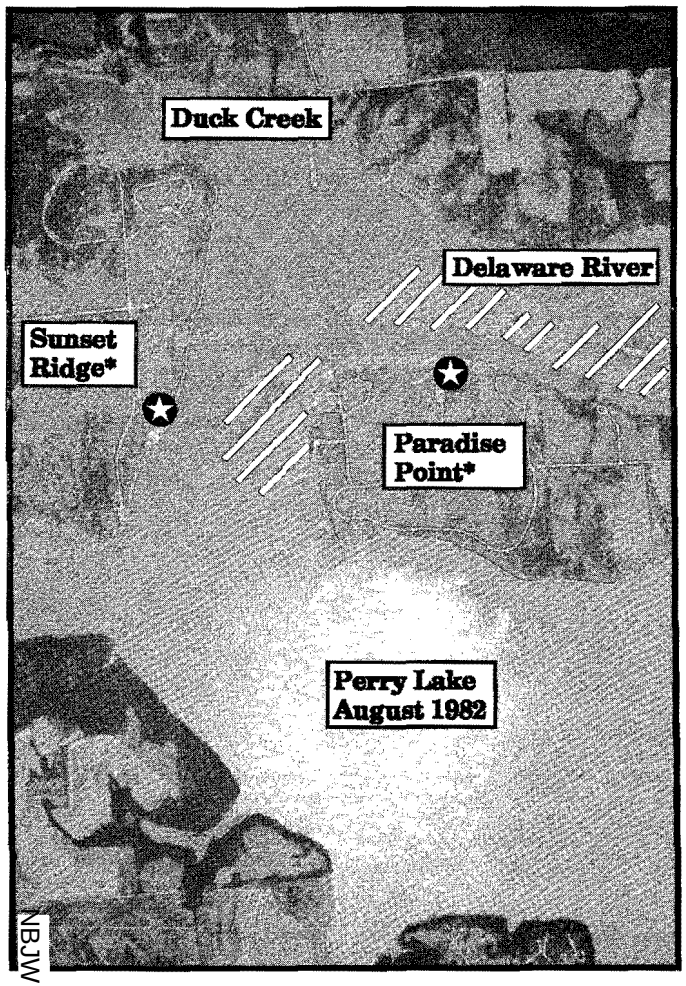
Sediment Deposition Effects on Recreational Facilities at Perry Lake

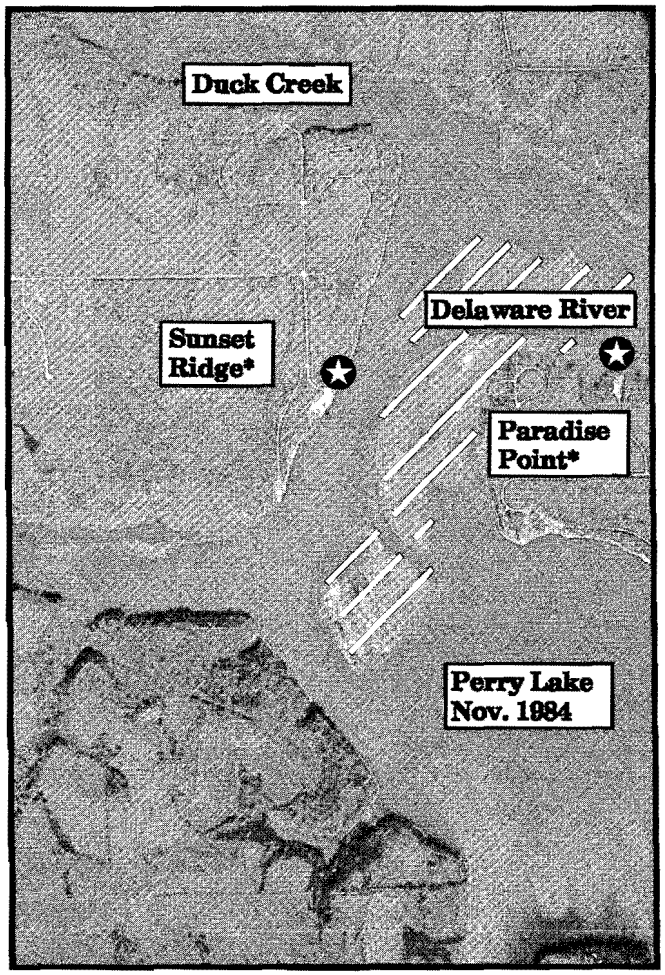
North

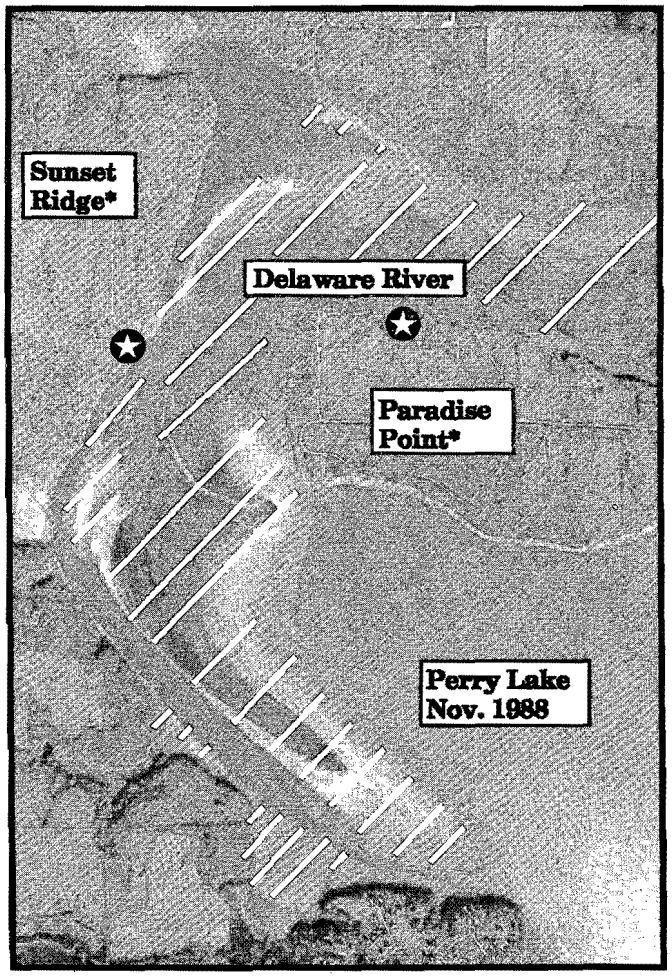
Sediment Deposition

Boat Ramps Affected

*Public Use Area



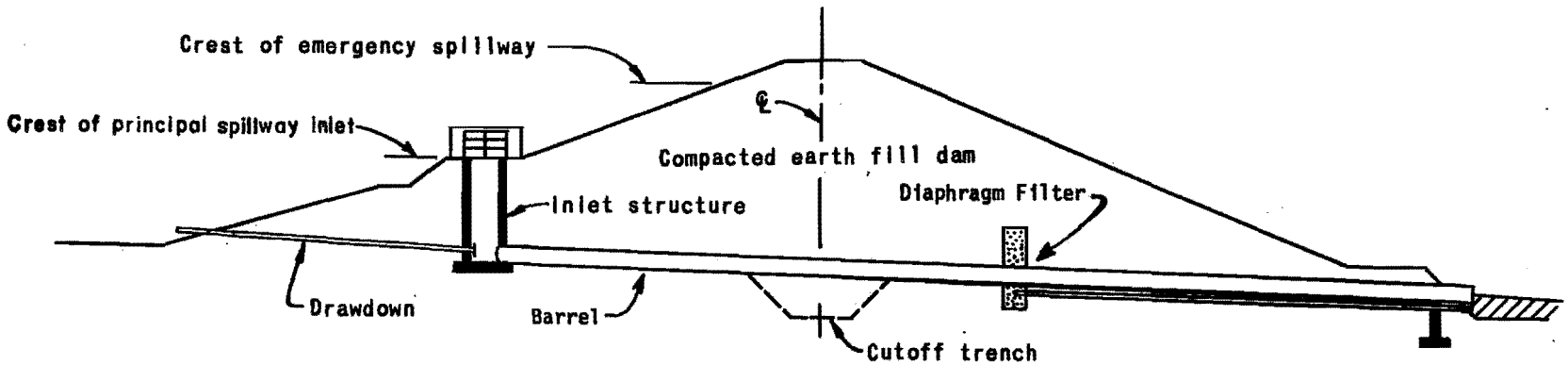




NBJW/D04055

SOIL CONSERVATION SERVICE

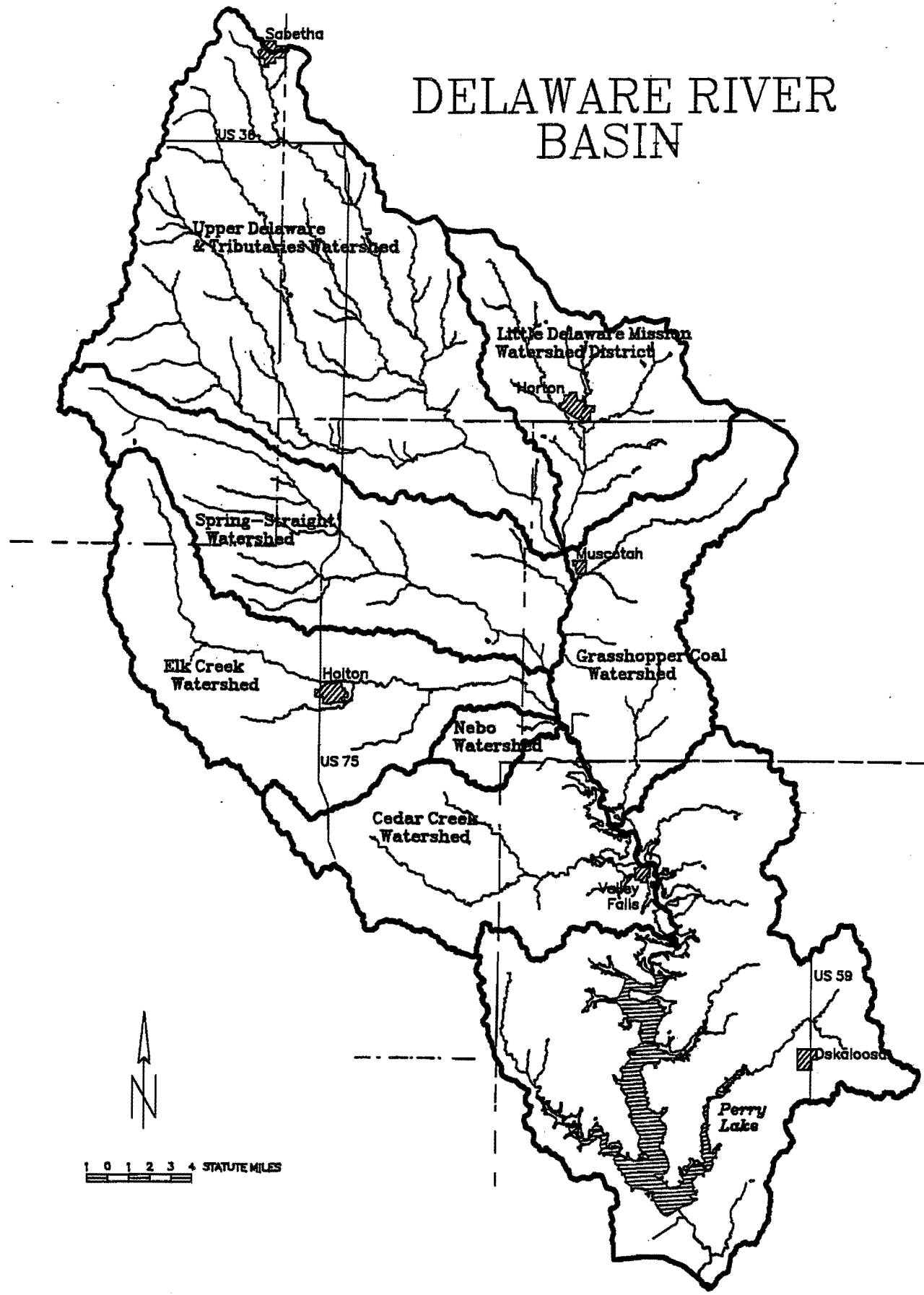
TYPICAL EARTH DAM WITH DROP INLET SPILLWAY



CROSS SECTION OF DAM ON CENTERLINE OF PRINCIPAL SPILLWAY

NOTES:

1. FOR INDIVIDUAL STRUCTURE DATA SEE TABLE 3.
2. EMBANKMENT AND FOUNDATION DESIGN FEATURES NOT SHOWN.



Source: USDA—SCS NRPP, 2/93.

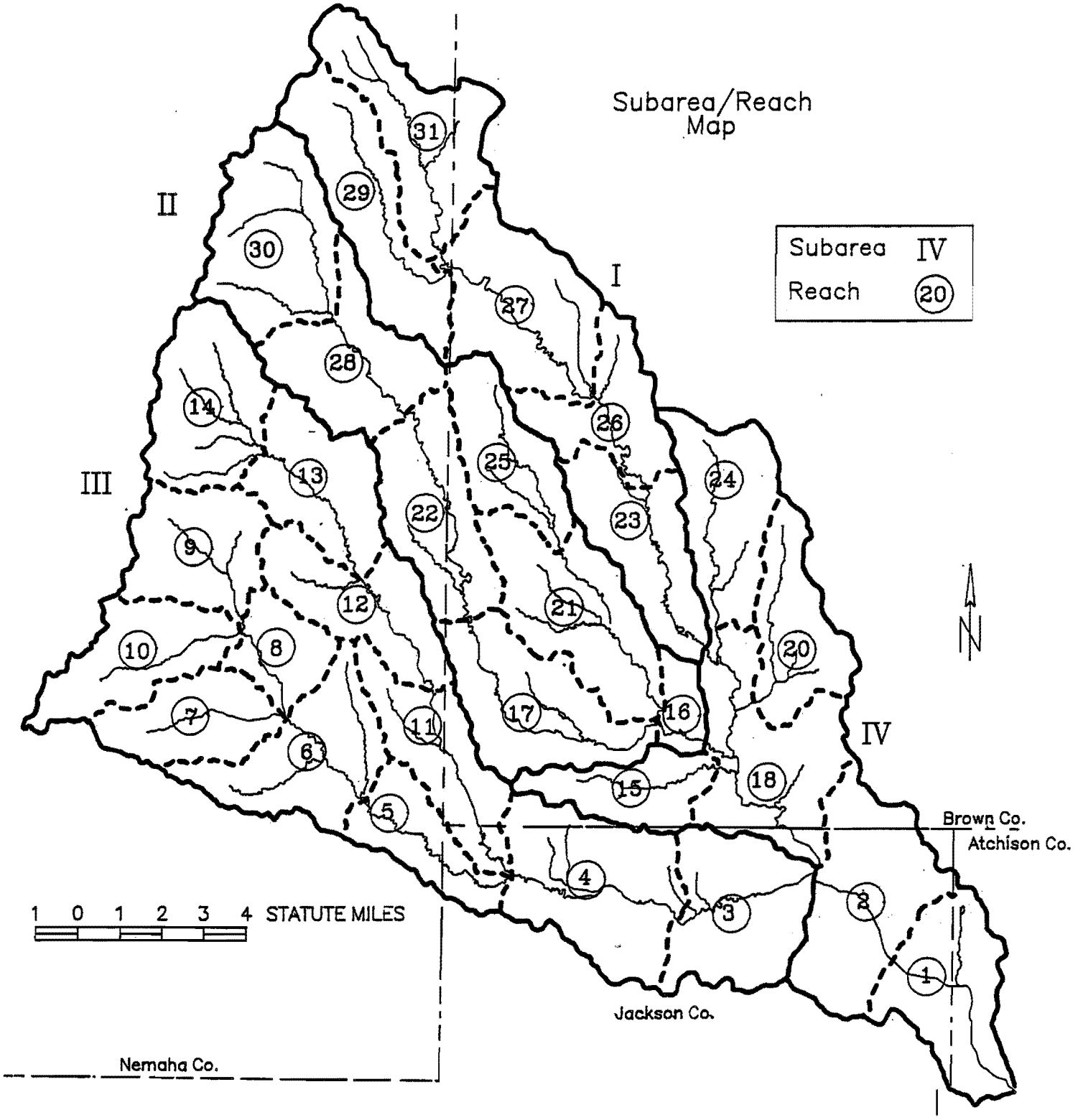
UNITED STATES
DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NBJWD04057

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

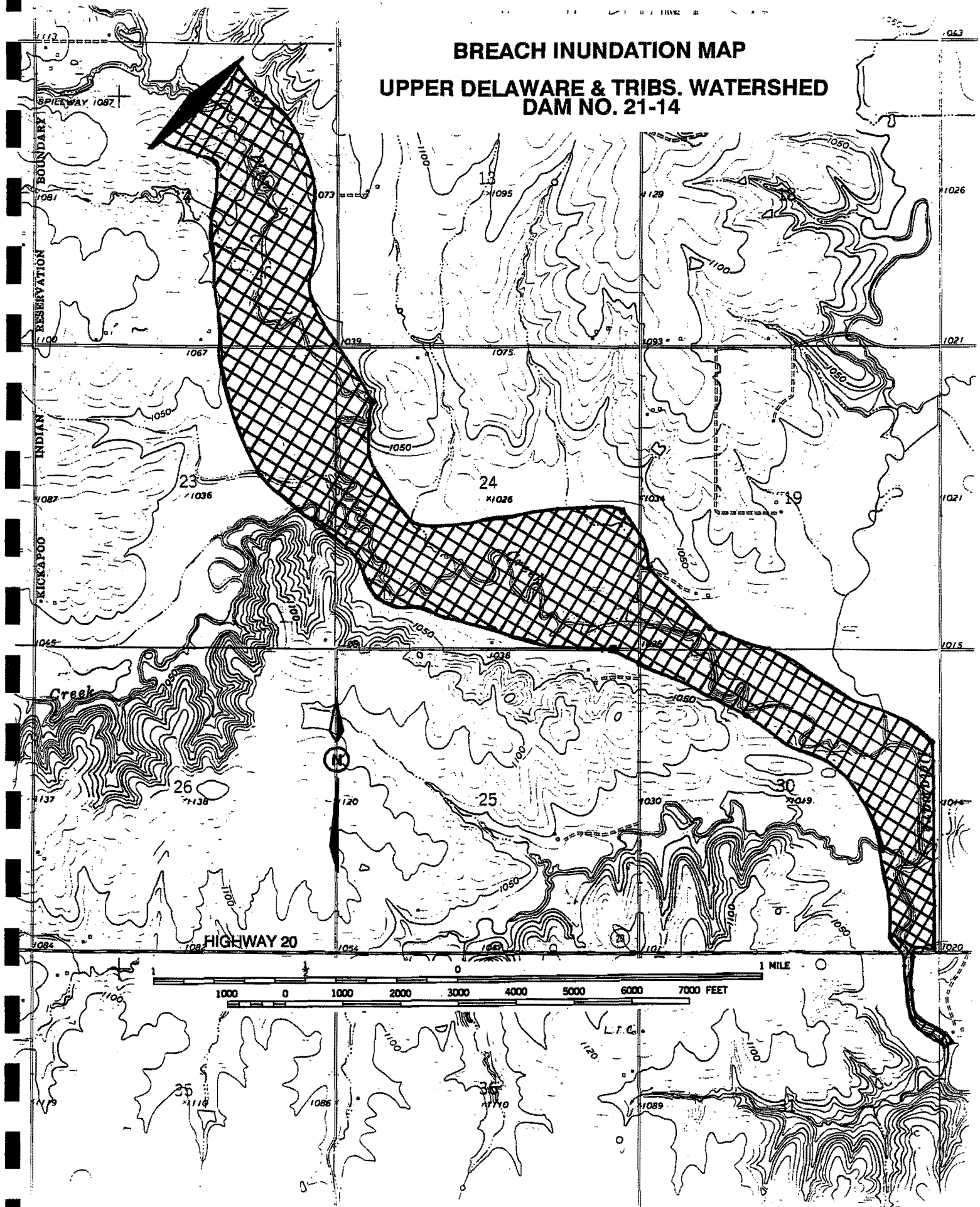
UPPER DELAWARE & TRIBUTARIES WATERSHED



Source:
USDA–SCS Kansas Natural Resource Planning Project
UTM projection zone 15, 2/93.

BREACH INUNDATION MAP

UPPER DELAWARE & TRIBS. WATERSHED
DAM NO. 21-14

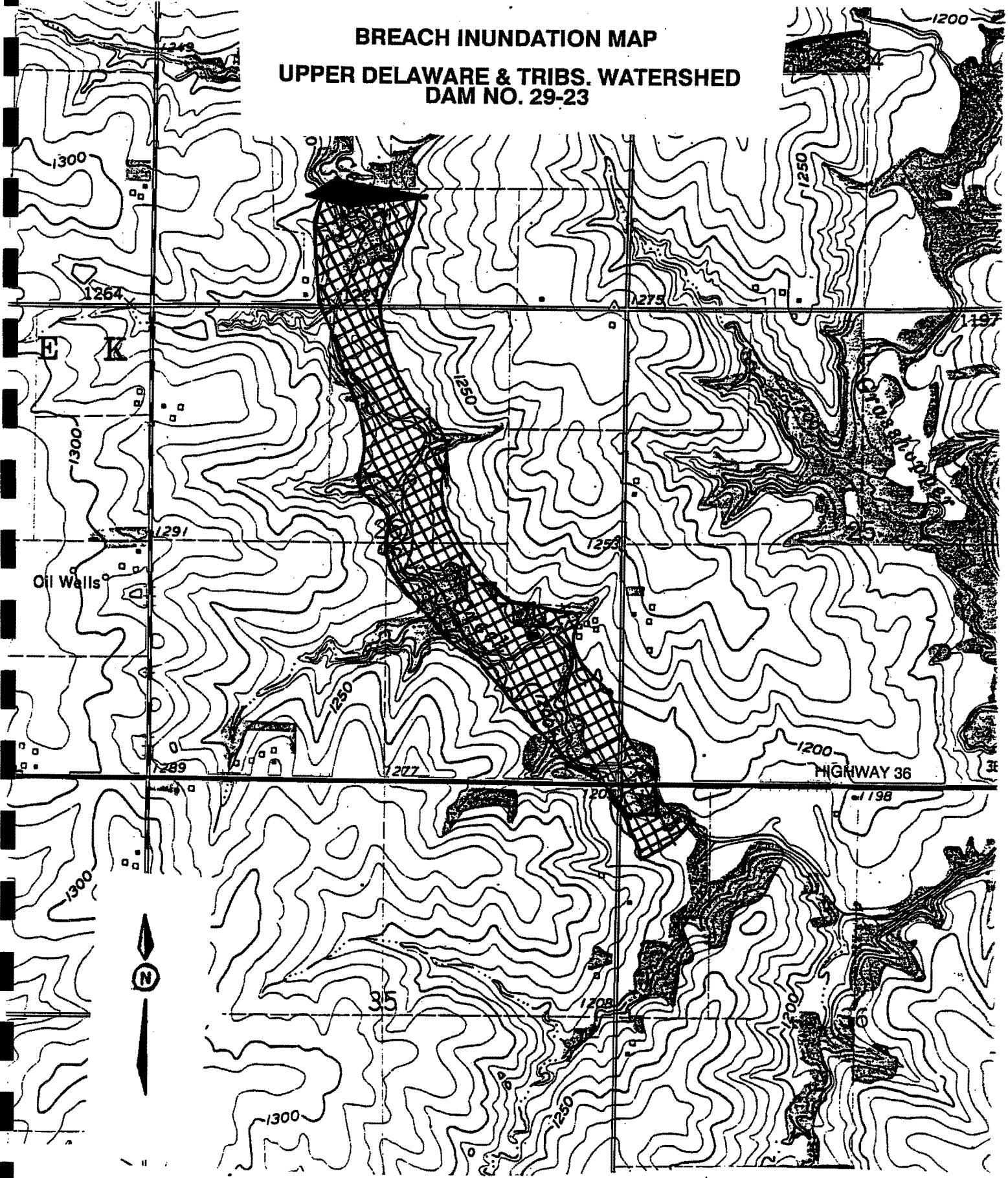


SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

NBJWD04059
B-5a

BREACH INUNDATION MAP

UPPER DELAWARE & TRIBS. WATERSHED
DAM NO. 29-23



½ 0 1 MILE

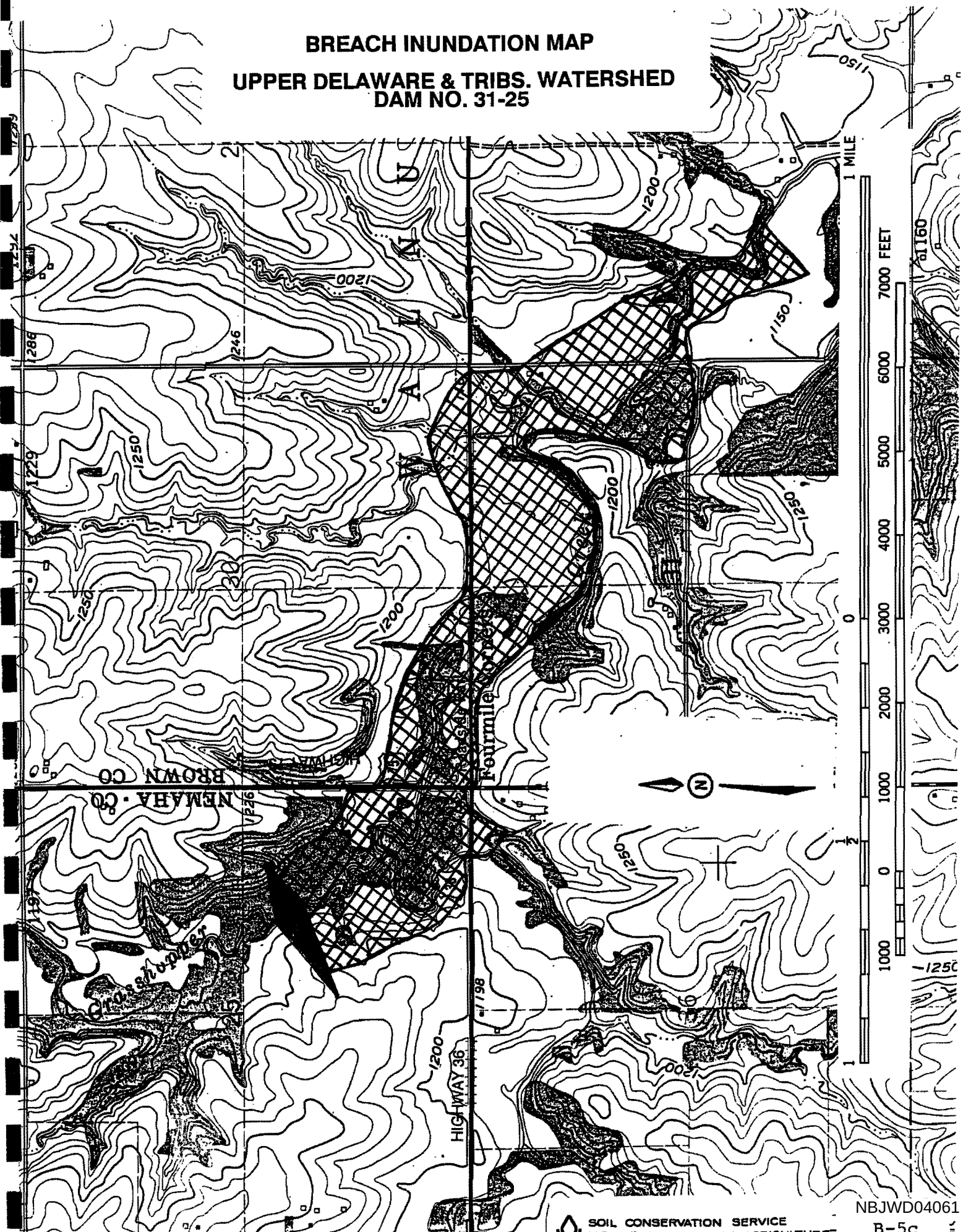
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF AGRICULTURE

NBJWD04060

BREACH INUNDATION MAP

UPPER DELAWARE & TRIBS. WATERSHED
DAM NO. 31-25



SOIL CONSERVATION SERVICE
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NBJWD04061

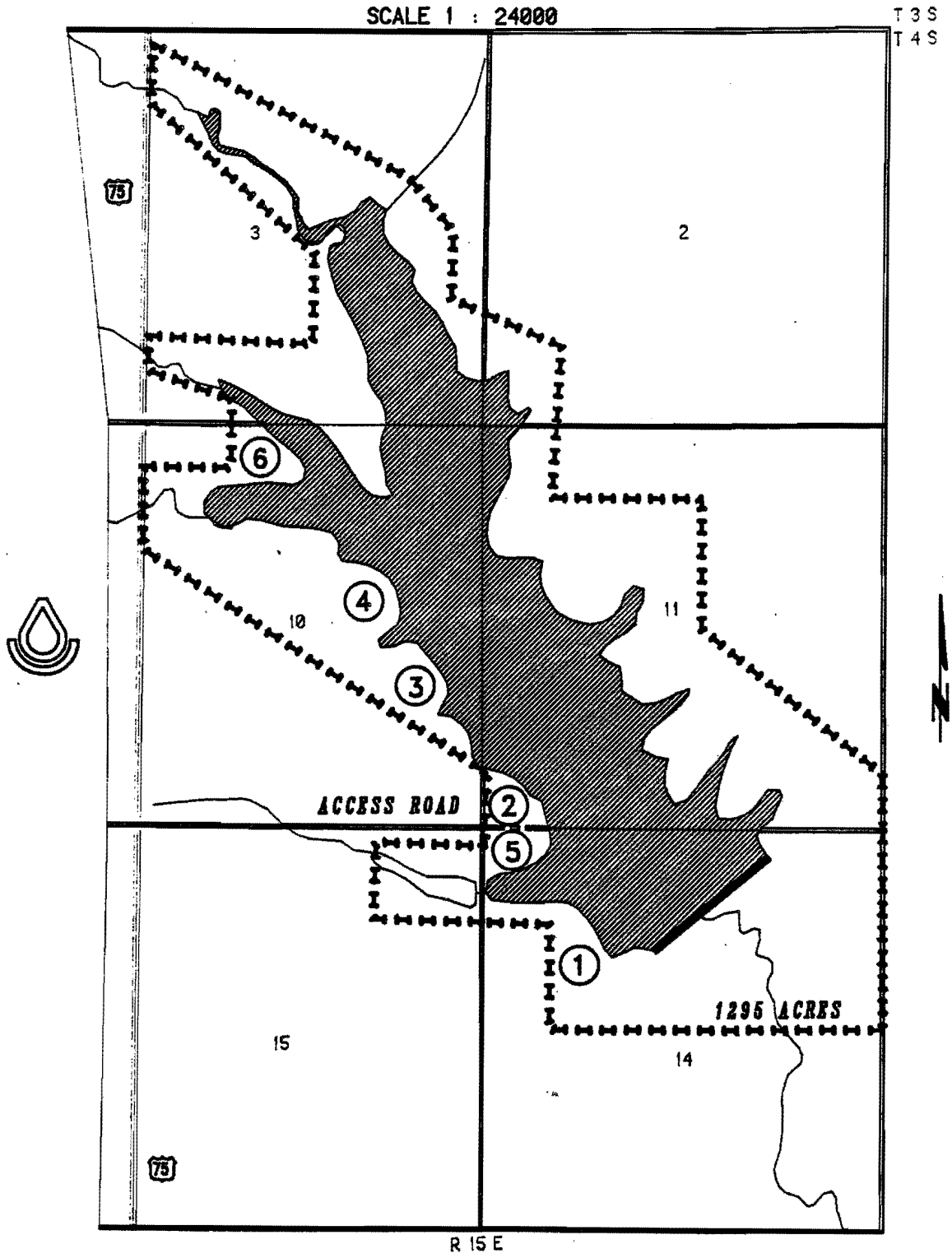
B-5c

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

UPPER DELAWARE & TRIBUTARIES PL-566 WATERSHED

MULTIPURPOSE SITE 21-14 PROPOSED RECREATIONAL DEVELOPMENT AREAS

0 1/2 1 MILE



RECREATION AREA BOUNDARY

① RECREATION AREA

Public Land Survey

Light-duty Road

Unimproved Dirt

Source: Kansas Natural Resources Project Planning Staff, 4/93.

NBJWD04062

APPENDIX C

SUPPORTING INFORMATION

LIST OF PREPARERS

INVESTIGATION AND ANALYSIS

CONSERVATION PRACTICES/COST SHARE RATE

WILDLIFE HABITAT COMPENSATION ALTERNATIVES

LIST OF PREPARERS AND QUALIFICATIONS

UPPER DELAWARE AND TRIBUTARIES WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT

FORMAT:

Name - Present Job Title (years): Former Job Titles (Years of experience)

ROBERT H. DREES - SCS Planning Geologist (9); Engineering Geologist (7); Corps of Engineers, Field Geologist (5).

W. DUANE EVANS - SCS Agricultural Economist (26).

DON HALEY - FWS Wildlife Biologist.

STEVEN C. HENNINGSEN - SCS Natural Resources Project Planning Staff Soil Conservationist (6); District Conservationist (12); Soil Conservationist (3).

GARY A. KELLEY - SCS Geologist (26).

KENNETH A. KUIPER - SCS Biologist (2); State Water Quality Specialist (2); District Conservationist (4); Soil Conservationist-Water Conservation Target Team (3); Soil Conservationist (2); Conservation Technician (2).

NORMAN L. LISTER - SCS Hydraulic Engineer (10); Civil Engr. (project construction) (1); Engineering Technician (2); Soil Conservation Technician (14).

DEANNE LULL - SCS Natural Resources Project Planning Staff Secretary (34).

LARRY D. MILES - SCS Natural Resources Project Leader (9); Water Resources Planning Engineer (13); Construction Engineer (2), Design Engineer (5);

J. STEVEN NECHERO - SCS Geographic Information System Specialist (4).

JOHN W. REH - Retired; SCS Assistant State Conservationist for Water Resources (6); Water Resources Planning Staff Leader (14); Hydrologic Engineer (10); Design Engineer (2); Project Engineer (2).

VIC ROBBINS - KDHE, Bureau of Water, Industrial Program Section.

ERIC SCHENCK - KDWP, Chief, Environmental Services Section.

RICHARD L. SCHLEPP - SCS State Soil Scientist (3); Assistant State Soil Scientist (3); Soil Survey Party Leader (9); Soil Scientist (2).

ELDON W. SCHWANT - SCS District Conservationist (18); Soil Conservationist (7).

DON SNETHEN - KDHE, Section Chief, Nonpoint Source Pollution Section.

MATT L. SPRICK - SCS District Conservationist (6); Soil Conservationist (2)

JOHN K. STRICKLER - KSEF Extension Forester (3); Governor's Special Assistant for Environment and Natural Resources (2); Assoc. State Extension Forester (22); Area Extension Forester (4); Assistant District Ranger, Forest Service (3).

VERNON TABOR - FWS Aquatic Biologist

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The preparers of this document include various consultants in addition to the members of the Interdisciplinary Team and the Tri-Agency Team.

Bench marks were surveyed by VanDoren, Hazard, and Stallings, Topeka, Kansas. Hydraulic surveys were completed by Cook, Flatt, and Strobel, Topeka, Kansas. Reservoir topographic maps were developed by Municipal Engineers, Wichita, Kansas. Preliminary design and cost estimates were performed by Wilson and Company, Salina, Kansas.

The draft watershed plan and environmental impact statement was reviewed by SCS staff at the field, state, and Midwest National Technical Center levels by specialists having responsibility for engineering, soils, agronomy, range conservation, biology, forestry, geology, hydrology, economics, and recreation.

INVESTIGATION AND ANALYSIS REPORT

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INTRODUCTION

The purpose of this report is to document the procedures, techniques, assumptions, and the scope and intensity of the investigations that were used in planning the Upper Delaware and Tributaries PL-566 watershed project.

The planning process was directed by a "Plan of Work" (POW) developed by the Natural Resources Project Leader. A revised POW was reviewed and approved by the SCS Midwest National Technical Center in April 1991. Validation of methods and procedures and intensity have been an on-going process through regular reviews by MNTC and state and federal agencies. Input has been provided by SCS at state, area, and field office levels.

RESOURCE INVESTIGATIONS

BASELINE DATA

Baseline data were gathered from the 1987 National Resource Inventory (NRI) and the Northeast Kansas River Basin Study (NEKRB). The NEKRB study was a three percent random sample performed in seven northeast Kansas counties. These inventories were performed in the field in conjunction with the 1987 NRI. Work sheets were completed on land use, soils, land treatment, water bodies, sheet and rill erosion, ephemeral erosion, gully erosion, stream erosion, wildlife habitat, grassland condition and management, and woodland condition and management. All parts of the field inventory, except the woodland section, were completed by SCS soil conservationists. Technical quality was overseen by the SCS Area I agronomist and the state sedimentation geologist. The woodland section was completed by Kansas State and Extension Forestry personnel.

The inventory of the Upper Delaware and Tributaries Watershed was increased to a ten percent level for land use, land treatment, soils, and erosion. Randomly stratified samples were inventoried using aerial photographs and soil surveys completed by a soil conservationist with work experience in the watershed area. Upon compilation and analysis of the data, conclusions were reviewed with the local district conservationists.

LAND USE AND LAND TREATMENT

Land use and land treatment data were tied to soils so the data could be sorted by soil slope, HEL class, and prime land class. Data analysis indicated that soils had five common soil slope groups: 0-2, 3-6, 7-10, 11+ percent and flood plains. These groups shared common land treatment systems and erosion rates. In evaluating cropland, three observations were used: (1) unprotected 0-2 percent slopes are commonly treated by management practices, (2) unprotected 11+ percent slopes are commonly inclusions in the 7-10 percent group and will be treated with that group or be established to permanent vegetation, and (3) flood plain soils are not commonly affected by sheet and rill erosion.

Land use in the drainage areas of proposed dams was inventoried using Landsat/TM July 1988 imagery. Imagery was 90 percent cloud free with a resolution of 25 meters or 1/10 of an acre. Delta Data Systems classified the imagery. Imagery was imported into a Geographic Information System (GIS) and "ground-truthed" with aerial photography and by personnel familiar with the area.

Land treatment information upstream of the proposed dams was digitized into GIS using aerial photography interpretation.

Results of analyses of land use and land treatment from the resource inventory and GIS were comparable. Results were reviewed by the district conservationist and adjusted for local conditions.

HYDROLOGY

The Upper Delaware and Tributaries Watershed consists of the reaches of the Delaware River and its tributaries upstream from the town of Muscotah. Flood plain reaches include: Delaware River, reaches 1, 2, 18, 23, 26, and 27; Gregg Creek, reaches 16, 17, 22, and 28; Plum Creek, reach 21; Muddy Creek, reaches 3, 4, 11, 12, and 13; and Wolfley Creek, reaches 5, 6, 7, and 8. Plum Creek drains into Gregg Creek and Wolfley Creek drains into Muddy Creek.

Determination of the hydraulics of the channels and flood plains was begun by surveying 75 valley cross sections and 43 road and bridge cross sections. The WSP2 computer program was used to evaluate the hydraulics at each of the cross sections along the stream.

To analyze the hydrology of the watershed, the Technical Release 20 (TR20) computer model was used. The first run was with the project in its "present" condition. The second run was "future without the project" conditions . The third run included part of the dams in the watershed district's general watershed plan. Included in the general plan were 124 floodwater retarding dams, 5 multipurpose dams, and 200 grade stabilization dams. One hundred eight of the 124 floodwater retarding and 5 multipurpose dams were selected for the third run. Twenty-one floodwater retarding dams and a number of the grade stabilization dams were not considered because they were upper dams in series with one of the 108 or had drainage areas of less than .55 square mile.

A preliminary analysis showed only 5 of the 108 dams with a benefit:cost ratio greater than 1:1 using flood and grade stabilization benefits. Where the five dams tended to have larger drainage areas, the watershed board was encouraged to consider additional dam locations with larger drainage areas. Subsequently, the watershed board selected 27 dams with larger drainage areas to be analyzed in detail.

The 27 dams were analyzed and ranked by using the "drainage area controlled" procedure. An incremental analysis was run on the 27 dams beginning with the most

effective flood control dam down to the least effective dam.

To help show how each dam reduced flooding damages, hydrographs were plotted for selected locations throughout the watershed as each dam was added to the system, using the ten-year frequency storm. This data was presented to the board and as a result, two of the proposed dams were combined and an additional dam was added to the system.

To verify the TR20 output, a regional stream gage analysis was made and the TR20 discharges were adjusted before the economic analysis was made. The same percentage adjustments were made on all alternatives.

SITE INVESTIGATIONS

Over 300 potential floodwater retarding and grade stabilization dams were identified by Nemaha-Brown Watershed Joint District No. 7 in its General Plan dated July 1978. Field examinations, USGS 7-1/2 minute quadrangle topographic maps, and aerial photos had been used in developing preliminary designs for the General Plan.

In April 1981, the Kickapoo Tribe of Kansas published a Water Resources Investigation report prepared by Van Doren-Hazard-Stallings, Topeka, Kansas, which proposed multi-purpose development for water supply, irrigation, and recreation at five of the General Plan site locations.

When PL-566 planning was subsequently begun by SCS in 1989, preliminary designs and cost estimates were made for 15 proposed dams. The designs utilized General Plan sites including two multipurpose dams proposed by the Tribe. Costs from these representative dams were expanded graphically to estimate the costs of the remaining dams proposed.

Upon economic analysis and the watershed district board's review, 27 dams were selected for further study. For these dams, as with the initial 15 dams, topographic maps with 4-foot contour interval, photographic background, and a scale of 1"=300' were made by contract with Municipal Engineers, Wichita, Kansas. Also provided by Municipal Engineers were elevation-area-storage curves and field-run centerline profiles. Permanent monuments were set at each dam to establish horizontal and vertical control for future use.

Reconnaissance-level geologic investigations were made by the SCS geologist using field review and Kansas Geologic Survey data for Nemaha, Brown, and Atchison Counties.

Foundation and borrow area conditions are similar to those of many previously built structures in nearby watersheds.

Most preliminary designs and cost estimates were made by contract with Wilson and Company, Engineers and Architects, Salina, Kansas. Hazard classifications, runoff curve numbers, times of concentration, and sediment storage volumes were furnished by SCS. The designer measured and/or checked drainage areas. The DAMS2 computer program was used in making preliminary designs.

Hazard classifications were made using field reconnaissance and USGS topographic maps. In questionable cases, TR-66 computer routings were made to estimate breach impact areas. Hazard classifications are subject to review and approval by the State Conservation Engineer.

Itemized cost estimates utilized unit costs based on averages of contract prices for recently constructed PL-566 dams in Kansas.

Contingencies of 12 percent were included in construction costs. Engineering costs were estimated at 35 percent of construction costs. Project administrative costs were estimated at 15 percent of construction costs. Land rights costs were estimated using land values supplied by the watershed board. Installation costs amortized at 8.25 percent for 50 years, plus operation and maintenance costs at 0.41 percent of construction costs constitute average annual costs of the floodwater retarding dams.

Land rights work maps with photo-mosaic backgrounds were developed. They show elevations of permanent pools, minimum required easements, emergency spillways, and tops of dams. Areas associated with each level for each landowner are tabulated on the maps.

An analysis of visual resources was made following MNTC guidelines. It showed that the proposed project will not significantly affect visual resources in the rural agricultural area.

EROSION

Sheet and Rill: The NEKRB inventory was the initial source of USLE factors such as soil types, land treatment, and ground cover. Soil slopes and slope lengths obtained during the field inventory were verified through the SCS Field Office Technical Guide (FOTG) Ks Section III-A-2. Sheet and rill erosion was estimated for "before" and "after" conditions for all land uses, slope evaluation groups, and by project subarea.

Ephemeral: Two complementary methods were used to determine ephemeral erosion. Aerial photos and published soil surveys were used to identify ephemeral gully lengths by soil type. Field investigations and interviews with district conservationists were used to determine average gully widths, depths, and frequency of occurrence. The EGEM model was used to duplicate, verify, and complement the "manual" method.

Classical Gully Erosion: Classical gully erosion was determined by using aerial photos and soil survey maps to identify current land damage and to project potential future growth. Measurements of length and width were verified by field investigations. Judgment was used to determine average annual erosion rates by utilizing vegetation and movement of head cuts relative to stable points in time. Rates translated into potential future erosion lengths were correlated with control points (features that would stop a gully from eroding further) such as road-bridge crossings, top of the ridge, etc.

Streambank: Streambank erosion was determined from work sheet information obtained from field trips. Judgment was used to estimate lateral erosion rates from root exposure, slumping, and other obvious erosional features. Interviews were also used to verify general conclusions.

Flood Plain Scour: Scour determinations were made by using aerial photos to delineate length and width of channels and flood plain sheet scour areas. Surveyed valley and channel cross sections were used to verify widths and determine depths of scoured areas. These acres were correlated with ECON2 information on acres flooded. Field interviews were conducted to determine land operators' perceptions and experiences with scour damage. SNTC TG-12 was used as a reference in determining percent damage and recovery time.

WATER QUALITY

General: Little was known about water quality conditions or inventory methods before planning began on the Upper Delaware and Tributaries PL-566 project. To establish acceptable procedures for planning PL-566 projects, an interagency task force was established. Key members involved were Kansas Department of Health and Environment, Kansas Department Wildlife and Parks, Environmental Protection Agency, and Soil Conservation Service. Advisors were Cooperative Extension Service, State Conservation Commission, United States Geological Survey, Kansas Geological Survey, Kansas Biological Survey, and Division of Plant Health.

Key agreements coming from the committee included: KDHE would perform laboratory analysis, interpret present water quality conditions, and recommend NPS pollutant reduction goals. KDWP would determine present fisheries conditions and how they are affected by NPS pollutant levels, and forecast how fishery populations and angler days would be affected by meeting the recommended NPS pollutant reduction goals. SCS would aid KDHE in taking water samples, inventory sources of potential NPS pollutants, and formulate alternatives to reach the NPS goals.

Long-term water quality data were available from an exiting USGS/KDHE monitoring station near the mouth of the watershed. Monitoring of the tributaries was conducted during 1988 and 1989. KDHE sampled base flow conditions at several sites on a monthly basis. Two automated water quality samplers were installed in the watershed to collect runoff samples. Runoff events at four other locations were sampled by the "grab sample" method.

The overall mean pollutant concentrations were calculated using the baseflow and runoff means along with the estimated fraction of the time the creek carries baseflow and runoff flows.

KDHE analyzed the water samples, made interpretations, and wrote an assessment report containing conclusions and recommendations. These recommendations included percent reductions of each pollutant needed to meet state water quality standards for each designated water use. This report formed the basis for formulating the water quality plan.

The pollutants causing the impairments include total suspended solids (predominantly sediment), phosphorous, nitrate-nitrogen, and fecal coliform bacteria. Both aquatic life support and recreational uses are impaired. Perry Lake is impaired by nutrient enrichment and by pesticides.

A literature search was performed to determine the traits of these pollutants and the effects of various conservation practices on nonpoint source pollutants. Due to the complexity of the problem of water quality as related to effects of conservation practices, there is no single scientific "method" but more of an "approach" to solving the problems. The basic premises of the approach used for this plan were: information is readily documented on sediment movement and deposition; much is known about the trap efficiency of sediment by various conservation practices; individual pollutants relate in general to the movement and deposition of sediment; therefore, sediment is used as the "indicator" for the effects of conservation practices on pollutants.

Sediment: Sediment yields were determined by developing sediment delivery ratios (SDR) from knowledge of the area and Bulletin No. 16 which contains information on SDR's in Kansas based on over 170 sediment surveys conducted in ponds and lakes in the state. Modification or "fine tuning" to specific locations was determined by noting such criteria as topography, distance to watershed outlet, and/or distance to a significant water course. Judgment and logical interpretation of potential or relative deliveries for different erosion types helped to develop delivery ratios for ephemeral gully, classical gully, flood plain scour, and stream bank erosion. Future land treatment including on-going, CRP, and other land use changes and selected dams were used to estimate sediment yields for all alternatives.

Fecal Bacteria: Fecal bacteria was considered separately due to its uniqueness. Unlike other pollutants, fecal bacteria concentrations do not relate to sediment. Bacteria concentrations tended to peak during runoff events, indicating confined livestock areas as a prime pollution source. KDHE technicians conducted a field investigation of confined livestock areas. Each confined livestock area was ranked numerically relative to its potential to influence water quality. Some of the factors considered were distance to a stream, stream type, topography, number and kind of animals, presence of treatment, and foreign drainage through the lot area.

The literature search revealed little information on the movement of fecal bacteria and the effects of conservation practices on bacteria concentrations. Judgment was used to develop a reasonable method to estimate the effects of conservation practices on confined feeding areas. KDHE's rankings were divided into three pollution potential groups. Alternative treatment systems were developed for each group. The treatment systems were composed of different combinations of practices including cover crops, filter strips, diversions, lagoons, livestock waste disposal, and relocation of all or part of a confined livestock area.

RIPARIAN WOODLAND

Riparian woodlands were inventoried by Kansas State and Extension Forestry. The forester walked the stream corridors documenting land cover, condition, and treatment needs of a sixty-six foot border from the stream bank out. Valley cross sections used in flood damage analysis were used as riparian sample points. Cross section locations were recorded on aerial photography to aid in the field inventory.

Findings were reviewed and agreed upon by a committee including Kansas State and Extension Forestry, State Conservation Commission, Kansas Department of Wildlife and Parks, and the SCS. Input on a public participation rate in a woodland improvement program was obtained from the conservation districts and the watershed districts.

WETLANDS

There are three areas of wetlands in the flood plain of the watershed depressional areas including riparian areas and cultivated land, linear or channel, and oxbow bends.

Oxbows: Twelve oxbow bends were analyzed for their water holding capacity in acre feet and the acres of drainage area into them. The following table gives the location in the watershed, drainage area, length, acre feet of storage, and runoff in inches from the drainage area to satisfy the available storage.

Between Cross Section	Drainage Area (acres)	Length (feet)	Storage (acre feet)	Runoff (inches)
1-2 & 1-3	102	1,140	2.1	0.25
1-5 & 1-6	30	1,770	3.2	1.30
1-6 & 2-1	150	3,700	6.8	0.54
2-2 & 2-3	217	1,740	3.2	0.18
2-3R Road	17	760	1.4	0.98
2-3 & 2-4	551	1,650	3.0	0.07
3-1 & 3-2	998	3,020	5.5	0.07
18-2 & 18-3	2,295	3,420	6.3	0.03
18-5 & 18-6	179	2,930	5.4	0.36
23-1 & 23-2	53	2,520	4.6	1.05
23-2 & 23-3	80	1,620	3.0	0.45
26-1	744	3,860	7.1	0.11

The oxbow bends were created by channel straightening with the upper end of them filled so the flow would have to flow through the straightened channel. The outlet ends were usually left open so they would continue to drain as most of them have adjacent areas draining into them. The storage capacity in them is varied to the size of the natural pools, sedimentation, and whether the outlet end has been partially plugged. Therefore, the acre feet of storage were estimated with the following assumptions: the water surface width is 40 feet and the depth is 3 feet. The procedure used was to multiply the width times the length then divide by 43,560 square feet per acre to get surface acres. Then multiply the surface acres by the depth and multiply by 0.67 to compute acre feet.

The inches of runoff were computed by multiplying the acre feet by 12 inches per foot to get acre inches and dividing by acres of drainage area.

The curve numbers in the watershed range from 74 to 83 and the largest estimated inches of runoff is 1.3 inches between cross sections 1-5 and 1-6. It takes an event of 3.6 inches at a 74 CN and 2.8 inches at an 83 CN to produce this much runoff. The 3.3 inches is a 2-year frequency storm in Brown County. If the wetland was completely dry, a 2-year frequency storm would not quite fill it, but in years of average precipitation it would be filled by several smaller runoff events.

Depressional Areas: The FSA designated wetlands are on hydric soils in the flood plain and the adjacent drainage area provides ample runoff to fill the depressions in these areas. To verify this statement, aerial photography flown on April 6 and 18, 1984, was reviewed and shows the depressional areas full of water. The National Weather Service precipitation records are shown in the following table for four collection points:

Location	March 4-28 (inches)	April 1-4 (inches)	April 8-9 (inches)	April 12-16 (inches)
Horton	4.69	1.77	1.15	0.33
Hiawatha	2.83	1.54	0.94	0.26
Centralia	3.68	2.25	0.97	0.51
Effingham	4.06	1.68	0.90	0.62

Horton is the only station in the drainage area of the Muscotah stream gage. The others are just outside the drainage area but close enough to show a regional pattern of precipitation.

The stream gage at Muscotah, Kansas, shows peak discharges on March 21, 6,070 cfs; March 24, 7,070 cfs; April 3, 7,410 cfs; and April 8, 5,660 cfs. These discharges are from a drainage area of 471 square miles of which the Upper Delaware and Tributaries contributes 277 square miles. The Upper Delaware and Tributaries Watershed is approximately 59 percent of the drainage area. It is estimated that 4,300 cfs of the 7,410 cfs that was recorded on April 3 is from the Upper Delaware and Tributaries Watershed. The 4,300 cfs is about half bankfull at the cross sections below the confluence with Muddy Creek as per the WSP2 hydraulic evaluations. Therefore, the depressional areas in the flood plain had to be filled from direct rainfall and runoff from adjacent drainage areas since no out-of-bank flows occurred.

Linear Stream Channel: There are 420 acres of linear stream channel wetlands in the watershed from the outlet up to the upper surveyed cross section. Most surveyed cross sections are about one mile below the dam on each channel. The procedure used was to take the stream channel width at one foot above the water line elevation designated on the cross section times the channel length between the cross section downstream from it.

MULTIPURPOSE SITE

Water Supply: The cost of constructing and maintaining a pipeline to conduct an adequate water supply from existing available source was computed and compared to the cost of obtaining water from the proposed multipurpose structure. The multipurpose structure proved least costly.

A Water Quality and Quantity Analysis for Multipurpose Dam No. 21-14 was furnished by White, Martin, and Associates, Inc., Topeka, Kansas, on behalf of the Tribe, in January 1992. It utilized the Water Budget-Frequency Drought computer program.

Computer-generated aerial views of the proposed multi-purpose dam and reservoir were used to show a before-and-after sequence to the sponsors.

Recreation: In September 1992, White, Martin, and Associates, Inc. completed a recreation plan for Site No. 21-14 on behalf of the Tribe. This plan formed the basis for the recreational facilities, their cost, and location as shown in the PL-566 plan/EIS.

ECONOMIC ANALYSIS

FLOOD DAMAGES

Project Area: ECON2, the economics program used to evaluate agricultural flood damages, and LDAMG, the economics program used to compute average annual sediment, scour, and swamping damages, were used. About 20 flood plain farmers were interviewed and provided flood plain land use, flood-free crop yields, and historical damages other than crop for two historical storms. The hydrologist determined the discharge and frequency of these storms and elevation and discharge of beginning flood damages. A damage curve was drawn between these data points beginning at zero damage and the curve was projected to the 100-year discharges.

Data gathered during interviews with county road engineers were used to develop the damage factors for road and bridge damage evaluations. Beginning road and bridge damage elevations, depths of flooding, and width of flooding were computed by using the WSP2 computer program. Data collected by the counties on the major flood of June 1984 were used in the analysis.

After completion of an economic analysis, 12 flood-water retarding dams and 1 multipurpose dam had benefit: cost ratios greater than one. To take the incremental analysis one step further, the 13 dams were analyzed then the next best dam on each the Delaware River and Muddy Creek were added as the next increment. The 15-dam system had a benefit:cost ratio greater than one, but when the next best dam was added it cost more than the benefits it provided. Therefore, the 15-dam system is the best "dams only" system that could be formulated. This is shown as Alternative 2.

Sponsor flood damage reduction goals and the State of Kansas water quality goals were not met with this alternative. In an effort to meet these goals, systems of practices treating erosion, riparian woodlands, and livestock waste problems were added with the next six best dams to form Alternative 3. The potential of meeting the State's water quality goals was still a concern. Alternative 3 had the rate of application of land treatment systems levels set at the maximum forecasted public participation and social acceptance levels. In order to increase the likelihood of meeting these water quality goals, 10 of the general plan dams were added to form Alternative 4.

Off Project: Delaware River has about 7,000 acres of common flood plain affected by Elk Creek, Grasshopper-Coal Creek, Spring-Straight Creek, South Cedar, North Cedar, Nebo Creek, and Upper Delaware and Tributaries watersheds.

When the Elk Creek and Grasshopper-Coal Creek watersheds were evaluated, an analysis was made of Delaware River. Data were collected and an ECON2 file and evaluation were made and flood damage reduction benefits distributed to the respective watersheds based on acres controlled in their General Plans. This ECON2 file was updated to 1990 and became the basis for allocating benefits to this project based on square miles controlled.

SITE EVALUATION

Each dam was tested individually to determine its effect on flood damage reduction based on starting with the most efficient dam to the least efficient dam. The sequence in which the dams were given a priority came from a comparison of hydrographs for the 10-year storm. This work was done to determine a National Economic Development Plan. The damage reduction benefits fit closely the relationships shown by comparing hydrographs.

Incidental Recreation: Kansas has most of their dam sites granted to the watershed districts by easement. Landowners generally stock the sediment pools with fish for fishing by themselves as well as selected persons whom they allow to fish on a request basis only. Similar observations have occurred in Missouri and studies have been conducted to measure the fishing occurring at these lakes. For this watershed, we used the average incidental fishing rate per acre from the Missouri study (Fishery Potential of Flood-Control Impoundments, Phillip James Goebel, August 1985). The unit-day value was used to show dollar benefits.

EROSION

Three evaluation groups were agreed upon based on soil and land slope. Evaluations were made for sheet and rill erosion, ephemeral erosion, and current erosion. Current crop yields, 1991 current normalized prices, soil erosion phases, physical inventories, and interest rates were used to evaluate and discount damage to a current base.

Sheet and Rill: Sheet and rill erosion caused by over-land flow was evaluated using USLE, soil erosion phases, time to erode between phases, and crop budgets. The evaluation was based on "future conditions without the project" compared to applying conservation treatment which involved terraces, waterways, tile outlets, contour farming, and conservation tillage. The analysis was based on current crop yields and 1991 prices.

Current erosion was evaluated by studying the plant populations and crop yields on eroding soils compared to non-eroding soils. The State SCS Agronomist after conferring the plant population and crop yield studies, estimated the current damage by percent damage for selected slope groups. Crop budgets based on current crop yields and 1991 prices were developed and became the basis for determining benefits.

Water conservation effects by conservation practice were evaluated by James Koelliker, Professional Engineer, Kansas State University, under contract with the Soil Conservation Service. A computer program was used to simulate 60 years of rainfall records. The effects of conservation tillage, contour farming, terraces, and combinations of these practices were modeled by the computer and changes in the amount of root zone water quantified for each practice. The increase in root zone water is the basis of project benefits.

Crop yield responses to increases in available water from Kansas and Nebraska research data were used to determine the crop yield increases from the added root zone water by implementing the specific conservation practices. Crop budgets were prepared for with and without conditions and the difference between those conditions were used as project beneficial effects. The water conservation analysis was made for each of the three soil slope groups.

Ephemeral: Ephemeral erosion is the erosion which occurs in the natural water courses that have not matured or enlarged to the point that they are classified as gullies. During a storm runoff event, an ephemeral gully voids an area to the depth of tillage. These voids occur in the same place year after year. Farmers regularly fill the voided areas by tilling and pushing soil into them from adjacent areas. This causes a constant mining of the areas adjacent to the ephemeral so that the soil nutrients and organic matter can not be maintained.

Project benefits were based on eliminating the damage to crop populations in the voided area by cutting off the water naturally accumulating in these drainage areas, avoiding the extra costs of filling the voids, increasing the production of the strips adjacent to ephemeral drains, and reducing extra harvesting costs.

Classical Gully: Protection of land treatment systems previously applied to cropland and grassland was also important in the study. Surveys were made to determine how much farmers were spending to protect treated cropland and grassland. The Upper Delaware and Tributaries Watershed board members were asked to estimate a typical farm within the watershed to measure this erosion damage on and to

estimate project effects. The costs to protect treated cropland and grassland for the typical farm were compared to similar costs used to evaluated the Wolf River Watershed.

Flood Plain Scour: The land damage program was used to evaluate the damages and benefits that would accrue to the various alternatives. Physical data were developed by the geologist and inputted directly into the land damage program. The output from ECON2 was used as required in the land damage program. The potential crop yields used in ECON2 were used in this program. The 1991 current normalized prices were used as the price base to determine benefits.

WATER QUALITY

Project Area: Improvement to water quality was quantified in dollar benefits in four areas: (1) Upper Delaware streams, (2) Delaware River, (3) Perry Lake, and (4) in-field situations. While sediment, phosphorous, and fecal bacteria were major pollutants, benefits for improvement of the streams were based on the change in stream sediment loads.

The Kansas Department of Wildlife and Parks determined the present condition of fish populations under current water quality conditions. The inventory included quantifying stream and water parameters in order to determine the limiting factors to populations. They then forecast the change in fish populations in the future if water quality parameters met the state water quality standards.

KDWP personnel estimated that if the water quality of the streams and river met state water quality standards, fishing potential could increase thirteen times. Being conservative and recognizing that other things will affect fish populations and angler days besides the sediment, KDWP elected to limit the potential to an increase of three times. This qualified effect was used for the analysis. For more details see the report prepared by William Layher, entitled Abatement of Nonpoint Source Pollution Impacts and Abatement Levels on Sport Fishing in the Upper Delaware River and Tributaries Watershed of Kansas, 1990.

The watershed has approximately 130 miles of perennial streams. Increases in potential stream fishing is limited to the streams below dams.

The 1977 Kansas River Basin Preliminary Stream Fishing Survey identified about 35 miles of stream within the watershed recording fishing pressure. Other sections had physical characteristics which would meet fishing needs except for

stream flow. The dams and especially the multipurpose dam will supplement the stream flow at low flow periods enhancing the fishing potential.

Delaware River: A 1990 KDWP report prepared by William Layher documented the annual fishing day use on the mainstem of the Delaware River. The report also forecast that if KDHE's nonpoint source pollutant reduction goals were met, a conservative tripling of the amount of fishing days would occur. This increase was approximately 42,500 days. The change was then allocated to subwatersheds in the basin in proportion to the drainage area. Upper Delaware and Tributaries Watershed, being 25.7 percent of the basin, was credited with approximately 10,925 angler days.

The generalized unit-day recreational value was used to evaluate the dollar beneficial effects from cleaning up the water. The unit-day value was adjusted to reflect the value of the fishing experiences for these streams compared to a model stream.

Perry Lake: The beneficial effects of reducing sediment entering Perry Lake was done in two steps. Step one involved extending all lake purposes for about 16 years for all PL-566 watersheds and 10 years for the Upper Delaware and Tributaries Watershed. Benefits were discounted at 8 1/4 percent interest. Step two involved the altering of the recreational use by slowing the rate of sediment deposited in the lake. This acknowledges that the lake will continue to fill with sediment which will replace the flat water for recreation but at a slower rate than it is now occurring. The difference between recreation without the project and with the project represents potential project benefits. The travel-cost value method was used to evaluate recreation opportunities and the beneficial effects were discounted to reflect the evaluation period.

Travel-Cost Method: The basic premise of the travel-cost method is that per capita use of a recreational site will decrease as the out-of-pocket and time costs of traveling from place of origin to the site increases. Perry Lake has experienced a decline in recreational use. Sediment has replaced water in the upper end of the lake resulting in closing of two major camping areas. Our concern was how to measure the full effect sediment was having on the value of recreation so the travel-cost method was used.

Detailed data were not available for Perry Lake; therefore, Milford Lake was evaluated and used as representative of Perry Lake. Most use of Kansas lakes comes from Kansas residents; however, for this study county populations from Kansas, Missouri, and Nebraska were included as they fell within the selected travel zone.

Participation factors were derived from a regression equation. Five formulas, (Linear, Exponential, Second order, Logarithmic, and Power), were compared and the exponential formula was selected for this analysis because it gave the best fit of the data.

Perry Lake and Milford Lake are similar in that both were constructed by the Army Corps of Engineers as multi-purpose lakes which included flood control, water supply, and recreation as project purposes. Each lake has been modestly developed for recreation which assures each participant with a very high quality recreation experience. State parks were developed at both lakes. Primitive camping areas are available at both lakes. Modern camping areas were developed which provide showers, flush toilets, and electrical hookups. Several boat ramps are available at each lake for boaters to easily get their boats into the water. They have many access points and are accessible from Interstate Highway No. 70 by all weather surface roads. County sheriffs provide security for recreational areas located in their counties. Both have about 12,000 surface acres available for water-based recreation and water quality tests show that the water is of about the same quality. Kansas City, Lawrence, Manhattan, Junction City, and Topeka residents are primary users of both lakes.

In-Field Water Quality Benefits: Procedures have not been developed at this time to measure the beneficial effects reducing excess nutrients entering watershed streams except for reducing the rate of pesticides, herbicides, and fertilizers applied on cropland and grassland. For this analysis, nutrient reduction benefits were claimed for the tons of fertilizer that would be retained on the cropland field by reducing soil erosion at the price farmers must pay to have it applied. The benefits were limited to nitrogen and phosphorous; however, other nutrient and pesticide costs should be reduced too.

RIPARIAN WOODLAND

Riparian woodlands are used for wildlife habitat, recreation, wood production, and water quality buffers. Benefits were attributed to riparian woodland treatment due to the change in these uses. The intent of this riparian element was to establish continuous strips of woodland along stream banks for the improvement of water quality. The continuous strips would increase the quality of wildlife habitat and create travel lane between existing woodland habitats. Increased technical assistance would increase the likelihood of a managed timber harvest and the harvest of firewood.

Water quality benefits were difficult to measure in dollar amounts. A literature search documented qualitative benefits of riparian woodland buffers but methodology to measure the quantity of benefits in dollars was not found.

The Kansas Department of Wildlife and Parks forecast the change in wildlife species and a corresponding increase in hunting days. The unit-day recreation value was used to arrive at the value of the increase in hunting days. No value was taken for the increase in non-game species.

Kansas State and Extension Forestry estimated the increase in cords of firewood and board feet of timber harvested. Only the value of firewood was used in this analysis. Value claimed equalled the field value minus the cost of cutting.

MULTIPURPOSE SITE EVALUATION

Water Supply: A private engineering firm working for the Kickapoo Tribe established the current water supply and projected the future need which includes some water for rural communities and small towns near the dam site. The beneficial effects of the dam were based on the least costly alternative to satisfy the projected need.

Recreation: An analysis was made based on Kansas SCORP to establish the number of recreational opportunities needed. This was based on the counties located within 50 miles of the dam. About 60,000 recreational visitor days were determined as needed within this area. The dam will create about 400 acres of flat water which can more than provide for this much recreation; however, the basic recreational development and corresponding benefits were limited to the 23,000 visitors. Once the dam is built, it will likely draw more than 23,000 visitor days per year with some of the increase coming from other lakes near this one. The unit-day value was used to show dollar benefits.

TABLE I

CONSERVATION PRACTICES/COST-SHARE RATE

Conservation Treatment System			Livestock Waste Management Systems a/			Riparian Woodland Systems a/		
SCS Code	Practice Name	Cost Share Rate (%)	SCS Code	Practice Name	Cost Share Rate (%)	SCS Code	Practice Name	Cost Share Rate (%)
350	Sediment Basin	65	382	Fencing	65	382	Fencing	65
362	Diversion	"	359	Waste Treatment Lagoon	"	612	Tree Planting	"
378	Pond	"	425	Waste Storage Pond	"	660	Woodland Pruning	"
386	Field Borders	"	516	Pipeline	"	666	Woodland Improvement	"
382	Fencing	"	574	Spring Development	"	652	Woodland Direct Seeding	"
393	Filter Strips	"	614	Trough or Tank	"	490	Woodland Site Preparation	"
410	Grade Stabilization Struc.	"				654	Woodland Improved Harvest (immediate thinning)	"
412	Grassed Waterway	"				580	Streambank and Shoreline Protection	"
512	Pasture and Hayland Planting	"						
550	Range Seeding	"						
600	Terrace	"						
620	Underground Outlet	"						
683	Water and Sediment Control Basin	"						
ASSOCIATED PRACTICES								
330	Contour Farming	No Cost Share	633	Waste Utilization	No Cost Share	472	Livestock Exclusion	No Cost Share
510	Pasture and Hayland Mngt.	"				644	Wildlife Wetland Habitat Management	"
528	Proper Grazing Use	"				645	Wildlife Upland Habitat Management	"
585	Strip Cropping	"				654f	Woodland Improvement (final harvest)	"
680	Nutrient Management	"						
685	Pest Management	"						
328	Conser. Cropping Sequence	"						
329	Conservation Tillage	"						
344	Crop Residue Use	"						

a/ Conservation treatment practices included as needed

May 1993

TABLE II

WILDLIFE HABITAT UNIT LOSS FOR FLOODWATER STRUCTURES
BEFORE COMPENSATION

Site No.	Acres		Cropland		Grassland		Riparian Forestland		Upland Forestland		Bank Zone		Water Zone		Stream Length (Feet)
	Dam & Splwy.	Sed. Pool	Acres	H.U.	Acres	H.U.	Acres	H.U.	Acres	H.U.	Acres	H.U.	Acres	H.U.	
6-26	4.0	18	0	0	15.2	41.0	4.3	26.7	0	0	1.7	8.5	0.8	1.6	4,900
6-32	4.3	15	0	0	18.3	36.6	0	0	0	0	0.7	2.2	0.3	1.0	2,100
7-19	5.8	41	15.6	59.3	0	0	13.6	97.9	15.6	112.3	1.4	4.6	0.6	3.1	4,100
9-31	4.6	26	16.1	59.6	8.0	32.0	3.5	23.1	0.5	4.1	1.7	14.5	0.8	4.0	4,400
10-14	5.8	26	19.8	95.0	0	0	8.5	45.9	1.0	5.4	1.7	6.8	0.8	4.0	5,100
11-24	4.3	16	0	0	7.9	18.2	9.8	59.8	0	0	1.8	3.6	0.8	1.4	5,300
12-3	6.5	26	0	0	24.2	48.4	1.3	5.8	4.6	34.0	1.4	4.6	1.0	5.2	6,900
14-17	13.7	45	18.0	28.0	7.0	31.5	28.0	218.4	0	0	4.0	21.2	1.8	14.0	11,900
15-30	7.0	50	0	0	19.3	67.6	33.2	204.9	0	0	3.1	15.5	1.4	4.5	9,100
20-17	8.5	50	21.6	82.1	21.0	52.5	11.5	71.7	0	0	3.1	14.6	1.3	5.5	8,700
21-14 MP	82.1	475	202.9	771.0	165.0	639.0	114.7	732.1	61.2	369.8	9.3	60.5	4.0	14.8	37,900
23-35	5.4	13	8.0	29.6	3.4	9.5	5.7	41.4	0	0	0.9	3.9	0.4	1.6	2,600
24-7	13.0	78	18.0	59.4	59.8	133.1	9.0	62.1	0	0	3.0	6.6	1.2	3.0	11,600
26-10	3.5	10	0	0	9.9	26.7	2.0	4.8	0	0	1.1	2.2	0.5	1.9	3,200
26-15	5.6	14	0	0	11.4	25.1	6.0	38.4	0	0	1.5	4.2	0.7	4.1	4,300
28-33	8.0	28	10.0	30.0	3.3	10.7	16.4	109.8	3.0	20.1	2.0	4.6	1.3	3.9	7,000
28-4	4.9	17	7.0	22.4	5.0	10.0	7.3	33.6	0	0	1.8	3.6	0.8	3.4	5,200
28-10	4.5	18	8.0	42.4	7.8	22.6	4.3	32.2	0	0	1.7	10.2	0.7	2.8	4,800
29-23	9.9	43	11.5	34.5	20.1	64.3	15.3	110.2	0	0	4.0	12.0	2.0	11.4	12,000
30-21	7.5	47	18.2	49.1	15.4	41.6	16.0	76.0	0	0	3.4	11.2	1.5	5.3	9,700
31-25	9.8	70	28.2	93.1	9.5	31.4	37.0	318.2	0	0	3.5	24.9	1.5	11.0	9,900
Total	218.5	1,126	402.9	1,455.5	431.5	1,341.8	347.4	2,313.0	85.9	545.7	52.8	239.9	24.2	107.5	170,700

September 1993

TABLE III

WILDLIFE HABITAT COMPENSATION ALTERNATIVES[a/]

Site No.	Habitat Units Lost		Habitat Units to be Compensated		Planting Acres to be Planted		Preservation Estimated Acres to be Preserved	Net Change Herbaceous Habitat Units
	Woodland	Herbaceous	Woodland	Herbaceous	Woodland	Herbaceous	Riparian Woodland b/	
6-26	26.7	51.1	26.7	40.0	5.3	4.0	7.9	- 11.1
6-32	0	39.8	0	43.0	0	4.3	0	+ 3.2
7-19	217.9	59.3	217.9	58.0	43.6	5.8	64.1	- 1.3
9-31	45.7	91.6	45.7	46.0	9.1	4.6	13.4	- 45.6
10-14	62.1	95.0	62.1	58.0	12.4	5.8	18.3	- 37.0
11-24	64.8	18.2	64.8	43.0	13.0	4.3	19.1	+ 24.8
12-3	49.6	48.4	49.6	65.0	9.9	6.5	14.6	+ 16.6
14-17	253.6	59.5	253.6	137.0	50.7	13.7	74.6	+ 77.5
15-30	224.9	67.6	224.9	70.0	45.0	7.0	66.0	+ 2.4
20-17	81.8	144.1	81.8	85.0	16.4	8.5	24.1	- 59.1
21-14 MP	1,177.2	1,410.0	1,177.2	821.0	235.4	82.1	346.2	- 589.0
23-35	41.4	44.6	41.4	54.0	8.3	5.4	12.2	+ 9.4
24-7	62.1	202.1	62.1	130.0	12.4	13.0	18.3	- 72.1
26-10	4.8	30.8	4.8	35.0	1.0	3.5	1.4	+ 4.2
26-15	38.4	33.4	38.4	56.0	7.7	5.6	11.3	+ 22.6
28-4	40.6	32.4	40.6	49.0	8.2	4.9	11.9	+ 16.6
28-33	138.4	40.7	138.4	80.0	27.7	8.0	40.7	+ 39.3
28-10	45.2	65.0	45.2	45.0	9.0	4.5	13.3	- 20.0
29-23	110.2	122.2	110.2	99.0	22.0	9.9	32.4	- 23.2
30-21	92.5	90.7	92.5	75.0	18.5	7.5	27.2	- 15.7
31-25	354.1	124.5	354.1	98.0	70.8	9.8	104.1	- 26.5
Total	3,132.0	2,871.0	3,132.0	2,187.0	626.4	218.7	921.1	- 684.0

a/ Woodland compensation will likely be a combination of planting and preservation
b/ Based upon 10-R value of 3.4

May 1993

APPENDIX D

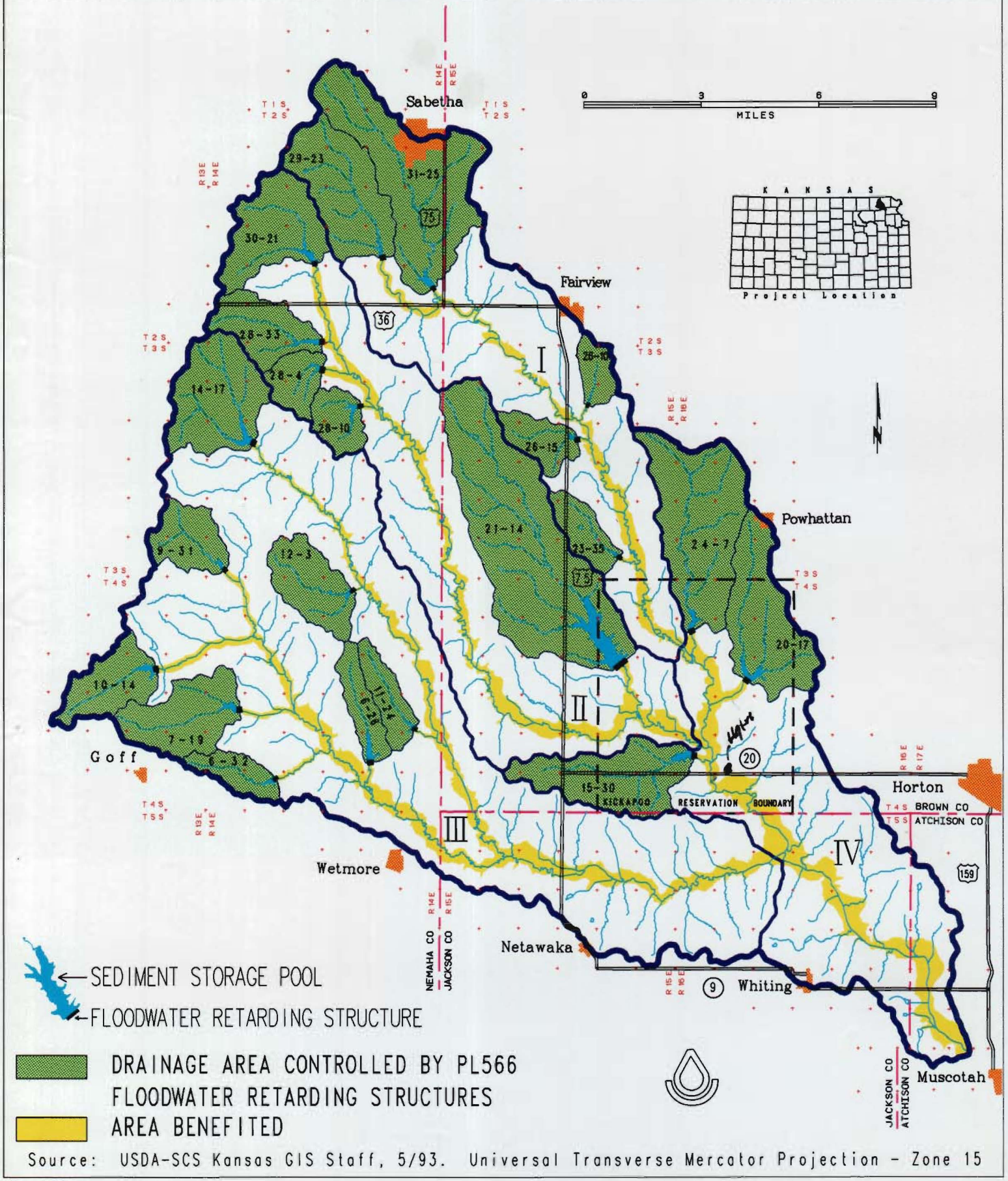
PROJECT MAP

*U.S. GOVERNMENT PRINTING OFFICE: 1994:55

U.S. Department of Agriculture — Soil Conservation Service

UPPER DELAWARE & TRIBUTARIES WATERSHED

ATCHISON, BROWN, JACKSON, & NEMAHA COUNTIES, KANSAS



Source: USDA-SCS Kansas GIS Staff, 5/93. Universal Transverse Mercator Projection - Zone 15

NOTICE

OF INTEREST CREDIT

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
PHONE:785-284-3433

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6443

MATURITY DATE
04/01/03

TERM
12 MONTHS

INTEREST RATE
3.0200 %

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

RJC

001 00 03 NOTICE OF INTEREST CREDIT 09/30/02

MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209

NAME:	NEMAHA BROWN WATERSHED
PUBLIC FUNDS CDS ACCOUNT NUMBER:	6443
TAX ID NUMBER:	48-0892184
INTEREST PAID ON:	09/30/02
INTEREST PAID THIS PERIOD:	932.36
INTEREST PAID 2002:	2,438.99

INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY.
ON 10/01/02, ASSUMING NO OTHER ACTIVITY,
THE PROJECTED BALANCE OF YOUR PUBLIC FUNDS CDS
ACCOUNT 6443 WILL BE 62,509.21.

NBJWD04092

001 00 03 NOTICE OF INTEREST CREDIT 09/28/01

MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209

NAME: NEMAHA BROWN WATERSHED

PUBLIC FUNDS CDS ACCOUNT NUMBER: 6443

TAX ID NUMBER: 48-0892184

INTEREST PAID ON: 09/30/01

INTEREST PAID THIS PERIOD: 1,477.64

INTEREST PAID 2001: 3,179.68 OK

INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY.
ON 10/01/01, ASSUMING NO OTHER ACTIVITY,
THE PROJECTED BALANCE OF YOUR PUBLIC FUNDS CDS
ACCOUNT 6443 WILL BE 60,070.22.

NOTICE

OF INTEREST CREDIT

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
~~PHONE:785-284-3433~~

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6443

MATURITY DATE
04/01/02

TERM
12 MONTHS

INTEREST RATE
5.0300 %

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

NBJWD04093

001 00 03 NOTICE OF INTEREST CREDIT 12/31/01

MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209

NAME: NEMAHA BROWN WATERSHED

PUBLIC FUNDS CDS ACCOUNT NUMBER: 6642

TAX ID NUMBER: 48-0892184

INTEREST PAID ON: 12/31/01

INTEREST PAID THIS PERIOD: 1,564.48

INTEREST PAID 2001: 3,043.81

INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY. dc
ON 01/01/02, ASSUMING NO OTHER ACTIVITY,
THE PROJECTED BALANCE OF YOUR PUBLIC FUNDS CDS
ACCOUNT 6642 WILL BE 57,990.96.

NOTICE

OF INTEREST CREDIT

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
~~PHONE:785-284-3433~~

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6642

MATURITY DATE
02/03/03
TERM
24 MONTHS
INTEREST RATE
5.5000 %

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

NBJWD04094

001 00 03 NOTICE OF INTEREST CREDIT 12/31/01

MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209

NAME: NEMAHA BROWN WATERSHED

PUBLIC FUNDS CDS ACCOUNT NUMBER: 6370

TAX ID NUMBER: 48-0892184

INTEREST PAID ON: 12/31/01

INTEREST PAID THIS PERIOD: 1,544.42

INTEREST PAID 2001: 3,034.50 OK

INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY.
ON 01/01/02, ASSUMING NO OTHER ACTIVITY,
THE PROJECTED BALANCE OF YOUR PUBLIC FUNDS CDS
ACCOUNT 6370 WILL BE 51,360.12.

NOTICE

OF INTEREST CREDIT

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
~~PHONE:785-284-3433~~

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6370

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

MATURITY DATE
12/30/03

TERM
36 MONTHS

INTEREST RATE
6.1500 %

NBJWD04095

NOTICE

OF APPROACHING RENEWAL

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
PHONE:785-284-3433

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6443

MATURITY DATE
04/01/02

TERM
12 MONTHS

INTEREST RATE
5.0300 %

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

001 00 03 NOTICE OF APPROACHING RENEWAL 03/20/02
MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209
NAME: NEMAHA BROWN WATERSHED
PUBLIC FUNDS CDS ACCOUNT NUMBER: 6443
TAX ID NUMBER: 48-0892184

YOUR ACCOUNT WILL MATURE ON 04/01/02. INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY. THE CURRENT BALANCE OF YOUR PUBLIC FUNDS CDS ACCOUNT IS 60,070.22. IF THE ACCOUNT RENEWS, THE NEW MATURITY DATE WILL BE 04/01/03.

SEE ENCLOSED TRUTH IN SAVINGS NOTICE

NBJWD04096

MORRILL STATE BANK & TRUST CO
21 MAIN ST PO BOX 209
SABETHA KS 66534-0209
PHONE:785-284-3433

NOTICE
OF INTEREST CREDIT

CUSTOMER	PUBLIC FUNDS CDS ACCOUNT
215	6443

MATURITY DATE
04/01/02

TERM
12 MONTHS

INTEREST RATE
5.0300 %

NEMAHA BROWN WATERSHED
JOINT DIST 7
LEONARD BURDICK
612 COMMUNITY DR
SENECA KS 66538

001 00 03 NOTICE OF INTEREST CREDIT 03/29/02

MORRILL STATE BANK & TRUST CO - SABETHA KS 66534-0209

NAME: NEMAHA BROWN WATERSHED
PUBLIC FUNDS CDS ACCOUNT NUMBER: 6443
TAX ID NUMBER: 48-0892184
INTEREST PAID ON: 03/31/02
INTEREST PAID THIS PERIOD: 1,506.63
INTEREST PAID 2002: 1,506.63

INTEREST WILL BE CREDITED TO YOUR ACCOUNT SEMI-ANNUALLY.
ON 04/01/02, ASSUMING NO OTHER ACTIVITY,
THE PROJECTED BALANCE OF YOUR PUBLIC FUNDS CDS
ACCOUNT 6443 WILL BE 61,576.85.

NBJWD04097