USDA-SCS-EIS-WS-(ADM)-75-1-(F)-CO

SEDGWICK-SAND DRAWS WATERSHED PROJECT

Sedgwick County, Colorado
Cheyenne and Deuel Counties, Nebraska

FINAL ENVIRONMENTAL IMPACT STATEMENT

Merritt D. Burdick
State Conservationist

Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

Sponsoring Local Organizations

Sedgwick County Soil Conservation District
Sedgwick-Sand Draws Conservancy District
Sedgwick County Board of Commissioners
Julesburg Irrigation District
Town Council of Ovid
Colorado State Soil Conservation Board
South Platte Natural Resources District

December 1975

Prepared By

UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

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Sedg ict

Sedgwick County Board of Commissioners
County Courthouse
Julesburg, Colorado 80737

Julesburg Irrigation District
Clarence Jenick, President
Julesburg, Colorado 80737

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Ovid, Colorado 80744

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Gail Klingman, Vice-President
Chappel, Nebraska 69129

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USDA SOIL CONSERVATION SERVICE FINAL ENVIRONMENTAL IMPACT STATEMENT

The Sedgwick-Sand Draws Watershed Project
Colorado - Nebraska

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Sedgwick County, Colorado
Cheyenne and Deuel Counties, Nebraska

Prepared in Accordance with
Sec. 102(2)(C) of P.L. 91-190

Summary Sheet

I Final

II Soil Conservation Service

III Administrative

IV Project Purpose and Action

The objective of the project is to reduce floodwater, erosion, and sediment damages to agricultural lands, crops, irrigation systems, wildlife habitat, roads, railroad, and farmsteads in the vicinity of Sedgwick and Ovid, and to the Town of Ovid, Sedgwick County, Colorado; and rural areas of Cheyenne and Deuel Counties, Nebraska.

The project plan provides for conservation land treatment measures supplemented by structural measures.

V Summary of Environmental Impact and Adverse Environmental Effects

Adequate land treatment measures on 8,450 acres of cropland and 5,700 acres of rangeland will reduce runoff and sediment production with an average annual benefit of $9,440 and improve the plant cover conditions throughout the watershed. Average annual forage loss due to fire on 1,600 acres of rangeland will be reduced.

Structural measures will supplement land treatment to eliminate damages on up to 3,244 acres including the Town of Ovid, from a 100-year frequency storm, 2702 acres from a 10-year frequency storm, 2,362 acres from a 5-year frequency storm, and 2016 acres from a 2-year storm with an estimated average annual benefit of $387,200.

There will be 361 acres of land disturbed for construction of structural measures. This land will be revegetated after construction is completed. In addition, there will be 272 surface-acres of sediment storage and 293 surface-acres of temporary floodwater storage. Plantings will provide 554 acres of multiple-use land, including wildlife habitat.

Construction of structural measures will cause a change in the landscape.

Adverse environmental effects which cannot be avoided are 361 acres of land which will be disturbed during construction of structural measures, 272 acres of land behind the structures will be subject to sedimentation during the 100 years evaluation period, and 293 acres above the sediment pool will be subject to flooding for periods up to 10 days. Four acres of grass cover on the Sedgwick Bar State Wildlife Area will be disturbed during construction.

Archeological sites that are not identified prior to the construction start may be damaged or completely lost.

VI List of Alternatives Considered

Flood plains in this watershed are used primarily for agriculture. About 19.1% is irrigated cropland, 41.3% is nonirrigated cropland, 36.1% is rangeland and 3.5% is in miscellaneous uses such as roads, urban areas, etc.

Alternatives considered were:

1. Change in land use and intensified land treatment.

2. Enlargement of canal capacities to handle floodwater and building a number of floodways to the South Platte River to handle peak flows.

3. Taking no project action.

VII Comments About Project

Agencies and other sources from which written comments on the Draft Environmental Impact Statement were received:

Department of the Army
Department of Health, Education and Welfare
Department of the Interior
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
Nebraska State Office of Planning and Programming

VIII Transmittal to CEQ

Draft statement transmitted to CEQ on June 17, 1975.

USDA SOIL CONSERVATION SERVICE

FINAL ENVIRONMENTAL IMPACT STATEMENT [1/]

THE SEDGWICK-SAND DRAWS WATERSHED PROJECT
Sedgwick County, Colorado
Cheyenne and Deuel Counties, Nebraska

Latitude 41° - 00'
Lontitude 102° - 30'

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of Public Law 83-566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

Sedgwick County Soil Conservation District, Sedgwick-Sand Draws Conservancy District, Sedgwick County Board of Commissioners, Julesburg Irrigation District, Town Council of Ovid, Colorado State Soil Conservation Board in Colorado and the South Platte Natural Resources District in Nebraska.

PROJECT PURPOSES AND GOALS

Goals which the sponsors desire to achieve with this project include installing land treatment and flood prevention measures to reduce floodwater, erosion and sediment damages to agricultural land, crops and irrigation systems; to wildlife habitat, and to homes, roads, railroads and farmsteads in the towns of Ovid and Sedgwick, Colorado, and surrounding areas. One flood[2/] damaged more than 4,500 acres of crops and land, and caused personal injury because bridges washed out. Like other rural communities such hardships need to be alleviated. However, it is recognized that all of the sponsors' goals may not be achieved because of the difficulty in predicting the occurrence and magnitude of damaging floods.

The project plan provides for conservation land treatment measures supplemented by 10 single-purpose floodwater retarding structures; three grade stabilization structures; three floodways and 10 canal inlet structures. [3/] A map showing the project features is included in the Appendix.

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

2/ Application For Assistance, pp 1-2, Sedgwick-Sand Draws Watershed.

3/ See Glossary -- Appendix F.

PLANNED PROJECT

LAND TREATMENT

Land treatment measures include those which are needed and can be applied during the five-year installation period. These measures will provide watershed protection and project benefits through improved land and plant cover conditions.

Conservation Plans developed by landowners and operators with assistance from the sponsoring districts will designate land treatment measures planned on each farm and ranch unit. Technical assistance is available from the Soil Conservation Service through the districts for these measures. Technical forestry assistance will be provided to interested landowners by the Nebraska State Extension Forester or the Colorado State Forester.

Wildlife food and cover plantings will be encouraged on farm and ranchland through conservation plans developed by owners and operators, with assistance from the Colorado Division of Wildlife, Soil Conservation Service and the Districts.

Some of the major conservation practices planned to be applied during the five-year project installation period are:4/

Conservation cropping system	5,144 acres
Irrigation ditch and canal lining	50,000 feet
Irrigation pipeline	4,000 feet
Land leveling	1,310 acres
Irrigation water management	4,154 acres
Pasture planting	140 acres
Ponds	15
Terraces	166,428 feet
Contour farming	1,300 acres
Range seeding	100 acres
Proper grazing use	2,500 acres
Woodland tree planting	40 acres
Upland wildlife habitat	514 acres

Specifications for measures will differ from farm to farm because of differences in soils, sites, slopes, and farm or ranch enterprises. Details on land treatment specifications by soil or range site classifications can be obtained from the Soil Conservation Service field office assisting the Sedgwick County Soil Conservation District or the South Platte Natural Resources District.

4/ See Glossary.

An estimated 8,450 acres of cropland and 5,700 acres of rangeland will be adequately treated during the project installation period.

Floodway 1 between station 231 + 20 and the South Platte River crosses Sedgwick Bar State Wildlife Area. Plantings of switchgrass, alkali sacaton and western wheatgrasses, and of Russian olive, juniper, and sumac shrubs will be made in this area. These grasses and shrubs will be provided by Colorado Division of Wildlife and planted by the Sedgwick-Sand Draws Conservancy District along the west side of the floodway maintenance roadway. The plantings and floodway road will be fenced for protection as a P.L. 566 construction cost.

The State Forester's report indicates adequate watershed fire protection can be achieved in Nebraska without acceleration. However, in Colorado, three additional vehicles and better facilities to house equipment are needed to provide the desired level of fire protection to the Sedgwick and Ovid rural fire districts. Technical assistance will be provided to these districts to develop district fire plans, acquire fire control equipment, train personnel and conduct fire prevention programs. In addition, 40 acres of tree planting will be established in the Nebraska portion of the watershed.

Soil surveys have been completed and published for Sedgwick County, Colorado and Deuel County, Nebraska. These soil surveys are used during conservation planning.

No acceleration of the rates of application of measures or technical assistance is needed for the planning and application of the land treatment measures, except for the fire control intensification estimated at $1,500 of P.L. 566 funds for Colorado.

There are no areas of critical sediment sources that are required to be treated.

These planned measures are expected to achieve adequate treatment for watershed protection on 8,450 acres of cropland and 5,700 acres of rangeland during the project installation period.

STRUCTURAL MEASURES

Structural measures in the plan were selected on the basis of the most effective and economical combination of measures, evaluation units, and levels of protection investigated during planning. The final determination on the combination of measures to be included in the plan were made by the sponsors with the agreement of the Service.

Planned Project

Project structural measures consist of 10 floodwater retarding structures, three floodways, three grade stabilization structures, and 10 canal drop inlets. Structures are planned to have a 100-year effective life.

There will be no people nor businesses displaced by installation of structural measures.

Floodwater retarding structures with the required floodwater and sediment volumes are designed to control approximately 56 percent of the watershed area.

1. Classification, Storage, and Level of Control - The floodwater retarding structures are class "a" with floodwater storage for the 50-year frequency storm runoff and sediment storage for the anticipated 100-year accumulation. Level of control at the dams is the 37-1/2 year storm through the low stage of the principal spillway and the 50-year frequency storm through the high stage of the principal spillway. Total storage of the floodwater retarding structures is 5,731 acre-feet of which 3,961 is for floodwater and 1,770 is for sediment storage. The structures have no permanent conservation storage. No water is to be held in the sediment pools.

Looking north from the west end of proposed dam SS-3 Area to the hill in background will be floodwater and sediment pool.

Looking southwest from above the site of proposed dam SS-7. East end of dam will be between hay stack and farm buildings.

2. Dams, Emergency Spillways and Borrow Areas - The emergency spillways will be vegetated earth. They will be excavated into the claystone and siltstone bedrock or firm alluvial clay. The frequency of flow in the spillways is once in 50 years. In order to preserve the natural vegetation in the return areas, no exit channel shaping has been considered.

The dams, emergency spillways, borrow areas and other areas disturbed during construction will be vegetated for erosion control and fenced to preclude grazing and access to roving livestock and to human foot and vehicular traffic. However, in seasons with good production hay harvesting will be permitted. Specifications for fencing will meet those of the Service and the Colorado Division of Wildlife. Empty borrow areas will be graded for total drainage before seeding. Where available, suitable topsoil will be stripped from the site and stockpiled for later seedbed preparation. Earthen areas of the spillways will be compacted to a firm seedbed. Areas to be seeded also will be fertilized. When weeds compete with the vegetative cover, they shall be mowed early in the summer. The areas are to be protected from burning.

3. Floodways - The three floodways included in the structural measures are Floodways 1 and 2, connecting the Highline Canal to the South Platte River, and the Ovid Floodway extending from Highway 138 around the southwest side of Ovid, Colorado to the South Platte River.

The present flow condition of the floodways is ephemeral. One and two-tenths miles of floodways have no or practically no defined channel. The remaining are manmade or previously modified channels with an approximate construction date of 1910. The land use adjacent to the floodways is agricultural. The crops grown are sugar beets, corn, beans, and alfalfa.

Floodways use existing railroad and state highway bridges. Three new county road bridges, seven farm bridges and one Ovid street bridge will be required. The Town of Ovid will move or relocate utilities as required for construction of the Ovid floodway.

All floodways will have maintenance roadways built on one side wherever they are not adjacent to an existing road. Floodway 1 crosses the Sedgwick Bar State Wildlife Area and will have a maintenance road on the west side with a grouted crossing on the riprap at the lower end of the floodway.

a. Floodways 1 and 2 - Floodway 1 follows an existing floodway and irrigation drop ditch between the Highline Canal and Petersen Ditch. A new and/or enlarged floodway outlet from the Petersen Ditch to the South Platte River will be constructed. Floodway 2 is new and will utilize the borrow ditch along county and state roads where possible.

Flows from watershed lands above it flow into the Highline Canal. During major storm activity on the watershed, irrigation flows will be shut off in the Highline at the outlet from the Julesburg Reservoir. Floodways are provided out of the Highline Canal at two points. These are points where maximum low stage principal spillway flows from five of the floodwater retarding structures located above the point reach the maximum safe capacity for the canal to convey.

These floodways convey flows to the South Platte River. Above State Highway 138, Floodways 1 and 2 have a capacity to carry these design flows. Peak flows from large storms between the dams and the Highline Canal may exceed the canal capacity and overflow the canal banks without entering the floodways. Likewise, simultaneous high stage principal spillway discharges will exceed the Highline Canal capacity and overflow the banks. No appreciable local flow will enter either floodway above Highway 138 except between Stations 26+00 and 53+00 of Floodway 2. Here, local peaks greater than the capacity described above will overtop the floodway.

Floodways 1 and 2 will have the designed grade established and maintained by 27 reinforced concrete drop or chute drop spillways with riprap at the lower ends. All existing drops in Floodway 1 except the recently installed one at Station 28+35 will be replaced.

Below Highway 138 the floodways have capacity for the routed 5-year frequency peak storm runoff.

b. Ovid Floodway - The Ovid Floodway has a capacity for the routed 100-year frequency peak storm with the project structures in place. Riprap will be used along the Floodway at bridge, bend and structure locations for stabilization.

The table on the following page gives dimensions and capacities for the floodways.

c. Floodwater Control Structures - Drop structures out of the Highline, Settlers and Petersen Ditches will have radial gates inleting into Floodways 1 and 2. Floodway 1 will have a 10-foot wide radial gate and a 4-foot wide slide gate at the Highline and the Settlers Ditch, and a 14-foot gate out of the Petersen Ditch.

Two 12-foot wide radial gates will inlet into Floodway 2 from the canals.

There will be five canal checks in the Highline and Settlers where Floodway 1 intersects (H1 and S1) and in all three canals where Floodway 2 intersects (H2 + S2, and P2). These will be stop-log type checks so the canals can be blocked to divert flows into the floodways.

TABLE 1 - STRUCTURE DATA

FLOODWAYS

Sedgwick-Sand Draws Watershed, Colorado and Nebraska

Floodway	Reach	Drainage Area 1/ Sq.Mi.	Capacity cfs Req'd.	Capacity cfs Design	Water Surface Elev. (MSL)	Hydraulic Gradient (ft/ft)	Floodway Dimensions Bottom Width (ft)	Bottom Grade (%)	Depth of Flow (ft)	Side Slope (Z)	"n" Value Aged	"n" Value As Built	Velocities ft./sec Aged	Velocities ft./sec As Built	Excavation Cu.Yds.	Type of 2/ Work	Before Project Type of 3/ Channel	Before Project Flow 4/ Conditions
Floodway 1	5+00 to 42+90		135	350	3,658.3	.0010	32	.10	3.3	3	.035	.025	2.6	3.2		II	M(1910)	E
	42+90 to 71+44		135	150	3,615.5	.0004	12	.04	4.5	1.5	.035	.025	1.8	2.3		II	M(1910)	E
	71+44 to 115+11		135	150	3,613.0	.0010	14	.10	3.2	2	.035	.025	2.3	3.0	14,500 5/	II	M(1910)	E
	147+30 to 187+30		135	150	3,567.6	.0015	18	.15	2.6	3	.035	.025	2.6	3.1	19,160	I	0	E
	187+30 to 212+80		135	150	3,562.0	.0010	16	.10	3.0	2	.035	.025	2.37	3.0	7,370	I	0	E
	212+80 to 250+80		300	300	3,559.4	.0009	30	.09	3.3	2	.035	.025	2.48	3.1	32,850	I	0	E
Floodway 2	19+10 6/ to 70+29		120	135	3,638.2	.0010	12	.10	3.2	2	.035	.025	2.3	3.0		I	0	E
	70+29 to 99+55		120	135	3,603.2	.0010	12	.10	3.2	2	.035	.025	2.3	3.0	60,617 7/	II	M(1910)	E
	99+55 to 114+50		250	250	3,536.2	.0010	30	.10	3.0	2	.035	.025	2.5	3.0	4,263	II	M(1910)	E
Ovid Floodway	47+20 to 52+10		200	200	3,523.7	.0015	14	.15	3.2	3	.035	.025	2.8	3.0	1,960	II	M(1910)	E
	52+10 8/ to 67+30		850	850	3,524.3	.0011	45	.11	4.6	3	.035	.025	3.3	3.0	13,500	II	M(1910)	E

1/ Drainage area not a consideration for floodway design. Principal spillway discharge is primary factor.
2/ I - Establishment of new channel including necessary stabilization measures; II - Enlargement of existing channel.
3/ M( ) - Manmade or previously modified channel (approximate construction date); 0 - None or practically no defined channel.
4/ E - Ephemeral - flows only during periods of surface runoff, otherwise dry.
5/ Floodway #1 subtotal.
6/ Reach length equals 17,105 feet. Includes station 115+62 behind = 25+72 ahead.
7/ Floodway #2 subtotal.
8/ 650 cfs enters from side channel at this station.

The floodwater control structures and canal checks are all included in the floodway costs.

d. Fencing and Seeding - All construction areas of the floodways will be reseeded as a construction cost to reduce erosion and sedimentation in the channels. Grass plantings will be made that are selected for their contribution to erosion control and wildlife habitat food and cover. Fencing will be a construction cost with specifications satisfactory to SCS and the Colorado Division of Wildlife.

4. Grade Stabilization - There are active headcuts in the natural waterways below SS-2 and SS-6. GS-2.1 and GS-2.2 will be installed below SS-2. Below SS-6 there is one headcut that will be stabilized by structure GS-6.

Capacity of these grade stabilization structures is based on the greater of the 25-year peak storm runoff or the high stage principal spillway release rate of the upstream floodwater retarding structure. Structures below SS-2 are controlled by local flow. The GS-6 structure capacity is controlled by the release rate from SS-6.

5. Canal and Floodway Inlets - There will be 10 canal inlets into the Highline Canal. These drop structures will be located on the natural waterways below the 10 floodwater retarding structures to prevent head-cutting from prolonged principal spillway discharge.

Canal inlets on waterways where bedload movement may take place will have crests set to provide a debris basin to prevent sedimentation of the canal.

Capacity of canal inlets is the greater of the high stage principal spillway flow from the upstream dam or the 10-year frequency peak storm runoff. Larger flows will be passed over earth spillway sections in the collecting dikes into the canal without damage to the drop structures.

Floodway inlet drops will be constructed to control storm runoff inflows at Station 53+00 of Floodway 2 and Station 52+10 of the Ovid Floodway. Each drop is a part of the canal structural costs. The floodway inlet drop on Floodway 2 has a 5-year frequency storm capacity. The Ovid Floodway inlet drop has a 100-year frequency storm capacity.

6. Land Rights - Approximately 802 acres of land are required for the 10 floodwater retarding structures. This includes the area needed for the dams, emergency spillways, flood pools, and emergency spillway returns. The present use of this land is 20 acres of nonirrigated cropland, and 782 acres of pasture and rangeland.

All of the land required for floodwater retarding structures is in private ownership except sites for structures SS-1 and SS-4 which are on State land. Improvements that will have to be relocated at the structure sites are windmills on sites SS-2, 3, 5,7, and 8 and a country road on site SS-3.

Land rights to be acquired for grade stabilization, canal inlets and floodways are estimated at 59.3 acres, comprising 16.94 irrigated cropland, 8.72 acres dry cropland, 21.65 acres of native pasture and rangeland, and 11.99 acres of county roads. Improvements that will be relocated at structure sites consist of nine power poles and 2,550 linear feet of fence on Floodway 2, and a street bridge and city utilities on the Ovid Floodway.

7. Pollution Control - Construction will be carried out under guidelines 5/ of construction management and equipment control that will minimize erosion and pollution and maintain environmental quality during construction. These specific measures will be included in construction drawings and specifications. When special or unforeseen problems involving pollution arise during construction, appropriate measures will be taken to control them by contract modification.

All federal and state pollution requirements will be complied with during and after construction.

8. Other Provisions to Minimize Adverse Environmental Effects - The floodway through the Sedgwick Bar State Wildlife Area will provide floodwater protection to wildlife habitat, and the planting of shrubs (5 acres) along the floodway road will provide food and cover for wildlife and will improve aesthetic value of the wildlife area.

There are no registered archeological or historical sites that will be affected by the project works of improvement.

Since the Colorado State Historical Society has indicated an interest in designating an area along Lodgepole Creek as a historic Indian camp district, the Soil Conservation Service will notify the Society, (1) when the Work Plan is approved showing proposed construction site locations, (2) when the final construction sites are located and, (3) of dates when construction will begin at each site.

The Secretary of the Interior, through the Midwest Archeological Center in Lincoln, Nebraska, will be notified at the same time as the Colorado State Historical Society so that any additional archeological studies necessary may be conducted.

If evidence is found or presented during construction that historical or archeological materials exist or may be present, construction will stop

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5/ See Appendix G.

until the applicable provisions of Public Law 93-291 and/or Public Law 89-665 have been complied with. Applicable state laws dealing with archeological and historical site preservation will be complied with.

The proposed federally assisted project will not change the existing responsibilities of any federal agency under Executive Order 11593 with respect to archeological and historical resources.

Where possible, existing ephemeral watercourses are utilized to prevent disturbing additional land areas.

PROVISION FOR OPERATION AND MAINTENANCE

1. Land Treatment Measures - Land treatment measures will be maintained by the landowners or operators of farms on which the measures are installed. Technical assistance from the Soil Conservation Service is available through the Sedgwick Soil Conservation District in Colorado and the South Platte Natural Resources District in Nebraska.

Technical assistance to landowners and rural fire protection districts for operating and maintaining fire control and forestry measures beyond this installation period will be provided by the Nebraska State Extension Forester and the Colorado State Forester in cooperation with the U.S. Forest Service under regular continuing programs.

The Colorado Division of Wildlife will operate and maintain wildlife food and cover plantings and continue management practices of the Sedgwick Bar State Wildlife Area from funds allocated for this purpose. All maintenance work will be done as soon as it is needed.

2. Structural Measures - The project measures have been designed to operate effectively for 100 years with proper maintenance. During this period, it is expected that some damage may occur to the structures from large storms. Repair of these damages and all maintenance of the structures are considered to be operation and maintenance costs.

Copies of the Colorado Watershed and RC&D Operation and Maintenance Handbook will be provided to the Sponsors. The handbook will acquaint Sponsors with the essentials of operation and maintenance of their projects. The information and suggestions will help each Sponsor understand and appreciate their job more fully so that it can be carried out in a timely and more efficient manner.

The structural measures will be operated and maintained by the various sponsoring organizations at an estimated annual cost of $16,000. This represents material, men and equipment as necessary to repair, maintain, and assure the continued operation of the structural measures as designed. This does not cover maintenance of existing improvements, canals, and floodways in the watershed that are not project measures.

All operation and maintenance work will be done as soon as it is needed by the following responsible organizations:

The Julesburg Irrigation District will assume operation and maintenance responsibility for the following with an estimated annual cost of $6,970:

... Ten canal inlet structures adjacent to the north bank of the Highline Canal. These drop structures are located on the natural drainages below each of the floodwater retarding structures.

... All gates and structures within the Julesburg irrigation system, including Floodways 1 and 2 from the Highline Canal to the outlets from the Petersen Ditch.

... The Floodways (spillways) 1 and 2 between the Highline Canal and Petersen Ditch.

... Assistance to other sponsors, when deemed practicable by the Board of Directors of the Julesburg Irrigation District, with maintenance, etc. of the 10 floodwater retarding dams and spillways, three grade stabilizing structures, and the remainder of the Floodways 1 and 2 from the Petersen Ditch to the South Platte River, when men, money, and equipment are available as determined by the Julesburg Irrigation District Board. Funds are available through annual assessments paid by shareholders.

The Sedgwick-Sand Draws Conservancy District will assume operation and maintenance responsibility for the 10 floodwater retarding dams and spillways, the three grade stabilizing structures, and the sections of Floodways 1 and 2 below the Petersen Ditch to the South Platte River with an estimated annual cost of $8,500. (The Julesburg Irrigation District and Sedgwick County will make every reasonable effort to assist the Conservancy District with this responsibility for the following as part of their normal program.)

The Sedgwick County Commissioners will assume operation and maintenance responsibilities for maintenance of the three county road bridges across Floodway 2 as part of the county road system, and assistance to other sponsors whenever possible with maintenance needs of the structural programs.

The Town Council of Ovid will assume operation and maintenance responsibility for the Ovid Floodway with the Union Pacific Railroad assisting by maintaining their new street bridge over the floodway at an estimated annual cost of $530.

Planned Project

An Operation and Maintenance agreement will be developed and signed by each Sponsor and the Soil Conservation Service prior to signing of the Project Agreement for installation of works of improvement and the bid advertisement for each construction contract. Each operation and maintenance agreement will enumerate the particular considerations needed to cover requirements of each group of structures to be contracted. The principal considerations and requirements are discussed in the following paragraphs.

The Ovid Floodway requires no operation procedures. No operation of the floodwater retarding structures is required as they have ungated outlets.

Operation of the project measures will require regulation of the canal and ditch irrigation flows and the opening of the floodway inlet gates when heavy rainstorms occur. Company reservoir releases of irrigation water into the Highline Canal will be reduced to provide canal capacity for the floodwater retarding structure releases. The Floodways 1 and 2 anticipated control gates will be opened and the Highline Canal, Settlers and Petersen Ditches will be checked downstream from the floodway gates so the retarding structure releases will be retained in the floodways for conveyance to the South Platte River.

Maintenance will involve removing debris from the reservoirs and debris and sediment from the floodways, maintaining protective vegetative cover where needed, spraying to control noxious weeds, maintaining channel stability, and keeping all structures in serviceable condition and repair as needed during the lifetime of the structure.

To further assure maintenance and improvement of the existing environment and to provide vector control, the following will be done as regular items of maintenance when need develops:

... Proper drainage behind the floodwater retarding structures to minimize the ponding of water.

... Periodic removal of vegetation and floatage from shallow inundated areas of the reservoirs.

... Channeling (interceptor drains) in the event marshy or seepage areas develop below the dams.

The structural works of improvement will be inspected annually before the flood season and after each large storm runoff. For three years after completion of construction the inspections will be made by representatives of the sponsoring organizations and the Soil Conservation Service. After the third year, the Sponsors will continue to make the inspections.

Inspection reports will cover maintenance needed, outline what will be done, and establish a schedule for accomplishing the work promptly. Each inspection report and a record of action will be kept on file by the Sponsoring organization with copies provided to the Soil Conservation Service. No federal funds are provided for operation and maintenance of land treatment or structural measures.

TABLE 2 - ESTIMATED PROJECT INSTALLATION COST

Sedgwick-Sand Draws Watershed, Colorado

and Nebraska

Installation Cost Item	Unit	Number		Estimated Cost (Dollars) 1/						
		Non-Fed. Land	Total	P. L. 566 Funds			Other			TOTAL
				Non-Federal Land		Total	Non-Federal Land		Total	
				SCS 3/	FS 3/		SCS 3/	FS 3/		
LAND TREATMENT										
Land Areas 2/										
Cropland	Acre	8,450	8,450	---	---	---	685,650	---	685,650	685,650
Rangeland	Acre	5,700	5,700	---	---	---	116,800	---	116,800	116,800
Individual Practices										
Fire Control										
Nebraska	Acre	20,000	20,000	---	---	---	---	10,000	10,000	10,000
Colorado	Acre	31,709	31,709	---	---	---	---	33,100	33,100	33,100
Tree Planting										
Nebraska	Acre	40	40	---	---	---	---	4,000	4,000	4,000
Technical Assistance										
Nebraska		---	---	---	---	---	14,100	1,500 5/	15,600	15,600
Colorado		---	---	---	1,500	1,500	35,000	500 6/	35,500	37,000
TOTAL LAND TREATMENT	xxxx	xxxxxx	xxxxxx		1,500	1,500	851,550	49,100	900,650	902,150
STRUCTURAL MEASURES										
Construction										
Floodwater retarding structures	No.	10	10	1,721,000	---	1,721,000	---	---	---	1,721,000
Grade Stabilization structures	No.	13	13	143,800	---	143,800	---	---	---	143,800
Floodways	No.	3	3	---	---	---	---	---	---	---
(M) 4/	Mi.	5.02	5.02	407,700	---	407,700	---	---	---	407,700
(O) 4/	Mi.	2.93	2.93	149,500	---	149,500	---	---	---	149,500
Subtotal - Construction				2,422,000		2,422,000	---	---	---	2,422,000
Engineering Services				339,000		339,000	---	---	---	339,000
Project Administration										
Construction Inspection				184,500		184,500	13,900	---	13,900	198,400
Other				203,200		203,200	10,400	---	10,400	213,600
Subtotal - Administration				387,700		387,700	24,300	---	24,300	412,000
Other Costs										
Land Rights							241,020	---	241,020	241,020
TOTAL STRUCTURE MEASURES				3,148,700		3,148,700	265,320	---	265,320	3,414,020
TOTAL PROJECT				3,148,700	1,500	3,150,200	1,116,870	49,100	1,165,970	4,316,170

1/ Price Base - 1970 Land treatment, 1975 - Individual Practices and structural costs.
2/ Areas estimated to be adequately treated during project installation period.
3/ Federal Agency responsible for assisting in installation of works of improvement.
4/ Type of channel before project: (M) manmade ditch or previously modified channel; (O) none or practically no defined channel.
5/ Includes $1250 contributed through going programs and RC&D
6/ Includes $200 contributed through going programs.

Date: December 1975

ENVIRONMENTAL SETTING

PHYSICAL DATA

The watershed contains approximately 66,714 acres (104.2 square miles) of which 11,000 acres (17.2 square miles) are in Cheyenne and 24,005 acres (37.5 square miles) are in Deuel County, Nebraska, and 31,709 acres (49.5 square miles) are in Sedgwick County Colorado.

The following towns are within the watershed boundaries: Sedgwick, Colorado (pop. 208), Ovid, Colorado (pop. 463). Towns near the watershed include: Julesburg, Colorado (pop. 1578), the county seat of Sedgwick County located eight miles east of the watershed; Chappell, Nebraska (pop. 1204), the county seat of Deuel County located five miles north of the watershed; Sidney, Nebraska (pop. 6,403), the county seat of Cheyenne County located 18 miles northwest of the watershed; and Sterling, Colorado (pop. 10,636), located 50 miles southwest of the watershed. The closest metropolitan area is Denver, Colorado, located 175 miles southwest of the watershed.

The watershed is in the South Platte River subregion of the Missouri Water Resource Region as delineated by the Water Resources Council [1]. The area is described as Central High Tablelands comprised of relatively flat land draining into the Platte and Republican River Drainages. The watershed area is typical of the water resource region.

The upper part of the watershed consists mainly of a flat to gently undulating plain that is dissected towards its southern margins by numerous small, normally dry channels draining southeastward to the broad valley of the South Platte River. There are about 14 of these tributary drainages in Colorado, the largest of which are Sedgwick Draw and Sand Draw. These drainages coalesce at their lower ends into a broad alluvial plain bordering the north sides of the flood plain of the South Platte River. There are two tributary drainages in Nebraska that flow eastward into Lodgepole Creek, which flows southward into Colorado and enters the South Platte River southeast of Ovid, Colorado.

The climate is classed as semi-arid. Average annual precipitation at Sedgwick, in the southwestern part of the watershed, is 17.01 inches. Temperature has ranged from a low of -40° F. to a high of 110° F. with an average annual temperature of 50° F [2]. The average frost-free growing season is 143 days based on 56 years of Weather Bureau records at Julesburg, eight miles east of the watershed.

Periods of low rainfall are common with an uneven distribution of precipitation from year to year. The principal source of precipitation that causes damaging floodwater and sediment runoff is from high intensity, short duration, convection type thunderstorms occurring over rather limited areas, normally in the period from April to October.

Environmental Setting

The greatest 24-hour amount of precipitation recorded at the Weather Bureau Station 5 miles south of Sedgwick was 5.00 inches on May 5, 1969. A number of amounts in excess of 5.00 inches were reported in farm gages throughout the watershed in 1965 and 1968.

Altitudes range from about 4,150 feet at the northwestern edge of the watershed to 3,510 feet at the southeastern edge of the watershed near Ovid, Colorado.

Geologic formations exposed within the watershed consist of rocks and sediments of Tertiary and Quaternary age. Bedrock occurring at or near the surface at the lower ends of the tributary drainages consists predominantly of blocky claystone and siltstone of the Brule Formation of Tertiary age. In the upper part of the watershed, these rocks are overlain by the Ogallala Formation of Tertiary age, which consists of beds of stream deposited gravel, sand, silt, and clay. Some of the sand and gravel of the Ogallala is cemented by calcium carbonate, which forms a rock ranging from a soft friable sandstone to a relatively hard sandstone.

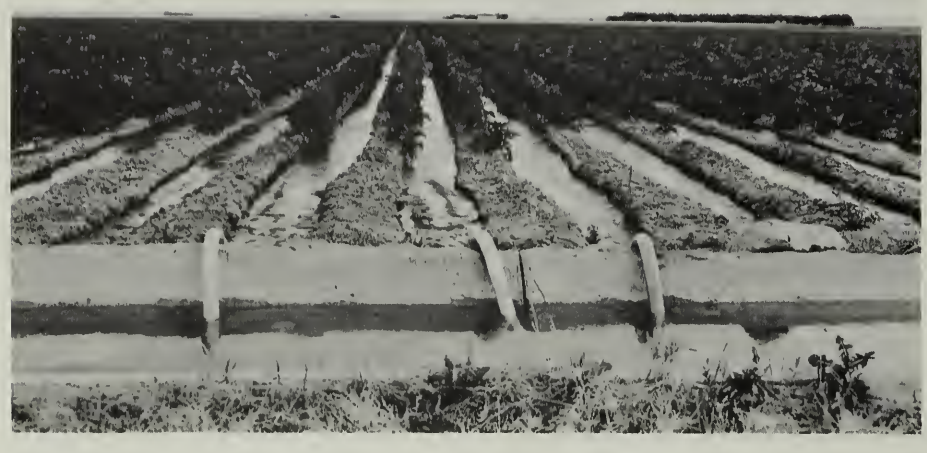
Much of the middle part of the watershed is underlain by Pleistocene terrace deposits consisting of alluvial sands, silts, and clays. Throughout most of the upper and middle portions of the watershed, the surface is mantled with wind deposited silt and clay or silt and fine sand of Pleistocene age. The alluvial plain in the lower part of the watershed is underlain by stream deposited silt, clay and sand of Pleistocene and Recent age.

Soils of the watershed are mainly deep or moderately deep loams or sandy loams. In the nonirrigated cropland area, in the upper watershed, these soils on slopes below 9 percent are high producing wheatland. Most of the steeper land is in native grass. Plant cover is such that there are no areas of critical erosion or sediment production.

The soils vary from silty loams to sandy loams to coarse gravel. The soil series are Colby silt loam, Bridgeport loam, Havre loam, Epping and Keota loams, Ascalon sandy loam, Chappell sandy loam, Dix and sandy alluvials. Except for the Epping and Keota soils, all have good hydrological ratings.

The soils of the irrigated areas are mainly Keith-Tripp-Bridgeport Associations. Long time yield records show that these soils are consistently highly productive. In the extreme lower part of the watershed adjacent to the South Platte River flood plain, a saline condition exists in some areas due to the low gradient of the South Platte River.

Soil surveys have been made and published for most of the watershed area. These include those for Deuel County, Nebraska, issued June 1965 and Sedgwick County, Colorado, issued December 1969.



Most of the lands in the lower end of the watershed are irrigated.

There is no assured water source from the watershed. Small floodflows from the upper plains are often taken into the irrigation canals that traverse the watershed and put to beneficial uses. The larger flows overtop the canals causing excessive floodwater, erosion, and sediment damage.

Irrigated lands in the watershed are served primarily by gravity flow diversion from the South Platte River with storage in the Julesburg Reservoir west of the watershed. The Julesburg Irrigation District owns the Julesburg Reservoir and the Highline Canal that distributes the stored water to the irrigated lands in Colorado and Nebraska. The Settlers Ditch, a pickup and distribution canal and the Petersen Ditch, which diverts out of the South Platte just west of Sedgwick, Colorado, are also part of the system traversing the watershed and serving the irrigated lands below Highline Canal.

Part of the canal system of the Julesburg Irrigation District. Town of Sedgwick, Colorado, is in the background.

The Petersen, unlike the other two canals, continues east of the watershed across Lodgepole Creek and serves irrigated lands in Colorado in the vicinity of Julesburg. The lands under the system have adequate water most years, however, a few landowners have drilled shallow wells into the valley alluvium to supplement surface water.

The flood plain adjacent to the South Platte River has a high water table (four to five feet) which limits production of irrigated crops. Wells serve the needs for rural, domestic, municipal, and industrial uses in the vicinity.

The Highline Irrigation Canal crosses the Project area from west to east. Above, to the north of the canal, part of the land is covered by natural vegetation, and is used for rangeland. The other major land use is nonirrigated cropland.

Looking northwest at drop structure in the Julesburg Irrigation District canal system. Canal delivers irrigation water to farms.

According to A.W. Kuchler's classification of the potential vegetation in the National Atlas of the United States [3], the area is represented by the grama-buffalograss (Bouteloua-Buchloe) of the Central Grasslands.

All plant communities of the Central Grasslands are characterized by the presence of bluegrama. This widespread grass of the Central High Tableland and Land Resource Area [13] grows in varying amounts in the seven plant communities in this part of the Project area.

Blue grama is associated with western wheatgrass, buffalograss, red threeawn, sedges and other species in the plant community described in the Loamy Plains rangesite. The soils are moderately deep to deep, medium textured, with high moisture storing capacity. The infiltration rate decreases sharply with a lowering of range condition. The soils are subject to severe water erosion if vegetation is badly depleted.

Needle-and-thread, western wheatgrass, sideoats grama, and sedges form the natural vegetation of the Loamy Slopes range site. The soils are windblown silt loams and loams, limey at or near the surface.

The vegetation of another extensive range site, Sandy Plains, includes sand dropseed, needle-and-thread, prairie sandreed, red threeawn, sand sagebrush, bush buckwheat, yucca and other plants of sandy lands. Soils are deep with moderately sandy profiles. Moisture intake is good and moisture storage is fair to good.

Plants adapted to gravelly soils form a contrasting vegetative cover on the Gravel Breaks range site. Among these plants are little bluestem, sideoats grama, and needle-and-thread. A distinctive shrub of the Gravel Breaks plant community is leadplant. Other plants include prairie clover, hairy goldaster, Colorado greenthread, and wormwood. Surface soils are gravelly and extremely porous, making them capable of taking water quite readily but susceptible to being droughty during prolonged periods of drouth.

Gravel Breaks range site on Eckley soils.

The least productive plant community in the Project area is on the Shallow Siltstone site. Here, the shallow, highly calcareous soils severely limit plant growth to a short form of blue grama in association with sideoats grama, threadleaf sedge, winterfat, snakeweed, and other species.

Shallow Siltstone range site on Epping soils.

Below the Highline Canal, areas of natural vegetation occur intermingled with irrigated cropland and associated land uses such as irrigation ditches, roads and farmsteads. Kuchler classifies the potential natural vegetation of this area as the Northern flood plain forest (Populus-Salix-Ulmus) of the Broadleaf Forest. This is highly productive area along the lowlands which receives the benefits of extra water for plant growth.

Sandy Meadow range site (Wann soils) on Sedgwick-Bar Game Preserve.

A plant community intermingled with the cottonwood groves on the flood plain is on the Sandy Meadow range site. This plant community closely resembles the tall grass prairie and contains yellow Indiangrass, prairie cordgrass, and switchgrass. It receives benefits of a stable watertable within reach of the vegetation's root systems.

The riparian vegetation of the South Platte River and minor areas away from the river proper, consist of plains cottonwood, willow, and occasional green ash mixed with sedges, rushes, grasses and other river bottom plant species.

Extensive areas of range sites have been drastically changed from the potential natural vegetation described above. In most cases the changes have favored the growth of species which are less palatable for livestock and more adapted to growing under drier conditions. A number of annual weeds become more abundant as the original cover is weakened by overgrazing and other disturbances. Departures from the original plant communities are often noticed by the presence of more bare ground than is in the original cover. More detailed information about these plant communities is available from the Soil Conservation Service field office at Julesburg, Colorado.

A few acres of woodland occur in small scattered stands along drainage slopes and in windbreaks. The predominant species are cottonwood, ash, elm, willow, and boxelder. Stands are usually well stocked and provide livestock shelter and wildlife habitat.

Land use in the watershed is shown on the following table:

Land Use

Item	Colorado	Nebraska	Total	Square Miles	Percent
Cropland					
Irrigated	12,135	640	12,775	20.0	19.1
Nonirrigated	4,005	23,535	27,540	43.0	41.3
Rangeland	13,699*	10,380	24,079	37.6	36.1
Miscellaneous	1,870	450	2,320	3.6	3.5
Total	31,709	35,005	66,714	104.2	100.0

* Includes 3,330 acres of Salt Meadow

The stream pattern of the watershed consists of a series of 14 ephemeral watercourses in Colorado which flow in a southeasterly direction into the South Platte River. These watercourses total 50.5 miles from their sources to the points where they cross the Highline Canal. Two normally dry channels, totaling 16.5 miles in length, originate and end in Nebraska. They outlet into the southerly flowing Lodgepole Creek, which flows into Colorado and joins the South Platte at the southeastern edge of the Town of Ovid. The stream courses are well defined natural channels from their points of origin to the cropland. They contain a few scattered stands of trees, but mainly appear as continuations of the grasslands as shown in photos of SS-3 and SS-7 dam sites. In the flood plain areas, the channels have become obscure because of agricultural and transportation developments across the drainages.

There are no perennial or intermittent streams in the watershed area. Characteristics of natural and manmade drainages which will be used as project floodways are shown on Table 3.

The Water Pollution Control Commission of the Colorado Department of Health has established water quality standards in the publication, Water Quality Standards and Stream Classification. [4]

Environmental Setting

The main stem of the South Platte River, adjacent to the project area, has been designated to meet the requirements for industrial use, irrigation, and fish and wildlife (warm-water fishery) in addition to the basic standards that apply to all waters in the state.

To meet the above standards, limits have been set on (1) dissolved oxygen, (2) pH, (3) turbidity, (4) temperature, (5) total dissolved solids (salt) concentrations, (6) sodium absorption ratio, (7) toxic materials, (8) bacteria and (9) other material. These standards are shown in Appendix D.

The latest water quality data from the South Platte River adjacent to the project area is shown in Appendix E [5].

Water quality standards have not been established for watercourses within the project area.

There are no lakes in the watershed area. There are a number of ponds for livestock water.

There are no areas of Wetland Types 3, 4, or 5 as described in Wetlands of the United States [6] that will be affected by the project.

ECONOMIC DATA

Land ownership is as follows:

Ownership	Colorado (Acres)	Nebraska (Acres)	Total (Acres)	Farms & Ranches (Number)
Private	29,089	31,085	60,174	135
State Lands	2,620	3,920	6,540	-
TOTAL	31,709	35,005	66,714	135

About 2,018 acres of state-owned land in Colorado are leased to farmers and ranchers by the Colorado Board of Land Commissioners. The Nebraska Board of Educational Lands and Funds leases 3,920 acres of Nebraska state land to farmers and ranchers. Principal use of this leased land is for livestock grazing.

The remaining state owned lands in Colorado consist of approximately 602 acres of grassland in the 893-acre Sedgwick Bar State Wildlife Area. This preserve is maintained and operated by the Colorado Division of Wildlife for wildfowl.

Agricultural enterprises date back to about 1859 and are the major source of income in the watershed. Of the total 1970 retail sales of $13,619,000 in Sedgwick County, a majority are attributable to agriculture.

Operating units in the upper portion of the watershed are primarily combination ranching and dryland wheat operations. The lower lying irrigated land produces sugar beets, corn, beans, and alfalfa. Most of the corn and alfalfa is fed on the farms through feedlot operations.

Woodland sites are rated low to medium in potential for commercial tree development. Existing sites have little commercial woodland value.

The current per acre price of irrigated and urban land is about $550, nonirrigated cropland $125, and rangeland $60.

The only known commercial mineral deposits occurring in the watershed are sand and gravel and natural gas. In 1971 in Sedgwick County, Colorado, sand and gravel valued at $305,736 was mined. Natural gas produced in the county the same year was valued at $55,924.

The watershed lands are accessible to markets in both states. In addition to Interstate Highway 80S, U. S. Highway 138 and State Highway 59, numerous county roads and the Denver branch of the Union Pacific Railroad traverse the watershed. The facilities of the Julesburg Airport, transcontinental buslines and motor freight lines help provide excellent access to and from the watershed locally, statewide, and nationally.

Commercial development normally associated with a primary cross country highway and railroad has not taken place with the exception of the Great Western Sugar Company factory at Ovid and grain storage elevators and agriculture fertilizer and equipment supply dealers in the nearby towns. It is expected that the economy of the watershed will remain principally agricultural, with most of the units being family operated.

The 1970 Sedgwick County employed labor force is estimated at 1,827 which is broken down into the following categories:

Category	Employed Labor Male	Female	Total	Percent
Professional-Managers & Administrators	281	110	391	21.4
Wholesale & Retail	137	100	237	12.9
Services	237	181	418	23.0
Contracts & Construction	128	6	134	7.3
Farmers, Mgrs. & Laborers	374	5	379	20.8
Miscellaneous (Under 2%)	196	72	268	14.6
TOTALS	1,353	474	1,827	100.0

The 1970 data shows the average annual unemployment rate for male workers was 2.4% and for female workers was 2.3% of the available labor force.

Sedgwick County 1970 income breakdown by annual earnings is as follows:

Annual Income	Percentage of Total
$ 0 - $2,999	17.4
$3,000 - $4,999	13.2
$5,000 - $7,999	28.1
$8,000 - $9,999	15.0
Over - $10,000	26.3

The population in the area is declining. The population in Sedgwick County, Colorado, decreased from 4,242 in 1960 to 3,405 in 1970. This is also representative of the population decline in the Nebraska portion of the watershed.

The Overland Trail Resource Conservation and Development Project sponsors submitted an RC&D application on November 2, 1970, which includes Logan, Phillips, Yuma, Washington, and Sedgwick Counties in Colorado. Morgan County was added to the project area July 29, 1971. The project has not been approved for planning.

The Panhandle Resource Conservation and Development Project is authorized for planning and includes Cheyenne and Deuel Counties in the Nebraska portion of the watershed project.

FISH AND WILDLIFE RESOURCES

The absence of permanent streams and of substantial amounts of water in the watershed tributaries, except during flood periods, precludes stream fishing in the watershed. Due to the unpredictability and infrequency of runoff, as well as State water laws and rights, proposed impoundments in the watershed are not deemed suitable for water retention and subsequent management for a warmwater fishery.

Wildlife species in the watershed area that usually occur in huntable numbers include ducks, Canada geese, ring-necked pheasants, mourning dove, bobwhite quail, cottontail rabbit, jackrabbit, muledeer, limited numbers of white-tailed deer, and pronghorn antelope.

Table 3

Characteristics of Natural and Man-Made Drainages to be Used as Project Floodways

Channel	Reach	Before Type of Channel 1/	Project Flow Conditions 2/
Floodway 1	5+00 to 42+90	M(1910)	E
	42+90 to 71+44	M(1910)	E
	71+44 to 115+11	M(1910)	E
	147+30 to 187+30	0	E
	187+30 to 212+80	0	E
	212+80 to 250+80	0	E
Floodway 2	19+10 3/ to 70+29	0	E
	70+29 to 99+55	M(1910)	E
	99+55 to 114+50	M(1910)	E
Ovid Floodway	47+20 to 52+10	M(1910)	E
	52+10 4/ to 67+30	M(1910)	E

1/ M( ) - Manmade or previously modified channels (approximate construction date); 0-None or practically no defined channel.

2/ E - Ephemeral - flows only during periods of surface runoff, otherwise dry.

3/ Reach length equals 17,105 feet. Includes station 115+62 behind = 25+72 ahead.

4/ 650 cfs enters from side channel at this station.

Some of the more abundant nongame species of wildlife are: coyote, skunk, badger, beaver, mink, muskrat, rodents, reptiles and insects. Bird species include several species of owls, migratory hawks and eagles, and a wide variety of songbirds and shore birds. Fox squirrel and raccoon are hunted in the river bottoms.

The relationship between wildlife species, other wildlife, and their habitat are shown in tables 4, 5, and 6.

Julesburg and Jumbo Annex Reservoirs, outside the project, are important factors in attracting waterfowl to the area.

Land treatment such as tree planting and irrigation also provide food, shelter, and water for wildlife.

TABLE 4 - TYPICAL NATURAL LIFE ZONE-PLANT COMMUNITY-ANIMAL COMMUNITY ASSOCIATIONS [a/]

Sedgwick-Sand Draws Watershed
Colorado and Nebraska

	LAND AREAS						WATER AREAS		AIR SPACE	SUBTERRANEAN
	CENTRAL GRASSLAND		BROADLEAF FOREST							
	UPLAND		LOWLAND		RIPARIAN					
Natural Life Zones	Loamy Plains Loamy Slopes Sandy Plains Gravel Breaks Shallow Siltstone		Sandy Meadow		Woodland	Wetlands	Still Water	Moving Water		
Land Use	Rangeland	Dry Cropland	Hayland & Rangeland	Irrigated Cropland	Woodland Grazing	Wildlife				
Species of the Plant Communities Commonly Found in the Watershed Area	Blue Grama Buffalograss Needle-and-thread Threeawn Sedges Sideoats Grama Prickly Pear Prairie Clover Winterfat	Dry Beans Wheat Planted Pasture	Yellow Indiangrass Prairie Cordgrass Switchgrass Nebraska Sedge Baltic Rush	Alfalfa Sugar Beets Corn	Plains Cottonwood Willow Green Ash Redtop Wild Licorice Snowberry Saltgrass Wheatgrass Dropseed	Sedges Bullrushes Cattail Duckweed Common Reed	Sedges Bullrushes Cattail Duckweed Common Reed Smartweed Pond Weed	Water Cress Cattails Reeds Algae Rushes Smartweed Pond Weed		
Species of the Animal Community Commonly Found in the Watershed Area	Cow Man	Cow Man	Cow Man Amphibians	Cow Man Amphibians	Cow Man Amphibians	Amphibians Ducks	Amphibians Ducks	Amphibians Ducks	Ducks	Amphibians
	Canada Geese	Canada Geese	Canada Geese	Canada Geese	Canada Geese	Canada Geese Shore Birds	Canada Geese Shore Birds	Canada Geese Shore Birds	Canada Geese Shore Birds	
					Hawks Eagles Owls				Hawks Eagles Owls	
	Song Birds Mourning Doves Ringneck Pheasant	Song Birds Mourning Doves Ringneck Pheasant	Song Birds Mourning Doves Ringneck Pheasant Bobwhite Quail	Song Birds Mourning Doves Ringneck Pheasant Bobwhite Quail	Song Birds Mourning Doves Ringneck Pheasant Bobwhite Quail	Song Birds Mourning Doves Ringneck Pheasant Bobwhite Quail			Song Birds Mourning Doves Ringneck Pheasant Bobwhite Quail	
	Mule Deer Whitetail Deer Pronghorn	Mule Deer Whitetail Deer Pronghorn	Mule Deer Whitetail Deer	Whitetail Deer	Mule Deer Whitetail Deer	Mule Deer Whitetail Deer				
	Jackrabbit	Cottontail Rabbit	Cottontail Rabbit Jackrabbit	Cottontail Rabbit	Cottontail Rabbit					
	Rodents	Rodents	Rodents	Rodents	Rodents Fox Squirrel	Rodents				Rodents
					Beaver	Beaver	Beaver	Beaver		Beaver
			Mink		Mink	Mink Muskrat	Mink Muskrat	Mink Muskrat		Mink Muskrat
			Raccoon		Raccoon	Raccoon				
	Coyote Skunk Badger	Coyote Skunk Badger	Coyote Skunk Badger	Coyote Skunk Badger	Coyote Skunk Badger	Coyote Skunk				Coyote Skunk Badger
	Reptiles Insects	Reptiles Insects	Reptiles Insects	Reptiles Insects	Reptiles Insects	Reptiles Insects	Reptiles Insects Fish	Reptiles Insects Fish	Insects	Reptiles Insects
	Prairie Dog									Prairie Dog
Species of the Animal Community which are included in the "Status Undetermined..." Section of Bureau of Sport Fisheries & Wildlife Res. Publ. 114, 3/73 & may be found in watershed area	Western Burrowing Owl					White-faced Ibis	White-faced Ibis		White-faced Ibis Western Burrowing Owl	Western Burrowing Owl
Species of the Animal Community which are included in the list of "Threatened Wildlife of the U.S." (Addl. information follows) and may be in the watershed area	Northern Greater Prairie Chicken		Northern Greater Prairie Chicken		Prairie Falcon				Prairie Falcon Northern Greater Prairie Chicken	
Species of the Animal Community which are included in the "U.S. List of Endangered Native Fish and Wildlife" (addl. information follows) which may be found in the watershed area	Black-footed Ferret				American Peregrine Artic Peregrine				American Peregrine Artic Peregrine	Black-footed Ferret
Species of the Animal Community which occupied the area at some time in the past but are no longer present in watershed	Buffalo Elk Grizzly Bear		Buffalo Elk Grizzly Bear		Elk Grizzly Bear	Grizzly Bear				Grizzly Bear

a/ Predatory animals will range through the territory of their prey. See Table 5

TABLE 5 - FOOD REQUIREMENTS FOR ANIMALS OF THE WATERSHED AREA

Sedgwick-Sand Draws Watershed
Colorado and Nebraska

Eating Animal	Vegetation	PREY																																								
		Man	Amphibians	Ducks	Canada Geese	Shore Birds	Hawks	Eagles	Owls*	Song Birds	Mourning Doves	Ringneck Pheasant	Bobwhite Quail	Mule Deer	Whitetail Deer	Pronghorn Antelope	Cottontail Rabbit	Jackrabbit	Rodents	Fox Squirrel	Beaver	Mink	Muskrat	Raccoon	Coyote	Skunk	Badger	Reptiles	Insects	Fish	Cow	Western Burrowing Owl	White-faced Ibis	Prairie Falcon	Northern Greater Prairie Chicken	American Peregrine	Artic Peregrine	Black-footed Ferret	Buffalo	Elk	Grizzly Bear	Prairie Dog
Man	X		X	X	X						X	X	X	X	X	X	X													X	X				X				X	X		
Amphibians																													X	X												
Ducks	X																												X	X												
Canada Geese	X																												X													
Shore Birds	X		X																									X	X	X												
Hawks			X	X	X	X				X	X	X	X				X	X	X	X			X					X	X													X
Eagles																	X	X	X									X	X	X												X
Owls*			X							X	X	X	X				X	X	X	X						X		X	X													X
Song Birds	X																												X													
Mourning Doves	X																												X													
Ringneck Pheasant	X																												X													
Bobwhite Quail	X																												X													
Mule Deer	X																																									
Whitetail Deer	X																																									
Pronghorn Antelope	X																																									
Cottontail Rabbit	X																																									
Jackrabbit	X																																									
Rodents	X																											X	X													
Fox Squirrel	X									X	X																		X													
Beaver	X																																									
Mink			X	X	X					X	X						X		X				X						X	X												X
Muskrat	X																																									
Raccoon	X		X	X	X	X				X	X	X	X						X									X	X	X												
Coyote	X		X	X	X	X				X	X	X	X	X	X	X	X	X	X									X	X													X
Skunk	X		X	X	X	X				X	X	X	X				X	X	X									X	X													
Badger	X																X		X									X	X													X
Reptiles			X	X	X	X				X	X		X				X	X	X									X	X	X												X
Insects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish	X		X	X	X	X																							X	X												
Cow	X																																									
Western Burrowing Owl																			X									X	X	X												
White-faced Ibis			X																										X	X												
Prairie Falcon			X	X	X	X				X	X	X	X				X	X	X	X			X					X	X													X
Northern Greater Prairie Chicken	X																												X													
American Peregrine			X	X	X	X			X	X	X	X					X	X	X	X			X					X	X													X
Arctic Peregrine			X	X	X	X			X	X	X	X					X	X	X	X			X					X	X													X
Black-footed Ferret																			X										X													X
Buffalo	X																																									
Elk	X																																									
Grizzly Bear			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Prairie Dog	X																																									

*Burrowing Owl is shown separately.

TABLE 6 - ANIMAL FOOD PREFERENCE

Sedgwick-Sand Draws Watershed

Colorado and Nebraska

Animal	Eats Vegetation (X = Yes)	A Food Source for Other Animals (No. of Other Animals)	Eats Other Animals (No. of Other Animals)
Insects	X	28	41
Reptiles		16	14
Rodents	X	16	2
Amphibians		16	1
Mourning dove	X	14	1
Cottontail rabbit	X	14	0
Fish	X	13	6
Ducks	X	13	2
Song birds	X	13	1
Canada geese	X	13	1
Prairie dog	X	13	0
Bobwhite quail	X	12	1
Shore birds	X	11	4
Ringneck pheasant	X	11	1
Jackrabbits	X	11	0
Fox squirrel	X	7	3
Eagles		7	2
Muskrat	X	7	0
Mule deer	X	4	0
Whitetail deer	X	4	0
Pronghorn antelope	X	4	0
Skunk	X	3	13
Prairie chicken	X	3	1
Cow	X	3	0
Buffalo	X	3	0
Elk	X	3	0
Coyote	X	2	17
Prairie falcon		2	16
American peregrine		2	16
Arctic peregrine		2	16
Hawks		2	16
Owls		2	13
Raccoon	X	2	12
Mink		2	11
Badger	X	2	5
Burrowing owl		2	4
White-faced ibis		2	3
Black-footed ferret		2	3
Beaver	X	2	0
Grizzly bear	X	1	39
Man	X	1	15

Environmental Setting

Animals which may possibly be found in the watershed and are considered to be *endangered* species are the American peregrine falcon (Falco peregrinus anatum), artic peregrine falcon (Falco peregrinus tundris) and the black-footed ferret (Mustela nigripes). [7]

The following information on these species is from *Threatened Wildlife of the United States*, [8].

AMERICAN PEREGRINE FALCON — Falco peregrinus anatum (Bonaparte)

Order: FALCONIFORMES — Family: FALCONIDAE

Distinguishing characteristics: Medium-sized hawk with long, pointed wings and long tail. Rapid, shallow wing beats. Adult is slate gray above, wing and tail feathers and flanks barred with black. Moustache marks on side face black. Throat white. Below white and reddish buffy, extensively spotted and barred with black. Legs and feet yellow. Immature brown above, streaked below. Larger, darker, and black markings on face more extensive than Artic peregrine (F.p. tundrius); paler and more reddish, less grayish below than Peale's peregrine.

Present distribution: Breeds from non-Arctic portions of Alaska and Canada south to Baja California (except coast of southern Alaska and British Columbia), central Arizona and Mexico (locally); eastern limits presently follow eastern front of the Rocky Mountains in the United States; distribution local in the southern boreal forests of Canada and a few pairs still breed in Labrador. Winters chiefly in breeding range, but more northern birds move to south. Other races occur on Pacific coast of British Columbia and southern Alaska in Arctic North America and other parts of the world.

Former distribution: Same, but breeding distribution also included Eastern United States south to Georgia; also Ontario, southern Quebec and the Maritime Provinces of Canada.

Status: Extirpated as a breeding bird east of the Rocky Mountains in the United States, in Ontario, southern Quebec, and the Maritimes. Local declines reported from the western United States also taiga in Yukon Territory,

Makenzie District, and interior Alaska (Cade and Fyfe). Eggshell thickness reduced 15 to 20 percent since 1947 (Hickey and Anderson, Cade and Fyfe, Cade et al.), and taiga eggs average more than 600 ppm DDE (lipid basis); there is a highly significant negative correlation between shell thickness and DDE concentration in eggs (Cade et al.)

Estimated numbers: Number of known aeries with adults present in 1969-70, but not all producing young: British Columbia, 19 (J. Simonyi); Alberta, 3 (R. Fyfe); southern Labrador, 2(R. Fyfe); California, 2(H. L. Leach); Oregon, 2 (D.B.Marshall); western Mexico, 14 (M. Kirven); Arizona, 2 (J. Enderson); New Mexico, 2 (J. Enderson); Utah, 0 (C.M. White); Colorado, 6-8; Wyoming, 1; Montana, 1 (J. Enderson); Texas, 3-5 (C. M. White). Recent information lacking for Washington, Idaho, and Nevada but Nelson (in Hickey, 1969) estimated only 10 to 20 percent of pairs remaining in 1965. A few hundred pairs still breed in interior Alaska and taiga of Northwestern Canada principally along major rivers. Status in eastern Canadian boreal forest unclear but evidently not numerous.

Breeding rate in the wild: 3 or 4 eggs per set. Number of pairs laying eggs and hatching success low in southern part of range (Herman et al.); reproductive rate and number of breeding pairs also decreasing in taiga populations (Cade and Fyfe).

Reasons for decline: All field and laboratory evidence points to cumulative effects of chlorinated pesticides and their breakdown products obtained from its prey, especially DDT and DDE, which have increased adult mortality and reduced production of young by affecting reproductive mechanisms and causing eggs to become thinshelled or otherwise nonviable. Habitat destruction and collection of young and adults for falconry have also been factors.

Protective measures already taken: Peregrine falcons are protected by Federal law and by States in the United States. Propagation techniques are being studied by Government and private investigators and at Cornell University.

Measures proposed: Eliminate use of food chain pesticides where possible. Responsible agencies should set appropriate regulations for the protection of this species. Include in international conservation agreements. Develop methods for captive propagation to bolster wild population. Initiate management-oriented research and investigate the establishment of refuges around known eyries.

Number in captivity: Not precisely known, but number of peregrines from south of the taiga in possession of falconers, zoos, and captive breeding projects believed to be less than 20 (Cade).

Breeding potential in captivity: Probably poor.

ARCTIC PEREGRINE FALCON — Falco peregrinus tundrius (White)

Order: FALCONIFORMES — Family: FALCONIDAE

Distinguishing characteristics: Like American peregrine falcon in general appearance, but smaller and paler in coloration; black moustache marks on side of face narrower.

Present distribution: Breeds in the treeless tundra area of Arctic Alaska, Canada, and western Greenland. Migrates south chiefly through eastern and middle North America to gulf coast of United States, middle and south America as far south as Argentina and Chile. Band recoveries indicate that southward migration along the Atlantic coast may be chiefly from breeding areas in western Greenland (Shor 1970).

Former distribution: Same.

Status: Production of fledglings per occupied nest on Colville River, Alaska, dropped from 1.40 in 152 to 0.5 in 1971; 53 percent of aeries unoccupied in 1970 and 1971. Mean eggshell-thickness for this population decreased 21.7 percent since 1947; egg contents average over 800 ppm DDE (lipid basis); and there is a highly significant negative correlation between shell-thickness and DDE concentration in eggs (T. J. Cade and co-workers). In Ungava, of 8 aeries occupied in 1968, only one was occupied in 1969 (J. A. Keith); of 15 aeries examined in 1970, seven had a total of 12 young and 9 bad eggs (D. D. Berger and co-workers). Numbers have declined along the Thelon River in Northwest Territories from 10 pairs in 1966 to 4 pairs in 1970 (R. Fyfe). No obvious decline in migrants along the Atlantic or gulf coasts nor consistent reduction in ratio of young to adults has been shown (Ruos 1970); however, there has been a 31 percent reduction in the western Great Lakes migrants from the 1938-40 average to the 5year period ending in 1967 (D. D. Berger). Experience with the rapid decline of the American peregrine indicates this subspecies is following the same pattern which led to collapse in numbers.

Estimated numbers: 200 to 300 pairs in Arctic Alaska (Cade); perhaps a few thousand pairs in Arctic Canada (Fyfe), but assumption of a large population in Canadian Arctic Islands may be erroneous (see J. Weaver and J. Grier in Cade and Fyfe, 1970). No estimate for Greenland.

Breeding rate in the wild: Average clutch size 3 (Cade 1960). Hatching success decreasing; number of pairs failing to breed increasing. Dead young noted on nesting ledges in 1969 at Bathurst Inlet and on Colville River. Periodic fluctuations in weather adverse to breeding success must be taken into consideration along with other factors (Ruos 1970.)

Reasons for decline: All field and laboratory evidence points to cumulative effects of chlorinated pesticides and their breakdown products obtained from prey, especially DDT and DDE, which have increased adult mortality and reduced production of young by affecting reproductive mechanisms and causing eggs to become thin-shelled or otherwise nonviable.

Protective measures already taken: Peregrine falcons are protected at all times of the year by Federal laws and the laws of most States and Provinces. Bureau of Sport Fisheries and Wildlife, Canadian Wildlife Service, about 20 falconer-aviculturists, and Cornell University are studying artificial propagation techniques with peregrines.

Measures proposed: Work towards the elimination of food chain pesticides in the environment. Responsible agencies should set appropriate regulations for protection. All out effort to develop a self-perpetuating captive population to bolster numbers in the wild.

Number in captivity: 150 to 200 tundra or taiga inhabiting peregrines, including 15 held at Patuxent Wildlife Research Center.

Breeding potential in captivity: Probably poor. At least seven peregrines of all sub-species have been reared in captive breeding projects since 1966.

BLACK-FOOTED FERRET — *Mustela nigripes* (Audubon & Bachman)

Order: CARNIVORA — Family: MUSTELIDAE

Distinguishing characteristics: A large weasel with black feet and face mask.

Present distribution: Western North and South Dakota to northern Montana and Alberta, south to Texas and central New Mexico.

Former distribution: Great Plains, Alberta and Saskatchewan to Texas and Arizona, to 10,500 feet in the Rockies, in association with prairie dogs.

Status: Very few observations have been reported. The species apparently never was abundant.

Estimated numbers: Since 1955, confirmed sightings have been made in 26 counties in South Dakota, one (Burleigh) in North Dakota, one in Nebraska, one in Texas, one in Wyoming, and one (possibly two) in Colorado.

Breeding rate in the wild: Probably one litter of 4 to 5 young.

Reasons for decline: Significant data are not available on population history of the black-footed ferret. If a decline is to be assumed, the following causes are likely: elimination of natural prey and den holes; destruction of original grasslands; shot by people hunting prairie dogs for sport; possibility of disease, particularly distemper; since 1955 eleven road kills have been reported.

Protective measures already taken: Protected by law in some States. Life history and ecology studies of individuals in the wild are underway by South Dakota Cooperative Wildlife Research Unit and the National Park Service, and also by the Bureau of Sport Fisheries and Wildlife. Prairie dog towns must be determined to be "ferret free" before the Bureau undertakes damage suppression measures. "Sikes Act Agreement" signed with South Dakota Department of Game, Fish and Parks and Defense Department to protect ferrets on 42,000-acre Air Force Aerial Gunnery Range.

Measures proposed: Legal protection; preservation of grassland habitat and of prairie dog towns where ferrets

are present. Establishment in sanctuaries (Wind Cave National Park, South Dakota; Theodore Roosevelt National Memorial Park, North Dakota; and Charles M. Russell National Wildlife Range, Montana, have been suggested). Attempt to bring more into captivity for breeding purposes.

Number in captivity: Three; 2 males and 1 female (December 1972).

Breeding potential in captivity: Unknown.

Remarks: Research into the animals status, life history, and ecology is being conducted by the Bureau of Sport Fisheries and Wildlife throughout its entire former range.

In addition to the above which are considered to be "endangered", the prairie falcon and northern prairie chicken are considered "threatened". The following descriptions of these species are from *Threatened Wildlife of the United States*, [8].

PRAIRIE FALCON — Falco mexicanus (Schlegal)

Order: Falconiformes — Family: FALCONIDAE

Distinguishing characteristics: Medium-sized hawk with long pointed wings and long tail. Generally pale gray coloration, lighter below, with conspicuous dark patches on under sides of wings where they join the body. Flies with rapid but shallow wing beats.

Present distribution: Breeds from central British Columbia east to southern Saskatchewan and south to Baja California and northern Texas. Winters throughout breeding range and southward to central Mexico.

Former distribution: Same, but less localized.

Status: Has disappeared from many localities within its overall range.

Estimated numbers: No estimates.

Breeding rate in the wild: Usually 4 or 5 eggs per set. Insufficient data available to determine nesting success.

Reasons for decline: Not fully known. Hard pesticides and resulting decline in production of young a factor in some areas. Young taken for falconry.

Protective measures already taken: Protected by federal law and laws of some states.

Measures proposed: Study to determine decimating factors. Better nest protection. Status surveys.

Number in captivity: Not known, although certainly a number in zoos and in the possession of falconers.

Breeding potential in captivity: Unknown.

NORTHERN GREATER PRAIRIE CHICKEN — Tympanuchus cupido pinnatus (Brewster)

Order: GALLIFORMES — Family: TETRAONIDAE

Distinguishing characteristics: A brown hen-like bird of prairies; heavily barred and with short, rounded dark tail and elongated pointed feathers on each side of the neck.

Present distribution: Resident locally in prairie and other grassland habitat from eastern North Dakota and northwest Minnesota south to northeastern Colorado, and south central Oklahoma east to central Michigan, northwest Indiana, and south central Illinois. Very localized, and much reduced or extirpated from most of its former range, particularly in the more optimum habitat of the midwestern tall grass prairies.

Former distribution: Similar to present but more extensive and continuous, particularly in the eastern or tall grass prairie section of the central United States east to Ohio and Kentucky and, following a marked extension of range during early white settlement, in prairie sections of central southern Canada.

Status: Decreasing over much of its range, particularly east of the Missouri River. Extirpated in Iowa, Ohio, Kentucky, and Arkansas; doing poorly in Illinois, Missouri, Wisconsin and Minnesota, and especially in Michigan and Indiana. Much reduced but still numerous enough for hunting in parts of South Dakota, Nebraska, Kansas, and Oklahoma. Despite relatively large numbers in a few limited areas, particularly eastern Kansas, this race of greater prairie chicken is so dependent on grassland habitat, and this is disappearing so rapidly over much of its range because of increase of cultivation and grazing, the bird is vulnerable.

Estimated numbers: About 16,500 in the eastern prairies of Illinois, Missouri, Wisconsin, and Minnesota. In the Great Plains States of South Dakota, Kansas and Oklahoma, there is an estimated population of 796,400 to 1,069,400 birds.

Breeding rate in the wild: One brood of 11 to 14 young each year.

Reasons for decline: Loss of undisturbed grasslands resulting from cultivation, haying, grazing, and invasion of trees and shrubs. The tall grass prairies which were the main habitat of this species are exceptionally fertile and tillable and are the most extensively utilized croplands of the Continent.

Protective measures already taken: Acquisition of land is underway in a number of places for management of habitat. Six states have acquired 13,848 acres of grassland specifically for prairie chickens and 8 states have land management for these birds underway or planned. Four states are conducting research on the species. A "Prairie Grouse Technical Council" has been formed. In Wisconsin two foundations and other organizations and individuals have spent about $240,000 for land purchases dedicated to prairie chickens. Another foundation has been formed in Illinois to purchase suitable prairie land. Habitat has benefited considerably from the Federal Soil Bank program while it lasted.

Measures proposed: Acquisition and management for preservation of tall grass prairie, including about 20,000 acres where prairie chickens still occur, in each of 4 areas in South Dakota, Nebraska, Kansas, and Oklahoma. More specific management of federal and state refuges and national grasslands for prairie chickens by exclusion of grazing and cultivation from sufficiently large areas

to permit natural tall grass habitat to become established and occasional burning to keep out shrubs.

Number in captivity: Very few.

Breeding potential in captivity: Fair.

Water quality standards for the South Platte River, adjacent to the project area, have been established by the Water Pollution Control Commission. [4] This section of the South Platte is designated to meet the standards set for water for fish and wildlife (warm water fishing.)

At the present time no appreciable fishing exists due to periodic low river flows and pollution.

Although the South Platte River is not important as a sport fishery, channel catfish and bullheads are occasionally caught. Carp, suckers, chubs and minnows are the most common fish present.

Access on the project area is essentially governed by the landowners. The Colorado Division of Wildlife owns the 893-acre Sedgwick Bar State Wildlife Area in the watershed which gives access. Adjacent to the watershed, the Division also owns 1,280 acres around Julesburg and Jumbo Annex Reservoirs and leases Julesburg Reservoir for public use.

Huntable wildlife species are presently utilized by a relatively small local population and hunters from outside the area including the Denver Metropolitan Area. At the present time, game populations are probably under utilized. However better roads, more free time, and increasing populations indicate this condition will not exist long.

Fishing opportunities, according to the 1970 Colorado Comprehensive Outdoor Recreation Plan exceed demand and are expected to do so in the foreseeable future. [9]

RECREATIONAL RESOURCES

Existing public recreation areas in Sedgwick County include several small city parks totaling 39 acres. The largest public facilities are the 2,868-acre Julesburg Wildlife Management Area which offers water-based recreation as well as fishing and waterfowl hunting, and the 893-acre Sedgwick Bar property. [10]

The project area is included in Recreation Region "O" and it is reported in the 1970 Colorado Comprehensive Outdoor Recreation Plan that supply exceeds demand for fishing, trailer camping, outdoor game areas, tennis, and golf. Other outdoor recreation activities are in deficient supply. [9]

Accessibility to public facilities for recreational purposes is good. On private land outdoor recreational activities are pursued at the landowner's pleasure.

CULTURAL RESOURCES

Jules Bevi's ranch headquarters, established in 1859 on the south side of the South Platte River opposite the mouth of Lodgepole Creek, became an Indian trading post and later a stopping point on the Oregon Trail and Pony Express. Fort Sedgwick was established in 1864 near Bevi's ranch headquarters on the south side of the South Platte River.

The Town of Julesburg has had four locations, the first two were south of the South Platte River and the last two locations have been north of the South Platte River and east of Lodgepole Creek.

The Nebraska State Historical Society does not have any archeological or historical sites listed for the Nebraska portion of the watershed. [12]. The Colorado State Historical Society does not have any historical sites listed in the watershed. There are no sites listed in the Federal Register, Department of the Interior, National Park Service, National Register of Historic Places.

The University of Colorado Archeological Museum has two archeological site cards on file in their office. One card describes scattered surface Indian camp site evidence in the N.W. 1/4, Section 36, T12-N, R-47W which is within the watershed. The other card was issued for R44 or 45-W, T12-N, but does not indicate that any evidence was found. A professional archeologist conducted a cultural resource inventory of proposed construction sites and flood pool areas. The report and its supplement was reviewed and its conclusions with respect to effects of the structural measures have been accepted by the State Historical Society of Colorado. 1/ His report 2/ concluded that no significant scientific, prehistoric, or archeological resources will be adversely effected by proposed works of improvement. The report is on file at the State Office, Soil Conservation Service, Denver, Colorado.

There are no unique scenic areas within the watershed.

SOIL, WATER & PLANT MANAGEMENT STATUS

It is expected that land use in the watershed will remain in agricultural uses with most of the farms and ranches being owner operated.

Commercial development usually associated with a major cross-country highway will not occur in the watershed. The new Interstate Highway 80S has been constructed on the south side of the South Platte River. This reduces Highway 138 to a secondary highway with all of the normal improvements being built along Interstate 80S.

1/ Letter dated July 25, 1975 from Cynthia Emerick for the State Preservation Office, and a letter dated August 1, 1975 from John A. Ware of the State Archaeologist's staff.

2/ Cultural Resource Inventory Report, Dr. Michael Nowak, May 26, 1975. Under contract by the Soil Conservation Service, Denver, Colorado.

Environmental Setting

The land treatment program in both states is making satisfactory progress toward installation needs of the watershed for land, soil and water conservation measures, except in areas which are subject to flooding or interrupted irrigation water delivery. Most of the lands in agricultural production that are subject to flooding have been improved and managed to provide best use of the land for production and leveled and shaped to minimize damage from flooding. None of these lands are considered to be in marginal use.

High water table land in the South Platte River flood plain would not benefit from drainage without channelization of the river. Landowners are smoothing and planting these areas to adapted grasses to provide forage for livestock.

The project area is served by the Sedgwick County SCD, Julesburg, Colorado, and the South Platte Natural Resources District in Nebraska. The SCS provides technical assistance to these districts. The districts are stressing the importance of watershed land treatment and have been active in watershed planning. They have promoted land and water resource conservation programs with schools, scouting and 4-H groups in and near the watershed. Representatives of each district are becoming involved in land use development planning with the County Commissioners and town councils.

There are 157 district cooperators receiving assistance through the districts of which 153 have complete conservation plans. About 88 percent of the watershed is covered by farmer-district agreements. An estimated 45 percent of the total land treatment needs have been applied to date with an estimated 24 percent of the irrigated cropland; 40 percent of the nonirrigated cropland and 62 percent of the rangeland having adequate treatment for resource protection.

Financial assistance is provided to the landowners and operators by the Great Plains Conservation Program and Farmers Home Administration.

The few acres of woodland serve a beneficial function in the watershed. These stands should be retained and augmented with additional tree planting in woodlands, shelterbelts, recreation sites, and wildlife development.

The watershed area is now partially protected by rural fire districts. Equipment procurement, fire training, and fire prevention education will continue to be developed by the Nebraska State Extension Forester and the Colorado State Forester, cooperating with the U. S. Forest Service, through the going Cooperative Fire Control Program. Adequate watershed fire protection can be achieved in Nebraska through this program without program acceleration. In Colorado accelerated PL-566 technical assistance to the Sedgwick and Ovid Volunteer Fire Departments will help meet State fire loss goals and improve their capability to respond to emergencies.

Landowners and operators in the watershed with technical and/or financial assistance from the Sedgwick County Soil Conservation District in Colorado, the South Platte Natural Resources District in Nebraska, the Great Plains Conservation and the Rural Environmental Assistance Programs have applied land treatment measures listed in table 7 to reduce runoff and erosion through improved condition of the watershed land.

Table 7.- STATUS OF WATERSHED WORKS OF IMPROVEMENT
(at time of Work Plan Preparation)

Sedgwick-Sand Draws Watershed, Colorado and Nebraska

Measures	Unit	Applied to Date	Total Cost (Dollars) 1/
Land Treatment			
Irrigated Land			
Conservation Cropping System	Acre	9,638	9,638
Crop Residue Use	Acre	8,638	6,479
Irrigation Ditch Lining	L.F.	130,000	195,000
Grass & Legumes in Rotation	Acre	1,800	900
Farmstead & Feedlot Windbreaks	Acre	20	2,000
Pond	No.	5	1,500
Irrigation Pipeline	L.F.	25,656	41,312
Irrigation Water Management	Acre	3,138	6,276
Irrigation Land Leveling	Acre	6,186	498,600
Structure for Water Control	No.	850	42,500
Pasture & Hay Planting	Acre	500	15,000
Irrigation Wells	No.	5	33,750
Irrigation Sprinkler Systems	No.	3	22,000
Non-Irrigated Cropland			
Conservation Cropping System	Acre	18,273	18,273
Crop Residue Use	Acre	17,418	14,564
Terrace,Level	Feet	1,314,421	131,442
Contour Farming	Acre	3,717	8,363
Farmstead & Feedlot Windbreak	Acre	45	2,550
Stripcropping	Acre	554	1,108
Diversions	Feet	4,457	669
Wildlife Habitat Management	Acre	153	7,650
Rangeland			
Range Proper Use	Acre	19,166	19,166
Range Seeding	Acre	100	1,500
Pond	No.	67	46,140
Cropland to Grassland	Acres	325	6,500
Subtotal			1,132,880
Forest Service			
Tree Planting - Nebraska	Acre	14	1,100
Fire Protection - Nebraska	Acre	35,005 2/	10,000
Fire Protection - Colorado	Acre	31,709	5,000
Subtotal - Forest Service			16,100
TOTAL			1,148,980

1/ Price Base - 1970 Price Level
2/ 20,000 of these acres need additional fire protection

September 1975

WATER AND RELATED LAND RESOURCE PROBLEMS

LAND TREATMENT

There are no areas of critical erosion in the watershed. Minor annual erosion is occurring from sheet and rill erosion on the nonirrigated tablelands. Erosion occurs on cropland from flood flows caused by high intensity thunderstorms during the spring months. Erosion rate is low on rangeland. Plant cover varies from 65 to 80 percent.

Soils are mainly deep or moderately deep loams or sandy loams with high or moderately high fertility resulting in good soil-water relationship.

Land use adjustments have taken place on the nonirrigated cropland through the Soil Bank Program and the Great Plains Conservation Program. Minor land use adjustments need to be made on the irrigated land.

Net returns to the farm and ranching units are high compared to the Colorado average. This is reflected in the number of landowners and operators cooperating with the districts and the amount of land treatment applied and being applied throughout the watershed. With continuing good economic conditions, the landowner and operators will have financial ability to install needed project land treatment measures.

Fires destroy grass and tree cover needed for watershed protection. The watershed is protected by rural fire districts. Three additional vehicles and better facilities to house equipment are needed to provide the desired level of fire protection.

Some farms would benefit from windbreak, pond, or wildlife plantings. Properly planned and placed, plantings would add materially to the value of these farms and ranches. Some windbreaks are in need of renovation.

FLOODWATER DAMAGE

High intensity rainfall produces runoff on the upper part of the watershed. Runoff accumulates in the natural drainages and flows toward the lowlands. In the middle and lower portion of the watershed, irrigation canals, irrigated farms, county, state and federal roads and the Union Pacific Railroad have been constructed across the drainages.

Sloping topography of the breaks, in the background, concentrates rainfall runoff in the draws in the foreground.

Little damage is done on rangeland in the upland areas of Colorado and Nebraska. Rilling and sheet erosion cause some damage on wheatland. The type and extent of crop damage depends on the time of flooding. Most of the wheat crop is harvested by the middle of July. Storms that occur during May, June, or July may wash out the wheat plants or cause the grain to lodge or be beaten down.

The Highline Canal and its laterals and, to a lesser extent, the Petersen and Settlers Ditches all intercept floodwater and sediment flows originating on the lands above each. Floodwater overtops the canal banks with frequent breaching which causes interruption of water delivery to Colorado and Nebraska crops until each breach is repaired. Breaching of the canals usually causes more floodwater damage to the cropland and crops than overtopping because of the concentration of flows and the increased amount and velocity of flow as the breach deepens and starts draining the canal.

Floodwater and sediment from the upper watershed (left) enter the canal system causing sediment deposition in the canal and overtopping.

Rather than leave the numerous channels across the irrigated lands, farmers have leveled across the drainages which tends to spread floodwaters over a wider area with shallower depths.

Flooding also occurs to the farmsteads, roads, and the railroad in the lower, flatter portion of the flood plain in Nebraska and Colorado, and to the Town of Ovid.

Flood hazard areas consist of:

(1) Nonirrigated cropland in wheat-fallow rotation above the irrigated land amounting to about 900 acres in Colorado and about 500 acres in Nebraska in nine ownerships.

(2) Irrigated cropland, primarily alfalfa, sugar beets, beans, and corn amounting to about 4,200 acres in Colorado and 200 acres in Nebraska in 53 ownerships. The upper portions of this land between the Highline Canal and the Settlers Ditch averages a 1.4 percent slope. The portion below the Settlers and the Petersen Ditches is on about 0.5 percent slope to the South Platte River.

Row crops, in particular, are severely damaged or lost by flooding. About 900 acres of the irrigated land subject to more frequent flooding is kept in alfalfa and pasture to reduce damage from erosion due to floodflows. With protection, these acres could be farmed more intensively, using more productive and higher income producing row crops in the rotation.

Native pasture and saltgrass meadow of about 800 acres in 11 ownerships in the lower part do not suffer too much from flooding, but the quality and quantity is reduced by sediment.

Erosion in corn row on Reese Farm from storm runoff in July 1964.

About 150 acres of land in miscellaneous uses are subject to flood damage. Topping of roads, highways, and the railroad by floodwater has interrupted service occasionally for short periods of time due to high water, erosion of road surfaces and shoulders, or undermining of road surfaces and bridge approaches. Any interruption of service is detrimental to the agricultural and commercial activities of the service area and to the state and national business dependent on these facilities.

About 49 acres in and adjacent to the Town of Ovid are subject to overflow damage. About 30 acres in the southwestern part of Ovid include 20 residences, one grain elevator, one railroad bridge, one street bridge, 1,300 feet of railroad track and 3,000 feet of town streets that have been damaged by flooding and sedimentation.

Damaging floods occurred in 1935, 1947, 1948, 1960, 1963, 1964, 1965, 1966, and 1968. Local residents estimated that many other smaller flood flows have occurred, but do not recall dates. Under present conditions, it is estimated that damage begins with the two-year frequency storm. Most flooding occurred from May to September.

The flood of 1935 and June 1965 are the largest storms recalled. The 1965 storm is believed to have caused the greatest amount of damage throughout the watershed. The 1965 storm is estimated to have been of greater volume and peak flow than a 100-year frequency storm.

Records of the 1965 storm show that damages occurred to 1,800 acres of dry cropland and 4,400 acres of irrigated cropland. Three county bridges were destroyed and six damaged. Nine miles of county road and one state highway bridge were damaged. In Deuel County several motor vehicles were damaged and personal injuries caused from accidents at washed out or damaged bridges. The road and bridge damages are estimated at $17,000. The Union Pacific Railroad reported $2,600 as the repair cost for roadbed damage.

The Julesburg Irrigation District Estimated 1965 damages to the canal system from 13 canal breaks and silt and debris at $28,000. Not evaluated was interruption of water service to the farms for nearly a month, because a few rains following the storm prevented additional crop damage to that already suffered. Irrigated crops were destroyed on more than 1,500 acres and damaged on about 2,900 acres. Nine farm houses were flooded, 24 farmsteads flooded, and 3.5 miles of fence were damaged.

In Ovid, 20 homes were flooded with a few basements and contents suffering high damages. Floors, carpets and furniture were damaged requiring cleanup, repainting or replacement. The grain elevator company estimated $6,700 damage to facilities and stored grain. The fertilizer company received damages estimated at $10,000. The estimated damages to residences and businesses are estimated at $20,000 for the 1965 storm.

5. Debris against corn on Inouye Farm from storm runoff in June 1965.

6. Storm runoff in August 1968 caused overflow adjacent to bridge on Highway 138 requiring extensive backfill to support concrete highway slab.

Following the 1965 storm, the Agricultural Stabilization and Conservation Service office received applications for payments for emergency (F-4) assistance in the amount of $67,100 for land leveling, debris removal, irrigation ditch repair, grading and shaping, and fencing. This F-4 assistance represented 80 percent of the estimated total cost of $84,000. In addition, it is estimated that no F-4 applications were made on at least $20,000 of damage repairs. From these applications and damage schedules taken, the land damages from sediment and erosion are estimated at $104,000.

The estimated crop losses from damage schedules are estimated at $267,000 and other agricultural farm damages are estimated at $62,000. Total damages for the watershed area from the 1965 storm are estimated at $500,800. Secondary and indirect damages were not estimated for this flood.

Under present conditions damages begin at the two-year frequency. The estimated average annual floodwater damages for the watershed are:

... Agricultural: $220,050 of which $208,550 is crop and pasture and $11,500 is other agricultural damage; and

... Nonagricultural: $11,760 of which $6,590 is to Julesburg Irrigation District; $3,070 to roads and bridges and railroad; and $2,100 to the Town of Ovid.

The larger floods have caused a number of people to move out of their homes, particularly in the Town of Ovid.

EROSION DAMAGE

Erosion rates for the watershed are generally low. There are no areas of critical sediment source.

The upland erosion rate will reduce from 0.37 to 0.34 acre-feet per square mile annually.

Flood plain scour damages on 273 acres are concurrent with floodflows, particularly on the irrigated cropland and to the irrigation systems. Estimated average annual damage from flood plain scour is $4,750. This has an effect on the quality and quantity of agricultural crops damaged and reduces fertility of agricultural and urban lands that are scoured.

SEDIMENT DAMAGE

Principal source of sediment is sheet and rill erosion. Including the erosion on upland lands above structures, the sediment rates for the structures vary from a low of 0.20 acre-feet per square mile per year for SS-1 to a high of 0.52 acre-feet per square mile per year for SS-8.5. The structures are estimated to have a 90 percent trap efficiency. Sediment deposition occurs on 377 acres of flood plain lands.

This necessitates cleaning of sections of canals and ditches to maintain operating efficiency after each floodflow. Irrigated land must be re-leveled.

Water quality and sediment yield to the river system downstream is not presently a significant problem because stream channels have been mostly eliminated and most of the sediment is deposited near the source.

About 900 acres of irrigated cropland have been taken out of crop rotation because of previous erosion and sediment damage from flooding. This land is now being used to grow a soil protective crop to reduce erosion. This land needs to be returned to the cropping system so a more efficient use of committed factors of production can be effected by landowners.

Average annual sediment damage is estimated at $6,620 for the watershed.

Six inches of sediment deposit on sugar beets and two feet of erosion along row from storm runoff in June 1965.

Sediment and debris across sugar beet field below break in Highline Canal-storm of 1968.

DRAINAGE

Lack of drainage is not a major problem in this watershed. A few small scattered areas of cropland have been drained on an individual basis. The saltgrass meadows in the flood plain area near the South Platte River are affected by a high water table because of the flat grade of the South Platte River. Drainage is not feasible without channelization of the South Platte River. Landowners have upgraded vegetative cover and operate it under proper grazing.

IRRIGATION

Most of the irrigation water used in this watershed is supplied by direct diversion and water storage through the Julesburg Irrigation District system. The Julesburg Reservoir, an off stream site, has lost considerable capacity through sedimentation by diversion of flood flows from the South Platte River. The District is interested in repair and enlargement of its embankments to insure stability of the structures and a larger capacity for storing over 25,000 acre- feet for regular and late season water. The Highline Canal, Settlers, and Petersen Ditches of the system have some problems of seepage losses. To the extent of their capacities, they intercept and carry floodwater and sediment from the area above each of the canals. Any excess will cause damages to the canals, structures, crops, and lands below.

Resource Problems

Irrigation water delivery is a problem because of recurring flood damage to the canal systems. The interrupted water delivery is reflected in the low application of conservation irrigation practices. Only 25 percent of the needed irrigation water management has been applied. Fifty-six percent of the needed land leveling and 54 percent of the needed irrigation ditch lining has been applied. Farmers are reluctant to spend large amounts of money on these conservation practices as long as the water delivery is uncertain.

MUNICIPAL AND INDUSTRIAL WATER

There is no problem in regard to rural, domestic, municipal and industrial water supplies. Supplies from wells are adequate for the foreseeable needs of the watershed.

RECREATION

Existing outdoor recreation resources are in two categories, public and private. Access to the public areas is good, while access to private lands requires consent of the operator in both states.

Currently supply exceeds the need for several outdoor recreational activities including fishing, trailer camping, outdoor games, tennis, and golf. Water-related recreational activities demands indicate an immediate need for swimming and boating facilities. [9] The present sediment load plus additional pollutants from outside the project area preclude uses of the South Platte for many recreational activities at this time.

FISH AND WILDLIFE

Floods during nesting season cause loss of quail, pheasant, waterfowl, and rabbit nests. Flooding also causes loss of young wildlife and subsequent reduction of local wildlife populations utilized for hunting. Currently the river fishery is not important.

The state's comprehensive recreation plan indicates there now exists an excess of fishing opportunities. Hunting opportunities, according to the comprehensive plan, are needed and this need will increase. At the present time, there is a need for 238,000 additional activity days for hunting and this need will increase to almost 367,000 days by 1980.

Therefore, there is an apparent need for hunting opportunities, which can be assisted by development of wildlife habitat, but there is no apparent need for fishing areas, at least of the kind provided for in reservoirs.

No endangered wildlife species [7] are known to exist in the project area. However, the habitat is suitable for the species of animals shown on the bottom of Table 4.

OTHER WATER & RELATED LAND RESOURCE PROBLEMS

There are no water management needs in regard to rural domestic, municipal and industrial water supplies. Supplies from wells are adequate for the foreseeable needs of the watershed.

Water quality is good from wells and irrigation sources. Quality does suffer somewhat from suspended sediment following floodflows on crop and pasture lands.

Erosion across beet rows on Jenik Farm from storm runoff in June 1965.

RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

Although not formally adopted, two broad objectives have been agreed upon by the Northeastern Colorado Council of Governments 1/. These are:

1. To preserve fertile agricultural lands for production of crops and grazing of livestock.

2. To prevent intensive land use in natural and geologically hazardous areas such as flood plains.

The objectives of this proposed project are in conformance with these two broad objectives 2/. There are no other proposed or existing water resource development projects in the area that have a direct relationship to this proposed project.

ENVIRONMENTAL IMPACT

LAND TREATMENT

Installation of the project land treatment measures will increase the application of the estimated land treatment needs within the watershed from 45 to 77 percent. This is expected to achieve adequate treatment on 8,450 acres of cropland and 5,700 acres of rangeland. Land Treatment measures installed above the floodwater retarding structures will result mostly in onsite benefits. These, together with the measures installed on the irrigated land, will reduce floodwater, flood plain scour, and sediment deposition to crops, land and improvements. Project annual damage reduction benefits to land treatment are estimated to be: floodwater 5.2 percent; sediment 8.5 percent; and erosion 8.4 percent.

It is estimated that land treatment measures will provide average annual flood damage reduction benefits of $13,210.

The Sedgwick County Soil Conservation District will provide landowners and operators information and assistance regarding optimum application of fertilizer and the use of pesticides. This will be beneficial in minimizing possible pollution problems in the South Platte River arising from agricultural runoff. Judicious use of pesticides will reduce the hydrocarbons entering the food chains of birds.

The accelerated program of equipment improvement in the Sedgwick and Ovid Fire Protection Districts will result in these two districts being more mobile and responsible to emergencies. These two districts expect to achieve the state fire loss goal of 0.1 percent which will be a gain of about 1,600 acres for beneficial use.

1/ Telephone conversation between Mr. Donald Kock, Asst. Director of the Northeastern Colorado Council of Governments and Earl Hess, SCS, River Basin-Watershed Planning, Denver, Colorado, November 25, 1975.

2/ Letter from Northeastern Colorado Council of Governments, July 16, 1975.

Environmental Impact

The woodland planting of 40 acres and treatment program as planned under the regular continuing forestry program will increase the multiple-use benefits for wind protection and wildlife habitat and provide a potential economic return to the cooperating landowner and an improved hydrologic condition over the watershed. The expected creation of 514 acres of upland wildlife habitat management will also increase the multiple-use benefits.

STRUCTURAL MEASURES

Project structural measures will reduce peak flows, resulting in: (1) reduced areas inundated and depth of floodwater, (2) reduced erosion and sediment transportation, (3) reduced damage to highways, railroad, residential, and commercial properties, and (4) reduced damage from canal breaching. Project annual floodwater damage reduction benefits to structural measures are estimated to be: agriculture 66.4 percent; nonagricultural 71.4 percent; sediment 54.5 percent; and erosion 54.3 percent. The resulting effect of these measures will be an improvement in the watershed environment and economy.

The one percent chance of occurrence peak flow of 3,200 c.f.s. under present condition at the Town of Ovid will be reduced to the equivalent of a 10 percent chance peak flow of 850 c.f.s. with the floodwater retarding structures installed. The Ovid Floodway will be enlarged to contain the 850 cfs flow and to prevent out-of-bank flooding for the 100-year event.

The 272 acres behind structures will be covered with sediment at the end of 100 years. This land will be covered slowly and vegetation will adjust to the gradually expanding sediment area. The project will prevent this sediment from being deposited on cropland and in the canal system.

The degree of protection and the reduction in area and depth of flooding varies by reaches throughout the watershed for the irrigated and non-irrigated cropland. The irrigated land lies mostly on an alluvial fan or plain with no defined channels. The following table shows the number of acres flooded with and without project conditions and the reduction by frequencies.

Storm Frequency	Before Project (Acres)	After Project (Acres)	Damage Reduction Benefit (Acres)
One Hundred Year			
Above Highline Canal	913	288	625
Below Highline Canal	5,124	2,554	2,570
Ovid Vicinity	---	---	49
Total damage reduction			3,244
Ten Year			
Above Highline Canal	654	179	475
Below Highline Canal	3,775	1,548	2,227
Total damage reduction			2,702
Five Year			
Above Highline Canal	574	108	466
Below Highline Canal	3,325	1,429	1,896
Total damage reduction			2,362
Two Year			
Above Highline Canal	493	30	463
Below Highline Canal	2,809	1,256	1,553
Total damage reduction			2,016

The 1965 storm is the largest recorded in recent years. This storm was calculated to be equal or greater than a one percent chance of occurrence event with damages estimated at $500,800. It is estimated that the structural measures planned for the watershed would have reduced the 1965 floodwater damages about 64 percent ($320,510).

Frequent flooding without project conditions has resulted in about 900 acres being used less intensively than the rest of the irrigated flood plain lands. These acres include about 250 acres classified as idle, growing some grasses and weeds, and about 650 acres of low producing alfalfa. The primary purpose of these uses has been to provide a protective soil cover to reduce soil and crop losses from erosion caused by floodwater scouring. With project installed, a shift from these soil protective crops will be made to higher valued row crops and will be included in the crop rotation. Row crops require more nitrogen but less

phosphate in applied fertilizer than does alfalfa. However, with good management of irrigation water, no significant increase in the quantity or adverse change in the quality of tailwater runoff is expected. No new land will be brought into crop production and no crops in surplus are grown.

The project measure will eliminate crop losses resulting from delay in irrigation water deliveries caused by floodwater breaching the canals. About 18,924 acres being served by the Highline Canal, Settlers and Petersen Ditches will benefit. These crop losses occur from a storm having a 33.3 percent chance of occurrence to the Highline Canal and Settlers Ditch and from the 16.6 percent chance to the Petersen Ditch. The crop losses that will be eliminated are those acres having reduced yield and quality of crops.

Erosion rates of the watershed are generally low. Source of sediment above the floodwater retarding sites is mainly from sheet and rill erosion with only about 10 percent of the sediment being produced by gully and streambank erosion. The upland erosion rate will be reduced from 0.37- to 0.34-acre-feet per square mile annually. The area of flood plain erosion scour damage will be reduced from 250 acres to 148 acres, or 107,600 cubic yards reduction annually. Sediment deposition on the flood plain land will be reduced from 345 acres to 140 acres annually.

Installation of the project structural measures will affect four irrigated farms and 30 nonirrigated farms or ranches, but no residences will be affected. The construction will convert 33 acres of irrigated cropland to floodways. The floodway courses will be revegetated after construction. No long term adverse effects on wildlife species is foreseen. The planting of shrubs and grasses will provide food and cover for wildlife and will improve the aesthetics of the watershed.

There are approximately 174 farms that will benefit from project measures and about 6,086 flood plain acres protected from a storm having a one percent chance of occurrence. About 3,244 acres will have full protection, including 625 acres of nonirrigated cropland, 2,589 acres of irrigated cropland and Salt Meadow, and 30 acres in the town of Ovid.

The average annual agricultural damage to items such as crops, pasture, fences, field roads, farm machinery, irrigation equipment and livestock will be reduced by 71.8%. Non-agricultural damages to such improvements as roads, bridges, and property in the town of Ovid will be reduced by 83.3%.

The town of Ovid will have complete protection from a storm having a one percent chance of occurrence. The maximum depth of flooding, 3.2 feet covering 30 acres, will be reduced to zero depth and area. Benefiting will be 20 residences, one grain elevator, one fertilizer plant, 1300 feet of railroad track, one railroad bridge, and 3,000 feet of town streets. No additional land is expected to be converted to urban use.

Other beneficiaries include the Julesburg Irrigation District, Department of Highways, and the Boards of County Commissioners.

The slow release rates of the floodwater retarding structures will have a minor incidental effect towards improving quality and maintaining the present water table.

FISH, WILDLIFE & RECREATION

There are no specific recreation or wildlife developments proposed in the watershed. However, there will be incidental effects throughout the watershed for wildlife habitat, resulting from about 40 acres of tree planting, about 200 acres of reseeding disturbed areas from construction of structural measures, and creation of wildlife habitat management areas estimated at 514 acres on watershed lands.

The floodway through the Sedgwick Bar State Wildlife Area will provide floodwater protection to wildlife habitat, and the planting of shrubs (5 acres) along the floodway road will provide food and cover for wildlife and will improve aesthetic value of the wildlife area.

The impact of the project on fish and wildlife will be minor. Some detrimental effects will occur during construction when habitat is disturbed or covered by project features. Reseeding of disturbed areas and the establishment of habitat areas will compensate for this minor loss and create additional benefits. No endangered species will be adversely effected by the works of improvement.

It is possible that strict vector and weed control could affect wildlife production. For instance, wildlife would substantially benefit from small ponds left behind retarding structures or from marsh areas below the dams.

Pollution abatement and reduced sediment loads into the South Platte River will benefit the fishery although upstream uses will continue to dictate quality of water.

The project should have little effect upon recreational resources although habitat developments will improve aesthetic qualities. The floodwater retarding structures are not expected to provide incidental recreation use.

CULTURAL RESOURCES

Any archeological or scientific sites, if discovered, will be evaluated for recovery in cooperation with the State Historical Preservation Officer and appropriate National Park Service representative.

ECONOMIC & SOCIAL

The economy of the watershed will improve with the project measures installed. This will occur by increasing farm efficiency through the reduction of floodwater, erosion and sediment deposition damages, delay of irrigation water deliveries, and by restoring about 900 acres of irrigated land into the cropping system. The increased returns to the farming units will increase their needs for improved farming equipment;

supplies, such as seed and fertilizer; and will increase their need for additional labor by 12 man-years of employment on the farm and three man-years in associated measures. The combination of these items will have an effect on the economy throughout the watershed and adjacent trade areas.

The expected improvement in the economy of the watershed and trade area will provide more employment in agriculture and businesses serving agriculture and should effect migration from the county to cities.

OTHER IMPACTS

There will be about 33 acres of irrigated cropland, 149 acres of non-irrigated cropland, and 179 acres of rangeland disturbed while the project measures are being installed. These acres will be replanted to grasses and shrubs to reduce erosion and to provide incidental food and cover for wildlife. In addition, there will be 272 surface-acres of sediment storage included in the 502 surface acres for temporary flood storage. These acres are presently rangeland. The 33 acres of irrigated cropland will be converted to floodways. During construction of the measures, erosion rate may increase slightly until the disturbed areas are revegetated. All practices and standards to reduce pollution during construction will be required. 1/ There will be an increase in air pollution caused by dust and equipment exhaust during construction.

Food and cover for wildlife will be temporarily reduced during this period. After the areas are revegetated with native species of grasses and shrubs, the planted area will provide more food and cover for wildlife than the areas provided prior to being disturbed.

AVERAGE ANNUAL DOLLAR COSTS & DOLLAR BENEFITS

The average annual dollar costs and dollar benefits are shown in Appendix A.

1/ See Appendix G

FAVORABLE ENVIRONMENTAL EFFECTS

The following effects are considered to be favorable:

... Adequate treatment to protect the resource base on an additional 8,450 acres of cropland and 5,700 acres of rangeland.

... Floodwater, erosion and sediment damage reduction due to land treatment.

... Reduction in burn rate by 1,600 acres.

... Five hundred and fifty-four acres of wildlife management area and plantings for multiple-use, including wildlife habitat.

... Floodwater, sediment and erosion damage reduction due to structural measures.

... More intensive land use on 900 acres of cropland.

... Secondary benefits of a regional nature stemming from and induced by the project estimated to be $85,100 on an average annual basis.

... Reduced damage to 6,037 acres of resources base subject to damage by a 100-year storm. Structural measures will reduce the damage area by 3,195 acres from a 100-year storm; 2,702 acres from a 10-year storm; and 2,016 acres from a 2-year storm.

... Forty-nine acres in the vicinity of the Town of Ovid will be protected from a 100-year storm event and will receive reduced damages from storms larger than the 100-year event together with a reduction in possibility of loss of life.

... 18,924 acres will benefit from more dependable irrigation water delivery.

... Erosion on rangeland will be reduced by 1,328 tons of soil per year and flood plain scour damage will be reduced by 107,600 cubic yards per year, resulting in elimination of sediment deposition on 205 acres of lower lying flood plain lands.

... Reduced chances of interruption of services provided by the Julesburg Irrigation District.

... Reduced damages to county and state roads and highways, the Union Pacific Railroad and residences and businesses.

Favorable Environmental Effects

... Two hundred of the 361 acres disturbed by construction will be fenced for wildlife use, and revegetated in plant communities more suitable to wildlife than the present plant communities.

... Five acres of wildlife habitat and food planting on the Sedgwick Bar State Wildlife Area which will be an improvement over the present habitat. Also, about four acres of construction area will be revegetated with wildlife habitat and food planting.

ADVERSE ENVIRONMENTAL EFFECTS

The following effects are considered to be adverse:

... Thirty three acres of irrigated, 149 acres of nonirrigated and 179 acres of rangeland will be disturbed during construction of structural measures with increase in erosion rate until vegetation can be reestablished. The estimated time from start of construction to vegetative stand establishment is two years.

... Two hundred seventy-two acres of land behind the structures will be covered with sediment at the end of the 100-year project life.

... Two hundred ninety-three acres of rangeland above the sediment pools will be subject to flooding for periods up to 10 days, while the flood pools drain.

... Four acres of vegetation, principally grass, on the Sedgwick Bar State Wildlife Area will be disturbed during construction. The estimated time from start of construction to vegetative stand establishment is two years.

... Loss of forage production and wildlife habitat on disturbed areas until reestablished.

... Readjustment of wildlife communities due to plant and habitat changes caused by project installation.

... Increased air pollution caused by dust and equipment exhaust during construction.

ALTERNATIVES

Alternatives investigated include the "no-project" alternative, non-structural alternative, and a diversion alternative. Some of these investigations were not completed when it became evident they would not be acceptable as viable alternatives.

"NO-PROJECT" ALTERNATIVE

No action would result in continued floodwater runoff from high intensity thunderstorms, overtopping of the Highline Canal, deterioration of the resource base, and flooding and erosion damage to irrigated lands below the canal. The on-going land treatment program would continue at an estimated annual cost of $115,000. The average annual monetary benefits foregone with no action was estimated at $170,000.

NONSTRUCTURAL MEASURE

The alternative would include land use changes, application of conservation practices to protect the resource base, floodproofing existing buildings and improvements, establishing land use regulations, and acquiring additional fire-fighting equipment. This alternative would effectively reduce sediment damage, but would not significantly reduce floodwater damage. The project would provide a greater variety of plant species, improve wildlife food sources and reduce wildlife losses due to reduced incidence of wildfire. The estimated installation cost was $6,500,000.

FLOODWAY ALTERNATIVE

Enlarge the Highline Canal to intercept and convey flood peaks to the South Platte River via floodways. The canal size would be enlarged to handle peak flows in addition to normal irrigation flow. To prevent overtopping would require construction of floodways to the river every one and one-half to two miles along the canal. In addition, the alternative included application of conservation practices in the upper watershed. This alternative would provide protection from the 10-year frequency storm.

Adverse impacts included loss of wildlife habitat along proposed floodway courses, disruption of farming patterns, and decreased air and water quality during construction. Beneficial impacts include reduction of floodwater damages, increased land treatment in the upper watershed and establishment of new wildlife habitat along revegetated floodways. The estimated cost was $3,310,000.

OTHER INVESTIGATIONS

Measures to control damages in the Nebraska portion of the watershed were investigated. Two floodwater retarding structures and an attendant floodway to reduce floodwater erosion and sediment damages were not feasible. The flood plain of the Nebraska portion of the project is separate from that of the Colorado structures.

The desires and needs of the Board of Directors of the Julesburg Irrigation District to repair and enlarge the embankments of the Julesburg Reservoir were discussed with representatives of the U.S. Bureau of Reclamation, state agencies, sponsors and Service personnel. It was decided that the problems of the reservoir should have priority for investigations and funds over those of canal seepage losses and canal structural rehabilitation. However, with the large size of the reservoir (over 25,000 acre-feet) both should be investigated under the provisions of some authority other than Public Law 566.

MONETARY BENEFITS OF SELECTED ALTERNATIVE

The average annual monetary benefits foregone by not implementing the project amounts to $170,000.

SHORT-TERM vs. LONG-TERM USE OF RESOURCES

The present land use in the watershed is:

Cropland	
Irrigated	13,090 acres
Nonirrigated	27,225 acres
Rangeland	24,079 acres
Miscellaneous (roads, etc.)	2,320 acres

Land use has stabilized at the above acreages. A trend in land use change could not be identified by contacts with landowners and operators. Within the project, the land use is expected to remain the same as the present land use.

The vegetative cover at the construction sites will be disturbed and in some areas completely removed. These areas will be reseeded after construction is completed. Due to the rainfall characteristics of the areas, from five to seven years may be required for the reseeded areas to provide maximum cover that the soil and climate will support. At the end of the establishment period, the reseeded areas should achieve more cover than the undisturbed areas.

The project is compatible with the projected future long term use of the land, water, and other natural resources for agricultural development. Structural measures will have flood prevention benefits beyond the 100-year design life. Advances in land treatment methods and technology could decrease sediment rates and increase the effective life of the project beyond the 100-year evaluation period. Structures will still provide protection from the 50-year frequency and smaller storms after the 100-year sediment storage capacity has been occupied. The project is in subregion seven of the Missouri Water Resource Region as designated by the Water Resource Council. Installed P.L. 566 projects in the Colorado portion of subregion seven are (1) Coalbank Creek, (2) Louden, (3) Franktown-Parker, and (4) West Cherry Creek. A pilot watershed project, Kiowa, has also been installed. The Home Supply Watershed is under construction.

Potential P.L. 566 projects in the subregion include (1) Boxelder, (2) O'Neil Draw, and (3) Henrylyn. The project is isolated from other completed or potential projects and will have little or no cumulative effects on the subregion and less effect on the Water Resource Region.

The project is expected to have local effects of reducing flood peaks and reducing flood-borne pollutants into the South Platte River. The project will not adversely affect any mineral resources nor will it appreciably hamper future exploitation of such resources.

IRREVERSIBLE & IRRETRIEVABLE COMMITMENTS OF RESOURCES

About 33 acres of irrigated cropland, 149 acres of nonirrigated cropland and 179 acres of rangeland will be involved during installation of structural measures. These acres will be replanted to grasses and shrubs to reduce erosion and to provide food and cover for wildlife.

The sediment pool areas comprising 272 surface acres will in time constitute a commitment or changed use of the soil resource as will the fill material in dams.

The floodway channels included in the acreage figure for structural measures constitute another commitment of resources but are necessary in any event to replace former natural drainage ways that have been obliterated.

In general, the project will protect the previous and continuing commitment of resources to agricultural and related uses.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

Following the field examination held September 8, 1966, every effort has been made to coordinate planning and investigations with sponsors, local groups and Federal and State agencies. Of primary importance was the objective of the Julesburg Irrigation District to repair and enlarge the Julesburg Irrigation Reservoir and to rehabilitate parts of the delivery system. Following field investigations and meetings with Sponsors, U.S. Bureau of Reclamation, Colorado Water Conservation Board and SCS personnel, it was decided that reservoir repair and enlargement was of first priority over canal rehabilitation. However, the needed enlargement would exceed 25,000 acre-feet of capacity and could not be done under existing authorities of P.L. 566. Therefore, agricultural water management by agreement of sponsors is not a project purpose.

A reconnaissance of the recreational and wildlife conditions and potentials of the watershed was made by the U. S. Fish and Wildlife Service in cooperation with the Colorado Division of Wildlife and the Soil Conservation Service.

Action towards development of a final plan was held up over a year while sponsors set up a legal entity that would have taxing powers, etc., to fulfill most of the sponsor obligations as delineated in the Preliminary Investigation Report of April 4, 1968. The Sedgwick-Sand Draws Conservancy District was decreed June 24, 1969. A request for planning approval followed September 12, 1969, and with authorization for planning December 9, 1969, the field studies were initiated January 15, 1970.

A public meeting was held with sponsors and local people December 2, 1970, to review draft work plan proposals. This resulted in meetings with various sponsoring organizations to arrive at solutions to floodway design problems on December 16, 1970, and August 26, 1971. Letters of Agreement have been signed by the Union Pacific Railroad Company to provide the street bridge for the Ovid floodway on August 5, 1971, and August 21, 1972. A Letter of Agreement between Sponsors and the Colorado Division of Wildlife for land rights and environmental wildlife aspects agreements for Floodway 1 across Sedgwick Bar State Wildlife Area and for general recommendations for wildlife habitat improvement for areas disturbed by the construction program were incorporated in trip report signed and dated November 8, 1971. The Letter of Agreement resolved questions raised by the Colorado Division of Wildlife in a letter dated August 18, 1971. The Division of Wildlife submitted a second letter on March 15, 1973. Questions were raised concerning fish, wildlife and recreational resources. All specific recommendations were accommodated in the draft work plan and environmental impact statement. The U. S. Fish and Wildlife Service, in a letter dated July 19, 1971, made two recommendations. The first was to have all permanent fencing allow for free movement of antelope through the area. The second recommendation

dealt with the fencing and vegetating of the floodwater retarding structures. The suggestion included the recommendation that the sites be permanently fenced, excluded from grazing for the life of the project, and seeded with specific species. Both recommendations were included in the draft work plan and environmental statement.

Assisted by U. S. Forest Service personnel, State Foresters from Colorado and Nebraska examined the watershed area to determine its condition and the need for accelerated treatment during the installation period. A Forestry and Fire Control Plan was completed November 22, 1971, and incorporated into the Work Plan.

A Letter of Agreement signed February 3, 1972, between the four principal local sponsors for construction and maintenance of the structural works of improvement; Sedgwick-Sand Draws Conservancy District; Sedgwick County Board of Commissioners; Julesburg Irrigation District and the Town of Ovid, detailed responsibilities for each for land rights and operation and maintenance obligations.

Letters and correspondence received from the State Historical Society of Colorado (Colorado Preservation Office), and the Nebraska State Historical Society in August 1972 indicate no known archeological sites or unique scenic areas located in the proximity of any of the proposed works of improvement in Sedgwick County, Colorado, nor in Cheyenne and Deuel Counties, Nebraska. A search of the National Historical Register shows no sites located at or near proposed works of improvement in Colorado.

Following receipt of initial review comments made by SCS offices in Washington and Portland, Oregon, and the U. S. Forest Service the draft has been rewritten to conform to Watershed Handbook Revisions of September 1972. Representatives of the Colorado Division of Wildlife and the State and Private Forestry Division of the U.S. Forest Service read the draft on October 26th and 27th, and made comments regarding the wildlife and forestry writeups which are incorporated in the Revised Draft of the Work Plan.

On January 19, 1973, copies of the Preliminary Draft Environmental Impact Statement were sent to 50 agencies or groups. These agencies or groups were invited to attend an informal field review of the project which was held on February 7, 1973, at Sedgwick, Colorado. Agencies or groups which could not attend the informal field review were requested to submit any comments they had to the Soil Conservation Service.

A public information meeting, advertised in the local newspaper, was held on February 8, 1973, at Sedgwick, Colorado. Twenty individuals attended. The Preliminary Draft Environmental Impact Statement was reviewed and copies were provided to all individuals. The individuals were requested to submit comments to the Soil Conservation Service.

All comments received were considered in revising the Project Work Plan and the Draft Environmental Impact Statement which was again sent to interested agencies and groups on June 15, 1974.

Another public information meeting was held at Sedgwick, Colorado on October 1, 1974. Comments received by mail and at the public meeting were considered in this Draft Environmental Impact Statement.

The following agencies were asked to comment on the Draft Environmental Impact Statement:

Department of the Army
Department of Commerce
Department of Health, Education, & Welfare
Department of the Interior
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
Federal Power Commission
Governor, State of Colorado
Governor, State of Nebraska
Colorado Department of Natural Resources
Colorado Division of Planning
Colorado State Liaison Officer, State Historical Society
Nebraska State Office of Planning and Programming

Responses with no comment or objections were received from:

Department of Agriculture
  Agricultural Stabilization & Conservation Service
  Forest Service
Department of the Army
Department of Transportation
State of Nebraska, Natural Resources Commission
State of Nebraska, Office of Planning & Programming
  (representing the State Clearinghouse)

Responses with comments were received from:

Department of Health, Education & Welfare
Department of the Interior
Environmental Protection Agency
Advisory Council on Historic Preservation
State Historical Society of Colorado

The issues raised and the disposition of each comment are as follows:

1. The Department of Health, Education & Welfare expressed concern for vector control in areas used for "borrow areas."

   The first paragraph on page 62, Environmental Impact Statement, gives reasons against strict vector control. However, the second paragraph on page 6 was rewritten to include grading for total drainage of empty borrow areas before seeding.

2. The Environmental Protection Agency requested additional details on guidelines for pollution control during construction. In response, the Soil Conservation Service Construction Specification for Pollution Control was added as Appendix G.

   Additionally, the Environmental Protection Agency requested more detail regarding the 900 acres of irrigated land (page 50) that will be cultivated more intensively after the project is completed. In response, paragraph 2, page 60, was modified to show no increase in quantity, and no adverse change in quality of irrigation tailwater.

3. The Advisory Council on Historic Preservation questioned the effect of the project on a proposed historical district mentioned on page 62 of the Draft Environmental Impact Statement. This district referred to the Lodgepole Creek campsite at the junction of Lodgepole Creek and the South Platte River. Although the State Historical Society of Colorado has expressed interest in the site, it will not be directly affected adversely by the project measures. The site is two miles from the nearest structural measure in the project. In response, the reference to a proposed historic district on page 62 was deleted from the Final Environmental Impact Statement. Also, the reference to the work of a professional archeologist on page 43 has been modified to show acceptance of his conclusions by the State Historical Society of Colorado for the State Historic Preservation Office and the State Archeologist.

4. The State Historical Society of Colorado expressed concern over "the potential impact to archaeological resources by large-scale watershed alterations which modify the hydrological regime and overall land-use strategy in areas peripheral to the loci of major construction." This refers to the effect of land treatment proposed in the project. In response, SCS has taken the position 1/ that land treatment is not a major federal action and, therefore,

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1/ Letter dated August 26, 1975 from M. D. Burdick, SCS State Conservationist to Dr. James J. Hester, Acting State Archaeologist.

need not extend archeological investigations on private land for conservation land treatment. However, SCS does recognize the responsibility to advise land users who receive technical assistance to contact the National Park Service if proposed land treatment measures might affect objects of cultural value located on private property.

5. The U.S. Department of the Interior raised the following issues:

(a) The work plan does not comply with the new Principles and Standards for planning water resource projects. In response, this work plan complies with SCS criteria for the period of transition between the phasing out of requirements under Senate Document 97 and full compliance with the Principles and Standards.

(b) The long-term and short-term impacts of floodwater retention on the downstream water rights in Nebraska. In response, the floodwater retarding dams are designed to release all water retained in the flood pool within 10 days from the time of filling. Actual drawdown time for each structure can be estimated from data contained in Table 3 of the work plan.

(c) The meaning of the term "adequately treated" as used on page 3 of the Draft Environmental Impact Statement. This term is defined in the Glossary.

(d) The table on page 2 of the Environmental Impact Statement does not show the 5,700 acres of rangeland to be treated. The table shows treatment needs by types. Some areas will receive more than one type of treatment. Therefore, acreages in the table are not additive.

(e) The table on page 25 shows 22 urban residences; a figure too low for a population of 463. The 22 residences reflect the number of homes flooded. The total number of homes in the watershed is irrelevant in the Environmental Impact Statement, therefore, this column was deleted.

(f) The Environmental Impact Statement does not clearly confirm consultation with the State Historic Preservation Officer (SHPO) for the States involved. The State Historical Society of Colorado includes the State Historical Preservation Officer. Correspondence with members of the Society reflects signing for the State Historic Preservation Office. No structural measures are proposed in the State of Nebraska. However, the record shows correspondence with the Nebraska State Clearinghouse.

(g) The lack of consulting with monthly supplements to the February 4, 1975 listing of the National Register of Historic Places. The listings through August 5, 1975 - the latest available - were checked. No additional listings were noted.

(h) The historic Indian camp district on Lodgepole Creek. See response to Advisory Council on Historic Preservation, item 3 above.

(i) The details on Dr. Nowak's archeological survey. See response to Advisory Council on Historic Preservation, item 3 above.

(j) Adverse effect of land treatment. Land treatment is not a major federal action. In most cases effective treatment will be achieved by changing the land users cultural and management practices. Structural practices for land treatment will be small scale and short term construction.

(k) Disturbances from construction of the 26 structures. This is discussed at the bottom of page 62 in the Environmental Impact Statement.

(l) Species of wildlife benefited. All species listed on page 30 of the Environmental Impact Statement will be benefited either directly or indirectly.

(m) Other Impacts, as discussed on page 62. SCS disagrees. Cropland is an adequate definition because of the practice of rotating crops from time to time. Also, rangeland is an adequate description infering native vegetation.

(n) Discussion of short-term impacts of turbidity and sediment loads. SCS disagrees. Conditions during construction are too variable to make specific or quantified statements meaningful.

(o) Acreage of soils adversely impacted as referenced on page 66. This change was made.

(p) More emphasis on viable alternatives. Sponsors of the project select the alternative for which the plan is developed. Alternatives not acceptable to the sponsors were not evaluated when this plan was being developed prior to enactment of NEPA (PL 93-190).

6. The Northeastern Colorado Council of Governments submitted the following comments:

(a) The benefit-cost ratio could be less favorable if the commitment of 502 acres of rangeland to sediment storage and periodic

flooding is considered.

If the structures were filled to capacity every year, the 502 acres could be lost to the range purpose. However, the structures are designed to contain the 100-year frequency storm and will fill partially during less severe storms. During many years, the storage areas will remain dry and available for use as range. In addition, all structures have a 10-day drawdown period and many will drain faster. Most range vegetation can withstand periodic innundation for short periods of time with no significant change in the plant community. Therefore, the range resource should remain available for local use.

It is felt the economic evaluation is correct and therefore, no change has been made.

(b) The proposed project measures may serve to enhance the rate of groundwater recharge to potentially productive deep and/or tributary aquifers.

The proposed structures have a maximum 10 day drawdown period and most will drain faster. In addition, most structures will not impound water every year. The structures, as designed, should not provide significant amounts of water for deep percolation.

7. The Sedgwick County Land Use Planner requested clarification regarding expenditure for fire fighting equipment and technical assistance.

The $21,400 from the Colorado State Forester will be used for procurement of needed fire equipment and facilities.

The Nebraska State and Extension Forester will provide technical assistance to rural fire protection districts in Nebraska estimated to cost $10,000.

BIBLIOGRAPHY

[1] The Nation's Water Resources, U.S. Water Resources Council, 1968, Chap. 9.

[2] Records of U.S. Weather Bureau, Julesburg, Colorado Station.

[3] The National Atlas of the United States of America, U.S. Department of the Interior, Geological Survey, 1970, Potential Natural Vegetation by A.W. Kuchler, Univ. of Kansas.

[4] Water Quality Standards and Stream Classification, Water Pollution Commission, Colorado Dept. of Health, effective September 1, 1971.

[5] Water Quality Data, Storet ADP, U.S. Environmental Protection Agency, Denver, CO, June 8, 1973.

[6] Wetlands of the United States, U.S. Department of the Interior, Fish and Wildlife Circular No. 39.

[7] Federal Register, 38(106), June 4, 1973. Species listed are considered to be "endangered" as provided for by The Endangered Species Conservation Act of 1969, 83rd Stat. 275.

[8] Threatened Wildlife of the United States, compiled by the Office of Endangered Species and International Activities, Bureau of Sport Fisheries & Wildlife, Resource Publ. 114.

[9] 1970 Colorado Comprehensive Outdoor Recreation Plan, Dept. of Natural Resources, Division of Game, Fish & Parks, State Printing Code GFP-P-I-1-70.

[10] An Appraisal of Outdoor Recreation Potentials in the Five Northeastern Colorado Counties, U.S. Dept. of Agric., Soil Conservation Serv., Jan. 1971.

[11] Unless otherwise noted, the information in this Section is from discussions, correspondence, or publications of the State Historical Society of Colorado.

[12] Nebraska State Historical Society, Preservation Series, Report No. 1, 1971.

[13] Land Resource Regions and Major Land Resource Areas of the United States, Agric. Handbook 296, Soil Conserv. Serv., U.S. Dept. of Agric., (Rev.), March 1972.

LIST OF APPENDICES

APPROVED BY _____ DATE 12-10-75

Merritt D. Burdick
State Conservationist
Denver, Colorado

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Sedgwick-Sand Draws Watershed
Colorado and Nebraska
(Dollars)

Evaluation Unit	Average Annual Benefits 1/				Average Annual Cost 3/	Benefit-Cost Ratio
	Damage 2/ Reduction	More Intensive Land Use	Secondary	Total		
1	194,310	107,790	85,100	387,200	193,000	2.0:1.0
Project Administration					24,300	
GRAND TOTAL	194,310	107,790	85,100	387,200	217,300	1.8:1.0

1/ Current normalized prices for crop and pasture and current prices for other items.

2/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of $13,210.

3/ Reference: Watershed Work Plan.

FORM ASCS-204 (4-15-70)

UNITED STATES GOVERNMENT

Memorandum

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Stabilization and Conservation Servic

Colorado State ASCS Office
Denver, Colorado 80211

TO : M.D. Burdick, State Conservationist
Soil Conservation Service

Date: July 23, 1975
In Reply Refer to: ACP:COMPLC:LEB

FROM : LOWELL E. SONNENBERG, SED

SUBJECT: Sedgwick - Sand Draws Watershed - your memorandum dated June 9, 1975

We have completed our review of the Sedgwick - Sand Draws Watershed work plan and EIS drafts. We have no adverse comments. We concur with the plan and feel that this is one of the best we have seen.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Rocky Mountain Region
11177 West Eighth Avenue, Box 25127
Lakewood, Colorado 80225

June 24, 1975

M.D. Burdick, State Conservationist
2490 W. 26th Avenue
Denver, Colorado 80217

Dear Mr. Burdick:

We and the Colorado and Nebraska State Foresters concur in the Watershed Work Plan for Sedgwick-Sand Draws, Cheyenne and Deuel Counties Nebraska and Sedgwick County, Colorado.

Sincerely,

SIDNEY H. HANKS
Deputy Regional Forester
State and Private Forestry

6200-11 (1/69)

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
Washington, D. C. 20310

14 AUG 1975

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83rd Congress, the Administrator of the Soil Conservation Service, by letter of 17 June 1975, requested the views of the Secretary of the Army on the work plan for Sedgwick-Sand Draws Watershed, Colorado and Nebraska.

We have reviewed this work plan and foresee no conflict with any projects or current proposals of this Department. The draft environmental statement satisfies the requirements of Public Law 91-190 91st Congress, insofar as this Department is concerned.

Sincerely,

Charles R. Ford
Deputy Assistant Secretary of the Army
(Civil Works)

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

19 AUG 1975

Mr. M. D. Burdick
State Conservationist
Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

This is in response to your letter of 17 June 1975 addressed to the Commandant, U. S. Coast Guard concerning a draft environmental impact statement for the Sedgwick-Sand Draws Watershed, Sedgwick County, Colorado.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this draft statement is appreciated.

Sincerely,

D. J. RILEY
Captain, U. S. Coast Guard
Deputy Chief, Office of Marine
Environment and Systems
By direction of the Commandant

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

AUG 13 1975

Mr. M. D. Burdick
State Conservationist
Soil Conservation Service
Department of Agriculture
P.O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

We have reviewed the draft Environmental Impact Statement concerning the Sedgwick-Sand Draws Watershed, Colorado and Nebraska. On the basis of our review, we feel some discussion should be devoted to vector control for those areas which will be utilized for "Borrow Areas."

Additionally, the statement indicates that grading and seeding will be performed, but does not address drainage of these areas, or adequate control of insects where impoundments of water in these areas develop.

Thank you for the opportunity to review the document.

Sincerely,

Paul Cromwell
Acting Director
Office of Environmental Affairs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80203

AUG 12 1975

Ref: 8W-EE

Mr. M. D. Burdick, State Conservationist
United States Department of Agriculture
Soil Conservation Service
P.O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

The Region VIII office of the Environmental Protection Agency has reviewed the draft environmental impact statement for the Sedgwick-Sand Draws Watershed Project.

On page 10, under the section titled Pollution Control, more information should be provided. The guidelines that will be used for construction should be specified. Examples could be given for the measures that would be taken in the event of special or unforeseen difficulties. Since pollution control is one of the objectives of this project, I feel that this section should be strengthened with more detail.

On page 50, it is stated that with protection provided, more intensive use of approximately 900 acres of land would be possible. What impacts will result if more intensive farming is employed? Will the quality or quantity of irrigation return flows be altered? Will the use of pesticides and fertilization increase? If so, what impacts could be expected? Will irrigation return flows be monitored?

According to the rating system used by the Environmental Protection Agency to evaluate the impact statements of other Federal agencies, this statement is given a rating of LO-2. A copy of the rating system is enclosed for your information. Please send us a copy of the final statement.

Sincerely yours,

John A. Green
Regional Administrator

Enclosure

Advisory Council
On Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

August 4, 1975

Mr. M. D. Burdick
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P. O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

This is in response to your request of June 17, 1975, for comments on the draft environmental statement (DES) and watershed work plan for the Sedgwick-Sand Draws Watershed Project, in Colorado and Nebraska. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that while your draft environmental statement appears adequate regarding our area of expertise, there appear to be contradictory statements in the DES which make it unclear whether or not cultural resources will be affected by this proposed undertaking of the Soil Conservation Service (SCS). While page 43 of the DES details the SCS's determination that there will be no effect on cultural resources included in or eligible for inclusion in the National Register of Historic Places, page 62 of the DES states that "The project will have the effect of changing the landscape of the proposed historical district from its present condition. . . ." It therefore appears that someone is proposing an historical district which may be eligible for inclusion in the National Register. If this is the case, changing the landscape could adversely affect the historic district pursuant to Sections 800.9(b) and 800.9(c) of the Advisory Council's "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800).

In order to avoid possible delays in this project, the Council therefore wishes to remind the SCS that if, after consultation with the State Historic Preservation Officer (SHPO) this district appears to be eligible for inclusion in the National Register, then the SCS should seek a determination of eligibility from the Secretary of the Interior and pursue the steps detailed in Section 800.4 of the Council's procedures. Ideally, these steps should be undertaken as soon as possible so that compliance with Executive Order 11593, "Protection and Enhancement of the Cultural Environment" of May 13, 1971, will be completed prior to issuance of the final environmental statement.

In addition, the Council notes that the SCS has demonstrated consultation with both the Colorado and Nebraska state historical societies on page 43 of the DES. For your future reference, compliance with Section 106 of the National Historic Preservation Act of 1966 and Sections 1(3) and 2(b) of Executive Order 11593 as implemented through the Council's procedures require consultation with the SHPO of the appropriate state. In the cases of Colorado and Nebraska the SHPO is associated with the state historical society, but in many states this is not the case. In future documents the SCS's compliance with Section 106 and Executive Order 11593 will be more explicitly detailed by reference to the SHPO instead of to the state historical society.

Should you have any questions or require any additional assistance, please contact Brit Allan Storey of the Advisory Council staff at P. O. Box 25085, Denver, Colorado 80225, telephone number (303) 234-4946.

Sincerely yours,

Louis S. Wall
Assistant Director, Office of
Review and Compliance

THE STATE HISTORICAL SOCIETY OF COLORADO

State Archaeologist, 5A Ketchum Bldg., University of Colorado, Boulder 80302

August 1, 1975

Mr. George Christy
U.S.D.A., Soil Conservation Service
P.O. Box 17107
Denver, CO 80217

Dear Mr. Christy:

We have now received and reviewed two archaeological survey reports for the Sedgwick-Sand Draws Watershed Project, submitted by Dr. Michael Nowak of the Colorado College. The first survey report, dated May 26, 1975, covered the major works of improvement on the watershed, while the second supplementary report, dated July 11, 1975, covered small-scale associated projects including grade stabilization structures, canal inlet structures, and irrigation water control structures.

On the basis of Dr. Nowak's findings, this office can grant conditional archaeological clearance for those areas of proposed land alteration which were covered by archaeological survey. In the event that buried archaeological remains are encountered during construction on the project, this office should be immediately notified in order to record and salvage the endangered antiquities.

It is important that this clearance authorization is not construed as a "blanket" clearance for all future construction activity and/or land alteration on those areas of the watershed which were not surveyed intensively by Dr. Nowak's crew. Included here are large areas within the watershed and proposed benefit area for which the indirect impacts of construction activities have not been adequately assessed.

Thank you for your patience in this matter, and we apologize for any inconvenience or delay which may have resulted from our initial unfavorable review of this important project.

Sincerely,

John A. Ware
Staff Archaeologist

cc M.D. Burdick

THE STATE HISTORICAL SOCIETY OF COLORADO

Colorado State Museum, 200 Fourteenth Avenue, Denver 80203

July 25, 1975

Mr. George Christy
State Administrator
U.S.D.A., Soil Conservation Service
Building A, Room 319
2490 West Twenty-sixth Avenue
Denver, Colorado 80211

RE: Sedgwick - Sand Draws Watershed

Dear Mr. Christy:

We received the additional report of Kris Kranzush. We concur with the conclusions and the recommendations of the report.

For the Colorado Preservation Office.

Cynthia Emrick

Cynthia Emrick
Preservation Assistant

THE STATE HISTORICAL SOCIETY OF COLORADO

State Archaeologist, 5A Ketchum Bldg., University of Colorado, Boulder 80302

July 25, 1975

Mr. M.D. Burdick
State Conservationist
USDA, Soil Conservation Service
P.O.Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

This office is in receipt of a copy of a supplement to the Cultural Resource Inventory Report of the Sedgwick-Sand Draws Watershed prepared by Kris Kranzush of The Colorado College, Colorado Springs. We have notified George Christy under separate cover, granting conditional archaeological clearance for those areas of the project which will be directly impacted by construction activities. Conditional clearance provides for the recovery of buried antiquities located subsequent to the initiation of construction activities at a site.

At this point, our present and continuing concern is not for those areas which will be directly impacted by project construction activities, but rather, for those large areas that will be indirectly affected by the construction of water control structures. We are refering specifically to the drainage areas controlled by the structures and the areas downstream from the structures that will receive direct benefit from the flood control facilities.

We expressed our concern about these areas of indirect impaction at a July 21st meeting with SCS personnel at your office in Denver, and assume that you have already received a resume of what was discussed at that time. Very briefly, our concern is with the potential impact to archaeological resources by large-scale watershed alterations which modify the hydrological regime and overall land-use strategy in areas peripheral to the loci of major construction. Our position is that there is a destructive potential inherent in any drainage basin modification, which extends beyond the areas of direct construction, particularly on arid and semi-arid landscapes. We feel it is incumbant upon the Federal agency sponsoring the land alteration to attempt to assess both the direct and indirect impact of watershed management and/or alteration on the archaeological and cultural resources of the entire watershed and benefit area destined to be affected by water control measures.

Many, if not most of these impacts will be subtle and will occur gradually over an extended period of time. Nevertheless, we feel that certain impacts can be anticipated and should perhaps be enumerated in order to clarify and substantiate our position. We could anticipate, for example, that the altering of stream gradients subsequent to dam construction and water impoundment might have a long-term but nevertheless profound effect on hydrological events in the watershed, including erosional and depositional cycles. These changes in the hydrological regime could effect local topography, and hence, archaeological resources. We emphasize that any change in local topography subsequent to water control measures constitutes a potential impact on archaeological and other fragile cultural resources.

In the benefit area below the water control facilities, the construction of irrigation channels, land-leveling operations, and construction of other facilities directly or indirectly linked to the major water control structures constitutes potential impaction of archaeological resources.

In short, it is our position that the very act of initial alteration of the natural landscape, regardless of the intent or scope of this alteration, creates the potential for, and in many cases encourages, further alterations of the landscape in the direction of an intensification of overall land-use strategy. Hence, the net effect is an endangering of archaeological resources ultimately linked to initial implementation of water control measures on the watershed. Clearly, the soil and wildlife resources of the entire watershed are evaluated and the potential for impaction of these valuable natural resources are assessed. It is our position that this concern for potential alteration of natural resources should be extended to include cultural resources as well.

In this, the Bicentennial year of our Nation, our concern for the cultural and archaeological heritage of America is understandably heightened and our need for general mitigation policies is becoming increasingly apparent. The ultimate goal of this office is to protect and preserve our State's archaeololgical resources in order to encourage and facilitate the scientific investigation of these important aspects of our heritage. Consequently, one of our primary responsibilities lies in the formulation of general policies regarding the mitigation of land and land-use alterations which pose a threat to the existing cultural resource base.

Although current Federal and State antiquities legislation expresses the intent to preserve and protect our Nation's cultural resources, clearly, these statutes often fall short of insuring that these resources survive intact for future generations. What we feel is needed to implement the "spirit" of these laws are a series of cooperative understandings between this Office and the various

Federal and State agencies which provide funds for projects involving land alteration in the State of Colorado. It is our hope that these cooperative agreements will provide for the initial funding of long range archaeological reconnaissance programs in areas of potential land alteration which have previously been neglected.

In the case of the SCS watershed improvement projects, we would like to enter into an agreement with the Soil Conservation Service wherein funds in their construction budgets for specific structures be made available for more extensive archaeological reconniassance in those watershed areas which will be indirectly affected by the construction of water control facilities, including watershed areas above the major check dam facilities, and benefit areas below the dams. These surveys would be extensive rather than intensive in nature, and involve rigorous sampling designs rather than complete inventories of cultural resources. Thus, we feel that the cost of these projects would not be prohibitively expensive; they would enhance our current knowledge of the distribution of archaeological and cultural resources over large portions of the State in keeping with the spirit of the Federal Antiquities Legislation.

If your office is amenable to discussing the details of such an agreement, we would be more than happy to meet with you at your convenience. If an agreement is reached, this office will take any action necessary to insure that archaeologists contracting with your office to provide watershed reconnissance coverage agree to abide by the conditions set forth in the agreement.

Thank you for your consideration of this matter.

Sincerely,

James J. Hester
Acting State Archaeologist

John A. Ware
Staff Archaeologist

cc. E.A. Morris
Cynthia Emrick
Roy Reaves

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-75/617

SEP 5 1975

Dear Mr. Burdick:

Thank you for the letter of June 17, 1975, requesting our views and comments on the draft watershed work plan and environmental impact statement for the Sedgwick-Sand Draws Watershed, Cheyenne and Deuel Counties, Nebraska, and Sedgwick County, Colorado. Our review indicates that the proposal is adequate as it relates to outdoor recreation and fish and wildlife resources. In addition, we believe that the floodwater retarding structures would not significantly alter the availability of mineral resources. However, several portions of both documents should be strengthened with additional information.

Watershed Work Plan

It appears that an attempt has been made to apply the new Water Resources Council's Principles and Standards to the plan formulation studies. But the approach to multiobjective planning (MOP) seems to be superficial in that the effects of the selected plan are only briefly displayed under the four-account system. There is no indication that the MOP procedures are actually utilized in plan formulation and in evaluating plans to emphasize both national economic development and environmental quality objectives. The method used appears to be based on the more traditional methods of plan formulation with only limited application of the two-objective approach system.

Our main concern stems from the lack of assessing the possible short-term and long-term impacts of flood water retention on downstream water rights and uses in Nebraska. The thinking appears to be that these actions are small and result in little, if any, impact on downstream water users. It occurs to us, however, that even though the individual action is small, the accumulative loss of water to downstream users is significant. This is particularly true when consideration is given to the numerous structures proposed and built by the SCS.

We suggest, therefore, that the accumulative effects of flood water retarding structures on possible depletion of base water supplies on main river systems be fully evaluated.

Environmental Impact Statement

It is stated on page 3, paragraph 1, that 5,700 acres of rangeland will be adequately treated. It should be explained what is meant by this statement. The table on page 2 does not show this acreage. A table showing acres of rangeland in various condition classes would be helpful in describing the existing environment.

The table on page 25 shows only 22 urban residences. This appears low for 463 people who live in Ovid.

The statement does not clearly confirm consultation with the State Historic Preservation Officers for the states involved. The final environmental statement should reflect that they were consulted to determine whether the proposal will affect any cultural site which may be in the process of nomination to the National Register of Historic Places and contain a copy of their response.

Since all properties on the National Register are published in the Federal Register, your final environmental statement should reflect not only consultation with the issue for February 4, 1975, but also with all monthly supplements. The supplementary listings of sites added to the National Register, subsequent to publication of the previous supplement, are cited in the Federal Register appearing on the first Tuesday of each month.

It is unclear from the discussion on page 10 of the draft environmental impact statement whether or not the "historic Indian camp district" along Lodgepole Creek will be affected by the proposed action. It is also unclear whether this area is being considered for nomination to the National Register of Historic Places as a historic district or to a state register of recognized historic values. If the former situation pertains, and if the values in question will be affected in any manner by the proposed project, it will be necessary to provide documentation in the final environmental

statement of formal compliance with Section 106 of the National Historic Preservation Act of 1966, as specified in "Procedures for the Protection of Historic and Cultural Properties," (36 CFR, Part 800) published in the Federal Register, Volume 39, No. 18, Part II.

We note on page 43 of the draft environmental impact statement that a "cultural resource inventory of proposed construction sites and flood pool areas" has been conducted by Dr. Michael Nowak. It is also stated that "His report concluded that no significant scientific, prehistoric, or archeological resources will be adversely affected (sic) by proposed works of improvement." However, since details of this survey are not included, we suggest that the final environmental statement present documentation in the form of a letter from Dr. Nowak summarizing the extent and findings of his inventory.

In the event that this survey did not cover areas to be used for borrow pits, road and utility relocations, floodway construction, drop structures, floodwater retarding structures, road construction areas next to canals, and canal linings, Dr. Nowak should again be consulted regarding the need for further survey of these areas.

Only positive impacts are included in the section on Land Treatment, page 58. It would be difficult for a reader to accept the fact that some 14,000 acres of land treatment can be applied without at least some short term, adverse impacts to soils, water, and vegetation.

Disturbances from construction of the 26 structures mentioned in paragraph b, page 58, will certainly create some short term adverse effects.

Section c, page 61, could be expanded to tell which species will be benefited and how. Similarly, on page 63, what species should be planted for which wildlife species?

The section Other Impacts, page 62 lists some quantified adverse impacts from the project action. However, they would be more meaningful to the reader if the acreages were classified by type of soil and vegetation. Also, short-term impacts on water quality from disturbances (i.e.: sediment loads, turbidity, etc.) should be discussed.

Acreages of soils and vegetation adversely impacted should be classified by type and acreage of each to assist the reader in determining the importance of such adverse effects, page 66.

More emphasis should be placed on identifying viable alternatives, page 67. There appears to be a tendency towards justification of the proposal throughout the statement.

We hope these comments and suggestions will be of assistance to you.

Sincerely yours,

Royston C. Hughes

Assistant Secretary of the Interior

Mr. M. D. Burdick
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 17107
Denver, Colorado 80217

NORTHEASTERN COLORADO
COUNCIL of GOVERNMENTS

YUMA COUNTY COURTHOUSE ANNEX · WRAY, COLORADO 80758 · TEL. (303) 332-4850

July 16, 1975

Mr. M. D. Burdick
State Conservationist
United States Department
of Agriculture
Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

Thank you for the opportunity to review the Sedgwick-Sand Draws Watershed Work Plan and accompanying Draft Environmental Impact Statement submitted to the Council of Governments with your letter of June 17, 1975.

Presented below are our comments regarding this proposed project:

1. The benefit-cost ratio of the proposed project appears both realistic and favorable even without the inclusion of the secondary benefits. However, I presume that if the calculation of adverse effects included the cost of committing 502 acres of rangeland to sediment storage and periodic flooding, the benefit-cost ratio would be less favorable than the ratio indicated in the Draft EIS.

   If this cost has in fact been subtracted from the value of beneficial effects, then the final EIS should so state.

2. The proposed project evidences extensive intergovernmental cooperation and an admirable mix of agricultural and municipal benefits. The Council of Governments is especially pleased that the proposed structural measures will help alleviate the flooding problems experienced by the Town of Ovid.

3. There may be reason to believe that various of the proposed project measures will serve to enhance the rate of ground water recharge to potentially productive deep and/or tributary aquifers. If this is the case, then the final EIS should address the issue and SCS should be encouraged to take the appropriate steps to measure changes in the rate of ground water recharge.

4. The proposed project is entirely consistent with the goals, objectives, plans and priorities of the Northeastern Colorado Council of Governments and its member units of government.

Please feel free to contact me for additional information or clarification.

Sincerely,

Donald W. Koch
Assistant Director

DWK:bc

cc: Wally Bruce

Sedgwick County Courthouse
Julesburg, Colorado 80737

July 28, 1975

State Conservationist
USDA
Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

Mr. Burdick:

This letter contains my comments following my review of the Draft of the Watershed Work Plan and Draft Environmental Impact Statement (1975) for the Sedgwick-Sand Draws Watershed, Colorado and Nebraska.

Overall Purpose

The reasoning and cause behind the proposed watershed project is well documented, both pictorially and factually, within the work plan. One factor which seems to point out a definite need for completion of the project is the interest and concern of a variety of different organizations. Only if the project was of immediate concern could so many organizations get together and address a common problem.

Money for Fire Protection

Page 59 of the 'Draft Watershed Work Plan' indicates that:

> "The Colorado State Forester will provide technical assistance for going programs and help to procure needed fire equipment estimated at $21,400 for Colorado rural fire protection districts. The Nebraska State and Extension Forester will provide technical assistance to Nebraska rural fire protection districts for fire control estimated to cost $10,000."

Table 1 of the Work Plan indicates that these two costs, i.e. $21,400 and $10,000 will be spent for land treatment.

Page 35 of the Work Plan indicates that

> "...in Colorado three additional vehicles and better facilities to house equipment are needed to provide the desired level of fire protection to the Sedgwick and Ovid rural fire districts. Technical assistance will be provided to these districts to develop district fire plans, acquire control equipment, train personnel and conduct fire prevention programs. In addition, 40 acres of tree planting will be established on farms and ranches in the Nebraska portion of the watershed."

My comment, finally, is that it is not clear as to exactly how the area will benefit from the $21,400 and the $10,000. Will this money be spent in the actual purchase of new fire fighting equipment, will it be spent in land

treatment, or will it provide administrative money to pay foresters capable of providing technical assistance and advice as to how to proceed in the other two areas? As the Work Plan now reads, I would be unable to explain exactly how the money for fire protection would or could be utilized.

Favorable Environmental Effects

Although not a specific effect, one general favorable environmental effect could perhaps be added to the list on page 64 and 65 of the Environmental Impact Statement. That would be

> "A stablilization of land use within the project area. Predictable behavior of floods within the area will allow citizens to accurately decide on appropriate long-term land uses."

Personnel to Negotiate for Land Rights

Page 58 of the Work Plan states that "The Colorado State Soil Conservation Board will provide funds for personnel to negotiate for land rights and be the Contracting Local Organization for letting of construction contracts."

While this passage clearly indicates where funds for hiring personnel to negotiate for land rights will come, it does not specify who will make the final decision in hiring of that personnel. Other portions of the work plan simply state that the land rights will be obtained by the sponsors. Perhaps it should be indicated whether or not the personnel referred to will be hired as a joint decision of all sponsors or whether one particular sponsor will have authority for hiring that personnel.

The two watersheds presently pose definite hardships on progressive farming or the location of any additional development within the project area. While greatly reducing current damages, completion of the proposed project would also stabilize the area. This stabilization could account for secondary benefits which are not totalled in either the draft plan or the environmental impact statement. The computed cost-benefit ratio, the positive environmental factors, and the yearly damages which now occur would all indicate that completion of the project should begin as soon as possible.

Sincerely,

Randy Schafer

Randy Schafer
Land Use Planner

OGRAMS:
SOIL & WATER CONSERVATION
WATERSHED PROTECTION
COMPREHENSIVE PLANNING
FLOOD PLAIN MANAGEMENT
DATA BANK
WATER QUALITY PLANNING
DEVELOPMENT FUND

STATE OF NEBRASKA

NATURAL RESOURCES COMMISSI

Seventh Floor
Terminal Building
Lincoln, Nebraska 68508

August 12, 1975

Mr. M. D. Burdick
State Conservationist
Soil Conservation Service, USDA
P. O. Box 17107
Denver, Colorado 80217

RE: Sedgwick-Sand Draws Watershed Project

Dear Mr. Burdick:

The Nebraska Natural Resources Commission has reviewed the Sedgwick-Sand Draws Work Plan and Draft Environmental Impact Statement and has invited all concerned state agencies to review and comment on these documents. No further comments were received in regard to them, so the policy statement on the project adopted by the Commission on September 26, 1974 remains effective in its present form.

Very truly yours,

Dayle Stan

for Dayle E. Williamson
Executive Secretary

DEW:GHL:JW:JB:ka

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Randy Schafer

Randy Schafer
Land Use Planner

ROGRAMS:
SOIL & WATER CONSERVATION
WATERSHED PROTECTION
COMPREHENSIVE PLANNING
FLOOD PLAIN MANAGEMENT
DATA BANK
WATER QUALITY PLANNING
DEVELOPMENT FUND

STATE OF NEBRASKA

NATURAL RESOURCES COMMISSION

Seventh Floor
Terminal Building
Lincoln, Nebraska 68508

August 12, 1975

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Executive Secretary

DEW:GHL:JW:JB:ka

OFFICE OF PLANNING AND PROGRAMMING

STATE OF NEBRASKA

BOX 94601 · STATE CAPITOL · LINCOLN, NEBRASKA · 68509 · (402) 471-2

Governor J. James Exon
State Planning Officer

W. Don Nelson
Director

August 6, 1975

M. D. Burdick
State Conservationist
U. S. Department of Agriculture
Soil Conservation Service
P. O. Box 17107
Denver, Colorado 80217

Dear Mr. Burdick:

Project 75 06 24 73

Under the provisions of OMB Circular A-95, this agency has completed a state level review of the Watershed Work Plan & Draft Environmental Impact Statement for the Sedge-wick Sand Draws Watershed-Colorado and Nebraska.

The proposed project does not appear to be in conflict with any state level comprehensive plans and does not represent a duplication in the expenditure of state or federal funds.

This letter completes the state clearinghouse review on this project.

Sincerely,

Ann M. Kosmicki

Ann Kosmicki
Regional Planner

AK:jb

APPENDIX C

STRUCTURAL MEASURE DRAWINGS

STORAGE CAPACITY AND AREA

TOPOGRAPHIC MAP OF RESERVOIR AND DAM SITE

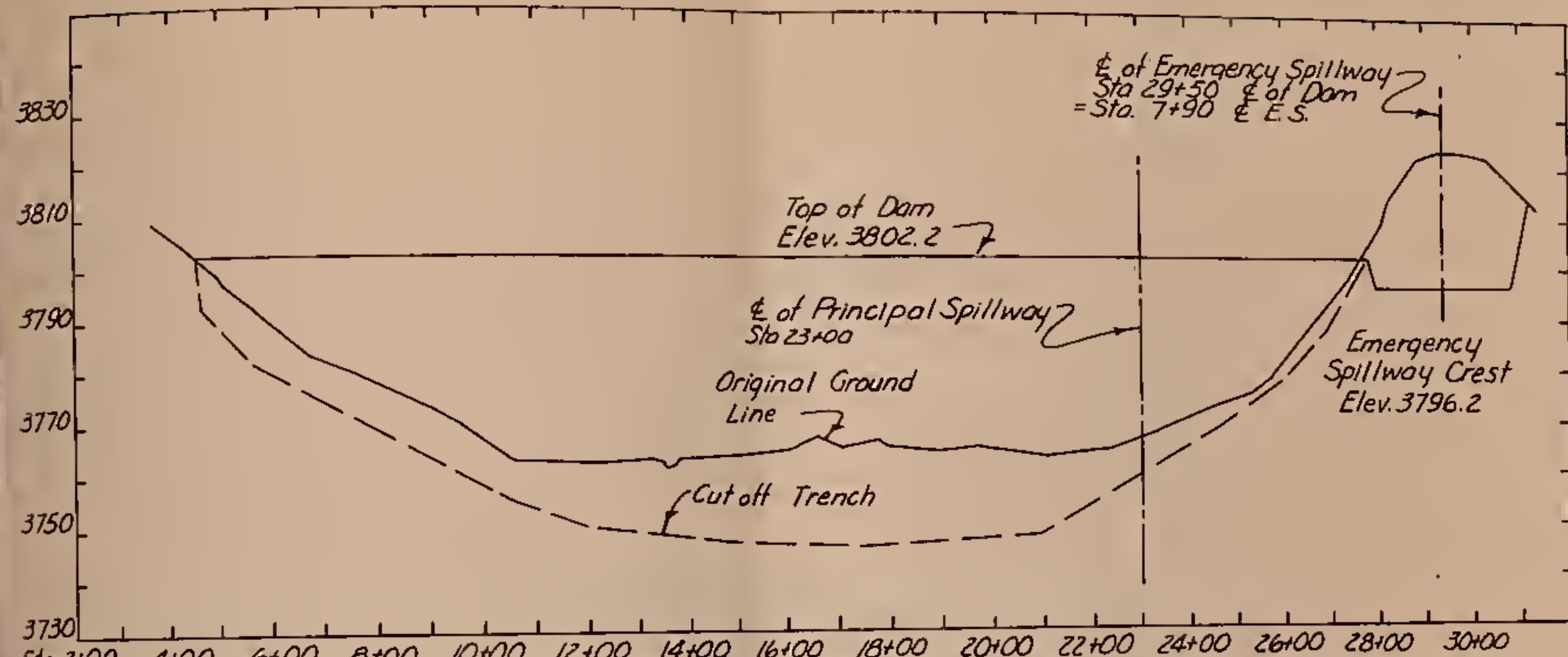
FLOODWATER RETARDING STRUCTURE SS-3

SEDGWICK-SAND DRAWS WATERSHED

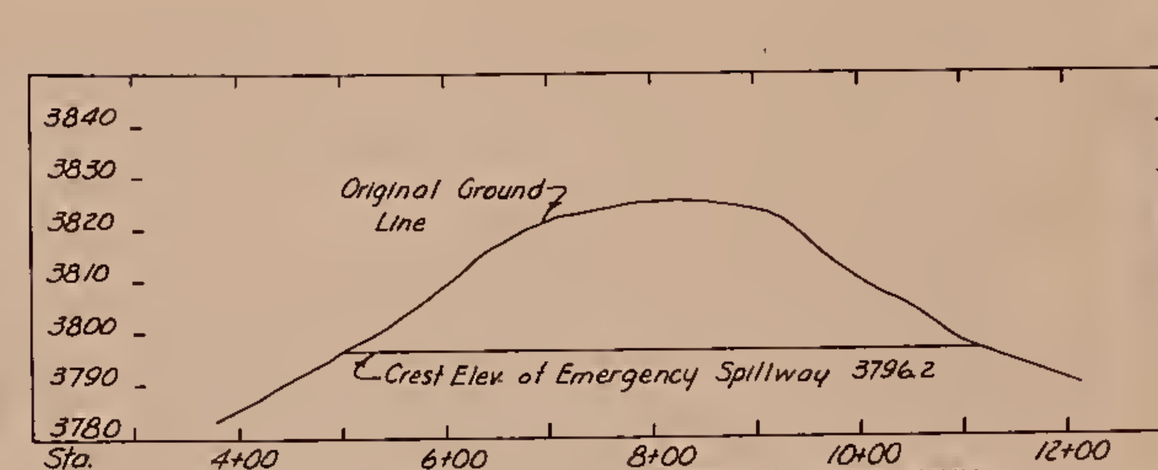
SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

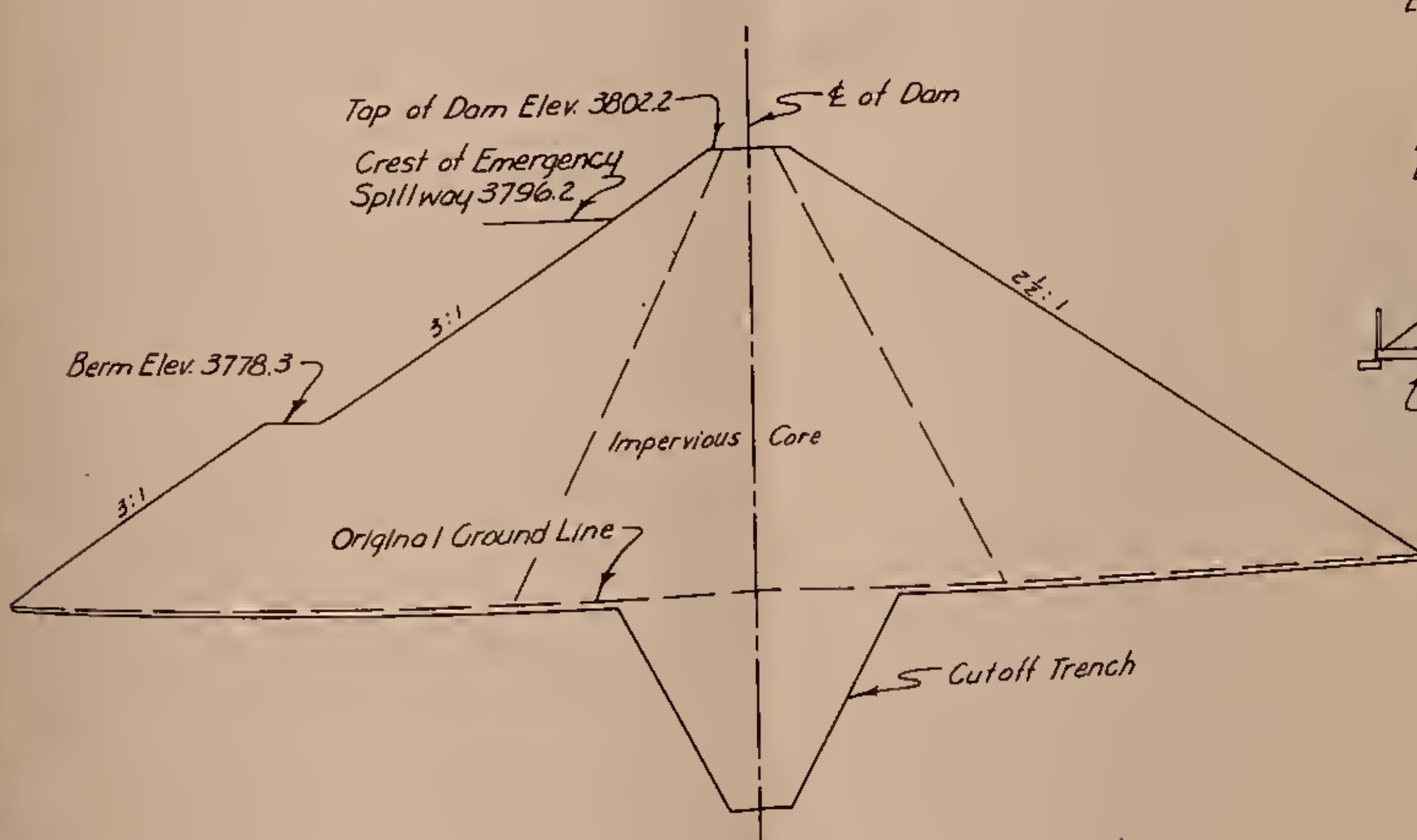
	Date		
Designed		Approved by	
Drawn	12-70	Title	
Traced		Title	
Checked		Sheet No. 1 of 2	Drawing No. FIGURE 1



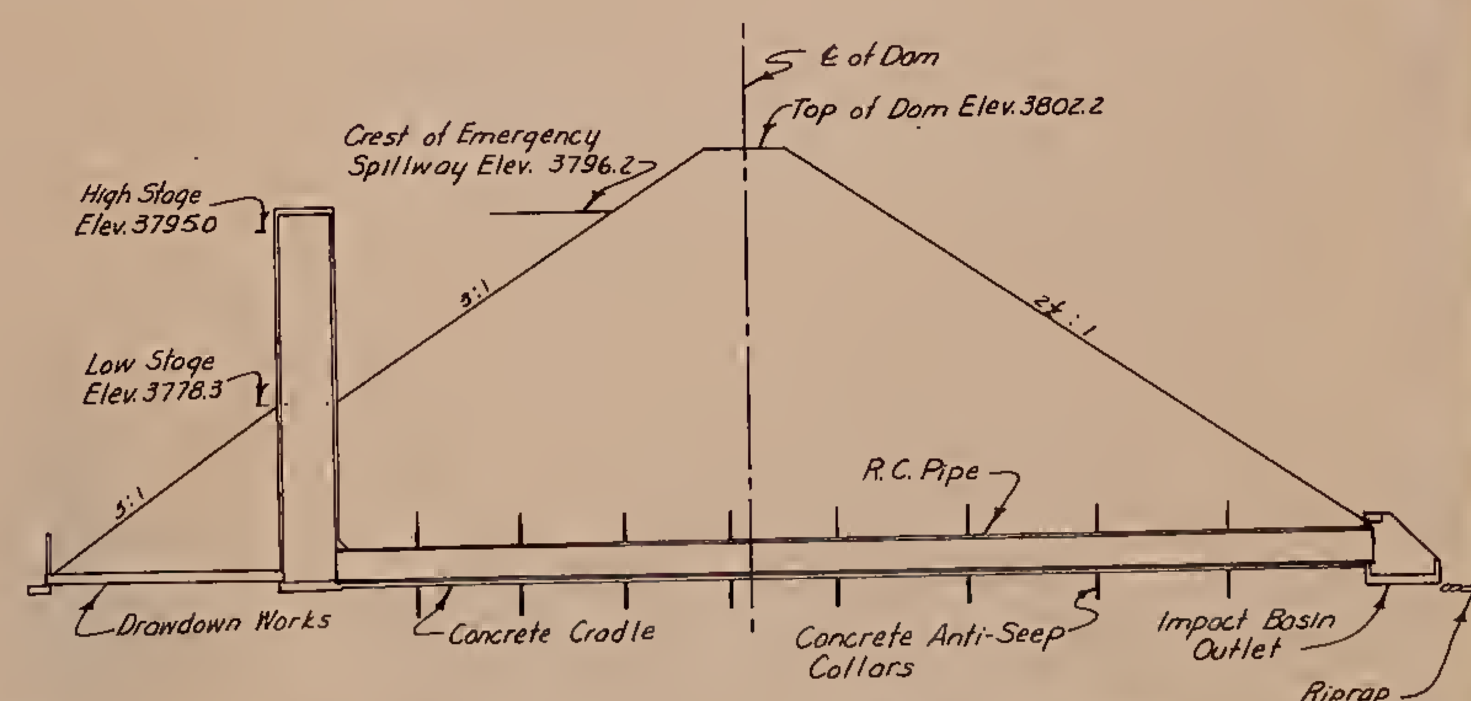
PROFILE ALONG ℄ OF DAM



PROFILE ALONG ℄ OF EMERGENCY SPILLWAY



MAXIMUM CROSS SECTION OF DAM



CROSS SECTION OF DAM ON ℄ OF PRINCIPAL SPILLWAY

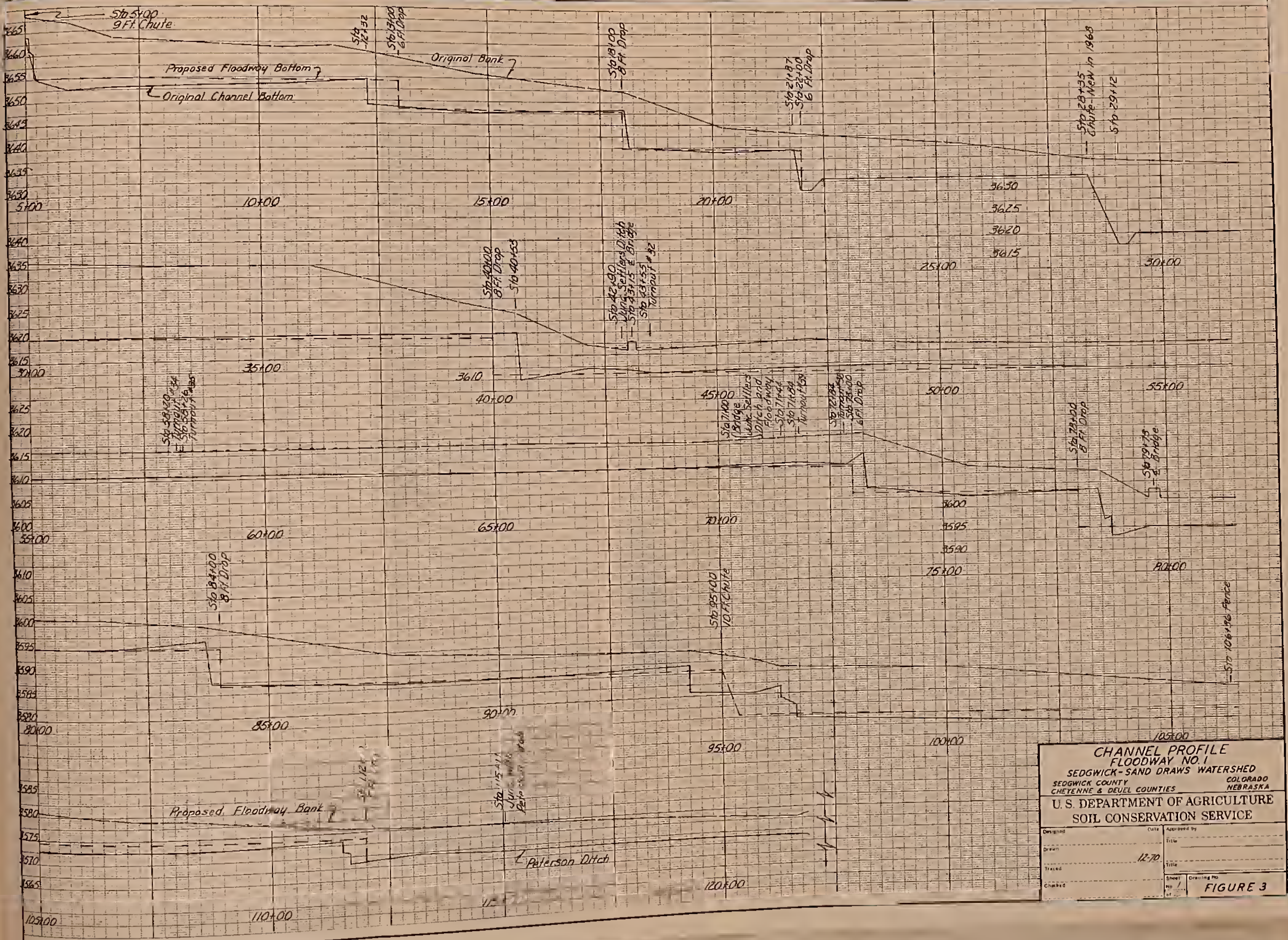
Note:
Cross Sections are Typical of all Project Floodwater Retarding Structures.

FLOODWATER RETARDING STRUCTURE SS-3
SEDGWICK-SAND DRAWS WATERSHED

SEDGWICK COUNTY — COLORADO
CHEYENNE & DEUEL COUNTIES — NEBRASKA

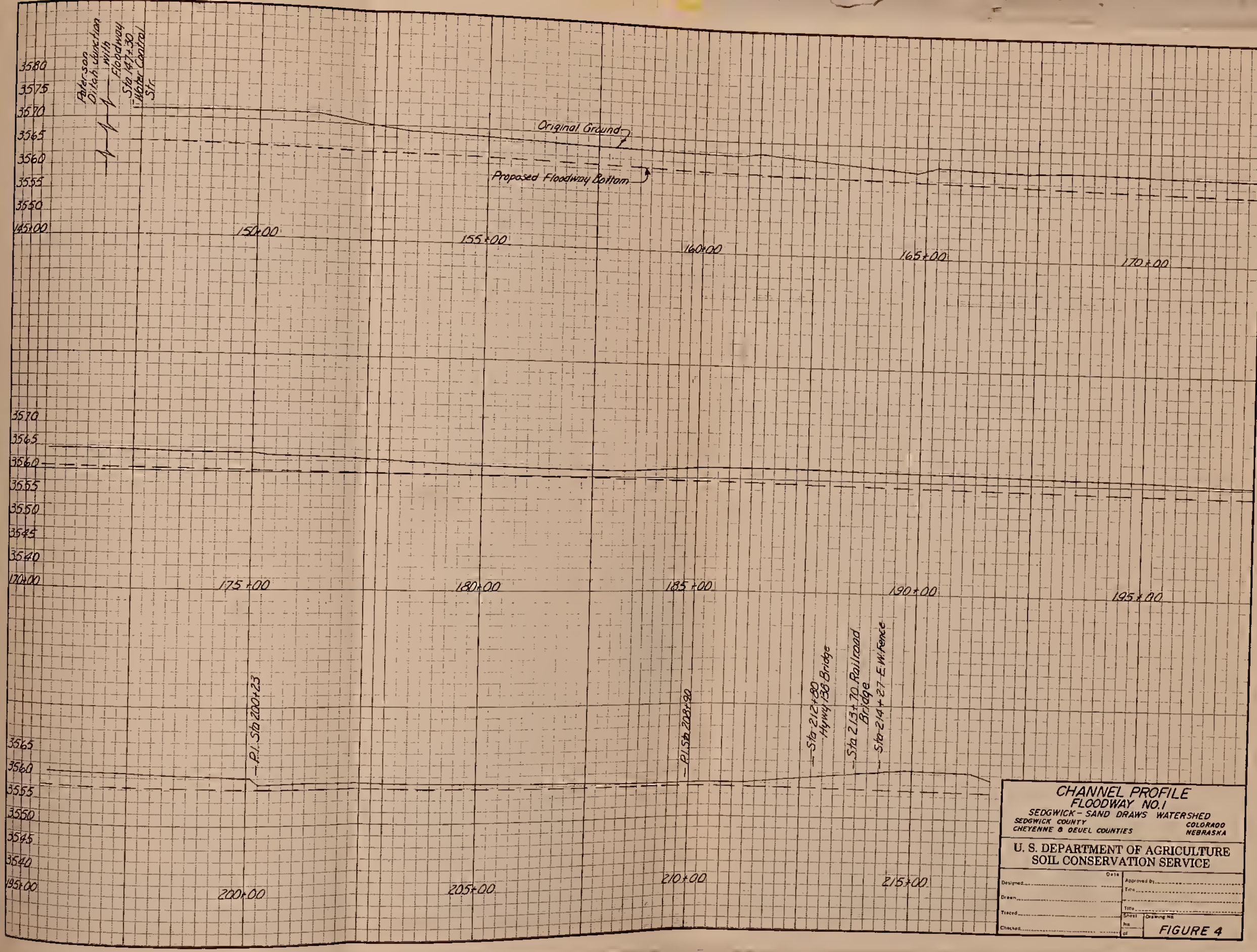
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FIGURE 2



CHANNEL PROFILE
FLOODWAY NO. 1
SEDGWICK-SAND DRAWS WATERSHED
SEDGWICK COUNTY
CHEYENNE & DEUEL COUNTIES
COLORADO
NEBRASKA
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
12-70
Proposed Floodway Bottom
Original Channel Bottom
Original Bank
Proposed Floodway Bank
Peterson Ditch
Sta 5+00 9 Ft. Chute
Sta 18+00 8 Ft. Drop
Sta 84+00 8 Ft. Drop
Sta 95+00 10 Ft. Chute

FIGURE 3



CHANNEL PROFILE
FLOODWAY NO. 1
SEDGWICK - SAND DRAWS WATERSHED
SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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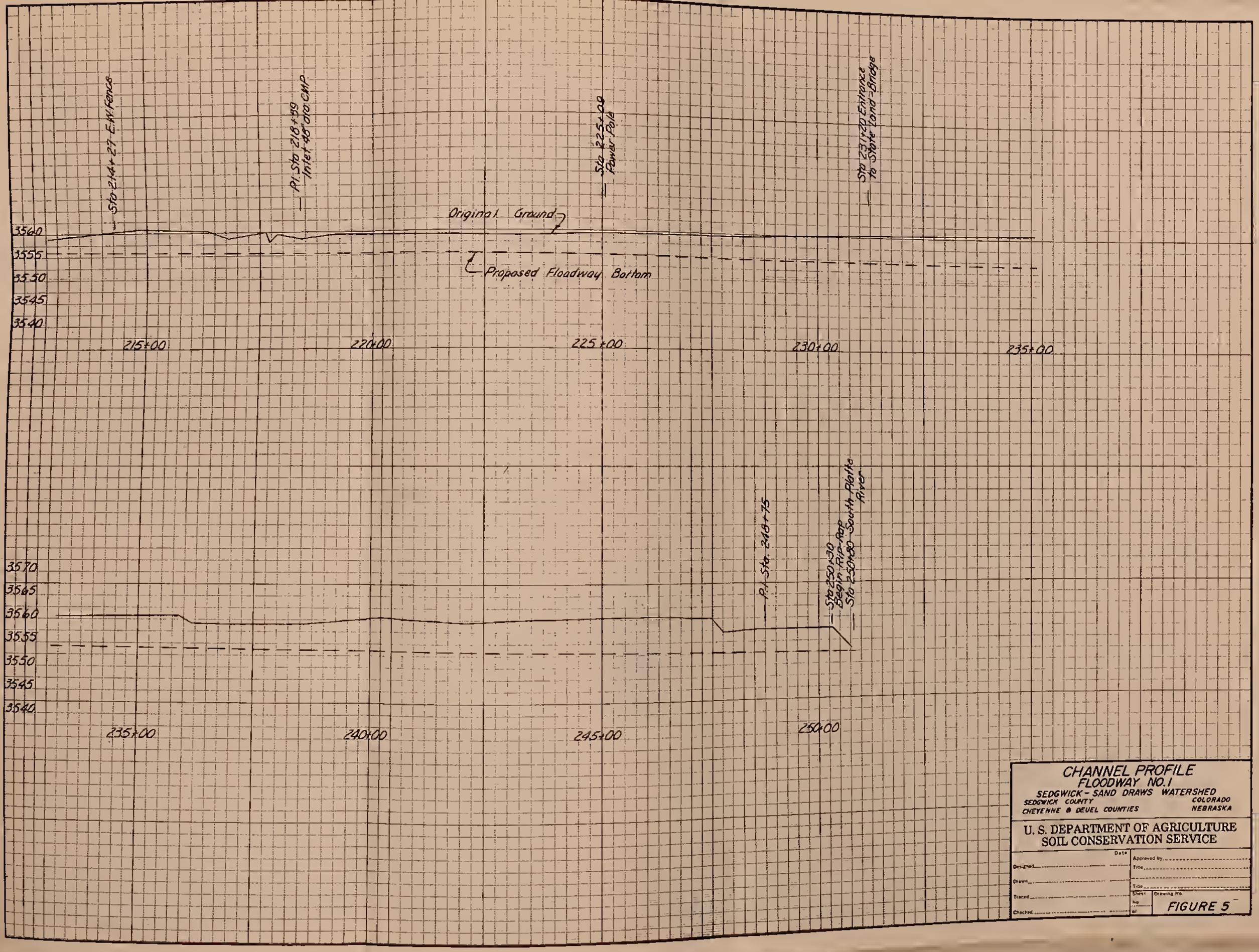
Approved By ____
Title ____
Sheet No ____ of ____
Drawing No.

FIGURE 4



CHANNEL PROFILE
FLOODWAY NO. 1

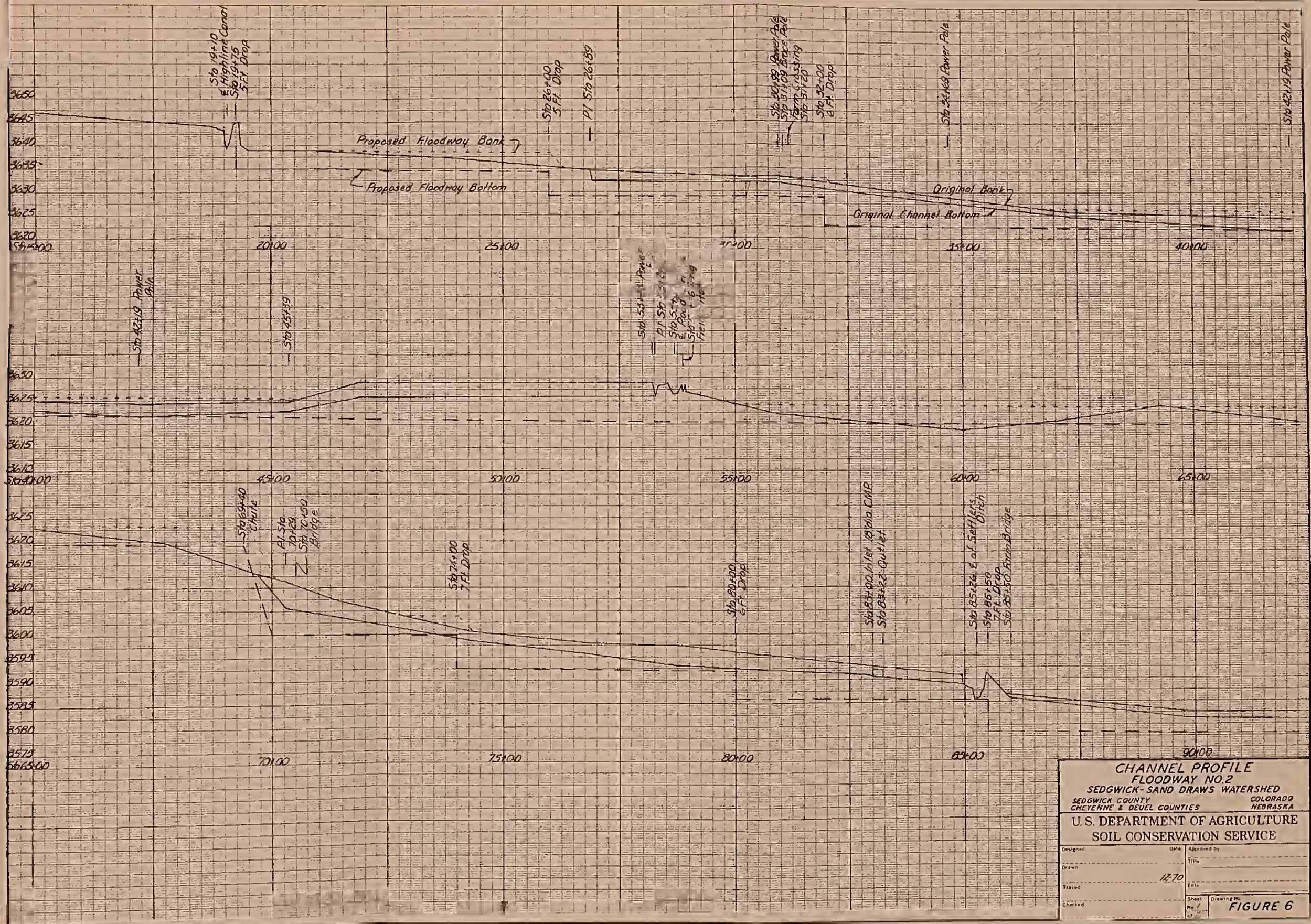
SEDGWICK - SAND DRAWS WATERSHED

SEDGWICK COUNTY, COLORADO

CHEYENNE & DEUEL COUNTIES, NEBRASKA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

	Date		
Designed		Approved by	
Drawn		Title	
Traced		Title	
Checked		Sheet No. of	Drawing No. FIGURE 5

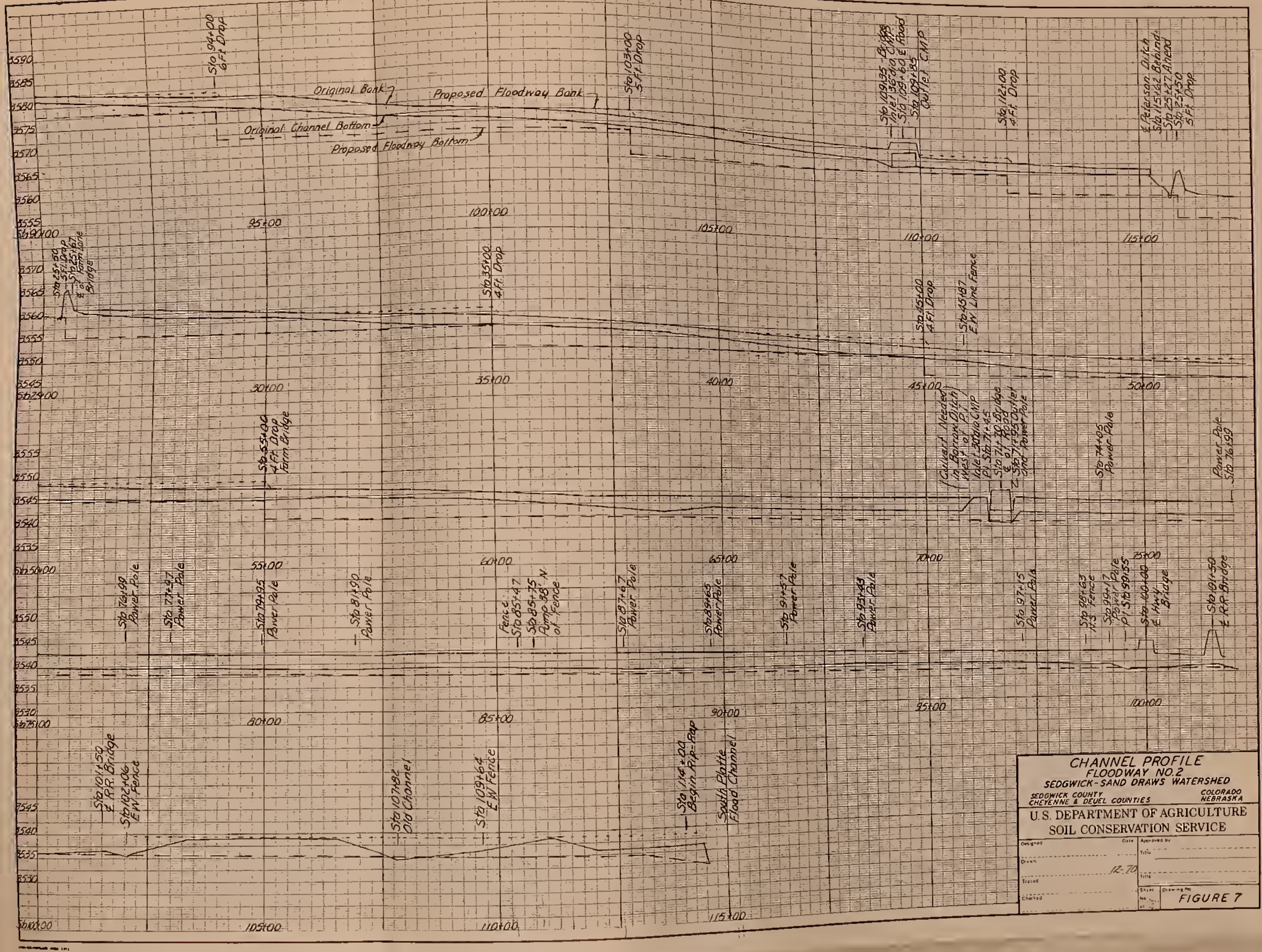


CHANNEL PROFILE
FLOODWAY NO.2
SEDGWICK-SAND DRAWS WATERSHED

SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by	
Drawn	12-70	Title	
Traced		Title	
Checked		Sheet No. 1 of 2	Drawing No. FIGURE 6



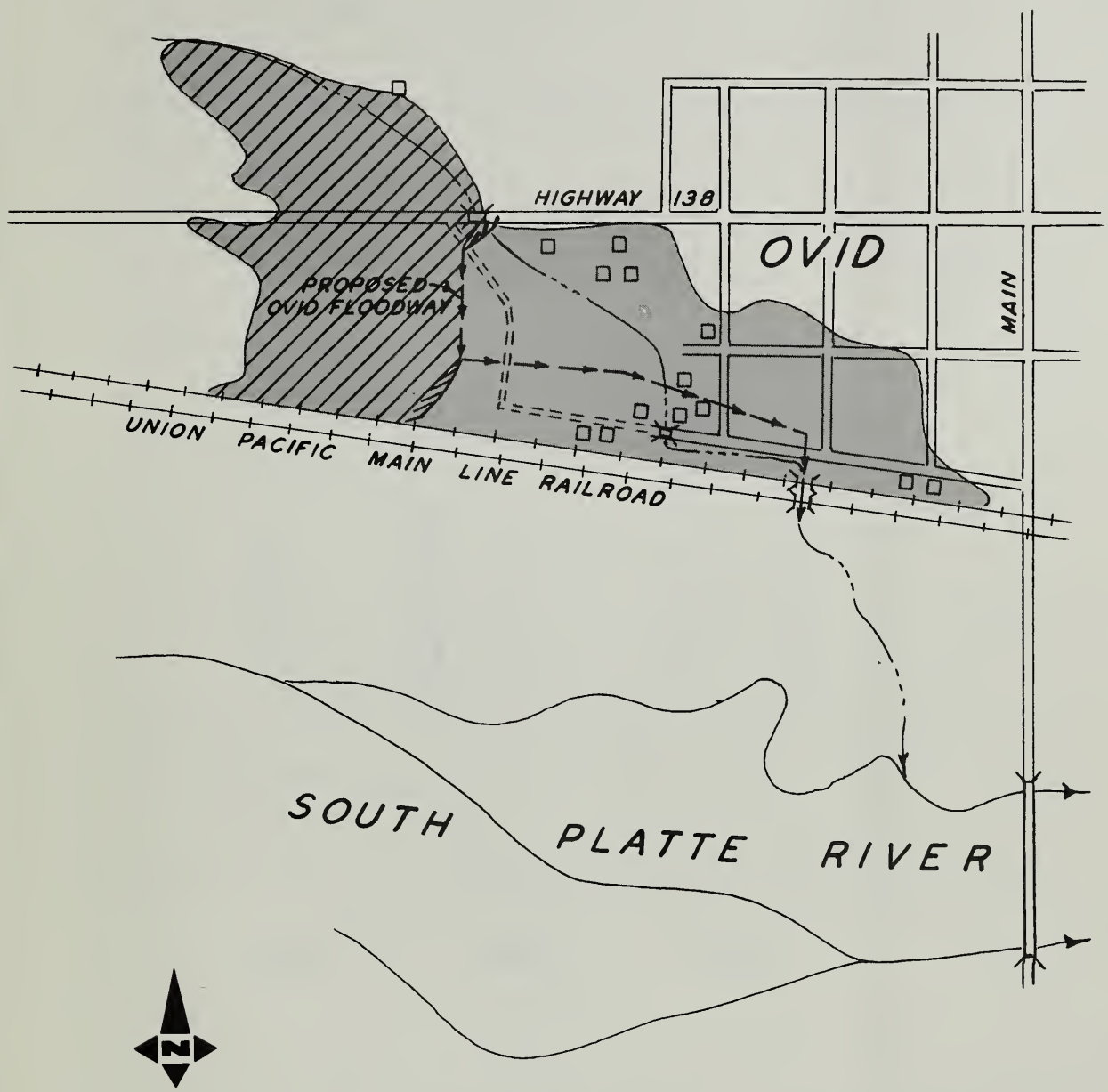
CHANNEL PROFILE
FLOODWAY NO. 2
SEDGWICK - SAND DRAWS WATERSHED

SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed — Date — Approved by — Title
Drawn — 12-70 — Title
Traced
Checked
Sheet No. of — Drawing No.

FIGURE 7



500 0 500 1000

SCALE IN FEET
1" = 660'

100 YR. FLOOD WITHOUT PROJECT

100 YR. FLOOD WITH PROJECT

FLOOD PLAIN DAMAGE MAP

100 YR. EVENT WITH AND WITHOUT PROJECT

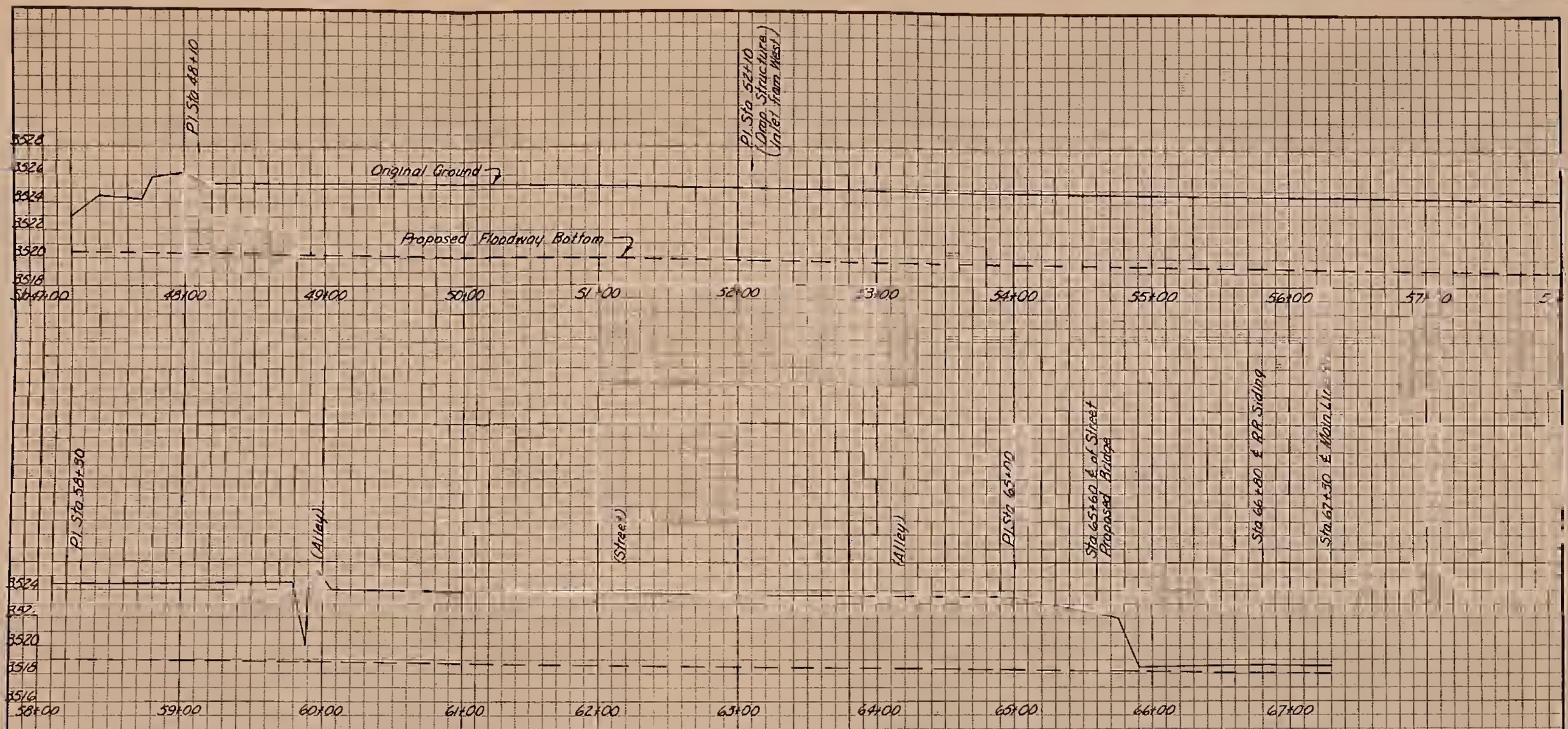
SEDGWICK - SAND DRAWS WATERSHED

SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

12-70

FIGURE 8

U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE



CHANNEL PROFILE
OVID FLOODWAY
SEDGWICK-SAND DRAWS WATERSHED

SEDGWICK COUNTY, COLORADO
CHEYENNE & DEUEL COUNTIES, NEBRASKA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date	Approved by:
Designed	Title
Drawn	Title
Traced	Sheet No. of
Checked	Drawing No. FIGURE 9

Water Quality Standards for Colorado 5/
Effective September 1, 1971

Main Stem of South Platte River Adjacent to Sedqwick-Sand Draws Watershed Project

I. Basic Standards Applicable to All Waters of the State:

A. All wastes capable of treatment or control prior to discharge into any waters of the state, shall receive secondary treatment with disinfection or its industrial waste equivalent, as determined by by the State Water Pollution Control Commission. Lesser degrees of treatment or control may be permitted only where it can be demonstrated that the standards applicable to the classified use of the water can be attained. Greater degrees of treatment or control will be required where it can be demonstrated that it is necessary to comply with the standards applicable to the classified use of the water.

B. Free from substances attributable to municipal, domestic, or industrial wastes, or other controllable sources that will either settle to form unsightly, putrescent, or odorous bottom deposits, or will interfere with the classified use of the water.

C. Free from unsightly floating debris, oil, grease, scum, and other floating material attributable to municipal, domestic, or industrial wastes, or other controllable sources.

D. Free from materials attributable to municipal, domestic or industrial wastes, or other controllable sources that will produce objectionable odor, color, taste, or turbidity in the water, or objectionable aquatic life which may result in eutrophication or other conditions that interfere with the classified use of the water.

E. Free from high temperatures, biocides, toxic, or other deleterious substances attributable to municipal, domestic, or industrial wastes, or other controllable sources in levels, concentrations, or combinations sufficient to be harmful to human or animal life.

F. Radioactive materials attributable to municipal, industrial or other controllable sources will be minimum concentrations that are physically and economically feasible to achieve. In no case shall such materials in the stream exceed the limits established in the current edition of the U. S. Public Health Service Drinking Water Standards or the limits approved by the Federal Radiation Council, or, in the or the Federal Radiation Council, 1/30 of the 168-hour-week values for other radioactive substances specified in the National Bureau of Standards Handbook 69.

CLASS B.

2. The following standards shall apply to waters classified for fish and wildlife (Warm Water Fishery):

a. Bacteria: Wastes or substances from controllable sources shall not be discharged into these waters in amounts which will cause the number of organisms of the fecal coliform group, as determined by either multiple tube fermentation or membrane filter techniques, to exceed a log mean of 1000 per 100 milliliters or exceed 2000 per 100 milliliters in more than 10% of the samples collected in any 30 day period.

b. Dissolved Oxygen: In warm water fisheries, dissolved oxygen content shall in no case go below 5 milligrams per liter.

c. pH: pH shall be maintained between 6.5 and 8.5. No controllable pH change will be permitted which will interfere with fish and aquatic life.

d. Turbidity: No turbidity shall exist in concentrations that will impair natural and developed fisheries.

* e. Temperature: In warm water fisheries the temperature shall not exceed 90° F. No controllable temperature change will be permitted which will interfere with spawning and other aspects of fish life. *Note: See additional temperature criteria on page 6.

f. Toxic Material: Free from biocides, toxic, or other deleterious substances attributable to municipal, domestic, or industrial wastes, or other controllable sources in levels, concentrations, or combinations sufficient to be harmful to aquatic life.

g. Other Material: Free from materials attributable to municipal, domestic, or industrial wastes, or other controllable sources that will produce off-flavor in the flesh of fish.

*Note: Limits on temperature change in fisheries have not been established due to lack of historical temperature data and lack of conclusive temperature change criteria for the aquatic biota of waters of the state. These factual data are being collected, however, to serve as a basis for setting limits. In the meantime, the following tentative criteria will be used as administrative policy:

In cold water fisheries an abrupt change in temperature must be avoided and the normal pattern of diurnal and seasonal fluctuations must be preserved. The maximum allowable temperature increase due to waste discharges in streams and in the epilimnion of lakes shall be 2° F. No warming waste discharge shall be permitted to the hypolimnion of lakes.

In warm water fisheries an abrupt change in temperature must be avoided and the normal pattern of diurnal and seasonal changes must be preserved. The maximum allowable temperature increase due to waste discharges in streams will be 5° F; in the epilimnion of lakes the maximum increase will be 3°F. No warming waste discharge shall be permitted in the hypolimnion of lakes.

In temperature measurement, allowance shall be made for a mixing zone. Provisions shall be made for adequate mixing and no thermal barrier to migration and free movement of aquatic biota shall be permitted in any waters of the state.

CLASS C.

1. The following standards shall apply to waters classified for industrial uses:

   a. Dissolved Oxygen: Dissolved oxygen content shall not go below 3 milligrams per liter.

   b. pH: pH shall be maintained between 5.0 and 9.0.

   c. Turbidity: No turbidity shall exist in concentrations that will interfere with established levels of treatment.

   d. Temperature: The temperature shall not exceed 90° F.

CLASS D.

1. The following standards shall apply to waters classified for irrigation:

   a. Total Dissolved Solids (Salt) Concentration: A time-weighted monthly mean at a monitoring station which exceeds the time-weighted monthly mean for a base period established by the Commission by more than two standard deviations shall be subject to review by the Commission.

   b. Sodium Adsorption Ratio: A time-weighted monthly mean at a monitoring station which exceeds the time-weighted monthly mean for a base period established by the Commission by more than two standard deviations shall be subject to review by the Commission.

   c. Toxic Material: Free from biocides, toxic or other deleterious substances attributable to municipal, domestic, industrial wastes, or other controllable sources in concentrations or combinations which are harmful to crop life.

Sedgwick-Sand Draws Watershed Project

Water Quality Data-South Platte River,

Adjacent to the Project Area

Data from Environmental Protection Agency, Storet System, dated July 8, 1973

Reference Number	Parameter			Below Sterling 1/ Mean	Below Sterling 1/ Standard Deviation	At Julesburg 2/ Mean	At Julesburg 2/ Standard Deviation
00010	WATER	TEMP	CENT	---	---	13.196	9.158
00011	WATER	TEMP	FAHN	57.429	20.816		
00070	TURB	JKSN	JTU	38.680	27.147	131.554	297.942
00095	CNDUCTVY	AT 25C	MICROMHO	1802.00	150.961	1837.73	478.265
00300	DO		MG/L	10.967	2.031	8.696	2.097
00310	BOD	5 DAY	MG/L	3.575	1.228	11.673	51.826
00400	PH		SU	8.640	0.467	7.960	0.307
00505	RESIDUE	TOT VOL	MG/L	13.500	5.260	---	---
00515	RESIDUE	DISS-105	C MG/L	1559.00	129.054	1495.79	110.385
00530	RESIDUE	TOT NFLT	MG/L	67.250	34.596	261.547	595.222
00546	RESIDUE	SETTLBLE	MG/L	---	---	1.052	2.081
00900	TOT HARD	CACO3	MG/L	746.000	35.121	671.435	135.046
00930	SODIUM	NA, DISS	MG/L	164.000	40.224	152.714	45.349
00931	SODIUM	ADSBTION	RATIO	2.640	0.611	---	---
00935	PTSSIUM	K, DISS	MG/L	---	---	16.529	3.375
00940	CHLORIDE	CL	MG/L	78.400	6.504	67.281	13.260
00945	SULFATE	SO4	MG/L	754.000	47.090	732.254	144.277
00950	FLUORIDE	F, DISS	MG/L	1.000	0.082	0.630	0.162
01000	ARSENIC	AS, DISS	UG/L	0.00	---	45.000	19.716
01020	BORON	B,DISS	UG/L	223.333	126.122	407.062	262.224
01049	LEAD	BB, DISS	UG/L	0.000	0.000	58.056	47.210
01145	SELENIUM	SE, DISS	UG/L	1.750	3.500	0.010	0.000
31616	FEC COLI	MFM-FCBR	/100 ML	4807.000	8484.39	713388	4572558
39330	ALDRIN	WHL SMPL	UG/L	---	---	0.000	0.000
39340	BHC	WHL SMPL	UG/L	---	---	0.0022	0.0070
39350	CHLRDANE	WHL SMPL	UG/L	---	---	0.000	0.000
39360	DDD	WHL SMPL	UG/L		---	0.0008	0.0009
39365	DDE	WHL SMPL	UG/L	---	---	0.0027	0.0056
39370	DDT	WHL SMPL	UG/L	---	---	0.0023	0.0073
39380	DIELDRIN	WHL SMPL	UG/L	---	---	0.0059	0.0082
39390	ENDRIN	WHL SMPL	UG/L	---	---	0.0080	0.0198
39410	HCHLR	WHL SMPL	UG/L	---	---	0.000	0.000
39420	HCHLR-EP	WHL SMPL	UG/L	---	---	0.0019	0.006

1/ Re: Station 000128, Agency 21COL001 located at latitude 40°-45'-00.0", longitude 103°-03'-00.0".

2/ Re: Station 070092, Agency 1110 NET located at latitude 40°-59'-00.0", longitude 102°-14'-00.0".

GLOSSARY

A

adequate treatment - Land used within its capabilities on which the conservation practices that are essential to its protection and planned improvements have been applied.

amortization - To repay a debt in a sequence of equal payments. Part of each payment is used to pay the interest due at the time it is made, and the balance is applied to the reduction of the principal.

animal unit - A measure of livestock numbers based on the equavalent of a mature cow (approximately 1,000 pounds live weight). An animal unit is roughly one cow, one horse, one mule, five sheep, five swine, or six goats.

associated costs - A term commonly used in water resource development projects. These costs include the value of goods and services needed over and above project costs to make the immediate products or services of a project available for use or sale.

auxiliary spillway - A dam spillway built to carry runoff in excess of that carried by the principal spillway.

average annual - Amounts may fluctuate over a period of years, so they may be averaged over the time-frame and referred to as average annual.

B

borrow area - The area designated and used as a source of fill or embankment material.

browse - Twigs or shoots, with or without attached leaves, of shrubs, trees, or woody vines available as forage for domestic and wild browsing animals.

bunchgrass - A grass that does not have rhizomes or stolons and forms a bunch or tuft.

burn rate - The percentage of an area (district) burned during a year.

C

canal (irrigation) - Constructed open channel for transporting water from the source of supply to the point of distribution.

channel - A natural stream that conveys water; a ditch or channel excavated for the flow of water.

channel work - The improvement of the flow characteristics of a channel by clearning, excavation, realignment, lining, or other means in order to increase its capacity. Sometimes used to connote channel stabilization.

channel stabilization - Erosion prevention and stabilization of velocity distribution in a channel using jetties, drops, revetments, vegetation, and other measures.

check (hydraulics, irrigation) - A structure, permanent or portable, designed to raise or control the water surface in a channel or ditch.

clay (soils) - 1. A mineral soil separate consisting of particles less than 0.002 millimeter is equivalent diameter. 2. A soil textural class. 3. (engineering) A fine-grained soil that has a high plasticity index in relation to the liquid limits.

climax vegetation - Relatively stable vegetation in equilibrium with its environment and with good reproduction of the dominant plants.

coalesce - To unite or merge into a single body, group or mass.

conservation - The protection, improvement and wise use of natural resources.

community - The plant and animal populations occupying any given area.

conservation cropping system - Growing crops in rotation and in combination with needed cultural and management measures to improve or maintain good physical condition of the soil and protect the soil during periods when erosion usually occurs.

conservation district - A public organization created under state enabling law as a special-purpose district to develop and carry out a program of soil, water and related resource conservation, use and development within its boundaries, usually a subdivision of state government with a local governing body and always with limited authorities. Often called a soil conservation district or a soil and water conservation district.

D

dam - A barrier to confine or raise water for storage or diversion, to create a hydraulic head, to prevent gully erosion, or for retention of soil, rock, or other debris.

decreaser plant species - Plant species in the original vegetation that will decrease in relative amount with continued overuse, often termed decreasers.

deferred grazing - Discontinuance of grazing livestock on an area for a specified period of time during the growing season to promote plant reproduction, establishment of new plants, or restoration of vigor by old plants.

deferred-rotation grazing - A systematic rotation of deferred grazing.

diversion - Channel constructed across the slope for the purpose of intercepting surface runoff; changing the accustomed course of all or part of a stream. See terrace.

diversion dam - A barrier built to divert part or all of the water from a stream into a different course.

drainage - 1. The removal of excess surface water or groundwater from land by means of surface or subsurface drains. 2. Soil characteristics that affect natural drainage.

drop-inlet spillway - Overfall structure in which the water drops through a vertical riser connected to a discharge conduit.

drop spillway - Overfall structure in which the water drops over a vertical wall onto an apron at a lower elevation.

drop structure - A structure for dropping water to a lower level and dissipating its surplus energy; a fall. A drop may be vertical or inclined. Syn. drop.

dryland farming - The practice of crop production in low rainfall areas without irrigation.

conservation plan for farm, ranch, or nonagricultural land unit - The properly recorded decisions of the cooperating landowner or operator on how he plans, within practical limits, to use his land in an operating unit within its capability and to treat it according to its needs for maintenance or improvement of the soil, water, and plant resources.

conservation practice - An identifiable action to solve a land or water use problem or protect a resource. Usually several conservation practices are collectively referred to as land treatment.

contour farming - Conducting field operations, such as plowing, planting, cultivating and harvesting, on the contour.

contour stripcropping - Layout of crops in comparatively narrow strips in which the farming operations are performed approximately on the contour. Usually strips of grass, close-growing crops, or fallow are alternated with those in cultivated crops.

control structure - A regulating structure to maintain water at a desired elevation, usually installed in gravity flow systems.

cover crop - A close-growing crop grown primarily for the purpose of protecting and improving soil between periods of regular crop production or between trees and vines in orchards and vineyards.

critical sediment source area - An eroding area, which if not treated to reduce the erosion rate, will provide a hazard to the storage capacity of a reservoir below it by yielding large amounts of sediment in large storms.

cropland - Land used primarily for the production of adapted cultivated, close-growing, fruit, or nut crops for harvest, alone or in association with sod crops.

crop residue - The portion of a plant or crop left in the field after harvest.

crop residue management - Use of that portion of the plant or crop left in the field after harvest for protection or improvement of the soil.

crop rotation - The growing of different crops in recurring succession on the same land.

cubic foot per second - Rate of fluid flow at which 1 cubic foot of fluid passes a measuring point in 1 second. Abbr. cfs. Syn. Second-foot; CUSEC.

cut - Portion of land surface or area from which earth has been removed or will be removed by excavation; the depth below original ground surface to excavated surface.

cut-and-fill - Process of earth moving by excavating part of an area and using the excavated material for adjacent embankments or fill areas.

E

ecology - The study of the interrelationships of organisms to one another and to the environment.

ecosystem - Energy-driven complex of a community of organisms and its controlling environment.

ecotone - A transition line or strip of vegetation between two communities, having characteristics of both kinds of neighboring vegetation as well as characteristics of its own.

emergency spillway - A spillway used to carry runoff exceeding a given design flood.

environment - The sum total of all the external conditions that may act upon an organism or community to influence its development or existence.

ephemeral stream - A stream or portion of a stream that flows only in direct response to precipitation. It receives little or no water from springs and no long continued supply from snow or other sources. Its channel is at all times above the water table.

erosion - 1: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. 2: Detachment and movement of soil or rock fragments by water, wind, ice, or gravity. The following terms are used to describe different types of water erosion:

accelerated erosion - Erosion much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of other animals or natural catastrophies that expose base surfaces, for example, fires.

geological erosion - The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains, the building up of floodplains, coastal plains, etc. Syn. natural erosion.

gully erosion - The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, ranging from 1 to 2 feet to as much as 75 to 100 feet.

natural erosion - Wearing away of the earth's surface by water, ice, or other natural agents under natural environmental conditions of climate, vegetation, etc., undisturbed by man. Syn. geological erosion.

normal erosion - The gradual erosion of land used by man which does not greatly exceed natural erosion. See natural erosion.

rill erosion - An erosion process in which numerous small channels only several inches deep are formed; occurs mainly on recently cultivated soils. See rill.

sheet erosion - The removal of a fairly uniform layer of soil from the land surface by runoff water.

splash erosion - The spattering of small soil particles caused by the impact of raindrops on wet soils. The loosened and spattered particles may or may not be subsequently removed by surface runoff.

F

fallow - Allowing cropland to lie idle, either tilled or untilled, during the whole or greater portion of the growing season.

farm pond - A water impoundment made by constructing a dam or embankment or by excavating a pit or "dug out". See tank, earth.

farmstead and feedlot windbreak - A belt of trees or shrubs established next to a farmstead or feedlot to protect soil resources, control snow deposition, prevent wind damage, provide shelter for livestock and wildlife and beautify the area.

field stripcropping - A system of stripcropping in which crops are grown in parallel strips laid out across the general slope but which do not follow the contour. Strips of grass or close-growing crops are alternated with strips of cultivated crops.

fishing waters - Waters used for angling or for commercial fishing.

fishpond - A small body of water managed for fish.

fixed costs - Costs which are largely determined in advance of the year's operation and subject to little or no control on the part of the farmer, for example, rent of land, payment of taxes, interest on borrowed money, and upkeep of buildings, fences, and drains.

flood - An overflow or inundation that comes from a river or other body of water and causes or threatens damage.

flood control - Methods or facilities for reducing flood flows.

flood control project - A structural system installed for protection of land and improvements from floods by the construction of dikes, river embankments, channels, or dams.

flood peak - The highest value of the stage or discharge attained by a flood, thus, peak stage or peak discharge.

floodplain - Nearly level land situated on either side of a channel which is subject to overflow flooding.

flood stage - The stage at which overflow of the natural banks of a stream begins to cause damage in the reach in which the elevation is measured.

floodwater retarding structure - A structure providing for temporary storage of floodwater and for its controlled release.

floodway - A channel, either natural, excavated, or bounded by dikes and levees, used to carry excessive flood flows to reduce flooding. Sometimes considered to be the transitional area between the active channel and the floodplain.

forage - All browse and herbaceous food that is available to livestock or game animals, used for grazing or harvested for feeding.

forb - A herbaceous plant which is not a grass, sedge, or rush.

freeboard (hydraulics) - Vertical distance between the maximum water surface elevation anticipated in design and the top of retaining banks or structures provided to prevent overtopping because of unforeseen conditions.

frequency - A statistical expression of the presence or absence of individuals of a species in a series of subsamples, that is, the ratio between the number of sample areas that contains a species and the total number of sample areas.

friable - Easy to break, crumble, or crush.

ft./ft. - Feet per foot, a measure of slope.

G

game animal - An animal sought for its fur, flesh, or trophy value, or one so defined by law.

game management - The art of producing sustained annual crops of wild game animals.

game refuge - An area designated for the protection of game animals within which hunting and fishing is either prohibited or strictly controlled.

gate - Structure or device for controlling the rate of flow into or from a canal, ditch, or pipe.

grade stabilization structure - A structure for the purpose of stabilizing the grade of a gully or other watercourse, thereby preventing further head-cutting or lowering of the channel grade.

grassed waterway - A natural or constructed waterway usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.

grassland - Land on which the existing plant cover is dominated by grasses. See natural grassland.

grazing system - The manipulation of grazing animals to accomplish a desired result.

H

habitat - The environment in which the life needs of a plant or animal are supplied.

hay - The dried stems and leafy parts of plants cut and harvested by man, such as alfalfa, clovers, other forage legumes, and the finer stemmed, leafy grasses. Contrast with fodder; stover.

head (hydraulics) - 1: The height of water above any plane or reference. 2: The energy, either kinetic or potential, possessed by each unit weight of a liquid, expressed as the vertical height through which a unit weight would have to fall to release the average energy possessed. Used in various compound terms such as pressure head, velocity head, and lost head.

herb - Any flowering plant except those developing persistent woody bases and stems above ground.

herbage - The sum total of all herbaceous plants.

herbicide - A chemical substance used for killing plants, especially weeds.

hood inlet - Entrance to a closed conduit that has been shaped to induce full flow at minimum water surface elevation.

huntable wildlife - Wildlife species that are typically sought in sports hunting activities.

hunting area - A tract of land or land and water managed for the production and harvest of wildlife.

I

increaser plant species - Plant species of the original vegetation that increase in relative amount, at least for a time, under overuse. Commonly termed increasers.

indicator - An organism, species, or community that shows the presence of certain environmental conditions.

infiltration - The flow of a liquid into a substance through pores or other openings, connoting flow into a soil in contradistinction to the word percolation which connotes flow through a porous substance.

inlet (hydraulics) - 1: A surface connection to a closed drain. 2: A structure at the diversion end of a conduit. 3: The upstream end of any structure through which water may flow.

intake - 1: The headworks of a conduit; the place of diversion, 2: Entry of water into soil. See infiltration.

intake rate - The rate of entry of water into soil. See infiltration rate.

intermittent stream - A stream or portion of a stream that flows only in direct response to precipitation. It receives little or no water from springs and no long-continued supply from melting snow or other sources. It is dry for a large part of the year, ordinarily more than 3 months.

invader plant species - Plant species that were absent in undisturbed portions of the original vegetation and will invade under disturbance or continued overuse. Commonly termed invaders.

irrigation - Application of water to lands for agricultural purposes.

irrigation application efficiency - Percentage of irrigation water applied to an area that is stored in the soil for crop use.

irrigation frequency - Time interval between irrigations.

irrigation lateral - A branch of the main canal conveying water to the farm ditches, sometimes used in reference to farm ditches.

irrigation structure - Any structure or device necessary for the proper conveyance, control, measurement, or application of irrigation water.

irrigation water management - The use and management of irrigation water where the quantity of water used for each irrigation is determined by the water-holding capacity of the soil and the need for the crop, and where the water is applied at a rate and in such a manner that the crop can use it efficiently and significant erosion does not occur.

L

land leveling - Process of shaping the land surface for better movement of water and machinery over the land. Also called land forming, land shaping, or land grading.

lateral - Secondary or side channel, ditch, or conduit. Somestimes called branch line or drain, spur, lateral, ditch, group lateral.

livestock pond - An impoundment, the principal purpose of which is to supply water to livestock. Includes reservoirs, pits, and tanks.

M

marsh - Periodically wet or continually flooded area with the surface not deeply submerged. Covered dominantly with sedges, cattails, rushes, or other hydrophytic plants. Sub-classes include freshwater and salt-water marshes. See swamp; miscellaneous land type.

meadow - An area of natural or planted vegetation dominated by grasses and grasslike plants used primarily for hay production.

measuring weir - A shaped notch through which water flows are measured. Common shapes are rectangular, trapezoidal, and triangular.

miscellaneous land type - Land too inaccessible for orderly examination or where, for other reasons, it is not feasible to classify the soil.

N

native species - A species that is a part of an area's original fauna or flora.

natural grassland - An area in which the natural potential plant community is dominated by grasses and grasslike plants. Associated species include forbs and woody plants.

natural revegetation - Natural re-establishment of plants; propagation of new plants over an area by natural processes.

O

open drain - Natural watercourse or constructed open channel that conveys drainage water.

outdoor recreation - The use of soil, water, and natural resources, their aesthetic values and productivity, in accordance with the suitability of these resources for providing outdoor leisure-time activities to serve the needs of the people.

outlet - Point of water disposal from a stream, river, lake, tidewater, or artificial drain.

outlet channel - A waterway constructed or altered primarily to carry water from man-made structures, such as terraces, tile lines, and diversions.

overgrazed range - A range deteriorated from its productive potential due to continued overuse.

overgrazing - Grazing so heavy that it impairs future forage production and causes deterioration through damage to plants or soil or both.

overstocking - Placing a number of animals on a given area that will result in overuse at the end of the planned grazing period.

P

pasture - An area devoted to the production of forage (introduced or native) and harvested by grazing.

pasture improvement - Any practice of grazing, mowing, fertilizing, liming, seeding, scattering droppings, contour furrowing, or other methods of management designed to improve vegetation for grazing purposes.

pasture management - The application of practices to keep pasture plants growing actively over as long a period as possible so that they will provide palatable feed of high nutritive value; to encourage the growth of desirable grasses and legumes while crowding out weeds, brush, and inferior grasses. See pasture improvement.

peak discharge - See flood peak.

perennial plant - A plant that normally lives for 3 or more years.

permanent pasture - Grazing land occupied by perennial pasture plants or by self-seeding annuals, usually both of which remains unplowed for many years. Contrast with rotation pasture.

pesticide - A chemical agent used to control pests.

phreatophyte - A plant deriving its water from subsurface sources; commonly used to describe nonbeneficial, water-loving vegetation.

plant succession - The process of vegetation development whereby an area becomes successively occupied by different plant communities of higher ecological order.

pollution, water - Any change in the character of water adversely affecting its usefulness.

primary project benefits - A water resource development term used to describe the value of products and services directly resulting from the project: net of all associated cost incurred in their realization.

project costs - A term commonly used in connection with water resource development projects. It includes the value of goods and services (land, labor, and material) used for the establishment, maintenance, and operation of a project together with the value of any net-induced adverse effects, whether or not compensated for.

proper grazing use - Grazing ranges and pastures in a manner that will maintain adequate cover for soil protection and maintain or improve the quality and quantity of desirable vegetation.

R

range condition - The state and health of the range based on what it is naturally capable of producing.

range condition class - One of a series of arbitrary categories used to classify range condition, usually expressed as either excellent, good, fair, or poor.

range seeding - Establishing adapted plant species on ranges by means other than natural revegetation.

range site - A distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants.

recreation area planting - Establishing grasses, legumes, vines, shrubs, trees, or other plants on recreation areas.

recreation area pruning and thinning - Selectively reducing stand density and trimming woody plants to improve an area for recreation.

recreation area stabilization - Stabilizing recreation areas subject to heavy use by surfacing with suitable materials or by installing needed structures.

reservoir - Impounded body of water or controlled lake in which water is collected or stored.

rest-rotation grazing - A form of deferred-rotation grazing in which at least one grazing unit is rested from grazing for a full year.

rill - A small, intermittent water course with steep sides, usually only a few inches deep and, hence, no obstacle to tillage operations.

rill erosion - See erosion.

riparian land - Land situated along the bank of a stream or other body of water.

riparian rights - The rights of an owner whose land abuts water. They differ from state to state and often depend on whether the water is a river, lake, or ocean. See water rights.

riprap - Broken rock, cobbles, or boulders placed on earth surfaces, such as the face of a dam or the bank of a stream, for protection against the action of water (waves); also applied to brush or pole mattresses, or brush and stone, or other similar materials used for soil erosion control.

river basin - The United States has been divided into 20 major water resource regions (river basins). See drainage basin.

root zone - The part of the soil that is penetrated or can be penetrated by plant roots.

rotation-deferred grazing - See deferred-rotation grazing.

rotation grazing - Grazing two or more pastures or parts of a range in regular order, with definite recovery periods between grazing periods. Where only two fields are involved, sometimes called alternate grazing. Contrast with continuous grazing.

row crop - A crop planted in rows, normally to allow cultivation between rows during the growing season.

roughness coefficient (hydraulics) - A factor in velocity and discharge formulas representing the effect of channel roughness on energy losses in flowing water. Manning's "n" is a commonly used roughness coefficient

runoff (hydraulics) - That portion of the precipitation on a drainage area that is discharged from the area in stream channels. Types include surface runoff, groundwater runoff, or seepage.

S

secondary benefits - The values over and above the immediate products or services of a water resource development project. These result from activities "stemming from" or induced by a project.

second-foot - See cubic foot per second.

sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

sediment pool - The reservoir space allotted to the accumulation of submerged sediment during the life of the structure.

shelterbelt - A wind barrier of living trees and shrubs established and maintained for protection of farm fields. Syn. windbreak.

shrub - A woody perennial plant differing from a perennial herb by its more woody stems and from a tree by its lower stature and habit of branching from the base. There is no definite line between herbs and shrubs or between shrubs and trees; all possible intergraduations occur.

side slopes (engineering) - The slope of the sides of a canal, dam, or embankment. It is customary to name the horizontal distance first, as 1.5 to 1, or frequently, 1½:1, meaning a horizontal distance of 1.5 feet to 1 foot vertical.

site (ecology) - 1: An area considered for its ecological factors with reference to capacity to produce vegetation; the combination of biotic, climatic, and soil conditions of an area. 2: An area sufficiently uniform in soil, climate, and natural biotic conditions to produce a particular climax vegetation.

soil erosion - The detachment and movement of soil from the land surface by wind or water. See gully erosion; rill erosion; sheet erosion; splash erosion; wind erosion.

spillway - An open or closed channel, or both, used to convey excess water from a reservoir. It may contain gates, either manually or automatically controlled to regulate the discharge of excess water.

sprinkler irrigation - Irrigation where water is applied by means of perforated pipes or nozzles operated under pressure so as to form a spray pattern.

storm frequency - The number of times a storm of a given intensity will occur in a time frame. May be expressed as a "50-year storm" or a "2% chance storm".

stripcropping - Growing crops in a systematic arrangement of strips or bands which serve as barriers to wind and water erosion. See buffer strips; contour stripcropping; correction strip; field stripcropping; filter strip; sod strips; spreader strip; strip sodding; contour; wind stripcropping.

stubble mulch - The stubble of crops or crop residues left essentially in place on the land as a surface cover during fallow and the growing of a succeeding crop.

surface irrigation - Irrigation where the soil surface is used as a conduit, as in furrow and border irrigation as opposed to sprinkler irrigation or subirrigation.

swamp - A tract of wet, spongy land, often having a growth of certain types of trees and other vegetation or animal life, but not suited for cultivation.

I

terrace - An embankment or combination of an embankment and channel constructed across a slope to control erosion by diverting or storing surface runoff instead of permitting it to flow uninterrupted down the slope. Terraces or terrace systems may be classified by their alignment, gradient, outlet, and cross-section. Alignment is parallel or non-parallel. Gradient may be level, uniformly graded, or variably graded. Grade is often incorporated to permit paralleling the terraces. Outlets may be soil infiltration only, vegetated waterways, tile outlets, or combinations of these. Cross-sections may be narrow base, broad base, bench, steep backslope, flat channel, or channel.

tributary - Secondary or branch of a stream, drain, or other channel that contributes flow to the primary or main channel.

V

variable costs - Costs subject to the year's production schedule. As such, they may be largely controlled by the operator. Examples are the use of fertilizer and insecticides, hauling grain, etc.

W

watershed protection and flood prevention projects - A system of land treatment or soil conservation practices combined with structural measures installed to improve infiltration and reduce erosion of land within a drainage basin and to protect lands from floods.

waterway - A natural course or constructed channel for the flow of water. See grassed waterway.

wildlife - Undomesticated vertebrate animals, except fish, considered collectively.

wildlife habitat management - Retaining, creating, or managing wildlife habitat.

windbreak - 1: A living barrier of trees or combination of trees and shrubs located adjacent to farm or ranch headquarters and designed to protect the area from cold or hot winds and drifting snow. Also headquarters and livestock windbreaks. 2: A narrow barrier of living trees or combination of trees and shrubs, usually from one to five rows, established within or around a field for the protection of land and crops. May also consist of narrow strips of annual crops, such as corn or sorghum.

wind erosion - The detachment and transportation of soil by wind.

wind stripcropping - The production of crops in relatively narrow strips placed perpendicular to the direction of prevailing winds.

woodland - Any land used primarily for growing trees and shrubs. Woodland includes, in addition to what is ordinarily termed "forest" or "forest plantations," shelterbelts, windbreaks, wide hedgerows containing woodland species for wildlife food or cover, stream and other banks with woodland cover, etc. It also includes farmland and other lands on cover, etc. It also includes farmland and other lands on which woody vegetation is to be established and maintained.

CONSTRUCTION SPECIFICATION

400. POLLUTION CONTROL

1. SCOPE

The work shall consist of the Contractor performing all phases of construction work in a manner that will minimize or eliminate air and water pollution in order to maintain the general quality of the environment.

2. WET WEATHER

Construction operations shall not be performed during extended periods of wet weather unless measures are taken to control or prevent soil erosion and water pollution.

3. TRANSPORTATION ROUTES

Transportation routes for materials, men and equipment to, from or within the project areas shall be limited to those access roads located as approved by the Engineer.

4. WATER POLLUTION

Pollution of live streams, lakes, ponds, springs, irrigation or drainage channels or other water sources shall be prevented.

Soil erosion within the construction site shall be controlled to prevent water pollution. Such prevention shall include one or a combination of the following:

a. Scheduling of construction operations so that the amount of erodible soils exposed at any one time is minimized.

b. Applying temporary ground cover (vegetation or mulch).

c. Constructing temporary drainage ditches, dikes, terraces or sumps to trap the eroded soils before the water is released downstream from the construction site.

d. Constructing ditches or dikes to divert surface water away from exposed soil areas.

Work on channels, banks of creeks, ponds or lakes shall be prohibited or limited to the work actually specified to be done. Turn areas, roads, parking areas, temporary building sites, etc. shall be established at locations approved by the Engineer to prevent contamination of water or the destruction of game or fish habitat.

Where access or construction roads cross existing streams, temporary culverts or bridges of adequate size shall be installed as shown on the drawings or approved by the Contracting Officer.

The Contractor shall provide tanks or barrels or construct a sump (sealed with plastic sheets, if necessary) to be used to dispose of chemical pollutants produced as a by-product of the project's work, such as drained lubricating or transmission oils, greases, soaps, asphalt, etc. All equipment used for disposal and the location and maintenance of the disposal area shall be as approved by the Contracting Officer. At the completion of the construction work, the sump shall be covered or filled. Storage tanks or barrels and all other designated materials shall be removed from the site.

Sanitary facilities such as pit toilets, chemical toilets or septic tanks shall not be placed adjacent to live streams, wells or springs. They shall be located at a sufficient distance from any water source to prevent pollution of the water.

5. AIR POLLUTION

Construction activities shall be performed in such manner that air pollution is held to a minimum. All operations shall be in conformance with the requirements of all related laws and codes.

The burning of brush or slash or the disposal of other combustible materials shall comply with all local and state regulations. Fire prevention measures shall be taken to prevent the start of fires or the spread of fires which result from the project work. Fire breaks or guards shall be constructed at locations shown on the drawings or approved by the Contracting Officer.

All access or haul roads used during construction of the projects shall be managed by applying chemical dust inhibitors or sprinkling with water to suppress dust.

6. NOISE CONTROL

Construction activities shall be performed in such manner that the noise level is held to a minimum. All equipment and operation of the equipment shall be in compliance with all local and state regulations. All equipment shall be equipped with mufflers or other noise abatement devices approved by the Contracting Officer.

7. MEASUREMENT AND PAYMENT

For items of work for which specific lump sum prices are established in the contract, payment for poilution control will be made at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools and all other items necessary and incidental to the completion of the work.

Compensation for any items of work described in the contract but not listed in the bid schedule will be included in the payment for the items of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 8 of this specification.

CONSTRUCTION SPECIFICATION 400, POLLUTION CONTROL (Cont.)

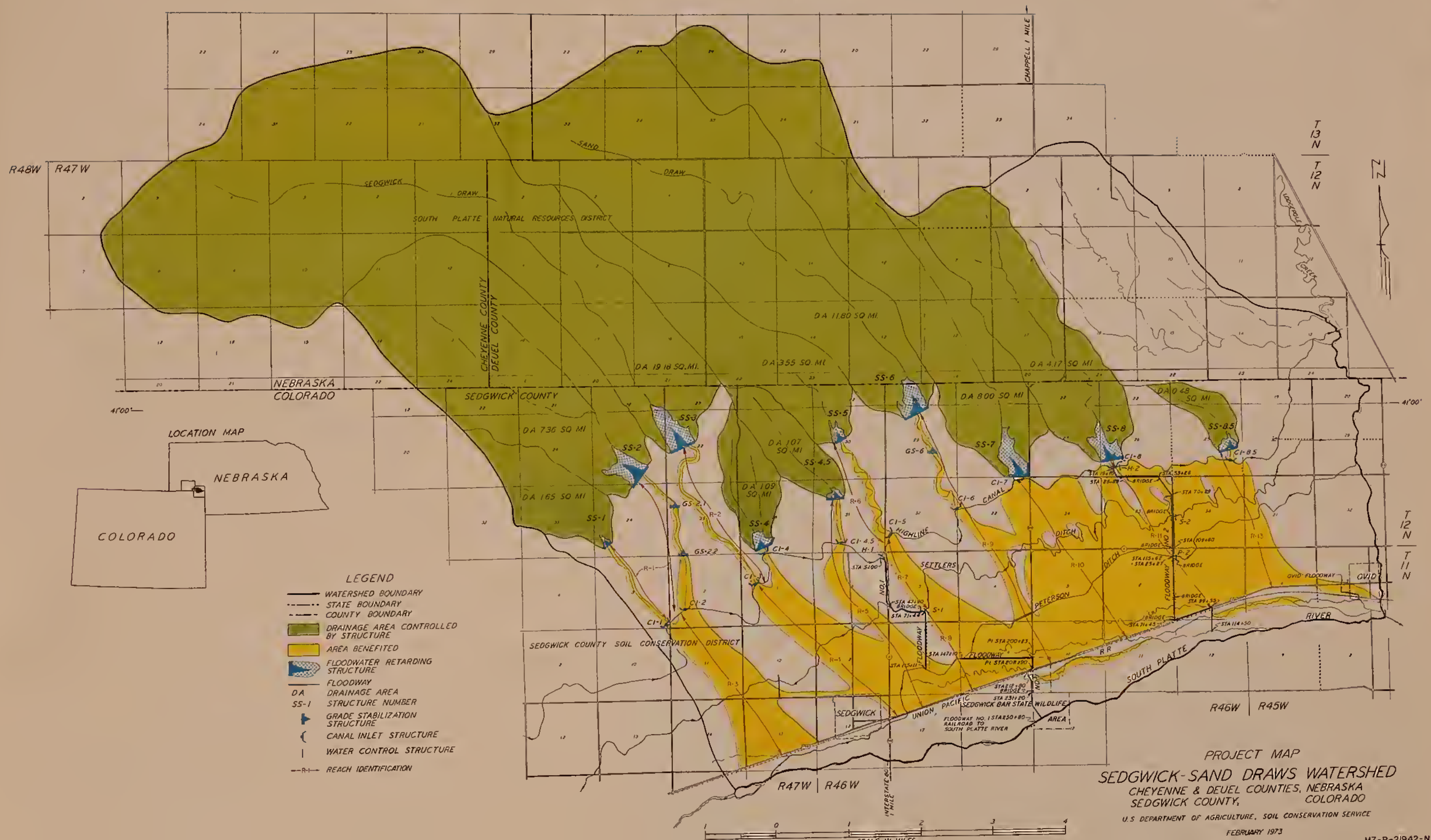
8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details are;

a. Subsidiary Item, Pollution Control

(1) This item shall consist of work done to prevent water and air pollution during construction.

(2) No separate payment will be made for pollution control. Compensation for pollution control will be included with the payment for the related items of work.



PROJECT MAP
SEDGWICK-SAND DRAWS WATERSHED
CHEYENNE & DEUEL COUNTIES, NEBRASKA
SEDGWICK COUNTY, COLORADO

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

FEBRUARY 1973

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