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92d Congress }
1st Session }

COMMITTEE PRINT

DOCUMENTS

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WATERSHED WORK PLAN FOR LOWER McKEE CREEK
(NORTH FORK) WATERSHED, ADAMS, BROWN, AND
PIKE COUNTIES, ILLINOIS



OF THE SOIL CONSERVATION SERVICE, DEPARTMENT
OF AGRICULTURE, IN ACCORDANCE WITH THE
PROVISIONS OF PUBLIC LAW 83-566

COMMITTEE ON PUBLIC WORKS
UNITED STATES SENATE

APRIL 1971

SERIAL NO. 92-11



Printed for the use of the Committee on Public Works

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WASHINGTON : 1971

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LETTER OF SUBMITTAL

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

April 15, 1971

Honorable Spiro T. Agnew
President of the Senate
Washington, D. C. 20510

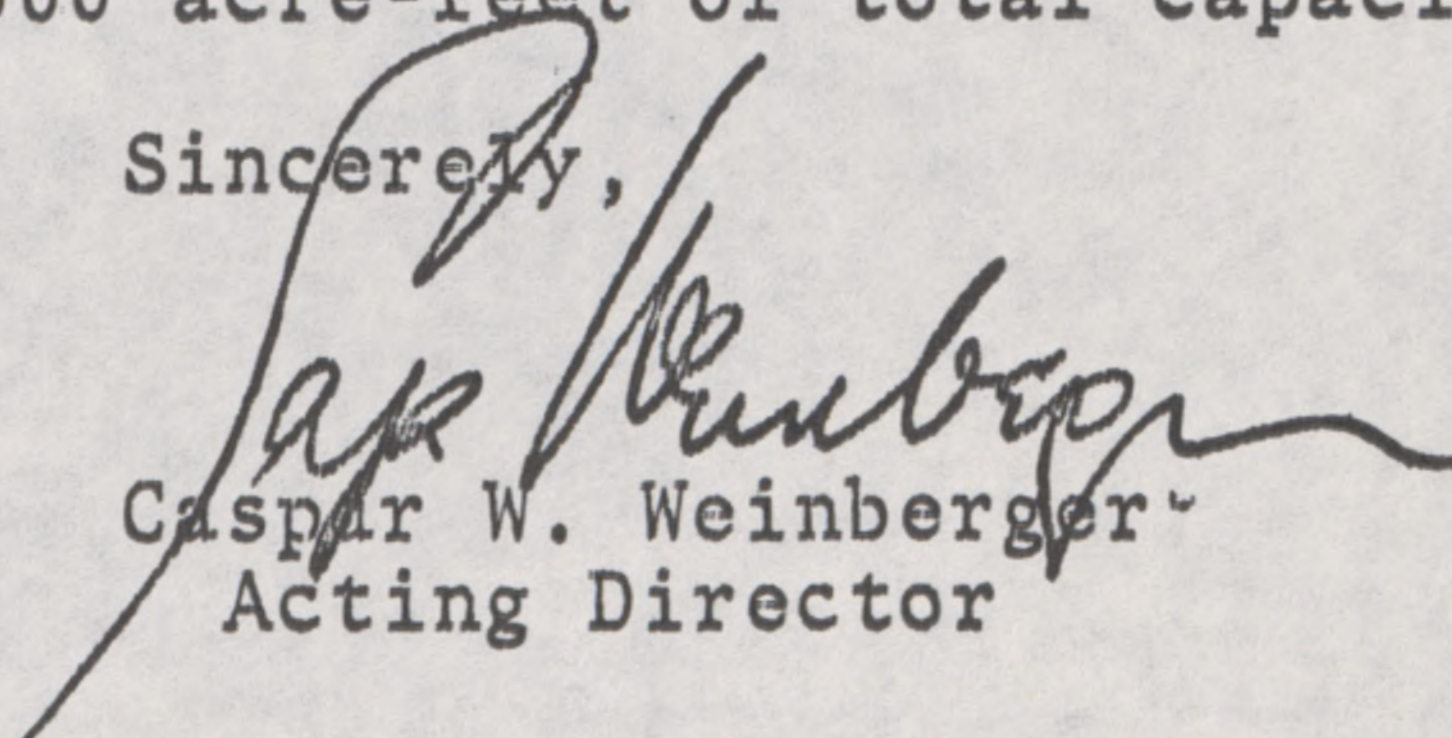
Dear Mr. President:

Pursuant to the authority vested in the President by section 5 of the Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. 1005), and delegated to the Director of the Office of Management and Budget by Executive Order No. 10654 of January 20, 1956, there are transmitted herewith the following plans for works of improvement which have been prepared under the provisions of that Act:

<u>State</u>	<u>Watershed</u>
Georgia	Cedar Creek *
Illinois	Lower McKee Creek
Illinois	Upper McKee Creek *
Kansas	West Sector
	Whitewater River *
North Dakota	Middle South Branch
	Forest River
	(Supplemental) *
Oklahoma	Deep Red Run-Coffin
	Creek *
Tennessee	Little Bigby Creek *
West Virginia	Mill Creek *

Each of the above listed plans involves at least one structure which provides more than 4,000 acre-feet of total capacity.

Sincerely,


Caspar W. Weinberger
Acting Director

Note: Referred to the Committee on Public Works by the Secretary of the Senate on April 19, 1971, Executive Communication No. 32.

*Printed separately.

ENVIRONMENTAL STATEMENT

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Prepared in accordance with Section 102(2) (C) of P.L. 91-190

Date: January 1971

Title of Statement: The Effect of the Watershed Projects for Upper and Lower McKee Creek (North Fork) Watersheds, Illinois, Upon Environmental Quality

Authority for Project: Public Law 566, 83rd Congress, 68 Stat. 666, as amended

Sponsoring Local Organizations: McKee Creek Watershed Conservancy District; Adams, Brown, and Pike County Soil and Water Conservation Districts; and the City of Mt. Sterling

Nature of Action:

The following statement presents the combined information for two inter-related watershed projects on McKee Creek (North Fork). Plans for solving water and related natural resource problems have been prepared by the above listed sponsors with Federal assistance under the provisions of Public Law 83-566, as amended. The projects are located in Adams, Brown and Pike Counties in western Illinois. The McKee Creek Conservancy District and the Soil and Water Conservation Districts of Adams and Brown Counties will assume all local responsibilities for installing, operating and maintaining the Upper McKee Creek project. The Pike County Soil and Water Conservation District and the City of Mt. Sterling will join them in assuming these responsibilities in the Lower McKee Creek project.

The combined project area consists of 216,300 acres. Farming is quite diversified with cash grain farming predominating. Corn, soybeans and wheat are the principal crops grown. Diversification is reflected in the use of the land with about 30 percent being in cropland, 40 percent in grassland, 14 percent in forest and the remaining 7 percent in miscellaneous uses. More than 70 percent of the farm enterprises are corn-hog operations. An estimated 60 percent of farm income is derived from the sale of livestock (cattle and hogs). There are 850 operating farm units averaging about 250 acres each. Most of the farmland is owner-operated.

McKee Creek receives a moderate amount of fishing use. Catches of bass, catfish, sunfish and carp are good. Good wildlife habitat is provided by an interspersed pattern of crops, meadows, pasture and woodlands. There are good populations of quail, squirrel, deer, rabbit and dove. Hunting pressure for small game is moderate and for deer it is heavy. Furbearers are abundant.

Flooding two or three times a year, mostly during the growing season, causes severe damage to an estimated 9,470 acres. Drainage on an additional 1,740 acres of flood plain is impaired. In October 1969, a nine-inch rain over a 3-day period caused an estimated \$65,800 damage to crops and pastures and extensive damage to flood plain land and fixed improvement.

Severe sheet and gully erosion are occurring over the entire watershed. The average annual rate of sheet erosion is estimated to be 4.1 tons per acre. Erosion in the uplands is resulting in moderate sediment deposition on flood plain lands. This sediment deposition has reduced the productive capacity of the flood plain and also filled drainageways and road ditches, within the watershed and also downstream.

In addition to the impaired drainage of the 1,740 acres of flood plain land, impaired drainage of about 43,000 acres of upland delays planting, lowers planting temperatures, causes weed control problems, retards crop growth and increases operating costs.

Since there are only three Illinois State Parks within a 50-mile radius of the watershed, there is a need for water-based recreation to serve local residents.

Present water supplies are inadequate to serve watershed residents. Population trends and projections made by consulting engineers, indicate future needs for water supply will be great.

Conservation land treatment will be accelerated and intensified during the 10-year project installation period. This is to achieve all essential treatment on 97,000 acres and will provide assistance for some treatment on all other land still needing treatment. Because of the severe gully erosion, about 500 small grade stabilization structures will be installed. These measures will be supplemented by 12 floodwater retarding structures and four multiple-purpose reservoirs.

In addition to capacity for floodwater detention and sediment storage, three of the multiple-purpose reservoirs will include capacity for recreation, and two will include capacity for municipal and industrial water supply. Recreational facilities will be installed at three recreational lakes.

All project construction areas will be revegetated with appropriate grasses and shrubs suitable to control erosion after construction. Destruction of forest cover during construction will be kept to a minimum. Construction contractors will be required to adhere to strict guidelines for minimizing soil erosion, and water and air pollution. Sponsors will advise the concerned landowners of the need for sanitary facilities in accordance with State and local health regulations if the sediment pools of any of the floodwater-retarding structures are used for recreation.

Sewage treatment facilities in the drainage areas above the multiple-purpose reservoirs have been certified as being adequate by the State Water Pollution Control Bureau and the local health departments. Future installation of septic tank systems and sewage treatment facilities will be regulated by the State Environmental Protection Agency and local health agencies to assure adequate water quality for the intended uses proposed in the project.

The sediment pools of each of the proposed floodwater retarding structures have potential for recreational use. If this potential is utilized, basic sanitary facilities will need to be provided to reduce potential adverse effects on water quality and health. These sediment pools can provide about 1,670 acres of lake fishery if stocked and managed until they become too shallow from sediment deposition.

The following Public Health Service Publications will be used as guidelines in the design and installation of watershed features:

1. For any drinking water systems: the Public Health Service Drinking Water Standards (Public Health Service publication number 956) and the Manual for Evaluating Public Drinking Water Supplies (Public Health Service publication number 1820).
2. For recreational developments: Environmental Health Practices in Recreational Areas (Public Health Service publication number 1195).
3. For control of disease vector problems: Prevention and Control of Vector Problems Associated with Water Resources (Public Health Service monograph, January 1965).

Inquiries during planning didn't reveal any places of archeological or historical value that will be affected by the project. The Soil Conservation Service will keep the National Park Service advised of the progress of the projects so that archeological surveys and any necessary salvage may be programmed and completed prior to the beginning of construction.

Statement:

(i.) Environmental Impact

Conservation land treatment will reduce fertility losses through excessive erosion, increase productivity and decrease operating costs. It is estimated that erosion will be reduced by about 28 percent as a result of conservation land treatment. The average annual rate of erosion is expected to be reduced from about 4.5 tons per acre to 3.2 tons per acre.

The project will reduce floodwater and sediment damages by about 30 percent on 9,470 acres of flood plain land. About 200 acres of forest land will be changed to cropland or other land uses. The Forest Service has indicated that since this is only about 0.5 percent of the total forested area, the impact will be minimal on forest land resources of the area.

Two hundred and sixty of the 850 farms in the watershed will receive direct flood protection benefits from the projects. Flood frequencies, depths and durations will be reduced. Farmers can profitably follow better management practices including improved seed varieties and soil building rotations. Farmers will be able to perform tillage, planting and harvesting operations on a timely basis for improved production. As part of the accelerated technical assistance to be furnished in carrying out the project, farmers will be encouraged to practice improved management techniques in the use of fertilizers and pesticides to minimize any adverse effect on water quality.

The projects will provide 2,375 acre-feet of water supply storage for about 5,500 residents of the area. This will assure a sustained yield of 6.1 million gallons per day.

The three multiple-purpose recreational reservoirs will provide 1,600 surface acres of lake fishery and other recreational uses. The recreational developments associated with these reservoirs will occupy 2,060 acres and will provide facilities for swimming, picnicking, fishing, camping, boating, etc., for an estimated 400,000 user-days annually.

The project dams, spillways and pool areas will destroy vegetative cover on about 2,800 acres, most of which is cropland. Floodwater will periodically inundate an additional 4,460 acres in the detention pools of planned structural measures. Small areas in grassland and forest cover also will be lost. The structures and pool areas will inundate about 45 miles of stream channels which have a low to moderate stream fishery value. Some of the vegetative cover in the recreation areas surrounding the lakes will be lost. All disturbed areas will be vegetated by grass, trees or shrubs having erosion control, wildlife and aesthetic value.

(ii.) Favorable Environmental Impact

1. Reduce erosion by an estimated 28 percent.
2. Reduce floodwater and sediment damages by about 80 percent.
3. Allow farmers in flood-prone areas to enjoy a greater sense of security in farm management and crop production.
4. Provide a sustained yield of 6.1 million gallons per day for water supply to watershed residents.
5. Provide recreational facilities and about 1,600 surface acres of lake fishery. An estimated 400,000 people will use the lakes and facilities for fishing, boating, camping, picnicking and swimming annually.

6. Provide a potential for recreational use of the 1,670 acres in sediment pools of the proposed floodwater retarding structures.
7. Increase the water surface area and distribution of lakes to be used for feeding and resting by migratory waterfowl and aquatic furbearers.
8. Provide more and better wildlife habitat through increased and improved vegetative cover.

(iii.) Adverse Effects on the Environment

1. A low to moderate fishery resource in the approximately 45 miles of stream channels to be inundated by the planned structures and reservoirs will be lost.
2. Wildlife cover will be lost on about 4,860 acres in the construction areas, until vegetation is replaced after construction on those areas not covered by water. The land use in these areas is primarily cropland and grassland, with a few scattered areas in woods.

(iv.) Alternatives to the Proposed Action

Flood plain lands are primarily in crop production (76 percent) with the remainder in pasture, woods and miscellaneous uses. Among the possible alternative uses of the flood plain are the following: (1) non-agricultural including residential, (2) more intensive agricultural use, such as conversion to vegetable or specialty crops, (3) less intensive use, such as retiring cropland to pasture or woodland, and (4) continuing the present trend in agricultural use.

Both of the first two alternatives would require more or larger structural measures to achieve the higher level of flood protection necessary for these uses. Further consideration need not be given them because, in addition to there being no present need for these uses, either would have greater adverse effects than the proposed plan.

The retirement of cropland to pasture and woodland or related uses would eliminate much of the flood damage. This alternative use would reduce the level of protection needed and also reduce the adverse effects of the projects on fish and wildlife habitat. However, such uses would not fit into the economic enterprises to which most of the present landowners are committed. To accomplish conversion to these uses on any large scale would undoubtedly

require a public land acquisition program. In addition to the impact of losing agricultural production on the 9,470 acres of flood plain land, purchasing the land would cost about \$3.3 million, at the current estimated value of \$350 per acre.

The continuation of the present trends in the use of the flood plain for agricultural production and reducing flood damages to an acceptable level is in harmony with local desires and is the projected long-term use of the area. For this intensity of use, agreement was reached between the sponsors and the Soil Conservation Service on an objective that would reduce present flood-water damages a minimum of about 70 percent.

One possible alternative to the proposed measures might be one of smaller floodwater retarding structures controlling smaller drainage areas, but in greater numbers. To control as much area as the proposed plan (57 percent), or a greater percent, by means of smaller structural measures would require greater costs and a larger commitment of land to the measures. Studies have shown that as the drainage area controlled by floodwater retarding structures decreases in size, the cost increases. This alternative would cause greater adverse effects on the environment.

Channel enlargement, in lieu of, or in combination with floodwater retarding structures as another possible alternative structural plan, would greatly increase costs and result in a greater adverse effect on the environment by destroying a better fishery resource in the main stream channel. Tributary streams furnish a limited or lower value fishery resource than the main stream since some are intermittent, or nearly so, and do not support a valuable resource.

Another possible alternative for solving the water and related land resource problems would be to eliminate the floodwater retarding structures and multiple purpose reservoirs from the proposed plan and install only the planned conservation land treatment. This would conserve the natural resources for future generations and improve the aesthetics over the entire area. However, without floodwater retardation, flood plain lands could not be improved with conservation measures because of the continuing flood hazard. Conservation land treatment alone would reduce erosion in the upland areas significantly, probably more than 25 percent, but floodwater and sediment damages would be reduced by only 3 to 5 percent.

If the proposed project were not installed, it is estimated that approximately \$130,000 in average annual benefits would be foregone.

(v.) Relationship Between Local-Short Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Land in this watershed is expected to remain in agricultural use. The project will reduce erosion, flooding and sedimentation, and increase productivity on forest land. This will preserve the total area for use by future generations while maintaining and improving its current productivity. Even after the designed life of the projects, 100 years, they will still be effective in conserving the land and water resources in the watershed.

(vi.) Irreversible and Irretrievable Commitments of Resources

An estimated 2,400 acres of cropland and about 400 acres of grassland will be committed to dams, spillways, sediment and multiple-use pool areas. An additional 2,060 acres now being used for cropland and grassland will be devoted to recreational facilities.

All of these areas have some value for wildlife food and cover. The 2,800 acres will be lost permanently, for wildlife habitat. The 2,060 acres in recreation areas will be lost until new vegetative cover is established after construction. Floodwater will periodically inundate an additional 4,460 acres in the detention pools of planned structural measures. Some wildlife habitat losses will also occur.

Consultation-General

The application for assistance for these projects was submitted to and approved by the Governor of Illinois. The plans for solving water and related land resource problems were developed in full consultation with Federal, State and local agencies and groups expressing interest. Numerous coordination meetings were held and contacts made during the plan development stage. Prior to preparation of the final plans, an informal field review was held in the watershed on June 25, 1970, at which time interests were invited to present their views and recommendations either orally or in writing. The plans and environmental statement have been prepared in consideration of such comments and recommendations as were provided by reviewing Federal agencies and the Governor of Illinois.

Consultation with Appropriate Federal Agencies

The Department of the Interior suggested that the environmental statement would be improved by discussing the preservation of important historical,

cultural, and archeological aspects of our natural heritage as related to the projects. Since a loss of terrestrial wildlife habitat will result from construction, they also suggested that the statement show an irreversible and irretrievable loss of the wildlife resource.

The environmental statement has been revised to reflect these recommendations.

The Department of Health, Education and Welfare recommended that appropriate health guidelines outlined in the following publications be employed during the development and operation of the projects:

1. For any drinking water systems: The Public Health Service Drinking Water Standards (PHS publication No. 956) and the Manual for Evaluating Public Drinking Water Supplies (PHS publication No. 1820)
2. For recreational developments: Environmental Health Practices in Recreational Areas (PHS publication No. 1195)
3. For control of disease vector problems: Prevention and Control of Vector Problems Associated with Water Resources (PHS monograph, January 1965).

The environmental statement has been revised to show that these guidelines will be followed.

Review by State and Local Agencies Developing and Enforcing Environmental Standards:

No problems or objections were presented.

APPROVED BY

Kenneth E. Grant
Administrator

DATE

2/24/71

COMMENTS OF THE STATE OF ILLINOIS



STATE OF ILLINOIS

SPRINGFIELD

JOHN W. LEWIS
DIRECTOR

DIVISION OF SOIL AND WATER CONSERVATION
JOSEPH BERTA III, SUPERINTENDENT

GORDON L. ROPEL
ASSISTANT DIRECTOR

September 2, 1970

Mr. Norman Berg, Administrator
U. S. Department of Agriculture
Soil Conservation Service
Washington, D. C. 20250

Dear Mr. Berg:

The work plans for UPPER MCKEE CREEK and LOWER MCKEE CREEK WATERSHEDS, and the environmental statements have been referred to our Department by Governor Ogilvie for comment.

My compliments to your service and the local sponsors for developing work plans which answer many critical development needs in this part of our state.

Proposed improvements including flood control, erosion control, municipal water supply, recreational development, fish and wildlife development, reforestation, and other purposes, when developed, will greatly enhance the economic and aesthetic values of the community.

Our Department, as well as other members of the Natural Resources Development Board, have reviewed the plans.

Please be assured that we are favorable to development of this watershed under P. L. 566.

Sincerely yours,

A handwritten signature in cursive script, reading "Joseph Berta III".

Joseph Berta III
Superintendent

JB:pa

cc Director John W. Lewis

COMMENTS OF THE DEPARTMENT OF THE ARMY



DEPARTMENT OF THE ARMY

WASHINGTON, D.C. 20310

September 25, 1970

Honorable Thomas K. Cowden
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Dr. Cowden:

In compliance with the provisions of Section 5 of Public Law 566, 83d Congress, the Administrator of the Soil Conservation Service, by letter of 13 August 1970, requested the views of the Secretary of the Army on the work plan for Lower McKee Creek (North Fork) Watershed, Adams, Brown and Pike Counties, Illinois.

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

Sincerely,

A handwritten signature in cursive script, reading "Robert E. Jordan, III".

Robert E. Jordan, III
Special Assistant to the Secretary of the Army
(Civil Functions)

COMMENTS OF THE DEPARTMENT OF THE INTERIOR



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

October 16, 1970

Dear Mr. Secretary:

This is in reply to the letter of August 13, 1970, from the Administrator of Soil Conservation Service, submitting for our review and comment the work plan for Lower McKee Creek (North Fork) Watershed, Illinois. In accordance with Section 2 of Executive Order 10913 and provisions of Section 5 of the Watershed Protection and Flood Prevention Act, as amended, this work plan has been reviewed by interested agencies of the Department of the Interior and the following comments are offered.

We note that the Corps of Engineers has been authorized to relocate and enlarge the present outlet channel of McKee Creek downstream from the Route 104 bridge at Chambersburg. We concur with the conclusion that the proposed channel and levee construction would not have an adverse effect on the Lower McKee Creek Watershed plan.

Our review indicates that domestic wastes from the communities in or near the watershed are potential sources of pollution due to untreated or partially treated effluent being discharged to this waterway.

The Village of Clayton has recently constructed sewage treatment facilities. These sewage treatment facilities were needed by the Village of Clayton because of impervious soil conditions, high water table and small lot sizes. We note that as a result of the above mentioned factors it had been impossible for the Village to develop satisfactory subsurface sewage disposal systems for individual homes. As a result, septic tank wastes drained directly into the roadside ditches in nearly all areas of the Village producing an obvious health hazard.

If these same soil and water table conditions prevail throughout the watershed, all home septic tank systems could also be discharging untreated or partially treated sewage to the roadside ditches and, in turn, to the water impoundments. This situation could be especially critical for the communities of Kingston and Beverly because of their

location in relation to Structure 10. The rural population located near the impoundments could similarly affect the water quality. A survey should be made by the appropriate health departments to determine if unsewered domestic wastes are, in fact, going to present a possible health hazard.

Wastes from agricultural sources can be a large source of pollution in the watershed. Although no detailed statistics on animal populations are given in the work plan, it is noted that as of January 1, 1970, Adams County had 61,400 cattle and 196,700 hogs, Brown County had 19,600 cattle and 58,400 hogs, and Pike County had 66,400 cattle and 282,600 hogs. If distribution throughout the counties can be assumed to be even, the Lower McKee Creek Watershed would have approximately 13,800 cattle and 45,000 hogs, producing considerably more waste than the human population. The work plan points out that at the present time pollution in the form of sediment drainage from hog lots is a problem causing some deterioration of fish habitat in McKee Creek. We therefore recommend that suitable diversion terraces be constructed to divert watershed drainage away from animal confinement areas and that sufficient silting basins, stabilization lagoons, and storage ponds be designed and installed for containing animal waste runoff prior to land disposal or other approved treatment techniques.

Peak daily use for all recreation activities at both impoundments combined is estimated to be 5,530 people. Any sanitary facilities provided for the public in connection with recreational use will require careful design and location. Care should be exercised in selecting sites for and providing adequate sanitation facilities and sewage treatment in the recreational areas. We note that flush-type toilets are proposed for the comfort stations at the picnic, camping, boat and beach areas, and a sewage disposal system is planned for the wastes at each facility.

The same degree of collection and treatment of wastes should be employed for any additional recreational developments to be built in the future. Installation of masonry vault privies should be approved only where more modern sanitary facilities are considered impractical or as a temporary expedient.

We recommend that, to protect water quality during the construction period, the contract specifications require all contractors to adhere

to guidelines for minimizing soil erosion and air pollution during construction as set forth in Soil Conservation Service "Engineering Memorandum-66".

General recreation and warmwater fishing opportunities will be improved with the project. While some wildlife habitat will be destroyed, loss prevention measures were not deemed necessary.

There appears to be a conflict of policy in paragraph 4, page 23, of the work plan. Here it is stated that "Development and preservation of wildlife cover as a part of land treatment will compensate for the loss of wildlife habitat." This appears to be in conflict with SCS Watershed Memorandum 102.

Section 101(b)(4) of the National Environmental Policy Act of 1969 provides for the preservation of important historic, cultural, and natural aspects of our national heritage. The Environmental Statement would be improved by considering these values.

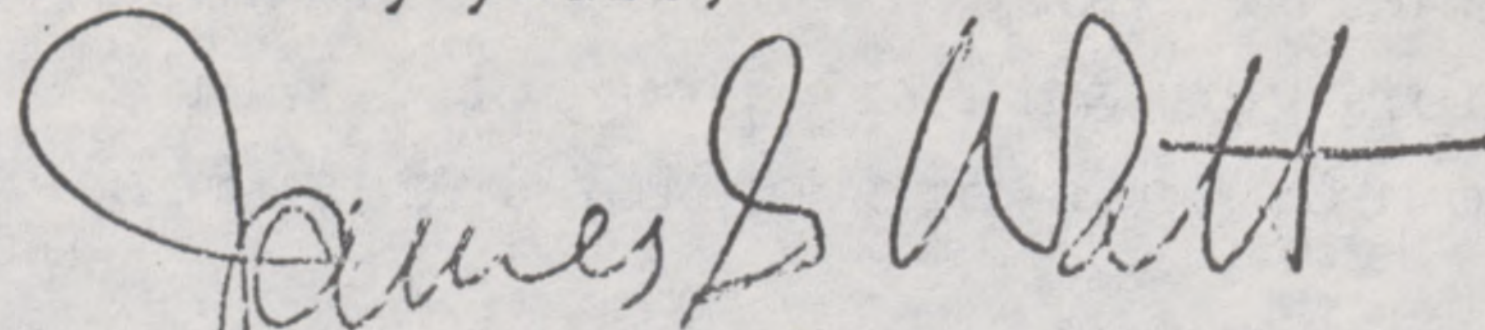
A loss of terrestrial wildlife habitat will result from construction of reservoir pools. Therefore, specific reference should be made to an irreversible and irretrievable loss of the wildlife resource under Item V. It is requested that the enclosed report of the Bureau of Sport Fisheries and Wildlife accompany the work plan when it is forwarded to the Congress.

For compliance with the requirements of the Federal Reservoir Salvage Act of 1960, Public Law 86-523, we request that the Director, Northeast Region, National Park Service, 143 South Third Street, Philadelphia, Pennsylvania 19106, be kept advised of the progress of this plan so that archeological surveys and any necessary salvage may be programmed and completed prior to construction of flood retarding structures.

We do not believe the measures described in the work plan would have any adverse effects upon the mineral industry of the area.

We appreciate the opportunity to review and comment on this watershed work plan, and provided that the above recommendations are considered, we have no objections to the proposed project.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "James B. Watt". The signature is fluid and cursive, with a large initial "J" and a long horizontal stroke at the end.

Deputy Assistant Secretary of the Interior

Honorable Clifford M. Hardin
Secretary of Agriculture
Washington, D.C. 20250

Enclosure



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
1005 WEST LAKE STREET
MINNEAPOLIS, MINNESOTA 55408

In reply refer to:

RB

May 15, 1968

Mr. L. H. Binnie
State Conservationist
Soil Conservation Service
200 West Church Street
Champaign, Illinois 61820

Dear Mr. Binnie:

The Bureau of Sport Fisheries and Wildlife, in cooperation with the Illinois Department of Conservation, has completed a study of the McKee Creek (North Fork) Watershed in Adams, Brown, and Pike Counties, Illinois. Planning assistance was authorized in February 1967. This report has been prepared under the provisions of Section 12 of the Watershed Protection and Flood Prevention Act (68 Stat. 666), as amended. Field observations and the Preliminary Investigation Report of October 1966 were sources of basic data. The Illinois Department of Conservation concurs with our project analysis and recommendations, as indicated in the attached copy of a letter of May 6, 1968 from Director William T. Lodge.

The 219,520-acre watershed is relatively flat in the north and northwest portions; the middle section is rolling and grades into the flat, Illinois River floodplain in the southeast. Small grain and row crops account for about 35 percent of land use. About 42 percent of the watershed is meadow pasture and woodland. Siloam Springs State Park is an important recreational center. The watershed lacks large bodies of water, either in the form of natural lakes or reservoirs.

Seventeen retention dams are being planned for installation. Their flood control pools will vary from 128 to 1,192 surface acres in size. Sites 4A, 7, 8, 12B and 17 also will impound recreational water storage. Most of the retention sites are located in areas of steep topography, wooded slopes, and marginal farming. No ditching operations are included in project planning.

The existing fish resource in McKee Creek Watershed provides few fishing opportunities for desirable species. Following project installation, the fishery potential will be greatly enhanced, providing recreational water storage or other permanent water is held at the several retention sites.

Quality sport fishery development in each pool will require the application of management techniques. These can best be provided by the Illinois Department of Conservation. For example, it may be necessary to eliminate

undesirable fish species in McKee Creek and tributaries prior to reservoir closure. Once the silt and recreational pools are filled, they must be stocked with a suitable game fish and possibly a forage species. As the impoundments age, fishery surveys would determine the need of other management measures. Siltation, excessive aquatic vegetation, pollution and unbalanced fish populations are several of the potential problems that may require attention before a productive and continuous fishery can be maintained. Too, it is most important that access be provided to each impoundment, including also those pools not developed for recreational purposes. The fishery potential cannot be realized, unless there is full utilization assured by access for the fishing public.

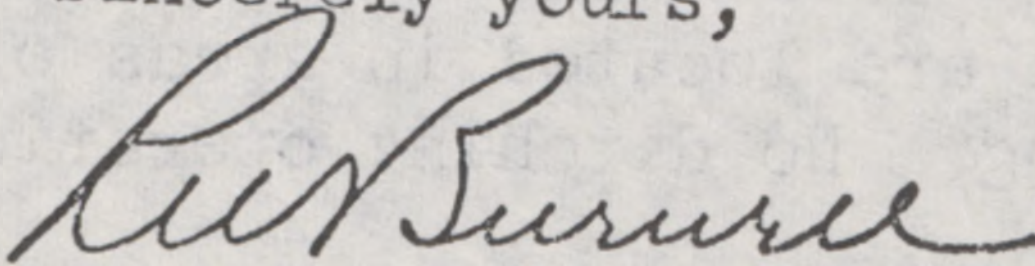
Approximately one-half of the watershed area provides good wildlife habitat. There is an excellent interspersed of farms, meadows, pasture and woodlands. Game species include quail, squirrels, deer, rabbit and dove. Fur animal species include the muskrat, mink, opossum, and raccoon. Migrating ducks and geese use the water areas, especially during spring and fall migrations. Deer hunting is very popular, as is small game and waterfowl shooting. Muskrat and mink are trapped, especially along McKee Creek and the larger tributaries.

Flooding the proposed retention reservoirs will destroy some terrestrial wildlife habitat. Protection of downstream lands from flooding may result in additional land being used for agriculture. However, this reduction in habitat will not be severe enough to reduce game populations. The increase in ponded water will benefit waterfowl and aquatic furbearers. Other resident game will utilize the pool peripheries, providing they are protected from grazing and agricultural encroachment.

The project will benefit the fishery and waterfowl resources in the area. Project incurred wildlife losses, as a result of the structural installation, will be minor; loss mitigation will not be necessary. Close coordination between project planners and Illinois Department of Conservation will help assure realization of project potentials for fish and wildlife.

We propose no further studies of the McKee Creek Watershed unless project proposals are significantly modified. Assistance rendered during the course of this study by your staff and the Illinois Department of Conservation is appreciated.

Sincerely yours,



R. W. Burwell
Regional Director

Attachment

STATE OF ILLINOIS

DEPARTMENT OF CONSERVATION

William T. Lodge
Director

SPRINGFIELD

May 6, 1968

Mr. S. E. Jorgensen
Assistant Regional Director
Bureau of Sport Fisheries and Wildlife
1006 West Lake Street
Minneapolis, Minnesota 55408

Dear Mr. Jorgensen:

We have reviewed the fish and wildlife report on McKee Creek Watershed and concur with the Bureau's statements on this watershed project.

Very truly yours,

/S/ William T. Lodge

William T. Lodge
Director

WTL/Hf

COMMENTS OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20201

October 21, 1970

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
Department of Agriculture
Washington, D.C. 20250

Dear Mr. Grant:

As requested in your letter of August 13, 1970, the work plan and draft environmental statement for Lower McKee Creek, Illinois, have been reviewed by the appropriate agencies of the Department that have an environmental interest.

The work plan describes a proposed multiple-purpose water resource development to be located on Lower McKee Creek in western Illinois near the Mississippi River. The work plan provides for the construction of six single-purpose floodwater retarding structures and two multiple-purpose structures for flood prevention and recreation including basic recreational facilities. Municipal water supply storage will also be included at one of the multiple-purpose structures. Various land treatment measures are also proposed to control erosion and sediment damages in the watershed.

We note that the work plan outlines comprehensive recreational developments, including adequate sanitary facilities, at the two multiple-purpose reservoirs. Water supply storage in one of the reservoirs will serve the city of Mt. Sterling, and replace the present supply which is inadequate both in quantity and quality.

Construction of this multiple-purpose water resource development should contribute significantly to the health and welfare of the people in this area. We recommend, however, that appropriate health guidelines outlined in the following publications be employed during the development and operation and maintenance stages of this project:

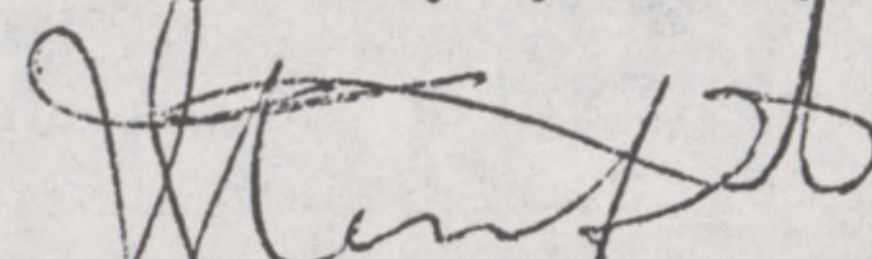
1. For any drinking water systems: the Public Health Service Drinking Water Standards (Public Health Service publication number 956) and the Manual for Evaluating Public Drinking Water Supplies (Public Health Service publication number 1820).

2. For recreational developments: Environmental Health Practices in Recreational Areas (Public Health Service publication number 1195).

3. For control of disease vector problems: Prevention and Control of Vector Problems Associated with Water Resources (Public Health Service monograph, January 1965).

With respect to our review of the draft environmental statement we have concluded that the project as proposed will have no significant adverse effect on environmental factors of concern to the Department of Health, Education, and Welfare. We have no objection to the authorization of this project insofar as the Department's interests and responsibilities are concerned.

Sincerely yours,



Roger O. Egeberg, M.D.
Assistant Secretary

for Health and Scientific Affairs

COMMENTS OF THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Washington, D. C. 20250

January 19, 1971

Honorable J. G. Watt
Deputy Assistant Secretary
Department of the Interior

Dear Mr. Watt:

This is in response to your letters of October 15 and 16 containing the comments of the Department of the Interior on the work plans for the Upper and Lower McKee Creek Watersheds in Illinois.

The comments noted that the recently constructed sewage treatment facility for the Village of Clayton is in the drainage area of structure 12-B, Upper McKee Creek Watershed, and that the work plan should provide for separating the sewage lagoon from the structure. It was also stated that chlorination is still needed as a part of the municipal treatment facilities for Clayton.

A check of our engineering plans shows that the toe of the fill for the lagoon is about five feet above the elevation of the maximum flood pool for structure 12-B. On this basis, it appears that there will be adequate separation of the lagoon and the structure. We have been advised by the State Water Pollution Control Bureau and the Adams County Health Department that chlorination facilities were installed in 1968 as a part of the sewage treatment facilities constructed by the Village of Clayton.

You also commented that the impervious soils and high water table which necessitated these facilities at Clayton might also be found at the Villages of Columbus, Kingston and Beverly. Our soil surveys indicate that the soils are impervious but a high water table is not a problem in these villages. The Adams County Public Health Department and the State Bureau of Public Water Supplies in the Environmental Protection Agency believe that septic tanks in these villages are not likely to create a health hazard. However, if they should become hazardous, the Environmental Protection Agency has authority and will use it if necessary to regulate the use of reservoirs for municipal water supply.

The Environmental Protection Agency also has authority over agricultural sources of pollution such as livestock feedlots. This agency considers livestock feeders in the same category as municipalities and they are required to treat their effluent to the same standards. Officials of the Environmental Protection Agency have informed us that they are unaware of any significant livestock concentrations and pollution problems in the watersheds and that they do not anticipate any problems with the proposed water supply reservoirs. As you recommended, diversion terraces, silting basins, and storage lagoons will be installed as a part of land treatment measures planned for the watersheds.

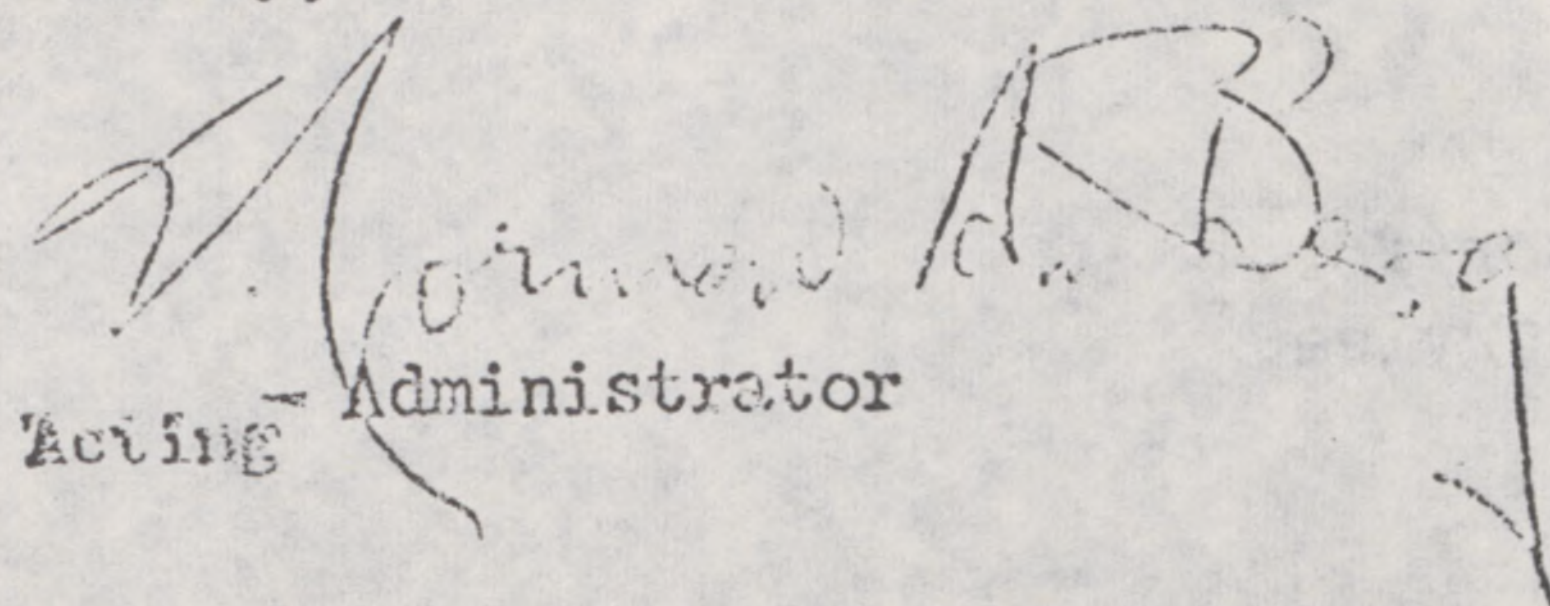
As requested, we will keep the Director, Northeast Region, National Park Service advised of the progress of the projects so that archeological surveys and any necessary salvage may be programmed and completed prior to the beginning of construction activities.

You also commented on a statement in the plans that "Development and preservation of wildlife cover as a part of land treatment will compensate for the loss of wildlife habitat." You indicate that this appears to conflict with our policy that land treatment measures are not adequate mitigation for damages caused by structural measures. The Bureau of Sport Fisheries and Wildlife found and we concur that wildlife losses from the structural measures would be minor and that mitigation measures would not be necessary. It was for this reason that the statement was made rather than to imply that land treatment measures are considered to be mitigation measures.

As you suggest, we will modify the environmental statement to make reference to (1) the irreversible and irretrievable loss of wildlife habitat resulting from construction of the reservoir pools, and (2) the possibility of important cultural, historic and natural aspects being affected by the project.

Thank you for calling these matters to our attention and for the opportunity to provide this explanation.

Sincerely,


Acting Administrator

COMMENTS OF THE DEPARTMENT OF LABOR

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION
WASHINGTON, D.C. 20210

September 8, 1970

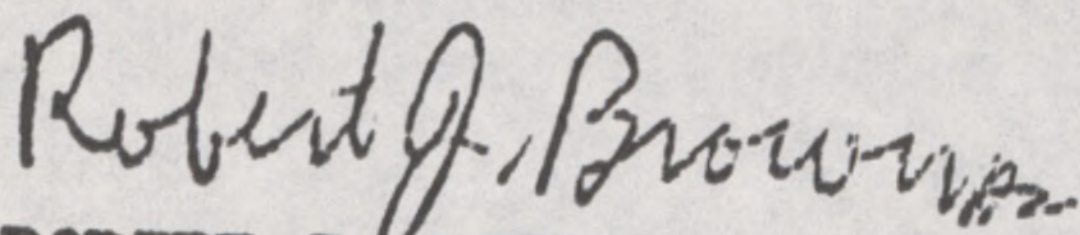
Mr. Norman A. Berg
Acting Administrator
Soil Conservation Service
Department of Agriculture
Washington, D.C. 20250

Dear Mr. Berg:

As requested in your letter of August 13, 1970 to the Secretary of Labor, we are providing you with our comments regarding the proposed report of the Department of Agriculture concerning the Watershed Work Plan for the Lower McKee (North Fork) Watershed, Illinois.

While the project is expected to have little long-term impact on increasing job opportunities in the project area, the report suggests that benefits will accrue to the area through an increase in the water supply for municipal usage, help improve wildlife habitat, and result in some increase in farm income and land values.

In view of the above considerations, the Department of Labor endorses this project, assuming that it otherwise meets standards set forth in pertinent laws.



ROBERT J. BROWN
Associate Manpower Administrator for
U.S. Training and Employment Service

WATERSHED WORK PLAN
LOWER McKEE CREEK
(NORTH FORK)
WATERSHED
ADAMS, BROWN, AND PIKE COUNTIES, ILLINOIS

WATERSHED WORK PLAN

LOWER McKEE CREEK (NORTH FORK) WATERSHED

Adams, Brown, and Pike Counties, Illinois

Prepared Under the Authority of the Watershed
Protection and Flood Prevention Act (Public
Law 566, 83rd Congress, 68 Stat. 666), as amended.

Prepared by:

McKee Creek Watershed Conservancy District
Adams County Soil and Water Conservation District
Brown County Soil and Water Conservation District
Pike County Soil and Water Conservation District
City of Mt. Sterling

With assistance by:

U. S. Department of Agriculture, Soil Conservation Service

U. S. Department of Agriculture, Forest Service

January 1971

LOWER McKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

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PROJECT MAP

WATERSHED WORK PLAN

LOWER MCKEE CREEK (NORTH FORK) WATERSHED

Adams, Brown, and Pike Counties, Illinois

January 1971

SUMMARY OF PLAN

Lower McKee Creek (North Fork) Watershed covers a 128,000-acre area in Adams, Brown, and Pike Counties, Illinois.

Sponsors of the watershed work plan are the Soil and Water Conservation Districts of Adams, Brown, and Pike Counties, McKee Creek Watershed Conservancy District, and the city of Mt. Sterling.

Technical assistance in the preparation of the plan was furnished by the U. S. Department of Agriculture's Soil Conservation Service and Forest Service; U. S. Department of Interior, Fish and Wildlife Service; and the State of Illinois, Department of Conservation.

Sheet and gully erosion in the upland areas has reduced soil productivity and scarred the landscape. Resulting sediments clog the downstream channels and/or are deposited as infertile overwash in selected areas.

Floodwater damage is a major watershed problem. Flooding has caused extensive damage to crops, pasture, farm fences, roads, and bridges. Approximately 11,210 acres downstream from the planned structures in Upper and Lower McKee Creek Watersheds are subject to flooding and/or have impaired drainage. Extensive annual crop losses occur because of these problems. Installation of structural measures in Lower McKee Creek Watershed will benefit directly about 8,480 acres in Lower McKee Creek Watershed.

Quality and quantity of municipal water supply in Mt. Sterling has severely curtailed economic growth. Demand for high quality water-based recreation facilities far exceed the supply within a 50-mile radius of the watershed.

The sponsoring local organizations have developed a plan to (1) reduce soil and water losses from the uplands, (2) alleviate floodwater damage, (3) provide municipal water supply needs, and (4) provide water-oriented recreation facilities. Proposed structural measures would include 6 floodwater retarding structures and 2 multiple-purpose reservoirs

The respective soil and water conservation districts have provided technical assistance to prepare basic conservation plans covering an

estimated 27,000 acres of the watershed area. Approximately 25 percent of the watershed area is under cooperator agreement with the local districts.

Watershed farmers have, with Agriculture Conservation Program cost-sharing assistance, spent about \$815,260 to install land treatment measures. Major emphasis has been placed on farm ponds, pasture improvement, grade stabilization structures, and grassed waterways.

Other than P.L. 566 costs for proposed land treatment measures are estimated to be \$2,388,500. Included in these costs is \$197,400 for technical assistance. P.L. 566 costs are estimated to be \$512,000. An estimated \$37,800 of the P.L. 566 funds will be used to conduct soil surveys of the watershed.

Installation of planned forestry measures on about 2,460 acres of privately-owned land is estimated to cost \$25,100. Local installation costs are estimated to be \$13,300 while technical assistance costs are \$11,800. Technical assistance will be provided for by the existing State and Federal Cooperative Forest Management Programs.

Planned structural measures consist of 6 floodwater retarding structures, one multiple-purpose (flood prevention-recreation) reservoir with basic recreation facilities and one multiple-purpose (flood prevention-municipal water supply-recreation) reservoir with basic recreation facilities. Costs for structural measures are estimated to total \$5,119,500; the P.L. 566 share of this cost is \$3,450,900 while the other than P.L. 566 costs are \$1,668,600.

Project installation is scheduled to be completed in a 10-year period. The McKee Creek Watershed Conservancy District, and the city of Mt. Sterling will defray other than P.L. 566 costs for construction, engineering services, land rights, and project administration.

The aforementioned organizations will also operate and maintain the structural measures and related facilities. Average annual operation and maintenance costs are estimated to be \$107,100.

Local landowners and farm operators will install and maintain land treatment measures in accordance with their agreements with the Soil and Water Conservation Districts of Adams, Brown, and Pike Counties.

Installation of the planned works of improvement will directly benefit more than 300 landowners and farm operators and approximately 253,300 users of the multiple-purpose reservoirs and recreational facilities. Expanded demand for goods and services will stimulate business activity in the local area economy, thereby directly and indirectly benefiting a bulk of the watershed's 5,000 person population.

Average annual benefits from structural measures are estimated to be \$557,100. Average annual costs will be \$358,800; the benefit-cost ratio is 1.6:1.0.

DESCRIPTION OF THE WATERSHED

Physical Data

Lower McKee Creek Watershed is an area of approximately 128,000 acres (or 200 square miles) in the western part of Illinois. The area consists of about 41,200 acres in Adams County, 18,600 acres in Pike County, and 68,200 acres in Brown County. This watershed project is one of two which covers the lands in the McKee Creek Conservancy District. U. S. Route 24 parallels the northern watershed boundary with the city of Mt. Sterling, county seat of Brown County, lying on the northeastern watershed divide.

The topography is characterized by broad relatively flat upland areas along the northern watershed boundary and by sharply dissected areas near the major water courses with narrow steep valleys and narrow rolling ridges. A well developed dendritic drainage pattern has developed and effectively channels runoff from all areas except the flat upland. These areas were originally poorly drained prior to installation of drainage improvements. Elevations range from 840 feet in the uplands of the watershed to 430 feet at the confluence with the Illinois, a total fall of 410 feet in approximately 47 miles.

The watershed is underlain by nearly flat lying limestone strata of Mississippian age and sandstone and shale strata of Pennsylvanian age. Outcrops are common along the main water courses. There are no known mineable coal reserves in the watershed.

Kansan and possibly earlier Nebraskan stage glacial outwash and till overlies the watershed bedrock surface. Illinoian stage till is found in the northern portion of Lower McKee Creek. The Wisconsin stage ice sheet did not advance into this area but a considerable amount of outwash consisting of sand, gravel, and silt was deposited in most of the major valleys.

Four major soil associations occur in Lower McKee Creek. The north fringe upland areas are characterized by dark colored, deep, nearly level, prairie soil. Directly downstream are found gently sloping to steep, light colored, forest soils. This association comprises the bulk of the watershed area. The bottomland association is predominantly light colored, deep, nearly level, alluvium. The eastern tip contains gently sloping to steep well drained easily eroded forest soils.

McKee Creek rises in the extreme northwest corner of the Upper McKee Creek Watershed near the town of Paloma and flows into the Illinois River

4 miles southeast of Chambersburg. The upstream end of Lower McKee is at the confluence of McKee Creek and Walnut Creek. Principal tributaries of Lower McKee Creek are Fishhook Creek, Little Missouri, and Dry Fork.

Approximately 15.2 percent (19,400 acres) of the watershed is in forest cover. It has been determined that 70 percent of the forest land is in very poor hydrologic condition, 30 percent is in poor condition, and none is in fair or good condition.

Average annual rainfall for the watershed area is 35 inches based on Illinois State Water Survey publications. Average annual snowfall is 19 inches. Mean annual runoff is 8 inches. Temperatures range from a mean January temperature of 29 degrees to a mean July temperature of 79 degrees. Mean annual temperature is 52 degrees. Frost-free season averages 185 days.

Economic Data

Diverse farming operations are found in Lower McKee Creek. Cash grain farming predominates in the upland areas with corn, soybeans, and wheat being the principal crops harvested. In the more hilly regions of the watershed, farming enterprises include cattle and hog feeding and some dairy operations. Approximately 70 percent of the watershed farms are corn-hog operations with relatively little grain sold from the farm. An estimated 60 percent of farm income is derived from the sale of livestock (cattle and hogs).

Land use is as follows:

	Acres		
	<u>Upland</u>	<u>Bottomland</u>	<u>Total</u>
Cropland	46,100	7,500	53,600
Grassland or pasture	44,600	800	45,400
Woodland	18,400	1,000	19,400
Miscellaneous, idle	<u>9,200</u>	<u>400</u>	<u>9,600</u>
Totals	118,300	9,700	128,000

About 80 percent of the flood plain area is used for row crop (corn and soybeans) production. Without project flood-free corn yields are expected to average 115 bushels per acre. Comparable soybean yields are estimated at 36 bushels per acre.

The farmland consists of about 500 operating units averaging about 250 acres. Except Siloam Springs State Park, the watershed is in private ownership. Of the farmland, 75 percent is farmed by the owner.

Total watershed population is estimated to be 5,000. Rural population is about 2,200; approximately 2,800 people live in Mt. Sterling and Versailles.

Farm population in Brown County declined by approximately 30 percent during the period from 1940 to 1968. Much of the decline in population was the result of the consolidation of farm units; median farm size is now estimated to be in excess of 250 acres.

Further consolidation of farms is expected, particularly in the level upland and bottomland areas. Grain farming is expected to dominate in the areas suited to the large equipment required for this type of enterprise.

A trend toward livestock (herds or feeding) operations is developing in the more sloping upland areas. This is expected to continue as more of the smaller fields are retired from cropland and utilized for pasture.

Current land values are estimated to vary from \$50-\$800 in the upland areas and from \$200-\$400 on the flood plain areas.

Although the economy of the watershed is geared primarily to agriculture, there are some off-farm employment opportunities provided in Mt. Sterling.

Present forest stands occupying 15 percent of the watershed area include 50 percent in oak-hickory types. The mixed upland hardwood types cover 45 percent of the area. Bottomland hardwood types cover the remaining 5 percent. About 30 percent of the forest stands are in sawtimber size, 50 percent in pole size stands, and 20 percent in stands consisting of seedlings and saplings.

Local forest markets are fair for saw logs, and very good for veneer logs. Stave bolts for use in barrel manufacture are also in very good demand.

There are 3,026 acres of forest land in public ownership located within the Siloam Springs State Park. The remaining forest land is held by an estimated 300 owners. The average size private forest ownership is approximately 55 acres.

Adequate forest fire protection is provided on private land by local fire departments and on state park land by the Illinois Department of Conservation, in cooperation with the U. S. Forest Service through the Clarke-McNary Cooperative Forest Fire Control Program. There is no record of any reported fires during the past 5 years. Other current federal-state forestry programs include Cooperative Forest Management and Cooperative Forestation. Given protection, care, and management the forest stands are expected to increase their contribution to the economy of the watershed.

The watershed is served by an extensive system of roads (see project map). These include State Highways 24 and 104. This system is considered adequate except when interrupted by high water or erosion damage.

Land Treatment Data

Lower McKee Creek Watershed is served by the Soil and Water Conservation Districts of Adams, Pike, and Brown Counties. Technical assistance is provided by the Soil Conservation Service through the Quincy, Pittsfield, and Mt. Sterling Work Units.

There are 160 soil and water conservation district cooperators with a total of 32,000 acres, or about 25 percent of the watershed, covered by agreement. The work units, through 2 districts have assisted farmers in preparing 135 soil and water conservation plans on 27,000 acres, or about 21 percent of the watershed. Details on the quantities of and costs for land treatment already installed are shown in Table 1A.

Available current federal-state forestry programs with technical assistance furnished by the Illinois Department of Conservation, Division of Forestry, cooperating with the U. S. Forest Service include: Cooperative Forest Management and Cooperative Forestation. These going programs provide technical assistance in forest protection, care, and management to the landowners.

Fish and Wildlife Resource Data

McKee Creek receives moderate fishing usage. Fishing is considered to be good. Major species caught are smallmouth bass, channel catfish, sunfish, carp, carpsuckers, and redhorse. There is excellent interspersion of farms, meadows, pasture, and woodlands which provide good wildlife habitat. There are good population of quail, squirrels, deer, and rabbits. Doves are also present. Hunting pressure for small game is moderate; for deer heavy. Furbearers are abundant.

WATERSHED PROBLEMS

Sheet Erosion

Severe sheet erosion is occurring in many areas of the agricultural portion of the watershed due to the steepness of many cropland slopes and the lack of adequate protective treatment. Continuation of this rate of sheet erosion would bring about a gradual decline in the productivity of the watershed lands and contribute to the excessive sediment damages downstream.

The amount of soil loss from sheet erosion under present condition and with the planned land treatment measures installed was studied and computed for use in formulating an adequate land treatment program for watershed protection and estimating sediment storage requirements in the sediment pools of the planned structures. The present rate of sheet erosion averaged over the 118,300-acre upland portion of the watershed area is estimated to be 4.1 tons per acre per year. The present average rate of erosion from all sources averaged over the upland is about 4.7 tons per acre per year.

Gully Erosion

Past gully erosion has caused land destruction and depreciation throughout the upland areas of the watershed. Gullies have developed to the extent that highly productive upland areas are now subject to damage. On-farm stabilization structures are needed to (1) reduce gully advances and (2) provide outlets for stable drainage systems.

It is estimated that 890 stabilization structures, farm ponds, and drainage structures are needed to adequately protect the upland.

Sediment Damage

Under present conditions the amount of sediment from all sources including sheet, roadside, gully, and channel erosion delivered annually to the 8 planned reservoirs is estimated to total 135 acre-feet. Annual sediment delivery rates were found to vary from 1.4 to 1.7 acre-feet per square mile drainage area. The Mt. Sterling city reservoir has been filling with sediment at the rate of 3.6 tons per acre per year according to Illinois State Water Survey reports.

On the flood plain, sediment and debris left by receding floodwater fills surface ditches, blocks tile outlets, and often reduces fertility. The average annual sedimentation damages to the Lower McKee Creek flood plain are estimated to be \$4,700.

Floodwater Damage

An estimated 8,480 acres in Lower McKee Creek Watershed are either subject to flooding or have impaired drainage. Approximately 7,240 acres are subject to flood overflow and the remaining 1,240 acres have some degree of impaired drainage.

Floods are characterized by frequent high velocity overflow. Although flood depths and durations vary throughout the watershed, flood depths greater than 3 feet and durations greater than 24 hours are common. In most flood plain areas, 2 to 3 overflow events can be expected each year. The most significant factors affecting average annual damages are the large number of floods and the high overflow velocity.

Approximately 76 percent of the floods occur during the growing months, April through November. Half of these events occur during the planting months of April, May, and June. Growing season floods delay tillage, increase tillage costs, delay planting, increase planting costs, damage growing or mature crops, and delay harvesting operations. Non-growing season floods hamper fall plowing; cause sedimentation, trash, and scour damage; and decrease fertility.

In spite of the high flood hazard, intense cropping of most flood plain areas continues. On many farms this land is the only tillable

land suited to intensive cultivation. Therefore, other agricultural improvements such as fences, field roads, and field crossings require continuous maintenance.

Approximately 9.6 miles of secondary roads are subject to flood-water damage. Direct damages consist mainly of cost for replacing gravel, removing flood deposited debris, and cleaning out road ditches. Fifteen bridges over Lower McKee Creek and its major tributaries are subject to floodwater damage. Principal sources of bridge damage are high velocity flows which scour around abutments and undermine footings and ice and logs which batter supports and block bridge openings. During larger floods, bridges are seriously damaged and sometimes wash out.

Indirect floodwater damages are disruption of traffic and delays in marketing farm produce. Other tangible damages to health result from pollution of well water and mosquito hazards.

Average Annual Flood Damages

<u>Items</u>	<u>Dollars</u>
Direct damage	
Floodwater	
Crop and pasture	197,800
Other agriculture	8,000
Road and bridge	11,200
Sediment	4,700
Indirect damage	<u>23,300</u>
Total damages	245,000

In October 1969, before corn harvesting was underway, a 9-inch rain fell in a 3-day period. Field measurements indicate the resulting flood inundated 5,630 acres in Lower McKee Creek Watershed. Crop and pasture damages were estimated to be \$40,000. Other damages were estimated to be \$45,000 including \$40,000 for one bridge which was washed out. This flood has an estimated recurrence frequency of once every 2 years.

Problems Relating to Water Management

Drainage

Approximately 8,500 acres of gently rolling upland and 6,480 acres of bottomland have both surface and subsurface drainage problems. The upland area drainage problems are most severe in depressional areas and natural water courses. Bottomland drainage is impaired because (1) natural levees along the major streams block outlets, (2) floodwater overloads drainage systems, and (3) high velocity flood flows damage tile outlets and induce a high amount of maintenance. These drainage impairments delay planting, lower planting temperatures, cause weed control problems, retard crop growth, and increase operating expenses. These factors reduce yields and lower profits.

Municipal and Industrial Water

The city of Mt. Sterling presently has a municipal water system. It receives water from a municipally-owned reservoir which is nearly filled with sediment. Available water supplies are barely adequate for the present needs. In 1954 the present water supply failed and an emergency 8-mile pipeline was laid to the LaMoine River. The lack of adequate water has contributed to the stagnant economic condition in Mt. Sterling.

Consulting engineers employed by the city of Mt. Sterling have estimated the population of Mt. Sterling to be about 2,900 in the year 2020. Future water demands are expected to be 130 gallons per capita per day as compared to the 80 gallons per day at present.

Recreation

In spite of the close proximity to the Illinois River (15 miles), the demand for water-oriented recreational facilities far exceeds the area's present resources. The highest potential for recreation development is in the categories of campgrounds, fishing and hunting areas, picnic grounds, and vacation cabins.

Only 3 Illinois State parks fall within a 50-mile radius of Lower McKee. These have a combined area of 4,230 acres. However, only two of these parks have water based recreational facilities and these facilities do not include swimming. The largest lake presently available for public use within the 50-mile radius is less than 300 acres.

A study of U. S. Census data indicates population within a 50-mile radius will increase from 354,200 in 1960 to an estimated 405,100 in 2000. Increased leisure time in the future, coupled with improved highways, will enhance the area's potential as a recreation center for persons outside a 50-mile radius.

Fish and Wildlife

Although McKee Creek provides good fishing for a moderate number of fisherman, reservoir fishing is limited by a lack of impoundments. Pollution in the form of sediment is a problem causing some deterioration of fish habitat in McKee Creek.

Water Quality

Data from the Illinois State Sanitary Water Board in cooperation with the Illinois Department of Public Health indicates water quality in McKee Creek is good. Bimonthly samples are taken and analyzed at the bridge at Chambersburg.

Controlled disposal of animal wastes in conjunction with reducing erosion and resultant sedimentation is necessary to insure satisfactory

water quality in the watershed. Increased livestock populations (cattle and swine) will in all probability be in the form of confinement feeding operations.

The State Sanitary Water Board encourages dry handling of manure with maximum diversion of roof and watershed drainage away from feedlot and shelter areas. Where manure handling is by water-carry methods, sufficient lagoon surface water storage must be provided for period of time between land applications and anticipated rainfall and runoff.

PROJECTS OF OTHER AGENCIES

The U. S. Army Corps of Engineers is authorized by the Flood Control Act of 1962 to relocate and enlarge the present McKee Creek outlet channel downstream from the Route 104 bridge at Chambersburg. Some levee improvement and relocation are also authorized. These improvements are planned to provide flood protection to the McGee Drainage and Levee District. The Corps project is included in their active program and is eligible for construction when Congress appropriates the necessary funds. The channel and levee construction would not have an adverse effect on the proposed Lower McKee Creek Watershed improvements and vice versa.

PROJECT FORMULATION

The people of the Lower McKee Creek Watershed recognize the need for a comprehensive approach to the watershed problems. The McKee Creek Conservancy District provides the legal means by which the landowners in the watershed may collectively develop a P.L. 566 project. The McKee Creek Conservancy District, the Soil and Water Conservation Districts of Adams, Brown, and Pike Counties, and the Soil Conservation Service agree to the following objectives:

- (1) Maintenance of soil productivity by the prevention of excessive erosion and holding the maximum amount of moisture in the soil.
- (2) Reduction of floodwater damage to crop and pastureland by the use of floodwater retarding structures.
- (3) Inclusion of water supply storage for municipal and industrial use.
- (4) Inclusion of recreation water and development of recreational facilities for public use.
- (5) Reduction of sedimentation due to erosion.

The protection of watershed lands to permit sustained future production was considered necessary. Therefore, installation of land treatment measures that would reduce sheet erosion soil losses in such amounts that

would not impair future crop yields on the various soil types was considered essential. An accelerated program for installing such land treatment measures is included in the project. These land treatment measures will reduce sediment production which will strengthen the family farms, aid in providing for a more permanent agriculture, and safeguard the designed life of the proposed structural measures.

The control of gullies was of major concern. Control measures that affect several farms and that require group action for their installation were considered as possible project measures for flood prevention which, if found feasible, would be installed with funds available under authority of the act. However, land treatment studies indicated that the control points were generally found on individual farms. This conclusion was substantiated by preliminary geologic, engineering, and economic studies of control measures which indicated that major grade stabilization structures were not economically feasible at the sites studied. The conservancy district and the Soil Conservation Service agreed that cost-sharing assistance through P.L. 566 was needed to aid in the installation of the minor grade stabilization structures on individual farms.

Floodwater damage is a serious problem in the bottomland areas of McKee Creek. The preliminary investigation indicated that floodwater damages could be reduced on this watershed by 72 percent. It was agreed by the Service and the local sponsoring organizations that this reduction would be a minimum that would be accepted. It was agreed that a higher percent reduction of damages would be very desirable and that economical units of structural measures would be added wherever possible to raise the level of protection. It was also agreed that noneconomical structural measures if identified would be excluded from the plan.

The McKee Creek Conservancy District trustees working with the Soil Conservation Service selected a system of physically feasible and economically justified tributary structures formulated to provide the highest degree of economically sound flood protection. The watershed topography provides numerous sites for dam construction. However, alternate site locations and structure combinations were studied in an effort to minimize costs and maximize system benefits.

Upper McKee and Lower McKee were studied jointly to give full consideration to the combined effects of all structural measures. The proportionately large damaged area located on the main stem of Lower McKee was a major factor. It was determined that a system of floodwater retarding structures located on major tributaries could provide a satisfactory reduction in acres flooded and duration of flooding. The system of floodwater retarding structures selected provides the most efficient means of reducing these damages.

Structure 4A, located within 4 miles of Mt. Sterling, was selected to provide additional municipal and industrial water supply for that city. Additional storage was provided in the quantity recommended by the city

council. Studies by engineering consultants indicated that the storage provided will adequately meet present and future needs.

Structure 4A also included permanent storage for water-based recreation. An agreed upon recreational-municipal use pool of 292 acres and basic facilities will be developed to serve the rural area in and around the watershed and the city of Mt. Sterling.

Structure 8 will provide permanent storage for water-based recreation. The 2,500-acre development will include (1) an 800-acre reservoir and (2) an additional 1,700 acres for the flood pool and recreation facilities area.

Structure 8 was selected to provide additional water for recreation primarily for residents of Adams, Pike, Scott, and Morgan Counties. The proposed recreation area will be 2 miles south of the existing Siloam Springs State Park in an area which possesses considerable scenic potential. It is the intent of the McKee Creek Conservancy District that the recreation lake and development at site 8 ultimately be annexed to the Siloam Springs State Park. However, the State Department of Conservation could not make a commitment at this time for participation in the development of this lake and recreation area because of their budget situation. The Department of Conservation did assist in the preliminary layout of the facilities so that road relocation and rearrangement of the facilities will be negligible if and when the state is able to participate in this development.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

Land treatment measures to be installed will be based on using each acre within its capabilities and treating it in accordance with its needs. Such a program is now being carried out by the Soil and Water Conservation Districts of Adams, Brown, and Pike Counties. Emphasis will be placed on accelerating the establishment of land treatment practices which have a significant effect on the reduction of erosion and floodwater damage.

Soil surveys will be made on 94,500 acres. This information will be used by landowners and others in planning proper land use and treatment.

An estimated 210 conservation plans will be prepared during the 10-year installation period. These plans will represent a record of management decisions by landowners and will be the basis for timely installation of land treatment measures.

Acres to be treated and estimated costs for the 10-year installation period are shown in Table 1. Installation and maintenance of land treatment measures will continue after this period.

Cropland subject to erosion will be protected by use of conservation cropping systems and erosion and control measures such as contour farming, terraces, diversions, stabilization structures, grassed waterways, and minimum tillage. Poorly drained areas will be improved through the use of surface field ditches and outlet ditches where needed.

Forestry practices will be applied to improve the hydrologic condition of watershed woodlands and to improve the timber stand. Forest management plans will provide for fire protection, livestock exclusion, insect and disease protection, species selection, stand composition, thinning, cultural and sanitation work, needed tree planting and interplanting, harvest cutting, and wildlife needs.

The forestry program shown in Table 1 was developed for private lands from a statement of land treatment needs prepared by the Illinois Department of Conservation, Division of Forestry, and the U. S. Forest Service as determined by a field survey.

To provide for proper installation and maintenance of approved measures, individual management and planting plans will be prepared for approximately 41 forest-land owners, involving 828 acres. This service together with other technical assistance to landowners insures that watershed values are not impaired.

Pasture and hayland will be treated to improve vegetative cover, thus reducing soil and water losses and increasing hay or pasture production. Treatment will consist of seeding adapted species, applying required plant nutrients, controlling undesirable or competitive vegetation, and limiting grazing for sustained production. Farm ponds for livestock water will be installed for improved pasture utilization.

Wildlife habitat development will be applied to enhance the wildlife resource. Such development will consist essentially of establishing, maintaining, and preserving vegetation suitable for protection and propagation of desired wildlife species. Practices beneficial to wildlife, such as hedgerows and field borders, will also be included in conservation plans where applicable and needed on land devoted to other purposes and to replace habitat lost in establishment of erosion control practices.

Other land including feed lots, farm lanes, roadsides, borrow pits, and other areas subject to critical erosion will be shaped, seeded or protected by diversions where necessary to control erosion and siltation.

Structural Measures

Six floodwater retarding structures and 2 multiple-purpose reservoirs will be installed at locations shown on the project map.

These structures will temporarily detain runoff from 84.5 square miles representing 42 percent of Lower McKee Creek Watershed and 25 percent of McKee Creek at its confluence with the Illinois River. A total of 2,834 acres of land will be covered by the flood pools formed by these structures. The permanent pools, including areas reserved for sediment, water supply and recreation, will cover 1,419 acres. Construction and borrow areas will require another 250 acres.

The 8 structures will have a combined storage capacity of 49,303 acre-feet. Total floodwater detention capacity will total 26,180 acre-feet. Municipal and industrial water storage of 1,020 acre-feet and 13,380 acre-feet of recreation storage will be provided. The sediment storage of 8,723 acre-feet will be adequate for an estimated 100-year accumulation. Floodwater detention capacity, expressed in inches of runoff from the drainage area of the structure, is 5.5 inches. This is a storm with only a 2 percent chance of occurrence. Runoff from the most recent major storm, October 1969, was estimated at 1.3 inches.

The 8 structures will be compacted earth fill dams with reinforced concrete principal spillways and vegetated emergency spillways. (See Plates CP-9 and SS-14.) The principal spillways of the structures will be reinforced concrete 2-stage inlets with reinforced concrete pipe or monolithic box conduits. The outlet sections will be armored plunge pools, reinforced concrete impact, or S.A.F. stilling basins. All structures will be provided with drain valve, conduit, and inlet appurtenances. Water intake tower and water distribution lines will be installed in conjunction with structure 4A.

The vegetated spillways of structures 5, 9, 10, and 11 are planned so that their chance of operation will be less than once in 50 years. Structures 4A, 6, 7, and 8 are planned to operate once in 100 years. The vegetated spillways will be cut through ridges of stiff silty and sandy clay Illinoian till and outlet below the downstream toe of the embankment. No rock excavation or any other significant problems are expected to be involved in the emergency spillway excavation. Emergency spillway excavation may be used as fill material. The type and dimensions of emergency spillway may be modified prior to final design for structures 5 and 8 dependent upon further geologic study of spillway area. Additional cost has been included in the estimates to cover this contingency.

Good quality borrow material is plentiful and easily accessible from the proposed borrow areas on the right or left abutments composed of Illinoian till.

Foundation conditions at most structure sites consist of 10 to 20 feet of unconsolidated alluvial materials which are probably, in part, permeable. This condition will be solved by the construction of an impermeable core trench combined with a drainage system under the downstream toe of the embankment that will intercept any seepage through the foundation and embankment. Additional cost has been included for structure 8

to cover possible foundation treatment contingent upon pressure testing during design studies.

Multiple-purpose structure 4A (10 square miles drainage area) will provide 1,380 acre-feet of recreation water, 1,020 acre-feet of municipal and industrial water supply, 3,420 acre-feet of floodwater detention, and 1,034 acre-feet of sediment storage. This structure will have a permanent pool area of 292 acres and a shoreline of about 17 miles. An additional 522 acres will include the temporary flood pool, dam site, borrow areas, spillway area, and foot paths. About 42 acres outside the proposed taking area will be temporarily flooded on occasion and will require flowage easements prior to dam construction.

Recreational facilities areas total 192 acres and include beach and bathhouse complex, boat launching and marina area, and nature study areas with trails. These facilities include access roads, picnic tables and grills, flush toilets, twin boat launching ramp, parking area at each facility, signs, open field grass seeding and tree plantings, water lines, exterior fencing, shelters, power lines with lighting and trailer outlets, and sewage disposal system for each facility. The reservoir will be stocked with suitable game fish. Areas for undisturbed fishing will be developed through reservoir zoning plan.

The recreational development area is located on a flat ridge between the east and west branches of Dry Fork Creek. Park and recreation development potential of this excellent area is enhanced by a good growth of native timber estimated to be more than 30 years old, an abundance of flowering plants and shrubs, and the topographic features of the shore line with its many bays and points.

Multiple-purpose structure 8 (26.4 square miles drainage area) will provide 12,000 acre-feet of recreation water, 9,490 acre-feet of floodwater detention, and 2,638 acre-feet of sediment storage. This reservoir will have a permanent pool area of 800 acres and a shoreline of about 20 miles. An additional 450 acres will include the temporary flood pool, dam site, borrow areas, spillway area, and foot paths. Also, about 19 acres outside the proposed taking area will be temporarily flooded on occasion and will require flowage easements prior to dam construction. Recreational facilities areas total 1,600 acres and include marina area, swimming beach with bathhouse, camping and picnicking areas, environmental study area, trails, and overlook. Parking will be provided at each of these facilities. The major portion of the recreational facilities for site 8 will be located on the east and north end of the reservoir.

A total land area of 2500 acres is to be purchased for recreation development now with an additional 520 acres to be purchased by the McKee Creek Conservancy District for future recreation development. This 2500-acre area is comprised of the dam and spillway, the total normal pool area, the flood pool area with exception of temporary flooded areas

in the upstream heads of the flood pool lying well above the permanent water line, and an area lying around the reservoir which will assure full public use of the recreation facilities at all times.

Recreational facilities to be included in these developments are listed in Table 2B. Locations of the proposed facilities are shown in the recreational development maps. Both of these developments are planned in accordance with state and local health regulations.

Some building of camp sites and fishing areas around the sediment pools of the 6 floodwater retarding structures is expected. The McKee Creek Conservancy District will require that all such recreational developments be planned, constructed, and operated in accordance with state and local health regulations.

The following modifications of existing improvements and utilities will be required by project installation. These costs are included in the total "Land Rights" costs as shown in Table 2.

Structure No.	Telephone & Power Relocations		Road Relocations		
	Miles	Cost in \$	Miles	Roadway on Fill	Cost in \$
4A	1.00	9,000	0.50 ^{1/}	yes	9,400 (7,700) ^{2/}
5	----	---	----	no	---
6	----	---	0.25 ^{1/}	yes	(7,400) ^{2/}
7	----	---	0.25	yes	(10,500) ^{2/}
8	----	---	0.89 ^{1/}	no	7,500
9	----	---	----	no	---
10	----	---	----	no	---
11	0.28	500	0.15	no	500

^{1/} Includes 0.55 miles of road closure.

^{2/} Additional nonproject costs - roadway over fill.

The existing channels in Lower McKee Creek will carry release flows from the structures and flood runoff from the uncontrolled drainage area. With the upstream structures installed, the existing channels will provide protection to the flood plain against significant damages from flooding that can be expected to have an average occurrence of once in two years. Existing main channels have sufficient depth to provide surface and sub-surface drainage.

The structures and evaluation reaches are shown on the project map. Information on quantities, cost, and design features are given in Tables 1, 2, and 3.

EXPLANATION OF INSTALLATION COSTS

The total installation cost of the project is estimated to be \$8,020,000 of which \$3,962,900 (49.4 percent) will be paid from P.L. 566 funds and \$4,057,100 (50.6 percent) will be borne by other funds. Included in total costs are land treatment measures, \$2,900,500, and structural measures, \$5,119,500.

Land Treatment

P.L. 566 funds will be furnished in the amount of \$317,000 to provide technical assistance to accelerate the current program and \$195,000 to cost share on minor stabilization structures. Funds from all sources other than P.L. 566 such as existing federal or state programs, special legislation, or private sources will be provided in the amount of \$2,388,500 for installing land treatment measures.

These include Public Law 46, carried out by the soil and water conservation districts and the Soil Conservation Service; the existing forestry program of the Illinois Department of Conservation, Division of Forestry; and the Cooperative Forest Management Program, administered by the Illinois Department of Conservation in cooperation with U. S. Forest Service. These funds will be used to maintain personnel and equipment of the Soil Conservation Service and the Illinois Division of Forestry. These people will assist the Soil and Water Conservation Districts of Adams, Pike, and Brown Counties in helping landowners and operators to develop conservation plans and forest management plans. They will also assist these landowners and operators in establishing, constructing, and maintaining planned soil and water conservation practices over the 10-year installation period.

Estimated costs for technical assistance are based on current expenditures for comparable personnel, equipment, vehicles, and overhead.

Structural Measures

The installation costs for structural measures include all P.L. 566 and other costs for installation of these works of improvement. These costs are shown in Table 2 as construction, engineering, land rights, and project administration.

Construction costs are the engineer's estimate of the cost of all material, labor, and equipment involved in construction. Unit costs are based on current prices for similar construction work in Illinois. A contingency allowance of 12 percent is added to the construction cost of the 6 floodwater retarding structures and the 2 multiple-purpose structures to defray any unforeseen additional costs incurred during construction.

Engineering costs are those costs incurred by engineers and other technicians for surveys, designs, and preparation and interpretation of

plans and specifications. At the time of project installation, additional surveys will be needed at the dam sites as a basis for structural design and construction cost estimates. Geologic drilling and soil mechanics tests and analysis will be performed to verify site and foundation conditions. Reservoir storage volumes will be computed from topographic maps made during work plan preparation.

Land rights costs include the cost of acquiring land rights (including survey fees and legal fees) plus all related engineering, construction, and land costs for modification and/or relocation of road and bridges, culverts, utilities, and fences. Costs of modifying bridges and culverts and moving or modifying utilities were computed for each structure. These land rights cost estimates were supplied by the McKee Creek Conservancy District.

Project administration costs are those costs associated with the installation of structural measures including the cost of contract administration, review of engineering plans prepared by others, government representatives, and necessary inspection service during construction.

Cost Allocation

All costs for floodwater retarding structures 5, 6, 7, 8, 9, 10, and 11 are allocated to flood prevention. Installation costs are \$1,282,500 for these 6 structures.

Joint costs for the multiple-purpose structure 4A were allocated to purpose by the Use of Facilities Method of cost allocation. This resulted in an allocation of 39.2 percent (or \$127,900) to flood prevention, 12.3 percent (or \$40,000) to municipal water supply, and 48.5 percent (or \$158,000) to recreation.

Joint costs for structure 8 were allocated to purpose in the same manner as described above. This resulted in an allocation of \$561,000 (41.0 percent) to flood prevention and \$808,800 (59.0 percent) to recreation.

Specific costs for municipal water supply facilities associated with structure 4A total \$273,900. Specific costs for recreation (land rights and facilities) associated with structures 4A and 8 are \$377,400 and \$957,800 respectively.

Total installation cost for all structural measures is \$4,641,100. These costs are allocated as follows: \$2,025,200 or 43.6 percent to flood prevention, \$313,900 or 6.8 percent to municipal water, and \$2,302,000 or 49.6 percent to recreation.

Cost Sharing

Cost sharing between P.L. 566 and other funds for installation of structural measures was determined as follows:

Multiple-Purpose Structure 4A (and Recreation Facilities) -
Municipal Water, Recreation, and Flood Prevention

Public Law 566 funds will pay \$450,600 including \$295,400 for construction; \$29,600 for engineering; \$70,900 for land rights; and \$54,700 for project administration. Other funds will pay \$602,800 including \$454,800 for construction; \$84,500 for land rights; \$42,000 for engineering; and \$21,500 for project administration.

Multiple-Purpose Structure 8 (and Recreational Facilities) -
Recreation and Flood Prevention

Public Law 566 funds will pay \$1,630,900 including \$1,043,400 for construction; \$288,700 for land rights; \$100,800 for engineering; and \$198,000 for project administration. Other funds will pay \$927,700 including \$536,400 for construction; \$333,100 for land rights; \$25,200 for engineering; and \$33,000 for project administration.

Six Floodwater Retarding Structures

Public Law 566 funds will pay \$1,369,400 including \$1,119,100 for construction; \$84,000 for engineering; and \$166,300 for project administration. Other funds will pay \$138,100 including \$133,200 for land rights and \$4,900 for project administration.

All Structural Measures

Public Law 566 funds will pay \$3,450,900 including \$2,457,900 for construction; \$214,400 for engineering; \$359,600 for land rights; and \$419,000 for project administration. Other funds will pay \$1,668,600 including \$991,200 for construction; \$550,000 for land rights; \$67,200 for engineering; and \$59,400 for project administration.

Included in land rights cost to be paid from other funds are \$17,400 for road and bridge modifications and \$9,500 for telephone and power line relocations.

An estimated schedule of expenditures for the 10-year installation period is as follows:

<u>Fiscal Year</u>	<u>Measures</u>	<u>P.L. 566 Funds</u>	<u>Other Funds</u>	<u>Total</u>
First	Land treatment	86,000	191,100	277,100
	Land rights (structures 4A and 5)	35,500	52,600	88,100
	Survey and design (structures 4A and 5)	41,100	2,700	43,800
	Project administration	10,600	2,100	12,700
Second	Land treatment	101,000	238,800	339,800
	Land rights (structures 4A and 5)	35,400	52,500	87,900
	Install structures 4A and 5	479,100	44,800	523,900
	Install water facilities (structure 4A)	---	273,900	273,900
	Project administration	71,100	13,700	84,800
Third	Land treatment	83,000	286,600	369,600
	Land rights (structures 6 and 7)	---	30,400	30,400
	Survey and design (structures 6 and 7)	24,200	---	24,200
	Project administration	3,300	1,100	4,400
Fourth	Land treatment	83,000	358,300	441,300
	Land rights (structures 6 and 7)	---	30,400	30,400
	Install recreation facilities (structure 4A)	175,400	175,400	350,800
	Project administration	24,200	7,600	31,800
Fifth	Land treatment	83,000	358,300	441,300
	Install structures 6 & 7	323,400	---	323,400
	Project administration	44,700	---	44,700
Sixth	Land treatment	28,000	286,600	314,600
	Land rights (structures 10 and 11)	---	22,100	22,100
	Survey and design (structures 10 and 11)	21,200	---	21,200
	Project administration	2,900	800	3,700
Seventh	Land treatment	12,000	238,800	250,800
	Land rights (structures 10 and 11)	---	22,000	22,000
	Project administration	---	800	800

<u>Fiscal Year</u>	<u>Measures</u>	<u>P.L. 566 Funds</u>	<u>Other Funds</u>	<u>Total</u>
Eighth	Land treatment	12,000	191,200	203,200
	Land rights (structures 8 and 9)	144,300	170,400	314,700
	Survey and design (structures 8 and 9)	113,500	25,200	138,700
	Install structures 10 and 11	281,900	---	281,900
	Project administration	74,600	7,200	81,800
Ninth	Land treatment	12,000	119,400	131,400
	Land rights (structures 8 and 9)	144,400	170,400	314,800
	Project administration	20,000	6,300	26,300
Tenth	Land treatment	12,000	119,400	131,400
	Install structures 8 and 9 and recreation facilities			
	structure 8	1,212,500	536,400	1,748,900
	Project administration	167,600	19,800	187,400
Total	Structural measures	3,450,900	1,668,600	5,119,500
Total	Land treatment measures	512,000	2,388,500	2,900,500
GRAND TOTAL		3,962,900	4,057,100	8,020,000

EFFECTS OF WORKS OF IMPROVEMENT

The program of land treatment and structural measures in Upper and Lower McKee Creek Watersheds will directly benefit 11,210 acres.

Flood damages will be reduced 78 percent and about 260 operating units within Upper and Lower McKee Creek Watersheds will directly benefit.

Installation of structural measures will reduce flooding and directly benefit approximately 7,240 acres and about 90 landowners in Lower McKee Creek. An additional 1,240 acres adjacent to the flood plain area will be benefited as a result of the decreased flooding. Surface and subsurface drainage improvements will function more efficiently and require less maintenance due to the decreased flooding. Drainage benefits were not evaluated or used for project justification.

The on-site effects of land treatment and improved land use will be (1) reduction of fertility losses through excessive erosion, (2) increased productivity due to higher fertility and moisture levels, and (3) decreases in operating costs by use of minimum tillage.

The installation of the 325 minor grade stabilization structures on individual farms will provide stable outlets for gully control and land treatment measures.

Installation of the land treatment measures planned for the installation period will reduce erosion from all sources from a present mean annual rate of 4.4 tons per acre to 3.2 tons per acre, a 27 percent reduction.

The proposed forest land treatment measures will improve the hydrologic condition of the forest land. This will have the effect of reducing surface storm runoff, with a subsequent decrease in sediment yield. Proper management, protection from grazing and continued fire protection will also increase the productivity of the forest land of the watershed and be useful to wildlife.

Off-site effects from land treatment and improved land use would be (1) reduced amounts of storm runoff, (2) reduced maintenance costs on road ditches where maintenance is caused by an excessive sedimentation rate, (3) increased life and reduced maintenance costs of on-farm waterways and diversions, and (4) reduced sedimentation in the large multiple-purpose flood retarding structures.

Installation of the 6 floodwater retarding reservoirs and 2 multiple-purpose reservoirs will provide significant effects within Lower McKee Creek Watershed and the surrounding area. The downstream effects of these reservoirs will be to (1) retard flood flows and slowly release the water so the existing channels will not be overloaded, (2) significantly reduce the number of flood events over the period of years, and (3) reduce the intensity of flood damages by reducing the depth and duration of floods that do occur. Other project effects will be adequate water supply for the city of Mt. Sterling and needed public recreation areas totaling about 3,660 acres.

The project would reduce flooding from a storm of October 1969 magnitude significantly. The total acres flooded would be reduced from 5,570 acres to 3,350 in Lower McKee Creek. In most areas of the flood plain the duration of flooding would be reduced to less than 24 hours. It is estimated that the October 1969 storm caused an estimated \$45,000 damage in Lower McKee Creek Watershed. If this storm had occurred with the project in place, the estimated damages would have been reduced to \$16,000.

Reduction in the extent and frequency of flooding is illustrated by the following table.

<u>Frequency Interval</u>	<u>Acres Flooded</u>		<u>Percent Reduction</u>
	<u>Without Project</u>	<u>With Project</u>	
<u>Lower McKee Creek (Laterals)</u>			
50-year	1,520	860	43
2-year	790	245	69
1-year	420	120	71
<u>Lower McKee Creek (Mainstem)^{1/}</u>			
50-year	5,720	4,910	15
2-year	4,780	1,500	68
1-year	4,480	250	94

^{1/} Approximately half of the mainstem flood reduction can be attributed to the works of improvement in Upper McKee Creek Watershed.

Flood plain scour damage caused when floodwater breaks out of the channel will be greatly reduced in the future as a result of structural measures. The primary benefit will be reduced loss of top soil to small areas of cultivated land and decreased road maintenance caused by scouring of the road surface materials.

Reduced flooding of flood plain roads will (1) reduce maintenance by reducing road grading expenses, (2) improve area transportation patterns by increasing road quality and traffic interruptions, and (3) make possible a general quality increase of all roads by releasing maintenance money now obligated to the flood plain roadways.

In cooperation with local road authorities, roadways will be incorporated on the dams of sites 4A, 6, and 7. These improvements will (1) eliminate costly bridge replacement and maintenance expenses, (2) reduce roadway maintenance expenses, (3) eliminate abrupt and dangerous changes in roadbed slopes since the present road dips sharply to cross the valley, and (4) provide a scenic view to accentuate the esthetic beauty of the area.

An estimated 150 acres of cropland will be removed from production at the sites of the 6 floodwater retarding structures. Proposed impoundments will flood some upland game habitat. Development and preservation of wildlife cover as a part of land treatment will compensate for the loss of wildlife habitat. Lake margins will also become preferred habitat by many species of aquatic birds, songbirds, and furbearers. Waterfowl hunters will find increased hunting opportunities with the project.

Incidental recreation benefits are expected to accrue to the public from sediment pools associated with the 6 floodwater retarding structures. These pools will have a combined surface area of about 330 acres. Initially the pools will be sufficiently deep to support fish life and, if

properly managed, will provide good quality fishing until such time as the pools are silted in. The pools will provide opportunities for developing facilities for fishing, boating, and hunting. The majority of the land surrounding the pools is expected to remain in private ownership. However, Lower McKee Creek Watershed is expected to follow the pattern established by other completed Illinois watersheds with the general public getting much recreational use from the watershed structures. The McKee Creek Conservancy District will require that any recreational developments around the pools have sanitary facilities which meet state and local health regulations. Public recreational use will be contingent upon meeting and maintaining satisfactory water quality standards in accordance with state laws.

The 292-acre pool and 192-acre recreational area associated with multiple-purpose structure 4A will result in an estimated annual use by 84,300 persons after an initial 10-year buildup period. The recreational season was considered to be a period beginning with Memorial Day and closing on Labor Day or 100 days.

Peak daily use and annual use at structure 4A after the initial buildup is estimated as follows:

<u>Activity</u>	<u>Visitor Days</u>		
	<u>Designed Capacity</u>	<u>Peak Daily Use</u>	<u>Annual Use</u>
Beach	800	1,040	40,320
Picnicking	200	260	10,080
Fishing	220	290	21,900
Camping	240	310	12,000
Total			84,300

An estimated 170 acres of cropland will be removed from production at the site of multiple-purpose structure 4A and the recreation facilities.

Approximately 1,020 acre-feet of municipal and industrial water supply will be provided in structure 4A. The yield from the water supply reservoir during a drought expected to occur once every 35 years could provide a sustained yield of 1.27 million gallons per day. This reservoir will provide high quality water at an estimated cost of \$3.25 per user month.

The 800-acre pool and 1,600-acre recreational area associated with multiple-purpose structure 8 will provide adequate facilities for an estimated 169,000 annual visitor days after an initial 10-year buildup period. Peak daily use and annual use after the initial buildup period are estimated as follows:

<u>Activity</u>	<u>Visitor Days</u>		
	<u>Designed Capacity</u>	<u>Peak Daily Use</u>	<u>Annual Use</u>
Beach	900	1,170	47,700
Picnicking	950	1,140	50,300
Fishing	400	520	40,000
Camping	620	800	31,000
Total			169,000

An estimated 500 acres of cropland will be removed from production at the site of multiple-purpose structure 8 and the recreation facilities.

The availability of adequate high quality water will undoubtedly have profound and long-lasting effects on the economy of Mt. Sterling. This community does not appear to have an outstanding potential for industrial growth at this time.

However, its adequate water supply, proximity to the Illinois River, U. S. Route 24, and the recreational developments at structures 4A and 8 coupled with the surplus of underemployed farm labor in the area could provide an attractive combination for locating light industry in the future. Increased demand for goods and services resulting from project installation will also increase sales of existing local businesses.

PROJECT BENEFITS

Annual project benefits in Upper and Lower McKee Creek Watersheds will amount to \$963,200. This includes flood prevention and sediment reduction benefits totaling \$15,300 which are not used for project justification. The project would reduce damages from a future flood of the same magnitude as the flood of October 1969 from about \$70,800 to \$19,600, a reduction of 72 percent.

Evaluated annual project benefits in Lower McKee Creek Watershed amount to \$566,800. Of these \$8,000 are flood prevention and sediment reduction benefits resulting from land treatment measures which are not used for project justification. Individual items of benefit are shown in Tables 5 and 6.

The project would reduce damages from a future flood of the same magnitude as the flood of October 1969 from about \$45,000 to \$16,000, a reduction of 64 percent. Flood damage reduction benefits will result from reductions in the extent, depth, and duration of flooding. Average annual flood damages will be reduced from \$217,000 to \$48,500, a reduction of 78 percent.

Sediment damage reduction benefits will accrue as the result of decreased frequency and magnitude of flooding. Benefits consist of (1) restoration of productivity to areas now damaged and (2) reduction of future damages to these areas and additional areas which would be damaged.

Changed land use will result in an estimated average annual benefit of \$3,900. Reduced flooding will result in the clearing and conversion of some small scattered areas of woodland and idle land areas for row crop production.

Reduced flooding will also encourage more intensive cultivation and increased use of fertilizer and herbicides on existing cropland. Benefits from more intensive land use are estimated to be \$10,000 annually.

Average annual recreation benefits derived from the recreational area associated with multiple-purpose structures 4A and 8 are estimated to be \$308,900. This is based on 253,300 annual visitor days after an initial buildup period of 10 years. A value of \$1.50 was assigned to each visitor day.

Municipal water supply benefits are estimated to total \$48,700 annually. Benefits were determined as being equal to average annual costs for a locally financed well and transmission line installation.

Secondary benefits of \$61,700 annually will accrue as a result of the project. Net profits of trucking firms, grain elevators, and related industries will increase as a result of the increased supply of goods. Also, increased net income will be realized by firms supplying additional goods and services needed in the field of agriculture (fertilizer dealers, seed dealers, etc.) and recreation (grocery stores, sporting goods, etc.).

Secondary benefits which may accrue outside of the project area were not considered pertinent to the economic evaluation.

In addition to the monetary benefit, there are other substantial intangible values which will accrue from the project such as better living conditions, a sense of economic security, abatement of the fear of flood damage, and potentials exist for wildlife and fisheries management.

COMPARISON OF BENEFITS AND COSTS

The average annual cost of structural measures in Upper and Lower McKee Creek Watersheds including installation, operation, and maintenance is \$647,100. When both projects are completely installed, these measures are expected to produce average annual primary benefits of \$870,500 or \$1.35 for each \$1.00 cost.

With secondary benefits included, the combined projects will produce benefits of \$1.50 for each \$1.00 of equivalent cost.

The average annual cost of structural measures in Lower McKee Creek Watershed including installation, operation, and maintenance is \$358,800. When the project is completely installed, these measures are expected to produce average annual primary benefits of \$495,700 or \$1.40 for each \$1.00 cost.

With secondary benefits included, the Lower McKee Creek Watershed project will produce benefits of \$1.60 for each \$1.00 of equivalent cost. (See Table 6.)

PROJECT INSTALLATION

Federal assistance will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Stat. 666), as amended. This assistance is subject to the appropriation of funds.

The McKee Creek Conservancy District and the Soil and Water Conservation Districts of Adams, Pike, and Brown Counties, with the assistance of the Extension Service and other interested agencies, will carry out the educational phase of the program. This will be accomplished by conducting general information and local community meetings; preparing radio, television and press releases; and using other methods of getting information to the landowners, operators, and other interested groups in the watershed. Such action will help achieve understanding and stimulate participation in the entire watershed project.

Land Treatment

Land treatment measures exclusive of minor grade stabilization structures will be established on the land by the owners and operators in cooperation with the Soil and Water Conservation Districts of Adams, Pike, and Brown Counties. The cost of applying these measures will be borne by the owners and operators of the land. The soil and water conservation districts will encourage farmers to establish complete conservation programs on their farms. The Soil Conservation Service, through the soil and water conservation districts, is presently giving technical assistance to landowners and operators in planning and establishing land treatment measures. Technical assistance to the soil and water conservation districts will be accelerated to assure application of the planned measures within the 10-year installation period of the project.

The Soil Conservation Service will provide accelerated cost sharing and technical assistance for land treatment measures to stabilize waterways, ditches, and critical sediment source areas. Such assistance shall be consistent with the cost sharing under existing national programs and national handbook or regulations governing that program. The McKee Creek Conservancy District will be the local contracting organization for the 325 grade stabilization structures. The conservancy district will (1) secure the necessary land rights and (2) provide necessary legal, administrative and clerical personnel needed to advertise, award, and administer the contracts. A project agreement between the Service and the conservancy district providing cost-share assistance will be executed for each stabilization structure or group of stabilization structures to be included in a construction contract.

Technical assistance for forestry measures will be furnished by the Illinois Department of Conservation, Division of Forestry, in cooperation with the U. S. Forest Service under the going cooperative forestry programs.

Additional technical assistance for planning and applying practices to enhance wildlife resources will be furnished by the Illinois Department of Conservation, Division of Game, through its regular individual farm habitat development program. Examples of material assistance available from the department are planting stock and use of tree planters for establishing wildlife habitat. The Department of Conservation, Division of Fisheries, provides fish for suitable ponds and fisheries management information.

Structural Measures

The McKee Creek Conservancy District will be the sponsoring and contracting local organization for the 6 single purpose floodwater retarding structures 5, 6, 7, 9, 10, and 11 and multiple-purpose structure 8. Specifically, for the 6 single-purpose floodwater retarding structures the conservancy district will (1) secure the necessary land rights and (2) provide necessary legal, administrative, and clerical personnel needed to advertise, award, and administer the contracts.

The Soil Conservation Service with P.L. 566 funds will (1) share 100 percent of the construction costs allocated to flood prevention and (2) provide technical assistance in design, preparation of specifications, inspection of construction, preparation of contract payment estimates, final inspection, execution of certificates of completion, and related tasks for the establishment of the 6 structures.

Under provisions of an agreement between the city of Mt. Sterling and the McKee Creek Watershed Conservancy District, the conservancy district will be the contracting local organization for structure 4A. This agreement provides that the city of Mt. Sterling will reimburse the conservancy district for a portion of the conservancy district's share of land rights costs, construction costs, and contract administration costs of structure 4A.

As contracting local organization for structure 4A, the McKee Creek Watershed Conservancy District will provide the following items in connection with structure 4A and the associated facilities for public recreation and municipal water,

(1) All land rights needed for the dam, reservoir, and recreation facilities. The Soil Conservation Service with P.L. 566 funds will share 45.9 percent of the cost of the fee simple title of the land for the structure and reservoir.

No portion of such land rights will be disposed of without prior approval of the Service.

(2) The conservancy district will enter into an engineering services contract for the plans and construction specifications for the structure. The conservancy district will pay 14.9 percent and the Soil Conservation Service will pay 85.1 percent of this contract. The Soil Conservation Service will review and approve construction plans, inspect construction, prepare contract payment estimates, make final inspection, execute certificates of completion, and perform the related tasks for the establishment of the structure.

(3) The conservancy district will enter into an engineering services contract for the plans and construction specifications for the associated water supply facilities.

(4) The conservancy district will enter into an engineering services contract for the plans and construction specifications of the basic recreation facilities to be installed. The conservancy district and the Soil Conservation Service will each pay 50 percent of cost of this contract. The Soil Conservation Service will review and approve construction plans, inspect construction, prepare contract payment estimates, make final inspection, execute certificates of completion, and perform other related tasks for the establishment of the basic recreation facilities.

(5) All legal, administrative, and clerical personnel needed to advertise, award, and administer engineering services contracts and construction contracts for the structure and associated water supply facilities and recreation facilities.

(6) 25.0 percent of the construction costs of the structure. Soil Conservation Service, P.L. 566 funds, will share 75.0 percent of the structure construction cost.

(7) 50.0 percent of construction costs of the recreation facilities. Soil Conservation Service, P.L. 566 funds, will share 50.0 percent of the recreation facilities construction cost.

(8) 100 percent of construction of water supply facilities associated with the structure.

As the contracting local organization for structure 8, the McKee Creek Conservancy District will provide the following items in connection with the addition of public recreation water and facilities.

(1) All land rights needed for the dam, reservoir, and recreation facilities. Soil Conservation Service with P.L. 566 funds will share 50 percent of the cost of the fee simple title of the land for the structure, reservoir, and recreation facilities. Ownership of land and water areas associated with structure 8 will be retained indefinitely by the conservancy district unless leased or sold to a public agency which will continue

to operate and maintain the development in accordance with the operation and maintenance agreement. No portion of such land rights will be disposed of without prior approval of the Service.

(2) The conservancy district will enter into an engineering services contract for the plans and construction specifications of the basic recreational facilities to be installed. The conservancy district and Soil Conservation Service, P.L. 566 funds, will each pay 50.0 percent of the cost of this contract. Soil Conservation Service will review and approve construction plans, inspect construction, prepare contract payment estimates, make final inspection, execute certificates of completion, and perform other related tasks for the establishment of the basic recreation facilities.

(3) All legal, administrative, and clerical personnel needed to advertise, award, and administer engineering services contracts and construction contracts for the structure and recreation facilities.

(4) 24.9 percent of the construction costs of the structure. Soil Conservation Service, P.L. 566 funds, will share 75.1 percent of the structure construction cost.

(5) 50.0 percent of the construction costs of the recreation facilities. Soil Conservation Service, P.L. 566 funds, will share 50.0 percent of the construction cost of the recreation facilities.

Structural measures will be installed during the 10-year period pursuant to the following conditions:

(1) Adequate land treatment above the structures has been installed. Local sponsoring organizations shall obtain agreements to carry out recommended soil conservation measures and conservation plans from owners of not less than 50 percent of the land situated in the drainage area above each detention reservoir to be installed with federal assistance.

In addition to the above provision, conservation plans will be prepared and not less than 75 percent of the effective land treatment measures will be installed or their installation commenced, on those sediment source areas which, if uncontrolled, would require a material increase in the cost of construction, operation, or maintenance of all structural measures.

(2) All land rights have been secured for all structural measures. In lieu of this requirement, a written statement may be made by the conservancy district stating that its rights of eminent domain will be used, if needed, to secure any remaining easements and that sufficient funds can be obtained for the purchase of these easements and rights-of-way.

(3) Mutual agreement on the schedule of construction and on plans and specifications shall be reached. Terms of contracts and all matters pertaining to contracts or to works of construction shall be mutually satisfactory in accordance with federal, technical, and administrative specifications.

(4) The sponsoring organizations are prepared to advertise, award, and administer the contracts for the structures.

Full conformance with state and federal laws and regulations shall be the responsibility of the nonfederal interests and shall be secured at no cost to federal government and reasonable evidence of conformity shall be presented to the mutual satisfaction of all parties.

(5) Project agreements for construction of structural measures and operation and maintenance agreements have been executed.

(6) Federal funds are available.

FINANCING PROJECT INSTALLATION

Federal technical assistance and installation services for construction under authority of P.L. 566 are contingent upon appropriation of funds for these purposes.

Land Treatment

Table 1 shows the amount of land programmed for treatment and the cost of installing land treatment measures.

P.L. 566 funds will provide \$317,000 for technical assistance for additional Soil Conservation Service personnel. This includes \$37,800 for soil surveys. The going land treatment program will continue with \$197,400 provided for technical assistance under authority of Public Law 46.

Technical assistance for installing forestry measures will cost \$11,800 and will be provided under the Cooperative Forest Management Program.

Installation costs for land treatment measures will be paid by landowners and operators. The sponsoring soil and water conservation districts will seek such allocation of Agricultural Conservation Program funds as are needed to cost share on land treatment measures to meet project objectives within the watershed.

Funds for construction costs of minor stabilization structures to stabilize critical sediment source areas will be provided to accelerate the installation of these needed measures. A project agreement between the Soil Conservation Service and the sponsoring local organizations providing for cost sharing assistance will be executed for each stabilization structure or group of stabilization structures to be included in a construction contract.

Structural Measures

The McKee Creek Conservancy District intends to borrow from the Farmers Home Administration the money needed to purchase land rights and

to finance the nonfederal cost of installation of structural measures. Preliminary application forms have been filed with the Farmers Home Administration for \$430,000. Land acquisition is planned as follows:

<u>Structure No.</u>	<u>Approximate Acreage</u>
4A	974
5	236
6	215
7	186
8	2,500
9	162
10	260
11	184

An assessment will be levied on the benefited area to repay that portion of costs allocated to flood prevention. Revenues from sales of water and user fees will also be used to repay the Farmers Home Administration.

The McKee Creek Watershed Conservancy District is pursuing from the State of Illinois (1) direct financial assistance or (2) complete assumption of installation, operation, and maintenance responsibilities for multiple-purpose structure 8.

The city of Mt. Sterling intends to borrow from the Farmers Home Administration the money needed for their share of land rights and other than P.L. 566 costs of installing structure 4A and associated water supply facilities. Revenue from sales of water will be used to repay the Farmers Home Administration. Preliminary application forms have been filed with the Farmers Home Administration for \$298,000.

P.L. 566 watershed loan funds will not be used for water treatment plants or the supply mains and distribution system for treated water.

PROVISIONS FOR OPERATION AND MAINTENANCE

Land Treatment

Land treatment measures will be maintained by landowners and operators as provided in their cooperative agreement with the Soil and Water Conservation Districts of Adams, Pike and Brown Counties. Technical assistance will be provided by the Soil and Water Conservation Districts of Adams, Pike, and Brown Counties; Soil Conservation Service personnel;

the Illinois Department of Conservation, Divisions of Game and Fisheries; and the Illinois Department of Conservation, Division of Forestry in cooperation with the U. S. Forest Service under the going Cooperative Forestry Programs.

Structural Measures

All structural works of improvement except multiple-purpose structure 4A and its associated recreational area and facilities will be operated and maintained by the McKee Creek Conservancy District. The annual maintenance costs are estimated to be \$7,600 for maintaining the structures.

The water supply facilities associated with structure 4A will be operated and maintained by the city of Mt. Sterling under provisions of an agreement with the McKee Creek Conservancy District. Average annual operation and maintenance costs are estimated to be \$10,800 for the municipal water supply facilities.

Multiple-purpose structures 4A and 8 with their associated recreational facilities will be operated and maintained by the McKee Creek Conservancy District. Annual operation and maintenance cost of the recreation facilities is estimated to be \$88,700 based on 35 cents per visitor day. This cost will provide for replacement materials, labor, and custodial services. Items likely to need frequent replacement are picnic tables, grills, and trash cans.

Responsibility for operation and maintenance of the recreational developments at structures 4A and 8 by the McKee Creek Conservancy District, respectively, will include the establishment and enforcement of regulations regarding such items as hours of use, types of use permitted, and provisions for safety. The recreational developments will be operated and maintained in accordance with state and local health regulations.

The volume of 1,020 acre-feet of municipal water supply storage between the 225-acre surface area at elevation 656.0 and the 292-acre normal pool at elevation 660.0 may be withdrawn by the city of Mt. Sterling at its discretion. The volume of 1,380 acre-feet between the 225-acre area at elevation 656.0 and the 135-acre area at elevation 648.0 is provided for public recreation. The city of Mt. Sterling is responsible for notifying the Soil Conservation Service, through the State Conservationist, and the McKee Creek Watershed Conservancy District whenever the reservoir is operated below

elevation 656.0. If it is found that there is a continuing need for the use of the recreation storage for municipal or industrial purposes, the city of Mt. Sterling agrees to reimburse the Service for all P.L. 566 funds used for the public recreation costs associated with the reservoir.

Sanitary facilities of any public recreational developments associated with the sediment pools will be operated and maintained in accordance with state and local health regulations.

Quality sport fishery development in each pool will require the application of management techniques. Undesirable fish species may have to be removed from the watershed prior to floodwater and multiple-purpose reservoir closure. If so, Department of Conservation fishery biologists will provide technical supervision and cost estimates of chemicals needed to do this job as the need arises.

Representatives of the sponsoring local organizations will, after each heavy rain, or at least annually, make maintenance inspections of all works of improvement. A representative of the Soil Conservation Service will participate in these inspections at least annually for the first 3 years following installation of each structural measure. Items of inspection will include, but will not be limited to, the following items:

- (1) Floodwater retarding structures--the condition of the principal spillway and its appurtenances, the emergency spillway, the earth fill, and the vegetative cover of the earth fill and the emergency spillway.

- (2) Channels to insure the present condition of McKee Creek channel and its major tributaries will be guarded against filling, dumping, and other means of willful or natural channel obstruction.

Provision will be made for free access of representatives of the sponsoring local organizations and the Soil Conservation Service to inspect, and for the local organizations to provide maintenance for structural measures at any time.

The sponsoring local organizations fully understand their obligations for maintenance and will execute specific maintenance agreements prior to the issuance of invitations to bid on the construction of structural measures.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

			Estimated Cost (Dollars) ^{1/}		
Installation			PL-566		
Cost Item	Unit	Number	Funds	Other	Total
LAND TREATMENT					
Soil Cons. Service					
Cropland	Acres	39,900	---	995,500	995,500
Grade stab, struc.	No.	325	195,000	130,000	325,000
Grassland	Acres	11,800	---	697,500	697,500
Miscellaneous land	Acres	1,400	---	239,000	239,000
Wildlife land	Acres	5,200	---	104,000	104,000
Technical assistance			317,000 ^{2/}	197,400	514,400
SCS Subtotal			512,000	2,363,400	2,875,400
Forest Service					
Forest land	Acres	2,460	---	13,300	13,300
Technical assistance			---	11,800	11,800
FS Subtotal				25,100	25,100
TOTAL LAND TREATMENT			512,000	2,388,500	2,900,500
STRUCTURAL MEASURES					
Soil Cons. Service					
Construction					
Floodwater retard- ing structures	Each	6	1,119,100	---	1,119,100
Multiple-purpose reservoirs	Each	2	892,100	295,400	1,187,500
Water supply fac.			---	249,000	249,000
Recreation fac.			446,700	446,800	893,500
Subtotal-Constr.			2,457,900	991,200	3,449,100
Engineering services			214,400	67,200	281,600
Project administration					
Construction inspection			249,000	---	249,000
Other			170,000	59,400	229,400
Land rights			359,600	550,800	910,400
TOTAL STRUCTURAL MEASURES			3,450,900	1,668,600	5,119,500
TOTAL PROJECT			3,962,900	4,057,100	8,020,000
SUMMARY					
Subtotal SCS			3,962,900	4,032,000	7,994,900
Subtotal FS			---	25,100	25,100
TOTAL PROJECT			3,962,900	4,057,100	8,020,000

^{1/} Price base - 1970.

^{2/} Includes \$37,800 for soil surveys.

Date: June 1970

**TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS**

Measures	Unit	To Date	Total Cost (Dollars) ^{1/}
LAND TREATMENT			
Soil Conservation Service			
Conservation cropping systems	Acre	2,722	13,610
Contour farming	Acre	3,724	7,450
Critical area planting	Acre	22	4,400
Diversions	Feet	48,600	14,580
Drainage - mains and laterals	Feet	3,960	2,570
Drainage - tile drains	Feet	46,200	23,100
Farm ponds	No.	233	233,000
Grade stabilization structures	No.	66	66,000
Grassed waterways	Acre	142	63,900
Pasture and hayland planting	Acre	5,433	271,650
Terraces	Feet	182,400	40,130
Wildlife habitat management	Acre	193	7,720
Subtotal			748,110
Forest Service			
Tree planting (open land)	Acre	400	15,200
Hydrologic cultural operations	Acre	120	530
Woodland grazing control	Acre	3,316	33,000
Fire control	Acre	18,420	18,420
Subtotal			67,150
Total			815,260

^{1/} Price base - 1970.

Date: June 1970

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS
 (Dollars) 1/

Structural Measures	Installation Cost P.L. 566 Funds				Installation Cost - Other Funds				Total Inst. Cost
	Construc- tion	Engi- neering	Land Rights	Total P.L. 566	Construc- tion	Engi- neering	Land Rights	Total Other	
Floodwater) 5	344,700	25,900	---	370,600	---	---	20,600	20,600	391,200
Retarding) 6	186,900	14,000	---	200,900	(6,900) ^{2/}	(500) ^{2/}	36,400	36,400	237,300
Structures 7	136,500	10,200	---	146,700	(9,700) ^{2/}	(800) ^{2/}	24,400	24,400	171,100
9	169,100	12,700	---	181,800	---	---	7,700	7,700	189,500
10	166,500	12,500	---	179,000	---	---	21,800	21,800	200,800
11	115,400	8,700	---	124,100	---	---	22,300	22,300	146,400
Subtotal	1,119,100	84,000		1,203,100			133,200	133,200	1,336,300
Multiple-Purpose Structure 4A	134,400	15,200	58,100	207,700	44,800 (7,000) ^{2/}	2,700 (700) ^{2/}	70,700	118,200	325,900
Water Intake Tower	---	---	---	---	70,000	7,000	---	77,000	77,000
Supply Mains	---	---	---	---	74,000	7,400	---	81,400	81,400
Treatment Plant	---	---	---	---	105,000	10,500	---	115,500	115,500
Recreation Fac.	161,000	14,400	12,800	188,200	161,000	14,400	13,800	189,200	377,400
Subtotal	295,400	29,600	70,900	395,900	454,800	42,000	84,500	581,300	977,200
Multiple-Purpose Structure 8	757,700	75,700	128,700	962,100	250,600	---	157,100	407,700	1,369,800
Recreation Fac.	285,700	25,100	160,000	470,800	285,800	25,200	176,000	487,000	957,800
Subtotal	1,043,400	100,800	288,700	1,432,900	536,400	25,200	333,100	894,700	2,327,600
Total	2,457,900	214,400	359,600 ^{3/}	3,031,900	991,200	67,200	550,800 ^{4/}	1,609,200	4,641,100
Project Administration				419,000				59,400	478,400
GRAND TOTAL				3,450,900				1,668,600	5,119,500

1/ Price base - 1970.

2/ Nonproject costs - widening fills for roadways.

3/ Includes \$346,900 for P.L. 566 share of fee simple title to 3,860 acres and \$12,200 for the modification of existing roads and utility lines. (See page 16)

4/ Includes \$489,500 for land rights, \$39,400 for legal fees and survey costs, and \$13,700 for the modification of existing roads and utility lines. (See page 16) Also includes \$8,200 for flowage easements.

Date: June 1970

TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

(Dollars) ^{1/}

Item	COST ALLOCATION				C O S T S H A R I N G						
	Purpose				P. L. 566			Other			
	Flood Prevention	Recreation	Municipal Water S.	Total	Flood Prevention	Recreation	Total	Flood Prevention	Recreation	Municipal Water S.	Total
Floodwater Retarding Structures	1,336,300	---	---	1,336,300	1,203,100	---	1,203,100	133,200	---	---	133,200
Multiple-Purpose Structure 4A											
Structure	127,900	158,000	40,000	325,900	127,900	79,800	207,700	---	78,200	40,000	118,200
Water Supply Facilities	---	---	273,900	273,900	---	---	---	---	---	273,900	273,900
Recreation Fac.	---	377,400	---	377,400	---	188,200	188,200	---	189,200	---	189,200
Multiple-Purpose Structure 8											
Structure	561,000	808,800	---	1,369,800	545,200	416,900	962,100	15,800	391,900	---	407,700
Recreation Facilities	---	957,800	---	957,800	---	470,800	470,800	---	487,000	---	487,000
GRAND TOTAL	2,025,200	2,302,000	313,900	4,641,100	1,876,200	1,155,700	3,031,900	149,000	1,146,300	313,900	1,609,200

^{1/} Price base - 1970.

Date: June 1970

TABLE 2B - RECREATIONAL FACILITIES
ESTIMATED CONSTRUCTION COSTS
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS
(Dollars)^{1/}

Item	Number & Unit	Est. Unit Cost	Total Const. Cost
STRUCTURE 4A			
<u>Beach - Capacity - 800 people</u>			
1 acre sand 12" deep with diving towers and equipment			11,000
6' chain link fence with gate-600 ft.			3,300
			30,000
<u>Bathhouse</u>			
	Male Female		
(Flush type) water closets	6 8		
Urinals	6 6 (sanistand)		
Lavatories	4 4		
Showers (with separate septic field)	8 8		
			3,000
<u>Gate House</u>			
Parking spaces (10 x 20)	300 spaces	100	30,000
<u>Picnic (5 ac.)</u>			
Picnic tables and grills	50 each	80	4,000
Parking spaces (10 x 20)	55 spaces	100	5,500
Group shelter (16 x 30)			1,000
			12,000
<u>Comfort station</u>			
	Male Female		
(Flush type) water closets	2 4		
Urinals	2 2 (sanistand)		
Lavatories	2 2		
			2,000
<u>Boat ramp - double lane</u>			
Parking spaces (10 x 40)	50 spaces	130	6,500
Parking spaces (10 x 20)	50 spaces	100	5,000
Boat docks - 2(each 200 feet)	400 feet	50	20,000
<u>Comfort station</u>			
Vault type (2 places per sex)			2,200
<u>Signs</u>			
Entrance sign (wood)	1 sign	500	500
Information signs (wood)	4 signs	100	400
<u>Camping area</u>			
Camp sites	60 sites	400	24,000
			20,000
<u>Comfort station & trailer sanitary dump station</u>			
	Male Female		
(Flush type) water closets	4 4		
Urinals	2 2 (sanistand)		
Lavatories	4 4		
Showers	6 6		
<u>Roads</u>			
Double lane (asphalt)	7,000 ft.	8	56,000
Single lane (asphalt)	2,500 ft.	4	10,000
<u>Septic tanks and disposal fields for</u>			
Beach			3,500
Camping area			3,000
Picnic area			2,500

TABLE 2B - RECREATIONAL FACILITIES (continued)

Item	Number & Unit	Est. Unit Cost	Const. Cost
<u>Permanent playground equipment for camping and picnic areas</u>			2,000
<u>Nature trails</u>			500
<u>Underground electric line (with hookups)</u>	6,600 ft.	1.10	7,300
<u>Water service lines - 3'</u>	7,000 ft.	2.70	18,900
<u>Selective clearing of picnic and camping areas</u>	10 ac.	100	1,000
<u>Recreation area planting (trees)</u>	40 ac.	50	2,000
<u>Open field grass seeding</u>	20 ac.	45	900
Subtotal - Structure 4A			288,000
Contingency			34,000
GRAND TOTAL - Structure 4A			322,000
<u>STRUCTURE 8</u>			
<u>Primitive camping, environmental study area, and overlook</u>			
Road, 2 lane, gravel	1,000 ft.	3	3,000
Parking area, gravel surface with barriers	20 spaces	30	600
Toilet, vault type, wood construction, male & female, 2 fixtures each sex	1	2,000	2,000
Signs, wood	4	30	120
Grass seeding	8 ac.	45	360
Tree planting	10 ac.	50	500
Trail, earth surface	8,000 ft.	0.50	4,000
Subtotal			10,580
<u>North Recreation area</u>			
Access roads, 2 lane, hard surface	2 miles	40,000	80,000
Water supply system, pressure with piped supply to all areas	10,200 ft.	1.50	15,300
Treatment plant	1	22,000	22,000
Sewage disposal system (marina-beach-picnic area complex and campground)	9,000 ft.	2.50	22,500
Lagoon	1	5,000	5,000
Grass seeding	20 acres	45	900
Tree planting	80 acres	50	4,000
Sign, main entrance	1	400	400
Electric system for distribution to all areas	1 system		10,500
Sign at highway 104	1	400	400
Exterior fence to protect the develop.	25,000 ft.	0.20	5,000
Gate house	1	2,500	2,500
Subtotal			168,500

TABLE 2B - RECREATIONAL FACILITIES (continued)

ITEM	Number & Unit	Est. Unit Cost	Const. Cost
<u>Picnic Area No. 1</u>			
Access road, 2 lane, hard surface	1,500 ft.	7.50	11,250
Parking area, hard surface with barriers	75 spaces	110	8,250
Toilet, flush type, 3 water closets for women, 2 water closets and 1 urinal for men, 2 lavatories each	1	8,000	8,000
Picnic tables	60	50	3,000
Waist high steel grills	30	30	900
Trash can support stations	30	25	750
Water outlets	4	75	300
Shelters, 20 x 30, concrete floor, open side, 4 tables for each, waist high grill each end (tables and grills in addition to above)	2	2,000	4,000
Signs, wood	4	30	120
Security lights	2	100	200
Playground equipment	1 unit	3,000	<u>3,000</u>
Subtotal			39,770
<u>Marina-Beach-Picnic Area Complex</u>			
<u>Marina</u>			
Launch ramp, 2 lane, concrete	1	4,000	4,000
Parking area, hard surface with barriers			
Car & trailer	50 spaces	150	7,500
Car only	40 spaces	110	4,400
Loading dock, floating, wood or steel and styrofoam, 30 feet	2	300	600
Toilet, flush type, 4 water closets for women, 2 water closets and 2 urinals for men, 2 lavatories each	1	9,000	9,000
Picnic tables, wood or plastic top, steel legs	30	50	1,500
Waist high grills	15	30	450
Trash can support stations	15	25	375
Signs, wood	5	30	150
Security lights	2	100	200
Access road for marina-beach-picnic area complex, 2 lane, hard surface	3,000 ft.	7.50	<u>22,500</u>
Subtotal			50,675

TABLE 2B - RECREATIONAL FACILITIES (continued)

Item	Number & Unit	Est. Unit Cost	Const. Cost
<u>Beach</u>			
Beach area, sand with concrete retainer wall between sand and grassed area. Sand area above water line 30 feet by 250, grassed area 40 by 250, retainer wall 4 inches above ground level, 250 feet long. Sand below water line to water depth of 5.5 feet.	15,000 sq.ft.	0.60	9,000
Diving float, 20 x 20, wood or steel and styrofoam with diving board and life-guard chair	1	3,000	3,000
Lifeguard stations on beach	2	300	600
6' chain link fence with gate	400 ft.	5	2,000
Bathhouse with 3 water closets and 2 urinals for males, 5 water closets for females plus 2 lavatories each side. One central shower facility each side plus a sand shower outside. Bathhouse will also contain toilet facilities with separate entrance for use by picnickers. 1 water closet, 1 urinal for males, 2 water closets for females, 1 lavatory each.			
Bathhouse dressing rooms with open top.	1	28,000	28,000
Parking area, hard surface with barriers (also serves picnickers).	160 spaces	110	17,600
Picnic tables, wood or plastic top, steel legs	30	50	1,500
Waist high grills	16	30	480
Trash can support stations	16	25	400
Signs, wood	5	30	150
Septic field for showers	1,000 ft.	2.50	2,500
Subtotal			65,230
<u>Picnic Area</u>			
Parking area, hard surface with barriers	50 spaces	110	5,500
Toilet, flush type, 2 water closets and 1 urinal for males, 3 water closets for females and 2 lavatories each	1	8,000	8,000
Picnic tables	40	50	2,000
Waist high steel grills	20	30	600
Trash can support stations	20	25	500
Shelter house, 20 x 30 (as in Picnic Area No. 1)	2	2,000	4,000
Signs, wood	4	30	120
Playground equipment	1 unit	3,000	3,000
Subtotal			23,720

TABLE 2B - RECREATIONAL FACILITIES (continued)

Item	Number & Unit	Est. Unit Cost	Const. Cost
<u>Campground</u>			
Thirty-unit camp area with spurs or pull-through parking and electrical hook-up. Two 30-unit areas with water hook-up. One water outlet for the other 30-unit area. (Includes only the cost of roads, parking, clearing, and grading.)	3 areas	6,000	18,000
Toilets, flush type, 2 water closets and 2 urinals for males, 3 water closets for females, 2 lavatories each plus 2 showers each	3	12,000	36,000
Picnic tables	90	50	4,500
Fire rings, concrete & steel for individual use	90	15	1,350
Fire rings, concrete & steel for group use (one per each camp area)	3	25	75
Security lights	3	100	300
Trailer sanitary dump station	1	1,800	1,800
Signs	12	30	360
Access road from main recreation road, 2 lane, hard surface	2,500 ft.	7.50	18,750
Playground equipment	3 units	2,000	6,000
Electrical hook-ups	60 each	25	1,500
Water hook-ups	60 each	37	2,220
Water outlets	3	50	150
Subtotal			91,005
<u>Picnic Area No. 2</u>			
(Same as Picnic Area No. 1 - exclusive of access road)			28,520
Access road from main recreation road to parking lot, 2 lane, hard surface	3,000 ft.	7.50	32,500
Subtotal			61,020
Subtotal - Structure 8			510,500
Contingency			61,000
GRAND TOTAL - Structure 8			571,500

1/ Price base - 1970.

Date: June 1970

TABLE 3 - STRUCTURE DATA
FLOODWATER RETARDING STRUCTURES AND RECREATION RESERVOIRS
LOWER MCKEE CREEK (NORTH FORK) WATERSHED
ILLINOIS

ITEM	UNIT	4A <u>1/</u>	5	6 <u>1/</u>	7 <u>1/</u>	8	9	10	11	TOTAL
Class of structure		b	b	b	b	b	b	b	b	
Drainage area	Sq.Mi.	10.0	11.4	9.2	5.8	26.4	6.2	9.7	5.8	84.5
Curve No. (1-day) (AMC II)		80	80	80	80	82	81	81	81	
Tc	Hrs.	3.30	4.34	5.10	4.97	7.92	3.18	3.92	3.59	
Elevation top of dam	Ft.	674.0	617.0	671.0	671.0	650.0	613.0	633.0	644.0	
Elev.crest emerg.spwy.	Ft.	669.2	610.0	665.3	665.8	645.5	607.2	627.6	639.1	
Elev. crest high stage inlet	Ft.	663.0	600.0	656.0	657.0	640.0	599.0	620.0	632.0	
Elev. crest low stage inlet	Ft.	660.0	573.0	642.0	644.0	636.0	585.0	607.0	622.0	
Maximum height of dam	Ft.	48.0	70.0	52	47.0	81	59	49	44	
Volume of fill	Cu.Yds.	129,000	326,000	172,000	131,000	858,000	163,000	147,000	89,000	2,015,000
Total capacity	Ac.Ft.	6,854	3,955	3,724	2,407	24,128	2,386	3,617	2,232	49,303
Sediment submerged										
1st 50 years	Ac.Ft.	512	515	517	356	1,290	369	521	348	4,428
2nd 50 years	Ac.Ft.	449	496	416	290	1,260	332	451	273	3,967
Sediment aerated	Ac.Ft.	73	34	31	21	88	25	35	21	328
Municipal water	Ac.Ft.	1,020	--	--	--	--	--	--	--	1,020
Recreation	Ac.Ft.	1,380	--	--	--	12,000	--	--	--	13,380
Retarding	Ac.Ft.	3,420	2,910	2,760	1,740	9,490	1,660	2,610	1,590	26,180
Between high and low stage	Ac.Ft.	950	1,310	993	606	3,510	674	1,070	593	9,706
Surface area										
Sediment pool	Acres	135	41	66	51	200	40	73	56	662
Municipal water	Acres	292	--	--	--	--	--	--	--	292
Recreation	Acres	225	--	--	--	800	--	--	--	1,025
Retarding pool	Acres	458	203	238	159	1,210	145	248	173	2,834

1/ Structure with road on the dam.

(continued)

TABLE 3 - STRUCTURE DATA (continued)
FLOODWATER RETARDING STRUCTURES AND RECREATION RESERVOIRS
LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

ITEM	UNIT	4A ^{1/}	5	6 ^{1/}	7 ^{1/}	8	9	10	11	TOTAL
Principal spillway										
Rainfall vol. (areal)										
1-day	In.	6.70	6.10	6.70	6.70	6.80	6.10	6.10	6.10	
10-day	In.	12.40	11.60	12.50	12.50	12.50	11.50	11.50	11.60	
Runoff vol. 10-day	In.	7.67	6.96	7.76	7.76	8.20	7.08	7.08	6.96	
Cap. low stage (max.)	cfs	41	112	83	50	184	61	106	54	
Cap. high stage (max.)	cfs	212	227	202	132	727	134	200	128	
Frequency operation- emergency spillway	% chance	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	
Size of conduit	Dim.Ft.	3.0Ø	3.0Ø	3.0Ø	2.5Ø	4.5x4.5	2.5Ø	3.0Ø	2.5Ø	
Emergency spillway										
Rainfall vol. (ESH)										
(areal)	In.	7.50	7.44	7.50	7.50	7.47	7.50	7.50	7.50	
Runoff vol. (ESH)	In.	5.16	5.10	5.16	5.16	5.36	5.27	5.27	5.27	
Type		Sod	Sod ^{2/}	Sod	Sod	Sod ^{2/}	Sod	Sod	Sod	
Bottom width	Ft.	120	160	120	100	300	100	150	80	
Velocity of flow (VE)	Ft./Sec.	2.9	6.6	3.6	3.6	--	1.1	--	--	
Slope of exit channel	Ft./Ft.	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04	
Max.water surface elev.	Ft.	669.55	611.7	665.8	666.3	645.8	607.2	627.5	638.8	
Freeboard										
Rainfall vol. (FH)										
(areal)	In.	13.40	13.24	13.35	13.35	13.35	13.35	13.35	13.40	
Runoff vol. (FH)	In.	10.81	10.65	10.76	10.76	11.03	10.90	10.90	10.95	
Max.water surface elev.	Ft.	673.6	616.6	670.7	670.6	649.4	612.7	632.8	644.0	
Capacity equivalents										
Sediment volume	In.	1.94	1.72	1.96	2.16	1.87	2.19	1.96	2.07	
Retarding volume	In.	6.42	4.79	5.63	5.63	6.74	5.00	5.05	5.14	

^{1/} Structure with road on the dam.

^{2/} Type and dimensions subject to modification prior to final design.

Date: June 1970

TABLE 4 - ANNUAL COST

LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

(Dollars) 1/

Evaluation Unit	Amortization of Installation Cost <u>2/</u>	Maintenance <u>3/</u>	Total
Structural Measures	228,200	107,100	335,300
Project Administration	23,500	---	23,500
GRAND TOTAL	251,700	107,100	358,800

1/ Price base - 1970.

2/ 100 years @ 4-7/8 percent interest.

3/ Price base - adjusted normalized prices. This includes \$10,800 for the maintenance of water supply facilities and \$88,700 for the operation, maintenance, and replacement of recreation facilities.

Date: June 1970

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

LOWER MCKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

(Dollars) 1/

Item	Estimated Average Annual Damage		Damage Reduction Benefit
	Without Project	With Project	
Floodwater			
Crop and pasture	197,800	45,200	152,600
Other agricultural	8,000	1,800	6,200
Road and bridge	11,200	1,500	9,700
Subtotal	217,000	48,500	168,500
Sediment			
Overbank deposition	4,700	900	3,800
Indirect	23,300	5,100	18,200
Total damage reduction Lower McKee	245,000	54,500	190,500
Damage reduction attributed to Upper McKee			58,300
TOTAL REMAINING DAMAGE REDUCTION			132,200

1/ Price base - adjusted normalized prices.

Date: June 1970

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

LOWER McKEE CREEK (NORTH FORK) WATERSHED, ILLINOIS

(Dollars) 1/

Evaluation Unit	AVERAGE ANNUAL BENEFITS <u>2/</u>							Average Annual Costs <u>3/</u>	Benefit Cost Ratio
	Damage Reduction	Intensive Land Use	Changed Land Use	Municipal Water Supply	Recreation	Secondary Benefits	Total		
Total Project	124,200	10,000	3,900	48,700	308,900	61,400	557,100	335,300	1.7:1.0
Project Administration								23,500	
GRAND TOTAL	124,200	10,000	3,900	48,700	308,900	61,400	557,100	358,800	1.6:1.0

1/ Price base - 1970.

2/ In addition, it is estimated that land treatment measures will provide benefits of \$8,000 annually.

3/ From Table 4.

Date: June 1970

INVESTIGATION AND ANALYSES

Hydrology

Runoff Studies

Since there are no stream gauges in the watershed, rainfall records were converted to runoff using the National Engineering Handbook, Section 4, Chapter 10. However, the stream gauge records from similar watersheds in the same area were utilized in conjunction with U. S. Geological Survey Water Supply Paper 1813 to determine the appropriate average runoff curve number and storm duration to be used in project evaluation.

Plate 1 shows that 2-day rainfall duration and curve number 83 together represent an average condition for the 4 stream gauges shown. Other rainfall durations were also tested but no significant changes were noted in the average runoff curve number.

Table A1 shows how the 48-hour evaluation storm and curve number 83 produced good correlation with stream gauge data.

In order to reflect local rainfall conditions, Illinois State Water Survey Technical Letter 1 entitled "Rainfall Frequencies" was used for project evaluation. For structure design U. S. Weather Bureau Technical Papers 40 and 49 were used since values given in these publications exceeded those in the state publication.

Flood Distribution Studies

The flood distribution supplied the economist and used in his damage studies was developed from studying the stream flow records from 5 nearby watersheds. The following table shows the results of this study.

Storm Occurrences in Percent

January	4.2	July	15.0
February	6.9	August	10.9
March	12.4	September	7.6
April	13.0	October	1.3
May	11.7	November	2.7
June	13.7	December	.6

Hydraulic Computations

Seventy-six valley channel cross sections were surveyed with vertical control tied to mean sea level datum. The locations of these valley sections were selected in order to (1) accurately develop flood profiles and (2) develop discharge vs. area flooded information to be used in damage

analysis. Stage discharge and stage acres-flooded relationships were developed for each of 73 evaluation reaches by running successive water surface profiles for a wide range of CSM rates.

Present Condition of Flood Routing

Soil Conservation Service Technical Release-20 was used to route each of the evaluation storms. Table A1 shows the frequencies which were routed and the close correlations between the peaks generated by TR-20 and the Bay Creek stream gauge.

Acres flooded information by depth increments 0-1', 1-3', 3+!', and the duration of flooding at each depth increment was supplied to the economist for each evaluation storm.

With-Project Flood Routing

Recognizing that structural measures would be restricted to floodwater retarding structures, considerable attention was given to principal spillway design. Plate 2 was developed as a result of these studies. This design curve reflects design considerations such as typical site conditions in the watershed, design criteria, costs, and downstream effects on damaged areas.

Plate 2 was used to develop storage discharge curves for each potential structure site in the watershed. Alternative combinations of floodwater retarding structures were evaluated by routing the same series of evaluation storms. During the course of project formulation, 6 alternative structure combinations were tested.

Detailed analysis of the hydrographs with the floodwater retarding structures in place indicated that the structures would not increase the flood durations.

Acres flooded information by depth increments 0-1', 1-3', 3+!', and the duration of flooding at each depth increment was supplied to the economist for each evaluation storm and project alternative.

TABLE A1 ^{1/}

48-hour evaluation rainfall and gauged runoff

Gauged -- Bay Creek at Nebo -- 162 square miles

Routed -- McKee Creek Reach 34 -- 165 square miles

Freq. Years	TR-20 Routed Peak c.f.s.	Gauged Peak c.f.s.	Routed Volume inches	Routed Hydrograph Base Time hours	Gauged Volume 1-Day Base inches	Gauged Volume 2-Day Base inches	Gauged Volume 3-Day Base inches	Gauged Volume 7-Day Base inches
.3	1630	--	.31	40	--	.16	--	--
.4	2745	--	.50	40	--	--	--	--
.5	3330	3100	.60	45	--	.49	--	--
.7	4320	4700	.78	50	--	.71	--	--
1.0	5230	6000	.93	50	--	.94	--	--
2.0	6890	8900	1.22	55	--	1.39	--	--
5.0	10040	11000	1.79	55	1.5	1.98	2.2	2.8
10.0	13060	13500	2.30	55	1.7	2.43	2.9	3.5
50.0	22950	21000	4.02	60	2.4	3.47	3.8	4.1

^{1/} 15-day separation of storm events significantly reduces the volumes from the smaller frequency events.

Engineering Surveys

Some of the engineering surveys for watershed planning were accomplished with funds provided by the State of Illinois. These funds supplied the needed services through engineering contract between the Soil Conservation Service and Klingner & Associates, Engineering Consultants. Services rendered under a contract were vertical control bench marks and valley cross sections.

Vertical control lines were run throughout the watershed with bench marks established at or near each structure site and at all roads crossing the major tributaries. All surveys were referenced to mean sea level datum.

All planning designs are based on field surveys and photogrammetric topographic maps of the structure and reservoir areas. The field surveys consist of cross sections taken along centerline of each site.

The topographic maps were developed from low level aerial photographs flown at approximately 5,400-foot elevation. A maximum contour interval of 4 feet was used with an interval of 2 feet in the structure, spillway, and borrow areas. Areas were measured from the topographic maps and stage-storage curves developed. Accuracy of the photogrammetric work was verified by checking with field surveyed structure centerlines. The formulation of a structural system of 17 floodwater retarding, 4 multiple-purpose structures, and 7 debris basins were located and cost estimates completed. From this information 12 floodwater retarding and 4 multiple-purpose structures were selected.

A total of 272 grade stabilization gullied problem areas were located and studied. The severity and size of the problem and the cost of the structures needed as compared with structures now being built under the going programs were the prime reasons for eliminating stabilization as a structural measure.

Structure Design and Cost Estimates

The 6 floodwater retarding and 2 multiple-purpose structures are planned with 2-stage principal spillways. The crest of the low stage inlet of the 6 floodwater retarding sites is set at the surface of the estimated 50-year sediment accumulation and proportioned to release at a rate of approximately 10 c.f.s. per square mile. The crest of the high stage inlet is set at the estimated 100-year sediment storage accumulation plus storage equal to the 5-year frequency, 24-hour duration storm. The high stage inlet was planned to release the 50- or 100-year storm at no more than 27 c.f.s. per square mile controlled.

All necessary hydrographs, including alternate trials, were routed through the structures by use of a computer and the SCS Dams program.

The structural routings were used to determine (1) the required volume of temporary storage, (2) the crest elevation of the emergency spillway, (3) required emergency spillway dimensions, and (4) elevation of the top of dam. The total volume for floodwater storage was determined by using 50- or 100-year frequency storms depending on structure class.

The floodwater retarding and multiple-purpose structure release rates were established considering downstream channel capacities. The combined maximum release rates of the low-stage spillway will not exceed channel capacity.

Planning designs were based on criteria and procedures contained in Engineering Memorandum SCS-27, Soil Conservation Service Technical Release-2, Chapter 21 of the Hydrology Guide, and Technical Papers 40 and 49 of the U. S. Department of Commerce, Weather Bureau.

The 100-year frequency rainfall of a 10-day duration was used for the design of the principal spillways of structures 4A, 6, 7, and 8; all other structures used the 50-year frequency rainfall.

A water budget analysis was developed for multiple-purpose structure 4A to determine the average annual drawdown due to evaporation seepage and municipal draft.

Consulting engineers for the city of Mt. Sterling supplied estimates of projected population and needs for the municipal draft requirements from the reservoirs of structure 4A. The projected daily per capita consumption was estimated 130 gallons per capita per day. An increase in daily per capita consumption of one gallon per person per day each year is included for normal use increases. The average daily watershed yield of 1.27 million gallons a day in excess of evaporation and seepage is more than adequate to meet the projected needs of Mt. Sterling.

Costs for adequate drainage systems were included in all structure estimates. An allowance of 5 percent for additional embankment was also included to allow for consolidation.

Cost estimates were based on unit prices on current construction. Details on quantities, costs, and design features are listed in Tables 1, 2, and 3 of this plan.

Geology

Present land use and trends, soil loss, and needed conservation practices were determined by projection from detailed studies of 40 sample areas constituting 3 percent of the watershed area. The Universal Soil Loss Equation and recent soils information were used to determine soil loss under present conditions and future conditions after full establishment of the needed conservation practices. Average annual soil losses for each land resource area are summarized below:

Land Resource Area (Major Soil Association)	Present Soil Loss (T/acre/year)	Soil Loss at End of Project Installation Period (T/acre/year)	Future Soil Loss After Full Establishment of Conservation Practices (T/acre/year)
Herrick-Ipava	5.3	3.8	2.0
Hickory-Clinton-Keomah	4.4	3.2	1.8
Fayette-Sylvan	4.3	3.3	2.0
Wakeland-Haymond	negligible	negligible	negligible

The results of the study indicate that present soil losses are severe on the intensively cultivated upland areas and especially severe on 1,770 acres of critical erosion areas including road banks and feedlots on sloping land. The study also indicates that erosion in the watershed can be reduced to reasonable levels within the soil capabilities by the application of conservation practices.

Reservoir sediment storage and allocation requirements were calculated in accordance with procedures outlined in Soil Conservation Service Technical Release-12. Sediment yield to each structure was estimated by multiplying the soil loss figures determined in the erosion study by a delivery ratio derived from published curves and previous Illinois watershed work. The sediment storage requirements reflect reductions in sediment yield which are expected to occur as land treatment measures are applied. Calculation of the sediment storage volume was made using a submerged unit weight of 55 pounds per cubic foot and an aerated unit weight of 70 pounds per cubic foot.

Sediment damage to the Lower McKee Creek Watershed was estimated using procedures outlined in Soil Conservation Service Technical Release-17. The damaging sediment consists of small areas of infertile sandy overwash deposited over the original soil as water leaves the channel during high flood stage. The damage is severe over small areas adjacent to the main channel. Damaged areas mapped on large scale aerial photographs totaled approximately 83 acres. The study also indicated that approximately 250 acres would be damaged in the future without project. A negligible amount of flood plain scour occurs.

Geologic investigations of proposed dam sites were conducted in accordance with procedures outlined in the National Engineering Handbook, Section 8. Power drilling equipment was used in each of the 8 site investigations.

Mississippian and Pennsylvanian shale, calcareous shale, limestone, and argillaceous limestone generally outcrop in the lower abutment areas. Locally, differential weathering has produced a highly permeable fractured zone extending 5 to 10 feet into the outcrops. The unweathered rock has a high bearing strength and low permeability. Kansan or Illinoian till

consisting of stiff silty to sandy clay overlies bedrock in the upper abutment areas. A few thin lentils of sand were encountered in the till and at the till-rock interface but are not expected to present any significant leakage problems. The valley bottoms contain 10 to 20 feet of alluvium consisting of sand, silt, and gravel of varying permeability and bearing strength overlying either till or bedrock similar to that in the abutments. Relatively small amounts of emergency spillway rock excavation were indicated for a few of the sites. There are adequate supplies of suitable borrow material consisting of till and weathered loess located adjacent to the sites. The geologic investigations indicate that no severe conditions exist at the proposed sites which would prohibit the construction of effective compacted earth fill dams at reasonable cost.

Economics

Land Use and Land Treatment

Watershed land use and estimated land treatment costs were based on the findings of a land treatment needs sample study of the watershed area. This study was conducted by the state resource conservationist, watershed planning staff geologist, and the area and district conservationists.

Floodwater Damages - Crop and Pasture

Flood plain land use was estimated on the basis of field observations, study of aerial photos, and farmer interviews. Flood-free yields were based on information from farmer interviews and yield projections. Projected flood-free crop yields are estimated as follows:

	<u>Without Project</u>	<u>With Project</u>
Corn	115 bu.	130 bu.
Soybeans	36 bu.	40 bu.
Pasture	125 A.U.D.	150 A.U.D.

Land use varies between groups of designated hydrologic reaches. These reaches were combined into economic reaches to facilitate damage evaluation studies.

Crop and pasture damages were calculated with a computer. Input data used consist of the following:

(1) Crop damage values

- Monthly percentage distribution of damaging storms
- Crop yields and gross crop values
- Monthly damage - percentage of gross crop value damaged by month and by depth and duration of flooding
- Crop damage values - $a \times b \times c$

- (2) Acreage flooded by frequency, depth, and duration as previously determined from valley cross section rating curves and watershed flood routings.
- (3) Percentage of each crop by reach.

Output data include damage by frequency, average annual acres flooded, percentage of composite acre value damaged, and unadjusted average annual damages. Damages were adjusted downward approximately 16 percent to discount for recurrent flooding. Adjusted average annual damages are estimated to be 28.8 percent of gross composite acre value for without project conditions.

Floodwater Damage - Other Agricultural

Fence repair costs and debris removal are the major damage items. Fence damages were estimated to be equivalent to 100 percent of normal fence depreciation and repair costs, or about \$.60 per acre, annually.

Debris removal costs, based on costs for labor and machinery, are estimated to be \$.85 per acre. Average annual damages for without-project conditions were determined by multiplying the \$1.45 damage per acre by the acreages flooded for each of the evaluation floods. Reduction in average annual damages was estimated to be equal to the reduction in average annual acres flooded.

Floodwater Damage - Road and Bridge

Road damages consist mainly of costs for replacing gravel, grading, and cleaning out road ditches. Costs for additional maintenance caused by flooding are estimated to average \$690 per mile. Damages for with- and without-project conditions were based on the difference in average annual acres flooded.

Savings will result from the replacement of 5 existing bridges with less costly structures under with-project conditions. Savings in individual bridge construction costs were discounted to reflect the projected date of replacement and amortized to an annual cost. Estimated savings total \$3,500 annually.

Further savings will accrue from the use of 3 structure fills as road beds and/or bridges. The structures in question are structures 4A, 6, and 7. Estimated average annual benefits are \$1,200.

Sediment Damage

A field study was made with the watershed planning staff geologist to estimate the extent and magnitude of damage from infertile overwash.

Hand auger borings were made to determine the depth of damaging sediments; the areas subject to damage were delineated on aerial photos.

A summary of these findings is listed as follows:

<u>Area Damaged</u> (Acres)	<u>Present Damage</u> (Percentage)	<u>With Project</u>	
		<u>Recovery Period</u> (Years)	<u>Damage Remaining</u> (Percentage)
1.5	15	5	--
26.2	20	5	--
24.2	40	10	10
24.6	80	20	30
6.7	100	25	40
<u>83.2</u>			

Continued deposition of overwash in these areas will result in average annual damages of \$4.14 per acre.

An additional 250 acres was estimated to be subject to future sediment damage. Average annual damages were estimated to be \$5.04 per acre.

Damages with project will be reduced by approximately 80 percent.

Indirect Damages

Indirect damages are estimated to be 10 percent of agricultural damages and 20 percent of road and bridge damages. Reduction of indirect damages is proportionate to reduction of direct damage.

More Intensive Land Use Benefits

Approximately 4,330 acres of cropland and within the 2-year frequency flood plain will receive protection from flooding. An estimated 80 percent of this area, or 3,470 acres, will benefit from more intensive cultivation and increased crop yields.

Gross benefits will total \$10.94 per acre. Associated costs and induced damages totaling \$3.87 were deducted to obtain net benefits of \$7.07 per acre. Net benefits, discounted to reflect a 10-year lag in accrual, are \$5.75 per acre.

Net average annual benefits total \$19,900. About 50 percent, or \$10,000, is credited to Lower McKee Creek Watershed.

Changed Land Use Benefits

An estimated 250 acres of woodland and idle areas within the 5-year frequency flood plain of Upper and Lower McKee Creek Watersheds will be

protected from flooding. About 80 percent of this area, or 200 acres, will shift to cultivation.

Gross benefits will total \$82.34 per acre. Associated costs for random surface drainage, land clearing, present and future timber harvests, and induced damages totaling \$34.30 were deducted to obtain a net benefit of \$48.04 per acre. Net benefits, discounted to reflect a 10-year lag in accrual, are \$39.05 per acre.

Net average annual benefits total \$7,800. An estimated 50 percent (\$3,900) of this benefit is credited to Lower McKee Creek Watershed.

Municipal Water Supply

Average annual benefits were considered equivalent to average annual costs for the locally financed installation and maintenance of a well and transmission line.

Amortized installation costs are \$25,200; average annual maintenance costs are \$23,500. Average annual benefits equal average annual costs, or \$48,700.

Recreation

Estimates of past, present, and projected population were based on a review of U. S. Census data. Population estimates for the net zone of influence within a 50-mile radius of the watershed are as follows:

<u>Year</u>	<u>Population</u>
1960	354,200
1968	364,500
1980	379,600
2000	405,100

Potential annual attendance at multiple-purpose structures 4A and 8 is estimated to be 253,000 visitor days. This will result in a 60 percent use of the designed capacity of the recreation facilities.

A value of \$1.50 per visitor day was used to evaluate recreation benefits. Projected benefits were discounted to reflect a 10-year lag in accrual; average annual benefits are estimated to be \$308,900.

Secondary Benefits

Secondary benefits were evaluated on the basis of procedure outlined in Watershed Memorandum SCS-57. Average annual benefits total \$61,700 and consist of (1) 10 percent of primary benefits and (2) 10 percent of increased costs.

Prices and Interest Rates

Project installation costs were based on current unit costs and were amortized at 4-7/8 percent interest over the 100-year evaluation period; project benefits were also discounted at this rate to reflect lag in accrual. Associated costs were amortized at 6 percent interest over the expected useful life of the facility.

Project benefits were based on adjusted normalized prices as listed in "Interim Price Standards for Planning and Evaluating Land and Water Resources," dated April 1966.

Forestry

A Forest Land Plan was developed by the Illinois Department of Conservation, Division of Forestry, and the U. S. Forest Service, Northeastern Area, State and Private Forestry. The basic contents of this plan have been included in the overall watershed work plan.

Information on the hydrologic condition of the forest land within the watershed and the reasons for the present hydrologic condition were obtained from a series of systematically selected field plots. These data collected included measurements of litter and humus layers; determination of soil type and other hydrologic factors; and recording the presence or absence of disturbance factors such as fire, grazing, cutting, logging, and the abnormal infestation of insects or diseases which might adversely affect hydrologic condition or increase the fire hazard. This information served as the basis for developing precipitation-runoff curve numbers and land treatment needs for forest land.

Forest fire protection is provided by local fire departments on a fee basis. Field plot data indicate the average annual burn to be within the watershed fire loss index goal of 0.2 percent of the total forest area. No increase in fire occurrence or area burned is expected as a result of the watershed project.

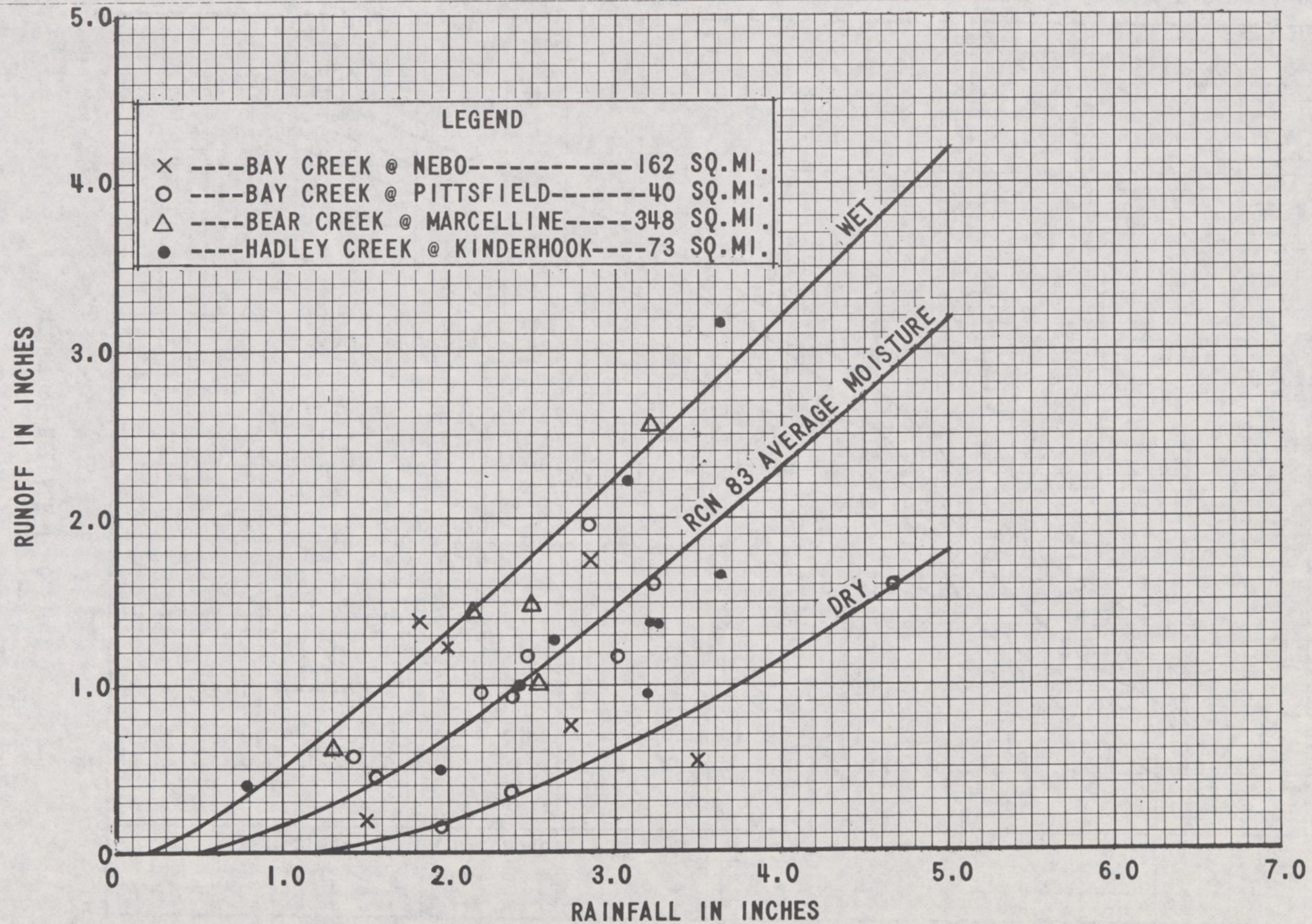
Fish and Wildlife

The following reports "Inventory of the Fishes of Nine River Basins in Illinois," 1967; "Special Fisheries Report Number 25," April 1968; and a special letter report by the Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, provided information on recommendations for improving fish and wildlife conditions in the watershed. These findings were concurred in by the Illinois Department of Conservation, Division of Game and Fish.

The reports concluded that the project will have no significant adverse effects on resident fish and wildlife. Loss prevention measures will not be required.

The project presents opportunities to improve fish and wildlife populations. Recommendations provided by the Illinois Department of Conservation Watershed-River Basin Development Adviser and the Soil Conservation Service biologist have been included in the overall plan.

RAINFALL vs. RUNOFF FOR FOUR ILLINOIS WATERSHEDS USING TWO DAY RAINFALL DURATIONS*

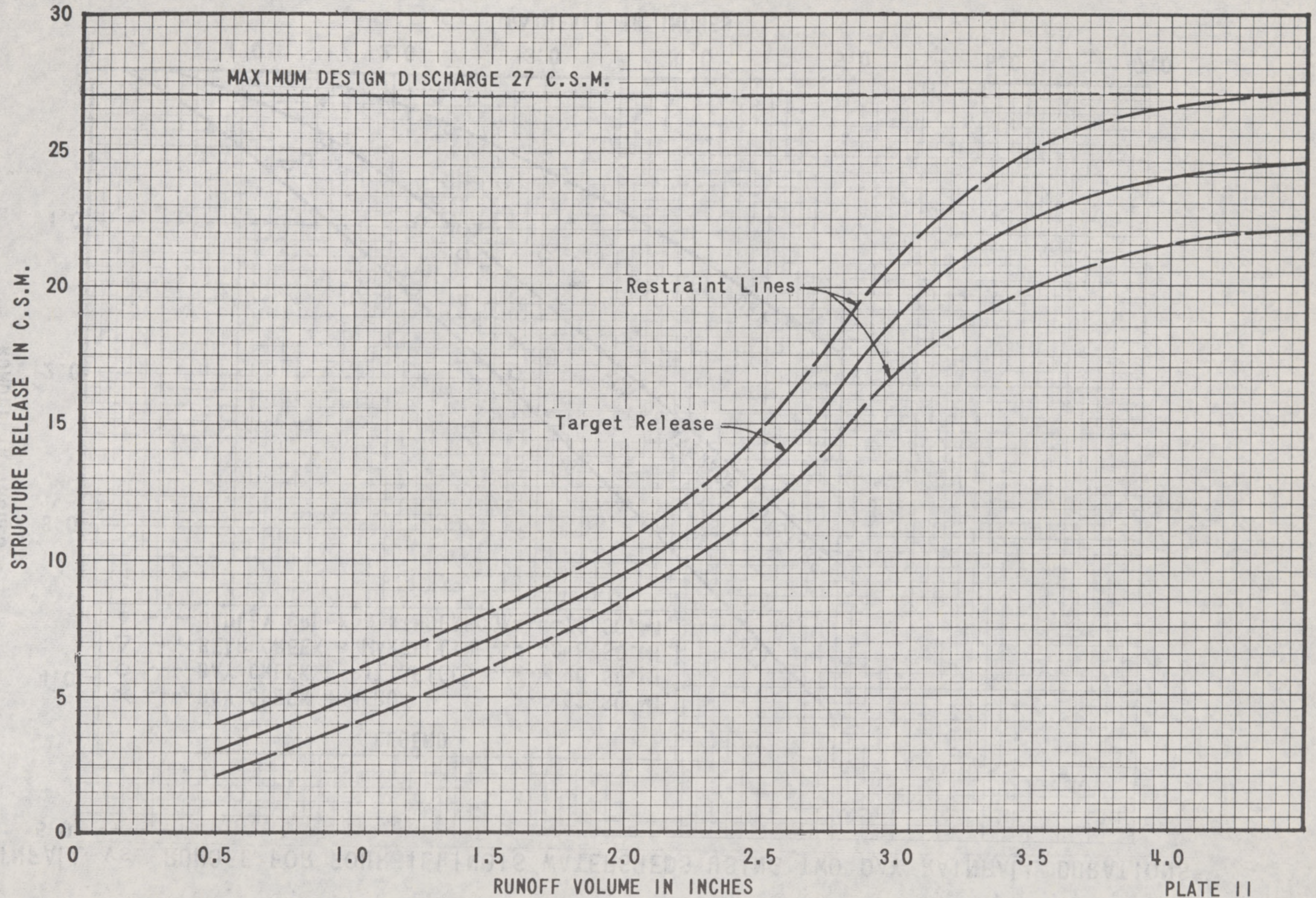


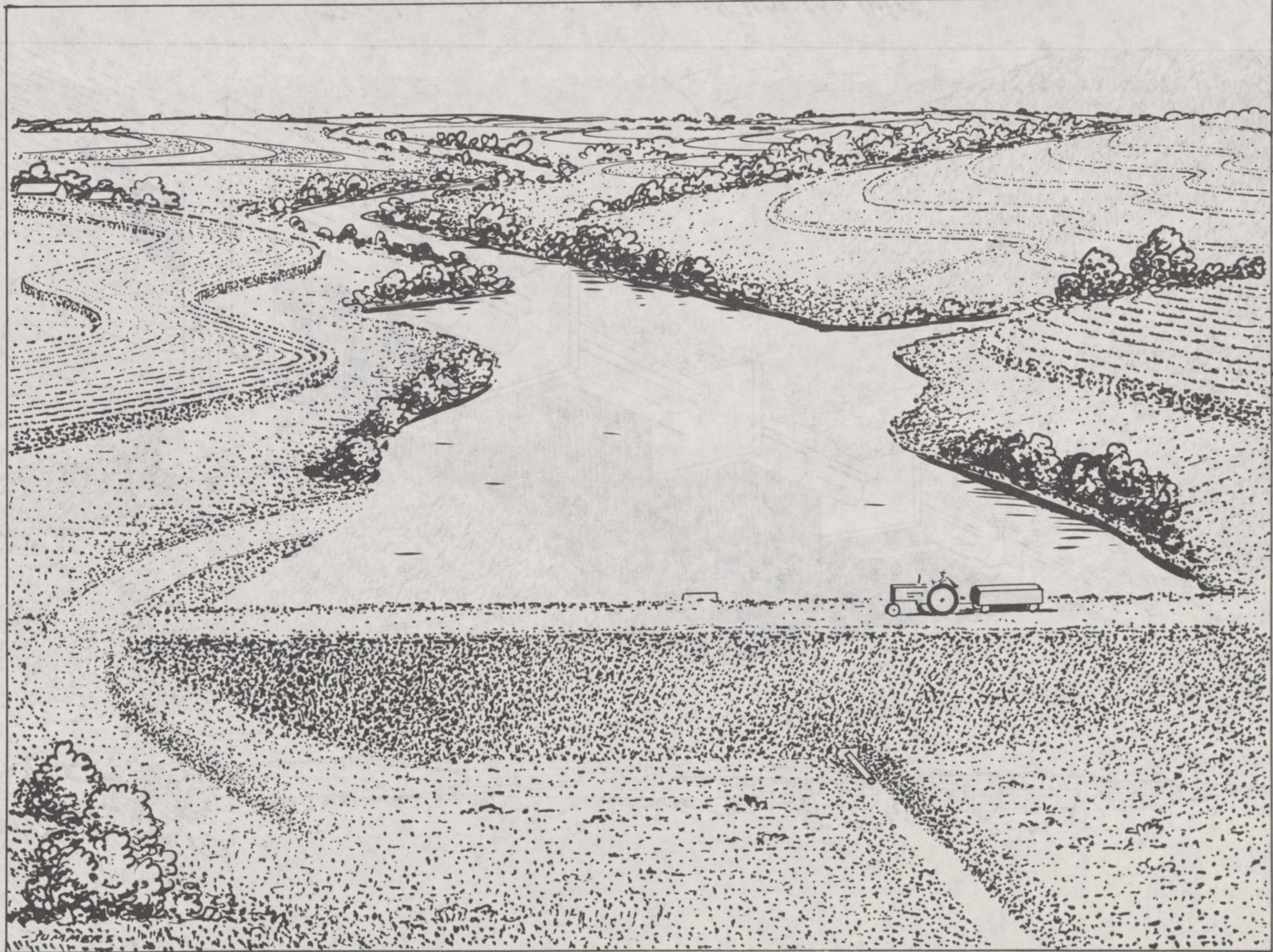
*SOURCE: USGS WATER SUPPLY PAPER 1813

PLATE I

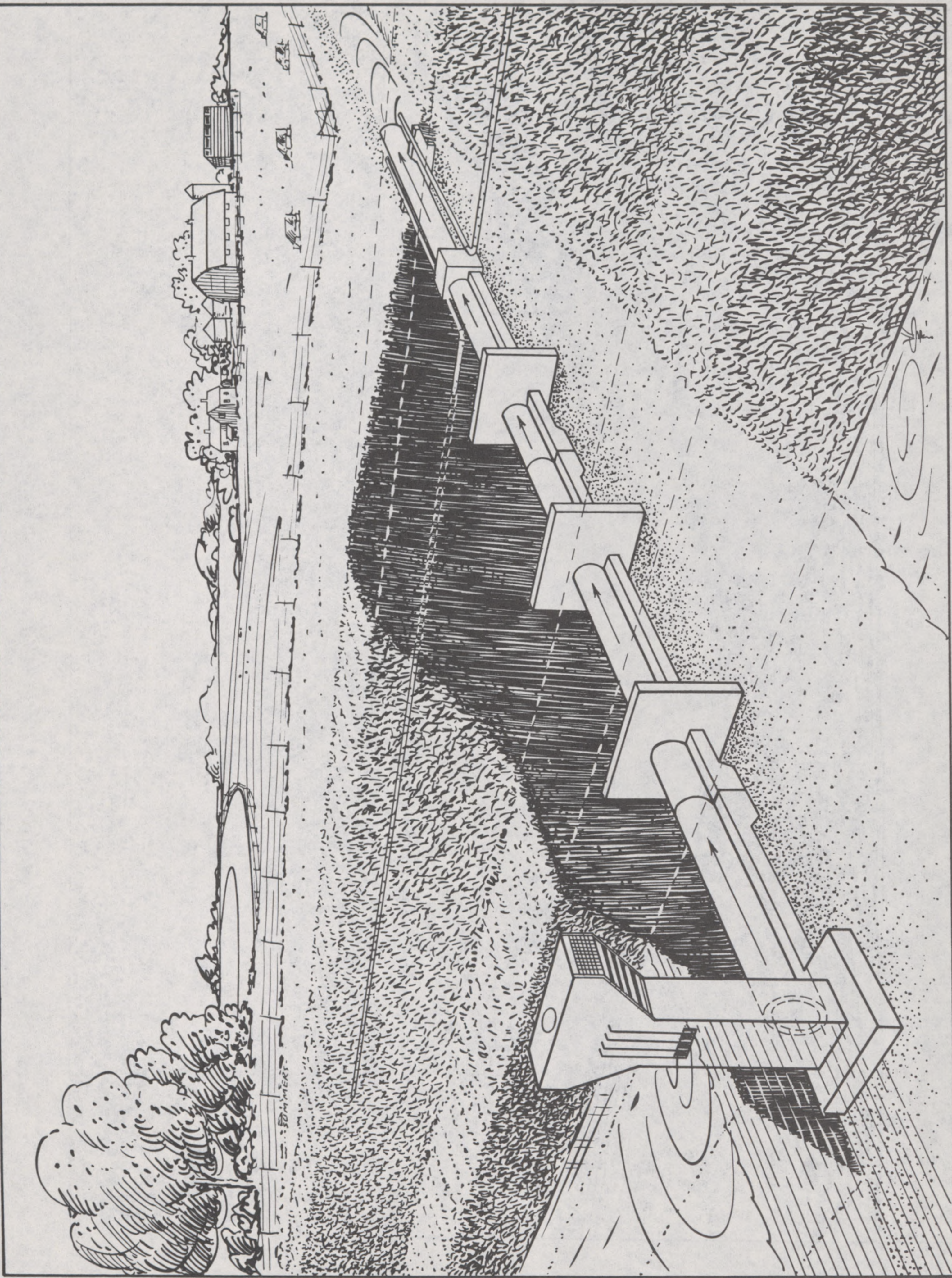
McKEE CREEK

RUNOFF vs. RELEASE TO BE USED IN STRUCTURE DESIGN

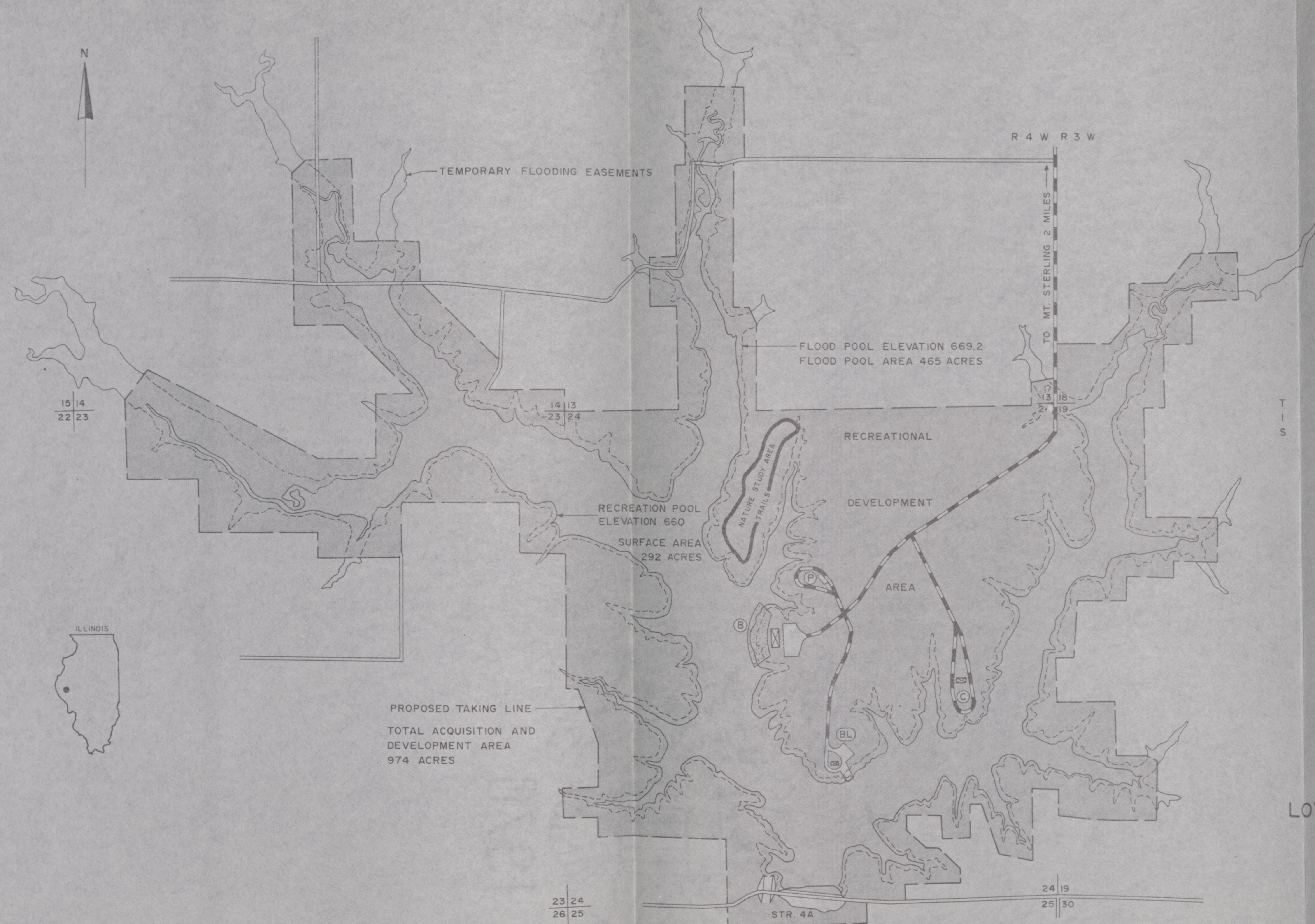




Floodwater retarding and storage reservoir



Reinforced concrete pipe with flat top inlet.



POPULATION CENTERS AND HIGHWAYS
WITHIN 50 MILE RADIUS

SCALE 10 0 10 20 30 MILES

LEGEND

- EXISTINGS ROAD
- PROPOSED PROJECT ROAD
- PROPOSED CAMPING AREA (C)
- PROPOSED PICNIC AREA (P)
- PROPOSED BEACH AND BATH HOUSE (B)
- BOAT LAUNCH AREA (BL)

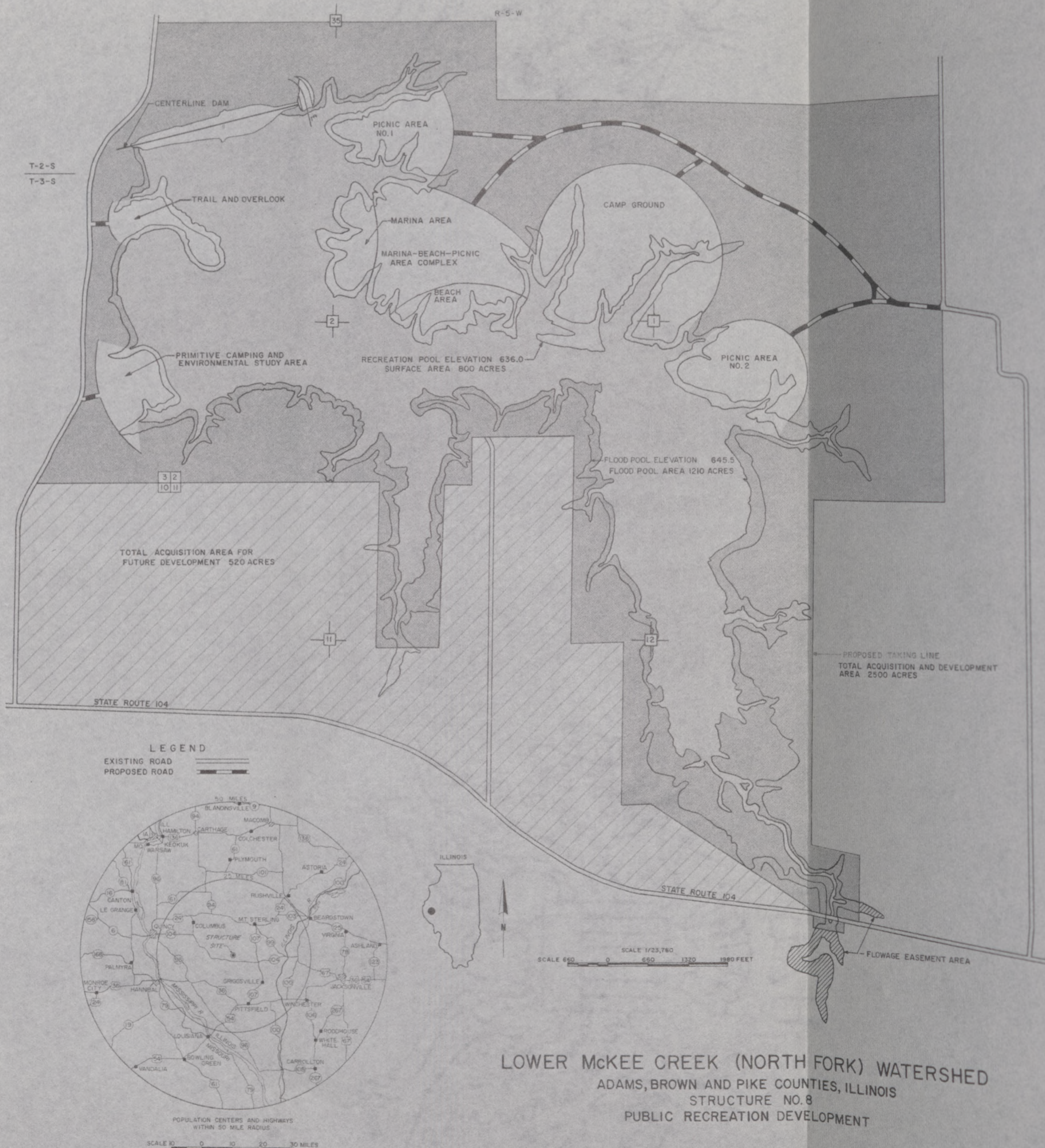
LOWER MCKEE CREEK (NORTH FORK) WATERSHED
ADAMS, BROWN, & PIKE COUNTIES, ILLINOIS
STRUCTURE 4A
PUBLIC RECREATION DEVELOPMENT

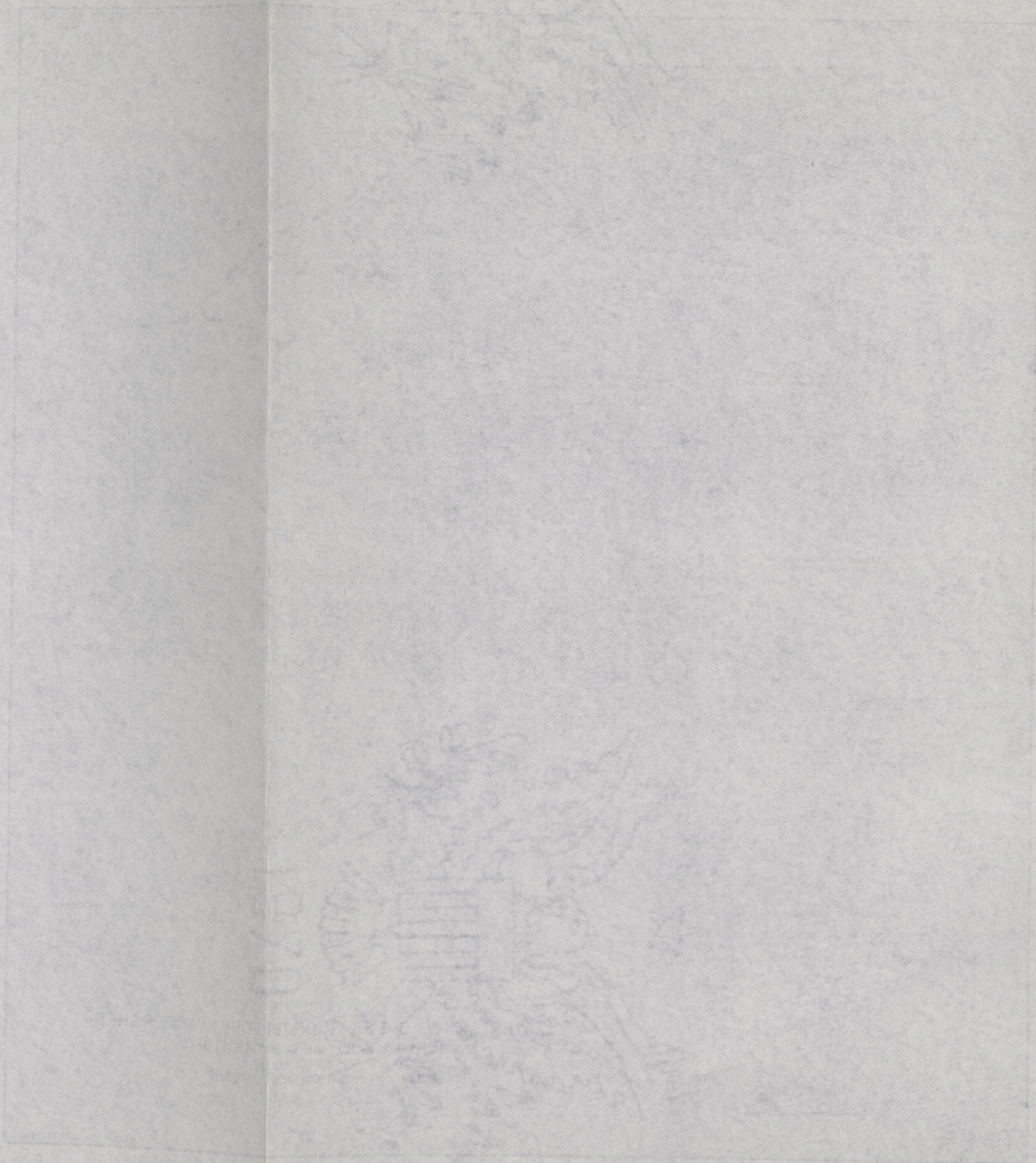
SOURCE:
MAPS FURNISHED BY SCS FIELD TECHNICIANS,
MAP PROJECTION NOT SPECIFIED.

USDA-SCS-LINCOLN NEBR 1970

SCALE 1/13,500
SCALE 1000 0 1000 2000 FEET

1-9-70
5,5-27824



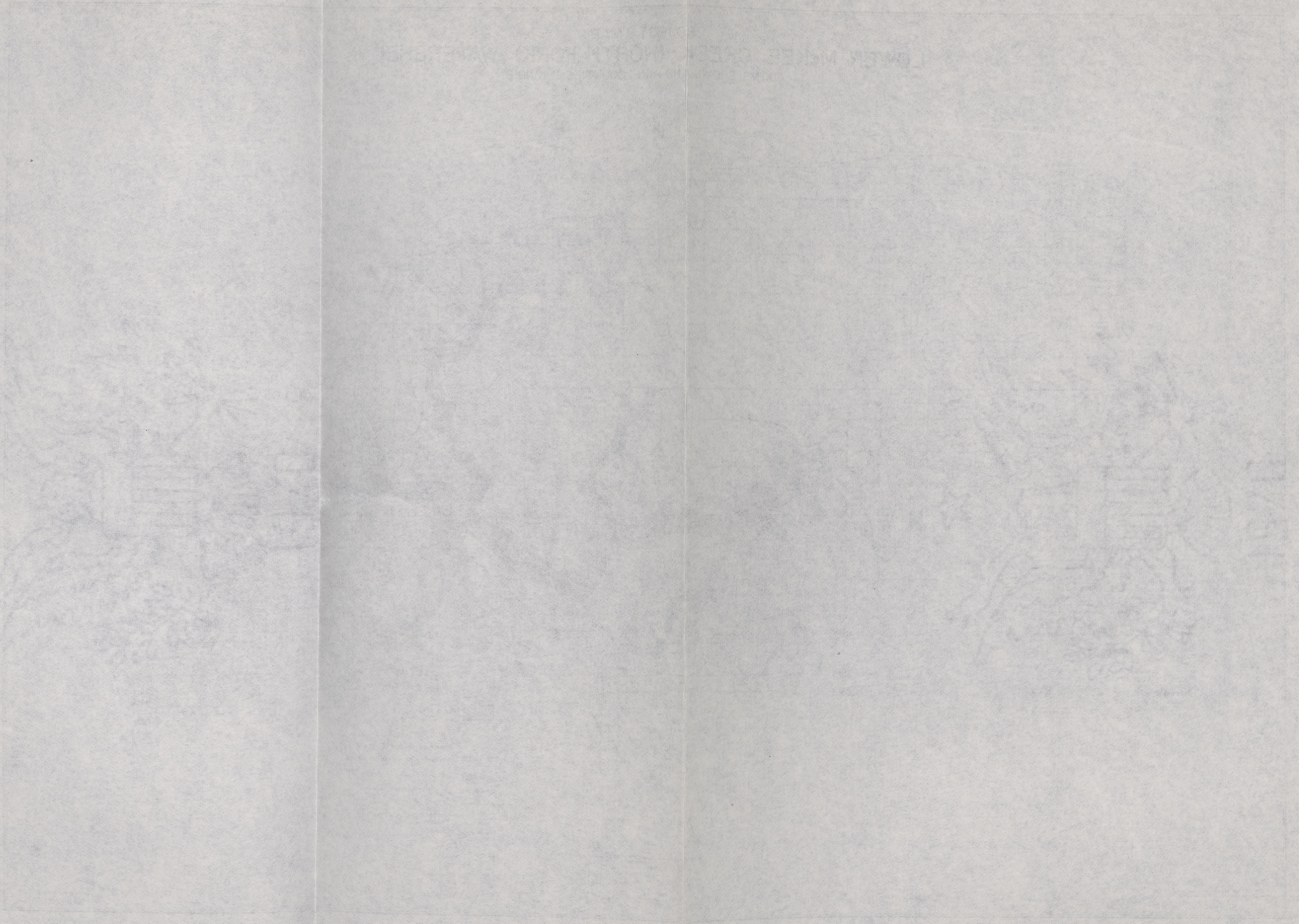


PROJECT MAP
LOWER MCKEE CREEK (NORTH FORK) WATERSHED
ADAMS, BROWN AND PIKE COUNTIES, ILLINOIS



SOURCE:
SCS BASE 3,5-46,803 AND DATA
FURNISHED BY FIELD TECHNICIANS

3-18-70
5,5-28,010



ADDENDUM

Lower McKee Creek (North Fork) Watershed, Illinois

This Addendum shows the project costs, benefits, and benefit-cost ratio based on a 5-1/8 percent interest rate. Annual project costs, benefits, and benefit-cost ratio are as follows:

- | | |
|--------------------------------------|------------------|
| 1. Project costs are | <u>\$371,300</u> |
| 2. Project benefits are | <u>555,200</u> |
| 3. The project benefit-cost ratio is | <u>1.5 to 1</u> |

9/29/70

APPENDIX

Lower House (North) - Estimated	
The following shows the project costs, benefits, and	
benefit-cost ratio based on a 5% discount rate.	
Annual project costs, benefits, and benefit-cost ratio are	
as follows:	
1. Project costs are	15,000
2. Project benefits are	850,000
3. The project benefit-cost ratio is	57 to 1

