APPENDIX E

SUPPORTING INFORMATION

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WORK PLAN

SWITZLER CREEK WATERSHED

OF THE OSAGE RIVER WATERSHED

OSAGE COUNTY, KANSAS

PREPARED BY

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SALINA, KANSAS

SEPTEMBER, 1954

TO: A. E. McClymonds, Regional Director DATE: 8/19/53
SCS, Lincoln, Nebraska
FROM: Robt. M. Salter, Chief
SCS, Washington 25, D. C.
SUBJECT: Designation of Switzler Creek Watershed, Kansas

This is to inform you that I have designated Switzler Creek watershed in Osage County, Kansas, as a project eligible for Federal assistance in the installation of improvement measures under the Watershed Protection item in the appropriation bill for fiscal year 1954.

Switzler Creek watershed has been designated on the basis of the formal assurance of the Osage County Soil Conservation District that it is ready to sponsor the program on the watershed and to cooperate with the Federal Government, state and local agencies and individuals in carrying it out.

Switzler Creek watershed, with an area of 33 square miles, is to be completely treated within 5 years at an estimated cost of $250,000 to the Federal Government. The program is based on local interests making at least an equal contribution. The treatment will consist of interrelated land treatment and structural measures designed to prevent the formation of damaging floods, soil erosion and to retard runoff and thereby conserve and improve the agricultural resources of the area.

Local interests will be assisted by the Federal Government in the development of a watershed plan and in the installation of watershed protection measures in accordance with this plan. This assistance will consist of (1) providing technical services to accelerate planning and applying land-treatment measures on watershed lands, (2) designing and supervising the construction of control measures, and (3) issuing invitations to bid and entering into contracts for the installation of structural and related measures.

It is also intended to initiate studies in the Switzler Creek watershed that will provide factual information of the effects of a watershed protection program on crop yields, soil loss and sediment production, runoff, and flood flows. The cooperation of the Geological Survey and other agencies will be sought in carrying out these evaluations. The installation of this program will also serve to demonstrate the willingness and ability of local interests to cooperate with the Federal Government in solving their watershed problems.

The Congress has fixed a ceiling of $28,706,000 in Federal costs to be expended in a five-year period throughout the Nation on this Watershed Protection program. The ceiling for this project as indicated above is $250,000 and cannot be exceeded.

I am sure you have plans to get the work started at once in this watershed and I hope you will do so.

/s/ J. C. Dykes
acting

Osage City, Kansas
June 8, 1954

Dwight Blaesi
Work Unit Conservationist
Soil Conservation Service

Dear Mr. Blaesi:

The supervisors of the Osage County Soil Conservation District have reviewed the attached work plan for the watershed protection works of improvement for the Switzler Creek watershed.

We believe that the development of this plan by the joint efforts of the landowners, the District Supervisors, the Soil Conservation Service, and the other cooperating agencies have resulted in a plan to which we all thoroughly subscribe and are willing to push through to completion according to the terms of cooperation and the schedule shown. We have officially incorporated this plan into the District work plan.

Yours very truly,

The Osage County
Soil Conservation District
Board of Supervisors

Signed: Irving Niles

Roy Driver

Fred Reed

Glenn Wilkin

Russell Booth

RESOLUTION

We, the District Supervisors of Osage County Soil Conservation District in Osage County, Kansas, will sponsor the Water Protection Program on Switzler Creek Watershed.

DATED: August 11, 1953

SIGNED: Fred H. Reed
Glenn S. Wilkin
Roy Driver
Leslie D. Coffman
Irving R. Niles

OFFICE OF COUNTY ENGINEER
Osage County
L. D. Pierce, County Engineer
Phone 220
Lyndon, Kansas

June 7, 1954

Osage County Soil Conservation District
Post Office Building
Osage City, Kansas

Gentlemen:

Concerning the proposed work on Switzler Creek Watershed:

After having examined the plans and specifications on work at Detention Dam No. 5 of Switzler Creek Watershed and having come to an agreement on the plan affecting a short section of county road, the plan is considered satisfactory and approval of the same is hereby given.

Yours truly,

L. D. Pierce
County Engineer

LDP:en

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS

State of Kansas

June 9, 1954

Chairman, Soil Conservation
District Supervisors
Osage County Soil Conservation
District
Osage City, Kansas

Dear Sirs:

I have examined the work plan for the Switzler Creek watershed and find no additions or corrections to make.

I am heartily in accord with the plan and will give my support to the development of the project.

Sincerely yours,

Walter W. Campbell
County Agent
Osage County

jln

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Stabilization and Conservation Office
Osage County, Lyndon, Kansas

June 9, 1954

Chairman, Soil Conservation
District Supervisors
Osage County Soil Conservation
District
Osage City, Kansas

Dear Sirs:

At a meeting at Osage City last night we went over the Switzler Creek watershed plan and find no corrections or additions to make. Our Committee is in agreement with this plan and will give it our support and cooperation.

Very truly yours,

M. Reid, Chairman
Osage County ASC

MR:HAD

WORK PLAN
SWITZLER CREEK WATERSHED
of the Osage River Watershed
Osage County, Kansas

Sponsoring Agency

Osage County Soil Conservation District

Participating Agencies

Soil Conservation Service
Forest Service
Kansas Agricultural Extension Service
Agricultural Conservation Program Service
Osage County Highway Department

Prepared by
Soil Conservation Service
U. S. Department of Agriculture
September 1954

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WORK PLAN

SWITZLER CREEK WATERSHED

Osage County, Kansas

INTRODUCTION

Authority

Federal participation in carrying out this work plan is authorized by the Soil Conservation Act of 1935 (Public Law No. 46, 74th Congress). Money for operations was authorized and appropriated by the 83rd Congress, 1st Session, 1953. (Agr. Appropriation Act for fiscal year 1954, Public Law 156.)

Purpose and Scope of Plan

The purpose of this plan is to set forth the practices and measures which are required and feasible to achieve the maximum practicable degree of soil and moisture conservation and flood prevention. This plan also states how these measures will be carried out within a period of five years. This plan has been developed cooperatively with sponsoring and assisting agencies, who have agreed that the work proposed herein can be undertaken at this time with combined facilities of local interests, State and Federal agencies. The installation on the land of the measures contained in this plan will make a substantial contribution to sustaining agricultural production and to the welfare of land owners and operators, with resultant benefit to the community, State and Nation.

The watershed is entirely within Osage County and contains 19,910 acres or 31.1 square miles.

SUMMARY OF PLAN

This plan is a combination of land treatment practices and measures, which contribute directly to erosion control and flood prevention, and of measures primarily for flood prevention. The works of improvements as listed in Table 1 are planned to be installed during a five-year period at an estimated total cost of $473,165. These costs will be shared as follows: $276,038 by private interests; $8,000 by county and state units of government; $189,127 by the Federal Government. Private costs include $16,120 estimated value of easements and rights-of-way for floodwater retarding structures, and $259,918 for costs of applying land treatment measures. County and township estimated costs of $8,000 are for raising roads which will be affected by floodwater retarding structures.

This combination of measures included in this plan will retard runoff, reduce erosion, inundation and sediment damages to such a degree that land owners and operators will be encouraged to make full and continuous use of agricultural land now subject to frequent overflow.

The Osage County Soil Conservation District has agreed to assume responsibility for maintenance of the floodwater retarding structures at an estimated annual cost of $509, with funds expected to be provided on the basis of benefits accruing to individuals, local agencies and governmental units.

Land owners and operators will maintain the land treatment measures at an estimated annual cost of $12,453 in accordance with provision of the Farmer-District cooperative agreements.

Comparison of Benefit Cost

When the works of improvement are installed and operating at full effectiveness, the ratio of the estimated average annual benefit ($143,468) to the estimated average annual cost ($32,436) is 4.4 to 1, based on current prices for costs and long-term prices for benefits.

DESCRIPTION OF THE WATERSHED

Switzler Creek, a tributary of Dragoon Creek, is located in northwestern Osage County, Kansas, near the western boundary of the Marias des Cygnes or Osage River Watershed. The drainage area is 31.1 square miles (19,910 acres). All of the watershed is located in Burlingame Township with the exception of about two square miles in Dragoon Township and one square mile in Scranton Township. The main stem rises about eight miles northwest of the town of Burlingame (population 1,021) and flows in a southeasterly direction through the eastern section of Burlingame to converge with Dragoon Creek about three miles southeast of the town. The watershed covered by this program does not include all of Switzler Creek watershed. Approximately nine square miles on the southeast tributary of Switzler Creek are not included.

All land in the watershed is privately owned and used for agricultural purposes with the exception of 384 acres in the town of Burlingame.

Total present land use in the watershed is as follows:

Land Use	Acres	Percent
Cultivated	9,737	49
Grassland	8,710	44
Woodland	673	3
Miscellaneous 1/	790	4
Total	19,910	100

The Switzler Creek flood plain is not now intensively utilized as shown by the following table:

Land Use	Acres	Percent
Cultivated	560	32
Woodland	663	39
Grassland	372	21
Miscellaneous 1/	142	8
Total	1,737	100

The soils of the watershed fall within the great soil group of prairie soils and were developed in a cool, moist, sub-humid climate, under the influence of grass vegetation. The parent material of the upland soils are shales, fine-grained sandstones, limestones and calcareous shales.

On the upper level portions of the watershed, the predominant soil is dark grayish-brown soil with a heavy claypan-like subsoil. When not eroded, 8-14 inches of silty material covers the claypan. However, on most cultivated sloping fields only 4 to 8 inches of silty material overlays the clay materials. These soils are similar to Woodson.

Below limestone escarpments on the slopes there occurs a dark prairie soil with a moderately heavy subsoil and shale or sandy shale parent materials. These soils are similar to Iola silty clay loam or summit soils.

Other major soils are friable sloping dark brown soils on sandstone and limestone; these soils are similar to Bates and Bartlett, and moderate depth soils over sandy shales and sandstones, similar to Dennis.

The only soils that are not lacking in available calcium are those occurring immediately below limestone escarpments. There has been an extensive liming program throughout the county; therefore, much of the lime need has been alleviated.

1/ Includes roads, highways, farmsteads, railroad right-of-way, town, etc.

Practically all of the soils are deficient in phosphate but tests do not show potash to be a factor that limits production in most soils.

Response to nitrogen fertilizer will be good in most cases unless an exceptional rotation has been followed.

The general topography of the watershed is undulating to gently rolling. Elevations range from about 1,000 feet above mean sea level in the alluvial bottoms near Dragoon Creek, to about 1,250 feet above mean sea level at the northwestern boundary of the watershed.

The climate is favorable to agriculture. The mean temperature is 55.3° F. Seasonal temperatures range from an average annual of 30.1° F. for January to 78.3° F. average for July. During a 39-year period of record at Osage City, located about 5 miles south of the watershed, a maximum temperature of 118° F. and a minimum of -26° F. have been recorded. The average length of growing season is 178 days. The shortest on record is 151 days, and the longest is 209 days. The average date of the first killing frost is October 16. The earliest date of record is September 18, 1901. The average date of the last killing frost is April 21 and the latest record is May 25, 1925.

The average annual rainfall is 35.12 inches, based on a 39-year record at Osage City. About 79 percent of this falls during the months of April through October. The driest year on record was 1919 with only 22.87 inches and the wettest year was 1951 with 61.15 inches.

The area is subjected to prolonged rains of large volume and also short rainstorms of high intensity. Monthly maximums in July of 19.67 inches (1909) and 15.09 inches (1951) have been recorded at Osage City. In July 1951, about 12 inches fell during a 3-day period. A 24-hour rainfall of 9.65 inches occurred July 7, 1909, at Osage City. Rainstorms of high intensity recorded in or near the watershed are 4.16 inches in 60 minutes, 2.92 inches in 30 minutes, and 0.67 inches in 5 minutes. Annual snowfall averages 10.7 inches.

Water for livestock and domestic uses in the rural area is supplied largely by shallow wells, cisterns, and small farm ponds. The town of Burlingame obtains its water from Dragoon Creek.

The farming in the watershed is of a general type with major emphasis on beef cattle raising and feeding. The major crops are corn, wheat, and native grasses used for pasture and hay. Minor crops are soybeans, oats, sorghum and alfalfa. Largely all of the crops are fed locally to beef cattle that are grazed on the native grass pastures during the pasture season. Cash grain, dairies, hog and sheep production are of minor importance in the watershed.

A soil conservation district was established in Osage County, Kansas, in 1939. Switzler Creek is served by this district. The district has assisted the farmers in preparing conservation plans on 40 percent of the watershed and about 35 percent of the planned land treatment practices have been applied.

There are 3.5 miles of state highways, 8.2 miles of county roads, and 49.2 miles of township roads in the area. These roads provide adequate access to all parts of the watershed. However, floods occasionally make some of the roads impassable. The detours thus occasioned cause delay and extra travel distance to and from places of employment and markets.

There are 4.2 miles of railroad within the watershed.

FLOOD AND EROSION PROBLEMS AND DAMAGES

Switzler Creek has a long history of flood damage. Major floods occurred in 1935, 1945, and 1951. Low first bottoms adjacent to the channel average being flooded 3 to 4 times per year. In 1951 there were 5 floods that covered all of the flood plains.

The largest agricultural loss from floods is growing crops. Inundation damages corn, sorghum, grain, hay, and pasture crops. The loss is usually in the form of reduced yields, rather than total destruction, since the period of inundation is short. Average annual damage to crops is $4,730.

Flood damage has occurred to 54,200 lineal feet of farm fences. Farmers state that they no longer attempt to maintain fences in the flood plain due to flood hazards. This lack of suitable fences results in losses due to inability to pasture wheat, wooded pastures, and stubble.

Farmers have not used adequate lime, fertilizer and crop rotations on floodplain lands due to the flood hazards involved. Some brush and wooded areas now producing very little economic returns will be cleared for crop production when flood prevention measures are installed. Washed out bridges and crossings following floods cause additional travel and inconvenience to farmers in getting to fields.

Flood damage to roads includes removal of gravel surfacing from 22,500 feet of roadbed, damage to 15 bridges and 14 culverts. Indirect damage on roads includes interruption of travel. Minor floods usually stop traffic on all floodplain roads except U. S. 50 N.

In 1951, U. S. 50 N. was closed to traffic on 4 different occasions for periods of 12 hours each. Since this highway carries an average of 2,500 cars and 300 commercial trucks daily, the monetary loss through interruption of travel is of considerable importance, although it has not been evaluated monetarily in this work plan.

The City of Burlingame has an estimated average annual damage of $7,000. Residences, business establishments and public facilities in the eastern part of the city are damaged by floodwater and sediment. In 1945, 32 homes were flooded. Red Cross aid was provided for 4 days during this emergency.

Soil resources on uplands are declining due to sheet erosion which has removed 25 to 75 percent of the topsoil on cropland. This loss of topsoil is particularly damaging, since the majority of the soils have subsoils unfavorable to cultivation. Severe sheet erosion results in abandonment of 39 acres annually. Land damage by gully erosion is moderate. Gullies are usually shallow, ranging 3 to 5 feet in depth with occasional deep gullies due to alteration in gradient by roads or other structures.

A total of 237 acres of floodplain land has been damaged by scouring. Streambank erosion causes damage on 3 acres annually. Deposition of sediment in road ditches, culverts and roadbeds results in increased maintenance costs.

There are no large reservoirs within the watershed. Considerable amounts of sediment are transported out of the watershed.

EXISTING OR PROPOSED WATER MANAGEMENT PROJECTS

There are no existing or proposed water-management projects in the Switzler Creek Subwatershed.

FLOOD PREVENTION WORKS OF IMPROVEMENT TO BE INSTALLED

Measures Primarily for Flood Prevention

The 5 floodwater retarding structures to provide flood protection for floodplain lands, highways, railroads, and urban improvements are listed in Table 1. This table shows cost and distribution of cost.

The location, number and drainage area in acres of these 5 floodwater retarding structures are shown on the Work Plan map Figure 2. Other data concerning the floodwater retarding structures are summarized in Table 6.

The system of floodwater retarding structures will detain runoff from 57.5 percent of the Switzler Creek Watershed.

These measures will reduce inundation, scour and sediment damage caused by runoff in excess of that which can be controlled by the land treatment measures recommended for the watershed. The installation of these structures will permit more intensive use of the bottomlands.

These structures are located at sites where the temporary impoundment of water will cause a minimum reduction in productivity in the reservoir area. The type of structures will be an earth fill dam with uncontrolled outlet, designed to release water at a fixed and safe rate. All structures will use a vegetated spillway, thereby effecting a substantial reduction in cost over concrete or similar type spillways.

As indicated in Figure 2, it will be necessary to raise one county and several township roads where they are within the detention pool areas of proposed structures. Costs of this are included in the non-Federal public cost of floodwater retarding structures.

Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention

The land treatment measures will provide for use of land within its capabilities and treatment according to its needs for efficient and sustained production. These measures will prevent erosion and retard runoff.

The land treatment measures that will have a major effect in contributing to flood prevention will be the conversion of 755 acres of cropland to pasture and the seeding of grasses and legumes on 1,001 acres in a conservation crop rotation.

The 4,920 acres of contour farming and 3,660 acres of crop residue management will also have a very significant effect.

The 2,568 acres of pasture improvement will have a significant effect.

The supporting measures -- 270.9 miles of terraces, 369.5 acres of waterways, 47 erosion control structures -- are needed to support the recommended land use.

Other land treatment measures include 31 farm ponds, 156 acres of tree planting and 8.9 miles of diversion construction.

The estimated total cost of planning and installing these measures, as shown in Table 1, is $275,668. The annual cost, including installation and maintenance, is $25,107.

Effects of Measures on Damages and Benefits

The complete program of land treatment and flood prevention measures described above would reduce floodwater damages from $19,464 to $4,813 annually. Approximately 33 percent of this reduction would be due to the installation of the land treatment program, and 67 percent to the installation of the flood prevention measures.

The extent and frequency of flooding will be reduced on much of the bottomland now in trees and brush to such an extent that it can be cultivated at a profit. The increased net income for this intensification of use is estimated to be $5,207 annually.

The total flood prevention benefit due to reduction in flood damages and more intensive use of floodplain lands is estimated to be $19,858 annually. In addition, it is estimated that the conservation benefits to land owners and operators would be $123,610 annually. This benefit is due to increased production due to the installation of land treatment measures and the effectiveness of these measures in preventing deterioration of the land resource.

This watershed protection program and similar treatment on other tributary watersheds to Dragoon Creek and the Marias des Cygnes River will reduce floodwater and sediment damages, and provide for more intensive agricultural use of floodplain lands in those areas.

Comparison of Costs and Benefit

The ratio of the average annual benefit from measures primarily for flood prevention, $15,053, to the average annual value of the cost of the measures, $6,569, is approximately 2.3:1.

The ratio of the average annual benefit, $128,415, from land treatment measures and practices to their average annual cost, $25,107, is approximately 5.1:1.

The estimated ratio of total average annual benefits, $143,468, to total average annual value of costs, $32,436, is 4.4:1.

In addition to the monetary benefits discussed above, there are other substantial values which will accrue from the program, such as increased recreation, better living conditions, and a greater sense of security.

PROVISIONS FOR MAINTENANCE

The estimated annual maintenance cost of land treatment measures and measures primarily for flood prevention are shown in Table 3.

The floodwater retarding structures will be maintained by the Osage County Soil Conservation District at an estimated annual cost of $509. The District owns sufficient equipment and has capable employees who can do ordinary repair and maintenance work. The District plans to ask landowners and operators who benefit from floodwater retardation to contribute to the maintenance fund established by the District.

The land treatment measures will be maintained by the land owners and operators of the farms on which the measures are installed in accordance with terms of the Farmer-District cooperative agreement at an estimated annual cost of $12,453.

ACCOMPLISHING THE PLAN

The Kansas Agricultural Extension Service, through the County Agent, will conduct general information meetings and local farm meetings, prepare press releases and use other means of disseminating information to the people in Switzler Creek watershed. This will help achieve understanding, and stimulate participation by farmers in the watershed in installing and maintaining the land treatment practices and the measures primarily for flood prevention.

The Soil Conservation Service has assigned additional technicians and aids to the Osage County Soil Conservation District to assist land owners and operators in the preparation and application of soil and water conservation plans. Farmers will be given assistance in groups, whenever feasible, for farm planning and for instruction in conservation farming. Final plans will be developed individually with each farmer cooperator. SCS technicians will also determine need and extent, design, layout, check installation and certify performance on practices eligible for Agricultural Conservation Program Service payments.

In addition to the regular county allotment, additional ACPS funds have been made available for cost-sharing assistance to farmers in the watershed. This will provide financial assistance for farmers to accelerate the application of land treatment measures.

The Forest Service made a survey to determine present status of forestry activities and prepared an estimate of woodland treatment for the preliminary work plan. Tree plantings for conservation of watershed lands are included in Table 1.

The Board of Supervisors of the Osage County Soil Conservation District will arrange for meetings according to a definite schedule, and by individual contacts, will encourage land owners and operators within the watershed to adopt and carry out soil and water conservation plans on their farms. District-owned equipment will be made available to farmers in accordance with the existing arrangements for equipment usage in the District. The District Governing Body will make periodic inspections of the completed conservation measures within their respective districts and follow through to see that needed maintenance is performed according to provisions in the District's plans for maintenance.

The Soil Conservation Service will provide technical specialists to assist in the planning, design, supervision of construction, certification of payments and related duties for the measures primarily for flood prevention. Since this work will be done by contract, the Soil Conservation Service personnel will be responsible for preparing specifications and discharging the various steps involved in the letting of contracts in accordance with customary Federal procedures.

The Osage County Commissioners agree to make the necessary changes to raise the county road grade sufficient to prevent flooding of the road by floodwater retarding structure #5.

Table 1 and Figure 1 indicate the schedule of operations for the program which the cooperating parties have agreed should be followed to achieve the most efficient prosecution of the work. This schedule will be adjusted year by year on the basis of any significant changes in the plan found to be mutually desired and in light of appropriations and accomplishments actually made year by year.

PROGRAM EVALUATION

An evaluation supplement to this work plan has been prepared which sets forth the methodology and instrumentation which will be used in making a physical and economic evaluation of the effects of the application of the watershed protection program. (Supplement attached to the back of this report).

Project: Switzler Creek Watershed
State: Kansas

Table I
Installation Cost - Fiscal Year 1954

September 1954

Measures	Unit	No. Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No. 1/	5	17,466	1,500	1,560	20,526
	Acre Feet Detention Storage	375				
Total A-Measures			17,466	1,500	1,560	20,526
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	100				
Diversion construction	Mile	0.5			158	158
Pasture seeding	Acre	50			2,000	2,000
Pond construction	No.	4			1,600	1,600
Pasture (range) improvement 2/	Acre	500			3,000	3,000
Structures, erosion control	No.	1			350	350
Terracing	Mile	4.0			952	952
Tree planting	Acre	2.0			150	150
Waterway development	Acre	25.0			2,325	2,325
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	250			8,750	8,750
Crop residue management	Acre	240			120	120
Land use and adjustment practices						
(a) Fencing (for conservation)	Rod	316			790	790
(b) Obstruction removal	Acre	12.0			600	600
"Accelerated" farm and ranch planning and application assistance	Acre	2,000	3,000			3,000
Total B-Measures			3,000		20,795	23,795
Total A and B Measures			20,466	1,500	22,355	44,321
Facilitating Measures						
Program Evaluation SCS			2,500			2,500
Work Plan Development SCS			13,000			13,000
Work Plan Development FS			1,100			1,100
GRAND TOTAL (Watershed Protection Funds)			37,066	1,500	22,355	60,921
Summary						
Total Federal Costs SCS			35,966			
Total Federal Costs FS			1,100			
"Going" Program SCS	Acre					

1/ Map designation number of structures to be installed.
2/ Includes reseeding of range lands.

Project: Smitzler Creek Watershed
State: Kansas

Table I
Installation Cost - Fiscal Year 1955

September 1954

Measures	Unit	No. to be Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No. 1/	4 & 7	61,776	1,500	6,400	69,676
	Acre Feet Detention Storage	1,701				
Total A-Measures			61,776	1,500	6,400	69,676
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	295				
Diversion construction	Mile	1.2			378	378
Pasture seeding	Acre	235			9,400	9,400
Pond construction	No.	5			2,000	2,000
Pasture (range) improvement 2/	Acre	775			4,650	4,650
Structures, erosion control	No.	2			700	700
Terracing	Mile	16.9			4,022	4,022
Tree planting	Acre	31.0			2,251	2,251
Waterway development	Acre	122.5			11,392	11,392
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	200			7,000	7,000
Crop residue management	Acre	920			460	460
Land use and adjustment practices						
(a) Fencing (for conservation)	Rod	632			1,580	1,580
(b) Construction removal	Acre	23.6			1,180	1,180
"Accelerated" farm and ranch planning and application assistance	Acre	4,500	6,750			6,750
Total B-Measures			6,750		45,013	51,763
Total A and B Measures			68,526	1,500	51,413	121,439
Facilitating Measures						
Program Evaluation SCS			1,500			1,500
Work Plan Development SCS			1,300			1,300
Work Plan Development FS						
GRAND TOTAL (Watershed Protection Funds)			71,326	1,500	51,413	124,239
Summary						
Total Federal Costs SCS			71,326			
Total Federal Costs FS						
"Going" Program SCS	Acre					

1/ Map designation number of structures to be installed.
2/ Includes reseeding of range lands.

Project: Switzler Creek Watershed
State: Kansas

Table I
Installation Cost - Fiscal Year 1956

September 1954

Measures	Unit	No. to be Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No. 1/	1	45,030	5,000	5,140	55,170
	Acre Feet Detention Storage	1,558				
Total A-Measures			45,030	5,000	5,140	55,170
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	984				
Diversion construction	Mile	1.8			568	568
Pasture seeding	Acre	280			11,200	11,200
Pond construction	No.	8			3,200	3,200
Pasture (range) improvement 2/	Acre	645			3,870	3,870
Structures, erosion control	No.	10			3,500	3,500
Terracing	Mile	54.0			12,852	12,852
Tree planting	Acre	33.0			2,891	2,891
Waterway development	Acre	148.0			13,763	13,763
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	200			7,000	7,000
Crop residue management	Acre	1,285			642	642
Land use and adjustment practices						
(a) Fencing (for conservation)	Rod	1,264			3,160	3,160
(b) Obstruction removal	Acre	48.0			2,400	2,400
"Accelerated" farm and ranch planning and application assistance	Acre	3,600	5,400			5,400
Total B-Measures			5,400		65,046	70,446
Total A and B Measures			50,430	5,000	70,186	125,616
Facilitating Measures						
Program Evaluation SCS			1,500			1,500
Work Plan Development SCS			1,300			1,300
Work Plan Development FS						
GRAND TOTAL (Watershed Protection Funds)			53,230	5,000	70,186	128,416
Summary						
Total Federal Costs SCS			53,230			
Total Federal Costs FS						
"Caring" Program SCS	Acre					

1/ Map designation number of structures to be installed.
2/ Includes reseeding of range lands.

Project: Switzler Creek Watershed
State: Kansas

Table I
Installation Cost - Fiscal Year 1957

September 1954

Measures	Unit	No. to be Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No. 1/	3	21,305		3,020	24,325
	Acre Feet Detention Storage	744				
Total A-Measures			21,305		3,020	24,325
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	1,471				
Diversion construction	Mile	2.7			852	852
Pasture seeding	Acre	188			7,520	7,520
Pond construction	No.	8			3,200	3,200
Pasture (range) improvement 2/	Acre	388			2,327	2,327
Structures, erosion control	No.	14			4,900	4,900
Terracing	Mile	81.0			19,278	19,278
Tree planting	Acre	42.0			3,421	3,421
Waterway development	Acre	37.0			3,440	3,440
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	200			7,000	7,000
Crop residue management	Acre	735			368	368
Land use and adjustment practices						
(a) Fencing(for conservation)	Rod	2,212			5,530	5,530
(b) Obstruction removal	Acre	82.0			4,100	4,100
"Accelerated" farm and ranch planning and application assistance	Acre	400	600			600
Total B-Measures			600		61,936	62,536
Total A and B Measures			21,905		64,956	86,861
Facilitating Measures						
Program Evaluation SCS			1,500			1,500
Work Plan Development SCS			1,300			1,300
Work Plan Development FS						
GRAND TOTAL (Watershed Protection Funds)			24,705		64,956	89,661
Summary						
Total Federal Costs SCS			24,705			
Total Federal Costs FS						
"Going" Program SCS	Acre					

1/ Map designation number of structures to be installed.
2/ Includes reseeding of range lands.

Project: Switzler Creek Watershed
State: Kansas

Table 1
Installation Cost - Fiscal Year 1958

September 1954

Measures	Unit	No. to be Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No.					
	Acre Feet Detention Storage					
Total A-Measures						
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	2,070				
Diversion construction	Mile	2.7			852	852
Pasture seeding	Acre	188			7,520	7,520
Pond construction	No.	6			2,400	2,400
Pasture (range) improvement 1/	Acre	260			1,500	1,500
Structures, erosion control	No.	20			7,000	7,000
Terracing	Mile	115.0			27,370	27,370
Tree planting	Acre	48.0			3,172	3,172
Waterway development	Acre	37.0			3,440	3,440
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	151			5,284	5,284
Crop residue management	Acre	480			240	240
Land use and adjustment practices						
(a) Fencing (for conservation)	Rod	1,896			4,740	4,740
(b) Obstruction removal	Acre	71.0			3,550	3,550
"Accelerated" farm and ranch planning and application assistance	Acre					
Total B-Measures					67,128	67,128
Total A and B Measures					67,128	67,128
Facilitating Measures						
Program Evaluation SCS			1,500			1,500
Work Plan Development SCS			1,300			1,300
Work Plan Development FS						
GRAND TOTAL (Watershed Protection Funds)			2,800		67,128	69,928
Summary						
Total Federal Costs SCS			2,800			
Total Federal Costs FS						
"Going" Program SCS	Acre					

1/ Includes reseeding of range lands.

Project: Switzler Creek Watershed
State: Kansas

Table 1
Installation Cost - Total Needed Program

September 1954

Measures	Unit	No. to be Applied	Estimated Cost: Federal	Non-Federal Public	Private	Total
			(dollars)	(dollars)	(dollars)	(dollars)
A-Measures Primarily for Flood Prevention						
SCS Floodwater retarding structures	No.	5	145,577	8,000	16,120	169,697
	Acre Feet Detention Storage	4,378				
Total A-Measures			145,577	8,000	16,120	169,697
B-Measures for Conservation of Watershed Lands that Contribute Directly to Flood Prevention						
SCS Contour farming	Acre	4,920				
Diversion construction	Mile	8.9			2,808	2,808
Pasture seeding	Acre	941			37,640	37,640
Pond construction	No.	31			12,400	12,400
Pasture (range) improvement 1/	Acre	2,568			15,407	15,407
Structures, erosion control	No.	47			16,450	16,450
Terracing	Mile	270.9			64,474	64,474
Tree planting	Acre	156.0			11,885	11,885
Waterway development	Acre	369.5			34,360	34,360
Conservation crop rotation						
(a) Seeding grasses and/or legumes	Acre	1,001			35,034	35,034
Crop residue management	Acre	3,660			1,830	1,830
Land use and adjustment practices						
(a) Fencing (for conservation)	Rod	6,320			15,800	15,800
(b) Obstruction removal	Acre	236.6			11,830	11,830
"Accelerated" farm and ranch planning and application assistance	Acre	10,500	15,750			15,750
Total B-Measures			15,750		259,918 2/	275,668
Total A and B Measures			161,327	8,000	276,038	445,365
Facilitating Measures						
Program Evaluation SCS			8,500			8,500
Work Plan Development SCS			18,200			18,200
Work Plan Development FS			1,100			1,100
GRAND TOTAL (Watershed Protection Funds)			189,127	8,000	276,038	473,165
Summary						
Total Federal Costs SCS			188,027			
Total Federal Costs FS			1,100			
"Going" Program SCS	Acre	1,500	2,250			2,250

1/ Includes reseeding of range lands.
2/ An estimated 36.6% of the private cost, or a total of $95,715 for the 5-year program, may be available from other Federal funds, such as ACPS, to reimburse private interests for the cost of applying these measures.

TABLE 2
STATUS OF CONSERVATION JOB ON WATERSHED
Switzler Creek Watershed - Osage County, Kansas

September 1954

	Unit	Total Conservation Job: Number	Total Conservation Job: Total Cost (dollars)	Applied To Date	Estimated Cost To Date: Federal 1/ (dollars)	Estimated Cost To Date: Non-Federal Public (dollars)	Estimated Cost To Date: Private 2/ (dollars)	Remaining To Be Applied (See Table 1)
A-Measures								
Floodwater retarding structures	No.	5	169,697	0				5
B-Measures								
Contour farming	Acre	6,890		1,970				4,920
Diversion construction	Mile	18.5	5,842	9.6	1,517		1,517	8.9
Pasture seeding	Acre	1,671	66,840	730	8,760		20,440	941
Pond construction	No.	90	36,000	59	11,800		11,800	31
Pasture improvement	Acre	3,918	23,507	1,350	3,240		4,860	2,568
Structures, erosion control	No.	47	16,450	0				47
Terracing	Mile	370	88,060	99.1	11,793		11,793	270.9
Tree planting	Acre	181	13,731	25	250		1,596	156
Waterway development	Acre	441	41,010	71.5	2,660		3,990	369.5
Conservation crop rotation								
(a) Seeding grasses and/or legumes	Acre	2,250	78,748	1,249	13,114		30,600	1,001
Crop residue management	Acre	9,000	4,500	5,340			2,670	3,660
Land use and adjustment								
(a) Fencing (For conservation)	Rod	8,000	20,000	1,680			4,200	6,320
(b) Obstruction removal	Acre	371	18,550	134.4			6,720	236.6
Farm and ranch planning and application assistance	Acre	19,910	29,865	7,910	11,865			12,000
Total B-Measures			443,103		64,999		100,186	
Total A and B Measures			612,800		64,999		100,186	

1/ ACP payments are included.
2/ ACP payments have been deducted.

TABLE 3
ANNUAL COSTS
Switzler Creek Watershed

	AMORTIZATION OF INSTALLATION COSTS 3/				OPERATION & MAINTENANCE			
	Federal 1/	Non-Fed. Public 1/	Private 2/	Total	Federal	Non-Fed. Public	Private	Grand Total
A-Measures								
Floodwater retarding structures	5,133	282	645	6,060		509		6,569
B-Measures	555		12,099	12,654			12,453	25,107
Facilitating Measures								
Work plan development	681			681				681
"Going" Farm and Ranch Planning and Application Assistance	79			79				79
Total All Measures	6,448	282	12,744	19,474		509	12,453	32,436

1/ 3.5258 percent of installation costs for A-Measures and B-Measures (50-year period), including interest at 2.5 percent on investment.
2/ 4.6550 percent of installation costs for A-Measures and B-Measures (50-year period), including interest at 4.0 percent on investment.
3/ In this report the Federal interest rate is 2.5 percent and private rate is 4.0 percent.

TABLE 4
SUMMARY OF AVERAGE ANNUAL MONETARY FLOODWATER AND SEDIMENT DAMAGE
AND FLOOD PREVENTION BENEFIT FROM THE PLAN
Switzler Creek Watershed
(Long-Term Prices)

Damages	Average Annual Damage			Average Annual Benefit		
	Under Present Conditions	B-Measures Only	With A and B Measures	From B-Measures Only	From A-Measures Only	Total Flood Prevention Benefit from A and B
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Floodwater Damage						
Crop and pasture	4,730	3,385	805	1,345	2,580	3,925
Floodplain scour	1,284	905	141	379	764	1,143
Other agricultural	1,865	1,381	579	484	802	1,286
Roads and bridges	4,585	3,388	1,258	1,197	2,130	3,327
Non-agricultural	7,000	5,600	2,030	1,400	3,570	4,970
Total Damage	19,464	14,659	4,813			
Benefit from reduction of damage				4,805	9,846	14,651
Benefit from more intensive use of flood plain					5,207	5,207
Total Flood Prevention Benefit				4,805	15,053	19,858

TABLE 5
DISTRIBUTION OF COSTS AND BENEFITS BY MEASURES AND GROUPS OF MEASURES
Switzler Creek Watershed

Item	Total Cost	Average Annual Cost	Average Annual Benefit: Floodwater & Sediment Benefit	Average Annual Benefit: More Intensive Use of Land	Average Annual Benefit: Conservation Benefit	Average Annual Benefit: Total	Benefit Cost Ratio
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	
A-Measures							
Floodwater retarding structure Nos. 1, 3, 4, 5, and 7	169,697	6,569	9,846	5,207		15,053	2.3:1
B-Measures	275,668	25,107	4,805		123,610 1/	128,415	5.1:1
Facilitating Measures							
Work plan development	19,300	681					
"Going" Farm and Ranch Planning and Application Assistance	2,250	79					
Total All Measures	466,915	32,436	14,651	5,207	123,610	143,468	4.4:1

1/ Includes $103,749 from increased production and $19,861 from reduction in deterioration of land resources.

TABLE 6
FLOODWATER RETARDING STRUCTURE DATA
Switzler Creek Watershed

Site No.	Drainage Area Sq. Miles	Storage Capacity Acre Feet Sed. Pool	Storage Capacity Acre Feet Det. Pool	Storage Capacity Acre Feet Total	Storage Capacity Inches of Runoff Sed. Pool	Storage Capacity Inches of Runoff Det. Pool	Storage Capacity Inches of Runoff Total	Surface Area Acres Top of Sed. Pool	Surface Area Acres Top of Det. Pool	Max. Ht. of Dam Feet	Flood Plain Area Inundated - Acres Under Sed. Pool	Flood Plain Area Inundated - Acres Under Det. Pool	Flood Plain Area Inundated - Acres Total	Volume of fill Cu. Yds.	Draw Down Rate cfs	Type of Spillway	Estimated Total Cost
1	7.65	122	1558	1680	0.3	3.8	4.1	33	200	31	33	79	112	92,000	135	Veg.	$ 55,170
3	3.00	48	744	792	0.3	4.6	4.9	19	116	26	17	25	42	47,500	60	Veg.	24,325
5	1.47	24	375	399	0.3	4.8	5.1	9	51	24	8	12	20	27,000	24	Veg.	20,526
7	5.13	83	1537	1620	0.3	5.6	5.9	30	216	32	25	29	54	109,000	77	Veg.	55,731
4	0.65	11	164	175	0.3	4.7	5.0	5	33	22	0	0	0	25,500	10	Veg.	13,945
TOTAL	17.9	288	4378	4666				96	616		83	145	228	301,000			$169,697 1/

SUMMARY

1/ Construction Cost	$111,981
Engineering Cost	27,996
Contingencies	5,600
Easements & Rights-of-way	24,120

TABLE 7
SUMMARY OF PROGRAM DATA
Switzler Watershed,
Kansas

Item	Unit	Quantity
Years to complete program	Year	5
Total installation cost		
Federal	Dollar	189,127
Non-Federal	Dollar	284,038 1/
Annual O&M cost		
Federal	Dollar	
Non-Federal	Dollar	12,962
Annual benefits	Dollar	143,468
Floodwater retarding structures	Each	5
Area inundated by structures		
Floodplain	Acre	228
Upland	Acre	388
Watershed area above structures	Acre	11,460
Reduction of floodwater damage		
A-Measures	Percent	51
B-Measures	Percent	25
Reduction of erosion damage		
A-Measures	Percent	1
B-Measures	Percent	96
Other benefits		
A-Measures	Dollar	5,207
B-Measures	Dollar	103,749

1/ It is estimated that $95,715 may be available from other Federal funds (ACPS) to reimburse private interests for part of cost of land-treatment measures.

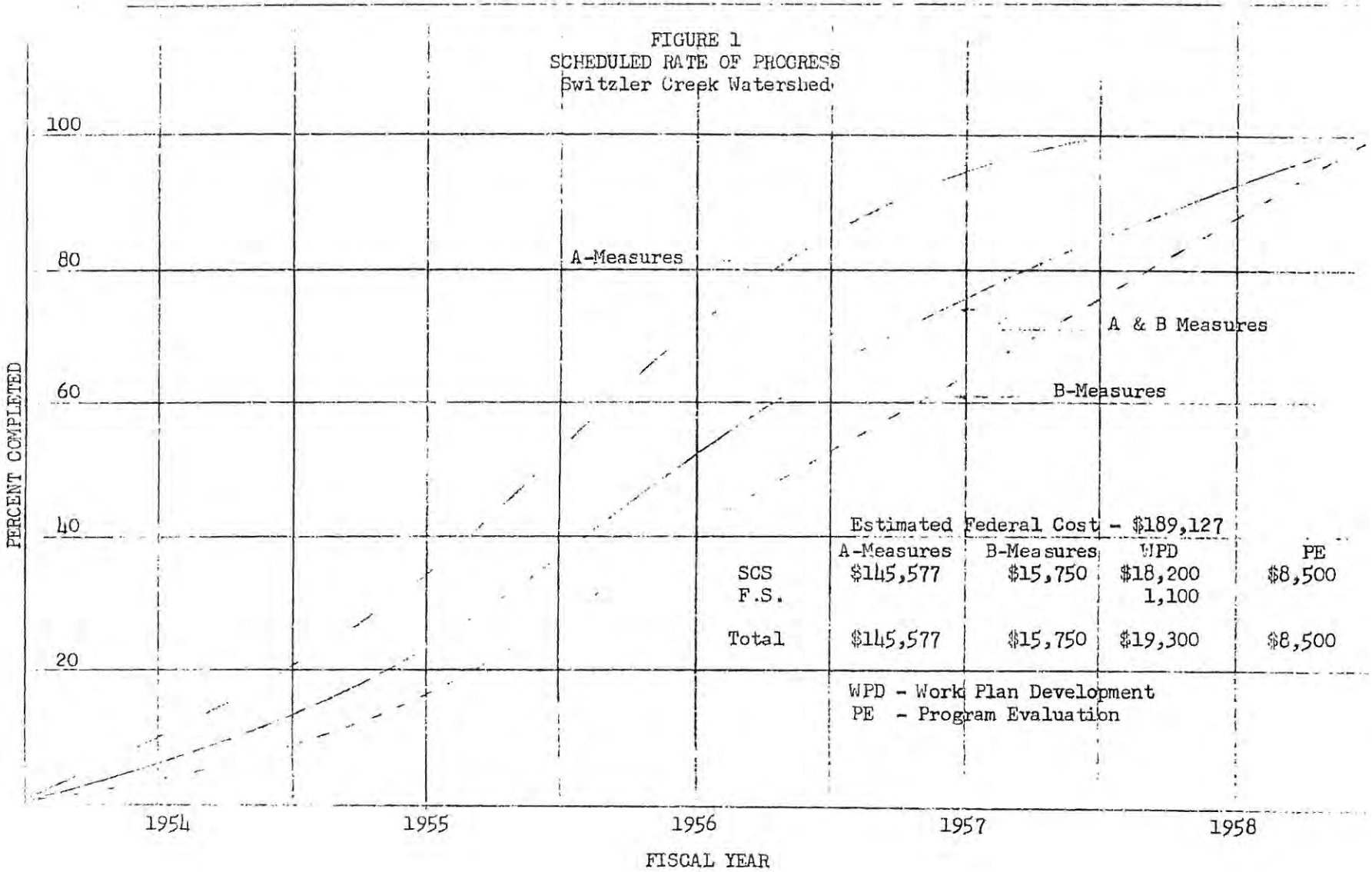
TABLE 8
SUMMARY OF PHYSICAL DATA
Switzler Watershed,
Kansas

Item	Unit	Quantity Without Program	Quantity With Program
Watershed area	Sq. Mi.	31.13	31.13
Watershed area	Acre	19,910	19,910
Area of cropland	Acre	9,737	9,992
Area of grassland	Acre	8,710	8,824
Area of woodland	Acre	673	304
Miscellaneous 1/		790	790
Floodplain area subject to damage by 25-year frequency storm	Acre	1,710	970 2/
Annual rate of erosion			
Sheet	Tons/Yr	74,680	17,840
Gully	Tons/Yr	10,580	2,740
Streambank and valley trenching	Tons/Yr	31,360	30,970
Scour	Tons/Yr	3,920	2,350
Area damaged annually by			
Sediment	Acre	Negligible	Negligible
Floodplain scour	Acre	237	140
Swamping	Acre	Negligible	Negligible
Streambank erosion	Acre	3	3
Sheet erosion	Acre	6,860	686
Sediment production	Tons/Ac/Yr	5.78	2.58
Frequency of flooding	Events/Yr	4	2
Average annual precipitation	Inch	35.12	35.12
Average annual runoff	Inch	5	4

1/ Includes roads, highways, farmsteads, railroad rights-of-way, town, etc.

2/ Includes area of detention storage in floodwater retarding reservoirs.

FIGURE 1
SCHEDULED RATE OF PROGRESS
Switzler Creek Watershed



Estimated Federal Cost - $189,127

	A-Measures	B-Measures	WPD	PE
SCS	$145,577	$15,750	$18,200	$8,500
F.S.			1,100	
Total	$145,577	$15,750	$19,300	$8,500

WPD - Work Plan Development
PE - Program Evaluation

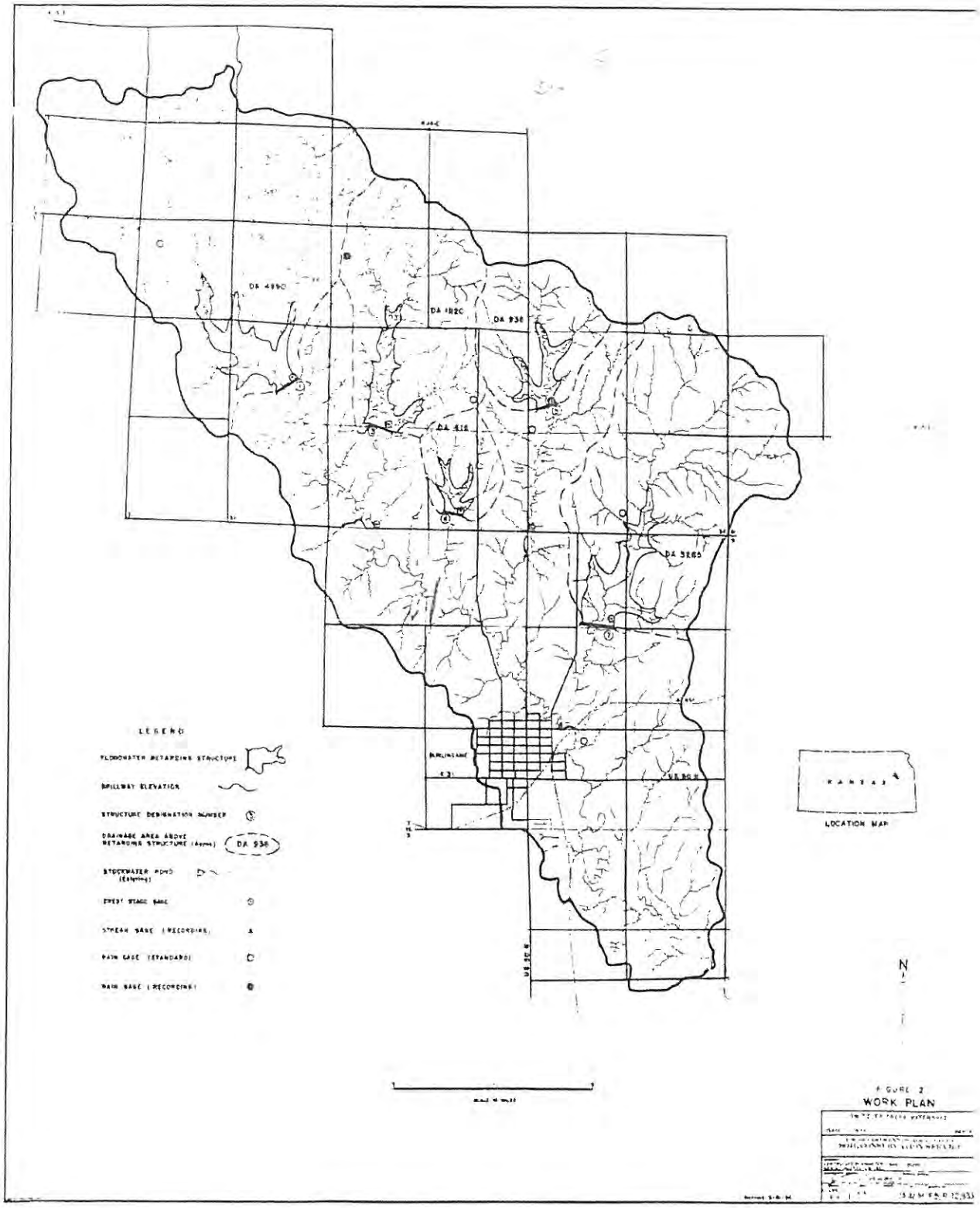
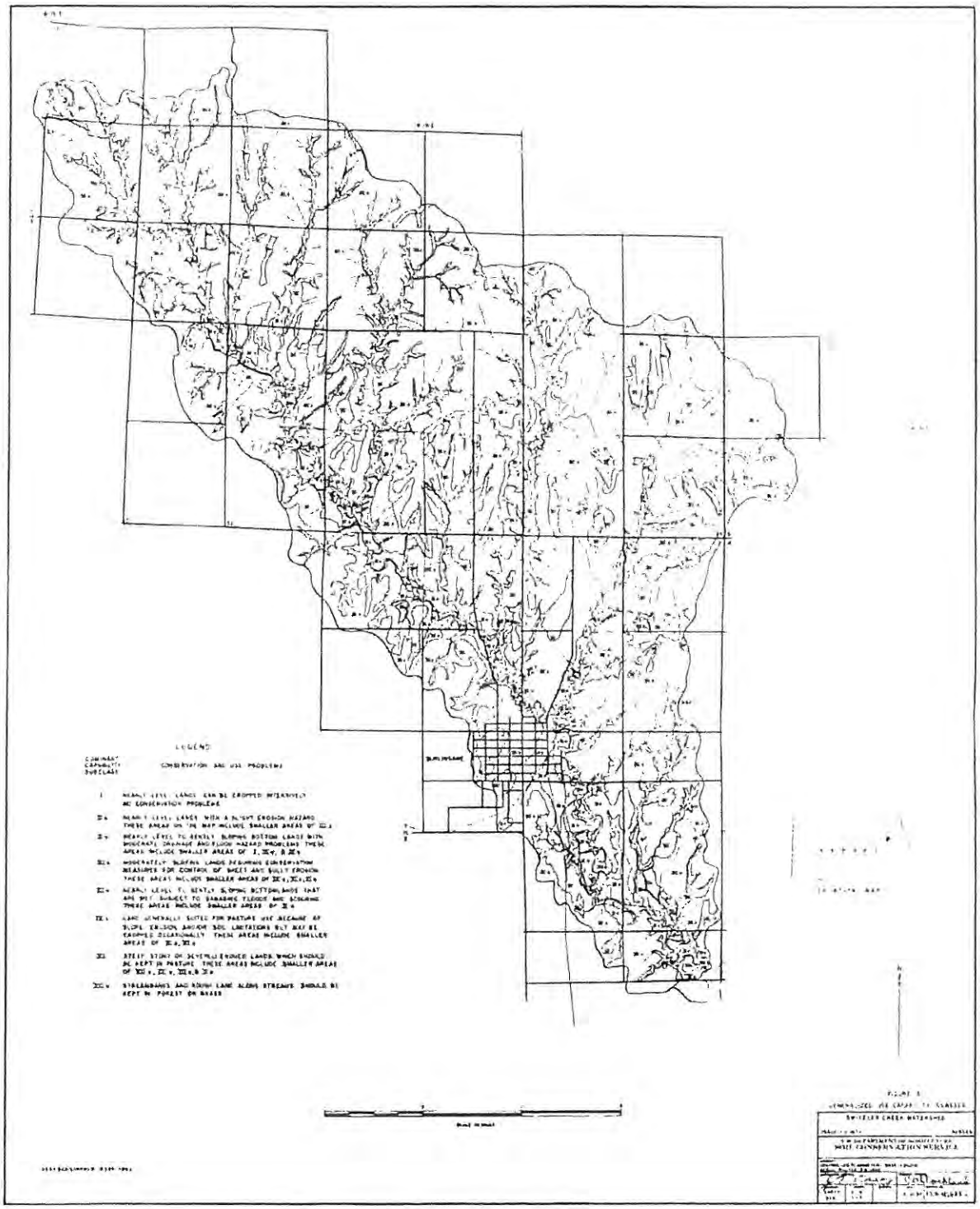


FIGURE 2
WORK PLAN


LEGEND
COMMON CAPABILITY SUBCLASS
CONSERVATION AND USE PROBLEMS
I NEARLY LEVEL LANDS CAN BE CROPPED INTENSIVELY AND CONSERVATION PROBLEMS
IIa NEARLY LEVEL LANDS WITH A SLIGHT EROSION HAZARD THESE AREAS ON THE MAP INCLUDE SMALLER AREAS OF IIIa
IIb NEARLY LEVEL TO GENTLY SLOPING BOTTOM LANDS WITH MODERATE DRAINAGE AND FLOOD HAZARD PROBLEMS THESE AREAS INCLUDE SMALLER AREAS OF I, IIIb, & IIIc
IIIa MODERATELY SLOPING LANDS REQUIRING CONSERVATION MEASURES FOR CONTROL OF SHEET AND GULLY EROSION THESE AREAS INCLUDE SMALLER AREAS OF IIIa, IIIb, IIIc
IIIb NEARLY LEVEL TO GENTLY SLOPING BOTTOMLANDS THAT ARE NOT SUBJECT TO SARASHIC FLOODS AND SCOURING THESE AREAS INCLUDE SMALLER AREAS OF IIIa
IIIc LAND GENERALLY SUITED FOR PASTURE USE BECAUSE OF SLOPE EROSION AND/OR SOIL LIMITATIONS BUT MAY BE CROPPED OCCASIONALLY THESE AREAS INCLUDE SMALLER AREAS OF IIIa, IIIb
III STEEP STONY OR SEVERELY ERODED LANDS WHICH SHOULD BE KEPT IN PASTURE THESE AREAS INCLUDE SMALLER AREAS OF IIIa, IIIb, IIIc, & IIIb
IIIc STREAMBANKS AND ROUGH LAND ALONG STREAMS SHOULD BE KEPT IN FOREST OR BRASS
SUNLINGSAME
SOIL CONSERVATION SERVICE

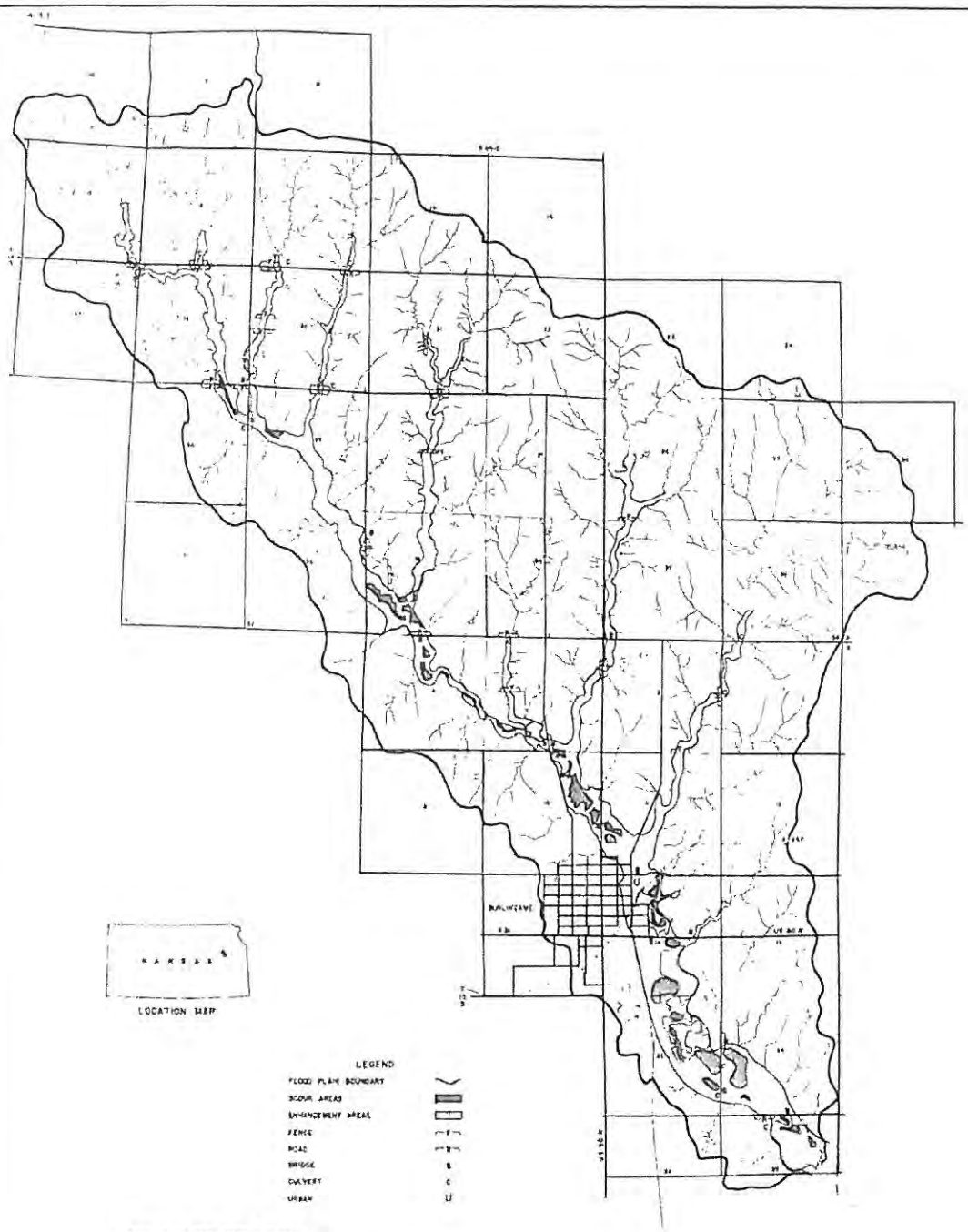


FIGURE 4
AREAS OF SIGNIFICANT
FLOOD PLAINS DAMAGES

PROGRAM EVALUATION SUPPLEMENT

Objective

Area in which benefits are expected to accrue

Hydrologic and Sedimentation Instrumentation

Plan of Study

Cooperative arrangements with other agencies

Observations, analysis of data and reports

EVALUATION SUPPLEMENT

Evaluation of Watershed Program

Objective

The general objective of project evaluation is to measure and evaluate the effects of the watershed protection program in both physical and monetary terms. This will involve the installation and operation of instruments and measuring devices to measure rainfall, runoff and sediment accumulation and to determine changes brought about by installation of the program. Studies will be carried out on production, conservation benefits, economic effect of flood damage reduction, more intensive use of floodplain lands and related effects of the program.

The specific objective of this evaluation will be to determine actual effects from application of the program and their relation to expected benefits. The estimated average annual benefits expected from installation of the program are:

1.	Reduction of floodwater and sediment damage	$ 14,651
2.	More intensive use of floodplain lands	5,207
3.	Conservation benefits	123,610
	Total - All Measures	$143,468

Area in which Benefits are Expected to Accrue

Benefits from reduction in floodwater and sediment damages are expected to accrue primarily on the mainstem of Switzler Creek downstream from floodwater retarding structure No. 1 to the lower end of the watershed. Additional benefits will occur on side tributaries below floodwater retarding structures 3, 5, and 7. Benefits are expected to accrue to urban property located on the flood plain within the City of Burlingame.

Benefits from more intensive use of land are expected primarily in the reach downstream from the City of Burlingame. These areas are shown on the map, Figure 4.

Conservation benefits are expected to occur throughout the watershed as a result of conservation treatment of watershed lands. These benefits are expected to result largely from increased production, with additional benefits obtained from reduction in deterioration of land resources.

It is expected that floodwater retarding structures will achieve primary benefits in reduction of floodwater damages and in more intensive use of land. B-Measures will achieve primary benefits in reduction of sediment yield and in conservation benefits.

Hydrologic and Sedimentation Instrumentation

Instruments and measuring devices will be installed to measure precipitation in the watershed, stream flow, and flood crests in such a manner that hydrographs can be constructed and relationships established between rainfall, runoff, stage and area inundated. Sediment ranges will be established on selected floodwater retarding reservoirs to obtain data on sediment accumulation.

The installations will include:1/

1. One recording rain gage.
   Five standard rain gages.
2. One recording stream gage.
   Two crest stage indicators on stream channels.
   Five crest stage indicators in reservoirs.
3. Reservoir sediment ranges, with range ends monumented.

Plan of Study

This plan of study outlines the procedures which are to be used in relating measurements, observations and records to the benefits derived from installation of the program.

1. Reduction in floodwater and Sediment Damages

Rain gages, recording stream gage and crest stage indicators will provide a record of the storms in terms of rainfall and runoff at the gaging station on the main stem of Switzler Creek. Crest stage indicators in the floodwater retarding reservoirs together with a computation of outflow will provide data on the effect of individual structures. Measurements of sediment deposition in floodwater retarding reservoirs will be made from time to time to determine sediment production. Damages will be appraised by work unit personnel after each flood during the period of evaluation. For each event the following determination will be made:

1. Damages with measures installed.
2. Damages that would have occurred without the measures.
3. Benefits creditable to the measures installed.

Data has been assembled and will be kept current on extent of flood plains, land use on flood plains, crop yields, crop and pasture damages, and other damages.

2. More Intensive Use of Land

Annual records will be kept by work unit personnel to show changes in land use resulting from protection provided by measures primarily for flood prevention. Comparison of net

1/ See Figure 2 for location of installations.

returns from more intensive use as compared to past use will be the basis for determining benefits.

3. Conservation Benefits

Work unit personnel maintain records on the installation of B-Measures which are summarized semi-annually. Sampling procedures will be used in determining initial cost and increased returns from B-Measures.

Cooperative Arrangements with Other Agencies

The Weather Bureau has agreed to purchase, install and make an annual inspection of one recording rain gage and five standard rain gages, the costs to be paid by SCS through transfer of funds. SCS personnel will maintain the recording rain gage and will be assisted by cooperating local farmers in obtaining records from standard rain gages.

U. S. Geological Survey has agreed to install and operate the stream gaging station, the cost to be paid by SCS through transfer of Federal Watershed Protection funds. SCS will make direct purchase of the water stage recording instrument to be installed by USGS at the stream gaging station. USGS will make a rating curve for stage discharge at the gaging station. USGS will also furnish design for crest stage indicators and suggest their location on the main stem and in floodwater retarding reservoirs. USGS has indicated their intention to make current velocity meters available on a loan basis for operation by SCS personnel.

Sediment ranges will be established on selected floodwater retarding reservoirs for sediment accumulation studies. Cross sections will be run and rerun as necessary to determine sediment deposition.

The costs of installation, operation and maintenance are:

Type of Installation	Installation Cost Including Instrument	Observer
Recording rain gage (1)	$ 240	SCS
Standard rain gages (5)	315	Donated
Stream gage (1)	1,400	USGS
Crest stage indicators (7)	175	SCS
Sediment ranges and monuments	300	SCS
Total first year	$2,430	

Annual costs after first year will be:

Maintenance of rain gages - Weather Bureau	$ 150
Stream gage - operation and analysis of data - USGS	1,000
Personal services - observations, records, analysis of data - SCS	350
Annual Charge - SCS WPP Funds	$1,500

Transfer of Funds to:

USGS -- Installation, $825; next 4 fiscal years annually, $1,000.
Weather Bureau -- Installation, $492; next 4 fiscal years annually, $175.

Observations, Analysis of Data and Reports

Each year work unit personnel will summarize records of B-Measure installation, effects of B-Measure treatment, flood damages, changes in floodplain land use and other related physical and economic data.

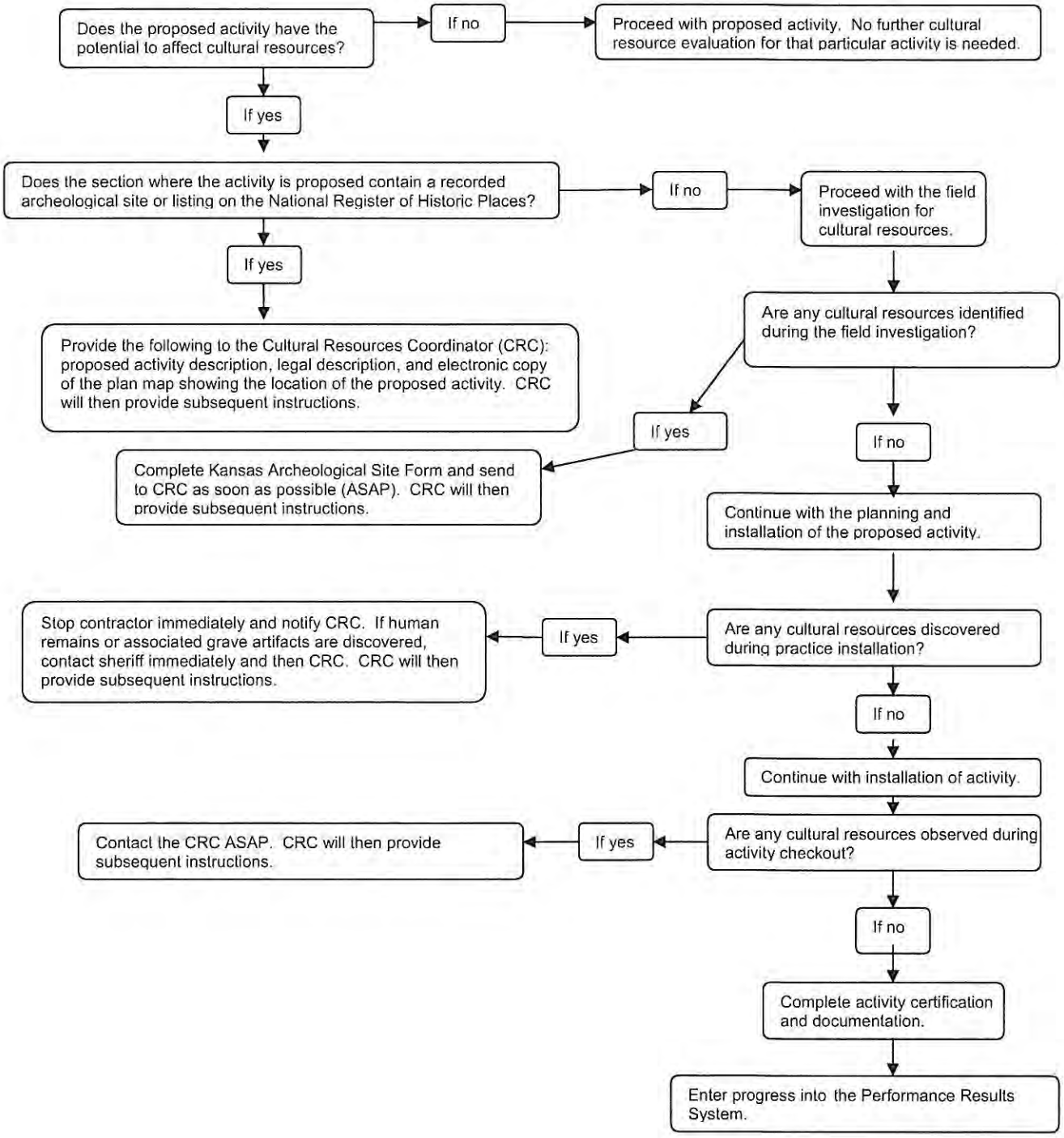
The Engineering and Watershed Planning Unit will assist in preparing an annual summary of benefits and costs from A and B-Measures.

An annual report of project evaluation will be prepared by the State Conservationist on a calendar-year basis for submission to Washington.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

CULTURAL RESOURCES



Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

THREATENED AND ENDANGERED SPECIES

Consult Section II of the electronic Field Office Technical Guide (eFOTG) for a listing of species and their habitats and implementation guidance that will assist you in answering the following questions. If you are still uncertain about the status of endangered or threatened species or their habitats in the planning area and/or impact zone, consult with a Kansas Natural Resources Conservation Service (NRCS) biologist.

STEP 1. Do endangered or threatened species, designated critical habitat, or species that have been proposed for listing as endangered or threatened exist, or could they exist, in the area of the proposed action or activity or the area of potential effects?

NO **YES** **UNKNOWN**

a. If your answer is "No," additional evaluation is not needed concerning endangered and threatened species. Document the finding, including the basis for the determination, on Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," go to Step 2.
c. If your answer is "Unknown," consult Section II of the eFOTG for a listing of endangered and threatened species and repeat Step 1. If you are still uncertain about the status of endangered or threatened species in the planning area, consult your state biologist.

STEP 2. What are the short and long-term impacts of the proposed action or activity on the endangered or threatened species, designated critical habitat or species or habitat, proposed for listing? More than one may apply.

NO EFFECT

MAY AFFECT BUT NOT LIKELY TO ADVERSELY AFFECT

MAY ADVERSELY AFFECT

EFFECTS ARE UNKNOWN

a. If your answer is "No effect," additional evaluation is not needed concerning endangered and threatened species. Document the finding, including the reasons for your determination on Form KS-CPA-52 and proceed with planning.
b. If your only answer is "May affect but not likely to adversely affect," document the finding, including the reasons, on Form KS-CPA-52. Go to Step 3.
c. If your answer includes "May adversely affect," modify the action if possible to avoid adverse effects. If the action can be modified, repeat Step 2. If the action can not be modified, go to step 3.

d. If your answer is "Effects are unknown," contact the NRCS state biologist for assistance and repeat Step 2.

STEP 3. Will a federal agency other then NRCS provide funding or otherwise control implementation of the action?

NO **YES**

a. If your answer is "No," go to Step 4.
b. If your answer is "Yes," ensure that potential adverse effects are avoided to the extent feasible, document and describe the effects on the Form KS-CPA-52. Include both short-term and long-term effects. Document on the Form KS-CPA-52 the need for the lead federal agency to consult (if listed species or habitat may be affected beneficially or adversely) or conference (if proposed species or habitat are likely to be adversely affected) with the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration (NOAA) Fisheries, as appropriate. Inform the client and continue planning.

STEP 4. Is NRCS providing financial assistance or otherwise controlling the action?

NO **YES**

a. If your answer is "No," and your answer in Step 2 was "May affect but not likely to adversely affect" and there is no possibility of any short-term or long-term adverse effects to threatened or endangered species, designated critical habitat or species or habitat proposed for listing, continue with planning but ensure the client is aware of the effects.
b. If your answer is "No," and your answer in Step 2 was "May adversely affect," inform the client of NRCS policy concerning endangered and threatened species and the need to use alternative conservation treatments to avoid adverse effects on species or their habitat. Further NRCS assistance will be provided only if one of the alternative treatments is selected that avoids adverse effects or the landowner obtains a "take" permit from the USFWS/NOAA Fisheries, as appropriate.
c. If your answer is "Yes," and your answer in Step 2 was "May affect but not likely to adversely affect" and the effects are to species or habitat that has been proposed for listing, continue with planning. Neither consultation nor conferencing is required.
d. If your answer is "Yes," and your answer in Step 2 was either "May affect but not likely to adversely affect" or "May adversely affect," inform the client that the NRCS district conservationist or the NRCS state biologist must consult or conference with the USFWS/NOAA Fisheries, as appropriate. The action will only be implemented according to the terms of the consultation. When consultation is completed, reference or attach the consultation documents to the Form KS-CPA-52.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

ENVIRONMENTAL JUSTICE

STEP 1. In the area affected by the Natural Resources Conservation Service (NRCS) action, are there low-income populations, minority populations, or Indian tribes?

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning environmental justice. Document the finding on Form KS-CPA-52, and proceed with planning.
b. If yes, then go to Step 2.

STEP 2. Is the proposed action the type that might have a disproportionately adverse environmental or human health effect on any population?

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning environmental justice. Document the finding on Form KS-CPA-52 and proceed with planning.
b. If yes, then go to Step 3.

STEP 3. Initiate community outreach to affected and interested parties that are categorized as low-income, minority, or as Indian tribes. The purpose of this is to encourage participation and input on the proposed program or activity and any alternatives or mitigating options. Participation of these populations may require adaptive or innovative approaches to overcome linguistic, institutional, cultural, economic, historic, or other potential barriers to effective participation. Go to Step 4.

STEP 4. Considering the results of the outreach initiative together with other information gathered for the decision making process, will the proposed activity have a disproportionately high and adverse effect on the human health or the environment of minority, low-income, or Indian populations?

NO **YES**

a. If "No," then go to Step 6.
b. If "Yes," then go to Step 5.

STEP 5. Consider the feasibility and appropriateness of alternatives or mitigating options and their effects.

STEP 6. Notify interested and affected parties of agency decision.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

FISH AND WILDLIFE COORDINATION

STEP 1. Does the action or activity propose or authorize any stream or other body of water to be impounded, diverted, the channel deepened, controlled, or otherwise modified for any purpose?

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning Fish and Wildlife Coordination. Document the finding on Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," go to Step 2.

STEP 2. Is the proposed action to impound water with a surface area less than 10 acres?

NO **YES**

a. If your answer is "No," go to Step 3.
b. If your answer is "Yes," document the finding on Form KS-CPA-52 and proceed with planning.

STEP 3. Will a federal agency other than NRCS provide funding or otherwise control implementation of the action?

NO **YES**

a. If your answer is "No," the Natural Resources Conservation Service (NRCS) district conservationist or NRCS state office SO employee must initiate consultation with the U.S. Fish and Wildlife Service (USFWS) and the state agency that administers wildlife resources. NRCS shall give full consideration to the recommendations and those recommendations shall be referenced in or attached to the Form KS-CPA-52 and made an integral part of the plan.
b. If your answer is "Yes," indicate on the Form KS-CPA-52 that consultation with the USFWS and the state agency that administers wildlife resources may be required before the action is implemented. Proceed with planning.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

FLOODPLAIN MANAGEMENT

This determination criterion is intended for non-project technical and financial assistance only. For project assistance criteria, consult General Manual (GM) Title 190, Part 410.25(c) 2.

STEP 1. Is a base (100-year) floodplain present in or near the planning area?

NO **YES** **UNKNOWN**

a. If your answer is "No," additional evaluation is not needed concerning floodplain areas. Document the finding on Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," go to Step 2.
c. If your answer is "Unknown," review the Federal Emergency Management Agency (FEMA) flood insurance rate maps or make an onsite determination and repeat Step 1.

STEP 2. Does the floodplain have an agricultural area that has been used to produce food, fiber, feed, forage, or oilseed for at least three of the last five years before the request for assistance?

NO **YES**

a. If your answer is "No," the land user is not eligible for technical and/or financial assistance from the Natural Resources Conservation Service (NRCS) for the area of the floodplain.
b. If your answer is "Yes," document the crop history and go to Step 3.

STEP 3. Is the floodplain's agricultural production in accordance with official state or designated area water quality plans?

NO **YES**

a. If your answer is "No," the land user is not eligible for technical and/or financial assistance from the NRCS for the area of the floodplain.
b. If your answer is "Yes," document the finding, including the reasons. The land user is eligible to receive technical and/or financial assistance. Go to Step 4.

STEP 4. Will the proposed action or alternative likely result in an adverse effect, incompatible development, or an increased flood hazard?

NO **YES**

a. If your answer is “No,” additional evaluation is not needed concerning floodplain areas. Document the finding, including the reasons, on Form KS-CPA-52 and proceed with planning.
b. If your answer is “Yes,” the district conservationist (DC) shall determine and inform the land user of alternative methods of achieving the objective, as well as alternative locations outside of the base floodplain. If the action involves building a structure, inform the participant of the hazards of locating actions in the floodplain. Document the effects of all alternatives on Form KS-CPA-52 and go to Step 5.

STEP 5. Is one or more of the alternative methods or locations practical?

NO **YES**

a. If your answer is "No,” the DC will determine whether to continue to providing assistance. Go to Step 6.
b. If your answer is "Yes" and the land user agrees to implement the alternative, no additional evaluation is needed concerning floodplain areas. Document the finding, including the reasons, on Form KS-CPA-52 and proceed with planning. If otherwise, go to Step 6.

STEP 6. Will assistance continue to be provided?

NO **YES**

a. If your answer is "No,” written notification of the decision to terminate assistance shall be provided to the land user and the local conservation district. Document the finding, including the reasons, on Form KS-CPA-52.
b. If your answer is "Yes,” the proposed action should be designed or modified to minimize the adverse effects to the extent possible. A written public notice shall be locally circulated explaining why the action is proposed to be located in the base flood plain. Document the finding, including the reasons, on Form KS-CPA-52 and proceed with planning.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

INVASIVE SPECIES

STEP 1. Is the proposed action or activity likely to cause or promote the introduction or spread of invasive and or noxious listed species?

NO **YES** **UNKNOWN**

a. If your answer is "No," additional evaluation is not needed concerning invasive species. Document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," go to Step 2.
c. If your answer is "Unknown," consult Section II of the electronic Field Office Technical Guide (eFOTG) for a listing of invasive and noxious plant species.

STEP 2. Have all appropriate tools, techniques, management strategies, and risks for invasive and or noxious species prevention, control, and management been considered in the planning process?

NO **YES**

a. If your answer is "No," you must consider all items listed in Step 2. Document the findings on Form KS-CPA-52 and go to Step 3.
b. If your answer is "Yes," document the finding on Form KS-CPA-52 and go to Step 3.

STEP 3. Is the proposed action or alternative consistent with General Manual (GM) Title 190 Part 414 Subpart D?

NO **YES**
a. If your answer is "No," modify the proposed action to comply with GM 190, document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," document the finding on Form KS-CPA-52 and proceed with the planning process.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

MIGRATORY BIRDS

STEP 1. Will the proposed action or activity result in a migratory bird or any part, nest, or egg of the bird, intentionally being pursued, hunted, taken, captured, or killed, or will it result in an intentionally attempt to take, capture kill, or possessed a migratory bird or any part, nest, or egg?

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning migratory birds. Document the finding, including the reasons, on Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," go to Step 2.

STEP 2. Can the proposed action be modified to avoid the effects?

NO **YES**

a. If your answer is "No," document the effects, including the reasons, on Form KS-CPA-52. After discussing the situation with the client, indicate on the Form KS-CPA-52 which of the following options will be pursued:

- The client will obtain a permit from U.S. Fish and Wildlife Service (USFWS) before the action is implemented; or
- An alternative conservation system will be implemented that avoids the effect; or
- Natural Resources Conservation Service (NRCS) will terminate assistance. If assistance is terminated, indicate the circumstances on the Form KS-CPA-52 or contact the NRCS state office for assistance.

b. If your answer is "Yes," modify the alternative and repeat Step 1.

Special Environmental Concerns Evaluation Procedure Guide Sheet

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NATURAL AREAS

STEP 1. Are natural areas present in or near the planning area? Natural areas are land and or water units where natural conditions are maintained with a minimum of human intervention, such as preserves. Manipulation of natural areas may be necessary to maintain or restore natural features where degradation of those features has occurred. Natural areas may be designated by federal, state, or local governments, or may be privately controlled through such entities as the Nature Conservancy.

NO **YES** **UNKNOWN**

a. If your answer is "No," additional evaluation is not needed concerning natural areas. Document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," go to Step 2.
c. If your answer is "Unknown," consult through channels the state biologist.

STEP 2. Will the proposed or any alternative action affect the natural features of the area?

NO **YES**

a. If your answer is "No," document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," proceed to Step 3.

STEP 3. Is the proposed or any alternative action consistent with General Manual (GM) Title 190 Part 410.23?

NO **YES**

a. If your answer is "No," modify the proposed action to comply with GM Title190 Part 410.23, document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," document the finding on Form KS-CPA-52 and proceed with the planning process.

Special Environmental Concerns Evaluation Procedure Guide Sheet

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PRIME AND UNIQUE FARMLANDS

STEP 1. Are prime or unique farmlands or farmlands of statewide or local importance present in or near the area that will be affected by the proposed action or activity?

NO **YES** **UNKNOWN**

If your answer is "No," additional evaluation is not needed concerning prime and unique farmlands. Document the finding on Form KS-CPA-52 and proceed with the planning process.

a. If your answer is "Yes," go to Step 2.
b. If your answer is "Unknown," consult Section II of the electronic Field Office Technical Guide (eFOTG), Soils Data Mart, Prime and Other Important Farmlands Report.

STEP 2. Does the proposed action involve the conversion of prime or unique farmlands to a nonagricultural use?

Note: Conversion does not include construction of on-farm structures necessary for farm operations.

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning prime and unique farmlands. Document the finding on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes", go to Step 3.

STEP 3. Can the proposed action be modified to avoid impacts to the prime or unique farmlands?

NO **YES**

a. If your answer is "No," consult your state environmental compliance coordinator.
b. If your answer is "Yes," document the findings on Form KS-CPA-52 and process with the planning process.

Special Environmental Concerns Evaluation Procedure Guide Sheet

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RIPARIAN AREA

STEP 1. Is a riparian area present in or near the planning area?

NO **YES**

a. If your answer is "No," additional evaluation is not needed concerning riparian areas. Document the finding on Form KS-CPA-52 and proceed with planning process.
b. If your answer is "Yes," go to Step 2.

STEP 2. Do the land user's objectives conflict with the resource needs of the riparian area?

NO **YES**

a. If your answer is "No," go to Step 3.
b. If your answer is "Yes," alternatives must be developed which resolve the conflict(s). Following resolution, go to Step 3.

STEP 3. Is the proposed action or alternative consistent with General Manual (GM) Title 190, Part 411.03?

NO **YES**

a. If your answer is "No," modify proposed action to comply with GM Title 190, document the findings on Form KS-CPA-52 and proceed with the planning process.
b. If your answer is "Yes," document the findings on Form KS-CPA-52 and proceed with the planning process.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

WATERS OF THE U.S./CLEAN WATER ACT

STEP 1. Will the planned action or activity involve or likely result in, the discharge of dredged or fill material or other pollutant into "Waters of the U.S.," or is the project in proximately of water that has been listed by the state as "impaired" under Section 303(d)?

NO **YES** **UNKNOWN**

a. If your answer is "No," document this on Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," go to Step 2.
c. If your answer is "Unknown," meaning that you do not know if the action will involve the discharge of dredged or fill material or other pollutant into Waters of the U.S., or if the project is in proximately to a Section 303(d) water, the client should contact the appropriate U.S. Army Corps of Engineers (COE) or state water quality office for a determination. Repeat Step 1.

STEP 2. Has the client obtained a Section 404 and/or a Non-Point Discharge Elimination System (Section 402) Permit or a determination of an exemption?

NO **YES** **UNKNOWN**

a. If your answer is "Yes," document this on Form KS-CPA-52 and proceed with planning. The final plan should not be contrary to the provisions of the permit authorization or exemption. Changes made during the planning process that may impact the applicability of the permit, such as amount or location of fills or discharges of pollutants should be coordinated with the COE.
b. If your answer is "no," determine if the client has applied for a permit. If a permit has been applied for, document this and continue the planning process in consultation with the client and the regulatory agencies. If a permit has not been applied for, the client should apply. Continue the planning process in consultation with the client and the regulatory agencies. The permit authorization should reflect the final plan and documentation.
c. If your answer is "Unknown," meaning that you do not know if authorization has been obtained or applied for, consult the client and repeat Step 2.

Special Environmental Concerns Evaluation Procedure Guide Sheet

The following guide sheet may be used to assist in the evaluation of the special resource concerns shown in Part J of the Form KS-CPA-52, Environmental Effects for Conservation Planning. Completion of this guide sheet is not required, but may provide additional documentation that the appropriate processes have been followed.

WETLANDS

STEP 1. Are wetlands present in or near the planning area?

NO **YES**

a. If your answer is "No," document this on the Natural Resources Conservation Service (NRCS) Form KS-CPA-52. (If the area could qualify as "Waters of the U.S." such as lakes, streams, channels, or other impoundment or conveyances, a Clean Water Act (CWA) Section 404 permit may be required from the U.S. Army Corps of Engineers (COE). Refer to the Waters of the U.S./Clean Water Act Help Sheet).
b. If your answer is "Yes," document and go to Step 2.

STEP 2. Will the proposed activity impact any wetland areas?

NO **YES**

a. If your answer is "No," document this on the Form KS-CPA-52 and proceed with planning.
b. If your answer is "Yes," describe on the Form KS-CPA -52 the effects of the proposed activity on the wetland area. Proceed to Step 3.

STEP 3. Do practicable alternatives exist which either enhance wetland functions and values, or avoid or minimize harm to wetlands?

NO **YES**

a. If your answer is "No," meaning that the findings of the environmental evaluation show that no practicable alternatives exist, NRCS may provide technical assistance which allows for the conversion of the wetland and develop a mitigation plan for compensation of the functions and values that were lost through the conversion activity. Prior to or concurrent with NRCS assistance, the client should obtain all necessary permits or approvals related to work in wetlands.
b. If your answer is "Yes" meaning that a practicable alternative exists, inform the client, and advise them of the available options and the benefits of those options. Proceed to Step 4.

STEP 4. Does the client wish to pursue an identified practicable alternative that enhances wetland functions and values, or avoids or minimizes harm to wetlands?

NO **YES**

a. If the answer is "No" meaning the client chooses to pursue an activity other than an identified practicable alternative, advise the client regarding eligibility criteria under the Food Security Act (FSA) as amended, and that the NRCS may assist with the development of an acceptable associated mitigation plan, but can not offer further financial or technical assistance for the wetland conversion activity itself. Prior to or concurrent with NRCS assistance, the client should obtain all necessary permits or approvals related to work in wetlands.

b. If the answer is "yes," meaning the client selects one of the alternative options, continue with planning and technical assistance for the conversion activity, as well as the development of an associated mitigation plan and document effects on Form KS-CPA-52. Prior to or concurrent with NRCS assistance, the client should obtain all necessary permits or approvals related to work in wetlands.

USDA
NRCS

KS-CPA-52
Rev. 2/09

A. Client (name/address)
Switzler Creek Watershed District (14852 S. Osage Road, Burlingame, Kansas 66413-9581) and the Osage County Conservation District (115 West 17th Street Lyndon, KS 66451-9561)

B. Plan ID Number (as applicable)

C. Fields/Legal Description (as applicable)
14-Digit Hydrologic Unit Code=10290101030040, Upper Marais des Cygnes (10290101), Latitude -95.8226, Longitude 38.7686

D. Client's Objective(s)
The proposed action (Project) is the rehabilitation of Switzler Creek Watershed Site No. 7 (Site 7 (see Exhibit S-1, Project Map)) under the Natural Resources Conservation Service (NRCS) Public Law 83-566 (PL-566) Watershed Program.

E. Proposed Alternatives(s)
The purpose of this federal action is to upgrade Site 7 to meet current applicable state and or NRCS high hazard class criteria so Site 7 can continue to provide flood damage reduction benefits to rural areas within Osage County and the City of Burlingame in a manner that minimizes the risk of loss of human life and is both cost efficient and environmentally acceptable.

F. Resource Considerations	**H.** Alternatives and Effects					
	No Action		Alternative 1 (State Rehabilitation)		Alternative 2 (Federal Reconstruction)	
(Check preferred alternative effects)	○		○		◉	
	No Federal Action - Hazard Removal or Low Hazard: Does not meet purpose and need of the Sponsors.		Rehabilitate Site 7 to meet current state dam safety criteria for high hazard structures.		Rehabilitate Site 7 to meet current state and NRCS dam safety criteria for high hazard structures.	
	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term
SOIL	All NRCS planning begins with an Environmental Evaluation (EE). The EE is a preliminary scoping process, which identifies the ecological, social, and economic factors that the proposed action is likely to affect. The results of the EE are documented on form KS CPA-52. The NEPA finding of the EE determines the level of environmental analysis to be conducted.					
Erosion						
Condition						
WATER	In the larger scale watershed type planning projects, the preliminary scoping process not only involves technical specialists from the NRCS but also involvement and input from other agencies, the public, and special coordination with the local sponsor. This scoping process heavily utilizes coordination meetings, site visits, and public meetings. The information gathered through this process is maintained as part of the Administrative Record in the form of trip reports, meeting minutes, comments received, etc. This results in a more comprehensive preliminary scoping product than is generally applied in the EE process for Programs applications. Thus the F. Resource Considerations portion of the KS CPA-52 form does not properly allow for documenting the findings from this large scale type of planning scoping.					
Quantity						
Quality						
AIR	Scoping activities were implemented to identify applicable resource concerns. A listing of those activities can be found below. The concerns were incorporated into the plan-EA in Chapter 3 Scope of Environmental Assessment and indicated in Table 3-1 Summary of Scoping.					
Quality						
PLANTS	March 23, 2005: Switzler Creek Watershed, Kansas, Rehabilitation Supplement June 2007: Switzler Creek Watershed, Joint District No. 63, Environmental Evaluation, Site No. 7 (NRCS) 2009: Switzler Creek Watershed Site No. 7 Rehabilitation, Scope of Work (Kirkham Michael)					
Condition						
Not Adapted or Suited						
ANIMALS	The scoping activities and the KS-CPA-52 did not result in any "red flag" type concerns that would immediately cause concern for significance. There were several items relating to the KS CPA-52 J. Special Environmental Concerns that needed a specific action and/or consultation.					
Fish and Wildlife						
Domestic Animals						

G. Economic and Social Considerations	I. Effects					
	No Action		Alternative 1 (State Rehabilitation)		Alternative 2 (Federal Reconstruction)	
Effects	Short-term	Long-term	Short-term	Long-term	Short-term	Long-term
Land Use	A specific and separate Economic Evaluation is developed which includes:					
Capital	Economic Benefits Benefit-Cost Ration of Alternatives Risk and Uncertainty in Economics					
Labor						
Management Level						
Profitability	This information will be included in the plan-EA Appendix D.					
Risk						

COMPLIANCE WITH APPLICABLE FEDERAL LAWS AND EXECUTIVE ORDERS
(National Environmental Policy Act [NEPA] planning requirements for resource issues)

Attach appropriate effects help sheet as needed to clarify special environmental concerns

J. Special Environmental Concerns (See Evaluation Procedure Guide Sheets)	K. Effects		
	No Action	Alternative 1 (State Rehabilitation)	Alternative 2 (Federal Reconstruction)
Cultural Resources	Not Applicable	No Effect	No Effect
Threatened and Endangered Species	Not Applicable	No Effect	No Effect
Environmental Justice	Not Applicable	No Effect	No Effect
Fish and Wildlife Coordination Act	Not Applicable	No Effect	No Effect
Floodplain Management	Not Applicable	No Effect	No Effect
Invasive Species	Not Applicable	No Effect	No Effect
Migratory Birds	Not Applicable	No Effect	No Effect
Natural Areas	Not Applicable	No Effect	No Effect
Prime and Unique Farmlands	Not Applicable	No Effect	No Effect
Riparian Area	Not Applicable	No Effect	No Effect
Waters of US/Clean Water Act	Not Applicable	See Attached Documentation	See Attached Documentation
Welland	Not Applicable	See Attached Documentation	See Attached Documentation

L. Easements, Permissions, or Permits

SLO to obtain easements, 404 permit

M. Mitigation/Best Management Practices

Migratory Bird Treaty Act: any needed vegetation clearing to occur outside of the primary nesting period of April 1 to July 15.

N. The information recorded above is based on the best available information.

Signature Title Date

O. Agencies, Persons, and References Consulted

Agency Scoping list to be included in plan-EA Appendix D

P. Findings	**I have considered the effects of this action and the alternatives on the Resource, Economic, and Social Considerations; the Special Environmental Concerns; and the extraordinary circumstances criteria in the instructions for Form KS-CPA-52. I find, for the reasons stated in (Q) below, that the preferred alternative:**		
Check one	NEPA review identified	NEPA action required	NEPA reference documentation
	is **not a federal action.**	No additional analysis is required.	National Environmental Compliance Handbook Part 610.21
	is **categorically excluded** from further environmental analysis and there are **no extraordinary circumstances.**	No additional analysis is required.	National Environmental Compliance Handbook Part 610.22
	has been sufficiently analyzed in an existing NRCS environment document.	No additional analysis is required.	
X	may require preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS).	The action will be referred to the state office.	

Q. Rationale Supporting the Finding:

A Supplemental Watershed Plan and Environmental Assessment is required.

R.

Signature Title Date

S. Comments

RECEIVED 6/1/07

KANSAS

Kansas State Historical Society
Cultural Resources Division

KATHLEEN SEBELIUS, GOVERNOR

Harold L. Klaege, State Conservationist
Natural Resources Conservation Service
760 South Broadway
Salina, Kansas 67401

25 May 2007

ATTN: Terry Conway, Cultural Resources Coordinator

RE: Switzler Creek Site 7 Watershed Rehabilitation program, Osage County

Dear Sir:

Staff review of the above referenced project has been completed. Pursuant to 36 CFR 800.4, we concur with the finding of no historic properties affected for the above referenced undertaking. We therefore have no objection to implementation of the project.

Sincerely yours,

Jennie Chinn
State Historic Preservation Officer

Timothy Weston for

Patrick Zollner
Deputy State Historic Preservation Officer

pk

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KANSAS

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760 South Broadway
Salina, Kansas 67401

25 May 2007

ATTN: Terry Conway, Cultural Resources Coordinator

RE: Switzler Creek Site 7 Watershed Rehabilitation program, Osage County

Dear Sir:

In accordance with the goals and procedures of the Cooperative Agreement between the Kansas State Historical Society (KSHS) and the Natural Resources Conservation Service (NRCS), the Society has completed a Phase II field survey investigation of the above referenced project. The fieldwork was conducted by Society staff archeologist Randall M. Thies on 25 May 2007. Enclosed, you will find a report of that investigation.

In brief, no significant archeological sites were found in or adjacent to the specified project area. We therefore recommend that the project proceed as planned with no further archeological investigations. A copy of the enclosed report, containing this recommendation, has been sent to the State Historic Preservation Officer for review.

Of course, due to the nature of archeological manifestations, it is always possible that buried cultural deposits could be encountered during the course of the project. If that occurs the remains should be left in place and the State Archeologist contacted immediately so that the appropriate mitigative measures can be carried out as soon as possible.

Thank you for your cooperation in helping to preserve the State's archeological resources. The costs incurred during the course of our investigation are detailed below. The actual invoice will be presented in our regular billing.

Sincerely,

For the State Archeologist:

Randall M. Thies, Archeologist

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ARCHEOLOGICAL SURVEY OF SWITZLER CREEK SITE 7 WATERSHED REHABILITATION PROGRAM, AN NRCS PROJECT IN OSAGE COUNTY, KANSAS

Report submitted to the Natural Resources Conservation Service,
Salina, Kansas

by Randall M. Thies
Archeology Office, Cultural Resources Division
Kansas State Historical Society
25 May 2007

ARCHEOLOGICAL SURVEY OF SWITZLER CREEK SITE 7 WATERSHED REHABILITATION PROGRAM, AN NRCS PROJECT IN OSAGE COUNTY, KANSAS

by Randall M. Thies
Archeology Office, Cultural Resources Division
Kansas State Historical Society
25 May 2007

INTRODUCTION

In accordance with the goals and procedures of the Cooperative Agreement between the Kansas State Historical Society (KSHS) and the Natural Resources Conservation Service (NRCS), the Kansas State Historical Society (KSHS, or "the Society") recently completed a Phase II archeological field survey investigation of an NRCS project known as the Switzler Creek Site 7 Watershed Rehabilitation Program. The purpose of the investigation was to determine whether any significant archeological resources would be affected by the proposed project. More specifically, the investigation was conducted to ensure compliance with various laws governing the treatment of cultural resources, particularly Section 106 of the National Historic Preservation Act and its implementing regulation, 36 CFR 800.

As required by the terms of the Cooperative Agreement, a Phase II survey must result in a report submitted to NRCS and the State Historic Preservation Officer (SHPO) wherein the investigation is described and recommendations are made for clearance or for further work to be done. This report was prepared to comply with that requirement. In accordance with the SHPO's request that site locational data be left out of the text of reports such as these, and to enable the easy removal of such data from copies of reports so as to guarantee confidentiality, all of the maps and figures pertaining to this investigation are contained within Appendix I.

As currently planned, the project will involve the rehabilitation of a watershed known as Switzler Creek Site 7, which is located in Osage County, Kansas (Figures 1 and 2). There are two rehabilitation alternatives being considered. The first will involve improvement of the existing pool by raising the embankment (both on the top and the downstream slope) with several feet of fill obtained from around the watershed area; in addition, some of the sediment from within the pool may be dredged and placed along the edges of the permanent pool. The second alternative is to do away with the pool by removing the embankment and spillway, stabilizing the grade with a concrete structure, and stabilizing the bare and denuded areas exposed after removal of the embankment. In that case, excavation of the watershed area would be limited to reconnecting the channel upstream of the embankment, and all fill removal and disposition would be limited to the embankment.

The Phase II investigation was initiated by earlier correspondence between the Society and NRCS relating to the potential impact of the project on cultural resources. A Phase I investigation (archival research) was requested by NRCS on 14 May 2007. After reviewing the

available documentation and consulting with the SHPO, the Society concurred that a Phase II field survey investigation be performed. Based on comments by the SHPO, the primary purpose of the investigation was to conduct a pedestrian survey of the area immediately surrounding the existing pool. After receiving NRCS approval on 21 May 2007, the recommended fieldwork was thereby carried out by Society staff archeologist Randall M. Thies on 25 May 2007.

ENVIRONMENTAL SETTING

In physiographic terms, the project area is located within the Osage Cuestas division of the Osage Plains section of the Central Lowland province of the Interior Plains division of North America (Schoewe 1949:283-286). The bedrock of the region consists of interbedded limestone, shale, and sandstone formations of Pennsylvanian age. Exposure and differential erosion of the unequally resistant, westward sloping strata at the ground surface has created a series of low parallel ridges. These "cuestas" have steep, rugged, east facing escarpments that front on broad, gently inclined, westward sloping vales. Thus, the topography consists of long, low rolling hills and wide, shallow valleys. In general, the escarpments exhibit an irregular northeast-southwest trend. The major stream courses, however, flow to the east and southeast, transverse to the direction of the escarpments and against the westward dip of the rock formations.

The prehistoric vegetation of the Osage Cuestas was open prairie penetrated by thin ribbons of riverine forest. Kuchler (1974) lists the Cuestas as part of the tall grass bluestem prairies, described more specifically as an area with extensive interspersion of forest and prairie. Soil survey data and early historical accounts indicate that the wooded areas were confined to the floodplains and valley edges of the major stream courses and their tributaries. The timber consisted of medium tall to tall broadleaf deciduous forests, often with dense undergrowth and many lianas. Oak, black walnut, hickory, hackberry, cottonwood, willow, and elm were common along with a variety of smaller species such as persimmon, papaw, elderberry, serviceberry, chokecherry, and wild grape. Forestation was apparently not pervasive even in bottomland locations, however, since many of the common stream course soils have characteristics indicating that they developed under a native vegetation of both tall grasses and hardwood trees. In any case the forest belts and nearby prairies of the Osage Plains provided shelter and food for plentiful mammalian fauna, including bison, elk, deer, antelope, and bear, while the streams yielded an abundance of edible fish and shellfish. Wild turkey, prairie chicken, ruffed grouse, and quail were also available, and ducks and geese were present on a seasonal basis (Wedel 1959:14).

The natural ecology of the region has been greatly altered by modern land-use practices. Today, most of the lands within this part of the state are used for agricultural purposes, primarily the pasturing of cattle and the cultivation of crops such as wheat, corn, milo, and soybeans.

Ground conditions within the bulk of the project area consisted of a thin cover of grass, weeds, and a scattering of trees. The extreme upstream edge of the pool was too swampy and brush covered to permit a survey of that area. All of the rest of the project area (except for the downside of the dam) had obviously been heavily flooded recently, resulting in a diminishment of the vegetation. Ground visibility ranged from 30-80%. Cattle trails also cut through the area,

providing 100% visibility. In addition, many areas along the edges of the permanent pool had been heavily eroded, providing 100% visibility. These areas also provided a view of the soil stratigraphy, indicating that the project area was entirely contained within an upland setting with heavily eroded bedrock being quite close to the surface.

CULTURAL-HISTORICAL SETTING

Archeologically, research in this region of Kansas has yielded evidence of prehistoric human occupation dating from around 11,000 years ago and extending up to the modern era, and certainly has the potential for yielding more such evidence. Sites in the region usually represent habitation areas or small workshops and more rarely occur as villages or burials. While the full extent of the area's archeological resources has yet to be determined, it is clear that the region contains materials deriving from all of the major cultural periods thus far identified in Kansas, i.e.,

Paleoindian	circa 9,000 B.C. to 7,000 B.C.
Archaic	circa 7,000 B.C. to A.D. 1
Early Ceramic	circa A.D. 1 to A.D. 1000
Middle Ceramic	circa A.D. 1000 to A.D. 1500
Late Ceramic	circa A.D. 1500 to A.D. 1800
Historic	A.D. 1541 to present

The list consists of broad and somewhat artificial categories, and there is some temporal overlap between periods. As might be expected, more is known about the most recent inhabitants than is known about the earliest (Lees 1989; Brown and Simmons 1987; Thies 1987; Wedel 1959).

With regard to the project that is the subject of this report, documentation consulted during the Phase I investigation indicated that no archeological sites had been reported in or near the project area. The topographic setting, however, suggested that there was some potential for prehistoric sites to be present. Since the project area had never been professionally inspected for archeological remains, a Phase II field survey was recommended.

RESEARCH METHODOLOGY

The Phase II investigation consisted of a field inspection of all but the extreme upstream edge of the specified portion of the project area, which was too swampy to allow for an inspection. The field inspection included an intensive pedestrian survey accompanied by a reconnaissance survey of the surrounding area. The specified project area was systematically surveyed by a series of two pedestrian transects spaced 12-15 meters apart. The amount of land covered in this survey amounted to approximately 13.5 acres (see Figure 3). As described in the Environmental Setting section of this report, the ground visibility ranged from 30-100%.

SURVEY FINDINGS AND CONCLUSIONS

Despite the intensity of the survey and the presumed potential of the area to contain cultural remains, no significant cultural resources were found within the project area. To use the language employed in 36 CFR 800.4, the investigation produced a finding of "no historic properties affected." We therefore recommend that the project proceed as planned, with no additional investigations unless archeological discoveries are made during the course of the project.

It is always possible, of course, due to the nature of archeological manifestations, that buried cultural deposits could be encountered. If that occurs, the remains should be left in place and the State Archeologist contacted immediately so that appropriate mitigative actions can be carried out as soon as possible.

Randall M. Thies
Archeology Office, Cultural Resources Division
Kansas State Historical Society
25 May 2007

REFERENCES CITED

Brown, Kenneth L. and Alan H. Simmons, editors
1987 Kansas prehistoric archeological preservation plan. Unpublished report prepared for the Historic Preservation Department, Kansas State Historical Society, by the Office of Archeological Research, Museum of Anthropology, University of Kansas, Lawrence. Ms. on file, Kansas State Historical Society, Topeka.

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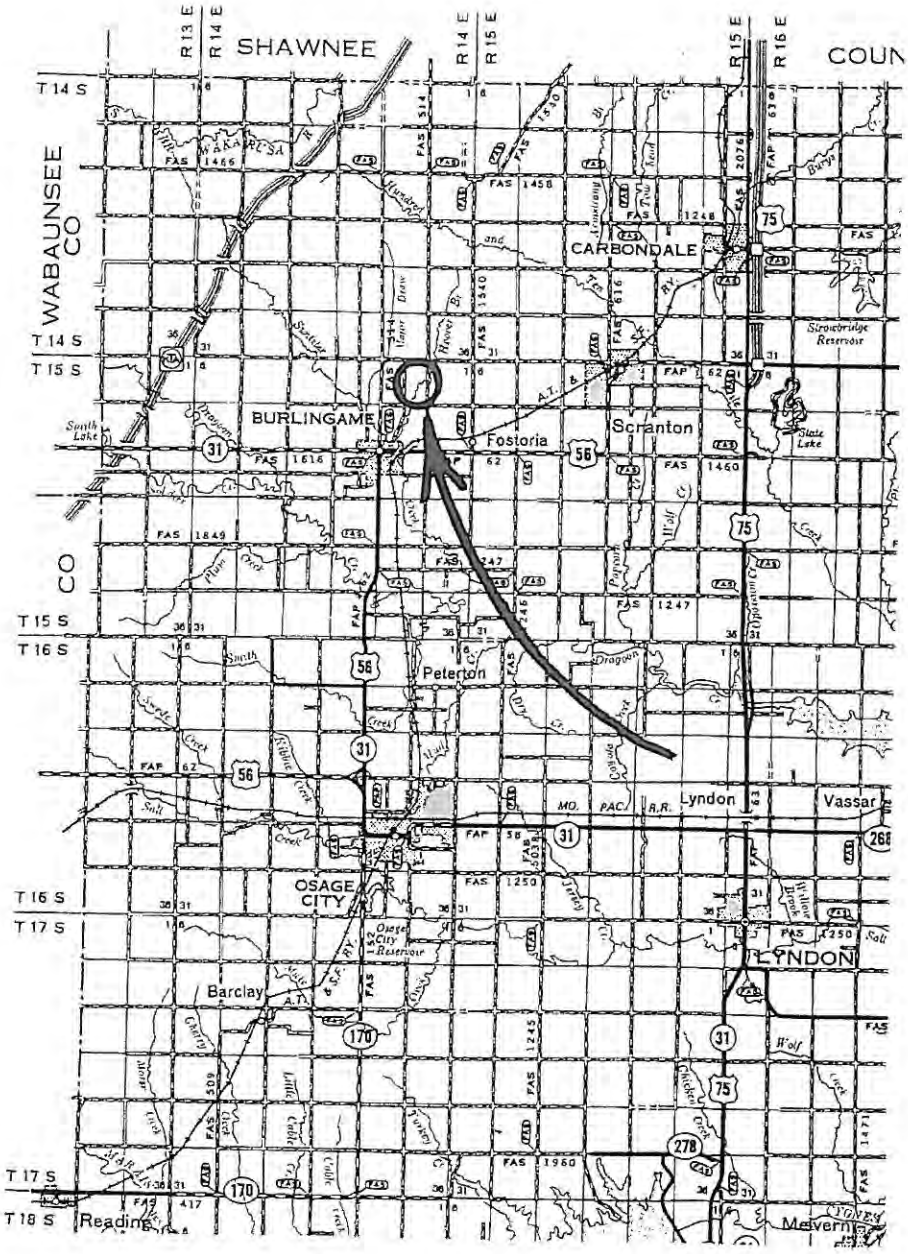
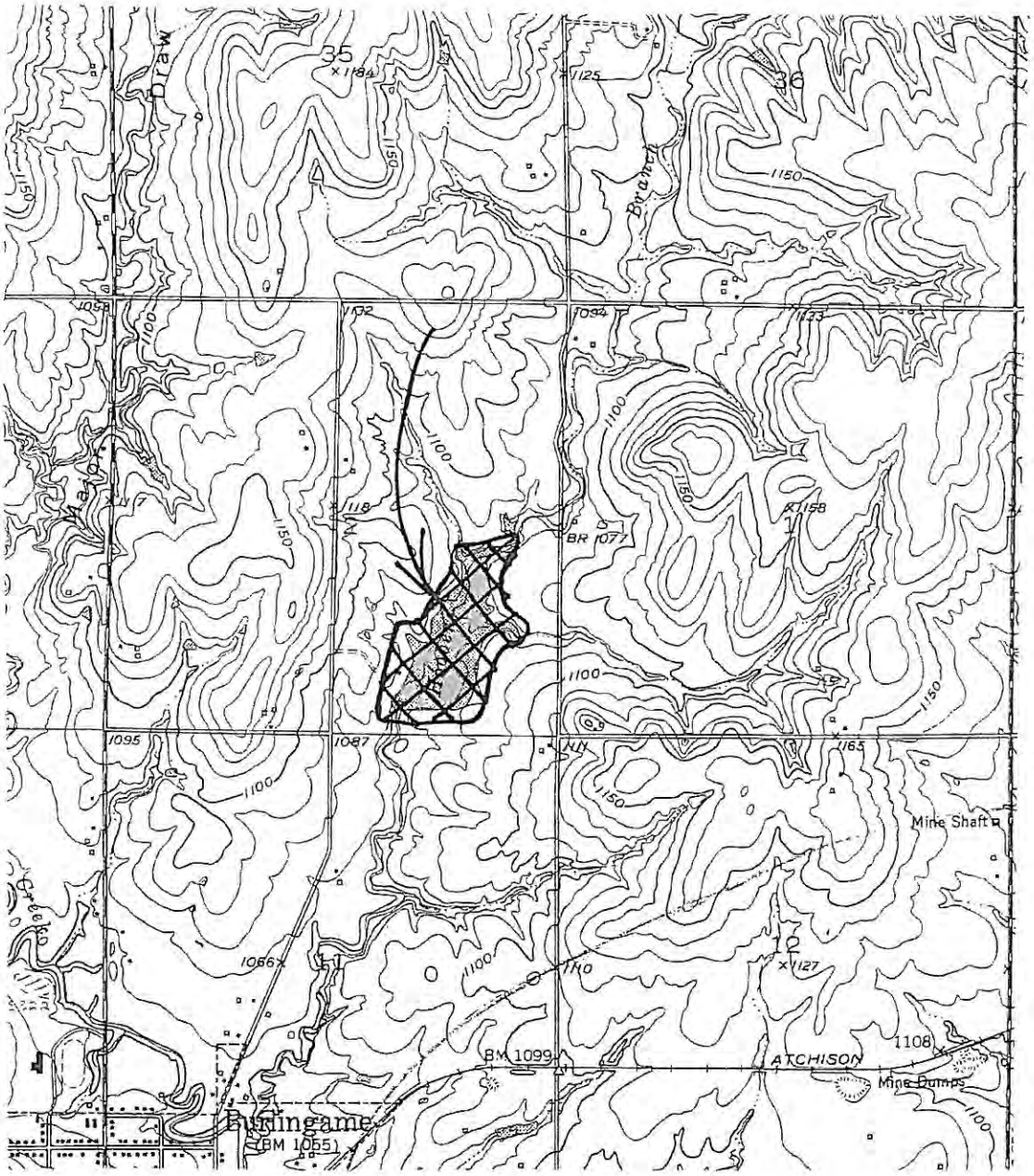
Wedel, Waldo R.
1959 An introduction to Kansas archeology. Smithsonian Institution, Bureau of American Ethnology, Bulletin 174.

APPENDIX I.



ten miles

FIGURE 1. Section of Osage County highway map, showing the location of the NRCS project known as the Switzler Creek Site 7 Watershed Rehabilitation Program, as indicated by circle and arrow.



one mile

FIGURE 2. Section of U.S.G.S. topographic map (Burlingame quadrangle), showing the location and general extent of the project, as indicated by hatching and arrow.

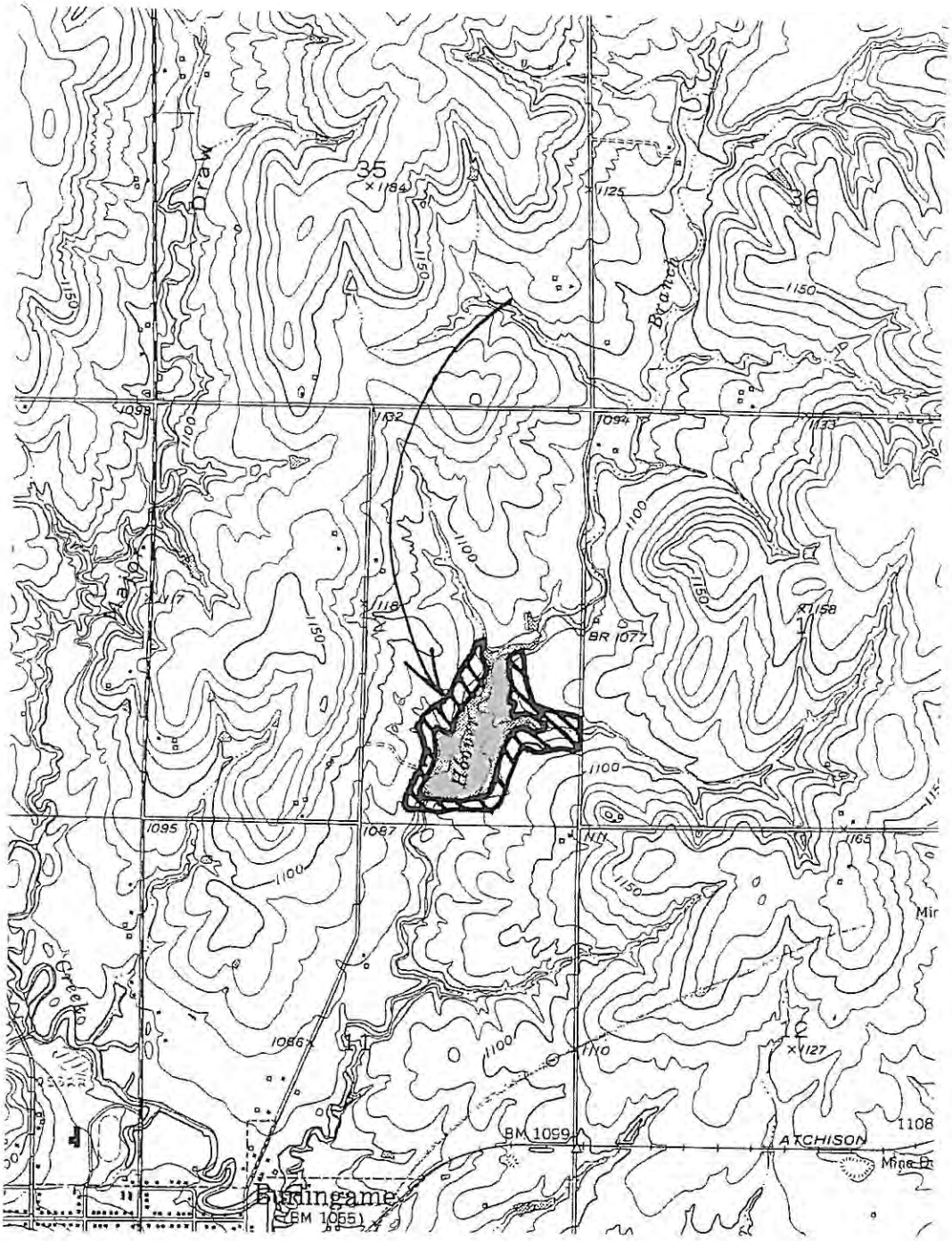


FIGURE 3. Section of U.S.G.S. topographic map (Burlingame quadrangle), showing the location and general extent of the areas subjected to pedestrian inspection during the Phase II survey, as indicated by hatching and arrow.

ARCHEOLOGICAL SURVEY OF PROJECT 2010-04, AN NRCS PROJECT IN OSAGE COUNTY, KANSAS

by John Tomasic
Archeology Office, Cultural Resources Division
Kansas Historical Society
June 30th, 2010

INTRODUCTION

In accordance with the goals and procedures of the Cooperative Agreement between the Kansas Historical Society (KSHS) and the Natural Resources Conservation Service (NRCS), the Kansas Historical Society (KSHS, or "the Society") recently completed a Phase II archeological field survey investigation of an NRCS project known as Project 2010-04. The purpose of the investigation was to determine whether any significant archeological resources would be affected by the proposed project. More specifically, the investigation was conducted to ensure compliance with various laws governing the treatment of cultural resources, particularly Section 106 of the National Historic Preservation Act and its implementing regulation, 36 CFR 800.

As required by the terms of the Cooperative Agreement, a Phase II survey must result in a report submitted to NRCS and the State Historic Preservation Officer (SHPO) wherein the investigation is described and recommendations are made for clearance or for further work to be done. This report was prepared to comply with that requirement. In accordance with the SHPO's request that site locational data be left out of the text of reports such as these, and to enable the easy removal of such data from copies of reports so as to guarantee confidentiality, all of the maps and figures pertaining to this investigation are contained within Appendix I.

As currently planned, the project will involve the creation two borrow areas, a new spillway, and a new waterway associated with the Switzler Creek Watershed Site No. 7 in Osage County, Kansas. The general project location is shown in Figure 1.

The Phase II investigation was initiated by earlier correspondence between the Society and NRCS relating to the potential impact of the project on cultural resources. A Phase I investigation (archival research) was requested by NRCS on June 3rd, 2010. After reviewing the available documentation and consulting with the SHPO, the Society concurred that a Phase II field survey investigation be performed. Based on comments by the SHPO, the primary purpose of the investigation was to determine if any cultural resources would be affected by the creation of the borrow areas and new spillway and waterway. Society staff archeologist John Tomasic thereby carried out the recommended fieldwork on June 23rd and 24th, 2010.

ENVIRONMENTAL SETTING

In physiographic terms, the project area is located within the Osage Cuestas division of the Osage Plains section of the Central Lowland province of the Interior Plains division of North America (Schoewe 1949:283-286). The bedrock of the region consists of interbedded limestone, shale, and sandstone formations of Pennsylvanian age. Exposure and differential erosion of the unequally resistant, westward sloping strata at the ground surface has created a series of low parallel ridges. These "cuestas" have steep, rugged, east facing escarpments that front on broad, gently inclined, westward sloping vales. Thus, the topography consists of long, low rolling hills and wide, shallow valleys. In general, the escarpments exhibit an irregular northeast-southwest trend. The major stream courses, however, flow to the east and southeast, transverse to the direction of the escarpments and against the westward dip of the rock formations.

The prehistoric vegetation of the Osage Cuestas was open prairie penetrated by thin ribbons of riverine forest. Kuchler (1974) lists the Cuestas as part of the tall grass bluestem prairies, described more specifically as an area with extensive interspersion of forest and prairie. Soil survey data and early historical accounts indicate that the wooded areas were confined to the floodplains and valley edges of the major stream courses and their tributaries. The timber consisted of medium tall to tall broadleaf deciduous forests, often with dense undergrowth and many lianas. Oak, black walnut, hickory, hackberry, cottonwood, willow, and elm were common along with a variety of smaller species such as persimmon, papaw, elderberry, serviceberry, chokecherry, and wild grape. Forestation was apparently not pervasive even in bottomland locations, however, since many of the common stream course soils have characteristics indicating that they developed under a native vegetation of both tall grasses and hardwood trees. In any case the forest belts and nearby prairies of the Osage Plains provided shelter and food for plentiful mammalian fauna, including bison, elk, deer, antelope, and bear, while the streams yielded an abundance of edible fish and shellfish. Wild turkey, prairie chicken, ruffed grouse, and quail were also available, and ducks and geese were present on a seasonal basis (Wedel 1959:14).

The natural ecology of the region has been greatly altered by modern land-use practices. Today, most of the lands within this part of the state are used for agricultural purposes, primarily the pasturing of cattle and the cultivation of crops such as wheat, corn, milo, and soybeans.

Ground conditions within the survey areas varied considerably (Figure 2). Borrow Area # 1 consisted of an uncultivated pasture covered in dense grasses and small patches of trees, and ground visibility was less than 10%. Borrow Area #2 consisted of a cultivated field with ankle-high rows of soybean plants in the field at the time of the survey. Ground visibility was generally good (50-60%) within Borrow Area #2. The majority of the actual project area was covered in grass and trees, and ground visibility within these areas was less than 10%. However, portions of the southern edge of the project area were located within a cultivated field covered in ankle-high rows of soybeans, and ground visibility averaged between 50-60%.

CULTURAL-HISTORICAL SETTING

Archeologically, research in this region of Kansas has yielded evidence of prehistoric human occupation dating from around 11,000 years ago and extending up to the modern era, and certainly has the potential for yielding more such evidence. Sites in the region usually represent habitation areas or small workshops and more rarely occur as villages or burials. While the full extent of the area's archeological resources has yet to be determined, it is clear that the region contains materials deriving from all of the major cultural periods thus far identified in Kansas, i.e.,

Paleoindian	circa 9,000 B.C. to 7,000 B.C.
Archaic	circa 7,000 B.C. to A.D. 1
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Historic	A.D. 1541 to present

The list consists of broad and somewhat artificial categories, and there is some temporal overlap between periods. As might be expected, more is known about the most recent inhabitants than is known about the earliest (Lees 1989; Brown and Simmons 1987; Hoard and Banks 2006; Thies 1987; Wedel 1959).

With regard to the project that is the subject of this report, documentation consulted during the Phase I investigation indicated that no archeological sites had been reported within or immediately adjacent to the project area. However, the topographic setting of the project area suggested that there was some potential for prehistoric sites to be present. As a result, a Phase II field survey was recommended.

RESEARCH METHODOLOGY

The Phase II investigation consisted of a field inspection of the project areas, including a reconnaissance survey of surrounding areas. Portions along the southern edge of the actual project area within cultivated soybean fields, along with Borrow Area #2 in its entirety, were surveyed by a series of pedestrian transects spaced 15 meters apart and oriented in the direction of the crop rows. Areas of high topographic potential for the finding of prehistoric archeological remains were criss-crossed to ensure that no archeological remains would be overlooked. As described in the Environmental Setting section of this report, the ground visibility within the soybean fields ranged from 50-60%. Due to poor surface visibility within Borrow Area 1 and the majority of the actual project area, a series of shovel tests were excavated order to search for potentially deeply buried archeological sites that might potentially be adversely affected by the proposed project. Shovel tests were excavated to a depth of 10 centimeters into sterile sub-soil (B-horizon) and all excavated material was hand sorted. Overall, the amount of land covered in this survey amounted to approximately 19 acres (see Figure 2, Figure 3).

SURVEY FINDINGS AND CONCLUSIONS

Despite the intensity of the survey and the presumed potential of the area to contain intact cultural remains, no significant cultural resources were found within the project area. To use the language employed in 36 CFR 800.4, the investigation produced a finding of "no historic properties affected." We therefore recommend that the project proceed as planned, with no additional investigations unless archeological discoveries are made during the course of the project. We request the concurrence of the State Historic Preservation Office with this recommendation

It is always possible, of course, due to the nature of archeological manifestations, that buried cultural deposits could be encountered. If that occurs, the remains should be left in place and the State Archeologist contacted immediately so that appropriate mitigative actions can be carried out as soon as possible.

John Tomasic
Archeology Office, Cultural Resources Division
Kansas Historical Society
June 30th, 2010

REFERENCES CITED

Brown, Kenneth L. and Alan H. Simmons, editors
1987 Kansas prehistoric archeological preservation plan. Unpublished report prepared for the Historic Preservation Department, Kansas State Historical Society, by the Office of Archeological Research, Museum of Anthropology, University of Kansas, Lawrence. Ms. on file, Kansas State Historical Society, Topeka.

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Kansas Department of Transportation
2008 Map of Osage County at www.ksdot.org/burtransplan/maps/Mapscounties.asp

Kuchler, A. W.
1974 A new vegetation map of Kansas. Ecology 55(3):586-604.

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United States Geological Survey
1958 7.5 minute Topographic Map, Burlingame Quadrangle.

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APPENDIX I.

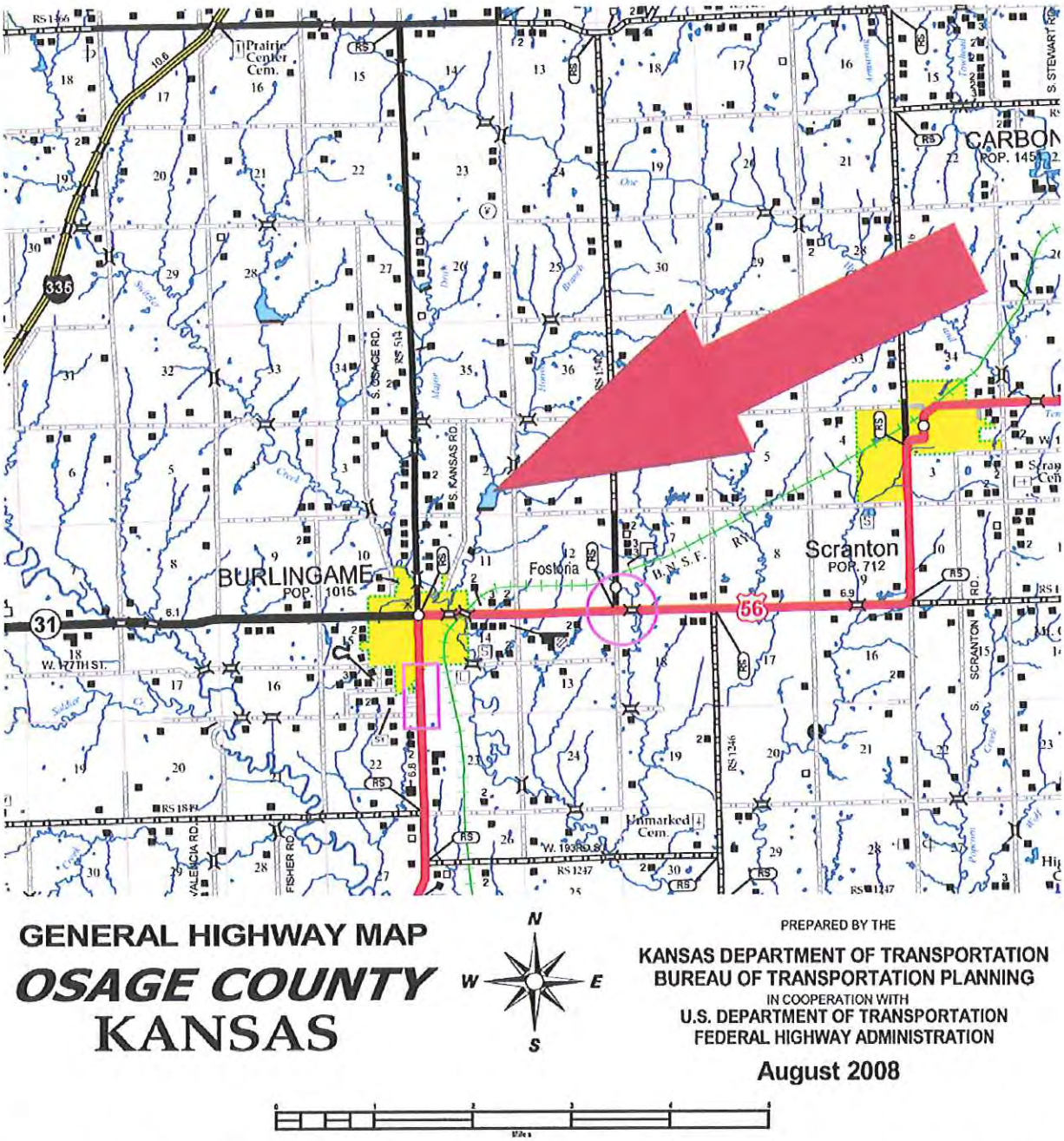

FIGURE 1. Section of Osage County highway map, with a red arrow indicating the location of Project 2010-04.

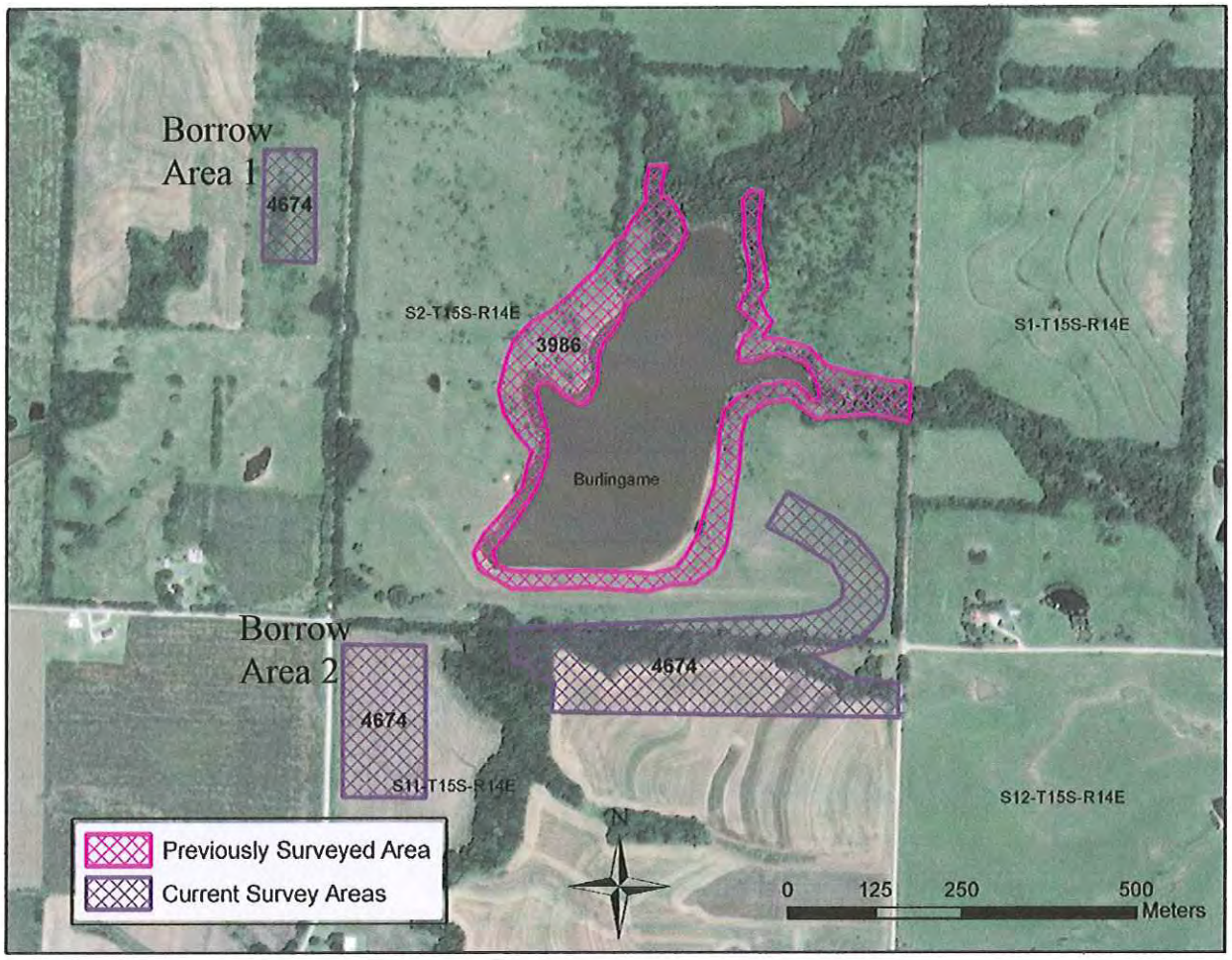

FIGURE 2. Aerial image of the project area showing the location and extent of the areas surveyed. The areas surveyed are labeled with a Kansas Historical Society bibliographic record number (4674).

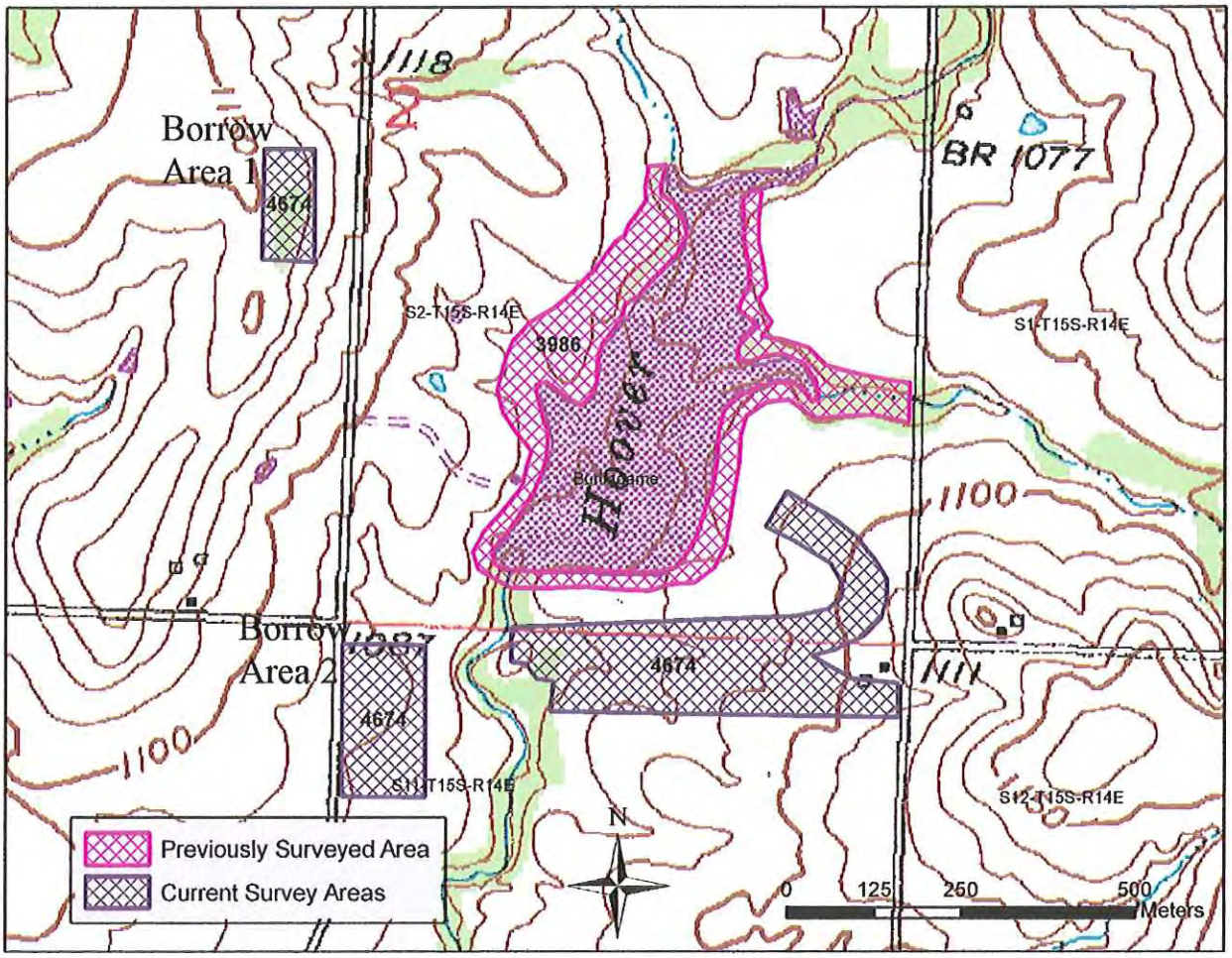

FIGURE 3. Section of U.S.G.S. topographic map (Burlingame quadrangle Section 2, Township 15 South, Range 14 East), showing the location and extent of the areas surveyed. The areas surveyed are labeled with a Kansas Historical Society bibliographic record number (4674).